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Contents

1.1 kingpin 2.2.6

1.1.1 Available under license

1.2 template v0.0.0-20190718012654-fb15b899a751

1.2.1 Available under license

1.3 githubcommodernngoconcurrent v0.0.0-20180306012644-bacd9c7ef1dd

1.3.1 Available under license

1.4 gopkg-in-alecthomas-kingpin-v2 v2.2.6

1.4.1 Available under license

1.5 githubcomghodssyaml v1.0.1-0.20190212211648-25d852aeb32

1.5.1 Available under license

1.6 kelseyhightower-envconfig v1.4.0

1.6.1 Available under license

1.7 golang-protobuf v1.0.2-0.20181231171920-c182affec369

1.7.1 Available under license

1.8 goautoneg v0.0.0-20191010083416-a7dc8b61c822

1.8.1 Available under license

1.9 run v1.1.0

1.9.1 Available under license

1.10 clientmodel v0.2.0

1.10.1 Available under license

1.11 gopkg-in-yaml-v2 v2.4.0

1.11.1 Available under license

1.12 gopkgin v0.9.1

1.12.1 Available under license

1.13 bytebufferpool v1.0.0

1.13.1 Available under license

1.14 groupcache v0.0.0-20210331224755-41bb18bfe9da

1.14.1 Available under license

1.15 go-version v1.3.0

1.15.1 Available under license

1.16 gogo-protobuf v1.3.2

1.16.1 Available under license

1.17 errors v0.9.1

1.17.1 Available under license

1.18 perks v1.0.1

1.18.1 Available under license

1.19 jsonpatch v2.2.0

1.19.1 Available under license

1.20 xxhash v2.1.2

1.20.1 Available under license

1.21 perks 1.0.1

1.21.1 Available under license

1.22 oklog-run 1.1.0

1.22.1 Available under license

1.23 go_serialization_benchmarks 2.2.6

1.23.1 Available under license

1.24 parse 0.0.0-20190718012654-fb15b899a751

1.24.1 Available under license

1.25 prometheus-procfs 0.7.3

1.25.1 Available under license

1.26 golang 1.12.7

1.26.1 Available under license

1.27 busybox 1.34.1

1.27.1 Available under license

1.28 quicktemplate v1.7.0

1.28.1 Available under license

1.29 logfmt v0.5.1

1.29.1 Available under license

1.30 githubcomgooglegofuzz v1.2.0

1.30.1 Available under license

1.31 procfs v0.7.3

1.31.1 Available under license

1.32 githubcommailrueasyjson v0.7.7

1.32.1 Available under license

1.33 sigs-k8s-io-yaml v1.3.0

- 1.33.1 Available under license
- 1.34 go-uber-org-zap v1.21.0**
 - 1.34.1 Available under license
- 1.35 fastrand v1.1.0**
 - 1.35.1 Available under license
- 1.36 histogram v1.2.0**
 - 1.36.1 Available under license
- 1.37 jsonpatch v5.6.0+incompatible**
 - 1.37.1 Available under license
- 1.38 deep v1.0.7**
 - 1.38.1 Available under license
- 1.39 protobuf v1.28.0**
 - 1.39.1 Available under license
- 1.40 fsnotify 1.5.4**
 - 1.40.1 Available under license
- 1.41 golang-protobuf v1.3.2**
 - 1.41.1 Available under license
- 1.42 ./api (devel)**
 - 1.42.1 Available under license
- 1.43 yaml v3.0.1**
 - 1.43.1 Available under license
- 1.44 githubcomfsnotifyfsnotify v1.5.4**
 - 1.44.1 Available under license
- 1.45 go-kit-log 0.2.1**
 - 1.45.1 Available under license
- 1.46 github.com/victoriametrics/operator (devel)**
 - 1.46.1 Available under license
- 1.47 golang 1.18.4**
 - 1.47.1 Available under license
- 1.48 go-spew v1.1.2-0.20180830191138-d8f796af33cc**
 - 1.48.1 Available under license
- 1.49 x-sys 0.0.0-20220712014510-0a85c31ab51e**
 - 1.49.1 Available under license
- 1.50 prometheus-common 0.37.0**
 - 1.50.1 Available under license
- 1.51 githubcomgoopenapijsonreference v0.20.0**
 - 1.51.1 Available under license
- 1.52 prometheus-client v1.12.2**
 - 1.52.1 Available under license

1.53 prometheus-operator (devel)

1.53.1 Available under license

1.54 githubcomgoopenapiswag v0.22.3

1.54.1 Available under license

1.55 common v0.37.0

1.55.1 Available under license

1.56 jsonpatch v5.6.0

1.56.1 Available under license

1.57 google-go-cmp v0.5.9

1.57.1 Available under license

1.58 structured-merge-diff v4.2.3

1.58.1 Available under license

1.59 sigs.k8s.io/json v0.0.0-20220713155537-f223a00ba0e2

1.59.1 Available under license

1.60 thanos 0.27.0

1.60.1 Available under license

1.61 x-sys v0.0.0-20220712014510-0a85c31ab51e

1.61.1 Available under license

1.62 klog v2.80.1

1.62.1 Available under license

1.63 zapr v1.2.3

1.63.1 Available under license

1.64 prometheus-client 0.2.0

1.64.1 Available under license

1.65 github.com/google/gnostic v0.6.9

1.65.1 Available under license

1.66 githubcomfsnotifyfsnotify v1.6.0

1.66.1 Available under license

1.67 fasttemplate v1.2.2

1.67.1 Available under license

1.68 x-time v0.3.0

1.68.1 Available under license

1.69 fastjson v1.6.4

1.69.1 Available under license

1.70 googlecloudgocomputemetadata v0.2.3

1.70.1 Available under license

1.71 thanos v0.27.0

1.71.1 Available under license

1.72 units v0.0.0-20211218093645-b94a6e3cc137

- 1.72.1 Available under license
- 1.73 github.com/go-kit/log v0.2.1**
 - 1.73.1 Available under license
- 1.74 github.com/bmatcuk/doublestar/v4 v4.6.0**
 - 1.74.1 Available under license
- 1.75 github.com/golang/protobuf v1.5.3**
 - 1.75.1 Available under license
- 1.76 [prometheus-operator-prometheus-operator](#) v0.58.0**
 - 1.76.1 Available under license
- 1.77 [k8s-io-api](#) v0.25.6**
 - 1.77.1 Available under license
- 1.78 [controller-runtime](#) v0.13.1**
 - 1.78.1 Available under license
- 1.79 [go-restful](#) v3.10.0**
 - 1.79.1 Available under license
- 1.80 [component-base](#) v0.25.4**
 - 1.80.1 Available under license
- 1.81 [k8s-io-client-go](#) v0.25.6**
 - 1.81.1 Available under license
- 1.82 [utils](#) v0.0.0-20221108210102-8e77b1f39fe2**
 - 1.82.1 Available under license
- 1.83 [prometheus-operator](#) v0.62.0**
 - 1.83.1 Available under license
- 1.84 [k8s-io-apimachinery](#) v0.25.6**
 - 1.84.1 Available under license
- 1.85 [k8s-io-apiextensions-apiserver](#) v0.25.4**
 - 1.85.1 Available under license
- 1.86 [k8s-io-kube-openapi](#) v0.0.0-2022110221610-a28e98eb7c70**
 - 1.86.1 Available under license
- 1.87 [fasthttp](#) v1.2.0**
 - 1.87.1 Available under license
- 1.88 [logr](#) v1.2.4**
 - 1.88.1 Available under license
- 1.89 [libc-utils](#) 0.7.2-r5**
 - 1.89.1 Available under license
- 1.90 [alpine-baselayout-data](#) 3.4.3-r1**
 - 1.90.1 Available under license
- 1.91 [scanelf](#) 1.3.7-r1**
 - 1.91.1 Available under license

1.92 go-uber-org-atomic v1.11.0

1.92.1 Available under license

1.93 protobuf v1.31.0

1.93.1 Available under license

1.94 ssl-client 1.36.1-r2

1.94.1 Available under license

1.95 libssl3 3.1.2-r0

1.95.1 Available under license

1.96 libcrypto3 3.1.2-r0

1.96.1 Available under license

1.97 go-uber-org-multierr v1.11.0

1.97.1 Available under license

1.98 common v0.44.0

1.98.1 Available under license

1.99 x-sync v0.3.0

1.99.1 Available under license

1.100 metrics v1.24.0

1.100.1 Available under license

1.101 githubcomgolangprotobuf v1.5.2

1.101.1 Available under license

1.102 githubcomimdatomergo v0.3.13

1.102.1 Available under license

1.103 json iterator go v1.1.12

1.103.1 Available under license

1.104 githubcommodernngoreflex2 v1.0.2

1.104.1 Available under license

1.105 githubcomgoopenapijsonpointer v0.19.5

1.105.1 Available under license

1.106 spf13-pflag v1.0.5

1.106.1 Available under license

1.107 intern v1.0.0

1.107.1 Available under license

1.108 uuid v1.3.1

1.108.1 Available under license

1.109 golang-protobuf-extensions v1.0.4

1.109.1 Available under license

1.110 x-text v0.13.0

1.110.1 Available under license

1.111 x-sys v0.12.0

1.111.1 Available under license

1.112 term v0.12.0

1.112.1 Available under license

1.113 busybox 1.31.0

1.113.1 Available under license

1.114 x-net v0.15.0

1.114.1 Available under license

1.115 compress v1.17.0

1.115.1 Available under license

1.116 prometheus-client v1.17.0

1.116.1 Available under license

1.117 musl-utils 1.2.4-r1

1.117.1 Available under license

1.118 clientmodel v0.4.1-0.20230718164431-9a2bf3000d16

1.118.1 Available under license

1.119 procfs v0.12.0

1.119.1 Available under license

1.120 logfmt 0.5.1

1.120.1 Available under license

1.121 spew 1.1.2-0.20180830191138-d8f796af33cc

1.121.1 Available under license

1.122 ca-certificates-bundle 20230506-r0

1.122.1 Available under license

1.123 xxhash v2.2.0

1.123.1 Available under license

1.124 stdlib go1.20.11

1.124.1 Available under license

1.125 gofuzz 1.2.0

1.125.1 Available under license

1.126 xxhash 2.1.2

1.126.1 Available under license

1.127 perks 1.0.1

1.127.1 Available under license

1.128 protobuf 1.28.0

1.128.1 Available under license

1.129 goprotobuf 1.5.2

1.129.1 Available under license

1.130 units 0.0.0-20211218093645-b94a6e3cc137

1.130.1 Available under license

1.131 x-oauth2 v0.12.0

1.131.1 Available under license

1.132 errors 0.9.1

1.132.1 Available under license

1.133 metricsql v0.66.0

1.133.1 Available under license

1.134 protobuf-go 1.31.0

1.134.1 Available under license

1.135 bytebufferpool 1.0.0

1.135.1 Available under license

1.136 goautoneg 0.0.0-20191010083416-a7dc8b61c822

1.136.1 Available under license

1.137 intern 1.0.0

1.137.1 Available under license

1.138 structured-merge-diff 4.2.3

1.138.1 Available under license

1.139 go-openapi-jsonpointer 0.19.5

1.139.1 Available under license

1.140 prometheus-client 1.17.0

1.140.1 Available under license

1.141 kube-openapi 0.0.0-20221110221610-a28e98eb7c70

1.141.1 Available under license

1.142 dario-mergo 0.3.13

1.142.1 Available under license

1.143 jsonpatch 5.6.0+incompatible

1.143.1 Available under license

1.144 go.uber.org/atomic 1.11.0

1.144.1 Available under license

1.145 kubernetes-klog 2.80.1

1.145.1 Available under license

1.146 fsnotify 1.4.7

1.146.1 Available under license

1.147 spf13-pflag 1.0.5

1.147.1 Available under license

1.148 doublestar 4.6.0

1.148.1 Available under license

1.149 easyjson 0.7.7

1.149.1 Available under license

1.150 groupcache 0.0.0-20210331224755-41bb18bfe9da

1.150.1 Available under license

1.151 pax-utils 1.3.7-r1

1.151.1 Available under license

1.152 fastrand 1.1.0

1.152.1 Available under license

1.153 alpine-keys 2.4-r1

1.153.1 Available under license

1.154 gnostic 0.6.9

1.154.1 Available under license

1.155 json-iterator-go 1.1.12

1.155.1 Available under license

1.156 prometheus-client 1.0.0

1.156.1 Available under license

1.157 procfs 0.0.2

1.157.1 Available under license

1.158 logr 1.2.4

1.158.1 Available under license

1.159 jsonpatch 2.2.0

1.159.1 Available under license

1.160 inf 0.9.1

1.160.1 Available under license

1.161 kubernetes-api 0.25.6

1.161.1 Available under license

1.162 apk-tools 2.14.0-r2

1.162.1 Available under license

1.163 x-net 0.15.0

1.163.1 Available under license

1.164 modern-go-concurrent 0.0.0-20180306012644-bacd9c7ef1dd

1.164.1 Available under license

1.165 zlib 1.2.13-r1

1.165.1 Available under license

1.166 musl 1.2.4-r1

1.166.1 Available under license

1.167 apimachinery 0.25.6

1.167.1 Available under license

1.168 swag 0.22.3

1.168.1 Available under license

1.169 hashicorp-go-version 1.3.0

1.169.1 Available under license

1.170 ca-certificates 20230506-r0
1.170.1 Available under license

1.171 x-sync 0.3.0
1.171.1 Available under license

1.172 perks 1.0.0
1.172.1 Available under license

1.173 x-sys 0.0.0-20190621062556-bf70e4678053
1.173.1 Available under license

1.174 fastjson 1.6.4
1.174.1 Available under license

1.175 google-uuid 1.3.1
1.175.1 Available under license

1.176 fasthttp 1.2.0
1.176.1 Available under license

1.177 kelseyhightower-envconfig 1.4.0
1.177.1 Available under license

1.178 xxhash 2.2.0
1.178.1 Available under license

1.179 jsonreference 0.20.0
1.179.1 Available under license

1.180 busybox 1.36.1-r2
1.180.1 Available under license

1.181 openssl 3.1.2-r0
1.181.1 Available under license

1.182 zapr 1.2.3
1.182.1 Available under license

1.183 reflect2 1.0.2
1.183.1 Available under license

1.184 procfs 0.12.0
1.184.1 Available under license

1.185 json 0.0.0-20220713155537-f223a00ba0e2
1.185.1 Available under license

1.186 google-go-cmp 0.5.9
1.186.1 Available under license

1.187 deep 1.0.7
1.187.1 Available under license

1.188 go-compute-metadata 0.2.3
1.188.1 Available under license

1.189 fasttemplate 1.2.2

- 1.189.1 Available under license
- 1.190 quicktemplate 1.7.0**
 - 1.190.1 Available under license
- 1.191 zap 1.21.0**
 - 1.191.1 Available under license
- 1.192 x-term 0.12.0**
 - 1.192.1 Available under license
- 1.193 prometheus-common 0.44.0**
 - 1.193.1 Available under license
- 1.194 victoriametrics-fasthttp 1.2.0**
 - 1.194.1 Available under license
- 1.195 component-base 0.25.4**
 - 1.195.1 Available under license
- 1.196 x-time-rate 0.3.0**
 - 1.196.1 Available under license
- 1.197 jimidyson-configmap-reload v0.3.0**
 - 1.197.1 Available under license
- 1.198 kubernetes-yaml 1.3.0**
 - 1.198.1 Available under license
- 1.199 tre 0.8.0**
 - 1.199.1 Available under license
- 1.200 fsnotify 1.6.0**
 - 1.200.1 Available under license
- 1.201 multierr 1.11.0**
 - 1.201.1 Available under license
- 1.202 protobuf 1.3.1**
 - 1.202.1 Available under license
- 1.203 golang-protobuf-extensions 1.0.4**
 - 1.203.1 Available under license
- 1.204 go-restful 3.10.0**
 - 1.204.1 Available under license
- 1.205 prometheus-client-model 0.4.1-0.20230718164431-9a2bf3000d16**
 - 1.205.1 Available under license
- 1.206 zap-exp 1.21.0**
 - 1.206.1 Available under license
- 1.207 prometheus-client-model 0.0.0-20190129233127-fd36f4220a90**
 - 1.207.1 Available under license
- 1.208 alpine-baselayout 3.4.3-r1**
 - 1.208.1 Available under license

1.209 valyala-histogram 1.2.0

1.209.1 Available under license

1.210 kubernetes-client 0.25.6

1.210.1 Available under license

1.211 prometheus-common 0.4.1

1.211.1 Available under license

1.212 x-oauth2 0.12.0

1.212.1 Available under license

1.213 ghodss-yaml 1.0.1-0.20190212211648-25d852aebe32

1.213.1 Available under license

1.214 gogo-protobuf 1.3.2

1.214.1 Available under license

1.215 controller-runtime 0.13.1

1.215.1 Available under license

1.216 x-sys 0.12.0

1.216.1 Available under license

1.217 klauspost-compress 1.17.0

1.217.1 Available under license

1.218 victoriametrics-metrics 1.24.0

1.218.1 Available under license

1.219 protobuf 1.5.3

1.219.1 Available under license

1.220 x-text 0.13.0

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1.1 kingpin 2.2.6

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1.5 githubcomghodssyami v1.0.1-0.20190212211648-25d852aebe32

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1.8 goautoneg v0.0.0-20191010083416-a7dc8b61c822

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1.9 run v1.1.0

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1.11 gopkg-in-yaml-v2 v2.4.0

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1.23 go_serialization_benchmarks 2.2.6

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

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1.32 githubcommailrueasyjson v0.7.7

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1.40 fsnotify 1.5.4

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1.41 golang-protobuf-extensions 1.0.2-0.20181231171920-c182affec369

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1.42 ./api (devel)

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1.45 go-kit-log 0.2.1

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1.46 github.com/victoriametrics/operator (devel)

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*/

Found in path(s):

- * /operator-tar-gz/operator/api/v1beta1/zz_generated.deepcopy.go
- * /operator-tar-gz/operator/api/v1beta1/groupversion_info.go
- * /operator-tar-gz/operator/api/v1beta1/vmauth_webhook.go
- * /operator-tar-gz/operator/api/v1beta1/vmuser_webhook.go
- * /operator-tar-gz/operator/api/v1beta1/vmalertmanagerconfig_types.go
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1.47 golang 1.18.4

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```
# This source code was written by the Go contributors.
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# This is the official list of people who can contribute
# (and typically have contributed) code to the Go repository.
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# but not in AUTHORS, because Google holds the copyright.
#
# Names should be added to this file only after verifying that
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# the appropriate Contributor License Agreement, found here:
#
#   http://code.google.com/legal/individual-cla-v1.0.html
#   http://code.google.com/legal/corporate-cla-v1.0.html
#
# The agreement for individuals can be filled out on the web.
#
# Names should be added to this file like so:
#   Individual's name <submission email address>
#   Individual's name <submission email address> <email2> <emailN>
#
# An entry with multiple email addresses specifies that the
# first address should be used in the submit logs and
# that the other addresses should be recognized
# as the
# same person when interacting with Gerrit.
#
# Please keep the list sorted.
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1.48 go-spew v1.1.2-0.20180830191138-d8f796af33cc

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1.58 structured-merge-diff v4.2.3

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1.61 x-sys v0.0.0-20220712014510-0a85c31ab51e

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1.62 klog v2.80.1

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1.63 zapr v1.2.3

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1.67 fasttemplate v1.2.2

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1.68 x-time v0.3.0

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1.71 thanos v0.27.0

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1.72 units v0.0.0-20211218093645-b94a6e3cc137

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1.73 github.com/go-kit/log v0.2.1

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1.74 github.com/bmatcuk/doublestar/v4

v4.6.0

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1.75 github.com/golang/protobuf v1.5.3

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1.76 prometheus-operator-prometheus-operator v0.58.0

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1.78 controller-runtime v0.13.1

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1.79 go-restful v3.10.0

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1.85 k8s-io-apiextensions-apiserver v0.25.4

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1.86 k8s-io-kube-openapi v0.0.0- 20221110221610-a28e98eb7c70

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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"`
}
```

```
}  
# This source code was written by the Go contributors.  
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1.88 logr v1.2.4

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```

Found in path(s):

```
* /dbosak01-logr-v1-2-4-0-g8c5ac86-1-tar-gz/dbosak01-logr-8c5ac86/docs/bootstrap-toc.css  
* /dbosak01-logr-v1-2-4-0-g8c5ac86-1-tar-gz/dbosak01-logr-8c5ac86/docs/bootstrap-toc.js
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```
/*  
Source: https://github.com/algolia/docsearch/  
License: MIT  
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* /dbosak01-logr-v1-2-4-0-g8c5ac86-1-tar-gz/dbosak01-logr-8c5ac86/docs/docsearch.css
```

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Package: logr

Title: Creates Log Files

Version: 1.2.4

Authors@R:

```
person(given = "David",  
       family = "Bosak",  
       role = c("aut", "cre"),  
       email = "dbosak01@gmail.com")
```

Description: Contains functions to help create log files. The

package aims to overcome the difficulty of the base R `sink()` command. The `log_print()` function will print to both the console and the file log, without interfering in other write operations.

License: CC0

Encoding: UTF-8

URL: <https://logr.r-sassy.org>

BugReports: <https://github.com/dbosak01/logr/issues>

Depends: R (>= 3.4.0)

Suggests: knitr,
rmarkdown,
testthat,
tidylog,
dplyr,
utils

Imports: withr

VignetteBuilder: knitr

Roxygen: list(markdown = TRUE)

RoxygenNote: 7.1.1

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* /dbosak01-logr-v1-2-4-0-g8c5ac86-1-tar-gz/dbosak01-logr-8c5ac86/DESCRIPTION

1.89 libc-utils 0.7.2-r5

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*
* @(#)queue.h 8.5 (Berkeley) 8/20/94
*/

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Found in path(s):

* /aports-master-main-libc-dev-zip/aports-master-main-libc-dev/main/libc-dev/sys-tree.h

1.90 alpine-baselayout-data 3.4.3-r1

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* Create mount directories in fstab
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* usage: mkmntdirs [fstab]

*

*/

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* /alpine-baselayout-master-zip/alpine-baselayout-master/src/mkmntdirs.c

1.91 scanelf 1.3.7-r1

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1.92 go-uber-org-atomic v1.11.0

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1.93 protobuf v1.31.0

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1.94 ssl-client 1.36.1-r2

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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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1.99 x-sync v0.3.0

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1.108 uuid v1.3.1

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1.109 golang-protobuf-extensions v1.0.4

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1.113 busybox 1.31.0

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1.117 musl-utils 1.2.4-r1

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#
# certdata.txt
#
# This file contains the object definitions for the certs and other
# information "built into" NSS.
#
# Object definitions:
#
#  Certificates
#
# -- Attribute --      -- type --      -- value --
# CKA_CLASS            CK_OBJECT_CLASS  CKO_CERTIFICATE
# CKA_TOKEN            CK_BBOOL        CK_TRUE
# CKA_PRIVATE          CK_BBOOL        CK_FALSE
# CKA_MODIFIABLE       CK_BBOOL        CK_FALSE
# CKA_LABEL            UTF8            (varies)
# CKA_CERTIFICATE_TYPE CK_CERTIFICATE_TYPE CKC_X_509
# CKA_SUBJECT          DER+base64      (varies)
# CKA_ID               byte array      (varies)
#
```

```

    CKA_ISSUER            DER+base64      (varies)
# CKA_SERIAL_NUMBER      DER+base64      (varies)
# CKA_VALUE              DER+base64      (varies)
# CKA_NSS_EMAIL          ASCII7         (unused here)
# CKA_NSS_SERVER_DISTRICT_AFTER DER+base64 (varies)
# CKA_NSS_EMAIL_DISTRICT_AFTER DER+base64 (varies)
#
# Trust
#
# -- Attribute --      -- type --      -- value --
# CKA_CLASS            CK_OBJECT_CLASS  CKO_TRUST
# CKA_TOKEN            CK_BBOOL         CK_TRUE
# CKA_PRIVATE          CK_BBOOL         CK_FALSE
# CKA_MODIFIABLE       CK_BBOOL         CK_FALSE
# CKA_LABEL            UTF8             (varies)
# CKA_ISSUER           DER+base64      (varies)
# CKA_SERIAL_NUMBER    DER+base64      (varies)
# CKA_CERT_HASH        binary+base64   (varies)
# CKA_EXPIRES          CK_DATE
(not used here)
# CKA_TRUST_DIGITAL_SIGNATURE CK_TRUST (varies)
# CKA_TRUST_NON_REPUDIATION CK_TRUST (varies)
# CKA_TRUST_KEY_ENCIPHERMENT CK_TRUST (varies)
# CKA_TRUST_DATA_ENCIPHERMENT CK_TRUST (varies)
# CKA_TRUST_KEY_AGREEMENT CK_TRUST (varies)
# CKA_TRUST_KEY_CERT_SIGN CK_TRUST (varies)
# CKA_TRUST_CRL_SIGN CK_TRUST (varies)
# CKA_TRUST_SERVER_AUTH CK_TRUST (varies)
# CKA_TRUST_CLIENT_AUTH CK_TRUST (varies)
# CKA_TRUST_CODE_SIGNING CK_TRUST (varies)
# CKA_TRUST_EMAIL_PROTECTION CK_TRUST (varies)
# CKA_TRUST_IPSEC_END_SYSTEM CK_TRUST (varies)
# CKA_TRUST_IPSEC_TUNNEL CK_TRUST (varies)
# CKA_TRUST_IPSEC_USER CK_TRUST (varies)
# CKA_TRUST_TIME_STAMPING CK_TRUST (varies)
# CKA_TRUST_STEP_UP_APPROVED CK_BBOOL (varies)
# (other
trust attributes can be defined)
#
#
# The object to tell NSS that this is a root list and we don't
# have to go looking for others.
#
BEGINDATA
CKA_CLASS CK_OBJECT_CLASS CKO_NSS_BUILTIN_ROOT_LIST
CKA_TOKEN CK_BBOOL CK_TRUE
CKA_PRIVATE CK_BBOOL CK_FALSE

```

```

CKA_MODIFIABLE CK_BBOOL CK_FALSE
CKA_LABEL UTF8 "Mozilla Builtin Roots"

#
# Certificate "GlobalSign Root CA"
#
# Issuer: CN=GlobalSign Root CA,OU=Root CA,O=GlobalSign nv-sa,C=BE
# Serial Number:04:00:00:00:00:01:15:4b:5a:c3:94
# Subject: CN=GlobalSign Root CA,OU=Root CA,O=GlobalSign nv-sa,C=BE
# Not Valid Before: Tue Sep 01 12:00:00 1998
# Not Valid After : Fri Jan 28 12:00:00 2028
# Fingerprint (SHA-256):
EB:D4:10:40:E4:BB:3E:C7:42:C9:E3:81:D3:1E:F2:A4:1A:48:B6:68:5C:96:E7:CE:F3:C1:DF:6C:D4:33:1C:99
# Fingerprint (SHA1): B1:BC:96:8B:D4:F4:9D:62:2A:A8:9A:81:F2:15:01:52:A4:1D:82:9C
CKA_CLASS CK_OBJECT_CLASS CKO_CERTIFICATE
CKA_TOKEN CK_BBOOL CK_TRUE
CKA_PRIVATE CK_BBOOL CK_FALSE
CKA_MODIFIABLE CK_BBOOL CK_FALSE
CKA_LABEL UTF8 "GlobalSign
Root CA"
CKA_CERTIFICATE_TYPE CK_CERTIFICATE_TYPE CKC_X_509
CKA_SUBJECT MULTILINE_OCTAL
\060\127\061\013\060\011\006\003\125\004\006\023\002\102\105\061
\031\060\027\006\003\125\004\012\023\020\107\154\157\142\141\154
\123\151\147\156\040\156\166\055\163\141\061\020\060\016\006\003
\125\004\013\023\007\122\157\157\164\040\103\101\061\033\060\031
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\156\040\122\157\157\164\040\103\101
END
CKA_ID UTF8 "0"
CKA_ISSUER MULTILINE_OCTAL
\060\127\061\013\060\011\006\003\125\004\006\023\002\102\105\061
\031\060\027\006\003\125\004\012\023\020\107\154\157\142\141\154
\123\151\147\156\040\156\166\055\163\141\061\020\060\016\006\003
\125\004\013\023\007\122\157\157\164\040\103\101\061\033\060\031
\006\003\125\004\003\023\022\107\154\157\142\141\154\123\151\147
\156\040\122\157\157\164\040\103\101
END
CKA_SERIAL_NUMBER MULTILINE_OCTAL
\002\013\004\000\000\000\000\001\025\113\132\303\224
END
CKA_VALUE MULTILINE_OCTAL
\060\202\003\165\060\202\002\135\240\003\002\001\002\002\013\004
\000\000\000\000\001\025\113\132\303\224\060\015\006\011\052\206
\110\206\367\015\001\001\005\005\000\060\127\061\013\060\011\006
\003\125\004\006\023\002\102\105\061\031\060\027\006\003\125\004
\012\023\020\107\154\157\142\141\154\123\151\147\156\040\156\166
\055\163\141\061\020\060\016\006\003\125\004\013\023\007\122\157

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\157\164\040\103\101\061\033\060\031\006\003\125\004\003\023\022
\107\154\157\142\141\154\123\151\147\156\040\122\157\157\164\040
\103\101\060\036\027\015\071\070\060\071\060\061\061\062\060\060
\060\060\132\027\015\062\070\060\061\062\070\061\062\060\060\060
\060\132\060\127\061\013\060\011\006\003\125\004\006\023\002\102
\105\061\031\060\027\006\003\125\004\012\023\020\107\154\157\142
\141\154\123\151\147\156\040\156\166\055\163\141\061\020\060\016
\006\003\125\004\013\023\007\122\157\157\164\040\103\101\061\033
\060\031\006\003\125\004\003\023\022\107\154\157\142\141\154\123
\151\147\156\040\122\157\157\164\040\103\101\060\202\001\042\060
\015\006\011\052\206\110\206\367\015\001\001\001\005\000\003\202
\001\017\000\060\202\001\012\002\202\001\001\000\332\016\346\231
\215\316\243\343\117\212\176\373\361\213\203\045\153\352\110\037
\361\052\260\271\225\021\004\275\360\143\321\342\147\146\317\034
\335\317\033\110\053\356\215\211\216\232\257\051\200\145\253\351
\307\055\022\313\253\034\114\160\007\241\075\012\060\315\025\215
\117\370\335\324\214\120\025\034\357\120\356\304\056\367\374\351
\122\362\221\175\340\155\325\065\060\216\136\103\163\362\101\351
\325\152\343\262\211\072\126\071\070\157\006\074\210\151\133\052
\115\305\247\124\270\154\211\314\233\371\074\312\345\375\211\365
\022\074\222\170\226\326\334\164\156\223\104\141\321\215\307\106
\262\165\016\206\350\031\212\325\155\154\325\170\026\225\242\351
\310\012\070\353\362\044\023\117\163\124\223\023\205\072\033\274
\036\064\265\213\005\214\271\167\213\261\333\037\040\221\253\011
\123\156\220\316\173\067\164\271\160\107\221\042\121\143\026\171
\256\261\256\101\046\010\310\031\053\321\106\252\110\326\144\052
\327\203\064\377\054\052\301\154\031\103\112\007\205\347\323\174
\366\041\150\357\352\362\122\237\177\223\220\317\002\003\001\000
\001\243\102\060\100\060\016\006\003\125\035\017\001\001\377\004
\004\003\002\001\006\060\017\006\003\125\035\023\001\001\377\004
\005\060\003\001\001\377\060\035\006\003\125\035\016\004\026\004
\024\140\173\146\032\105\015\227\312\211\120\057\175\004\315\064
\250\377\374\375\113\060\015\006\011\052\206\110\206\367\015\001
\001\005\005\000\003\202\001\001\000\326\163\347\174\117\166\320
\215\277\354\272\242\276\064\305\050\062\265\174\374\154\234\054
\053\275\011\236\123\277\153\136\252\021\110\266\345\010\243\263
\312\075\141\115\323\106\011\263\076\303\240\343\143\125\033\362
\272\357\255\071\341\103\271\070\243\346\057\212\046\073\357\240
\120\126\371\306\012\375\070\315\304\013\160\121\224\227\230\004
\337\303\137\224\325\025\311\024\101\234\304\135\165\144\025\015
\377\125\060\354\206\217\377\015\357\054\271\143\106\366\252\374
\337\274\151\375\056\022\110\144\232\340\225\360\246\357\051\217
\001\261\025\265\014\035\245\376\151\054\151\044\170\036\263\247
\034\161\142\356\312\310\227\254\027\135\212\302\370\107\206\156
\052\304\126\061\225\320\147\211\205\053\371\154\246\135\106\235
\014\252\202\344\231\121\335\160\267\333\126\075\141\344\152\341
\134\326\366\376\075\336\101\314\007\256\143\122\277\123\123\364
\053\351\307\375\266\367\202\137\205\322\101\030\333\201\263\004

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\034\305\037\244\200\157\025\040\311\336\014\210\012\035\326\146
\125\342\374\110\311\051\046\151\340
END
CKA_NSS_MOZILLA_CA_POLICY
CK_BBOOL CK_TRUE
CKA_NSS_SERVER_DISTRUST_AFTER CK_BBOOL CK_FALSE
CKA_NSS_EMAIL_DISTRUST_AFTER CK_BBOOL CK_FALSE

# Trust for "GlobalSign Root CA"
# Issuer: CN=GlobalSign Root CA,OU=Root CA,O=GlobalSign nv-sa,C=BE
# Serial Number:04:00:00:00:00:01:15:4b:5a:c3:94
# Subject: CN=GlobalSign Root CA,OU=Root CA,O=GlobalSign nv-sa,C=BE
# Not Valid Before: Tue Sep 01 12:00:00 1998
#
Not Valid After : Fri Jan 28 12:00:00 2028
# Fingerprint (SHA-256):
EB:D4:10:40:E4:BB:3E:C7:42:C9:E3:81:D3:1E:F2:A4:1A:48:B6:68:5C:96:E7:CE:F3:C1:DF:6C:D4:33:1C:99
# Fingerprint (SHA1): B1:BC:96:8B:D4:F4:9D:62:2A:A8:9A:81:F2:15:01:52:A4:1D:82:9C
CKA_CLASS CK_OBJECT_CLASS CKO_NSS_TRUST
CKA_TOKEN CK_BBOOL CK_TRUE
CKA_PRIVATE CK_BBOOL CK_FALSE
CKA_MODIFIABLE CK_BBOOL CK_FALSE
CKA_LABEL UTF8 "GlobalSign Root CA"
CKA_CERT_SHA1_HASH MULTILINE_OCTAL
\261\274\226\213\324\364\235\142\052\250\232\201\362\025\001\122
\244\035\202\234
END
CKA_CERT_MD5_HASH MULTILINE_OCTAL
\076\105\122\025\011\121\222\341\267\135\067\237\261\207\051\212
END
CKA_ISSUER MULTILINE_OCTAL
\060\127\061\013\060\011\006\003\125\004\006\023\002\102\105\061
\031\060\027\006\003\125\004\012\023\020\107\154\157\142\141\154
\123\151\147\156\040\156\166\055\163\141\061\020\060\016\006\003
\125\004\013\023\007\122\157\157\164\040\103\101\061\033\060\031
\006\003\125\004\003\023\022\107\154\157\142\141\154\123\151\147
\156\040\122\157\157\164\040\103\101
END
CKA_SERIAL_NUMBER
MULTILINE_OCTAL
\002\013\004\000\000\000\000\001\025\113\132\303\224
END
CKA_TRUST_SERVER_AUTH CK_TRUST CKT_NSS_TRUSTED_DELEGATOR
CKA_TRUST_EMAIL_PROTECTION CK_TRUST CKT_NSS_TRUSTED_DELEGATOR
CKA_TRUST_CODE_SIGNING CK_TRUST CKT_NSS_MUST_VERIFY_TRUST
CKA_TRUST_STEP_UP_APPROVED CK_BBOOL CK_FALSE

#

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# Certificate "Verisign Class 1 Public Primary Certification Authority - G3"
#
# Issuer: CN=VeriSign Class 1 Public Primary Certification Authority - G3,OU="(c) 1999 VeriSign, Inc. - For
authorized use only",OU=VeriSign Trust Network,O="VeriSign, Inc.",C=US
# Serial Number:00:8b:5b:75:56:84:54:85:0b:00:cf:af:38:48:ce:b1:a4
# Subject: CN=VeriSign Class 1 Public Primary Certification Authority - G3,OU="(c) 1999 VeriSign, Inc. - For
authorized use only",OU=VeriSign Trust Network,O="VeriSign, Inc.",C=US
# Not Valid Before: Fri Oct 01 00:00:00 1999
# Not Valid After : Wed Jul 16 23:59:59 2036
# Fingerprint (SHA-256):
CB:B5:AF:18:5E:94:2A:24:02:F9:EA:CB:C0:ED:5B:B8:76:EE:A3:C1:22:36:23:D0:04:47:E4:F3:BA:55:4B:65
#
Fingerprint (SHA1): 20:42:85:DC:F7:EB:76:41:95:57:8E:13:6B:D4:B7:D1:E9:8E:46:A5
CKA_CLASS CK_OBJECT_CLASS CKO_CERTIFICATE
CKA_TOKEN CK_BBOOL CK_TRUE
CKA_PRIVATE CK_BBOOL CK_FALSE
CKA_MODIFIABLE CK_BBOOL CK_FALSE
CKA_LABEL UTF8 "Verisign Class 1 Public Primary Certification Authority - G3"
CKA_CERTIFICATE_TYPE CK_CERTIFICATE_TYPE CKC_X_509
CKA_SUBJECT MULTILINE_OCTAL
\060\201\312\061\013\060\011\006\003\125\004\006\023\002\125\123
\061\027\060\025\006\003\125\004\012\023\016\126\145\162\151\123
\151\147\156\054\040\111\156\143\056\061\037\060\035\006\003\125
\004\013\023\026\126\145\162\151\123\151\147\156\040\124\162\165
\163\164\040\116\145\164\167\157\162\153\061\072\060\070\006\003
\125\004\013\023\061\050\143\051\040\061\071\071\071\040\126\145
\162\151\123\151\147\156\054\040\111\156\143\056\040\055\040\106
\157\162\040\141\165\164\150\157\162\151\172\145\144\040\165\163
\145\040\157\156\154\171\061\105\060\103\006\003\125\004\003\023
\074\126\145\162\151\123\151\147\156\040\103\154\141\163\163\040
\061\040\120\165\142\154\151\143\040\120\162\151\155\141\162\171
\040\103\145\162\164\151\146\151\143\141\164\151\157\156\040\101
\165\164\150\157\162\151\164\171\040\055\040\107\063
END
CKA_ID
UTF8 "0"
CKA_ISSUER MULTILINE_OCTAL
\060\201\312\061\013\060\011\006\003\125\004\006\023\002\125\123
\061\027\060\025\006\003\125\004\012\023\016\126\145\162\151\123
\151\147\156\054\040\111\156\143\056\061\037\060\035\006\003\125
\004\013\023\026\126\145\162\151\123\151\147\156\040\124\162\165
\163\164\040\116\145\164\167\157\162\153\061\072\060\070\006\003
\125\004\013\023\061\050\143\051\040\061\071\071\071\040\126\145
\162\151\123\151\147\156\054\040\111\156\143\056\040\055\040\106
\157\162\040\141\165\164\150\157\162\151\172\145\144\040\165\163
\145\040\157\156\154\171\061\105\060\103\006\003\125\004\003\023
\074\126\145\162\151\123\151\147\156\040\103\154\141\163\163\040
\061\040\120\165\142\154\151\143\040\120\162\151\155\141\162\171

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\040\103\145\162\164\151\146\151\143\141\164\151\157\156\040\101
\165\164\150\157\162\151\164\171\040\055\040\107\063
END
CKA_SERIAL_NUMBER
MULTILINE_OCTAL
\002\021\000\213\133\165\126\204\124\205\013\000\317\257\070\110
\316\261\244
END
CKA_VALUE MULTILINE_OCTAL
\060\202\004\032\060\202\003\002\002\021\000\213\133\165\126\204
\124\205\013\000\317\257\070\110\316\261\244\060\015\006\011\052
\206\110\206\367\015\001\001\005\005\000\060\201\312\061\013\060
\011\006\003\125\004\006\023\002\125\123\061\027\060\025\006\003
\125\004\012\023\016\126\145\162\151\123\151\147\156\054\040\111
\156\143\056\061\037\060\035\006\003\125\004\013\023\026\126\145
\162\151\123\151\147\156\040\124\162\165\163\164\040\116\145\164
\167\157\162\153\061\072\060\070\006\003\125\004\013\023\061\050
\143\051\040\061\071\071\071\040\126\145\162\151\123\151\147\156
\054\040\111\156\143\056\040\055\040\106\157\162\040\141\165\164
\150\157\162\151\172\145\144\040\165\163\145\040\157\156\154\171
\061\105\060\103\006\003\125\004\003\023\074\126\145\162\151\123
\151\147\156\040\103\154\141\163\163\040\061\040\120\165\142\154
\151\143\040\120\162\151\155\141\162\171\040\103\145\162\164\151
\146\151\143\141\164\151\157\156\040\101\165\164\150\157\162\151
\164\171\040\055\040\107\063\060\036\027\015\071\071\061\060\060
\061\060\060\060\060\060\060\132\027\015\063\066\060\067\061\066
\062\063\065\071\065\071\132\060\201\312\061\013\060\011\006\003
\125\004\006\023\002\125\123\061\027\060\025\006\003\125\004\012
\023\016\126\145\162\151\123\151\147\156\054\040\111\156\143\056
\061\037\060\035\006\003\125\004\013\023\026\126\145\162\151\123
\151\147\156\040\124\162\165\163\164\040\116\145\164\167\157\162
\153\061\072\060\070\006\003\125\004\013\023\061\050\143\051\040
\061\071\071\071\040\126\145\162\151\123\151\147\156\054\040\111
\156\143\056\040\055\040\106\157\162\040\141\165\164\150\157\162
\151\172\145\144\040\165\163\145\040\157\156\154\171\061\105\060
\103\006\003\125\004\003\023\074\126\145\162\151\123\151\147\156
\040\103\154\141\163\163\040\061\040\120\165\142\154\151\143\040
\120\162\151\155\141\162\171\040\103\145\162\164\151\146\151\143
\141\164\151\157\156\040\101\165\164\150\157\162\151\164\171\040
\055\040\107\063\060\202\001\042\060\015\006\011\052\206\110\206
\367\015\001\001\001\005\000\003\202\001\017\000\060\202\001\012
\002\202\001\001\000\335\204\324\271\264\371\247\330\363\004\170
\234\336\075\334\154\023\026\331\172\335\044\121\146\300\307\046
\131\015\254\006\010\302\224\321\063\037\360\203\065\037\156\033
\310\336\252\156\025\116\124\047\357\304\155\032\354\013\343\016
\360\104\245\127\307\100\130\036\243\107\037\161\354\140\366\155
\224\310\030\071\355\376\102\030\126\337\344\114\111\020\170\116
\001\166\065\143\022\066\335\146\274\001\004\066\243\125\150\325

\242\066\011\254\253\041\046\124\006\255\077\312\024\340\254\312
\255\006\035\225\342\370\235\361\340\140\377\302\177\165\053\114
\314\332\376\207\231\041\352\272\376\076\124\327\322\131\170\333
\074\156\317\240\023\000\032\270\047\241\344\276\147\226\312\240
\305\263\234\335\311\165\236\353\060\232\137\243\315\331\256\170
\031\077\043\351\134\333\051\275\255\125\310\033\124\214\143\366
\350\246\352\307\067\022\134\243\051\036\002\331\333\037\073\264
\327\017\126\107\201\025\004\112\257\203\047\321\305\130\210\301
\335\366\252\247\243\030\332\150\252\155\021\121\341\277\145\153
\237\226\166\321\075\002\003\001\000\001\060\015\006\011\052\206
\110\206\367\015\001\001\005\005\000\003\202\001\001\000\253\146
\215\327\263\272\307\232\266\346\125\320\005\361\237\061\215\132
\252\331\252\106\046\017\161\355\245\255\123\126\142\001\107\052
\104\351\376\077\164\013\023\233\271\364\115\033\262\321\137\262
\266\322\210\134\263\237\315\313\324\247\331\140\225\204\072\370
\301\067\035\141\312\347\260\305\345\221\332\124\246\254\061\201
\256\227\336\315\010\254\270\300\227\200\177\156\162\244\347\151
\023\225\145\037\304\223\074\375\171\217\004\324\076\117\352\367
\236\316\315\147\174\117\145\002\377\221\205\124\163\307\377\066
\367\206\055\354\320\136\117\377\021\237\162\006\326\270\032\361
\114\015\046\145\342\104\200\036\307\237\343\335\350\012\332\354
\245\040\200\151\150\241\117\176\341\153\317\007\101\372\203\216
\274\070\335\260\056\021\261\153\262\102\314\232\274\371\110\042
\171\112\031\017\262\034\076\040\164\331\152\303\276\362\050\170
\023\126\171\117\155\120\352\033\260\265\127\261\067\146\130\043
\363\334\017\337\012\207\304\357\206\005\325\070\024\140\231\243
\113\336\006\226\161\054\362\333\266\037\244\357\077\356

END

CKA_NSS_MOZILLA_CA_POLICY

CK_BBOOL CK_TRUE

CKA_NSS_SERVER_DISTRUST_AFTER CK_BBOOL CK_FALSE

For Email Distrust After: Wed Aug 31 00:00:00 2022

CKA_NSS_EMAIL_DISTRUST_AFTER MULTILINE_OCTAL

\062\062\060\070\063\061\060\060\060\060\060\060\132

END

Trust for "Verisign Class 1 Public Primary Certification Authority - G3"

Issuer: CN=VeriSign Class 1 Public Primary Certification Authority - G3,OU="(c) 1999 VeriSign, Inc. - For authorized use only",OU=VeriSign Trust Network,O="VeriSign, Inc.",C=US

Serial Number:00:8b:5b:75:56:84:54:85:0b:00:cf:af:38:48:ce:b1:a4

Subject: CN=VeriSign Class 1 Public Primary Certification Authority - G3,OU="(c) 1999 VeriSign, Inc. - For authorized use only",OU=VeriSign Trust Network,O="VeriSign, Inc.",C=US

Not Valid Before: Fri Oct 01 00:00:00 1999

Not Valid After : Wed Jul 16 23:59:59 2036

Fingerprint (SHA-256):

CB:B5:AF:18:5E:94:2A:24:02:F9:EA:CB:C0:ED:5B:B8:76:EE:A3:C1:22:36:23:D0:04:47:E4:F3:BA:55:4B:65

Fingerprint (SHA1): 20:42:85:DC:F7:EB:76:41:95:57:8E:13:6B:D4:B7:D1:E9:8E:46:A5

CKA_CLASS CK_OBJECT_CLASS CKO_NSS_TRUST

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CKA_TOKEN CK_BBOOL CK_TRUE
CKA_PRIVATE CK_BBOOL CK_FALSE
CKA_MODIFIABLE CK_BBOOL CK_FALSE
CKA_LABEL UTF8 "Verisign Class 1 Public Primary Certification Authority - G3"
CKA_CERT_SHA1_HASH MULTILINE_OCTAL
\040\102\205\334\367\353\166\101\225\127\216\023\153\324\267\321
\351\216\106\245
END
CKA_CERT_MD5_HASH MULTILINE_OCTAL
\261\107\274\030\127\321\030\240\170\055\354\161\350\052\225\163
END
CKA_ISSUER
MULTILINE_OCTAL
\060\201\312\061\013\060\011\006\003\125\004\006\023\002\125\123
\061\027\060\025\006\003\125\004\012\023\016\126\145\162\151\123
\151\147\156\054\040\111\156\143\056\061\037\060\035\006\003\125
\004\013\023\026\126\145\162\151\123\151\147\156\040\124\162\165
\163\164\040\116\145\164\167\157\162\153\061\072\060\070\006\003
\125\004\013\023\061\050\143\051\040\061\071\071\071\040\126\145
\162\151\123\151\147\156\054\040\111\156\143\056\040\055\040\106
\157\162\040\141\165\164\150\157\162\151\172\145\144\040\165\163
\145\040\157\156\154\171\061\105\060\103\006\003\125\004\003\023
\074\126\145\162\151\123\151\147\156\040\103\154\141\163\163\040
\061\040\120\165\142\154\151\143\040\120\162\151\155\141\162\171
\040\103\145\162\164\151\146\151\143\141\164\151\157\156\040\101
\165\164\150\157\162\151\164\171\040\055\040\107\063
END
CKA_SERIAL_NUMBER MULTILINE_OCTAL
\002\021\000\213\133\165\126\204\124\205\013\000\317\257\070\110
\316\261\244
END
CKA_TRUST_SERVER_AUTH
CK_TRUST CKT_NSS_MUST_VERIFY_TRUST
CKA_TRUST_EMAIL_PROTECTION CK_TRUST CKT_NSS_TRUSTED_DELEGATOR
CKA_TRUST_CODE_SIGNING CK_TRUST CKT_NSS_MUST_VERIFY_TRUST
CKA_TRUST_STEP_UP_APPROVED CK_BBOOL CK_FALSE

#
# Certificate "Verisign Class 2 Public Primary Certification Authority - G3"
#
# Issuer: CN=VeriSign Class 2 Public Primary Certification Authority - G3,OU="(c) 1999 VeriSign, Inc. - For
authorized use only",OU=VeriSign Trust Network,O="VeriSign, Inc.",C=US
# Serial Number:61:70:cb:49:8c:5f:98:45:29:e7:b0:a6:d9:50:5b:7a
# Subject: CN=VeriSign Class 2 Public Primary Certification Authority - G3,OU="(c) 1999 VeriSign, Inc. - For
authorized use only",OU=VeriSign Trust Network,O="VeriSign, Inc.",C=US
# Not Valid Before: Fri Oct 01 00:00:00 1999
# Not Valid After : Wed Jul 16 23:59:59 2036
# Fingerprint (SHA-256):

```

92:A9:D9:83:3F:E1:94:4D:B3:66:E8:BF:AE:7A:95:B6:48:0C:2D:6C:6C:2A:1B:E6:5D:42:36:B6:08:FC:A1:BB

Fingerprint (SHA1): 61:EF:43:D7:7F:CA:D4:61:51:BC:98:E0:C3:59:12:AF:9F:EB:63:11

CKA_CLASS

CK_OBJECT_CLASS CKO_CERTIFICATE

CKA_TOKEN CK_BBOOL CK_TRUE

CKA_PRIVATE CK_BBOOL CK_FALSE

CKA_MODIFIABLE CK_BBOOL CK_FALSE

CKA_LABEL UTF8 "Verisign Class 2 Public Primary Certification Authority - G3"

CKA_CERTIFICATE_TYPE CK_CERTIFICATE_TYPE CKC_X_509

CKA_SUBJECT MULTILINE_OCTAL

\060\201\312\061\013\060\011\006\003\125\004\006\023\002\125\123
\061\027\060\025\006\003\125\004\012\023\016\126\145\162\151\123
\151\147\156\054\040\111\156\143\056\061\037\060\035\006\003\125
\004\013\023\026\126\145\162\151\123\151\147\156\040\124\162\165
\163\164\040\116\145\164\167\157\162\153\061\072\060\070\006\003
\125\004\013\023\061\050\143\051\040\061\071\071\071\040\126\145
\162\151\123\151\147\156\054\040\111\156\143\056\040\055\040\106
\157\162\040\141\165\164\150\157\162\151\172\145\144\040\165\163
\145\040\157\156\154\171\061\105\060\103\006\003\125\004\003\023
\074\126\145\162\151\123\151\147\156\040\103\154\141\163\163\040
\062\040\120\165\142\154\151\143\040\120\162\151\155\141\162\171
\040\103\145\162\164\151\146\151\143\141\164\151\157\156\040\101
\165\164\150\157\162\151\164\171\040\055\040\107\063

END

CKA_ID

UTF8 "0"

CKA_ISSUER MULTILINE_OCTAL

\060\201\312\061\013\060\011\006\003\125\004\006\023\002\125\123
\061\027\060\025\006\003\125\004\012\023\016\126\145\162\151\123
\151\147\156\054\040\111\156\143\056\061\037\060\035\006\003\125
\004\013\023\026\126\145\162\151\123\151\147\156\040\124\162\165
\163\164\040\116\145\164\167\157\162\153\061\072\060\070\006\003
\125\004\013\023\061\050\143\051\040\061\071\071\071\040\126\145
\162\151\123\151\147\156\054\040\111\156\143\056\040\055\040\106
\157\162\040\141\165\164\150\157\162\151\172\145\144\040\165\163
\145\040\157\156\154\171\061\105\060\103\006\003\125\004\003\023
\074\126\145\162\151\123\151\147\156\040\103\154\141\163\163\040
\062\040\120\165\142\154\151\143\040\120\162\151\155\141\162\171
\040\103\145\162\164\151\146\151\143\141\164\151\157\156\040\101
\165\164\150\157\162\151\164\171\040\055\040\107\063

END

CKA_SERIAL_NUMBER

MULTILINE_OCTAL

\002\020\141\160\313\111\214\137\230\105\051\347\260\246\331\120
\133\172

END

CKA_VALUE MULTILINE_OCTAL

\060\202\004\031\060\202\003\001\002\020\141\160\313\111\214\137

\230\105\051\347\260\246\331\120\133\172\060\015\006\011\052\206
\110\206\367\015\001\001\005\005\000\060\201\312\061\013\060\011
\006\003\125\004\006\023\002\125\123\061\027\060\025\006\003\125
\004\012\023\016\126\145\162\151\123\151\147\156\054\040\111\156
\143\056\061\037\060\035\006\003\125\004\013\023\026\126\145\162
\151\123\151\147\156\040\124\162\165\163\164\040\116\145\164\167
\157\162\153\061\072\060\070\006\003\125\004\013\023\061\050\143
\051\040\061\071\071\071\040\126\145\162\151\123\151\147\156\054
\040\111\156\143\056\040\055\040\106\157\162\040\141\165\164\150
\157\162\151\172\145\144\040\165\163\145\040\157\156\154\171\061
\105\060\103\006\003\125\004\003\023\074\126\145\162\151\123\151
\147\156\040\103\154\141\163\163\040\062\040\120\165\142\154\151
\143\040\120\162\151\155\141\162\171\040\103\145\162\164\151\146
\151\143\141\164\151\157\156\040\101\165\164\150\157\162\151\164
\171\040\055\040\107\063\060\036\027\015\071\071\061\060\060\061
\060\060\060\060\060\060\132\027\015\063\066\060\067\061\066\062
\063\065\071\065\071\132\060\201\312\061\013\060\011\006\003\125
\004\006\023\002\125\123\061\027\060\025\006\003\125\004\012\023
\016\126\145\162\151\123\151\147\156\054\040\111\156\143\056\061
\037\060\035\006\003\125\004\013\023\026\126\145\162\151\123\151
\147\156\040\124\162\165\163\164\040\116\145\164\167\157\162\153
\061\072\060\070\006\003\125\004\013\023\061\050\143\051\040\061
\071\071\071\040\126\145\162\151\123\151\147\156\054\040\111\156
\143\056\040\055\040\106\157\162\040\141\165\164\150\157\162\151
\172\145\144\040\165\163\145\040\157\156\154\171\061\105\060\103
\006\003\125\004\003\023\074\126\145\162\151\123\151\147\156\040
\103\154\141\163\163\040\062\040\120\165\142\154\151\143\040\120
\162\151\155\141\162\171\040\103\145\162\164\151\146\151\143\141
\164\151\157\156\040\101\165\164\150\157\162\151\164\171\040\055
\040\107\063\060\202\001\042\060\015\006\011\052\206\110\206\367
\015\001\001\001\005\000\003\202\001\017\000\060\202\001\012\002
\202\001\001\000\257\012\015\302\325\054\333\147\271\055\345\224
\047\335\245\276\340\260\115\217\263\141\126\074\326\174\303\364
\315\076\206\313\242\210\342\341\330\244\151\305\265\342\277\301
\246\107\120\136\106\071\213\325\226\272\265\157\024\277\020\316
\047\023\236\005\107\233\061\172\023\330\037\331\323\002\067\213
\255\054\107\360\216\201\006\247\015\060\014\353\367\074\017\040
\035\334\162\106\356\245\002\310\133\303\311\126\151\114\305\030
\301\221\173\013\325\023\000\233\274\357\303\110\076\106\140\040
\205\052\325\220\266\315\213\240\314\062\335\267\375\100\125\262
\120\034\126\256\314\215\167\115\307\040\115\247\061\166\357\150
\222\212\220\036\010\201\126\262\255\151\243\122\320\313\034\304
\043\075\037\231\376\114\350\026\143\216\306\010\216\366\061\366
\322\372\345\166\335\265\034\222\243\111\315\315\001\315\150\315
\251\151\272\243\353\035\015\234\244\040\246\301\240\305\321\106
\114\027\155\322\254\146\077\226\214\340\204\324\066\377\042\131
\305\371\021\140\250\137\004\175\362\032\366\045\102\141\017\304
\112\270\076\211\002\003\001\000\001\060\015\006\011\052\206\110

\206\367\015\001\001\005\005\000\003\202\001\001\000\064\046\025
\074\300\215\115\103\111\035\275\351\041\222\327\146\234\267\336
\305\270\320\344\135\137\166\042\300\046\371\204\072\072\371\214
\265\373\354\140\361\350\316\004\260\310\335\247\003\217\060\363
\230\337\244\346\244\061\337\323\034\013\106\334\162\040\077\256
\356\005\074\244\063\077\013\071\254\160\170\163\113\231\053\337
\060\302\124\260\250\073\125\241\376\026\050\315\102\275\164\156
\200\333\047\104\247\316\104\135\324\033\220\230\015\036\102\224
\261\000\054\004\320\164\243\002\005\042\143\143\315\203\265\373
\301\155\142\153\151\165\375\135\160\101\271\365\277\174\337\276
\301\062\163\042\041\213\130\201\173\025\221\172\272\343\144\110
\260\177\373\066\045\332\225\320\361\044\024\027\335\030\200\153
\106\043\071\124\365\216\142\011\004\035\224\220\246\233\346\045
\342\102\105\252\270\220\255\276\010\217\251\013\102\030\224\317
\162\071\341\261\103\340\050\317\267\347\132\154\023\153\111\263
\377\343\030\174\211\213\063\135\254\063\327\247\371\332\072\125
\311\130\020\371\252\357\132\266\317\113\113\337\052

END

CKA_NSS_MOZILLA_CA_POLICY

CK_BBOOL CK_TRUE

CKA_NSS_SERVER_DISTRUST_AFTER CK_BBOOL CK_FALSE

For Email Distrust After: Wed Aug 31 00:00:00 2022

CKA_NSS_EMAIL_DISTRUST_AFTER MULTILINE_OCTAL

\062\062\060\070\063\061\060\060\060\060\060\060\132

END

Trust for "Verisign Class 2 Public Primary Certification Authority - G3"

Issuer: CN=VeriSign Class 2 Public Primary Certification Authority - G3,OU="(c) 1999 VeriSign, Inc. - For authorized use only",OU=VeriSign Trust Network,O="VeriSign, Inc.",C=US

Serial Number:61:70:cb:49:8c:5f:98:45:29:e7:b0:a6:d9:50:5b:7a

#

Subject: CN=VeriSign Class 2 Public Primary Certification Authority - G3,OU="(c) 1999 VeriSign, Inc. - For authorized use only",OU=VeriSign Trust Network,O="VeriSign, Inc.",C=US

Not Valid Before: Fri Oct 01 00:00:00 1999

Not Valid After : Wed Jul 16 23:59:59 2036

Fingerprint (SHA-256):

92:A9:D9:83:3F:E1:94:4D:B3:66:E8:BF:AE:7A:95:B6:48:0C:2D:6C:6C:2A:1B:E6:5D:42:36:B6:08:FC:A1:BB

Fingerprint (SHA1): 61:EF:43:D7:7F:CA:D4:61:51:BC:98:E0:C3:59:12:AF:9F:EB:63:11

CKA_CLASS CK_OBJECT_CLASS CKO_NSS_TRUST

CKA_TOKEN CK_BBOOL CK_TRUE

CKA_PRIVATE CK_BBOOL CK_FALSE

CKA_MODIFIABLE CK_BBOOL CK_FALSE

CKA_LABEL UTF8 "Verisign Class 2 Public Primary Certification Authority - G3"

CKA_CERT_SHA1_HASH MULTILINE_OCTAL

\141\357\103\327\177\312\324\141\121\274\230\340\303\131\022\257

\237\353\143\021

END

CKA_CERT_MD5_HASH MULTILINE_OCTAL

\370\276\304\143\042\311\250\106\164\213\270\035\036\112\053\366

END

CKA_ISSUER MULTILINE_OCTAL

\060\201\312\061\013\060\011\006\003\125\004\006\023\002\125\123
\061\027\060\025\006\003\125\004\012\023\016\126\145\162\151\123
\151\147\156\054\040\111\156\143\056\061\037\060\035\006\003\125
\004\013\023\026\126\145\162\151\123\151\147\156\040\124\162\165
\163\164\040\116\145\164\167\157\162\153\061\072\060\070\006\003
\125\004\013\023\061\050\143\051\040\061\071\071\071\040\126\145
\162\151\123\151\147\156\054\040\111\156\143\056\040\055\040\106
\157\162\040\141\165\164\150\157\162\151\172\145\144\040\165\163
\145\040\157\156\154\171\061\105\060\103\006\003\125\004\003\023
\074\126\145\162\151\123\151\147\156\040\103\154\141\163\163\040
\062\040\120\165\142\154\151\143\040\120\162\151\155\141\162\171
\040\103\145\162\164\151\146\151\143\141\164\151\157\156\040\101
\165\164\150\157\162\151\164\171\040\055\040\107\063

END

CKA_SERIAL_NUMBER

MULTILINE_OCTAL

\002\020\141\160\313\111\214\137\230\105\051\347\260\246\331\120
\133\172

END

CKA_TRUST_SERVER_AUTH CK_TRUST CKT_NSS_MUST_VERIFY_TRUST

CKA_TRUST_EMAIL_PROTECTION

CK_TRUST CKT_NSS_TRUSTED_DELEGATOR

CKA_TRUST_CODE_SIGNING CK_TRUST CKT_NSS_MUST_VERIFY_TRUST

CKA_TRUST_STEP_UP_APPROVED CK_BBOOL CK_FALSE

#

Certificate "Entrust.net Premium 2048 Secure Server CA"

#

Issuer: CN=Entrust.net Certification Authority (2048),OU=(c) 1999 Entrust.net
Limited,OU=www.entrust.net/CPS_2048 incorp. by ref. (limits liab.),O=Entrust.net

Serial Number: 946069240 (0x3863def8)

Subject: CN=Entrust.net Certification Authority (2048),OU=(c) 1999 Entrust.net
Limited,OU=www.entrust.net/CPS_2048 incorp. by ref. (limits liab.),O=Entrust.net

Not Valid Before: Fri Dec 24 17:50:51 1999

Not Valid After : Tue Jul 24 14:15:12 2029

Fingerprint (SHA-256):

6D:C4:71:72:E0:1C:BC:B0:BF:62:58:0D:89:5F:E2:B8:AC:9A:D4:F8:73:80:1E:0C:10:B9:C8:37:D2:1E:B1:77

Fingerprint (SHA1): 50:30:06:09:1D:97:D4:F5:AE:39:F7:CB:E7:92:7D:7D:65:2D:34:31

CKA_CLASS CK_OBJECT_CLASS CKO_CERTIFICATE

CKA_TOKEN CK_BBOOL CK_TRUE

CKA_PRIVATE CK_BBOOL CK_FALSE

CKA_MODIFIABLE CK_BBOOL CK_FALSE

CKA_LABEL

UTF8 "Entrust.net Premium 2048 Secure Server CA"

CKA_CERTIFICATE_TYPE CK_CERTIFICATE_TYPE CKC_X_509

CKA_SUBJECT MULTILINE_OCTAL

\060\201\264\061\024\060\022\006\003\125\004\012\023\013\105\156
\164\162\165\163\164\056\156\145\164\061\100\060\076\006\003\125
\004\013\024\067\167\167\167\056\145\156\164\162\165\163\164\056
\156\145\164\057\103\120\123\137\062\060\064\070\040\151\156\143
\157\162\160\056\040\142\171\040\162\145\146\056\040\050\154\151
\155\151\164\163\040\154\151\141\142\056\051\061\045\060\043\006
\003\125\004\013\023\034\050\143\051\040\061\071\071\071\040\105
\156\164\162\165\163\164\056\156\145\164\040\114\151\155\151\164
\145\144\061\063\060\061\006\003\125\004\003\023\052\105\156\164
\162\165\163\164\056\156\145\164\040\103\145\162\164\151\146\151
\143\141\164\151\157\156\040\101\165\164\150\157\162\151\164\171
\040\050\062\060\064\070\051

END

CKA_ID UTF8 "0"

CKA_ISSUER MULTILINE_OCTAL

\060\201\264\061\024\060\022\006\003\125\004\012\023\013\105\156
\164\162\165\163\164\056\156\145\164\061\100\060\076\006\003\125
\004\013\024\067\167\167\167\056\145\156\164\162\165\163\164\056
\156\145\164\057\103\120\123\137\062\060\064\070\040\151\156\143
\157\162\160\056\040\142\171\040\162\145\146\056\040\050\154\151
\155\151\164\163\040\154\151\141\142\056\051\061\045\060\043\006
\003\125\004\013\023\034\050\143\051\040\061\071\071\071\040\105
\156\164\162\165\163\164\056\156\145\164\040\114\151\155\151\164
\145\144\061\063\060\061\006\003\125\004\003\023\052\105\156\164
\162\165\163\164\056\156\145\164\040\103\145\162\164\151\146\151
\143\141\164\151\157\156\040\101\165\164\150\157\162\151\164\171
\040\050\062\060\064\070\051

END

CKA_SERIAL_NUMBER

MULTILINE_OCTAL

\002\004\070\143\336\370

END

CKA_VALUE MULTILINE_OCTAL

\060\202\004\052\060\202\003\022\240\003\002\001\002\002\004\070
\143\336\370\060\015\006\011\052\206\110\206\367\015\001\001\005
\005\000\060\201\264\061\024\060\022\006\003\125\004\012\023\013
\105\156\164\162\165\163\164\056\156\145\164\061\100\060\076\006
\003\125\004\013\024\067\167\167\167\056\145\156\164\162\165\163
\164\056\156\145\164\057\103\120\123\137\062\060\064\070\040\151
\156\143\157\162\160\056\040\142\171\040\162\145\146\056\040\050
\154\151\155\151\164\163\040\154\151\141\142\056\051\061\045\060
\043\006\003\125\004\013\023\034\050\143\051\040\061\071\071\071
\040\105\156\164\162\165\163\164\056\156\145\164\040\114\151\155
\151\164\145\144\061\063\060\061\006\003\125\004\003\023\052\105
\156\164\162\165\163\164\056\156\145\164\040\103\145\162\164\151
\146\151\143\141\164\151\157\156\040\101\165\164\150\157\162\151
\164\171\040\050\062\060\064\070\051\060\036\027\015\071\071\061

\062\062\064\061\067\065\060\065\061\132\027\015\062\071\060\067
\062\064\061\064\061\065\061\062\132\060\201\264\061\024\060\022
\006\003\125\004\012\023\013\105\156\164\162\165\163\164\056\156
\145\164\061\100\060\076\006\003\125\004\013\024\067\167\167\167
\056\145\156\164\162\165\163\164\056\156\145\164\057\103\120\123
\137\062\060\064\070\040\151\156\143\157\162\160\056\040\142\171
\040\162\145\146\056\040\050\154\151\155\151\164\163\040\154\151
\141\142\056\051\061\045\060\043\006\003\125\004\013\023\034\050
\143\051\040\061\071\071\071\040\105\156\164\162\165\163\164\056
\156\145\164\040\114\151\155\151\164\145\144\061\063\060\061\006
\003\125\004\003\023\052\105\156\164\162\165\163\164\056\156\145
\164\040\103\145\162\164\151\146\151\143\141\164\151\157\156\040
\101\165\164\150\157\162\151\164\171\040\050\062\060\064\070\051
\060\202\001\042\060\015\006\011\052\206\110\206\367\015\001\001
\001\005\000\003\202\001\017\000\060\202\001\012\002\202\001\001
\000\255\115\113\251\022\206\262\352\243\040\007\025\026\144\052
\053\113\321\277\013\112\115\216\355\200\166\245\147\267\170\100
\300\163\102\310\150\300\333\123\053\335\136\270\166\230\065\223
\213\032\235\174\023\072\016\037\133\267\036\317\345\044\024\036
\261\201\251\215\175\270\314\153\113\003\361\002\014\334\253\245
\100\044\000\177\164\224\241\235\010\051\263\210\013\365\207\167
\235\125\315\344\303\176\327\152\144\253\205\024\206\225\133\227
\062\120\157\075\310\272\146\014\343\374\275\270\111\301\166\211
\111\031\375\300\250\275\211\243\147\057\306\237\274\161\031\140
\270\055\351\054\311\220\166\146\173\224\342\257\170\326\145\123
\135\074\326\234\262\317\051\003\371\057\244\120\262\324\110\316
\005\062\125\212\375\262\144\114\016\344\230\007\165\333\177\337
\271\010\125\140\205\060\051\371\173\110\244\151\206\343\065\077
\036\206\135\172\172\025\275\357\000\216\025\042\124\027\000\220
\046\223\274\016\111\150\221\277\370\107\323\235\225\102\301\016
\115\337\157\046\317\303\030\041\142\146\103\160\326\325\300\007
\341\002\003\001\000\001\243\102\060\100\060\016\006\003\125\035
\017\001\001\377\004\004\003\002\001\006\060\017\006\003\125\035
\023\001\001\377\004\005\060\003\001\001\377\060\035\006\003\125
\035\016\004\026\004\024\125\344\201\321\021\200\276\330\211\271
\010\243\061\371\241\044\011\026\271\160\060\015\006\011\052\206
\110\206\367\015\001\001\005\005\000\003\202\001\001\000\073\233
\217\126\233\060\347\123\231\174\172\171\247\115\227\327\031\225
\220\373\006\037\312\063\174\106\143\217\226\146\044\372\100\033
\041\047\312\346\162\163\362\117\376\061\231\375\310\014\114\150
\123\306\200\202\023\230\372\266\255\332\135\075\361\316\156\366
\025\021\224\202\014\356\077\225\257\021\253\017\327\057\336\037
\003\217\127\054\036\311\273\232\032\104\225\353\030\117\246\037
\315\175\127\020\057\233\004\011\132\204\265\156\330\035\072\341
\326\236\321\154\171\136\171\034\024\305\343\320\114\223\073\145
\074\355\337\075\276\246\345\225\032\303\265\031\303\275\136\133
\273\377\043\357\150\031\313\022\223\047\134\003\055\157\060\320
\036\266\032\254\336\132\367\321\252\250\047\246\376\171\201\304

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\171\231\063\127\272\022\260\251\340\102\154\223\312\126\336\376
\155\204\013\010\213\176\215\352\327\230\041\306\363\347\074\171
\057\136\234\321\114\025\215\341\354\042\067\314\232\103\013\227
\334\200\220\215\263\147\233\157\110\010\025\126\317\277\361\053
\174\136\232\166\351\131\220\305\174\203\065\021\145\121
END
CKA_NSS_Mozilla_CA_POLICY
CK_BBOOL CK_TRUE
CKA_NSS_SERVER_DISTRUST_AFTER CK_BBOOL CK_FALSE
CKA_NSS_EMAIL_DISTRUST_AFTER CK_BBOOL CK_FALSE

# Trust for "Entrust.net Premium 2048 Secure Server CA"
# Issuer: CN=Entrust.net Certification Authority (2048),OU=(c) 1999 Entrust.net
Limited,OU=www.entrust.net/CPS_2048 incorp. by ref. (limits liab.),O=Entrust.net
# Serial Number: 946069240 (0x3863def8)
# Subject: CN=Entrust.net Certification Authority (2048),OU=(c) 1999 Entrust.net
Limited,OU=www.entrust.net/CPS_2048 incorp. by ref. (limits liab.),O=Entrust.net
# Not Valid Before: Fri Dec 24 17:50:51 1999
# Not Valid After : Tue Jul 24 14:15:12 2029
# Fingerprint (SHA-256):
6D:C4:71:72:E0:1C:BC:B0:BF:62:58:0D:89:5F:E2:B8:AC:9A:D4:F8:73:80:1E:0C:10:B9:C8:37:D2:1E:B1:77
# Fingerprint (SHA1): 50:30:06:09:1D:97:D4:F5:AE:39:F7:CB:E7:92:7D:7D:65:2D:34:31
CKA_CLASS CK_OBJECT_CLASS CKO_NSS_TRUST
CKA_TOKEN
CK_BBOOL CK_TRUE
CKA_PRIVATE CK_BBOOL CK_FALSE
CKA_MODIFIABLE CK_BBOOL CK_FALSE
CKA_LABEL UTF8 "Entrust.net Premium 2048 Secure Server CA"
CKA_CERT_SHA1_HASH MULTILINE_OCTAL
\120\060\006\011\035\227\324\365\256\071\367\313\347\222\175\175
\145\055\064\061
END
CKA_CERT_MD5_HASH MULTILINE_OCTAL
\356\051\061\274\062\176\232\346\350\265\367\121\264\064\161\220
END
CKA_ISSUER MULTILINE_OCTAL
\060\201\264\061\024\060\022\006\003\125\004\012\023\013\105\156
\164\162\165\163\164\056\156\145\164\061\100\060\076\006\003\125
\004\013\024\067\167\167\167\056\145\156\164\162\165\163\164\056
\156\145\164\057\103\120\123\137\062\060\064\070\040\151\156\143
\157\162\160\056\040\142\171\040\162\145\146\056\040\050\154\151
\155\151\164\163\040\154\151\141\142\056\051\061\045\060\043\006
\003\125\004\013\023\034\050\143\051\040\061\071\071\071\040\105
\156\164\162\165\163\164\056\156\145\164\040\114\151\155\151\164
\145\144\061\063\060\061\006\003\125\004\003\023\052\105\156\164
\162\165\163\164\056\156\145\164\040\103\145\162\164\151\146\151
\143\141\164\151\157\156\040\101\165\164\150\157\162\151\164\171
\040\050\062\060\064\070\051

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END
CKA_SERIAL_NUMBER
MULTILINE_OCTAL
\002\004\070\143\336\370
END
CKA_TRUST_SERVER_AUTH CK_TRUST CKT_NSS_TRUSTED_DELEGATOR
CKA_TRUST_EMAIL_PROTECTION CK_TRUST CKT_NSS_TRUSTED_DELEGATOR
CKA_TRUST_CODE_SIGNING CK_TRUST CKT_NSS_MUST_VERIFY_TRUST
CKA_TRUST_STEP_UP_APPROVED CK_BBOOL CK_FALSE

#
# Certificate "Baltimore CyberTrust Root"
#
# Issuer: CN=Baltimore CyberTrust Root,OU=CyberTrust,O=Baltimore,C=IE
# Serial Number: 33554617 (0x20000b9)
# Subject: CN=Baltimore CyberTrust Root,OU=CyberTrust,O=Baltimore,C=IE
# Not Valid Before: Fri May 12 18:46:00 2000
# Not Valid After : Mon May 12 23:59:00 2025
# Fingerprint (SHA-256):
16:AF:57:A9:F6:76:B0:AB:12:60:95:AA:5E:BA:DE:F2:2A:B3:11:19:D6:44:AC:95:CD:4B:93:DB:F3:F2:6A:EB
# Fingerprint (SHA1): D4:DE:20:D0:5E:66:FC:53:FE:1A:50:88:2C:78:DB:28:52:CA:E4:74
CKA_CLASS CK_OBJECT_CLASS CKO_CERTIFICATE
CKA_TOKEN
CK_BBOOL CK_TRUE
CKA_PRIVATE CK_BBOOL CK_FALSE
CKA_MODIFIABLE CK_BBOOL CK_FALSE
CKA_LABEL UTF8 "Baltimore CyberTrust Root"
CKA_CERTIFICATE_TYPE CK_CERTIFICATE_TYPE CKC_X_509
CKA_SUBJECT MULTILINE_OCTAL
\060\132\061\013\060\011\006\003\125\004\006\023\002\111\105\061
\022\060\020\006\003\125\004\012\023\011\102\141\154\164\151\155
\157\162\145\061\023\060\021\006\003\125\004\013\023\012\103\171
\142\145\162\124\162\165\163\164\061\042\060\040\006\003\125\004
\003\023\031\102\141\154\164\151\155\157\162\145\040\103\171\142
\145\162\124\162\165\163\164\040\122\157\157\164
END
CKA_ID UTF8 "0"
CKA_ISSUER MULTILINE_OCTAL
\060\132\061\013\060\011\006\003\125\004\006\023\002\111\105\061
\022\060\020\006\003\125\004\012\023\011\102\141\154\164\151\155
\157\162\145\061\023\060\021\006\003\125\004\013\023\012\103\171
\142\145\162\124\162\165\163\164\061\042\060\040\006\003\125\004
\003\023\031\102\141\154\164\151\155\157\162\145\040\103\171\142
\145\162\124\162\165\163\164\040\122\157\157\164
END
CKA_SERIAL_NUMBER
MULTILINE_OCTAL
\002\004\002\000\000\271

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END

CKA_VALUE MULTILINE_OCTAL

\060\202\003\167\060\202\002\137\240\003\002\001\002\002\004\002
\000\000\271\060\015\006\011\052\206\110\206\367\015\001\001\005
\005\000\060\132\061\013\060\011\006\003\125\004\006\023\002\111
\105\061\022\060\020\006\003\125\004\012\023\011\102\141\154\164
\151\155\157\162\145\061\023\060\021\006\003\125\004\013\023\012
\103\171\142\145\162\124\162\165\163\164\061\042\060\040\006\003
\125\004\003\023\031\102\141\154\164\151\155\157\162\145\040\103
\171\142\145\162\124\162\165\163\164\040\122\157\157\164\060\036
\027\015\060\060\060\065\061\062\061\070\064\066\060\060\132\027
\015\062\065\060\065\061\062\062\063\065\071\060\060\132\060\132
\061\013\060\011\006\003\125\004\006\023\002\111\105\061\022\060
\020\006\003\125\004\012\023\011\102\141\154\164\151\155\157\162
\145\061\023\060\021\006\003\125\004\013\023\012\103\171\142\145
\162\124\162\165\163\164\061\042\060\040\006\003\125\004\003\023
\031\102\141\154\164\151\155\157\162\145\040\103\171\142\145\162
\124\162\165\163\164\040\122\157\157\164\060\202\001\042\060\015
\006\011\052\206\110\206\367\015\001\001\001\005\000\003\202\001
\017\000\060\202\001\012\002\202\001\001\000\243\004\273\042\253
\230\075\127\350\046\162\232\265\171\324\051\342\341\350\225\200
\261\260\343\133\216\053\051\232\144\337\241\135\355\260\011\005
\155\333\050\056\316\142\242\142\376\264\210\332\022\353\070\353
\041\235\300\101\053\001\122\173\210\167\323\034\217\307\272\271
\210\265\152\011\347\163\350\021\100\247\321\314\312\142\215\055
\345\217\013\246\120\322\250\120\303\050\352\365\253\045\207\212
\232\226\034\251\147\270\077\014\325\367\371\122\023\057\302\033
\325\160\160\360\217\300\022\312\006\313\232\341\331\312\063\172
\167\326\370\354\271\361\150\104\102\110\023\322\300\302\244\256
\136\140\376\266\246\005\374\264\335\007\131\002\324\131\030\230
\143\365\245\143\340\220\014\175\135\262\006\172\363\205\352\353
\324\003\256\136\204\076\137\377\025\355\151\274\371\071\066\162
\165\317\167\122\115\363\311\220\054\271\075\345\311\043\123\077
\037\044\230\041\134\007\231\051\275\306\072\354\347\156\206\072
\153\227\164\143\063\275\150\030\061\360\170\215\166\277\374\236
\216\135\052\206\247\115\220\334\047\032\071\002\003\001\000\001
\243\105\060\103\060\035\006\003\125\035\016\004\026\004\024\345
\235\131\060\202\107\130\314\254\372\010\124\066\206\173\072\265
\004\115\360\060\022\006\003\125\035\023\001\001\377\004\010\060
\006\001\001\377\002\001\003\060\016\006\003\125\035\017\001\001
\377\004\004\003\002\001\006\060\015\006\011\052\206\110\206\367
\015\001\001\005\005\000\003\202\001\001\000\205\014\135\216\344
\157\121\150\102\005\240\335\273\117\047\045\204\003\275\367\144
\375\055\327\060\343\244\020\027\353\332\051\051\266\171\077\166
\366\031\023\043\270\020\012\371\130\244\324\141\160\275\004\141
\152\022\212\027\325\012\275\305\274\060\174\326\351\014\045\215
\206\100\117\354\314\243\176\070\306\067\021\117\355\335\150\061
\216\114\322\263\001\164\356\276\165\136\007\110\032\177\160\377

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\026\134\204\300\171\205\270\005\375\177\276\145\021\243\017\300
\002\264\370\122\067\071\004\325\251\061\172\030\277\240\052\364
\022\231\367\243\105\202\343\074\136\365\235\236\265\310\236\174
\056\310\244\236\116\010\024\113\155\375\160\155\153\032\143\275
\144\346\037\267\316\360\362\237\056\273\033\267\362\120\210\163
\222\302\342\343\026\215\232\062\002\253\216\030\335\351\020\021
\356\176\065\253\220\257\076\060\224\172\320\063\075\247\145\017
\365\374\216\236\142\317\107\104\054\001\135\273\035\265\062\322
\107\322\070\056\320\376\201\334\062\152\036\265\356\074\325\374
\347\201\035\031\303\044\102\352\143\071\251
```

END

CKA_NSS_MOZILLA_CA_POLICY

CK_BBOOL CK_TRUE

CKA_NSS_SERVER_DISTRUST_AFTER CK_BBOOL CK_FALSE

CKA_NSS_EMAIL_DISTRUST_AFTER CK_BBOOL CK_FALSE

Trust for "Baltimore CyberTrust Root"

Issuer: CN=Baltimore CyberTrust Root,OU=CyberTrust,O=Baltimore,C=IE

Serial Number: 33554617

(0x20000b9)

Subject: CN=Baltimore CyberTrust Root,OU=CyberTrust,O=Baltimore,C=IE

Not Valid Before: Fri May 12 18:46:00 2000

Not Valid After : Mon May 12 23:59:00 2025

Fingerprint (SHA-256):

16:AF:57:A9:F6:76:B0:AB:12:60:95:AA:5E:BA:DE:F2:2A:B3:11:19:D6:44:AC:95:CD:4B:93:DB:F3:F2:6A:EB

Fingerprint (SHA1): D4:DE:20:D0:5E:66:FC:53:FE:1A:50:88:2C:78:DB:28:52:CA:E4:74

CKA_CLASS CK_OBJECT_CLASS CKO_NSS_TRUST

CKA_TOKEN CK_BBOOL CK_TRUE

CKA_PRIVATE CK_BBOOL CK_FALSE

CKA_MODIFIABLE CK_BBOOL CK_FALSE

CKA_LABEL UTF8 "Baltimore CyberTrust Root"

CKA_CERT_SHA1_HASH MULTILINE_OCTAL

```
\324\336\040\320\136\146\374\123\376\032\120\210\054\170\333\050
\122\312\344\164
```

END

CKA_CERT_MD5_HASH MULTILINE_OCTAL

```
\254\266\224\245\234\027\340\327\221\122\233\261\227\006\246\344
```

END

CKA_ISSUER MULTILINE_OCTAL

```
\060\132\061\013\060\011\006\003\125\004\006\023\002\111\105\061
\022\060\020\006\003\125\004\012\023\011\102\141\154\164\151\155
\157\162\145\061\023\060\021\006\003\125\004\013\023\012\103\171
\142\145\162\124\162\165\163\164\061\042\060\040\006\003\125\004
\003\023\031\102\141\154\164\151\155\157\162\145\040\103\171\142
\145\162\124\162\165\163\164\040\122\157\157\164
```

END

CKA_SERIAL_NUMBER

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MULTILINE_OCTAL
\002\004\002\000\000\271
END
CKA_TRUST_SERVER_AUTH CK_TRUST CKT_NSS_TRUSTED_DELEGATOR
CKA_TRUST_EMAIL_PROTECTION CK_TRUST CKT_NSS_TRUSTED_DELEGATOR
CKA_TRUST_CODE_SIGNING CK_TRUST CKT_NSS_MUST_VERIFY_TRUST
CKA_TRUST_STEP_UP_APPROVED CK_BBOOL CK_FALSE

#
# Certificate "Entrust Root Certification Authority"
#
# Issuer: CN=Entrust Root Certification Authority,OU="(c) 2006 Entrust, Inc.",OU=www.entrust.net/CPS is
incorporated by reference,O="Entrust, Inc.",C=US
# Serial Number: 1164660820 (0x456b5054)
# Subject: CN=Entrust Root Certification Authority,OU="(c) 2006 Entrust, Inc.",OU=www.entrust.net/CPS is
incorporated by reference,O="Entrust, Inc.",C=US
# Not Valid Before: Mon Nov 27 20:23:42 2006
# Not Valid After : Fri Nov 27 20:53:42 2026
# Fingerprint (SHA-256):
73:C1:76:43:4F:1B:C6:D5:AD:F4:5B:0E:76:E7:27:28:7C:8D:E5:76:16:C1:E6:E6:14:1A:2B:2C:BC:7D:8E:4C
#
Fingerprint (SHA1): B3:1E:B1:B7:40:E3:6C:84:02:DA:DC:37:D4:4D:F5:D4:67:49:52:F9
CKA_CLASS CK_OBJECT_CLASS CKO_CERTIFICATE
CKA_TOKEN CK_BBOOL CK_TRUE
CKA_PRIVATE CK_BBOOL CK_FALSE
CKA_MODIFIABLE CK_BBOOL CK_FALSE
CKA_LABEL UTF8 "Entrust Root Certification Authority"
CKA_CERTIFICATE_TYPE CK_CERTIFICATE_TYPE CKC_X_509
CKA_SUBJECT MULTILINE_OCTAL
\060\201\260\061\013\060\011\006\003\125\004\006\023\002\125\123
\061\026\060\024\006\003\125\004\012\023\015\105\156\164\162\165
\163\164\054\040\111\156\143\056\061\071\060\067\006\003\125\004
\013\023\060\167\167\167\056\145\156\164\162\165\163\164\056\156
\145\164\057\103\120\123\040\151\163\040\151\156\143\157\162\160
\157\162\141\164\145\144\040\142\171\040\162\145\146\145\162\145
\156\143\145\061\037\060\035\006\003\125\004\013\023\026\050\143
\051\040\062\060\060\066\040\105\156\164\162\165\163\164\054\040
\111\156\143\056\061\055\060\053\006\003\125\004\003\023\044\105
\156\164\162\165\163\164\040\122\157\157\164\040\103\145\162\164
\151\146\151\143\141\164\151\157\156\040\101\165\164\150\157\162
\151\164\171
END
CKA_ID
UTF8 "0"
CKA_ISSUER MULTILINE_OCTAL
\060\201\260\061\013\060\011\006\003\125\004\006\023\002\125\123
\061\026\060\024\006\003\125\004\012\023\015\105\156\164\162\165
\163\164\054\040\111\156\143\056\061\071\060\067\006\003\125\004

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\013\023\060\167\167\167\056\145\156\164\162\165\163\164\056\156
\145\164\057\103\120\123\040\151\163\040\151\156\143\157\162\160
\157\162\141\164\145\144\040\142\171\040\162\145\146\145\162\145
\156\143\145\061\037\060\035\006\003\125\004\013\023\026\050\143
\051\040\062\060\060\066\040\105\156\164\162\165\163\164\054\040
\111\156\143\056\061\055\060\053\006\003\125\004\003\023\044\105
\156\164\162\165\163\164\040\122\157\157\164\040\103\145\162\164
\151\146\151\143\141\164\151\157\156\040\101\165\164\150\157\162
\151\164\171

END

CKA_SERIAL_NUMBER MULTILINE_OCTAL

\002\004\105\153\120\124

END

CKA_VALUE

MULTILINE_OCTAL

\060\202\004\221\060\202\003\171\240\003\002\001\002\002\004\105
\153\120\124\060\015\006\011\052\206\110\206\367\015\001\001\005
\005\000\060\201\260\061\013\060\011\006\003\125\004\006\023\002
\125\123\061\026\060\024\006\003\125\004\012\023\015\105\156\164
\162\165\163\164\054\040\111\156\143\056\061\071\060\067\006\003
\125\004\013\023\060\167\167\167\056\145\156\164\162\165\163\164
\056\156\145\164\057\103\120\123\040\151\163\040\151\156\143\157
\162\160\157\162\141\164\145\144\040\142\171\040\162\145\146\145
\162\145\156\143\145\061\037\060\035\006\003\125\004\013\023\026
\050\143\051\040\062\060\060\066\040\105\156\164\162\165\163\164
\054\040\111\156\143\056\061\055\060\053\006\003\125\004\003\023
\044\105\156\164\162\165\163\164\040\122\157\157\164\040\103\145
\162\164\151\146\151\143\141\164\151\157\156\040\101\165\164\150
\157\162\151\164\171\060\036\027\015\060\066\061\061\062\067\062
\060\062\063\064\062\132\027\015\062\066\061\061\062\067\062\060
\065\063\064\062\132\060\201\260\061\013\060\011\006\003\125\004
\006\023\002\125\123\061\026\060\024\006\003\125\004\012\023\015
\105\156\164\162\165\163\164\054\040\111\156\143\056\061\071\060
\067\006\003\125\004\013\023\060\167\167\167\056\145\156\164\162
\165\163\164\056\156\145\164\057\103\120\123\040\151\163\040\151
\156\143\157\162\160\157\162\141\164\145\144\040\142\171\040\162
\145\146\145\162\145\156\143\145\061\037\060\035\006\003\125\004
\013\023\026\050\143\051\040\062\060\060\066\040\105\156\164\162
\165\163\164\054\040\111\156\143\056\061\055\060\053\006\003\125
\004\003\023\044\105\156\164\162\165\163\164\040\122\157\157\164
\040\103\145\162\164\151\146\151\143\141\164\151\157\156\040\101
\165\164\150\157\162\151\164\171\060\202\001\042\060\015\006\011
\052\206\110\206\367\015\001\001\001\005\000\003\202\001\017\000
\060\202\001\012\002\202\001\001\000\266\225\266\103\102\372\306
\155\052\157\110\337\224\114\071\127\005\356\303\171\021\101\150
\066\355\354\376\232\001\217\241\070\050\374\367\020\106\146\056
\115\036\032\261\032\116\306\321\300\225\210\260\311\377\061\213
\063\003\333\267\203\173\076\040\204\136\355\262\126\050\247\370

\340\271\100\161\067\305\313\107\016\227\052\150\300\042\225\142
\025\333\107\331\365\320\053\377\202\113\311\255\076\336\114\333
\220\200\120\077\011\212\204\000\354\060\012\075\030\315\373\375
\052\131\232\043\225\027\054\105\236\037\156\103\171\155\014\134
\230\376\110\247\305\043\107\134\136\375\156\347\036\264\366\150
\105\321\206\203\133\242\212\215\261\343\051\200\376\045\161\210
\255\276\274\217\254\122\226\113\252\121\215\344\023\061\031\350
\116\115\237\333\254\263\152\325\274\071\124\161\312\172\172\177
\220\335\175\035\200\331\201\273\131\046\302\021\376\346\223\342
\367\200\344\145\373\064\067\016\051\200\160\115\257\070\206\056
\236\177\127\257\236\027\256\353\034\313\050\041\137\266\034\330
\347\242\004\042\371\323\332\330\313\002\003\001\000\001\243\201
\260\060\201\255\060\016\006\003\125\035\017\001\001\377\004\004
\003\002\001\006\060\017\006\003\125\035\023\001\001\377\004\005
\060\003\001\001\377\060\053\006\003\125\035\020\004\044\060\042
\200\017\062\060\060\066\061\061\062\067\062\060\062\063\064\062
\132\201\017\062\060\062\066\061\061\062\067\062\060\065\063\064
\062\132\060\037\006\003\125\035\043\004\030\060\026\200\024\150
\220\344\147\244\246\123\200\307\206\146\244\361\367\113\103\373
\204\275\155\060\035\006\003\125\035\016\004\026\004\024\150\220
\344\147\244\246\123\200\307\206\146\244\361\367\113\103\373\204
\275\155\060\035\006\011\052\206\110\206\366\175\007\101\000\004
\020\060\016\033\010\126\067\056\061\072\064\056\060\003\002\004
\220\060\015\006\011\052\206\110\206\367\015\001\001\005\005\000
\003\202\001\001\000\223\324\060\260\327\003\040\052\320\371\143
\350\221\014\005\040\251\137\031\312\173\162\116\324\261\333\320
\226\373\124\132\031\054\014\010\367\262\274\205\250\235\177\155
\073\122\263\052\333\347\324\204\214\143\366\017\313\046\001\221
\120\154\364\137\024\342\223\164\300\023\236\060\072\120\343\264
\140\305\034\360\042\104\215\161\107\254\310\032\311\351\233\232
\000\140\023\377\160\176\137\021\115\111\033\263\025\122\173\311
\124\332\277\235\225\257\153\232\330\236\351\361\344\103\215\342
\021\104\072\277\257\275\203\102\163\122\213\252\273\247\051\317
\365\144\034\012\115\321\274\252\254\237\052\320\377\177\177\332
\175\352\261\355\060\045\301\204\332\064\322\133\170\203\126\354
\234\066\303\046\342\021\366\147\111\035\222\253\214\373\353\377
\172\356\205\112\247\120\200\360\247\134\112\224\056\137\005\231
\074\122\101\340\315\264\143\317\001\103\272\234\203\334\217\140
\073\363\132\264\264\173\256\332\013\220\070\165\357\201\035\146
\322\367\127\160\066\263\277\374\050\257\161\045\205\133\023\376
\036\177\132\264\074

END

CKA_NSS_MOZILLA_CA_POLICY

CK_BBOOL CK_TRUE

CKA_NSS_SERVER_DISTRUST_AFTER CK_BBOOL CK_FALSE

CKA_NSS_EMAIL_DISTRUST_AFTER CK_BBOOL CK_FALSE

Trust for "Entrust Root Certification Authority"

```

# Issuer: CN=Entrust
Root Certification Authority,OU="(c) 2006 Entrust, Inc.",OU=www.entrust.net/CPS is incorporated by
reference,O="Entrust, Inc.",C=US
# Serial Number: 1164660820 (0x456b5054)
# Subject: CN=Entrust Root Certification Authority,OU="(c) 2006 Entrust, Inc.",OU=www.entrust.net/CPS is
incorporated by reference,O="Entrust, Inc.",C=US
# Not Valid Before: Mon Nov 27 20:23:42 2006
# Not Valid After : Fri Nov 27 20:53:42 2026
# Fingerprint (SHA-256):
73:C1:76:43:4F:1B:C6:D5:AD:F4:5B:0E:76:E7:27:28:7C:8D:E5:76:16:C1:E6:E6:14:1A:2B:2C:BC:7D:8E:4C
# Fingerprint (SHA1): B3:1E:B1:B7:40:E3:6C:84:02:DA:DC:37:D4:4D:F5:D4:67:49:52:F9
CKA_CLASS CK_OBJECT_CLASS CKO_NSS_TRUST
CKA_TOKEN CK_BBOOL CK_TRUE
CKA_PRIVATE CK_BBOOL CK_FALSE
CKA_MODIFIABLE CK_BBOOL CK_FALSE
CKA_LABEL UTF8 "Entrust Root Certification Authority"
CKA_CERT_SHA1_HASH MULTILINE_OCTAL
\263\036\261\267\100\343\154\204\002\332\334\067\324\115\365\324
\147\111\122\371
END
CKA_CERT_MD5_HASH MULTILINE_OCTAL
\326\245\303\355\135\335\076\000\301\075\207\222\037\035\077\344
END
CKA_ISSUER
MULTILINE_OCTAL
\060\201\260\061\013\060\011\006\003\125\004\006\023\002\125\123
\061\026\060\024\006\003\125\004\012\023\015\105\156\164\162\165
\163\164\054\040\111\156\143\056\061\071\060\067\006\003\125\004
\013\023\060\167\167\167\056\145\156\164\162\165\163\164\056\156
\145\164\057\103\120\123\040\151\163\040\151\156\143\157\162\160
\157\162\141\164\145\144\040\142\171\040\162\145\146\145\162\145
\156\143\145\061\037\060\035\006\003\125\004\013\023\026\050\143
\051\040\062\060\060\066\040\105\156\164\162\165\163\164\054\040
\111\156\143\056\061\055\060\053\006\003\125\004\003\023\044\105
\156\164\162\165\163\164\040\122\157\157\164\040\103\145\162\164
\151\146\151\143\141\164\151\157\156\040\101\165\164\150\157\162
\151\164\171
END
CKA_SERIAL_NUMBER MULTILINE_OCTAL
\002\004\105\153\120\124
END
CKA_TRUST_SERVER_AUTH CK_TRUST CKT_NSS_TRUSTED_DELEGATOR
CKA_TRUST_EMAIL_PROTECTION CK_TRUST CKT_NSS_MUST_VERIFY_TRUST
CKA_TRUST_CODE_SIGNING CK_TRUST
CKT_NSS_MUST_VERIFY_TRUST
CKA_TRUST_STEP_UP_APPROVED CK_BBOOL CK_FALSE

#

```

```

# Certificate "Certum Root CA"
#
# Issuer: CN=Certum CA,O=Unizeto Sp. z o.o.,C=PL
# Serial Number: 65568 (0x10020)
# Subject: CN=Certum CA,O=Unizeto Sp. z o.o.,C=PL
# Not Valid Before: Tue Jun 11 10:46:39 2002
# Not Valid After : Fri Jun 11 10:46:39 2027
# Fingerprint (SHA-256):
D8:E0:FE:BC:1D:B2:E3:8D:00:94:0F:37:D2:7D:41:34:4D:99:3E:73:4B:99:D5:65:6D:97:78:D4:D8:14:36:24
# Fingerprint (SHA1): 62:52:DC:40:F7:11:43:A2:2F:DE:9E:F7:34:8E:06:42:51:B1:81:18
CKA_CLASS CK_OBJECT_CLASS CKO_CERTIFICATE
CKA_TOKEN CK_BBOOL CK_TRUE
CKA_PRIVATE CK_BBOOL CK_FALSE
CKA_MODIFIABLE CK_BBOOL CK_FALSE
CKA_LABEL UTF8 "Certum Root CA"
CKA_CERTIFICATE_TYPE CK_CERTIFICATE_TYPE CKC_X_509
CKA_SUBJECT MULTILINE_OCTAL
\060\076\061\013\060\011\006\003\125\004\006\023\002\120\114\061
\033\060\031\006\003\125\004\012\023\022\125\156\151\172\145\164
\157\040\123\160\056\040\172\040\157\056\157\056\061\022\060\020
\006\003\125\004\003\023\011\103\145\162\164\165\155\040\103\101
END
CKA_ID
UTF8 "0"
CKA_ISSUER MULTILINE_OCTAL
\060\076\061\013\060\011\006\003\125\004\006\023\002\120\114\061
\033\060\031\006\003\125\004\012\023\022\125\156\151\172\145\164
\157\040\123\160\056\040\172\040\157\056\157\056\061\022\060\020
\006\003\125\004\003\023\011\103\145\162\164\165\155\040\103\101
END
CKA_SERIAL_NUMBER MULTILINE_OCTAL
\002\003\001\000\040
END
CKA_VALUE MULTILINE_OCTAL
\060\202\003\014\060\202\001\364\240\003\002\001\002\002\003\001
\000\040\060\015\006\011\052\206\110\206\367\015\001\001\005\005
\000\060\076\061\013\060\011\006\003\125\004\006\023\002\120\114
\061\033\060\031\006\003\125\004\012\023\022\125\156\151\172\145
\164\157\040\123\160\056\040\172\040\157\056\157\056\061\022\060
\020\006\003\125\004\003\023\011\103\145\162\164\165\155\040\103
\101\060\036\027\015\060\062\060\066\061\061\061\060\064\066\063
\071\132\027\015\062\067\060\066\061\061\061\060\064\066\063\071
\132\060\076\061\013\060\011\006\003\125\004\006\023\002\120\114
\061\033\060\031\006\003\125\004\012\023\022\125\156\151\172\145
\164\157\040\123\160\056\040\172\040\157\056\157\056\061\022\060
\020\006\003\125\004\003\023\011\103\145\162\164\165\155\040\103
\101\060\202\001\042\060\015\006\011\052\206\110\206\367\015\001
\001\001\005\000\003\202\001\017\000\060\202\001\012\002\202\001

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\001\000\316\261\301\056\323\117\174\315\045\316\030\076\117\304
\214\157\200\152\163\310\133\121\370\233\322\334\273\000\134\261
\240\374\165\003\356\201\360\210\356\043\122\351\346\025\063\215
\254\055\011\305\166\371\053\071\200\211\344\227\113\220\245\250
\170\370\163\103\173\244\141\260\330\130\314\341\154\146\176\234
\363\011\136\125\143\204\325\250\357\363\261\056\060\150\263\304
\074\330\254\156\215\231\132\220\116\064\334\066\232\217\201\210
\120\267\155\226\102\011\363\327\225\203\015\101\113\260\152\153
\370\374\017\176\142\237\147\304\355\046\137\020\046\017\010\117
\360\244\127\050\316\217\270\355\105\366\156\356\045\135\252\156
\071\276\344\223\057\331\107\240\162\353\372\246\133\257\312\123
\077\342\016\306\226\126\021\156\367\351\146\251\046\330\177\225
\123\355\012\205\210\272\117\051\245\102\214\136\266\374\205\040
\000\252\150\013\241\032\205\001\234\304\106\143\202\210\266\042
\261\356\376\252\106\131\176\317\065\054\325\266\332\135\367\110
\063\024\124\266\353\331\157\316\315\210\326\253\033\332\226\073
\035\131\002\003\001\000\001\243\023\060\021\060\017\006\003\125
\035\023\001\001\377\004\005\060\003\001\001\377\060\015\006\011
\052\206\110\206\367\015\001\001\005\005\000\003\202\001\001\000
\270\215\316\357\347\024\272\317\356\260\104\222\154\264\071\076
\242\204\156\255\270\041\167\322\324\167\202\207\346\040\101\201
\356\342\370\021\267\143\321\027\067\276\031\166\044\034\004\032
\114\353\075\252\147\157\055\324\315\376\145\061\160\305\033\246
\002\012\272\140\173\155\130\302\232\111\376\143\062\013\153\343
\072\300\254\253\073\260\350\323\011\121\214\020\203\306\064\340
\305\053\340\032\266\140\024\047\154\062\167\214\274\262\162\230
\317\315\314\077\271\310\044\102\024\326\127\374\346\046\103\251
\035\345\200\220\316\003\124\050\076\367\077\323\370\115\355\152
\012\072\223\023\233\073\024\043\023\143\234\077\321\207\047\171
\345\114\121\343\001\255\205\135\032\073\261\325\163\020\244\323
\362\274\156\144\365\132\126\220\250\307\016\114\164\017\056\161
\073\367\310\107\364\151\157\025\362\021\136\203\036\234\174\122
\256\375\002\332\022\250\131\147\030\333\274\160\335\233\261\151
\355\200\316\211\100\110\152\016\065\312\051\146\025\041\224\054
\350\140\052\233\205\112\100\363\153\212\044\354\006\026\054\163
END

CKA_NSS_MOZILLA_CA_POLICY

CK_BBOOL CK_TRUE

CKA_NSS_SERVER_DISTRUST_AFTER CK_BBOOL CK_FALSE

CKA_NSS_EMAIL_DISTRUST_AFTER CK_BBOOL CK_FALSE

Trust for "Certum Root CA"

Issuer: CN=Certum CA,O=Unizeto Sp. z o.o.,C=PL

Serial Number: 65568 (0x10020)

Subject: CN=Certum CA,O=Unizeto Sp. z o.o.,C=PL

Not Valid Before: Tue Jun 11 10:46:39 2002

Not Valid After : Fri Jun 11

```

10:46:39 2027
# Fingerprint (SHA-256):
D8:E0:FE:BC:1D:B2:E3:8D:00:94:0F:37:D2:7D:41:34:4D:99:3E:73:4B:99:D5:65:6D:97:78:D4:D8:14:36:24
# Fingerprint (SHA1): 62:52:DC:40:F7:11:43:A2:2F:DE:9E:F7:34:8E:06:42:51:B1:81:18
CKA_CLASS CK_OBJECT_CLASS CKO_NSS_TRUST
CKA_TOKEN CK_BBOOL CK_TRUE
CKA_PRIVATE CK_BBOOL CK_FALSE
CKA_MODIFIABLE CK_BBOOL CK_FALSE
CKA_LABEL UTF8 "Certum Root CA"
CKA_CERT_SHA1_HASH MULTILINE_OCTAL
\142\122\334\100\367\021\103\242\057\336\236\367\064\216\006\102
\121\261\201\030
END
CKA_CERT_MD5_HASH MULTILINE_OCTAL
\054\217\237\146\035\030\220\261\107\046\235\216\206\202\214\251
END
CKA_ISSUER MULTILINE_OCTAL
\060\076\061\013\060\011\006\003\125\004\006\023\002\120\114\061
\033\060\031\006\003\125\004\012\023\022\125\156\151\172\145\164
\157\040\123\160\056\040\172\040\157\056\157\056\061\022\060\020
\006\003\125\004\003\023\011\103\145\162\164\165\155\040\103\101
END
CKA_SERIAL_NUMBER MULTILINE_OCTAL
\002\003\001\000\040
END
CKA_TRUST_SERVER_AUTH CK_TRUST CKT_NSS_MUST_VERIFY_TRUST
CKA_TRUST_EMAIL_PROTECTION
CK_TRUST CKT_NSS_TRUSTED_DELEGATOR
CKA_TRUST_CODE_SIGNING CK_TRUST CKT_NSS_MUST_VERIFY_TRUST
CKA_TRUST_STEP_UP_APPROVED CK_BBOOL CK_FALSE

#
# Certificate "Comodo AAA Services root"
#
# Issuer: CN=AAA Certificate Services,O=Comodo CA Limited,L=Salford,ST=Greater Manchester,C=GB
# Serial Number: 1 (0x1)
# Subject: CN=AAA Certificate Services,O=Comodo CA Limited,L=Salford,ST=Greater Manchester,C=GB
# Not Valid Before: Thu Jan 01 00:00:00 2004
# Not Valid After : Sun Dec 31 23:59:59 2028
# Fingerprint (SHA-256):
D7:A7:A0:FB:5D:7E:27:31:D7:71:E9:48:4E:BC:DE:F7:1D:5F:0C:3E:0A:29:48:78:2B:C8:3E:E0:EA:69:9E:F4
# Fingerprint (SHA1): D1:EB:23:A4:6D:17:D6:8F:D9:25:64:C2:F1:F1:60:17:64:D8:E3:49
CKA_CLASS CK_OBJECT_CLASS CKO_CERTIFICATE
CKA_TOKEN CK_BBOOL CK_TRUE
CKA_PRIVATE CK_BBOOL CK_FALSE
CKA_MODIFIABLE CK_BBOOL CK_FALSE
CKA_LABEL UTF8 "Comodo AAA Services root"
CKA_CERTIFICATE_TYPE CK_CERTIFICATE_TYPE CKC_X_509

```

CKA_SUBJECT MULTILINE_OCTAL

\060\173\061\013\060\011\006\003\125\004\006\023\002\107\102\061
\033\060\031\006\003\125\004\010\014\022\107\162\145\141\164\145
\162\040\115\141\156\143\150\145\163\164\145\162\061\020\060\016
\006\003\125\004\007\014\007\123\141\154\146\157\162\144\061\032
\060\030\006\003\125\004\012\014\021\103\157\155\157\144\157\040
\103\101\040\114\151\155\151\164\145\144\061\041\060\037\006\003
\125\004\003\014\030\101\101\101\040\103\145\162\164\151\146\151
\143\141\164\145\040\123\145\162\166\151\143\145\163

END

CKA_ID

UTF8 "0"

CKA_ISSUER MULTILINE_OCTAL

\060\173\061\013\060\011\006\003\125\004\006\023\002\107\102\061
\033\060\031\006\003\125\004\010\014\022\107\162\145\141\164\145
\162\040\115\141\156\143\150\145\163\164\145\162\061\020\060\016
\006\003\125\004\007\014\007\123\141\154\146\157\162\144\061\032
\060\030\006\003\125\004\012\014\021\103\157\155\157\144\157\040
\103\101\040\114\151\155\151\164\145\144\061\041\060\037\006\003
\125\004\003\014\030\101\101\101\040\103\145\162\164\151\146\151
\143\141\164\145\040\123\145\162\166\151\143\145\163

END

CKA_SERIAL_NUMBER

MULTILINE_OCTAL

\002\001\001

END

CKA_VALUE MULTILINE_OCTAL

\060\202\004\062\060\202\003\032\240\003\002\001\002\002\001\001
\060\015\006\011\052\206\110\206\367\015\001\001\005\005\000\060
\173\061\013\060\011\006\003\125\004\006\023\002\107\102\061\033
\060\031\006\003\125\004\010\014\022\107\162\145\141\164\145\162
\040\115\141\156\143\150\145\163\164\145\162\061\020\060\016\006
\003\125\004\007\014\007\123\141\154\146\157\162\144\061\032\060
\030\006\003\125\004\012\014\021\103\157\155\157\144\157\040\103
\101\040\114\151\155\151\164\145\144\061\041\060\037\006\003\125
\004\003\014\030\101\101\101\040\103\145\162\164\151\146\151\143
\141\164\145\040\123\145\162\166\151\143\145\163\060\036\027\015
\060\064\060\061\060\061\060\060\060\060\060\060\132\027\015\062
\070\061\062\063\061\062\063\065\071\065\071\132\060\173\061\013
\060\011\006\003\125\004\006\023\002\107\102\061\033\060\031\006
\003\125\004\010\014\022\107\162\145\141\164\145\162\040\115\141
\156\143\150\145\163\164\145\162\061\020\060\016\006\003\125\004
\007\014\007\123\141\154\146\157\162\144\061\032\060\030\006\003
\125\004\012\014\021\103\157\155\157\144\157\040\103\101\040\114
\151\155\151\164\145\144\061\041\060\037\006\003\125\004\003\014
\030\101\101\101\040\103\145\162\164\151\146\151\143\141\164\145
\040\123\145\162\166\151\143\145\163\060\202\001\042\060\015\006
\011\052\206\110\206\367\015\001\001\001\005\000\003\202\001\017

\000\060\202\001\012\002\202\001\001\000\276\100\235\364\156\341
\352\166\207\034\115\105\104\216\276\106\310\203\006\235\301\052
\376\030\037\216\344\002\372\363\253\135\120\212\026\061\013\232
\006\320\305\160\042\315\111\055\124\143\314\266\156\150\106\013
\123\352\313\114\044\300\274\162\116\352\361\025\256\364\124\232
\022\012\303\172\262\063\140\342\332\211\125\363\042\130\363\336
\334\317\357\203\206\242\214\224\117\237\150\362\230\220\106\204
\047\307\166\277\343\314\065\054\213\136\007\144\145\202\300\110
\260\250\221\371\141\237\166\040\120\250\221\307\146\265\353\170
\142\003\126\360\212\032\023\352\061\243\036\240\231\375\070\366
\366\047\062\130\157\007\365\153\270\373\024\053\257\267\252\314
\326\143\137\163\214\332\005\231\250\070\250\313\027\170\066\121
\254\351\236\364\170\072\215\317\017\331\102\342\230\014\253\057
\237\016\001\336\357\237\231\111\361\055\337\254\164\115\033\230
\265\107\305\345\051\321\371\220\030\307\142\234\276\203\307\046
\173\076\212\045\307\300\335\235\346\065\150\020\040\235\217\330
\336\322\303\204\234\015\136\350\057\311\002\003\001\000\001\243
\201\300\060\201\275\060\035\006\003\125\035\016\004\026\004\024
\240\021\012\043\076\226\361\007\354\342\257\051\357\202\245\177
\320\060\244\264\060\016\006\003\125\035\017\001\001\377\004\004
\003\002\001\006\060\017\006\003\125\035\023\001\001\377\004\005
\060\003\001\001\377\060\173\006\003\125\035\037\004\164\060\162
\060\070\240\066\240\064\206\062\150\164\164\160\072\057\057\143
\162\154\056\143\157\155\157\144\157\143\141\056\143\157\155\057
\101\101\101\103\145\162\164\151\146\151\143\141\164\145\123\145
\162\166\151\143\145\163\056\143\162\154\060\066\240\064\240\062
\206\060\150\164\164\160\072\057\057\143\162\154\056\143\157\155
\157\144\157\056\156\145\164\057\101\101\101\103\145\162\164\151
\146\151\143\141\164\145\123\145\162\166\151\143\145\163\056\143
\162\154\060\015\006\011\052\206\110\206\367\015\001\001\005\005
\000\003\202\001\001\000\010\126\374\002\360\233\350\377\244\372
\326\173\306\104\200\316\117\304\305\366\000\130\314\246\266\274
\024\111\150\004\166\350\346\356\135\354\002\017\140\326\215\120
\030\117\046\116\001\343\346\260\245\356\277\274\164\124\101\277
\375\374\022\270\307\117\132\364\211\140\005\177\140\267\005\112
\363\366\361\302\277\304\271\164\206\266\055\175\153\314\322\363
\106\335\057\306\340\152\303\303\064\003\054\175\226\335\132\302
\016\247\012\231\301\005\213\253\014\057\363\134\072\317\154\067
\125\011\207\336\123\100\154\130\357\374\266\253\145\156\004\366
\033\334\074\340\132\025\306\236\331\361\131\110\060\041\145\003
\154\354\351\041\163\354\233\003\241\340\067\255\240\025\030\217
\372\272\002\316\247\054\251\020\023\054\324\345\010\046\253\042
\227\140\370\220\136\164\324\242\232\123\275\362\251\150\340\242
\156\302\327\154\261\243\017\236\277\353\150\347\126\362\256\362
\343\053\070\072\011\201\265\153\205\327\276\055\355\077\032\267
\262\143\342\365\142\054\202\324\152\000\101\120\361\071\203\237
\225\351\066\226\230\156

END

```

CKA_NSS_Mozilla_CA_POLICY
CK_BBOOL CK_TRUE
CKA_NSS_SERVER_DISTRUST_AFTER CK_BBOOL CK_FALSE
CKA_NSS_EMAIL_DISTRUST_AFTER CK_BBOOL CK_FALSE

# Trust for "Comodo AAA Services root"
# Issuer: CN=AAA Certificate Services,O=Comodo CA Limited,L=Salford,ST=Greater Manchester,C=GB
# Serial Number: 1 (0x1)
# Subject: CN=AAA Certificate Services,O=Comodo CA Limited,L=Salford,ST=Greater Manchester,C=GB
# Not Valid Before: Thu Jan 01 00:00:00 2004
# Not Valid After : Sun Dec 31 23:59:59 2028
# Fingerprint
(SHA-256):
D7:A7:A0:FB:5D:7E:27:31:D7:71:E9:48:4E:BC:DE:F7:1D:5F:0C:3E:0A:29:48:78:2B:C8:3E:E0:EA:69:9E:F4
# Fingerprint (SHA1): D1:EB:23:A4:6D:17:D6:8F:D9:25:64:C2:F1:F1:60:17:64:D8:E3:49
CKA_CLASS CK_OBJECT_CLASS CKO_NSS_TRUST
CKA_TOKEN CK_BBOOL CK_TRUE
CKA_PRIVATE CK_BBOOL CK_FALSE
CKA_MODIFIABLE CK_BBOOL CK_FALSE
CKA_LABEL UTF8 "Comodo AAA Services root"
CKA_CERT_SHA1_HASH MULTILINE_OCTAL
\321\353\043\244\155\027\326\217\331\045\144\302\361\361\140\027
\144\330\343\111
END
CKA_CERT_MD5_HASH MULTILINE_OCTAL
\111\171\004\260\353\207\031\254\107\260\274\021\121\233\164\320
END
CKA_ISSUER MULTILINE_OCTAL
\060\173\061\013\060\011\006\003\125\004\006\023\002\107\102\061
\033\060\031\006\003\125\004\010\014\022\107\162\145\141\164\145
\162\040\115\141\156\143\150\145\163\164\145\162\061\020\060\016
\006\003\125\004\007\014\007\123\141\154\146\157\162\144\061\032
\060\030\006\003\125\004\012\014\021\103\157\155\157\144\157\040
\103\101\040\114\151\155\151\164\145\144\061\041\060\037\006\003
\125\004\003\014\030\101\101\101\040\103\145\162\164\151\146\151
\143\141\164\145\040\123\145\162\166\151\143\145\163
END
CKA_SERIAL_NUMBER
MULTILINE_OCTAL
\002\001\001
END
CKA_TRUST_SERVER_AUTH CK_TRUST CKT_NSS_TRUSTED_DELEGATOR
CKA_TRUST_EMAIL_PROTECTION CK_TRUST CKT_NSS_TRUSTED_DELEGATOR
CKA_TRUST_CODE_SIGNING CK_TRUST CKT_NSS_MUST_VERIFY_TRUST
CKA_TRUST_STEP_UP_APPROVED CK_BBOOL CK_FALSE

#
# Certificate "QuoVadis Root CA 2"

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#
# Issuer: CN=QuoVadis Root CA 2,O=QuoVadis Limited,C=BM
# Serial Number: 1289 (0x509)
# Subject: CN=QuoVadis Root CA 2,O=QuoVadis Limited,C=BM
# Not Valid Before: Fri Nov 24 18:27:00 2006
# Not Valid After : Mon Nov 24 18:23:33 2031
# Fingerprint (SHA-256):
85:A0:DD:7D:D7:20:AD:B7:FF:05:F8:3D:54:2B:20:9D:C7:FF:45:28:F7:D6:77:B1:83:89:FE:A5:E5:C4:9E:86
# Fingerprint (SHA1): CA:3A:FB:CF:12:40:36:4B:44:B2:16:20:88:80:48:39:19:93:7C:F7
CKA_CLASS CK_OBJECT_CLASS CKO_CERTIFICATE
CKA_TOKEN CK_BBOOL CK_TRUE
CKA_PRIVATE CK_BBOOL CK_FALSE
CKA_MODIFIABLE CK_BBOOL
CK_FALSE
CKA_LABEL UTF8 "QuoVadis Root CA 2"
CKA_CERTIFICATE_TYPE CK_CERTIFICATE_TYPE CKC_X_509
CKA_SUBJECT MULTILINE_OCTAL
\060\105\061\013\060\011\006\003\125\004\006\023\002\102\115\061
\031\060\027\006\003\125\004\012\023\020\121\165\157\126\141\144
\151\163\040\114\151\155\151\164\145\144\061\033\060\031\006\003
\125\004\003\023\022\121\165\157\126\141\144\151\163\040\122\157
\157\164\040\103\101\040\062
END
CKA_ID UTF8 "0"
CKA_ISSUER MULTILINE_OCTAL
\060\105\061\013\060\011\006\003\125\004\006\023\002\102\115\061
\031\060\027\006\003\125\004\012\023\020\121\165\157\126\141\144
\151\163\040\114\151\155\151\164\145\144\061\033\060\031\006\003
\125\004\003\023\022\121\165\157\126\141\144\151\163\040\122\157
\157\164\040\103\101\040\062
END
CKA_SERIAL_NUMBER MULTILINE_OCTAL
\002\002\005\011
END
CKA_VALUE MULTILINE_OCTAL
\060\202\005\267\060\202\003\237\240\003\002\001\002\002\002\005
\011\060\015\006\011\052\206\110\206\367\015\001\001\005\005\000
\060\105\061\013\060\011\006\003\125\004\006\023\002\102\115\061
\031\060\027\006\003\125\004\012\023\020\121\165\157\126\141\144
\151\163\040\114\151\155\151\164\145\144\061\033\060\031\006\003
\125\004\003\023\022\121\165\157\126\141\144\151\163\040\122\157
\157\164\040\103\101\040\062\060\036\027\015\060\066\061\061\062
\064\061\070\062\067\060\060\132\027\015\063\061\061\061\062\064
\061\070\062\063\063\063\132\060\105\061\013\060\011\006\003\125
\004\006\023\002\102\115\061\031\060\027\006\003\125\004\012\023
\020\121\165\157\126\141\144\151\163\040\114\151\155\151\164\145
\144\061\033\060\031\006\003\125\004\003\023\022\121\165\157\126
\141\144\151\163\040\122\157\157\164\040\103\101\040\062\060\202

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\002\042\060\015\006\011\052\206\110\206\367\015\001\001\001\005
\000\003\202\002\017\000\060\202\002\012\002\202\002\001\000\232
\030\312\113\224\015\000\055\257\003\051\212\360\017\201\310\256
\114\031\205\035\010\237\253\051\104\205\363\057\201\255\062\036
\220\106\277\243\206\046\032\036\376\176\034\030\072\134\234\140
\027\052\072\164\203\063\060\175\141\124\021\313\355\253\340\346
\322\242\176\365\153\157\030\267\012\013\055\375\351\076\357\012
\306\263\020\351\334\302\106\027\370\135\375\244\332\377\236\111
\132\234\346\063\346\044\226\367\077\272\133\053\034\172\065\302
\326\147\376\253\146\120\213\155\050\140\053\357\327\140\303\307
\223\274\215\066\221\363\177\370\333\021\023\304\234\167\166\301
\256\267\002\152\201\172\251\105\203\342\005\346\271\126\301\224
\067\217\110\161\143\042\354\027\145\007\225\212\113\337\217\306
\132\012\345\260\343\137\136\153\021\253\014\371\205\353\104\351
\370\004\163\362\351\376\134\230\214\365\163\257\153\264\176\315
\324\134\002\053\114\071\341\262\225\225\055\102\207\327\325\263
\220\103\267\154\023\361\336\335\366\304\370\211\077\321\165\365
\222\303\221\325\212\210\320\220\354\334\155\336\211\302\145\161
\226\213\015\003\375\234\277\133\026\254\222\333\352\376\171\174
\255\353\257\367\026\313\333\315\045\053\345\037\373\232\237\342
\121\314\072\123\014\110\346\016\275\311\264\166\006\122\346\021
\023\205\162\143\003\004\340\004\066\053\040\031\002\350\164\247
\037\266\311\126\146\360\165\045\334\147\301\016\141\140\210\263
\076\321\250\374\243\332\035\260\321\261\043\124\337\104\166\155
\355\101\330\301\262\042\266\123\034\337\065\035\334\241\167\052
\061\344\055\365\345\345\333\310\340\377\345\200\327\013\143\240
\377\063\241\017\272\054\025\025\352\227\263\322\242\265\276\362
\214\226\036\032\217\035\154\244\141\067\271\206\163\063\327\227
\226\236\043\175\202\244\114\201\342\241\321\272\147\137\225\007
\243\047\021\356\026\020\173\274\105\112\114\262\004\322\253\357
\325\375\014\121\316\120\152\010\061\371\221\332\014\217\144\134
\003\303\072\213\040\077\156\215\147\075\072\326\376\175\133\210
\311\136\373\314\141\334\213\063\167\323\104\062\065\011\142\004
\222\026\020\330\236\047\107\373\073\041\343\370\353\035\133\002
\003\001\000\001\243\201\260\060\201\255\060\017\006\003\125\035
\023\001\001\377\004\005\060\003\001\001\377\060\013\006\003\125
\035\017\004\004\003\002\001\006\060\035\006\003\125\035\016\004
\026\004\024\032\204\142\274\110\114\063\045\004\324\356\320\366
\003\304\031\106\321\224\153\060\156\006\003\125\035\043\004\147
\060\145\200\024\032\204\142\274\110\114\063\045\004\324\356\320
\366\003\304\031\106\321\224\153\241\111\244\107\060\105\061\013
\060\011\006\003\125\004\006\023\002\102\115\061\031\060\027\006
\003\125\004\012\023\020\121\165\157\126\141\144\151\163\040\114
\151\155\151\164\145\144\061\033\060\031\006\003\125\004\003\023
\022\121\165\157\126\141\144\151\163\040\122\157\157\164\040\103
\101\040\062\202\002\005\011\060\015\006\011\052\206\110\206\367
\015\001\001\005\005\000\003\202\002\001\000\076\012\026\115\237
\006\133\250\256\161\135\057\005\057\147\346\023\105\203\304\066

\366\363\300\046\014\015\265\107\144\135\370\264\162\311\106\245
\003\030\047\125\211\170\175\166\352\226\064\200\027\040\334\347
\203\370\215\374\007\270\332\137\115\056\147\262\204\375\331\104
\374\167\120\201\346\174\264\311\015\013\162\123\370\166\007\007
\101\107\226\014\373\340\202\046\223\125\214\376\042\037\140\145
\174\137\347\046\263\367\062\220\230\120\324\067\161\125\366\222
\041\170\367\225\171\372\370\055\046\207\146\126\060\167\246\067
\170\063\122\020\130\256\077\141\216\362\152\261\357\030\176\112
\131\143\312\215\242\126\325\247\057\274\126\037\317\071\301\342
\373\012\250\025\054\175\115\172\143\306\154\227\104\074\322\157
\303\112\027\012\370\220\322\127\242\031\121\245\055\227\101\332
\007\117\251\120\332\220\215\224\106\341\076\360\224\375\020\000
\070\365\073\350\100\341\264\156\126\032\040\314\157\130\215\355
\056\105\217\326\351\223\077\347\261\054\337\072\326\042\214\334
\204\273\042\157\320\370\344\306\071\351\004\210\074\303\272\353
\125\172\155\200\231\044\365\154\001\373\370\227\260\224\133\353
\375\322\157\361\167\150\015\065\144\043\254\270\125\241\003\321
\115\102\031\334\370\165\131\126\243\371\250\111\171\370\257\016
\271\021\240\174\267\152\355\064\320\266\046\142\070\032\207\014
\370\350\375\056\323\220\177\007\221\052\035\326\176\134\205\203
\231\260\070\010\077\351\136\371\065\007\344\311\142\156\127\177
\247\120\225\367\272\310\233\346\216\242\001\305\326\146\277\171
\141\363\074\034\341\271\202\134\135\240\303\351\330\110\275\031
\242\021\024\031\156\262\206\033\150\076\110\067\032\210\267\135
\226\136\234\307\357\047\142\010\342\221\031\134\322\361\041\335
\272\027\102\202\227\161\201\123\061\251\237\366\175\142\277\162
\341\243\223\035\314\212\046\132\011\070\320\316\327\015\200\026
\264\170\245\072\207\114\215\212\245\325\106\227\362\054\020\271
\274\124\042\300\001\120\151\103\236\364\262\357\155\370\354\332
\361\343\261\357\337\221\217\124\052\013\045\301\046\031\304\122
\020\005\145\325\202\020\352\302\061\315\056

END

CKA_NSS_MOZILLA_CA_POLICY

CK_BBOOL CK_TRUE

CKA_NSS_SERVER_DISTRUST_AFTER CK_BBOOL CK_FALSE

CKA_NSS_EMAIL_DISTRUST_AFTER CK_BBOOL CK_FALSE

Trust for "QuoVadis Root CA 2"

Issuer: CN=QuoVadis Root

CA 2,O=QuoVadis Limited,C=BM

Serial Number: 1289 (0x509)

Subject: CN=QuoVadis Root CA 2,O=QuoVadis Limited,C=BM

Not Valid Before: Fri Nov 24 18:27:00 2006

Not Valid After : Mon Nov 24 18:23:33 2031

Fingerprint (SHA-256):

85:A0:DD:7D:D7:20:AD:B7:FF:05:F8:3D:54:2B:20:9D:C7:FF:45:28:F7:D6:77:B1:83:89:FE:A5:E5:C4:9E:86

Fingerprint (SHA1): CA:3A:FB:CF:12:40:36:4B:44:B2:16:20:88:80:48:39:19:93:7C:F7

CKA_CLASS CK_OBJECT_CLASS CKO_NSS_TRUST

```

CKA_TOKEN CK_BBOOL CK_TRUE
CKA_PRIVATE CK_BBOOL CK_FALSE
CKA_MODIFIABLE CK_BBOOL CK_FALSE
CKA_LABEL UTF8 "QuoVadis Root CA 2"
CKA_CERT_SHA1_HASH MULTILINE_OCTAL
\312\072\373\317\022\100\066\113\104\262\026\040\210\200\110\071
\031\223\174\367
END
CKA_CERT_MD5_HASH MULTILINE_OCTAL
\136\071\173\335\370\272\354\202\351\254\142\272\014\124\000\053
END
CKA_ISSUER MULTILINE_OCTAL
\060\105\061\013\060\011\006\003\125\004\006\023\002\102\115\061
\031\060\027\006\003\125\004\012\023\020\121\165\157\126\141\144
\151\163\040\114\151\155\151\164\145\144\061\033\060\031\006\003
\125\004\003\023\022\121\165\157\126\141\144\151\163\040\122\157
\157\164\040\103\101\040\062
END
CKA_SERIAL_NUMBER
MULTILINE_OCTAL
\002\002\005\011
END
CKA_TRUST_SERVER_AUTH CK_TRUST CKT_NSS_TRUSTED_DELEGATOR
CKA_TRUST_EMAIL_PROTECTION CK_TRUST CKT_NSS_TRUSTED_DELEGATOR
CKA_TRUST_CODE_SIGNING CK_TRUST CKT_NSS_MUST_VERIFY_TRUST
CKA_TRUST_STEP_UP_APPROVED CK_BBOOL CK_FALSE

#
# Certificate "QuoVadis Root CA 3"
#
# Issuer: CN=QuoVadis Root CA 3,O=QuoVadis Limited,C=BM
# Serial Number: 1478 (0x5c6)
# Subject: CN=QuoVadis Root CA 3,O=QuoVadis Limited,C=BM
# Not Valid Before: Fri Nov 24 19:11:23 2006
# Not Valid After : Mon Nov 24 19:06:44 2031
# Fingerprint (SHA-256):
18:F1:FC:7F:20:5D:F8:AD:DD:EB:7F:E0:07:DD:57:E3:AF:37:5A:9C:4D:8D:73:54:6B:F4:F1:FE:D1:E1:8D:35
# Fingerprint (SHA1): 1F:49:14:F7:D8:74:95:1D:DD:AE:02:C0:BE:FD:3A:2D:82:75:51:85
CKA_CLASS CK_OBJECT_CLASS CKO_CERTIFICATE
CKA_TOKEN CK_BBOOL CK_TRUE
CKA_PRIVATE CK_BBOOL CK_FALSE
CKA_MODIFIABLE CK_BBOOL CK_FALSE
CKA_LABEL
UTF8 "QuoVadis Root CA 3"
CKA_CERTIFICATE_TYPE CK_CERTIFICATE_TYPE CKC_X_509
CKA_SUBJECT MULTILINE_OCTAL
\060\105\061\013\060\011\006\003\125\004\006\023\002\102\115\061
\031\060\027\006\003\125\004\012\023\020\121\165\157\126\141\144

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\151\163\040\114\151\155\151\164\145\144\061\033\060\031\006\003
\125\004\003\023\022\121\165\157\126\141\144\151\163\040\122\157
\157\164\040\103\101\040\063
END
CKA_ID UTF8 "0"
CKA_ISSUER MULTILINE_OCTAL
\060\105\061\013\060\011\006\003\125\004\006\023\002\102\115\061
\031\060\027\006\003\125\004\012\023\020\121\165\157\126\141\144
\151\163\040\114\151\155\151\164\145\144\061\033\060\031\006\003
\125\004\003\023\022\121\165\157\126\141\144\151\163\040\122\157
\157\164\040\103\101\040\063
END
CKA_SERIAL_NUMBER MULTILINE_OCTAL
\002\002\005\306
END
CKA_VALUE MULTILINE_OCTAL
\060\202\006\235\060\202\004\205\240\003\002\001\002\002\002\005
\306\060\015\006\011\052\206\110\206\367\015\001\001\005\005\000
\060\105\061\013\060\011\006\003\125\004\006\023\002\102\115\061
\031\060\027\006\003\125\004\012\023\020\121\165\157\126\141\144
\151\163\040\114\151\155\151\164\145\144\061\033\060\031\006\003
\125\004\003\023\022\121\165\157\126\141\144\151\163\040\122\157
\157\164\040\103\101\040\063\060\036\027\015\060\066\061\061\062
\064\061\071\061\061\062\063\132\027\015\063\061\061\061\062\064
\061\071\060\066\064\064\132\060\105\061\013\060\011\006\003\125
\004\006\023\002\102\115\061\031\060\027\006\003\125\004\012\023
\020\121\165\157\126\141\144\151\163\040\114\151\155\151\164\145
\144\061\033\060\031\006\003\125\004\003\023\022\121\165\157\126
\141\144\151\163\040\122\157\157\164\040\103\101\040\063\060\202
\002\042\060\015\006\011\052\206\110\206\367\015\001\001\001\005
\000\003\202\002\017\000\060\202\002\012\002\202\002\001\000\314
\127\102\026\124\234\346\230\323\323\115\356\376\355\307\237\103
\071\112\145\263\350\026\210\064\333\015\131\221\164\317\222\270
\004\100\255\002\113\061\253\274\215\221\150\330\040\016\032\001
\342\032\173\116\027\135\342\212\267\077\231\032\315\353\141\253
\302\145\246\037\267\267\275\267\217\374\375\160\217\013\240\147
\276\001\242\131\317\161\346\017\051\166\377\261\126\171\105\053
\037\236\172\124\350\243\051\065\150\244\001\117\017\244\056\067
\357\033\277\343\217\020\250\162\253\130\127\347\124\206\310\311
\363\133\332\054\332\135\216\156\074\243\076\332\373\202\345\335
\362\134\262\005\063\157\212\066\316\320\023\116\377\277\112\014
\064\114\246\303\041\275\120\004\125\353\261\273\235\373\105\036
\144\025\336\125\001\214\002\166\265\313\241\077\102\151\274\057
\275\150\103\026\126\211\052\067\141\221\375\246\256\116\300\313
\024\145\224\067\113\222\006\357\004\320\310\234\210\333\013\173
\201\257\261\075\052\304\145\072\170\266\356\334\200\261\322\323
\231\234\072\356\153\132\153\263\215\267\325\316\234\302\276\245
\113\057\026\261\236\150\073\006\157\256\175\237\370\336\354\314

\051\247\230\243\045\103\057\357\361\137\046\341\210\115\370\136
\156\327\331\024\156\031\063\151\247\073\204\211\223\304\123\125
\023\241\121\170\100\370\270\311\242\356\173\272\122\102\203\236
\024\355\005\122\132\131\126\247\227\374\235\077\012\051\330\334
\117\221\016\023\274\336\225\244\337\213\231\276\254\233\063\210
\357\265\201\257\033\306\042\123\310\366\307\356\227\024\260\305
\174\170\122\310\360\316\156\167\140\204\246\351\052\166\040\355
\130\001\027\060\223\351\032\213\340\163\143\331\152\222\224\111
\116\264\255\112\205\304\243\042\060\374\011\355\150\042\163\246
\210\014\125\041\130\305\341\072\237\052\335\312\341\220\340\331
\163\253\154\200\270\350\013\144\223\240\234\214\031\377\263\322
\014\354\221\046\207\212\263\242\341\160\217\054\012\345\315\155
\150\121\353\332\077\005\177\213\062\346\023\134\153\376\137\100
\342\042\310\264\264\144\117\326\272\175\110\076\250\151\014\327
\273\206\161\311\163\270\077\073\235\045\113\332\377\100\353\002
\003\001\000\001\243\202\001\225\060\202\001\221\060\017\006\003
\125\035\023\001\001\377\004\005\060\003\001\001\377\060\201\341
\006\003\125\035\040\004\201\331\060\201\326\060\201\323\006\011
\053\006\001\004\001\276\130\000\003\060\201\305\060\201\223\006
\010\053\006\001\005\005\007\002\002\060\201\206\032\201\203\101
\156\171\040\165\163\145\040\157\146\040\164\150\151\163\040\103
\145\162\164\151\146\151\143\141\164\145\040\143\157\156\163\164
\151\164\165\164\145\163\040\141\143\143\145\160\164\141\156\143
\145\040\157\146\040\164\150\145\040\121\165\157\126\141\144\151
\163\040\122\157\157\164\040\103\101\040\063\040\103\145\162\164
\151\146\151\143\141\164\145\040\120\157\154\151\143\171\040\057
\040\103\145\162\164\151\146\151\143\141\164\151\157\156\040\120
\162\141\143\164\151\143\145\040\123\164\141\164\145\155\145\156
\164\056\060\055\006\010\053\006\001\005\005\007\002\001\026\041
\150\164\164\160\072\057\057\167\167\167\056\161\165\157\166\141
\144\151\163\147\154\157\142\141\154\056\143\157\155\057\143\160
\163\060\013\006\003\125\035\017\004\004\003\002\001\006\060\035
\006\003\125\035\016\004\026\004\024\362\300\023\340\202\103\076
\373\356\057\147\062\226\065\134\333\270\313\002\320\060\156\006
\003\125\035\043\004\147\060\145\200\024\362\300\023\340\202\103
\076\373\356\057\147\062\226\065\134\333\270\313\002\320\241\111
\244\107\060\105\061\013\060\011\006\003\125\004\006\023\002\102
\115\061\031\060\027\006\003\125\004\012\023\020\121\165\157\126
\141\144\151\163\040\114\151\155\151\164\145\144\061\033\060\031
\006\003\125\004\003\023\022\121\165\157\126\141\144\151\163\040
\122\157\157\164\040\103\101\040\063\202\002\005\306\060\015\006
\011\052\206\110\206\367\015\001\001\005\005\000\003\202\002\001
\000\117\255\240\054\114\372\300\362\157\367\146\125\253\043\064
\356\347\051\332\303\133\266\260\203\331\320\320\342\041\373\363
\140\247\073\135\140\123\047\242\233\366\010\042\052\347\277\240
\162\345\234\044\152\061\261\220\172\047\333\204\021\211\047\246
\167\132\070\327\277\254\206\374\356\135\203\274\006\306\321\167
\153\017\155\044\057\113\172\154\247\007\226\312\343\204\237\255

\210\213\035\253\026\215\133\146\027\331\026\364\213\200\322\335
\370\262\166\303\374\070\023\252\014\336\102\151\053\156\363\074
\353\200\047\333\365\246\104\015\237\132\125\131\013\325\015\122
\110\305\256\237\362\057\200\305\352\062\120\065\022\227\056\301
\341\377\361\043\210\121\070\237\362\146\126\166\347\017\121\227
\245\122\014\115\111\121\225\066\075\277\242\113\014\020\035\206
\231\114\252\363\162\021\223\344\352\366\233\332\250\135\247\115
\267\236\002\256\163\000\310\332\043\003\350\371\352\031\164\142
\000\224\313\042\040\276\224\247\131\265\202\152\276\231\171\172
\251\362\112\044\122\367\164\375\272\116\346\250\035\002\156\261
\015\200\104\301\256\323\043\067\137\273\205\174\053\222\056\350
\176\245\213\335\231\341\277\047\157\055\135\252\173\207\376\012
\335\113\374\216\365\046\344\156\160\102\156\063\354\061\236\173
\223\301\344\311\151\032\075\300\153\116\042\155\356\253\130\115
\306\320\101\301\053\352\117\022\207\136\353\105\330\154\365\230
\002\323\240\330\125\212\006\231\031\242\240\167\321\060\236\254
\314\165\356\203\365\260\142\071\317\154\127\342\114\322\221\013
\016\165\050\033\232\277\375\032\103\361\312\167\373\073\217\141
\270\151\050\026\102\004\136\160\052\034\041\330\217\341\275\043
\133\055\164\100\222\331\143\031\015\163\335\151\274\142\107\274
\340\164\053\262\353\175\276\101\033\265\300\106\305\241\042\313
\137\116\301\050\222\336\030\272\325\052\050\273\021\213\027\223
\230\231\140\224\134\043\317\132\047\227\136\013\005\006\223\067
\036\073\151\066\353\251\236\141\035\217\062\332\216\014\326\164
\076\173\011\044\332\001\167\107\304\073\315\064\214\231\365\312
\341\045\141\063\262\131\033\342\156\327\067\127\266\015\251\022
\332

END

CKA_NSS_Mozilla_CA_POLICY

CK_BBOOL CK_TRUE

CKA_NSS_SERVER_DISTRUST_AFTER CK_BBOOL CK_FALSE

CKA_NSS_EMAIL_DISTRUST_AFTER CK_BBOOL CK_FALSE

Trust for "QuoVadis Root CA 3"

Issuer: CN=QuoVadis Root CA 3,O=QuoVadis Limited,C=BM

Serial Number: 1478 (0x5c6)

Subject:

CN=QuoVadis Root CA 3,O=QuoVadis Limited,C=BM

Not Valid Before: Fri Nov 24 19:11:23 2006

Not Valid After : Mon Nov 24 19:06:44 2031

Fingerprint (SHA-256):

18:F1:FC:7F:20:5D:F8:AD:DD:EB:7F:E0:07:DD:57:E3:AF:37:5A:9C:4D:8D:73:54:6B:F4:F1:FE:D1:E1:8D:35

Fingerprint (SHA1): 1F:49:14:F7:D8:74:95:1D:DD:AE:02:C0:BE:FD:3A:2D:82:75:51:85

CKA_CLASS CK_OBJECT_CLASS CKO_NSS_TRUST

CKA_TOKEN CK_BBOOL CK_TRUE

CKA_PRIVATE CK_BBOOL CK_FALSE

CKA_MODIFIABLE CK_BBOOL CK_FALSE

CKA_LABEL UTF8 "QuoVadis Root CA 3"

```

CKA_CERT_SHA1_HASH MULTILINE_OCTAL
\037\111\024\367\330\164\225\035\335\256\002\300\276\375\072\055
\202\165\121\205
END
CKA_CERT_MD5_HASH MULTILINE_OCTAL
\061\205\074\142\224\227\143\271\252\375\211\116\257\157\340\317
END
CKA_ISSUER MULTILINE_OCTAL
\060\105\061\013\060\011\006\003\125\004\006\023\002\102\115\061
\031\060\027\006\003\125\004\012\023\020\121\165\157\126\141\144
\151\163\040\114\151\155\151\164\145\144\061\033\060\031\006\003
\125\004\003\023\022\121\165\157\126\141\144\151\163\040\122\157
\157\164\040\103\101\040\063
END
CKA_SERIAL_NUMBER
MULTILINE_OCTAL
\002\002\005\306
END
CKA_TRUST_SERVER_AUTH CK_TRUST CKT_NSS_TRUSTED_DELEGATOR
CKA_TRUST_EMAIL_PROTECTION CK_TRUST CKT_NSS_TRUSTED_DELEGATOR
CKA_TRUST_CODE_SIGNING CK_TRUST CKT_NSS_MUST_VERIFY_TRUST
CKA_TRUST_STEP_UP_APPROVED CK_BBOOL CK_FALSE

#
# Certificate "Security Communication Root CA"
#
# Issuer: OU=Security Communication RootCA1,O=SECOM Trust.net,C=JP
# Serial Number: 0 (0x0)
# Subject: OU=Security Communication RootCA1,O=SECOM Trust.net,C=JP
# Not Valid Before: Tue Sep 30 04:20:49 2003
# Not Valid After : Sat Sep 30 04:20:49 2023
# Fingerprint (SHA-256):
E7:5E:72:ED:9F:56:0E:EC:6E:B4:80:00:73:A4:3F:C3:AD:19:19:5A:39:22:82:01:78:95:97:4A:99:02:6B:6C
# Fingerprint (SHA1): 36:B1:2B:49:F9:81:9E:D7:4C:9E:BC:38:0F:C6:56:8F:5D:AC:B2:F7
CKA_CLASS CK_OBJECT_CLASS CKO_CERTIFICATE
CKA_TOKEN CK_BBOOL CK_TRUE
CKA_PRIVATE CK_BBOOL CK_FALSE
CKA_MODIFIABLE CK_BBOOL CK_FALSE
CKA_LABEL UTF8 "Security Communication
Root CA"
CKA_CERTIFICATE_TYPE CK_CERTIFICATE_TYPE CKC_X_509
CKA_SUBJECT MULTILINE_OCTAL
\060\120\061\013\060\011\006\003\125\004\006\023\002\112\120\061
\030\060\026\006\003\125\004\012\023\017\123\105\103\117\115\040
\124\162\165\163\164\056\156\145\164\061\047\060\045\006\003\125
\004\013\023\036\123\145\143\165\162\151\164\171\040\103\157\155
\155\165\156\151\143\141\164\151\157\156\040\122\157\157\164\103
\101\061

```


END

CKA_ID UTF8 "0"

CKA_ISSUER MULTILINE_OCTAL

\060\120\061\013\060\011\006\003\125\004\006\023\002\112\120\061
\030\060\026\006\003\125\004\012\023\017\123\105\103\117\115\040
\124\162\165\163\164\056\156\145\164\061\047\060\045\006\003\125
\004\013\023\036\123\145\143\165\162\151\164\171\040\103\157\155
\155\165\156\151\143\141\164\151\157\156\040\122\157\157\164\103
\101\061

END

CKA_SERIAL_NUMBER MULTILINE_OCTAL

\002\001\000

END

CKA_VALUE MULTILINE_OCTAL

\060\202\003\132\060\202\002\102\240\003\002\001\002\002\001\000
\060\015\006\011\052\206\110\206\367\015\001\001\005\005\000\060
\120\061\013\060\011\006\003\125\004\006\023\002\112\120\061\030
\060\026\006\003\125\004\012\023\017\123\105\103\117\115\040\124
\162\165\163\164\056\156\145\164\061\047\060\045\006\003\125\004
\013\023\036\123\145\143\165\162\151\164\171\040\103\157\155\155
\165\156\151\143\141\164\151\157\156\040\122\157\157\164\103\101
\061\060\036\027\015\060\063\060\071\063\060\060\064\062\060\064
\071\132\027\015\062\063\060\071\063\060\060\064\062\060\064\071
\132\060\120\061\013\060\011\006\003\125\004\006\023\002\112\120
\061\030\060\026\006\003\125\004\012\023\017\123\105\103\117\115
\040\124\162\165\163\164\056\156\145\164\061\047\060\045\006\003
\125\004\013\023\036\123\145\143\165\162\151\164\171\040\103\157
\155\155\165\156\151\143\141\164\151\157\156\040\122\157\157\164
\103\101\061\060\202\001\042\060\015\006\011\052\206\110\206\367
\015\001\001\001\005\000\003\202\001\017\000\060\202\001\012\002
\202\001\001\000\263\263\376\177\323\155\261\357\026\174\127\245
\014\155\166\212\057\113\277\144\373\114\356\212\360\363\051\174
\365\377\356\052\340\351\351\272\133\144\042\232\232\157\054\072
\046\151\121\005\231\046\334\325\034\152\161\306\232\175\036\235
\335\174\154\306\214\147\147\112\076\370\161\260\031\047\251\011
\014\246\225\277\113\214\014\372\125\230\073\330\350\042\241\113
\161\070\171\254\227\222\151\263\211\176\352\041\150\006\230\024
\226\207\322\141\066\274\155\047\126\236\127\356\300\300\126\375
\062\317\244\331\216\302\043\327\215\250\363\330\045\254\227\344
\160\070\364\266\072\264\235\073\227\046\103\243\241\274\111\131
\162\114\043\060\207\001\130\366\116\276\034\150\126\146\257\315
\101\135\310\263\115\052\125\106\253\037\332\036\342\100\075\333
\315\175\271\222\200\234\067\335\014\226\144\235\334\042\367\144
\213\337\141\336\025\224\122\025\240\175\122\311\113\250\041\311
\306\261\355\313\303\225\140\321\017\360\253\160\370\337\313\115
\176\354\326\372\253\331\275\177\124\362\245\351\171\372\331\326
\166\044\050\163\002\003\001\000\001\243\077\060\075\060\035\006
\003\125\035\016\004\026\004\024\240\163\111\231\150\334\205\133

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\145\343\233\050\057\127\237\275\063\274\007\110\060\013\006\003
\125\035\017\004\004\003\002\001\006\060\017\006\003\125\035\023
\001\001\377\004\005\060\003\001\001\377\060\015\006\011\052\206
\110\206\367\015\001\001\005\005\000\003\202\001\001\000\150\100
\251\250\273\344\117\135\171\263\005\265\027\263\140\023\353\306
\222\135\340\321\323\152\376\373\276\233\155\277\307\005\155\131
\040\304\034\360\267\332\204\130\002\143\372\110\026\357\117\245
\013\367\112\230\362\077\236\033\255\107\153\143\316\010\107\353
\122\077\170\234\257\115\256\370\325\117\317\232\230\052\020\101
\071\122\304\335\331\233\016\357\223\001\256\262\056\312\150\102
\044\102\154\260\263\072\076\315\351\332\110\304\025\313\351\371
\007\017\222\120\111\212\335\061\227\137\311\351\067\252\073\131
\145\227\224\062\311\263\237\076\072\142\130\305\111\255\142\016
\161\245\062\252\057\306\211\166\103\100\023\023\147\075\242\124
\045\020\313\361\072\362\331\372\333\111\126\273\246\376\247\101
\065\303\340\210\141\311\210\307\337\066\020\042\230\131\352\260
\112\373\126\026\163\156\254\115\367\042\241\117\255\035\172\055
\105\047\345\060\301\136\362\332\023\313\045\102\121\225\107\003
\214\154\041\314\164\102\355\123\377\063\213\217\017\127\001\026
\057\317\246\356\311\160\042\024\275\375\276\154\013\003
```

END

CKA_NSS_MOZILLA_CA_POLICY

CK_BBOOL CK_TRUE

CKA_NSS_SERVER_DISTRUST_AFTER CK_BBOOL CK_FALSE

CKA_NSS_EMAIL_DISTRUST_AFTER CK_BBOOL CK_FALSE

Trust for "Security Communication Root CA"

Issuer: OU=Security Communication RootCA1,O=SECOM Trust.net,C=JP

Serial Number: 0 (0x0)

Subject: OU=Security Communication RootCA1,O=SECOM Trust.net,C=JP

Not Valid Before: Tue Sep 30 04:20:49 2003

Not Valid After : Sat Sep 30 04:20:49 2023

Fingerprint (SHA-256):

E7:5E:72:ED:9F:56:0E:EC:6E:B4:80:00:73:A4:3F:C3:AD:19:19:5A:39:22:82:01:78:95:97:4A:99:02:6B:6C

Fingerprint (SHA1): 36:B1:2B:49:F9:81:9E:D7:4C:9E:BC:38:0F:C6:56:8F:5D:AC:B2:F7

CKA_CLASS

CK_OBJECT_CLASS CKO_NSS_TRUST

CKA_TOKEN CK_BBOOL CK_TRUE

CKA_PRIVATE CK_BBOOL CK_FALSE

CKA_MODIFIABLE CK_BBOOL CK_FALSE

CKA_LABEL UTF8 "Security Communication Root CA"

CKA_CERT_SHA1_HASH MULTILINE_OCTAL

```
\066\261\053\111\371\201\236\327\114\236\274\070\017\306\126\217
\135\254\262\367
```

END

CKA_CERT_MD5_HASH MULTILINE_OCTAL

```
\361\274\143\152\124\340\265\047\365\315\347\032\343\115\156\112
```

END

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CKA_ISSUER MULTILINE_OCTAL
\060\120\061\013\060\011\006\003\125\004\006\023\002\112\120\061
\030\060\026\006\003\125\004\012\023\017\123\105\103\117\115\040
\124\162\165\163\164\056\156\145\164\061\047\060\045\006\003\125
\004\013\023\036\123\145\143\165\162\151\164\171\040\103\157\155
\155\165\156\151\143\141\164\151\157\156\040\122\157\157\164\103
\101\061
END
CKA_SERIAL_NUMBER MULTILINE_OCTAL
\002\001\000
END
CKA_TRUST_SERVER_AUTH CK_TRUST CKT_NSS_TRUSTED_DELEGATOR
CKA_TRUST_EMAIL_PROTECTION CK_TRUST CKT_NSS_TRUSTED_DELEGATOR
CKA_TRUST_CODE_SIGNING CK_TRUST CKT_NSS_MUST_VERIFY_TRUST
CKA_TRUST_STEP_UP_APPROVED
CK_BBOOL CK_FALSE

#
# Certificate "Camerfirma Chambers of Commerce Root"
#
# Issuer: CN=Chambers of Commerce Root,OU=http://www.chambersign.org,O=AC Camerfirma SA CIF
A82743287,C=EU
# Serial Number: 0 (0x0)
# Subject: CN=Chambers of Commerce Root,OU=http://www.chambersign.org,O=AC Camerfirma SA CIF
A82743287,C=EU
# Not Valid Before: Tue Sep 30 16:13:43 2003
# Not Valid After : Wed Sep 30 16:13:44 2037
# Fingerprint (SHA-256):
0C:25:8A:12:A5:67:4A:EF:25:F2:8B:A7:DC:FA:EC:EE:A3:48:E5:41:E6:F5:CC:4E:E6:3B:71:B3:61:60:6A:C3
# Fingerprint (SHA1): 6E:3A:55:A4:19:0C:19:5C:93:84:3C:C0:DB:72:2E:31:30:61:F0:B1
CKA_CLASS CK_OBJECT_CLASS CKO_CERTIFICATE
CKA_TOKEN CK_BBOOL CK_TRUE
CKA_PRIVATE CK_BBOOL CK_FALSE
CKA_MODIFIABLE CK_BBOOL CK_FALSE
CKA_LABEL UTF8 "Camerfirma Chambers of Commerce Root"
CKA_CERTIFICATE_TYPE CK_CERTIFICATE_TYPE CKC_X_509
CKA_SUBJECT MULTILINE_OCTAL
\060\177\061\013\060\011\006\003\125\004\006\023\002\105\125\061
\047\060\045\006\003\125\004\012\023\036\101\103\040\103\141\155
\145\162\146\151\162\155\141\040\123\101\040\103\111\106\040\101
\070\062\067\064\063\062\070\067\061\043\060\041\006\003\125\004
\013\023\032\150\164\164\160\072\057\057\167\167\167\056\143\150
\141\155\142\145\162\163\151\147\156\056\157\162\147\061\042\060
\040\006\003\125\004\003\023\031\103\150\141\155\142\145\162\163
\040\157\146\040\103\157\155\155\145\162\143\145\040\122\157\157
\164
END
CKA_ID

```

UTF8 "0"

CKA_ISSUER MULTILINE_OCTAL

\060\177\061\013\060\011\006\003\125\004\006\023\002\105\125\061
\047\060\045\006\003\125\004\012\023\036\101\103\040\103\141\155
\145\162\146\151\162\155\141\040\123\101\040\103\111\106\040\101
\070\062\067\064\063\062\070\067\061\043\060\041\006\003\125\004
\013\023\032\150\164\164\160\072\057\057\167\167\167\056\143\150
\141\155\142\145\162\163\151\147\156\056\157\162\147\061\042\060
\040\006\003\125\004\003\023\031\103\150\141\155\142\145\162\163
\040\157\146\040\103\157\155\155\145\162\143\145\040\122\157\157
\164

END

CKA_SERIAL_NUMBER

MULTILINE_OCTAL

\002\001\000

END

CKA_VALUE MULTILINE_OCTAL

\060\202\004\275\060\202\003\245\240\003\002\001\002\002\001\000
\060\015\006\011\052\206\110\206\367\015\001\001\005\005\000\060
\177\061\013\060\011\006\003\125\004\006\023\002\105\125\061\047
\060\045\006\003\125\004\012\023\036\101\103\040\103\141\155\145
\162\146\151\162\155\141\040\123\101\040\103\111\106\040\101\070
\062\067\064\063\062\070\067\061\043\060\041\006\003\125\004\013
\023\032\150\164\164\160\072\057\057\167\167\167\056\143\150\141
\155\142\145\162\163\151\147\156\056\157\162\147\061\042\060\040
\006\003\125\004\003\023\031\103\150\141\155\142\145\162\163\040
\157\146\040\103\157\155\155\145\162\143\145\040\122\157\157\164
\060\036\027\015\060\063\060\071\063\060\061\066\061\063\064\063
\132\027\015\063\067\060\071\063\060\061\066\061\063\064\064\132
\060\177\061\013\060\011\006\003\125\004\006\023\002\105\125\061
\047\060\045\006\003\125\004\012\023\036\101\103\040\103\141\155
\145\162\146\151\162\155\141\040\123\101\040\103\111\106\040\101
\070\062\067\064\063\062\070\067\061\043\060\041\006\003\125\004
\013\023\032\150\164\164\160\072\057\057\167\167\167\056\143\150
\141\155\142\145\162\163\151\147\156\056\157\162\147\061\042\060
\040\006\003\125\004\003\023\031\103\150\141\155\142\145\162\163
\040\157\146\040\103\157\155\155\145\162\143\145\040\122\157\157
\164\060\202\001\040\060\015\006\011\052\206\110\206\367\015\001
\001\001\005\000\003\202\001\015\000\060\202\001\010\002\202\001
\001\000\267\066\125\345\245\135\030\060\340\332\211\124\221\374
\310\307\122\370\057\120\331\357\261\165\163\145\107\175\033\133
\272\165\305\374\241\210\044\372\057\355\312\010\112\071\124\304
\121\172\265\332\140\352\070\074\201\262\313\361\273\331\221\043
\077\110\001\160\165\251\005\052\255\037\161\363\311\124\075\035
\006\152\100\076\263\014\205\356\134\033\171\302\142\304\270\066
\216\065\135\001\014\043\004\107\065\252\233\140\116\240\146\075
\313\046\012\234\100\241\364\135\230\277\161\253\245\000\150\052
\355\203\172\017\242\024\265\324\042\263\200\260\074\014\132\121

\151\055\130\030\217\355\231\236\361\256\342\225\346\366\107\250
\326\014\017\260\130\130\333\303\146\067\236\233\221\124\063\067
\322\224\034\152\110\311\311\362\245\332\245\014\043\367\043\016
\234\062\125\136\161\234\204\005\121\232\055\375\346\116\052\064
\132\336\312\100\067\147\014\124\041\125\167\332\012\014\314\227
\256\200\334\224\066\112\364\076\316\066\023\036\123\344\254\116
\072\005\354\333\256\162\234\070\213\320\071\073\211\012\076\167
\376\165\002\001\003\243\202\001\104\060\202\001\100\060\022\006
\003\125\035\023\001\001\377\004\010\060\006\001\001\377\002\001
\014\060\074\006\003\125\035\037\004\065\060\063\060\061\240\057
\240\055\206\053\150\164\164\160\072\057\057\143\162\154\056\143
\150\141\155\142\145\162\163\151\147\156\056\157\162\147\057\143
\150\141\155\142\145\162\163\162\157\157\164\056\143\162\154\060
\035\006\003\125\035\016\004\026\004\024\343\224\365\261\115\351
\333\241\051\133\127\213\115\166\006\166\341\321\242\212\060\016
\006\003\125\035\017\001\001\377\004\004\003\002\001\006\060\021
\006\011\140\206\110\001\206\370\102\001\001\004\004\003\002\000
\007\060\047\006\003\125\035\021\004\040\060\036\201\034\143\150
\141\155\142\145\162\163\162\157\157\164\100\143\150\141\155\142
\145\162\163\151\147\156\056\157\162\147\060\047\006\003\125\035
\022\004\040\060\036\201\034\143\150\141\155\142\145\162\163\162
\157\157\164\100\143\150\141\155\142\145\162\163\151\147\156\056
\157\162\147\060\130\006\003\125\035\040\004\121\060\117\060\115
\006\013\053\006\001\004\001\201\207\056\012\003\001\060\076\060
\074\006\010\053\006\001\005\005\007\002\001\026\060\150\164\164
\160\072\057\057\143\160\163\056\143\150\141\155\142\145\162\163
\151\147\156\056\157\162\147\057\143\160\163\057\143\150\141\155
\142\145\162\163\162\157\157\164\056\150\164\155\154\060\015\006
\011\052\206\110\206\367\015\001\001\005\005\000\003\202\001\001
\000\014\101\227\302\032\206\300\042\174\237\373\220\363\032\321
\003\261\357\023\371\041\137\004\234\332\311\245\215\047\154\226
\207\221\276\101\220\001\162\223\347\036\175\137\366\211\306\135
\247\100\011\075\254\111\105\105\334\056\215\060\150\262\011\272
\373\303\057\314\272\013\337\077\167\173\106\175\072\022\044\216
\226\217\074\005\012\157\322\224\050\035\155\014\300\056\210\042
\325\330\317\035\023\307\360\110\327\327\005\247\317\307\107\236
\073\074\064\310\200\117\324\024\273\374\015\120\367\372\263\354
\102\137\251\335\155\310\364\165\317\173\301\162\046\261\001\034
\134\054\375\172\116\264\001\305\005\127\271\347\074\252\005\331
\210\351\007\106\101\316\357\101\201\256\130\337\203\242\256\312
\327\167\037\347\000\074\235\157\216\344\062\011\035\115\170\064
\170\064\074\224\233\046\355\117\161\306\031\172\275\040\042\110
\132\376\113\175\003\267\347\130\276\306\062\116\164\036\150\335
\250\150\133\263\076\356\142\175\331\200\350\012\165\172\267\356
\264\145\232\041\220\340\252\320\230\274\070\265\163\074\213\370
\334

END

CKA_NSS_MOZILLA_CA_POLICY

```

CK_BBOOL CK_TRUE
CKA_NSS_SERVER_DISTRUST_AFTER CK_BBOOL CK_FALSE
# For Email Distrust After: Mon Mar 01 00:00:00 2021
CKA_NSS_EMAIL_DISTRUST_AFTER MULTILINE_OCTAL
\062\061\060\063\060\061\060\060\060\060\060\132
END

# Trust for "Camerfirma Chambers of Commerce Root"
# Issuer: CN=Chambers of Commerce Root,OU=http://www.chambersign.org,O=AC Camerfirma SA CIF
A82743287,C=EU
# Serial Number: 0 (0x0)
# Subject: CN=Chambers of Commerce Root,OU=http://www.chambersign.org,O=AC Camerfirma SA CIF
A82743287,C=EU
# Not Valid Before: Tue Sep 30 16:13:43 2003
# Not Valid After : Wed Sep 30 16:13:44 2037
# Fingerprint (SHA-256):
0C:25:8A:12:A5:67:4A:EF:25:F2:8B:A7:DC:FA:EC:EE:A3:48:E5:41:E6:F5:CC:4E:E6:3B:71:B3:61:60:6A:C3
# Fingerprint (SHA1): 6E:3A:55:A4:19:0C:19:5C:93:84:3C:C0:DB:72:2E:31:30:61:F0:B1
CKA_CLASS CK_OBJECT_CLASS CKO_NSS_TRUST
CKA_TOKEN CK_BBOOL CK_TRUE
CKA_PRIVATE CK_BBOOL CK_FALSE
CKA_MODIFIABLE CK_BBOOL
CK_FALSE
CKA_LABEL UTF8 "Camerfirma Chambers of Commerce Root"
CKA_CERT_SHA1_HASH MULTILINE_OCTAL
\156\072\125\244\031\014\031\134\223\204\074\300\333\162\056\061
\060\141\360\261
END
CKA_CERT_MD5_HASH MULTILINE_OCTAL
\260\001\356\024\331\257\051\030\224\166\216\361\151\063\052\204
END
CKA_ISSUER MULTILINE_OCTAL
\060\177\061\013\060\011\006\003\125\004\006\023\002\105\125\061
\047\060\045\006\003\125\004\012\023\036\101\103\040\103\141\155
\145\162\146\151\162\155\141\040\123\101\040\103\111\106\040\101
\070\062\067\064\063\062\070\067\061\043\060\041\006\003\125\004
\013\023\032\150\164\164\160\072\057\057\167\167\167\056\143\150
\141\155\142\145\162\163\151\147\156\056\157\162\147\061\042\060
\040\006\003\125\004\003\023\031\103\150\141\155\142\145\162\163
\040\157\146\040\103\157\155\155\145\162\143\145\040\122\157\157
\164
END
CKA_SERIAL_NUMBER MULTILINE_OCTAL
\002\001\000
END
CKA_TRUST_SERVER_AUTH CK_TRUST CKT_NSS_MUST_VERIFY_TRUST
CKA_TRUST_EMAIL_PROTECTION CK_TRUST CKT_NSS_TRUSTED_DELEGATOR
CKA_TRUST_CODE_SIGNING

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CKA_TRUST CKT_NSS_MUST_VERIFY_TRUST
CKA_TRUST_STEP_UP_APPROVED CK_BBOOL CK_FALSE

#
# Certificate "XRamp Global CA Root"
#
# Issuer: CN=XRamp Global Certification Authority,O=XRamp Security Services
Inc,OU=www.xrampsecurity.com,C=US
# Serial Number:50:94:6c:ec:18:ea:d5:9c:4d:d5:97:ef:75:8f:a0:ad
# Subject: CN=XRamp Global Certification Authority,O=XRamp Security Services
Inc,OU=www.xrampsecurity.com,C=US
# Not Valid Before: Mon Nov 01 17:14:04 2004
# Not Valid After : Mon Jan 01 05:37:19 2035
# Fingerprint (SHA-256):
CE:CD:DC:90:50:99:D8:DA:DF:C5:B1:D2:09:B7:37:CB:E2:C1:8C:FB:2C:10:C0:FF:0B:CF:0D:32:86:FC:1A:A2
# Fingerprint (SHA1): B8:01:86:D1:EB:9C:86:A5:41:04:CF:30:54:F3:4C:52:B7:E5:58:C6
CKA_CLASS CK_OBJECT_CLASS CKO_CERTIFICATE
CKA_TOKEN CK_BBOOL CK_TRUE
CKA_PRIVATE CK_BBOOL CK_FALSE
CKA_MODIFIABLE CK_BBOOL CK_FALSE
CKA_LABEL UTF8 "XRamp Global CA Root"
CKA_CERTIFICATE_TYPE CK_CERTIFICATE_TYPE CKC_X_509
CKA_SUBJECT MULTILINE_OCTAL
\060\201\202\061\013\060\011\006\003\125\004\006\023\002\125\123
\061\036\060\034\006\003\125\004\013\023\025\167\167\167\056\170
\162\141\155\160\163\145\143\165\162\151\164\171\056\143\157\155
\061\044\060\042\006\003\125\004\012\023\033\130\122\141\155\160
\040\123\145\143\165\162\151\164\171\040\123\145\162\166\151\143
\145\163\040\111\156\143\061\055\060\053\006\003\125\004\003\023
\044\130\122\141\155\160\040\107\154\157\142\141\154\040\103\145
\162\164\151\146\151\143\141\164\151\157\156\040\101\165\164\150
\157\162\151\164\171
END
CKA_ID
UTF8 "0"
CKA_ISSUER MULTILINE_OCTAL
\060\201\202\061\013\060\011\006\003\125\004\006\023\002\125\123
\061\036\060\034\006\003\125\004\013\023\025\167\167\167\056\170
\162\141\155\160\163\145\143\165\162\151\164\171\056\143\157\155
\061\044\060\042\006\003\125\004\012\023\033\130\122\141\155\160
\040\123\145\143\165\162\151\164\171\040\123\145\162\166\151\143
\145\163\040\111\156\143\061\055\060\053\006\003\125\004\003\023
\044\130\122\141\155\160\040\107\154\157\142\141\154\040\103\145
\162\164\151\146\151\143\141\164\151\157\156\040\101\165\164\150
\157\162\151\164\171
END
CKA_SERIAL_NUMBER

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MULTILINE_OCTAL

\002\020\120\224\154\354\030\352\325\234\115\325\227\357\165\217
\240\255

END

CKA_VALUE MULTILINE_OCTAL

\060\202\004\060\060\202\003\030\240\003\002\001\002\002\020\120
\224\154\354\030\352\325\234\115\325\227\357\165\217\240\255\060
\015\006\011\052\206\110\206\367\015\001\001\005\005\000\060\201
\202\061\013\060\011\006\003\125\004\006\023\002\125\123\061\036
\060\034\006\003\125\004\013\023\025\167\167\167\056\170\162\141
\155\160\163\145\143\165\162\151\164\171\056\143\157\155\061\044
\060\042\006\003\125\004\012\023\033\130\122\141\155\160\040\123
\145\143\165\162\151\164\171\040\123\145\162\166\151\143\145\163
\040\111\156\143\061\055\060\053\006\003\125\004\003\023\044\130
\122\141\155\160\040\107\154\157\142\141\154\040\103\145\162\164
\151\146\151\143\141\164\151\157\156\040\101\165\164\150\157\162
\151\164\171\060\036\027\015\060\064\061\061\060\061\061\067\061
\064\060\064\132\027\015\063\065\060\061\060\061\060\065\063\067
\061\071\132\060\201\202\061\013\060\011\006\003\125\004\006\023
\002\125\123\061\036\060\034\006\003\125\004\013\023\025\167\167
\167\056\170\162\141\155\160\163\145\143\165\162\151\164\171\056
\143\157\155\061\044\060\042\006\003\125\004\012\023\033\130\122
\141\155\160\040\123\145\143\165\162\151\164\171\040\123\145\162
\166\151\143\145\163\040\111\156\143\061\055\060\053\006\003\125
\004\003\023\044\130\122\141\155\160\040\107\154\157\142\141\154
\040\103\145\162\164\151\146\151\143\141\164\151\157\156\040\101
\165\164\150\157\162\151\164\171\060\202\001\042\060\015\006\011
\052\206\110\206\367\015\001\001\001\005\000\003\202\001\017\000
\060\202\001\012\002\202\001\001\000\230\044\036\275\025\264\272
\337\307\214\245\047\266\070\013\151\363\266\116\250\054\056\041
\035\134\104\337\041\135\176\043\164\376\136\176\264\112\267\246
\255\037\256\340\006\026\342\233\133\331\147\164\153\135\200\217
\051\235\206\033\331\234\015\230\155\166\020\050\130\344\145\260
\177\112\230\171\237\340\303\061\176\200\053\265\214\300\100\073
\021\206\320\313\242\206\066\140\244\325\060\202\155\331\156\320
\017\022\004\063\227\137\117\141\132\360\344\371\221\253\347\035
\073\274\350\317\364\153\055\064\174\342\110\141\034\216\363\141
\104\314\157\240\112\251\224\260\115\332\347\251\064\172\162\070
\250\101\314\074\224\021\175\353\310\246\214\267\206\313\312\063
\073\331\075\067\213\373\172\076\206\054\347\163\327\012\127\254
\144\233\031\353\364\017\004\010\212\254\003\027\031\144\364\132
\045\042\215\064\054\262\366\150\035\022\155\323\212\036\024\332
\304\217\246\342\043\205\325\172\015\275\152\340\351\354\354\027
\273\102\033\147\252\045\355\105\203\041\374\301\311\174\325\142
\076\372\362\305\055\323\375\324\145\002\003\001\000\001\243\201
\237\060\201\234\060\023\006\011\053\006\001\004\001\202\067\024
\002\004\006\036\004\000\103\000\101\060\013\006\003\125\035\017
\004\004\003\002\001\206\060\017\006\003\125\035\023\001\001\377

\004\005\060\003\001\001\377\060\035\006\003\125\035\016\004\026
\004\024\306\117\242\075\006\143\204\011\234\316\142\344\004\254
\215\134\265\351\266\033\060\066\006\003\125\035\037\004\057\060
\055\060\053\240\051\240\047\206\045\150\164\164\160\072\057\057
\143\162\154\056\170\162\141\155\160\163\145\143\165\162\151\164
\171\056\143\157\155\057\130\107\103\101\056\143\162\154\060\020
\006\011\053\006\001\004\001\202\067\025\001\004\003\002\001\001
\060\015\006\011\052\206\110\206\367\015\001\001\005\005\000\003
\202\001\001\000\221\025\071\003\001\033\147\373\112\034\371\012
\140\133\241\332\115\227\142\371\044\123\047\327\202\144\116\220
\056\303\111\033\053\232\334\374\250\170\147\065\361\035\360\021
\275\267\110\343\020\366\015\337\077\322\311\266\252\125\244\110
\272\002\333\336\131\056\025\133\073\235\026\175\107\327\067\352
\137\115\166\022\066\273\037\327\241\201\004\106\040\243\054\155
\251\236\001\176\077\051\316\000\223\337\375\311\222\163\211\211
\144\236\347\053\344\034\221\054\322\271\316\175\316\157\061\231
\323\346\276\322\036\220\360\011\024\171\134\043\253\115\322\332
\041\037\115\231\171\235\341\317\047\237\020\233\034\210\015\260
\212\144\101\061\270\016\154\220\044\244\233\134\161\217\272\273
\176\034\033\333\152\200\017\041\274\351\333\246\267\100\364\262
\213\251\261\344\357\232\032\320\075\151\231\356\250\050\243\341
\074\263\360\262\021\234\317\174\100\346\335\347\103\175\242\330
\072\265\251\215\362\064\231\304\324\020\341\006\375\011\204\020
\073\356\304\114\364\354\047\174\102\302\164\174\202\212\011\311
\264\003\045\274

END

CKA_NSS_MOZILLA_CA_POLICY

CK_BBOOL CK_TRUE

CKA_NSS_SERVER_DISTRUST_AFTER CK_BBOOL CK_FALSE

CKA_NSS_EMAIL_DISTRUST_AFTER CK_BBOOL CK_FALSE

Trust for "XRamp Global CA Root"

Issuer: CN=XRamp Global Certification Authority,O=XRamp Security Services

Inc,OU=www.xrampsecurity.com,C=US

Serial Number:50:94:6c:ec:18:ea:d5:9c:4d:d5:97:ef:75:8f:a0:ad

Subject: CN=XRamp

Global Certification Authority,O=XRamp Security Services Inc,OU=www.xrampsecurity.com,C=US

Not Valid Before: Mon Nov 01 17:14:04 2004

Not Valid After : Mon Jan 01 05:37:19 2035

Fingerprint (SHA-256):

CE:CD:DC:90:50:99:D8:DA:DF:C5:B1:D2:09:B7:37:CB:E2:C1:8C:FB:2C:10:C0:FF:0B:CF:0D:32:86:FC:1A:A2

Fingerprint (SHA1): B8:01:86:D1:EB:9C:86:A5:41:04:CF:30:54:F3:4C:52:B7:E5:58:C6

CKA_CLASS CK_OBJECT_CLASS CKO_NSS_TRUST

CKA_TOKEN CK_BBOOL CK_TRUE

CKA_PRIVATE CK_BBOOL CK_FALSE

CKA_MODIFIABLE CK_BBOOL CK_FALSE

CKA_LABEL UTF8 "XRamp Global CA Root"

CKA_CERT_SHA1_HASH MULTILINE_OCTAL

\270\001\206\321\353\234\206\245\101\004\317\060\124\363\114\122

\267\345\130\306

END

CKA_CERT_MD5_HASH MULTILINE_OCTAL

\241\013\104\263\312\020\330\000\156\235\017\330\017\222\012\321

END

CKA_ISSUER MULTILINE_OCTAL

\060\201\202\061\013\060\011\006\003\125\004\006\023\002\125\123

\061\036\060\034\006\003\125\004\013\023\025\167\167\167\056\170

\162\141\155\160\163\145\143\165\162\151\164\171\056\143\157\155

\061\044\060\042\006\003\125\004\012\023\033\130\122\141\155\160

\040\123\145\143\165\162\151\164\171\040\123\145\162\166\151\143

\145\163\040\111\156\143\061\055\060\053\006\003\125\004\003\023

\044\130\122\141\155\160\040\107\154\157\142\141\154\040\103\145

\162\164\151\146\151\143\141\164\151\157\156\040\101\165\164\150

\157\162\151\164\171

END

CKA_SERIAL_NUMBER

MULTILINE_OCTAL

\002\020\120\224\154\354\030\352\325\234\115\325\227\357\165\217

\240\255

END

CKA_TRUST_SERVER_AUTH CK_TRUST CKT_NSS_TRUSTED_DELEGATOR

CKA_TRUST_EMAIL_PROTECTION CK_TRUST CKT_NSS_TRUSTED_DELEGATOR

CKA_TRUST_CODE_SIGNING CK_TRUST CKT_NSS_MUST_VERIFY_TRUST

CKA_TRUST_STEP_UP_APPROVED CK_BBOOL CK_FALSE

#

Certificate "Go Daddy Class 2 CA"

#

Issuer: OU=Go Daddy Class 2 Certification Authority,O="The Go Daddy Group, Inc.",C=US

Serial Number: 0 (0x0)

Subject: OU=Go Daddy Class 2 Certification Authority,O="The Go Daddy Group, Inc.",C=US

Not Valid Before: Tue Jun 29 17:06:20 2004

Not Valid After : Thu Jun

29 17:06:20 2034

Fingerprint (SHA-256):

C3:84:6B:F2:4B:9E:93:CA:64:27:4C:0E:C6:7C:1E:CC:5E:02:4F:FC:AC:D2:D7:40:19:35:0E:81:FE:54:6A:E4

Fingerprint (SHA1): 27:96:BA:E6:3F:18:01:E2:77:26:1B:A0:D7:77:70:02:8F:20:EE:E4

CKA_CLASS CK_OBJECT_CLASS CKO_CERTIFICATE

CKA_TOKEN CK_BBOOL CK_TRUE

CKA_PRIVATE CK_BBOOL CK_FALSE

CKA_MODIFIABLE CK_BBOOL CK_FALSE

CKA_LABEL UTF8 "Go Daddy Class 2 CA"

CKA_CERTIFICATE_TYPE CK_CERTIFICATE_TYPE CKC_X_509

CKA_SUBJECT MULTILINE_OCTAL

\060\143\061\013\060\011\006\003\125\004\006\023\002\125\123\061

\041\060\037\006\003\125\004\012\023\030\124\150\145\040\107\157

\040\104\141\144\144\171\040\107\162\157\165\160\054\040\111\156
\143\056\061\061\060\057\006\003\125\004\013\023\050\107\157\040
\104\141\144\144\171\040\103\154\141\163\163\040\062\040\103\145
\162\164\151\146\151\143\141\164\151\157\156\040\101\165\164\150
\157\162\151\164\171

END

CKA_ID UTF8 "0"

CKA_ISSUER MULTILINE_OCTAL

\060\143\061\013\060\011\006\003\125\004\006\023\002\125\123\061
\041\060\037\006\003\125\004\012\023\030\124\150\145\040\107\157
\040\104\141\144\144\171\040\107\162\157\165\160\054\040\111\156
\143\056\061\061\060\057\006\003\125\004\013\023\050\107\157\040
\104\141\144\144\171\040\103\154\141\163\163\040\062\040\103\145
\162\164\151\146\151\143\141\164\151\157\156\040\101\165\164\150
\157\162\151\164\171

END

CKA_SERIAL_NUMBER

MULTILINE_OCTAL

\002\001\000

END

CKA_VALUE MULTILINE_OCTAL

\060\202\004\000\060\202\002\350\240\003\002\001\002\002\001\000
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\143\061\013\060\011\006\003\125\004\006\023\002\125\123\061\041
\060\037\006\003\125\004\012\023\030\124\150\145\040\107\157\040
\104\141\144\144\171\040\107\162\157\165\160\054\040\111\156\143
\056\061\061\060\057\006\003\125\004\013\023\050\107\157\040\104
\141\144\144\171\040\103\154\141\163\163\040\062\040\103\145\162
\164\151\146\151\143\141\164\151\157\156\040\101\165\164\150\157
\162\151\164\171\060\036\027\015\060\064\060\066\062\071\061\067
\060\066\062\060\132\027\015\063\064\060\066\062\071\061\067\060
\066\062\060\132\060\143\061\013\060\011\006\003\125\004\006\023
\002\125\123\061\041\060\037\006\003\125\004\012\023\030\124\150
\145\040\107\157\040\104\141\144\144\171\040\107\162\157\165\160
\054\040\111\156\143\056\061\061\060\057\006\003\125\004\013\023
\050\107\157\040\104\141\144\144\171\040\103\154\141\163\163\040
\062\040\103\145\162\164\151\146\151\143\141\164\151\157\156\040
\101\165\164\150\157\162\151\164\171\060\202\001\040\060\015\006
\011\052\206\110\206\367\015\001\001\001\005\000\003\202\001\015
\000\060\202\001\010\002\202\001\001\000\336\235\327\352\127\030
\111\241\133\353\327\137\110\206\352\276\335\377\344\357\147\034
\364\145\150\263\127\161\240\136\167\273\355\233\111\351\160\200
\075\126\030\143\010\157\332\362\314\320\077\177\002\124\042\124
\020\330\262\201\324\300\165\075\113\177\307\167\303\076\170\253
\032\003\265\040\153\057\152\053\261\305\210\176\304\273\036\260
\301\330\105\047\157\252\067\130\367\207\046\327\330\055\366\251
\027\267\037\162\066\116\246\027\077\145\230\222\333\052\156\135
\242\376\210\340\013\336\177\345\215\025\341\353\313\072\325\342

\022\242\023\055\330\216\257\137\022\075\240\010\005\010\266\134
\245\145\070\004\105\231\036\243\140\140\164\305\101\245\162\142
\033\142\305\037\157\137\032\102\276\002\121\145\250\256\043\030
\152\374\170\003\251\115\177\200\303\372\253\132\374\241\100\244
\312\031\026\376\262\310\357\136\163\015\356\167\275\232\366\171
\230\274\261\007\147\242\025\015\335\240\130\306\104\173\012\076
\142\050\137\272\101\007\123\130\317\021\176\070\164\305\370\377
\265\151\220\217\204\164\352\227\033\257\002\001\003\243\201\300
\060\201\275\060\035\006\003\125\035\016\004\026\004\024\322\304
\260\322\221\324\114\021\161\263\141\313\075\241\376\335\250\152
\324\343\060\201\215\006\003\125\035\043\004\201\205\060\201\202
\200\024\322\304\260\322\221\324\114\021\161\263\141\313\075\241
\376\335\250\152\324\343\241\147\244\145\060\143\061\013\060\011
\006\003\125\004\006\023\002\125\123\061\041\060\037\006\003\125
\004\012\023\030\124\150\145\040\107\157\040\104\141\144\144\171
\040\107\162\157\165\160\054\040\111\156\143\056\061\061\060\057
\006\003\125\004\013\023\050\107\157\040\104\141\144\144\171\040
\103\154\141\163\163\040\062\040\103\145\162\164\151\146\151\143
\141\164\151\157\156\040\101\165\164\150\157\162\151\164\171\202
\001\000\060\014\006\003\125\035\023\004\005\060\003\001\001\377
\060\015\006\011\052\206\110\206\367\015\001\001\005\005\000\003
\202\001\001\000\062\113\363\262\312\076\221\374\022\306\241\007
\214\216\167\240\063\006\024\134\220\036\030\367\010\246\075\012
\031\371\207\200\021\156\151\344\226\027\060\377\064\221\143\162
\070\356\314\034\001\243\035\224\050\244\061\366\172\304\124\327
\366\345\061\130\003\242\314\316\142\333\224\105\163\265\277\105
\311\044\265\325\202\002\255\043\171\151\215\270\266\115\316\317
\114\312\063\043\350\034\210\252\235\213\101\156\026\311\040\345
\211\236\315\073\332\160\367\176\231\046\040\024\124\045\253\156
\163\205\346\233\041\235\012\154\202\016\250\370\302\014\372\020
\036\154\226\357\207\015\304\017\141\213\255\356\203\053\225\370
\216\222\204\162\071\353\040\352\203\355\203\315\227\156\010\274
\353\116\046\266\163\053\344\323\366\114\376\046\161\342\141\021
\164\112\377\127\032\207\017\165\110\056\317\121\151\027\240\002
\022\141\225\325\321\100\262\020\114\356\304\254\020\103\246\245
\236\012\325\225\142\232\015\317\210\202\305\062\014\344\053\237
\105\346\015\237\050\234\261\271\052\132\127\255\067\017\257\035
\177\333\275\237

END

CKA_NSS_MOZILLA_CA_POLICY

CK_BBOOL CK_TRUE

CKA_NSS_SERVER_DISTRUST_AFTER CK_BBOOL CK_FALSE

CKA_NSS_EMAIL_DISTRUST_AFTER CK_BBOOL CK_FALSE

Trust for "Go Daddy Class 2 CA"

Issuer: OU=Go Daddy Class 2 Certification Authority,O="The Go Daddy Group, Inc.",C=US

Serial Number: 0 (0x0)

Subject: OU=Go Daddy Class 2 Certification Authority,O="The Go Daddy Group, Inc.",C=US

```

# Not Valid Before: Tue
Jun 29 17:06:20 2004
# Not Valid After : Thu Jun 29 17:06:20 2034
# Fingerprint (SHA-256):
C3:84:6B:F2:4B:9E:93:CA:64:27:4C:0E:C6:7C:1E:CC:5E:02:4F:FC:AC:D2:D7:40:19:35:0E:81:FE:54:6A:E4
# Fingerprint (SHA1): 27:96:BA:E6:3F:18:01:E2:77:26:1B:A0:D7:77:70:02:8F:20:EE:E4
CKA_CLASS CK_OBJECT_CLASS CKO_NSS_TRUST
CKA_TOKEN CK_BBOOL CK_TRUE
CKA_PRIVATE CK_BBOOL CK_FALSE
CKA_MODIFIABLE CK_BBOOL CK_FALSE
CKA_LABEL UTF8 "Go Daddy Class 2 CA"
CKA_CERT_SHA1_HASH MULTILINE_OCTAL
\047\226\272\346\077\030\001\342\167\046\033\240\327\167\160\002
\217\040\356\344
END
CKA_CERT_MD5_HASH MULTILINE_OCTAL
\221\336\006\045\253\332\375\062\027\014\273\045\027\052\204\147
END
CKA_ISSUER MULTILINE_OCTAL
\060\143\061\013\060\011\006\003\125\004\006\023\002\125\123\061
\041\060\037\006\003\125\004\012\023\030\124\150\145\040\107\157
\040\104\141\144\144\171\040\107\162\157\165\160\054\040\111\156
\143\056\061\061\060\057\006\003\125\004\013\023\050\107\157\040
\104\141\144\144\171\040\103\154\141\163\163\040\062\040\103\145
\162\164\151\146\151\143\141\164\151\157\156\040\101\165\164\150
\157\162\151\164\171
END
CKA_SERIAL_NUMBER
MULTILINE_OCTAL
\002\001\000
END
CKA_TRUST_SERVER_AUTH CK_TRUST CKT_NSS_TRUSTED_DELEGATOR
CKA_TRUST_EMAIL_PROTECTION CK_TRUST CKT_NSS_TRUSTED_DELEGATOR
CKA_TRUST_CODE_SIGNING CK_TRUST CKT_NSS_MUST_VERIFY_TRUST
CKA_TRUST_STEP_UP_APPROVED CK_BBOOL CK_FALSE

#
# Certificate "Starfield Class 2 CA"
#
# Issuer: OU=Starfield Class 2 Certification Authority,O="Starfield Technologies, Inc.",C=US
# Serial Number: 0 (0x0)
# Subject: OU=Starfield Class 2 Certification Authority,O="Starfield Technologies, Inc.",C=US
# Not Valid Before: Tue Jun 29 17:39:16 2004
# Not Valid After : Thu Jun 29 17:39:16 2034
# Fingerprint (SHA-256):
14:65:FA:20:53:97:B8:76:FA:A6:F0:A9:95:8E:55:90:E4:0F:CC:7F:AA:4F:B7:C2:C8:67:75:21:FB:5F:B6:58
# Fingerprint (SHA1): AD:7E:1C:28:B0:64:EF:8F:60:03:40:20:14:C3:D0:E3:37:0E:B5:8A
CKA_CLASS CK_OBJECT_CLASS CKO_CERTIFICATE

```

```
CKA_TOKEN CK_BBOOL CK_TRUE
CKA_PRIVATE
CK_BBOOL CK_FALSE
CKA_MODIFIABLE CK_BBOOL CK_FALSE
CKA_LABEL UTF8 "Starfield Class 2 CA"
CKA_CERTIFICATE_TYPE CK_CERTIFICATE_TYPE CKC_X_509
CKA_SUBJECT MULTILINE_OCTAL
\060\150\061\013\060\011\006\003\125\004\006\023\002\125\123\061
\045\060\043\006\003\125\004\012\023\034\123\164\141\162\146\151
\145\154\144\040\124\145\143\150\156\157\154\157\147\151\145\163
\054\040\111\156\143\056\061\062\060\060\006\003\125\004\013\023
\051\123\164\141\162\146\151\145\154\144\040\103\154\141\163\163
\040\062\040\103\145\162\164\151\146\151\143\141\164\151\157\156
\040\101\165\164\150\157\162\151\164\171
END
CKA_ID UTF8 "0"
CKA_ISSUER MULTILINE_OCTAL
\060\150\061\013\060\011\006\003\125\004\006\023\002\125\123\061
\045\060\043\006\003\125\004\012\023\034\123\164\141\162\146\151
\145\154\144\040\124\145\143\150\156\157\154\157\147\151\145\163
\054\040\111\156\143\056\061\062\060\060\006\003\125\004\013\023
\051\123\164\141\162\146\151\145\154\144\040\103\154\141\163\163
\040\062\040\103\145\162\164\151\146\151\143\141\164\151\157\156
\040\101\165\164\150\157\162\151\164\171
END
CKA_SERIAL_NUMBER
MULTILINE_OCTAL
\002\001\000
END
CKA_VALUE MULTILINE_OCTAL
\060\202\004\017\060\202\002\367\240\003\002\001\002\002\001\000
\060\015\006\011\052\206\110\206\367\015\001\001\005\005\000\060
\150\061\013\060\011\006\003\125\004\006\023\002\125\123\061\045
\060\043\006\003\125\004\012\023\034\123\164\141\162\146\151\145
\154\144\040\124\145\143\150\156\157\154\157\147\151\145\163\054
\040\111\156\143\056\061\062\060\060\006\003\125\004\013\023\051
\123\164\141\162\146\151\145\154\144\040\103\154\141\163\163\040
\062\040\103\145\162\164\151\146\151\143\141\164\151\157\156\040
\101\165\164\150\157\162\151\164\171\060\036\027\015\060\064\060
\066\062\071\061\067\063\071\061\066\132\027\015\063\064\060\066
\062\071\061\067\063\071\061\066\132\060\150\061\013\060\011\006
\003\125\004\006\023\002\125\123\061\045\060\043\006\003\125\004
\012\023\034\123\164\141\162\146\151\145\154\144\040\124\145\143
\150\156\157\154\157\147\151\145\163\054\040\111\156\143\056\061
\062\060\060\006\003\125\004\013\023\051\123\164\141\162\146\151
\145\154\144\040\103\154\141\163\163\040\062\040\103\145\162\164
\151\146\151\143\141\164\151\157\156\040\101\165\164\150\157\162
\151\164\171\060\202\001\040\060\015\006\011\052\206\110\206\367
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\015\001\001\001\005\000\003\202\001\015\000\060\202\001\010\002
\202\001\001\000\267\062\310\376\351\161\246\004\205\255\014\021
\144\337\316\115\357\310\003\030\207\077\241\253\373\074\246\237
\360\303\241\332\324\330\156\053\123\220\373\044\244\076\204\360
\236\350\137\354\345\047\104\365\050\246\077\173\336\340\052\360
\310\257\123\057\236\312\005\001\223\036\217\146\034\071\247\115
\372\132\266\163\004\045\146\353\167\177\347\131\306\112\231\045
\024\124\353\046\307\363\177\031\325\060\160\217\257\260\106\052
\377\255\353\051\355\327\237\252\004\207\243\324\371\211\245\064
\137\333\103\221\202\066\331\146\074\261\270\271\202\375\234\072
\076\020\310\073\357\006\145\146\172\233\031\030\075\377\161\121
\074\060\056\137\276\075\167\163\262\135\006\154\303\043\126\232
\053\205\046\222\034\247\002\263\344\077\015\257\010\171\202\270
\066\075\352\234\323\065\263\274\151\312\365\314\235\350\375\144
\215\027\200\063\156\136\112\135\231\311\036\207\264\235\032\300
\325\156\023\065\043\136\337\233\137\075\357\326\367\166\302\352
\076\273\170\015\034\102\147\153\004\330\370\326\332\157\213\362
\104\240\001\253\002\001\003\243\201\305\060\201\302\060\035\006
\003\125\035\016\004\026\004\024\277\137\267\321\316\335\037\206
\364\133\125\254\334\327\020\302\016\251\210\347\060\201\222\006
\003\125\035\043\004\201\212\060\201\207\200\024\277\137\267\321
\316\335\037\206\364\133\125\254\334\327\020\302\016\251\210\347
\241\154\244\152\060\150\061\013\060\011\006\003\125\004\006\023
\002\125\123\061\045\060\043\006\003\125\004\012\023\034\123\164
\141\162\146\151\145\154\144\040\124\145\143\150\156\157\154\157
\147\151\145\163\054\040\111\156\143\056\061\062\060\060\006\003
\125\004\013\023\051\123\164\141\162\146\151\145\154\144\040\103
\154\141\163\163\040\062\040\103\145\162\164\151\146\151\143\141
\164\151\157\156\040\101\165\164\150\157\162\151\164\171\202\001
\000\060\014\006\003\125\035\023\004\005\060\003\001\001\377\060
\015\006\011\052\206\110\206\367\015\001\001\005\005\000\003\202
\001\001\000\005\235\077\210\235\321\311\032\125\241\254\151\363
\363\131\332\233\001\207\032\117\127\251\241\171\011\052\333\367
\057\262\036\314\307\136\152\330\203\207\241\227\357\111\065\076
\167\006\101\130\142\277\216\130\270\012\147\077\354\263\335\041
\146\037\311\124\372\162\314\075\114\100\330\201\257\167\236\203
\172\273\242\307\365\064\027\216\331\021\100\364\374\054\052\115
\025\177\247\142\135\056\045\323\000\013\040\032\035\150\371\027
\270\364\275\213\355\050\131\335\115\026\213\027\203\310\262\145
\307\055\172\245\252\274\123\206\155\335\127\244\312\370\040\101
\013\150\360\364\373\164\276\126\135\172\171\365\371\035\205\343
\055\225\276\365\161\220\103\314\215\037\232\000\012\207\051\351
\125\042\130\000\043\352\343\022\103\051\133\107\010\335\214\101
\152\145\006\250\345\041\252\101\264\225\041\225\271\175\321\064
\253\023\326\255\274\334\342\075\071\315\275\076\165\160\241\030
\131\003\311\042\264\217\234\325\136\052\327\245\266\324\012\155
\370\267\100\021\106\232\037\171\016\142\277\017\227\354\340\057
\037\027\224

```

END
CKA_NSS_Mozilla_CA_POLICY
CK_BBOOL CK_TRUE
CKA_NSS_SERVER_DISTRUST_AFTER CK_BBOOL CK_FALSE
CKA_NSS_EMAIL_DISTRUST_AFTER CK_BBOOL CK_FALSE

# Trust for "Starfield Class 2 CA"
# Issuer: OU=Starfield Class 2 Certification Authority,O="Starfield Technologies, Inc.",C=US
# Serial Number: 0 (0x0)
# Subject: OU=Starfield Class 2 Certification Authority,O="Starfield Technologies, Inc.",C=US
# Not Valid Before: Tue Jun 29 17:39:16 2004
# Not Valid After : Thu Jun 29 17:39:16 2034
# Fingerprint (SHA-256):
14:65:FA:20:53:97:B8:76:FA:A6:F0:A9:95:8E:55:90:E4:0F:CC:7F:AA:4F:B7:C2:C8:67:75:21:FB:5F:B6:58
#
Fingerprint (SHA1): AD:7E:1C:28:B0:64:EF:8F:60:03:40:20:14:C3:D0:E3:37:0E:B5:8A
CKA_CLASS CK_OBJECT_CLASS CKO_NSS_TRUST
CKA_TOKEN CK_BBOOL CK_TRUE
CKA_PRIVATE CK_BBOOL CK_FALSE
CKA_MODIFIABLE CK_BBOOL CK_FALSE
CKA_LABEL UTF8 "Starfield Class 2 CA"
CKA_CERT_SHA1_HASH MULTILINE_OCTAL
\255\176\034\050\260\144\357\217\140\003\100\040\024\303\320\343
\067\016\265\212
END
CKA_CERT_MD5_HASH MULTILINE_OCTAL
\062\112\113\273\310\143\151\233\276\164\232\306\335\035\106\044
END
CKA_ISSUER MULTILINE_OCTAL
\060\150\061\013\060\011\006\003\125\004\006\023\002\125\123\061
\045\060\043\006\003\125\004\012\023\034\123\164\141\162\146\151
\145\154\144\040\124\145\143\150\156\157\154\157\147\151\145\163
\054\040\111\156\143\056\061\062\060\060\006\003\125\004\013\023
\051\123\164\141\162\146\151\145\154\144\040\103\154\141\163\163
\040\062\040\103\145\162\164\151\146\151\143\141\164\151\157\156
\040\101\165\164\150\157\162\151\164\171
END
CKA_SERIAL_NUMBER MULTILINE_OCTAL
\002\001\000
END
CKA_TRUST_SERVER_AUTH
CK_TRUST CKT_NSS_TRUSTED_DELEGATOR
CKA_TRUST_EMAIL_PROTECTION CK_TRUST CKT_NSS_TRUSTED_DELEGATOR
CKA_TRUST_CODE_SIGNING CK_TRUST CKT_NSS_MUST_VERIFY_TRUST
CKA_TRUST_STEP_UP_APPROVED CK_BBOOL CK_FALSE

#
# Certificate "DigiCert Assured ID Root CA"

```



```

#
# Issuer: CN=DigiCert Assured ID Root CA,OU=www.digicert.com,O=DigiCert Inc,C=US
# Serial Number:0c:e7:e0:e5:17:d8:46:fe:8f:e5:60:fc:1b:f0:30:39
# Subject: CN=DigiCert Assured ID Root CA,OU=www.digicert.com,O=DigiCert Inc,C=US
# Not Valid Before: Fri Nov 10 00:00:00 2006
# Not Valid After : Mon Nov 10 00:00:00 2031
# Fingerprint (SHA-256):
3E:90:99:B5:01:5E:8F:48:6C:00:BC:EA:9D:11:1E:E7:21:FA:BA:35:5A:89:BC:F1:DF:69:56:1E:3D:C6:32:5C
# Fingerprint (SHA1): 05:63:B8:63:0D:62:D7:5A:BB:C8:AB:1E:4B:DF:B5:A8:99:B2:4D:43
CKA_CLASS CK_OBJECT_CLASS CKO_CERTIFICATE
CKA_TOKEN CK_BBOOL CK_TRUE
CKA_PRIVATE CK_BBOOL CK_FALSE
CKA_MODIFIABLE CK_BBOOL CK_FALSE
CKA_LABEL UTF8 "DigiCert Assured ID Root CA"
CKA_CERTIFICATE_TYPE CK_CERTIFICATE_TYPE CKC_X_509
CKA_SUBJECT
MULTILINE_OCTAL
\060\145\061\013\060\011\006\003\125\004\006\023\002\125\123\061
\025\060\023\006\003\125\004\012\023\014\104\151\147\151\103\145
\162\164\040\111\156\143\061\031\060\027\006\003\125\004\013\023
\020\167\167\167\056\144\151\147\151\143\145\162\164\056\143\157
\155\061\044\060\042\006\003\125\004\003\023\033\104\151\147\151
\103\145\162\164\040\101\163\163\165\162\145\144\040\111\104\040
\122\157\157\164\040\103\101
END
CKA_ID UTF8 "0"
CKA_ISSUER MULTILINE_OCTAL
\060\145\061\013\060\011\006\003\125\004\006\023\002\125\123\061
\025\060\023\006\003\125\004\012\023\014\104\151\147\151\103\145
\162\164\040\111\156\143\061\031\060\027\006\003\125\004\013\023
\020\167\167\167\056\144\151\147\151\143\145\162\164\056\143\157
\155\061\044\060\042\006\003\125\004\003\023\033\104\151\147\151
\103\145\162\164\040\101\163\163\165\162\145\144\040\111\104\040
\122\157\157\164\040\103\101
END
CKA_SERIAL_NUMBER MULTILINE_OCTAL
\002\020\014\347\340\345\027\330\106\376\217\345\140\374\033\360
\060\071
END
CKA_VALUE
MULTILINE_OCTAL
\060\202\003\267\060\202\002\237\240\003\002\001\002\002\020\014
\347\340\345\027\330\106\376\217\345\140\374\033\360\060\071\060
\015\006\011\052\206\110\206\367\015\001\001\005\005\000\060\145
\061\013\060\011\006\003\125\004\006\023\002\125\123\061\025\060
\023\006\003\125\004\012\023\014\104\151\147\151\103\145\162\164
\040\111\156\143\061\031\060\027\006\003\125\004\013\023\020\167
\167\167\056\144\151\147\151\143\145\162\164\056\143\157\155\061

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\044\060\042\006\003\125\004\003\023\033\104\151\147\151\103\145
\162\164\040\101\163\163\165\162\145\144\040\111\104\040\122\157
\157\164\040\103\101\060\036\027\015\060\066\061\061\061\060\060
\060\060\060\060\060\132\027\015\063\061\061\061\061\060\060\060
\060\060\060\060\132\060\145\061\013\060\011\006\003\125\004\006
\023\002\125\123\061\025\060\023\006\003\125\004\012\023\014\104
\151\147\151\103\145\162\164\040\111\156\143\061\031\060\027\006
\003\125\004\013\023\020\167\167\167\056\144\151\147\151\143\145
\162\164\056\143\157\155\061\044\060\042\006\003\125\004\003\023
\033\104\151\147\151\103\145\162\164\040\101\163\163\165\162\145
\144\040\111\104\040\122\157\157\164\040\103\101\060\202\001\042
\060\015\006\011\052\206\110\206\367\015\001\001\001\005\000\003
\202\001\017\000\060\202\001\012\002\202\001\001\000\255\016\025
\316\344\103\200\134\261\207\363\267\140\371\161\022\245\256\334
\046\224\210\252\364\316\365\040\071\050\130\140\014\370\200\332
\251\025\225\062\141\074\265\261\050\204\212\212\334\237\012\014
\203\027\172\217\220\254\212\347\171\123\134\061\204\052\366\017
\230\062\066\166\314\336\335\074\250\242\357\152\373\041\362\122
\141\337\237\040\327\037\342\261\331\376\030\144\322\022\133\137
\371\130\030\065\274\107\315\241\066\371\153\177\324\260\070\076
\301\033\303\214\063\331\330\057\030\376\050\017\263\247\203\326
\303\156\104\300\141\065\226\026\376\131\234\213\166\155\327\361
\242\113\015\053\377\013\162\332\236\140\320\216\220\065\306\170
\125\207\040\241\317\345\155\012\310\111\174\061\230\063\154\042
\351\207\320\062\132\242\272\023\202\021\355\071\027\235\231\072
\162\241\346\372\244\331\325\027\061\165\256\205\175\042\256\077
\001\106\206\366\050\171\310\261\332\344\127\027\304\176\034\016
\260\264\222\246\126\263\275\262\227\355\252\247\360\267\305\250
\077\225\026\320\377\241\226\353\010\137\030\167\117\002\003\001
\000\001\243\143\060\141\060\016\006\003\125\035\017\001\001\377
\004\004\003\002\001\206\060\017\006\003\125\035\023\001\001\377
\004\005\060\003\001\001\377\060\035\006\003\125\035\016\004\026
\004\024\105\353\242\257\364\222\313\202\061\055\121\213\247\247
\041\235\363\155\310\017\060\037\006\003\125\035\043\004\030\060
\026\200\024\105\353\242\257\364\222\313\202\061\055\121\213\247
\247\041\235\363\155\310\017\060\015\006\011\052\206\110\206\367
\015\001\001\005\005\000\003\202\001\001\000\242\016\274\337\342
\355\360\343\162\163\172\144\224\277\367\162\146\330\062\344\102
\165\142\256\207\353\362\325\331\336\126\263\237\314\316\024\050
\271\015\227\140\134\022\114\130\344\323\075\203\111\105\130\227
\065\151\032\250\107\352\126\306\171\253\022\330\147\201\204\337
\177\011\074\224\346\270\046\054\040\275\075\263\050\211\367\137
\377\042\342\227\204\037\351\145\357\207\340\337\301\147\111\263
\135\353\262\011\052\353\046\355\170\276\175\077\053\363\267\046
\065\155\137\211\001\266\111\133\237\001\005\233\253\075\045\301
\314\266\177\302\361\157\206\306\372\144\150\353\201\055\224\353
\102\267\372\214\036\335\142\361\276\120\147\267\154\275\363\361
\037\153\014\066\007\026\177\067\174\251\133\155\172\361\022\106

\140\203\327\047\004\276\113\316\227\276\303\147\052\150\021\337
\200\347\014\063\146\277\023\015\024\156\363\177\037\143\020\036
\372\215\033\045\155\154\217\245\267\141\001\261\322\243\046\241
\020\161\235\255\342\303\371\303\231\121\267\053\007\010\316\056
\346\120\262\247\372\012\105\057\242\360\362

END

CKA_NSS_MOZILLA_CA_POLICY

CK_BBOOL CK_TRUE

CKA_NSS_SERVER_DISTRUST_AFTER

CK_BBOOL CK_FALSE

CKA_NSS_EMAIL_DISTRUST_AFTER CK_BBOOL CK_FALSE

Trust for "DigiCert Assured ID Root CA"

Issuer: CN=DigiCert Assured ID Root CA,OU=www.digicert.com,O=DigiCert Inc,C=US

Serial Number:0c:e7:e0:e5:17:d8:46:fe:8f:e5:60:fc:1b:f0:30:39

Subject: CN=DigiCert Assured ID Root CA,OU=www.digicert.com,O=DigiCert Inc,C=US

Not Valid Before: Fri Nov 10 00:00:00 2006

Not Valid After : Mon Nov 10 00:00:00 2031

Fingerprint (SHA-256):

3E:90:99:B5:01:5E:8F:48:6C:00:BC:EA:9D:11:1E:E7:21:FA:BA:35:5A:89:BC:F1:DF:69:56:1E:3D:C6:32:5C

Fingerprint (SHA1): 05:63:B8:63:0D:62:D7:5A:BB:C8:AB:1E:4B:DF:B5:A8:99:B2:4D:43

CKA_CLASS CK_OBJECT_CLASS CKO_NSS_TRUST

CKA_TOKEN CK_BBOOL CK_TRUE

CKA_PRIVATE CK_BBOOL CK_FALSE

CKA_MODIFIABLE CK_BBOOL CK_FALSE

CKA_LABEL UTF8 "DigiCert Assured ID Root CA"

CKA_CERT_SHA1_HASH MULTILINE_OCTAL

\005\143\270\143\015\142\327\132\273\310\253\036\113\337\265\250
\231\262\115\103

END

CKA_CERT_MD5_HASH MULTILINE_OCTAL

\207\316\013\173\052\016\111\000\341\130\161\233\067\250\223\162

END

CKA_ISSUER

MULTILINE_OCTAL

\060\145\061\013\060\011\006\003\125\004\006\023\002\125\123\061
\025\060\023\006\003\125\004\012\023\014\104\151\147\151\103\145
\162\164\040\111\156\143\061\031\060\027\006\003\125\004\013\023
\020\167\167\167\056\144\151\147\151\143\145\162\164\056\143\157
\155\061\044\060\042\006\003\125\004\003\023\033\104\151\147\151
\103\145\162\164\040\101\163\163\165\162\145\144\040\111\104\040
\122\157\157\164\040\103\101

END

CKA_SERIAL_NUMBER MULTILINE_OCTAL

\002\020\014\347\340\345\027\330\106\376\217\345\140\374\033\360
\060\071

END

CKA_TRUST_SERVER_AUTH CK_TRUST CKT_NSS_TRUSTED_DELEGATOR

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CKA_TRUST_EMAIL_PROTECTION CK_TRUST CKT_NSS_TRUSTED_DELEGATOR
CKA_TRUST_CODE_SIGNING CK_TRUST CKT_NSS_MUST_VERIFY_TRUST
CKA_TRUST_STEP_UP_APPROVED CK_BBOOL CK_FALSE

#
# Certificate "DigiCert Global Root CA"
#
# Issuer: CN=DigiCert Global Root CA,OU=www.digicert.com,O=DigiCert Inc,C=US
# Serial Number:08:3b:e0:56:90:42:46:b1:a1:75:6a:c9:59:91:c7:4a
#
# Subject: CN=DigiCert Global Root CA,OU=www.digicert.com,O=DigiCert Inc,C=US
# Not Valid Before: Fri Nov 10 00:00:00 2006
# Not Valid After : Mon Nov 10 00:00:00 2031
# Fingerprint (SHA-256):
43:48:A0:E9:44:4C:78:CB:26:5E:05:8D:5E:89:44:B4:D8:4F:96:62:BD:26:DB:25:7F:89:34:A4:43:C7:01:61
# Fingerprint (SHA1): A8:98:5D:3A:65:E5:E5:C4:B2:D7:D6:6D:40:C6:DD:2F:B1:9C:54:36
CKA_CLASS CK_OBJECT_CLASS CKO_CERTIFICATE
CKA_TOKEN CK_BBOOL CK_TRUE
CKA_PRIVATE CK_BBOOL CK_FALSE
CKA_MODIFIABLE CK_BBOOL CK_FALSE
CKA_LABEL UTF8 "DigiCert Global Root CA"
CKA_CERTIFICATE_TYPE CK_CERTIFICATE_TYPE CKC_X_509
CKA_SUBJECT MULTILINE_OCTAL
\060\141\061\013\060\011\006\003\125\004\006\023\002\125\123\061
\025\060\023\006\003\125\004\012\023\014\104\151\147\151\103\145
\162\164\040\111\156\143\061\031\060\027\006\003\125\004\013\023
\020\167\167\167\056\144\151\147\151\143\145\162\164\056\143\157
\155\061\040\060\036\006\003\125\004\003\023\027\104\151\147\151
\103\145\162\164\040\107\154\157\142\141\154\040\122\157\157\164
\040\103\101
END
CKA_ID
UTF8 "0"
CKA_ISSUER MULTILINE_OCTAL
\060\141\061\013\060\011\006\003\125\004\006\023\002\125\123\061
\025\060\023\006\003\125\004\012\023\014\104\151\147\151\103\145
\162\164\040\111\156\143\061\031\060\027\006\003\125\004\013\023
\020\167\167\167\056\144\151\147\151\143\145\162\164\056\143\157
\155\061\040\060\036\006\003\125\004\003\023\027\104\151\147\151
\103\145\162\164\040\107\154\157\142\141\154\040\122\157\157\164
\040\103\101
END
CKA_SERIAL_NUMBER MULTILINE_OCTAL
\002\020\010\073\340\126\220\102\106\261\241\165\152\311\131\221
\307\112
END
CKA_VALUE MULTILINE_OCTAL
\060\202\003\257\060\202\002\227\240\003\002\001\002\002\020\010

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\073\340\126\220\102\106\261\241\165\152\311\131\221\307\112\060
\015\006\011\052\206\110\206\367\015\001\001\005\005\000\060\141
\061\013\060\011\006\003\125\004\006\023\002\125\123\061\025\060
\023\006\003\125\004\012\023\014\104\151\147\151\103\145\162\164
\040\111\156\143\061\031\060\027\006\003\125\004\013\023\020\167
\167\167\056\144\151\147\151\143\145\162\164\056\143\157\155\061
\040\060\036\006\003\125\004\003\023\027\104\151\147\151\103\145
\162\164\040\107\154\157\142\141\154\040\122\157\157\164\040\103
\101\060\036\027\015\060\066\061\061\061\060\060\060\060\060\060
\060\132\027\015\063\061\061\061\061\060\060\060\060\060\060
\132\060\141\061\013\060\011\006\003\125\004\006\023\002\125\123
\061\025\060\023\006\003\125\004\012\023\014\104\151\147\151\103
\145\162\164\040\111\156\143\061\031\060\027\006\003\125\004\013
\023\020\167\167\167\056\144\151\147\151\143\145\162\164\056\143
\157\155\061\040\060\036\006\003\125\004\003\023\027\104\151\147
\151\103\145\162\164\040\107\154\157\142\141\154\040\122\157\157
\164\040\103\101\060\202\001\042\060\015\006\011\052\206\110\206
\367\015\001\001\001\005\000\003\202\001\017\000\060\202\001\012
\002\202\001\001\000\342\073\341\021\162\336\250\244\323\243\127
\252\120\242\217\013\167\220\311\242\245\356\022\316\226\133\001
\011\040\314\001\223\247\116\060\267\123\367\103\304\151\000\127
\235\342\215\042\335\207\006\100\000\201\011\316\316\033\203\277
\337\315\073\161\106\342\326\146\307\005\263\166\047\026\217\173
\236\036\225\175\356\267\110\243\010\332\326\257\172\014\071\006
\145\177\112\135\037\274\027\370\253\276\356\050\327\164\177\172
\170\231\131\205\150\156\134\043\062\113\277\116\300\350\132\155
\343\160\277\167\020\277\374\001\366\205\331\250\104\020\130\062
\251\165\030\325\321\242\276\107\342\047\152\364\232\063\370\111
\010\140\213\324\137\264\072\204\277\241\252\112\114\175\076\317
\117\137\154\166\136\240\113\067\221\236\334\042\346\155\316\024
\032\216\152\313\376\315\263\024\144\027\307\133\051\236\062\277
\362\356\372\323\013\102\324\253\267\101\062\332\014\324\357\370
\201\325\273\215\130\077\265\033\350\111\050\242\160\332\061\004
\335\367\262\026\362\114\012\116\007\250\355\112\075\136\265\177
\243\220\303\257\047\002\003\001\000\001\243\143\060\141\060\016
\006\003\125\035\017\001\001\377\004\004\003\002\001\206\060\017
\006\003\125\035\023\001\001\377\004\005\060\003\001\001\377\060
\035\006\003\125\035\016\004\026\004\024\003\336\120\065\126\321
\114\273\146\360\243\342\033\033\303\227\262\075\321\125\060\037
\006\003\125\035\043\004\030\060\026\200\024\003\336\120\065\126
\321\114\273\146\360\243\342\033\033\303\227\262\075\321\125\060
\015\006\011\052\206\110\206\367\015\001\001\005\005\000\003\202
\001\001\000\313\234\067\252\110\023\022\012\372\335\104\234\117
\122\260\364\337\256\004\365\171\171\010\243\044\030\374\113\053
\204\300\055\271\325\307\376\364\301\037\130\313\270\155\234\172
\164\347\230\051\253\021\265\343\160\240\241\315\114\210\231\223
\214\221\160\342\253\017\034\276\223\251\377\143\325\344\007\140
\323\243\277\235\133\011\361\325\216\343\123\364\216\143\372\077

\247\333\264\146\337\142\146\326\321\156\101\215\362\055\265\352
\167\112\237\235\130\342\053\131\300\100\043\355\055\050\202\105
\076\171\124\222\046\230\340\200\110\250\067\357\360\326\171\140
\026\336\254\350\016\315\156\254\104\027\070\057\111\332\341\105
\076\052\271\066\123\317\072\120\006\367\056\350\304\127\111\154
\141\041\030\325\004\255\170\074\054\072\200\153\247\353\257\025
\024\351\330\211\301\271\070\154\342\221\154\212\377\144\271\167
\045\127\060\300\033\044\243\341\334\351\337\107\174\265\264\044
\010\005\060\354\055\275\013\277\105\277\120\271\251\363\353\230
\001\022\255\310\210\306\230\064\137\215\012\074\306\351\325\225
\225\155\336

END

CKA_NSS_Mozilla_CA_POLICY

CK_BBOOL CK_TRUE

CKA_NSS_SERVER_DISTRUST_AFTER CK_BBOOL CK_FALSE

CKA_NSS_EMAIL_DISTRUST_AFTER CK_BBOOL CK_FALSE

Trust for "DigiCert Global Root CA"

Issuer: CN=DigiCert Global Root CA,OU=www.digicert.com,O=DigiCert Inc,C=US

Serial Number:08:3b:e0:56:90:42:46:b1:a1:75:6a:c9:59:91:c7:4a

Subject: CN=DigiCert Global Root CA,OU=www.digicert.com,O=DigiCert Inc,C=US

Not Valid Before: Fri Nov 10 00:00:00 2006

Not Valid After : Mon Nov 10 00:00:00 2031

Fingerprint (SHA-256):

43:48:A0:E9:44:4C:78:CB:26:5E:05:8D:5E:89:44:B4:D8:4F:96:62:BD:26:DB:25:7F:89:34:A4:43:C7:01:61

#

Fingerprint (SHA1): A8:98:5D:3A:65:E5:E5:C4:B2:D7:D6:6D:40:C6:DD:2F:B1:9C:54:36

CKA_CLASS CK_OBJECT_CLASS CKO_NSS_TRUST

CKA_TOKEN CK_BBOOL CK_TRUE

CKA_PRIVATE CK_BBOOL CK_FALSE

CKA_MODIFIABLE CK_BBOOL CK_FALSE

CKA_LABEL UTF8 "DigiCert Global Root CA"

CKA_CERT_SHA1_HASH MULTILINE_OCTAL

\250\230\135\072\145\345\345\304\262\327\326\155\100\306\335\057
\261\234\124\066

END

CKA_CERT_MD5_HASH MULTILINE_OCTAL

\171\344\251\204\015\175\072\226\327\300\117\342\103\114\211\056
END

CKA_ISSUER MULTILINE_OCTAL

\060\141\061\013\060\011\006\003\125\004\006\023\002\125\123\061
\025\060\023\006\003\125\004\012\023\014\104\151\147\151\103\145
\162\164\040\111\156\143\061\031\060\027\006\003\125\004\013\023
\020\167\167\167\056\144\151\147\151\143\145\162\164\056\143\157
\155\061\040\060\036\006\003\125\004\003\023\027\104\151\147\151
\103\145\162\164\040\107\154\157\142\141\154\040\122\157\157\164
\040\103\101

END

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CKA_SERIAL_NUMBER
MULTILINE_OCTAL
\002\020\010\073\340\126\220\102\106\261\241\165\152\311\131\221
\307\112
END
CKA_TRUST_SERVER_AUTH CK_TRUST CKT_NSS_TRUSTED_DELEGATOR
CKA_TRUST_EMAIL_PROTECTION CK_TRUST CKT_NSS_TRUSTED_DELEGATOR
CKA_TRUST_CODE_SIGNING CK_TRUST CKT_NSS_MUST_VERIFY_TRUST
CKA_TRUST_STEP_UP_APPROVED CK_BBOOL CK_FALSE

#
# Certificate "DigiCert High Assurance EV Root CA"
#
# Issuer: CN=DigiCert High Assurance EV Root CA,OU=www.digicert.com,O=DigiCert Inc,C=US
# Serial Number:02:ac:5c:26:6a:0b:40:9b:8f:0b:79:f2:ae:46:25:77
# Subject: CN=DigiCert High Assurance EV Root CA,OU=www.digicert.com,O=DigiCert Inc,C=US
# Not Valid Before: Fri Nov 10 00:00:00 2006
# Not Valid After : Mon Nov 10 00:00:00 2031
# Fingerprint (SHA-256):
74:31:E5:F4:C3:C1:CE:46:90:77:4F:0B:61:E0:54:40:88:3B:A9:A0:1E:D0:0B:A6:AB:D7:80:6E:D3:B1:18:CF
# Fingerprint (SHA1): 5F:B7:EE:06:33:E2:59:DB:AD:0C:4C:9A:E6:D3:8F:1A:61:C7:DC:25
CKA_CLASS CK_OBJECT_CLASS CKO_CERTIFICATE
CKA_TOKEN CK_BBOOL CK_TRUE
CKA_PRIVATE
CK_BBOOL CK_FALSE
CKA_MODIFIABLE CK_BBOOL CK_FALSE
CKA_LABEL UTF8 "DigiCert High Assurance EV Root CA"
CKA_CERTIFICATE_TYPE CK_CERTIFICATE_TYPE CKC_X_509
CKA_SUBJECT MULTILINE_OCTAL
\060\154\061\013\060\011\006\003\125\004\006\023\002\125\123\061
\025\060\023\006\003\125\004\012\023\014\104\151\147\151\103\145
\162\164\040\111\156\143\061\031\060\027\006\003\125\004\013\023
\020\167\167\167\056\144\151\147\151\143\145\162\164\056\143\157
\155\061\053\060\051\006\003\125\004\003\023\042\104\151\147\151
\103\145\162\164\040\110\151\147\150\040\101\163\163\165\162\141
\156\143\145\040\105\126\040\122\157\157\164\040\103\101
END
CKA_ID UTF8 "0"
CKA_ISSUER MULTILINE_OCTAL
\060\154\061\013\060\011\006\003\125\004\006\023\002\125\123\061
\025\060\023\006\003\125\004\012\023\014\104\151\147\151\103\145
\162\164\040\111\156\143\061\031\060\027\006\003\125\004\013\023
\020\167\167\167\056\144\151\147\151\143\145\162\164\056\143\157
\155\061\053\060\051\006\003\125\004\003\023\042\104\151\147\151
\103\145\162\164\040\110\151\147\150\040\101\163\163\165\162\141
\156\143\145\040\105\126\040\122\157\157\164\040\103\101
END
CKA_SERIAL_NUMBER

```

MULTILINE_OCTAL

\002\020\002\254\134\046\152\013\100\233\217\013\171\362\256\106
\045\167

END

CKA_VALUE MULTILINE_OCTAL

\060\202\003\305\060\202\002\255\240\003\002\001\002\002\020\002
\254\134\046\152\013\100\233\217\013\171\362\256\106\045\167\060
\015\006\011\052\206\110\206\367\015\001\001\005\005\000\060\154
\061\013\060\011\006\003\125\004\006\023\002\125\123\061\025\060
\023\006\003\125\004\012\023\014\104\151\147\151\103\145\162\164
\040\111\156\143\061\031\060\027\006\003\125\004\013\023\020\167
\167\167\056\144\151\147\151\143\145\162\164\056\143\157\155\061
\053\060\051\006\003\125\004\003\023\042\104\151\147\151\103\145
\162\164\040\110\151\147\150\040\101\163\163\165\162\141\156\143
\145\040\105\126\040\122\157\157\164\040\103\101\060\036\027\015
\060\066\061\061\061\060\060\060\060\060\060\060\132\027\015\063
\061\061\061\061\060\060\060\060\060\060\060\132\060\154\061\013
\060\011\006\003\125\004\006\023\002\125\123\061\025\060\023\006
\003\125\004\012\023\014\104\151\147\151\103\145\162\164\040\111
\156\143\061\031\060\027\006\003\125\004\013\023\020\167\167\167
\056\144\151\147\151\143\145\162\164\056\143\157\155\061\053\060
\051\006\003\125\004\003\023\042\104\151\147\151\103\145\162\164
\040\110\151\147\150\040\101\163\163\165\162\141\156\143\145\040
\105\126\040\122\157\157\164\040\103\101\060\202\001\042\060\015
\006\011\052\206\110\206\367\015\001\001\001\005\000\003\202\001
\017\000\060\202\001\012\002\202\001\001\000\306\314\345\163\346
\373\324\273\345\055\055\062\246\337\345\201\077\311\315\045\111
\266\161\052\303\325\224\064\147\242\012\034\260\137\151\246\100
\261\304\267\262\217\320\230\244\251\101\131\072\323\334\224\326
\074\333\164\070\244\112\314\115\045\202\367\112\245\123\022\070
\356\363\111\155\161\221\176\143\266\253\246\137\303\244\204\370
\117\142\121\276\370\305\354\333\070\222\343\006\345\010\221\014
\304\050\101\125\373\313\132\211\025\176\161\350\065\277\115\162
\011\075\276\072\070\120\133\167\061\033\215\263\307\044\105\232
\247\254\155\000\024\132\004\267\272\023\353\121\012\230\101\101
\042\116\145\141\207\201\101\120\246\171\134\211\336\031\112\127
\325\056\346\135\034\123\054\176\230\315\032\006\026\244\150\163
\320\064\004\023\134\241\161\323\132\174\125\333\136\144\341\067
\207\060\126\004\345\021\264\051\200\022\361\171\071\210\242\002
\021\174\047\146\267\210\267\170\362\312\012\250\070\253\012\144
\302\277\146\135\225\204\301\241\045\036\207\135\032\120\013\040
\022\314\101\273\156\013\121\070\270\113\313\002\003\001\000\001
\243\143\060\141\060\016\006\003\125\035\017\001\001\377\004\004
\003\002\001\206\060\017\006\003\125\035\023\001\001\377\004\005
\060\003\001\001\377\060\035\006\003\125\035\016\004\026\004\024
\261\076\303\151\003\370\277\107\001\324\230\046\032\010\002\357
\143\144\053\303\060\037\006\003\125\035\043\004\030\060\026\200
\024\261\076\303\151\003\370\277\107\001\324\230\046\032\010\002

\357\143\144\053\303\060\015\006\011\052\206\110\206\367\015\001
\001\005\005\000\003\202\001\001\000\034\032\006\227\334\327\234
\237\074\210\146\006\010\127\041\333\041\107\370\052\147\252\277
\030\062\166\100\020\127\301\212\363\172\331\021\145\216\065\372
\236\374\105\265\236\331\114\061\113\270\221\350\103\054\216\263
\170\316\333\343\123\171\161\326\345\041\224\001\332\125\207\232
\044\144\366\212\146\314\336\234\067\315\250\064\261\151\233\043
\310\236\170\042\053\160\103\343\125\107\061\141\031\357\130\305
\205\057\116\060\366\240\061\026\043\310\347\342\145\026\063\313
\277\032\033\240\075\370\312\136\213\061\213\140\010\211\055\014
\006\134\122\267\304\371\012\230\321\025\137\237\022\276\174\066
\143\070\275\104\244\177\344\046\053\012\304\227\151\015\351\214
\342\300\020\127\270\310\166\022\221\125\362\110\151\330\274\052
\002\133\017\104\324\040\061\333\364\272\160\046\135\220\140\236
\274\113\027\011\057\264\313\036\103\150\311\007\047\301\322\134
\367\352\041\271\150\022\234\074\234\277\236\374\200\134\233\143
\315\354\107\252\045\047\147\240\067\363\000\202\175\124\327\251
\370\351\056\023\243\167\350\037\112

END

CKA_NSS_Mozilla_CA_POLICY

CK_BBOOL CK_TRUE

CKA_NSS_SERVER_DISTRUST_AFTER CK_BBOOL CK_FALSE

CKA_NSS_EMAIL_DISTRUST_AFTER CK_BBOOL CK_FALSE

Trust for "DigiCert High Assurance EV Root CA"

Issuer: CN=DigiCert High Assurance EV Root CA,OU=www.digicert.com,O=DigiCert Inc,C=US

Serial Number:02:ac:5c:26:6a:0b:40:9b:8f:0b:79:f2:ae:46:25:77

Subject: CN=DigiCert High Assurance EV Root CA,OU=www.digicert.com,O=DigiCert Inc,C=US

Not Valid Before: Fri Nov 10 00:00:00 2006

Not Valid After : Mon Nov 10 00:00:00 2031

Fingerprint (SHA-256):

74:31:E5:F4:C3:C1:CE:46:90:77:4F:0B:61:E0:54:40:88:3B:A9:A0:1E:D0:0B:A6:AB:D7:80:6E:D3:B1:18:CF

Fingerprint (SHA1): 5F:B7:EE:06:33:E2:59:DB:AD:0C:4C:9A:E6:D3:8F:1A:61:C7:DC:25

CKA_CLASS CK_OBJECT_CLASS CKO_NSS_TRUST

CKA_TOKEN CK_BBOOL CK_TRUE

CKA_PRIVATE

CK_BBOOL CK_FALSE

CKA_MODIFIABLE CK_BBOOL CK_FALSE

CKA_LABEL UTF8 "DigiCert High Assurance EV Root CA"

CKA_CERT_SHA1_HASH MULTILINE_OCTAL

\137\267\356\006\063\342\131\333\255\014\114\232\346\323\217\032
\141\307\334\045

END

CKA_CERT_MD5_HASH MULTILINE_OCTAL

\324\164\336\127\134\071\262\323\234\205\203\305\300\145\111\212

END

CKA_ISSUER MULTILINE_OCTAL

\060\154\061\013\060\011\006\003\125\004\006\023\002\125\123\061

\025\060\023\006\003\125\004\012\023\014\104\151\147\151\103\145
\162\164\040\111\156\143\061\031\060\027\006\003\125\004\013\023
\020\167\167\167\056\144\151\147\151\143\145\162\164\056\143\157
\155\061\053\060\051\006\003\125\004\003\023\042\104\151\147\151
\103\145\162\164\040\110\151\147\150\040\101\163\163\165\162\141
\156\143\145\040\105\126\040\122\157\157\164\040\103\101

END

CKA_SERIAL_NUMBER MULTILINE_OCTAL

\002\020\002\254\134\046\152\013\100\233\217\013\171\362\256\106
\045\167

END

CKA_TRUST_SERVER_AUTH CK_TRUST CKT_NSS_TRUSTED_DELEGATOR

CKA_TRUST_EMAIL_PROTECTION

CK_TRUST CKT_NSS_TRUSTED_DELEGATOR

CKA_TRUST_CODE_SIGNING CK_TRUST CKT_NSS_MUST_VERIFY_TRUST

CKA_TRUST_STEP_UP_APPROVED CK_BBOOL CK_FALSE

#

Certificate "SwissSign Gold CA - G2"

#

Issuer: CN=SwissSign Gold CA - G2,O=SwissSign AG,C=CH

Serial Number:00:bb:40:1c:43:f5:5e:4f:b0

Subject: CN=SwissSign Gold CA - G2,O=SwissSign AG,C=CH

Not Valid Before: Wed Oct 25 08:30:35 2006

Not Valid After : Sat Oct 25 08:30:35 2036

Fingerprint (SHA-256):

62:DD:0B:E9:B9:F5:0A:16:3E:A0:F8:E7:5C:05:3B:1E:CA:57:EA:55:C8:68:8F:64:7C:68:81:F2:C8:35:7B:95

Fingerprint (SHA1): D8:C5:38:8A:B7:30:1B:1B:6E:D4:7A:E6:45:25:3A:6F:9F:1A:27:61

CKA_CLASS CK_OBJECT_CLASS CKO_CERTIFICATE

CKA_TOKEN CK_BBOOL CK_TRUE

CKA_PRIVATE CK_BBOOL CK_FALSE

CKA_MODIFIABLE CK_BBOOL CK_FALSE

CKA_LABEL UTF8 "SwissSign Gold CA - G2"

CKA_CERTIFICATE_TYPE CK_CERTIFICATE_TYPE CKC_X_509

CKA_SUBJECT MULTILINE_OCTAL

\060\105\061\013\060\011\006\003\125\004\006\023\002\103\110\061
\025\060\023\006\003\125\004\012\023\014\123\167\151\163\163\123
\151\147\156\040\101\107\061\037\060\035\006\003\125\004\003\023
\026\123\167\151\163\163\123\151\147\156\040\107\157\154\144\040
\103\101\040\055\040\107\062

END

CKA_ID

UTF8 "0"

CKA_ISSUER MULTILINE_OCTAL

\060\105\061\013\060\011\006\003\125\004\006\023\002\103\110\061
\025\060\023\006\003\125\004\012\023\014\123\167\151\163\163\123
\151\147\156\040\101\107\061\037\060\035\006\003\125\004\003\023
\026\123\167\151\163\163\123\151\147\156\040\107\157\154\144\040

\103\101\040\055\040\107\062
END
CKA_SERIAL_NUMBER MULTILINE_OCTAL
\002\011\000\273\100\034\103\365\136\117\260
END
CKA_VALUE MULTILINE_OCTAL
\060\202\005\272\060\202\003\242\240\003\002\001\002\002\011\000
\273\100\034\103\365\136\117\260\060\015\006\011\052\206\110\206
\367\015\001\001\005\005\000\060\105\061\013\060\011\006\003\125
\004\006\023\002\103\110\061\025\060\023\006\003\125\004\012\023
\014\123\167\151\163\163\123\151\147\156\040\101\107\061\037\060
\035\006\003\125\004\003\023\026\123\167\151\163\163\123\151\147
\156\040\107\157\154\144\040\103\101\040\055\040\107\062\060\036
\027\015\060\066\061\060\062\065\060\070\063\060\063\065\132\027
\015\063\066\061\060\062\065\060\070\063\060\063\065\132\060\105
\061\013\060\011\006\003\125\004\006\023\002\103\110\061\025\060
\023\006\003\125\004\012\023\014\123\167\151\163\163\123\151\147
\156\040\101\107\061\037\060\035\006\003\125\004\003\023\026\123
\167\151\163\163\123\151\147\156\040\107\157\154\144\040\103\101
\040\055\040\107\062\060\202\002\042\060\015\006\011\052\206\110
\206\367\015\001\001\001\005\000\003\202\002\017\000\060\202\002
\012\002\202\002\001\000\257\344\356\176\213\044\016\022\156\251
\120\055\026\104\073\222\222\134\312\270\135\204\222\102\023\052
\274\145\127\202\100\076\127\044\315\120\213\045\052\267\157\374
\357\242\320\300\037\002\044\112\023\226\217\043\023\346\050\130
\000\243\107\307\006\247\204\043\053\273\275\226\053\177\125\314
\213\301\127\037\016\142\145\017\335\075\126\212\163\332\256\176
\155\272\201\034\176\102\214\040\065\331\103\115\204\372\204\333
\122\054\363\016\047\167\013\153\277\021\057\162\170\237\056\330
\076\346\030\067\132\052\162\371\332\142\220\222\225\312\037\234
\351\263\074\053\313\363\001\023\277\132\317\301\265\012\140\275
\335\265\231\144\123\270\240\226\263\157\342\046\167\221\214\340
\142\020\002\237\064\017\244\325\222\063\121\336\276\215\272\204
\172\140\074\152\333\237\053\354\336\336\001\077\156\115\345\120
\206\313\264\257\355\104\100\305\312\132\214\332\322\053\174\250
\356\276\246\345\012\252\016\245\337\005\122\267\125\307\042\135
\062\152\227\227\143\023\333\311\333\171\066\173\205\072\112\305
\122\211\371\044\347\235\167\251\202\377\125\034\245\161\151\053
\321\002\044\362\263\046\324\153\332\004\125\345\301\012\307\155
\060\067\220\052\344\236\024\063\136\026\027\125\305\133\265\313
\064\211\222\361\235\046\217\241\007\324\306\262\170\120\333\014
\014\013\174\013\214\101\327\271\351\335\214\210\367\243\115\262
\062\314\330\027\332\315\267\316\146\235\324\375\136\377\275\227
\076\051\165\347\176\247\142\130\257\045\064\245\101\307\075\274
\015\120\312\003\003\017\010\132\037\225\163\170\142\277\257\162
\024\151\016\245\345\003\016\170\216\046\050\102\360\007\013\142
\040\020\147\071\106\372\251\003\314\004\070\172\146\357\040\203
\265\214\112\126\216\221\000\374\216\134\202\336\210\240\303\342

\150\156\175\215\357\074\335\145\364\135\254\121\357\044\200\256
\252\126\227\157\371\255\175\332\141\077\230\167\074\245\221\266
\034\214\046\332\145\242\011\155\301\342\124\343\271\312\114\114
\200\217\167\173\140\232\036\337\266\362\110\036\016\272\116\124
\155\230\340\341\242\032\242\167\120\317\304\143\222\354\107\031
\235\353\346\153\316\301\002\003\001\000\001\243\201\254\060\201
\251\060\016\006\003\125\035\017\001\001\377\004\004\003\002\001
\006\060\017\006\003\125\035\023\001\001\377\004\005\060\003\001
\001\377\060\035\006\003\125\035\016\004\026\004\024\133\045\173
\226\244\145\121\176\270\071\363\300\170\146\136\350\072\347\360
\356\060\037\006\003\125\035\043\004\030\060\026\200\024\133\045
\173\226\244\145\121\176\270\071\363\300\170\146\136\350\072\347
\360\356\060\106\006\003\125\035\040\004\077\060\075\060\073\006
\011\140\205\164\001\131\001\002\001\001\060\056\060\054\006\010
\053\006\001\005\005\007\002\001\026\040\150\164\164\160\072\057
\057\162\145\160\157\163\151\164\157\162\171\056\163\167\151\163
\163\163\151\147\156\056\143\157\155\057\060\015\006\011\052\206
\110\206\367\015\001\001\005\005\000\003\202\002\001\000\047\272
\343\224\174\361\256\300\336\027\346\345\330\325\365\124\260\203
\364\273\315\136\005\173\117\237\165\146\257\074\350\126\176\374
\162\170\070\003\331\053\142\033\000\271\370\351\140\315\314\316
\121\212\307\120\061\156\341\112\176\030\057\151\131\266\075\144
\201\053\343\203\204\346\042\207\216\175\340\356\002\231\141\270
\036\364\270\053\210\022\026\204\302\061\223\070\226\061\246\271
\073\123\077\303\044\223\126\133\151\222\354\305\301\273\070\000
\343\354\027\251\270\334\307\174\001\203\237\062\107\272\122\042
\064\035\062\172\011\126\247\174\045\066\251\075\113\332\300\202
\157\012\273\022\310\207\113\047\021\371\036\055\307\223\077\236
\333\137\046\153\122\331\056\212\361\024\306\104\215\025\251\267
\277\275\336\246\032\356\256\055\373\110\167\027\376\273\354\257
\030\365\052\121\360\071\204\227\225\154\156\033\303\053\304\164
\140\171\045\260\012\047\337\337\136\322\071\317\105\175\102\113
\337\263\054\036\305\306\135\312\125\072\240\234\151\232\217\332
\357\262\260\074\237\207\154\022\053\145\160\025\122\061\032\044
\317\157\061\043\120\037\214\117\217\043\303\164\101\143\034\125
\250\024\335\076\340\121\120\317\361\033\060\126\016\222\260\202
\205\330\203\313\042\144\274\055\270\045\325\124\242\270\006\352
\255\222\244\044\240\301\206\265\112\023\152\107\317\056\013\126
\225\124\313\316\232\333\152\264\246\262\333\101\010\206\047\167
\367\152\240\102\154\013\070\316\327\165\120\062\222\302\337\053
\060\042\110\320\325\101\070\045\135\244\351\135\237\306\224\165
\320\105\375\060\227\103\217\220\253\012\307\206\163\140\112\151
\055\336\245\170\327\006\332\152\236\113\076\167\072\040\023\042
\001\320\277\150\236\143\140\153\065\115\013\155\272\241\075\300
\223\340\177\043\263\125\255\162\045\116\106\371\322\026\357\260
\144\301\001\236\351\312\240\152\230\016\317\330\140\362\057\111
\270\344\102\341\070\065\026\364\310\156\117\367\201\126\350\272
\243\276\043\257\256\375\157\003\340\002\073\060\166\372\033\155

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\101\317\001\261\351\270\311\146\364\333\046\363\072\244\164\362
\111\044\133\311\260\320\127\301\372\076\172\341\227\311
END
CKA_NSS_Mozilla_CA_POLICY
CK_BBOOL CK_TRUE
CKA_NSS_SERVER_DISTRUST_AFTER CK_BBOOL CK_FALSE
CKA_NSS_EMAIL_DISTRUST_AFTER CK_BBOOL CK_FALSE

# Trust for "SwissSign Gold CA - G2"
# Issuer: CN=SwissSign Gold CA - G2,O=SwissSign AG,C=CH
# Serial Number:00:bb:40:1c:43:f5:5e:4f:b0
# Subject: CN=SwissSign Gold CA - G2,O=SwissSign AG,C=CH
# Not Valid Before: Wed Oct 25 08:30:35 2006
# Not Valid
  After : Sat Oct 25 08:30:35 2036
# Fingerprint (SHA-256):
62:DD:0B:E9:B9:F5:0A:16:3E:A0:F8:E7:5C:05:3B:1E:CA:57:EA:55:C8:68:8F:64:7C:68:81:F2:C8:35:7B:95
# Fingerprint (SHA1): D8:C5:38:8A:B7:30:1B:1B:6E:D4:7A:E6:45:25:3A:6F:9F:1A:27:61
CKA_CLASS CK_OBJECT_CLASS CKO_NSS_TRUST
CKA_TOKEN CK_BBOOL CK_TRUE
CKA_PRIVATE CK_BBOOL CK_FALSE
CKA_MODIFIABLE CK_BBOOL CK_FALSE
CKA_LABEL UTF8 "SwissSign Gold CA - G2"
CKA_CERT_SHA1_HASH MULTILINE_OCTAL
\330\305\070\212\267\060\033\033\156\324\172\346\105\045\072\157
\237\032\047\141
END
CKA_CERT_MD5_HASH MULTILINE_OCTAL
\044\167\331\250\221\321\073\372\210\055\302\377\370\315\063\223
END
CKA_ISSUER MULTILINE_OCTAL
\060\105\061\013\060\011\006\003\125\004\006\023\002\103\110\061
\025\060\023\006\003\125\004\012\023\014\123\167\151\163\163\123
\151\147\156\040\101\107\061\037\060\035\006\003\125\004\003\023
\026\123\167\151\163\163\123\151\147\156\040\107\157\154\144\040
\103\101\040\055\040\107\062
END
CKA_SERIAL_NUMBER MULTILINE_OCTAL
\002\011\000\273\100\034\103\365\136\117\260
END
CKA_TRUST_SERVER_AUTH
CK_TRUST CKT_NSS_TRUSTED_DELEGATOR
CKA_TRUST_EMAIL_PROTECTION CK_TRUST CKT_NSS_TRUSTED_DELEGATOR
CKA_TRUST_CODE_SIGNING CK_TRUST CKT_NSS_MUST_VERIFY_TRUST
CKA_TRUST_STEP_UP_APPROVED CK_BBOOL CK_FALSE

#
# Certificate "SwissSign Silver CA - G2"

```

```

#
# Issuer: CN=SwissSign Silver CA - G2,O=SwissSign AG,C=CH
# Serial Number:4f:1b:d4:2f:54:bb:2f:4b
# Subject: CN=SwissSign Silver CA - G2,O=SwissSign AG,C=CH
# Not Valid Before: Wed Oct 25 08:32:46 2006
# Not Valid After : Sat Oct 25 08:32:46 2036
# Fingerprint (SHA-256):
BE:6C:4D:A2:BB:B9:BA:59:B6:F3:93:97:68:37:42:46:C3:C0:05:99:3F:A9:8F:02:0D:1D:ED:BE:D4:8A:81:D5
# Fingerprint (SHA1): 9B:AA:E5:9F:56:EE:21:CB:43:5A:BE:25:93:DF:A7:F0:40:D1:1D:CB
CKA_CLASS CK_OBJECT_CLASS CKO_CERTIFICATE
CKA_TOKEN CK_BBOOL CK_TRUE
CKA_PRIVATE CK_BBOOL CK_FALSE
CKA_MODIFIABLE CK_BBOOL CK_FALSE
CKA_LABEL UTF8 "SwissSign Silver CA - G2"
CKA_CERTIFICATE_TYPE CK_CERTIFICATE_TYPE CKC_X_509
CKA_SUBJECT MULTILINE_OCTAL
\060\107\061\013\060\011\006\003\125\004\006\023\002\103\110\061
\025\060\023\006\003\125\004\012\023\014\123\167\151\163\163\123
\151\147\156\040\101\107\061\041\060\037\006\003\125\004\003\023
\030\123\167\151\163\163\123\151\147\156\040\123\151\154\166\145
\162\040\103\101\040\055\040\107\062
END
CKA_ID
UTF8 "0"
CKA_ISSUER MULTILINE_OCTAL
\060\107\061\013\060\011\006\003\125\004\006\023\002\103\110\061
\025\060\023\006\003\125\004\012\023\014\123\167\151\163\163\123
\151\147\156\040\101\107\061\041\060\037\006\003\125\004\003\023
\030\123\167\151\163\163\123\151\147\156\040\123\151\154\166\145
\162\040\103\101\040\055\040\107\062
END
CKA_SERIAL_NUMBER MULTILINE_OCTAL
\002\010\117\033\324\057\124\273\057\113
END
CKA_VALUE MULTILINE_OCTAL
\060\202\005\275\060\202\003\245\240\003\002\001\002\002\010\117
\033\324\057\124\273\057\113\060\015\006\011\052\206\110\206\367
\015\001\001\005\005\000\060\107\061\013\060\011\006\003\125\004
\006\023\002\103\110\061\025\060\023\006\003\125\004\012\023\014
\123\167\151\163\163\123\151\147\156\040\101\107\061\041\060\037
\006\003\125\004\003\023\030\123\167\151\163\163\123\151\147\156
\040\123\151\154\166\145\162\040\103\101\040\055\040\107\062\060
\036\027\015\060\066\061\060\062\065\060\070\063\062\064\066\132
\027\015\063\066\061\060\062\065\060\070\063\062\064\066\132\060
\107\061\013\060\011\006\003\125\004\006\023\002\103\110\061\025
\060\023\006\003\125\004\012\023\014\123\167\151\163\163\123\151
\147\156\040\101\107\061\041\060\037\006\003\125\004\003\023\030
\123\167\151\163\163\123\151\147\156\040\123\151\154\166\145\162

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\040\103\101\040\055\040\107\062\060\202\002\042\060\015\006\011
\052\206\110\206\367\015\001\001\001\005\000\003\202\002\017\000
\060\202\002\012\002\202\002\001\000\304\361\207\177\323\170\061
\367\070\311\370\303\231\103\274\307\367\274\067\347\116\161\272
\113\217\245\163\035\134\156\230\256\003\127\256\070\067\103\057
\027\075\037\310\316\150\020\301\170\256\031\003\053\020\372\054
\171\203\366\350\271\150\271\125\362\004\104\247\071\371\374\004
\213\036\361\242\115\047\371\141\173\272\267\345\242\023\266\353
\141\076\320\154\321\346\373\372\136\355\035\264\236\240\065\133
\241\222\313\360\111\222\376\205\012\005\076\346\331\013\342\117
\273\334\225\067\374\221\351\062\065\042\321\037\072\116\047\205
\235\260\025\224\062\332\141\015\107\115\140\102\256\222\107\350
\203\132\120\130\351\212\213\271\135\241\334\335\231\112\037\066
\147\273\110\344\203\266\067\353\110\072\257\017\147\217\027\007
\350\004\312\357\152\061\207\324\300\266\371\224\161\173\147\144
\270\266\221\112\102\173\145\056\060\152\014\365\220\356\225\346
\362\315\202\354\331\241\112\354\366\262\113\345\105\205\346\155
\170\223\004\056\234\202\155\066\251\304\061\144\037\206\203\013
\052\364\065\012\170\311\125\317\101\260\107\351\060\237\231\276
\141\250\006\204\271\050\172\137\070\331\033\251\070\260\203\177
\163\301\303\073\110\052\202\017\041\233\270\314\250\065\303\204
\033\203\263\076\276\244\225\151\001\072\211\000\170\004\331\311
\364\231\031\253\126\176\133\213\206\071\025\221\244\020\054\011
\062\200\140\263\223\300\052\266\030\013\235\176\215\111\362\020
\112\177\371\325\106\057\031\222\243\231\247\046\254\273\214\074
\346\016\274\107\007\334\163\121\361\160\144\057\010\371\264\107
\035\060\154\104\352\051\067\205\222\150\146\274\203\070\376\173
\071\056\323\120\360\037\373\136\140\266\251\246\372\047\101\361
\233\030\162\362\365\204\164\112\311\147\304\124\256\110\144\337
\214\321\156\260\035\341\007\217\010\036\231\234\161\351\114\330
\245\367\107\022\037\164\321\121\236\206\363\302\242\043\100\013
\163\333\113\246\347\163\006\214\301\240\351\301\131\254\106\372
\346\057\370\317\161\234\106\155\271\304\025\215\070\171\003\105
\110\357\304\135\327\010\356\207\071\042\206\262\015\017\130\103
\367\161\251\110\056\375\352\326\037\002\003\001\000\001\243\201
\254\060\201\251\060\016\006\003\125\035\017\001\001\377\004\004
\003\002\001\006\060\017\006\003\125\035\023\001\001\377\004\005
\060\003\001\001\377\060\035\006\003\125\035\016\004\026\004\024
\027\240\315\301\344\101\266\072\133\073\313\105\235\275\034\302
\230\372\206\130\060\037\006\003\125\035\043\004\030\060\026\200
\024\027\240\315\301\344\101\266\072\133\073\313\105\235\275\034
\302\230\372\206\130\060\106\006\003\125\035\040\004\077\060\075
\060\073\006\011\140\205\164\001\131\001\003\001\001\060\056\060
\054\006\010\053\006\001\005\005\007\002\001\026\040\150\164\164
\160\072\057\057\162\145\160\157\163\151\164\157\162\171\056\163
\167\151\163\163\163\151\147\156\056\143\157\155\057\060\015\006
\011\052\206\110\206\367\015\001\001\005\005\000\003\202\002\001
\000\163\306\201\340\047\322\055\017\340\225\060\342\232\101\177

\120\054\137\137\142\141\251\206\152\151\030\014\164\111\326\135
\204\352\101\122\030\157\130\255\120\126\040\152\306\275\050\151
\130\221\334\221\021\065\251\072\035\274\032\245\140\236\330\037
\177\105\221\151\331\176\273\170\162\301\006\017\052\316\217\205
\160\141\254\240\315\013\270\071\051\126\204\062\116\206\273\075
\304\052\331\327\037\162\356\376\121\241\042\101\261\161\002\143
\032\202\260\142\253\136\127\022\037\337\313\335\165\240\300\135
\171\220\214\033\340\120\346\336\061\376\230\173\160\137\245\220
\330\255\370\002\266\157\323\140\335\100\113\042\305\075\255\072
\172\237\032\032\107\221\171\063\272\202\334\062\151\003\226\156
\037\113\360\161\376\343\147\162\240\261\277\134\213\344\372\231
\042\307\204\271\033\215\043\227\077\355\045\340\317\145\273\365
\141\004\357\335\036\262\132\101\042\132\241\237\135\054\350\133
\311\155\251\014\014\170\252\140\306\126\217\001\132\014\150\274
\151\031\171\304\037\176\227\005\277\305\351\044\121\136\324\325
\113\123\355\331\043\132\066\003\145\243\301\003\255\101\060\363
\106\033\205\220\257\145\265\325\261\344\026\133\170\165\035\227
\172\155\131\251\052\217\173\336\303\207\211\020\231\111\163\170
\310\075\275\121\065\164\052\325\361\176\151\033\052\273\073\275
\045\270\232\132\075\162\141\220\146\207\356\014\326\115\324\021
\164\013\152\376\013\003\374\243\125\127\211\376\112\313\256\133
\027\005\310\362\215\043\061\123\070\322\055\152\077\202\271\215
\010\152\367\136\101\164\156\303\021\176\007\254\051\140\221\077
\070\312\127\020\015\275\060\057\307\245\346\101\240\332\256\005
\207\232\240\244\145\154\114\011\014\211\272\270\323\271\300\223
\212\060\372\215\345\232\153\025\001\116\147\252\332\142\126\076
\204\010\146\322\304\066\175\247\076\020\374\210\340\324\200\345
\000\275\252\363\116\006\243\172\152\371\142\162\343\011\117\353
\233\016\001\043\361\237\273\174\334\334\154\021\227\045\262\362
\264\143\024\322\006\052\147\214\203\365\316\352\007\330\232\152
\036\354\344\012\273\052\114\353\011\140\071\316\312\142\330\056
\156

END

CKA_NSS_Mozilla_CA_POLICY

CK_BBOOL CK_TRUE

CKA_NSS_SERVER_DISTRUST_AFTER CK_BBOOL CK_FALSE

CKA_NSS_EMAIL_DISTRUST_AFTER CK_BBOOL CK_FALSE

Trust for "SwissSign Silver CA - G2"

Issuer: CN=SwissSign Silver CA - G2,O=SwissSign AG,C=CH

Serial Number:4f:1b:d4:2f:54:bb:2f:4b

#

Subject: CN=SwissSign Silver CA - G2,O=SwissSign AG,C=CH

Not Valid Before: Wed Oct 25 08:32:46 2006

Not Valid After : Sat Oct 25 08:32:46 2036

Fingerprint (SHA-256):

BE:6C:4D:A2:BB:B9:BA:59:B6:F3:93:97:68:37:42:46:C3:C0:05:99:3F:A9:8F:02:0D:1D:ED:BE:D4:8A:81:D5

Fingerprint (SHA1): 9B:AA:E5:9F:56:EE:21:CB:43:5A:BE:25:93:DF:A7:F0:40:D1:1D:CB


```

CKA_CLASS CK_OBJECT_CLASS CKO_NSS_TRUST
CKA_TOKEN CK_BBOOL CK_TRUE
CKA_PRIVATE CK_BBOOL CK_FALSE
CKA_MODIFIABLE CK_BBOOL CK_FALSE
CKA_LABEL UTF8 "SwissSign Silver CA - G2"
CKA_CERT_SHA1_HASH MULTILINE_OCTAL
\233\252\345\237\126\356\041\313\103\132\276\045\223\337\247\360
\100\321\035\313
END
CKA_CERT_MD5_HASH MULTILINE_OCTAL
\340\006\241\311\175\317\311\374\015\300\126\165\226\330\142\023
END
CKA_ISSUER MULTILINE_OCTAL
\060\107\061\013\060\011\006\003\125\004\006\023\002\103\110\061
\025\060\023\006\003\125\004\012\023\014\123\167\151\163\163\123
\151\147\156\040\101\107\061\041\060\037\006\003\125\004\003\023
\030\123\167\151\163\163\123\151\147\156\040\123\151\154\166\145
\162\040\103\101\040\055\040\107\062
END
CKA_SERIAL_NUMBER
MULTILINE_OCTAL
\002\010\117\033\324\057\124\273\057\113
END
CKA_TRUST_SERVER_AUTH CK_TRUST CKT_NSS_TRUSTED_DELEGATOR
CKA_TRUST_EMAIL_PROTECTION CK_TRUST CKT_NSS_TRUSTED_DELEGATOR
CKA_TRUST_CODE_SIGNING CK_TRUST CKT_NSS_MUST_VERIFY_TRUST
CKA_TRUST_STEP_UP_APPROVED CK_BBOOL CK_FALSE

#
# Certificate "SecureTrust CA"
#
# Issuer: CN=SecureTrust CA,O=SecureTrust Corporation,C=US
# Serial Number:0c:f0:8e:5c:08:16:a5:ad:42:7f:f0:eb:27:18:59:d0
# Subject: CN=SecureTrust CA,O=SecureTrust Corporation,C=US
# Not Valid Before: Tue Nov 07 19:31:18 2006
# Not Valid After : Mon Dec 31 19:40:55 2029
# Fingerprint (SHA-256):
F1:C1:B5:0A:E5:A2:0D:D8:03:0E:C9:F6:BC:24:82:3D:D3:67:B5:25:57:59:B4:E7:1B:61:FC:E9:F7:37:5D:73
# Fingerprint (SHA1): 87:82:C6:C3:04:35:3B:CF:D2:96:92:D2:59:3E:7D:44:D9:34:FF:11
CKA_CLASS CK_OBJECT_CLASS CKO_CERTIFICATE
CKA_TOKEN CK_BBOOL CK_TRUE
CKA_PRIVATE CK_BBOOL
CK_FALSE
CKA_MODIFIABLE CK_BBOOL CK_FALSE
CKA_LABEL UTF8 "SecureTrust CA"
CKA_CERTIFICATE_TYPE CK_CERTIFICATE_TYPE CKC_X_509
CKA_SUBJECT MULTILINE_OCTAL
\060\110\061\013\060\011\006\003\125\004\006\023\002\125\123\061

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\040\060\036\006\003\125\004\012\023\027\123\145\143\165\162\145
\124\162\165\163\164\040\103\157\162\160\157\162\141\164\151\157
\156\061\027\060\025\006\003\125\004\003\023\016\123\145\143\165
\162\145\124\162\165\163\164\040\103\101

END

CKA_ID UTF8 ""

CKA_ISSUER MULTILINE_OCTAL

\060\110\061\013\060\011\006\003\125\004\006\023\002\125\123\061
\040\060\036\006\003\125\004\012\023\027\123\145\143\165\162\145
\124\162\165\163\164\040\103\157\162\160\157\162\141\164\151\157
\156\061\027\060\025\006\003\125\004\003\023\016\123\145\143\165
\162\145\124\162\165\163\164\040\103\101

END

CKA_SERIAL_NUMBER MULTILINE_OCTAL

\002\020\014\360\216\134\010\026\245\255\102\177\360\353\047\030
\131\320

END

CKA_VALUE MULTILINE_OCTAL

\060\202\003\270\060\202\002\240\240\003\002\001\002\002\020\014
\360\216\134\010\026\245\255\102\177\360\353\047\030\131\320\060
\015\006\011\052\206\110\206\367\015\001\001\005\005\000\060\110
\061\013\060\011\006\003\125\004\006\023\002\125\123\061\040\060
\036\006\003\125\004\012\023\027\123\145\143\165\162\145\124\162
\165\163\164\040\103\157\162\160\157\162\141\164\151\157\156\061
\027\060\025\006\003\125\004\003\023\016\123\145\143\165\162\145
\124\162\165\163\164\040\103\101\060\036\027\015\060\066\061\061
\060\067\061\071\063\061\061\070\132\027\015\062\071\061\062\063
\061\061\071\064\060\065\065\132\060\110\061\013\060\011\006\003
\125\004\006\023\002\125\123\061\040\060\036\006\003\125\004\012
\023\027\123\145\143\165\162\145\124\162\165\163\164\040\103\157
\162\160\157\162\141\164\151\157\156\061\027\060\025\006\003\125
\004\003\023\016\123\145\143\165\162\145\124\162\165\163\164\040
\103\101\060\202\001\042\060\015\006\011\052\206\110\206\367\015
\001\001\001\005\000\003\202\001\017\000\060\202\001\012\002\202
\001\001\000\253\244\201\345\225\315\365\366\024\216\302\117\312
\324\342\170\225\130\234\101\341\015\231\100\044\027\071\221\063
\146\351\276\341\203\257\142\134\211\321\374\044\133\141\263\340
\021\021\101\034\035\156\360\270\273\370\336\247\201\272\246\110
\306\237\035\275\276\216\251\101\076\270\224\355\051\032\324\216
\322\003\035\003\357\155\015\147\034\127\327\006\255\312\310\365
\376\016\257\146\045\110\004\226\013\135\243\272\026\303\010\117
\321\106\370\024\134\362\310\136\001\231\155\375\210\314\206\250
\301\157\061\102\154\122\076\150\313\363\031\064\337\273\207\030
\126\200\046\304\320\334\300\157\337\336\240\302\221\026\240\144
\021\113\104\274\036\366\347\372\143\336\146\254\166\244\161\243
\354\066\224\150\172\167\244\261\347\016\057\201\172\342\265\162
\206\357\242\153\213\360\017\333\323\131\077\272\162\274\104\044
\234\343\163\263\367\257\127\057\102\046\235\251\164\272\000\122

\362\113\315\123\174\107\013\066\205\016\146\251\010\227\026\064
\127\301\146\367\200\343\355\160\124\307\223\340\056\050\025\131
\207\272\273\002\003\001\000\001\243\201\235\060\201\232\060\023
\006\011\053\006\001\004\001\202\067\024\002\004\006\036\004\000
\103\000\101\060\013\006\003\125\035\017\004\004\003\002\001\206
\060\017\006\003\125\035\023\001\001\377\004\005\060\003\001\001
\377\060\035\006\003\125\035\016\004\026\004\024\102\062\266\026
\372\004\375\376\135\113\172\303\375\367\114\100\035\132\103\257
\060\064\006\003\125\035\037\004\055\060\053\060\051\240\047\240
\045\206\043\150\164\164\160\072\057\057\143\162\154\056\163\145
\143\165\162\145\164\162\165\163\164\056\143\157\155\057\123\124
\103\101\056\143\162\154\060\020\006\011\053\006\001\004\001\202
\067\025\001\004\003\002\001\000\060\015\006\011\052\206\110\206
\367\015\001\001\005\005\000\003\202\001\001\000\060\355\117\112
\341\130\072\122\162\133\265\246\243\145\030\246\273\121\073\167
\351\235\352\323\237\134\340\105\145\173\015\312\133\342\160\120
\262\224\005\024\256\111\307\215\101\007\022\163\224\176\014\043
\041\375\274\020\177\140\020\132\162\365\230\016\254\354\271\177
\335\172\157\135\323\034\364\377\210\005\151\102\251\005\161\310
\267\254\046\350\056\264\214\152\377\161\334\270\261\337\231\274
\174\041\124\053\344\130\242\273\127\051\256\236\251\243\031\046
\017\231\056\010\260\357\375\151\317\231\032\011\215\343\247\237
\053\311\066\064\173\044\263\170\114\225\027\244\006\046\036\266
\144\122\066\137\140\147\331\234\305\005\164\013\347\147\043\322
\010\374\210\351\256\213\177\341\060\364\067\176\375\306\062\332
\055\236\104\060\060\154\356\007\336\322\064\374\322\377\100\366
\113\364\146\106\006\124\246\362\062\012\143\046\060\153\233\321
\334\213\107\272\341\271\325\142\320\242\240\364\147\005\170\051
\143\032\157\004\326\370\306\114\243\232\261\067\264\215\345\050
\113\035\236\054\302\270\150\274\355\002\356\061

END

CKA_NSS_Mozilla_CA_POLICY

CK_BBOOL CK_TRUE

CKA_NSS_SERVER_DISTRUST_AFTER CK_BBOOL CK_FALSE

CKA_NSS_EMAIL_DISTRUST_AFTER CK_BBOOL CK_FALSE

Trust for "SecureTrust CA"

#

Issuer: CN=SecureTrust CA,O=SecureTrust Corporation,C=US

Serial Number:0c:f0:8e:5c:08:16:a5:ad:42:7f:f0:eb:27:18:59:d0

Subject: CN=SecureTrust CA,O=SecureTrust Corporation,C=US

Not Valid Before: Tue Nov 07 19:31:18 2006

Not Valid After : Mon Dec 31 19:40:55 2029

Fingerprint (SHA-256):

F1:C1:B5:0A:E5:A2:0D:D8:03:0E:C9:F6:BC:24:82:3D:D3:67:B5:25:57:59:B4:E7:1B:61:FC:E9:F7:37:5D:73

Fingerprint (SHA1): 87:82:C6:C3:04:35:3B:CF:D2:96:92:D2:59:3E:7D:44:D9:34:FF:11

CKA_CLASS CK_OBJECT_CLASS CKO_NSS_TRUST

CKA_TOKEN CK_BBOOL CK_TRUE

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CKA_PRIVATE CK_BBOOL CK_FALSE
CKA_MODIFIABLE CK_BBOOL CK_FALSE
CKA_LABEL UTF8 "SecureTrust CA"
CKA_CERT_SHA1_HASH MULTILINE_OCTAL
\207\202\306\303\004\065\073\317\322\226\222\322\131\076\175\104
\331\064\377\021
END
CKA_CERT_MD5_HASH MULTILINE_OCTAL
\334\062\303\247\155\045\127\307\150\011\235\352\055\251\242\321
END
CKA_ISSUER MULTILINE_OCTAL
\060\110\061\013\060\011\006\003\125\004\006\023\002\125\123\061
\040\060\036\006\003\125\004\012\023\027\123\145\143\165\162\145
\124\162\165\163\164\040\103\157\162\160\157\162\141\164\151\157
\156\061\027\060\025\006\003\125\004\003\023\016\123\145\143\165
\162\145\124\162\165\163\164\040\103\101
END
CKA_SERIAL_NUMBER
MULTILINE_OCTAL
\002\020\014\360\216\134\010\026\245\255\102\177\360\353\047\030
\131\320
END
CKA_TRUST_SERVER_AUTH CK_TRUST CKT_NSS_TRUSTED_DELEGATOR
CKA_TRUST_EMAIL_PROTECTION CK_TRUST CKT_NSS_MUST_VERIFY_TRUST
CKA_TRUST_CODE_SIGNING CK_TRUST CKT_NSS_MUST_VERIFY_TRUST
CKA_TRUST_STEP_UP_APPROVED CK_BBOOL CK_FALSE

#
# Certificate "Secure Global CA"
#
# Issuer: CN=Secure Global CA,O=SecureTrust Corporation,C=US
# Serial Number:07:56:22:a4:e8:d4:8a:89:4d:f4:13:c8:f0:f8:ea:a5
# Subject: CN=Secure Global CA,O=SecureTrust Corporation,C=US
# Not Valid Before: Tue Nov 07 19:42:28 2006
# Not Valid After : Mon Dec 31 19:52:06 2029
# Fingerprint (SHA-256):
42:00:F5:04:3A:C8:59:0E:BB:52:7D:20:9E:D1:50:30:29:FB:CB:D4:1C:A1:B5:06:EC:27:F1:5A:DE:7D:AC:69
# Fingerprint (SHA1): 3A:44:73:5A:E5:81:90:1F:24:86:61:46:1E:3B:9C:C4:5F:F5:3A:1B
CKA_CLASS
CK_OBJECT_CLASS CKO_CERTIFICATE
CKA_TOKEN CK_BBOOL CK_TRUE
CKA_PRIVATE CK_BBOOL CK_FALSE
CKA_MODIFIABLE CK_BBOOL CK_FALSE
CKA_LABEL UTF8 "Secure Global CA"
CKA_CERTIFICATE_TYPE CK_CERTIFICATE_TYPE CKC_X_509
CKA_SUBJECT MULTILINE_OCTAL
\060\112\061\013\060\011\006\003\125\004\006\023\002\125\123\061
\040\060\036\006\003\125\004\012\023\027\123\145\143\165\162\145

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\124\162\165\163\164\040\103\157\162\160\157\162\141\164\151\157
\156\061\031\060\027\006\003\125\004\003\023\020\123\145\143\165
\162\145\040\107\154\157\142\141\154\040\103\101
END
CKA_ID UTF8 "0"
CKA_ISSUER MULTILINE_OCTAL
\060\112\061\013\060\011\006\003\125\004\006\023\002\125\123\061
\040\060\036\006\003\125\004\012\023\027\123\145\143\165\162\145
\124\162\165\163\164\040\103\157\162\160\157\162\141\164\151\157
\156\061\031\060\027\006\003\125\004\003\023\020\123\145\143\165
\162\145\040\107\154\157\142\141\154\040\103\101
END
CKA_SERIAL_NUMBER MULTILINE_OCTAL
\002\020\007\126\042\244\350\324\212\211\115\364\023\310\360\370
\352\245
END
CKA_VALUE
MULTILINE_OCTAL
\060\202\003\274\060\202\002\244\240\003\002\001\002\002\020\007
\126\042\244\350\324\212\211\115\364\023\310\360\370\352\245\060
\015\006\011\052\206\110\206\367\015\001\001\005\005\000\060\112
\061\013\060\011\006\003\125\004\006\023\002\125\123\061\040\060
\036\006\003\125\004\012\023\027\123\145\143\165\162\145\124\162
\165\163\164\040\103\157\162\160\157\162\141\164\151\157\156\061
\031\060\027\006\003\125\004\003\023\020\123\145\143\165\162\145
\040\107\154\157\142\141\154\040\103\101\060\036\027\015\060\066
\061\061\060\067\061\071\064\062\062\070\132\027\015\062\071\061
\062\063\061\061\071\065\062\060\066\132\060\112\061\013\060\011
\006\003\125\004\006\023\002\125\123\061\040\060\036\006\003\125
\004\012\023\027\123\145\143\165\162\145\124\162\165\163\164\040
\103\157\162\160\157\162\141\164\151\157\156\061\031\060\027\006
\003\125\004\003\023\020\123\145\143\165\162\145\040\107\154\157
\142\141\154\040\103\101\060\202\001\042\060\015\006\011\052\206
\110\206\367\015\001\001\001\005\000\003\202\001\017\000\060\202
\001\012\002\202\001\001\000\257\065\056\330\254\154\125\151\006
\161\345\023\150\044\263\117\330\314\041\107\370\361\140\070\211
\211\003\351\275\352\136\106\123\011\334\134\365\132\350\367\105
\052\002\353\061\141\327\051\063\114\316\307\174\012\067\176\017
\272\062\230\341\035\227\257\217\307\334\311\070\226\363\333\032
\374\121\355\150\306\320\156\244\174\044\321\256\102\310\226\120
\143\056\340\376\165\376\230\247\137\111\056\225\343\071\063\144
\216\036\244\137\220\322\147\074\262\331\376\101\271\125\247\011
\216\162\005\036\213\335\104\205\202\102\320\111\300\035\140\360
\321\027\054\225\353\366\245\301\222\243\305\302\247\010\140\015
\140\004\020\226\171\236\026\064\346\251\266\372\045\105\071\310
\036\145\371\223\365\252\361\122\334\231\230\075\245\206\032\014
\065\063\372\113\245\004\006\025\034\061\200\357\252\030\153\302
\173\327\332\316\371\063\040\325\365\275\152\063\055\201\004\373

\260\134\324\234\243\342\134\035\343\251\102\165\136\173\324\167
\357\071\124\272\311\012\030\033\022\231\111\057\210\113\375\120
\142\321\163\347\217\172\103\002\003\001\000\001\243\201\235\060
\201\232\060\023\006\011\053\006\001\004\001\202\067\024\002\004
\006\036\004\000\103\000\101\060\013\006\003\125\035\017\004\004
\003\002\001\206\060\017\006\003\125\035\023\001\001\377\004\005
\060\003\001\001\377\060\035\006\003\125\035\016\004\026\004\024
\257\104\004\302\101\176\110\203\333\116\071\002\354\354\204\172
\346\316\311\244\060\064\006\003\125\035\037\004\055\060\053\060
\051\240\047\240\045\206\043\150\164\164\160\072\057\057\143\162
\154\056\163\145\143\165\162\145\164\162\165\163\164\056\143\157
\155\057\123\107\103\101\056\143\162\154\060\020\006\011\053\006
\001\004\001\202\067\025\001\004\003\002\001\000\060\015\006\011
\052\206\110\206\367\015\001\001\005\005\000\003\202\001\001\000
\143\032\010\100\175\244\136\123\015\167\330\172\256\037\015\013
\121\026\003\357\030\174\310\343\257\152\130\223\024\140\221\262
\204\334\210\116\276\071\212\072\363\346\202\211\135\001\067\263
\253\044\244\025\016\222\065\132\112\104\136\116\127\372\165\316
\037\110\316\146\364\074\100\046\222\230\154\033\356\044\106\014
\027\263\122\245\333\245\221\221\317\067\323\157\347\047\010\072
\116\031\037\072\247\130\134\027\317\171\077\213\344\247\323\046
\043\235\046\017\130\151\374\107\176\262\320\215\213\223\277\051
\117\103\151\164\166\147\113\317\007\214\346\002\367\265\341\264
\103\265\113\055\024\237\371\334\046\015\277\246\107\164\006\330
\210\321\072\051\060\204\316\322\071\200\142\033\250\307\127\111
\274\152\125\121\147\025\112\276\065\007\344\325\165\230\067\171
\060\024\333\051\235\154\305\151\314\107\125\242\060\367\314\134
\177\302\303\230\034\153\116\026\200\353\172\170\145\105\242\000
\032\257\014\015\125\144\064\110\270\222\271\361\264\120\051\362
\117\043\037\332\154\254\037\104\341\335\043\170\121\133\307\026
END

CKA_NSS_MOZILLA_CA_POLICY

CK_BBOOL CK_TRUE

CKA_NSS_SERVER_DISTRUST_AFTER CK_BBOOL CK_FALSE

CKA_NSS_EMAIL_DISTRUST_AFTER CK_BBOOL CK_FALSE

Trust for "Secure Global CA"

Issuer: CN=Secure Global CA,O=SecureTrust Corporation,C=US

Serial Number:07:56:22:a4:e8:d4:8a:89:4d:f4:13:c8:f0:f8:ea:a5

Subject: CN=Secure Global CA,O=SecureTrust Corporation,C=US

Not Valid Before: Tue Nov 07 19:42:28 2006

Not Valid After : Mon Dec 31 19:52:06 2029

Fingerprint (SHA-256):

42:00:F5:04:3A:C8:59:0E:BB:52:7D:20:9E:D1:50:30:29:FB:CB:D4:1C:A1:B5:06:EC:27:F1:5A:DE:7D:AC:69

Fingerprint (SHA1): 3A:44:73:5A:E5:81:90:1F:24:86:61:46:1E:3B:9C:C4:5F:F5:3A:1B

CKA_CLASS CK_OBJECT_CLASS CKO_NSS_TRUST

CKA_TOKEN CK_BBOOL CK_TRUE

CKA_PRIVATE CK_BBOOL CK_FALSE

```

CKA_MODIFIABLE CK_BBOOL CK_FALSE
CKA_LABEL UTF8 "Secure Global CA"
CKA_CERT_SHA1_HASH MULTILINE_OCTAL
\072\104\163\132\345\201\220\037\044\206\141\106\036\073\234\304
\137\365\072\033
END
CKA_CERT_MD5_HASH MULTILINE_OCTAL
\317\364\047\015\324\355\334\145\026\111\155\075\332\277\156\336
END
CKA_ISSUER
MULTILINE_OCTAL
\060\112\061\013\060\011\006\003\125\004\006\023\002\125\123\061
\040\060\036\006\003\125\004\012\023\027\123\145\143\165\162\145
\124\162\165\163\164\040\103\157\162\160\157\162\141\164\151\157
\156\061\031\060\027\006\003\125\004\003\023\020\123\145\143\165
\162\145\040\107\154\157\142\141\154\040\103\101
END
CKA_SERIAL_NUMBER MULTILINE_OCTAL
\002\020\007\126\042\244\350\324\212\211\115\364\023\310\360\370
\352\245
END
CKA_TRUST_SERVER_AUTH CK_TRUST CKT_NSS_TRUSTED_DELEGATOR
CKA_TRUST_EMAIL_PROTECTION CK_TRUST CKT_NSS_TRUSTED_DELEGATOR
CKA_TRUST_CODE_SIGNING CK_TRUST CKT_NSS_MUST_VERIFY_TRUST
CKA_TRUST_STEP_UP_APPROVED CK_BBOOL CK_FALSE

#
# Certificate "COMODO Certification Authority"
#
# Issuer: CN=COMODO Certification Authority,O=COMODO CA Limited,L=Salford,ST=Greater
Manchester,C=GB
# Serial Number:4e:81:2d:8a:82:65:e0:0b:02:ee:3e:35:02:46:e5:3d
# Subject: CN=COMODO Certification Authority,O=COMODO CA Limited,L=Salford,ST=Greater
Manchester,C=GB
# Not Valid Before: Fri Dec 01 00:00:00 2006
# Not Valid After : Mon Dec 31 23:59:59 2029
# Fingerprint (SHA-256):
0C:2C:D6:3D:F7:80:6F:A3:99:ED:E8:09:11:6B:57:5B:F8:79:89:F0:65:18:F9:80:8C:86:05:03:17:8B:AF:66
# Fingerprint (SHA1): 66:31:BF:9E:F7:4F:9E:B6:C9:D5:A6:0C:BA:6A:BE:D1:F7:BD:EF:7B
CKA_CLASS CK_OBJECT_CLASS CKO_CERTIFICATE
CKA_TOKEN CK_BBOOL CK_TRUE
CKA_PRIVATE CK_BBOOL CK_FALSE
CKA_MODIFIABLE CK_BBOOL CK_FALSE
CKA_LABEL UTF8 "COMODO Certification Authority"
CKA_CERTIFICATE_TYPE CK_CERTIFICATE_TYPE CKC_X_509
CKA_SUBJECT MULTILINE_OCTAL
\060\201\201\061\013\060\011\006\003\125\004\006\023\002\107\102
\061\033\060\031\006\003\125\004\010\023\022\107\162\145\141\164

```

\145\162\040\115\141\156\143\150\145\163\164\145\162\061\020\060
\016\006\003\125\004\007\023\007\123\141\154\146\157\162\144\061
\032\060\030\006\003\125\004\012\023\021\103\117\115\117\104\117
\040\103\101\040\114\151\155\151\164\145\144\061\047\060\045\006
\003\125\004\003\023\036\103\117\115\117\104\117\040\103\145\162
\164\151\146\151\143\141\164\151\157\156\040\101\165\164\150\157
\162\151\164\171

END

CKA_ID

UTF8 "0"

CKA_ISSUER MULTILINE_OCTAL

\060\201\201\061\013\060\011\006\003\125\004\006\023\002\107\102
\061\033\060\031\006\003\125\004\010\023\022\107\162\145\141\164
\145\162\040\115\141\156\143\150\145\163\164\145\162\061\020\060
\016\006\003\125\004\007\023\007\123\141\154\146\157\162\144\061
\032\060\030\006\003\125\004\012\023\021\103\117\115\117\104\117
\040\103\101\040\114\151\155\151\164\145\144\061\047\060\045\006
\003\125\004\003\023\036\103\117\115\117\104\117\040\103\145\162
\164\151\146\151\143\141\164\151\157\156\040\101\165\164\150\157
\162\151\164\171

END

CKA_SERIAL_NUMBER MULTILINE_OCTAL

\002\020\116\201\055\212\202\145\340\013\002\356\076\065\002\106
\345\075

END

CKA_VALUE MULTILINE_OCTAL

\060\202\004\035\060\202\003\005\240\003\002\001\002\002\020\116
\201\055\212\202\145\340\013\002\356\076\065\002\106\345\075\060
\015\006\011\052\206\110\206\367\015\001\001\005\005\000\060\201
\201\061\013\060\011\006\003\125\004\006\023\002\107\102\061\033
\060\031\006\003\125\004\010\023\022\107\162\145\141\164\145\162
\040\115\141\156\143\150\145\163\164\145\162\061\020\060\016\006
\003\125\004\007\023\007\123\141\154\146\157\162\144\061\032\060
\030\006\003\125\004\012\023\021\103\117\115\117\104\117\040\103
\101\040\114\151\155\151\164\145\144\061\047\060\045\006\003\125
\004\003\023\036\103\117\115\117\104\117\040\103\145\162\164\151
\146\151\143\141\164\151\157\156\040\101\165\164\150\157\162\151
\164\171\060\036\027\015\060\066\061\062\060\061\060\060\060\060
\060\060\132\027\015\062\071\061\062\063\061\062\063\065\071\065
\071\132\060\201\201\061\013\060\011\006\003\125\004\006\023\002
\107\102\061\033\060\031\006\003\125\004\010\023\022\107\162\145
\141\164\145\162\040\115\141\156\143\150\145\163\164\145\162\061
\020\060\016\006\003\125\004\007\023\007\123\141\154\146\157\162
\144\061\032\060\030\006\003\125\004\012\023\021\103\117\115\117
\104\117\040\103\101\040\114\151\155\151\164\145\144\061\047\060
\045\006\003\125\004\003\023\036\103\117\115\117\104\117\040\103
\145\162\164\151\146\151\143\141\164\151\157\156\040\101\165\164
\150\157\162\151\164\171\060\202\001\042\060\015\006\011\052\206

\110\206\367\015\001\001\001\005\000\003\202\001\017\000\060\202
\001\012\002\202\001\001\000\320\100\213\213\162\343\221\033\367
\121\301\033\124\004\230\323\251\277\301\346\212\135\073\207\373
\273\210\316\015\343\057\077\006\226\360\242\051\120\231\256\333
\073\241\127\260\164\121\161\315\355\102\221\115\101\376\251\310
\330\152\206\167\104\273\131\146\227\120\136\264\324\054\160\104
\317\332\067\225\102\151\074\060\304\161\263\122\360\041\115\241
\330\272\071\174\034\236\243\044\235\362\203\026\230\252\026\174
\103\233\025\133\267\256\064\221\376\324\142\046\030\106\232\077
\353\301\371\361\220\127\353\254\172\015\213\333\162\060\152\146
\325\340\106\243\160\334\150\331\377\004\110\211\167\336\265\351
\373\147\155\101\351\274\071\275\062\331\142\002\361\261\250\075
\156\067\234\342\057\342\323\242\046\213\306\270\125\103\210\341
\043\076\245\322\044\071\152\107\253\000\324\241\263\251\045\376
\015\077\247\035\272\323\121\301\013\244\332\254\070\357\125\120
\044\005\145\106\223\064\117\055\215\255\306\324\041\031\322\216
\312\005\141\161\007\163\107\345\212\031\022\275\004\115\316\116
\234\245\110\254\273\046\367\002\003\001\000\001\243\201\216\060
\201\213\060\035\006\003\125\035\016\004\026\004\024\013\130\345
\213\306\114\025\067\244\100\251\060\251\041\276\107\066\132\126
\377\060\016\006\003\125\035\017\001\001\377\004\004\003\002\001
\006\060\017\006\003\125\035\023\001\001\377\004\005\060\003\001
\001\377\060\111\006\003\125\035\037\004\102\060\100\060\076\240
\074\240\072\206\070\150\164\164\160\072\057\057\143\162\154\056
\143\157\155\157\144\157\143\141\056\143\157\155\057\103\117\115
\117\104\117\103\145\162\164\151\146\151\143\141\164\151\157\156
\101\165\164\150\157\162\151\164\171\056\143\162\154\060\015\006
\011\052\206\110\206\367\015\001\001\005\005\000\003\202\001\001
\000\076\230\236\233\366\033\351\327\071\267\170\256\035\162\030
\111\323\207\344\103\202\353\077\311\252\365\250\265\357\125\174
\041\122\145\371\325\015\341\154\364\076\214\223\163\221\056\002
\304\116\007\161\157\300\217\070\141\010\250\036\201\012\300\057
\040\057\101\213\221\334\110\105\274\361\306\336\272\166\153\063
\310\000\055\061\106\114\355\347\235\317\210\224\377\063\300\126
\350\044\206\046\270\330\070\070\337\052\153\335\022\314\307\077
\107\027\114\242\302\006\226\011\326\333\376\077\074\106\101\337
\130\342\126\017\074\073\301\034\223\065\331\070\122\254\356\310
\354\056\060\116\224\065\264\044\037\113\170\151\332\362\002\070
\314\225\122\223\360\160\045\131\234\040\147\304\356\371\213\127
\141\364\222\166\175\077\204\215\125\267\350\345\254\325\361\365
\031\126\246\132\373\220\034\257\223\353\345\034\324\147\227\135
\004\016\276\013\203\246\027\203\271\060\022\240\305\063\025\005
\271\015\373\307\005\166\343\330\112\215\374\064\027\243\306\041
\050\276\060\105\061\036\307\170\276\130\141\070\254\073\342\001
\145

END

CKA_NSS_MOZILLA_CA_POLICY

```

CK_BBOOL CK_TRUE
CKA_NSS_SERVER_DISTRUST_AFTER CK_BBOOL CK_FALSE
CKA_NSS_EMAIL_DISTRUST_AFTER CK_BBOOL CK_FALSE

# Trust for "COMODO Certification Authority"
# Issuer: CN=COMODO Certification Authority,O=COMODO CA Limited,L=Salford,ST=Greater
Manchester,C=GB
# Serial Number:4e:81:2d:8a:82:65:e0:0b:02:ee:3e:35:02:46:e5:3d
# Subject: CN=COMODO Certification Authority,O=COMODO CA Limited,L=Salford,ST=Greater
Manchester,C=GB
# Not Valid Before: Fri Dec 01 00:00:00 2006
# Not Valid After : Mon Dec 31 23:59:59 2029
# Fingerprint (SHA-256):
0C:2C:D6:3D:F7:80:6F:A3:99:ED:E8:09:11:6B:57:5B:F8:79:89:F0:65:18:F9:80:8C:86:05:03:17:8B:AF:66
# Fingerprint (SHA1): 66:31:BF:9E:F7:4F:9E:B6:C9:D5:A6:0C:BA:6A:BE:D1:F7:BD:EF:7B
CKA_CLASS CK_OBJECT_CLASS CKO_NSS_TRUST
CKA_TOKEN CK_BBOOL CK_TRUE
CKA_PRIVATE CK_BBOOL CK_FALSE
CKA_MODIFIABLE
CK_BBOOL CK_FALSE
CKA_LABEL UTF8 "COMODO Certification Authority"
CKA_CERT_SHA1_HASH MULTILINE_OCTAL
\146\061\277\236\367\117\236\266\311\325\246\014\272\152\276\321
\367\275\357\173
END
CKA_CERT_MD5_HASH MULTILINE_OCTAL
\134\110\334\367\102\162\354\126\224\155\034\314\161\065\200\165
END
CKA_ISSUER MULTILINE_OCTAL
\060\201\201\061\013\060\011\006\003\125\004\006\023\002\107\102
\061\033\060\031\006\003\125\004\010\023\022\107\162\145\141\164
\145\162\040\115\141\156\143\150\145\163\164\145\162\061\020\060
\016\006\003\125\004\007\023\007\123\141\154\146\157\162\144\061
\032\060\030\006\003\125\004\012\023\021\103\117\115\117\104\117
\040\103\101\040\114\151\155\151\164\145\144\061\047\060\045\006
\003\125\004\003\023\036\103\117\115\117\104\117\040\103\145\162
\164\151\146\151\143\141\164\151\157\156\040\101\165\164\150\157
\162\151\164\171
END
CKA_SERIAL_NUMBER MULTILINE_OCTAL
\002\020\116\201\055\212\202\145\340\013\002\356\076\065\002\106
\345\075
END
CKA_TRUST_SERVER_AUTH CK_TRUST
CKT_NSS_TRUSTED_DELEGATOR
CKA_TRUST_EMAIL_PROTECTION CK_TRUST CKT_NSS_TRUSTED_DELEGATOR
CKA_TRUST_CODE_SIGNING CK_TRUST CKT_NSS_MUST_VERIFY_TRUST
CKA_TRUST_STEP_UP_APPROVED CK_BBOOL CK_FALSE

```

```

#
# Certificate "COMODO ECC Certification Authority"
#
# Issuer: CN=COMODO ECC Certification Authority,O=COMODO CA Limited,L=Salford,ST=Greater
Manchester,C=GB
# Serial Number:1f:47:af:aa:62:00:70:50:54:4c:01:9e:9b:63:99:2a
# Subject: CN=COMODO ECC Certification Authority,O=COMODO CA Limited,L=Salford,ST=Greater
Manchester,C=GB
# Not Valid Before: Thu Mar 06 00:00:00 2008
# Not Valid After : Mon Jan 18 23:59:59 2038
# Fingerprint (SHA-256):
17:93:92:7A:06:14:54:97:89:AD:CE:2F:8F:34:F7:F0:B6:6D:0F:3A:E3:A3:B8:4D:21:EC:15:DB:BA:4F:AD:C7
# Fingerprint (SHA1): 9F:74:4E:9F:2B:4D:BA:EC:0F:31:2C:50:B6:56:3B:8E:2D:93:C3:11
CKA_CLASS CK_OBJECT_CLASS CKO_CERTIFICATE
CKA_TOKEN CK_BBOOL CK_TRUE
CKA_PRIVATE CK_BBOOL CK_FALSE
CKA_MODIFIABLE CK_BBOOL CK_FALSE
CKA_LABEL UTF8 "COMODO ECC Certification Authority"
CKA_CERTIFICATE_TYPE
CK_CERTIFICATE_TYPE CKC_X_509
CKA_SUBJECT MULTILINE_OCTAL
\060\201\205\061\013\060\011\006\003\125\004\006\023\002\107\102
\061\033\060\031\006\003\125\004\010\023\022\107\162\145\141\164
\145\162\040\115\141\156\143\150\145\163\164\145\162\061\020\060
\016\006\003\125\004\007\023\007\123\141\154\146\157\162\144\061
\032\060\030\006\003\125\004\012\023\021\103\117\115\117\104\117
\040\103\101\040\114\151\155\151\164\145\144\061\053\060\051\006
\003\125\004\003\023\042\103\117\115\117\104\117\040\105\103\103
\040\103\145\162\164\151\146\151\143\141\164\151\157\156\040\101
\165\164\150\157\162\151\164\171
END
CKA_ID UTF8 "0"
CKA_ISSUER MULTILINE_OCTAL
\060\201\205\061\013\060\011\006\003\125\004\006\023\002\107\102
\061\033\060\031\006\003\125\004\010\023\022\107\162\145\141\164
\145\162\040\115\141\156\143\150\145\163\164\145\162\061\020\060
\016\006\003\125\004\007\023\007\123\141\154\146\157\162\144\061
\032\060\030\006\003\125\004\012\023\021\103\117\115\117\104\117
\040\103\101\040\114\151\155\151\164\145\144\061\053\060\051\006
\003\125\004\003\023\042\103\117\115\117\104\117\040\105\103\103
\040\103\145\162\164\151\146\151\143\141\164\151\157\156\040\101
\165\164\150\157\162\151\164\171
END
CKA_SERIAL_NUMBER
MULTILINE_OCTAL
\002\020\037\107\257\252\142\000\160\120\124\114\001\236\233\143
\231\052

```

END

CKA_VALUE_MULTILINE_OCTAL

\060\202\002\211\060\202\002\017\240\003\002\001\002\002\020\037
\107\257\252\142\000\160\120\124\114\001\236\233\143\231\052\060
\012\006\010\052\206\110\316\075\004\003\003\060\201\205\061\013
\060\011\006\003\125\004\006\023\002\107\102\061\033\060\031\006
\003\125\004\010\023\022\107\162\145\141\164\145\162\040\115\141
\156\143\150\145\163\164\145\162\061\020\060\016\006\003\125\004
\007\023\007\123\141\154\146\157\162\144\061\032\060\030\006\003
\125\004\012\023\021\103\117\115\117\104\117\040\103\101\040\114
\151\155\151\164\145\144\061\053\060\051\006\003\125\004\003\023
\042\103\117\115\117\104\117\040\105\103\103\040\103\145\162\164
\151\146\151\143\141\164\151\157\156\040\101\165\164\150\157\162
\151\164\171\060\036\027\015\060\070\060\063\060\066\060\060\060
\060\060\060\132\027\015\063\070\060\061\061\070\062\063\065\071
\065\071\132\060\201\205\061\013\060\011\006\003\125\004\006\023
\002\107\102\061\033\060\031\006\003\125\004\010\023\022\107\162
\145\141\164\145\162\040\115\141\156\143\150\145\163\164\145\162
\061\020\060\016\006\003\125\004\007\023\007\123\141\154\146\157
\162\144\061\032\060\030\006\003\125\004\012\023\021\103\117\115
\117\104\117\040\103\101\040\114\151\155\151\164\145\144\061\053
\060\051\006\003\125\004\003\023\042\103\117\115\117\104\117\040
\105\103\103\040\103\145\162\164\151\146\151\143\141\164\151\157
\156\040\101\165\164\150\157\162\151\164\171\060\166\060\020\006
\007\052\206\110\316\075\002\001\006\005\053\201\004\000\042\003
\142\000\004\003\107\173\057\165\311\202\025\205\373\165\344\221
\026\324\253\142\231\365\076\122\013\006\316\101\000\177\227\341
\012\044\074\035\001\004\356\075\322\215\011\227\014\340\165\344
\372\373\167\212\052\365\003\140\113\066\213\026\043\026\255\011
\161\364\112\364\050\120\264\376\210\034\156\077\154\057\057\011
\131\133\245\133\013\063\231\342\303\075\211\371\152\054\357\262
\323\006\351\243\102\060\100\060\035\006\003\125\035\016\004\026
\004\024\165\161\247\031\110\031\274\235\235\352\101\107\337\224
\304\110\167\231\323\171\060\016\006\003\125\035\017\001\001\377
\004\004\003\002\001\006\060\017\006\003\125\035\023\001\001\377
\004\005\060\003\001\001\377\060\012\006\010\052\206\110\316\075
\004\003\003\003\150\000\060\145\002\061\000\357\003\133\172\254
\267\170\012\162\267\210\337\377\265\106\024\011\012\372\240\346
\175\010\306\032\207\275\030\250\163\275\046\312\140\014\235\316
\231\237\317\134\017\060\341\276\024\061\352\002\060\024\364\223
\074\111\247\063\172\220\106\107\263\143\175\023\233\116\267\157
\030\067\200\123\376\335\040\340\065\232\066\321\307\001\271\346
\334\335\363\377\035\054\072\026\127\331\222\071\326

END

CKA_NSS_MOZILLA_CA_POLICY

CK_BBOOL CK_TRUE

CKA_NSS_SERVER_DISTRUST_AFTER CK_BBOOL CK_FALSE

CKA_NSS_EMAIL_DISTRUST_AFTER CK_BBOOL CK_FALSE

```

# Trust for "COMODO ECC Certification Authority"
# Issuer: CN=COMODO ECC Certification Authority,O=COMODO CA Limited,L=Salford,ST=Greater
Manchester,C=GB
# Serial Number:1f:47:af:aa:62:00:70:50:54:4c:01:9e:9b:63:99:2a
# Subject: CN=COMODO ECC Certification Authority,O=COMODO CA Limited,L=Salford,ST=Greater
Manchester,C=GB
# Not Valid Before: Thu Mar 06 00:00:00 2008
# Not Valid After : Mon Jan 18 23:59:59 2038
# Fingerprint (SHA-256):
17:93:92:7A:06:14:54:97:89:AD:CE:2F:8F:34:F7:F0:B6:6D:0F:3A:E3:A3:B8:4D:21:EC:15:DB:BA:4F:AD:C7
# Fingerprint (SHA1): 9F:74:4E:9F:2B:4D:BA:EC:0F:31:2C:50:B6:56:3B:8E:2D:93:C3:11
CKA_CLASS CK_OBJECT_CLASS CKO_NSS_TRUST
CKA_TOKEN CK_BBOOL CK_TRUE
CKA_PRIVATE CK_BBOOL CK_FALSE
CKA_MODIFIABLE CK_BBOOL CK_FALSE
CKA_LABEL UTF8 "COMODO ECC Certification Authority"
CKA_CERT_SHA1_HASH MULTILINE_OCTAL
\237\164\116\237\053\115\272\354\017\061\054\120\266\126\073\216
\055\223\303\021
END
CKA_CERT_MD5_HASH
MULTILINE_OCTAL
\174\142\377\164\235\061\123\136\150\112\325\170\252\036\277\043
END
CKA_ISSUER MULTILINE_OCTAL
\060\201\205\061\013\060\011\006\003\125\004\006\023\002\107\102
\061\033\060\031\006\003\125\004\010\023\022\107\162\145\141\164
\145\162\040\115\141\156\143\150\145\163\164\145\162\061\020\060
\016\006\003\125\004\007\023\007\123\141\154\146\157\162\144\061
\032\060\030\006\003\125\004\012\023\021\103\117\115\117\104\117
\040\103\101\040\114\151\155\151\164\145\144\061\053\060\051\006
\003\125\004\003\023\042\103\117\115\117\104\117\040\105\103\103
\040\103\145\162\164\151\146\151\143\141\164\151\157\156\040\101
\165\164\150\157\162\151\164\171
END
CKA_SERIAL_NUMBER MULTILINE_OCTAL
\002\020\037\107\257\252\142\000\160\120\124\114\001\236\233\143
\231\052
END
CKA_TRUST_SERVER_AUTH CK_TRUST CKT_NSS_TRUSTED_DELEGATOR
CKA_TRUST_EMAIL_PROTECTION CK_TRUST CKT_NSS_TRUSTED_DELEGATOR
CKA_TRUST_CODE_SIGNING
CK_TRUST CKT_NSS_MUST_VERIFY_TRUST
CKA_TRUST_STEP_UP_APPROVED CK_BBOOL CK_FALSE

#
# Certificate "OISTE WISKey Global Root GA CA"

```

```

#
# Issuer: CN=OISTE WISeKey Global Root GA CA,OU=OISTE Foundation Endorsed,OU=Copyright (c)
2005,O=WISeKey,C=CH
# Serial Number:41:3d:72:c7:f4:6b:1f:81:43:7d:f1:d2:28:54:df:9a
# Subject: CN=OISTE WISeKey Global Root GA CA,OU=OISTE Foundation Endorsed,OU=Copyright (c)
2005,O=WISeKey,C=CH
# Not Valid Before: Sun Dec 11 16:03:44 2005
# Not Valid After : Fri Dec 11 16:09:51 2037
# Fingerprint (SHA-256):
41:C9:23:86:6A:B4:CA:D6:B7:AD:57:80:81:58:2E:02:07:97:A6:CB:DF:4F:FF:78:CE:83:96:B3:89:37:D7:F5
# Fingerprint (SHA1): 59:22:A1:E1:5A:EA:16:35:21:F8:98:39:6A:46:46:B0:44:1B:0F:A9
CKA_CLASS CK_OBJECT_CLASS CKO_CERTIFICATE
CKA_TOKEN CK_BBOOL CK_TRUE
CKA_PRIVATE CK_BBOOL CK_FALSE
CKA_MODIFIABLE CK_BBOOL CK_FALSE
CKA_LABEL UTF8 "OISTE WISeKey Global Root GA CA"
CKA_CERTIFICATE_TYPE CK_CERTIFICATE_TYPE CKC_X_509
CKA_SUBJECT MULTILINE_OCTAL
\060\201\212\061\013\060\011\006\003\125\004\006\023\002\103\110
\061\020\060\016\006\003\125\004\012\023\007\127\111\123\145\113
\145\171\061\033\060\031\006\003\125\004\013\023\022\103\157\160
\171\162\151\147\150\164\040\050\143\051\040\062\060\060\065\061
\042\060\040\006\003\125\004\013\023\031\117\111\123\124\105\040
\106\157\165\156\144\141\164\151\157\156\040\105\156\144\157\162
\163\145\144\061\050\060\046\006\003\125\004\003\023\037\117\111
\123\124\105\040\127\111\123\145\113\145\171\040\107\154\157\142
\141\154\040\122\157\157\164\040\107\101\040\103\101
END
CKA_ID
UTF8 "0"
CKA_ISSUER MULTILINE_OCTAL
\060\201\212\061\013\060\011\006\003\125\004\006\023\002\103\110
\061\020\060\016\006\003\125\004\012\023\007\127\111\123\145\113
\145\171\061\033\060\031\006\003\125\004\013\023\022\103\157\160
\171\162\151\147\150\164\040\050\143\051\040\062\060\060\065\061
\042\060\040\006\003\125\004\013\023\031\117\111\123\124\105\040
\106\157\165\156\144\141\164\151\157\156\040\105\156\144\157\162
\163\145\144\061\050\060\046\006\003\125\004\003\023\037\117\111
\123\124\105\040\127\111\123\145\113\145\171\040\107\154\157\142
\141\154\040\122\157\157\164\040\107\101\040\103\101
END
CKA_SERIAL_NUMBER
MULTILINE_OCTAL
\002\020\101\075\162\307\364\153\037\201\103\175\361\322\050\124
\337\232
END
CKA_VALUE MULTILINE_OCTAL
\060\202\003\361\060\202\002\331\240\003\002\001\002\002\020\101

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\075\162\307\364\153\037\201\103\175\361\322\050\124\337\232\060
\015\006\011\052\206\110\206\367\015\001\001\005\005\000\060\201
\212\061\013\060\011\006\003\125\004\006\023\002\103\110\061\020
\060\016\006\003\125\004\012\023\007\127\111\123\145\113\145\171
\061\033\060\031\006\003\125\004\013\023\022\103\157\160\171\162
\151\147\150\164\040\050\143\051\040\062\060\060\065\061\042\060
\040\006\003\125\004\013\023\031\117\111\123\124\105\040\106\157
\165\156\144\141\164\151\157\156\040\105\156\144\157\162\163\145
\144\061\050\060\046\006\003\125\004\003\023\037\117\111\123\124
\105\040\127\111\123\145\113\145\171\040\107\154\157\142\141\154
\040\122\157\157\164\040\107\101\040\103\101\060\036\027\015\060
\065\061\062\061\061\061\066\060\063\064\064\132\027\015\063\067
\061\062\061\061\061\066\060\071\065\061\132\060\201\212\061\013
\060\011\006\003\125\004\006\023\002\103\110\061\020\060\016\006
\003\125\004\012\023\007\127\111\123\145\113\145\171\061\033\060
\031\006\003\125\004\013\023\022\103\157\160\171\162\151\147\150
\164\040\050\143\051\040\062\060\060\065\061\042\060\040\006\003
\125\004\013\023\031\117\111\123\124\105\040\106\157\165\156\144
\141\164\151\157\156\040\105\156\144\157\162\163\145\144\061\050
\060\046\006\003\125\004\003\023\037\117\111\123\124\105\040\127
\111\123\145\113\145\171\040\107\154\157\142\141\154\040\122\157
\157\164\040\107\101\040\103\101\060\202\001\042\060\015\006\011
\052\206\110\206\367\015\001\001\001\005\000\003\202\001\017\000
\060\202\001\012\002\202\001\001\000\313\117\263\000\233\075\066
\335\371\321\111\152\153\020\111\037\354\330\053\262\306\370\062
\201\051\103\225\114\232\031\043\041\025\105\336\343\310\034\121
\125\133\256\223\350\067\377\053\153\351\324\352\276\052\335\250
\121\053\327\146\303\141\134\140\002\310\365\316\162\173\073\270
\362\116\145\010\232\315\244\152\031\301\001\273\163\246\327\366
\303\335\315\274\244\213\265\231\141\270\001\242\243\324\115\324
\005\075\221\255\370\264\010\161\144\257\160\361\034\153\176\366
\303\167\235\044\163\173\344\014\214\341\331\066\341\231\213\005
\231\013\355\105\061\011\312\302\000\333\367\162\240\226\252\225
\207\320\216\307\266\141\163\015\166\146\214\334\033\264\143\242
\237\177\223\023\060\361\241\047\333\331\377\054\125\210\221\240
\340\117\007\260\050\126\214\030\033\227\104\216\211\335\340\027
\156\347\052\357\217\071\012\061\204\202\330\100\024\111\056\172
\101\344\247\376\343\144\314\301\131\161\113\054\041\247\133\175
\340\035\321\056\201\233\303\330\150\367\275\226\033\254\160\261
\026\024\013\333\140\271\046\001\005\002\003\001\000\001\243\121
\060\117\060\013\006\003\125\035\017\004\004\003\002\001\206\060
\017\006\003\125\035\023\001\001\377\004\005\060\003\001\001\377
\060\035\006\003\125\035\016\004\026\004\024\263\003\176\256\066
\274\260\171\321\334\224\046\266\021\276\041\262\151\206\224\060
\020\006\011\053\006\001\004\001\202\067\025\001\004\003\002\001
\000\060\015\006\011\052\206\110\206\367\015\001\001\005\005\000
\003\202\001\001\000\113\241\377\013\207\156\263\371\301\103\261
\110\363\050\300\035\056\311\011\101\372\224\000\034\244\244\253

\111\117\217\075\036\357\115\157\275\274\244\366\362\046\060\311
\020\312\035\210\373\164\031\037\205\105\275\260\154\121\371\066
\176\333\365\114\062\072\101\117\133\107\317\350\013\055\266\304
\031\235\164\305\107\306\073\152\017\254\024\333\074\364\163\234
\251\005\337\000\334\164\170\372\370\065\140\131\002\023\030\174
\274\373\115\260\040\155\103\273\140\060\172\147\063\134\305\231
\321\370\055\071\122\163\373\214\252\227\045\134\162\331\010\036
\253\116\074\343\201\061\237\003\246\373\300\376\051\210\125\332
\204\325\120\003\266\342\204\243\246\066\252\021\072\001\341\030
\113\326\104\150\263\075\371\123\164\204\263\106\221\106\226\000
\267\200\054\266\341\343\020\342\333\242\347\050\217\001\226\142
\026\076\000\343\034\245\066\201\030\242\114\122\166\300\021\243
\156\346\035\272\343\132\276\066\123\305\076\165\217\206\151\051
\130\123\265\234\273\157\237\134\305\030\354\335\057\341\230\311
\374\276\337\012\015

END

CKA_NSS_Mozilla_CA_POLICY

CK_BBOOL CK_TRUE

CKA_NSS_SERVER_DISTRUST_AFTER CK_BBOOL CK_FALSE

CKA_NSS_EMAIL_DISTRUST_AFTER CK_BBOOL CK_FALSE

Trust for "OISTE WiSeKey Global Root GA CA"

Issuer: CN=OISTE WiSeKey Global Root GA CA,OU=OISTE Foundation Endorsed,OU=Copyright (c)
2005,O=WiSeKey,C=CH

Serial Number:41:3d:72:c7:f4:6b:1f:81:43:7d:f1:d2:28:54:df:9a

Subject: CN=OISTE WiSeKey Global Root GA CA,OU=OISTE Foundation Endorsed,OU=Copyright (c)
2005,O=WiSeKey,C=CH

Not Valid Before: Sun Dec 11 16:03:44 2005

Not Valid After : Fri

Dec 11 16:09:51 2037

Fingerprint (SHA-256):

41:C9:23:86:6A:B4:CA:D6:B7:AD:57:80:81:58:2E:02:07:97:A6:CB:DF:4F:FF:78:CE:83:96:B3:89:37:D7:F5

Fingerprint (SHA1): 59:22:A1:E1:5A:EA:16:35:21:F8:98:39:6A:46:46:B0:44:1B:0F:A9

CKA_CLASS CK_OBJECT_CLASS CKO_NSS_TRUST

CKA_TOKEN CK_BBOOL CK_TRUE

CKA_PRIVATE CK_BBOOL CK_FALSE

CKA_MODIFIABLE CK_BBOOL CK_FALSE

CKA_LABEL UTF8 "OISTE WiSeKey Global Root GA CA"

CKA_CERT_SHA1_HASH MULTILINE_OCTAL

\131\042\241\341\132\352\026\065\041\370\230\071\152\106\106\260
\104\033\017\251

END

CKA_CERT_MD5_HASH MULTILINE_OCTAL

\274\154\121\063\247\351\323\146\143\124\025\162\033\041\222\223

END

CKA_ISSUER MULTILINE_OCTAL

\060\201\212\061\013\060\011\006\003\125\004\006\023\002\103\110
\061\020\060\016\006\003\125\004\012\023\007\127\111\123\145\113


```

\145\171\061\033\060\031\006\003\125\004\013\023\022\103\157\160
\171\162\151\147\150\164\040\050\143\051\040\062\060\060\065\061
\042\060\040\006\003\125\004\013\023\031\117\111\123\124\105\040
\106\157\165\156\144\141\164\151\157\156\040\105\156\144\157\162
\163\145\144\061\050\060\046\006\003\125\004\003\023\037\117\111
\123\124\105\040\127\111\123\145\113\145\171\040\107\154\157\142
\141\154\040\122\157\157\164\040\107\101\040\103\101
END
CKA_SERIAL_NUMBER
MULTILINE_OCTAL
\002\020\101\075\162\307\364\153\037\201\103\175\361\322\050\124
\337\232
END
CKA_TRUST_SERVER_AUTH CK_TRUST CKT_NSS_MUST_VERIFY_TRUST
CKA_TRUST_EMAIL_PROTECTION CK_TRUST CKT_NSS_TRUSTED_DELEGATOR
CKA_TRUST_CODE_SIGNING CK_TRUST CKT_NSS_MUST_VERIFY_TRUST
CKA_TRUST_STEP_UP_APPROVED CK_BBOOL CK_FALSE

#
# Certificate "Certigna"
#
# Issuer: CN=Certigna,O=Dhimyotis,C=FR
# Serial Number:00:fe:dc:e3:01:0f:c9:48:ff
# Subject: CN=Certigna,O=Dhimyotis,C=FR
# Not Valid Before: Fri Jun 29 15:13:05 2007
# Not Valid After : Tue Jun 29 15:13:05 2027
# Fingerprint (SHA-256):
E3:B6:A2:DB:2E:D7:CE:48:84:2F:7A:C5:32:41:C7:B7:1D:54:14:4B:FB:40:C1:1F:3F:1D:0B:42:F5:EE:A1:2D
# Fingerprint (SHA1): B1:2E:13:63:45:86:A4:6F:1A:B2:60:68:37:58:2D:C4:AC:FD:94:97
CKA_CLASS
CK_OBJECT_CLASS CKO_CERTIFICATE
CKA_TOKEN CK_BBOOL CK_TRUE
CKA_PRIVATE CK_BBOOL CK_FALSE
CKA_MODIFIABLE CK_BBOOL CK_FALSE
CKA_LABEL UTF8 "Certigna"
CKA_CERTIFICATE_TYPE CK_CERTIFICATE_TYPE CKC_X_509
CKA_SUBJECT MULTILINE_OCTAL
\060\064\061\013\060\011\006\003\125\004\006\023\002\106\122\061
\022\060\020\006\003\125\004\012\014\011\104\150\151\155\171\157
\164\151\163\061\021\060\017\006\003\125\004\003\014\010\103\145
\162\164\151\147\156\141
END
CKA_ID UTF8 "0"
CKA_ISSUER MULTILINE_OCTAL
\060\064\061\013\060\011\006\003\125\004\006\023\002\106\122\061
\022\060\020\006\003\125\004\012\014\011\104\150\151\155\171\157
\164\151\163\061\021\060\017\006\003\125\004\003\014\010\103\145
\162\164\151\147\156\141

```

END

CKA_SERIAL_NUMBER MULTILINE_OCTAL

\002\011\000\376\334\343\001\017\311\110\377

END

CKA_VALUE MULTILINE_OCTAL

\060\202\003\250\060\202\002\220\240\003\002\001\002\002\011\000
\376\334\343\001\017\311\110\377\060\015\006\011\052\206\110\206
\367\015\001\001\005\005\000\060\064\061\013\060\011\006\003\125
\004\006\023\002\106\122\061\022\060\020\006\003\125\004\012\014
\011\104\150\151\155\171\157\164\151\163\061\021\060\017\006\003
\125\004\003\014\010\103\145\162\164\151\147\156\141\060\036\027
\015\060\067\060\066\062\071\061\065\061\063\060\065\132\027\015
\062\067\060\066\062\071\061\065\061\063\060\065\132\060\064\061
\013\060\011\006\003\125\004\006\023\002\106\122\061\022\060\020
\006\003\125\004\012\014\011\104\150\151\155\171\157\164\151\163
\061\021\060\017\006\003\125\004\003\014\010\103\145\162\164\151
\147\156\141\060\202\001\042\060\015\006\011\052\206\110\206\367
\015\001\001\001\005\000\003\202\001\017\000\060\202\001\012\002
\202\001\001\000\310\150\361\311\326\326\263\064\165\046\202\036
\354\264\276\352\134\341\046\355\021\107\141\341\242\174\026\170
\100\041\344\140\236\132\310\143\341\304\261\226\222\377\030\155
\151\043\341\053\142\367\335\342\066\057\221\007\271\110\317\016
\354\171\266\054\347\064\113\160\010\045\243\074\207\033\031\362
\201\007\017\070\220\031\323\021\376\206\264\362\321\136\036\036
\226\315\200\154\316\073\061\223\266\362\240\320\251\225\022\175
\245\232\314\153\310\204\126\212\063\251\347\042\025\123\026\360
\314\027\354\127\137\351\242\012\230\011\336\343\137\234\157\334
\110\343\205\013\025\132\246\272\237\254\110\343\011\262\367\364
\062\336\136\064\276\034\170\135\102\133\316\016\042\217\115\220
\327\175\062\030\263\013\054\152\277\216\077\024\021\211\040\016
\167\024\265\075\224\010\207\367\045\036\325\262\140\000\354\157
\052\050\045\156\052\076\030\143\027\045\077\076\104\040\026\366
\046\310\045\256\005\112\264\347\143\054\363\214\026\123\176\134
\373\021\032\010\301\106\142\237\042\270\361\302\215\151\334\372
\072\130\006\337\002\003\001\000\001\243\201\274\060\201\271\060
\017\006\003\125\035\023\001\001\377\004\005\060\003\001\001\377
\060\035\006\003\125\035\016\004\026\004\024\032\355\376\101\071
\220\264\044\131\276\001\362\122\325\105\366\132\071\334\021\060
\144\006\003\125\035\043\004\135\060\133\200\024\032\355\376\101
\071\220\264\044\131\276\001\362\122\325\105\366\132\071\334\021
\241\070\244\066\060\064\061\013\060\011\006\003\125\004\006\023
\002\106\122\061\022\060\020\006\003\125\004\012\014\011\104\150
\151\155\171\157\164\151\163\061\021\060\017\006\003\125\004\003
\014\010\103\145\162\164\151\147\156\141\202\011\000\376\334\343
\001\017\311\110\377\060\016\006\003\125\035\017\001\001\377\004
\004\003\002\001\006\060\021\006\011\140\206\110\001\206\370\102
\001\001\004\004\003\002\000\007\060\015\006\011\052\206\110\206
\367\015\001\001\005\005\000\003\202\001\001\000\205\003\036\222

```
\161\366\102\257\341\243\141\236\353\363\300\017\362\245\324\332
\225\346\326\276\150\066\075\176\156\037\114\212\357\321\017\041
\155\136\245\122\143\316\022\370\357\052\332\157\353\067\376\023
\002\307\313\073\076\042\153\332\141\056\177\324\162\075\335\060
\341\036\114\100\031\214\017\327\234\321\203\060\173\230\131\334
\175\306\271\014\051\114\241\063\242\353\147\072\145\204\323\226
\342\355\166\105\160\217\265\053\336\371\043\326\111\156\074\024
\265\306\237\065\036\120\320\301\217\152\160\104\002\142\313\256
\035\150\101\247\252\127\350\123\252\007\322\006\366\325\024\006
\013\221\003\165\054\154\162\265\141\225\232\015\213\271\015\347
\365\337\124\315\336\346\330\326\011\010\227\143\345\301\056\260
\267\104\046\300\046\300\257\125\060\236\073\325\066\052\031\004
\364\134\036\377\317\054\267\377\320\375\207\100\021\325\021\043
\273\110\300\041\251\244\050\055\375\025\370\260\116\053\364\060
\133\041\374\021\221\064\276\101\357\173\235\227\165\377\227\225
\300\226\130\057\352\273\106\327\273\344\331\056
```

END

CKA_NSS_MOZILLA_CA_POLICY

CK_BBOOL CK_TRUE

CKA_NSS_SERVER_DISTRUST_AFTER CK_BBOOL CK_FALSE

CKA_NSS_EMAIL_DISTRUST_AFTER CK_BBOOL CK_FALSE

Trust for "Certigna"

Issuer: CN=Certigna,O=Dhimyotis,C=FR

Serial Number:00:fe:dc:e3:01:0f:c9:48:ff

Subject: CN=Certigna,O=Dhimyotis,C=FR

Not Valid Before: Fri Jun 29 15:13:05 2007

#

Not Valid After : Tue Jun 29 15:13:05 2027

Fingerprint (SHA-256):

E3:B6:A2:DB:2E:D7:CE:48:84:2F:7A:C5:32:41:C7:B7:1D:54:14:4B:FB:40:C1:1F:3F:1D:0B:42:F5:EE:A1:2D

Fingerprint (SHA1): B1:2E:13:63:45:86:A4:6F:1A:B2:60:68:37:58:2D:C4:AC:FD:94:97

CKA_CLASS CK_OBJECT_CLASS CKO_NSS_TRUST

CKA_TOKEN CK_BBOOL CK_TRUE

CKA_PRIVATE CK_BBOOL CK_FALSE

CKA_MODIFIABLE CK_BBOOL CK_FALSE

CKA_LABEL UTF8 "Certigna"

CKA_CERT_SHA1_HASH MULTILINE_OCTAL

```
\261\056\023\143\105\206\244\157\032\262\140\150\067\130\055\304
\254\375\224\227
```

END

CKA_CERT_MD5_HASH MULTILINE_OCTAL

```
\253\127\246\133\175\102\202\031\265\330\130\046\050\136\375\377
```

END

CKA_ISSUER MULTILINE_OCTAL

```
\060\064\061\013\060\011\006\003\125\004\006\023\002\106\122\061
\022\060\020\006\003\125\004\012\014\011\104\150\151\155\171\157
\164\151\163\061\021\060\017\006\003\125\004\003\014\010\103\145
```

```

\162\164\151\147\156\141
END
CKA_SERIAL_NUMBER MULTILINE_OCTAL
\002\011\000\376\334\343\001\017\311\110\377
END
CKA_TRUST_SERVER_AUTH CK_TRUST CKT_NSS_TRUSTED_DELEGATOR
CKA_TRUST_EMAIL_PROTECTION
CK_TRUST CKT_NSS_TRUSTED_DELEGATOR
CKA_TRUST_CODE_SIGNING CK_TRUST CKT_NSS_MUST_VERIFY_TRUST
CKA_TRUST_STEP_UP_APPROVED CK_BBOOL CK_FALSE

#
# Certificate "ePKI Root Certification Authority"
#
# Issuer: OU=ePKI Root Certification Authority,O="Chunghwa Telecom Co., Ltd.",C=TW
# Serial Number:15:c8:bd:65:47:5c:af:b8:97:00:5e:e4:06:d2:bc:9d
# Subject: OU=ePKI Root Certification Authority,O="Chunghwa Telecom Co., Ltd.",C=TW
# Not Valid Before: Mon Dec 20 02:31:27 2004
# Not Valid After : Wed Dec 20 02:31:27 2034
# Fingerprint (SHA-256):
C0:A6:F4:DC:63:A2:4B:FD:CF:54:EF:2A:6A:08:2A:0A:72:DE:35:80:3E:2F:F5:FF:52:7A:E5:D8:72:06:DF:D5
# Fingerprint (SHA1): 67:65:0D:F1:7E:8E:7E:5B:82:40:A4:F4:56:4B:CF:E2:3D:69:C6:F0
CKA_CLASS CK_OBJECT_CLASS CKO_CERTIFICATE
CKA_TOKEN CK_BBOOL CK_TRUE
CKA_PRIVATE CK_BBOOL CK_FALSE
CKA_MODIFIABLE CK_BBOOL CK_FALSE
CKA_LABEL UTF8 "ePKI Root Certification Authority"
CKA_CERTIFICATE_TYPE CK_CERTIFICATE_TYPE CKC_X_509
CKA_SUBJECT
MULTILINE_OCTAL
\060\136\061\013\060\011\006\003\125\004\006\023\002\124\127\061
\043\060\041\006\003\125\004\012\014\032\103\150\165\156\147\150
\167\141\040\124\145\154\145\143\157\155\040\103\157\056\054\040
\114\164\144\056\061\052\060\050\006\003\125\004\013\014\041\145
\120\113\111\040\122\157\157\164\040\103\145\162\164\151\146\151
\143\141\164\151\157\156\040\101\165\164\150\157\162\151\164\171
END
CKA_ID UTF8 "0"
CKA_ISSUER MULTILINE_OCTAL
\060\136\061\013\060\011\006\003\125\004\006\023\002\124\127\061
\043\060\041\006\003\125\004\012\014\032\103\150\165\156\147\150
\167\141\040\124\145\154\145\143\157\155\040\103\157\056\054\040
\114\164\144\056\061\052\060\050\006\003\125\004\013\014\041\145
\120\113\111\040\122\157\157\164\040\103\145\162\164\151\146\151
\143\141\164\151\157\156\040\101\165\164\150\157\162\151\164\171
END
CKA_SERIAL_NUMBER MULTILINE_OCTAL
\002\020\025\310\275\145\107\134\257\270\227\000\136\344\006\322

```

\274\235

END

CKA_VALUE MULTILINE_OCTAL

\060\202\005\260\060\202\003\230\240\003\002\001\002\002\020\025
\310\275\145\107\134\257\270\227\000\136\344\006\322\274\235\060
\015\006\011\052\206\110\206\367\015\001\001\005\005\000\060\136
\061\013\060\011\006\003\125\004\006\023\002\124\127\061\043\060
\041\006\003\125\004\012\014\032\103\150\165\156\147\150\167\141
\040\124\145\154\145\143\157\155\040\103\157\056\054\040\114\164
\144\056\061\052\060\050\006\003\125\004\013\014\041\145\120\113
\111\040\122\157\157\164\040\103\145\162\164\151\146\151\143\141
\164\151\157\156\040\101\165\164\150\157\162\151\164\171\060\036
\027\015\060\064\061\062\062\060\060\062\063\061\062\067\132\027
\015\063\064\061\062\062\060\060\062\063\061\062\067\132\060\136
\061\013\060\011\006\003\125\004\006\023\002\124\127\061\043\060
\041\006\003\125\004\012\014\032\103\150\165\156\147\150\167\141
\040\124\145\154\145\143\157\155\040\103\157\056\054\040\114\164
\144\056\061\052\060\050\006\003\125\004\013\014\041\145\120\113
\111\040\122\157\157\164\040\103\145\162\164\151\146\151\143\141
\164\151\157\156\040\101\165\164\150\157\162\151\164\171\060\202
\002\042\060\015\006\011\052\206\110\206\367\015\001\001\001\005
\000\003\202\002\017\000\060\202\002\012\002\202\002\001\000\341
\045\017\356\215\333\210\063\165\147\315\255\037\175\072\116\155
\235\323\057\024\363\143\164\313\001\041\152\067\352\204\120\007
\113\046\133\011\103\154\041\236\152\310\325\003\365\140\151\217
\314\360\042\344\037\347\367\152\042\061\267\054\025\362\340\376
\000\152\103\377\207\145\306\265\032\301\247\114\155\042\160\041
\212\061\362\227\164\211\011\022\046\034\236\312\331\022\242\225
\074\332\351\147\277\010\240\144\343\326\102\267\105\357\227\364
\366\365\327\265\112\025\002\130\175\230\130\113\140\274\315\327
\015\232\023\063\123\321\141\371\172\325\327\170\263\232\063\367
\000\206\316\035\115\224\070\257\250\354\170\121\160\212\134\020
\203\121\041\367\021\075\064\206\136\345\110\315\227\201\202\065
\114\031\354\145\366\153\305\005\241\356\107\023\326\263\041\047
\224\020\012\331\044\073\272\276\104\023\106\060\077\227\074\330
\327\327\152\356\073\070\343\053\324\227\016\271\033\347\007\111
\177\067\052\371\167\170\317\124\355\133\106\235\243\200\016\221
\103\301\326\133\137\024\272\237\246\215\044\107\100\131\277\162
\070\262\066\154\067\377\231\321\135\016\131\012\253\151\367\300
\262\004\105\172\124\000\256\276\123\366\265\347\341\370\074\243
\061\322\251\376\041\122\144\305\246\147\360\165\007\006\224\024
\201\125\306\047\344\001\217\027\301\152\161\327\276\113\373\224
\130\175\176\021\063\261\102\367\142\154\030\326\317\011\150\076
\177\154\366\036\217\142\255\245\143\333\011\247\037\042\102\101
\036\157\231\212\076\327\371\077\100\172\171\260\245\001\222\322
\235\075\010\025\245\020\001\055\263\062\166\250\225\015\263\172
\232\373\007\020\170\021\157\341\217\307\272\017\045\032\164\052
\345\034\230\101\231\337\041\207\350\225\006\152\012\263\152\107

\166\145\366\072\317\217\142\027\031\173\012\050\315\032\322\203
\036\041\307\054\277\276\377\141\150\267\147\033\273\170\115\215
\316\147\345\344\301\216\267\043\146\342\235\220\165\064\230\251
\066\053\212\232\224\271\235\354\314\212\261\370\045\211\134\132
\266\057\214\037\155\171\044\247\122\150\303\204\065\342\146\215
\143\016\045\115\325\031\262\346\171\067\247\042\235\124\061\002
\003\001\000\001\243\152\060\150\060\035\006\003\125\035\016\004
\026\004\024\036\014\367\266\147\362\341\222\046\011\105\300\125
\071\056\167\077\102\112\242\060\014\006\003\125\035\023\004\005
\060\003\001\001\377\060\071\006\004\147\052\007\000\004\061\060
\057\060\055\002\001\000\060\011\006\005\053\016\003\002\032\005
\000\060\007\006\005\147\052\003\000\000\004\024\105\260\302\307
\012\126\174\356\133\170\014\225\371\030\123\301\246\034\330\020
\060\015\006\011\052\206\110\206\367\015\001\001\005\005\000\003
\202\002\001\000\011\263\203\123\131\001\076\225\111\271\361\201
\272\371\166\040\043\265\047\140\164\324\152\231\064\136\154\000
\123\331\237\362\246\261\044\007\104\152\052\306\245\216\170\022
\350\107\331\130\033\023\052\136\171\233\237\012\052\147\246\045
\077\006\151\126\163\303\212\146\110\373\051\201\127\164\006\312
\234\352\050\350\070\147\046\053\361\325\265\077\145\223\370\066
\135\216\215\215\100\040\207\031\352\357\047\300\075\264\071\017
\045\173\150\120\164\125\234\014\131\175\132\075\101\224\045\122
\010\340\107\054\025\061\031\325\277\007\125\306\273\022\265\227
\364\137\203\205\272\161\301\331\154\201\021\166\012\012\260\277
\202\227\367\352\075\372\372\354\055\251\050\224\073\126\335\322
\121\056\256\300\275\010\025\214\167\122\064\226\326\233\254\323
\035\216\141\017\065\173\233\256\071\151\013\142\140\100\040\066
\217\257\373\066\356\055\010\112\035\270\277\233\134\370\352\245
\033\240\163\246\330\370\156\340\063\004\137\150\252\047\207\355
\331\301\220\234\355\275\343\152\065\257\143\337\253\030\331\272
\346\351\112\352\120\212\017\141\223\036\342\055\031\342\060\224
\065\222\135\016\266\007\257\031\200\217\107\220\121\113\056\115
\335\205\342\322\012\122\012\027\232\374\032\260\120\002\345\001
\243\143\067\041\114\104\304\233\121\231\021\016\163\234\006\217
\124\056\247\050\136\104\071\207\126\055\067\275\205\104\224\341
\014\113\054\234\303\222\205\064\141\313\017\270\233\112\103\122
\376\064\072\175\270\351\051\334\166\251\310\060\370\024\161\200
\306\036\066\110\164\042\101\134\207\202\350\030\161\213\101\211
\104\347\176\130\133\250\270\215\023\351\247\154\303\107\355\263
\032\235\142\256\215\202\352\224\236\335\131\020\303\255\335\342
\115\343\061\325\307\354\350\362\260\376\222\036\026\012\032\374
\331\363\370\047\266\311\276\035\264\154\144\220\177\364\344\304
\133\327\067\256\102\016\335\244\032\157\174\210\124\305\026\156
\341\172\150\056\370\072\277\015\244\074\211\073\170\247\116\143
\203\004\041\010\147\215\362\202\111\320\133\375\261\315\017\203
\204\324\076\040\205\367\112\075\053\234\375\052\012\011\115\352
\201\370\021\234

END

```

CKA_NSS_Mozilla_CA_POLICY
CK_BBOOL CK_TRUE
CKA_NSS_SERVER_DISTRUST_AFTER
CK_BBOOL CK_FALSE
CKA_NSS_EMAIL_DISTRUST_AFTER CK_BBOOL CK_FALSE

# Trust for "ePKI Root Certification Authority"
# Issuer: OU=ePKI Root Certification Authority,O="Chunghwa Telecom Co., Ltd.",C=TW
# Serial Number:15:c8:bd:65:47:5c:af:b8:97:00:5e:e4:06:d2:bc:9d
# Subject: OU=ePKI Root Certification Authority,O="Chunghwa Telecom Co., Ltd.",C=TW
# Not Valid Before: Mon Dec 20 02:31:27 2004
# Not Valid After : Wed Dec 20 02:31:27 2034
# Fingerprint (SHA-256):
C0:A6:F4:DC:63:A2:4B:FD:CF:54:EF:2A:6A:08:2A:0A:72:DE:35:80:3E:2F:F5:FF:52:7A:E5:D8:72:06:DF:D5
# Fingerprint (SHA1): 67:65:0D:F1:7E:8E:7E:5B:82:40:A4:F4:56:4B:CF:E2:3D:69:C6:F0
CKA_CLASS CK_OBJECT_CLASS CKO_NSS_TRUST
CKA_TOKEN CK_BBOOL CK_TRUE
CKA_PRIVATE CK_BBOOL CK_FALSE
CKA_MODIFIABLE CK_BBOOL CK_FALSE
CKA_LABEL UTF8 "ePKI Root Certification Authority"
CKA_CERT_SHA1_HASH MULTILINE_OCTAL
\147\145\015\361\176\216\176\133\202\100\244\364\126\113\317\342
\075\151\306\360
END
CKA_CERT_MD5_HASH MULTILINE_OCTAL
\033\056\000\312\046\006\220\075\255\376\157\025\150\323\153\263
END
CKA_ISSUER
MULTILINE_OCTAL
\060\136\061\013\060\011\006\003\125\004\006\023\002\124\127\061
\043\060\041\006\003\125\004\012\014\032\103\150\165\156\147\150
\167\141\040\124\145\154\145\143\157\155\040\103\157\056\054\040
\114\164\144\056\061\052\060\050\006\003\125\004\013\014\041\145
\120\113\111\040\122\157\157\164\040\103\145\162\164\151\146\151
\143\141\164\151\157\156\040\101\165\164\150\157\162\151\164\171
END
CKA_SERIAL_NUMBER MULTILINE_OCTAL
\002\020\025\310\275\145\107\134\257\270\227\000\136\344\006\322
\274\235
END
CKA_TRUST_SERVER_AUTH CK_TRUST CKT_NSS_TRUSTED_DELEGATOR
CKA_TRUST_EMAIL_PROTECTION CK_TRUST CKT_NSS_TRUSTED_DELEGATOR
CKA_TRUST_CODE_SIGNING CK_TRUST CKT_NSS_MUST_VERIFY_TRUST
CKA_TRUST_STEP_UP_APPROVED CK_BBOOL CK_FALSE

#
# Certificate "certSIGN ROOT CA"
#

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# Issuer: OU=certSIGN ROOT CA,O=certSIGN,C=RO
# Serial Number:20:06:05:16:70:02
# Subject: OU=certSIGN ROOT CA,O=certSIGN,C=RO
# Not Valid Before: Tue Jul 04 17:20:04
2006
# Not Valid After : Fri Jul 04 17:20:04 2031
# Fingerprint (SHA-256):
EA:A9:62:C4:FA:4A:6B:AF:EB:E4:15:19:6D:35:1C:CD:88:8D:4F:53:F3:FA:8A:E6:D7:C4:66:A9:4E:60:42:BB
# Fingerprint (SHA1): FA:B7:EE:36:97:26:62:FB:2D:B0:2A:F6:BF:03:FD:E8:7C:4B:2F:9B
CKA_CLASS CK_OBJECT_CLASS CKO_CERTIFICATE
CKA_TOKEN CK_BBOOL CK_TRUE
CKA_PRIVATE CK_BBOOL CK_FALSE
CKA_MODIFIABLE CK_BBOOL CK_FALSE
CKA_LABEL UTF8 "certSIGN ROOT CA"
CKA_CERTIFICATE_TYPE CK_CERTIFICATE_TYPE CKC_X_509
CKA_SUBJECT MULTILINE_OCTAL
\060\073\061\013\060\011\006\003\125\004\006\023\002\122\117\061
\021\060\017\006\003\125\004\012\023\010\143\145\162\164\123\111
\107\116\061\031\060\027\006\003\125\004\013\023\020\143\145\162
\164\123\111\107\116\040\122\117\117\124\040\103\101
END
CKA_ID UTF8 "0"
CKA_ISSUER MULTILINE_OCTAL
\060\073\061\013\060\011\006\003\125\004\006\023\002\122\117\061
\021\060\017\006\003\125\004\012\023\010\143\145\162\164\123\111
\107\116\061\031\060\027\006\003\125\004\013\023\020\143\145\162
\164\123\111\107\116\040\122\117\117\124\040\103\101
END
CKA_SERIAL_NUMBER
MULTILINE_OCTAL
\002\006\040\006\005\026\160\002
END
CKA_VALUE MULTILINE_OCTAL
\060\202\003\070\060\202\002\040\240\003\002\001\002\002\006\040
\006\005\026\160\002\060\015\006\011\052\206\110\206\367\015\001
\001\005\005\000\060\073\061\013\060\011\006\003\125\004\006\023
\002\122\117\061\021\060\017\006\003\125\004\012\023\010\143\145
\162\164\123\111\107\116\061\031\060\027\006\003\125\004\013\023
\020\143\145\162\164\123\111\107\116\040\122\117\117\124\040\103
\101\060\036\027\015\060\066\060\067\060\064\061\067\062\060\060
\064\132\027\015\063\061\060\067\060\064\061\067\062\060\060\064
\132\060\073\061\013\060\011\006\003\125\004\006\023\002\122\117
\061\021\060\017\006\003\125\004\012\023\010\143\145\162\164\123
\111\107\116\061\031\060\027\006\003\125\004\013\023\020\143\145
\162\164\123\111\107\116\040\122\117\117\124\040\103\101\060\202
\001\042\060\015\006\011\052\206\110\206\367\015\001\001\001\005
\000\003\202\001\017\000\060\202\001\012\002\202\001\001\000\267
\063\271\176\310\045\112\216\265\333\264\050\033\252\127\220\350

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\321\042\323\144\272\323\223\350\324\254\206\141\100\152\140\127
\150\124\204\115\274\152\124\002\005\377\337\233\232\052\256\135
\007\217\112\303\050\177\357\373\053\372\171\361\307\255\360\020
\123\044\220\213\146\311\250\210\253\257\132\243\000\351\276\272
\106\356\133\163\173\054\027\202\201\136\142\054\241\002\145\263
\275\305\053\000\176\304\374\003\063\127\015\355\342\372\316\135
\105\326\070\315\065\266\262\301\320\234\201\112\252\344\262\001
\134\035\217\137\231\304\261\255\333\210\041\353\220\010\202\200
\363\060\243\103\346\220\202\256\125\050\111\355\133\327\251\020
\070\016\376\217\114\133\233\106\352\101\365\260\010\164\303\320
\210\063\266\174\327\164\337\334\204\321\103\016\165\071\241\045
\100\050\352\170\313\016\054\056\071\235\214\213\156\026\034\057
\046\202\020\342\343\145\224\012\004\300\136\367\135\133\370\020
\342\320\272\172\113\373\336\067\000\000\032\133\050\343\322\234
\163\076\062\207\230\241\311\121\057\327\336\254\063\263\117\002
\003\001\000\001\243\102\060\100\060\017\006\003\125\035\023\001
\001\377\004\005\060\003\001\001\377\060\016\006\003\125\035\017
\001\001\377\004\004\003\002\001\306\060\035\006\003\125\035\016
\004\026\004\024\340\214\233\333\045\111\263\361\174\206\326\262
\102\207\013\320\153\240\331\344\060\015\006\011\052\206\110\206
\367\015\001\001\005\005\000\003\202\001\001\000\076\322\034\211
\056\065\374\370\165\335\346\177\145\210\364\162\114\311\054\327
\062\116\363\335\031\171\107\275\216\073\133\223\017\120\111\044
\023\153\024\006\162\357\011\323\241\241\343\100\204\311\347\030
\062\164\074\110\156\017\237\113\324\367\036\323\223\206\144\124
\227\143\162\120\325\125\317\372\040\223\002\242\233\303\043\223
\116\026\125\166\240\160\171\155\315\041\037\317\057\055\274\031
\343\210\061\370\131\032\201\011\310\227\246\164\307\140\304\133
\314\127\216\262\165\375\033\002\011\333\131\157\162\223\151\367
\061\101\326\210\070\277\207\262\275\026\171\371\252\344\276\210
\045\335\141\047\043\034\265\061\007\004\066\264\032\220\275\240
\164\161\120\211\155\274\024\343\017\206\256\361\253\076\307\240
\011\314\243\110\321\340\333\144\347\222\265\317\257\162\103\160
\213\371\303\204\074\023\252\176\222\233\127\123\223\372\160\302
\221\016\061\371\233\147\135\351\226\070\136\137\263\163\116\210
\025\147\336\236\166\020\142\040\276\125\151\225\103\000\071\115
\366\356\260\132\116\111\104\124\130\137\102\203

END

CKA_NSS_MOZILLA_CA_POLICY

CK_BBOOL CK_TRUE

CKA_NSS_SERVER_DISTRUST_AFTER CK_BBOOL CK_FALSE

CKA_NSS_EMAIL_DISTRUST_AFTER CK_BBOOL CK_FALSE

Trust for "certSIGN ROOT CA"

Issuer: OU=certSIGN ROOT CA,O=certSIGN,C=RO

Serial Number:20:06:05:16:70:02

Subject: OU=certSIGN ROOT CA,O=certSIGN,C=RO

Not Valid Before: Tue Jul 04 17:20:04 2006

```

# Not Valid After : Fri Jul 04 17:20:04 2031
# Fingerprint (SHA-256):
EA:A9:62:C4:FA:4A:6B:AF:EB:E4:15:19:6D:35:1C:CD:88:8D:4F:53:F3:FA:8A:E6:D7:C4:66:A9:4E:60:42:BB
#
Fingerprint (SHA1): FA:B7:EE:36:97:26:62:FB:2D:B0:2A:F6:BF:03:FD:E8:7C:4B:2F:9B
CKA_CLASS CK_OBJECT_CLASS CKO_NSS_TRUST
CKA_TOKEN CK_BBOOL CK_TRUE
CKA_PRIVATE CK_BBOOL CK_FALSE
CKA_MODIFIABLE CK_BBOOL CK_FALSE
CKA_LABEL UTF8 "certSIGN ROOT CA"
CKA_CERT_SHA1_HASH MULTILINE_OCTAL
\372\267\356\066\227\046\142\373\055\260\052\366\277\003\375\350
\174\113\057\233
END
CKA_CERT_MD5_HASH MULTILINE_OCTAL
\030\230\300\326\351\072\374\371\260\365\014\367\113\001\104\027
END
CKA_ISSUER MULTILINE_OCTAL
\060\073\061\013\060\011\006\003\125\004\006\023\002\122\117\061
\021\060\017\006\003\125\004\012\023\010\143\145\162\164\123\111
\107\116\061\031\060\027\006\003\125\004\013\023\020\143\145\162
\164\123\111\107\116\040\122\117\117\124\040\103\101
END
CKA_SERIAL_NUMBER MULTILINE_OCTAL
\002\006\040\006\005\026\160\002
END
CKA_TRUST_SERVER_AUTH CK_TRUST CKT_NSS_TRUSTED_DELEGATOR
CKA_TRUST_EMAIL_PROTECTION CK_TRUST CKT_NSS_TRUSTED_DELEGATOR
CKA_TRUST_CODE_SIGNING CK_TRUST CKT_NSS_MUST_VERIFY_TRUST
CKA_TRUST_STEP_UP_APPROVED
CK_BBOOL CK_FALSE

#
# Certificate "NetLock Arany (Class Gold) Ftanúsítvány"
#
# Issuer: CN=NetLock Arany (Class Gold) F..tan..s..tv..ny,OU=Tan..s..tv..nykiad..k (Certification
Services),O=NetLock Kft.,L=Budapest,C=HU
# Serial Number:49:41:2c:e4:00:10
# Subject: CN=NetLock Arany (Class Gold) F..tan..s..tv..ny,OU=Tan..s..tv..nykiad..k (Certification
Services),O=NetLock Kft.,L=Budapest,C=HU
# Not Valid Before: Thu Dec 11 15:08:21 2008
# Not Valid After : Wed Dec 06 15:08:21 2028
# Fingerprint (SHA-256):
6C:61:DA:C3:A2:DE:F0:31:50:6B:E0:36:D2:A6:FE:40:19:94:FB:D1:3D:F9:C8:D4:66:59:92:74:C4:46:EC:98
# Fingerprint (SHA1): 06:08:3F:59:3F:15:A1:04:A0:69:A4:6B:A9:03:D0:06:B7:97:09:91
CKA_CLASS CK_OBJECT_CLASS CKO_CERTIFICATE
CKA_TOKEN CK_BBOOL CK_TRUE
CKA_PRIVATE CK_BBOOL CK_FALSE

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```
CKA_MODIFIABLE CK_BBOOL CK_FALSE
CKA_LABEL UTF8 "NetLock Arany (Class Gold) Ftanúsítvány"
CKA_CERTIFICATE_TYPE CK_CERTIFICATE_TYPE CKC_X_509
CKA_SUBJECT MULTILINE_OCTAL
\060\201\247\061\013\060\011\006\003\125\004\006\023\002\110\125
\061\021\060\017\006\003\125\004\007\014\010\102\165\144\141\160
\145\163\164\061\025\060\023\006\003\125\004\012\014\014\116\145
\164\114\157\143\153\040\113\146\164\056\061\067\060\065\006\003
\125\004\013\014\056\124\141\156\303\272\163\303\255\164\166\303
\241\156\171\153\151\141\144\303\263\153\040\050\103\145\162\164
\151\146\151\143\141\164\151\157\156\040\123\145\162\166\151\143
\145\163\051\061\065\060\063\006\003\125\004\003\014\054\116\145
\164\114\157\143\153\040\101\162\141\156\171\040\050\103\154\141
\163\163\040\107\157\154\144\051\040\106\305\221\164\141\156\303
\272\163\303\255\164\166\303\241\156\171
END
CKA_ID
UTF8 "0"
CKA_ISSUER MULTILINE_OCTAL
\060\201\247\061\013\060\011\006\003\125\004\006\023\002\110\125
\061\021\060\017\006\003\125\004\007\014\010\102\165\144\141\160
\145\163\164\061\025\060\023\006\003\125\004\012\014\014\116\145
\164\114\157\143\153\040\113\146\164\056\061\067\060\065\006\003
\125\004\013\014\056\124\141\156\303\272\163\303\255\164\166\303
\241\156\171\153\151\141\144\303\263\153\040\050\103\145\162\164
\151\146\151\143\141\164\151\157\156\040\123\145\162\166\151\143
\145\163\051\061\065\060\063\006\003\125\004\003\014\054\116\145
\164\114\157\143\153\040\101\162\141\156\171\040\050\103\154\141
\163\163\040\107\157\154\144\051\040\106\305\221\164\141\156\303
\272\163\303\255\164\166\303\241\156\171
END
CKA_SERIAL_NUMBER
MULTILINE_OCTAL
\002\006\111\101\054\344\000\020
END
CKA_VALUE MULTILINE_OCTAL
\060\202\004\025\060\202\002\375\240\003\002\001\002\002\006\111
\101\054\344\000\020\060\015\006\011\052\206\110\206\367\015\001
\001\013\005\000\060\201\247\061\013\060\011\006\003\125\004\006
\023\002\110\125\061\021\060\017\006\003\125\004\007\014\010\102
\165\144\141\160\145\163\164\061\025\060\023\006\003\125\004\012
\014\014\116\145\164\114\157\143\153\040\113\146\164\056\061\067
\060\065\006\003\125\004\013\014\056\124\141\156\303\272\163\303
\255\164\166\303\241\156\171\153\151\141\144\303\263\153\040\050
\103\145\162\164\151\146\151\143\141\164\151\157\156\040\123\145
\162\166\151\143\145\163\051\061\065\060\063\006\003\125\004\003
\014\054\116\145\164\114\157\143\153\040\101\162\141\156\171\040
\050\103\154\141\163\163\040\107\157\154\144\051\040\106\305\221
```

\164\141\156\303\272\163\303\255\164\166\303\241\156\171\060\036
\027\015\060\070\061\062\061\061\061\065\060\070\062\061\132\027
\015\062\070\061\062\060\066\061\065\060\070\062\061\132\060\201
\247\061\013\060\011\006\003\125\004\006\023\002\110\125\061\021
\060\017\006\003\125\004\007\014\010\102\165\144\141\160\145\163
\164\061\025\060\023\006\003\125\004\012\014\014\116\145\164\114
\157\143\153\040\113\146\164\056\061\067\060\065\006\003\125\004
\013\014\056\124\141\156\303\272\163\303\255\164\166\303\241\156
\171\153\151\141\144\303\263\153\040\050\103\145\162\164\151\146
\151\143\141\164\151\157\156\040\123\145\162\166\151\143\145\163
\051\061\065\060\063\006\003\125\004\003\014\054\116\145\164\114
\157\143\153\040\101\162\141\156\171\040\050\103\154\141\163\163
\040\107\157\154\144\051\040\106\305\221\164\141\156\303\272\163
\303\255\164\166\303\241\156\171\060\202\001\042\060\015\006\011
\052\206\110\206\367\015\001\001\001\005\000\003\202\001\017\000
\060\202\001\012\002\202\001\001\000\304\044\136\163\276\113\155
\024\303\241\364\343\227\220\156\322\060\105\036\074\356\147\331
\144\340\032\212\177\312\060\312\203\343\040\301\343\364\072\323
\224\137\032\174\133\155\277\060\117\204\047\366\237\037\111\274
\306\231\012\220\362\017\365\177\103\204\067\143\121\213\172\245
\160\374\172\130\315\216\233\355\303\106\154\204\160\135\332\363
\001\220\043\374\116\060\251\176\341\047\143\347\355\144\074\240
\270\311\063\143\376\026\220\377\260\270\375\327\250\300\300\224
\103\013\266\325\131\246\236\126\320\044\037\160\171\257\333\071
\124\015\145\165\331\025\101\224\001\257\136\354\366\215\361\377
\255\144\376\040\232\327\134\353\376\246\037\010\144\243\213\166
\125\255\036\073\050\140\056\207\045\350\252\257\037\306\144\106
\040\267\160\177\074\336\110\333\226\123\267\071\167\344\032\342
\307\026\204\166\227\133\057\273\031\025\205\370\151\205\365\231
\247\251\362\064\247\251\266\246\003\374\157\206\075\124\174\166
\004\233\153\371\100\135\000\064\307\056\231\165\235\345\210\003
\252\115\370\003\322\102\166\300\033\002\003\000\250\213\243\105
\060\103\060\022\006\003\125\035\023\001\001\377\004\010\060\006
\001\001\377\002\001\004\060\016\006\003\125\035\017\001\001\377
\004\004\003\002\001\006\060\035\006\003\125\035\016\004\026\004
\024\314\372\147\223\360\266\270\320\245\300\036\363\123\375\214
\123\337\203\327\226\060\015\006\011\052\206\110\206\367\015\001
\001\013\005\000\003\202\001\001\000\253\177\356\034\026\251\234
\074\121\000\240\300\021\010\005\247\231\346\157\001\210\124\141
\156\361\271\030\255\112\255\376\201\100\043\224\057\373\165\174
\057\050\113\142\044\201\202\013\365\141\361\034\156\270\141\070
\353\201\372\142\241\073\132\142\323\224\145\304\341\346\155\202
\370\057\045\160\262\041\046\301\162\121\037\214\054\303\204\220
\303\132\217\272\317\364\247\145\245\353\230\321\373\005\262\106
\165\025\043\152\157\205\143\060\200\360\325\236\037\051\034\302
\154\260\120\131\135\220\133\073\250\015\060\317\277\175\177\316
\361\235\203\275\311\106\156\040\246\371\141\121\272\041\057\173
\276\245\025\143\241\324\225\207\361\236\271\363\211\363\075\205

```
\270\270\333\276\265\271\051\371\332\067\005\000\111\224\003\204
\104\347\277\103\061\317\165\213\045\321\364\246\144\365\222\366
\253\005\353\075\351\245\013\066\142\332\314\006\137\066\213\266
\136\061\270\052\373\136\366\161\337\104\046\236\304\346\015\221
\264\056\165\225\200\121\152\113\060\246\260\142\241\223\361\233
\330\316\304\143\165\077\131\107\261
```

END

CKA_NSS_Mozilla_CA_POLICY

CK_BBOOL CK_TRUE

CKA_NSS_SERVER_DISTRUST_AFTER CK_BBOOL CK_FALSE

CKA_NSS_EMAIL_DISTRUST_AFTER CK_BBOOL CK_FALSE

Trust for "NetLock Arany (Class Gold) Ftanúsítvány"

Issuer:

CN=NetLock Arany (Class Gold) F..tan..s..tv..ny,OU=Tan..s..tv..nykiad..k (Certification Services),O=NetLock Kft.,L=Budapest,C=HU

Serial Number:49:41:2c:e4:00:10

Subject: CN=NetLock Arany (Class Gold) F..tan..s..tv..ny,OU=Tan..s..tv..nykiad..k (Certification Services),O=NetLock Kft.,L=Budapest,C=HU

Not Valid Before: Thu Dec 11 15:08:21 2008

Not Valid After : Wed Dec 06 15:08:21 2028

Fingerprint (SHA-256):

6C:61:DA:C3:A2:DE:F0:31:50:6B:E0:36:D2:A6:FE:40:19:94:FB:D1:3D:F9:C8:D4:66:59:92:74:C4:46:EC:98

Fingerprint (SHA1): 06:08:3F:59:3F:15:A1:04:A0:69:A4:6B:A9:03:D0:06:B7:97:09:91

CKA_CLASS CK_OBJECT_CLASS CKO_NSS_TRUST

CKA_TOKEN CK_BBOOL CK_TRUE

CKA_PRIVATE CK_BBOOL CK_FALSE

CKA_MODIFIABLE CK_BBOOL CK_FALSE

CKA_LABEL UTF8 "NetLock Arany (Class Gold) Ftanúsítvány"

CKA_CERT_SHA1_HASH MULTILINE_OCTAL

```
\006\010\077\131\077\025\241\004\240\151\244\153\251\003\320\006
\267\227\011\221
```

END

CKA_CERT_MD5_HASH MULTILINE_OCTAL

```
\305\241\267\377\163\335\326\327\064\062\030\337\374\074\255\210
END
```

CKA_ISSUER

MULTILINE_OCTAL

```
\060\201\247\061\013\060\011\006\003\125\004\006\023\002\110\125
\061\021\060\017\006\003\125\004\007\014\010\102\165\144\141\160
\145\163\164\061\025\060\023\006\003\125\004\012\014\014\116\145
\164\114\157\143\153\040\113\146\164\056\061\067\060\065\006\003
\125\004\013\014\056\124\141\156\303\272\163\303\255\164\166\303
\241\156\171\153\151\141\144\303\263\153\040\050\103\145\162\164
\151\146\151\143\141\164\151\157\156\040\123\145\162\166\151\143
\145\163\051\061\065\060\063\006\003\125\004\003\014\054\116\145
\164\114\157\143\153\040\101\162\141\156\171\040\050\103\154\141
\163\163\040\107\157\154\144\051\040\106\305\221\164\141\156\303
```

```

\272\163\303\255\164\166\303\241\156\171
END
CKA_SERIAL_NUMBER MULTILINE_OCTAL
\002\006\111\101\054\344\000\020
END
CKA_TRUST_SERVER_AUTH CK_TRUST CKT_NSS_TRUSTED_DELEGATOR
CKA_TRUST_EMAIL_PROTECTION CK_TRUST CKT_NSS_TRUSTED_DELEGATOR
CKA_TRUST_CODE_SIGNING CK_TRUST CKT_NSS_MUST_VERIFY_TRUST
CKA_TRUST_STEP_UP_APPROVED
CK_BBOOL CK_FALSE

#
# Certificate "Hongkong Post Root CA 1"
#
# Issuer: CN=Hongkong Post Root CA 1,O=Hongkong Post,C=HK
# Serial Number: 1000 (0x3e8)
# Subject: CN=Hongkong Post Root CA 1,O=Hongkong Post,C=HK
# Not Valid Before: Thu May 15 05:13:14 2003
# Not Valid After : Mon May 15 04:52:29 2023
# Fingerprint (SHA-256):
F9:E6:7D:33:6C:51:00:2A:C0:54:C6:32:02:2D:66:DD:A2:E7:E3:FF:F1:0A:D0:61:ED:31:D8:BB:B4:10:CF:B2
# Fingerprint (SHA1): D6:DA:A8:20:8D:09:D2:15:4D:24:B5:2F:CB:34:6E:B2:58:B2:8A:58
CKA_CLASS CK_OBJECT_CLASS CKO_CERTIFICATE
CKA_TOKEN CK_BBOOL CK_TRUE
CKA_PRIVATE CK_BBOOL CK_FALSE
CKA_MODIFIABLE CK_BBOOL CK_FALSE
CKA_LABEL UTF8 "Hongkong Post Root CA 1"
CKA_CERTIFICATE_TYPE CK_CERTIFICATE_TYPE CKC_X_509
CKA_SUBJECT MULTILINE_OCTAL
\060\107\061\013\060\011\006\003\125\004\006\023\002\110\113\061
\026\060\024\006\003\125\004\012\023\015\110\157\156\147\153\157
\156\147\040\120\157\163\164\061\040\060\036\006\003\125\004\003
\023\027\110\157\156\147\153\157\156\147\040\120\157\163\164\040
\122\157\157\164\040\103\101\040\061
END
CKA_ID
UTF8 "0"
CKA_ISSUER MULTILINE_OCTAL
\060\107\061\013\060\011\006\003\125\004\006\023\002\110\113\061
\026\060\024\006\003\125\004\012\023\015\110\157\156\147\153\157
\156\147\040\120\157\163\164\061\040\060\036\006\003\125\004\003
\023\027\110\157\156\147\153\157\156\147\040\120\157\163\164\040
\122\157\157\164\040\103\101\040\061
END
CKA_SERIAL_NUMBER MULTILINE_OCTAL
\002\002\003\350
END
CKA_VALUE MULTILINE_OCTAL

```

\060\202\003\060\060\202\002\030\240\003\002\001\002\002\002\003
\350\060\015\006\011\052\206\110\206\367\015\001\001\005\005\000
\060\107\061\013\060\011\006\003\125\004\006\023\002\110\113\061
\026\060\024\006\003\125\004\012\023\015\110\157\156\147\153\157
\156\147\040\120\157\163\164\061\040\060\036\006\003\125\004\003
\023\027\110\157\156\147\153\157\156\147\040\120\157\163\164\040
\122\157\157\164\040\103\101\040\061\060\036\027\015\060\063\060
\065\061\065\060\065\061\063\061\064\132\027\015\062\063\060\065
\061\065\060\064\065\062\062\071\132\060\107\061\013\060\011\006
\003\125\004\006\023\002\110\113\061\026\060\024\006\003\125\004
\012\023\015\110\157\156\147\153\157\156\147\040\120\157\163\164
\061\040\060\036\006\003\125\004\003\023\027\110\157\156\147\153
\157\156\147\040\120\157\163\164\040\122\157\157\164\040\103\101
\040\061\060\202\001\042\060\015\006\011\052\206\110\206\367\015
\001\001\001\005\000\003\202\001\017\000\060\202\001\012\002\202
\001\001\000\254\377\070\266\351\146\002\111\343\242\264\341\220
\371\100\217\171\371\342\275\171\376\002\275\356\044\222\035\042
\366\332\205\162\151\376\327\077\011\324\335\221\265\002\234\320
\215\132\341\125\303\120\206\271\051\046\302\343\331\240\361\151
\003\050\040\200\105\042\055\126\247\073\124\225\126\042\131\037
\050\337\037\040\075\155\242\066\276\043\240\261\156\265\261\047
\077\071\123\011\352\253\152\350\164\262\302\145\134\216\277\174
\303\170\204\315\236\026\374\365\056\117\040\052\010\237\167\363
\305\036\304\232\122\146\036\110\136\343\020\006\217\042\230\341
\145\216\033\135\043\146\073\270\245\062\121\310\206\252\241\251
\236\177\166\224\302\246\154\267\101\360\325\310\006\070\346\324
\014\342\363\073\114\155\120\214\304\203\047\301\023\204\131\075
\236\165\164\266\330\002\136\072\220\172\300\102\066\162\354\152
\115\334\357\304\000\337\023\030\127\137\046\170\310\326\012\171
\167\277\367\257\267\166\271\245\013\204\027\135\020\352\157\341
\253\225\021\137\155\074\243\134\115\203\133\362\263\031\212\200
\213\013\207\002\003\001\000\001\243\046\060\044\060\022\006\003
\125\035\023\001\001\377\004\010\060\006\001\001\377\002\001\003
\060\016\006\003\125\035\017\001\001\377\004\004\003\002\001\306
\060\015\006\011\052\206\110\206\367\015\001\001\005\005\000\003
\202\001\001\000\016\106\325\074\256\342\207\331\136\201\213\002
\230\101\010\214\114\274\332\333\356\047\033\202\347\152\105\354
\026\213\117\205\240\363\262\160\275\132\226\272\312\156\155\356
\106\213\156\347\052\056\226\263\031\063\353\264\237\250\262\067
\356\230\250\227\266\056\266\147\047\324\246\111\375\034\223\145
\166\236\102\057\334\042\154\232\117\362\132\025\071\261\161\327
\053\121\350\155\034\230\300\331\052\364\241\202\173\325\311\101
\242\043\001\164\070\125\213\017\271\056\147\242\040\004\067\332
\234\013\323\027\041\340\217\227\171\064\157\204\110\002\040\063
\033\346\064\104\237\221\160\364\200\136\204\103\302\051\322\154
\022\024\344\141\215\254\020\220\236\204\120\273\360\226\157\105
\237\212\363\312\154\117\372\021\072\025\025\106\303\315\037\203
\133\055\101\022\355\120\147\101\023\075\041\253\224\212\252\116

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\174\301\261\373\247\326\265\047\057\227\253\156\340\035\342\321
\034\054\037\104\342\374\276\221\241\234\373\326\051\123\163\206
\237\123\330\103\016\135\326\143\202\161\035\200\164\312\366\342
\002\153\331\132
END
CKA_NSS_MOZILLA_CA_POLICY
CK_BBOOL CK_TRUE
CKA_NSS_SERVER_DISTRUST_AFTER CK_BBOOL CK_FALSE
CKA_NSS_EMAIL_DISTRUST_AFTER CK_BBOOL CK_FALSE

# Trust for "Hongkong Post Root CA
1"
# Issuer: CN=Hongkong Post Root CA 1,O=Hongkong Post,C=HK
# Serial Number: 1000 (0x3e8)
# Subject: CN=Hongkong Post Root CA 1,O=Hongkong Post,C=HK
# Not Valid Before: Thu May 15 05:13:14 2003
# Not Valid After : Mon May 15 04:52:29 2023
# Fingerprint (SHA-256):
F9:E6:7D:33:6C:51:00:2A:C0:54:C6:32:02:2D:66:DD:A2:E7:E3:FF:F1:0A:D0:61:ED:31:D8:BB:B4:10:CF:B2
# Fingerprint (SHA1): D6:DA:A8:20:8D:09:D2:15:4D:24:B5:2F:CB:34:6E:B2:58:B2:8A:58
CKA_CLASS CK_OBJECT_CLASS CKO_NSS_TRUST
CKA_TOKEN CK_BBOOL CK_TRUE
CKA_PRIVATE CK_BBOOL CK_FALSE
CKA_MODIFIABLE CK_BBOOL CK_FALSE
CKA_LABEL UTF8 "Hongkong Post Root CA 1"
CKA_CERT_SHA1_HASH MULTILINE_OCTAL
\326\332\250\040\215\011\322\025\115\044\265\057\313\064\156\262
\130\262\212\130
END
CKA_CERT_MD5_HASH MULTILINE_OCTAL
\250\015\157\071\170\271\103\155\167\102\155\230\132\314\043\312
END
CKA_ISSUER MULTILINE_OCTAL
\060\107\061\013\060\011\006\003\125\004\006\023\002\110\113\061
\026\060\024\006\003\125\004\012\023\015\110\157\156\147\153\157
\156\147\040\120\157\163\164\061\040\060\036\006\003\125\004\003
\023\027\110\157\156\147\153\157\156\147\040\120\157\163\164\040
\122\157\157\164\040\103\101\040\061
END
CKA_SERIAL_NUMBER
MULTILINE_OCTAL
\002\002\003\350
END
CKA_TRUST_SERVER_AUTH CK_TRUST CKT_NSS_TRUSTED_DELEGATOR
CKA_TRUST_EMAIL_PROTECTION CK_TRUST CKT_NSS_MUST_VERIFY_TRUST
CKA_TRUST_CODE_SIGNING CK_TRUST CKT_NSS_MUST_VERIFY_TRUST
CKA_TRUST_STEP_UP_APPROVED CK_BBOOL CK_FALSE

```



```

#
# Certificate "SecureSign RootCA11"
#
# Issuer: CN=SecureSign RootCA11,O="Japan Certification Services, Inc.",C=JP
# Serial Number: 1 (0x1)
# Subject: CN=SecureSign RootCA11,O="Japan Certification Services, Inc.",C=JP
# Not Valid Before: Wed Apr 08 04:56:47 2009
# Not Valid After : Sun Apr 08 04:56:47 2029
# Fingerprint (SHA-256):
BF:0F:EE:FB:9E:3A:58:1A:D5:F9:E9:DB:75:89:98:57:43:D2:61:08:5C:4D:31:4F:6F:5D:72:59:AA:42:16:12
# Fingerprint (SHA1): 3B:C4:9F:48:F8:F3:73:A0:9C:1E:BD:F8:5B:B1:C3:65:C7:D8:11:B3
CKA_CLASS CK_OBJECT_CLASS CKO_CERTIFICATE
CKA_TOKEN
CK_BBOOL CK_TRUE
CKA_PRIVATE CK_BBOOL CK_FALSE
CKA_MODIFIABLE CK_BBOOL CK_FALSE
CKA_LABEL UTF8 "SecureSign RootCA11"
CKA_CERTIFICATE_TYPE CK_CERTIFICATE_TYPE CKC_X_509
CKA_SUBJECT MULTILINE_OCTAL
\060\130\061\013\060\011\006\003\125\004\006\023\002\112\120\061
\053\060\051\006\003\125\004\012\023\042\112\141\160\141\156\040
\103\145\162\164\151\146\151\143\141\164\151\157\156\040\123\145
\162\166\151\143\145\163\054\040\111\156\143\056\061\034\060\032
\006\003\125\004\003\023\023\123\145\143\165\162\145\123\151\147
\156\040\122\157\157\164\103\101\061\061
END
CKA_ID UTF8 "0"
CKA_ISSUER MULTILINE_OCTAL
\060\130\061\013\060\011\006\003\125\004\006\023\002\112\120\061
\053\060\051\006\003\125\004\012\023\042\112\141\160\141\156\040
\103\145\162\164\151\146\151\143\141\164\151\157\156\040\123\145
\162\166\151\143\145\163\054\040\111\156\143\056\061\034\060\032
\006\003\125\004\003\023\023\123\145\143\165\162\145\123\151\147
\156\040\122\157\157\164\103\101\061\061
END
CKA_SERIAL_NUMBER
MULTILINE_OCTAL
\002\001\001
END
CKA_VALUE MULTILINE_OCTAL
\060\202\003\155\060\202\002\125\240\003\002\001\002\002\001\001
\060\015\006\011\052\206\110\206\367\015\001\001\005\005\000\060
\130\061\013\060\011\006\003\125\004\006\023\002\112\120\061\053
\060\051\006\003\125\004\012\023\042\112\141\160\141\156\040\103
\145\162\164\151\146\151\143\141\164\151\157\156\040\123\145\162
\166\151\143\145\163\054\040\111\156\143\056\061\034\060\032\006
\003\125\004\003\023\023\123\145\143\165\162\145\123\151\147\156
\040\122\157\157\164\103\101\061\061\060\036\027\015\060\071\060

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\064\060\070\060\064\065\066\064\067\132\027\015\062\071\060\064
\060\070\060\064\065\066\064\067\132\060\130\061\013\060\011\006
\003\125\004\006\023\002\112\120\061\053\060\051\006\003\125\004
\012\023\042\112\141\160\141\156\040\103\145\162\164\151\146\151
\143\141\164\151\157\156\040\123\145\162\166\151\143\145\163\054
\040\111\156\143\056\061\034\060\032\006\003\125\004\003\023\023
\123\145\143\165\162\145\123\151\147\156\040\122\157\157\164\103
\101\061\061\060\202\001\042\060\015\006\011\052\206\110\206\367
\015\001\001\001\005\000\003\202\001\017\000\060\202\001\012\002
\202\001\001\000\375\167\252\245\034\220\005\073\313\114\233\063
\213\132\024\105\244\347\220\026\321\337\127\322\041\020\244\027
\375\337\254\326\037\247\344\333\174\367\354\337\270\003\332\224
\130\375\135\162\174\214\077\137\001\147\164\025\226\343\002\074
\207\333\256\313\001\216\302\363\146\306\205\105\364\002\306\072
\265\142\262\257\372\234\277\244\346\324\200\060\230\363\015\266
\223\217\251\324\330\066\362\260\374\212\312\054\241\025\063\225
\061\332\300\033\362\356\142\231\206\143\077\277\335\223\052\203
\250\166\271\023\037\267\316\116\102\205\217\042\347\056\032\362
\225\011\262\005\265\104\116\167\241\040\275\251\362\116\012\175
\120\255\365\005\015\105\117\106\161\375\050\076\123\373\004\330
\055\327\145\035\112\033\372\317\073\260\061\232\065\156\310\213
\006\323\000\221\362\224\010\145\114\261\064\006\000\172\211\342
\360\307\003\131\317\325\326\350\247\062\263\346\230\100\206\305
\315\047\022\213\314\173\316\267\021\074\142\140\007\043\076\053
\100\156\224\200\011\155\266\263\157\167\157\065\010\120\373\002
\207\305\076\211\002\003\001\000\001\243\102\060\100\060\035\006
\003\125\035\016\004\026\004\024\133\370\115\117\262\245\206\324
\072\322\361\143\232\240\276\011\366\127\267\336\060\016\006\003
\125\035\017\001\001\377\004\004\003\002\001\006\060\017\006\003
\125\035\023\001\001\377\004\005\060\003\001\001\377\060\015\006
\011\052\206\110\206\367\015\001\001\005\005\000\003\202\001\001
\000\240\241\070\026\146\056\247\126\037\041\234\006\372\035\355
\271\042\305\070\046\330\116\117\354\243\177\171\336\106\041\241
\207\167\217\007\010\232\262\244\305\257\017\062\230\013\174\146
\051\266\233\175\045\122\111\103\253\114\056\053\156\172\160\257
\026\016\343\002\154\373\102\346\030\235\105\330\125\310\350\073
\335\347\341\364\056\013\034\064\134\154\130\112\373\214\210\120
\137\225\034\277\355\253\042\265\145\263\205\272\236\017\270\255
\345\172\033\212\120\072\035\275\015\274\173\124\120\013\271\102
\257\125\240\030\201\255\145\231\357\276\344\234\277\304\205\253
\101\262\124\157\334\045\315\355\170\342\216\014\215\011\111\335
\143\173\132\151\226\002\041\250\275\122\131\351\175\065\313\310
\122\312\177\201\376\331\153\323\367\021\355\045\337\370\347\371
\244\372\162\227\204\123\015\245\320\062\030\121\166\131\024\154
\017\353\354\137\200\214\165\103\203\303\205\230\377\114\236\055
\015\344\167\203\223\116\265\226\007\213\050\023\233\214\031\215
\101\047\111\100\356\336\346\043\104\071\334\241\042\326\272\003
\362

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END
CKA_NSS_Mozilla_CA_POLICY
CK_BBOOL CK_TRUE
CKA_NSS_SERVER_DISTRUST_AFTER CK_BBOOL CK_FALSE
CKA_NSS_EMAIL_DISTRUST_AFTER CK_BBOOL CK_FALSE

# Trust for "SecureSign RootCA11"
# Issuer: CN=SecureSign RootCA11,O="Japan Certification Services, Inc.",C=JP
# Serial Number: 1 (0x1)
# Subject: CN=SecureSign RootCA11,O="Japan Certification Services, Inc.",C=JP
#
Not Valid Before: Wed Apr 08 04:56:47 2009
# Not Valid After : Sun Apr 08 04:56:47 2029
# Fingerprint (SHA-256):
BF:0F:EE:FB:9E:3A:58:1A:D5:F9:E9:DB:75:89:98:57:43:D2:61:08:5C:4D:31:4F:6F:5D:72:59:AA:42:16:12
# Fingerprint (SHA1): 3B:C4:9F:48:F8:F3:A0:9C:1E:BD:F8:5B:B1:C3:65:C7:D8:11:B3
CKA_CLASS CK_OBJECT_CLASS CKO_NSS_TRUST
CKA_TOKEN CK_BBOOL CK_TRUE
CKA_PRIVATE CK_BBOOL CK_FALSE
CKA_MODIFIABLE CK_BBOOL CK_FALSE
CKA_LABEL UTF8 "SecureSign RootCA11"
CKA_CERT_SHA1_HASH MULTILINE_OCTAL
\073\304\237\110\370\363\163\240\234\036\275\370\133\261\303\145
\307\330\021\263
END
CKA_CERT_MD5_HASH MULTILINE_OCTAL
\267\122\164\342\222\264\200\223\362\165\344\314\327\362\352\046
END
CKA_ISSUER MULTILINE_OCTAL
\060\130\061\013\060\011\006\003\125\004\006\023\002\112\120\061
\053\060\051\006\003\125\004\012\023\042\112\141\160\141\156\040
\103\145\162\164\151\146\151\143\141\164\151\157\156\040\123\145
\162\166\151\143\145\163\054\040\111\156\143\056\061\034\060\032
\006\003\125\004\003\023\023\123\145\143\165\162\145\123\151\147
\156\040\122\157\157\164\103\101\061\061
END
CKA_SERIAL_NUMBER
MULTILINE_OCTAL
\002\001\001
END
CKA_TRUST_SERVER_AUTH CK_TRUST CKT_NSS_TRUSTED_DELEGATOR
CKA_TRUST_EMAIL_PROTECTION CK_TRUST CKT_NSS_MUST_VERIFY_TRUST
CKA_TRUST_CODE_SIGNING CK_TRUST CKT_NSS_MUST_VERIFY_TRUST
CKA_TRUST_STEP_UP_APPROVED CK_BBOOL CK_FALSE

#
# Certificate "Microsec e-Szigno Root CA 2009"
#

```

```
# Issuer: E=info@e-szigno.hu,CN=Microsec e-Szigno Root CA 2009,O=Microsec Ltd.,L=Budapest,C=HU
# Serial Number:00:c2:7e:43:04:4e:47:3f:19
# Subject: E=info@e-szigno.hu,CN=Microsec e-Szigno Root CA 2009,O=Microsec Ltd.,L=Budapest,C=HU
# Not Valid Before: Tue Jun 16 11:30:18 2009
# Not Valid After : Sun Dec 30 11:30:18 2029
# Fingerprint (SHA-256):
3C:5F:81:FE:A5:FA:B8:2C:64:BF:A2:EA:EC:AF:CD:E8:E0:77:FC:86:20:A7:CA:E5:37:16:3D:F3:6E:DB:F3:78
# Fingerprint (SHA1): 89:DF:74:FE:5C:F4:0F:4A:80:F9:E3:37:7D:54:DA:91:E1:01:31:8E
CKA_CLASS CK_OBJECT_CLASS CKO_CERTIFICATE
CKA_TOKEN CK_BBOOL CK_TRUE
CKA_PRIVATE
CK_BBOOL CK_FALSE
CKA_MODIFIABLE CK_BBOOL CK_FALSE
CKA_LABEL UTF8 "Microsec e-Szigno Root CA 2009"
CKA_CERTIFICATE_TYPE CK_CERTIFICATE_TYPE CKC_X_509
CKA_SUBJECT MULTILINE_OCTAL
\060\201\202\061\013\060\011\006\003\125\004\006\023\002\110\125
\061\021\060\017\006\003\125\004\007\014\010\102\165\144\141\160
\145\163\164\061\026\060\024\006\003\125\004\012\014\015\115\151
\143\162\157\163\145\143\040\114\164\144\056\061\047\060\045\006
\003\125\004\003\014\036\115\151\143\162\157\163\145\143\040\145
\055\123\172\151\147\156\157\040\122\157\157\164\040\103\101\040
\062\060\060\071\061\037\060\035\006\011\052\206\110\206\367\015
\001\011\001\026\020\151\156\146\157\100\145\055\163\172\151\147
\156\157\056\150\165
END
CKA_ID UTF8 "0"
CKA_ISSUER MULTILINE_OCTAL
\060\201\202\061\013\060\011\006\003\125\004\006\023\002\110\125
\061\021\060\017\006\003\125\004\007\014\010\102\165\144\141\160
\145\163\164\061\026\060\024\006\003\125\004\012\014\015\115\151
\143\162\157\163\145\143\040\114\164\144\056\061\047\060\045\006
\003\125\004\003\014\036\115\151\143\162\157\163\145\143\040\145
\055\123\172\151\147\156\157\040\122\157\157\164\040\103\101\040
\062\060\060\071\061\037\060\035\006\011\052\206\110\206\367\015
\001\011\001\026\020\151\156\146\157\100\145\055\163\172\151\147
\156\157\056\150\165
END
CKA_SERIAL_NUMBER
MULTILINE_OCTAL
\002\011\000\302\176\103\004\116\107\077\031
END
CKA_VALUE MULTILINE_OCTAL
\060\202\004\012\060\202\002\362\240\003\002\001\002\002\011\000
\302\176\103\004\116\107\077\031\060\015\006\011\052\206\110\206
\367\015\001\001\013\005\000\060\201\202\061\013\060\011\006\003
\125\004\006\023\002\110\125\061\021\060\017\006\003\125\004\007
\014\010\102\165\144\141\160\145\163\164\061\026\060\024\006\003
```

\125\004\012\014\015\115\151\143\162\157\163\145\143\040\114\164
\144\056\061\047\060\045\006\003\125\004\003\014\036\115\151\143
\162\157\163\145\143\040\145\055\123\172\151\147\156\157\040\122
\157\157\164\040\103\101\040\062\060\060\071\061\037\060\035\006
\011\052\206\110\206\367\015\001\011\001\026\020\151\156\146\157
\100\145\055\163\172\151\147\156\157\056\150\165\060\036\027\015
\060\071\060\066\061\066\061\061\063\060\061\070\132\027\015\062
\071\061\062\063\060\061\061\063\060\061\070\132\060\201\202\061
\013\060\011\006\003\125\004\006\023\002\110\125\061\021\060\017
\006\003\125\004\007\014\010\102\165\144\141\160\145\163\164\061
\026\060\024\006\003\125\004\012\014\015\115\151\143\162\157\163
\145\143\040\114\164\144\056\061\047\060\045\006\003\125\004\003
\014\036\115\151\143\162\157\163\145\143\040\145\055\123\172\151
\147\156\157\040\122\157\157\164\040\103\101\040\062\060\060\071
\061\037\060\035\006\011\052\206\110\206\367\015\001\011\001\026
\020\151\156\146\157\100\145\055\163\172\151\147\156\157\056\150
\165\060\202\001\042\060\015\006\011\052\206\110\206\367\015\001
\001\001\005\000\003\202\001\017\000\060\202\001\012\002\202\001
\001\000\351\370\217\363\143\255\332\206\330\247\340\102\373\317
\221\336\246\046\370\231\245\143\160\255\233\256\312\063\100\175
\155\226\156\241\016\104\356\341\023\235\224\102\122\232\275\165
\205\164\054\250\016\035\223\266\030\267\214\054\250\317\373\134
\161\271\332\354\376\350\176\217\344\057\035\262\250\165\207\330
\267\241\345\073\317\231\112\106\320\203\031\175\300\241\022\034
\225\155\112\364\330\307\245\115\063\056\205\071\100\165\176\024
\174\200\022\230\120\307\101\147\270\240\200\141\124\246\154\116
\037\340\235\016\007\351\311\272\063\347\376\300\125\050\054\002
\200\247\031\365\236\334\125\123\003\227\173\007\110\377\231\373
\067\212\044\304\131\314\120\020\143\216\252\251\032\260\204\032
\206\371\137\273\261\120\156\244\321\012\314\325\161\176\037\247
\033\174\365\123\156\042\137\313\053\346\324\174\135\256\326\302
\306\114\345\005\001\331\355\127\374\301\043\171\374\372\310\044
\203\225\363\265\152\121\001\320\167\326\351\022\241\371\032\203
\373\202\033\271\260\227\364\166\006\063\103\111\240\377\013\265
\372\265\002\003\001\000\001\243\201\200\060\176\060\017\006\003
\125\035\023\001\001\377\004\005\060\003\001\001\377\060\016\006
\003\125\035\017\001\001\377\004\004\003\002\001\006\060\035\006
\003\125\035\016\004\026\004\024\313\017\306\337\102\103\314\075
\313\265\110\043\241\032\172\246\052\273\064\150\060\037\006\003
\125\035\043\004\030\060\026\200\024\313\017\306\337\102\103\314
\075\313\265\110\043\241\032\172\246\052\273\064\150\060\033\006
\003\125\035\021\004\024\060\022\201\020\151\156\146\157\100\145
\055\163\172\151\147\156\157\056\150\165\060\015\006\011\052\206
\110\206\367\015\001\001\013\005\000\003\202\001\001\000\311\321
\016\136\056\325\314\263\174\076\313\374\075\377\015\050\225\223
\004\310\277\332\315\171\270\103\220\360\244\276\357\362\357\041
\230\274\324\324\135\006\366\356\102\354\060\154\240\252\251\312
\361\257\212\372\077\013\163\152\076\352\056\100\176\037\256\124

\141\171\353\056\010\067\327\043\363\214\237\276\035\261\341\244
\165\333\240\342\124\024\261\272\034\051\244\030\366\022\272\242
\024\024\343\061\065\310\100\377\267\340\005\166\127\301\034\131
\362\370\277\344\355\045\142\134\204\360\176\176\037\263\276\371
\267\041\021\314\003\001\126\160\247\020\222\036\033\064\201\036
\255\234\032\303\004\074\355\002\141\326\036\006\363\137\072\207
\362\053\361\105\207\345\075\254\321\307\127\204\275\153\256\334
\330\371\266\033\142\160\013\075\066\311\102\362\062\327\172\141
\346\322\333\075\317\310\251\311\233\334\333\130\104\327\157\070
\257\177\170\323\243\255\032\165\272\034\301\066\174\217\036\155
\034\303\165\106\256\065\005\246\366\134\075\041\356\126\360\311
\202\042\055\172\124\253\160\303\175\042\145\202\160\226

END

CKA_NSS_MOZILLA_CA_POLICY

CK_BBOOL CK_TRUE

CKA_NSS_SERVER_DISTRUST_AFTER CK_BBOOL CK_FALSE

CKA_NSS_EMAIL_DISTRUST_AFTER CK_BBOOL CK_FALSE

Trust for "Microsec e-Szigno Root CA 2009"

Issuer: E=info@e-szigno.hu,CN=Microsec e-Szigno Root CA 2009,O=Microsec Ltd.,L=Budapest,C=HU

Serial Number:00:c2:7e:43:04:4e:47:3f:19

Subject: E=info@e-szigno.hu,CN=Microsec

e-Szigno Root CA 2009,O=Microsec Ltd.,L=Budapest,C=HU

Not Valid Before: Tue Jun 16 11:30:18 2009

Not Valid After : Sun Dec 30 11:30:18 2029

Fingerprint (SHA-256):

3C:5F:81:FE:A5:FA:B8:2C:64:BF:A2:EA:EC:AF:CD:E8:E0:77:FC:86:20:A7:CA:E5:37:16:3D:F3:6E:DB:F3:78

Fingerprint (SHA1): 89:DF:74:FE:5C:F4:0F:4A:80:F9:E3:37:7D:54:DA:91:E1:01:31:8E

CKA_CLASS CK_OBJECT_CLASS CKO_NSS_TRUST

CKA_TOKEN CK_BBOOL CK_TRUE

CKA_PRIVATE CK_BBOOL CK_FALSE

CKA_MODIFIABLE CK_BBOOL CK_FALSE

CKA_LABEL UTF8 "Microsec e-Szigno Root CA 2009"

CKA_CERT_SHA1_HASH MULTILINE_OCTAL

\211\337\164\376\134\364\017\112\200\371\343\067\175\124\332\221
\341\001\061\216

END

CKA_CERT_MD5_HASH MULTILINE_OCTAL

\370\111\364\003\274\104\055\203\276\110\151\175\051\144\374\261

END

CKA_ISSUER MULTILINE_OCTAL

\060\201\202\061\013\060\011\006\003\125\004\006\023\002\110\125
\061\021\060\017\006\003\125\004\007\014\010\102\165\144\141\160
\145\163\164\061\026\060\024\006\003\125\004\012\014\015\115\151
\143\162\157\163\145\143\040\114\164\144\056\061\047\060\045\006
\003\125\004\003\014\036\115\151\143\162\157\163\145\143\040\145
\055\123\172\151\147\156\157\040\122\157\157\164\040\103\101\040
\062\060\060\071\061\037\060\035\006\011\052\206\110\206\367\015

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\001\011\001\026\020\151\156\146\157\100\145\055\163\172\151\147
\156\157\056\150\165
END
CKA_SERIAL_NUMBER
MULTILINE_OCTAL
\002\011\000\302\176\103\004\116\107\077\031
END
CKA_TRUST_SERVER_AUTH CK_TRUST CKT_NSS_TRUSTED_DELEGATOR
CKA_TRUST_EMAIL_PROTECTION CK_TRUST CKT_NSS_TRUSTED_DELEGATOR
CKA_TRUST_CODE_SIGNING CK_TRUST CKT_NSS_MUST_VERIFY_TRUST
CKA_TRUST_STEP_UP_APPROVED CK_BBOOL CK_FALSE

#
# Certificate "GlobalSign Root CA - R3"
#
# Issuer: CN=GlobalSign,O=GlobalSign,OU=GlobalSign Root CA - R3
# Serial Number:04:00:00:00:01:21:58:53:08:a2
# Subject: CN=GlobalSign,O=GlobalSign,OU=GlobalSign Root CA - R3
# Not Valid Before: Wed Mar 18 10:00:00 2009
# Not Valid After : Sun Mar 18 10:00:00 2029
# Fingerprint (SHA-256):
CB:B5:22:D7:B7:F1:27:AD:6A:01:13:86:5B:DF:1C:D4:10:2E:7D:07:59:AF:63:5A:7C:F4:72:0D:C9:63:C5:3B
#
Fingerprint (SHA1): D6:9B:56:11:48:F0:1C:77:C5:45:78:C1:09:26:DF:5B:85:69:76:AD
CKA_CLASS CK_OBJECT_CLASS CKO_CERTIFICATE
CKA_TOKEN CK_BBOOL CK_TRUE
CKA_PRIVATE CK_BBOOL CK_FALSE
CKA_MODIFIABLE CK_BBOOL CK_FALSE
CKA_LABEL UTF8 "GlobalSign Root CA - R3"
CKA_CERTIFICATE_TYPE CK_CERTIFICATE_TYPE CKC_X_509
CKA_SUBJECT MULTILINE_OCTAL
\060\114\061\040\060\036\006\003\125\004\013\023\027\107\154\157
\142\141\154\123\151\147\156\040\122\157\157\164\040\103\101\040
\055\040\122\063\061\023\060\021\006\003\125\004\012\023\012\107
\154\157\142\141\154\123\151\147\156\061\023\060\021\006\003\125
\004\003\023\012\107\154\157\142\141\154\123\151\147\156
END
CKA_ID UTF8 "0"
CKA_ISSUER MULTILINE_OCTAL
\060\114\061\040\060\036\006\003\125\004\013\023\027\107\154\157
\142\141\154\123\151\147\156\040\122\157\157\164\040\103\101\040
\055\040\122\063\061\023\060\021\006\003\125\004\012\023\012\107
\154\157\142\141\154\123\151\147\156\061\023\060\021\006\003\125
\004\003\023\012\107\154\157\142\141\154\123\151\147\156
END
CKA_SERIAL_NUMBER
MULTILINE_OCTAL
\002\013\004\000\000\000\000\001\041\130\123\010\242

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END

CKA_VALUE MULTILINE_OCTAL

\060\202\003\137\060\202\002\107\240\003\002\001\002\002\013\004
\000\000\000\000\001\041\130\123\010\242\060\015\006\011\052\206
\110\206\367\015\001\001\013\005\000\060\114\061\040\060\036\006
\003\125\004\013\023\027\107\154\157\142\141\154\123\151\147\156
\040\122\157\157\164\040\103\101\040\055\040\122\063\061\023\060
\021\006\003\125\004\012\023\012\107\154\157\142\141\154\123\151
\147\156\061\023\060\021\006\003\125\004\003\023\012\107\154\157
\142\141\154\123\151\147\156\060\036\027\015\060\071\060\063\061
\070\061\060\060\060\060\060\132\027\015\062\071\060\063\061\070
\061\060\060\060\060\060\132\060\114\061\040\060\036\006\003\125
\004\013\023\027\107\154\157\142\141\154\123\151\147\156\040\122
\157\157\164\040\103\101\040\055\040\122\063\061\023\060\021\006
\003\125\004\012\023\012\107\154\157\142\141\154\123\151\147\156
\061\023\060\021\006\003\125\004\003\023\012\107\154\157\142\141
\154\123\151\147\156\060\202\001\042\060\015\006\011\052\206\110
\206\367\015\001\001\001\005\000\003\202\001\017\000\060\202\001
\012\002\202\001\001\000\314\045\166\220\171\006\170\042\026\365
\300\203\266\204\312\050\236\375\005\166\021\305\255\210\162\374
\106\002\103\307\262\212\235\004\137\044\313\056\113\341\140\202
\106\341\122\253\014\201\107\160\154\335\144\321\353\365\054\243
\017\202\075\014\053\256\227\327\266\024\206\020\171\273\073\023
\200\167\214\010\341\111\322\152\142\057\037\136\372\226\150\337
\211\047\225\070\237\006\327\076\311\313\046\131\015\163\336\260
\310\351\046\016\203\025\306\357\133\213\322\004\140\312\111\246
\050\366\151\073\366\313\310\050\221\345\235\212\141\127\067\254
\164\024\334\164\340\072\356\162\057\056\234\373\320\273\277\365
\075\000\341\006\063\350\202\053\256\123\246\072\026\163\214\335
\101\016\040\072\300\264\247\241\351\262\117\220\056\062\140\351
\127\313\271\004\222\150\150\345\070\046\140\165\262\237\167\377
\221\024\357\256\040\111\374\255\100\025\110\321\002\061\141\031
\136\270\227\357\255\167\267\144\232\172\277\137\301\023\357\233
\142\373\015\154\340\124\151\026\251\003\332\156\351\203\223\161
\166\306\151\205\202\027\002\003\001\000\001\243\102\060\100\060
\016\006\003\125\035\017\001\001\377\004\004\003\002\001\006\060
\017\006\003\125\035\023\001\001\377\004\005\060\003\001\001\377
\060\035\006\003\125\035\016\004\026\004\024\217\360\113\177\250
\056\105\044\256\115\120\372\143\232\213\336\342\335\033\274\060
\015\006\011\052\206\110\206\367\015\001\001\013\005\000\003\202
\001\001\000\113\100\333\300\120\252\376\310\014\357\367\226\124
\105\111\273\226\000\011\101\254\263\023\206\206\050\007\063\312
\153\346\164\271\272\000\055\256\244\012\323\365\361\361\017\212
\277\163\147\112\203\307\104\173\170\340\257\156\154\157\003\051
\216\063\071\105\303\216\344\271\127\154\252\374\022\226\354\123
\306\055\344\044\154\271\224\143\373\334\123\150\147\126\076\203
\270\317\065\041\303\311\150\376\316\332\302\123\252\314\220\212
\351\360\135\106\214\225\335\172\130\050\032\057\035\336\315\000


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\067\101\217\355\104\155\327\123\050\227\176\363\147\004\036\025
\327\212\226\264\323\336\114\047\244\114\033\163\163\166\364\027
\231\302\037\172\016\343\055\010\255\012\034\054\377\074\253\125
\016\017\221\176\066\353\303\127\111\276\341\056\055\174\140\213
\303\101\121\023\043\235\316\367\062\153\224\001\250\231\347\054
\063\037\072\073\045\322\206\100\316\073\054\206\170\311\141\057
\024\272\356\333\125\157\337\204\356\005\011\115\275\050\330\162
\316\323\142\120\145\036\353\222\227\203\061\331\263\265\312\107
\130\077\137
END
CKA_NSS_Mozilla_CA_POLICY
CK_BBOOL CK_TRUE
CKA_NSS_SERVER_DISTRUST_AFTER CK_BBOOL CK_FALSE
CKA_NSS_EMAIL_DISTRUST_AFTER CK_BBOOL CK_FALSE

# Trust for "GlobalSign Root CA - R3"
# Issuer: CN=GlobalSign,O=GlobalSign,OU=GlobalSign Root CA - R3
# Serial Number:04:00:00:00:00:01:21:58:53:08:a2
#
Subject: CN=GlobalSign,O=GlobalSign,OU=GlobalSign Root CA - R3
# Not Valid Before: Wed Mar 18 10:00:00 2009
# Not Valid After : Sun Mar 18 10:00:00 2029
# Fingerprint (SHA-256):
CB:B5:22:D7:B7:F1:27:AD:6A:01:13:86:5B:DF:1C:D4:10:2E:7D:07:59:AF:63:5A:7C:F4:72:0D:C9:63:C5:3B
# Fingerprint (SHA1): D6:9B:56:11:48:F0:1C:77:C5:45:78:C1:09:26:DF:5B:85:69:76:AD
CKA_CLASS CK_OBJECT_CLASS CKO_NSS_TRUST
CKA_TOKEN CK_BBOOL CK_TRUE
CKA_PRIVATE CK_BBOOL CK_FALSE
CKA_MODIFIABLE CK_BBOOL CK_FALSE
CKA_LABEL UTF8 "GlobalSign Root CA - R3"
CKA_CERT_SHA1_HASH MULTILINE_OCTAL
\326\233\126\021\110\360\034\167\305\105\170\301\011\046\337\133
\205\151\166\255
END
CKA_CERT_MD5_HASH MULTILINE_OCTAL
\305\337\270\111\312\005\023\125\356\055\272\032\303\076\260\050
END
CKA_ISSUER MULTILINE_OCTAL
\060\114\061\040\060\036\006\003\125\004\013\023\027\107\154\157
\142\141\154\123\151\147\156\040\122\157\157\164\040\103\101\040
\055\040\122\063\061\023\060\021\006\003\125\004\012\023\012\107
\154\157\142\141\154\123\151\147\156\061\023\060\021\006\003\125
\004\003\023\012\107\154\157\142\141\154\123\151\147\156
END
CKA_SERIAL_NUMBER
MULTILINE_OCTAL
\002\013\004\000\000\000\000\001\041\130\123\010\242
END
```

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CKA_TRUST_SERVER_AUTH CK_TRUST CKT_NSS_TRUSTED_DELEGATOR
CKA_TRUST_EMAIL_PROTECTION CK_TRUST CKT_NSS_TRUSTED_DELEGATOR
CKA_TRUST_CODE_SIGNING CK_TRUST CKT_NSS_MUST_VERIFY_TRUST
CKA_TRUST_STEP_UP_APPROVED CK_BBOOL CK_FALSE

#
# Certificate "Autoridad de Certificacion Firmaprofesional CIF A62634068"
#
# Issuer: CN=Autoridad de Certificacion Firmaprofesional CIF A62634068,C=ES
# Serial Number:53:ec:3b:ee:fb:b2:48:5f
# Subject: CN=Autoridad de Certificacion Firmaprofesional CIF A62634068,C=ES
# Not Valid Before: Wed May 20 08:38:15 2009
# Not Valid After : Tue Dec 31 08:38:15 2030
# Fingerprint (SHA-256):
04:04:80:28:BF:1F:28:64:D4:8F:9A:D4:D8:32:94:36:6A:82:88:56:55:3F:3B:14:30:3F:90:14:7F:5D:40:EF
# Fingerprint (SHA1): AE:C5:FB:3F:C8:E1:BF:C4:E5:4F:03:07:5A:9A:E8:00:B7:F7:B6:FA
CKA_CLASS
CK_OBJECT_CLASS CKO_CERTIFICATE
CKA_TOKEN CK_BBOOL CK_TRUE
CKA_PRIVATE CK_BBOOL CK_FALSE
CKA_MODIFIABLE CK_BBOOL CK_FALSE
CKA_LABEL UTF8 "Autoridad de Certificacion Firmaprofesional CIF A62634068"
CKA_CERTIFICATE_TYPE CK_CERTIFICATE_TYPE CKC_X_509
CKA_SUBJECT MULTILINE_OCTAL
\060\121\061\013\060\011\006\003\125\004\006\023\002\105\123\061
\102\060\100\006\003\125\004\003\014\071\101\165\164\157\162\151
\144\141\144\040\144\145\040\103\145\162\164\151\146\151\143\141
\143\151\157\156\040\106\151\162\155\141\160\162\157\146\145\163
\151\157\156\141\154\040\103\111\106\040\101\066\062\066\063\064
\060\066\070
END
CKA_ID UTF8 "0"
CKA_ISSUER MULTILINE_OCTAL
\060\121\061\013\060\011\006\003\125\004\006\023\002\105\123\061
\102\060\100\006\003\125\004\003\014\071\101\165\164\157\162\151
\144\141\144\040\144\145\040\103\145\162\164\151\146\151\143\141
\143\151\157\156\040\106\151\162\155\141\160\162\157\146\145\163
\151\157\156\141\154\040\103\111\106\040\101\066\062\066\063\064
\060\066\070
END
CKA_SERIAL_NUMBER
MULTILINE_OCTAL
\002\010\123\354\073\356\373\262\110\137
END
CKA_VALUE MULTILINE_OCTAL
\060\202\006\024\060\202\003\374\240\003\002\001\002\002\010\123
\354\073\356\373\262\110\137\060\015\006\011\052\206\110\206\367
\015\001\001\005\005\000\060\121\061\013\060\011\006\003\125\004

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\006\023\002\105\123\061\102\060\100\006\003\125\004\003\014\071
\101\165\164\157\162\151\144\141\144\040\144\145\040\103\145\162
\164\151\146\151\143\141\143\151\157\156\040\106\151\162\155\141
\160\162\157\146\145\163\151\157\156\141\154\040\103\111\106\040
\101\066\062\066\063\064\060\066\070\060\036\027\015\060\071\060
\065\062\060\060\070\063\070\061\065\132\027\015\063\060\061\062
\063\061\060\070\063\070\061\065\132\060\121\061\013\060\011\006
\003\125\004\006\023\002\105\123\061\102\060\100\006\003\125\004
\003\014\071\101\165\164\157\162\151\144\141\144\040\144\145\040
\103\145\162\164\151\146\151\143\141\143\151\157\156\040\106\151
\162\155\141\160\162\157\146\145\163\151\157\156\141\154\040\103
\111\106\040\101\066\062\066\063\064\060\066\070\060\202\002\042
\060\015\006\011\052\206\110\206\367\015\001\001\001\005\000\003
\202\002\017\000\060\202\002\012\002\202\002\001\000\312\226\153
\216\352\370\373\361\242\065\340\177\114\332\340\303\122\327\175
\266\020\310\002\136\263\103\052\304\117\152\262\312\034\135\050
\232\170\021\032\151\131\127\257\265\040\102\344\213\017\346\337
\133\246\003\222\057\365\021\344\142\327\062\161\070\331\004\014
\161\253\075\121\176\017\007\337\143\005\134\351\277\224\157\301
\051\202\300\264\332\121\260\301\074\273\255\067\112\134\312\361
\113\066\016\044\253\277\303\204\167\375\250\120\364\261\347\306
\057\322\055\131\215\172\012\116\226\151\122\002\252\066\230\354
\374\372\024\203\014\067\037\311\222\067\177\327\201\055\345\304
\271\340\076\064\376\147\364\076\146\321\323\364\100\317\136\142
\064\017\160\006\076\040\030\132\316\367\162\033\045\154\223\164
\024\223\243\163\261\016\252\207\020\043\131\137\040\005\031\107
\355\150\216\222\022\312\135\374\326\053\262\222\074\040\317\341
\137\257\040\276\240\166\177\166\345\354\032\206\141\063\076\347
\173\264\077\240\017\216\242\271\152\157\271\207\046\157\101\154
\210\246\120\375\152\143\013\365\223\026\033\031\217\262\355\233
\233\311\220\365\001\014\337\031\075\017\076\070\043\311\057\217
\014\321\002\376\033\125\326\116\320\215\074\257\117\244\363\376
\257\052\323\005\235\171\010\241\313\127\061\264\234\310\220\262
\147\364\030\026\223\072\374\107\330\321\170\226\061\037\272\053
\014\137\135\231\255\143\211\132\044\040\166\330\337\375\253\116
\246\042\252\235\136\346\047\212\175\150\051\243\347\212\270\332
\021\273\027\055\231\235\023\044\106\367\305\342\330\237\216\177
\307\217\164\155\132\262\350\162\365\254\356\044\020\255\057\024
\332\377\055\232\106\161\107\276\102\337\273\001\333\364\177\323
\050\217\061\131\133\323\311\002\246\264\122\312\156\227\373\103
\305\010\046\157\212\364\273\375\237\050\252\015\325\105\363\023
\072\035\330\300\170\217\101\147\074\036\224\144\256\173\013\305
\350\331\001\210\071\032\227\206\144\101\325\073\207\014\156\372
\017\306\275\110\024\277\071\115\324\236\101\266\217\226\035\143
\226\223\331\225\006\170\061\150\236\067\006\073\200\211\105\141
\071\043\307\033\104\243\025\345\034\370\222\060\273\002\003\001
\000\001\243\201\357\060\201\354\060\022\006\003\125\035\023\001
\001\377\004\010\060\006\001\001\377\002\001\001\060\016\006\003

\125\035\017\001\001\377\004\004\003\002\001\006\060\035\006\003
\125\035\016\004\026\004\024\145\315\353\253\065\036\000\076\176
\325\164\300\034\264\163\107\016\032\144\057\060\201\246\006\003
\125\035\040\004\201\236\060\201\233\060\201\230\006\004\125\035
\040\000\060\201\217\060\057\006\010\053\006\001\005\005\007\002
\001\026\043\150\164\164\160\072\057\057\167\167\167\056\146\151
\162\155\141\160\162\157\146\145\163\151\157\156\141\154\056\143
\157\155\057\143\160\163\060\134\006\010\053\006\001\005\005\007
\002\002\060\120\036\116\000\120\000\141\000\163\000\145\000\157
\000\040\000\144\000\145\000\040\000\154\000\141\000\040\000\102
\000\157\000\156\000\141\000\156\000\157\000\166\000\141\000\040
\000\064\000\067\000\040\000\102\000\141\000\162\000\143\000\145
\000\154\000\157\000\156\000\141\000\040\000\060\000\070\000\060
\000\061\000\067\060\015\006\011\052\206\110\206\367\015\001\001
\005\005\000\003\202\002\001\000\027\175\240\371\264\335\305\305
\353\255\113\044\265\241\002\253\335\245\210\112\262\017\125\113
\053\127\214\073\345\061\335\376\304\062\361\347\133\144\226\066
\062\030\354\245\062\167\327\343\104\266\300\021\052\200\271\075
\152\156\174\233\323\255\374\303\326\243\346\144\051\174\321\341
\070\036\202\053\377\047\145\257\373\026\025\304\056\161\204\345
\265\377\372\244\107\275\144\062\273\366\045\204\242\047\102\365
\040\260\302\023\020\021\315\020\025\272\102\220\052\322\104\341
\226\046\353\061\110\022\375\052\332\311\006\317\164\036\251\113
\325\207\050\371\171\064\222\076\056\104\350\366\217\117\217\065
\077\045\263\071\334\143\052\220\153\040\137\304\122\022\116\227
\054\052\254\235\227\336\110\362\243\146\333\302\322\203\225\246
\146\247\236\045\017\351\013\063\221\145\012\132\303\331\124\022
\335\257\303\116\016\037\046\136\015\334\263\215\354\325\201\160
\336\322\117\044\005\363\154\116\365\114\111\146\215\321\377\322
\013\045\101\110\376\121\204\306\102\257\200\004\317\320\176\144
\111\344\362\337\242\354\261\114\300\052\035\347\264\261\145\242
\304\274\361\230\364\252\160\007\143\264\270\332\073\114\372\100
\042\060\133\021\246\360\005\016\306\002\003\110\253\206\233\205
\335\333\335\352\242\166\200\163\175\365\234\004\304\105\215\347
\271\034\213\236\352\327\165\321\162\261\336\165\104\347\102\175
\342\127\153\175\334\231\274\075\203\050\352\200\223\215\305\114
\145\301\160\201\270\070\374\103\061\262\366\003\064\107\262\254
\373\042\006\313\036\335\027\107\034\137\146\271\323\032\242\332
\021\261\244\274\043\311\344\276\207\377\271\224\266\370\135\040
\112\324\137\347\275\150\173\145\362\025\036\322\072\251\055\351
\330\153\044\254\227\130\104\107\255\131\030\361\041\145\160\336
\316\064\140\250\100\361\363\074\244\303\050\043\214\376\047\063
\103\100\240\027\074\353\352\073\260\162\246\243\271\112\113\136
\026\110\364\262\274\310\214\222\305\235\237\254\162\066\274\064
\200\064\153\251\213\222\300\270\027\355\354\166\123\365\044\001
\214\263\042\350\113\174\125\306\235\372\243\024\273\145\205\156
\156\117\022\176\012\074\235\225

END

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CKA_NSS_Mozilla_CA_POLICY
CK_BBOOL CK_TRUE
CKA_NSS_SERVER_DISTRUST_AFTER CK_BBOOL CK_FALSE
CKA_NSS_EMAIL_DISTRUST_AFTER CK_BBOOL CK_FALSE

# Trust for "Autoridad de Certificacion Firmaprofesional CIF A62634068"
# Issuer: CN=Autoridad de Certificacion Firmaprofesional CIF A62634068,C=ES
# Serial Number:53:ec:3b:ee:fb:b2:48:5f
# Subject: CN=Autoridad de Certificacion Firmaprofesional CIF A62634068,C=ES
# Not Valid Before: Wed May 20 08:38:15 2009
# Not Valid After : Tue Dec 31 08:38:15 2030
# Fingerprint (SHA-256):
04:04:80:28:BF:1F:28:64:D4:8F:9A:D4:D8:32:94:36:6A:82:88:56:55:3F:3B:14:30:3F:90:14:7F:5D:40:EF
#
Fingerprint (SHA1): AE:C5:FB:3F:C8:E1:BF:C4:E5:4F:03:07:5A:9A:E8:00:B7:F7:B6:FA
CKA_CLASS CK_OBJECT_CLASS CKO_NSS_TRUST
CKA_TOKEN CK_BBOOL CK_TRUE
CKA_PRIVATE CK_BBOOL CK_FALSE
CKA_MODIFIABLE CK_BBOOL CK_FALSE
CKA_LABEL UTF8 "Autoridad de Certificacion Firmaprofesional CIF A62634068"
CKA_CERT_SHA1_HASH MULTILINE_OCTAL
\256\305\373\077\310\341\277\304\345\117\003\007\132\232\350\000
\267\367\266\372
END
CKA_CERT_MD5_HASH MULTILINE_OCTAL
\163\072\164\172\354\273\243\226\246\302\344\342\310\233\300\303
END
CKA_ISSUER MULTILINE_OCTAL
\060\121\061\013\060\011\006\003\125\004\006\023\002\105\123\061
\102\060\100\006\003\125\004\003\014\071\101\165\164\157\162\151
\144\141\144\040\144\145\040\103\145\162\164\151\146\151\143\141
\143\151\157\156\040\106\151\162\155\141\160\162\157\146\145\163
\151\157\156\141\154\040\103\111\106\040\101\066\062\066\063\064
\060\066\070
END
CKA_SERIAL_NUMBER MULTILINE_OCTAL
\002\010\123\354\073\356\373\262\110\137
END
CKA_TRUST_SERVER_AUTH
CK_TRUST CKT_NSS_TRUSTED_DELEGATOR
CKA_TRUST_EMAIL_PROTECTION CK_TRUST CKT_NSS_TRUSTED_DELEGATOR
CKA_TRUST_CODE_SIGNING CK_TRUST CKT_NSS_MUST_VERIFY_TRUST
CKA_TRUST_STEP_UP_APPROVED CK_BBOOL CK_FALSE

#
# Certificate "Izenpe.com"
#
# Issuer: CN=Izenpe.com,O=IZENPE S.A.,C=ES

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# Serial Number:00:b0:b7:5a:16:48:5f:bf:e1:cb:f5:8b:d7:19:e6:7d
# Subject: CN=Izenpe.com,O=IZENPE S.A.,C=ES
# Not Valid Before: Thu Dec 13 13:08:28 2007
# Not Valid After : Sun Dec 13 08:27:25 2037
# Fingerprint (SHA-256):
25:30:CC:8E:98:32:15:02:BA:D9:6F:9B:1F:BA:1B:09:9E:2D:29:9E:0F:45:48:BB:91:4F:36:3B:C0:D4:53:1F
# Fingerprint (SHA1): 2F:78:3D:25:52:18:A7:4A:65:39:71:B5:2C:A2:9C:45:15:6F:E9:19
CKA_CLASS CK_OBJECT_CLASS CKO_CERTIFICATE
CKA_TOKEN CK_BBOOL CK_TRUE
CKA_PRIVATE CK_BBOOL CK_FALSE
CKA_MODIFIABLE CK_BBOOL CK_FALSE
CKA_LABEL UTF8 "Izenpe.com"
CKA_CERTIFICATE_TYPE CK_CERTIFICATE_TYPE CKC_X_509
CKA_SUBJECT MULTILINE_OCTAL
\060\070\061\013\060\011\006\003\125\004\006\023\002\105\123\061
\024\060\022\006\003\125\004\012\014\013\111\132\105\116\120\105
\040\123\056\101\056\061\023\060\021\006\003\125\004\003\014\012
\111\172\145\156\160\145\056\143\157\155
END
CKA_ID
UTF8 "0"
CKA_ISSUER MULTILINE_OCTAL
\060\070\061\013\060\011\006\003\125\004\006\023\002\105\123\061
\024\060\022\006\003\125\004\012\014\013\111\132\105\116\120\105
\040\123\056\101\056\061\023\060\021\006\003\125\004\003\014\012
\111\172\145\156\160\145\056\143\157\155
END
CKA_SERIAL_NUMBER MULTILINE_OCTAL
\002\020\000\260\267\132\026\110\137\277\341\313\365\213\327\031
\346\175
END
CKA_VALUE MULTILINE_OCTAL
\060\202\005\361\060\202\003\331\240\003\002\001\002\002\020\000
\260\267\132\026\110\137\277\341\313\365\213\327\031\346\175\060
\015\006\011\052\206\110\206\367\015\001\001\013\005\000\060\070
\061\013\060\011\006\003\125\004\006\023\002\105\123\061\024\060
\022\006\003\125\004\012\014\013\111\132\105\116\120\105\040\123
\056\101\056\061\023\060\021\006\003\125\004\003\014\012\111\172
\145\156\160\145\056\143\157\155\060\036\027\015\060\067\061\062
\061\063\061\063\060\070\062\070\132\027\015\063\067\061\062\061
\063\060\070\062\067\062\065\132\060\070\061\013\060\011\006\003
\125\004\006\023\002\105\123\061\024\060\022\006\003\125\004\012
\014\013\111\132\105\116\120\105\040\123\056\101\056\061\023\060
\021\006\003\125\004\003\014\012\111\172\145\156\160\145\056\143
\157\155\060\202\002\042\060\015\006\011\052\206\110\206\367\015
\001\001\001\005\000\003\202\002\017\000\060\202\002\012\002\202
\002\001\000\311\323\172\312\017\036\254\247\206\350\026\145\152
\261\302\033\105\062\161\225\331\376\020\133\314\257\347\245\171
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\001\217\211\303\312\362\125\161\367\167\276\167\224\363\162\244
\054\104\330\236\222\233\024\072\241\347\044\220\012\012\126\216
\305\330\046\224\341\331\110\341\055\076\332\012\162\335\243\231
\025\332\201\242\207\364\173\156\046\167\211\130\255\326\353\014
\262\101\172\163\156\155\333\172\170\101\351\010\210\022\176\207
\056\146\021\143\154\124\373\074\235\162\300\274\056\377\302\267
\335\015\166\343\072\327\367\264\150\276\242\365\343\201\156\301
\106\157\135\215\340\115\306\124\125\211\032\063\061\012\261\127
\271\243\212\230\303\354\073\064\305\225\101\151\176\165\302\074
\040\305\141\272\121\107\240\040\220\223\241\220\113\363\116\174
\205\105\124\232\321\005\046\101\260\265\115\035\063\276\304\003
\310\045\174\301\160\333\073\364\011\055\124\047\110\254\057\341
\304\254\076\310\313\222\114\123\071\067\043\354\323\001\371\340
\011\104\115\115\144\300\341\015\132\207\042\274\255\033\243\376
\046\265\025\363\247\374\204\031\351\354\241\210\264\104\151\204
\203\363\211\321\164\006\251\314\013\326\302\336\047\205\120\046
\312\027\270\311\172\207\126\054\032\001\036\154\276\023\255\020
\254\265\044\365\070\221\241\326\113\332\361\273\322\336\107\265
\361\274\201\366\131\153\317\031\123\351\215\025\313\112\313\251
\157\104\345\033\101\317\341\206\247\312\320\152\237\274\114\215
\006\063\132\242\205\345\220\065\240\142\134\026\116\360\343\242
\372\003\032\264\054\161\263\130\054\336\173\013\333\032\017\353
\336\041\037\006\167\006\003\260\311\357\231\374\300\271\117\013
\206\050\376\322\271\352\343\332\245\303\107\151\022\340\333\360
\366\031\213\355\173\160\327\002\326\355\207\030\050\054\004\044
\114\167\344\110\212\032\306\073\232\324\017\312\372\165\322\001
\100\132\215\171\277\213\317\113\317\252\026\301\225\344\255\114
\212\076\027\221\324\261\142\345\202\345\200\004\244\003\176\215
\277\332\177\242\017\227\117\014\323\015\373\327\321\345\162\176
\034\310\167\377\133\232\017\267\256\005\106\345\361\250\026\354
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END

CKA_NSS_MOZILLA_CA_POLICY

CK_BBOOL CK_TRUE

CKA_NSS_SERVER_DISTRUST_AFTER CK_BBOOL CK_FALSE

CKA_NSS_EMAIL_DISTRUST_AFTER CK_BBOOL CK_FALSE

Trust for "Izenpe.com"

#

Issuer: CN=Izenpe.com,O=IZENPE S.A.,C=ES

Serial Number:00:b0:b7:5a:16:48:5f:bf:e1:cb:f5:8b:d7:19:e6:7d

Subject: CN=Izenpe.com,O=IZENPE S.A.,C=ES

Not Valid Before: Thu Dec 13 13:08:28 2007

Not Valid After : Sun Dec 13 08:27:25 2037

Fingerprint (SHA-256):

25:30:CC:8E:98:32:15:02:BA:D9:6F:9B:1F:BA:1B:09:9E:2D:29:9E:0F:45:48:BB:91:4F:36:3B:C0:D4:53:1F

Fingerprint (SHA1): 2F:78:3D:25:52:18:A7:4A:65:39:71:B5:2C:A2:9C:45:15:6F:E9:19


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CKA_CLASS CK_OBJECT_CLASS CKO_NSS_TRUST
CKA_TOKEN CK_BBOOL CK_TRUE
CKA_PRIVATE CK_BBOOL CK_FALSE
CKA_MODIFIABLE CK_BBOOL CK_FALSE
CKA_LABEL UTF8 "Izenpe.com"
CKA_CERT_SHA1_HASH MULTILINE_OCTAL
\057\170\075\045\122\030\247\112\145\071\161\265\054\242\234\105
\025\157\351\031
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CKA_ISSUER MULTILINE_OCTAL
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\024\060\022\006\003\125\004\012\014\013\111\132\105\116\120\105
\040\123\056\101\056\061\023\060\021\006\003\125\004\003\014\012
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CKA_TRUST_EMAIL_PROTECTION CK_TRUST CKT_NSS_MUST_VERIFY_TRUST
CKA_TRUST_CODE_SIGNING CK_TRUST CKT_NSS_MUST_VERIFY_TRUST
CKA_TRUST_STEP_UP_APPROVED CK_BBOOL CK_FALSE

#
# Certificate "Chambers of Commerce Root - 2008"
#
# Issuer: CN=Chambers of Commerce Root - 2008,O=AC Camerfirma S.A.,serialNumber=A82743287,L=Madrid
(see current address at www.camerfirma.com/address),C=EU
# Serial Number:00:a3:da:42:7e:a4:b1:ae:da
# Subject: CN=Chambers of Commerce Root - 2008,O=AC Camerfirma S.A.,serialNumber=A82743287,L=Madrid
(see current address at www.camerfirma.com/address),C=EU
# Not Valid Before: Fri Aug 01 12:29:50 2008
# Not Valid After : Sat Jul 31 12:29:50 2038
# Fingerprint (SHA-256):
06:3E:4A:FA:C4:91:DF:D3:32:F3:08:9B:85:42:E9:46:17:D8:93:D7:FE:94:4E:10:A7:93:7E:E2:9D:96:93:C0
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Fingerprint (SHA1): 78:6A:74:AC:76:AB:14:7F:9C:6A:30:50:BA:9E:A8:7E:FE:9A:CE:3C
CKA_CLASS CK_OBJECT_CLASS CKO_CERTIFICATE
CKA_TOKEN CK_BBOOL CK_TRUE
CKA_PRIVATE CK_BBOOL CK_FALSE
CKA_MODIFIABLE CK_BBOOL CK_FALSE
CKA_LABEL UTF8 "Chambers of Commerce Root - 2008"
CKA_CERTIFICATE_TYPE CK_CERTIFICATE_TYPE CKC_X_509

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\144\040\050\163\145\145\040\143\165\162\162\145\156\164\040\141
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\004\012\023\022\101\103\040\103\141\155\145\162\146\151\162\155
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END

CKA_ID

UTF8 "0"

CKA_ISSUER MULTILINE_OCTAL

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\155\145\162\146\151\162\155\141\056\143\157\155\057\141\144\144
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END

CKA_SERIAL_NUMBER MULTILINE_OCTAL

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END

CKA_VALUE MULTILINE_OCTAL

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\125\004\006\023\002\105\125\061\103\060\101\006\003\125\004\007
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\162\162\145\156\164\040\141\144\144\162\145\163\163\040\141\164
\040\167\167\167\056\143\141\155\145\162\146\151\162\155\141\056
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\070\147\004\061\354\217\363\202\306\336\271\125\363\073\061\221
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CKA_NSS_Mozilla_CA_POLICY
CK_BBOOL CK_TRUE
CKA_NSS_SERVER_DISTRUST_AFTER CK_BBOOL CK_FALSE
CKA_NSS_EMAIL_DISTRUST_AFTER CK_BBOOL CK_FALSE

# Trust for "Chambers of Commerce Root - 2008"
# Issuer: CN=Chambers of Commerce Root - 2008,O=AC Camerfirma S.A.,serialNumber=A82743287,L=Madrid
(see current address at www.camerfirma.com/address),C=EU
# Serial Number:00:a3:da:42:7e:a4:b1:ae:da
#
Subject: CN=Chambers of Commerce Root - 2008,O=AC Camerfirma S.A.,serialNumber=A82743287,L=Madrid
(see current address at www.camerfirma.com/address),C=EU
# Not Valid Before: Fri Aug 01 12:29:50 2008
# Not Valid After : Sat Jul 31 12:29:50 2038
# Fingerprint (SHA-256):
06:3E:4A:FA:C4:91:DF:D3:32:F3:08:9B:85:42:E9:46:17:D8:93:D7:FE:94:4E:10:A7:93:7E:E2:9D:96:93:C0
# Fingerprint (SHA1): 78:6A:74:AC:76:AB:14:7F:9C:6A:30:50:BA:9E:A8:7E:FE:9A:CE:3C
CKA_CLASS CK_OBJECT_CLASS CKO_NSS_TRUST
CKA_TOKEN CK_BBOOL CK_TRUE
CKA_PRIVATE CK_BBOOL CK_FALSE
CKA_MODIFIABLE CK_BBOOL CK_FALSE
CKA_LABEL UTF8 "Chambers of Commerce Root - 2008"
CKA_CERT_SHA1_HASH MULTILINE_OCTAL
\170\152\164\254\166\253\024\177\234\152\060\120\272\236\250\176
\376\232\316\074
END
CKA_CERT_MD5_HASH MULTILINE_OCTAL
\136\200\236\204\132\016\145\013\027\002\363\125\030\052\076\327
END
CKA_ISSUER MULTILINE_OCTAL
\060\201\256\061\013\060\011\006\003\125\004\006\023\002\105\125
\061\103\060\101\006\003\125\004\007\023\072\115\141\144\162\151
\144\040\050\163\145\145\040\143\165\162\162\145\156\164\040\141
\144\144\162\145\163\163\040\141\164\040\167\167\167\056\143\141
\155\145\162\146\151\162\155\141\056\143\157\155\057\141\144\144
\162\145\163\163\051\061\022\060\020\006\003\125\004\005\023\011
\101\070\062\067\064\063\062\070\067\061\033\060\031\006\003\125
\004\012\023\022\101\103\040\103\141\155\145\162\146\151\162\155
\141\040\123\056\101\056\061\051\060\047\006\003\125\004\003\023

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\040\103\150\141\155\142\145\162\163\040\157\146\040\103\157\155
\155\145\162\143\145\040\122\157\157\164\040\055\040\062\060\060
\070
END
CKA_SERIAL_NUMBER
MULTILINE_OCTAL
\002\011\000\243\332\102\176\244\261\256\332
END
CKA_TRUST_SERVER_AUTH CK_TRUST CKT_NSS_MUST_VERIFY_TRUST
CKA_TRUST_EMAIL_PROTECTION CK_TRUST CKT_NSS_TRUSTED_DELEGATOR
CKA_TRUST_CODE_SIGNING CK_TRUST CKT_NSS_MUST_VERIFY_TRUST
CKA_TRUST_STEP_UP_APPROVED CK_BBOOL CK_FALSE

#
# Certificate "Global Chambersign Root - 2008"
#
# Issuer: CN=Global Chambersign
Root - 2008,O=AC Camerfirma S.A.,serialNumber=A82743287,L=Madrid (see current address at
www.camerfirma.com/address),C=EU
# Serial Number:00:c9:cd:d3:e9:d5:7d:23:ce
# Subject: CN=Global Chambersign Root - 2008,O=AC Camerfirma S.A.,serialNumber=A82743287,L=Madrid
(see current address at www.camerfirma.com/address),C=EU
# Not Valid Before: Fri Aug 01 12:31:40 2008
# Not Valid After : Sat Jul 31 12:31:40 2038
# Fingerprint (SHA-256):
13:63:35:43:93:34:A7:69:80:16:A0:D3:24:DE:72:28:4E:07:9D:7B:52:20:BB:8F:BD:74:78:16:EE:BE:BA:CA
# Fingerprint (SHA1): 4A:BD:EE:EC:95:0D:35:9C:89:AE:C7:52:A1:2C:5B:29:F6:D6:AA:0C
CKA_CLASS CK_OBJECT_CLASS CKO_CERTIFICATE
CKA_TOKEN CK_BBOOL CK_TRUE
CKA_PRIVATE CK_BBOOL CK_FALSE
CKA_MODIFIABLE CK_BBOOL CK_FALSE
CKA_LABEL UTF8 "Global Chambersign Root - 2008"
CKA_CERTIFICATE_TYPE CK_CERTIFICATE_TYPE CKC_X_509
CKA_SUBJECT MULTILINE_OCTAL
\060\201\254\061\013\060\011\006\003\125\004\006\023\002\105\125
\061\103\060\101\006\003\125\004\007\023\072\115\141\144\162\151
\144\040\050\163\145\145\040\143\165\162\162\145\156\164\040\141
\144\144\162\145\163\163\040\141\164\040\167\167\167\056\143\141
\155\145\162\146\151\162\155\141\056\143\157\155\057\141\144\144
\162\145\163\163\051\061\022\060\020\006\003\125\004\005\023\011
\101\070\062\067\064\063\062\070\067\061\033\060\031\006\003\125
\004\012\023\022\101\103\040\103\141\155\145\162\146\151\162\155
\141\040\123\056\101\056\061\047\060\045\006\003\125\004\003\023
\036\107\154\157\142\141\154\040\103\150\141\155\142\145\162\163
\151\147\156\040\122\157\157\164\040\055\040\062\060\060\070
END
CKA_ID

```

UTF8 "0"

CKA_ISSUER MULTILINE_OCTAL

\060\201\254\061\013\060\011\006\003\125\004\006\023\002\105\125
\061\103\060\101\006\003\125\004\007\023\072\115\141\144\162\151
\144\040\050\163\145\145\040\143\165\162\162\145\156\164\040\141
\144\144\162\145\163\163\040\141\164\040\167\167\167\056\143\141
\155\145\162\146\151\162\155\141\056\143\157\155\057\141\144\144
\162\145\163\163\051\061\022\060\020\006\003\125\004\005\023\011
\101\070\062\067\064\063\062\070\067\061\033\060\031\006\003\125
\004\012\023\022\101\103\040\103\141\155\145\162\146\151\162\155
\141\040\123\056\101\056\061\047\060\045\006\003\125\004\003\023
\036\107\154\157\142\141\154\040\103\150\141\155\142\145\162\163
\151\147\156\040\122\157\157\164\040\055\040\062\060\060\070

END

CKA_SERIAL_NUMBER

MULTILINE_OCTAL

\002\011\000\311\315\323\351\325\175\043\316

END

CKA_VALUE MULTILINE_OCTAL

\060\202\007\111\060\202\005\061\240\003\002\001\002\002\011\000
\311\315\323\351\325\175\043\316\060\015\006\011\052\206\110\206
\367\015\001\001\005\005\000\060\201\254\061\013\060\011\006\003
\125\004\006\023\002\105\125\061\103\060\101\006\003\125\004\007
\023\072\115\141\144\162\151\144\040\050\163\145\145\040\143\165
\162\162\145\156\164\040\141\144\144\162\145\163\163\040\141\164
\040\167\167\167\056\143\141\155\145\162\146\151\162\155\141\056
\143\157\155\057\141\144\144\162\145\163\163\051\061\022\060\020
\006\003\125\004\005\023\011\101\070\062\067\064\063\062\070\067
\061\033\060\031\006\003\125\004\012\023\022\101\103\040\103\141
\155\145\162\146\151\162\155\141\040\123\056\101\056\061\047\060
\045\006\003\125\004\003\023\036\107\154\157\142\141\154\040\103
\150\141\155\142\145\162\163\151\147\156\040\122\157\157\164\040
\055\040\062\060\060\070\060\036\027\015\060\070\060\070\060\061
\061\062\063\061\064\060\132\027\015\063\070\060\067\063\061\061
\062\063\061\064\060\132\060\201\254\061\013\060\011\006\003\125
\004\006\023\002\105\125\061\103\060\101\006\003\125\004\007\023
\072\115\141\144\162\151\144\040\050\163\145\145\040\143\165\162
\162\145\156\164\040\141\144\144\162\145\163\163\040\141\164\040
\167\167\167\056\143\141\155\145\162\146\151\162\155\141\056\143
\157\155\057\141\144\144\162\145\163\163\051\061\022\060\020\006
\003\125\004\005\023\011\101\070\062\067\064\063\062\070\067\061
\033\060\031\006\003\125\004\012\023\022\101\103\040\103\141\155
\145\162\146\151\162\155\141\040\123\056\101\056\061\047\060\045
\006\003\125\004\003\023\036\107\154\157\142\141\154\040\103\150
\141\155\142\145\162\163\151\147\156\040\122\157\157\164\040\055
\040\062\060\060\070\060\202\002\042\060\015\006\011\052\206\110
\206\367\015\001\001\001\005\000\003\202\002\017\000\060\202\002
\012\002\202\002\001\000\300\337\126\323\344\072\233\166\105\264

\023\333\377\301\266\031\213\067\101\030\225\122\107\353\027\235
\051\210\216\065\154\006\062\056\107\142\363\111\004\277\175\104
\066\261\161\314\275\132\011\163\325\331\205\104\377\221\127\045
\337\136\066\216\160\321\134\161\103\035\331\332\357\134\322\373
\033\275\072\265\313\255\243\314\104\247\015\256\041\025\077\271
\172\133\222\165\330\244\022\070\211\031\212\267\200\322\342\062
\157\126\234\221\326\210\020\013\263\164\144\222\164\140\363\366
\317\030\117\140\262\043\320\307\073\316\141\113\231\217\302\014
\320\100\262\230\334\015\250\116\243\271\012\256\140\240\255\105
\122\143\272\146\275\150\340\371\276\032\250\201\273\036\101\170
\165\323\301\376\000\125\260\207\124\350\047\220\065\035\114\063
\255\227\374\227\056\230\204\277\054\311\243\277\321\230\021\024
\355\143\370\312\230\210\130\027\231\355\105\003\227\176\074\206
\036\210\214\276\362\221\204\217\145\064\330\000\114\175\267\061
\027\132\051\172\012\030\044\060\243\067\265\172\251\001\175\046
\326\371\016\216\131\361\375\033\063\265\051\073\027\073\101\266
\041\335\324\300\075\245\237\237\037\103\120\311\273\274\154\172
\227\230\356\315\214\037\373\234\121\256\213\160\275\047\237\161
\300\153\254\175\220\146\350\327\135\072\015\260\325\302\215\325
\310\235\235\301\155\320\320\277\121\344\343\370\303\070\066\256
\326\247\165\346\257\204\103\135\223\222\014\152\007\336\073\035
\230\042\326\254\301\065\333\243\240\045\377\162\265\166\035\336
\155\351\054\146\054\122\204\320\105\222\316\034\345\345\063\035
\334\007\123\124\243\252\202\073\232\067\057\334\335\240\144\351
\346\335\275\256\374\144\205\035\074\247\311\006\336\204\377\153
\350\153\032\074\305\242\263\102\373\213\011\076\137\010\122\307
\142\304\324\005\161\277\304\144\344\370\241\203\350\076\022\233
\250\036\324\066\115\057\161\366\215\050\366\203\251\023\322\141
\301\221\273\110\300\064\217\101\214\113\114\333\151\022\377\120
\224\234\040\203\131\163\355\174\241\362\361\375\335\367\111\323
\103\130\240\126\143\312\075\075\345\065\126\131\351\016\312\040
\314\053\113\223\051\017\002\003\001\000\001\243\202\001\152\060
\202\001\146\060\022\006\003\125\035\023\001\001\377\004\010\060
\006\001\001\377\002\001\014\060\035\006\003\125\035\016\004\026
\004\024\271\011\312\234\036\333\323\154\072\153\256\355\124\361
\133\223\006\065\056\136\060\201\341\006\003\125\035\043\004\201
\331\060\201\326\200\024\271\011\312\234\036\333\323\154\072\153
\256\355\124\361\133\223\006\065\056\136\241\201\262\244\201\257
\060\201\254\061\013\060\011\006\003\125\004\006\023\002\105\125
\061\103\060\101\006\003\125\004\007\023\072\115\141\144\162\151
\144\040\050\163\145\145\040\143\165\162\162\145\156\164\040\141
\144\144\162\145\163\163\040\141\164\040\167\167\167\056\143\141
\155\145\162\146\151\162\155\141\056\143\157\155\057\141\144\144
\162\145\163\163\051\061\022\060\020\006\003\125\004\005\023\011
\101\070\062\067\064\063\062\070\067\061\033\060\031\006\003\125
\004\012\023\022\101\103\040\103\141\155\145\162\146\151\162\155
\141\040\123\056\101\056\061\047\060\045\006\003\125\004\003\023
\036\107\154\157\142\141\154\040\103\150\141\155\142\145\162\163

\151\147\156\040\122\157\157\164\040\055\040\062\060\060\070\202
\011\000\311\315\323\351\325\175\043\316\060\016\006\003\125\035
\017\001\001\377\004\004\003\002\001\006\060\075\006\003\125\035
\040\004\066\060\064\060\062\006\004\125\035\040\000\060\052\060
\050\006\010\053\006\001\005\005\007\002\001\026\034\150\164\164
\160\072\057\057\160\157\154\151\143\171\056\143\141\155\145\162
\146\151\162\155\141\056\143\157\155\060\015\006\011\052\206\110
\206\367\015\001\001\005\005\000\003\202\002\001\000\200\210\177
\160\336\222\050\331\005\224\106\377\220\127\251\361\057\337\032
\015\153\372\174\016\034\111\044\171\047\330\106\252\157\051\131
\122\210\160\022\352\335\075\365\233\123\124\157\341\140\242\250
\011\271\354\353\131\174\306\065\361\334\030\351\361\147\345\257
\272\105\340\011\336\312\104\017\302\027\016\167\221\105\172\063
\137\137\226\054\150\213\301\107\217\230\233\075\300\354\313\365
\325\202\222\204\065\321\276\066\070\126\162\061\133\107\055\252
\027\244\143\121\353\012\001\255\177\354\165\236\313\241\037\361
\177\022\261\271\344\144\177\147\326\043\052\364\270\071\135\230
\350\041\247\341\275\075\102\032\164\232\160\257\150\154\120\135
\111\317\377\373\016\135\346\054\107\327\201\072\131\000\265\163
\153\143\040\366\061\105\010\071\016\364\160\176\100\160\132\077
\320\153\102\251\164\075\050\057\002\155\165\162\225\011\215\110
\143\306\306\043\127\222\223\136\065\301\215\371\012\367\054\235
\142\034\366\255\174\335\246\061\036\266\261\307\176\205\046\372
\244\152\265\332\143\060\321\357\223\067\262\146\057\175\005\367
\347\267\113\230\224\065\300\331\072\051\301\235\262\120\063\035
\112\251\132\246\311\003\357\355\364\347\250\156\212\264\127\204
\353\244\077\320\356\252\252\207\133\143\350\223\342\153\250\324
\270\162\170\153\033\355\071\344\135\313\233\252\207\325\117\116
\000\376\331\152\237\074\061\017\050\002\001\175\230\350\247\260
\242\144\236\171\370\110\362\025\251\314\346\310\104\353\077\170
\231\362\173\161\076\074\361\230\247\305\030\022\077\346\273\050
\063\102\351\105\012\174\155\362\206\171\057\305\202\031\175\011
\211\174\262\124\166\210\256\336\301\363\314\341\156\333\061\326
\223\256\231\240\357\045\152\163\230\211\133\072\056\023\210\036
\277\300\222\224\064\033\343\047\267\213\036\157\102\377\347\351
\067\233\120\035\055\242\371\002\356\313\130\130\072\161\274\150
\343\252\301\257\034\050\037\242\334\043\145\077\201\352\256\231
\323\330\060\317\023\015\117\025\311\204\274\247\110\055\370\060
\043\167\330\106\113\171\155\366\214\355\072\177\140\021\170\364
\351\233\256\325\124\300\164\200\321\013\102\237\301

END

CKA_NSS_Mozilla_CA_POLICY

CK_BBOOL CK_TRUE

CKA_NSS_SERVER_DISTRUST_AFTER CK_BBOOL CK_FALSE

CKA_NSS_EMAIL_DISTRUST_AFTER CK_BBOOL CK_FALSE

Trust for "Global Chambersign Root - 2008"

Issuer: CN=Global Chambersign Root - 2008,O=AC Camerfirma S.A.,serialNumber=A82743287,L=Madrid (see

```
current address at www.camerfirma.com/address),C=EU
# Serial Number:00:c9:cd:d3:e9:d5:7d:23:ce
# Subject: CN=Global Chambersign Root - 2008,O=AC Camerfirma S.A.,serialNumber=A82743287,L=Madrid
(see current address at www.camerfirma.com/address),C=EU
# Not Valid Before: Fri Aug 01 12:31:40 2008
# Not Valid After : Sat Jul 31 12:31:40 2038
# Fingerprint (SHA-256):
13:63:35:43:93:34:A7:69:80:16:A0:D3:24:DE:72:28:4E:07:9D:7B:52:20:BB:8F:BD:74:78:16:EE:BE:BA:CA
# Fingerprint (SHA1): 4A:BD:EE:EC:95:0D:35:9C:89:AE:C7:52:A1:2C:5B:29:F6:D6:AA:0C
CKA_CLASS CK_OBJECT_CLASS CKO_NSS_TRUST
CKA_TOKEN CK_BBOOL CK_TRUE
CKA_PRIVATE CK_BBOOL CK_FALSE
CKA_MODIFIABLE CK_BBOOL
CK_FALSE
CKA_LABEL UTF8 "Global Chambersign Root - 2008"
CKA_CERT_SHA1_HASH MULTILINE_OCTAL
\112\275\356\354\225\015\065\234\211\256\307\122\241\054\133\051
\366\326\252\014
END
CKA_CERT_MD5_HASH MULTILINE_OCTAL
\236\200\377\170\001\014\056\301\066\275\376\226\220\156\010\363
END
CKA_ISSUER MULTILINE_OCTAL
\060\201\254\061\013\060\011\006\003\125\004\006\023\002\105\125
\061\103\060\101\006\003\125\004\007\023\072\115\141\144\162\151
\144\040\050\163\145\145\040\143\165\162\162\145\156\164\040\141
\144\144\162\145\163\163\040\141\164\040\167\167\167\056\143\141
\155\145\162\146\151\162\155\141\056\143\157\155\057\141\144\144
\162\145\163\163\051\061\022\060\020\006\003\125\004\005\023\011
\101\070\062\067\064\063\062\070\067\061\033\060\031\006\003\125
\004\012\023\022\101\103\040\103\141\155\145\162\146\151\162\155
\141\040\123\056\101\056\061\047\060\045\006\003\125\004\003\023
\036\107\154\157\142\141\154\040\103\150\141\155\142\145\162\163
\151\147\156\040\122\157\157\164\040\055\040\062\060\060\070
END
CKA_SERIAL_NUMBER
MULTILINE_OCTAL
\002\011\000\311\315\323\351\325\175\043\316
END
CKA_TRUST_SERVER_AUTH CK_TRUST CKT_NSS_MUST_VERIFY_TRUST
CKA_TRUST_EMAIL_PROTECTION CK_TRUST CKT_NSS_TRUSTED_DELEGATOR
CKA_TRUST_CODE_SIGNING CK_TRUST CKT_NSS_MUST_VERIFY_TRUST
CKA_TRUST_STEP_UP_APPROVED CK_BBOOL CK_FALSE

#
# Certificate "Go Daddy Root Certificate Authority - G2"
#
# Issuer: CN=Go Daddy Root Certificate Authority - G2,O="GoDaddy.com, Inc.",L=Scottsdale,ST=Arizona,C=US
```

```
# Serial Number: 0 (0x0)
# Subject: CN=Go Daddy Root Certificate Authority - G2,O="GoDaddy.com,
Inc.",L=Scottsdale,ST=Arizona,C=US
# Not Valid Before: Tue Sep 01 00:00:00 2009
# Not Valid After : Thu Dec 31 23:59:59 2037
# Fingerprint (SHA-256):
45:14:0B:32:47:EB:9C:C8:C5:B4:F0:D7:B5:30:91:F7:32:92:08:9E:6E:5A:63:E2:74:9D:D3:AC:A9:19:8E:DA
# Fingerprint (SHA1): 47:BE:AB:C9:22:EA:E8:0E:78:78:34:62:A7:9F:45:C2:54:FD:E6:8B
CKA_CLASS CK_OBJECT_CLASS CKO_CERTIFICATE
CKA_TOKEN CK_BBOOL CK_TRUE
CKA_PRIVATE
CK_BBOOL CK_FALSE
CKA_MODIFIABLE CK_BBOOL CK_FALSE
CKA_LABEL UTF8 "Go Daddy Root Certificate Authority - G2"
CKA_CERTIFICATE_TYPE CK_CERTIFICATE_TYPE CKC_X_509
CKA_SUBJECT MULTILINE_OCTAL
\060\201\203\061\013\060\011\006\003\125\004\006\023\002\125\123
\061\020\060\016\006\003\125\004\010\023\007\101\162\151\172\157
\156\141\061\023\060\021\006\003\125\004\007\023\012\123\143\157
\164\164\163\144\141\154\145\061\032\060\030\006\003\125\004\012
\023\021\107\157\104\141\144\144\171\056\143\157\155\054\040\111
\156\143\056\061\061\060\057\006\003\125\004\003\023\050\107\157
\040\104\141\144\144\171\040\122\157\157\164\040\103\145\162\164
\151\146\151\143\141\164\145\040\101\165\164\150\157\162\151\164
\171\040\055\040\107\062
END
CKA_ID UTF8 "0"
CKA_ISSUER MULTILINE_OCTAL
\060\201\203\061\013\060\011\006\003\125\004\006\023\002\125\123
\061\020\060\016\006\003\125\004\010\023\007\101\162\151\172\157
\156\141\061\023\060\021\006\003\125\004\007\023\012\123\143\157
\164\164\163\144\141\154\145\061\032\060\030\006\003\125\004\012
\023\021\107\157\104\141\144\144\171\056\143\157\155\054\040\111
\156\143\056\061\061\060\057\006\003\125\004\003\023\050\107\157
\040\104\141\144\144\171\040\122\157\157\164\040\103\145\162\164
\151\146\151\143\141\164\145\040\101\165\164\150\157\162\151\164
\171\040\055\040\107\062
END
CKA_SERIAL_NUMBER
MULTILINE_OCTAL
\002\001\000
END
CKA_VALUE MULTILINE_OCTAL
\060\202\003\305\060\202\002\255\240\003\002\001\002\002\001\000
\060\015\006\011\052\206\110\206\367\015\001\001\013\005\000\060
\201\203\061\013\060\011\006\003\125\004\006\023\002\125\123\061
\020\060\016\006\003\125\004\010\023\007\101\162\151\172\157\156
\141\061\023\060\021\006\003\125\004\007\023\012\123\143\157\164
```

\164\163\144\141\154\145\061\032\060\030\006\003\125\004\012\023
\021\107\157\104\141\144\144\171\056\143\157\155\054\040\111\156
\143\056\061\061\060\057\006\003\125\004\003\023\050\107\157\040
\104\141\144\144\171\040\122\157\157\164\040\103\145\162\164\151
\146\151\143\141\164\145\040\101\165\164\150\157\162\151\164\171
\040\055\040\107\062\060\036\027\015\060\071\060\071\060\061\060
\060\060\060\060\060\132\027\015\063\067\061\062\063\061\062\063
\065\071\065\071\132\060\201\203\061\013\060\011\006\003\125\004
\006\023\002\125\123\061\020\060\016\006\003\125\004\010\023\007
\101\162\151\172\157\156\141\061\023\060\021\006\003\125\004\007
\023\012\123\143\157\164\164\163\144\141\154\145\061\032\060\030
\006\003\125\004\012\023\021\107\157\104\141\144\144\171\056\143
\157\155\054\040\111\156\143\056\061\061\060\057\006\003\125\004
\003\023\050\107\157\040\104\141\144\144\171\040\122\157\157\164
\040\103\145\162\164\151\146\151\143\141\164\145\040\101\165\164
\150\157\162\151\164\171\040\055\040\107\062\060\202\001\042\060
\015\006\011\052\206\110\206\367\015\001\001\001\005\000\003\202
\001\017\000\060\202\001\012\002\202\001\001\000\277\161\142\010
\361\372\131\064\367\033\311\030\243\367\200\111\130\351\042\203
\023\246\305\040\103\001\073\204\361\346\205\111\237\047\352\366
\204\033\116\240\264\333\160\230\307\062\001\261\005\076\007\116
\356\364\372\117\057\131\060\042\347\253\031\126\153\342\200\007
\374\363\026\165\200\071\121\173\345\371\065\266\164\116\251\215
\202\023\344\266\077\251\003\203\372\242\276\212\025\152\177\336
\013\303\266\031\024\005\312\352\303\250\004\224\073\106\174\062
\015\363\000\146\042\310\215\151\155\066\214\021\030\267\323\262
\034\140\264\070\372\002\214\316\323\335\106\007\336\012\076\353
\135\174\310\174\373\260\053\123\244\222\142\151\121\045\005\141
\032\104\201\214\054\251\103\226\043\337\254\072\201\232\016\051
\305\034\251\351\135\036\266\236\236\060\012\071\316\361\210\200
\373\113\135\314\062\354\205\142\103\045\064\002\126\047\001\221
\264\073\160\052\077\156\261\350\234\210\001\175\237\324\371\333
\123\155\140\235\277\054\347\130\253\270\137\106\374\316\304\033
\003\074\011\353\111\061\134\151\106\263\340\107\002\003\001\000
\001\243\102\060\100\060\017\006\003\125\035\023\001\001\377\004
\005\060\003\001\001\377\060\016\006\003\125\035\017\001\001\377
\004\004\003\002\001\006\060\035\006\003\125\035\016\004\026\004
\024\072\232\205\007\020\147\050\266\357\366\275\005\101\156\040
\301\224\332\017\336\060\015\006\011\052\206\110\206\367\015\001
\001\013\005\000\003\202\001\001\000\231\333\135\171\325\371\227
\131\147\003\141\361\176\073\006\061\165\055\241\040\216\117\145
\207\264\367\246\234\274\330\351\057\320\333\132\356\317\164\214
\163\264\070\102\332\005\173\370\002\165\270\375\245\261\327\256
\366\327\336\023\313\123\020\176\212\106\321\227\372\267\056\053
\021\253\220\260\047\200\371\350\237\132\351\067\237\253\344\337
\154\263\205\027\235\075\331\044\117\171\221\065\326\137\004\353
\200\203\253\232\002\055\265\020\364\330\220\307\004\163\100\355
\162\045\240\251\237\354\236\253\150\022\231\127\306\217\022\072

```
\011\244\275\104\375\006\025\067\301\233\344\062\243\355\070\350
\330\144\363\054\176\024\374\002\352\237\315\377\007\150\027\333
\042\220\070\055\172\215\321\124\361\151\343\137\063\312\172\075
\173\012\343\312\177\137\071\345\342\165\272\305\166\030\063\316
\054\360\057\114\255\367\261\347\316\117\250\304\233\112\124\006
\305\177\175\325\010\017\342\034\376\176\027\270\254\136\366\324
\026\262\103\011\014\115\366\247\153\264\231\204\145\312\172\210
\342\342\104\276\134\367\352\034\365
```

END

CKA_NSS_MOZILLA_CA_POLICY

CK_BBOOL CK_TRUE

CKA_NSS_SERVER_DISTRUST_AFTER CK_BBOOL CK_FALSE

CKA_NSS_EMAIL_DISTRUST_AFTER CK_BBOOL CK_FALSE

Trust for "Go Daddy Root Certificate Authority - G2"

Issuer: CN=Go Daddy Root Certificate Authority - G2,O="GoDaddy.com, Inc.",L=Scottsdale,ST=Arizona,C=US

Serial Number: 0 (0x0)

Subject: CN=Go Daddy Root Certificate Authority - G2,O="GoDaddy.com, Inc.",L=Scottsdale,ST=Arizona,C=US

Not Valid Before: Tue Sep 01 00:00:00 2009

Not Valid After : Thu Dec 31 23:59:59 2037

Fingerprint (SHA-256):

45:14:0B:32:47:EB:9C:C8:C5:B4:F0:D7:B5:30:91:F7:32:92:08:9E:6E:5A:63:E2:74:9D:D3:AC:A9:19:8E:DA

Fingerprint

(SHA1): 47:BE:AB:C9:22:EA:E8:0E:78:78:34:62:A7:9F:45:C2:54:FD:E6:8B

CKA_CLASS CK_OBJECT_CLASS CKO_NSS_TRUST

CKA_TOKEN CK_BBOOL CK_TRUE

CKA_PRIVATE CK_BBOOL CK_FALSE

CKA_MODIFIABLE CK_BBOOL CK_FALSE

CKA_LABEL UTF8 "Go Daddy Root Certificate Authority - G2"

CKA_CERT_SHA1_HASH MULTILINE_OCTAL

```
\107\276\253\311\042\352\350\016\170\170\064\142\247\237\105\302
\124\375\346\213
```

END

CKA_CERT_MD5_HASH MULTILINE_OCTAL

```
\200\072\274\042\301\346\373\215\233\073\047\112\062\033\232\001
```

END

CKA_ISSUER MULTILINE_OCTAL

```
\060\201\203\061\013\060\011\006\003\125\004\006\023\002\125\123
\061\020\060\016\006\003\125\004\010\023\007\101\162\151\172\157
\156\141\061\023\060\021\006\003\125\004\007\023\012\123\143\157
\164\164\163\144\141\154\145\061\032\060\030\006\003\125\004\012
\023\021\107\157\104\141\144\144\171\056\143\157\155\054\040\111
\156\143\056\061\061\060\057\006\003\125\004\003\023\050\107\157
\040\104\141\144\144\171\040\122\157\157\164\040\103\145\162\164
\151\146\151\143\141\164\145\040\101\165\164\150\157\162\151\164
\171\040\055\040\107\062
```

END

```

CKA_SERIAL_NUMBER
MULTILINE_OCTAL
\002\001\000
END
CKA_TRUST_SERVER_AUTH CK_TRUST CKT_NSS_TRUSTED_DELEGATOR
CKA_TRUST_EMAIL_PROTECTION CK_TRUST CKT_NSS_MUST_VERIFY_TRUST
CKA_TRUST_CODE_SIGNING CK_TRUST CKT_NSS_MUST_VERIFY_TRUST
CKA_TRUST_STEP_UP_APPROVED CK_BBOOL CK_FALSE

#
# Certificate "Starfield Root Certificate Authority - G2"
#
# Issuer: CN=Starfield Root Certificate Authority - G2,O="Starfield Technologies,
Inc.",L=Scottsdale,ST=Arizona,C=US
# Serial Number: 0 (0x0)
# Subject: CN=Starfield Root Certificate Authority - G2,O="Starfield Technologies,
Inc.",L=Scottsdale,ST=Arizona,C=US
# Not Valid Before: Tue Sep 01 00:00:00 2009
# Not Valid After : Thu Dec 31 23:59:59 2037
# Fingerprint (SHA-256):
2C:E1:CB:0B:F9:D2:F9:E1:02:99:3F:BE:21:51:52:C3:B2:DD:0C:AB:DE:1C:68:E5:31:9B:83:91:54:DB:B7:F5
# Fingerprint (SHA1): B5:1C:06:7C:EE:2B:0C:3D:F8:55:AB:2D:92:F4:FE:39:D4:E7:0F:0E
CKA_CLASS CK_OBJECT_CLASS CKO_CERTIFICATE
CKA_TOKEN
CK_BBOOL CK_TRUE
CKA_PRIVATE CK_BBOOL CK_FALSE
CKA_MODIFIABLE CK_BBOOL CK_FALSE
CKA_LABEL UTF8 "Starfield Root Certificate Authority - G2"
CKA_CERTIFICATE_TYPE CK_CERTIFICATE_TYPE CKC_X_509
CKA_SUBJECT MULTILINE_OCTAL
\060\201\217\061\013\060\011\006\003\125\004\006\023\002\125\123
\061\020\060\016\006\003\125\004\010\023\007\101\162\151\172\157
\156\141\061\023\060\021\006\003\125\004\007\023\012\123\143\157
\164\164\163\144\141\154\145\061\045\060\043\006\003\125\004\012
\023\034\123\164\141\162\146\151\145\154\144\040\124\145\143\150
\156\157\154\157\147\151\145\163\054\040\111\156\143\056\061\062
\060\060\006\003\125\004\003\023\051\123\164\141\162\146\151\145
\154\144\040\122\157\157\164\040\103\145\162\164\151\146\151\143
\141\164\145\040\101\165\164\150\157\162\151\164\171\040\055\040
\107\062
END
CKA_ID UTF8 ""
CKA_ISSUER MULTILINE_OCTAL
\060\201\217\061\013\060\011\006\003\125\004\006\023\002\125\123
\061\020\060\016\006\003\125\004\010\023\007\101\162\151\172\157
\156\141\061\023\060\021\006\003\125\004\007\023\012\123\143\157
\164\164\163\144\141\154\145\061\045\060\043\006\003\125\004\012
\023\034\123\164\141\162\146\151\145\154\144\040\124\145\143\150

```

\156\157\154\157\147\151\145\163\054\040\111\156\143\056\061\062
\060\060\006\003\125\004\003\023\051\123\164\141\162\146\151\145
\154\144\040\122\157\157\164\040\103\145\162\164\151\146\151\143
\141\164\145\040\101\165\164\150\157\162\151\164\171\040\055\040
\107\062

END

CKA_SERIAL_NUMBER

MULTILINE_OCTAL

\002\001\000

END

CKA_VALUE MULTILINE_OCTAL

\060\202\003\335\060\202\002\305\240\003\002\001\002\002\001\000
\060\015\006\011\052\206\110\206\367\015\001\001\013\005\000\060
\201\217\061\013\060\011\006\003\125\004\006\023\002\125\123\061
\020\060\016\006\003\125\004\010\023\007\101\162\151\172\157\156
\141\061\023\060\021\006\003\125\004\007\023\012\123\143\157\164
\164\163\144\141\154\145\061\045\060\043\006\003\125\004\012\023
\034\123\164\141\162\146\151\145\154\144\040\124\145\143\150\156
\157\154\157\147\151\145\163\054\040\111\156\143\056\061\062\060
\060\006\003\125\004\003\023\051\123\164\141\162\146\151\145\154
\144\040\122\157\157\164\040\103\145\162\164\151\146\151\143\141
\164\145\040\101\165\164\150\157\162\151\164\171\040\055\040\107
\062\060\036\027\015\060\071\060\071\060\061\060\060\060\060\060
\060\132\027\015\063\067\061\062\063\061\062\063\065\071\065\071
\132\060\201\217\061\013\060\011\006\003\125\004\006\023\002\125
\123\061\020\060\016\006\003\125\004\010\023\007\101\162\151\172
\157\156\141\061\023\060\021\006\003\125\004\007\023\012\123\143
\157\164\164\163\144\141\154\145\061\045\060\043\006\003\125\004
\012\023\034\123\164\141\162\146\151\145\154\144\040\124\145\143
\150\156\157\154\157\147\151\145\163\054\040\111\156\143\056\061
\062\060\060\006\003\125\004\003\023\051\123\164\141\162\146\151
\145\154\144\040\122\157\157\164\040\103\145\162\164\151\146\151
\143\141\164\145\040\101\165\164\150\157\162\151\164\171\040\055
\040\107\062\060\202\001\042\060\015\006\011\052\206\110\206\367
\015\001\001\001\005\000\003\202\001\017\000\060\202\001\012\002
\202\001\001\000\275\355\301\003\374\366\217\374\002\261\157\133
\237\110\331\235\171\342\242\267\003\141\126\030\303\107\266\327
\312\075\065\056\211\103\367\241\151\233\336\212\032\375\023\040
\234\264\111\167\062\051\126\375\271\354\214\335\042\372\162\334
\047\141\227\356\366\132\204\354\156\031\271\211\054\334\204\133
\325\164\373\153\137\305\211\245\020\122\211\106\125\364\270\165
\034\346\177\344\124\256\113\370\125\162\127\002\031\370\027\161
\131\353\036\050\007\164\305\235\110\276\154\264\364\244\260\363
\144\067\171\222\300\354\106\136\177\341\155\123\114\142\257\315
\037\013\143\273\072\235\373\374\171\000\230\141\164\317\046\202
\100\143\363\262\162\152\031\015\231\312\324\016\165\314\067\373
\213\211\301\131\361\142\177\137\263\137\145\060\370\247\267\115
\166\132\036\166\136\064\300\350\226\126\231\212\263\360\177\244

\315\275\334\062\061\174\221\317\340\137\021\370\153\252\111\134
\321\231\224\321\242\343\143\133\011\166\265\126\142\341\113\164
\035\226\324\046\324\010\004\131\320\230\016\016\346\336\374\303
\354\037\220\361\002\003\001\000\001\243\102\060\100\060\017\006
\003\125\035\023\001\001\377\004\005\060\003\001\001\377\060\016
\006\003\125\035\017\001\001\377\004\004\003\002\001\006\060\035
\006\003\125\035\016\004\026\004\024\174\014\062\037\247\331\060
\177\304\175\150\243\142\250\241\316\253\007\133\047\060\015\006
\011\052\206\110\206\367\015\001\001\013\005\000\003\202\001\001
\000\021\131\372\045\117\003\157\224\231\073\232\037\202\205\071
\324\166\005\224\136\341\050\223\155\142\135\011\302\240\250\324
\260\165\070\361\064\152\235\344\237\212\206\046\121\346\054\321
\306\055\156\225\040\112\222\001\354\270\212\147\173\061\342\147
\056\214\225\003\046\056\103\235\112\061\366\016\265\014\273\267
\342\067\177\042\272\000\243\016\173\122\373\153\273\073\304\323
\171\121\116\315\220\364\147\007\031\310\074\106\172\015\001\175
\305\130\347\155\346\205\060\027\232\044\304\020\340\004\367\340
\362\177\324\252\012\377\102\035\067\355\224\345\144\131\022\040
\167\070\323\062\076\070\201\165\226\163\372\150\217\261\313\316
\037\305\354\372\234\176\317\176\261\361\007\055\266\374\277\312
\244\277\320\227\005\112\274\352\030\050\002\220\275\124\170\011
\041\161\323\321\175\035\331\026\260\251\141\075\320\012\000\042
\374\307\173\313\011\144\105\013\073\100\201\367\175\174\062\365
\230\312\130\216\175\052\356\220\131\163\144\371\066\164\136\045
\241\365\146\005\056\177\071\025\251\052\373\120\213\216\205\151
\364

END

CKA_NSS_Mozilla_CA_POLICY

CK_BBOOL CK_TRUE

CKA_NSS_SERVER_DISTRUST_AFTER CK_BBOOL CK_FALSE

CKA_NSS_EMAIL_DISTRUST_AFTER CK_BBOOL CK_FALSE

Trust for "Starfield Root Certificate Authority - G2"

Issuer: CN=Starfield Root Certificate Authority - G2,O="Starfield Technologies,
Inc.",L=Scottsdale,ST=Arizona,C=US

Serial Number: 0 (0x0)

Subject: CN=Starfield Root Certificate Authority - G2,O="Starfield Technologies,
Inc.",L=Scottsdale,ST=Arizona,C=US

#

Not Valid Before: Tue Sep 01 00:00:00 2009

Not Valid After : Thu Dec 31 23:59:59 2037

Fingerprint (SHA-256):

2C:E1:CB:0B:F9:D2:F9:E1:02:99:3F:BE:21:51:52:C3:B2:DD:0C:AB:DE:1C:68:E5:31:9B:83:91:54:DB:B7:F5

Fingerprint (SHA1): B5:1C:06:7C:EE:2B:0C:3D:F8:55:AB:2D:92:F4:FE:39:D4:E7:0F:0E

CKA_CLASS CK_OBJECT_CLASS CKO_NSS_TRUST

CKA_TOKEN CK_BBOOL CK_TRUE

CKA_PRIVATE CK_BBOOL CK_FALSE

CKA_MODIFIABLE CK_BBOOL CK_FALSE


```
CKA_LABEL UTF8 "Starfield Root Certificate Authority - G2"
CKA_CERT_SHA1_HASH MULTILINE_OCTAL
\265\034\006\174\356\053\014\075\370\125\253\055\222\364\376\071
\324\347\017\016
END
CKA_CERT_MD5_HASH MULTILINE_OCTAL
\326\071\201\306\122\176\226\151\374\374\312\146\355\005\362\226
END
CKA_ISSUER MULTILINE_OCTAL
\060\201\217\061\013\060\011\006\003\125\004\006\023\002\125\123
\061\020\060\016\006\003\125\004\010\023\007\101\162\151\172\157
\156\141\061\023\060\021\006\003\125\004\007\023\012\123\143\157
\164\164\163\144\141\154\145\061\045\060\043\006\003\125\004\012
\023\034\123\164\141\162\146\151\145\154\144\040\124\145\143\150
\156\157\154\157\147\151\145\163\054\040\111\156\143\056\061\062
\060\060\006\003\125\004\003\023\051\123\164\141\162\146\151\145
\154\144\040\122\157\157\164\040\103\145\162\164\151\146\151\143
\141\164\145\040\101\165\164\150\157\162\151\164\171\040\055\040
\107\062
END
CKA_SERIAL_NUMBER
MULTILINE_OCTAL
\002\001\000
END
CKA_TRUST_SERVER_AUTH CK_TRUST CKT_NSS_TRUSTED_DELEGATOR
CKA_TRUST_EMAIL_PROTECTION CK_TRUST CKT_NSS_MUST_VERIFY_TRUST
CKA_TRUST_CODE_SIGNING CK_TRUST CKT_NSS_MUST_VERIFY_TRUST
CKA_TRUST_STEP_UP_APPROVED CK_BBOOL CK_FALSE
```

```
#
# Certificate "Starfield Services Root Certificate Authority - G2"
#
# Issuer: CN=Starfield Services Root Certificate Authority - G2,O="Starfield Technologies,
Inc.",L=Scottsdale,ST=Arizona,C=US
# Serial Number: 0 (0x0)
# Subject: CN=Starfield Services Root Certificate Authority - G2,O="Starfield Technologies,
Inc.",L=Scottsdale,ST=Arizona,C=US
# Not Valid Before:
Tue Sep 01 00:00:00 2009
# Not Valid After : Thu Dec 31 23:59:59 2037
# Fingerprint (SHA-256):
56:8D:69:05:A2:C8:87:08:A4:B3:02:51:90:ED:CF:ED:B1:97:4A:60:6A:13:C6:E5:29:0F:CB:2A:E6:3E:DA:B5
# Fingerprint (SHA1): 92:5A:8F:8D:2C:6D:04:E0:66:5F:59:6A:FF:22:D8:63:E8:25:6F:3F
CKA_CLASS CK_OBJECT_CLASS CKO_CERTIFICATE
CKA_TOKEN CK_BBOOL CK_TRUE
CKA_PRIVATE CK_BBOOL CK_FALSE
CKA_MODIFIABLE CK_BBOOL CK_FALSE
CKA_LABEL UTF8 "Starfield Services Root Certificate Authority - G2"
```

CKA_CERTIFICATE_TYPE CK_CERTIFICATE_TYPE CKC_X_509

CKA_SUBJECT MULTILINE_OCTAL

\060\201\230\061\013\060\011\006\003\125\004\006\023\002\125\123
\061\020\060\016\006\003\125\004\010\023\007\101\162\151\172\157
\156\141\061\023\060\021\006\003\125\004\007\023\012\123\143\157
\164\164\163\144\141\154\145\061\045\060\043\006\003\125\004\012
\023\034\123\164\141\162\146\151\145\154\144\040\124\145\143\150
\156\157\154\157\147\151\145\163\054\040\111\156\143\056\061\073
\060\071\006\003\125\004\003\023\062\123\164\141\162\146\151\145
\154\144\040\123\145\162\166\151\143\145\163\040\122\157\157\164
\040\103\145\162\164\151\146\151\143\141\164\145\040\101\165\164
\150\157\162\151\164\171\040\055\040\107\062

END

CKA_ID

UTF8 "0"

CKA_ISSUER MULTILINE_OCTAL

\060\201\230\061\013\060\011\006\003\125\004\006\023\002\125\123
\061\020\060\016\006\003\125\004\010\023\007\101\162\151\172\157
\156\141\061\023\060\021\006\003\125\004\007\023\012\123\143\157
\164\164\163\144\141\154\145\061\045\060\043\006\003\125\004\012
\023\034\123\164\141\162\146\151\145\154\144\040\124\145\143\150
\156\157\154\157\147\151\145\163\054\040\111\156\143\056\061\073
\060\071\006\003\125\004\003\023\062\123\164\141\162\146\151\145
\154\144\040\123\145\162\166\151\143\145\163\040\122\157\157\164
\040\103\145\162\164\151\146\151\143\141\164\145\040\101\165\164
\150\157\162\151\164\171\040\055\040\107\062

END

CKA_SERIAL_NUMBER MULTILINE_OCTAL

\002\001\000

END

CKA_VALUE MULTILINE_OCTAL

\060\202\003\357\060\202\002\327\240\003\002\001\002\002\001\000
\060\015\006\011\052\206\110\206\367\015\001\001\013\005\000\060
\201\230\061\013\060\011\006\003\125\004\006\023\002\125\123\061
\020\060\016\006\003\125\004\010\023\007\101\162\151\172\157\156
\141\061\023\060\021\006\003\125\004\007\023\012\123\143\157\164
\164\163\144\141\154\145\061\045\060\043\006\003\125\004\012\023
\034\123\164\141\162\146\151\145\154\144\040\124\145\143\150\156
\157\154\157\147\151\145\163\054\040\111\156\143\056\061\073\060
\071\006\003\125\004\003\023\062\123\164\141\162\146\151\145\154
\144\040\123\145\162\166\151\143\145\163\040\122\157\157\164\040
\103\145\162\164\151\146\151\143\141\164\145\040\101\165\164\150
\157\162\151\164\171\040\055\040\107\062\060\036\027\015\060\071
\060\071\060\061\060\060\060\060\060\060\132\027\015\063\067\061
\062\063\061\062\063\065\071\065\071\132\060\201\230\061\013\060
\011\006\003\125\004\006\023\002\125\123\061\020\060\016\006\003
\125\004\010\023\007\101\162\151\172\157\156\141\061\023\060\021
\006\003\125\004\007\023\012\123\143\157\164\164\163\144\141\154

\145\061\045\060\043\006\003\125\004\012\023\034\123\164\141\162
\146\151\145\154\144\040\124\145\143\150\156\157\154\157\147\151
\145\163\054\040\111\156\143\056\061\073\060\071\006\003\125\004
\003\023\062\123\164\141\162\146\151\145\154\144\040\123\145\162
\166\151\143\145\163\040\122\157\157\164\040\103\145\162\164\151
\146\151\143\141\164\145\040\101\165\164\150\157\162\151\164\171
\040\055\040\107\062\060\202\001\042\060\015\006\011\052\206\110
\206\367\015\001\001\001\005\000\003\202\001\017\000\060\202\001
\012\002\202\001\001\000\325\014\072\304\052\371\116\342\365\276
\031\227\137\216\210\123\261\037\077\313\317\237\040\023\155\051
\072\310\017\175\074\367\153\166\070\143\331\066\140\250\233\136
\134\000\200\262\057\131\177\366\207\371\045\103\206\347\151\033
\122\232\220\341\161\343\330\055\015\116\157\366\310\111\331\266
\363\032\126\256\053\266\164\024\353\317\373\046\343\032\272\035
\226\056\152\073\130\224\211\107\126\377\045\240\223\160\123\203
\332\204\164\024\303\147\236\004\150\072\337\216\100\132\035\112
\116\317\103\221\073\347\126\326\000\160\313\122\356\173\175\256
\072\347\274\061\371\105\366\302\140\317\023\131\002\053\200\314
\064\107\337\271\336\220\145\155\002\317\054\221\246\246\347\336
\205\030\111\174\146\116\243\072\155\251\265\356\064\056\272\015
\003\270\063\337\107\353\261\153\215\045\331\233\316\201\321\105
\106\062\226\160\207\336\002\016\111\103\205\266\154\163\273\144
\352\141\101\254\311\324\124\337\207\057\307\042\262\046\314\237
\131\124\150\237\374\276\052\057\304\125\034\165\100\140\027\205
\002\125\071\213\177\005\002\003\001\000\001\243\102\060\100\060
\017\006\003\125\035\023\001\001\377\004\005\060\003\001\001\377
\060\016\006\003\125\035\017\001\001\377\004\004\003\002\001\006
\060\035\006\003\125\035\016\004\026\004\024\234\137\000\337\252
\001\327\060\053\070\210\242\270\155\112\234\362\021\221\203\060
\015\006\011\052\206\110\206\367\015\001\001\013\005\000\003\202
\001\001\000\113\066\246\204\167\151\335\073\031\237\147\043\010
\157\016\141\311\375\204\334\137\330\066\201\315\330\033\101\055
\237\140\335\307\032\150\331\321\156\206\341\210\043\317\023\336
\103\317\342\064\263\004\235\037\051\325\277\370\136\310\325\301
\275\356\222\157\062\164\362\221\202\057\275\202\102\172\255\052
\267\040\175\115\274\172\125\022\302\025\352\275\367\152\225\056
\154\164\237\317\034\264\362\305\001\243\205\320\162\076\255\163
\253\013\233\165\014\155\105\267\216\224\254\226\067\265\240\320
\217\025\107\016\343\350\203\335\217\375\357\101\001\167\314\047
\251\142\205\063\362\067\010\357\161\317\167\006\336\310\031\035
\210\100\317\175\106\035\377\036\307\341\316\377\043\333\306\372
\215\125\116\251\002\347\107\021\106\076\364\375\275\173\051\046
\273\251\141\142\067\050\266\055\052\366\020\206\144\311\160\247
\322\255\267\051\160\171\352\074\332\143\045\237\375\150\267\060
\354\160\373\165\212\267\155\140\147\262\036\310\271\351\330\250
\157\002\213\147\015\115\046\127\161\332\040\374\301\112\120\215
\261\050\272

END

```

CKA_NSS_Mozilla_CA_POLICY
CK_BBOOL CK_TRUE
CKA_NSS_SERVER_DISTRUST_AFTER CK_BBOOL CK_FALSE
CKA_NSS_EMAIL_DISTRUST_AFTER CK_BBOOL CK_FALSE

# Trust for "Starfield Services Root Certificate Authority - G2"
# Issuer: CN=Starfield Services Root Certificate Authority - G2,O="Starfield Technologies,
Inc.",L=Scottsdale,ST=Arizona,C=US
# Serial Number: 0 (0x0)
# Subject: CN=Starfield Services Root Certificate Authority - G2,O="Starfield Technologies,
Inc.",L=Scottsdale,ST=Arizona,C=US
# Not Valid Before: Tue Sep 01 00:00:00 2009
# Not Valid After : Thu Dec 31 23:59:59 2037
# Fingerprint (SHA-256):
56:8D:69:05:A2:C8:87:08:A4:B3:02:51:90:ED:CF:ED:B1:97:4A:60:6A:13:C6:E5:29:0F:CB:2A:E6:3E:DA:B5
# Fingerprint (SHA1): 92:5A:8F:8D:2C:6D:04:E0:66:5F:59:6A:FF:22:D8:63:E8:25:6F:3F
CKA_CLASS CK_OBJECT_CLASS CKO_NSS_TRUST
CKA_TOKEN CK_BBOOL CK_TRUE
CKA_PRIVATE CK_BBOOL CK_FALSE
CKA_MODIFIABLE CK_BBOOL CK_FALSE
CKA_LABEL UTF8 "Starfield Services Root
Certificate Authority - G2"
CKA_CERT_SHA1_HASH MULTILINE_OCTAL
\222\132\217\215\054\155\004\340\146\137\131\152\377\042\330\143
\350\045\157\077
END
CKA_CERT_MD5_HASH MULTILINE_OCTAL
\027\065\164\257\173\141\034\353\364\371\074\342\356\100\371\242
END
CKA_ISSUER MULTILINE_OCTAL
\060\201\230\061\013\060\011\006\003\125\004\006\023\002\125\123
\061\020\060\016\006\003\125\004\010\023\007\101\162\151\172\157
\156\141\061\023\060\021\006\003\125\004\007\023\012\123\143\157
\164\164\163\144\141\154\145\061\045\060\043\006\003\125\004\012
\023\034\123\164\141\162\146\151\145\154\144\040\124\145\143\150
\156\157\154\157\147\151\145\163\054\040\111\156\143\056\061\073
\060\071\006\003\125\004\003\023\062\123\164\141\162\146\151\145
\154\144\040\123\145\162\166\151\143\145\163\040\122\157\157\164
\040\103\145\162\164\151\146\151\143\141\164\145\040\101\165\164
\150\157\162\151\164\171\040\055\040\107\062
END
CKA_SERIAL_NUMBER MULTILINE_OCTAL
\002\001\000
END
CKA_TRUST_SERVER_AUTH CK_TRUST CKT_NSS_TRUSTED_DELEGATOR
CKA_TRUST_EMAIL_PROTECTION
CK_TRUST CKT_NSS_MUST_VERIFY_TRUST
CKA_TRUST_CODE_SIGNING CK_TRUST CKT_NSS_MUST_VERIFY_TRUST

```

CKA_TRUST_STEP_UP_APPROVED CK_BBOOL CK_FALSE

#

Certificate "AffirmTrust Commercial"

#

Issuer: CN=AffirmTrust Commercial,O=AffirmTrust,C=US

Serial Number:77:77:06:27:26:a9:b1:7c

Subject: CN=AffirmTrust Commercial,O=AffirmTrust,C=US

Not Valid Before: Fri Jan 29 14:06:06 2010

Not Valid After : Tue Dec 31 14:06:06 2030

Fingerprint (SHA-256):

03:76:AB:1D:54:C5:F9:80:3C:E4:B2:E2:01:A0:EE:7E:EF:7B:57:B6:36:E8:A9:3C:9B:8D:48:60:C9:6F:5F:A7

Fingerprint (SHA1): F9:B5:B6:32:45:5F:9C:BE:EC:57:5F:80:DC:E9:6E:2C:C7:B2:78:B7

CKA_CLASS CK_OBJECT_CLASS CKO_CERTIFICATE

CKA_TOKEN CK_BBOOL CK_TRUE

CKA_PRIVATE CK_BBOOL CK_FALSE

CKA_MODIFIABLE CK_BBOOL CK_FALSE

CKA_LABEL UTF8 "AffirmTrust Commercial"

CKA_CERTIFICATE_TYPE CK_CERTIFICATE_TYPE CKC_X_509

CKA_SUBJECT MULTILINE_OCTAL

\060\104\061\013\060\011\006\003\125\004\006\023\002\125\123\061
\024\060\022\006\003\125\004\012\014\013\101\146\146\151\162\155
\124\162\165\163\164\061\037\060\035\006\003\125\004\003\014\026
\101\146\146\151\162\155\124\162\165\163\164\040\103\157\155\155
\145\162\143\151\141\154

END

CKA_ID

UTF8 "0"

CKA_ISSUER MULTILINE_OCTAL

\060\104\061\013\060\011\006\003\125\004\006\023\002\125\123\061
\024\060\022\006\003\125\004\012\014\013\101\146\146\151\162\155
\124\162\165\163\164\061\037\060\035\006\003\125\004\003\014\026
\101\146\146\151\162\155\124\162\165\163\164\040\103\157\155\155
\145\162\143\151\141\154

END

CKA_SERIAL_NUMBER MULTILINE_OCTAL

\002\010\167\167\006\047\046\251\261\174

END

CKA_VALUE MULTILINE_OCTAL

\060\202\003\114\060\202\002\064\240\003\002\001\002\002\010\167
\167\006\047\046\251\261\174\060\015\006\011\052\206\110\206\367
\015\001\001\013\005\000\060\104\061\013\060\011\006\003\125\004
\006\023\002\125\123\061\024\060\022\006\003\125\004\012\014\013
\101\146\146\151\162\155\124\162\165\163\164\061\037\060\035\006
\003\125\004\003\014\026\101\146\146\151\162\155\124\162\165\163
\164\040\103\157\155\155\145\162\143\151\141\154\060\036\027\015
\061\060\060\061\062\071\061\064\060\066\060\066\132\027\015\063
\060\061\062\063\061\061\064\060\066\060\066\132\060\104\061\013

\060\011\006\003\125\004\006\023\002\125\123\061\024\060\022\006
\003\125\004\012\014\013\101\146\146\151\162\155\124\162\165\163
\164\061\037\060\035\006\003\125\004\003\014\026\101\146\146\151
\162\155\124\162\165\163\164\040\103\157\155\155\145\162\143\151
\141\154\060\202\001\042\060\015\006\011\052\206\110\206\367\015
\001\001\001\005\000\003\202\001\017\000\060\202\001\012\002\202
\001\001\000\366\033\117\147\007\053\241\025\365\006\042\313\037
\001\262\343\163\105\006\104\111\054\273\111\045\024\326\316\303
\267\253\054\117\306\101\062\224\127\372\022\247\133\016\342\217
\037\036\206\031\247\252\265\055\271\137\015\212\302\257\205\065
\171\062\055\273\034\142\067\362\261\133\112\075\312\315\161\137
\351\102\276\224\350\310\336\371\042\110\144\306\345\253\306\053
\155\255\005\360\372\325\013\317\232\345\360\120\244\213\073\107
\245\043\133\172\172\370\063\077\270\357\231\227\343\040\301\326
\050\211\317\224\373\271\105\355\343\100\027\021\324\164\360\013
\061\342\053\046\152\233\114\127\256\254\040\076\272\105\172\005
\363\275\233\151\025\256\175\116\040\143\304\065\166\072\007\002
\311\067\375\307\107\356\350\361\166\035\163\025\362\227\244\265
\310\172\171\331\102\252\053\177\134\376\316\046\117\243\146\201
\065\257\104\272\124\036\034\060\062\145\235\346\074\223\136\120
\116\172\343\072\324\156\314\032\373\371\322\067\256\044\052\253
\127\003\042\050\015\111\165\177\267\050\332\165\277\216\343\334
\016\171\061\002\003\001\000\001\243\102\060\100\060\035\006\003
\125\035\016\004\026\004\024\235\223\306\123\213\136\312\257\077
\237\036\017\345\231\225\274\044\366\224\217\060\017\006\003\125
\035\023\001\001\377\004\005\060\003\001\001\377\060\016\006\003
\125\035\017\001\001\377\004\004\003\002\001\006\060\015\006\011
\052\206\110\206\367\015\001\001\013\005\000\003\202\001\001\000
\130\254\364\004\016\315\300\015\377\012\375\324\272\026\137\051
\275\173\150\231\130\111\322\264\035\067\115\177\047\175\106\006
\135\103\306\206\056\076\163\262\046\175\117\223\251\266\304\052
\232\253\041\227\024\261\336\214\323\253\211\025\330\153\044\324
\361\026\256\330\244\134\324\177\121\216\355\030\001\261\223\143
\275\274\370\141\200\232\236\261\316\102\160\342\251\175\006\045
\175\047\241\376\157\354\263\036\044\332\343\113\125\032\000\073
\065\264\073\331\327\135\060\375\201\023\211\362\302\006\053\355
\147\304\216\311\103\262\134\153\025\211\002\274\142\374\116\362
\265\063\252\262\157\323\012\242\120\343\366\073\350\056\104\302
\333\146\070\251\063\126\110\361\155\033\063\215\015\214\077\140
\067\235\323\312\155\176\064\176\015\237\162\166\213\033\237\162
\375\122\065\101\105\002\226\057\034\262\232\163\111\041\261\111
\107\105\107\264\357\152\064\021\311\115\232\314\131\267\326\002
\236\132\116\145\265\224\256\033\337\051\260\026\361\277\000\236
\007\072\027\144\265\004\265\043\041\231\012\225\073\227\174\357
END

CKA_NSS_MOZILLA_CA_POLICY

CK_BBOOL CK_TRUE

CKA_NSS_SERVER_DISTRUST_AFTER CK_BBOOL CK_FALSE

CKA_NSS_EMAIL_DISTRICT_AFTER CK_BBOOL CK_FALSE

Trust for "AffirmTrust Commercial"

Issuer: CN=AffirmTrust Commercial,O=AffirmTrust,C=US

Serial Number:77:77:06:27:26:a9:b1:7c

Subject: CN=AffirmTrust Commercial,O=AffirmTrust,C=US

Not Valid Before: Fri Jan 29 14:06:06 2010

Not Valid After : Tue Dec 31 14:06:06 2030

Fingerprint (SHA-256):

03:76:AB:1D:54:C5:F9:80:3C:E4:B2:E2:01:A0:EE:7E:EF:7B:57:B6:36:E8:A9:3C:9B:8D:48:60:C9:6F:5F:A7

Fingerprint (SHA1): F9:B5:B6:32:45:5F:9C:BE:EC:57:5F:80:DC:E9:6E:2C:C7:B2:78:B7

CKA_CLASS CK_OBJECT_CLASS CKO_NSS_TRUST

CKA_TOKEN CK_BBOOL CK_TRUE

CKA_PRIVATE CK_BBOOL CK_FALSE

CKA_MODIFIABLE CK_BBOOL CK_FALSE

CKA_LABEL UTF8 "AffirmTrust Commercial"

CKA_CERT_SHA1_HASH MULTILINE_OCTAL

\371\265\266\062\105\137\234\276\354\127\137\200\334\351\156\054

\307\262\170\267

END

CKA_CERT_MD5_HASH

MULTILINE_OCTAL

\202\222\272\133\357\315\212\157\246\075\125\371\204\366\326\267

END

CKA_ISSUER MULTILINE_OCTAL

\060\104\061\013\060\011\006\003\125\004\006\023\002\125\123\061

\024\060\022\006\003\125\004\012\014\013\101\146\146\151\162\155

\124\162\165\163\164\061\037\060\035\006\003\125\004\003\014\026

\101\146\146\151\162\155\124\162\165\163\164\040\103\157\155\155

\145\162\143\151\141\154

END

CKA_SERIAL_NUMBER MULTILINE_OCTAL

\002\010\167\167\006\047\046\251\261\174

END

CKA_TRUST_SERVER_AUTH CK_TRUST CKT_NSS_TRUSTED_DELEGATOR

CKA_TRUST_EMAIL_PROTECTION CK_TRUST CKT_NSS_MUST_VERIFY_TRUST

CKA_TRUST_CODE_SIGNING CK_TRUST CKT_NSS_MUST_VERIFY_TRUST

CKA_TRUST_STEP_UP_APPROVED CK_BBOOL CK_FALSE

#

Certificate "AffirmTrust Networking"

#

Issuer: CN=AffirmTrust Networking,O=AffirmTrust,C=US

Serial Number:7c:4f:04:39:1c:d4:99:2d

Subject: CN=AffirmTrust Networking,O=AffirmTrust,C=US

Not Valid Before: Fri Jan 29 14:08:24 2010

Not Valid After : Tue Dec

31 14:08:24 2030

Fingerprint (SHA-256):

0A:81:EC:5A:92:97:77:F1:45:90:4A:F3:8D:5D:50:9F:66:B5:E2:C5:8F:CD:B5:31:05:8B:0E:17:F3:F0:B4:1B

Fingerprint (SHA1): 29:36:21:02:8B:20:ED:02:F5:66:C5:32:D1:D6:ED:90:9F:45:00:2F

CKA_CLASS CK_OBJECT_CLASS CKO_CERTIFICATE

CKA_TOKEN CK_BBOOL CK_TRUE

CKA_PRIVATE CK_BBOOL CK_FALSE

CKA_MODIFIABLE CK_BBOOL CK_FALSE

CKA_LABEL UTF8 "AffirmTrust Networking"

CKA_CERTIFICATE_TYPE CK_CERTIFICATE_TYPE CKC_X_509

CKA_SUBJECT MULTILINE_OCTAL

\060\104\061\013\060\011\006\003\125\004\006\023\002\125\123\061
\024\060\022\006\003\125\004\012\014\013\101\146\146\151\162\155
\124\162\165\163\164\061\037\060\035\006\003\125\004\003\014\026
\101\146\146\151\162\155\124\162\165\163\164\040\116\145\164\167
\157\162\153\151\156\147

END

CKA_ID UTF8 "0"

CKA_ISSUER MULTILINE_OCTAL

\060\104\061\013\060\011\006\003\125\004\006\023\002\125\123\061
\024\060\022\006\003\125\004\012\014\013\101\146\146\151\162\155
\124\162\165\163\164\061\037\060\035\006\003\125\004\003\014\026
\101\146\146\151\162\155\124\162\165\163\164\040\116\145\164\167
\157\162\153\151\156\147

END

CKA_SERIAL_NUMBER

MULTILINE_OCTAL

\002\010\174\117\004\071\034\324\231\055

END

CKA_VALUE MULTILINE_OCTAL

\060\202\003\114\060\202\002\064\240\003\002\001\002\002\010\174
\117\004\071\034\324\231\055\060\015\006\011\052\206\110\206\367
\015\001\001\005\005\000\060\104\061\013\060\011\006\003\125\004
\006\023\002\125\123\061\024\060\022\006\003\125\004\012\014\013
\101\146\146\151\162\155\124\162\165\163\164\061\037\060\035\006
\003\125\004\003\014\026\101\146\146\151\162\155\124\162\165\163
\164\040\116\145\164\167\157\162\153\151\156\147\060\036\027\015
\061\060\060\061\062\071\061\064\060\070\062\064\132\027\015\063
\060\061\062\063\061\061\064\060\070\062\064\132\060\104\061\013
\060\011\006\003\125\004\006\023\002\125\123\061\024\060\022\006
\003\125\004\012\014\013\101\146\146\151\162\155\124\162\165\163
\164\061\037\060\035\006\003\125\004\003\014\026\101\146\146\151
\162\155\124\162\165\163\164\040\116\145\164\167\157\162\153\151
\156\147\060\202\001\042\060\015\006\011\052\206\110\206\367\015
\001\001\001\005\000\003\202\001\017\000\060\202\001\012\002\202
\001\001\000\264\204\314\063\027\056\153\224\154\153\141\122\240
\353\243\317\171\224\114\345\224\200\231\313\125\144\104\145\217
\147\144\342\006\343\134\067\111\366\057\233\204\204\036\055\362

\140\235\060\116\314\204\205\342\054\317\036\236\376\066\253\063
\167\065\104\330\065\226\032\075\066\350\172\016\330\325\107\241
\152\151\213\331\374\273\072\256\171\132\325\364\326\161\273\232
\220\043\153\232\267\210\164\207\014\036\137\271\236\055\372\253
\123\053\334\273\166\076\223\114\010\010\214\036\242\043\034\324
\152\255\042\272\231\001\056\155\145\313\276\044\146\125\044\113
\100\104\261\033\327\341\302\205\300\336\020\077\075\355\270\374
\361\361\043\123\334\277\145\227\157\331\371\100\161\215\175\275
\225\324\316\276\240\136\047\043\336\375\246\320\046\016\000\051
\353\074\106\360\075\140\277\077\120\322\334\046\101\121\236\024
\067\102\004\243\160\127\250\033\207\355\055\372\173\356\214\012
\343\251\146\211\031\313\101\371\335\104\066\141\317\342\167\106
\310\175\366\364\222\201\066\375\333\064\361\162\176\363\014\026
\275\264\025\002\003\001\000\001\243\102\060\100\060\035\006\003
\125\035\016\004\026\004\024\007\037\322\347\234\332\302\156\242
\100\264\260\172\120\020\120\164\304\310\275\060\017\006\003\125
\035\023\001\001\377\004\005\060\003\001\001\377\060\016\006\003
\125\035\017\001\001\377\004\004\003\002\001\006\060\015\006\011
\052\206\110\206\367\015\001\001\005\005\000\003\202\001\001\000
\211\127\262\026\172\250\302\375\326\331\233\233\064\302\234\264
\062\024\115\247\244\337\354\276\247\276\370\103\333\221\067\316
\264\062\056\120\125\032\065\116\166\103\161\040\357\223\167\116
\025\160\056\207\303\301\035\155\334\313\265\047\324\054\126\321
\122\123\072\104\322\163\310\304\033\005\145\132\142\222\234\356
\101\215\061\333\347\064\352\131\041\325\001\172\327\144\270\144
\071\315\311\355\257\355\113\003\110\247\240\231\001\200\334\145
\243\066\256\145\131\110\117\202\113\310\145\361\127\035\345\131
\056\012\077\154\330\321\365\345\011\264\154\124\000\012\340\025
\115\207\165\155\267\130\226\132\335\155\322\000\240\364\233\110
\276\303\067\244\272\066\340\174\207\205\227\032\025\242\336\056
\242\133\275\257\030\371\220\120\315\160\131\370\047\147\107\313
\307\240\007\072\175\321\054\135\154\031\072\146\265\175\375\221
\157\202\261\276\010\223\333\024\107\361\242\067\307\105\236\074
\307\167\257\144\250\223\337\366\151\203\202\140\362\111\102\064
\355\132\000\124\205\034\026\066\222\014\134\372\246\255\277\333
END

CKA_NSS_MOZILLA_CA_POLICY

CK_BBOOL CK_TRUE

CKA_NSS_SERVER_DISTRUST_AFTER CK_BBOOL CK_FALSE

CKA_NSS_EMAIL_DISTRUST_AFTER CK_BBOOL CK_FALSE

Trust for "AffirmTrust Networking"

Issuer: CN=AffirmTrust Networking,O=AffirmTrust,C=US

Serial Number:7c:4f:04:39:1c:d4:99:2d

Subject: CN=AffirmTrust Networking,O=AffirmTrust,C=US

Not Valid Before: Fri Jan

29 14:08:24 2010

Not Valid After : Tue Dec 31 14:08:24 2030

```

# Fingerprint (SHA-256):
0A:81:EC:5A:92:97:77:F1:45:90:4A:F3:8D:5D:50:9F:66:B5:E2:C5:8F:CD:B5:31:05:8B:0E:17:F3:F0:B4:1B
# Fingerprint (SHA1): 29:36:21:02:8B:20:ED:02:F5:66:C5:32:D1:D6:ED:90:9F:45:00:2F
CKA_CLASS CK_OBJECT_CLASS CKO_NSS_TRUST
CKA_TOKEN CK_BBOOL CK_TRUE
CKA_PRIVATE CK_BBOOL CK_FALSE
CKA_MODIFIABLE CK_BBOOL CK_FALSE
CKA_LABEL UTF8 "AffirmTrust Networking"
CKA_CERT_SHA1_HASH MULTILINE_OCTAL
\051\066\041\002\213\040\355\002\365\146\305\062\321\326\355\220
\237\105\000\057
END
CKA_CERT_MD5_HASH MULTILINE_OCTAL
\102\145\312\276\001\232\232\114\251\214\101\111\315\300\325\177
END
CKA_ISSUER MULTILINE_OCTAL
\060\104\061\013\060\011\006\003\125\004\006\023\002\125\123\061
\024\060\022\006\003\125\004\012\014\013\101\146\146\151\162\155
\124\162\165\163\164\061\037\060\035\006\003\125\004\003\014\026
\101\146\146\151\162\155\124\162\165\163\164\040\116\145\164\167
\157\162\153\151\156\147
END
CKA_SERIAL_NUMBER MULTILINE_OCTAL
\002\010\174\117\004\071\034\324\231\055
END
CKA_TRUST_SERVER_AUTH
CK_TRUST CKT_NSS_TRUSTED_DELEGATOR
CKA_TRUST_EMAIL_PROTECTION CK_TRUST CKT_NSS_MUST_VERIFY_TRUST
CKA_TRUST_CODE_SIGNING CK_TRUST CKT_NSS_MUST_VERIFY_TRUST
CKA_TRUST_STEP_UP_APPROVED CK_BBOOL CK_FALSE

#
# Certificate "AffirmTrust Premium"
#
# Issuer: CN=AffirmTrust Premium,O=AffirmTrust,C=US
# Serial Number:6d:8c:14:46:b1:a6:0a:ee
# Subject: CN=AffirmTrust Premium,O=AffirmTrust,C=US
# Not Valid Before: Fri Jan 29 14:10:36 2010
# Not Valid After : Mon Dec 31 14:10:36 2040
# Fingerprint (SHA-256):
70:A7:3F:7F:37:6B:60:07:42:48:90:45:34:B1:14:82:D5:BF:0E:69:8E:CC:49:8D:F5:25:77:EB:F2:E9:3B:9A
# Fingerprint (SHA1): D8:A6:33:2C:E0:03:6F:B1:85:F6:63:4F:7D:6A:06:65:26:32:28:27
CKA_CLASS CK_OBJECT_CLASS CKO_CERTIFICATE
CKA_TOKEN CK_BBOOL CK_TRUE
CKA_PRIVATE CK_BBOOL CK_FALSE
CKA_MODIFIABLE CK_BBOOL CK_FALSE
CKA_LABEL UTF8 "AffirmTrust Premium"
CKA_CERTIFICATE_TYPE CK_CERTIFICATE_TYPE CKC_X_509

```

CKA_SUBJECT MULTILINE_OCTAL
\\060\\101\\061\\013\\060\\011\\006\\003\\125\\004\\006\\023\\002\\125\\123\\061
\\024\\060\\022\\006\\003\\125\\004\\012\\014\\013\\101\\146\\146\\151\\162\\155
\\124\\162\\165\\163\\164\\061\\034\\060\\032\\006\\003\\125\\004\\003\\014\\023
\\101\\146\\146\\151\\162\\155\\124\\162\\165\\163\\164\\040\\120\\162\\145\\155
\\151\\165\\155
END
CKA_ID
UTF8 "0"
CKA_ISSUER MULTILINE_OCTAL
\\060\\101\\061\\013\\060\\011\\006\\003\\125\\004\\006\\023\\002\\125\\123\\061
\\024\\060\\022\\006\\003\\125\\004\\012\\014\\013\\101\\146\\146\\151\\162\\155
\\124\\162\\165\\163\\164\\061\\034\\060\\032\\006\\003\\125\\004\\003\\014\\023
\\101\\146\\146\\151\\162\\155\\124\\162\\165\\163\\164\\040\\120\\162\\145\\155
\\151\\165\\155
END
CKA_SERIAL_NUMBER MULTILINE_OCTAL
\\002\\010\\155\\214\\024\\106\\261\\246\\012\\356
END
CKA_VALUE MULTILINE_OCTAL
\\060\\202\\005\\106\\060\\202\\003\\056\\240\\003\\002\\001\\002\\002\\010\\155
\\214\\024\\106\\261\\246\\012\\356\\060\\015\\006\\011\\052\\206\\110\\206\\367
\\015\\001\\001\\014\\005\\000\\060\\101\\061\\013\\060\\011\\006\\003\\125\\004
\\006\\023\\002\\125\\123\\061\\024\\060\\022\\006\\003\\125\\004\\012\\014\\013
\\101\\146\\146\\151\\162\\155\\124\\162\\165\\163\\164\\061\\034\\060\\032\\006
\\003\\125\\004\\003\\014\\023\\101\\146\\146\\151\\162\\155\\124\\162\\165\\163
\\164\\040\\120\\162\\145\\155\\151\\165\\155\\060\\036\\027\\015\\061\\060\\060
\\061\\062\\071\\061\\064\\061\\060\\063\\066\\132\\027\\015\\064\\060\\061\\062
\\063\\061\\061\\064\\061\\060\\063\\066\\132\\060\\101\\061\\013\\060\\011\\006
\\003\\125\\004\\006\\023\\002\\125\\123\\061\\024\\060\\022\\006\\003\\125\\004
\\012\\014\\013\\101\\146\\146\\151\\162\\155\\124\\162\\165\\163\\164\\061\\034
\\060\\032\\006\\003\\125\\004\\003\\014\\023\\101\\146\\146\\151\\162\\155\\124
\\162\\165\\163\\164\\040\\120\\162\\145\\155\\151\\165\\155\\060\\202\\002\\042
\\060\\015\\006\\011\\052\\206\\110\\206\\367\\015\\001\\001\\001\\005\\000\\003
\\202\\002\\017\\000\\060\\202\\002\\012\\002\\202\\002\\001\\000\\304\\022\\337
\\251\\137\\376\\101\\335\\335\\365\\237\\212\\343\\366\\254\\341\\074\\170\\232
\\274\\330\\360\\177\\172\\240\\063\\052\\334\\215\\040\\133\\256\\055\\157\\347
\\223\\331\\066\\160\\152\\150\\317\\216\\121\\243\\205\\133\\147\\004\\240\\020
\\044\\157\\135\\050\\202\\301\\227\\127\\330\\110\\051\\023\\266\\341\\276\\221
\\115\\337\\205\\014\\123\\030\\232\\036\\044\\242\\117\\217\\360\\242\\205\\013
\\313\\364\\051\\177\\322\\244\\130\\356\\046\\115\\311\\252\\250\\173\\232\\331
\\372\\070\\336\\104\\127\\025\\345\\370\\214\\310\\331\\110\\342\\015\\026\\047
\\035\\036\\310\\203\\205\\045\\267\\272\\252\\125\\101\\314\\003\\042\\113\\055
\\221\\215\\213\\346\\211\\257\\146\\307\\351\\377\\053\\351\\074\\254\\332\\322
\\263\\303\\341\\150\\234\\211\\370\\172\\000\\126\\336\\364\\125\\225\\154\\373
\\272\\144\\335\\142\\213\\337\\013\\167\\062\\353\\142\\314\\046\\232\\233\\273
\\252\\142\\203\\114\\264\\006\\172\\060\\310\\051\\277\\355\\006\\115\\227\\271
\\034\\304\\061\\053\\325\\137\\274\\123\\022\\027\\234\\231\\127\\051\\146\\167

\141\041\061\007\056\045\111\235\030\362\356\363\053\161\214\265
\272\071\007\111\167\374\357\056\222\220\005\215\055\057\167\173
\357\103\277\065\273\232\330\371\163\247\054\362\320\127\356\050
\116\046\137\217\220\150\011\057\270\370\334\006\351\056\232\076
\121\247\321\042\304\012\247\070\110\154\263\371\377\175\253\206
\127\343\272\326\205\170\167\272\103\352\110\177\366\330\276\043
\155\036\277\321\066\154\130\134\361\356\244\031\124\032\365\003
\322\166\346\341\214\275\074\263\323\110\113\342\310\370\177\222
\250\166\106\234\102\145\076\244\036\301\007\003\132\106\055\270
\227\363\267\325\262\125\041\357\272\334\114\000\227\373\024\225
\047\063\277\350\103\107\106\322\010\231\026\140\073\232\176\322
\346\355\070\352\354\001\036\074\110\126\111\011\307\114\067\000
\236\210\016\300\163\341\157\146\351\162\107\060\076\020\345\013
\003\311\232\102\000\154\305\224\176\141\304\212\337\177\202\032
\013\131\304\131\062\167\263\274\140\151\126\071\375\264\006\173
\054\326\144\066\331\275\110\355\204\037\176\245\042\217\052\270
\102\364\202\267\324\123\220\170\116\055\032\375\201\157\104\327
\073\001\164\226\102\340\000\342\056\153\352\305\356\162\254\273
\277\376\352\252\250\370\334\366\262\171\212\266\147\002\003\001
\000\001\243\102\060\100\060\035\006\003\125\035\016\004\026\004
\024\235\300\147\246\014\042\331\046\365\105\253\246\145\122\021
\047\330\105\254\143\060\017\006\003\125\035\023\001\001\377\004
\005\060\003\001\001\377\060\016\006\003\125\035\017\001\001\377
\004\004\003\002\001\006\060\015\006\011\052\206\110\206\367\015
\001\001\014\005\000\003\202\002\001\000\263\127\115\020\142\116
\072\344\254\352\270\034\257\062\043\310\263\111\132\121\234\166
\050\215\171\252\127\106\027\325\365\122\366\267\104\350\010\104
\277\030\204\322\013\200\315\305\022\375\000\125\005\141\207\101
\334\265\044\236\074\304\330\310\373\160\236\057\170\226\203\040
\066\336\174\017\151\023\210\245\165\066\230\010\246\306\337\254
\316\343\130\326\267\076\336\272\363\353\064\100\330\242\201\365
\170\077\057\325\245\374\331\242\324\136\004\016\027\255\376\101
\360\345\262\162\372\104\202\063\102\350\055\130\367\126\214\142
\077\272\102\260\234\014\134\176\056\145\046\134\123\117\000\262
\170\176\241\015\231\055\215\270\035\216\242\304\260\375\140\320
\060\244\216\310\004\142\251\304\355\065\336\172\227\355\016\070
\136\222\057\223\160\245\251\234\157\247\175\023\035\176\306\010
\110\261\136\147\353\121\010\045\351\346\045\153\122\051\221\234
\322\071\163\010\127\336\231\006\264\133\235\020\006\341\302\000
\250\270\034\112\002\012\024\320\301\101\312\373\214\065\041\175
\202\070\362\251\124\221\031\065\223\224\155\152\072\305\262\320
\273\211\206\223\350\233\311\017\072\247\172\270\241\360\170\106
\372\374\067\057\345\212\204\363\337\376\004\331\241\150\240\057
\044\342\011\225\006\325\225\312\341\044\226\353\174\366\223\005
\273\355\163\351\055\321\165\071\327\347\044\333\330\116\137\103
\217\236\320\024\071\277\125\160\110\231\127\061\264\234\356\112
\230\003\226\060\037\140\006\356\033\043\376\201\140\043\032\107
\142\205\245\314\031\064\200\157\263\254\032\343\237\360\173\110

```
\255\325\001\331\147\266\251\162\223\352\055\146\265\262\270\344
\075\074\262\357\114\214\352\353\007\277\253\065\232\125\206\274
\030\246\265\250\136\264\203\154\153\151\100\323\237\334\361\303
\151\153\271\341\155\011\364\361\252\120\166\012\172\175\172\027
\241\125\226\102\231\061\011\335\140\021\215\005\060\176\346\216
\106\321\235\024\332\307\027\344\005\226\214\304\044\265\033\317
\024\007\262\100\370\243\236\101\206\274\004\320\153\226\310\052
\200\064\375\277\357\006\243\335\130\305\205\075\076\217\376\236
\051\340\266\270\011\150\031\034\030\103
```

END

CKA_NSS_Mozilla_CA_POLICY

CK_BBOOL CK_TRUE

CKA_NSS_SERVER_DISTRUST_AFTER CK_BBOOL CK_FALSE

CKA_NSS_EMAIL_DISTRUST_AFTER CK_BBOOL CK_FALSE

Trust for "AffirmTrust Premium"

Issuer: CN=AffirmTrust Premium,O=AffirmTrust,C=US

Serial Number:6d:8c:14:46:b1:a6:0a:ee

Subject: CN=AffirmTrust Premium,O=AffirmTrust,C=US

Not Valid Before: Fri Jan 29 14:10:36 2010

Not Valid After : Mon Dec 31 14:10:36 2040

Fingerprint (SHA-256):

70:A7:3F:7F:37:6B:60:07:42:48:90:45:34:B1:14:82:D5:BF:0E:69:8E:CC:49:8D:F5:25:77:EB:F2:E9:3B:9A

Fingerprint (SHA1): D8:A6:33:2C:E0:03:6F:B1:85:F6:63:4F:7D:6A:06:65:26:32:28:27

CKA_CLASS CK_OBJECT_CLASS CKO_NSS_TRUST

CKA_TOKEN CK_BBOOL CK_TRUE

CKA_PRIVATE CK_BBOOL CK_FALSE

CKA_MODIFIABLE CK_BBOOL CK_FALSE

CKA_LABEL UTF8 "AffirmTrust Premium"

CKA_CERT_SHA1_HASH

MULTILINE_OCTAL

```
\330\246\063\054\340\003\157\261\205\366\143\117\175\152\006\145
\046\062\050\047
```

END

CKA_CERT_MD5_HASH MULTILINE_OCTAL

```
\304\135\016\110\266\254\050\060\116\012\274\371\070\026\207\127
```

END

CKA_ISSUER MULTILINE_OCTAL

```
\060\101\061\013\060\011\006\003\125\004\006\023\002\125\123\061
\024\060\022\006\003\125\004\012\014\013\101\146\146\151\162\155
\124\162\165\163\164\061\034\060\032\006\003\125\004\003\014\023
\101\146\146\151\162\155\124\162\165\163\164\040\120\162\145\155
\151\165\155
```

END

CKA_SERIAL_NUMBER MULTILINE_OCTAL

```
\002\010\155\214\024\106\261\246\012\356
```

END

CKA_TRUST_SERVER_AUTH CK_TRUST CKT_NSS_TRUSTED_DELEGATOR

```

CKA_TRUST_EMAIL_PROTECTION CK_TRUST CKT_NSS_MUST_VERIFY_TRUST
CKA_TRUST_CODE_SIGNING CK_TRUST CKT_NSS_MUST_VERIFY_TRUST
CKA_TRUST_STEP_UP_APPROVED CK_BBOOL CK_FALSE

#
# Certificate "AffirmTrust Premium ECC"
#
# Issuer: CN=AffirmTrust Premium ECC,O=AffirmTrust,C=US
# Serial Number:74:97:25:8a:c7:3f:7a:54
# Subject: CN=AffirmTrust Premium ECC,O=AffirmTrust,C=US
#
Not Valid Before: Fri Jan 29 14:20:24 2010
# Not Valid After : Mon Dec 31 14:20:24 2040
# Fingerprint (SHA-256):
BD:71:FD:F6:DA:97:E4:CF:62:D1:64:7A:DD:25:81:B0:7D:79:AD:F8:39:7E:B4:EC:BA:9C:5E:84:88:82:14:23
# Fingerprint (SHA1): B8:23:6B:00:2F:1D:16:86:53:01:55:6C:11:A4:37:CA:EB:FF:C3:BB
CKA_CLASS CK_OBJECT_CLASS CKO_CERTIFICATE
CKA_TOKEN CK_BBOOL CK_TRUE
CKA_PRIVATE CK_BBOOL CK_FALSE
CKA_MODIFIABLE CK_BBOOL CK_FALSE
CKA_LABEL UTF8 "AffirmTrust Premium ECC"
CKA_CERTIFICATE_TYPE CK_CERTIFICATE_TYPE CKC_X_509
CKA_SUBJECT MULTILINE_OCTAL
\060\105\061\013\060\011\006\003\125\004\006\023\002\125\123\061
\024\060\022\006\003\125\004\012\014\013\101\146\146\151\162\155
\124\162\165\163\164\061\040\060\036\006\003\125\004\003\014\027
\101\146\146\151\162\155\124\162\165\163\164\040\120\162\145\155
\151\165\155\040\105\103\103
END
CKA_ID UTF8 "0"
CKA_ISSUER MULTILINE_OCTAL
\060\105\061\013\060\011\006\003\125\004\006\023\002\125\123\061
\024\060\022\006\003\125\004\012\014\013\101\146\146\151\162\155
\124\162\165\163\164\061\040\060\036\006\003\125\004\003\014\027
\101\146\146\151\162\155\124\162\165\163\164\040\120\162\145\155
\151\165\155\040\105\103\103
END
CKA_SERIAL_NUMBER
MULTILINE_OCTAL
\002\010\164\227\045\212\307\077\172\124
END
CKA_VALUE MULTILINE_OCTAL
\060\202\001\376\060\202\001\205\240\003\002\001\002\002\010\164
\227\045\212\307\077\172\124\060\012\006\010\052\206\110\316\075
\004\003\003\060\105\061\013\060\011\006\003\125\004\006\023\002
\125\123\061\024\060\022\006\003\125\004\012\014\013\101\146\146
\151\162\155\124\162\165\163\164\061\040\060\036\006\003\125\004
\003\014\027\101\146\146\151\162\155\124\162\165\163\164\040\120

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\162\145\155\151\165\155\040\105\103\103\060\036\027\015\061\060
\060\061\062\071\061\064\062\060\062\064\132\027\015\064\060\061
\062\063\061\061\064\062\060\062\064\132\060\105\061\013\060\011
\006\003\125\004\006\023\002\125\123\061\024\060\022\006\003\125
\004\012\014\013\101\146\146\151\162\155\124\162\165\163\164\061
\040\060\036\006\003\125\004\003\014\027\101\146\146\151\162\155
\124\162\165\163\164\040\120\162\145\155\151\165\155\040\105\103
\103\060\166\060\020\006\007\052\206\110\316\075\002\001\006\005
\053\201\004\000\042\003\142\000\004\015\060\136\033\025\235\003
\320\241\171\065\267\072\074\222\172\312\025\034\315\142\363\234
\046\134\007\075\345\124\372\243\326\314\022\352\364\024\137\350
\216\031\253\057\056\110\346\254\030\103\170\254\320\067\303\275
\262\315\054\346\107\342\032\346\143\270\075\056\057\170\304\117
\333\364\017\244\150\114\125\162\153\225\035\116\030\102\225\170
\314\067\074\221\342\233\145\053\051\243\102\060\100\060\035\006
\003\125\035\016\004\026\004\024\232\257\051\172\300\021\065\065
\046\121\060\000\303\152\376\100\325\256\326\074\060\017\006\003
\125\035\023\001\001\377\004\005\060\003\001\001\377\060\016\006
\003\125\035\017\001\001\377\004\004\003\002\001\006\060\012\006
\010\052\206\110\316\075\004\003\003\003\147\000\060\144\002\060
\027\011\363\207\210\120\132\257\310\300\102\277\107\137\365\154
\152\206\340\304\047\164\344\070\123\327\005\177\033\064\343\306
\057\263\312\011\074\067\235\327\347\270\106\361\375\241\342\161
\002\060\102\131\207\103\324\121\337\272\323\011\062\132\316\210
\176\127\075\234\137\102\153\365\007\055\265\360\202\223\371\131
\157\256\144\372\130\345\213\036\343\143\276\265\201\315\157\002
\214\171

END

CKA_NSS_MOZILLA_CA_POLICY

CK_BBOOL CK_TRUE

CKA_NSS_SERVER_DISTRUST_AFTER CK_BBOOL CK_FALSE

CKA_NSS_EMAIL_DISTRUST_AFTER CK_BBOOL CK_FALSE

Trust for "AffirmTrust Premium ECC"

Issuer: CN=AffirmTrust Premium ECC,O=AffirmTrust,C=US

Serial Number:74:97:25:8a:c7:3f:7a:54

Subject: CN=AffirmTrust Premium ECC,O=AffirmTrust,C=US

Not Valid Before: Fri Jan 29 14:20:24 2010

Not Valid After : Mon Dec 31 14:20:24 2040

Fingerprint (SHA-256):

BD:71:FD:F6:DA:97:E4:CF:62:D1:64:7A:DD:25:81:B0:7D:79:AD:F8:39:7E:B4:EC:BA:9C:5E:84:88:82:14:23

Fingerprint (SHA1): B8:23:6B:00:2F:1D:16:86:53:01:55:6C:11:A4:37:CA:EB:FF:C3:BB

CKA_CLASS

CK_OBJECT_CLASS CKO_NSS_TRUST

CKA_TOKEN CK_BBOOL CK_TRUE

CKA_PRIVATE CK_BBOOL CK_FALSE

CKA_MODIFIABLE CK_BBOOL CK_FALSE

CKA_LABEL UTF8 "AffirmTrust Premium ECC"

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CKA_CERT_SHA1_HASH MULTILINE_OCTAL
\270\043\153\000\057\035\026\206\123\001\125\154\021\244\067\312
\353\377\303\273
END
CKA_CERT_MD5_HASH MULTILINE_OCTAL
\144\260\011\125\317\261\325\231\342\276\023\253\246\135\352\115
END
CKA_ISSUER MULTILINE_OCTAL
\060\105\061\013\060\011\006\003\125\004\006\023\002\125\123\061
\024\060\022\006\003\125\004\012\014\013\101\146\146\151\162\155
\124\162\165\163\164\061\040\060\036\006\003\125\004\003\014\027
\101\146\146\151\162\155\124\162\165\163\164\040\120\162\145\155
\151\165\155\040\105\103\103
END
CKA_SERIAL_NUMBER MULTILINE_OCTAL
\002\010\164\227\045\212\307\077\172\124
END
CKA_TRUST_SERVER_AUTH CK_TRUST CKT_NSS_TRUSTED_DELEGATOR
CKA_TRUST_EMAIL_PROTECTION CK_TRUST CKT_NSS_MUST_VERIFY_TRUST
CKA_TRUST_CODE_SIGNING CK_TRUST CKT_NSS_MUST_VERIFY_TRUST
CKA_TRUST_STEP_UP_APPROVED
CK_BBOOL CK_FALSE

#
# Certificate "Certum Trusted Network CA"
#
# Issuer: CN=Certum Trusted Network CA,OU=Certum Certification Authority,O=Unizeto Technologies
S.A.,C=PL
# Serial Number: 279744 (0x444c0)
# Subject: CN=Certum Trusted Network CA,OU=Certum Certification Authority,O=Unizeto Technologies
S.A.,C=PL
# Not Valid Before: Wed Oct 22 12:07:37 2008
# Not Valid After : Mon Dec 31 12:07:37 2029
# Fingerprint (SHA-256):
5C:58:46:8D:55:F5:8E:49:7E:74:39:82:D2:B5:00:10:B6:D1:65:37:4A:CF:83:A7:D4:A3:2D:B7:68:C4:40:8E
# Fingerprint (SHA1): 07:E0:32:E0:20:B7:2C:3F:19:2F:06:28:A2:59:3A:19:A7:0F:06:9E
CKA_CLASS CK_OBJECT_CLASS CKO_CERTIFICATE
CKA_TOKEN CK_BBOOL CK_TRUE
CKA_PRIVATE CK_BBOOL CK_FALSE
CKA_MODIFIABLE CK_BBOOL CK_FALSE
CKA_LABEL UTF8 "Certum Trusted Network CA"
CKA_CERTIFICATE_TYPE CK_CERTIFICATE_TYPE CKC_X_509
CKA_SUBJECT MULTILINE_OCTAL
\060\176\061\013\060\011\006\003\125\004\006\023\002\120\114\061
\042\060\040\006\003\125\004\012\023\031\125\156\151\172\145\164
\157\040\124\145\143\150\156\157\154\157\147\151\145\163\040\123
\056\101\056\061\047\060\045\006\003\125\004\013\023\036\103\145
\162\164\165\155\040\103\145\162\164\151\146\151\143\141\164\151

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\157\156\040\101\165\164\150\157\162\151\164\171\061\042\060\040
\006\003\125\004\003\023\031\103\145\162\164\165\155\040\124\162
\165\163\164\145\144\040\116\145\164\167\157\162\153\040\103\101
END
CKA_ID
UTF8 "0"
CKA_ISSUER MULTILINE_OCTAL
\060\176\061\013\060\011\006\003\125\004\006\023\002\120\114\061
\042\060\040\006\003\125\004\012\023\031\125\156\151\172\145\164
\157\040\124\145\143\150\156\157\154\157\147\151\145\163\040\123
\056\101\056\061\047\060\045\006\003\125\004\013\023\036\103\145
\162\164\165\155\040\103\145\162\164\151\146\151\143\141\164\151
\157\156\040\101\165\164\150\157\162\151\164\171\061\042\060\040
\006\003\125\004\003\023\031\103\145\162\164\165\155\040\124\162
\165\163\164\145\144\040\116\145\164\167\157\162\153\040\103\101
END
CKA_SERIAL_NUMBER MULTILINE_OCTAL
\002\003\004\104\300
END
CKA_VALUE
MULTILINE_OCTAL
\060\202\003\273\060\202\002\243\240\003\002\001\002\002\003\004
\104\300\060\015\006\011\052\206\110\206\367\015\001\001\005\005
\000\060\176\061\013\060\011\006\003\125\004\006\023\002\120\114
\061\042\060\040\006\003\125\004\012\023\031\125\156\151\172\145
\164\157\040\124\145\143\150\156\157\154\157\147\151\145\163\040
\123\056\101\056\061\047\060\045\006\003\125\004\013\023\036\103
\145\162\164\165\155\040\103\145\162\164\151\146\151\143\141\164
\151\157\156\040\101\165\164\150\157\162\151\164\171\061\042\060
\040\006\003\125\004\003\023\031\103\145\162\164\165\155\040\124
\162\165\163\164\145\144\040\116\145\164\167\157\162\153\040\103
\101\060\036\027\015\060\070\061\060\062\062\061\062\060\067\063
\067\132\027\015\062\071\061\062\063\061\061\062\060\067\063\067
\132\060\176\061\013\060\011\006\003\125\004\006\023\002\120\114
\061\042\060\040\006\003\125\004\012\023\031\125\156\151\172\145
\164\157\040\124\145\143\150\156\157\154\157\147\151\145\163\040
\123\056\101\056\061\047\060\045\006\003\125\004\013\023\036\103
\145\162\164\165\155\040\103\145\162\164\151\146\151\143\141\164
\151\157\156\040\101\165\164\150\157\162\151\164\171\061\042\060
\040\006\003\125\004\003\023\031\103\145\162\164\165\155\040\124
\162\165\163\164\145\144\040\116\145\164\167\157\162\153\040\103
\101\060\202\001\042\060\015\006\011\052\206\110\206\367\015\001
\001\001\005\000\003\202\001\017\000\060\202\001\012\002\202\001
\001\000\343\373\175\243\162\272\302\360\311\024\207\365\153\001
\116\341\156\100\007\272\155\047\135\177\367\133\055\263\132\307
\121\137\253\244\062\246\141\207\266\156\017\206\322\060\002\227
\370\327\151\127\241\030\071\135\152\144\171\306\001\131\254\074
\061\112\070\174\322\004\322\113\050\350\040\137\073\007\242\314

\115\163\333\363\256\117\307\126\325\132\247\226\211\372\363\253
\150\324\043\206\131\047\317\011\047\274\254\156\162\203\034\060
\162\337\340\242\351\322\341\164\165\031\275\052\236\173\025\124
\004\033\327\103\071\255\125\050\305\342\032\273\364\300\344\256
\070\111\063\314\166\205\237\071\105\322\244\236\362\022\214\121
\370\174\344\055\177\365\254\137\353\026\237\261\055\321\272\314
\221\102\167\114\045\311\220\070\157\333\360\314\373\216\036\227
\131\076\325\140\116\346\005\050\355\111\171\023\113\272\110\333
\057\371\162\323\071\312\376\037\330\064\162\365\264\100\317\061
\001\303\354\336\021\055\027\135\037\270\120\321\136\031\247\151
\336\007\063\050\312\120\225\371\247\124\313\124\206\120\105\251
\371\111\002\003\001\000\001\243\102\060\100\060\017\006\003\125
\035\023\001\001\377\004\005\060\003\001\001\377\060\035\006\003
\125\035\016\004\026\004\024\010\166\315\313\007\377\044\366\305
\315\355\273\220\274\342\204\067\106\165\367\060\016\006\003\125
\035\017\001\001\377\004\004\003\002\001\006\060\015\006\011\052
\206\110\206\367\015\001\001\005\005\000\003\202\001\001\000\246
\250\255\042\316\001\075\246\243\377\142\320\110\235\213\136\162
\260\170\104\343\334\034\257\011\375\043\110\372\275\052\304\271
\125\004\265\020\243\215\047\336\013\202\143\320\356\336\014\067
\171\101\133\042\262\260\232\101\134\246\160\340\324\320\167\313
\043\323\000\340\154\126\057\341\151\015\015\331\252\277\041\201
\120\331\006\245\250\377\225\067\320\252\376\342\263\365\231\055
\105\204\212\345\102\011\327\164\002\057\367\211\330\231\351\274
\047\324\107\215\272\015\106\034\167\317\024\244\034\271\244\061
\304\234\050\164\003\064\377\063\031\046\245\351\015\164\267\076
\227\306\166\350\047\226\243\146\335\341\256\362\101\133\312\230
\126\203\163\160\344\206\032\322\061\101\272\057\276\055\023\132
\166\157\116\350\116\201\016\077\133\003\042\240\022\276\146\130
\021\112\313\003\304\264\052\052\055\226\027\340\071\124\274\110
\323\166\047\235\232\055\006\246\311\354\071\322\253\333\237\232
\013\047\002\065\051\261\100\225\347\371\350\234\125\210\031\106
\326\267\064\365\176\316\071\232\331\070\361\121\367\117\054

END

CKA_NSS_MOZILLA_CA_POLICY

CK_BBOOL CK_TRUE

CKA_NSS_SERVER_DISTRUST_AFTER

CK_BBOOL CK_FALSE

CKA_NSS_EMAIL_DISTRUST_AFTER CK_BBOOL CK_FALSE

Trust for "Certum Trusted Network CA"

Issuer: CN=Certum Trusted Network CA,OU=Certum Certification Authority,O=Unizeto Technologies
S.A.,C=PL

Serial Number: 279744 (0x444c0)

Subject: CN=Certum Trusted Network CA,OU=Certum Certification Authority,O=Unizeto Technologies
S.A.,C=PL

Not Valid Before: Wed Oct 22 12:07:37 2008

Not Valid After : Mon Dec 31 12:07:37 2029

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# Fingerprint (SHA-256):
5C:58:46:8D:55:F5:8E:49:7E:74:39:82:D2:B5:00:10:B6:D1:65:37:4A:CF:83:A7:D4:A3:2D:B7:68:C4:40:8E
# Fingerprint (SHA1): 07:E0:32:E0:20:B7:2C:3F:19:2F:06:28:A2:59:3A:19:A7:0F:06:9E
CKA_CLASS CK_OBJECT_CLASS CKO_NSS_TRUST
CKA_TOKEN CK_BBOOL CK_TRUE
CKA_PRIVATE CK_BBOOL CK_FALSE
CKA_MODIFIABLE CK_BBOOL CK_FALSE
CKA_LABEL UTF8 "Certum Trusted Network CA"
CKA_CERT_SHA1_HASH MULTILINE_OCTAL
\007\340\062\340\040\267\054\077\031\057\006\050\242\131\072\031
\247\017\006\236
END
CKA_CERT_MD5_HASH MULTILINE_OCTAL
\325\351\201\100\305\030\151\374\106\054\211\165\142\017\252\170
END
CKA_ISSUER
MULTILINE_OCTAL
\060\176\061\013\060\011\006\003\125\004\006\023\002\120\114\061
\042\060\040\006\003\125\004\012\023\031\125\156\151\172\145\164
\157\040\124\145\143\150\156\157\154\157\147\151\145\163\040\123
\056\101\056\061\047\060\045\006\003\125\004\013\023\036\103\145
\162\164\165\155\040\103\145\162\164\151\146\151\143\141\164\151
\157\156\040\101\165\164\150\157\162\151\164\171\061\042\060\040
\006\003\125\004\003\023\031\103\145\162\164\165\155\040\124\162
\165\163\164\145\144\040\116\145\164\167\157\162\153\040\103\101
END
CKA_SERIAL_NUMBER MULTILINE_OCTAL
\002\003\004\104\300
END
CKA_TRUST_SERVER_AUTH CK_TRUST CKT_NSS_TRUSTED_DELEGATOR
CKA_TRUST_EMAIL_PROTECTION CK_TRUST CKT_NSS_TRUSTED_DELEGATOR
CKA_TRUST_CODE_SIGNING CK_TRUST CKT_NSS_MUST_VERIFY_TRUST
CKA_TRUST_STEP_UP_APPROVED CK_BBOOL CK_FALSE

#
# Certificate "TWCA Root Certification Authority"
#
# Issuer: CN=TWCA Root Certification Authority,OU=Root
CA,O=TAIWAN-CA,C=TW
# Serial Number: 1 (0x1)
# Subject: CN=TWCA Root Certification Authority,OU=Root CA,O=TAIWAN-CA,C=TW
# Not Valid Before: Thu Aug 28 07:24:33 2008
# Not Valid After : Tue Dec 31 15:59:59 2030
# Fingerprint (SHA-256):
BF:D8:8F:E1:10:1C:41:AE:3E:80:1B:F8:BE:56:35:0E:E9:BA:D1:A6:B9:BD:51:5E:DC:5C:6D:5B:87:11:AC:44
# Fingerprint (SHA1): CF:9E:87:6D:D3:EB:FC:42:26:97:A3:B5:A3:7A:A0:76:A9:06:23:48
CKA_CLASS CK_OBJECT_CLASS CKO_CERTIFICATE
CKA_TOKEN CK_BBOOL CK_TRUE

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CKA_PRIVATE CK_BBOOL CK_FALSE
CKA_MODIFIABLE CK_BBOOL CK_FALSE
CKA_LABEL UTF8 "TWCA Root Certification Authority"
CKA_CERTIFICATE_TYPE CK_CERTIFICATE_TYPE CKC_X_509
CKA_SUBJECT MULTILINE_OCTAL
\060\137\061\013\060\011\006\003\125\004\006\023\002\124\127\061
\022\060\020\006\003\125\004\012\014\011\124\101\111\127\101\116
\055\103\101\061\020\060\016\006\003\125\004\013\014\007\122\157
\157\164\040\103\101\061\052\060\050\006\003\125\004\003\014\041
\124\127\103\101\040\122\157\157\164\040\103\145\162\164\151\146
\151\143\141\164\151\157\156\040\101\165\164\150\157\162\151\164
\171
END
CKA_ID
UTF8 "0"
CKA_ISSUER MULTILINE_OCTAL
\060\137\061\013\060\011\006\003\125\004\006\023\002\124\127\061
\022\060\020\006\003\125\004\012\014\011\124\101\111\127\101\116
\055\103\101\061\020\060\016\006\003\125\004\013\014\007\122\157
\157\164\040\103\101\061\052\060\050\006\003\125\004\003\014\041
\124\127\103\101\040\122\157\157\164\040\103\145\162\164\151\146
\151\143\141\164\151\157\156\040\101\165\164\150\157\162\151\164
\171
END
CKA_SERIAL_NUMBER MULTILINE_OCTAL
\002\001\001
END
CKA_VALUE MULTILINE_OCTAL
\060\202\003\173\060\202\002\143\240\003\002\001\002\002\001\001
\060\015\006\011\052\206\110\206\367\015\001\001\005\005\000\060
\137\061\013\060\011\006\003\125\004\006\023\002\124\127\061\022
\060\020\006\003\125\004\012\014\011\124\101\111\127\101\116\055
\103\101\061\020\060\016\006\003\125\004\013\014\007\122\157\157
\164\040\103\101\061\052\060\050\006\003\125\004\003\014\041\124
\127\103\101\040\122\157\157\164\040\103\145\162\164\151\146\151
\143\141\164\151\157\156\040\101\165\164\150\157\162\151\164\171
\060\036\027\015\060\070\060\070\062\070\060\067\062\064\063\063
\132\027\015\063\060\061\062\063\061\061\065\065\071\065\071\132
\060\137\061\013\060\011\006\003\125\004\006\023\002\124\127\061
\022\060\020\006\003\125\004\012\014\011\124\101\111\127\101\116
\055\103\101\061\020\060\016\006\003\125\004\013\014\007\122\157
\157\164\040\103\101\061\052\060\050\006\003\125\004\003\014\041
\124\127\103\101\040\122\157\157\164\040\103\145\162\164\151\146
\151\143\141\164\151\157\156\040\101\165\164\150\157\162\151\164
\171\060\202\001\042\060\015\006\011\052\206\110\206\367\015\001
\001\001\005\000\003\202\001\017\000\060\202\001\012\002\202\001
\001\000\260\176\162\270\244\003\224\346\247\336\011\070\221\112
\021\100\207\247\174\131\144\024\173\265\021\020\335\376\277\325

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\300\273\126\342\205\045\364\065\162\017\370\123\320\101\341\104
\001\302\264\034\303\061\102\026\107\205\063\042\166\262\012\157
\017\345\045\120\117\205\206\276\277\230\056\020\147\036\276\021
\005\206\005\220\304\131\320\174\170\020\260\200\134\267\341\307
\053\165\313\174\237\256\265\321\235\043\067\143\247\334\102\242
\055\222\004\033\120\301\173\270\076\033\311\126\004\213\057\122
\233\255\251\126\351\301\377\255\251\130\207\060\266\201\367\227
\105\374\031\127\073\053\157\344\107\364\231\105\376\035\361\370
\227\243\210\035\067\034\134\217\340\166\045\232\120\370\240\124
\377\104\220\166\043\322\062\306\303\253\006\277\374\373\277\363
\255\175\222\142\002\133\051\323\065\243\223\232\103\144\140\135
\262\372\062\377\073\004\257\115\100\152\371\307\343\357\043\375
\153\313\345\017\213\070\015\356\012\374\376\017\230\237\060\061
\335\154\122\145\371\213\201\276\042\341\034\130\003\272\221\033
\211\007\002\003\001\000\001\243\102\060\100\060\016\006\003\125
\035\017\001\001\377\004\004\003\002\001\006\060\017\006\003\125
\035\023\001\001\377\004\005\060\003\001\001\377\060\035\006\003
\125\035\016\004\026\004\024\152\070\133\046\215\336\213\132\362
\117\172\124\203\031\030\343\010\065\246\272\060\015\006\011\052
\206\110\206\367\015\001\001\005\005\000\003\202\001\001\000\074
\325\167\075\332\337\211\272\207\014\010\124\152\040\120\222\276
\260\101\075\271\046\144\203\012\057\350\100\300\227\050\047\202
\060\112\311\223\377\152\347\246\000\177\211\102\232\326\021\345
\123\316\057\314\362\332\005\304\376\342\120\304\072\206\175\314
\332\176\020\011\073\222\065\052\123\262\376\353\053\005\331\154
\135\346\320\357\323\152\146\236\025\050\205\172\350\202\000\254
\036\247\011\151\126\102\323\150\121\030\276\124\232\277\104\101
\272\111\276\040\272\151\134\356\270\167\315\316\154\037\255\203
\226\030\175\016\265\024\071\204\361\050\351\055\243\236\173\036
\172\162\132\203\263\171\157\357\264\374\320\012\245\130\117\106
\337\373\155\171\131\362\204\042\122\256\017\314\373\174\073\347
\152\312\107\141\303\172\370\323\222\004\037\270\040\204\341\066
\124\026\307\100\336\073\212\163\334\337\306\011\114\337\354\332
\377\324\123\102\241\311\362\142\035\042\203\074\227\305\371\031
\142\047\254\145\042\327\323\074\306\345\216\262\123\314\111\316
\274\060\376\173\016\063\220\373\355\322\024\221\037\007\257

END

CKA_NSS_Mozilla_CA_POLICY

CK_BBOOL CK_TRUE

CKA_NSS_SERVER_DISTRUST_AFTER CK_BBOOL CK_FALSE

CKA_NSS_EMAIL_DISTRUST_AFTER CK_BBOOL CK_FALSE

Trust for "TWCA Root Certification Authority"

Issuer: CN=TWCA Root Certification Authority,OU=Root CA,O=TAIWAN-CA,C=TW

Serial Number: 1 (0x1)

Subject: CN=TWCA Root Certification Authority,OU=Root CA,O=TAIWAN-CA,C=TW

Not Valid Before: Thu Aug 28 07:24:33 2008

Not Valid After : Tue Dec 31 15:59:59 2030

```

# Fingerprint (SHA-256):
BF:D8:8F:E1:10:1C:41:AE:3E:80:1B:F8:BE:56:35:0E:E9:BA:D1:A6:B9:BD:51:5E:DC:5C:6D:5B:87:11:AC:44
# Fingerprint (SHA1): CF:9E:87:6D:D3:EB:FC:42:26:97:A3:B5:A3:7A:A0:76:A9:06:23:48
CKA_CLASS CK_OBJECT_CLASS CKO_NSS_TRUST
CKA_TOKEN CK_BBOOL CK_TRUE
CKA_PRIVATE CK_BBOOL CK_FALSE
CKA_MODIFIABLE
CK_BBOOL CK_FALSE
CKA_LABEL UTF8 "TWCA Root Certification Authority"
CKA_CERT_SHA1_HASH MULTILINE_OCTAL
\317\236\207\155\323\353\374\102\046\227\243\265\243\172\240\166
\251\006\043\110
END
CKA_CERT_MD5_HASH MULTILINE_OCTAL
\252\010\217\366\371\173\267\362\261\247\036\233\352\352\275\171
END
CKA_ISSUER MULTILINE_OCTAL
\060\137\061\013\060\011\006\003\125\004\006\023\002\124\127\061
\022\060\020\006\003\125\004\012\014\011\124\101\111\127\101\116
\055\103\101\061\020\060\016\006\003\125\004\013\014\007\122\157
\157\164\040\103\101\061\052\060\050\006\003\125\004\003\014\041
\124\127\103\101\040\122\157\157\164\040\103\145\162\164\151\146
\151\143\141\164\151\157\156\040\101\165\164\150\157\162\151\164
\171
END
CKA_SERIAL_NUMBER MULTILINE_OCTAL
\002\001\001
END
CKA_TRUST_SERVER_AUTH CK_TRUST CKT_NSS_TRUSTED_DELEGATOR
CKA_TRUST_EMAIL_PROTECTION CK_TRUST CKT_NSS_TRUSTED_DELEGATOR
CKA_TRUST_CODE_SIGNING CK_TRUST CKT_NSS_MUST_VERIFY_TRUST
CKA_TRUST_STEP_UP_APPROVED CK_BBOOL CK_FALSE

#
#
Certificate "Explicitly Distrust DigiNotar Root CA"
#
# Issuer: E=info@diginotar.nl,CN=DigiNotar Root CA,O=DigiNotar,C=NL
# Serial Number:0f:ff:ff:ff:ff:ff:ff:ff:ff:ff:ff:ff:ff:ff:ff:ff
# Subject: E=info@diginotar.nl,CN=DigiNotar Root CA,O=DigiNotar,C=NL
# Not Valid Before: Fri Jul 27 17:19:37 2007
# Not Valid After : Mon Mar 31 18:19:22 2025
# Fingerprint (MD5): 0A:A4:D5:CC:BA:B4:FB:A3:59:E3:E6:01:DD:53:D9:4E
# Fingerprint (SHA1): C1:77:CB:4B:E0:B4:26:8E:F5:C7:CF:45:99:22:B9:B0:CE:BA:21:2F
CKA_CLASS CK_OBJECT_CLASS CKO_CERTIFICATE
CKA_TOKEN CK_BBOOL CK_TRUE
CKA_PRIVATE CK_BBOOL CK_FALSE
CKA_MODIFIABLE CK_BBOOL CK_FALSE

```

```
CKA_LABEL UTF8 "Explicitly Distrust DigiNotar Root CA"
CKA_CERTIFICATE_TYPE CK_CERTIFICATE_TYPE CKC_X_509
CKA_SUBJECT MULTILINE_OCTAL
\060\137\061\013\060\011\006\003\125\004\006\023\002\116\114\061
\022\060\020\006\003\125\004\012\023\011\104\151\147\151\116\157
\164\141\162\061\032\060\030\006\003\125\004\003\023\021\104\151
\147\151\116\157\164\141\162\040\122\157\157\164\040\103\101\061
\040\060\036\006\011\052\206\110\206\367\015\001\011\001\026\021
\151\156\146\157\100\144\151\147\151\156\157\164\141\162\056\156
\154
END
CKA_ID
UTF8 "0"
CKA_ISSUER MULTILINE_OCTAL
\060\137\061\013\060\011\006\003\125\004\006\023\002\116\114\061
\022\060\020\006\003\125\004\012\023\011\104\151\147\151\116\157
\164\141\162\061\032\060\030\006\003\125\004\003\023\021\104\151
\147\151\116\157\164\141\162\040\122\157\157\164\040\103\101\061
\040\060\036\006\011\052\206\110\206\367\015\001\011\001\026\021
\151\156\146\157\100\144\151\147\151\156\157\164\141\162\056\156
\154
END
CKA_SERIAL_NUMBER MULTILINE_OCTAL
\002\020\017\377\377\377\377\377\377\377\377\377\377\377\377\377
\377\377
END
CKA_VALUE MULTILINE_OCTAL
\060\202\005\212\060\202\003\162\240\003\002\001\002\002\020\017
\377\377\377\377\377\377\377\377\377\377\377\377\377\377\377\060
\015\006\011\052\206\110\206\367\015\001\001\005\005\000\060\137
\061\013\060\011\006\003\125\004\006\023\002\116\114\061\022\060
\020\006\003\125\004\012\023\011\104\151\147\151\116\157\164\141
\162\061\032\060\030\006\003\125\004\003\023\021\104\151\147\151
\116\157\164\141\162\040\122\157\157\164\040\103\101\061\040\060
\036\006\011\052\206\110\206\367\015\001\011\001\026\021\151\156
\146\157\100\144\151\147\151\156\157\164\141\162\056\156\154\060
\036\027\015\060\067\060\067\062\067\061\067\061\071\063\067\132
\027\015\062\065\060\063\063\061\061\070\061\071\062\062\132\060
\137\061\013\060\011\006\003\125\004\006\023\002\116\114\061\022
\060\020\006\003\125\004\012\023\011\104\151\147\151\116\157\164
\141\162\061\032\060\030\006\003\125\004\003\023\021\104\151\147
\151\116\157\164\141\162\040\122\157\157\164\040\103\101\061\040
\060\036\006\011\052\206\110\206\367\015\001\011\001\026\021\151
\156\146\157\100\144\151\147\151\156\157\164\141\162\056\156\154
\060\202\002\042\060\015\006\011\052\206\110\206\367\015\001\001
\001\005\000\003\202\002\017\000\060\202\002\012\002\202\002\001
\000\254\260\130\301\000\275\330\041\010\013\053\232\376\156\126
\060\005\237\033\167\220\020\101\134\303\015\207\021\167\216\201
```

\361\312\174\351\214\152\355\070\164\065\273\332\337\371\273\300
\011\067\264\226\163\201\175\063\032\230\071\367\223\157\225\177
\075\271\261\165\207\272\121\110\350\213\160\076\225\004\305\330
\266\303\026\331\210\260\261\207\035\160\332\206\264\017\024\213
\172\317\020\321\164\066\242\022\173\167\206\112\171\346\173\337
\002\021\150\245\116\206\256\064\130\233\044\023\170\126\042\045
\036\001\213\113\121\161\373\202\314\131\226\151\210\132\150\123
\305\271\015\002\067\313\113\274\146\112\220\176\052\013\005\007
\355\026\137\125\220\165\330\106\311\033\203\342\010\276\361\043
\314\231\035\326\052\017\203\040\025\130\047\202\056\372\342\042
\302\111\261\271\001\201\152\235\155\235\100\167\150\166\116\041
\052\155\204\100\205\116\166\231\174\202\363\363\267\002\131\324
\046\001\033\216\337\255\123\006\321\256\030\335\342\262\072\313
\327\210\070\216\254\133\051\271\031\323\230\371\030\003\317\110
\202\206\146\013\033\151\017\311\353\070\210\172\046\032\005\114
\222\327\044\324\226\362\254\122\055\243\107\325\122\366\077\376
\316\204\006\160\246\252\076\242\362\266\126\064\030\127\242\344
\201\155\347\312\360\152\323\307\221\153\002\203\101\174\025\357
\153\232\144\136\343\320\074\345\261\353\173\135\206\373\313\346
\167\111\315\243\145\334\367\271\234\270\344\013\137\223\317\314
\060\032\062\034\316\034\143\225\245\371\352\341\164\213\236\351
\053\251\060\173\240\030\037\016\030\013\345\133\251\323\321\154
\036\007\147\217\221\113\251\212\274\322\146\252\223\001\210\262
\221\372\061\134\325\246\301\122\010\011\315\012\143\242\323\042
\246\350\241\331\071\006\227\365\156\215\002\220\214\024\173\077
\200\315\033\234\272\304\130\162\043\257\266\126\237\306\172\102
\063\051\007\077\202\311\346\037\005\015\315\114\050\066\213\323
\310\076\034\306\210\357\136\356\211\144\351\035\353\332\211\176
\062\246\151\321\335\314\210\237\321\320\311\146\041\334\006\147
\305\224\172\232\155\142\114\175\314\340\144\200\262\236\107\216
\243\002\003\001\000\001\243\102\060\100\060\017\006\003\125\035
\023\001\001\377\004\005\060\003\001\001\377\060\016\006\003\125
\035\017\001\001\377\004\004\003\002\001\006\060\035\006\003\125
\035\016\004\026\004\024\210\150\277\340\216\065\304\073\070\153
\142\367\050\073\204\201\310\014\327\115\060\015\006\011\052\206
\110\206\367\015\001\001\005\005\000\003\202\002\001\000\073\002
\215\313\074\060\350\156\240\255\362\163\263\137\236\045\023\004
\005\323\366\343\213\273\013\171\316\123\336\344\226\305\321\257
\163\274\325\303\320\100\125\174\100\177\315\033\137\011\325\362
\174\237\150\035\273\135\316\172\071\302\214\326\230\173\305\203
\125\250\325\175\100\312\340\036\367\211\136\143\135\241\023\302
\135\212\266\212\174\000\363\043\303\355\205\137\161\166\360\150
\143\252\105\041\071\110\141\170\066\334\361\103\223\324\045\307
\362\200\145\341\123\002\165\121\374\172\072\357\067\253\204\050
\127\014\330\324\324\231\126\154\343\242\376\131\204\264\061\350
\063\370\144\224\224\121\227\253\071\305\113\355\332\335\200\013
\157\174\051\015\304\216\212\162\015\347\123\024\262\140\101\075
\204\221\061\150\075\047\104\333\345\336\364\372\143\105\310\114

\076\230\365\077\101\272\116\313\067\015\272\146\230\361\335\313
\237\134\367\124\066\202\153\054\274\023\141\227\102\370\170\273
\314\310\242\237\312\360\150\275\153\035\262\337\215\157\007\235
\332\216\147\307\107\036\312\271\277\052\102\221\267\143\123\146
\361\102\243\341\364\132\115\130\153\265\344\244\063\255\134\160
\035\334\340\362\353\163\024\221\232\003\301\352\000\145\274\007
\374\317\022\021\042\054\256\240\275\072\340\242\052\330\131\351
\051\323\030\065\244\254\021\137\031\265\265\033\377\042\112\134
\306\172\344\027\357\040\251\247\364\077\255\212\247\232\004\045
\235\016\312\067\346\120\375\214\102\051\004\232\354\271\317\113
\162\275\342\010\066\257\043\057\142\345\312\001\323\160\333\174
\202\043\054\026\061\014\306\066\007\220\172\261\037\147\130\304
\073\130\131\211\260\214\214\120\263\330\206\313\150\243\304\012
\347\151\113\040\316\301\036\126\113\225\251\043\150\330\060\330
\303\353\260\125\121\315\345\375\053\270\365\273\021\237\123\124
\366\064\031\214\171\011\066\312\141\027\045\027\013\202\230\163
\014\167\164\303\325\015\307\250\022\114\307\247\124\161\107\056
\054\032\175\311\343\053\073\110\336\047\204\247\143\066\263\175
\217\240\144\071\044\015\075\173\207\257\146\134\164\033\113\163
\262\345\214\360\206\231\270\345\305\337\204\301\267\353
END

#

Trust for Certificate "Explicitly Distrust DigiNotar Root CA"

Issuer: E=info@diginotar.nl,CN=DigiNotar Root CA,O=DigiNotar,C=NL

Serial Number:0f:ff:ff:ff:ff:ff:ff:ff:ff:ff:ff:ff:ff:ff:ff:ff

Subject: E=info@diginotar.nl,CN=DigiNotar Root CA,O=DigiNotar,C=NL

Not Valid Before: Fri Jul 27 17:19:37 2007

Not Valid After : Mon Mar 31 18:19:22 2025

Fingerprint (MD5): 0A:A4:D5:CC:BA:B4:FB:A3:59:E3:E6:01:DD:53:D9:4E

Fingerprint (SHA1): C1:77:CB:4B:E0:B4:26:8E:F5:C7:CF:45:99:22:B9:B0:CE:BA:21:2F

CKA_CLASS

CK_OBJECT_CLASS CKO_NSS_TRUST

CKA_TOKEN CK_BBOOL CK_TRUE

CKA_PRIVATE CK_BBOOL CK_FALSE

CKA_MODIFIABLE CK_BBOOL CK_FALSE

CKA_LABEL UTF8 "Explicitly Distrust DigiNotar Root CA"

CKA_CERT_SHA1_HASH MULTILINE_OCTAL

\301\167\313\113\340\264\046\216\365\307\317\105\231\042\271\260

\316\272\041\057

END

CKA_CERT_MD5_HASH MULTILINE_OCTAL

\012\244\325\314\272\264\373\243\131\343\346\001\335\123\331\116

END

CKA_ISSUER MULTILINE_OCTAL

\060\137\061\013\060\011\006\003\125\004\006\023\002\116\114\061

\022\060\020\006\003\125\004\012\023\011\104\151\147\151\116\157

\164\141\162\061\032\060\030\006\003\125\004\003\023\021\104\151

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\147\151\116\157\164\141\162\040\122\157\157\164\040\103\101\061
\040\060\036\006\011\052\206\110\206\367\015\001\011\001\026\021
\151\156\146\157\100\144\151\147\151\156\157\164\141\162\056\156
\154
END
CKA_SERIAL_NUMBER MULTILINE_OCTAL
\002\020\017\377\377\377\377\377\377\377\377\377\377\377\377
\377\377
END
CKA_TRUST_SERVER_AUTH CK_TRUST
CKT_NSS_NOT_TRUSTED
CKA_TRUST_EMAIL_PROTECTION CK_TRUST CKT_NSS_NOT_TRUSTED
CKA_TRUST_CODE_SIGNING CK_TRUST CKT_NSS_NOT_TRUSTED
CKA_TRUST_STEP_UP_APPROVED CK_BBOOL CK_FALSE

#
# Certificate "Security Communication RootCA2"
#
# Issuer: OU=Security Communication RootCA2,O="SECOM Trust Systems CO.,LTD.",C=JP
# Serial Number: 0 (0x0)
# Subject: OU=Security Communication RootCA2,O="SECOM Trust Systems CO.,LTD.",C=JP
# Not Valid Before: Fri May 29 05:00:39 2009
# Not Valid After : Tue May 29 05:00:39 2029
# Fingerprint (SHA-256):
51:3B:2C:EC:B8:10:D4:CD:E5:DD:85:39:1A:DF:C6:C2:DD:60:D8:7B:B7:36:D2:B5:21:48:4A:A4:7A:0E:BE:F6
# Fingerprint (SHA1): 5F:3B:8C:F2:F8:10:B3:7D:78:B4:CE:EC:19:19:C3:73:34:B9:C7:74
CKA_CLASS CK_OBJECT_CLASS CKO_CERTIFICATE
CKA_TOKEN CK_BBOOL CK_TRUE
CKA_PRIVATE CK_BBOOL CK_FALSE
CKA_MODIFIABLE CK_BBOOL CK_FALSE
CKA_LABEL UTF8 "Security Communication RootCA2"
CKA_CERTIFICATE_TYPE CK_CERTIFICATE_TYPE CKC_X_509
CKA_SUBJECT MULTILINE_OCTAL
\060\135\061\013\060\011\006\003\125\004\006\023\002\112\120\061
\045\060\043\006\003\125\004\012\023\034\123\105\103\117\115\040
\124\162\165\163\164\040\123\171\163\164\145\155\163\040\103\117
\056\054\114\124\104\056\061\047\060\045\006\003\125\004\013\023
\036\123\145\143\165\162\151\164\171\040\103\157\155\155\165\156
\151\143\141\164\151\157\156\040\122\157\157\164\103\101\062
END
CKA_ID
UTF8 "0"
CKA_ISSUER MULTILINE_OCTAL
\060\135\061\013\060\011\006\003\125\004\006\023\002\112\120\061
\045\060\043\006\003\125\004\012\023\034\123\105\103\117\115\040
\124\162\165\163\164\040\123\171\163\164\145\155\163\040\103\117
\056\054\114\124\104\056\061\047\060\045\006\003\125\004\013\023
\036\123\145\143\165\162\151\164\171\040\103\157\155\155\165\156

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\151\143\141\164\151\157\156\040\122\157\157\164\103\101\062
END
CKA_SERIAL_NUMBER MULTILINE_OCTAL
\002\001\000
END
CKA_VALUE MULTILINE_OCTAL
\060\202\003\167\060\202\002\137\240\003\002\001\002\002\001\000
\060\015\006\011\052\206\110\206\367\015\001\001\013\005\000\060
\135\061\013\060\011\006\003\125\004\006\023\002\112\120\061\045
\060\043\006\003\125\004\012\023\034\123\105\103\117\115\040\124
\162\165\163\164\040\123\171\163\164\145\155\163\040\103\117\056
\054\114\124\104\056\061\047\060\045\006\003\125\004\013\023\036
\123\145\143\165\162\151\164\171\040\103\157\155\155\165\156\151
\143\141\164\151\157\156\040\122\157\157\164\103\101\062\060\036
\027\015\060\071\060\065\062\071\060\065\060\060\063\071\132\027
\015\062\071\060\065\062\071\060\065\060\060\063\071\132\060\135
\061\013\060\011\006\003\125\004\006\023\002\112\120\061\045\060
\043\006\003\125\004\012\023\034\123\105\103\117\115\040\124\162
\165\163\164\040\123\171\163\164\145\155\163\040\103\117\056\054
\114\124\104\056\061\047\060\045\006\003\125\004\013\023\036\123
\145\143\165\162\151\164\171\040\103\157\155\155\165\156\151\143
\141\164\151\157\156\040\122\157\157\164\103\101\062\060\202\001
\042\060\015\006\011\052\206\110\206\367\015\001\001\001\005\000
\003\202\001\017\000\060\202\001\012\002\202\001\001\000\320\025
\071\122\261\122\263\272\305\131\202\304\135\122\256\072\103\145
\200\113\307\362\226\274\333\066\227\326\246\144\214\250\136\360
\343\012\034\367\337\227\075\113\256\366\135\354\041\265\101\253
\315\271\176\166\237\276\371\076\066\064\240\073\301\366\061\021
\105\164\223\075\127\200\305\371\211\231\312\345\253\152\324\265
\332\101\220\020\301\326\326\102\211\302\277\364\070\022\225\114
\124\005\367\066\344\105\203\173\024\145\326\334\014\115\321\336
\176\014\253\073\304\025\276\072\126\246\132\157\166\151\122\251
\172\271\310\353\152\232\135\122\320\055\012\153\065\026\011\020
\204\320\152\312\072\006\000\067\107\344\176\127\117\077\213\353
\147\270\210\252\305\276\123\125\262\221\304\175\271\260\205\031
\006\170\056\333\141\032\372\205\365\112\221\241\347\026\325\216
\242\071\337\224\270\160\037\050\077\213\374\100\136\143\203\074
\203\052\032\231\153\317\336\131\152\073\374\157\026\327\037\375
\112\020\353\116\202\026\072\254\047\014\123\361\255\325\044\260
\153\003\120\301\055\074\026\335\104\064\047\032\165\373\002\003
\001\000\001\243\102\060\100\060\035\006\003\125\035\016\004\026
\004\024\012\205\251\167\145\005\230\174\100\201\370\017\227\054
\070\361\012\354\074\317\060\016\006\003\125\035\017\001\001\377
\004\004\003\002\001\006\060\017\006\003\125\035\023\001\001\377
\004\005\060\003\001\001\377\060\015\006\011\052\206\110\206\367
\015\001\001\013\005\000\003\202\001\001\000\114\072\243\104\254
\271\105\261\307\223\176\310\013\012\102\337\144\352\034\356\131
\154\010\272\211\137\152\312\112\225\236\172\217\007\305\332\105

\162\202\161\016\072\322\314\157\247\264\241\043\273\366\044\237
\313\027\376\214\246\316\302\322\333\314\215\374\161\374\003\051
\301\154\135\063\137\144\266\145\073\211\157\030\166\170\365\334
\242\110\037\031\077\216\223\353\361\372\027\356\315\116\343\004
\022\125\326\345\344\335\373\076\005\174\342\035\136\306\247\274
\227\117\150\072\365\351\056\012\103\266\257\127\134\142\150\174
\267\375\243\212\204\240\254\142\276\053\011\207\064\360\152\001
\273\233\051\126\074\376\000\067\317\043\154\361\116\252\266\164
\106\022\154\221\356\064\325\354\232\221\347\104\276\220\061\162
\325\111\002\366\002\345\364\037\353\174\331\226\125\251\377\354
\212\371\231\107\377\065\132\002\252\004\313\212\133\207\161\051
\221\275\244\264\172\015\275\232\365\127\043\000\007\041\027\077
\112\071\321\005\111\013\247\266\067\201\245\135\214\252\063\136
\201\050\174\247\175\047\353\000\256\215\067

END

CKA_NSS_Mozilla_CA_POLICY

CK_BBOOL CK_TRUE

CKA_NSS_SERVER_DISTRUST_AFTER CK_BBOOL CK_FALSE

CKA_NSS_EMAIL_DISTRUST_AFTER CK_BBOOL CK_FALSE

Trust for "Security Communication RootCA2"

Issuer: OU=Security Communication RootCA2,O="SECOM Trust Systems CO.,LTD.",C=JP

Serial Number: 0 (0x0)

Subject: OU=Security Communication RootCA2,O="SECOM Trust Systems CO.,LTD.",C=JP

Not Valid Before: Fri May 29 05:00:39 2009

Not Valid After : Tue May 29 05:00:39 2029

Fingerprint (SHA-256):

51:3B:2C:EC:B8:10:D4:CD:E5:DD:85:39:1A:DF:C6:C2:DD:60:D8:7B:B7:36:D2:B5:21:48:4A:A4:7A:0E:BE:F6

#

Fingerprint (SHA1): 5F:3B:8C:F2:F8:10:B3:7D:78:B4:CE:EC:19:19:C3:73:34:B9:C7:74

CKA_CLASS CK_OBJECT_CLASS CKO_NSS_TRUST

CKA_TOKEN CK_BBOOL CK_TRUE

CKA_PRIVATE CK_BBOOL CK_FALSE

CKA_MODIFIABLE CK_BBOOL CK_FALSE

CKA_LABEL UTF8 "Security Communication RootCA2"

CKA_CERT_SHA1_HASH MULTILINE_OCTAL

\137\073\214\362\370\020\263\175\170\264\316\354\031\031\303\163
\064\271\307\164

END

CKA_CERT_MD5_HASH MULTILINE_OCTAL

\154\071\175\244\016\125\131\262\077\326\101\261\022\120\336\103

END

CKA_ISSUER MULTILINE_OCTAL

\060\135\061\013\060\011\006\003\125\004\006\023\002\112\120\061
\045\060\043\006\003\125\004\012\023\034\123\105\103\117\115\040
\124\162\165\163\164\040\123\171\163\164\145\155\163\040\103\117
\056\054\114\124\104\056\061\047\060\045\006\003\125\004\013\023
\036\123\145\143\165\162\151\164\171\040\103\157\155\155\165\156

```

\151\143\141\164\151\157\156\040\122\157\157\164\103\101\062
END
CKA_SERIAL_NUMBER
MULTILINE_OCTAL
\002\001\000
END
CKA_TRUST_SERVER_AUTH CK_TRUST CKT_NSS_TRUSTED_DELEGATOR
CKA_TRUST_EMAIL_PROTECTION CK_TRUST CKT_NSS_TRUSTED_DELEGATOR
CKA_TRUST_CODE_SIGNING CK_TRUST CKT_NSS_MUST_VERIFY_TRUST
CKA_TRUST_STEP_UP_APPROVED CK_BBOOL CK_FALSE

#
# Certificate "Actalis Authentication Root CA"
#
# Issuer: CN=Actalis Authentication Root CA,O=Actalis S.p.A./03358520967,L=Milan,C=IT
# Serial Number:57:0a:11:97:42:c4:e3:cc
# Subject: CN=Actalis Authentication Root CA,O=Actalis S.p.A./03358520967,L=Milan,C=IT
# Not Valid Before: Thu Sep 22 11:22:02 2011
# Not Valid After : Sun Sep 22 11:22:02 2030
# Fingerprint (SHA-256):
55:92:60:84:EC:96:3A:64:B9:6E:2A:BE:01:CE:0B:A8:6A:64:FB:FE:BC:C7:AA:B5:AF:C1:55:B3:7F:D7:60:66
# Fingerprint (SHA1): F3:73:B3:87:06:5A:28:84:8A:F2:F3:4A:CE:19:2B:DD:C7:8E:9C:AC
CKA_CLASS CK_OBJECT_CLASS CKO_CERTIFICATE
CKA_TOKEN CK_BBOOL CK_TRUE
CKA_PRIVATE CK_BBOOL CK_FALSE
CKA_MODIFIABLE CK_BBOOL CK_FALSE
CKA_LABEL UTF8 "Actalis Authentication Root CA"
CKA_CERTIFICATE_TYPE
CK_CERTIFICATE_TYPE CKC_X_509
CKA_SUBJECT MULTILINE_OCTAL
\060\153\061\013\060\011\006\003\125\004\006\023\002\111\124\061
\016\060\014\006\003\125\004\007\014\005\115\151\154\141\156\061
\043\060\041\006\003\125\004\012\014\032\101\143\164\141\154\151
\163\040\123\056\160\056\101\056\057\060\063\063\065\070\065\062
\060\071\066\067\061\047\060\045\006\003\125\004\003\014\036\101
\143\164\141\154\151\163\040\101\165\164\150\145\156\164\151\143
\141\164\151\157\156\040\122\157\157\164\040\103\101
END
CKA_ID UTF8 "0"
CKA_ISSUER MULTILINE_OCTAL
\060\153\061\013\060\011\006\003\125\004\006\023\002\111\124\061
\016\060\014\006\003\125\004\007\014\005\115\151\154\141\156\061
\043\060\041\006\003\125\004\012\014\032\101\143\164\141\154\151
\163\040\123\056\160\056\101\056\057\060\063\063\065\070\065\062
\060\071\066\067\061\047\060\045\006\003\125\004\003\014\036\101
\143\164\141\154\151\163\040\101\165\164\150\145\156\164\151\143
\141\164\151\157\156\040\122\157\157\164\040\103\101
END

```

CKA_SERIAL_NUMBER

MULTILINE_OCTAL

\002\010\127\012\021\227\102\304\343\314

END

CKA_VALUE MULTILINE_OCTAL

\060\202\005\273\060\202\003\243\240\003\002\001\002\002\010\127
\012\021\227\102\304\343\314\060\015\006\011\052\206\110\206\367
\015\001\001\013\005\000\060\153\061\013\060\011\006\003\125\004
\006\023\002\111\124\061\016\060\014\006\003\125\004\007\014\005
\115\151\154\141\156\061\043\060\041\006\003\125\004\012\014\032
\101\143\164\141\154\151\163\040\123\056\160\056\101\056\057\060
\063\063\065\070\065\062\060\071\066\067\061\047\060\045\006\003
\125\004\003\014\036\101\143\164\141\154\151\163\040\101\165\164
\150\145\156\164\151\143\141\164\151\157\156\040\122\157\157\164
\040\103\101\060\036\027\015\061\061\060\071\062\062\061\061\062
\062\060\062\132\027\015\063\060\060\071\062\062\061\061\062\062
\060\062\132\060\153\061\013\060\011\006\003\125\004\006\023\002
\111\124\061\016\060\014\006\003\125\004\007\014\005\115\151\154
\141\156\061\043\060\041\006\003\125\004\012\014\032\101\143\164
\141\154\151\163\040\123\056\160\056\101\056\057\060\063\063\065
\070\065\062\060\071\066\067\061\047\060\045\006\003\125\004\003
\014\036\101\143\164\141\154\151\163\040\101\165\164\150\145\156
\164\151\143\141\164\151\157\156\040\122\157\157\164\040\103\101
\060\202\002\042\060\015\006\011\052\206\110\206\367\015\001\001
\001\005\000\003\202\002\017\000\060\202\002\012\002\202\002\001
\000\247\306\304\245\051\244\054\357\345\030\305\260\120\243\157
\121\073\237\012\132\311\302\110\070\012\302\034\240\030\177\221
\265\207\271\100\077\335\035\150\037\010\203\325\055\036\210\240
\370\217\126\217\155\231\002\222\220\026\325\137\010\154\211\327
\341\254\274\040\302\261\340\203\121\212\151\115\000\226\132\157
\057\300\104\176\243\016\344\221\315\130\356\334\373\307\036\105
\107\335\047\271\010\001\237\246\041\035\365\101\055\057\114\375
\050\255\340\212\255\042\264\126\145\216\206\124\217\223\103\051
\336\071\106\170\243\060\043\272\315\360\175\023\127\300\135\322
\203\153\110\114\304\253\237\200\132\133\072\275\311\247\042\077
\200\047\063\133\016\267\212\014\135\007\067\010\313\154\322\172
\107\042\104\065\305\314\314\056\216\335\052\355\267\175\146\015
\137\141\121\042\125\033\343\106\343\343\075\320\065\142\232\333
\257\024\310\133\241\314\211\033\341\060\046\374\240\233\037\201
\247\107\037\004\353\243\071\222\006\237\231\323\277\323\352\117
\120\234\031\376\226\207\036\074\145\366\243\030\044\203\206\020
\347\124\076\250\072\166\044\117\201\041\305\343\017\002\370\223
\224\107\040\273\376\324\016\323\150\271\335\304\172\204\202\343
\123\124\171\335\333\234\322\362\007\233\056\266\274\076\355\205
\155\357\045\021\362\227\032\102\141\367\112\227\350\213\261\020
\007\372\145\201\262\242\071\317\367\074\377\030\373\306\361\132
\213\131\342\002\254\173\222\320\116\024\117\131\105\366\014\136
\050\137\260\350\077\105\317\317\257\233\157\373\204\323\167\132

\225\157\254\224\204\236\356\274\300\112\217\112\223\370\104\041
\342\061\105\141\120\116\020\330\343\065\174\114\031\264\336\005
\277\243\006\237\310\265\315\344\037\327\027\006\015\172\225\164
\125\015\150\032\374\020\033\142\144\235\155\340\225\240\303\224
\007\127\015\024\346\275\005\373\270\237\346\337\213\342\306\347
\176\226\366\123\305\200\064\120\050\130\360\022\120\161\027\060
\272\346\170\143\274\364\262\255\233\053\262\376\341\071\214\136
\272\013\040\224\336\173\203\270\377\343\126\215\267\021\351\073
\214\362\261\301\135\235\244\013\114\053\331\262\030\365\265\237
\113\002\003\001\000\001\243\143\060\141\060\035\006\003\125\035
\016\004\026\004\024\122\330\210\072\310\237\170\146\355\211\363
\173\070\160\224\311\002\002\066\320\060\017\006\003\125\035\023
\001\001\377\004\005\060\003\001\001\377\060\037\006\003\125\035
\043\004\030\060\026\200\024\122\330\210\072\310\237\170\146\355
\211\363\173\070\160\224\311\002\002\066\320\060\016\006\003\125
\035\017\001\001\377\004\004\003\002\001\006\060\015\006\011\052
\206\110\206\367\015\001\001\013\005\000\003\202\002\001\000\013
\173\162\207\300\140\246\111\114\210\130\346\035\210\367\024\144
\110\246\330\130\012\016\117\023\065\337\065\035\324\355\006\061
\310\201\076\152\325\335\073\032\062\356\220\075\021\322\056\364
\216\303\143\056\043\146\260\147\276\157\266\300\023\071\140\252
\242\064\045\223\165\122\336\247\235\255\016\207\211\122\161\152
\026\074\031\035\203\370\232\051\145\276\364\077\232\331\360\363
\132\207\041\161\200\115\313\340\070\233\077\273\372\340\060\115
\317\206\323\145\020\031\030\321\227\002\261\053\162\102\150\254
\240\275\116\132\332\030\277\153\230\201\320\375\232\276\136\025
\110\315\021\025\271\300\051\134\264\350\210\367\076\066\256\267
\142\375\036\142\336\160\170\020\034\110\133\332\274\244\070\272
\147\355\125\076\136\127\337\324\003\100\114\201\244\322\117\143
\247\011\102\011\024\374\000\251\302\200\163\117\056\300\100\331
\021\173\110\352\172\002\300\323\353\050\001\046\130\164\301\300
\163\042\155\223\225\375\071\175\273\052\343\366\202\343\054\227
\137\116\037\221\224\372\376\054\243\330\166\032\270\115\262\070
\117\233\372\035\110\140\171\046\342\363\375\251\320\232\350\160
\217\111\172\326\345\275\012\016\333\055\363\215\277\353\343\244
\175\313\307\225\161\350\332\243\174\305\302\370\164\222\004\033
\206\254\244\042\123\100\266\254\376\114\166\317\373\224\062\300
\065\237\166\077\156\345\220\156\240\246\046\242\270\054\276\321
\053\205\375\247\150\310\272\001\053\261\154\164\035\270\163\225
\347\356\267\307\045\360\000\114\000\262\176\266\013\213\034\363
\300\120\236\045\271\340\010\336\066\146\377\067\245\321\273\124
\144\054\311\047\265\113\222\176\145\377\323\055\341\271\116\274
\177\244\101\041\220\101\167\246\071\037\352\236\343\237\320\146
\157\005\354\252\166\176\277\153\026\240\353\265\307\374\222\124
\057\053\021\047\045\067\170\114\121\152\260\363\314\130\135\024
\361\152\110\025\377\302\007\266\261\215\017\216\134\120\106\263
\075\277\001\230\117\262\131\124\107\076\064\173\170\155\126\223
\056\163\352\146\050\170\315\035\024\277\240\217\057\056\270\056

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\216\362\024\212\314\351\265\174\373\154\235\014\245\341\226
END
CKA_NSS_Mozilla_CA_POLICY
CK_BBOOL CK_TRUE
CKA_NSS_SERVER_DISTRUST_AFTER CK_BBOOL CK_FALSE
CKA_NSS_EMAIL_DISTRUST_AFTER CK_BBOOL CK_FALSE

# Trust for "Actalis Authentication Root CA"
# Issuer: CN=Actalis Authentication Root CA,O=Actalis S.p.A./03358520967,L=Milan,C=IT
# Serial Number:57:0a:11:97:42:c4:e3:cc
# Subject: CN=Actalis Authentication Root CA,O=Actalis S.p.A./03358520967,L=Milan,C=IT
# Not Valid Before: Thu Sep 22 11:22:02 2011
# Not Valid After : Sun Sep 22 11:22:02 2030
# Fingerprint (SHA-256):
55:92:60:84:EC:96:3A:64:B9:6E:2A:BE:01:CE:0B:A8:6A:64:FB:FE:BC:C7:AA:B5:AF:C1:55:B3:7F:D7:60:66
# Fingerprint (SHA1): F3:73:B3:87:06:5A:28:84:8A:F2:F3:4A:CE:19:2B:DD:C7:8E:9C:AC
CKA_CLASS CK_OBJECT_CLASS CKO_NSS_TRUST
CKA_TOKEN CK_BBOOL CK_TRUE
CKA_PRIVATE CK_BBOOL CK_FALSE
CKA_MODIFIABLE CK_BBOOL CK_FALSE
CKA_LABEL UTF8 "Actalis Authentication Root CA"
CKA_CERT_SHA1_HASH MULTILINE_OCTAL
\363\163\263\207\006\132\050\204\212\362\363\112\316\031\053\335
\307\216\234\254
END
CKA_CERT_MD5_HASH
MULTILINE_OCTAL
\151\301\015\117\007\243\033\303\376\126\075\004\274\021\366\246
END
CKA_ISSUER MULTILINE_OCTAL
\060\153\061\013\060\011\006\003\125\004\006\023\002\111\124\061
\016\060\014\006\003\125\004\007\014\005\115\151\154\141\156\061
\043\060\041\006\003\125\004\012\014\032\101\143\164\141\154\151
\163\040\123\056\160\056\101\056\057\060\063\063\065\070\065\062
\060\071\066\067\061\047\060\045\006\003\125\004\003\014\036\101
\143\164\141\154\151\163\040\101\165\164\150\145\156\164\151\143
\141\164\151\157\156\040\122\157\157\164\040\103\101
END
CKA_SERIAL_NUMBER MULTILINE_OCTAL
\002\010\127\012\021\227\102\304\343\314
END
CKA_TRUST_SERVER_AUTH CK_TRUST CKT_NSS_TRUSTED_DELEGATOR
CKA_TRUST_EMAIL_PROTECTION CK_TRUST CKT_NSS_TRUSTED_DELEGATOR
CKA_TRUST_CODE_SIGNING CK_TRUST CKT_NSS_MUST_VERIFY_TRUST
CKA_TRUST_STEP_UP_APPROVED CK_BBOOL CK_FALSE

#
# Certificate "Buypass Class 2 Root

```



```

CA"
#
# Issuer: CN=Buypass Class 2 Root CA,O=Buypass AS-983163327,C=NO
# Serial Number: 2 (0x2)
# Subject: CN=Buypass Class 2 Root CA,O=Buypass AS-983163327,C=NO
# Not Valid Before: Tue Oct 26 08:38:03 2010
# Not Valid After : Fri Oct 26 08:38:03 2040
# Fingerprint (SHA-256):
9A:11:40:25:19:7C:5B:B9:5D:94:E6:3D:55:CD:43:79:08:47:B6:46:B2:3C:DF:11:AD:A4:A0:0E:FF:15:FB:48
# Fingerprint (SHA1): 49:0A:75:74:DE:87:0A:47:FE:58:EE:F6:C7:6B:EB:C6:0B:12:40:99
CKA_CLASS CK_OBJECT_CLASS CKO_CERTIFICATE
CKA_TOKEN CK_BBOOL CK_TRUE
CKA_PRIVATE CK_BBOOL CK_FALSE
CKA_MODIFIABLE CK_BBOOL CK_FALSE
CKA_LABEL UTF8 "Buypass Class 2 Root CA"
CKA_CERTIFICATE_TYPE CK_CERTIFICATE_TYPE CKC_X_509
CKA_SUBJECT MULTILINE_OCTAL
\060\116\061\013\060\011\006\003\125\004\006\023\002\116\117\061
\035\060\033\006\003\125\004\012\014\024\102\165\171\160\141\163
\163\040\101\123\055\071\070\063\061\066\063\063\062\067\061\040
\060\036\006\003\125\004\003\014\027\102\165\171\160\141\163\163
\040\103\154\141\163\163\040\062\040\122\157\157\164\040\103\101
END
CKA_ID
UTF8 "0"
CKA_ISSUER MULTILINE_OCTAL
\060\116\061\013\060\011\006\003\125\004\006\023\002\116\117\061
\035\060\033\006\003\125\004\012\014\024\102\165\171\160\141\163
\163\040\101\123\055\071\070\063\061\066\063\063\062\067\061\040
\060\036\006\003\125\004\003\014\027\102\165\171\160\141\163\163
\040\103\154\141\163\163\040\062\040\122\157\157\164\040\103\101
END
CKA_SERIAL_NUMBER MULTILINE_OCTAL
\002\001\002
END
CKA_VALUE MULTILINE_OCTAL
\060\202\005\131\060\202\003\101\240\003\002\001\002\002\001\002
\060\015\006\011\052\206\110\206\367\015\001\001\013\005\000\060
\116\061\013\060\011\006\003\125\004\006\023\002\116\117\061\035
\060\033\006\003\125\004\012\014\024\102\165\171\160\141\163\163
\040\101\123\055\071\070\063\061\066\063\063\062\067\061\040\060
\036\006\003\125\004\003\014\027\102\165\171\160\141\163\163\040
\103\154\141\163\163\040\062\040\122\157\157\164\040\103\101\060
\036\027\015\061\060\061\060\062\066\060\070\063\070\060\063\132
\027\015\064\060\061\060\062\066\060\070\063\070\060\063\132\060
\116\061\013\060\011\006\003\125\004\006\023\002\116\117\061\035
\060\033\006\003\125\004\012\014\024\102\165\171\160\141\163\163
\040\101\123\055\071\070\063\061\066\063\063\062\067\061\040\060

```

\036\006\003\125\004\003\014\027\102\165\171\160\141\163\163\040
\103\154\141\163\163\040\062\040\122\157\157\164\040\103\101\060
\202\002\042\060\015\006\011\052\206\110\206\367\015\001\001\001
\005\000\003\202\002\017\000\060\202\002\012\002\202\002\001\000
\327\307\136\367\301\007\324\167\373\103\041\364\364\365\151\344
\356\062\001\333\243\206\037\344\131\015\272\347\165\203\122\353
\352\034\141\025\110\273\035\007\312\214\256\260\334\226\235\352
\303\140\222\206\202\050\163\234\126\006\377\113\144\360\014\052
\067\111\265\345\317\014\174\356\361\112\273\163\060\145\363\325
\057\203\266\176\343\347\365\236\253\140\371\323\361\235\222\164
\212\344\034\226\254\133\200\351\265\364\061\207\243\121\374\307
\176\241\157\216\123\167\324\227\301\125\063\222\076\030\057\165
\324\255\206\111\313\225\257\124\006\154\330\006\023\215\133\377
\341\046\031\131\300\044\272\201\161\171\220\104\120\150\044\224
\137\270\263\021\361\051\101\141\243\101\313\043\066\325\301\361
\062\120\020\116\177\364\206\223\354\204\323\216\274\113\277\134
\001\116\007\075\334\024\212\224\012\244\352\163\373\013\121\350
\023\007\030\372\016\361\053\321\124\025\175\074\341\367\264\031
\102\147\142\136\167\340\242\125\354\266\331\151\027\325\072\257
\104\355\112\305\236\344\172\047\174\345\165\327\252\313\045\347
\337\153\012\333\017\115\223\116\250\240\315\173\056\362\131\001
\152\267\015\270\007\201\176\213\070\033\070\346\012\127\231\075
\356\041\350\243\365\014\026\335\213\354\064\216\234\052\034\000
\025\027\215\150\203\322\160\237\030\010\315\021\150\325\311\153
\122\315\304\106\217\334\265\363\330\127\163\036\351\224\071\004
\277\323\336\070\336\264\123\354\151\034\242\176\304\217\344\033
\160\255\362\242\371\373\367\026\144\146\151\237\111\121\242\342
\025\030\147\006\112\177\325\154\265\115\263\063\340\141\353\135
\276\351\230\017\062\327\035\113\074\056\132\001\122\221\011\362
\337\352\215\330\006\100\143\252\021\344\376\303\067\236\024\122
\077\364\342\314\362\141\223\321\375\147\153\327\122\256\277\150
\253\100\103\240\127\065\123\170\360\123\370\141\102\007\144\306
\327\157\233\114\070\015\143\254\142\257\066\213\242\163\012\015
\365\041\275\164\252\115\352\162\003\111\333\307\137\035\142\143
\307\375\335\221\354\063\356\365\155\264\156\060\150\336\310\326
\046\260\165\136\173\264\007\040\230\241\166\062\270\115\154\117
\002\003\001\000\001\243\102\060\100\060\017\006\003\125\035\023
\001\001\377\004\005\060\003\001\001\377\060\035\006\003\125\035
\016\004\026\004\024\311\200\167\340\142\222\202\365\106\234\363
\272\367\114\303\336\270\243\255\071\060\016\006\003\125\035\017
\001\001\377\004\004\003\002\001\006\060\015\006\011\052\206\110
\206\367\015\001\001\013\005\000\003\202\002\001\000\123\137\041
\365\272\260\072\122\071\054\222\260\154\000\311\357\316\040\357
\006\362\226\236\351\244\164\177\172\026\374\267\365\266\373\025
\033\077\253\246\300\162\135\020\261\161\356\274\117\343\255\254
\003\155\056\161\056\257\304\343\255\243\275\014\021\247\264\377
\112\262\173\020\020\037\247\127\101\262\300\256\364\054\131\326
\107\020\210\363\041\121\051\060\312\140\206\257\106\253\035\355

\072\133\260\224\336\104\343\101\010\242\301\354\035\326\375\117
\266\326\107\320\024\013\312\346\312\265\173\167\176\101\037\136
\203\307\266\214\071\226\260\077\226\201\101\157\140\220\342\350
\371\373\042\161\331\175\263\075\106\277\264\204\257\220\034\017
\217\022\152\257\357\356\036\172\256\002\112\212\027\053\166\376
\254\124\211\044\054\117\077\266\262\247\116\214\250\221\227\373
\051\306\173\134\055\271\313\146\266\267\250\133\022\121\205\265
\011\176\142\170\160\376\251\152\140\266\035\016\171\014\375\312
\352\044\200\162\303\227\077\362\167\253\103\042\012\307\353\266
\014\204\202\054\200\153\101\212\010\300\353\245\153\337\231\022
\313\212\325\136\200\014\221\340\046\010\066\110\305\372\070\021
\065\377\045\203\055\362\172\277\332\375\216\376\245\313\105\054
\037\304\210\123\256\167\016\331\232\166\305\216\054\035\243\272
\325\354\062\256\300\252\254\367\321\172\115\353\324\007\342\110
\367\042\216\260\244\237\152\316\216\262\262\140\364\243\042\320
\043\353\224\132\172\151\335\017\277\100\127\254\153\131\120\331
\243\231\341\156\376\215\001\171\047\043\025\336\222\235\173\011
\115\132\347\113\110\060\132\030\346\012\155\346\217\340\322\273
\346\337\174\156\041\202\301\150\071\115\264\230\130\146\142\314
\112\220\136\303\372\047\004\261\171\025\164\231\314\276\255\040
\336\046\140\034\353\126\121\246\243\352\344\243\077\247\377\141
\334\361\132\115\154\062\043\103\356\254\250\356\356\112\022\011
\074\135\161\302\276\171\372\302\207\150\035\013\375\134\151\314
\006\320\232\175\124\231\052\311\071\032\031\257\113\052\103\363
\143\135\132\130\342\057\343\035\344\251\326\320\012\320\236\277
\327\201\011\361\311\307\046\015\254\230\026\126\240

END

CKA_NSS_MOZILLA_CA_POLICY

CK_BBOOL CK_TRUE

CKA_NSS_SERVER_DISTRUST_AFTER CK_BBOOL CK_FALSE

CKA_NSS_EMAIL_DISTRUST_AFTER CK_BBOOL CK_FALSE

Trust for "Bypass Class 2 Root CA"

Issuer: CN=Bypass Class 2 Root CA,O=Bypass AS-983163327,C=NO

Serial Number: 2 (0x2)

Subject: CN=Bypass Class 2 Root CA,O=Bypass AS-983163327,C=NO

Not Valid Before: Tue Oct 26 08:38:03 2010

Not Valid After : Fri Oct 26 08:38:03 2040

Fingerprint (SHA-256):

9A:11:40:25:19:7C:5B:B9:5D:94:E6:3D:55:CD:43:79:08:47:B6:46:B2:3C:DF:11:AD:A4:A0:0E:FF:15:FB:48

Fingerprint (SHA1): 49:0A:75:74:DE:87:0A:47:FE:58:EE:F6:C7:6B:EB:C6:0B:12:40:99

CKA_CLASS CK_OBJECT_CLASS CKO_NSS_TRUST

CKA_TOKEN CK_BBOOL CK_TRUE

CKA_PRIVATE CK_BBOOL CK_FALSE

CKA_MODIFIABLE CK_BBOOL CK_FALSE

CKA_LABEL UTF8 "Bypass Class 2 Root CA"

CKA_CERT_SHA1_HASH MULTILINE_OCTAL

\111\012\165\164\336\207\012\107\376\130\356\366\307\153\353\306

```

\013\022\100\231
END
CKA_CERT_MD5_HASH
MULTILINE_OCTAL
\106\247\322\376\105\373\144\132\250\131\220\233\170\104\233\051
END
CKA_ISSUER MULTILINE_OCTAL
\060\116\061\013\060\011\006\003\125\004\006\023\002\116\117\061
\035\060\033\006\003\125\004\012\014\024\102\165\171\160\141\163
\163\040\101\123\055\071\070\063\061\066\063\063\062\067\061\040
\060\036\006\003\125\004\003\014\027\102\165\171\160\141\163\163
\040\103\154\141\163\163\040\062\040\122\157\157\164\040\103\101
END
CKA_SERIAL_NUMBER MULTILINE_OCTAL
\002\001\002
END
CKA_TRUST_SERVER_AUTH CK_TRUST CKT_NSS_TRUSTED_DELEGATOR
CKA_TRUST_EMAIL_PROTECTION CK_TRUST CKT_NSS_MUST_VERIFY_TRUST
CKA_TRUST_CODE_SIGNING CK_TRUST CKT_NSS_MUST_VERIFY_TRUST
CKA_TRUST_STEP_UP_APPROVED CK_BBOOL CK_FALSE

#
# Certificate "Buypass Class 3 Root CA"
#
# Issuer: CN=Buypass Class 3 Root CA,O=Buypass AS-983163327,C=NO
# Serial Number: 2 (0x2)
# Subject: CN=Buypass Class 3 Root CA,O=Buypass AS-983163327,C=NO
# Not Valid Before: Tue Oct 26 08:28:58 2010
# Not Valid After : Fri Oct 26 08:28:58
2040
# Fingerprint (SHA-256):
ED:F7:EB:BC:A2:7A:2A:38:4D:38:7B:7D:40:10:C6:66:E2:ED:B4:84:3E:4C:29:B4:AE:1D:5B:93:32:E6:B2:4D
# Fingerprint (SHA1): DA:FA:F7:FA:66:84:EC:06:8F:14:50:BD:C7:C2:81:A5:BC:A9:64:57
CKA_CLASS CK_OBJECT_CLASS CKO_CERTIFICATE
CKA_TOKEN CK_BBOOL CK_TRUE
CKA_PRIVATE CK_BBOOL CK_FALSE
CKA_MODIFIABLE CK_BBOOL CK_FALSE
CKA_LABEL UTF8 "Buypass Class 3 Root CA"
CKA_CERTIFICATE_TYPE CK_CERTIFICATE_TYPE CKC_X_509
CKA_SUBJECT MULTILINE_OCTAL
\060\116\061\013\060\011\006\003\125\004\006\023\002\116\117\061
\035\060\033\006\003\125\004\012\014\024\102\165\171\160\141\163
\163\040\101\123\055\071\070\063\061\066\063\063\062\067\061\040
\060\036\006\003\125\004\003\014\027\102\165\171\160\141\163\163
\040\103\154\141\163\163\040\063\040\122\157\157\164\040\103\101
END
CKA_ID UTF8 "0"
CKA_ISSUER MULTILINE_OCTAL

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\060\116\061\013\060\011\006\003\125\004\006\023\002\116\117\061
\035\060\033\006\003\125\004\012\014\024\102\165\171\160\141\163
\163\040\101\123\055\071\070\063\061\066\063\063\062\067\061\040
\060\036\006\003\125\004\003\014\027\102\165\171\160\141\163\163
\040\103\154\141\163\163\040\063\040\122\157\157\164\040\103\101
END
CKA_SERIAL_NUMBER
MULTILINE_OCTAL
\002\001\002
END
CKA_VALUE MULTILINE_OCTAL
\060\202\005\131\060\202\003\101\240\003\002\001\002\002\001\002
\060\015\006\011\052\206\110\206\367\015\001\001\013\005\000\060
\116\061\013\060\011\006\003\125\004\006\023\002\116\117\061\035
\060\033\006\003\125\004\012\014\024\102\165\171\160\141\163\163
\040\101\123\055\071\070\063\061\066\063\063\062\067\061\040\060
\036\006\003\125\004\003\014\027\102\165\171\160\141\163\163\040
\103\154\141\163\163\040\063\040\122\157\157\164\040\103\101\060
\036\027\015\061\060\061\060\062\066\060\070\062\070\065\070\132
\027\015\064\060\061\060\062\066\060\070\062\070\065\070\132\060
\116\061\013\060\011\006\003\125\004\006\023\002\116\117\061\035
\060\033\006\003\125\004\012\014\024\102\165\171\160\141\163\163
\040\101\123\055\071\070\063\061\066\063\063\062\067\061\040\060
\036\006\003\125\004\003\014\027\102\165\171\160\141\163\163\040
\103\154\141\163\163\040\063\040\122\157\157\164\040\103\101\060
\202\002\042\060\015\006\011\052\206\110\206\367\015\001\001\001
\005\000\003\202\002\017\000\060\202\002\012\002\202\002\001\000
\245\332\012\225\026\120\343\225\362\136\235\166\061\006\062\172
\233\361\020\166\270\000\232\265\122\066\315\044\107\260\237\030
\144\274\232\366\372\325\171\330\220\142\114\042\057\336\070\075
\326\340\250\351\034\054\333\170\021\351\216\150\121\025\162\307
\363\063\207\344\240\135\013\134\340\127\007\052\060\365\315\304
\067\167\050\115\030\221\346\277\325\122\375\161\055\160\076\347
\306\304\212\343\360\050\013\364\166\230\241\213\207\125\262\072
\023\374\267\076\047\067\216\042\343\250\117\052\357\140\273\075
\267\071\303\016\001\107\231\135\022\117\333\103\372\127\241\355
\371\235\276\021\107\046\133\023\230\253\135\026\212\260\067\034
\127\235\105\377\210\226\066\277\273\312\007\173\157\207\143\327
\320\062\152\326\135\154\014\361\263\156\071\342\153\061\056\071
\000\047\024\336\070\300\354\031\146\206\022\350\235\162\026\023
\144\122\307\251\067\034\375\202\060\355\204\030\035\364\256\134
\377\160\023\000\353\261\365\063\172\113\326\125\370\005\215\113
\151\260\365\263\050\066\134\024\304\121\163\115\153\013\361\064
\007\333\027\071\327\334\050\173\153\365\237\363\056\301\117\027
\052\020\363\314\312\350\353\375\153\253\056\232\237\055\202\156
\004\324\122\001\223\055\075\206\374\176\374\337\357\102\035\246
\153\357\271\040\306\367\275\240\247\225\375\247\346\211\044\330
\314\214\064\154\342\043\057\331\022\032\041\271\125\221\157\013

\221\171\031\014\255\100\210\013\160\342\172\322\016\330\150\110
\273\202\023\071\020\130\351\330\052\007\306\022\333\130\333\322
\073\125\020\107\005\025\147\142\176\030\143\246\106\077\011\016
\124\062\136\277\015\142\172\047\357\200\350\333\331\113\006\132
\067\132\045\320\010\022\167\324\157\011\120\227\075\310\035\303
\337\214\105\060\126\306\323\144\253\146\363\300\136\226\234\303
\304\357\303\174\153\213\072\171\177\263\111\317\075\342\211\237
\240\060\113\205\271\234\224\044\171\217\175\153\251\105\150\017
\053\320\361\332\034\313\151\270\312\111\142\155\310\320\143\142
\335\140\017\130\252\217\241\274\005\245\146\242\317\033\166\262
\204\144\261\114\071\122\300\060\272\360\214\113\002\260\266\267
\002\003\001\000\001\243\102\060\100\060\017\006\003\125\035\023
\001\001\377\004\005\060\003\001\001\377\060\035\006\003\125\035
\016\004\026\004\024\107\270\315\377\345\157\356\370\262\354\057
\116\016\371\045\260\216\074\153\303\060\016\006\003\125\035\017
\001\001\377\004\004\003\002\001\006\060\015\006\011\052\206\110
\206\367\015\001\001\013\005\000\003\202\002\001\000\000\040\043
\101\065\004\220\302\100\142\140\357\342\065\114\327\077\254\342
\064\220\270\241\157\166\372\026\026\244\110\067\054\351\220\302
\362\074\370\012\237\330\201\345\273\133\332\045\054\244\247\125
\161\044\062\366\310\013\362\274\152\370\223\254\262\007\302\137
\237\333\314\310\212\252\276\152\157\341\111\020\314\061\327\200
\273\273\310\330\242\016\144\127\352\242\365\302\251\061\025\322
\040\152\354\374\042\001\050\317\206\270\200\036\251\314\021\245
\074\362\026\263\107\235\374\322\200\041\304\313\320\107\160\101
\241\312\203\031\010\054\155\362\135\167\234\212\024\023\324\066
\034\222\360\345\006\067\334\246\346\220\233\070\217\134\153\033
\106\206\103\102\137\076\001\007\123\124\135\145\175\367\212\163
\241\232\124\132\037\051\103\024\047\302\205\017\265\210\173\032
\073\224\267\035\140\247\265\234\347\051\151\127\132\233\223\172
\103\060\033\003\327\142\310\100\246\252\374\144\344\112\327\221
\123\001\250\040\210\156\234\137\104\271\313\140\201\064\354\157
\323\175\332\110\137\353\264\220\274\055\251\034\013\254\034\325
\242\150\040\200\004\326\374\261\217\057\273\112\061\015\112\206
\034\353\342\066\051\046\365\332\330\304\362\165\141\317\176\256
\166\143\112\172\100\145\223\207\370\036\200\214\206\345\206\326
\217\016\374\123\054\140\350\026\141\032\242\076\103\173\315\071
\140\124\152\365\362\211\046\001\150\203\110\242\063\350\311\004
\221\262\021\064\021\076\352\320\103\031\037\003\223\220\014\377
\121\075\127\364\101\156\341\313\240\276\353\311\143\315\155\314
\344\370\066\252\150\235\355\275\135\227\160\104\015\266\016\065
\334\341\014\135\273\240\121\224\313\176\026\353\021\057\243\222
\105\310\114\161\331\274\311\231\122\127\106\057\120\317\275\065
\151\364\075\025\316\006\245\054\017\076\366\201\272\224\273\303
\273\277\145\170\322\206\171\377\111\073\032\203\014\360\336\170
\354\310\362\115\114\032\336\202\051\370\301\132\332\355\356\346
\047\136\350\105\320\235\034\121\250\150\253\104\343\320\213\152
\343\370\073\273\334\115\327\144\362\121\276\346\252\253\132\351

```

\061\356\006\274\163\277\023\142\012\237\307\271\227
END
CKA_NSS_Mozilla_CA_POLICY
CK_BBOOL CK_TRUE
CKA_NSS_SERVER_DISTRUST_AFTER CK_BBOOL CK_FALSE
CKA_NSS_EMAIL_DISTRUST_AFTER CK_BBOOL CK_FALSE

# Trust for "Buypass Class 3 Root CA"
#
Issuer: CN=Buypass Class 3 Root CA,O=Buypass AS-983163327,C=NO
# Serial Number: 2 (0x2)
# Subject: CN=Buypass Class 3 Root CA,O=Buypass AS-983163327,C=NO
# Not Valid Before: Tue Oct 26 08:28:58 2010
# Not Valid After : Fri Oct 26 08:28:58 2040
# Fingerprint (SHA-256):
ED:F7:EB:BC:A2:7A:2A:38:4D:38:7B:7D:40:10:C6:66:E2:ED:B4:84:3E:4C:29:B4:AE:1D:5B:93:32:E6:B2:4D
# Fingerprint (SHA1): DA:FA:F7:FA:66:84:EC:06:8F:14:50:BD:C7:C2:81:A5:BC:A9:64:57
CKA_CLASS CK_OBJECT_CLASS CKO_NSS_TRUST
CKA_TOKEN CK_BBOOL CK_TRUE
CKA_PRIVATE CK_BBOOL CK_FALSE
CKA_MODIFIABLE CK_BBOOL CK_FALSE
CKA_LABEL UTF8 "Buypass Class 3 Root CA"
CKA_CERT_SHA1_HASH MULTILINE_OCTAL
\332\372\367\372\146\204\354\006\217\024\120\275\307\302\201\245
\274\251\144\127
END
CKA_CERT_MD5_HASH MULTILINE_OCTAL
\075\073\030\236\054\144\132\350\325\210\316\016\371\067\302\354
END
CKA_ISSUER MULTILINE_OCTAL
\060\116\061\013\060\011\006\003\125\004\006\023\002\116\117\061
\035\060\033\006\003\125\004\012\014\024\102\165\171\160\141\163
\163\040\101\123\055\071\070\063\061\066\063\063\062\067\061\040
\060\036\006\003\125\004\003\014\027\102\165\171\160\141\163\163
\040\103\154\141\163\163\040\063\040\122\157\157\164\040\103\101
END
CKA_SERIAL_NUMBER
MULTILINE_OCTAL
\002\001\002
END
CKA_TRUST_SERVER_AUTH CK_TRUST CKT_NSS_TRUSTED_DELEGATOR
CKA_TRUST_EMAIL_PROTECTION CK_TRUST CKT_NSS_MUST_VERIFY_TRUST
CKA_TRUST_CODE_SIGNING CK_TRUST CKT_NSS_MUST_VERIFY_TRUST
CKA_TRUST_STEP_UP_APPROVED CK_BBOOL CK_FALSE

#
# Certificate "T-TeleSec GlobalRoot Class 3"
#

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# Issuer: CN=T-TeleSec GlobalRoot Class 3,OU=T-Systems Trust Center,O=T-Systems Enterprise Services
GmbH,C=DE
# Serial Number: 1 (0x1)
# Subject: CN=T-TeleSec GlobalRoot Class 3,OU=T-Systems Trust Center,O=T-Systems Enterprise Services
GmbH,C=DE
# Not Valid Before: Wed Oct 01 10:29:56 2008
# Not Valid After : Sat Oct 01 23:59:59 2033
# Fingerprint (SHA-256):
FD:73:DA:D3:1C:64:4F:F1:B4:3B:EF:0C:CD:DA:96:71:0B:9C:D9:87:5E:CA:7E:31:70:7A:F3:E9:6D:52:2B:BD
# Fingerprint (SHA1):
55:A6:72:3E:CB:F2:EC:CD:C3:23:74:70:19:9D:2A:BE:11:E3:81:D1
CKA_CLASS CK_OBJECT_CLASS CKO_CERTIFICATE
CKA_TOKEN CK_BBOOL CK_TRUE
CKA_PRIVATE CK_BBOOL CK_FALSE
CKA_MODIFIABLE CK_BBOOL CK_FALSE
CKA_LABEL UTF8 "T-TeleSec GlobalRoot Class 3"
CKA_CERTIFICATE_TYPE CK_CERTIFICATE_TYPE CKC_X_509
CKA_SUBJECT MULTILINE_OCTAL
\060\201\202\061\013\060\011\006\003\125\004\006\023\002\104\105
\061\053\060\051\006\003\125\004\012\014\042\124\055\123\171\163
\164\145\155\163\040\105\156\164\145\162\160\162\151\163\145\040
\123\145\162\166\151\143\145\163\040\107\155\142\110\061\037\060
\035\006\003\125\004\013\014\026\124\055\123\171\163\164\145\155
\163\040\124\162\165\163\164\040\103\145\156\164\145\162\061\045
\060\043\006\003\125\004\003\014\034\124\055\124\145\154\145\123
\145\143\040\107\154\157\142\141\154\122\157\157\164\040\103\154
\141\163\163\040\063
END
CKA_ID UTF8 "0"
CKA_ISSUER MULTILINE_OCTAL
\060\201\202\061\013\060\011\006\003\125\004\006\023\002\104\105
\061\053\060\051\006\003\125\004\012\014\042\124\055\123\171\163
\164\145\155\163\040\105\156\164\145\162\160\162\151\163\145\040
\123\145\162\166\151\143\145\163\040\107\155\142\110\061\037\060
\035\006\003\125\004\013\014\026\124\055\123\171\163\164\145\155
\163\040\124\162\165\163\164\040\103\145\156\164\145\162\061\045
\060\043\006\003\125\004\003\014\034\124\055\124\145\154\145\123
\145\143\040\107\154\157\142\141\154\122\157\157\164\040\103\154
\141\163\163\040\063
END
CKA_SERIAL_NUMBER
MULTILINE_OCTAL
\002\001\001
END
CKA_VALUE MULTILINE_OCTAL
\060\202\003\303\060\202\002\253\240\003\002\001\002\002\001\001
\060\015\006\011\052\206\110\206\367\015\001\001\013\005\000\060
\201\202\061\013\060\011\006\003\125\004\006\023\002\104\105\061

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\053\060\051\006\003\125\004\012\014\042\124\055\123\171\163\164
\145\155\163\040\105\156\164\145\162\160\162\151\163\145\040\123
\145\162\166\151\143\145\163\040\107\155\142\110\061\037\060\035
\006\003\125\004\013\014\026\124\055\123\171\163\164\145\155\163
\040\124\162\165\163\164\040\103\145\156\164\145\162\061\045\060
\043\006\003\125\004\003\014\034\124\055\124\145\154\145\123\145
\143\040\107\154\157\142\141\154\122\157\157\164\040\103\154\141
\163\163\040\063\060\036\027\015\060\070\061\060\060\061\061\060
\062\071\065\066\132\027\015\063\063\061\060\060\061\062\063\065
\071\065\071\132\060\201\202\061\013\060\011\006\003\125\004\006
\023\002\104\105\061\053\060\051\006\003\125\004\012\014\042\124
\055\123\171\163\164\145\155\163\040\105\156\164\145\162\160\162
\151\163\145\040\123\145\162\166\151\143\145\163\040\107\155\142
\110\061\037\060\035\006\003\125\004\013\014\026\124\055\123\171
\163\164\145\155\163\040\124\162\165\163\164\040\103\145\156\164
\145\162\061\045\060\043\006\003\125\004\003\014\034\124\055\124
\145\154\145\123\145\143\040\107\154\157\142\141\154\122\157\157
\164\040\103\154\141\163\163\040\063\060\202\001\042\060\015\006
\011\052\206\110\206\367\015\001\001\001\005\000\003\202\001\017
\000\060\202\001\012\002\202\001\001\000\275\165\223\360\142\042
\157\044\256\340\172\166\254\175\275\331\044\325\270\267\374\315
\360\102\340\353\170\210\126\136\233\232\124\035\115\014\212\366
\323\317\160\364\122\265\330\223\004\343\106\206\161\101\112\053
\360\052\054\125\003\326\110\303\340\071\070\355\362\134\074\077
\104\274\223\075\141\253\116\315\015\276\360\040\047\130\016\104
\177\004\032\207\245\327\226\024\066\220\320\111\173\241\165\373
\032\153\163\261\370\316\251\011\054\362\123\325\303\024\104\270
\206\245\366\213\053\071\332\243\063\124\331\372\162\032\367\042
\025\034\210\221\153\177\146\345\303\152\200\260\044\363\337\206
\105\210\375\031\177\165\207\037\037\261\033\012\163\044\133\271
\145\340\054\124\310\140\323\146\027\077\341\314\124\063\163\221
\002\072\246\177\173\166\071\242\037\226\266\070\256\265\310\223
\164\035\236\271\264\345\140\235\057\126\321\340\353\136\133\114
\022\160\014\154\104\040\253\021\330\364\031\366\322\234\122\067
\347\372\266\302\061\073\112\324\024\231\255\307\032\365\135\137
\372\007\270\174\015\037\326\203\036\263\002\003\001\000\001\243
\102\060\100\060\017\006\003\125\035\023\001\001\377\004\005\060
\003\001\001\377\060\016\006\003\125\035\017\001\001\377\004\004
\003\002\001\006\060\035\006\003\125\035\016\004\026\004\024\265
\003\367\166\073\141\202\152\022\252\030\123\353\003\041\224\277
\376\316\312\060\015\006\011\052\206\110\206\367\015\001\001\013
\005\000\003\202\001\001\000\126\075\357\224\325\275\332\163\262
\130\276\256\220\255\230\047\227\376\001\261\260\122\000\270\115
\344\033\041\164\033\176\300\356\136\151\052\045\257\134\326\035
\332\322\171\311\363\227\051\340\206\207\336\004\131\017\361\131
\324\144\205\113\231\257\045\004\036\311\106\251\227\336\202\262
\033\160\237\234\366\257\161\061\335\173\005\245\054\323\271\312
\107\366\312\362\366\347\255\271\110\077\274\026\267\301\155\364

\352\011\257\354\363\265\347\005\236\246\036\212\123\121\326\223
\201\314\164\223\366\271\332\246\045\005\164\171\132\176\100\076
\202\113\046\021\060\156\341\077\101\307\107\000\065\325\365\323
\367\124\076\201\075\332\111\152\232\263\357\020\075\346\353\157
\321\310\042\107\313\314\317\001\061\222\331\030\343\042\276\011
\036\032\076\132\262\344\153\014\124\172\175\103\116\270\211\245
\173\327\242\075\226\206\314\362\046\064\055\152\222\235\232\032
\320\060\342\135\116\004\260\137\213\040\176\167\301\075\225\202
\321\106\232\073\074\170\270\157\241\320\015\144\242\170\036\051
\116\223\303\244\124\024\133

END

CKA_NSS_Mozilla_CA_POLICY

CK_BBOOL CK_TRUE

CKA_NSS_SERVER_DISTRUST_AFTER CK_BBOOL CK_FALSE

CKA_NSS_EMAIL_DISTRUST_AFTER CK_BBOOL CK_FALSE

Trust for "T-TeleSec GlobalRoot Class 3"

Issuer: CN=T-TeleSec GlobalRoot Class 3,OU=T-Systems Trust Center,O=T-Systems Enterprise Services
GmbH,C=DE

Serial Number: 1 (0x1)

Subject: CN=T-TeleSec GlobalRoot Class 3,OU=T-Systems Trust Center,O=T-Systems Enterprise Services
GmbH,C=DE

Not Valid Before: Wed Oct 01 10:29:56 2008

Not Valid After : Sat Oct 01 23:59:59 2033

Fingerprint (SHA-256):

FD:73:DA:D3:1C:64:4F:F1:B4:3B:EF:0C:CD:DA:96:71:0B:9C:D9:87:5E:CA:7E:31:70:7A:F3:E9:6D:52:2B:BD

Fingerprint (SHA1): 55:A6:72:3E:CB:F2:EC:CD:C3:23:74:70:19:9D:2A:BE:11:E3:81:D1

CKA_CLASS CK_OBJECT_CLASS CKO_NSS_TRUST

CKA_TOKEN CK_BBOOL CK_TRUE

CKA_PRIVATE CK_BBOOL CK_FALSE

CKA_MODIFIABLE CK_BBOOL CK_FALSE

CKA_LABEL UTF8 "T-TeleSec GlobalRoot Class 3"

CKA_CERT_SHA1_HASH MULTILINE_OCTAL

\125\246\162\076\313\362\354\315\303\043\164\160\031\235\052\276
\021\343\201\321

END

CKA_CERT_MD5_HASH MULTILINE_OCTAL

\312\373\100\250\116\071\222\212\035\376\216\057\304\047\352\357
END

CKA_ISSUER MULTILINE_OCTAL

\060\201\202\061\013\060\011\006\003\125\004\006\023\002\104\105
\061\053\060\051\006\003\125\004\012\014\042\124\055\123\171\163
\164\145\155\163\040\105\156\164\145\162\160\162\151\163\145\040
\123\145\162\166\151\143\145\163\040\107\155\142\110\061\037\060
\035\006\003\125\004\013\014\026\124\055\123\171\163\164\145\155
\163\040\124\162\165\163\164\040\103\145\156\164\145\162\061\045
\060\043\006\003\125\004\003\014\034\124\055\124\145\154\145\123
\145\143\040\107\154\157\142\141\154\122\157\157\164\040\103\154

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\141\163\163\040\063
END
CKA_SERIAL_NUMBER
MULTILINE_OCTAL
\002\001\001
END
CKA_TRUST_SERVER_AUTH CK_TRUST CKT_NSS_TRUSTED_DELEGATOR
CKA_TRUST_EMAIL_PROTECTION CK_TRUST CKT_NSS_MUST_VERIFY_TRUST
CKA_TRUST_CODE_SIGNING CK_TRUST CKT_NSS_MUST_VERIFY_TRUST
CKA_TRUST_STEP_UP_APPROVED CK_BBOOL CK_FALSE

#
# Certificate "D-TRUST Root Class 3 CA 2 2009"
#
# Issuer: CN=D-TRUST Root Class 3 CA 2 2009,O=D-Trust GmbH,C=DE
# Serial Number: 623603 (0x983f3)
# Subject: CN=D-TRUST Root Class 3 CA 2 2009,O=D-Trust GmbH,C=DE
# Not Valid Before: Thu Nov 05 08:35:58 2009
# Not Valid After : Mon Nov 05 08:35:58 2029
# Fingerprint (SHA-256):
49:E7:A4:42:AC:F0:EA:62:87:05:00:54:B5:25:64:B6:50:E4:F4:9E:42:E3:48:D6:AA:38:E0:39:E9:57:B1:C1
# Fingerprint (SHA1): 58:E8:AB:B0:36:15:33:FB:80:F7:9B:1B:6D:29:D3:FF:8D:5F:00:F0
CKA_CLASS CK_OBJECT_CLASS CKO_CERTIFICATE
CKA_TOKEN CK_BBOOL
CK_TRUE
CKA_PRIVATE CK_BBOOL CK_FALSE
CKA_MODIFIABLE CK_BBOOL CK_FALSE
CKA_LABEL UTF8 "D-TRUST Root Class 3 CA 2 2009"
CKA_CERTIFICATE_TYPE CK_CERTIFICATE_TYPE CKC_X_509
CKA_SUBJECT MULTILINE_OCTAL
\060\115\061\013\060\011\006\003\125\004\006\023\002\104\105\061
\025\060\023\006\003\125\004\012\014\014\104\055\124\162\165\163
\164\040\107\155\142\110\061\047\060\045\006\003\125\004\003\014
\036\104\055\124\122\125\123\124\040\122\157\157\164\040\103\154
\141\163\163\040\063\040\103\101\040\062\040\062\060\060\071
END
CKA_ID UTF8 "0"
CKA_ISSUER MULTILINE_OCTAL
\060\115\061\013\060\011\006\003\125\004\006\023\002\104\105\061
\025\060\023\006\003\125\004\012\014\014\104\055\124\162\165\163
\164\040\107\155\142\110\061\047\060\045\006\003\125\004\003\014
\036\104\055\124\122\125\123\124\040\122\157\157\164\040\103\154
\141\163\163\040\063\040\103\101\040\062\040\062\060\060\071
END
CKA_SERIAL_NUMBER MULTILINE_OCTAL
\002\003\011\203\363
END
CKA_VALUE MULTILINE_OCTAL

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\060\202\004\063\060\202\003\033\240\003\002\001\002\002\003\011
\203\363\060\015\006\011\052\206\110\206\367\015\001\001\013\005
\000\060\115\061\013\060\011\006\003\125\004\006\023\002\104\105
\061\025\060\023\006\003\125\004\012\014\014\104\055\124\162\165
\163\164\040\107\155\142\110\061\047\060\045\006\003\125\004\003
\014\036\104\055\124\122\125\123\124\040\122\157\157\164\040\103
\154\141\163\163\040\063\040\103\101\040\062\040\062\060\060\071
\060\036\027\015\060\071\061\061\060\065\060\070\063\065\065\070
\132\027\015\062\071\061\061\060\065\060\070\063\065\065\070\132
\060\115\061\013\060\011\006\003\125\004\006\023\002\104\105\061
\025\060\023\006\003\125\004\012\014\014\104\055\124\162\165\163
\164\040\107\155\142\110\061\047\060\045\006\003\125\004\003\014
\036\104\055\124\122\125\123\124\040\122\157\157\164\040\103\154
\141\163\163\040\063\040\103\101\040\062\040\062\060\060\071\060
\202\001\042\060\015\006\011\052\206\110\206\367\015\001\001\001
\005\000\003\202\001\017\000\060\202\001\012\002\202\001\001\000
\323\262\112\317\172\107\357\165\233\043\372\072\057\326\120\105
\211\065\072\306\153\333\376\333\000\150\250\340\003\021\035\067
\120\010\237\115\112\150\224\065\263\123\321\224\143\247\040\126
\257\336\121\170\354\052\075\363\110\110\120\076\012\337\106\125
\213\047\155\303\020\115\015\221\122\103\330\207\340\135\116\066
\265\041\312\137\071\100\004\137\133\176\314\243\306\053\251\100
\036\331\066\204\326\110\363\222\036\064\106\040\044\301\244\121
\216\112\032\357\120\077\151\135\031\177\105\303\307\001\217\121
\311\043\350\162\256\264\274\126\011\177\022\313\034\261\257\051
\220\012\311\125\314\017\323\264\032\355\107\065\132\112\355\234
\163\004\041\320\252\275\014\023\265\000\312\046\154\304\153\014
\224\132\225\224\332\120\232\361\377\245\053\146\061\244\311\070
\240\337\035\037\270\011\056\363\247\350\147\122\253\225\037\340
\106\076\330\244\303\312\132\305\061\200\350\110\232\237\224\151
\376\031\335\330\163\174\201\312\226\336\216\355\263\062\005\145
\204\064\346\346\375\127\020\265\137\166\277\057\260\020\015\305
\002\003\001\000\001\243\202\001\032\060\202\001\026\060\017\006
\003\125\035\023\001\001\377\004\005\060\003\001\001\377\060\035
\006\003\125\035\016\004\026\004\024\375\332\024\304\237\060\336
\041\275\036\102\071\374\253\143\043\111\340\361\204\060\016\006
\003\125\035\017\001\001\377\004\004\003\002\001\006\060\201\323
\006\003\125\035\037\004\201\313\060\201\310\060\201\200\240\176
\240\174\206\172\154\144\141\160\072\057\057\144\151\162\145\143
\164\157\162\171\056\144\055\164\162\165\163\164\056\156\145\164
\057\103\116\075\104\055\124\122\125\123\124\045\062\060\122\157
\157\164\045\062\060\103\154\141\163\163\045\062\060\063\045\062
\060\103\101\045\062\060\062\045\062\060\062\060\060\071\054\117
\075\104\055\124\162\165\163\164\045\062\060\107\155\142\110\054
\103\075\104\105\077\143\145\162\164\151\146\151\143\141\164\145
\162\145\166\157\143\141\164\151\157\156\154\151\163\164\060\103
\240\101\240\077\206\075\150\164\164\160\072\057\057\167\167\167
\056\144\055\164\162\165\163\164\056\156\145\164\057\143\162\154

\057\144\055\164\162\165\163\164\137\162\157\157\164\137\143\154
\141\163\163\137\063\137\143\141\137\062\137\062\060\060\071\056
\143\162\154\060\015\006\011\052\206\110\206\367\015\001\001\013
\005\000\003\202\001\001\000\177\227\333\060\310\337\244\234\175
\041\172\200\160\316\024\022\151\210\024\225\140\104\001\254\262
\351\060\117\233\120\302\146\330\176\215\060\265\160\061\351\342
\151\307\363\160\333\040\025\206\320\015\360\276\254\001\165\204
\316\176\237\115\277\267\140\073\234\363\312\035\342\136\150\330
\243\235\227\345\100\140\322\066\041\376\320\264\270\027\332\164
\243\177\324\337\260\230\002\254\157\153\153\054\045\044\162\241
\145\356\045\132\345\346\062\347\362\337\253\111\372\363\220\151
\043\333\004\331\347\134\130\374\145\324\227\276\314\374\056\012
\314\045\052\065\004\370\140\221\025\165\075\101\377\043\037\031
\310\154\353\202\123\004\246\344\114\042\115\215\214\272\316\133
\163\354\144\124\120\155\321\234\125\373\151\303\066\303\214\274
\074\205\246\153\012\046\015\340\223\230\140\256\176\306\044\227
\212\141\137\221\216\146\222\011\207\066\315\213\233\055\076\366
\121\324\120\324\131\050\275\203\362\314\050\173\123\206\155\330
\046\210\160\327\352\221\315\076\271\312\300\220\156\132\306\136
\164\145\327\134\376\243\342

END

CKA_NSS_MOZILLA_CA_POLICY

CK_BBOOL CK_TRUE

CKA_NSS_SERVER_DISTRUST_AFTER CK_BBOOL CK_FALSE

CKA_NSS_EMAIL_DISTRUST_AFTER CK_BBOOL CK_FALSE

Trust for "D-TRUST Root Class 3 CA 2 2009"

Issuer: CN=D-TRUST Root Class 3 CA 2 2009,O=D-Trust GmbH,C=DE

Serial Number: 623603 (0x983f3)

Subject: CN=D-TRUST Root Class 3 CA 2 2009,O=D-Trust GmbH,C=DE

Not Valid Before: Thu Nov 05 08:35:58 2009

Not Valid After : Mon Nov 05 08:35:58 2029

Fingerprint (SHA-256):

49:E7:A4:42:AC:F0:EA:62:87:05:00:54:B5:25:64:B6:50:E4:F4:9E:42:E3:48:D6:AA:38:E0:39:E9:57:B1:C1

Fingerprint (SHA1): 58:E8:AB:B0:36:15:33:FB:80:F7:9B:1B:6D:29:D3:FF:8D:5F:00:F0

CKA_CLASS

CK_OBJECT_CLASS CKO_NSS_TRUST

CKA_TOKEN CK_BBOOL CK_TRUE

CKA_PRIVATE CK_BBOOL CK_FALSE

CKA_MODIFIABLE CK_BBOOL CK_FALSE

CKA_LABEL UTF8 "D-TRUST Root Class 3 CA 2 2009"

CKA_CERT_SHA1_HASH MULTILINE_OCTAL

\130\350\253\260\066\025\063\373\200\367\233\033\155\051\323\377
\215\137\000\360

END

CKA_CERT_MD5_HASH MULTILINE_OCTAL

\315\340\045\151\215\107\254\234\211\065\220\367\375\121\075\057
END

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CKA_ISSUER MULTILINE_OCTAL
\060\115\061\013\060\011\006\003\125\004\006\023\002\104\105\061
\025\060\023\006\003\125\004\012\014\014\104\055\124\162\165\163
\164\040\107\155\142\110\061\047\060\045\006\003\125\004\003\014
\036\104\055\124\122\125\123\124\040\122\157\157\164\040\103\154
\141\163\163\040\063\040\103\101\040\062\040\062\060\060\071
END
CKA_SERIAL_NUMBER MULTILINE_OCTAL
\002\003\011\203\363
END
CKA_TRUST_SERVER_AUTH CK_TRUST CKT_NSS_TRUSTED_DELEGATOR
CKA_TRUST_EMAIL_PROTECTION CK_TRUST CKT_NSS_MUST_VERIFY_TRUST
CKA_TRUST_CODE_SIGNING CK_TRUST CKT_NSS_MUST_VERIFY_TRUST
CKA_TRUST_STEP_UP_APPROVED
CK_BBOOL CK_FALSE

#
# Certificate "D-TRUST Root Class 3 CA 2 EV 2009"
#
# Issuer: CN=D-TRUST Root Class 3 CA 2 EV 2009,O=D-Trust GmbH,C=DE
# Serial Number: 623604 (0x983f4)
# Subject: CN=D-TRUST Root Class 3 CA 2 EV 2009,O=D-Trust GmbH,C=DE
# Not Valid Before: Thu Nov 05 08:50:46 2009
# Not Valid After : Mon Nov 05 08:50:46 2029
# Fingerprint (SHA-256):
EE:C5:49:6B:98:8C:E9:86:25:B9:34:09:2E:EC:29:08:BE:D0:B0:F3:16:C2:D4:73:0C:84:EA:F1:F3:D3:48:81
# Fingerprint (SHA1): 96:C9:1B:0B:95:B4:10:98:42:FA:D0:D8:22:79:FE:60:FA:B9:16:83
CKA_CLASS CK_OBJECT_CLASS CKO_CERTIFICATE
CKA_TOKEN CK_BBOOL CK_TRUE
CKA_PRIVATE CK_BBOOL CK_FALSE
CKA_MODIFIABLE CK_BBOOL CK_FALSE
CKA_LABEL UTF8 "D-TRUST Root Class 3 CA 2 EV 2009"
CKA_CERTIFICATE_TYPE CK_CERTIFICATE_TYPE CKC_X_509
CKA_SUBJECT MULTILINE_OCTAL
\060\120\061\013\060\011\006\003\125\004\006\023\002\104\105\061
\025\060\023\006\003\125\004\012\014\014\104\055\124\162\165\163
\164\040\107\155\142\110\061\052\060\050\006\003\125\004\003\014
\041\104\055\124\122\125\123\124\040\122\157\157\164\040\103\154
\141\163\163\040\063\040\103\101\040\062\040\105\126\040\062\060
\060\071
END
CKA_ID
UTF8 "0"
CKA_ISSUER MULTILINE_OCTAL
\060\120\061\013\060\011\006\003\125\004\006\023\002\104\105\061
\025\060\023\006\003\125\004\012\014\014\104\055\124\162\165\163
\164\040\107\155\142\110\061\052\060\050\006\003\125\004\003\014
\041\104\055\124\122\125\123\124\040\122\157\157\164\040\103\154

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\141\163\163\040\063\040\103\101\040\062\040\105\126\040\062\060
\060\071
END
CKA_SERIAL_NUMBER MULTILINE_OCTAL
\002\003\011\203\364
END
CKA_VALUE MULTILINE_OCTAL
\060\202\004\103\060\202\003\053\240\003\002\001\002\002\003\011
\203\364\060\015\006\011\052\206\110\206\367\015\001\001\013\005
\000\060\120\061\013\060\011\006\003\125\004\006\023\002\104\105
\061\025\060\023\006\003\125\004\012\014\014\104\055\124\162\165
\163\164\040\107\155\142\110\061\052\060\050\006\003\125\004\003
\014\041\104\055\124\122\125\123\124\040\122\157\157\164\040\103
\154\141\163\163\040\063\040\103\101\040\062\040\105\126\040\062
\060\060\071\060\036\027\015\060\071\061\061\060\065\060\070\065
\060\064\066\132\027\015\062\071\061\061\060\065\060\070\065\060
\064\066\132\060\120\061\013\060\011\006\003\125\004\006\023\002
\104\105\061\025\060\023\006\003\125\004\012\014\014\104\055\124
\162\165\163\164\040\107\155\142\110\061\052\060\050\006\003\125
\004\003\014\041\104\055\124\122\125\123\124\040\122\157\157\164
\040\103\154\141\163\163\040\063\040\103\101\040\062\040\105\126
\040\062\060\060\071\060\202\001\042\060\015\006\011\052\206\110
\206\367\015\001\001\001\005\000\003\202\001\017\000\060\202\001
\012\002\202\001\001\000\231\361\204\064\160\272\057\267\060\240
\216\275\174\004\317\276\142\274\231\375\202\227\322\172\012\147
\226\070\011\366\020\116\225\042\163\231\215\332\025\055\347\005
\374\031\163\042\267\216\230\000\274\074\075\254\241\154\373\326
\171\045\113\255\360\314\144\332\210\076\051\270\017\011\323\064
\335\063\365\142\321\341\315\031\351\356\030\117\114\130\256\342
\036\326\014\133\025\132\330\072\270\304\030\144\036\343\063\262
\265\211\167\116\014\277\331\224\153\023\227\157\022\243\376\231
\251\004\314\025\354\140\150\066\355\010\173\267\365\277\223\355
\146\061\203\214\306\161\064\207\116\027\352\257\213\221\215\034
\126\101\256\042\067\136\067\362\035\331\321\055\015\057\151\121
\247\276\146\246\212\072\052\275\307\032\261\341\024\360\276\072
\035\271\317\133\261\152\376\264\261\106\040\242\373\036\073\160
\357\223\230\175\214\163\226\362\305\357\205\160\255\051\046\374
\036\004\076\034\240\330\017\313\122\203\142\174\356\213\123\225
\220\251\127\242\352\141\005\330\371\115\304\047\372\156\255\355
\371\327\121\367\153\245\002\003\001\000\001\243\202\001\044\060
\202\001\040\060\017\006\003\125\035\023\001\001\377\004\005\060
\003\001\001\377\060\035\006\003\125\035\016\004\026\004\024\323
\224\212\114\142\023\052\031\056\314\257\162\212\175\066\327\232
\034\334\147\060\016\006\003\125\035\017\001\001\377\004\004\003
\002\001\006\060\201\335\006\003\125\035\037\004\201\325\060\201
\322\060\201\207\240\201\204\240\201\201\206\177\154\144\141\160
\072\057\057\144\151\162\145\143\164\157\162\171\056\144\055\164
\162\165\163\164\056\156\145\164\057\103\116\075\104\055\124\122

\125\123\124\045\062\060\122\157\157\164\045\062\060\103\154\141
\163\163\045\062\060\063\045\062\060\103\101\045\062\060\062\045
\062\060\105\126\045\062\060\062\060\060\071\054\117\075\104\055
\124\162\165\163\164\045\062\060\107\155\142\110\054\103\075\104
\105\077\143\145\162\164\151\146\151\143\141\164\145\162\145\166
\157\143\141\164\151\157\156\154\151\163\164\060\106\240\104\240
\102\206\100\150\164\164\160\072\057\057\167\167\167\056\144\055
\164\162\165\163\164\056\156\145\164\057\143\162\154\057\144\055
\164\162\165\163\164\137\162\157\157\164\137\143\154\141\163\163
\137\063\137\143\141\137\062\137\145\166\137\062\060\060\071\056
\143\162\154\060\015\006\011\052\206\110\206\367\015\001\001\013
\005\000\003\202\001\001\000\064\355\173\132\074\244\224\210\357
\032\021\165\007\057\263\376\074\372\036\121\046\353\207\366\051
\336\340\361\324\306\044\011\351\301\317\125\033\264\060\331\316
\032\376\006\121\246\025\244\055\357\262\113\277\040\050\045\111
\321\246\066\167\064\350\144\337\122\261\021\307\163\172\315\071
\236\302\255\214\161\041\362\132\153\257\337\074\116\125\257\262
\204\145\024\211\271\167\313\052\061\276\317\243\155\317\157\110
\224\062\106\157\347\161\214\240\246\204\031\067\007\362\003\105
\011\053\206\165\174\337\137\151\127\000\333\156\330\246\162\042
\113\120\324\165\230\126\337\267\030\377\103\103\120\256\172\104
\173\360\171\121\327\103\075\247\323\201\323\360\311\117\271\332
\306\227\206\320\202\303\344\102\155\376\260\342\144\116\016\046
\347\100\064\046\265\010\211\327\010\143\143\070\047\165\036\063
\352\156\250\335\237\231\117\164\115\201\211\200\113\335\232\227
\051\134\057\276\201\101\271\214\377\352\175\140\006\236\315\327
\075\323\056\243\025\274\250\346\046\345\157\303\334\270\003\041
\352\237\026\361\054\124\265

END

CKA_NSS_Mozilla_CA_POLICY

CK_BBOOL CK_TRUE

CKA_NSS_SERVER_DISTRICT_AFTER CK_BBOOL CK_FALSE

CKA_NSS_EMAIL_DISTRICT_AFTER CK_BBOOL CK_FALSE

Trust for "D-TRUST Root Class 3 CA 2 EV 2009"

Issuer: CN=D-TRUST Root Class 3 CA 2 EV 2009,O=D-Trust GmbH,C=DE

Serial Number: 623604 (0x983f4)

Subject: CN=D-TRUST Root Class 3 CA 2 EV 2009,O=D-Trust GmbH,C=DE

Not Valid Before: Thu Nov 05 08:50:46 2009

Not Valid After : Mon Nov 05 08:50:46 2029

Fingerprint (SHA-256):

EE:C5:49:6B:98:8C:E9:86:25:B9:34:09:2E:EC:29:08:BE:D0:B0:F3:16:C2:D4:73:0C:84:EA:F1:F3:D3:48:81

Fingerprint (SHA1): 96:C9:1B:0B:95:B4:10:98:42:FA:D0:D8:22:79:FE:60:FA:B9:16:83

CKA_CLASS CK_OBJECT_CLASS CKO_NSS_TRUST

CKA_TOKEN CK_BBOOL CK_TRUE

CKA_PRIVATE CK_BBOOL CK_FALSE

CKA_MODIFIABLE CK_BBOOL CK_FALSE

CKA_LABEL UTF8 "D-TRUST Root Class 3 CA 2 EV 2009"


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CKA_CERT_SHA1_HASH MULTILINE_OCTAL
\226\311\033\013\225\264\020\230\102\372\320\330\042\171\376\140
\372\271\026\203
END
CKA_CERT_MD5_HASH
MULTILINE_OCTAL
\252\306\103\054\136\055\315\304\064\300\120\117\021\002\117\266
END
CKA_ISSUER MULTILINE_OCTAL
\060\120\061\013\060\011\006\003\125\004\006\023\002\104\105\061
\025\060\023\006\003\125\004\012\014\014\104\055\124\162\165\163
\164\040\107\155\142\110\061\052\060\050\006\003\125\004\003\014
\041\104\055\124\122\125\123\124\040\122\157\157\164\040\103\154
\141\163\163\040\063\040\103\101\040\062\040\105\126\040\062\060
\060\071
END
CKA_SERIAL_NUMBER MULTILINE_OCTAL
\002\003\011\203\364
END
CKA_TRUST_SERVER_AUTH CK_TRUST CKT_NSS_TRUSTED_DELEGATOR
CKA_TRUST_EMAIL_PROTECTION CK_TRUST CKT_NSS_MUST_VERIFY_TRUST
CKA_TRUST_CODE_SIGNING CK_TRUST CKT_NSS_MUST_VERIFY_TRUST
CKA_TRUST_STEP_UP_APPROVED CK_BBOOL CK_FALSE

#
# Certificate "CA Disig Root R2"
#
# Issuer: CN=CA Disig Root R2,O=Disig a.s.,L=Bratislava,C=SK
# Serial Number:00:92:b8:88:db:b0:8a:c1:63
# Subject: CN=CA Disig Root R2,O=Disig a.s.,L=Bratislava,C=SK
# Not Valid Before: Thu
# Jul 19 09:15:30 2012
# Not Valid After : Sat Jul 19 09:15:30 2042
# Fingerprint (SHA-256):
E2:3D:4A:03:6D:7B:70:E9:F5:95:B1:42:20:79:D2:B9:1E:DF:BB:1F:B6:51:A0:63:3E:AA:8A:9D:C5:F8:07:03
# Fingerprint (SHA1): B5:61:EB:EA:A4:DE:E4:25:4B:69:1A:98:A5:57:47:C2:34:C7:D9:71
CKA_CLASS CK_OBJECT_CLASS CKO_CERTIFICATE
CKA_TOKEN CK_BBOOL CK_TRUE
CKA_PRIVATE CK_BBOOL CK_FALSE
CKA_MODIFIABLE CK_BBOOL CK_FALSE
CKA_LABEL UTF8 "CA Disig Root R2"
CKA_CERTIFICATE_TYPE CK_CERTIFICATE_TYPE CKC_X_509
CKA_SUBJECT MULTILINE_OCTAL
\060\122\061\013\060\011\006\003\125\004\006\023\002\123\113\061
\023\060\021\006\003\125\004\007\023\012\102\162\141\164\151\163
\154\141\166\141\061\023\060\021\006\003\125\004\012\023\012\104
\151\163\151\147\040\141\056\163\056\061\031\060\027\006\003\125
\004\003\023\020\103\101\040\104\151\163\151\147\040\122\157\157

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\164\040\122\062
END
CKA_ID UTF8 "0"
CKA_ISSUER MULTILINE_OCTAL
\060\122\061\013\060\011\006\003\125\004\006\023\002\123\113\061
\023\060\021\006\003\125\004\007\023\012\102\162\141\164\151\163
\154\141\166\141\061\023\060\021\006\003\125\004\012\023\012\104
\151\163\151\147\040\141\056\163\056\061\031\060\027\006\003\125
\004\003\023\020\103\101\040\104\151\163\151\147\040\122\157\157
\164\040\122\062
END
CKA_SERIAL_NUMBER
MULTILINE_OCTAL
\002\011\000\222\270\210\333\260\212\301\143
END
CKA_VALUE MULTILINE_OCTAL
\060\202\005\151\060\202\003\121\240\003\002\001\002\002\011\000
\222\270\210\333\260\212\301\143\060\015\006\011\052\206\110\206
\367\015\001\001\013\005\000\060\122\061\013\060\011\006\003\125
\004\006\023\002\123\113\061\023\060\021\006\003\125\004\007\023
\012\102\162\141\164\151\163\154\141\166\141\061\023\060\021\006
\003\125\004\012\023\012\104\151\163\151\147\040\141\056\163\056
\061\031\060\027\006\003\125\004\003\023\020\103\101\040\104\151
\163\151\147\040\122\157\157\164\040\122\062\060\036\027\015\061
\062\060\067\061\071\060\071\061\065\063\060\132\027\015\064\062
\060\067\061\071\060\071\061\065\063\060\132\060\122\061\013\060
\011\006\003\125\004\006\023\002\123\113\061\023\060\021\006\003
\125\004\007\023\012\102\162\141\164\151\163\154\141\166\141\061
\023\060\021\006\003\125\004\012\023\012\104\151\163\151\147\040
\141\056\163\056\061\031\060\027\006\003\125\004\003\023\020\103
\101\040\104\151\163\151\147\040\122\157\157\164\040\122\062\060
\202\002\042\060\015\006\011\052\206\110\206\367\015\001\001\001
\005\000\003\202\002\017\000\060\202\002\012\002\202\002\001\000
\242\243\304\000\011\326\205\135\055\155\024\366\302\303\163\236
\065\302\161\125\176\201\373\253\106\120\340\301\174\111\170\346
\253\171\130\074\332\377\174\034\237\330\227\002\170\076\153\101
\004\351\101\275\276\003\054\105\366\057\144\324\253\135\243\107
\075\144\233\351\150\232\306\314\033\077\272\276\262\213\064\002
\056\230\125\031\374\214\157\252\137\332\114\316\115\003\041\243
\330\322\064\223\126\226\313\114\014\000\026\074\137\032\315\310
\307\154\246\255\323\061\247\274\350\345\341\146\326\322\373\003
\264\101\145\311\020\256\016\005\143\306\200\152\151\060\375\322
\356\220\357\015\047\337\237\225\163\364\341\045\332\154\026\336
\101\070\064\352\213\374\321\350\004\024\141\055\101\176\254\307
\167\116\313\121\124\373\136\222\030\033\004\132\150\306\311\304
\372\267\023\240\230\267\021\053\267\326\127\314\174\236\027\321
\313\045\376\206\116\044\056\126\014\170\115\236\001\022\246\053
\247\001\145\156\174\142\035\204\204\337\352\300\153\265\245\052
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\225\203\303\123\021\014\163\035\013\262\106\220\321\102\072\316
\100\156\225\255\377\306\224\255\156\227\204\216\175\157\236\212
\200\015\111\155\163\342\173\222\036\303\363\301\363\353\056\005
\157\331\033\317\067\166\004\310\264\132\344\027\247\313\335\166
\037\320\031\166\350\054\005\263\326\234\064\330\226\334\141\207
\221\005\344\104\010\063\301\332\271\010\145\324\256\262\066\015
\353\272\070\272\014\345\233\236\353\215\146\335\231\317\326\211
\101\366\004\222\212\051\051\155\153\072\034\347\165\175\002\161
\016\363\300\347\275\313\031\335\235\140\262\302\146\140\266\261
\004\356\311\346\206\271\232\146\100\250\347\021\355\201\105\003
\213\366\147\131\350\301\006\021\275\335\317\200\002\117\145\100
\170\134\107\120\310\233\346\037\201\173\344\104\250\133\205\232
\342\336\132\325\307\371\072\104\146\113\344\062\124\174\344\154
\234\263\016\075\027\242\262\064\022\326\176\262\250\111\273\321
\172\050\100\276\242\026\037\337\344\067\037\021\163\373\220\012
\145\103\242\015\174\370\006\001\125\063\175\260\015\270\364\365
\256\245\102\127\174\066\021\214\173\136\304\003\235\214\171\235
\002\003\001\000\001\243\102\060\100\060\017\006\003\125\035\023
\001\001\377\004\005\060\003\001\001\377\060\016\006\003\125\035
\017\001\001\377\004\004\003\002\001\006\060\035\006\003\125\035
\016\004\026\004\024\265\231\370\257\260\224\365\343\040\326\012
\255\316\116\126\244\056\156\102\355\060\015\006\011\052\206\110
\206\367\015\001\001\013\005\000\003\202\002\001\000\046\006\136
\160\347\145\063\310\202\156\331\234\027\072\033\172\146\262\001
\366\170\073\151\136\057\352\377\116\371\050\303\230\052\141\114
\264\044\022\212\175\155\021\024\367\234\265\312\346\274\236\047
\216\114\031\310\251\275\172\300\327\066\016\155\205\162\156\250
\306\242\155\366\372\163\143\177\274\156\171\010\034\235\212\237
\032\212\123\246\330\273\331\065\125\261\021\305\251\003\263\126
\073\271\204\223\042\136\176\301\366\022\122\213\352\054\147\274
\376\066\114\365\270\317\321\263\111\222\073\323\051\016\231\033
\226\367\141\270\073\304\053\266\170\154\264\043\157\360\375\323
\262\136\165\037\231\225\250\254\366\332\341\305\061\173\373\321
\106\263\322\274\147\264\142\124\272\011\367\143\260\223\242\232
\371\351\122\056\213\140\022\253\374\365\140\126\357\020\134\213
\304\032\102\334\203\133\144\016\313\265\274\326\117\301\174\074
\156\215\023\155\373\173\353\060\320\334\115\257\305\325\266\245
\114\133\161\311\350\061\276\350\070\006\110\241\032\342\352\322
\336\022\071\130\032\377\200\016\202\165\346\267\311\007\154\016
\357\377\070\361\230\161\304\267\177\016\025\320\045\151\275\042
\235\053\355\005\366\106\107\254\355\300\360\324\073\342\354\356
\226\133\220\023\116\036\126\072\353\260\357\226\273\226\043\021
\272\362\103\206\164\144\225\310\050\165\337\035\065\272\322\067
\203\070\123\070\066\073\317\154\351\371\153\016\320\373\004\350
\117\167\327\145\001\170\206\014\172\076\041\142\361\177\143\161
\014\311\237\104\333\250\047\242\165\276\156\201\076\327\300\353
\033\230\017\160\134\064\262\212\314\300\205\030\353\156\172\263
\367\132\241\007\277\251\102\222\363\140\042\227\344\024\241\007

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\233\116\166\300\216\175\375\244\045\307\107\355\377\037\163\254
\314\303\245\351\157\012\216\233\145\302\120\205\265\243\240\123
\022\314\125\207\141\363\201\256\020\106\141\275\104\041\270\302
\075\164\317\176\044\065\372\034\007\016\233\075\042\312\357\061
\057\214\254\022\275\357\100\050\374\051\147\237\262\023\117\146
\044\304\123\031\351\036\051\025\357\346\155\260\177\055\147\375
\363\154\033\165\106\243\345\112\027\351\244\327\013
END
CKA_NSS_Mozilla_CA_POLICY
CK_BBOOL CK_TRUE
CKA_NSS_SERVER_DISTRUST_AFTER CK_BBOOL CK_FALSE
CKA_NSS_EMAIL_DISTRUST_AFTER CK_BBOOL CK_FALSE

# Trust for "CA Disig Root R2"
# Issuer: CN=CA Disig Root R2,O=Disig a.s.,L=Bratislava,C=SK
# Serial Number:00:92:b8:88:db:b0:8a:c1:63
# Subject: CN=CA Disig Root R2,O=Disig a.s.,L=Bratislava,C=SK
# Not Valid Before: Thu Jul 19 09:15:30 2012
# Not Valid After : Sat Jul 19 09:15:30 2042
# Fingerprint (SHA-256):
E2:3D:4A:03:6D:7B:70:E9:F5:95:B1:42:20:79:D2:B9:1E:DF:BB:1F:B6:51:A0:63:3E:AA:8A:9D:C5:F8:07:03
# Fingerprint (SHA1): B5:61:EB:EA:A4:DE:E4:25:4B:69:1A:98:A5:57:47:C2:34:C7:D9:71
CKA_CLASS CK_OBJECT_CLASS CKO_NSS_TRUST
CKA_TOKEN CK_BBOOL CK_TRUE
CKA_PRIVATE CK_BBOOL CK_FALSE
CKA_MODIFIABLE CK_BBOOL CK_FALSE
CKA_LABEL UTF8 "CA Disig Root R2"
CKA_CERT_SHA1_HASH MULTILINE_OCTAL
\265\141\353\352\244\336\344\045\113\151\032\230\245\127\107\302
\064\307\331\161
END
CKA_CERT_MD5_HASH MULTILINE_OCTAL
\046\001\373\330\047\247\027\232\105\124\070\032\103\001\073\003
END
CKA_ISSUER
MULTILINE_OCTAL
\060\122\061\013\060\011\006\003\125\004\006\023\002\123\113\061
\023\060\021\006\003\125\004\007\023\012\102\162\141\164\151\163
\154\141\166\141\061\023\060\021\006\003\125\004\012\023\012\104
\151\163\151\147\040\141\056\163\056\061\031\060\027\006\003\125
\004\003\023\020\103\101\040\104\151\163\151\147\040\122\157\157
\164\040\122\062
END
CKA_SERIAL_NUMBER MULTILINE_OCTAL
\002\011\000\222\270\210\333\260\212\301\143
END
CKA_TRUST_SERVER_AUTH CK_TRUST CKT_NSS_TRUSTED_DELEGATOR
CKA_TRUST_EMAIL_PROTECTION CK_TRUST CKT_NSS_TRUSTED_DELEGATOR

```

CKA_TRUST_CODE_SIGNING CK_TRUST CKT_NSS_MUST_VERIFY_TRUST
CKA_TRUST_STEP_UP_APPROVED CK_BBOOL CK_FALSE

#

Certificate "ACCVRAIZ1"

#

Issuer: C=ES,O=ACCV,OU=PKIACCV,CN=ACCVRAIZ1

Serial Number:5e:c3:b7:a6:43:7f:a4:e0

Subject: C=ES,O=ACCV,OU=PKIACCV,CN=ACCVRAIZ1

Not Valid Before: Thu May 05 09:37:37 2011

Not Valid After : Tue Dec 31 09:37:37 2030

Fingerprint (SHA-256):

9A:6E:C0:12:E1:A7:DA:9D:BE:34:19:4D:47:8A:D7:C0:DB:18:22:FB:07:1D:F1:29:81:49:6E:D1:04:38:41:13

#

Fingerprint (SHA1): 93:05:7A:88:15:C6:4F:CE:88:2F:FA:91:16:52:28:78:BC:53:64:17

CKA_CLASS CK_OBJECT_CLASS CKO_CERTIFICATE

CKA_TOKEN CK_BBOOL CK_TRUE

CKA_PRIVATE CK_BBOOL CK_FALSE

CKA_MODIFIABLE CK_BBOOL CK_FALSE

CKA_LABEL UTF8 "ACCVRAIZ1"

CKA_CERTIFICATE_TYPE CK_CERTIFICATE_TYPE CKC_X_509

CKA_SUBJECT MULTILINE_OCTAL

\060\102\061\022\060\020\006\003\125\004\003\014\011\101\103\103
\126\122\101\111\132\061\061\020\060\016\006\003\125\004\013\014
\007\120\113\111\101\103\103\126\061\015\060\013\006\003\125\004
\012\014\004\101\103\103\126\061\013\060\011\006\003\125\004\006
\023\002\105\123

END

CKA_ID UTF8 "0"

CKA_ISSUER MULTILINE_OCTAL

\060\102\061\022\060\020\006\003\125\004\003\014\011\101\103\103
\126\122\101\111\132\061\061\020\060\016\006\003\125\004\013\014
\007\120\113\111\101\103\103\126\061\015\060\013\006\003\125\004
\012\014\004\101\103\103\126\061\013\060\011\006\003\125\004\006
\023\002\105\123

END

CKA_SERIAL_NUMBER

MULTILINE_OCTAL

\002\010\136\303\267\246\103\177\244\340

END

CKA_VALUE MULTILINE_OCTAL

\060\202\007\323\060\202\005\273\240\003\002\001\002\002\010\136
\303\267\246\103\177\244\340\060\015\006\011\052\206\110\206\367
\015\001\001\005\005\000\060\102\061\022\060\020\006\003\125\004
\003\014\011\101\103\103\126\122\101\111\132\061\061\020\060\016
\006\003\125\004\013\014\007\120\113\111\101\103\103\126\061\015
\060\013\006\003\125\004\012\014\004\101\103\103\126\061\013\060
\011\006\003\125\004\006\023\002\105\123\060\036\027\015\061\061

\060\065\060\065\060\071\063\067\063\067\132\027\015\063\060\061
\062\063\061\060\071\063\067\063\067\132\060\102\061\022\060\020
\006\003\125\004\003\014\011\101\103\103\126\122\101\111\132\061
\061\020\060\016\006\003\125\004\013\014\007\120\113\111\101\103
\103\126\061\015\060\013\006\003\125\004\012\014\004\101\103\103
\126\061\013\060\011\006\003\125\004\006\023\002\105\123\060\202
\002\042\060\015\006\011\052\206\110\206\367\015\001\001\001\005
\000\003\202\002\017\000\060\202\002\012\002\202\002\001\000\233
\251\253\277\141\112\227\257\057\227\146\232\164\137\320\331\226
\375\317\342\344\146\357\037\037\107\063\302\104\243\337\232\336
\037\265\124\335\025\174\151\065\021\157\273\310\014\216\152\030
\036\330\217\331\026\274\020\110\066\134\360\143\263\220\132\134
\044\067\327\243\326\313\011\161\271\361\001\162\204\260\175\333
\115\200\315\374\323\157\311\370\332\266\016\202\322\105\205\250
\033\150\250\075\350\364\104\154\275\241\302\313\003\276\214\076
\023\000\204\337\112\110\300\343\042\012\350\351\067\247\030\114
\261\011\015\043\126\177\004\115\331\027\204\030\245\310\332\100
\224\163\353\316\016\127\074\003\201\072\235\012\241\127\103\151
\254\127\155\171\220\170\345\265\264\073\330\274\114\215\050\241
\247\243\247\272\002\116\045\321\052\256\355\256\003\042\270\153
\040\017\060\050\124\225\177\340\356\316\012\146\235\321\100\055
\156\042\257\235\032\301\005\031\322\157\300\362\237\370\173\263
\002\102\373\120\251\035\055\223\017\043\253\306\301\017\222\377
\320\242\025\365\123\011\161\034\377\105\023\204\346\046\136\370
\340\210\034\012\374\026\266\250\163\006\270\360\143\204\002\240
\306\132\354\347\164\337\160\256\243\203\045\352\326\307\227\207
\223\247\306\212\212\063\227\140\067\020\076\227\076\156\051\025
\326\241\017\321\210\054\022\237\157\252\244\306\102\353\101\242
\343\225\103\323\001\205\155\216\273\073\363\043\066\307\376\073
\340\241\045\007\110\253\311\211\164\377\010\217\200\277\300\226
\145\363\356\354\113\150\275\235\210\303\061\263\100\361\350\317
\366\070\273\234\344\321\177\324\345\130\233\174\372\324\363\016
\233\165\221\344\272\122\056\031\176\321\365\315\132\031\374\272
\006\366\373\122\250\113\231\004\335\370\371\264\213\120\243\116
\142\211\360\207\044\372\203\102\301\207\372\325\055\051\052\132
\161\172\144\152\327\047\140\143\015\333\316\111\365\215\037\220
\211\062\027\370\163\103\270\322\132\223\206\141\326\341\165\012
\352\171\146\166\210\117\161\353\004\045\326\012\132\172\223\345
\271\113\027\100\017\261\266\271\365\336\117\334\340\263\254\073
\021\160\140\204\112\103\156\231\040\300\051\161\012\300\145\002
\003\001\000\001\243\202\002\313\060\202\002\307\060\175\006\010
\053\006\001\005\005\007\001\001\004\161\060\157\060\114\006\010
\053\006\001\005\005\007\060\002\206\100\150\164\164\160\072\057
\057\167\167\167\056\141\143\143\166\056\145\163\057\146\151\154
\145\141\144\155\151\156\057\101\162\143\150\151\166\157\163\057
\143\145\162\164\151\146\151\143\141\144\157\163\057\162\141\151
\172\141\143\143\166\061\056\143\162\164\060\037\006\010\053\006
\001\005\005\007\060\001\206\023\150\164\164\160\072\057\057\157

\143\163\160\056\141\143\143\166\056\145\163\060\035\006\003\125
\035\016\004\026\004\024\322\207\264\343\337\067\047\223\125\366
\126\352\201\345\066\314\214\036\077\275\060\017\006\003\125\035
\023\001\001\377\004\005\060\003\001\001\377\060\037\006\003\125
\035\043\004\030\060\026\200\024\322\207\264\343\337\067\047\223
\125\366\126\352\201\345\066\314\214\036\077\275\060\202\001\163
\006\003\125\035\040\004\202\001\152\060\202\001\146\060\202\001
\142\006\004\125\035\040\000\060\202\001\130\060\202\001\042\006
\010\053\006\001\005\005\007\002\002\060\202\001\024\036\202\001
\020\000\101\000\165\000\164\000\157\000\162\000\151\000\144\000
\141\000\144\000\040\000\144\000\145\000\040\000\103\000\145\000
\162\000\164\000\151\000\146\000\151\000\143\000\141\000\143\000
\151\000\363\000\156\000\040\000\122\000\141\000\355\000\172\000
\040\000\144\000\145\000\040\000\154\000\141\000\040\000\101\000
\103\000\103\000\126\000\040\000\050\000\101\000\147\000\145\000
\156\000\143\000\151\000\141\000\040\000\144\000\145\000\040\000
\124\000\145\000\143\000\156\000\157\000\154\000\157\000\147\000
\355\000\141\000\040\000\171\000\040\000\103\000\145\000\162\000
\164\000\151\000\146\000\151\000\143\000\141\000\143\000\151\000
\363\000\156\000\040\000\105\000\154\000\145\000\143\000\164\000
\162\000\363\000\156\000\151\000\143\000\141\000\054\000\040\000
\103\000\111\000\106\000\040\000\121\000\064\000\066\000\060\000
\061\000\061\000\065\000\066\000\105\000\051\000\056\000\040\000
\103\000\120\000\123\000\040\000\145\000\156\000\040\000\150\000
\164\000\164\000\160\000\072\000\057\000\057\000\167\000\167\000
\167\000\056\000\141\000\143\000\143\000\166\000\056\000\145\000
\163\060\060\006\010\053\006\001\005\005\007\002\001\026\044\150
\164\164\160\072\057\057\167\167\167\056\141\143\143\166\056\145
\163\057\154\145\147\151\163\154\141\143\151\157\156\137\143\056
\150\164\155\060\125\006\003\125\035\037\004\116\060\114\060\112
\240\110\240\106\206\104\150\164\164\160\072\057\057\167\167\167
\056\141\143\143\166\056\145\163\057\146\151\154\145\141\144\155
\151\156\057\101\162\143\150\151\166\157\163\057\143\145\162\164
\151\146\151\143\141\144\157\163\057\162\141\151\172\141\143\143
\166\061\137\144\145\162\056\143\162\154\060\016\006\003\125\035
\017\001\001\377\004\004\003\002\001\006\060\027\006\003\125\035
\021\004\020\060\016\201\014\141\143\143\166\100\141\143\143\166
\056\145\163\060\015\006\011\052\206\110\206\367\015\001\001\005
\005\000\003\202\002\001\000\227\061\002\237\347\375\103\147\110
\104\024\344\051\207\355\114\050\146\320\217\065\332\115\141\267
\112\227\115\265\333\220\340\005\056\016\306\171\320\362\227\151
\017\275\004\107\331\276\333\265\051\332\233\331\256\251\231\325
\323\074\060\223\365\215\241\250\374\006\215\104\364\312\026\225
\174\063\334\142\213\250\067\370\047\330\011\055\033\357\310\024
\047\040\251\144\104\377\056\326\165\252\154\115\140\100\031\111
\103\124\143\332\342\314\272\146\345\117\104\172\133\331\152\201
\053\100\325\177\371\001\047\130\054\310\355\110\221\174\077\246
\000\317\304\051\163\021\066\336\206\031\076\235\356\031\212\033

\325\260\355\216\075\234\052\300\015\330\075\146\343\074\015\275
\325\224\134\342\342\247\065\033\004\000\366\077\132\215\352\103
\275\137\211\035\251\301\260\314\231\342\115\000\012\332\311\047
\133\347\023\220\134\344\365\063\242\125\155\334\340\011\115\057
\261\046\133\047\165\000\011\304\142\167\051\010\137\236\131\254
\266\176\255\237\124\060\042\003\301\036\161\144\376\371\070\012
\226\030\335\002\024\254\043\313\006\034\036\244\175\215\015\336
\047\101\350\255\332\025\267\260\043\335\053\250\323\332\045\207
\355\350\125\104\115\210\364\066\176\204\232\170\254\367\016\126
\111\016\326\063\045\326\204\120\102\154\040\022\035\052\325\276
\274\362\160\201\244\160\140\276\005\265\233\236\004\104\276\141
\043\254\351\245\044\214\021\200\224\132\242\242\271\111\322\301
\334\321\247\355\061\021\054\236\031\246\356\341\125\341\300\352
\317\015\204\344\027\267\242\174\245\336\125\045\006\356\314\300
\207\134\100\332\314\225\077\125\340\065\307\270\204\276\264\135
\315\172\203\001\162\356\207\346\137\035\256\265\205\306\046\337
\346\301\232\351\036\002\107\237\052\250\155\251\133\317\354\105
\167\177\230\047\232\062\135\052\343\204\356\305\230\146\057\226
\040\035\335\330\303\047\327\260\371\376\331\175\315\320\237\217
\013\024\130\121\237\057\213\303\070\055\336\350\217\326\215\207
\244\365\126\103\026\231\054\364\244\126\264\064\270\141\067\311
\302\130\200\033\240\227\241\374\131\215\351\021\366\321\017\113
\125\064\106\052\213\206\073

END

CKA_NSS_Mozilla_CA_POLICY

CK_BBOOL CK_TRUE

CKA_NSS_SERVER_DISTRUST_AFTER CK_BBOOL CK_FALSE

CKA_NSS_EMAIL_DISTRUST_AFTER CK_BBOOL CK_FALSE

Trust for "ACCVRAIZ1"

Issuer: C=ES,O=ACCV,OU=PKIACCV,CN=ACCVRAIZ1

Serial Number:5e:c3:b7:a6:43:7f:a4:e0

Subject: C=ES,O=ACCV,OU=PKIACCV,CN=ACCVRAIZ1

Not Valid Before: Thu May 05 09:37:37 2011

Not Valid After : Tue Dec 31 09:37:37 2030

Fingerprint (SHA-256):

9A:6E:C0:12:E1:A7:DA:9D:BE:34:19:4D:47:8A:D7:C0:DB:18:22:FB:07:1D:F1:29:81:49:6E:D1:04:38:41:13

Fingerprint (SHA1): 93:05:7A:88:15:C6:4F:CE:88:2F:FA:91:16:52:28:78:BC:53:64:17

CKA_CLASS CK_OBJECT_CLASS CKO_NSS_TRUST

CKA_TOKEN CK_BBOOL CK_TRUE

CKA_PRIVATE CK_BBOOL CK_FALSE

CKA_MODIFIABLE CK_BBOOL CK_FALSE

CKA_LABEL UTF8

"ACCVRAIZ1"

CKA_CERT_SHA1_HASH MULTILINE_OCTAL

\223\005\172\210\025\306\117\316\210\057\372\221\026\122\050\170
\274\123\144\027

END


```

CKA_CERT_MD5_HASH MULTILINE_OCTAL
\320\240\132\356\005\266\011\224\041\241\175\361\262\051\202\002
END
CKA_ISSUER MULTILINE_OCTAL
\060\102\061\022\060\020\006\003\125\004\003\014\011\101\103\103
\126\122\101\111\132\061\061\020\060\016\006\003\125\004\013\014
\007\120\113\111\101\103\103\126\061\015\060\013\006\003\125\004
\012\014\004\101\103\103\126\061\013\060\011\006\003\125\004\006
\023\002\105\123
END
CKA_SERIAL_NUMBER MULTILINE_OCTAL
\002\010\136\303\267\246\103\177\244\340
END
CKA_TRUST_SERVER_AUTH CK_TRUST CKT_NSS_TRUSTED_DELEGATOR
CKA_TRUST_EMAIL_PROTECTION CK_TRUST CKT_NSS_TRUSTED_DELEGATOR
CKA_TRUST_CODE_SIGNING CK_TRUST CKT_NSS_MUST_VERIFY_TRUST
CKA_TRUST_STEP_UP_APPROVED CK_BBOOL CK_FALSE

#
# Certificate "TWCA Global Root CA"
#
# Issuer: CN=TWCA Global Root CA,OU=Root CA,O=TAIWAN-CA,C=TW
# Serial Number: 3262 (0xcbe)
# Subject: CN=TWCA Global
# Root CA,OU=Root CA,O=TAIWAN-CA,C=TW
# Not Valid Before: Wed Jun 27 06:28:33 2012
# Not Valid After : Tue Dec 31 15:59:59 2030
# Fingerprint (SHA-256):
59:76:90:07:F7:68:5D:0F:CD:50:87:2F:9F:95:D5:75:5A:5B:2B:45:7D:81:F3:69:2B:61:0A:98:67:2F:0E:1B
# Fingerprint (SHA1): 9C:BB:48:53:F6:A4:F6:D3:52:A4:E8:32:52:55:60:13:F5:AD:AF:65
CKA_CLASS CK_OBJECT_CLASS CKO_CERTIFICATE
CKA_TOKEN CK_BBOOL CK_TRUE
CKA_PRIVATE CK_BBOOL CK_FALSE
CKA_MODIFIABLE CK_BBOOL CK_FALSE
CKA_LABEL UTF8 "TWCA Global Root CA"
CKA_CERTIFICATE_TYPE CK_CERTIFICATE_TYPE CKC_X_509
CKA_SUBJECT MULTILINE_OCTAL
\060\121\061\013\060\011\006\003\125\004\006\023\002\124\127\061
\022\060\020\006\003\125\004\012\023\011\124\101\111\127\101\116
\055\103\101\061\020\060\016\006\003\125\004\013\023\007\122\157
\157\164\040\103\101\061\034\060\032\006\003\125\004\003\023\023
\124\127\103\101\040\107\154\157\142\141\154\040\122\157\157\164
\040\103\101
END
CKA_ID UTF8 "0"
CKA_ISSUER MULTILINE_OCTAL
\060\121\061\013\060\011\006\003\125\004\006\023\002\124\127\061
\022\060\020\006\003\125\004\012\023\011\124\101\111\127\101\116

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\055\103\101\061\020\060\016\006\003\125\004\013\023\007\122\157
\157\164\040\103\101\061\034\060\032\006\003\125\004\003\023\023
\124\127\103\101\040\107\154\157\142\141\154\040\122\157\157\164
\040\103\101
END
CKA_SERIAL_NUMBER
MULTILINE_OCTAL
\002\002\014\276
END
CKA_VALUE MULTILINE_OCTAL
\060\202\005\101\060\202\003\051\240\003\002\001\002\002\002\014
\276\060\015\006\011\052\206\110\206\367\015\001\001\013\005\000
\060\121\061\013\060\011\006\003\125\004\006\023\002\124\127\061
\022\060\020\006\003\125\004\012\023\011\124\101\111\127\101\116
\055\103\101\061\020\060\016\006\003\125\004\013\023\007\122\157
\157\164\040\103\101\061\034\060\032\006\003\125\004\003\023\023
\124\127\103\101\040\107\154\157\142\141\154\040\122\157\157\164
\040\103\101\060\036\027\015\061\062\060\066\062\067\060\066\062
\070\063\063\132\027\015\063\060\061\062\063\061\061\065\065\071
\065\071\132\060\121\061\013\060\011\006\003\125\004\006\023\002
\124\127\061\022\060\020\006\003\125\004\012\023\011\124\101\111
\127\101\116\055\103\101\061\020\060\016\006\003\125\004\013\023
\007\122\157\157\164\040\103\101\061\034\060\032\006\003\125\004
\003\023\023\124\127\103\101\040\107\154\157\142\141\154\040\122
\157\157\164\040\103\101\060\202\002\042\060\015\006\011\052\206
\110\206\367\015\001\001\001\005\000\003\202\002\017\000\060\202
\002\012\002\202\002\001\000\260\005\333\310\353\214\304\156\212
\041\357\216\115\234\161\012\037\122\160\355\155\202\234\227\305
\327\114\116\105\111\313\100\102\265\022\064\154\031\302\164\244
\061\137\205\002\227\354\103\063\012\123\322\234\214\216\267\270
\171\333\053\325\152\362\216\146\304\356\053\001\007\222\324\263
\320\002\337\120\366\125\257\146\016\313\340\107\140\057\053\062
\071\065\122\072\050\203\370\173\026\306\030\270\142\326\107\045
\221\316\360\031\022\115\255\143\365\323\077\165\137\051\360\241
\060\034\052\240\230\246\025\275\356\375\031\066\360\342\221\103
\217\372\312\326\020\047\111\114\357\335\301\361\205\160\233\312
\352\250\132\103\374\155\206\157\163\351\067\105\251\360\066\307
\314\210\165\036\273\154\006\377\233\153\076\027\354\141\252\161
\174\306\035\242\367\111\351\025\265\074\326\241\141\365\021\367
\005\157\035\375\021\276\320\060\007\302\051\260\011\116\046\334
\343\242\250\221\152\037\302\221\105\210\134\345\230\270\161\245
\025\031\311\174\165\021\314\160\164\117\055\233\035\221\104\375
\126\050\240\376\273\206\152\310\372\134\013\130\334\306\113\166
\310\253\042\331\163\017\245\364\132\002\211\077\117\236\042\202
\356\242\164\123\052\075\123\047\151\035\154\216\062\054\144\000
\046\143\141\066\116\243\106\267\077\175\263\055\254\155\220\242
\225\242\316\317\332\202\347\007\064\031\226\351\270\041\252\051
\176\246\070\276\216\051\112\041\146\171\037\263\303\265\011\147

\336\326\324\007\106\363\052\332\346\042\067\140\313\201\266\017
\240\017\351\310\225\177\277\125\221\005\172\317\075\025\300\157
\336\011\224\001\203\327\064\033\314\100\245\360\270\233\147\325
\230\221\073\247\204\170\225\046\244\132\010\370\053\164\264\000
\004\074\337\270\024\216\350\337\251\215\154\147\222\063\035\300
\267\322\354\222\310\276\011\277\054\051\005\157\002\153\236\357
\274\277\052\274\133\300\120\217\101\160\161\207\262\115\267\004
\251\204\243\062\257\256\356\153\027\213\262\261\376\154\341\220
\214\210\250\227\110\316\310\115\313\363\006\317\137\152\012\102
\261\036\036\167\057\216\240\346\222\016\006\374\005\042\322\046
\341\061\121\175\062\334\017\002\003\001\000\001\243\043\060\041
\060\016\006\003\125\035\017\001\001\377\004\004\003\002\001\006
\060\017\006\003\125\035\023\001\001\377\004\005\060\003\001\001
\377\060\015\006\011\052\206\110\206\367\015\001\001\013\005\000
\003\202\002\001\000\137\064\201\166\357\226\035\325\345\265\331
\002\143\204\026\301\256\240\160\121\247\367\114\107\065\310\013
\327\050\075\211\161\331\252\063\101\352\024\033\154\041\000\300
\154\102\031\176\237\151\133\040\102\337\242\322\332\304\174\227
\113\215\260\350\254\310\356\245\151\004\231\012\222\246\253\047
\056\032\115\201\277\204\324\160\036\255\107\376\375\112\235\063
\340\362\271\304\105\010\041\012\332\151\151\163\162\015\276\064
\376\224\213\255\303\036\065\327\242\203\357\345\070\307\245\205
\037\253\317\064\354\077\050\376\014\361\127\206\116\311\125\367
\034\324\330\245\175\006\172\157\325\337\020\337\201\116\041\145
\261\266\341\027\171\225\105\006\316\137\314\334\106\211\143\150
\104\215\223\364\144\160\240\075\235\050\005\303\071\160\270\142
\173\040\375\344\333\351\010\241\270\236\075\011\307\117\373\054
\370\223\166\101\336\122\340\341\127\322\235\003\274\167\236\376
\236\051\136\367\301\121\140\037\336\332\013\262\055\165\267\103
\110\223\347\366\171\306\204\135\200\131\140\224\374\170\230\217
\074\223\121\355\100\220\007\337\144\143\044\313\116\161\005\241
\327\224\032\210\062\361\042\164\042\256\245\246\330\022\151\114
\140\243\002\356\053\354\324\143\222\013\136\276\057\166\153\243
\266\046\274\217\003\330\012\362\114\144\106\275\071\142\345\226
\353\064\143\021\050\314\225\361\255\357\357\334\200\130\110\351
\113\270\352\145\254\351\374\200\265\265\310\105\371\254\301\237
\331\271\352\142\210\216\304\361\113\203\022\255\346\213\204\326
\236\302\353\203\030\237\152\273\033\044\140\063\160\314\354\367
\062\363\134\331\171\175\357\236\244\376\311\043\303\044\356\025
\222\261\075\221\117\046\206\275\146\163\044\023\352\244\256\143
\301\255\175\204\003\074\020\170\206\033\171\343\304\363\362\004
\225\040\256\043\202\304\263\072\000\142\277\346\066\044\341\127
\272\307\036\220\165\325\137\077\225\141\053\301\073\315\345\263
\150\141\320\106\046\251\041\122\151\055\353\056\307\353\167\316
\246\072\265\003\063\117\166\321\347\134\124\001\135\313\170\364
\311\014\277\317\022\216\027\055\043\150\224\347\253\376\251\262
\053\006\320\004\315

END

```

CKA_NSS_Mozilla_CA_POLICY
CK_BBOOL CK_TRUE
CKA_NSS_SERVER_DISTRUST_AFTER CK_BBOOL CK_FALSE
CKA_NSS_EMAIL_DISTRUST_AFTER CK_BBOOL
CK_FALSE

# Trust for "TWCA Global Root CA"
# Issuer: CN=TWCA Global Root CA,OU=Root CA,O=TAIWAN-CA,C=TW
# Serial Number: 3262 (0xcbe)
# Subject: CN=TWCA Global Root CA,OU=Root CA,O=TAIWAN-CA,C=TW
# Not Valid Before: Wed Jun 27 06:28:33 2012
# Not Valid After : Tue Dec 31 15:59:59 2030
# Fingerprint (SHA-256):
59:76:90:07:F7:68:5D:0F:CD:50:87:2F:9F:95:D5:75:5A:5B:2B:45:7D:81:F3:69:2B:61:0A:98:67:2F:0E:1B
# Fingerprint (SHA1): 9C:BB:48:53:F6:A4:F6:D3:52:A4:E8:32:52:55:60:13:F5:AD:AF:65
CKA_CLASS CK_OBJECT_CLASS CKO_NSS_TRUST
CKA_TOKEN CK_BBOOL CK_TRUE
CKA_PRIVATE CK_BBOOL CK_FALSE
CKA_MODIFIABLE CK_BBOOL CK_FALSE
CKA_LABEL UTF8 "TWCA Global Root CA"
CKA_CERT_SHA1_HASH MULTILINE_OCTAL
\234\273\110\123\366\244\366\323\122\244\350\062\122\125\140\023
\365\255\257\145
END
CKA_CERT_MD5_HASH MULTILINE_OCTAL
\371\003\176\317\346\236\074\163\172\052\220\007\151\377\053\226
END
CKA_ISSUER MULTILINE_OCTAL
\060\121\061\013\060\011\006\003\125\004\006\023\002\124\127\061
\022\060\020\006\003\125\004\012\023\011\124\101\111\127\101\116
\055\103\101\061\020\060\016\006\003\125\004\013\023\007\122\157
\157\164\040\103\101\061\034\060\032\006\003\125\004\003\023\023
\124\127\103\101\040\107\154\157\142\141\154\040\122\157\157\164
\040\103\101
END
CKA_SERIAL_NUMBER
MULTILINE_OCTAL
\002\002\014\276
END
CKA_TRUST_SERVER_AUTH CK_TRUST CKT_NSS_TRUSTED_DELEGATOR
CKA_TRUST_EMAIL_PROTECTION CK_TRUST CKT_NSS_TRUSTED_DELEGATOR
CKA_TRUST_CODE_SIGNING CK_TRUST CKT_NSS_MUST_VERIFY_TRUST
CKA_TRUST_STEP_UP_APPROVED CK_BBOOL CK_FALSE

#
# Certificate "TeliaSonera Root CA v1"
#
# Issuer: CN=TeliaSonera Root CA v1,O=TeliaSonera

```

```
# Serial Number:00:95:be:16:a0:f7:2e:46:f1:7b:39:82:72:fa:8b:cd:96
# Subject: CN=TeliaSonera Root CA v1,O=TeliaSonera
# Not Valid Before: Thu Oct 18 12:00:50 2007
# Not Valid After : Mon Oct 18 12:00:50 2032
# Fingerprint (SHA-256):
DD:69:36:FE:21:F8:F0:77:C1:23:A1:A5:21:C1:22:24:F7:22:55:B7:3E:03:A7:26:06:93:E8:A2:4B:0F:A3:89
# Fingerprint (SHA1): 43:13:BB:96:F1:D5:86:9B:C1:4E:6A:92:F6:CF:F6:34:69:87:82:37
CKA_CLASS
CK_OBJECT_CLASS CKO_CERTIFICATE
CKA_TOKEN CK_BBOOL CK_TRUE
CKA_PRIVATE CK_BBOOL CK_FALSE
CKA_MODIFIABLE CK_BBOOL CK_FALSE
CKA_LABEL UTF8 "TeliaSonera Root CA v1"
CKA_CERTIFICATE_TYPE CK_CERTIFICATE_TYPE CKC_X_509
CKA_SUBJECT MULTILINE_OCTAL
\060\067\061\024\060\022\006\003\125\004\012\014\013\124\145\154
\151\141\123\157\156\145\162\141\061\037\060\035\006\003\125\004
\003\014\026\124\145\154\151\141\123\157\156\145\162\141\040\122
\157\157\164\040\103\101\040\166\061
END
CKA_ID UTF8 "0"
CKA_ISSUER MULTILINE_OCTAL
\060\067\061\024\060\022\006\003\125\004\012\014\013\124\145\154
\151\141\123\157\156\145\162\141\061\037\060\035\006\003\125\004
\003\014\026\124\145\154\151\141\123\157\156\145\162\141\040\122
\157\157\164\040\103\101\040\166\061
END
CKA_SERIAL_NUMBER MULTILINE_OCTAL
\002\021\000\225\276\026\240\367\056\106\361\173\071\202\162\372
\213\315\226
END
CKA_VALUE MULTILINE_OCTAL
\060\202\005\070\060\202\003\040\240\003\002\001\002\002\021\000
\225\276\026\240\367\056\106\361\173\071\202\162\372\213\315\226
\060\015\006\011\052\206\110\206\367\015\001\001\005\005\000\060
\067\061\024\060\022\006\003\125\004\012\014\013\124\145\154\151
\141\123\157\156\145\162\141\061\037\060\035\006\003\125\004\003
\014\026\124\145\154\151\141\123\157\156\145\162\141\040\122\157
\157\164\040\103\101\040\166\061\060\036\027\015\060\067\061\060
\061\070\061\062\060\060\065\060\132\027\015\063\062\061\060\061
\070\061\062\060\060\065\060\132\060\067\061\024\060\022\006\003
\125\004\012\014\013\124\145\154\151\141\123\157\156\145\162\141
\061\037\060\035\006\003\125\004\003\014\026\124\145\154\151\141
\123\157\156\145\162\141\040\122\157\157\164\040\103\101\040\166
\061\060\202\002\042\060\015\006\011\052\206\110\206\367\015\001
\001\001\005\000\003\202\002\017\000\060\202\002\012\002\202\002
\001\000\302\276\353\047\360\041\243\363\151\046\125\176\235\305
\125\026\221\134\375\357\041\277\123\200\172\055\322\221\214\143
```

\061\360\354\044\360\303\245\322\162\174\020\155\364\067\267\345
\346\174\171\352\214\265\202\213\256\110\266\254\000\334\145\165
\354\052\115\137\301\207\365\040\145\053\201\250\107\076\211\043
\225\060\026\220\177\350\127\007\110\347\031\256\277\105\147\261
\067\033\006\052\376\336\371\254\175\203\373\136\272\344\217\227
\147\276\113\216\215\144\007\127\070\125\151\064\066\075\023\110
\357\117\342\323\146\036\244\317\032\267\136\066\063\324\264\006
\275\030\001\375\167\204\120\000\105\365\214\135\350\043\274\176
\376\065\341\355\120\173\251\060\215\031\323\011\216\150\147\135
\277\074\227\030\123\273\051\142\305\312\136\162\301\307\226\324
\333\055\240\264\037\151\003\354\352\342\120\361\014\074\360\254
\363\123\055\360\034\365\355\154\071\071\163\200\026\310\122\260
\043\315\340\076\334\335\074\107\240\273\065\212\342\230\150\213
\276\345\277\162\356\322\372\245\355\022\355\374\230\030\251\046
\166\334\050\113\020\040\034\323\177\026\167\055\355\157\200\367
\111\273\123\005\273\135\150\307\324\310\165\026\077\211\132\213
\367\027\107\324\114\361\322\211\171\076\115\075\230\250\141\336
\072\036\322\370\136\003\340\301\311\034\214\323\215\115\323\225
\066\263\067\137\143\143\233\063\024\360\055\046\153\123\174\211
\214\062\302\156\354\075\041\000\071\311\241\150\342\120\203\056
\260\072\053\363\066\240\254\057\344\157\141\302\121\011\071\076
\213\123\271\273\147\332\334\123\271\166\131\066\235\103\345\040
\340\075\062\140\205\042\121\267\307\063\273\335\025\057\244\170
\246\007\173\201\106\066\004\206\335\171\065\307\225\054\073\260
\243\027\065\345\163\037\264\134\131\357\332\352\020\145\173\172
\320\177\237\263\264\052\067\073\160\213\233\133\271\053\267\354
\262\121\022\227\123\051\132\324\360\022\020\334\117\002\273\022
\222\057\142\324\077\151\103\174\015\326\374\130\165\001\210\235
\130\026\113\336\272\220\377\107\001\211\006\152\366\137\262\220
\152\263\002\246\002\210\277\263\107\176\052\331\325\372\150\170
\065\115\002\003\001\000\001\243\077\060\075\060\017\006\003\125
\035\023\001\001\377\004\005\060\003\001\001\377\060\013\006\003
\125\035\017\004\004\003\002\001\006\060\035\006\003\125\035\016
\004\026\004\024\360\217\131\070\000\263\365\217\232\226\014\325
\353\372\173\252\027\350\023\022\060\015\006\011\052\206\110\206
\367\015\001\001\005\005\000\003\202\002\001\000\276\344\134\142
\116\044\364\014\010\377\360\323\014\150\344\223\111\042\077\104
\047\157\273\155\336\203\146\316\250\314\015\374\365\232\006\345
\167\024\221\353\235\101\173\231\052\204\345\377\374\041\301\135
\360\344\037\127\267\165\251\241\137\002\046\377\327\307\367\116
\336\117\370\367\034\106\300\172\117\100\054\042\065\360\031\261
\320\153\147\054\260\250\340\300\100\067\065\366\204\134\134\343
\257\102\170\376\247\311\015\120\352\015\204\166\366\121\357\203
\123\306\172\377\016\126\111\056\217\172\326\014\346\047\124\343
\115\012\140\162\142\315\221\007\326\245\277\310\231\153\355\304
\031\346\253\114\021\070\305\157\061\342\156\111\310\077\166\200
\046\003\046\051\340\066\366\366\040\123\343\027\160\064\027\235
\143\150\036\153\354\303\115\206\270\023\060\057\135\106\015\107

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\103\325\033\252\131\016\271\134\215\006\110\255\164\207\137\307
\374\061\124\101\023\342\307\041\016\236\340\036\015\341\300\173
\103\205\220\305\212\130\306\145\012\170\127\362\306\043\017\001
\331\040\113\336\017\373\222\205\165\052\134\163\215\155\173\045
\221\312\356\105\256\006\113\000\314\323\261\131\120\332\072\210
\073\051\103\106\136\227\053\124\316\123\157\215\112\347\226\372
\277\161\016\102\213\174\375\050\240\320\110\312\332\304\201\114
\273\242\163\223\046\310\353\014\326\046\210\266\300\044\317\273
\275\133\353\165\175\351\010\216\206\063\054\171\167\011\151\245
\211\374\263\160\220\207\166\217\323\042\273\102\316\275\163\013
\040\046\052\320\233\075\160\036\044\154\315\207\166\251\027\226
\267\317\015\222\373\216\030\251\230\111\321\236\376\140\104\162
\041\271\031\355\302\365\061\361\071\110\210\220\044\165\124\026
\255\316\364\370\151\024\144\071\373\243\270\272\160\100\307\047
\034\277\304\126\123\372\143\145\320\363\034\016\026\365\153\206
\130\115\030\324\344\015\216\245\235\133\221\334\166\044\120\077
\306\052\373\331\267\234\265\326\346\320\331\350\031\213\025\161
\110\255\267\352\330\131\210\324\220\277\026\263\331\351\254\131
\141\124\310\034\272\312\301\312\341\271\040\114\217\072\223\211
\245\240\314\277\323\366\165\244\165\226\155\126
```

END

CKA_NSS_Mozilla_CA_POLICY

CK_BBOOL CK_TRUE

CKA_NSS_SERVER_DISTRUST_AFTER CK_BBOOL CK_FALSE

CKA_NSS_EMAIL_DISTRUST_AFTER CK_BBOOL CK_FALSE

Trust for "TeliaSonera Root CA v1"

Issuer: CN=TeliaSonera Root CA v1,O=TeliaSonera

Serial Number:00:95:be:16:a0:f7:2e:46:f1:7b:39:82:72:fa:8b:cd:96

Subject: CN=TeliaSonera Root CA v1,O=TeliaSonera

Not Valid Before: Thu Oct 18 12:00:50 2007

Not Valid After : Mon Oct 18 12:00:50 2032

Fingerprint (SHA-256):

DD:69:36:FE:21:F8:F0:77:C1:23:A1:A5:21:C1:22:24:F7:22:55:B7:3E:03:A7:26:06:93:E8:A2:4B:0F:A3:89

Fingerprint (SHA1): 43:13:BB:96:F1:D5:86:9B:C1:4E:6A:92:F6:CF:F6:34:69:87:82:37

CKA_CLASS

CK_OBJECT_CLASS CKO_NSS_TRUST

CKA_TOKEN CK_BBOOL CK_TRUE

CKA_PRIVATE CK_BBOOL CK_FALSE

CKA_MODIFIABLE CK_BBOOL CK_FALSE

CKA_LABEL UTF8 "TeliaSonera Root CA v1"

CKA_CERT_SHA1_HASH MULTILINE_OCTAL

```
\103\023\273\226\361\325\206\233\301\116\152\222\366\317\366\064
\151\207\202\067
```

END

CKA_CERT_MD5_HASH MULTILINE_OCTAL

```
\067\101\111\033\030\126\232\046\365\255\302\146\373\100\245\114
```

END

```

CKA_ISSUER MULTILINE_OCTAL
\060\067\061\024\060\022\006\003\125\004\012\014\013\124\145\154
\151\141\123\157\156\145\162\141\061\037\060\035\006\003\125\004
\003\014\026\124\145\154\151\141\123\157\156\145\162\141\040\122
\157\157\164\040\103\101\040\166\061
END
CKA_SERIAL_NUMBER MULTILINE_OCTAL
\002\021\000\225\276\026\240\367\056\106\361\173\071\202\162\372
\213\315\226
END
CKA_TRUST_SERVER_AUTH CK_TRUST CKT_NSS_TRUSTED_DELEGATOR
CKA_TRUST_EMAIL_PROTECTION CK_TRUST CKT_NSS_TRUSTED_DELEGATOR
CKA_TRUST_CODE_SIGNING CK_TRUST CKT_NSS_MUST_VERIFY_TRUST
CKA_TRUST_STEP_UP_APPROVED
CK_BBOOL CK_FALSE

#
# Certificate "E-Tugra Certification Authority"
#
# Issuer: CN=E-Tugra Certification Authority,OU=E-Tugra Sertifikasyon Merkezi,O=E-Tu..ra EBG Bili..im
Teknolojileri ve Hizmetleri A....,L=Ankara,C=TR
# Serial Number:6a:68:3e:9c:51:9b:cb:53
# Subject: CN=E-Tugra Certification Authority,OU=E-Tugra Sertifikasyon Merkezi,O=E-Tu..ra EBG Bili..im
Teknolojileri ve Hizmetleri A....,L=Ankara,C=TR
# Not Valid Before: Tue Mar 05 12:09:48 2013
# Not Valid After : Fri Mar 03 12:09:48 2023
# Fingerprint (SHA-256):
B0:BF:D5:2B:B0:D7:D9:BD:92:BF:5D:4D:C1:3D:A2:55:C0:2C:54:2F:37:83:65:EA:89:39:11:F5:5E:55:F2:3C
# Fingerprint (SHA1): 51:C6:E7:08:49:06:6E:F3:92:D4:5C:A0:0D:6D:A3:62:8F:C3:52:39
CKA_CLASS CK_OBJECT_CLASS CKO_CERTIFICATE
CKA_TOKEN CK_BBOOL CK_TRUE
CKA_PRIVATE CK_BBOOL CK_FALSE
CKA_MODIFIABLE CK_BBOOL CK_FALSE
CKA_LABEL UTF8 "E-Tugra Certification Authority"
CKA_CERTIFICATE_TYPE CK_CERTIFICATE_TYPE CKC_X_509
CKA_SUBJECT MULTILINE_OCTAL
\060\201\262\061\013\060\011\006\003\125\004\006\023\002\124\122
\061\017\060\015\006\003\125\004\007\014\006\101\156\153\141\162
\141\061\100\060\076\006\003\125\004\012\014\067\105\055\124\165
\304\237\162\141\040\105\102\107\040\102\151\154\151\305\237\151
\155\040\124\145\153\156\157\154\157\152\151\154\145\162\151\040
\166\145\040\110\151\172\155\145\164\154\145\162\151\040\101\056
\305\236\056\061\046\060\044\006\003\125\004\013\014\035\105\055
\124\165\147\162\141\040\123\145\162\164\151\146\151\153\141\163
\171\157\156\040\115\145\162\153\145\172\151\061\050\060\046\006
\003\125\004\003\014\037\105\055\124\165\147\162\141\040\103\145
\162\164\151\146\151\143\141\164\151\157\156\040\101\165\164\150
\157\162\151\164\171

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END
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UTF8 "0"
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\141\061\100\060\076\006\003\125\004\012\014\067\105\055\124\165
\304\237\162\141\040\105\102\107\040\102\151\154\151\305\237\151
\155\040\124\145\153\156\157\154\157\152\151\154\145\162\151\040
\166\145\040\110\151\172\155\145\164\154\145\162\151\040\101\056
\305\236\056\061\046\060\044\006\003\125\004\013\014\035\105\055
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\171\157\156\040\115\145\162\153\145\172\151\061\050\060\046\006
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\157\162\151\164\171

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MULTILINE_OCTAL
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\015\001\001\013\005\000\060\201\262\061\013\060\011\006\003\125
\004\006\023\002\124\122\061\017\060\015\006\003\125\004\007\014
\006\101\156\153\141\162\141\061\100\060\076\006\003\125\004\012
\014\067\105\055\124\165\304\237\162\141\040\105\102\107\040\102
\151\154\151\305\237\151\155\040\124\145\153\156\157\154\157\152
\151\154\145\162\151\040\166\145\040\110\151\172\155\145\164\154
\145\162\151\040\101\056\305\236\056\061\046\060\044\006\003\125
\004\013\014\035\105\055\124\165\147\162\141\040\123\145\162\164
\151\146\151\153\141\163\171\157\156\040\115\145\162\153\145\172
\151\061\050\060\046\006\003\125\004\003\014\037\105\055\124\165
\147\162\141\040\103\145\162\164\151\146\151\143\141\164\151\157
\156\040\101\165\164\150\157\162\151\164\171\060\036\027\015\061
\063\060\063\060\065\061\062\060\071\064\070\132\027\015\062\063
\060\063\060\063\061\062\060\071\064\070\132\060\201\262\061\013
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\145\162\153\145\172\151\061\050\060\046\006\003\125\004\003\014
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\103\323\200\256\241\210\133\256\263\352\136\313\026\232\167\104
\310\241\366\124\150\316\336\217\227\053\272\133\100\002\014\144
\027\300\265\223\315\341\361\023\146\316\014\171\357\321\221\050
\253\137\240\022\122\060\163\031\216\217\341\214\007\242\303\273
\112\360\352\037\025\250\356\045\314\244\106\370\033\042\357\263
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\313\347\071\123\300\230\236\214\124\142\213\046\260\367\175\215
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\171\034\367\132\364\023\354\154\370\077\342\131\037\225\356\102
\076\271\255\250\062\205\111\227\106\376\113\061\217\132\313\255
\164\107\037\351\221\267\337\050\004\042\240\324\017\135\342\171
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\312\372\135\002\243\337\326\144\214\132\263\001\012\251\265\012
\107\027\377\357\221\100\052\216\241\106\072\061\230\345\021\374
\314\273\111\126\212\374\271\320\141\232\157\145\154\346\303\313
\076\165\111\376\217\247\342\211\305\147\327\235\106\023\116\061
\166\073\044\263\236\021\145\206\253\177\357\035\324\370\274\347
\254\132\134\267\132\107\134\125\316\125\264\042\161\133\133\013
\360\317\334\240\141\144\352\251\327\150\012\143\247\340\015\077
\240\257\323\252\322\176\357\121\240\346\121\053\125\222\025\027
\123\313\267\146\016\146\114\370\371\165\114\220\347\022\160\307
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\047\052\376\314\116\322\350\116\124\060\017\006\003\125\035\023
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\007\113\312\151\232\262\204\172\167\223\105\027\025\237\044\320

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\357\263\102\107\315\073\125\023\006\260\011\333\375\143\366\072
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\274\133\122\242\375\006\067\070\100\141\217\112\226\270\220\067
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\311\277\310\103\255\375\056\216\361\257\342\364\230\372\022\037
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\237\211\213\375\067\137\137\072\316\070\131\206\113\257\161\013
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\313\204\064\362\050\304\352\155\364\052\357\301\153\166\332\373
\176\273\205\074\322\123\302\115\276\161\341\105\321\375\043\147
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END

CKA_NSS_Mozilla_CA_POLICY

CK_BBOOL CK_TRUE

CKA_NSS_SERVER_DISTRUST_AFTER CK_BBOOL CK_FALSE

CKA_NSS_EMAIL_DISTRUST_AFTER CK_BBOOL CK_FALSE

Trust for "E-Tugra Certification Authority"

Issuer: CN=E-Tugra Certification Authority,OU=E-Tugra Sertifikasyon Merkezi,O=E-Tu..ra EBG Bili..im
Teknolojileri ve Hizmetleri A....,L=Ankara,C=TR

Serial Number:6a:68:3e:9c:51:9b:cb:53

Subject: CN=E-Tugra Certification Authority,OU=E-Tugra Sertifikasyon Merkezi,O=E-Tu..ra EBG Bili..im
Teknolojileri ve Hizmetleri A....,L=Ankara,C=TR

Not Valid Before: Tue Mar 05 12:09:48 2013

Not Valid After : Fri Mar 03 12:09:48 2023

Fingerprint (SHA-256):

B0:BF:D5:2B:B0:D7:D9:BD:92:BF:5D:4D:C1:3D:A2:55:C0:2C:54:2F:37:83:65:EA:89:39:11:F5:5E:55:F2:3C

Fingerprint (SHA1): 51:C6:E7:08:49:06:6E:F3:92:D4:5C:A0:0D:6D:A3:62:8F:C3:52:39

CKA_CLASS CK_OBJECT_CLASS

CKO_NSS_TRUST

CKA_TOKEN CK_BBOOL CK_TRUE

CKA_PRIVATE CK_BBOOL CK_FALSE

```

CKA_MODIFIABLE CK_BBOOL CK_FALSE
CKA_LABEL UTF8 "E-Tugra Certification Authority"
CKA_CERT_SHA1_HASH MULTILINE_OCTAL
\121\306\347\010\111\006\156\363\222\324\134\240\015\155\243\142
\217\303\122\071
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CKA_CERT_MD5_HASH MULTILINE_OCTAL
\270\241\003\143\260\275\041\161\160\212\157\023\072\273\171\111
END
CKA_ISSUER MULTILINE_OCTAL
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\305\236\056\061\046\060\044\006\003\125\004\013\014\035\105\055
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\171\157\156\040\115\145\162\153\145\172\151\061\050\060\046\006
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\157\162\151\164\171
END
CKA_SERIAL_NUMBER
MULTILINE_OCTAL
\002\010\152\150\076\234\121\233\313\123
END
CKA_TRUST_SERVER_AUTH CK_TRUST CKT_NSS_TRUSTED_DELEGATOR
CKA_TRUST_EMAIL_PROTECTION CK_TRUST CKT_NSS_MUST_VERIFY_TRUST
CKA_TRUST_CODE_SIGNING CK_TRUST CKT_NSS_MUST_VERIFY_TRUST
CKA_TRUST_STEP_UP_APPROVED CK_BBOOL CK_FALSE

#
# Certificate "T-TeleSec GlobalRoot Class 2"
#
# Issuer: CN=T-TeleSec GlobalRoot Class 2,OU=T-Systems Trust Center,O=T-Systems Enterprise Services
GmbH,C=DE
# Serial Number: 1 (0x1)
# Subject: CN=T-TeleSec GlobalRoot Class 2,OU=T-Systems Trust Center,O=T-Systems Enterprise Services
GmbH,C=DE
# Not Valid Before: Wed Oct 01 10:40:14 2008
# Not Valid After : Sat Oct 01 23:59:59 2033
# Fingerprint (SHA-256):
91:E2:F5:78:8D:58:10:EB:A7:BA:58:73:7D:E1:54:8A:8E:CA:CD:01:45:98:BC:0B:14:3E:04:1B:17:05:25:52
# Fingerprint (SHA1): 59:0D:2D:7D:88:4F:40:2E:61:7E:A5:62:32:17:65:CF:17:D8:94:E9
CKA_CLASS
CK_OBJECT_CLASS CKO_CERTIFICATE
CKA_TOKEN CK_BBOOL CK_TRUE

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CKA_PRIVATE CK_BBOOL CK_FALSE
CKA_MODIFIABLE CK_BBOOL CK_FALSE
CKA_LABEL UTF8 "T-TeleSec GlobalRoot Class 2"
CKA_CERTIFICATE_TYPE CK_CERTIFICATE_TYPE CKC_X_509
CKA_SUBJECT MULTILINE_OCTAL
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\164\145\155\163\040\105\156\164\145\162\160\162\151\163\145\040
\123\145\162\166\151\143\145\163\040\107\155\142\110\061\037\060
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\060\043\006\003\125\004\003\014\034\124\055\124\145\154\145\123
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\164\145\155\163\040\105\156\164\145\162\160\162\151\163\145\040
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\060\043\006\003\125\004\003\014\034\124\055\124\145\154\145\123
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MULTILINE_OCTAL
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END
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\053\060\051\006\003\125\004\012\014\042\124\055\123\171\163\164
\145\155\163\040\105\156\164\145\162\160\162\151\163\145\040\123
\145\162\166\151\143\145\163\040\107\155\142\110\061\037\060\035
\006\003\125\004\013\014\026\124\055\123\171\163\164\145\155\163
\040\124\162\165\163\164\040\103\145\156\164\145\162\061\045\060
\043\006\003\125\004\003\014\034\124\055\124\145\154\145\123\145
\143\040\107\154\157\142\141\154\122\157\157\164\040\103\154\141
\163\163\040\062\060\036\027\015\060\070\061\060\060\061\061\060
\064\060\061\064\132\027\015\063\063\061\060\060\061\062\063\065
\071\065\071\132\060\201\202\061\013\060\011\006\003\125\004\006
\023\002\104\105\061\053\060\051\006\003\125\004\012\014\042\124
\055\123\171\163\164\145\155\163\040\105\156\164\145\162\160\162
\151\163\145\040\123\145\162\166\151\143\145\163\040\107\155\142
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\145\162\061\045\060\043\006\003\125\004\003\014\034\124\055\124
\145\154\145\123\145\143\040\107\154\157\142\141\154\122\157\157
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\307\137\355\002\174\173\174\055\033\326\272\271\200\302\030\202
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\003\002\001\006\060\035\006\003\125\035\016\004\026\004\024\277
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\005\000\003\202\001\001\000\061\003\242\141\013\037\164\350\162
\066\306\155\371\115\236\372\042\250\341\201\126\317\315\273\237
\352\253\221\031\070\257\252\174\025\115\363\266\243\215\245\364
\216\366\104\251\247\350\041\225\255\076\000\142\026\210\360\002
\272\374\141\043\346\063\233\060\172\153\066\142\173\255\004\043
\204\130\145\342\333\053\212\347\045\123\067\142\123\137\274\332
\001\142\051\242\246\047\161\346\072\042\176\301\157\035\225\160
\040\112\007\064\337\352\377\025\200\345\272\327\172\330\133\165
\174\005\172\051\107\176\100\250\061\023\167\315\100\073\264\121
\107\172\056\021\343\107\021\336\235\146\320\213\325\124\146\372
\203\125\352\174\302\051\211\033\351\157\263\316\342\005\204\311
\057\076\170\205\142\156\311\137\301\170\143\164\130\300\110\030
\014\231\071\353\244\314\032\265\171\132\215\025\234\330\024\015
\366\172\007\127\307\042\203\005\055\074\233\045\046\075\030\263
\251\103\174\310\310\253\144\217\016\243\277\234\033\235\060\333
\332\320\031\056\252\074\361\373\063\200\166\344\315\255\031\117
\005\047\216\023\241\156\302

END

CKA_NSS_MOZILLA_CA_POLICY

```

CK_BBOOL CK_TRUE
CKA_NSS_SERVER_DISTRUST_AFTER CK_BBOOL CK_FALSE
CKA_NSS_EMAIL_DISTRUST_AFTER CK_BBOOL CK_FALSE

# Trust for "T-TeleSec GlobalRoot Class 2"
# Issuer: CN=T-TeleSec GlobalRoot Class 2,OU=T-Systems Trust Center,O=T-Systems Enterprise Services
GmbH,C=DE
# Serial Number: 1 (0x1)
# Subject: CN=T-TeleSec GlobalRoot Class 2,OU=T-Systems Trust Center,O=T-Systems Enterprise Services
GmbH,C=DE
# Not Valid Before: Wed Oct 01 10:40:14 2008
# Not Valid After : Sat Oct 01 23:59:59 2033
# Fingerprint (SHA-256):
91:E2:F5:78:8D:58:10:EB:A7:BA:58:73:7D:E1:54:8A:8E:CA:CD:01:45:98:BC:0B:14:3E:04:1B:17:05:25:52
#
Fingerprint (SHA1): 59:0D:2D:7D:88:4F:40:2E:61:7E:A5:62:32:17:65:CF:17:D8:94:E9
CKA_CLASS CK_OBJECT_CLASS CKO_NSS_TRUST
CKA_TOKEN CK_BBOOL CK_TRUE
CKA_PRIVATE CK_BBOOL CK_FALSE
CKA_MODIFIABLE CK_BBOOL CK_FALSE
CKA_LABEL UTF8 "T-TeleSec GlobalRoot Class 2"
CKA_CERT_SHA1_HASH MULTILINE_OCTAL
\131\015\055\175\210\117\100\056\141\176\245\142\062\027\145\317
\027\330\224\351
END
CKA_CERT_MD5_HASH MULTILINE_OCTAL
\053\233\236\344\173\154\037\000\162\032\314\301\167\171\337\152
END
CKA_ISSUER MULTILINE_OCTAL
\060\201\202\061\013\060\011\006\003\125\004\006\023\002\104\105
\061\053\060\051\006\003\125\004\012\014\042\124\055\123\171\163
\164\145\155\163\040\105\156\164\145\162\160\162\151\163\145\040
\123\145\162\166\151\143\145\163\040\107\155\142\110\061\037\060
\035\006\003\125\004\013\014\026\124\055\123\171\163\164\145\155
\163\040\124\162\165\163\164\040\103\145\156\164\145\162\061\045
\060\043\006\003\125\004\003\014\034\124\055\124\145\154\145\123
\145\143\040\107\154\157\142\141\154\122\157\157\164\040\103\154
\141\163\163\040\062
END
CKA_SERIAL_NUMBER
MULTILINE_OCTAL
\002\001\001
END
CKA_TRUST_SERVER_AUTH CK_TRUST CKT_NSS_TRUSTED_DELEGATOR
CKA_TRUST_EMAIL_PROTECTION CK_TRUST CKT_NSS_TRUSTED_DELEGATOR
CKA_TRUST_CODE_SIGNING CK_TRUST CKT_NSS_MUST_VERIFY_TRUST
CKA_TRUST_STEP_UP_APPROVED CK_BBOOL CK_FALSE

```

```

#
# Certificate "Atos TrustedRoot 2011"
#
# Issuer: C=DE,O=Atos,CN=Atos TrustedRoot 2011
# Serial Number:5c:33:cb:62:2c:5f:b3:32
# Subject: C=DE,O=Atos,CN=Atos TrustedRoot 2011
# Not Valid Before: Thu Jul 07 14:58:30 2011
# Not Valid After : Tue Dec 31 23:59:59 2030
# Fingerprint (SHA-256):
F3:56:BE:A2:44:B7:A9:1E:B3:5D:53:CA:9A:D7:86:4A:CE:01:8E:2D:35:D5:F8:F9:6D:DF:68:A6:F4:1A:A4:74
# Fingerprint (SHA1): 2B:B1:F5:3E:55:0C:1D:C5:F1:D4:E6:B7:6A:46:4B:55:06:02:AC:21
CKA_CLASS CK_OBJECT_CLASS CKO_CERTIFICATE
CKA_TOKEN CK_BBOOL CK_TRUE
CKA_PRIVATE CK_BBOOL CK_FALSE
CKA_MODIFIABLE CK_BBOOL
CK_FALSE
CKA_LABEL UTF8 "Atos TrustedRoot 2011"
CKA_CERTIFICATE_TYPE CK_CERTIFICATE_TYPE CKC_X_509
CKA_SUBJECT MULTILINE_OCTAL
\060\074\061\036\060\034\006\003\125\004\003\014\025\101\164\157
\163\040\124\162\165\163\164\145\144\122\157\157\164\040\062\060
\061\061\061\015\060\013\006\003\125\004\012\014\004\101\164\157
\163\061\013\060\011\006\003\125\004\006\023\002\104\105
END
CKA_ID UTF8 "0"
CKA_ISSUER MULTILINE_OCTAL
\060\074\061\036\060\034\006\003\125\004\003\014\025\101\164\157
\163\040\124\162\165\163\164\145\144\122\157\157\164\040\062\060
\061\061\061\015\060\013\006\003\125\004\012\014\004\101\164\157
\163\061\013\060\011\006\003\125\004\006\023\002\104\105
END
CKA_SERIAL_NUMBER MULTILINE_OCTAL
\002\010\134\063\313\142\054\137\263\062
END
CKA_VALUE MULTILINE_OCTAL
\060\202\003\167\060\202\002\137\240\003\002\001\002\002\010\134
\063\313\142\054\137\263\062\060\015\006\011\052\206\110\206\367
\015\001\001\013\005\000\060\074\061\036\060\034\006\003\125\004
\003\014\025\101\164\157\163\040\124\162\165\163\164\145\144\122
\157\157\164\040\062\060\061\061\061\015\060\013\006\003\125\004
\012\014\004\101\164\157\163\061\013\060\011\006\003\125\004\006
\023\002\104\105\060\036\027\015\061\061\060\067\060\067\061\064
\065\070\063\060\132\027\015\063\060\061\062\063\061\062\063\065
\071\065\071\132\060\074\061\036\060\034\006\003\125\004\003\014
\025\101\164\157\163\040\124\162\165\163\164\145\144\122\157\157
\164\040\062\060\061\061\061\015\060\013\006\003\125\004\012\014
\004\101\164\157\163\061\013\060\011\006\003\125\004\006\023\002
\104\105\060\202\001\042\060\015\006\011\052\206\110\206\367\015

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\001\001\001\005\000\003\202\001\017\000\060\202\001\012\002\202
\001\001\000\225\205\073\227\157\052\073\056\073\317\246\363\051
\065\276\317\030\254\076\252\331\370\115\240\076\032\107\271\274
\232\337\362\376\314\076\107\350\172\226\302\044\216\065\364\251
\014\374\202\375\155\301\162\142\047\275\352\153\353\347\212\314
\124\076\220\120\317\200\324\225\373\350\265\202\324\024\305\266
\251\125\045\127\333\261\120\366\260\140\144\131\172\151\317\003
\267\157\015\276\312\076\157\164\162\352\252\060\052\163\142\276
\111\221\141\310\021\376\016\003\052\367\152\040\334\002\025\015
\136\025\152\374\343\202\301\265\305\235\144\011\154\243\131\230
\007\047\307\033\226\053\141\164\161\154\103\361\367\065\211\020
\340\236\354\125\241\067\042\242\207\004\005\054\107\175\264\034
\271\142\051\146\050\312\267\341\223\365\244\224\003\231\271\160
\205\265\346\110\352\215\120\374\331\336\314\157\007\016\335\013
\162\235\200\060\026\007\225\077\050\016\375\305\165\117\123\326
\164\232\264\044\056\216\002\221\317\166\305\233\036\125\164\234
\170\041\261\360\055\361\013\237\302\325\226\030\037\360\124\042
\172\214\007\002\003\001\000\001\243\175\060\173\060\035\006\003
\125\035\016\004\026\004\024\247\245\006\261\054\246\011\140\356
\321\227\351\160\256\274\073\031\154\333\041\060\017\006\003\125
\035\023\001\001\377\004\005\060\003\001\001\377\060\037\006\003
\125\035\043\004\030\060\026\200\024\247\245\006\261\054\246\011
\140\356\321\227\351\160\256\274\073\031\154\333\041\060\030\006
\003\125\035\040\004\021\060\017\060\015\006\013\053\006\001\004
\001\260\055\003\004\001\001\060\016\006\003\125\035\017\001\001
\377\004\004\003\002\001\206\060\015\006\011\052\206\110\206\367
\015\001\001\013\005\000\003\202\001\001\000\046\167\064\333\224
\110\206\052\101\235\054\076\006\220\140\304\214\254\013\124\270
\037\271\173\323\007\071\344\372\076\173\262\075\116\355\237\043
\275\227\363\153\134\357\356\375\100\246\337\241\223\241\012\206
\254\357\040\320\171\001\275\170\367\031\330\044\061\064\004\001
\246\272\025\232\303\047\334\330\117\017\314\030\143\377\231\017
\016\221\153\165\026\341\041\374\330\046\307\107\267\246\317\130
\162\161\176\272\341\115\225\107\073\311\257\155\241\264\301\354
\211\366\264\017\070\265\342\144\334\045\317\246\333\353\232\134
\231\241\305\010\336\375\346\332\325\326\132\105\014\304\267\302
\265\024\357\264\021\377\016\025\265\365\365\333\306\275\353\132
\247\360\126\042\251\074\145\124\306\025\250\275\206\236\315\203
\226\150\172\161\201\211\341\013\341\352\021\033\150\010\314\151
\236\354\236\101\236\104\062\046\172\342\207\012\161\075\353\344
\132\244\322\333\305\315\306\336\140\177\271\363\117\104\222\357
\052\267\030\076\247\031\331\013\175\261\067\101\102\260\272\140
\035\362\376\011\021\260\360\207\173\247\235

END

CKA_NSS_MOZILLA_CA_POLICY

CK_BBOOL CK_TRUE

CKA_NSS_SERVER_DISTRUST_AFTER CK_BBOOL CK_FALSE

CKA_NSS_EMAIL_DISTRUST_AFTER CK_BBOOL CK_FALSE

```

# Trust for "Atos TrustedRoot 2011"
# Issuer: C=DE,O=Atos,CN=Atos TrustedRoot 2011
# Serial Number:5c:33:cb:62:2c:5f:b3:32
# Subject: C=DE,O=Atos,CN=Atos TrustedRoot 2011
# Not Valid Before: Thu Jul 07 14:58:30 2011
# Not Valid After : Tue Dec 31 23:59:59 2030
# Fingerprint (SHA-256):
F3:56:BE:A2:44:B7:A9:1E:B3:5D:53:CA:9A:D7:86:4A:CE:01:8E:2D:35:D5:F8:F9:6D:DF:68:A6:F4:1A:A4:74
# Fingerprint (SHA1): 2B:B1:F5:3E:55:0C:1D:C5:F1:D4:E6:B7:6A:46:4B:55:06:02:AC:21
CKA_CLASS
CK_OBJECT_CLASS CKO_NSS_TRUST
CKA_TOKEN CK_BBOOL CK_TRUE
CKA_PRIVATE CK_BBOOL CK_FALSE
CKA_MODIFIABLE CK_BBOOL CK_FALSE
CKA_LABEL UTF8 "Atos TrustedRoot 2011"
CKA_CERT_SHA1_HASH MULTILINE_OCTAL
\053\261\365\076\125\014\035\305\361\324\346\267\152\106\113\125
\006\002\254\041
END
CKA_CERT_MD5_HASH MULTILINE_OCTAL
\256\271\304\062\113\254\177\135\146\314\167\224\273\052\167\126
END
CKA_ISSUER MULTILINE_OCTAL
\060\074\061\036\060\034\006\003\125\004\003\014\025\101\164\157
\163\040\124\162\165\163\164\145\144\122\157\157\164\040\062\060
\061\061\061\015\060\013\006\003\125\004\012\014\004\101\164\157
\163\061\013\060\011\006\003\125\004\006\023\002\104\105
END
CKA_SERIAL_NUMBER MULTILINE_OCTAL
\002\010\134\063\313\142\054\137\263\062
END
CKA_TRUST_SERVER_AUTH CK_TRUST CKT_NSS_TRUSTED_DELEGATOR
CKA_TRUST_EMAIL_PROTECTION CK_TRUST CKT_NSS_TRUSTED_DELEGATOR
CKA_TRUST_CODE_SIGNING CK_TRUST CKT_NSS_MUST_VERIFY_TRUST
CKA_TRUST_STEP_UP_APPROVED CK_BBOOL CK_FALSE

#
# Certificate
#
"QuoVadis Root CA 1 G3"
#
# Issuer: CN=QuoVadis Root CA 1 G3,O=QuoVadis Limited,C=BM
# Serial Number:78:58:5f:2e:ad:2c:19:4b:e3:37:07:35:34:13:28:b5:96:d4:65:93
# Subject: CN=QuoVadis Root CA 1 G3,O=QuoVadis Limited,C=BM
# Not Valid Before: Thu Jan 12 17:27:44 2012
# Not Valid After : Sun Jan 12 17:27:44 2042
# Fingerprint (SHA-256):
8A:86:6F:D1:B2:76:B5:7E:57:8E:92:1C:65:82:8A:2B:ED:58:E9:F2:F2:88:05:41:34:B7:F1:F4:BF:C9:CC:74

```

Fingerprint (SHA1): 1B:8E:EA:57:96:29:1A:C9:39:EA:B8:0A:81:1A:73:73:C0:93:79:67

CKA_CLASS CK_OBJECT_CLASS CKO_CERTIFICATE

CKA_TOKEN CK_BBOOL CK_TRUE

CKA_PRIVATE CK_BBOOL CK_FALSE

CKA_MODIFIABLE CK_BBOOL CK_FALSE

CKA_LABEL UTF8 "QuoVadis Root CA 1 G3"

CKA_CERTIFICATE_TYPE CK_CERTIFICATE_TYPE CKC_X_509

CKA_SUBJECT MULTILINE_OCTAL

\060\110\061\013\060\011\006\003\125\004\006\023\002\102\115\061
\031\060\027\006\003\125\004\012\023\020\121\165\157\126\141\144
\151\163\040\114\151\155\151\164\145\144\061\036\060\034\006\003
\125\004\003\023\025\121\165\157\126\141\144\151\163\040\122\157
\157\164\040\103\101\040\061\040\107\063

END

CKA_ID

UTF8 "0"

CKA_ISSUER MULTILINE_OCTAL

\060\110\061\013\060\011\006\003\125\004\006\023\002\102\115\061
\031\060\027\006\003\125\004\012\023\020\121\165\157\126\141\144
\151\163\040\114\151\155\151\164\145\144\061\036\060\034\006\003
\125\004\003\023\025\121\165\157\126\141\144\151\163\040\122\157
\157\164\040\103\101\040\061\040\107\063

END

CKA_SERIAL_NUMBER MULTILINE_OCTAL

\002\024\170\130\137\056\255\054\031\113\343\067\007\065\064\023
\050\265\226\324\145\223

END

CKA_VALUE MULTILINE_OCTAL

\060\202\005\140\060\202\003\110\240\003\002\001\002\002\024\170
\130\137\056\255\054\031\113\343\067\007\065\064\023\050\265\226
\324\145\223\060\015\006\011\052\206\110\206\367\015\001\001\013
\005\000\060\110\061\013\060\011\006\003\125\004\006\023\002\102
\115\061\031\060\027\006\003\125\004\012\023\020\121\165\157\126
\141\144\151\163\040\114\151\155\151\164\145\144\061\036\060\034
\006\003\125\004\003\023\025\121\165\157\126\141\144\151\163\040
\122\157\157\164\040\103\101\040\061\040\107\063\060\036\027\015
\061\062\060\061\061\062\061\067\062\067\064\064\132\027\015\064
\062\060\061\061\062\061\067\062\067\064\064\132\060\110\061\013
\060\011\006\003\125\004\006\023\002\102\115\061\031\060\027\006
\003\125\004\012\023\020\121\165\157\126\141\144\151\163\040\114
\151\155\151\164\145\144\061\036\060\034\006\003\125\004\003\023
\025\121\165\157\126\141\144\151\163\040\122\157\157\164\040\103
\101\040\061\040\107\063\060\202\002\042\060\015\006\011\052\206
\110\206\367\015\001\001\001\005\000\003\202\002\017\000\060\202
\002\012\002\202\002\001\000\240\276\120\020\216\351\362\154\100
\264\004\234\205\271\061\312\334\055\344\021\251\004\074\033\125
\301\347\130\060\035\044\264\303\357\205\336\214\054\341\301\075
\337\202\346\117\255\107\207\154\354\133\111\301\112\325\273\217

\354\207\254\177\202\232\206\354\075\003\231\122\001\322\065\236
\254\332\360\123\311\146\074\324\254\002\001\332\044\323\073\250
\002\106\257\244\034\343\370\163\130\166\267\366\016\220\015\265
\360\317\314\372\371\306\114\345\303\206\060\012\215\027\176\065
\353\305\337\273\016\234\300\215\207\343\210\070\205\147\372\076
\307\253\340\023\234\005\030\230\317\223\365\261\222\264\374\043
\323\317\325\304\047\111\340\236\074\233\010\243\213\135\052\041
\340\374\071\252\123\332\175\176\317\032\011\123\274\135\005\004
\317\241\112\217\213\166\202\015\241\370\322\307\024\167\133\220
\066\007\201\233\076\006\372\122\136\143\305\246\000\376\245\351
\122\033\122\265\222\071\162\003\011\142\275\260\140\026\156\246
\335\045\302\003\146\335\363\004\321\100\342\116\213\206\364\157
\345\203\240\047\204\136\004\301\365\220\275\060\075\304\357\250
\151\274\070\233\244\244\226\321\142\332\151\300\001\226\256\313
\304\121\064\352\014\252\377\041\216\131\217\112\134\344\141\232
\247\322\351\052\170\215\121\075\072\025\356\242\131\216\251\134
\336\305\371\220\042\345\210\105\161\335\221\231\154\172\237\075
\075\230\174\136\366\276\026\150\240\136\256\013\043\374\132\017
\252\042\166\055\311\241\020\035\344\323\104\043\220\210\237\306
\052\346\327\365\232\263\130\036\057\060\211\010\033\124\242\265
\230\043\354\010\167\034\225\135\141\321\313\211\234\137\242\112
\221\232\357\041\252\111\026\010\250\275\141\050\061\311\164\255
\205\366\331\305\261\213\321\345\020\062\115\137\213\040\072\074
\111\037\063\205\131\015\333\313\011\165\103\151\163\373\153\161
\175\360\337\304\114\175\306\243\056\310\225\171\313\163\242\216
\116\115\044\373\136\344\004\276\162\033\246\047\055\111\132\231
\172\327\134\011\040\267\177\224\271\117\361\015\034\136\210\102
\033\021\267\347\221\333\236\154\364\152\337\214\006\230\003\255
\314\050\357\245\107\363\123\002\003\001\000\001\243\102\060\100
\060\017\006\003\125\035\023\001\001\377\004\005\060\003\001\001
\377\060\016\006\003\125\035\017\001\001\377\004\004\003\002\001
\006\060\035\006\003\125\035\016\004\026\004\024\243\227\326\363
\136\242\020\341\253\105\237\074\027\144\074\356\001\160\234\314
\060\015\006\011\052\206\110\206\367\015\001\001\013\005\000\003
\202\002\001\000\030\372\133\165\374\076\172\307\137\167\307\312
\337\317\137\303\022\304\100\135\324\062\252\270\152\327\325\025
\025\106\230\043\245\346\220\133\030\231\114\343\255\102\243\202
\061\066\210\315\351\373\304\004\226\110\213\001\307\215\001\317
\133\063\006\226\106\146\164\035\117\355\301\266\271\264\015\141
\314\143\176\327\056\167\214\226\034\052\043\150\153\205\127\166
\160\063\023\376\341\117\246\043\167\030\372\032\214\350\275\145
\311\317\077\364\311\027\334\353\307\274\300\004\056\055\106\057
\151\146\303\033\217\376\354\076\323\312\224\277\166\012\045\015
\251\173\002\034\251\320\073\137\013\300\201\072\075\144\341\277
\247\055\116\275\115\304\330\051\306\042\030\320\305\254\162\002
\202\077\252\072\242\072\042\227\061\335\010\143\303\165\024\271
\140\050\055\133\150\340\026\251\146\202\043\121\365\353\123\330
\061\233\173\351\267\235\113\353\210\026\317\371\135\070\212\111

\060\217\355\361\353\031\364\167\032\061\030\115\147\124\154\057
\157\145\371\333\075\354\041\354\136\364\364\213\312\140\145\124
\321\161\144\364\371\246\243\201\063\066\063\161\360\244\170\137
\116\255\203\041\336\064\111\215\350\131\254\235\362\166\132\066
\362\023\364\257\340\011\307\141\052\154\367\340\235\256\273\206
\112\050\157\056\356\264\171\315\220\063\303\263\166\372\365\360
\154\235\001\220\372\236\220\366\234\162\317\107\332\303\037\344
\065\040\123\362\124\321\337\141\203\246\002\342\045\070\336\205
\062\055\136\163\220\122\135\102\304\316\075\113\341\371\031\204
\035\325\242\120\314\101\373\101\024\303\275\326\311\132\243\143
\146\002\200\275\005\072\073\107\234\354\000\046\114\365\210\121
\277\250\043\177\030\007\260\013\355\213\046\241\144\323\141\112
\353\134\237\336\263\257\147\003\263\037\335\155\135\151\150\151
\253\136\072\354\174\151\274\307\073\205\116\236\025\271\264\025
\117\303\225\172\130\327\311\154\351\154\271\363\051\143\136\264
\054\360\055\075\355\132\145\340\251\133\100\302\110\231\201\155
\236\037\006\052\074\022\264\213\017\233\242\044\360\246\215\326
\172\340\113\266\144\226\143\225\204\302\112\315\034\056\044\207
\063\140\345\303

END

CKA_NSS_Mozilla_CA_POLICY

CK_BBOOL CK_TRUE

CKA_NSS_SERVER_DISTRUST_AFTER CK_BBOOL CK_FALSE

CKA_NSS_EMAIL_DISTRUST_AFTER CK_BBOOL CK_FALSE

Trust for "QuoVadis Root CA 1 G3"

Issuer: CN=QuoVadis Root CA 1 G3,O=QuoVadis Limited,C=BM

Serial Number:78:58:5f:2e:ad:2c:19:4b:e3:37:07:35:34:13:28:b5:96:d4:65:93

Subject: CN=QuoVadis Root CA 1 G3,O=QuoVadis Limited,C=BM

Not Valid Before: Thu Jan 12 17:27:44 2012

Not Valid After : Sun Jan 12 17:27:44 2042

Fingerprint (SHA-256):

8A:86:6F:D1:B2:76:B5:7E:57:8E:92:1C:65:82:8A:2B:ED:58:E9:F2:F2:88:05:41:34:B7:F1:F4:BF:C9:CC:74

Fingerprint (SHA1): 1B:8E:EA:57:96:29:1A:C9:39:EA:B8:0A:81:1A:73:73:C0:93:79:67

CKA_CLASS CK_OBJECT_CLASS CKO_NSS_TRUST

CKA_TOKEN CK_BBOOL CK_TRUE

CKA_PRIVATE CK_BBOOL CK_FALSE

CKA_MODIFIABLE CK_BBOOL CK_FALSE

CKA_LABEL UTF8 "QuoVadis

Root CA 1 G3"

CKA_CERT_SHA1_HASH MULTILINE_OCTAL

\033\216\352\127\226\051\032\311\071\352\270\012\201\032\163\163
\300\223\171\147

END

CKA_CERT_MD5_HASH MULTILINE_OCTAL

\244\274\133\077\376\067\232\372\144\360\342\372\005\075\013\253

END

CKA_ISSUER MULTILINE_OCTAL

```

\060\110\061\013\060\011\006\003\125\004\006\023\002\102\115\061
\031\060\027\006\003\125\004\012\023\020\121\165\157\126\141\144
\151\163\040\114\151\155\151\164\145\144\061\036\060\034\006\003
\125\004\003\023\025\121\165\157\126\141\144\151\163\040\122\157
\157\164\040\103\101\040\061\040\107\063
END
CKA_SERIAL_NUMBER MULTILINE_OCTAL
\002\024\170\130\137\056\255\054\031\113\343\067\007\065\064\023
\050\265\226\324\145\223
END
CKA_TRUST_SERVER_AUTH CK_TRUST CKT_NSS_TRUSTED_DELEGATOR
CKA_TRUST_EMAIL_PROTECTION CK_TRUST CKT_NSS_TRUSTED_DELEGATOR
CKA_TRUST_CODE_SIGNING CK_TRUST CKT_NSS_MUST_VERIFY_TRUST
CKA_TRUST_STEP_UP_APPROVED CK_BBOOL CK_FALSE

#
# Certificate "QuoVadis Root CA 2 G3"
#
# Issuer: CN=QuoVadis Root CA
2 G3,O=QuoVadis Limited,C=BM
# Serial Number:44:57:34:24:5b:81:89:9b:35:f2:ce:b8:2b:3b:5b:a7:26:f0:75:28
# Subject: CN=QuoVadis Root CA 2 G3,O=QuoVadis Limited,C=BM
# Not Valid Before: Thu Jan 12 18:59:32 2012
# Not Valid After : Sun Jan 12 18:59:32 2042
# Fingerprint (SHA-256):
8F:E4:FB:0A:F9:3A:4D:0D:67:DB:0B:EB:B2:3E:37:C7:1B:F3:25:DC:BC:DD:24:0E:A0:4D:AF:58:B4:7E:18:40
# Fingerprint (SHA1): 09:3C:61:F3:8B:8B:DC:7D:55:DF:75:38:02:05:00:E1:25:F5:C8:36
CKA_CLASS CK_OBJECT_CLASS CKO_CERTIFICATE
CKA_TOKEN CK_BBOOL CK_TRUE
CKA_PRIVATE CK_BBOOL CK_FALSE
CKA_MODIFIABLE CK_BBOOL CK_FALSE
CKA_LABEL UTF8 "QuoVadis Root CA 2 G3"
CKA_CERTIFICATE_TYPE CK_CERTIFICATE_TYPE CKC_X_509
CKA_SUBJECT MULTILINE_OCTAL
\060\110\061\013\060\011\006\003\125\004\006\023\002\102\115\061
\031\060\027\006\003\125\004\012\023\020\121\165\157\126\141\144
\151\163\040\114\151\155\151\164\145\144\061\036\060\034\006\003
\125\004\003\023\025\121\165\157\126\141\144\151\163\040\122\157
\157\164\040\103\101\040\062\040\107\063
END
CKA_ID
UTF8 "0"
CKA_ISSUER MULTILINE_OCTAL
\060\110\061\013\060\011\006\003\125\004\006\023\002\102\115\061
\031\060\027\006\003\125\004\012\023\020\121\165\157\126\141\144
\151\163\040\114\151\155\151\164\145\144\061\036\060\034\006\003
\125\004\003\023\025\121\165\157\126\141\144\151\163\040\122\157
\157\164\040\103\101\040\062\040\107\063

```

END

CKA_SERIAL_NUMBER MULTILINE_OCTAL

\002\024\104\127\064\044\133\201\211\233\065\362\316\270\053\073
\133\247\046\360\165\050

END

CKA_VALUE MULTILINE_OCTAL

\060\202\005\140\060\202\003\110\240\003\002\001\002\002\024\104
\127\064\044\133\201\211\233\065\362\316\270\053\073\133\247\046
\360\165\050\060\015\006\011\052\206\110\206\367\015\001\001\013
\005\000\060\110\061\013\060\011\006\003\125\004\006\023\002\102
\115\061\031\060\027\006\003\125\004\012\023\020\121\165\157\126
\141\144\151\163\040\114\151\155\151\164\145\144\061\036\060\034
\006\003\125\004\003\023\025\121\165\157\126\141\144\151\163\040
\122\157\157\164\040\103\101\040\062\040\107\063\060\036\027\015
\061\062\060\061\061\062\061\070\065\071\063\062\132\027\015\064
\062\060\061\061\062\061\070\065\071\063\062\132\060\110\061\013
\060\011\006\003\125\004\006\023\002\102\115\061\031\060\027\006
\003\125\004\012\023\020\121\165\157\126\141\144\151\163\040\114
\151\155\151\164\145\144\061\036\060\034\006\003\125\004\003\023
\025\121\165\157\126\141\144\151\163\040\122\157\157\164\040\103
\101\040\062\040\107\063\060\202\002\042\060\015\006\011\052\206
\110\206\367\015\001\001\001\005\000\003\202\002\017\000\060\202
\002\012\002\202\002\001\000\241\256\045\262\001\030\334\127\210
\077\106\353\371\257\342\353\043\161\342\232\321\141\146\041\137
\252\257\047\121\345\156\033\026\324\055\175\120\260\123\167\275
\170\072\140\342\144\002\233\174\206\233\326\032\216\255\377\037
\025\177\325\225\036\022\313\346\024\204\004\301\337\066\263\026
\237\212\343\311\333\230\064\316\330\063\027\050\106\374\247\311
\360\322\264\325\115\011\162\111\371\362\207\343\251\332\175\241
\175\153\262\072\045\251\155\122\104\254\370\276\156\373\334\246
\163\221\220\141\246\003\024\040\362\347\207\243\210\255\255\240
\214\377\246\013\045\122\045\347\026\001\325\313\270\065\201\014
\243\073\360\341\341\374\132\135\316\200\161\155\370\111\253\076
\073\272\270\327\200\001\373\245\353\133\263\305\136\140\052\061
\240\257\067\350\040\072\237\250\062\054\014\314\011\035\323\236
\216\135\274\114\230\356\305\032\150\173\354\123\246\351\024\065
\243\337\315\200\237\014\110\373\034\364\361\277\112\270\372\325
\214\161\112\307\037\255\376\101\232\263\203\135\362\204\126\357
\245\127\103\316\051\255\214\253\125\277\304\373\133\001\335\043
\041\241\130\000\216\303\320\152\023\355\023\343\022\053\200\334
\147\346\225\262\315\036\042\156\052\370\101\324\362\312\024\007
\215\212\125\022\306\151\365\270\206\150\057\123\136\260\322\252
\041\301\230\346\060\343\147\125\307\233\156\254\031\250\125\246
\105\006\320\043\072\333\353\145\135\052\021\021\360\073\117\312
\155\364\064\304\161\344\377\000\132\366\134\256\043\140\205\163
\361\344\020\261\045\256\325\222\273\023\301\014\340\071\332\264
\071\127\265\253\065\252\162\041\073\203\065\347\061\337\172\041
\156\270\062\010\175\035\062\221\025\112\142\162\317\343\167\241

\274\325\021\033\166\001\147\010\340\101\013\303\353\025\156\370
\244\031\331\242\253\257\342\047\122\126\053\002\212\054\024\044
\371\277\102\002\277\046\310\306\217\340\156\070\175\123\055\345
\355\230\263\225\143\150\177\371\065\364\337\210\305\140\065\222
\300\174\151\034\141\225\026\320\353\336\013\257\076\004\020\105
\145\130\120\070\257\110\362\131\266\026\362\074\015\220\002\306
\160\056\001\255\074\025\327\002\003\001\000\001\243\102\060\100
\060\017\006\003\125\035\023\001\001\377\004\005\060\003\001\001
\377\060\016\006\003\125\035\017\001\001\377\004\004\003\002\001
\006\060\035\006\003\125\035\016\004\026\004\024\355\347\157\166
\132\277\140\354\111\133\306\245\167\273\162\026\161\233\304\075
\060\015\006\011\052\206\110\206\367\015\001\001\013\005\000\003
\202\002\001\000\221\337\200\077\103\011\176\161\302\367\353\263
\210\217\341\121\262\274\075\165\371\050\135\310\274\231\233\173
\135\252\345\312\341\012\367\350\262\323\237\335\147\061\176\272
\001\252\307\152\101\073\220\324\010\134\262\140\152\220\360\310
\316\003\142\371\213\355\373\156\052\334\006\115\074\051\017\211
\026\212\130\114\110\017\350\204\141\352\074\162\246\167\344\102
\256\210\243\103\130\171\176\256\312\245\123\015\251\075\160\275
\040\031\141\244\154\070\374\103\062\341\301\107\377\370\354\361
\021\042\062\226\234\302\366\133\151\226\173\040\014\103\101\232
\133\366\131\031\210\336\125\210\067\121\013\170\134\012\036\243
\102\375\307\235\210\017\300\362\170\002\044\124\223\257\211\207
\210\311\112\200\035\352\320\156\076\141\056\066\273\065\016\047
\226\375\146\064\073\141\162\163\361\026\134\107\006\124\111\000
\172\130\022\260\012\357\205\375\261\270\063\165\152\223\034\022
\346\140\136\157\035\177\311\037\043\313\204\141\237\036\202\104
\371\137\255\142\125\044\232\122\230\355\121\347\241\176\227\072
\346\057\037\021\332\123\200\054\205\236\253\065\020\333\042\137
\152\305\136\227\123\362\062\002\011\060\243\130\360\015\001\325
\162\306\261\174\151\173\303\365\066\105\314\141\156\136\114\224
\305\136\256\350\016\136\213\277\367\315\340\355\241\016\033\063
\356\124\030\376\017\276\357\176\204\153\103\343\160\230\333\135
\165\262\015\131\007\205\025\043\071\326\361\337\251\046\017\326
\110\307\263\246\042\365\063\067\132\225\107\237\173\272\030\025
\157\377\326\024\144\203\111\322\012\147\041\333\017\065\143\140
\050\042\343\261\225\203\315\205\246\335\057\017\347\147\122\156
\273\057\205\174\365\112\163\347\305\076\300\275\041\022\005\077
\374\267\003\111\002\133\310\045\346\342\124\070\365\171\207\214
\035\123\262\116\205\173\006\070\307\054\370\370\260\162\215\045
\345\167\122\364\003\034\110\246\120\137\210\040\060\156\362\202
\103\253\075\227\204\347\123\373\041\301\117\017\042\232\206\270
\131\052\366\107\075\031\210\055\350\205\341\236\354\205\010\152
\261\154\064\311\035\354\110\053\073\170\355\146\304\216\171\151
\203\336\177\214

END

CKA_NSS_MOZILLA_CA_POLICY


```

CK_BBOOL CK_TRUE
CKA_NSS_SERVER_DISTRUST_AFTER CK_BBOOL CK_FALSE
CKA_NSS_EMAIL_DISTRUST_AFTER CK_BBOOL CK_FALSE

# Trust for "QuoVadis Root CA 2 G3"
# Issuer: CN=QuoVadis Root CA 2 G3,O=QuoVadis Limited,C=BM
# Serial Number:44:57:34:24:5b:81:89:9b:35:f2:ce:b8:2b:3b:5b:a7:26:f0:75:28
# Subject: CN=QuoVadis Root CA 2 G3,O=QuoVadis Limited,C=BM
# Not Valid Before: Thu Jan 12 18:59:32 2012
# Not Valid After : Sun Jan 12 18:59:32 2042
# Fingerprint (SHA-256):
8F:E4:FB:0A:F9:3A:4D:0D:67:DB:0B:EB:B2:3E:37:C7:1B:F3:25:DC:BC:DD:24:0E:A0:4D:AF:58:B4:7E:18:40
# Fingerprint (SHA1): 09:3C:61:F3:8B:8B:DC:7D:55:DF:75:38:02:05:00:E1:25:F5:C8:36
CKA_CLASS CK_OBJECT_CLASS CKO_NSS_TRUST
CKA_TOKEN CK_BBOOL CK_TRUE
CKA_PRIVATE CK_BBOOL CK_FALSE
CKA_MODIFIABLE CK_BBOOL CK_FALSE
CKA_LABEL UTF8 "QuoVadis Root CA 2 G3"
CKA_CERT_SHA1_HASH MULTILINE_OCTAL
\011\074\141\363\213\213\334\175\125\337\165\070\002\005\000\341
\045\365\310\066
END
CKA_CERT_MD5_HASH
MULTILINE_OCTAL
\257\014\206\156\277\100\055\177\013\076\022\120\272\022\075\006
END
CKA_ISSUER MULTILINE_OCTAL
\060\110\061\013\060\011\006\003\125\004\006\023\002\102\115\061
\031\060\027\006\003\125\004\012\023\020\121\165\157\126\141\144
\151\163\040\114\151\155\151\164\145\144\061\036\060\034\006\003
\125\004\003\023\025\121\165\157\126\141\144\151\163\040\122\157
\157\164\040\103\101\040\062\040\107\063
END
CKA_SERIAL_NUMBER MULTILINE_OCTAL
\002\024\104\127\064\044\133\201\211\233\065\362\316\270\053\073
\133\247\046\360\165\050
END
CKA_TRUST_SERVER_AUTH CK_TRUST CKT_NSS_TRUSTED_DELEGATOR
CKA_TRUST_EMAIL_PROTECTION CK_TRUST CKT_NSS_MUST_VERIFY_TRUST
CKA_TRUST_CODE_SIGNING CK_TRUST CKT_NSS_MUST_VERIFY_TRUST
CKA_TRUST_STEP_UP_APPROVED CK_BBOOL CK_FALSE

#
# Certificate "QuoVadis Root CA 3 G3"
#
# Issuer: CN=QuoVadis Root CA 3 G3,O=QuoVadis Limited,C=BM
# Serial Number:2e:f5:9b:02:28:a7:db:7a:ff:d5:a3:a9:ee:bd:03:a0:cf:12:6a:1d
#

```

Subject: CN=QuoVadis Root CA 3 G3,O=QuoVadis Limited,C=BM
Not Valid Before: Thu Jan 12 20:26:32 2012
Not Valid After : Sun Jan 12 20:26:32 2042
Fingerprint (SHA-256):
88:EF:81:DE:20:2E:B0:18:45:2E:43:F8:64:72:5C:EA:5F:BD:1F:C2:D9:D2:05:73:07:09:C5:D8:B8:69:0F:46
Fingerprint (SHA1): 48:12:BD:92:3C:A8:C4:39:06:E7:30:6D:27:96:E6:A4:CF:22:2E:7D
CKA_CLASS CK_OBJECT_CLASS CKO_CERTIFICATE
CKA_TOKEN CK_BBOOL CK_TRUE
CKA_PRIVATE CK_BBOOL CK_FALSE
CKA_MODIFIABLE CK_BBOOL CK_FALSE
CKA_LABEL UTF8 "QuoVadis Root CA 3 G3"
CKA_CERTIFICATE_TYPE CK_CERTIFICATE_TYPE CKC_X_509
CKA_SUBJECT MULTILINE_OCTAL
\060\110\061\013\060\011\006\003\125\004\006\023\002\102\115\061
\031\060\027\006\003\125\004\012\023\020\121\165\157\126\141\144
\151\163\040\114\151\155\151\164\145\144\061\036\060\034\006\003
\125\004\003\023\025\121\165\157\126\141\144\151\163\040\122\157
\157\164\040\103\101\040\063\040\107\063
END
CKA_ID UTF8 "0"
CKA_ISSUER MULTILINE_OCTAL
\060\110\061\013\060\011\006\003\125\004\006\023\002\102\115\061
\031\060\027\006\003\125\004\012\023\020\121\165\157\126\141\144
\151\163\040\114\151\155\151\164\145\144\061\036\060\034\006\003
\125\004\003\023\025\121\165\157\126\141\144\151\163\040\122\157
\157\164\040\103\101\040\063\040\107\063
END
CKA_SERIAL_NUMBER
MULTILINE_OCTAL
\002\024\056\365\233\002\050\247\333\172\377\325\243\251\356\275
\003\240\317\022\152\035
END
CKA_VALUE MULTILINE_OCTAL
\060\202\005\140\060\202\003\110\240\003\002\001\002\002\024\056
\365\233\002\050\247\333\172\377\325\243\251\356\275\003\240\317
\022\152\035\060\015\006\011\052\206\110\206\367\015\001\001\013
\005\000\060\110\061\013\060\011\006\003\125\004\006\023\002\102
\115\061\031\060\027\006\003\125\004\012\023\020\121\165\157\126
\141\144\151\163\040\114\151\155\151\164\145\144\061\036\060\034
\006\003\125\004\003\023\025\121\165\157\126\141\144\151\163\040
\122\157\157\164\040\103\101\040\063\040\107\063\060\036\027\015
\061\062\060\061\061\062\062\060\062\066\063\062\132\027\015\064
\062\060\061\061\062\062\060\062\066\063\062\132\060\110\061\013
\060\011\006\003\125\004\006\023\002\102\115\061\031\060\027\006
\003\125\004\012\023\020\121\165\157\126\141\144\151\163\040\114
\151\155\151\164\145\144\061\036\060\034\006\003\125\004\003\023
\025\121\165\157\126\141\144\151\163\040\122\157\157\164\040\103
\101\040\063\040\107\063\060\202\002\042\060\015\006\011\052\206

\110\206\367\015\001\001\001\005\000\003\202\002\017\000\060\202
\002\012\002\202\002\001\000\263\313\016\020\147\216\352\024\227
\247\062\052\012\126\066\177\150\114\307\263\157\072\043\024\221
\377\031\177\245\312\254\356\263\166\235\172\351\213\033\253\153
\061\333\372\013\123\114\257\305\245\032\171\074\212\114\377\254
\337\045\336\116\331\202\062\013\104\336\312\333\214\254\243\156
\026\203\073\246\144\113\062\211\373\026\026\070\176\353\103\342
\323\164\112\302\142\012\163\012\335\111\263\127\322\260\012\205
\235\161\074\336\243\313\300\062\363\001\071\040\103\033\065\321
\123\263\261\356\305\223\151\202\076\026\265\050\106\241\336\352
\211\011\355\103\270\005\106\212\206\365\131\107\276\033\157\001
\041\020\271\375\251\322\050\312\020\071\011\312\023\066\317\234
\255\255\100\164\171\053\002\077\064\377\372\040\151\175\323\356
\141\365\272\263\347\060\320\067\043\206\162\141\105\051\110\131
\150\157\167\246\056\201\276\007\115\157\257\316\304\105\023\221
\024\160\006\217\037\237\370\207\151\261\016\357\303\211\031\353
\352\034\141\374\172\154\212\334\326\003\013\236\046\272\022\335
\324\124\071\253\046\243\063\352\165\201\332\055\315\017\117\344
\003\321\357\025\227\033\153\220\305\002\220\223\146\002\041\261
\107\336\213\232\112\200\271\125\217\265\242\057\300\326\063\147
\332\176\304\247\264\004\104\353\107\373\346\130\271\367\014\360
\173\053\261\300\160\051\303\100\142\055\073\110\151\334\043\074
\110\353\173\011\171\251\155\332\250\060\230\317\200\162\003\210
\246\133\106\256\162\171\174\010\003\041\145\256\267\341\034\245
\261\052\242\061\336\146\004\367\300\164\350\161\336\377\075\131
\314\226\046\022\213\205\225\127\032\253\153\165\013\104\075\021
\050\074\173\141\267\342\217\147\117\345\354\074\114\140\200\151
\127\070\036\001\133\215\125\350\307\337\300\314\167\043\064\111
\165\174\366\230\021\353\055\336\355\101\056\024\005\002\177\340
\376\040\353\065\347\021\254\042\316\127\075\336\311\060\155\020
\003\205\315\361\377\214\026\265\301\262\076\210\154\140\177\220
\117\225\367\366\055\255\001\071\007\004\372\165\200\175\277\111
\120\355\357\311\304\174\034\353\200\176\333\266\320\335\023\376
\311\323\234\327\262\227\251\002\003\001\000\001\243\102\060\100
\060\017\006\003\125\035\023\001\001\377\004\005\060\003\001\001
\377\060\016\006\003\125\035\017\001\001\377\004\004\003\002\001
\006\060\035\006\003\125\035\016\004\026\004\024\306\027\320\274
\250\352\002\103\362\033\006\231\135\053\220\040\271\327\234\344
\060\015\006\011\052\206\110\206\367\015\001\001\013\005\000\003
\202\002\001\000\064\141\331\126\265\022\207\125\115\335\243\065
\061\106\273\244\007\162\274\137\141\142\350\245\373\013\067\261
\074\266\263\372\051\235\177\002\365\244\311\250\223\267\172\161
\050\151\217\163\341\122\220\332\325\276\072\345\267\166\152\126
\200\041\337\135\346\351\072\236\345\076\366\242\151\307\052\012
\260\030\107\334\040\160\175\122\243\076\131\174\301\272\311\310
\025\100\141\312\162\326\160\254\322\267\360\034\344\206\051\360
\316\357\150\143\320\265\040\212\025\141\232\176\206\230\264\311
\302\166\373\314\272\060\026\314\243\141\306\164\023\345\153\357

\243\025\352\003\376\023\213\144\344\323\301\322\350\204\373\111
\321\020\115\171\146\353\252\375\364\215\061\036\160\024\255\334
\336\147\023\114\201\025\141\274\267\331\221\167\161\031\201\140
\273\360\130\245\265\234\013\367\217\042\125\047\300\113\001\155
\073\231\015\324\035\233\143\147\057\320\356\015\312\146\274\224
\117\246\255\355\374\356\143\254\127\077\145\045\317\262\206\217
\320\010\377\270\166\024\156\336\345\047\354\253\170\265\123\271
\266\077\350\040\371\322\250\276\141\106\312\207\214\204\363\371
\361\240\150\233\042\036\201\046\233\020\004\221\161\300\006\037
\334\240\323\271\126\247\343\230\055\177\203\235\337\214\053\234
\062\216\062\224\360\001\074\042\052\237\103\302\056\303\230\071
\007\070\173\374\136\000\102\037\363\062\046\171\203\204\366\345
\360\301\121\022\300\013\036\004\043\014\124\245\114\057\111\305
\112\321\266\156\140\015\153\374\153\213\205\044\144\267\211\016
\253\045\107\133\074\317\176\111\275\307\351\012\306\332\367\176
\016\027\010\323\110\227\320\161\222\360\017\071\076\064\152\034
\175\330\362\042\256\273\151\364\063\264\246\110\125\321\017\016
\046\350\354\266\013\055\247\205\065\315\375\131\310\237\321\315
\076\132\051\064\271\075\204\316\261\145\324\131\221\221\126\165
\041\301\167\236\371\172\341\140\235\323\255\004\030\364\174\353
\136\223\217\123\112\042\051\370\110\053\076\115\206\254\133\177
\313\006\231\131\140\330\130\145\225\215\104\321\367\177\176\047
\177\175\256\200\365\007\114\266\076\234\161\124\231\004\113\375
\130\371\230\364

END

CKA_NSS_Mozilla_CA_POLICY

CK_BBOOL CK_TRUE

CKA_NSS_SERVER_DISTRUST_AFTER CK_BBOOL CK_FALSE

CKA_NSS_EMAIL_DISTRUST_AFTER CK_BBOOL CK_FALSE

Trust for "QuoVadis Root CA 3 G3"

Issuer: CN=QuoVadis Root CA 3 G3,O=QuoVadis Limited,C=BM

Serial Number:2e:f5:9b:02:28:a7:db:7a:ff:d5:a3:a9:ee:bd:03:a0:cf:12:6a:1d

Subject: CN=QuoVadis Root CA 3 G3,O=QuoVadis Limited,C=BM

Not Valid Before: Thu Jan 12 20:26:32 2012

Not Valid After : Sun Jan 12 20:26:32 2042

Fingerprint (SHA-256):

88:EF:81:DE:20:2E:B0:18:45:2E:43:F8:64:72:5C:EA:5F:BD:1F:C2:D9:D2:05:73:07:09:C5:D8:B8:69:0F:46

Fingerprint (SHA1): 48:12:BD:92:3C:A8:C4:39:06:E7:30:6D:27:96:E6:A4:CF:22:2E:7D

CKA_CLASS CK_OBJECT_CLASS CKO_NSS_TRUST

CKA_TOKEN CK_BBOOL CK_TRUE

CKA_PRIVATE CK_BBOOL CK_FALSE

CKA_MODIFIABLE CK_BBOOL CK_FALSE

CKA_LABEL UTF8 "QuoVadis Root CA 3 G3"

CKA_CERT_SHA1_HASH MULTILINE_OCTAL

\110\022\275\222\074\250\304\071\006\347\060\155\047\226\346\244
\317\042\056\175

END

```

CKA_CERT_MD5_HASH
MULTILINE_OCTAL
\337\175\271\255\124\157\150\241\337\211\127\003\227\103\260\327
END
CKA_ISSUER MULTILINE_OCTAL
\060\110\061\013\060\011\006\003\125\004\006\023\002\102\115\061
\031\060\027\006\003\125\004\012\023\020\121\165\157\126\141\144
\151\163\040\114\151\155\151\164\145\144\061\036\060\034\006\003
\125\004\003\023\025\121\165\157\126\141\144\151\163\040\122\157
\157\164\040\103\101\040\063\040\107\063
END
CKA_SERIAL_NUMBER MULTILINE_OCTAL
\002\024\056\365\233\002\050\247\333\172\377\325\243\251\356\275
\003\240\317\022\152\035
END
CKA_TRUST_SERVER_AUTH CK_TRUST CKT_NSS_TRUSTED_DELEGATOR
CKA_TRUST_EMAIL_PROTECTION CK_TRUST CKT_NSS_TRUSTED_DELEGATOR
CKA_TRUST_CODE_SIGNING CK_TRUST CKT_NSS_MUST_VERIFY_TRUST
CKA_TRUST_STEP_UP_APPROVED CK_BBOOL CK_FALSE

#
# Certificate "DigiCert Assured ID Root G2"
#
# Issuer: CN=DigiCert Assured ID Root G2,OU=www.digicert.com,O=DigiCert Inc,C=US
# Serial Number:0b:93:1c:3a:d6:39:67:ea:67:23:bf:c3:af:9a:f4:4b
# Subject:
  CN=DigiCert Assured ID Root G2,OU=www.digicert.com,O=DigiCert Inc,C=US
# Not Valid Before: Thu Aug 01 12:00:00 2013
# Not Valid After : Fri Jan 15 12:00:00 2038
# Fingerprint (SHA-256):
7D:05:EB:B6:82:33:9F:8C:94:51:EE:09:4E:EB:FE:FA:79:53:A1:14:ED:B2:F4:49:49:45:2F:AB:7D:2F:C1:85
# Fingerprint (SHA1): A1:4B:48:D9:43:EE:0A:0E:40:90:4F:3C:E0:A4:C0:91:93:51:5D:3F
CKA_CLASS CK_OBJECT_CLASS CKO_CERTIFICATE
CKA_TOKEN CK_BBOOL CK_TRUE
CKA_PRIVATE CK_BBOOL CK_FALSE
CKA_MODIFIABLE CK_BBOOL CK_FALSE
CKA_LABEL UTF8 "DigiCert Assured ID Root G2"
CKA_CERTIFICATE_TYPE CK_CERTIFICATE_TYPE CKC_X_509
CKA_SUBJECT MULTILINE_OCTAL
\060\145\061\013\060\011\006\003\125\004\006\023\002\125\123\061
\025\060\023\006\003\125\004\012\023\014\104\151\147\151\103\145
\162\164\040\111\156\143\061\031\060\027\006\003\125\004\013\023
\020\167\167\167\056\144\151\147\151\143\145\162\164\056\143\157
\155\061\044\060\042\006\003\125\004\003\023\033\104\151\147\151
\103\145\162\164\040\101\163\163\165\162\145\144\040\111\104\040
\122\157\157\164\040\107\062
END
CKA_ID

```

UTF8 "0"

CKA_ISSUER MULTILINE_OCTAL

\060\145\061\013\060\011\006\003\125\004\006\023\002\125\123\061
\025\060\023\006\003\125\004\012\023\014\104\151\147\151\103\145
\162\164\040\111\156\143\061\031\060\027\006\003\125\004\013\023
\020\167\167\167\056\144\151\147\151\143\145\162\164\056\143\157
\155\061\044\060\042\006\003\125\004\003\023\033\104\151\147\151
\103\145\162\164\040\101\163\163\165\162\145\144\040\111\104\040
\122\157\157\164\040\107\062

END

CKA_SERIAL_NUMBER MULTILINE_OCTAL

\002\020\013\223\034\072\326\071\147\352\147\043\277\303\257\232
\364\113

END

CKA_VALUE MULTILINE_OCTAL

\060\202\003\226\060\202\002\176\240\003\002\001\002\002\020\013
\223\034\072\326\071\147\352\147\043\277\303\257\232\364\113\060
\015\006\011\052\206\110\206\367\015\001\001\013\005\000\060\145
\061\013\060\011\006\003\125\004\006\023\002\125\123\061\025\060
\023\006\003\125\004\012\023\014\104\151\147\151\103\145\162\164
\040\111\156\143\061\031\060\027\006\003\125\004\013\023\020\167
\167\167\056\144\151\147\151\143\145\162\164\056\143\157\155\061
\044\060\042\006\003\125\004\003\023\033\104\151\147\151\103\145
\162\164\040\101\163\163\165\162\145\144\040\111\104\040\122\157
\157\164\040\107\062\060\036\027\015\061\063\060\070\060\061\061
\062\060\060\060\060\132\027\015\063\070\060\061\061\065\061\062
\060\060\060\060\132\060\145\061\013\060\011\006\003\125\004\006
\023\002\125\123\061\025\060\023\006\003\125\004\012\023\014\104
\151\147\151\103\145\162\164\040\111\156\143\061\031\060\027\006
\003\125\004\013\023\020\167\167\167\056\144\151\147\151\143\145
\162\164\056\143\157\155\061\044\060\042\006\003\125\004\003\023
\033\104\151\147\151\103\145\162\164\040\101\163\163\165\162\145
\144\040\111\104\040\122\157\157\164\040\107\062\060\202\001\042
\060\015\006\011\052\206\110\206\367\015\001\001\001\005\000\003
\202\001\017\000\060\202\001\012\002\202\001\001\000\331\347\050
\057\122\077\066\162\111\210\223\064\363\370\152\036\061\124\200
\237\255\124\101\265\107\337\226\250\324\257\200\055\271\012\317
\165\375\211\245\175\044\372\343\042\014\053\274\225\027\013\063
\277\031\115\101\006\220\000\275\014\115\020\376\007\265\347\034
\156\042\125\061\145\227\275\323\027\322\036\142\363\333\352\154
\120\214\077\204\014\226\317\267\313\003\340\312\155\241\024\114
\033\211\335\355\000\260\122\174\257\221\154\261\070\023\321\351
\022\010\300\000\260\034\053\021\332\167\160\066\233\256\316\171
\207\334\202\160\346\011\164\160\125\151\257\243\150\237\277\335
\266\171\263\362\235\160\051\125\364\253\377\225\141\363\311\100
\157\035\321\276\223\273\323\210\052\273\235\277\162\132\126\161
\073\077\324\363\321\012\376\050\357\243\356\331\231\257\003\323
\217\140\267\362\222\241\261\275\211\211\037\060\315\303\246\056

\142\063\256\026\002\167\104\132\347\201\012\074\247\104\056\171
\270\077\004\274\134\240\207\341\033\257\121\216\315\354\054\372
\370\376\155\360\072\174\252\213\344\147\225\061\215\002\003\001
\000\001\243\102\060\100\060\017\006\003\125\035\023\001\001\377
\004\005\060\003\001\001\377\060\016\006\003\125\035\017\001\001
\377\004\004\003\002\001\206\060\035\006\003\125\035\016\004\026
\004\024\316\303\112\271\231\125\362\270\333\140\277\251\176\275
\126\265\227\066\247\326\060\015\006\011\052\206\110\206\367\015
\001\001\013\005\000\003\202\001\001\000\312\245\125\214\343\310
\101\156\151\047\247\165\021\357\074\206\066\157\322\235\306\170
\070\035\151\226\242\222\151\056\070\154\233\175\004\324\211\245
\261\061\067\212\311\041\314\253\154\315\213\034\232\326\277\110
\322\062\146\301\212\300\363\057\072\357\300\343\324\221\206\321
\120\343\003\333\163\167\157\112\071\123\355\336\046\307\265\175
\257\053\102\321\165\142\343\112\053\002\307\120\113\340\151\342
\226\154\016\104\146\020\104\217\255\005\353\370\171\254\246\033
\350\067\064\235\123\311\141\252\242\122\257\112\160\026\206\302
\072\310\261\023\160\066\330\317\356\364\012\064\325\133\114\375
\007\234\242\272\331\001\162\134\363\115\301\335\016\261\034\015
\304\143\276\255\364\024\373\211\354\242\101\016\114\314\310\127
\100\320\156\003\252\315\014\216\211\231\231\154\360\074\060\257
\070\337\157\274\243\276\051\040\047\253\164\377\023\042\170\336
\227\122\125\036\203\265\124\040\003\356\256\300\117\126\336\067
\314\303\177\252\004\047\273\323\167\270\142\333\027\174\234\050
\042\023\163\154\317\046\365\212\051\347

END

CKA_NSS_MOZILLA_CA_POLICY

CK_BBOOL CK_TRUE

CKA_NSS_SERVER_DISTRUST_AFTER CK_BBOOL CK_FALSE

CKA_NSS_EMAIL_DISTRUST_AFTER CK_BBOOL CK_FALSE

Trust for "DigiCert Assured ID Root G2"

Issuer: CN=DigiCert Assured ID Root G2,OU=www.digicert.com,O=DigiCert Inc,C=US

Serial Number:0b:93:1c:3a:d6:39:67:ea:67:23:bf:c3:af:9a:f4:4b

Subject: CN=DigiCert Assured ID Root G2,OU=www.digicert.com,O=DigiCert Inc,C=US

Not Valid Before: Thu Aug 01 12:00:00 2013

Not Valid After : Fri Jan 15 12:00:00 2038

Fingerprint (SHA-256):

7D:05:EB:B6:82:33:9F:8C:94:51:EE:09:4E:EB:FE:FA:79:53:A1:14:ED:B2:F4:49:49:45:2F:AB:7D:2F:C1:85

#

Fingerprint (SHA1): A1:4B:48:D9:43:EE:0A:0E:40:90:4F:3C:E0:A4:C0:91:93:51:5D:3F

CKA_CLASS CK_OBJECT_CLASS CKO_NSS_TRUST

CKA_TOKEN CK_BBOOL CK_TRUE

CKA_PRIVATE CK_BBOOL CK_FALSE

CKA_MODIFIABLE CK_BBOOL CK_FALSE

CKA_LABEL UTF8 "DigiCert Assured ID Root G2"

CKA_CERT_SHA1_HASH MULTILINE_OCTAL

\241\113\110\331\103\356\012\016\100\220\117\074\340\244\300\221

```

\223\121\135\077
END
CKA_CERT_MD5_HASH MULTILINE_OCTAL
\222\070\271\370\143\044\202\145\054\127\063\346\376\201\217\235
END
CKA_ISSUER MULTILINE_OCTAL
\060\145\061\013\060\011\006\003\125\004\006\023\002\125\123\061
\025\060\023\006\003\125\004\012\023\014\104\151\147\151\103\145
\162\164\040\111\156\143\061\031\060\027\006\003\125\004\013\023
\020\167\167\167\056\144\151\147\151\143\145\162\164\056\143\157
\155\061\044\060\042\006\003\125\004\003\023\033\104\151\147\151
\103\145\162\164\040\101\163\163\165\162\145\144\040\111\104\040
\122\157\157\164\040\107\062
END
CKA_SERIAL_NUMBER MULTILINE_OCTAL
\002\020\013\223\034\072\326\071\147\352\147\043\277\303\257\232
\364\113
END
CKA_TRUST_SERVER_AUTH
CK_TRUST CKT_NSS_TRUSTED_DELEGATOR
CKA_TRUST_EMAIL_PROTECTION CK_TRUST CKT_NSS_TRUSTED_DELEGATOR
CKA_TRUST_CODE_SIGNING CK_TRUST CKT_NSS_MUST_VERIFY_TRUST
CKA_TRUST_STEP_UP_APPROVED CK_BBOOL CK_FALSE

#
# Certificate "DigiCert Assured ID Root G3"
#
# Issuer: CN=DigiCert Assured ID Root G3,OU=www.digicert.com,O=DigiCert Inc,C=US
# Serial Number:0b:a1:5a:fa:1d:df:a0:b5:49:44:af:cd:24:a0:6c:ec
# Subject: CN=DigiCert Assured ID Root G3,OU=www.digicert.com,O=DigiCert Inc,C=US
# Not Valid Before: Thu Aug 01 12:00:00 2013
# Not Valid After : Fri Jan 15 12:00:00 2038
# Fingerprint (SHA-256):
7E:37:CB:8B:4C:47:09:0C:AB:36:55:1B:A6:F4:5D:B8:40:68:0F:BA:16:6A:95:2D:B1:00:71:7F:43:05:3F:C2
# Fingerprint (SHA1): F5:17:A2:4F:9A:48:C6:C9:F8:A2:00:26:9F:DC:0F:48:2C:AB:30:89
CKA_CLASS CK_OBJECT_CLASS CKO_CERTIFICATE
CKA_TOKEN CK_BBOOL CK_TRUE
CKA_PRIVATE CK_BBOOL CK_FALSE
CKA_MODIFIABLE CK_BBOOL CK_FALSE
CKA_LABEL
UTF8 "DigiCert Assured ID Root G3"
CKA_CERTIFICATE_TYPE CK_CERTIFICATE_TYPE CKC_X_509
CKA_SUBJECT MULTILINE_OCTAL
\060\145\061\013\060\011\006\003\125\004\006\023\002\125\123\061
\025\060\023\006\003\125\004\012\023\014\104\151\147\151\103\145
\162\164\040\111\156\143\061\031\060\027\006\003\125\004\013\023
\020\167\167\167\056\144\151\147\151\143\145\162\164\056\143\157
\155\061\044\060\042\006\003\125\004\003\023\033\104\151\147\151

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\103\145\162\164\040\101\163\163\165\162\145\144\040\111\104\040
\122\157\157\164\040\107\063
END
CKA_ID UTF8 ""
CKA_ISSUER MULTILINE_OCTAL
\060\145\061\013\060\011\006\003\125\004\006\023\002\125\123\061
\025\060\023\006\003\125\004\012\023\014\104\151\147\151\103\145
\162\164\040\111\156\143\061\031\060\027\006\003\125\004\013\023
\020\167\167\167\056\144\151\147\151\143\145\162\164\056\143\157
\155\061\044\060\042\006\003\125\004\003\023\033\104\151\147\151
\103\145\162\164\040\101\163\163\165\162\145\144\040\111\104\040
\122\157\157\164\040\107\063
END
CKA_SERIAL_NUMBER
MULTILINE_OCTAL
\002\020\013\241\132\372\035\337\240\265\111\104\257\315\044\240
\154\354
END
CKA_VALUE MULTILINE_OCTAL
\060\202\002\106\060\202\001\315\240\003\002\001\002\002\020\013
\241\132\372\035\337\240\265\111\104\257\315\044\240\154\354\060
\012\006\010\052\206\110\316\075\004\003\003\060\145\061\013\060
\011\006\003\125\004\006\023\002\125\123\061\025\060\023\006\003
\125\004\012\023\014\104\151\147\151\103\145\162\164\040\111\156
\143\061\031\060\027\006\003\125\004\013\023\020\167\167\167\056
\144\151\147\151\143\145\162\164\056\143\157\155\061\044\060\042
\006\003\125\004\003\023\033\104\151\147\151\103\145\162\164\040
\101\163\163\165\162\145\144\040\111\104\040\122\157\157\164\040
\107\063\060\036\027\015\061\063\060\070\060\061\061\062\060\060
\060\060\132\027\015\063\070\060\061\061\065\061\062\060\060\060
\060\132\060\145\061\013\060\011\006\003\125\004\006\023\002\125
\123\061\025\060\023\006\003\125\004\012\023\014\104\151\147\151
\103\145\162\164\040\111\156\143\061\031\060\027\006\003\125\004
\013\023\020\167\167\167\056\144\151\147\151\143\145\162\164\056
\143\157\155\061\044\060\042\006\003\125\004\003\023\033\104\151
\147\151\103\145\162\164\040\101\163\163\165\162\145\144\040\111
\104\040\122\157\157\164\040\107\063\060\166\060\020\006\007\052
\206\110\316\075\002\001\006\005\053\201\004\000\042\003\142\000
\004\031\347\274\254\104\145\355\315\270\077\130\373\215\261\127
\251\104\055\005\025\362\357\013\377\020\164\237\265\142\122\137
\146\176\037\345\334\033\105\171\013\314\306\123\012\235\215\135
\002\331\251\131\336\002\132\366\225\052\016\215\070\112\212\111
\306\274\306\003\070\007\137\125\332\176\011\156\342\177\136\320
\105\040\017\131\166\020\326\240\044\360\055\336\066\362\154\051
\071\243\102\060\100\060\017\006\003\125\035\023\001\001\377\004
\005\060\003\001\001\377\060\016\006\003\125\035\017\001\001\377
\004\004\003\002\001\206\060\035\006\003\125\035\016\004\026\004
\024\313\320\275\251\341\230\005\121\241\115\067\242\203\171\316

```
\215\035\052\344\204\060\012\006\010\052\206\110\316\075\004\003
\003\003\147\000\060\144\002\060\045\244\201\105\002\153\022\113
\165\164\117\310\043\343\160\362\165\162\336\174\211\360\317\221
\162\141\236\136\020\222\131\126\271\203\307\020\347\070\351\130
\046\066\175\325\344\064\206\071\002\060\174\066\123\360\060\345
\142\143\072\231\342\266\243\073\233\064\372\036\332\020\222\161
\136\221\023\247\335\244\156\222\314\062\326\365\041\146\307\057
\352\226\143\152\145\105\222\225\001\264
```

END

CKA_NSS_Mozilla_CA_POLICY

CK_BBOOL CK_TRUE

CKA_NSS_SERVER_DISTRUST_AFTER CK_BBOOL CK_FALSE

CKA_NSS_EMAIL_DISTRUST_AFTER CK_BBOOL CK_FALSE

Trust for "DigiCert Assured ID Root G3"

Issuer: CN=DigiCert Assured ID Root G3,OU=www.digicert.com,O=DigiCert Inc,C=US

Serial Number:0b:a1:5a:fa:1d:df:a0:b5:49:44:af:cd:24:a0:6c:ec

Subject: CN=DigiCert Assured ID Root G3,OU=www.digicert.com,O=DigiCert Inc,C=US

Not Valid Before: Thu Aug 01 12:00:00 2013

Not Valid After : Fri

Jan 15 12:00:00 2038

Fingerprint (SHA-256):

7E:37:CB:8B:4C:47:09:0C:AB:36:55:1B:A6:F4:5D:B8:40:68:0F:BA:16:6A:95:2D:B1:00:71:7F:43:05:3F:C2

Fingerprint (SHA1): F5:17:A2:4F:9A:48:C6:C9:F8:A2:00:26:9F:DC:0F:48:2C:AB:30:89

CKA_CLASS CK_OBJECT_CLASS CKO_NSS_TRUST

CKA_TOKEN CK_BBOOL CK_TRUE

CKA_PRIVATE CK_BBOOL CK_FALSE

CKA_MODIFIABLE CK_BBOOL CK_FALSE

CKA_LABEL UTF8 "DigiCert Assured ID Root G3"

CKA_CERT_SHA1_HASH MULTILINE_OCTAL

```
\365\027\242\117\232\110\306\311\370\242\000\046\237\334\017\110
\054\253\060\211
```

END

CKA_CERT_MD5_HASH MULTILINE_OCTAL

```
\174\177\145\061\014\201\337\215\272\076\231\342\134\255\156\373
```

END

CKA_ISSUER MULTILINE_OCTAL

```
\060\145\061\013\060\011\006\003\125\004\006\023\002\125\123\061
\025\060\023\006\003\125\004\012\023\014\104\151\147\151\103\145
\162\164\040\111\156\143\061\031\060\027\006\003\125\004\013\023
\020\167\167\167\056\144\151\147\151\143\145\162\164\056\143\157
\155\061\044\060\042\006\003\125\004\003\023\033\104\151\147\151
\103\145\162\164\040\101\163\163\165\162\145\144\040\111\104\040
\122\157\157\164\040\107\063
```

END

CKA_SERIAL_NUMBER

MULTILINE_OCTAL

```
\002\020\013\241\132\372\035\337\240\265\111\104\257\315\044\240
```

```

\154\354
END
CKA_TRUST_SERVER_AUTH CK_TRUST CKT_NSS_TRUSTED_DELEGATOR
CKA_TRUST_EMAIL_PROTECTION CK_TRUST CKT_NSS_TRUSTED_DELEGATOR
CKA_TRUST_CODE_SIGNING CK_TRUST CKT_NSS_MUST_VERIFY_TRUST
CKA_TRUST_STEP_UP_APPROVED CK_BBOOL CK_FALSE

#
# Certificate "DigiCert Global Root G2"
#
# Issuer: CN=DigiCert Global Root G2,OU=www.digicert.com,O=DigiCert Inc,C=US
# Serial Number:03:3a:f1:e6:a7:11:a9:a0:bb:28:64:b1:1d:09:fa:e5
# Subject: CN=DigiCert Global Root G2,OU=www.digicert.com,O=DigiCert Inc,C=US
# Not Valid Before: Thu Aug 01 12:00:00 2013
# Not Valid After : Fri Jan 15 12:00:00 2038
# Fingerprint (SHA-256):
CB:3C:CB:B7:60:31:E5:E0:13:8F:8D:D3:9A:23:F9:DE:47:FF:C3:5E:43:C1:14:4C:EA:27:D4:6A:5A:B1:CB:5F
# Fingerprint (SHA1): DF:3C:24:F9:BF:D6:66:76:1B:26:80:73:FE:06:D1:CC:8D:4F:82:A4
CKA_CLASS CK_OBJECT_CLASS CKO_CERTIFICATE
CKA_TOKEN
CK_BBOOL CK_TRUE
CKA_PRIVATE CK_BBOOL CK_FALSE
CKA_MODIFIABLE CK_BBOOL CK_FALSE
CKA_LABEL UTF8 "DigiCert Global Root G2"
CKA_CERTIFICATE_TYPE CK_CERTIFICATE_TYPE CKC_X_509
CKA_SUBJECT MULTILINE_OCTAL
\060\141\061\013\060\011\006\003\125\004\006\023\002\125\123\061
\025\060\023\006\003\125\004\012\023\014\104\151\147\151\103\145
\162\164\040\111\156\143\061\031\060\027\006\003\125\004\013\023
\020\167\167\167\056\144\151\147\151\143\145\162\164\056\143\157
\155\061\040\060\036\006\003\125\004\003\023\027\104\151\147\151
\103\145\162\164\040\107\154\157\142\141\154\040\122\157\157\164
\040\107\062
END
CKA_ID UTF8 "0"
CKA_ISSUER MULTILINE_OCTAL
\060\141\061\013\060\011\006\003\125\004\006\023\002\125\123\061
\025\060\023\006\003\125\004\012\023\014\104\151\147\151\103\145
\162\164\040\111\156\143\061\031\060\027\006\003\125\004\013\023
\020\167\167\167\056\144\151\147\151\143\145\162\164\056\143\157
\155\061\040\060\036\006\003\125\004\003\023\027\104\151\147\151
\103\145\162\164\040\107\154\157\142\141\154\040\122\157\157\164
\040\107\062
END
CKA_SERIAL_NUMBER
MULTILINE_OCTAL
\002\020\003\072\361\346\247\021\251\240\273\050\144\261\035\011
\372\345

```

END

CKA_VALUE MULTILINE_OCTAL

\060\202\003\216\060\202\002\166\240\003\002\001\002\002\020\003
\072\361\346\247\021\251\240\273\050\144\261\035\011\372\345\060
\015\006\011\052\206\110\206\367\015\001\001\013\005\000\060\141
\061\013\060\011\006\003\125\004\006\023\002\125\123\061\025\060
\023\006\003\125\004\012\023\014\104\151\147\151\103\145\162\164
\040\111\156\143\061\031\060\027\006\003\125\004\013\023\020\167
\167\167\056\144\151\147\151\143\145\162\164\056\143\157\155\061
\040\060\036\006\003\125\004\003\023\027\104\151\147\151\103\145
\162\164\040\107\154\157\142\141\154\040\122\157\157\164\040\107
\062\060\036\027\015\061\063\060\070\060\061\061\062\060\060\060
\060\132\027\015\063\070\060\061\061\065\061\062\060\060\060\060
\132\060\141\061\013\060\011\006\003\125\004\006\023\002\125\123
\061\025\060\023\006\003\125\004\012\023\014\104\151\147\151\103
\145\162\164\040\111\156\143\061\031\060\027\006\003\125\004\013
\023\020\167\167\167\056\144\151\147\151\143\145\162\164\056\143
\157\155\061\040\060\036\006\003\125\004\003\023\027\104\151\147
\151\103\145\162\164\040\107\154\157\142\141\154\040\122\157\157
\164\040\107\062\060\202\001\042\060\015\006\011\052\206\110\206
\367\015\001\001\001\005\000\003\202\001\017\000\060\202\001\012
\002\202\001\001\000\273\067\315\064\334\173\153\311\262\150\220
\255\112\165\377\106\272\041\012\010\215\365\031\124\311\373\210
\333\363\256\362\072\211\221\074\172\346\253\006\032\153\317\254
\055\350\136\011\044\104\272\142\232\176\326\243\250\176\340\124
\165\040\005\254\120\267\234\143\032\154\060\334\332\037\031\261
\327\036\336\375\327\340\313\224\203\067\256\354\037\103\116\335
\173\054\322\275\056\245\057\344\251\270\255\072\324\231\244\266
\045\351\233\153\000\140\222\140\377\117\041\111\030\367\147\220
\253\141\006\234\217\362\272\351\264\351\222\062\153\265\363\127
\350\135\033\315\214\035\253\225\004\225\111\363\065\055\226\343
\111\155\335\167\343\373\111\113\264\254\125\007\251\217\225\263
\264\043\273\114\155\105\360\366\251\262\225\060\264\375\114\125
\214\047\112\127\024\174\202\235\315\163\222\323\026\112\006\014
\214\120\321\217\036\011\276\027\241\346\041\312\375\203\345\020
\274\203\245\012\304\147\050\366\163\024\024\075\106\166\303\207
\024\211\041\064\115\257\017\105\014\246\111\241\272\273\234\305
\261\063\203\051\205\002\003\001\000\001\243\102\060\100\060\017
\006\003\125\035\023\001\001\377\004\005\060\003\001\001\377\060
\016\006\003\125\035\017\001\001\377\004\004\003\002\001\206\060
\035\006\003\125\035\016\004\026\004\024\116\042\124\040\030\225
\346\343\156\346\017\372\372\271\022\355\006\027\217\071\060\015
\006\011\052\206\110\206\367\015\001\001\013\005\000\003\202\001
\001\000\140\147\050\224\157\016\110\143\353\061\335\352\147\030
\325\211\175\074\305\213\112\177\351\276\333\053\027\337\260\137
\163\167\052\062\023\071\201\147\102\204\043\362\105\147\065\354
\210\277\370\217\260\141\014\064\244\256\040\114\204\306\333\370
\065\341\166\331\337\246\102\273\307\104\010\206\177\066\164\044

\132\332\154\015\024\131\065\275\362\111\335\266\037\311\263\015
\107\052\075\231\057\273\134\273\265\324\040\341\231\137\123\106
\025\333\150\233\360\363\060\325\076\061\342\215\204\236\343\212
\332\332\226\076\065\023\245\137\360\371\160\120\160\107\101\021
\127\031\116\300\217\256\006\304\225\023\027\057\033\045\237\165
\362\261\216\231\241\157\023\261\101\161\376\210\052\310\117\020
\040\125\327\363\024\105\345\340\104\364\352\207\225\062\223\016
\376\123\106\372\054\235\377\213\042\271\113\331\011\105\244\336
\244\270\232\130\335\033\175\122\237\216\131\103\210\201\244\236
\046\325\157\255\335\015\306\067\175\355\003\222\033\345\167\137
\166\356\074\215\304\135\126\133\242\331\146\156\263\065\067\345
\062\266

END

CKA_NSS_MOZILLA_CA_POLICY

CK_BBOOL CK_TRUE

CKA_NSS_SERVER_DISTRUST_AFTER

CK_BBOOL CK_FALSE

CKA_NSS_EMAIL_DISTRUST_AFTER CK_BBOOL CK_FALSE

Trust for "DigiCert Global Root G2"

Issuer: CN=DigiCert Global Root G2,OU=www.digicert.com,O=DigiCert Inc,C=US

Serial Number:03:3a:f1:e6:a7:11:a9:a0:bb:28:64:b1:1d:09:fa:e5

Subject: CN=DigiCert Global Root G2,OU=www.digicert.com,O=DigiCert Inc,C=US

Not Valid Before: Thu Aug 01 12:00:00 2013

Not Valid After : Fri Jan 15 12:00:00 2038

Fingerprint (SHA-256):

CB:3C:CB:B7:60:31:E5:E0:13:8F:8D:D3:9A:23:F9:DE:47:FF:C3:5E:43:C1:14:4C:EA:27:D4:6A:5A:B1:CB:5F

Fingerprint (SHA1): DF:3C:24:F9:BF:D6:66:76:1B:26:80:73:FE:06:D1:CC:8D:4F:82:A4

CKA_CLASS CK_OBJECT_CLASS CKO_NSS_TRUST

CKA_TOKEN CK_BBOOL CK_TRUE

CKA_PRIVATE CK_BBOOL CK_FALSE

CKA_MODIFIABLE CK_BBOOL CK_FALSE

CKA_LABEL UTF8 "DigiCert Global Root G2"

CKA_CERT_SHA1_HASH MULTILINE_OCTAL

\337\074\044\371\277\326\146\166\033\046\200\163\376\006\321\314
\215\117\202\244

END

CKA_CERT_MD5_HASH MULTILINE_OCTAL

\344\246\212\310\124\254\122\102\106\012\375\162\110\033\052\104
END

CKA_ISSUER

MULTILINE_OCTAL

\060\141\061\013\060\011\006\003\125\004\006\023\002\125\123\061
\025\060\023\006\003\125\004\012\023\014\104\151\147\151\103\145
\162\164\040\111\156\143\061\031\060\027\006\003\125\004\013\023
\020\167\167\167\056\144\151\147\151\143\145\162\164\056\143\157
\155\061\040\060\036\006\003\125\004\003\023\027\104\151\147\151
\103\145\162\164\040\107\154\157\142\141\154\040\122\157\157\164

```

\040\107\062
END
CKA_SERIAL_NUMBER MULTILINE_OCTAL
\002\020\003\072\361\346\247\021\251\240\273\050\144\261\035\011
\372\345
END
CKA_TRUST_SERVER_AUTH CK_TRUST CKT_NSS_TRUSTED_DELEGATOR
CKA_TRUST_EMAIL_PROTECTION CK_TRUST CKT_NSS_TRUSTED_DELEGATOR
CKA_TRUST_CODE_SIGNING CK_TRUST CKT_NSS_MUST_VERIFY_TRUST
CKA_TRUST_STEP_UP_APPROVED CK_BBOOL CK_FALSE

#
# Certificate "DigiCert Global Root G3"
#
# Issuer: CN=DigiCert Global Root G3,OU=www.digicert.com,O=DigiCert Inc,C=US
# Serial Number:05:55:56:bc:f2:5e:a4:35:35:c3:a4:0f:d5:ab:45:72
# Subject: CN=DigiCert Global
Root G3,OU=www.digicert.com,O=DigiCert Inc,C=US
# Not Valid Before: Thu Aug 01 12:00:00 2013
# Not Valid After : Fri Jan 15 12:00:00 2038
# Fingerprint (SHA-256):
31:AD:66:48:F8:10:41:38:C7:38:F3:9E:A4:32:01:33:39:3E:3A:18:CC:02:29:6E:F9:7C:2A:C9:EF:67:31:D0
# Fingerprint (SHA1): 7E:04:DE:89:6A:3E:66:6D:00:E6:87:D3:3F:FA:D9:3B:E8:3D:34:9E
CKA_CLASS CK_OBJECT_CLASS CKO_CERTIFICATE
CKA_TOKEN CK_BBOOL CK_TRUE
CKA_PRIVATE CK_BBOOL CK_FALSE
CKA_MODIFIABLE CK_BBOOL CK_FALSE
CKA_LABEL UTF8 "DigiCert Global Root G3"
CKA_CERTIFICATE_TYPE CK_CERTIFICATE_TYPE CKC_X_509
CKA_SUBJECT MULTILINE_OCTAL
\060\141\061\013\060\011\006\003\125\004\006\023\002\125\123\061
\025\060\023\006\003\125\004\012\023\014\104\151\147\151\103\145
\162\164\040\111\156\143\061\031\060\027\006\003\125\004\013\023
\020\167\167\167\056\144\151\147\151\143\145\162\164\056\143\157
\155\061\040\060\036\006\003\125\004\003\023\027\104\151\147\151
\103\145\162\164\040\107\154\157\142\141\154\040\122\157\157\164
\040\107\063
END
CKA_ID
UTF8 "0"
CKA_ISSUER MULTILINE_OCTAL
\060\141\061\013\060\011\006\003\125\004\006\023\002\125\123\061
\025\060\023\006\003\125\004\012\023\014\104\151\147\151\103\145
\162\164\040\111\156\143\061\031\060\027\006\003\125\004\013\023
\020\167\167\167\056\144\151\147\151\143\145\162\164\056\143\157
\155\061\040\060\036\006\003\125\004\003\023\027\104\151\147\151
\103\145\162\164\040\107\154\157\142\141\154\040\122\157\157\164
\040\107\063

```

END

CKA_SERIAL_NUMBER MULTILINE_OCTAL

\002\020\005\125\126\274\362\136\244\065\065\303\244\017\325\253
\105\162

END

CKA_VALUE MULTILINE_OCTAL

\060\202\002\077\060\202\001\305\240\003\002\001\002\002\020\005
\125\126\274\362\136\244\065\065\303\244\017\325\253\105\162\060
\012\006\010\052\206\110\316\075\004\003\003\060\141\061\013\060
\011\006\003\125\004\006\023\002\125\123\061\025\060\023\006\003
\125\004\012\023\014\104\151\147\151\103\145\162\164\040\111\156
\143\061\031\060\027\006\003\125\004\013\023\020\167\167\167\056
\144\151\147\151\143\145\162\164\056\143\157\155\061\040\060\036
\006\003\125\004\003\023\027\104\151\147\151\103\145\162\164\040
\107\154\157\142\141\154\040\122\157\157\164\040\107\063\060\036
\027\015\061\063\060\070\060\061\061\062\060\060\060\060\132\027
\015\063\070\060\061\061\065\061\062\060\060\060\060\132\060\141
\061\013\060\011\006\003\125\004\006\023\002\125\123\061\025\060
\023\006\003\125\004\012\023\014\104\151\147\151\103\145\162\164
\040\111\156\143\061\031\060\027\006\003\125\004\013\023\020\167
\167\167\056\144\151\147\151\143\145\162\164\056\143\157\155\061
\040\060\036\006\003\125\004\003\023\027\104\151\147\151\103\145
\162\164\040\107\154\157\142\141\154\040\122\157\157\164\040\107
\063\060\166\060\020\006\007\052\206\110\316\075\002\001\006\005
\053\201\004\000\042\003\142\000\004\335\247\331\273\212\270\013
\373\013\177\041\322\360\276\276\163\363\063\135\032\274\064\352
\336\306\233\274\320\225\366\360\314\320\013\272\141\133\121\106
\176\236\055\237\356\216\143\014\027\354\007\160\365\317\204\056
\100\203\234\350\077\101\155\073\255\323\244\024\131\066\170\235
\003\103\356\020\023\154\162\336\256\210\247\241\153\265\103\316
\147\334\043\377\003\034\243\342\076\243\102\060\100\060\017\006
\003\125\035\023\001\001\377\004\005\060\003\001\001\377\060\016
\006\003\125\035\017\001\001\377\004\004\003\002\001\206\060\035
\006\003\125\035\016\004\026\004\024\263\333\110\244\371\241\305
\330\256\066\101\314\021\143\151\142\051\274\113\306\060\012\006
\010\052\206\110\316\075\004\003\003\003\150\000\060\145\002\061
\000\255\274\362\154\077\022\112\321\055\071\303\012\011\227\163
\364\210\066\214\210\047\273\346\210\215\120\205\247\143\371\236
\062\336\146\223\017\361\314\261\011\217\335\154\253\372\153\177
\240\002\060\071\146\133\302\144\215\270\236\120\334\250\325\111
\242\355\307\334\321\111\177\027\001\270\310\206\217\116\214\210
\053\250\232\251\212\305\321\000\275\370\124\342\232\345\133\174
\263\047\027

END

CKA_NSS_MOZILLA_CA_POLICY

CK_BBOOL CK_TRUE

CKA_NSS_SERVER_DISTRUST_AFTER

```

CK_BBOOL CK_FALSE
CKA_NSS_EMAIL_DISTRICT_AFTER CK_BBOOL CK_FALSE

# Trust for "DigiCert Global Root G3"
# Issuer: CN=DigiCert Global Root G3,OU=www.digicert.com,O=DigiCert Inc,C=US
# Serial Number:05:55:56:bc:f2:5e:a4:35:35:c3:a4:0f:d5:ab:45:72
# Subject: CN=DigiCert Global Root G3,OU=www.digicert.com,O=DigiCert Inc,C=US
# Not Valid Before: Thu Aug 01 12:00:00 2013
# Not Valid After : Fri Jan 15 12:00:00 2038
# Fingerprint (SHA-256):
31:AD:66:48:F8:10:41:38:C7:38:F3:9E:A4:32:01:33:39:3E:3A:18:CC:02:29:6E:F9:7C:2A:C9:EF:67:31:D0
# Fingerprint (SHA1): 7E:04:DE:89:6A:3E:66:6D:00:E6:87:D3:3F:FA:D9:3B:E8:3D:34:9E
CKA_CLASS CK_OBJECT_CLASS CKO_NSS_TRUST
CKA_TOKEN CK_BBOOL CK_TRUE
CKA_PRIVATE CK_BBOOL CK_FALSE
CKA_MODIFIABLE CK_BBOOL CK_FALSE
CKA_LABEL UTF8 "DigiCert Global Root G3"
CKA_CERT_SHA1_HASH MULTILINE_OCTAL
\176\004\336\211\152\076\146\155\000\346\207\323\077\372\331\073
\350\075\064\236
END
CKA_CERT_MD5_HASH MULTILINE_OCTAL
\365\135\244\120\245\373\050\176\036\017\015\314\226\127\126\312
END
CKA_ISSUER
MULTILINE_OCTAL
\060\141\061\013\060\011\006\003\125\004\006\023\002\125\123\061
\025\060\023\006\003\125\004\012\023\014\104\151\147\151\103\145
\162\164\040\111\156\143\061\031\060\027\006\003\125\004\013\023
\020\167\167\167\056\144\151\147\151\143\145\162\164\056\143\157
\155\061\040\060\036\006\003\125\004\003\023\027\104\151\147\151
\103\145\162\164\040\107\154\157\142\141\154\040\122\157\157\164
\040\107\063
END
CKA_SERIAL_NUMBER MULTILINE_OCTAL
\002\020\005\125\126\274\362\136\244\065\065\303\244\017\325\253
\105\162
END
CKA_TRUST_SERVER_AUTH CK_TRUST CKT_NSS_TRUSTED_DELEGATOR
CKA_TRUST_EMAIL_PROTECTION CK_TRUST CKT_NSS_TRUSTED_DELEGATOR
CKA_TRUST_CODE_SIGNING CK_TRUST CKT_NSS_MUST_VERIFY_TRUST
CKA_TRUST_STEP_UP_APPROVED CK_BBOOL CK_FALSE

#
# Certificate "DigiCert Trusted Root G4"
#
# Issuer: CN=DigiCert Trusted Root G4,OU=www.digicert.com,O=DigiCert Inc,C=US
# Serial Number:05:9b:1b:57:9e:8e:21:32:e2:39:07:bd:a7:77:75:5c

```



```
# Subject: CN=DigiCert
Trusted Root G4,OU=www.digicert.com,O=DigiCert Inc,C=US
# Not Valid Before: Thu Aug 01 12:00:00 2013
# Not Valid After : Fri Jan 15 12:00:00 2038
# Fingerprint (SHA-256):
55:2F:7B:DC:F1:A7:AF:9E:6C:E6:72:01:7F:4F:12:AB:F7:72:40:C7:8E:76:1A:C2:03:D1:D9:D2:0A:C8:99:88
# Fingerprint (SHA1): DD:FB:16:CD:49:31:C9:73:A2:03:7D:3F:C8:3A:4D:7D:77:5D:05:E4
CKA_CLASS CK_OBJECT_CLASS CKO_CERTIFICATE
CKA_TOKEN CK_BBOOL CK_TRUE
CKA_PRIVATE CK_BBOOL CK_FALSE
CKA_MODIFIABLE CK_BBOOL CK_FALSE
CKA_LABEL UTF8 "DigiCert Trusted Root G4"
CKA_CERTIFICATE_TYPE CK_CERTIFICATE_TYPE CKC_X_509
CKA_SUBJECT MULTILINE_OCTAL
\060\142\061\013\060\011\006\003\125\004\006\023\002\125\123\061
\025\060\023\006\003\125\004\012\023\014\104\151\147\151\103\145
\162\164\040\111\156\143\061\031\060\027\006\003\125\004\013\023
\020\167\167\167\056\144\151\147\151\143\145\162\164\056\143\157
\155\061\041\060\037\006\003\125\004\003\023\030\104\151\147\151
\103\145\162\164\040\124\162\165\163\164\145\144\040\122\157\157
\164\040\107\064
END
CKA_ID
UTF8 "0"
CKA_ISSUER MULTILINE_OCTAL
\060\142\061\013\060\011\006\003\125\004\006\023\002\125\123\061
\025\060\023\006\003\125\004\012\023\014\104\151\147\151\103\145
\162\164\040\111\156\143\061\031\060\027\006\003\125\004\013\023
\020\167\167\167\056\144\151\147\151\143\145\162\164\056\143\157
\155\061\041\060\037\006\003\125\004\003\023\030\104\151\147\151
\103\145\162\164\040\124\162\165\163\164\145\144\040\122\157\157
\164\040\107\064
END
CKA_SERIAL_NUMBER MULTILINE_OCTAL
\002\020\005\233\033\127\236\216\041\062\342\071\007\275\247\167
\165\134
END
CKA_VALUE MULTILINE_OCTAL
\060\202\005\220\060\202\003\170\240\003\002\001\002\002\020\005
\233\033\127\236\216\041\062\342\071\007\275\247\167\165\134\060
\015\006\011\052\206\110\206\367\015\001\001\014\005\000\060\142
\061\013\060\011\006\003\125\004\006\023\002\125\123\061\025\060
\023\006\003\125\004\012\023\014\104\151\147\151\103\145\162\164
\040\111\156\143\061\031\060\027\006\003\125\004\013\023\020\167
\167\167\056\144\151\147\151\143\145\162\164\056\143\157\155\061
\041\060\037\006\003\125\004\003\023\030\104\151\147\151\103\145
\162\164\040\124\162\165\163\164\145\144\040\122\157\157\164\040
\107\064\060\036\027\015\061\063\060\070\060\061\061\062\060\060
```

\060\060\132\027\015\063\070\060\061\061\065\061\062\060\060\060
\060\132\060\142\061\013\060\011\006\003\125\004\006\023\002\125
\123\061\025\060\023\006\003\125\004\012\023\014\104\151\147\151
\103\145\162\164\040\111\156\143\061\031\060\027\006\003\125\004
\013\023\020\167\167\167\056\144\151\147\151\143\145\162\164\056
\143\157\155\061\041\060\037\006\003\125\004\003\023\030\104\151
\147\151\103\145\162\164\040\124\162\165\163\164\145\144\040\122
\157\157\164\040\107\064\060\202\002\042\060\015\006\011\052\206
\110\206\367\015\001\001\001\005\000\003\202\002\017\000\060\202
\002\012\002\202\002\001\000\277\346\220\163\150\336\273\344\135
\112\074\060\042\060\151\063\354\302\247\045\056\311\041\075\362
\212\330\131\302\341\051\247\075\130\253\166\232\315\256\173\033
\204\015\304\060\037\363\033\244\070\026\353\126\306\227\155\035
\253\262\171\362\312\021\322\344\137\326\005\074\122\017\122\037
\306\236\025\245\176\276\237\251\127\026\131\125\162\257\150\223
\160\302\262\272\165\231\152\163\062\224\321\020\104\020\056\337
\202\363\007\204\346\164\073\155\161\342\055\014\033\356\040\325
\311\040\035\143\051\055\316\354\136\116\310\223\370\041\141\233
\064\353\005\306\136\354\133\032\274\353\311\317\315\254\064\100
\137\261\172\146\356\167\310\110\250\146\127\127\237\124\130\216
\014\053\267\117\247\060\331\126\356\312\173\135\343\255\311\117
\136\345\065\347\061\313\332\223\136\334\216\217\200\332\266\221
\230\100\220\171\303\170\307\266\261\304\265\152\030\070\003\020
\215\330\324\067\244\056\005\175\210\365\202\076\020\221\160\253
\125\202\101\062\327\333\004\163\052\156\221\001\174\041\114\324
\274\256\033\003\165\135\170\146\331\072\061\104\232\063\100\277
\010\327\132\111\244\302\346\251\240\147\335\244\047\274\241\117
\071\265\021\130\027\367\044\134\106\217\144\367\301\151\210\166
\230\166\075\131\135\102\166\207\211\227\151\172\110\360\340\242
\022\033\146\232\164\312\336\113\036\347\016\143\256\346\324\357
\222\222\072\236\075\334\000\344\105\045\211\266\232\104\031\053
\176\300\224\264\322\141\155\353\063\331\305\337\113\004\000\314
\175\034\225\303\217\367\041\262\262\021\267\273\177\362\325\214
\160\054\101\140\252\261\143\030\104\225\032\166\142\176\366\200
\260\373\350\144\246\063\321\211\007\341\275\267\346\103\244\030
\270\246\167\001\341\017\224\014\041\035\262\124\051\045\211\154
\345\016\122\121\107\164\276\046\254\266\101\165\336\172\254\137
\215\077\311\274\323\101\021\022\133\345\020\120\353\061\305\312
\162\026\042\011\337\174\114\165\077\143\354\041\137\304\040\121
\153\157\261\253\206\213\117\302\326\105\137\235\040\374\241\036
\305\300\217\242\261\176\012\046\231\365\344\151\057\230\035\055
\365\331\251\262\035\345\033\002\003\001\000\001\243\102\060\100
\060\017\006\003\125\035\023\001\001\377\004\005\060\003\001\001
\377\060\016\006\003\125\035\017\001\001\377\004\004\003\002\001
\206\060\035\006\003\125\035\016\004\026\004\024\354\327\343\202
\322\161\135\144\114\337\056\147\077\347\272\230\256\034\017\117
\060\015\006\011\052\206\110\206\367\015\001\001\014\005\000\003
\202\002\001\000\273\141\331\175\251\154\276\027\304\221\033\303

\241\242\000\215\343\144\150\017\126\317\167\256\160\371\375\232
\112\231\271\311\170\134\014\014\137\344\346\024\051\126\013\066
\111\135\104\143\340\255\234\226\030\146\033\043\015\075\171\351
\155\153\326\124\370\322\074\301\103\100\256\035\120\365\122\374
\220\073\273\230\231\151\153\307\301\247\250\150\244\047\334\235
\371\047\256\060\205\271\366\147\115\072\076\217\131\071\042\123
\104\353\310\135\003\312\355\120\172\175\142\041\012\200\310\163
\146\321\240\005\140\137\350\245\264\247\257\250\367\155\065\234
\174\132\212\326\242\070\231\363\170\213\364\115\322\040\013\336
\004\356\214\233\107\201\162\015\300\024\062\357\060\131\056\256
\340\161\362\126\344\152\227\157\222\120\155\226\215\150\172\232
\262\066\024\172\006\362\044\271\011\021\120\327\010\261\270\211
\172\204\043\141\102\051\345\243\315\242\040\101\327\321\234\144
\331\352\046\241\213\024\327\114\031\262\120\101\161\075\077\115
\160\043\206\014\112\334\201\322\314\062\224\204\015\010\011\227
\034\117\300\356\153\040\164\060\322\340\071\064\020\205\041\025
\001\010\350\125\062\336\161\111\331\050\027\120\115\346\276\115
\321\165\254\320\312\373\101\270\103\245\252\323\303\005\104\117
\054\066\233\342\372\342\105\270\043\123\154\006\157\147\125\177
\106\265\114\077\156\050\132\171\046\322\244\250\142\227\322\036
\342\355\112\213\274\033\375\107\112\015\337\147\146\176\262\133
\101\320\073\344\364\073\364\004\143\351\357\302\124\000\121\240
\212\052\311\316\170\314\325\352\207\004\030\263\316\257\111\210
\257\363\222\231\266\263\346\141\017\322\205\000\347\120\032\344
\033\225\235\031\241\271\234\261\233\261\000\036\357\320\017\117
\102\154\311\012\274\356\103\372\072\161\245\310\115\046\245\065
\375\211\135\274\205\142\035\062\322\240\053\124\355\232\127\301
\333\372\020\317\031\267\213\112\033\217\001\266\047\225\123\350
\266\211\155\133\274\150\324\043\350\213\121\242\126\371\360\246
\200\240\326\036\263\274\017\017\123\165\051\252\352\023\167\344
\336\214\201\041\255\007\020\107\021\255\207\075\007\321\165\274
\317\363\146\176

END

CKA_NSS_Mozilla_CA_POLICY

CK_BBOOL CK_TRUE

CKA_NSS_SERVER_DISTRUST_AFTER CK_BBOOL CK_FALSE

CKA_NSS_EMAIL_DISTRUST_AFTER CK_BBOOL CK_FALSE

Trust for "DigiCert Trusted Root G4"

Issuer: CN=DigiCert Trusted Root G4,OU=www.digicert.com,O=DigiCert Inc,C=US

Serial Number:05:9b:1b:57:9e:8e:21:32:e2:39:07:bd:a7:77:75:5c

Subject: CN=DigiCert Trusted Root G4,OU=www.digicert.com,O=DigiCert Inc,C=US

Not Valid Before: Thu Aug 01 12:00:00 2013

Not Valid After : Fri Jan 15 12:00:00 2038

Fingerprint (SHA-256):

55:2F:7B:DC:F1:A7:AF:9E:6C:E6:72:01:7F:4F:12:AB:F7:72:40:C7:8E:76:1A:C2:03:D1:D9:D2:0A:C8:99:88

#

```

Fingerprint (SHA1): DD:FB:16:CD:49:31:C9:73:A2:03:7D:3F:C8:3A:4D:7D:77:5D:05:E4
CKA_CLASS CK_OBJECT_CLASS CKO_NSS_TRUST
CKA_TOKEN CK_BBOOL CK_TRUE
CKA_PRIVATE CK_BBOOL CK_FALSE
CKA_MODIFIABLE CK_BBOOL CK_FALSE
CKA_LABEL UTF8 "DigiCert Trusted Root G4"
CKA_CERT_SHA1_HASH MULTILINE_OCTAL
\335\373\026\315\111\061\311\163\242\003\175\077\310\072\115\175
\167\135\005\344
END
CKA_CERT_MD5_HASH MULTILINE_OCTAL
\170\362\374\252\140\037\057\264\353\311\067\272\123\056\165\111
END
CKA_ISSUER MULTILINE_OCTAL
\060\142\061\013\060\011\006\003\125\004\006\023\002\125\123\061
\025\060\023\006\003\125\004\012\023\014\104\151\147\151\103\145
\162\164\040\111\156\143\061\031\060\027\006\003\125\004\013\023
\020\167\167\167\056\144\151\147\151\143\145\162\164\056\143\157
\155\061\041\060\037\006\003\125\004\003\023\030\104\151\147\151
\103\145\162\164\040\124\162\165\163\164\145\144\040\122\157\157
\164\040\107\064
END
CKA_SERIAL_NUMBER MULTILINE_OCTAL
\002\020\005\233\033\127\236\216\041\062\342\071\007\275\247\167
\165\134
END
CKA_TRUST_SERVER_AUTH
CK_TRUST CKT_NSS_TRUSTED_DELEGATOR
CKA_TRUST_EMAIL_PROTECTION CK_TRUST CKT_NSS_TRUSTED_DELEGATOR
CKA_TRUST_CODE_SIGNING CK_TRUST CKT_NSS_MUST_VERIFY_TRUST
CKA_TRUST_STEP_UP_APPROVED CK_BBOOL CK_FALSE

#
# Certificate "COMODO RSA Certification Authority"
#
# Issuer: CN=COMODO RSA Certification Authority,O=COMODO CA Limited,L=Salford,ST=Greater
Manchester,C=GB
# Serial Number:4c:aa:f9:ca:db:63:6f:e0:1f:f7:4e:d8:5b:03:86:9d
# Subject: CN=COMODO RSA Certification Authority,O=COMODO CA Limited,L=Salford,ST=Greater
Manchester,C=GB
# Not Valid Before: Tue Jan 19 00:00:00 2010
# Not Valid After : Mon Jan 18 23:59:59 2038
# Fingerprint (SHA-256):
52:F0:E1:C4:E5:8E:C6:29:29:1B:60:31:7F:07:46:71:B8:5D:7E:A8:0D:5B:07:27:34:63:53:4B:32:B4:02:34
# Fingerprint (SHA1): AF:E5:D2:44:A8:D1:19:42:30:FF:47:9F:E2:F8:97:BB:CD:7A:8C:B4
CKA_CLASS CK_OBJECT_CLASS CKO_CERTIFICATE
CKA_TOKEN CK_BBOOL CK_TRUE
CKA_PRIVATE CK_BBOOL CK_FALSE

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```
CKA_MODIFIABLE
CK_BBOOL CK_FALSE
CKA_LABEL UTF8 "COMODO RSA Certification Authority"
CKA_CERTIFICATE_TYPE CK_CERTIFICATE_TYPE_CKC_X_509
CKA_SUBJECT MULTILINE_OCTAL
\060\201\205\061\013\060\011\006\003\125\004\006\023\002\107\102
\061\033\060\031\006\003\125\004\010\023\022\107\162\145\141\164
\145\162\040\115\141\156\143\150\145\163\164\145\162\061\020\060
\016\006\003\125\004\007\023\007\123\141\154\146\157\162\144\061
\032\060\030\006\003\125\004\012\023\021\103\117\115\117\104\117
\040\103\101\040\114\151\155\151\164\145\144\061\053\060\051\006
\003\125\004\003\023\042\103\117\115\117\104\117\040\122\123\101
\040\103\145\162\164\151\146\151\143\141\164\151\157\156\040\101
\165\164\150\157\162\151\164\171
END
CKA_ID UTF8 "0"
CKA_ISSUER MULTILINE_OCTAL
\060\201\205\061\013\060\011\006\003\125\004\006\023\002\107\102
\061\033\060\031\006\003\125\004\010\023\022\107\162\145\141\164
\145\162\040\115\141\156\143\150\145\163\164\145\162\061\020\060
\016\006\003\125\004\007\023\007\123\141\154\146\157\162\144\061
\032\060\030\006\003\125\004\012\023\021\103\117\115\117\104\117
\040\103\101\040\114\151\155\151\164\145\144\061\053\060\051\006
\003\125\004\003\023\042\103\117\115\117\104\117\040\122\123\101
\040\103\145\162\164\151\146\151\143\141\164\151\157\156\040\101
\165\164\150\157\162\151\164\171
END
CKA_SERIAL_NUMBER
MULTILINE_OCTAL
\002\020\114\252\371\312\333\143\157\340\037\367\116\330\133\003
\206\235
END
CKA_VALUE MULTILINE_OCTAL
\060\202\005\330\060\202\003\300\240\003\002\001\002\002\020\114
\252\371\312\333\143\157\340\037\367\116\330\133\003\206\235\060
\015\006\011\052\206\110\206\367\015\001\001\014\005\000\060\201
\205\061\013\060\011\006\003\125\004\006\023\002\107\102\061\033
\060\031\006\003\125\004\010\023\022\107\162\145\141\164\145\162
\040\115\141\156\143\150\145\163\164\145\162\061\020\060\016\006
\003\125\004\007\023\007\123\141\154\146\157\162\144\061\032\060
\030\006\003\125\004\012\023\021\103\117\115\117\104\117\040\103
\101\040\114\151\155\151\164\145\144\061\053\060\051\006\003\125
\004\003\023\042\103\117\115\117\104\117\040\122\123\101\040\103
\145\162\164\151\146\151\143\141\164\151\157\156\040\101\165\164
\150\157\162\151\164\171\060\036\027\015\061\060\060\061\061\071
\060\060\060\060\060\060\132\027\015\063\070\060\061\061\070\062
\063\065\071\065\071\132\060\201\205\061\013\060\011\006\003\125
\004\006\023\002\107\102\061\033\060\031\006\003\125\004\010\023
```

\022\107\162\145\141\164\145\162\040\115\141\156\143\150\145\163
\164\145\162\061\020\060\016\006\003\125\004\007\023\007\123\141
\154\146\157\162\144\061\032\060\030\006\003\125\004\012\023\021
\103\117\115\117\104\117\040\103\101\040\114\151\155\151\164\145
\144\061\053\060\051\006\003\125\004\003\023\042\103\117\115\117
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\145\336\110\010\272\244\116\251\362\203\106\067\204\353\350\314
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\027\030\256\275\074\011\150\377\204\233\074\325\326\013\003\343
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\314\131\306\346\072\355\022\056\151\074\154\225\261\375\252\035
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\113\106\143\376\000\064\100\160\301\303\271\241\335\246\160\342
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\100\350\123\262\047\235\112\271\300\167\041\215\377\207\362\336
\274\214\357\027\337\267\111\013\321\362\156\060\013\032\016\116
\166\355\021\374\365\351\126\262\175\277\307\155\012\223\214\245
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END

CKA_NSS_MOZILLA_CA_POLICY

CK_BBOOL CK_TRUE

CKA_NSS_SERVER_DISTRUST_AFTER CK_BBOOL CK_FALSE

CKA_NSS_EMAIL_DISTRUST_AFTER CK_BBOOL CK_FALSE

Trust for "COMODO RSA Certification Authority"

Issuer: CN=COMODO RSA Certification Authority,O=COMODO CA Limited,L=Salford,ST=Greater Manchester,C=GB

Serial Number:4c:aa:f9:ca:db:63:6f:e0:1f:f7:4e:d8:5b:03:86:9d

Subject: CN=COMODO RSA Certification Authority,O=COMODO CA Limited,L=Salford,ST=Greater Manchester,C=GB

Not Valid Before: Tue Jan 19 00:00:00 2010

Not Valid After : Mon Jan 18 23:59:59 2038

Fingerprint (SHA-256):

52:F0:E1:C4:E5:8E:C6:29:29:1B:60:31:7F:07:46:71:B8:5D:7E:A8:0D:5B:07:27:34:63:53:4B:32:B4:02:34

Fingerprint (SHA1): AF:E5:D2:44:A8:D1:19:42:30:FF:47:9F:E2:F8:97:BB:CD:7A:8C:B4

```

CKA_CLASS CK_OBJECT_CLASS CKO_NSS_TRUST
CKA_TOKEN CK_BBOOL CK_TRUE
CKA_PRIVATE CK_BBOOL CK_FALSE
CKA_MODIFIABLE CK_BBOOL CK_FALSE
CKA_LABEL UTF8 "COMODO RSA Certification Authority"
CKA_CERT_SHA1_HASH MULTILINE_OCTAL
\257\345\322\104\250\321\031\102\060\377\107\237\342\370\227\273
\315\172\214\264
END
CKA_CERT_MD5_HASH MULTILINE_OCTAL
\033\061\260\161\100\066\314\024\066\221\255\304\076\375\354\030
END
CKA_ISSUER MULTILINE_OCTAL
\060\201\205\061\013\060\011\006\003\125\004\006\023\002\107\102
\061\033\060\031\006\003\125\004\010\023\022\107\162\145\141\164
\145\162\040\115\141\156\143\150\145\163\164\145\162\061\020\060
\016\006\003\125\004\007\023\007\123\141\154\146\157\162\144\061
\032\060\030\006\003\125\004\012\023\021\103\117\115\117\104\117
\040\103\101\040\114\151\155\151\164\145\144\061\053\060\051\006
\003\125\004\003\023\042\103\117\115\117\104\117\040\122\123\101
\040\103\145\162\164\151\146\151\143\141\164\151\157\156\040\101
\165\164\150\157\162\151\164\171
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MULTILINE_OCTAL
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\206\235
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CKA_TRUST_SERVER_AUTH CK_TRUST CKT_NSS_TRUSTED_DELEGATOR
CKA_TRUST_EMAIL_PROTECTION CK_TRUST CKT_NSS_TRUSTED_DELEGATOR
CKA_TRUST_CODE_SIGNING CK_TRUST CKT_NSS_MUST_VERIFY_TRUST
CKA_TRUST_STEP_UP_APPROVED CK_BBOOL CK_FALSE

#
# Certificate "USERTrust RSA Certification Authority"
#
# Issuer: CN=USERTrust RSA Certification Authority,O=The USERTRUST Network,L=Jersey City,ST=New
Jersey,C=US
# Serial Number:01:fd:6d:30:fc:a3:ca:51:a8:1b:bc:64:0e:35:03:2d
# Subject: CN=USERTrust RSA Certification Authority,O=The USERTRUST Network,L=Jersey City,ST=New
Jersey,C=US
# Not Valid Before: Mon
Feb 01 00:00:00 2010
# Not Valid After : Mon Jan 18 23:59:59 2038
# Fingerprint (SHA-256):
E7:93:C9:B0:2F:D8:AA:13:E2:1C:31:22:8A:CC:B0:81:19:64:3B:74:9C:89:89:64:B1:74:6D:46:C3:D4:CB:D2
# Fingerprint (SHA1): 2B:8F:1B:57:33:0D:BB:A2:D0:7A:6C:51:F7:0E:E9:0D:DA:B9:AD:8E
CKA_CLASS CK_OBJECT_CLASS CKO_CERTIFICATE

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```

CKA_TOKEN CK_BBOOL CK_TRUE
CKA_PRIVATE CK_BBOOL CK_FALSE
CKA_MODIFIABLE CK_BBOOL CK_FALSE
CKA_LABEL UTF8 "USERTrust RSA Certification Authority"
CKA_CERTIFICATE_TYPE CK_CERTIFICATE_TYPE CKC_X_509
CKA_SUBJECT MULTILINE_OCTAL
\060\201\210\061\013\060\011\006\003\125\004\006\023\002\125\123
\061\023\060\021\006\003\125\004\010\023\012\116\145\167\040\112
\145\162\163\145\171\061\024\060\022\006\003\125\004\007\023\013
\112\145\162\163\145\171\040\103\151\164\171\061\036\060\034\006
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\125\123\124\040\116\145\164\167\157\162\153\061\056\060\054\006
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UTF8 "0"
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\061\023\060\021\006\003\125\004\010\023\012\116\145\167\040\112
\145\162\163\145\171\061\024\060\022\006\003\125\004\007\023\013
\112\145\162\163\145\171\040\103\151\164\171\061\036\060\034\006
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\125\123\124\040\116\145\164\167\157\162\153\061\056\060\054\006
\003\125\004\003\023\045\125\123\105\122\124\162\165\163\164\040
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\156\040\101\165\164\150\157\162\151\164\171
END
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\003\055
END
CKA_VALUE MULTILINE_OCTAL
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\015\006\011\052\206\110\206\367\015\001\001\014\005\000\060\201
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\060\021\006\003\125\004\010\023\012\116\145\167\040\112\145\162
\163\145\171\061\024\060\022\006\003\125\004\007\023\013\112\145
\162\163\145\171\040\103\151\164\171\061\036\060\034\006\003\125
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\101\040\103\145\162\164\151\146\151\143\141\164\151\157\156\040
\101\165\164\150\157\162\151\164\171\060\036\027\015\061\060\060
\062\060\061\060\060\060\060\060\060\132\027\015\063\070\060\061
\061\070\062\063\065\071\065\071\132\060\201\210\061\013\060\011

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\243\147\045\041\135\346\335\035\013\056\150\033\073\202\257\354
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\250\375

END

CKA_NSS_MOZILLA_CA_POLICY

CK_BBOOL CK_TRUE

CKA_NSS_SERVER_DISTRUST_AFTER CK_BBOOL CK_FALSE

CKA_NSS_EMAIL_DISTRUST_AFTER CK_BBOOL CK_FALSE

Trust for "USERTrust RSA Certification Authority"

Issuer: CN=USERTrust RSA Certification Authority,O=The USERTRUST Network,L=Jersey City,ST=New Jersey,C=US

Serial Number:01:fd:6d:30:fc:a3:ca:51:a8:1b:bc:64:0e:35:03:2d

Subject: CN=USERTrust RSA Certification Authority,O=The USERTRUST Network,L=Jersey City,ST=New Jersey,C=US

Not Valid Before: Mon Feb 01 00:00:00 2010

Not Valid After : Mon Jan 18 23:59:59 2038

Fingerprint (SHA-256):

```
E7:93:C9:B0:2F:D8:AA:13:E2:1C:31:22:8A:CC:B0:81:19:64:3B:74:9C:89:89:64:B1:74:6D:46:C3:D4:CB:D2
# Fingerprint (SHA1): 2B:8F:1B:57:33:0D:BB:A2:D0:7A:6C:51:F7:0E:E9:0D:DA:B9:AD:8E
CKA_CLASS CK_OBJECT_CLASS CKO_NSS_TRUST
CKA_TOKEN CK_BBOOL CK_TRUE
CKA_PRIVATE CK_BBOOL CK_FALSE
CKA_MODIFIABLE CK_BBOOL CK_FALSE
CKA_LABEL UTF8 "USERTrust RSA Certification Authority"
CKA_CERT_SHA1_HASH MULTILINE_OCTAL
\053\217\033\127\063\015\273\242\320\172\154\121\367\016\351\015
\332\271\255\216
END
CKA_CERT_MD5_HASH
MULTILINE_OCTAL
\033\376\151\321\221\267\031\063\243\162\250\017\341\125\345\265
END
CKA_ISSUER MULTILINE_OCTAL
\060\201\210\061\013\060\011\006\003\125\004\006\023\002\125\123
\061\023\060\021\006\003\125\004\010\023\012\116\145\167\040\112
\145\162\163\145\171\061\024\060\022\006\003\125\004\007\023\013
\112\145\162\163\145\171\040\103\151\164\171\061\036\060\034\006
\003\125\004\012\023\025\124\150\145\040\125\123\105\122\124\122
\125\123\124\040\116\145\164\167\157\162\153\061\056\060\054\006
\003\125\004\003\023\045\125\123\105\122\124\162\165\163\164\040
\122\123\101\040\103\145\162\164\151\146\151\143\141\164\151\157
\156\040\101\165\164\150\157\162\151\164\171
END
CKA_SERIAL_NUMBER MULTILINE_OCTAL
\002\020\001\375\155\060\374\243\312\121\250\033\274\144\016\065
\003\055
END
CKA_TRUST_SERVER_AUTH CK_TRUST CKT_NSS_TRUSTED_DELEGATOR
CKA_TRUST_EMAIL_PROTECTION CK_TRUST CKT_NSS_TRUSTED_DELEGATOR
CKA_TRUST_CODE_SIGNING
CK_TRUST CKT_NSS_MUST_VERIFY_TRUST
CKA_TRUST_STEP_UP_APPROVED CK_BBOOL CK_FALSE

#
# Certificate "USERTrust ECC Certification Authority"
#
# Issuer: CN=USERTrust ECC Certification Authority,O=The USERTRUST Network,L=Jersey City,ST=New
Jersey,C=US
# Serial Number:5c:8b:99:c5:5a:94:c5:d2:71:56:de:cd:89:80:cc:26
# Subject: CN=USERTrust ECC Certification Authority,O=The USERTRUST Network,L=Jersey City,ST=New
Jersey,C=US
# Not Valid Before: Mon Feb 01 00:00:00 2010
# Not Valid After : Mon Jan 18 23:59:59 2038
# Fingerprint (SHA-256):
4F:F4:60:D5:4B:9C:86:DA:BF:BC:FC:57:12:E0:40:0D:2B:ED:3F:BC:4D:4F:BD:AA:86:E0:6A:DC:D2:A9:AD:7A
```

Fingerprint (SHA1): D1:CB:CA:5D:B2:D5:2A:7F:69:3B:67:4D:E5:F0:5A:1D:0C:95:7D:F0

CKA_CLASS CK_OBJECT_CLASS CKO_CERTIFICATE

CKA_TOKEN CK_BBOOL CK_TRUE

CKA_PRIVATE CK_BBOOL CK_FALSE

CKA_MODIFIABLE CK_BBOOL CK_FALSE

CKA_LABEL UTF8 "USERTrust ECC Certification Authority"

CKA_CERTIFICATE_TYPE CK_CERTIFICATE_TYPE CKC_X_509

CKA_SUBJECT MULTILINE_OCTAL

\060\201\210\061\013\060\011\006\003\125\004\006\023\002\125\123
\061\023\060\021\006\003\125\004\010\023\012\116\145\167\040\112
\145\162\163\145\171\061\024\060\022\006\003\125\004\007\023\013
\112\145\162\163\145\171\040\103\151\164\171\061\036\060\034\006
\003\125\004\012\023\025\124\150\145\040\125\123\105\122\124\122
\125\123\124\040\116\145\164\167\157\162\153\061\056\060\054\006
\003\125\004\003\023\045\125\123\105\122\124\162\165\163\164\040
\105\103\103\040\103\145\162\164\151\146\151\143\141\164\151\157
\156\040\101\165\164\150\157\162\151\164\171

END

CKA_ID

UTF8 "0"

CKA_ISSUER MULTILINE_OCTAL

\060\201\210\061\013\060\011\006\003\125\004\006\023\002\125\123
\061\023\060\021\006\003\125\004\010\023\012\116\145\167\040\112
\145\162\163\145\171\061\024\060\022\006\003\125\004\007\023\013
\112\145\162\163\145\171\040\103\151\164\171\061\036\060\034\006
\003\125\004\012\023\025\124\150\145\040\125\123\105\122\124\122
\125\123\124\040\116\145\164\167\157\162\153\061\056\060\054\006
\003\125\004\003\023\045\125\123\105\122\124\162\165\163\164\040
\105\103\103\040\103\145\162\164\151\146\151\143\141\164\151\157
\156\040\101\165\164\150\157\162\151\164\171

END

CKA_SERIAL_NUMBER

MULTILINE_OCTAL

\002\020\134\213\231\305\132\224\305\322\161\126\336\315\211\200
\314\046

END

CKA_VALUE MULTILINE_OCTAL

\060\202\002\217\060\202\002\025\240\003\002\001\002\002\020\134
\213\231\305\132\224\305\322\161\126\336\315\211\200\314\046\060
\012\006\010\052\206\110\316\075\004\003\003\060\201\210\061\013
\060\011\006\003\125\004\006\023\002\125\123\061\023\060\021\006
\003\125\004\010\023\012\116\145\167\040\112\145\162\163\145\171
\061\024\060\022\006\003\125\004\007\023\013\112\145\162\163\145
\171\040\103\151\164\171\061\036\060\034\006\003\125\004\012\023
\025\124\150\145\040\125\123\105\122\124\122\125\123\124\040\116
\145\164\167\157\162\153\061\056\060\054\006\003\125\004\003\023
\045\125\123\105\122\124\162\165\163\164\040\105\103\103\040\103
\145\162\164\151\146\151\143\141\164\151\157\156\040\101\165\164

\150\157\162\151\164\171\060\036\027\015\061\060\060\062\060\061
\060\060\060\060\060\060\060\132\027\015\063\070\060\061\061\070\062
\063\065\071\065\071\132\060\201\210\061\013\060\011\006\003\125
\004\006\023\002\125\123\061\023\060\021\006\003\125\004\010\023
\012\116\145\167\040\112\145\162\163\145\171\061\024\060\022\006
\003\125\004\007\023\013\112\145\162\163\145\171\040\103\151\164
\171\061\036\060\034\006\003\125\004\012\023\025\124\150\145\040
\125\123\105\122\124\122\125\123\124\040\116\145\164\167\157\162
\153\061\056\060\054\006\003\125\004\003\023\045\125\123\105\122
\124\162\165\163\164\040\105\103\103\040\103\145\162\164\151\146
\151\143\141\164\151\157\156\040\101\165\164\150\157\162\151\164
\171\060\166\060\020\006\007\052\206\110\316\075\002\001\006\005
\053\201\004\000\042\003\142\000\004\032\254\124\132\251\371\150
\043\347\172\325\044\157\123\306\132\330\113\253\306\325\266\321
\346\163\161\256\335\234\326\014\141\375\333\240\211\003\270\005
\024\354\127\316\356\135\077\342\041\263\316\367\324\212\171\340
\243\203\176\055\227\320\141\304\361\231\334\045\221\143\253\177
\060\243\264\160\342\307\241\063\234\363\277\056\134\123\261\137
\263\175\062\177\212\064\343\171\171\243\102\060\100\060\035\006
\003\125\035\016\004\026\004\024\072\341\011\206\324\317\031\302
\226\166\164\111\166\334\340\065\306\143\143\232\060\016\006\003
\125\035\017\001\001\377\004\004\003\002\001\006\060\017\006\003
\125\035\023\001\001\377\004\005\060\003\001\001\377\060\012\006
\010\052\206\110\316\075\004\003\003\003\150\000\060\145\002\060
\066\147\241\026\010\334\344\227\000\101\035\116\276\341\143\001
\317\073\252\102\021\144\240\235\224\071\002\021\171\134\173\035
\372\144\271\356\026\102\263\277\212\302\011\304\354\344\261\115
\002\061\000\351\052\141\107\214\122\112\113\116\030\160\366\326
\104\326\156\365\203\272\155\130\275\044\331\126\110\352\357\304
\242\106\201\210\152\072\106\321\251\233\115\311\141\332\321\135
\127\152\030

END

CKA_NSS_MOZILLA_CA_POLICY

CK_BBOOL CK_TRUE

CKA_NSS_SERVER_DISTRUST_AFTER CK_BBOOL CK_FALSE

CKA_NSS_EMAIL_DISTRUST_AFTER CK_BBOOL CK_FALSE

Trust for "USERTrust ECC Certification Authority"

Issuer: CN=USERTrust ECC Certification Authority,O=The USERTRUST Network,L=Jersey City,ST=New Jersey,C=US

Serial Number:5c:8b:99:c5:5a:94:c5:d2:71:56:de:cd:89:80:cc:26

Subject: CN=USERTrust ECC Certification Authority,O=The USERTRUST Network,L=Jersey City,ST=New Jersey,C=US

Not Valid Before: Mon Feb 01 00:00:00 2010

Not Valid After : Mon Jan 18 23:59:59 2038

Fingerprint (SHA-256):

4F:F4:60:D5:4B:9C:86:DA:BF:BC:FC:57:12:E0:40:0D:2B:ED:3F:BC:4D:4F:BD:AA:86:E0:6A:DC:D2:A9:AD:7A

Fingerprint (SHA1): D1:CB:CA:5D:B2:D5:2A:7F:69:3B:67:4D:E5:F0:5A:1D:0C:95:7D:F0

```

CKA_CLASS CK_OBJECT_CLASS CKO_NSS_TRUST
CKA_TOKEN CK_BBOOL CK_TRUE
CKA_PRIVATE CK_BBOOL CK_FALSE
CKA_MODIFIABLE CK_BBOOL CK_FALSE
CKA_LABEL UTF8 "USERTrust ECC Certification Authority"
CKA_CERT_SHA1_HASH MULTILINE_OCTAL
\321\313\312\135\262\325\052\177\151\073\147\115\345\360\132\035
\014\225\175\360
END
CKA_CERT_MD5_HASH
MULTILINE_OCTAL
\372\150\274\331\265\177\255\375\311\035\006\203\050\314\044\301
END
CKA_ISSUER MULTILINE_OCTAL
\060\201\210\061\013\060\011\006\003\125\004\006\023\002\125\123
\061\023\060\021\006\003\125\004\010\023\012\116\145\167\040\112
\145\162\163\145\171\061\024\060\022\006\003\125\004\007\023\013
\112\145\162\163\145\171\040\103\151\164\171\061\036\060\034\006
\003\125\004\012\023\025\124\150\145\040\125\123\105\122\124\122
\125\123\124\040\116\145\164\167\157\162\153\061\056\060\054\006
\003\125\004\003\023\045\125\123\105\122\124\162\165\163\164\040
\105\103\103\040\103\145\162\164\151\146\151\143\141\164\151\157
\156\040\101\165\164\150\157\162\151\164\171
END
CKA_SERIAL_NUMBER MULTILINE_OCTAL
\002\020\134\213\231\305\132\224\305\322\161\126\336\315\211\200
\314\046
END
CKA_TRUST_SERVER_AUTH CK_TRUST CKT_NSS_TRUSTED_DELEGATOR
CKA_TRUST_EMAIL_PROTECTION CK_TRUST CKT_NSS_TRUSTED_DELEGATOR
CKA_TRUST_CODE_SIGNING
CK_TRUST CKT_NSS_MUST_VERIFY_TRUST
CKA_TRUST_STEP_UP_APPROVED CK_BBOOL CK_FALSE

#
# Certificate "GlobalSign ECC Root CA - R5"
#
# Issuer: CN=GlobalSign,O=GlobalSign,OU=GlobalSign ECC Root CA - R5
# Serial Number:60:59:49:e0:26:2e:bb:55:f9:0a:77:8a:71:f9:4a:d8:6c
# Subject: CN=GlobalSign,O=GlobalSign,OU=GlobalSign ECC Root CA - R5
# Not Valid Before: Tue Nov 13 00:00:00 2012
# Not Valid After : Tue Jan 19 03:14:07 2038
# Fingerprint (SHA-256):
17:9F:BC:14:8A:3D:D0:0F:D2:4E:A1:34:58:CC:43:BF:A7:F5:9C:81:82:D7:83:A5:13:F6:EB:EC:10:0C:89:24
# Fingerprint (SHA1): 1F:24:C6:30:CD:A4:18:EF:20:69:FF:AD:4F:DD:5F:46:3A:1B:69:AA
CKA_CLASS CK_OBJECT_CLASS CKO_CERTIFICATE
CKA_TOKEN CK_BBOOL CK_TRUE
CKA_PRIVATE CK_BBOOL CK_FALSE

```

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CKA_MODIFIABLE CK_BBOOL CK_FALSE
CKA_LABEL UTF8 "GlobalSign ECC Root CA - R5"
CKA_CERTIFICATE_TYPE CK_CERTIFICATE_TYPE CKC_X_509
CKA_SUBJECT MULTILINE_OCTAL
\060\120\061\044\060\042\006\003\125\004\013\023\033\107\154\157
\142\141\154\123\151\147\156\040\105\103\103\040\122\157\157\164
\040\103\101\040\055\040\122\065\061\023\060\021\006\003\125\004
\012\023\012\107\154\157\142\141\154\123\151\147\156\061\023\060
\021\006\003\125\004\003\023\012\107\154\157\142\141\154\123\151
\147\156
END
CKA_ID
UTF8 "0"
CKA_ISSUER MULTILINE_OCTAL
\060\120\061\044\060\042\006\003\125\004\013\023\033\107\154\157
\142\141\154\123\151\147\156\040\105\103\103\040\122\157\157\164
\040\103\101\040\055\040\122\065\061\023\060\021\006\003\125\004
\012\023\012\107\154\157\142\141\154\123\151\147\156\061\023\060
\021\006\003\125\004\003\023\012\107\154\157\142\141\154\123\151
\147\156
END
CKA_SERIAL_NUMBER MULTILINE_OCTAL
\002\021\140\131\111\340\046\056\273\125\371\012\167\212\161\371
\112\330\154
END
CKA_VALUE MULTILINE_OCTAL
\060\202\002\036\060\202\001\244\240\003\002\001\002\002\021\140
\131\111\340\046\056\273\125\371\012\167\212\161\371\112\330\154
\060\012\006\010\052\206\110\316\075\004\003\003\060\120\061\044
\060\042\006\003\125\004\013\023\033\107\154\157\142\141\154\123
\151\147\156\040\105\103\103\040\122\157\157\164\040\103\101\040
\055\040\122\065\061\023\060\021\006\003\125\004\012\023\012\107
\154\157\142\141\154\123\151\147\156\061\023\060\021\006\003\125
\004\003\023\012\107\154\157\142\141\154\123\151\147\156\060\036
\027\015\061\062\061\061\061\063\060\060\060\060\060\060\132\027
\015\063\070\060\061\061\071\060\063\061\064\060\067\132\060\120
\061\044\060\042\006\003\125\004\013\023\033\107\154\157\142\141
\154\123\151\147\156\040\105\103\103\040\122\157\157\164\040\103
\101\040\055\040\122\065\061\023\060\021\006\003\125\004\012\023
\012\107\154\157\142\141\154\123\151\147\156\061\023\060\021\006
\003\125\004\003\023\012\107\154\157\142\141\154\123\151\147\156
\060\166\060\020\006\007\052\206\110\316\075\002\001\006\005\053
\201\004\000\042\003\142\000\004\107\105\016\226\373\175\135\277
\351\071\321\041\370\237\013\266\325\173\036\222\072\110\131\034
\360\142\061\055\300\172\050\376\032\247\134\263\266\314\227\347
\105\324\130\372\321\167\155\103\242\300\207\145\064\012\037\172
\335\353\074\063\241\305\235\115\244\157\101\225\070\177\311\036
\204\353\321\236\111\222\207\224\207\014\072\205\112\146\237\235
```


\131\223\115\227\141\006\206\112\243\102\060\100\060\016\006\003
\125\035\017\001\001\377\004\004\003\002\001\006\060\017\006\003
\125\035\023\001\001\377\004\005\060\003\001\001\377\060\035\006
\003\125\035\016\004\026\004\024\075\346\051\110\233\352\007\312
\041\104\112\046\336\156\336\322\203\320\237\131\060\012\006\010
\052\206\110\316\075\004\003\003\003\150\000\060\145\002\061\000
\345\151\022\311\156\333\306\061\272\011\101\341\227\370\373\375
\232\342\175\022\311\355\174\144\323\313\005\045\213\126\331\240
\347\136\135\116\013\203\234\133\166\051\240\011\046\041\152\142
\002\060\161\322\265\217\134\352\073\341\170\011\205\250\165\222
\073\310\134\375\110\357\015\164\042\250\010\342\156\305\111\316
\307\014\274\247\141\151\361\367\073\341\052\313\371\053\363\146
\220\067

END

CKA_NSS_Mozilla_CA_POLICY

CK_BBOOL CK_TRUE

CKA_NSS_SERVER_DISTRUST_AFTER CK_BBOOL CK_FALSE

CKA_NSS_EMAIL_DISTRUST_AFTER CK_BBOOL CK_FALSE

Trust for "GlobalSign ECC Root CA - R5"

Issuer: CN=GlobalSign,O=GlobalSign,OU=GlobalSign ECC Root CA - R5

Serial Number:60:59:49:e0:26:2e:bb:55:f9:0a:77:8a:71:f9:4a:d8:6c

Subject: CN=GlobalSign,O=GlobalSign,OU=GlobalSign ECC Root CA - R5

Not Valid Before: Tue Nov 13 00:00:00 2012

Not Valid After : Tue Jan 19 03:14:07 2038

Fingerprint (SHA-256):

17:9F:BC:14:8A:3D:D0:0F:D2:4E:A1:34:58:CC:43:BF:A7:F5:9C:81:82:D7:83:A5:13:F6:EB:EC:10:0C:89:24

Fingerprint (SHA1): 1F:24:C6:30:CD:A4:18:EF:20:69:FF:AD:4F:DD:5F:46:3A:1B:69:AA

CKA_CLASS CK_OBJECT_CLASS CKO_NSS_TRUST

CKA_TOKEN CK_BBOOL CK_TRUE

CKA_PRIVATE CK_BBOOL CK_FALSE

CKA_MODIFIABLE CK_BBOOL CK_FALSE

CKA_LABEL UTF8 "GlobalSign ECC Root CA - R5"

CKA_CERT_SHA1_HASH MULTILINE_OCTAL

\037\044\306\060\315\244\030\357\040\151\377\255\117\335\137\106
\072\033\151\252

END

CKA_CERT_MD5_HASH MULTILINE_OCTAL

\237\255\073\034\002\036\212\272\027\164\070\201\014\242\274\010

END

CKA_ISSUER

MULTILINE_OCTAL

\060\120\061\044\060\042\006\003\125\004\013\023\033\107\154\157
\142\141\154\123\151\147\156\040\105\103\103\040\122\157\157\164
\040\103\101\040\055\040\122\065\061\023\060\021\006\003\125\004
\012\023\012\107\154\157\142\141\154\123\151\147\156\061\023\060
\021\006\003\125\004\003\023\012\107\154\157\142\141\154\123\151
\147\156

```

END
CKA_SERIAL_NUMBER MULTILINE_OCTAL
\002\021\140\131\111\340\046\056\273\125\371\012\167\212\161\371
\112\330\154
END
CKA_TRUST_SERVER_AUTH CK_TRUST CKT_NSS_TRUSTED_DELEGATOR
CKA_TRUST_EMAIL_PROTECTION CK_TRUST CKT_NSS_TRUSTED_DELEGATOR
CKA_TRUST_CODE_SIGNING CK_TRUST CKT_NSS_MUST_VERIFY_TRUST
CKA_TRUST_STEP_UP_APPROVED CK_BBOOL CK_FALSE

#
# Certificate "Staat der Nederlanden Root CA - G3"
#
# Issuer: CN=Staat der Nederlanden Root CA - G3,O=Staat der Nederlanden,C=NL
# Serial Number: 10003001 (0x98a239)
# Subject: CN=Staat der Nederlanden Root CA - G3,O=Staat der Nederlanden,C=NL
#
Not Valid Before: Thu Nov 14 11:28:42 2013
# Not Valid After : Mon Nov 13 23:00:00 2028
# Fingerprint (SHA-256):
3C:4F:B0:B9:5A:B8:B3:00:32:F4:32:B8:6F:53:5F:E1:72:C1:85:D0:FD:39:86:58:37:CF:36:18:7F:A6:F4:28
# Fingerprint (SHA1): D8:EB:6B:41:51:92:59:E0:F3:E7:85:00:C0:3D:B6:88:97:C9:EE:FC
CKA_CLASS CK_OBJECT_CLASS CKO_CERTIFICATE
CKA_TOKEN CK_BBOOL CK_TRUE
CKA_PRIVATE CK_BBOOL CK_FALSE
CKA_MODIFIABLE CK_BBOOL CK_FALSE
CKA_LABEL UTF8 "Staat der Nederlanden Root CA - G3"
CKA_CERTIFICATE_TYPE CK_CERTIFICATE_TYPE CKC_X_509
CKA_SUBJECT MULTILINE_OCTAL
\060\132\061\013\060\011\006\003\125\004\006\023\002\116\114\061
\036\060\034\006\003\125\004\012\014\025\123\164\141\141\164\040
\144\145\162\040\116\145\144\145\162\154\141\156\144\145\156\061
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CKA_VALUE MULTILINE_OCTAL

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END

CKA_NSS_Mozilla_CA_POLICY

CK_BBOOL CK_TRUE

CKA_NSS_SERVER_DISTRUST_AFTER CK_BBOOL CK_FALSE

CKA_NSS_EMAIL_DISTRUST_AFTER CK_BBOOL CK_FALSE

```

# Trust for "Staat der Nederlanden Root CA - G3"
# Issuer: CN=Staat der Nederlanden Root CA - G3,O=Staat der Nederlanden,C=NL
# Serial Number: 10003001 (0x98a239)
# Subject: CN=Staat der Nederlanden Root CA - G3,O=Staat der Nederlanden,C=NL
# Not Valid Before: Thu Nov 14 11:28:42 2013
# Not Valid After : Mon Nov 13 23:00:00 2028
# Fingerprint (SHA-256):
3C:4F:B0:B9:5A:B8:B3:00:32:F4:32:B8:6F:53:5F:E1:72:C1:85:D0:FD:39:86:58:37:CF:36:18:7F:A6:F4:28
# Fingerprint (SHA1): D8:EB:6B:41:51:92:59:E0:F3:E7:85:00:C0:3D:B6:88:97:C9:EE:FC
CKA_CLASS CK_OBJECT_CLASS CKO_NSS_TRUST
CKA_TOKEN CK_BBOOL CK_TRUE
CKA_PRIVATE CK_BBOOL CK_FALSE
CKA_MODIFIABLE CK_BBOOL CK_FALSE
CKA_LABEL UTF8 "Staat der Nederlanden Root CA - G3"
CKA_CERT_SHA1_HASH
MULTILINE_OCTAL
\330\353\153\101\121\222\131\340\363\347\205\000\300\075\266\210
\227\311\356\374
END
CKA_CERT_MD5_HASH MULTILINE_OCTAL
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END
CKA_SERIAL_NUMBER MULTILINE_OCTAL
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CKA_TRUST_EMAIL_PROTECTION CK_TRUST CKT_NSS_TRUSTED_DELEGATOR
CKA_TRUST_CODE_SIGNING CK_TRUST CKT_NSS_MUST_VERIFY_TRUST
CKA_TRUST_STEP_UP_APPROVED CK_BBOOL CK_FALSE

#
# Certificate "IdenTrust Commercial Root CA 1"
#
# Issuer: CN=IdenTrust Commercial Root CA
1,O=IdenTrust,C=US
# Serial Number:0a:01:42:80:00:00:01:45:23:c8:44:b5:00:00:00:02
# Subject: CN=IdenTrust Commercial Root CA 1,O=IdenTrust,C=US
# Not Valid Before: Thu Jan 16 18:12:23 2014
# Not Valid After : Mon Jan 16 18:12:23 2034
# Fingerprint (SHA-256):

```

5D:56:49:9B:E4:D2:E0:8B:CF:CA:D0:8A:3E:38:72:3D:50:50:3B:DE:70:69:48:E4:2F:55:60:30:19:E5:28:AE
Fingerprint (SHA1): DF:71:7E:AA:4A:D9:4E:C9:55:84:99:60:2D:48:DE:5F:BC:F0:3A:25
CKA_CLASS CK_OBJECT_CLASS CKO_CERTIFICATE
CKA_TOKEN CK_BBOOL CK_TRUE
CKA_PRIVATE CK_BBOOL CK_FALSE
CKA_MODIFIABLE CK_BBOOL CK_FALSE
CKA_LABEL UTF8 "IdenTrust Commercial Root CA 1"
CKA_CERTIFICATE_TYPE CK_CERTIFICATE_TYPE CKC_X_509
CKA_SUBJECT MULTILINE_OCTAL
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\022\060\020\006\003\125\004\012\023\011\111\144\145\156\124\162
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END
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END

CKA_NSS_MOZILLA_CA_POLICY

CK_BBOOL CK_TRUE

CKA_NSS_SERVER_DISTRUST_AFTER CK_BBOOL CK_FALSE

CKA_NSS_EMAIL_DISTRUST_AFTER CK_BBOOL CK_FALSE

Trust for "IdenTrust Commercial Root CA 1"

Issuer: CN=IdenTrust Commercial Root CA 1,O=IdenTrust,C=US

Serial Number:0a:01:42:80:00:00:01:45:23:c8:44:b5:00:00:00:02

Subject: CN=IdenTrust Commercial Root CA 1,O=IdenTrust,C=US

Not Valid Before: Thu Jan 16 18:12:23 2014

Not Valid After : Mon Jan 16 18:12:23 2034

Fingerprint (SHA-256):

5D:56:49:9B:E4:D2:E0:8B:CF:CA:D0:8A:3E:38:72:3D:50:50:3B:DE:70:69:48:E4:2F:55:60:30:19:E5:28:AE

Fingerprint (SHA1): DF:71:7E:AA:4A:D9:4E:C9:55:84:99:60:2D:48:DE:5F:BC:F0:3A:25

CKA_CLASS CK_OBJECT_CLASS CKO_NSS_TRUST

CKA_TOKEN CK_BBOOL CK_TRUE

CKA_PRIVATE CK_BBOOL CK_FALSE

CKA_MODIFIABLE CK_BBOOL CK_FALSE

CKA_LABEL UTF8 "IdenTrust Commercial Root CA 1"

CKA_CERT_SHA1_HASH MULTILINE_OCTAL

\337\161\176\252\112\331\116\311\125\204\231\140\055\110\336\137
\274\360\072\045

END

CKA_CERT_MD5_HASH

MULTILINE_OCTAL

\263\076\167\163\165\356\240\323\343\176\111\143\111\131\273\307
END


```

CKA_ISSUER MULTILINE_OCTAL
\060\112\061\013\060\011\006\003\125\004\006\023\002\125\123\061
\022\060\020\006\003\125\004\012\023\011\111\144\145\156\124\162
\165\163\164\061\047\060\045\006\003\125\004\003\023\036\111\144
\145\156\124\162\165\163\164\040\103\157\155\155\145\162\143\151
\141\154\040\122\157\157\164\040\103\101\040\061
END
CKA_SERIAL_NUMBER MULTILINE_OCTAL
\002\020\012\001\102\200\000\000\001\105\043\310\104\265\000\000
\000\002
END
CKA_TRUST_SERVER_AUTH CK_TRUST CKT_NSS_TRUSTED_DELEGATOR
CKA_TRUST_EMAIL_PROTECTION CK_TRUST CKT_NSS_TRUSTED_DELEGATOR
CKA_TRUST_CODE_SIGNING CK_TRUST CKT_NSS_MUST_VERIFY_TRUST
CKA_TRUST_STEP_UP_APPROVED CK_BBOOL CK_FALSE

#
# Certificate "IdenTrust Public Sector Root CA 1"
#
# Issuer: CN=IdenTrust Public Sector Root CA 1,O=IdenTrust,C=US
# Serial Number:0a:01:42:80:00:00:01:45:23:cf:46:7c:00:00:00:02
#
# Subject: CN=IdenTrust Public Sector Root CA 1,O=IdenTrust,C=US
# Not Valid Before: Thu Jan 16 17:53:32 2014
# Not Valid After : Mon Jan 16 17:53:32 2034
# Fingerprint (SHA-256):
30:D0:89:5A:9A:44:8A:26:20:91:63:55:22:D1:F5:20:10:B5:86:7A:CA:E1:2C:78:EF:95:8F:D4:F4:38:9F:2F
# Fingerprint (SHA1): BA:29:41:60:77:98:3F:F4:F3:EF:F2:31:05:3B:2E:EA:6D:4D:45:FD
CKA_CLASS CK_OBJECT_CLASS CKO_CERTIFICATE
CKA_TOKEN CK_BBOOL CK_TRUE
CKA_PRIVATE CK_BBOOL CK_FALSE
CKA_MODIFIABLE CK_BBOOL CK_FALSE
CKA_LABEL UTF8 "IdenTrust Public Sector Root CA 1"
CKA_CERTIFICATE_TYPE CK_CERTIFICATE_TYPE CKC_X_509
CKA_SUBJECT MULTILINE_OCTAL
\060\115\061\013\060\011\006\003\125\004\006\023\002\125\123\061
\022\060\020\006\003\125\004\012\023\011\111\144\145\156\124\162
\165\163\164\061\052\060\050\006\003\125\004\003\023\041\111\144
\145\156\124\162\165\163\164\040\120\165\142\154\151\143\040\123
\145\143\164\157\162\040\122\157\157\164\040\103\101\040\061
END
CKA_ID UTF8 "0"
CKA_ISSUER
MULTILINE_OCTAL
\060\115\061\013\060\011\006\003\125\004\006\023\002\125\123\061
\022\060\020\006\003\125\004\012\023\011\111\144\145\156\124\162
\165\163\164\061\052\060\050\006\003\125\004\003\023\041\111\144
\145\156\124\162\165\163\164\040\120\165\142\154\151\143\040\123

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\145\143\164\157\162\040\122\157\157\164\040\103\101\040\061
END
CKA_SERIAL_NUMBER MULTILINE_OCTAL
\002\020\012\001\102\200\000\000\001\105\043\317\106\174\000\000
\000\002
END
CKA_VALUE MULTILINE_OCTAL
\060\202\005\146\060\202\003\116\240\003\002\001\002\002\020\012
\001\102\200\000\000\001\105\043\317\106\174\000\000\000\002\060
\015\006\011\052\206\110\206\367\015\001\001\013\005\000\060\115
\061\013\060\011\006\003\125\004\006\023\002\125\123\061\022\060
\020\006\003\125\004\012\023\011\111\144\145\156\124\162\165\163
\164\061\052\060\050\006\003\125\004\003\023\041\111\144\145\156
\124\162\165\163\164\040\120\165\142\154\151\143\040\123\145\143
\164\157\162\040\122\157\157\164\040\103\101\040\061\060\036\027
\015\061\064\060\061\061\066\061\067\065\063\063\062\132\027\015
\063\064\060\061\061\066\061\067\065\063\063\062\132\060\115\061
\013\060\011\006\003\125\004\006\023\002\125\123\061\022\060\020
\006\003\125\004\012\023\011\111\144\145\156\124\162\165\163\164
\061\052\060\050\006\003\125\004\003\023\041\111\144\145\156\124
\162\165\163\164\040\120\165\142\154\151\143\040\123\145\143\164
\157\162\040\122\157\157\164\040\103\101\040\061\060\202\002\042
\060\015\006\011\052\206\110\206\367\015\001\001\001\005\000\003
\202\002\017\000\060\202\002\012\002\202\002\001\000\266\042\224
\374\244\110\257\350\107\153\012\373\047\166\344\362\077\212\073
\172\112\054\061\052\214\215\260\251\303\061\153\250\167\166\204
\046\266\254\201\102\015\010\353\125\130\273\172\370\274\145\175
\362\240\155\213\250\107\351\142\166\036\021\356\010\024\321\262
\104\026\364\352\320\372\036\057\136\333\313\163\101\256\274\000
\260\112\053\100\262\254\341\073\113\302\055\235\344\241\233\354
\032\072\036\360\010\263\320\344\044\065\007\237\234\264\311\122
\155\333\007\312\217\265\133\360\203\363\117\307\055\245\310\255
\313\225\040\244\061\050\127\130\132\344\215\033\232\253\236\015
\014\362\012\063\071\042\071\012\227\056\363\123\167\271\104\105
\375\204\313\066\040\201\131\055\232\157\155\110\110\141\312\114
\337\123\321\257\122\274\104\237\253\057\153\203\162\357\165\200
\332\006\063\033\135\310\332\143\306\115\315\254\146\061\315\321
\336\076\207\020\066\341\271\244\172\357\140\120\262\313\312\246
\126\340\067\257\253\064\023\071\045\350\071\146\344\230\172\252
\022\230\234\131\146\206\076\255\361\260\312\076\006\017\173\360
\021\113\067\240\104\155\173\313\250\214\161\364\325\265\221\066
\314\360\025\306\053\336\121\027\261\227\114\120\075\261\225\131
\174\005\175\055\041\325\000\277\001\147\242\136\173\246\134\362
\367\042\361\220\015\223\333\252\104\121\146\314\175\166\003\353
\152\250\052\070\031\227\166\015\153\212\141\371\274\366\356\166
\375\160\053\335\051\074\370\012\036\133\102\034\213\126\057\125
\033\034\241\056\265\307\026\346\370\252\074\222\216\151\266\001
\301\265\206\235\211\017\013\070\224\124\350\352\334\236\075\045

\274\123\046\355\325\253\071\252\305\100\114\124\253\262\264\331
\331\370\327\162\333\034\274\155\275\145\137\357\210\065\052\146
\057\356\366\263\145\360\063\215\174\230\101\151\106\017\103\034
\151\372\233\265\320\141\152\315\312\113\331\114\220\106\253\025
\131\241\107\124\051\056\203\050\137\034\302\242\253\162\027\000
\006\216\105\354\213\342\063\075\177\332\031\104\344\142\162\303
\337\042\306\362\126\324\335\137\225\162\355\155\137\367\110\003
\133\375\305\052\240\366\163\043\204\020\033\001\347\002\003\001
\000\001\243\102\060\100\060\016\006\003\125\035\017\001\001\377
\004\004\003\002\001\006\060\017\006\003\125\035\023\001\001\377
\004\005\060\003\001\001\377\060\035\006\003\125\035\016\004\026
\004\024\343\161\340\236\330\247\102\331\333\161\221\153\224\223
\353\303\243\321\024\243\060\015\006\011\052\206\110\206\367\015
\001\001\013\005\000\003\202\002\001\000\107\372\335\012\260\021
\221\070\255\115\135\367\345\016\227\124\031\202\110\207\124\214
\252\144\231\330\132\376\210\001\305\130\245\231\261\043\124\043
\267\152\035\040\127\345\001\142\101\027\323\011\333\165\313\156
\124\220\165\376\032\237\201\012\302\335\327\367\011\320\133\162
\025\344\036\011\152\075\063\363\041\232\346\025\176\255\121\325
\015\020\355\175\102\300\217\356\300\232\010\325\101\326\134\016
\041\151\156\200\141\016\025\300\270\317\305\111\022\122\314\276
\072\314\324\056\070\005\336\065\375\037\157\270\200\150\230\075
\115\240\312\100\145\322\163\174\365\213\331\012\225\077\330\077
\043\155\032\321\052\044\031\331\205\263\027\357\170\156\251\130
\321\043\323\307\023\355\162\045\177\135\261\163\160\320\177\006
\227\011\204\051\200\141\035\372\136\377\163\254\240\343\211\270
\034\161\025\306\336\061\177\022\334\341\155\233\257\347\350\237
\165\170\114\253\106\073\232\316\277\005\030\135\115\025\074\026
\232\031\120\004\232\262\232\157\145\213\122\137\074\130\004\050
\045\300\146\141\061\176\271\340\165\271\032\250\201\326\162\027
\263\305\003\061\065\021\170\170\242\340\351\060\214\177\200\337
\130\337\074\272\047\226\342\200\064\155\343\230\323\144\047\254
\110\176\050\167\134\306\045\141\045\370\205\014\145\372\304\062
\057\245\230\005\344\370\013\147\026\026\306\202\270\062\031\371
\371\271\171\334\037\315\353\257\253\016\335\033\333\105\344\172
\347\002\342\225\135\374\151\360\123\151\141\225\165\171\013\136
\125\346\070\034\224\251\131\063\236\310\161\164\171\177\121\211
\266\310\152\270\060\310\152\070\303\156\236\341\067\026\352\005
\142\114\133\022\107\355\247\264\263\130\126\307\111\363\177\022
\150\011\061\161\360\155\370\116\107\373\326\205\356\305\130\100
\031\244\035\247\371\113\103\067\334\150\132\117\317\353\302\144
\164\336\264\025\331\364\124\124\032\057\034\327\227\161\124\220
\216\331\040\235\123\053\177\253\217\342\352\060\274\120\067\357
\361\107\265\175\174\054\004\354\150\235\264\111\104\020\364\162
\113\034\144\347\374\346\153\220\335\151\175\151\375\000\126\245
\267\254\266\255\267\312\076\001\357\234

END

CKA_NSS_MOZILLA_CA_POLICY

```

CK_BBOOL CK_TRUE
CKA_NSS_SERVER_DISTRUST_AFTER CK_BBOOL CK_FALSE
CKA_NSS_EMAIL_DISTRUST_AFTER CK_BBOOL CK_FALSE

# Trust for "IdenTrust Public Sector Root CA 1"
# Issuer: CN=IdenTrust Public Sector Root CA 1,O=IdenTrust,C=US
# Serial Number:0a:01:42:80:00:00:01:45:23:cf:46:7c:00:00:00:02
# Subject: CN=IdenTrust Public Sector Root CA 1,O=IdenTrust,C=US
# Not Valid Before: Thu Jan 16 17:53:32 2014
# Not Valid After : Mon Jan 16 17:53:32 2034
# Fingerprint (SHA-256):
30:D0:89:5A:9A:44:8A:26:20:91:63:55:22:D1:F5:20:10:B5:86:7A:CA:E1:2C:78:EF:95:8F:D4:F4:38:9F:2F
# Fingerprint (SHA1): BA:29:41:60:77:98:3F:F4:F3:EF:F2:31:05:3B:2E:EA:6D:4D:45:FD
CKA_CLASS CK_OBJECT_CLASS CKO_NSS_TRUST
CKA_TOKEN CK_BBOOL CK_TRUE
CKA_PRIVATE CK_BBOOL CK_FALSE
CKA_MODIFIABLE CK_BBOOL CK_FALSE
CKA_LABEL UTF8 "IdenTrust Public Sector Root CA 1"
CKA_CERT_SHA1_HASH MULTILINE_OCTAL
\272\051\101\140\167\230\077\364\363\357\362\061\005\073\056\352
\155\115\105\375
END
CKA_CERT_MD5_HASH
MULTILINE_OCTAL
\067\006\245\260\374\211\235\272\364\153\214\032\144\315\325\272
END
CKA_ISSUER MULTILINE_OCTAL
\060\115\061\013\060\011\006\003\125\004\006\023\002\125\123\061
\022\060\020\006\003\125\004\012\023\011\111\144\145\156\124\162
\165\163\164\061\052\060\050\006\003\125\004\003\023\041\111\144
\145\156\124\162\165\163\164\040\120\165\142\154\151\143\040\123
\145\143\164\157\162\040\122\157\157\164\040\103\101\040\061
END
CKA_SERIAL_NUMBER MULTILINE_OCTAL
\002\020\012\001\102\200\000\000\001\105\043\317\106\174\000\000
\000\002
END
CKA_TRUST_SERVER_AUTH CK_TRUST CKT_NSS_TRUSTED_DELEGATOR
CKA_TRUST_EMAIL_PROTECTION CK_TRUST CKT_NSS_TRUSTED_DELEGATOR
CKA_TRUST_CODE_SIGNING CK_TRUST CKT_NSS_MUST_VERIFY_TRUST
CKA_TRUST_STEP_UP_APPROVED CK_BBOOL CK_FALSE

#
# Certificate "Entrust Root Certification Authority - G2"
#
# Issuer: CN=Entrust Root Certification Authority
- G2,OU="(c) 2009 Entrust, Inc. - for authorized use only",OU=See www.entrust.net/legal-terms,O="Entrust,
Inc.",C=US

```

```
# Serial Number: 1246989352 (0x4a538c28)
# Subject: CN=Entrust Root Certification Authority - G2,OU="(c) 2009 Entrust, Inc. - for authorized use
only",OU=See www.entrust.net/legal-terms,O="Entrust, Inc.",C=US
# Not Valid Before: Tue Jul 07 17:25:54 2009
# Not Valid After : Sat Dec 07 17:55:54 2030
# Fingerprint (SHA-256):
43:DF:57:74:B0:3E:7F:EF:5F:E4:0D:93:1A:7B:ED:F1:BB:2E:6B:42:73:8C:4E:6D:38:41:10:3D:3A:A7:F3:39
# Fingerprint (SHA1): 8C:F4:27:FD:79:0C:3A:D1:66:06:8D:E8:1E:57:EF:BB:93:22:72:D4
CKA_CLASS CK_OBJECT_CLASS CKO_CERTIFICATE
CKA_TOKEN CK_BBOOL CK_TRUE
CKA_PRIVATE CK_BBOOL CK_FALSE
CKA_MODIFIABLE CK_BBOOL CK_FALSE
CKA_LABEL UTF8 "Entrust Root Certification Authority - G2"
CKA_CERTIFICATE_TYPE CK_CERTIFICATE_TYPE CKC_X_509
CKA_SUBJECT MULTILINE_OCTAL
\060\201\276\061\013\060\011\006\003\125\004\006\023\002\125\123
\061\026\060\024\006\003\125\004\012\023\015\105\156\164\162\165
\163\164\054\040\111\156\143\056\061\050\060\046\006\003\125\004
\013\023\037\123\145\145\040\167\167\167\056\145\156\164\162\165
\163\164\056\156\145\164\057\154\145\147\141\154\055\164\145\162
\155\163\061\071\060\067\006\003\125\004\013\023\060\050\143\051
\040\062\060\060\071\040\105\156\164\162\165\163\164\054\040\111
\156\143\056\040\055\040\146\157\162\040\141\165\164\150\157\162
\151\172\145\144\040\165\163\145\040\157\156\154\171\061\062\060
\060\006\003\125\004\003\023\051\105\156\164\162\165\163\164\040
\122\157\157\164\040\103\145\162\164\151\146\151\143\141\164\151
\157\156\040\101\165\164\150\157\162\151\164\171\040\055\040\107
\062
END
CKA_ID
UTF8 "0"
CKA_ISSUER MULTILINE_OCTAL
\060\201\276\061\013\060\011\006\003\125\004\006\023\002\125\123
\061\026\060\024\006\003\125\004\012\023\015\105\156\164\162\165
\163\164\054\040\111\156\143\056\061\050\060\046\006\003\125\004
\013\023\037\123\145\145\040\167\167\167\056\145\156\164\162\165
\163\164\056\156\145\164\057\154\145\147\141\154\055\164\145\162
\155\163\061\071\060\067\006\003\125\004\013\023\060\050\143\051
\040\062\060\060\071\040\105\156\164\162\165\163\164\054\040\111
\156\143\056\040\055\040\146\157\162\040\141\165\164\150\157\162
\151\172\145\144\040\165\163\145\040\157\156\154\171\061\062\060
\060\006\003\125\004\003\023\051\105\156\164\162\165\163\164\040
\122\157\157\164\040\103\145\162\164\151\146\151\143\141\164\151
\157\156\040\101\165\164\150\157\162\151\164\171\040\055\040\107
\062
END
CKA_SERIAL_NUMBER
```

MULTILINE_OCTAL

\002\004\112\123\214\050

END

CKA_VALUE MULTILINE_OCTAL

\060\202\004\076\060\202\003\046\240\003\002\001\002\002\004\112
\123\214\050\060\015\006\011\052\206\110\206\367\015\001\001\013
\005\000\060\201\276\061\013\060\011\006\003\125\004\006\023\002
\125\123\061\026\060\024\006\003\125\004\012\023\015\105\156\164
\162\165\163\164\054\040\111\156\143\056\061\050\060\046\006\003
\125\004\013\023\037\123\145\145\040\167\167\167\056\145\156\164
\162\165\163\164\056\156\145\164\057\154\145\147\141\154\055\164
\145\162\155\163\061\071\060\067\006\003\125\004\013\023\060\050
\143\051\040\062\060\060\071\040\105\156\164\162\165\163\164\054
\040\111\156\143\056\040\055\040\146\157\162\040\141\165\164\150
\157\162\151\172\145\144\040\165\163\145\040\157\156\154\171\061
\062\060\060\006\003\125\004\003\023\051\105\156\164\162\165\163
\164\040\122\157\157\164\040\103\145\162\164\151\146\151\143\141
\164\151\157\156\040\101\165\164\150\157\162\151\164\171\040\055
\040\107\062\060\036\027\015\060\071\060\067\060\067\061\067\062
\065\065\064\132\027\015\063\060\061\062\060\067\061\067\065\065
\065\064\132\060\201\276\061\013\060\011\006\003\125\004\006\023
\002\125\123\061\026\060\024\006\003\125\004\012\023\015\105\156
\164\162\165\163\164\054\040\111\156\143\056\061\050\060\046\006
\003\125\004\013\023\037\123\145\145\040\167\167\167\056\145\156
\164\162\165\163\164\056\156\145\164\057\154\145\147\141\154\055
\164\145\162\155\163\061\071\060\067\006\003\125\004\013\023\060
\050\143\051\040\062\060\060\071\040\105\156\164\162\165\163\164
\054\040\111\156\143\056\040\055\040\146\157\162\040\141\165\164
\150\157\162\151\172\145\144\040\165\163\145\040\157\156\154\171
\061\062\060\060\006\003\125\004\003\023\051\105\156\164\162\165
\163\164\040\122\157\157\164\040\103\145\162\164\151\146\151\143
\141\164\151\157\156\040\101\165\164\150\157\162\151\164\171\040
\055\040\107\062\060\202\001\042\060\015\006\011\052\206\110\206
\367\015\001\001\001\005\000\003\202\001\017\000\060\202\001\012
\002\202\001\001\000\272\204\266\162\333\236\014\153\342\231\351
\060\001\247\166\352\062\270\225\101\032\311\332\141\116\130\162
\317\376\366\202\171\277\163\141\006\012\245\047\330\263\137\323
\105\116\034\162\326\116\062\362\162\212\017\367\203\031\320\152
\200\200\000\105\036\260\307\347\232\277\022\127\047\034\243\150
\057\012\207\275\152\153\016\136\145\363\034\167\325\324\205\215
\160\041\264\263\062\347\213\242\325\206\071\002\261\270\322\107
\316\344\311\111\304\073\247\336\373\124\175\127\276\360\350\156
\302\171\262\072\013\125\342\120\230\026\062\023\134\057\170\126
\301\302\224\263\362\132\344\047\232\237\044\327\306\354\320\233
\045\202\343\314\302\304\105\305\214\227\172\006\153\052\021\237
\251\012\156\110\073\157\333\324\021\031\102\367\217\007\277\365
\123\137\234\076\364\027\054\346\151\254\116\062\114\142\167\352
\267\350\345\273\064\274\031\213\256\234\121\347\267\176\265\123

\261\063\042\345\155\317\160\074\032\372\342\233\147\266\203\364
\215\245\257\142\114\115\340\130\254\144\064\022\003\370\266\215
\224\143\044\244\161\002\003\001\000\001\243\102\060\100\060\016
\006\003\125\035\017\001\001\377\004\004\003\002\001\006\060\017
\006\003\125\035\023\001\001\377\004\005\060\003\001\001\377\060
\035\006\003\125\035\016\004\026\004\024\152\162\046\172\320\036
\357\175\347\073\151\121\324\154\215\237\220\022\146\253\060\015
\006\011\052\206\110\206\367\015\001\001\013\005\000\003\202\001
\001\000\171\237\035\226\306\266\171\077\042\215\207\323\207\003
\004\140\152\153\232\056\131\211\163\021\254\103\321\365\023\377
\215\071\053\300\362\275\117\160\214\251\057\352\027\304\013\124
\236\324\033\226\230\063\074\250\255\142\242\000\166\253\131\151
\156\006\035\176\304\271\104\215\230\257\022\324\141\333\012\031
\106\107\363\353\367\143\301\100\005\100\245\322\267\364\265\232
\066\277\251\210\166\210\004\125\004\053\234\207\177\032\067\074
\176\055\245\032\330\324\211\136\312\275\254\075\154\330\155\257
\325\363\166\017\315\073\210\070\042\235\154\223\232\304\075\277
\202\033\145\077\246\017\135\252\374\345\262\025\312\265\255\306
\274\075\320\204\350\352\006\162\260\115\071\062\170\277\076\021
\234\013\244\235\232\041\363\360\233\013\060\170\333\301\334\207
\103\376\274\143\232\312\305\302\034\311\307\215\377\073\022\130
\010\346\266\075\354\172\054\116\373\203\226\316\014\074\151\207
\124\163\244\163\302\223\377\121\020\254\025\124\001\330\374\005
\261\211\241\177\164\203\232\111\327\334\116\173\212\110\157\213
\105\366

END

CKA_NSS_Mozilla_CA_POLICY

CK_BBOOL CK_TRUE

CKA_NSS_SERVER_DISTRUST_AFTER CK_BBOOL CK_FALSE

CKA_NSS_EMAIL_DISTRUST_AFTER CK_BBOOL CK_FALSE

Trust for "Entrust Root Certification Authority - G2"

Issuer: CN=Entrust Root Certification Authority - G2,OU="(c) 2009 Entrust, Inc. - for authorized use only",OU=See www.entrust.net/legal-terms,O="Entrust, Inc.",C=US

Serial Number: 1246989352 (0x4a538c28)

Subject: CN=Entrust Root Certification Authority - G2,OU="(c) 2009 Entrust, Inc. - for authorized use only",OU=See www.entrust.net/legal-terms,O="Entrust, Inc.",C=US

Not Valid Before: Tue Jul 07 17:25:54 2009

Not Valid After : Sat Dec 07 17:55:54 2030

Fingerprint (SHA-256):

43:DF:57:74:B0:3E:7F:EF:5F:E4:0D:93:1A:7B:ED:F1:BB:2E:6B:42:73:8C:4E:6D:38:41:10:3D:3A:A7:F3:39

Fingerprint (SHA1): 8C:F4:27:FD:79:0C:3A:D1:66:06:8D:E8:1E:57:EF:BB:93:22:72:D4

CKA_CLASS CK_OBJECT_CLASS CKO_NSS_TRUST

CKA_TOKEN CK_BBOOL CK_TRUE

CKA_PRIVATE CK_BBOOL CK_FALSE

CKA_MODIFIABLE

CK_BBOOL CK_FALSE

CKA_LABEL UTF8 "Entrust Root Certification Authority - G2"

```

CKA_CERT_SHA1_HASH MULTILINE_OCTAL
\214\364\047\375\171\014\072\321\146\006\215\350\036\127\357\273
\223\042\162\324
END
CKA_CERT_MD5_HASH MULTILINE_OCTAL
\113\342\311\221\226\145\014\364\016\132\223\222\240\012\376\262
END
CKA_ISSUER MULTILINE_OCTAL
\060\201\276\061\013\060\011\006\003\125\004\006\023\002\125\123
\061\026\060\024\006\003\125\004\012\023\015\105\156\164\162\165
\163\164\054\040\111\156\143\056\061\050\060\046\006\003\125\004
\013\023\037\123\145\145\040\167\167\167\056\145\156\164\162\165
\163\164\056\156\145\164\057\154\145\147\141\154\055\164\145\162
\155\163\061\071\060\067\006\003\125\004\013\023\060\050\143\051
\040\062\060\060\071\040\105\156\164\162\165\163\164\054\040\111
\156\143\056\040\055\040\146\157\162\040\141\165\164\150\157\162
\151\172\145\144\040\165\163\145\040\157\156\154\171\061\062\060
\060\006\003\125\004\003\023\051\105\156\164\162\165\163\164\040
\122\157\157\164\040\103\145\162\164\151\146\151\143\141\164\151
\157\156\040\101\165\164\150\157\162\151\164\171\040\055\040\107
\062
END
CKA_SERIAL_NUMBER
MULTILINE_OCTAL
\002\004\112\123\214\050
END
CKA_TRUST_SERVER_AUTH CK_TRUST CKT_NSS_TRUSTED_DELEGATOR
CKA_TRUST_EMAIL_PROTECTION CK_TRUST CKT_NSS_TRUSTED_DELEGATOR
CKA_TRUST_CODE_SIGNING CK_TRUST CKT_NSS_MUST_VERIFY_TRUST
CKA_TRUST_STEP_UP_APPROVED CK_BBOOL CK_FALSE

#
# Certificate "Entrust Root Certification Authority - EC1"
#
# Issuer: CN=Entrust Root Certification Authority - EC1,OU="(c) 2012 Entrust, Inc. - for authorized use
only",OU=See www.entrust.net/legal-terms,O="Entrust, Inc.",C=US
# Serial Number:00:a6:8b:79:29:00:00:00:50:d0:91:f9
# Subject: CN=Entrust Root Certification Authority - EC1,OU="(c) 2012 Entrust, Inc. - for authorized use
only",OU=See www.entrust.net/legal-terms,O="Entrust, Inc.",C=US
# Not Valid Before: Tue Dec 18 15:25:36 2012
# Not Valid After : Fri Dec 18 15:55:36 2037
# Fingerprint (SHA-256):
02:ED:0E:B2:8C:14:DA:45:16:5C:56:67:91:70:0D:64:51:D7:FB:56:F0:B2:AB:1D:3B:8E:B0:70:E5:6E:DF:F5
#
Fingerprint (SHA1): 20:D8:06:40:DF:9B:25:F5:12:25:3A:11:EA:F7:59:8A:EB:14:B5:47
CKA_CLASS CK_OBJECT_CLASS CKO_CERTIFICATE
CKA_TOKEN CK_BBOOL CK_TRUE
CKA_PRIVATE CK_BBOOL CK_FALSE

```



```
CKA_MODIFIABLE CK_BBOOL CK_FALSE
CKA_LABEL UTF8 "Entrust Root Certification Authority - EC1"
CKA_CERTIFICATE_TYPE CK_CERTIFICATE_TYPE CKC_X_509
CKA_SUBJECT MULTILINE_OCTAL
\060\201\277\061\013\060\011\006\003\125\004\006\023\002\125\123
\061\026\060\024\006\003\125\004\012\023\015\105\156\164\162\165
\163\164\054\040\111\156\143\056\061\050\060\046\006\003\125\004
\013\023\037\123\145\145\040\167\167\167\056\145\156\164\162\165
\163\164\056\156\145\164\057\154\145\147\141\154\055\164\145\162
\155\163\061\071\060\067\006\003\125\004\013\023\060\050\143\051
\040\062\060\061\062\040\105\156\164\162\165\163\164\054\040\111
\156\143\056\040\055\040\146\157\162\040\141\165\164\150\157\162
\151\172\145\144\040\165\163\145\040\157\156\154\171\061\063\060
\061\006\003\125\004\003\023\052\105\156\164\162\165\163\164\040
\122\157\157\164\040\103\145\162\164\151\146\151\143\141\164\151
\157\156\040\101\165\164\150\157\162\151\164\171\040\055\040\105
\103\061
END
CKA_ID
UTF8 "0"
CKA_ISSUER MULTILINE_OCTAL
\060\201\277\061\013\060\011\006\003\125\004\006\023\002\125\123
\061\026\060\024\006\003\125\004\012\023\015\105\156\164\162\165
\163\164\054\040\111\156\143\056\061\050\060\046\006\003\125\004
\013\023\037\123\145\145\040\167\167\167\056\145\156\164\162\165
\163\164\056\156\145\164\057\154\145\147\141\154\055\164\145\162
\155\163\061\071\060\067\006\003\125\004\013\023\060\050\143\051
\040\062\060\061\062\040\105\156\164\162\165\163\164\054\040\111
\156\143\056\040\055\040\146\157\162\040\141\165\164\150\157\162
\151\172\145\144\040\165\163\145\040\157\156\154\171\061\063\060
\061\006\003\125\004\003\023\052\105\156\164\162\165\163\164\040
\122\157\157\164\040\103\145\162\164\151\146\151\143\141\164\151
\157\156\040\101\165\164\150\157\162\151\164\171\040\055\040\105
\103\061
END
CKA_SERIAL_NUMBER
MULTILINE_OCTAL
\002\015\000\246\213\171\051\000\000\000\000\120\320\221\371
END
CKA_VALUE MULTILINE_OCTAL
\060\202\002\371\060\202\002\200\240\003\002\001\002\002\015\000
\246\213\171\051\000\000\000\000\120\320\221\371\060\012\006\010
\052\206\110\316\075\004\003\003\060\201\277\061\013\060\011\006
\003\125\004\006\023\002\125\123\061\026\060\024\006\003\125\004
\012\023\015\105\156\164\162\165\163\164\054\040\111\156\143\056
\061\050\060\046\006\003\125\004\013\023\037\123\145\145\040\167
\167\167\056\145\156\164\162\165\163\164\056\156\145\164\057\154
\145\147\141\154\055\164\145\162\155\163\061\071\060\067\006\003
```

\125\004\013\023\060\050\143\051\040\062\060\061\062\040\105\156
\164\162\165\163\164\054\040\111\156\143\056\040\055\040\146\157
\162\040\141\165\164\150\157\162\151\172\145\144\040\165\163\145
\040\157\156\154\171\061\063\060\061\006\003\125\004\003\023\052
\105\156\164\162\165\163\164\040\122\157\157\164\040\103\145\162
\164\151\146\151\143\141\164\151\157\156\040\101\165\164\150\157
\162\151\164\171\040\055\040\105\103\061\060\036\027\015\061\062
\061\062\061\070\061\065\062\065\063\066\132\027\015\063\067\061
\062\061\070\061\065\065\065\063\066\132\060\201\277\061\013\060
\011\006\003\125\004\006\023\002\125\123\061\026\060\024\006\003
\125\004\012\023\015\105\156\164\162\165\163\164\054\040\111\156
\143\056\061\050\060\046\006\003\125\004\013\023\037\123\145\145
\040\167\167\167\056\145\156\164\162\165\163\164\056\156\145\164
\057\154\145\147\141\154\055\164\145\162\155\163\061\071\060\067
\006\003\125\004\013\023\060\050\143\051\040\062\060\061\062\040
\105\156\164\162\165\163\164\054\040\111\156\143\056\040\055\040
\146\157\162\040\141\165\164\150\157\162\151\172\145\144\040\165
\163\145\040\157\156\154\171\061\063\060\061\006\003\125\004\003
\023\052\105\156\164\162\165\163\164\040\122\157\157\164\040\103
\145\162\164\151\146\151\143\141\164\151\157\156\040\101\165\164
\150\157\162\151\164\171\040\055\040\105\103\061\060\166\060\020
\006\007\052\206\110\316\075\002\001\006\005\053\201\004\000\042
\003\142\000\004\204\023\311\320\272\155\101\173\342\154\320\353
\125\137\146\002\032\044\364\133\211\151\107\343\270\302\175\361
\362\002\305\237\240\366\133\325\213\006\031\206\117\123\020\155
\007\044\047\241\240\370\325\107\031\141\114\175\312\223\047\352
\164\014\357\157\226\011\376\143\354\160\135\066\255\147\167\256
\311\235\174\125\104\072\242\143\121\037\365\343\142\324\251\107
\007\076\314\040\243\102\060\100\060\016\006\003\125\035\017\001
\001\377\004\004\003\002\001\006\060\017\006\003\125\035\023\001
\001\377\004\005\060\003\001\001\377\060\035\006\003\125\035\016
\004\026\004\024\267\143\347\032\335\215\351\010\246\125\203\244
\340\152\120\101\145\021\102\111\060\012\006\010\052\206\110\316
\075\004\003\003\003\147\000\060\144\002\060\141\171\330\345\102
\107\337\034\256\123\231\027\266\157\034\175\341\277\021\224\321
\003\210\165\344\215\211\244\212\167\106\336\155\141\357\002\365
\373\265\337\314\376\116\377\376\251\346\247\002\060\133\231\327
\205\067\006\265\173\010\375\353\047\213\112\224\371\341\372\247
\216\046\010\350\174\222\150\155\163\330\157\046\254\041\002\270
\231\267\046\101\133\045\140\256\320\110\032\356\006

END

CKA_NSS_MOZILLA_CA_POLICY

CK_BBOOL CK_TRUE

CKA_NSS_SERVER_DISTRUST_AFTER CK_BBOOL CK_FALSE

CKA_NSS_EMAIL_DISTRUST_AFTER CK_BBOOL CK_FALSE

Trust for "Entrust Root Certification Authority - EC1"

Issuer: CN=Entrust Root Certification Authority - EC1,OU="(c) 2012 Entrust, Inc. - for authorized use

```
only",OU=See www.entrust.net/legal-terms,O="Entrust, Inc.",C=US
# Serial Number:00:a6:8b:79:29:00:00:00:50:d0:91:f9
# Subject: CN=Entrust Root Certification Authority - EC1,OU="(c) 2012 Entrust, Inc. - for authorized use
only",OU=See www.entrust.net/legal-terms,O="Entrust, Inc.",C=US
# Not Valid Before: Tue Dec 18 15:25:36 2012
# Not Valid After : Fri Dec 18 15:55:36 2037
# Fingerprint (SHA-256):
02:ED:0E:B2:8C:14:DA:45:16:5C:56:67:91:70:0D:64:51:D7:FB:56:F0:B2:AB:1D:3B:8E:B0:70:E5:6E:DF:F5
# Fingerprint (SHA1): 20:D8:06:40:DF:9B:25:F5:12:25:3A:11:EA:F7:59:8A:EB:14:B5:47
CKA_CLASS CK_OBJECT_CLASS CKO_NSS_TRUST
CKA_TOKEN CK_BBOOL CK_TRUE
CKA_PRIVATE CK_BBOOL CK_FALSE
CKA_MODIFIABLE CK_BBOOL CK_FALSE
CKA_LABEL UTF8 "Entrust Root Certification Authority - EC1"
CKA_CERT_SHA1_HASH MULTILINE_OCTAL
\040\330\006\100\337\233\045\365\022\045\072\021\352\367\131\212
\353\024\265\107
END
CKA_CERT_MD5_HASH MULTILINE_OCTAL
\266\176\035\360\130\305\111\154\044\073\075\355\230\030\355\274
END
CKA_ISSUER MULTILINE_OCTAL
\060\201\277\061\013\060\011\006\003\125\004\006\023\002\125\123
\061\026\060\024\006\003\125\004\012\023\015\105\156\164\162\165
\163\164\054\040\111\156\143\056\061\050\060\046\006\003\125\004
\013\023\037\123\145\145\040\167\167\167\056\145\156\164\162\165
\163\164\056\156\145\164\057\154\145\147\141\154\055\164\145\162
\155\163\061\071\060\067\006\003\125\004\013\023\060\050\143\051
\040\062\060\061\062\040\105\156\164\162\165\163\164\054\040\111
\156\143\056\040\055\040\146\157\162\040\141\165\164\150\157\162
\151\172\145\144\040\165\163\145\040\157\156\154\171\061\063\060
\061\006\003\125\004\003\023\052\105\156\164\162\165\163\164\040
\122\157\157\164\040\103\145\162\164\151\146\151\143\141\164\151
\157\156\040\101\165\164\150\157\162\151\164\171\040\055\040\105
\103\061
END
CKA_SERIAL_NUMBER
MULTILINE_OCTAL
\002\015\000\246\213\171\051\000\000\000\000\120\320\221\371
END
CKA_TRUST_SERVER_AUTH CK_TRUST CKT_NSS_TRUSTED_DELEGATOR
CKA_TRUST_EMAIL_PROTECTION CK_TRUST CKT_NSS_TRUSTED_DELEGATOR
CKA_TRUST_CODE_SIGNING CK_TRUST CKT_NSS_MUST_VERIFY_TRUST
CKA_TRUST_STEP_UP_APPROVED CK_BBOOL CK_FALSE

#
# Certificate "CFCA EV ROOT"
#
```

```
# Issuer: CN=CFCA EV ROOT,O=China Financial Certification Authority,C=CN
# Serial Number: 407555286 (0x184accd6)
# Subject: CN=CFCA EV ROOT,O=China Financial Certification Authority,C=CN
# Not Valid Before: Wed Aug 08 03:07:01 2012
#
Not Valid After : Mon Dec 31 03:07:01 2029
# Fingerprint (SHA-256):
5C:C3:D7:8E:4E:1D:5E:45:54:7A:04:E6:87:3E:64:F9:0C:F9:53:6D:1C:CC:2E:F8:00:F3:55:C4:C5:FD:70:FD
# Fingerprint (SHA1): E2:B8:29:4B:55:84:AB:6B:58:C2:90:46:6C:AC:3F:B8:39:8F:84:83
CKA_CLASS CK_OBJECT_CLASS CKO_CERTIFICATE
CKA_TOKEN CK_BBOOL CK_TRUE
CKA_PRIVATE CK_BBOOL CK_FALSE
CKA_MODIFIABLE CK_BBOOL CK_FALSE
CKA_LABEL UTF8 "CFCA EV ROOT"
CKA_CERTIFICATE_TYPE CK_CERTIFICATE_TYPE CKC_X_509
CKA_SUBJECT MULTILINE_OCTAL
\060\126\061\013\060\011\006\003\125\004\006\023\002\103\116\061
\060\060\056\006\003\125\004\012\014\047\103\150\151\156\141\040
\106\151\156\141\156\143\151\141\154\040\103\145\162\164\151\146
\151\143\141\164\151\157\156\040\101\165\164\150\157\162\151\164
\171\061\025\060\023\006\003\125\004\003\014\014\103\106\103\101
\040\105\126\040\122\117\117\124
END
CKA_ID UTF8 "0"
CKA_ISSUER MULTILINE_OCTAL
\060\126\061\013\060\011\006\003\125\004\006\023\002\103\116\061
\060\060\056\006\003\125\004\012\014\047\103\150\151\156\141\040
\106\151\156\141\156\143\151\141\154\040\103\145\162\164\151\146
\151\143\141\164\151\157\156\040\101\165\164\150\157\162\151\164
\171\061\025\060\023\006\003\125\004\003\014\014\103\106\103\101
\040\105\126\040\122\117\117\124
END
CKA_SERIAL_NUMBER
MULTILINE_OCTAL
\002\004\030\112\314\326
END
CKA_VALUE MULTILINE_OCTAL
\060\202\005\215\060\202\003\165\240\003\002\001\002\002\004\030
\112\314\326\060\015\006\011\052\206\110\206\367\015\001\001\013
\005\000\060\126\061\013\060\011\006\003\125\004\006\023\002\103
\116\061\060\060\056\006\003\125\004\012\014\047\103\150\151\156
\141\040\106\151\156\141\156\143\151\141\154\040\103\145\162\164
\151\146\151\143\141\164\151\157\156\040\101\165\164\150\157\162
\151\164\171\061\025\060\023\006\003\125\004\003\014\014\103\106
\103\101\040\105\126\040\122\117\117\124\060\036\027\015\061\062
\060\070\060\070\060\063\060\067\060\061\132\027\015\062\071\061
\062\063\061\060\063\060\067\060\061\132\060\126\061\013\060\011
\006\003\125\004\006\023\002\103\116\061\060\060\056\006\003\125
```

\004\012\014\047\103\150\151\156\141\040\106\151\156\141\156\143
\151\141\154\040\103\145\162\164\151\146\151\143\141\164\151\157
\156\040\101\165\164\150\157\162\151\164\171\061\025\060\023\006
\003\125\004\003\014\014\103\106\103\101\040\105\126\040\122\117
\117\124\060\202\002\042\060\015\006\011\052\206\110\206\367\015
\001\001\001\005\000\003\202\002\017\000\060\202\002\012\002\202
\002\001\000\327\135\153\315\020\077\037\005\131\325\005\115\067
\261\016\354\230\053\216\025\035\372\223\113\027\202\041\161\020
\122\327\121\144\160\026\302\125\151\115\216\025\155\237\277\014
\033\302\340\243\147\326\014\254\317\042\256\257\167\124\052\113
\114\212\123\122\172\303\356\056\336\263\161\045\301\351\135\075
\356\241\057\243\367\052\074\311\043\035\152\253\035\241\247\361
\363\354\240\325\104\317\025\317\162\057\035\143\227\350\231\371
\375\223\244\124\200\114\122\324\122\253\056\111\337\220\315\270
\137\276\077\336\241\312\115\040\324\045\350\204\051\123\267\261
\210\037\377\372\332\220\237\012\251\055\101\077\261\361\030\051
\356\026\131\054\064\111\032\250\006\327\250\210\322\003\162\172
\062\342\352\150\115\156\054\226\145\173\312\131\372\362\342\335
\356\060\054\373\314\106\254\304\143\353\157\177\066\053\064\163
\022\224\177\337\314\046\236\361\162\135\120\145\131\217\151\263
\207\136\062\157\303\030\212\265\225\217\260\172\067\336\132\105
\073\307\066\341\357\147\321\071\323\227\133\163\142\031\110\055
\207\034\006\373\164\230\040\111\163\360\005\322\033\261\240\243
\267\033\160\323\210\151\271\132\326\070\364\142\334\045\213\170
\277\370\350\176\270\134\311\225\117\137\247\055\271\040\153\317
\153\335\365\015\364\202\267\364\262\146\056\020\050\366\227\132
\173\226\026\217\001\031\055\154\156\177\071\130\006\144\203\001
\203\203\303\115\222\335\062\306\207\244\067\351\026\316\252\055
\150\257\012\201\145\072\160\301\233\255\115\155\124\312\052\055
\113\205\033\263\200\346\160\105\015\153\136\065\360\177\073\270
\234\344\004\160\211\022\045\223\332\012\231\042\140\152\143\140
\116\166\006\230\116\275\203\255\035\130\212\045\205\322\307\145
\036\055\216\306\337\266\306\341\177\212\004\041\025\051\164\360
\076\234\220\235\014\056\361\212\076\132\252\014\011\036\307\325
\074\243\355\227\303\036\064\372\070\371\010\016\343\300\135\053
\203\321\126\152\311\266\250\124\123\056\170\062\147\075\202\177
\164\320\373\341\266\005\140\271\160\333\216\013\371\023\130\157
\161\140\020\122\020\271\301\101\011\357\162\037\147\061\170\377
\226\005\215\002\003\001\000\001\243\143\060\141\060\037\006\003
\125\035\043\004\030\060\026\200\024\343\376\055\375\050\320\013
\265\272\266\242\304\277\006\252\005\214\223\373\057\060\017\006
\003\125\035\023\001\001\377\004\005\060\003\001\001\377\060\016
\006\003\125\035\017\001\001\377\004\004\003\002\001\006\060\035
\006\003\125\035\016\004\026\004\024\343\376\055\375\050\320\013
\265\272\266\242\304\277\006\252\005\214\223\373\057\060\015\006
\011\052\206\110\206\367\015\001\001\013\005\000\003\202\002\001
\000\045\306\272\153\353\207\313\336\202\071\226\075\360\104\247
\153\204\163\003\336\235\053\117\272\040\177\274\170\262\317\227

\260\033\234\363\327\171\056\365\110\266\322\373\027\210\346\323
\172\077\355\123\023\320\342\057\152\171\313\000\043\050\346\036
\067\127\065\211\204\302\166\117\064\066\255\147\303\316\101\006
\210\305\367\356\330\032\270\326\013\177\120\377\223\252\027\113
\214\354\355\122\140\262\244\006\352\116\353\364\153\031\375\353
\365\032\340\045\052\232\334\307\101\066\367\310\164\005\204\071
\225\071\326\013\073\244\047\372\010\330\134\036\370\004\140\122
\021\050\050\003\377\357\123\146\000\245\112\064\026\146\174\375
\011\244\256\236\147\032\157\101\013\153\006\023\233\217\206\161
\005\264\057\215\211\146\063\051\166\124\232\021\370\047\372\262
\077\221\340\316\015\033\363\060\032\255\277\042\135\033\323\277
\045\005\115\341\222\032\177\231\237\074\104\223\312\324\100\111
\154\200\207\327\004\072\303\062\122\065\016\126\370\245\335\175
\304\213\015\021\037\123\313\036\262\027\266\150\167\132\340\324
\313\310\007\256\365\072\056\216\067\267\320\001\113\103\051\167
\214\071\227\217\202\132\370\121\345\211\240\030\347\150\177\135
\012\056\373\243\107\016\075\246\043\172\306\001\307\217\310\136
\277\155\200\126\276\212\044\272\063\352\237\341\062\021\236\361
\322\117\200\366\033\100\257\070\236\021\120\171\163\022\022\315
\346\154\235\054\210\162\074\060\201\006\221\042\352\131\255\332
\031\056\042\302\215\271\214\207\340\146\274\163\043\137\041\144
\143\200\110\365\240\074\030\075\224\310\110\101\035\100\272\136
\376\376\126\071\241\310\317\136\236\031\144\106\020\332\027\221
\267\005\200\254\213\231\222\175\347\242\330\007\013\066\047\347
\110\171\140\212\303\327\023\134\370\162\100\337\112\313\317\231
\000\012\000\013\021\225\332\126\105\003\210\012\237\147\320\325
\171\261\250\215\100\155\015\302\172\100\372\363\137\144\107\222
\313\123\271\273\131\316\117\375\320\025\123\001\330\337\353\331
\346\166\357\320\043\273\073\251\171\263\325\002\051\315\211\243
\226\017\112\065\347\116\102\300\165\315\007\317\346\054\353\173
\056

END

CKA_NSS_MOZILLA_CA_POLICY

CK_BBOOL CK_TRUE

CKA_NSS_SERVER_DISTRUST_AFTER CK_BBOOL CK_FALSE

CKA_NSS_EMAIL_DISTRUST_AFTER CK_BBOOL CK_FALSE

Trust for "CFCA EV ROOT"

Issuer: CN=CFCA EV ROOT,O=China Financial Certification Authority,C=CN

Serial Number: 407555286 (0x184accd6)

Subject: CN=CFCA EV ROOT,O=China Financial Certification Authority,C=CN

Not Valid Before: Wed Aug 08 03:07:01 2012

Not Valid After : Mon Dec 31 03:07:01 2029

Fingerprint (SHA-256):

5C:C3:D7:8E:4E:1D:5E:45:54:7A:04:E6:87:3E:64:F9:0C:F9:53:6D:1C:CC:2E:F8:00:F3:55:C4:C5:FD:70:FD

Fingerprint (SHA1): E2:B8:29:4B:55:84:AB:6B:58:C2:90:46:6C:AC:3F:B8:39:8F:84:83

CKA_CLASS CK_OBJECT_CLASS CKO_NSS_TRUST

CKA_TOKEN CK_BBOOL CK_TRUE

```

CKA_PRIVATE CK_BBOOL CK_FALSE
CKA_MODIFIABLE CK_BBOOL CK_FALSE
CKA_LABEL UTF8 "CFCA EV ROOT"
CKA_CERT_SHA1_HASH MULTILINE_OCTAL
\342\270\051\113\125\204\253\153\130\302\220\106\154\254\077\270
\071\217\204\203
END
CKA_CERT_MD5_HASH
MULTILINE_OCTAL
\164\341\266\355\046\172\172\104\060\063\224\253\173\047\201\060
END
CKA_ISSUER MULTILINE_OCTAL
\060\126\061\013\060\011\006\003\125\004\006\023\002\103\116\061
\060\060\056\006\003\125\004\012\014\047\103\150\151\156\141\040
\106\151\156\141\156\143\151\141\154\040\103\145\162\164\151\146
\151\143\141\164\151\157\156\040\101\165\164\150\157\162\151\164
\171\061\025\060\023\006\003\125\004\003\014\014\103\106\103\101
\040\105\126\040\122\117\117\124
END
CKA_SERIAL_NUMBER MULTILINE_OCTAL
\002\004\030\112\314\326
END
CKA_TRUST_SERVER_AUTH CK_TRUST CKT_NSS_TRUSTED_DELEGATOR
CKA_TRUST_EMAIL_PROTECTION CK_TRUST CKT_NSS_MUST_VERIFY_TRUST
CKA_TRUST_CODE_SIGNING CK_TRUST CKT_NSS_MUST_VERIFY_TRUST
CKA_TRUST_STEP_UP_APPROVED CK_BBOOL CK_FALSE

#
# Certificate "OISTE WISeKey Global Root GB CA"
#
# Issuer: CN=OISTE WISeKey Global Root GB CA,OU=OISTE Foundation Endorsed,O=WISeKey,C=CH
# Serial Number:76:b1:20:52:74:f0:85:87:46:b3:f8:23:1a:f6:c2:c0
#
Subject: CN=OISTE WISeKey Global Root GB CA,OU=OISTE Foundation Endorsed,O=WISeKey,C=CH
# Not Valid Before: Mon Dec 01 15:00:32 2014
# Not Valid After : Thu Dec 01 15:10:31 2039
# Fingerprint (SHA-256):
6B:9C:08:E8:6E:B0:F7:67:CF:AD:65:CD:98:B6:21:49:E5:49:4A:67:F5:84:5E:7B:D1:ED:01:9F:27:B8:6B:D6
# Fingerprint (SHA1): 0F:F9:40:76:18:D3:D7:6A:4B:98:F0:A8:35:9E:0C:FD:27:AC:CC:ED
CKA_CLASS CK_OBJECT_CLASS CKO_CERTIFICATE
CKA_TOKEN CK_BBOOL CK_TRUE
CKA_PRIVATE CK_BBOOL CK_FALSE
CKA_MODIFIABLE CK_BBOOL CK_FALSE
CKA_LABEL UTF8 "OISTE WISeKey Global Root GB CA"
CKA_CERTIFICATE_TYPE CK_CERTIFICATE_TYPE CKC_X_509
CKA_SUBJECT MULTILINE_OCTAL
\060\155\061\013\060\011\006\003\125\004\006\023\002\103\110\061
\020\060\016\006\003\125\004\012\023\007\127\111\123\145\113\145

```

\171\061\042\060\040\006\003\125\004\013\023\031\117\111\123\124
\105\040\106\157\165\156\144\141\164\151\157\156\040\105\156\144
\157\162\163\145\144\061\050\060\046\006\003\125\004\003\023\037
\117\111\123\124\105\040\127\111\123\145\113\145\171\040\107\154
\157\142\141\154\040\122\157\157\164\040\107\102\040\103\101

END

CKA_ID

UTF8 "0"

CKA_ISSUER MULTILINE_OCTAL

\060\155\061\013\060\011\006\003\125\004\006\023\002\103\110\061
\020\060\016\006\003\125\004\012\023\007\127\111\123\145\113\145
\171\061\042\060\040\006\003\125\004\013\023\031\117\111\123\124
\105\040\106\157\165\156\144\141\164\151\157\156\040\105\156\144
\157\162\163\145\144\061\050\060\046\006\003\125\004\003\023\037
\117\111\123\124\105\040\127\111\123\145\113\145\171\040\107\154
\157\142\141\154\040\122\157\157\164\040\107\102\040\103\101

END

CKA_SERIAL_NUMBER MULTILINE_OCTAL

\002\020\166\261\040\122\164\360\205\207\106\263\370\043\032\366
\302\300

END

CKA_VALUE MULTILINE_OCTAL

\060\202\003\265\060\202\002\235\240\003\002\001\002\002\020\166
\261\040\122\164\360\205\207\106\263\370\043\032\366\302\300\060
\015\006\011\052\206\110\206\367\015\001\001\013\005\000\060\155
\061\013\060\011\006\003\125\004\006\023\002\103\110\061\020\060
\016\006\003\125\004\012\023\007\127\111\123\145\113\145\171\061
\042\060\040\006\003\125\004\013\023\031\117\111\123\124\105\040
\106\157\165\156\144\141\164\151\157\156\040\105\156\144\157\162
\163\145\144\061\050\060\046\006\003\125\004\003\023\037\117\111
\123\124\105\040\127\111\123\145\113\145\171\040\107\154\157\142
\141\154\040\122\157\157\164\040\107\102\040\103\101\060\036\027
\015\061\064\061\062\060\061\061\065\060\060\063\062\132\027\015
\063\071\061\062\060\061\061\065\061\060\063\061\132\060\155\061
\013\060\011\006\003\125\004\006\023\002\103\110\061\020\060\016
\006\003\125\004\012\023\007\127\111\123\145\113\145\171\061\042
\060\040\006\003\125\004\013\023\031\117\111\123\124\105\040\106
\157\165\156\144\141\164\151\157\156\040\105\156\144\157\162\163
\145\144\061\050\060\046\006\003\125\004\003\023\037\117\111\123
\124\105\040\127\111\123\145\113\145\171\040\107\154\157\142\141
\154\040\122\157\157\164\040\107\102\040\103\101\060\202\001\042
\060\015\006\011\052\206\110\206\367\015\001\001\001\005\000\003
\202\001\017\000\060\202\001\012\002\202\001\001\000\330\027\267
\034\112\044\052\326\227\261\312\342\036\373\175\070\357\230\365
\262\071\230\116\047\270\021\135\173\322\045\224\210\202\025\046
\152\033\061\273\250\133\041\041\053\330\017\116\237\132\361\261
\132\344\171\326\062\043\053\341\123\314\231\105\134\173\117\255
\274\277\207\112\013\113\227\132\250\366\110\354\175\173\015\315

\041\006\337\236\025\375\101\212\110\267\040\364\241\172\033\127
\324\135\120\377\272\147\330\043\231\037\310\077\343\336\377\157
\133\167\261\153\156\270\311\144\367\341\312\101\106\016\051\161
\320\271\043\374\311\201\137\116\367\157\337\277\204\255\163\144
\273\267\102\216\151\366\324\166\035\176\235\247\270\127\212\121
\147\162\327\324\250\270\225\124\100\163\003\366\352\364\353\376
\050\102\167\077\235\043\033\262\266\075\200\024\007\114\056\117
\367\325\012\026\015\275\146\103\067\176\043\103\171\303\100\206
\365\114\051\332\216\232\255\015\245\004\207\210\036\205\343\351
\123\325\233\310\213\003\143\170\353\340\031\112\156\273\057\153
\063\144\130\223\255\151\277\217\033\357\202\110\307\002\003\001
\000\001\243\121\060\117\060\013\006\003\125\035\017\004\004\003
\002\001\206\060\017\006\003\125\035\023\001\001\377\004\005\060
\003\001\001\377\060\035\006\003\125\035\016\004\026\004\024\065
\017\310\066\143\136\342\243\354\371\073\146\025\316\121\122\343
\221\232\075\060\020\006\011\053\006\001\004\001\202\067\025\001
\004\003\002\001\000\060\015\006\011\052\206\110\206\367\015\001
\001\013\005\000\003\202\001\001\000\100\114\373\207\262\231\201
\220\176\235\305\260\260\046\315\210\173\053\062\215\156\270\041
\161\130\227\175\256\067\024\257\076\347\367\232\342\175\366\161
\230\231\004\252\103\164\170\243\343\111\141\076\163\214\115\224
\340\371\161\304\266\026\016\123\170\037\326\242\207\057\002\071
\201\051\074\257\025\230\041\060\376\050\220\000\214\321\341\313
\372\136\310\375\370\020\106\073\242\170\102\221\027\164\125\012
\336\120\147\115\146\321\247\377\375\331\300\265\250\243\212\316
\146\365\017\103\315\247\053\127\173\143\106\152\252\056\122\330
\364\355\341\155\255\051\220\170\110\272\341\043\252\243\211\354
\265\253\226\300\264\113\242\035\227\236\172\362\156\100\161\337
\150\361\145\115\316\174\005\337\123\145\251\245\360\261\227\004
\160\025\106\003\230\324\322\277\124\264\240\130\175\122\157\332
\126\046\142\324\330\333\211\061\157\034\360\042\302\323\142\034
\065\315\114\151\025\124\032\220\230\336\353\036\137\312\167\307
\313\216\075\103\151\234\232\130\320\044\073\337\033\100\226\176
\065\255\201\307\116\161\272\210\023

END

CKA_NSS_Mozilla_CA_POLICY

CK_BBOOL CK_TRUE

CKA_NSS_SERVER_DISTRUST_AFTER CK_BBOOL CK_FALSE

CKA_NSS_EMAIL_DISTRUST_AFTER CK_BBOOL CK_FALSE

Trust for "OISTE WISEKey Global Root GB CA"

Issuer: CN=OISTE WISEKey Global Root GB CA,OU=OISTE Foundation Endorsed,O=WISEKey,C=CH

Serial Number:76:b1:20:52:74:f0:85:87:46:b3:f8:23:1a:f6:c2:c0

Subject:

CN=OISTE WISEKey Global Root GB CA,OU=OISTE Foundation Endorsed,O=WISEKey,C=CH

Not Valid Before: Mon Dec 01 15:00:32 2014

Not Valid After : Thu Dec 01 15:10:31 2039

Fingerprint (SHA-256):

```

6B:9C:08:E8:6E:B0:F7:67:CF:AD:65:CD:98:B6:21:49:E5:49:4A:67:F5:84:5E:7B:D1:ED:01:9F:27:B8:6B:D6
# Fingerprint (SHA1): 0F:F9:40:76:18:D3:D7:6A:4B:98:F0:A8:35:9E:0C:FD:27:AC:CC:ED
CKA_CLASS CK_OBJECT_CLASS CKO_NSS_TRUST
CKA_TOKEN CK_BBOOL CK_TRUE
CKA_PRIVATE CK_BBOOL CK_FALSE
CKA_MODIFIABLE CK_BBOOL CK_FALSE
CKA_LABEL UTF8 "OISTE WISeKey Global Root GB CA"
CKA_CERT_SHA1_HASH MULTILINE_OCTAL
\017\371\100\166\030\323\327\152\113\230\360\250\065\236\014\375
\047\254\314\355
END
CKA_CERT_MD5_HASH MULTILINE_OCTAL
\244\353\271\141\050\056\267\057\230\260\065\046\220\231\121\035
END
CKA_ISSUER MULTILINE_OCTAL
\060\155\061\013\060\011\006\003\125\004\006\023\002\103\110\061
\020\060\016\006\003\125\004\012\023\007\127\111\123\145\113\145
\171\061\042\060\040\006\003\125\004\013\023\031\117\111\123\124
\105\040\106\157\165\156\144\141\164\151\157\156\040\105\156\144
\157\162\163\145\144\061\050\060\046\006\003\125\004\003\023\037
\117\111\123\124\105\040\127\111\123\145\113\145\171\040\107\154
\157\142\141\154\040\122\157\157\164\040\107\102\040\103\101
END
CKA_SERIAL_NUMBER
MULTILINE_OCTAL
\002\020\166\261\040\122\164\360\205\207\106\263\370\043\032\366
\302\300
END
CKA_TRUST_SERVER_AUTH CK_TRUST CKT_NSS_TRUSTED_DELEGATOR
CKA_TRUST_EMAIL_PROTECTION CK_TRUST CKT_NSS_TRUSTED_DELEGATOR
CKA_TRUST_CODE_SIGNING CK_TRUST CKT_NSS_MUST_VERIFY_TRUST
CKA_TRUST_STEP_UP_APPROVED CK_BBOOL CK_FALSE

#
# Certificate "SZAFIR ROOT CA2"
#
# Issuer: CN=SZAFIR ROOT CA2,O=Krajowa Izba Rozliczeniowa S.A.,C=PL
# Serial Number:3e:8a:5d:07:ec:55:d2:32:d5:b7:e3:b6:5f:01:eb:2d:dc:e4:d6:e4
# Subject: CN=SZAFIR ROOT CA2,O=Krajowa Izba Rozliczeniowa S.A.,C=PL
# Not Valid Before: Mon Oct 19 07:43:30 2015
# Not Valid After : Fri Oct 19 07:43:30 2035
# Fingerprint (SHA-256):
A1:33:9D:33:28:1A:0B:56:E5:57:D3:D3:2B:1C:E7:F9:36:7E:B0:94:BD:5F:A7:2A:7E:50:04:C8:DE:D7:CA:FE
#
Fingerprint (SHA1): E2:52:FA:95:3F:ED:DB:24:60:BD:6E:28:F3:9C:CC:CF:5E:B3:3F:DE
CKA_CLASS CK_OBJECT_CLASS CKO_CERTIFICATE
CKA_TOKEN CK_BBOOL CK_TRUE
CKA_PRIVATE CK_BBOOL CK_FALSE

```

```
CKA_MODIFIABLE CK_BBOOL CK_FALSE
CKA_LABEL UTF8 "SZAFIR ROOT CA2"
CKA_CERTIFICATE_TYPE CK_CERTIFICATE_TYPE CKC_X_509
CKA_SUBJECT MULTILINE_OCTAL
\060\121\061\013\060\011\006\003\125\004\006\023\002\120\114\061
\050\060\046\006\003\125\004\012\014\037\113\162\141\152\157\167
\141\040\111\172\142\141\040\122\157\172\154\151\143\172\145\156
\151\157\167\141\040\123\056\101\056\061\030\060\026\006\003\125
\004\003\014\017\123\132\101\106\111\122\040\122\117\117\124\040
\103\101\062
END
CKA_ID UTF8 "0"
CKA_ISSUER MULTILINE_OCTAL
\060\121\061\013\060\011\006\003\125\004\006\023\002\120\114\061
\050\060\046\006\003\125\004\012\014\037\113\162\141\152\157\167
\141\040\111\172\142\141\040\122\157\172\154\151\143\172\145\156
\151\157\167\141\040\123\056\101\056\061\030\060\026\006\003\125
\004\003\014\017\123\132\101\106\111\122\040\122\117\117\124\040
\103\101\062
END
CKA_SERIAL_NUMBER
MULTILINE_OCTAL
\002\024\076\212\135\007\354\125\322\062\325\267\343\266\137\001
\353\055\334\344\326\344
END
CKA_VALUE MULTILINE_OCTAL
\060\202\003\162\060\202\002\132\240\003\002\001\002\002\024\076
\212\135\007\354\125\322\062\325\267\343\266\137\001\353\055\334
\344\326\344\060\015\006\011\052\206\110\206\367\015\001\001\013
\005\000\060\121\061\013\060\011\006\003\125\004\006\023\002\120
\114\061\050\060\046\006\003\125\004\012\014\037\113\162\141\152
\157\167\141\040\111\172\142\141\040\122\157\172\154\151\143\172
\145\156\151\157\167\141\040\123\056\101\056\061\030\060\026\006
\003\125\004\003\014\017\123\132\101\106\111\122\040\122\117\117
\124\040\103\101\062\060\036\027\015\061\065\061\060\061\071\060
\067\064\063\063\060\132\027\015\063\065\061\060\061\071\060\067
\064\063\063\060\132\060\121\061\013\060\011\006\003\125\004\006
\023\002\120\114\061\050\060\046\006\003\125\004\012\014\037\113
\162\141\152\157\167\141\040\111\172\142\141\040\122\157\172\154
\151\143\172\145\156\151\157\167\141\040\123\056\101\056\061\030
\060\026\006\003\125\004\003\014\017\123\132\101\106\111\122\040
\122\117\117\124\040\103\101\062\060\202\001\042\060\015\006\011
\052\206\110\206\367\015\001\001\001\005\000\003\202\001\017\000
\060\202\001\012\002\202\001\001\000\267\274\076\120\250\113\315
\100\265\316\141\347\226\312\264\241\332\014\042\260\372\265\173
\166\000\167\214\013\317\175\250\206\314\046\121\344\040\075\205
\014\326\130\343\347\364\052\030\235\332\321\256\046\356\353\123
\334\364\220\326\023\112\014\220\074\303\364\332\322\216\015\222
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\072\334\261\261\377\070\336\303\272\055\137\200\271\002\275\112
\235\033\017\264\303\302\301\147\003\335\334\033\234\075\263\260
\336\000\036\250\064\107\273\232\353\376\013\024\275\066\204\332
\015\040\277\372\133\313\251\026\040\255\071\140\356\057\165\266
\347\227\234\371\076\375\176\115\157\115\057\357\210\015\152\372
\335\361\075\156\040\245\240\022\264\115\160\271\316\327\162\073
\211\223\247\200\204\034\047\111\162\111\265\377\073\225\236\301
\314\310\001\354\350\016\212\012\226\347\263\246\207\345\326\371
\005\053\015\227\100\160\074\272\254\165\132\234\325\115\235\002
\012\322\113\233\146\113\106\007\027\145\255\237\154\210\000\334
\042\211\340\341\144\324\147\274\061\171\141\074\273\312\101\315
\134\152\000\310\074\070\216\130\257\002\003\001\000\001\243\102
\060\100\060\017\006\003\125\035\023\001\001\377\004\005\060\003
\001\001\377\060\016\006\003\125\035\017\001\001\377\004\004\003
\002\001\006\060\035\006\003\125\035\016\004\026\004\024\056\026
\251\112\030\265\313\314\365\157\120\363\043\137\370\135\347\254
\360\310\060\015\006\011\052\206\110\206\367\015\001\001\013\005
\000\003\202\001\001\000\265\163\370\003\334\131\133\035\166\351
\243\052\173\220\050\262\115\300\063\117\252\232\261\324\270\344
\047\377\251\226\231\316\106\340\155\174\114\242\070\244\006\160
\360\364\101\021\354\077\107\215\077\162\207\371\073\375\244\157
\053\123\000\340\377\071\271\152\007\016\353\035\034\366\242\162
\220\313\202\075\021\202\213\322\273\237\052\257\041\346\143\206
\235\171\031\357\367\273\014\065\220\303\212\355\117\017\365\314
\022\331\244\076\273\240\374\040\225\137\117\046\057\021\043\203
\116\165\007\017\277\233\321\264\035\351\020\004\376\312\140\217
\242\114\270\255\317\341\220\017\315\256\012\307\135\173\267\120
\322\324\141\372\325\025\333\327\237\207\121\124\353\245\343\353
\311\205\240\045\040\067\373\216\316\014\064\204\341\074\201\262
\167\116\103\245\210\137\206\147\241\075\346\264\134\141\266\076
\333\376\267\050\305\242\007\256\265\312\312\215\052\022\357\227
\355\302\060\244\311\052\172\373\363\115\043\033\231\063\064\240
\056\365\251\013\077\324\135\341\317\204\237\342\031\302\137\212
\326\040\036\343\163\267

END

CKA_NSS_Mozilla_CA_POLICY

CK_BBOOL CK_TRUE

CKA_NSS_SERVER_DISTRUST_AFTER CK_BBOOL CK_FALSE

CKA_NSS_EMAIL_DISTRUST_AFTER CK_BBOOL

CK_FALSE

Trust for "SZAFIR ROOT CA2"

Issuer: CN=SZAFIR ROOT CA2,O=Krajowa Izba Rozliczeniowa S.A.,C=PL

Serial Number:3e:8a:5d:07:ec:55:d2:32:d5:b7:e3:b6:5f:01:eb:2d:dc:e4:d6:e4

Subject: CN=SZAFIR ROOT CA2,O=Krajowa Izba Rozliczeniowa S.A.,C=PL

Not Valid Before: Mon Oct 19 07:43:30 2015

Not Valid After : Fri Oct 19 07:43:30 2035

Fingerprint (SHA-256):

```

A1:33:9D:33:28:1A:0B:56:E5:57:D3:D3:2B:1C:E7:F9:36:7E:B0:94:BD:5F:A7:2A:7E:50:04:C8:DE:D7:CA:FE
# Fingerprint (SHA1): E2:52:FA:95:3F:ED:DB:24:60:BD:6E:28:F3:9C:CC:CF:5E:B3:3F:DE
CKA_CLASS CK_OBJECT_CLASS CKO_NSS_TRUST
CKA_TOKEN CK_BBOOL CK_TRUE
CKA_PRIVATE CK_BBOOL CK_FALSE
CKA_MODIFIABLE CK_BBOOL CK_FALSE
CKA_LABEL UTF8 "SZAFIR ROOT CA2"
CKA_CERT_SHA1_HASH MULTILINE_OCTAL
\342\122\372\225\077\355\333\044\140\275\156\050\363\234\314\317
\136\263\077\336
END
CKA_CERT_MD5_HASH MULTILINE_OCTAL
\021\144\301\211\260\044\261\214\261\007\176\211\236\121\236\231
END
CKA_ISSUER MULTILINE_OCTAL
\060\121\061\013\060\011\006\003\125\004\006\023\002\120\114\061
\050\060\046\006\003\125\004\012\014\037\113\162\141\152\157\167
\141\040\111\172\142\141\040\122\157\172\154\151\143\172\145\156
\151\157\167\141\040\123\056\101\056\061\030\060\026\006\003\125
\004\003\014\017\123\132\101\106\111\122\040\122\117\117\124\040
\103\101\062
END
CKA_SERIAL_NUMBER
MULTILINE_OCTAL
\002\024\076\212\135\007\354\125\322\062\325\267\343\266\137\001
\353\055\334\344\326\344
END
CKA_TRUST_SERVER_AUTH CK_TRUST CKT_NSS_TRUSTED_DELEGATOR
CKA_TRUST_EMAIL_PROTECTION CK_TRUST CKT_NSS_TRUSTED_DELEGATOR
CKA_TRUST_CODE_SIGNING CK_TRUST CKT_NSS_MUST_VERIFY_TRUST
CKA_TRUST_STEP_UP_APPROVED CK_BBOOL CK_FALSE

#
# Certificate "Certum Trusted Network CA 2"
#
# Issuer: CN=Certum Trusted Network CA 2,OU=Certum Certification Authority,O=Unizeto Technologies
S.A.,C=PL
# Serial Number:21:d6:d0:4a:4f:25:0f:c9:32:37:fc:aa:5e:12:8d:e9
# Subject: CN=Certum Trusted Network CA 2,OU=Certum Certification Authority,O=Unizeto Technologies
S.A.,C=PL
# Not Valid Before:
Thu Oct 06 08:39:56 2011
# Not Valid After : Sat Oct 06 08:39:56 2046
# Fingerprint (SHA-256):
B6:76:F2:ED:DA:E8:77:5C:D3:6C:B0:F6:3C:D1:D4:60:39:61:F4:9E:62:65:BA:01:3A:2F:03:07:B6:D0:B8:04
# Fingerprint (SHA1): D3:DD:48:3E:2B:BF:4C:05:E8:AF:10:F5:FA:76:26:CF:D3:DC:30:92
CKA_CLASS CK_OBJECT_CLASS CKO_CERTIFICATE
CKA_TOKEN CK_BBOOL CK_TRUE

```

```
CKA_PRIVATE CK_BBOOL CK_FALSE
CKA_MODIFIABLE CK_BBOOL CK_FALSE
CKA_LABEL UTF8 "Certum Trusted Network CA 2"
CKA_CERTIFICATE_TYPE CK_CERTIFICATE_TYPE CKC_X_509
CKA_SUBJECT MULTILINE_OCTAL
\060\201\200\061\013\060\011\006\003\125\004\006\023\002\120\114
\061\042\060\040\006\003\125\004\012\023\031\125\156\151\172\145
\164\157\040\124\145\143\150\156\157\154\157\147\151\145\163\040
\123\056\101\056\061\047\060\045\006\003\125\004\013\023\036\103
\145\162\164\165\155\040\103\145\162\164\151\146\151\143\141\164
\151\157\156\040\101\165\164\150\157\162\151\164\171\061\044\060
\042\006\003\125\004\003\023\033\103\145\162\164\165\155\040\124
\162\165\163\164\145\144\040\116\145\164\167\157\162\153\040\103
\101\040\062
END
CKA_ID
UTF8 "0"
CKA_ISSUER MULTILINE_OCTAL
\060\201\200\061\013\060\011\006\003\125\004\006\023\002\120\114
\061\042\060\040\006\003\125\004\012\023\031\125\156\151\172\145
\164\157\040\124\145\143\150\156\157\154\157\147\151\145\163\040
\123\056\101\056\061\047\060\045\006\003\125\004\013\023\036\103
\145\162\164\165\155\040\103\145\162\164\151\146\151\143\141\164
\151\157\156\040\101\165\164\150\157\162\151\164\171\061\044\060
\042\006\003\125\004\003\023\033\103\145\162\164\165\155\040\124
\162\165\163\164\145\144\040\116\145\164\167\157\162\153\040\103
\101\040\062
END
CKA_SERIAL_NUMBER MULTILINE_OCTAL
\002\020\041\326\320\112\117\045\017\311\062\067\374\252\136\022
\215\351
END
CKA_VALUE MULTILINE_OCTAL
\060\202\005\322\060\202\003\272\240\003\002\001\002\002\020\041
\326\320\112\117\045\017\311\062\067\374\252\136\022\215\351\060
\015\006\011\052\206\110\206\367\015\001\001\015\005\000\060\201
\200\061\013\060\011\006\003\125\004\006\023\002\120\114\061\042
\060\040\006\003\125\004\012\023\031\125\156\151\172\145\164\157
\040\124\145\143\150\156\157\154\157\147\151\145\163\040\123\056
\101\056\061\047\060\045\006\003\125\004\013\023\036\103\145\162
\164\165\155\040\103\145\162\164\151\146\151\143\141\164\151\157
\156\040\101\165\164\150\157\162\151\164\171\061\044\060\042\006
\003\125\004\003\023\033\103\145\162\164\165\155\040\124\162\165
\163\164\145\144\040\116\145\164\167\157\162\153\040\103\101\040
\062\060\042\030\017\062\060\061\061\061\060\060\066\060\070\063
\071\065\066\132\030\017\062\060\064\066\061\060\060\066\060\070
\063\071\065\066\132\060\201\200\061\013\060\011\006\003\125\004
\006\023\002\120\114\061\042\060\040\006\003\125\004\012\023\031
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\125\156\151\172\145\164\157\040\124\145\143\150\156\157\154\157
\147\151\145\163\040\123\056\101\056\061\047\060\045\006\003\125
\004\013\023\036\103\145\162\164\165\155\040\103\145\162\164\151
\146\151\143\141\164\151\157\156\040\101\165\164\150\157\162\151
\164\171\061\044\060\042\006\003\125\004\003\023\033\103\145\162
\164\165\155\040\124\162\165\163\164\145\144\040\116\145\164\167
\157\162\153\040\103\101\040\062\060\202\002\042\060\015\006\011
\052\206\110\206\367\015\001\001\001\005\000\003\202\002\017\000
\060\202\002\012\002\202\002\001\000\275\371\170\370\346\325\200
\014\144\235\206\033\226\144\147\077\042\072\036\165\001\175\357
\373\134\147\214\311\314\134\153\251\221\346\271\102\345\040\113
\233\332\233\173\271\231\135\331\233\200\113\327\204\100\053\047
\323\350\272\060\273\076\011\032\247\111\225\357\053\100\044\302
\227\307\247\356\233\045\357\250\012\000\227\205\132\252\235\334
\051\311\342\065\007\353\160\115\112\326\301\263\126\270\241\101
\070\233\321\373\061\177\217\340\137\341\261\077\017\216\026\111
\140\327\006\215\030\371\252\046\020\253\052\323\320\321\147\215
\033\106\276\107\060\325\056\162\321\305\143\332\347\143\171\104
\176\113\143\044\211\206\056\064\077\051\114\122\213\052\247\300
\342\221\050\211\271\300\133\371\035\331\347\047\255\377\232\002
\227\301\306\120\222\233\002\054\275\251\271\064\131\012\277\204
\112\377\337\376\263\237\353\331\236\340\230\043\354\246\153\167
\026\052\333\314\255\073\034\244\207\334\106\163\136\031\142\150
\105\127\344\220\202\102\273\102\326\360\141\340\301\243\075\146
\243\135\364\030\356\210\311\215\027\105\051\231\062\165\002\061
\356\051\046\310\153\002\346\265\142\105\177\067\025\132\043\150
\211\324\076\336\116\047\260\360\100\014\274\115\027\313\115\242
\263\036\320\006\132\335\366\223\317\127\165\231\365\372\206\032
\147\170\263\277\226\376\064\334\275\347\122\126\345\263\345\165
\173\327\101\221\005\334\135\151\343\225\015\103\271\374\203\226
\071\225\173\154\200\132\117\023\162\306\327\175\051\172\104\272
\122\244\052\325\101\106\011\040\376\042\240\266\133\060\215\274
\211\014\325\327\160\370\207\122\375\332\357\254\121\056\007\263
\116\376\320\011\332\160\357\230\372\126\346\155\333\265\127\113
\334\345\054\045\025\310\236\056\170\116\370\332\234\236\206\054
\312\127\363\032\345\310\222\213\032\202\226\172\303\274\120\022
\151\330\016\132\106\213\072\353\046\372\043\311\266\260\201\276
\102\000\244\370\326\376\060\056\307\322\106\366\345\216\165\375
\362\314\271\320\207\133\314\006\020\140\273\203\065\267\136\147
\336\107\354\231\110\361\244\241\025\376\255\214\142\216\071\125
\117\071\026\271\261\143\235\377\267\002\003\001\000\001\243\102
\060\100\060\017\006\003\125\035\023\001\001\377\004\005\060\003
\001\001\377\060\035\006\003\125\035\016\004\026\004\024\266\241
\124\071\002\303\240\077\216\212\274\372\324\370\034\246\321\072
\016\375\060\016\006\003\125\035\017\001\001\377\004\004\003\002
\001\006\060\015\006\011\052\206\110\206\367\015\001\001\015\005
\000\003\202\002\001\000\161\245\016\316\344\351\277\077\070\325
\211\132\304\002\141\373\114\305\024\027\055\213\117\123\153\020

\027\374\145\204\307\020\111\220\336\333\307\046\223\210\046\157
\160\326\002\136\071\240\367\217\253\226\265\245\023\134\201\024
\155\016\201\202\021\033\212\116\306\117\245\335\142\036\104\337
\011\131\364\133\167\013\067\351\213\040\306\370\012\116\056\130
\034\353\063\320\317\206\140\311\332\373\200\057\236\114\140\204
\170\075\041\144\326\373\101\037\030\017\347\311\165\161\275\275
\134\336\064\207\076\101\260\016\366\271\326\077\011\023\226\024
\057\336\232\035\132\271\126\316\065\072\260\137\160\115\136\343
\051\361\043\050\162\131\266\253\302\214\146\046\034\167\054\046
\166\065\213\050\247\151\240\371\073\365\043\335\205\020\164\311
\220\003\126\221\347\257\272\107\324\022\227\021\042\343\242\111
\224\154\347\267\224\113\272\055\244\332\063\213\114\246\104\377
\132\074\306\035\144\330\265\061\344\246\074\172\250\127\013\333
\355\141\032\313\361\316\163\167\143\244\207\157\114\121\070\326
\344\137\307\237\266\201\052\344\205\110\171\130\136\073\370\333
\002\202\147\301\071\333\303\164\113\075\066\036\371\051\223\210
\150\133\250\104\031\041\360\247\350\201\015\054\350\223\066\264
\067\262\312\260\033\046\172\232\045\037\232\232\200\236\113\052
\077\373\243\232\376\163\062\161\302\236\306\162\341\212\150\047
\361\344\017\264\304\114\245\141\223\370\227\020\007\052\060\045
\251\271\310\161\270\357\150\314\055\176\365\340\176\017\202\250
\157\266\272\154\203\103\167\315\212\222\027\241\236\133\170\026
\075\105\342\063\162\335\341\146\312\231\323\311\305\046\375\015
\150\004\106\256\266\331\233\214\276\031\276\261\306\362\031\343
\134\002\312\054\330\157\112\007\331\311\065\332\100\165\362\304
\247\031\157\236\102\020\230\165\346\225\213\140\274\355\305\022
\327\212\316\325\230\134\126\226\003\305\356\167\006\065\377\317
\344\356\077\023\141\356\333\332\055\205\360\315\256\235\262\030
\011\105\303\222\241\162\027\374\107\266\240\013\054\361\304\336
\103\150\010\152\137\073\360\166\143\373\314\006\054\246\306\342
\016\265\271\276\044\217

END

CKA_NSS_MOZILLA_CA_POLICY

CK_BBOOL CK_TRUE

CKA_NSS_SERVER_DISTRUST_AFTER CK_BBOOL CK_FALSE

CKA_NSS_EMAIL_DISTRUST_AFTER CK_BBOOL CK_FALSE

#

Trust for "Certum Trusted Network CA 2"

Issuer: CN=Certum Trusted Network CA 2,OU=Certum Certification Authority,O=Unizeto Technologies
S.A.,C=PL

Serial Number:21:d6:d0:4a:4f:25:0f:c9:32:37:fc:aa:5e:12:8d:e9

Subject: CN=Certum Trusted Network CA 2,OU=Certum Certification Authority,O=Unizeto Technologies
S.A.,C=PL

Not Valid Before: Thu Oct 06 08:39:56 2011

Not Valid After : Sat Oct 06 08:39:56 2046

Fingerprint (SHA-256):

B6:76:F2:ED:DA:E8:77:5C:D3:6C:B0:F6:3C:D1:D4:60:39:61:F4:9E:62:65:BA:01:3A:2F:03:07:B6:D0:B8:04


```
# Fingerprint (SHA1): D3:DD:48:3E:2B:BF:4C:05:E8:AF:10:F5:FA:76:26:CF:D3:DC:30:92
CKA_CLASS CK_OBJECT_CLASS CKO_NSS_TRUST
CKA_TOKEN CK_BBOOL CK_TRUE
CKA_PRIVATE CK_BBOOL CK_FALSE
CKA_MODIFIABLE CK_BBOOL CK_FALSE
CKA_LABEL UTF8 "Certum Trusted Network CA 2"
CKA_CERT_SHA1_HASH MULTILINE_OCTAL
\323\335\110\076\053\277\114\005\350\257\020\365\372\166\046\317
\323\334\060\222
END
CKA_CERT_MD5_HASH MULTILINE_OCTAL
\155\106\236\331\045\155\010\043\133\136\164\175\036\047\333\362
END
CKA_ISSUER
MULTILINE_OCTAL
\060\201\200\061\013\060\011\006\003\125\004\006\023\002\120\114
\061\042\060\040\006\003\125\004\012\023\031\125\156\151\172\145
\164\157\040\124\145\143\150\156\157\154\157\147\151\145\163\040
\123\056\101\056\061\047\060\045\006\003\125\004\013\023\036\103
\145\162\164\165\155\040\103\145\162\164\151\146\151\143\141\164
\151\157\156\040\101\165\164\150\157\162\151\164\171\061\044\060
\042\006\003\125\004\003\023\033\103\145\162\164\165\155\040\124
\162\165\163\164\145\144\040\116\145\164\167\157\162\153\040\103
\101\040\062
END
CKA_SERIAL_NUMBER MULTILINE_OCTAL
\002\020\041\326\320\112\117\045\017\311\062\067\374\252\136\022
\215\351
END
CKA_TRUST_SERVER_AUTH CK_TRUST CKT_NSS_TRUSTED_DELEGATOR
CKA_TRUST_EMAIL_PROTECTION CK_TRUST CKT_NSS_TRUSTED_DELEGATOR
CKA_TRUST_CODE_SIGNING CK_TRUST CKT_NSS_MUST_VERIFY_TRUST
CKA_TRUST_STEP_UP_APPROVED CK_BBOOL CK_FALSE
```

```
#
```

```
# Certificate "Hellenic Academic and Research Institutions RootCA 2015"
```

```
#
```

```
# Issuer: CN=Hellenic
```

```
Academic and Research Institutions RootCA 2015,O=Hellenic Academic and Research Institutions Cert.
Authority,L=Athens,C=GR
```

```
# Serial Number: 0 (0x0)
```

```
# Subject: CN=Hellenic Academic and Research Institutions RootCA 2015,O=Hellenic Academic and Research
Institutions Cert. Authority,L=Athens,C=GR
```

```
# Not Valid Before: Tue Jul 07 10:11:21 2015
```

```
# Not Valid After : Sat Jun 30 10:11:21 2040
```

```
# Fingerprint (SHA-256):
```

```
A0:40:92:9A:02:CE:53:B4:AC:F4:F2:FF:C6:98:1C:E4:49:6F:75:5E:6D:45:FE:0B:2A:69:2B:CD:52:52:3F:36
```

```
# Fingerprint (SHA1): 01:0C:06:95:A6:98:19:14:FF:BF:5F:C6:B0:B6:95:EA:29:E9:12:A6
```

```

CKA_CLASS CK_OBJECT_CLASS CKO_CERTIFICATE
CKA_TOKEN CK_BBOOL CK_TRUE
CKA_PRIVATE CK_BBOOL CK_FALSE
CKA_MODIFIABLE CK_BBOOL CK_FALSE
CKA_LABEL UTF8 "Hellenic Academic and Research Institutions RootCA 2015"
CKA_CERTIFICATE_TYPE CK_CERTIFICATE_TYPE CKC_X_509
CKA_SUBJECT MULTILINE_OCTAL
\060\201\246\061\013\060\011\006\003\125\004\006\023\002\107\122
\061\017\060\015\006\003\125\004\007\023\006\101\164\150\145\156
\163\061\104\060\102\006\003\125\004\012\023\073\110\145\154\154
\145\156\151\143\040\101\143\141\144\145\155\151\143\040\141\156
\144\040\122\145\163\145\141\162\143\150\040\111\156\163\164\151
\164\165\164\151\157\156\163\040\103\145\162\164\056\040\101\165
\164\150\157\162\151\164\171\061\100\060\076\006\003\125\004\003
\023\067\110\145\154\154\145\156\151\143\040\101\143\141\144\145
\155\151\143\040\141\156\144\040\122\145\163\145\141\162\143\150
\040\111\156\163\164\151\164\165\164\151\157\156\163\040\122\157
\157\164\103\101\040\062\060\061\065
END
CKA_ID
UTF8 "0"
CKA_ISSUER MULTILINE_OCTAL
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\061\017\060\015\006\003\125\004\007\023\006\101\164\150\145\156
\163\061\104\060\102\006\003\125\004\012\023\073\110\145\154\154
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\164\150\157\162\151\164\171\061\100\060\076\006\003\125\004\003
\023\067\110\145\154\154\145\156\151\143\040\101\143\141\144\145
\155\151\143\040\141\156\144\040\122\145\163\145\141\162\143\150
\040\111\156\163\164\151\164\165\164\151\157\156\163\040\122\157
\157\164\103\101\040\062\060\061\065
END
CKA_SERIAL_NUMBER
MULTILINE_OCTAL
\002\001\000
END
CKA_VALUE MULTILINE_OCTAL
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\060\015\006\011\052\206\110\206\367\015\001\001\013\005\000\060
\201\246\061\013\060\011\006\003\125\004\006\023\002\107\122\061
\017\060\015\006\003\125\004\007\023\006\101\164\150\145\156\163
\061\104\060\102\006\003\125\004\012\023\073\110\145\154\154\145
\156\151\143\040\101\143\141\144\145\155\151\143\040\141\156\144
\040\122\145\163\145\141\162\143\150\040\111\156\163\164\151\164
\165\164\151\157\156\163\040\103\145\162\164\056\040\101\165\164
\150\157\162\151\164\171\061\100\060\076\006\003\125\004\003\023

```

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\164\103\101\040\062\060\061\065\060\036\027\015\061\065\060\067
\060\067\061\060\061\061\062\061\132\027\015\064\060\060\066\063
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\103\145\162\164\056\040\101\165\164\150\157\162\151\164\171\061
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\164\151\157\156\163\040\122\157\157\164\103\101\040\062\060\061
\065\060\202\002\042\060\015\006\011\052\206\110\206\367\015\001
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\001\000\302\370\251\077\033\211\374\074\074\004\135\075\220\066
\260\221\072\171\074\146\132\357\155\071\001\111\032\264\267\317
\177\115\043\123\267\220\000\343\023\052\050\246\061\361\221\000
\343\050\354\256\041\101\316\037\332\375\175\022\133\001\203\017
\271\260\137\231\341\362\022\203\200\115\006\076\337\254\257\347
\241\210\153\061\257\360\213\320\030\063\270\333\105\152\064\364
\002\200\044\050\012\002\025\225\136\166\052\015\231\072\024\133
\366\313\313\123\274\023\115\001\210\067\224\045\033\102\274\042
\330\216\243\226\136\072\331\062\333\076\350\360\020\145\355\164
\341\057\247\174\257\047\064\273\051\175\233\266\317\011\310\345
\323\012\374\210\145\145\164\012\334\163\034\134\315\100\261\034
\324\266\204\214\114\120\317\150\216\250\131\256\302\047\116\202
\242\065\335\024\364\037\377\262\167\325\207\057\252\156\175\044
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\131\145\071\130\172\222\231\162\075\234\204\136\210\041\270\325
\364\054\374\331\160\122\117\170\270\275\074\053\213\225\230\365
\263\321\150\317\040\024\176\114\134\137\347\213\345\365\065\201
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\201\370\027\313\222\066\135\321\243\330\165\033\341\213\047\352
\172\110\101\375\105\031\006\255\047\231\116\301\160\107\335\265
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\143\226\113\051\060\116\204\116\142\031\136\074\316\227\220\245
\177\001\353\235\340\370\213\211\335\045\230\075\222\266\176\357
\331\361\121\121\175\055\046\310\151\131\141\340\254\152\270\052
\066\021\004\172\120\275\062\204\276\057\334\162\325\327\035\026
\107\344\107\146\040\077\364\226\305\257\216\001\172\245\017\172
\144\365\015\030\207\331\256\210\325\372\204\301\072\300\151\050
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\125\035\017\001\001\377\004\004\003\002\001\006\060\035\006\003
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\273\155\124\113\252\020\130\106\064\362\142\327\026\066\135\010
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\162\307\350\105\216\334\251\362\046\077\306\171\214\261\123\010
\063\201\260\126\023\276\346\121\134\330\233\012\117\113\234\126
\123\002\351\117\366\015\140\352\115\102\125\350\174\033\041\041
\323\033\072\314\167\362\270\220\361\150\307\371\132\376\372\055
\364\277\311\365\105\033\316\070\020\052\067\212\171\243\264\343
\011\154\205\206\223\377\211\226\047\170\201\217\147\343\106\164
\124\216\331\015\151\342\112\364\115\164\003\377\262\167\355\225
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\003\062\045\015\105\044\053\226\264\106\152\277\112\013\367\232
\217\301\254\032\305\147\363\157\064\322\372\163\143\214\357\026
\260\250\244\106\052\370\353\022\354\162\264\357\370\053\176\214
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\253\330\313\222\315\224\070\141\016\007\006\037\113\106\020\361
\025\276\215\205\134\073\112\053\201\171\017\264\151\237\111\120
\227\115\367\016\126\135\300\225\152\302\066\303\033\150\311\365
\052\334\107\232\276\262\316\305\045\350\372\003\271\332\371\026
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\157\072\004\274\315\170\211\013\216\017\057\243\252\117\242\033
\022\075\026\010\100\017\361\106\114\327\252\173\010\301\012\365
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\245\314\073\330\167\067\060\242\117\331\157\321\362\100\255\101
\172\027\305\326\112\065\211\267\101\325\174\206\177\125\115\203
\112\245\163\040\300\072\257\220\361\232\044\216\331\216\161\312
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\251\220\227\015\255\123\322\132\035\207\152\000\227\145\142\264
\276\157\152\247\365\054\102\355\062\255\266\041\236\276\274

END

CKA_NSS_Mozilla_CA_POLICY

CK_BBOOL CK_TRUE

CKA_NSS_SERVER_DISTRUST_AFTER CK_BBOOL CK_FALSE

CKA_NSS_EMAIL_DISTRUST_AFTER CK_BBOOL CK_FALSE

Trust for "Hellenic Academic and Research Institutions RootCA 2015"

Issuer: CN=Hellenic Academic and Research Institutions RootCA 2015,O=Hellenic Academic and Research

```
Institutions Cert. Authority,L=Athens,C=GR
# Serial Number: 0 (0x0)
# Subject: CN=Hellenic Academic and Research Institutions RootCA 2015,O=Hellenic Academic and Research
Institutions Cert. Authority,L=Athens,C=GR
# Not Valid Before: Tue Jul 07 10:11:21 2015
# Not Valid After : Sat Jun 30 10:11:21 2040
# Fingerprint (SHA-256):
A0:40:92:9A:02:CE:53:B4:AC:F4:F2:FF:C6:98:1C:E4:49:6F:75:5E:6D:45:FE:0B:2A:69:2B:CD:52:52:3F:36
# Fingerprint (SHA1): 01:0C:06:95:A6:98:19:14:FF:BF:5F:C6:B0:B6:95:EA:29:E9:12:A6
CKA_CLASS CK_OBJECT_CLASS CKO_NSS_TRUST
CKA_TOKEN CK_BBOOL CK_TRUE
CKA_PRIVATE CK_BBOOL CK_FALSE
CKA_MODIFIABLE CK_BBOOL CK_FALSE
CKA_LABEL UTF8 "Hellenic Academic and Research Institutions RootCA 2015"
CKA_CERT_SHA1_HASH MULTILINE_OCTAL
\001\014\006\225\246\230\031\024\377\277\137\306\260\266\225\352
\051\351\022\246
END
CKA_CERT_MD5_HASH MULTILINE_OCTAL
\312\377\342\333\003\331\313\113\351\017\255\204\375\173\030\316
END
CKA_ISSUER MULTILINE_OCTAL
\060\201\246\061\013\060\011\006\003\125\004\006\023\002\107\122
\061\017\060\015\006\003\125\004\007\023\006\101\164\150\145\156
\163\061\104\060\102\006\003\125\004\012\023\073\110\145\154\154
\145\156\151\143\040\101\143\141\144\145\155\151\143\040\141\156
\144\040\122\145\163\145\141\162\143\150\040\111\156\163\164\151
\164\165\164\151\157\156\163\040\103\145\162\164\056\040\101\165
\164\150\157\162\151\164\171\061\100\060\076\006\003\125\004\003
\023\067\110\145\154\154\145\156\151\143\040\101\143\141\144\145
\155\151\143\040\141\156\144\040\122\145\163\145\141\162\143\150
\040\111\156\163\164\151\164\165\164\151\157\156\163\040\122\157
\157\164\103\101\040\062\060\061\065
END
CKA_SERIAL_NUMBER
MULTILINE_OCTAL
\002\001\000
END
CKA_TRUST_SERVER_AUTH CK_TRUST CKT_NSS_TRUSTED_DELEGATOR
CKA_TRUST_EMAIL_PROTECTION CK_TRUST CKT_NSS_TRUSTED_DELEGATOR
CKA_TRUST_CODE_SIGNING CK_TRUST CKT_NSS_MUST_VERIFY_TRUST
CKA_TRUST_STEP_UP_APPROVED CK_BBOOL CK_FALSE

#
# Certificate "Hellenic Academic and Research Institutions ECC RootCA 2015"
#
#
```

Issuer: CN=Hellenic Academic and Research Institutions ECC RootCA 2015,O=Hellenic Academic and Research Institutions Cert. Authority,L=Athens,C=GR
Serial Number: 0 (0x0)
Subject: CN=Hellenic Academic and Research Institutions ECC RootCA 2015,O=Hellenic Academic and Research Institutions Cert. Authority,L=Athens,C=GR
Not Valid Before: Tue Jul 07 10:37:12 2015
Not Valid After : Sat Jun 30 10:37:12 2040
Fingerprint (SHA-256):
44:B5:45:AA:8A:25:E6:5A:73:CA:15:DC:27:FC:36:D2:4C:1C:B9:95:3A:06:65:39:B1:15:82:DC:48:7B:48:33
Fingerprint (SHA1): 9F:F1:71:8D:92:D5:9A:F3:7D:74:97:B4:BC:6F:84:68:0B:BA:B6:66
CKA_CLASS CK_OBJECT_CLASS CKO_CERTIFICATE
CKA_TOKEN CK_BBOOL CK_TRUE
CKA_PRIVATE CK_BBOOL CK_FALSE
CKA_MODIFIABLE CK_BBOOL CK_FALSE
CKA_LABEL UTF8 "Hellenic Academic and Research Institutions ECC RootCA 2015"
CKA_CERTIFICATE_TYPE CK_CERTIFICATE_TYPE CKC_X_509
CKA_SUBJECT MULTILINE_OCTAL
\\060\\201\\252\\061\\013\\060\\011\\006\\003\\125\\004\\006\\023\\002\\107\\122
\\061\\017\\060\\015\\006\\003\\125\\004\\007\\023\\006\\101\\164\\150\\145\\156
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END
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UTF8 "0"
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END
CKA_SERIAL_NUMBER
MULTILINE_OCTAL
\\002\\001\\000
END

CKA_VALUE MULTILINE_OCTAL

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\013\060\011\006\003\125\004\006\023\002\107\122\061\017\060\015
\006\003\125\004\007\023\006\101\164\150\145\156\163\061\104\060
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\040\101\143\141\144\145\155\151\143\040\141\156\144\040\122\145
\163\145\141\162\143\150\040\111\156\163\164\151\164\165\164\151
\157\156\163\040\103\145\162\164\056\040\101\165\164\150\157\162
\151\164\171\061\104\060\102\006\003\125\004\003\023\073\110\145
\154\154\145\156\151\143\040\101\143\141\144\145\155\151\143\040
\141\156\144\040\122\145\163\145\141\162\143\150\040\111\156\163
\164\151\164\165\164\151\157\156\163\040\105\103\103\040\122\157
\157\164\103\101\040\062\060\061\065\060\036\027\015\061\065\060
\067\060\067\061\060\063\067\061\062\132\027\015\064\060\060\066
\063\060\061\060\063\067\061\062\132\060\201\252\061\013\060\011
\006\003\125\004\006\023\002\107\122\061\017\060\015\006\003\125
\004\007\023\006\101\164\150\145\156\163\061\104\060\102\006\003
\125\004\012\023\073\110\145\154\154\145\156\151\143\040\101\143
\141\144\145\155\151\143\040\141\156\144\040\122\145\163\145\141
\162\143\150\040\111\156\163\164\151\164\165\164\151\157\156\163
\040\103\145\162\164\056\040\101\165\164\150\157\162\151\164\171
\061\104\060\102\006\003\125\004\003\023\073\110\145\154\154\145
\156\151\143\040\101\143\141\144\145\155\151\143\040\141\156\144
\040\122\145\163\145\141\162\143\150\040\111\156\163\164\151\164
\165\164\151\157\156\163\040\105\103\103\040\122\157\157\164\103
\101\040\062\060\061\065\060\166\060\020\006\007\052\206\110\316
\075\002\001\006\005\053\201\004\000\042\003\142\000\004\222\240
\101\350\113\202\204\134\342\370\061\021\231\206\144\116\011\045
\057\235\101\057\012\256\065\117\164\225\262\121\144\153\215\153
\346\077\160\225\360\005\104\107\246\162\070\120\166\225\002\132
\216\256\050\236\371\055\116\231\357\054\110\157\114\045\051\350
\321\161\133\337\035\301\165\067\264\327\372\173\172\102\234\152
\012\126\132\174\151\013\252\200\011\044\154\176\301\106\243\102
\060\100\060\017\006\003\125\035\023\001\001\377\004\005\060\003
\001\001\377\060\016\006\003\125\035\017\001\001\377\004\004\003
\002\001\006\060\035\006\003\125\035\016\004\026\004\024\264\042
\013\202\231\044\001\016\234\273\344\016\375\277\373\227\040\223
\231\052\060\012\006\010\052\206\110\316\075\004\003\002\003\147
\000\060\144\002\060\147\316\026\142\070\242\254\142\105\247\251
\225\044\300\032\047\234\062\073\300\300\325\272\251\347\370\004
\103\123\205\356\122\041\336\235\365\045\203\076\236\130\113\057
\327\147\023\016\041\002\060\005\341\165\001\336\150\355\052\037
\115\114\011\010\015\354\113\255\144\027\050\347\165\316\105\145
\162\041\027\313\042\101\016\214\023\230\070\232\124\155\233\312
\342\174\352\002\130\042\221
```

END

CKA_NSS_Mozilla_CA_POLICY

```

CK_BBOOL CK_TRUE
CKA_NSS_SERVER_DISTRUST_AFTER CK_BBOOL CK_FALSE
CKA_NSS_EMAIL_DISTRUST_AFTER CK_BBOOL CK_FALSE

# Trust for "Hellenic Academic and Research Institutions ECC RootCA 2015"
# Issuer: CN=Hellenic Academic and Research Institutions ECC RootCA 2015,O=Hellenic Academic and Research
Institutions Cert. Authority,L=Athens,C=GR
# Serial Number: 0 (0x0)
# Subject: CN=Hellenic Academic and Research Institutions ECC RootCA 2015,O=Hellenic Academic and
Research Institutions Cert. Authority,L=Athens,C=GR
# Not Valid Before: Tue Jul 07 10:37:12 2015
# Not Valid After : Sat Jun 30 10:37:12 2040
# Fingerprint (SHA-256):
44:B5:45:AA:8A:25:E6:5A:73:CA:15:DC:27:FC:36:D2:4C:1C:B9:95:3A:06:65:39:B1:15:82:DC:48:7B:48:33
#
Fingerprint (SHA1): 9F:F1:71:8D:92:D5:9A:F3:7D:74:97:B4:BC:6F:84:68:0B:BA:B6:66
CKA_CLASS CK_OBJECT_CLASS CKO_NSS_TRUST
CKA_TOKEN CK_BBOOL CK_TRUE
CKA_PRIVATE CK_BBOOL CK_FALSE
CKA_MODIFIABLE CK_BBOOL CK_FALSE
CKA_LABEL UTF8 "Hellenic Academic and Research Institutions ECC RootCA 2015"
CKA_CERT_SHA1_HASH MULTILINE_OCTAL
\237\361\161\215\222\325\232\363\175\164\227\264\274\157\204\150
\013\272\266\146
END
CKA_CERT_MD5_HASH MULTILINE_OCTAL
\201\345\264\027\353\302\365\341\113\015\101\173\111\222\376\357
END
CKA_ISSUER MULTILINE_OCTAL
\060\201\252\061\013\060\011\006\003\125\004\006\023\002\107\122
\061\017\060\015\006\003\125\004\007\023\006\101\164\150\145\156
\163\061\104\060\102\006\003\125\004\012\023\073\110\145\154\154
\145\156\151\143\040\101\143\141\144\145\155\151\143\040\141\156
\144\040\122\145\163\145\141\162\143\150\040\111\156\163\164\151
\164\165\164\151\157\156\163\040\103\145\162\164\056\040\101\165
\164\150\157\162\151\164\171\061\104\060\102\006\003\125\004\003
\023\073\110\145\154\154\145\156\151\143\040\101\143\141\144\145
\155\151\143\040\141\156\144\040\122\145\163\145\141\162\143\150
\040\111\156\163\164\151\164\165\164\151\157\156\163\040\105\103
\103\040\122\157\157\164\103\101\040\062\060\061\065
END
CKA_SERIAL_NUMBER
MULTILINE_OCTAL
\002\001\000
END
CKA_TRUST_SERVER_AUTH CK_TRUST CKT_NSS_TRUSTED_DELEGATOR
CKA_TRUST_EMAIL_PROTECTION CK_TRUST CKT_NSS_TRUSTED_DELEGATOR
CKA_TRUST_CODE_SIGNING CK_TRUST CKT_NSS_MUST_VERIFY_TRUST

```


CKA_TRUST_STEP_UP_APPROVED CK_BBOOL CK_FALSE

#

Certificate "ISRG Root X1"

#

Issuer: CN=ISRG Root X1,O=Internet Security Research Group,C=US

Serial Number:00:82:10:cf:b0:d2:40:e3:59:44:63:e0:bb:63:82:8b:00

Subject: CN=ISRG Root X1,O=Internet Security Research Group,C=US

Not Valid Before: Thu Jun 04 11:04:38 2015

Not Valid After : Mon Jun 04 11:04:38 2035

Fingerprint (SHA-256):

96:BC:EC:06:26:49:76:F3:74:60:77:9A:CF:28:C5:A7:CF:E8:A3:C0:AA:E1:1A:8F:FC:EE:05:C0:BD:DF:08:C6

#

Fingerprint (SHA1): CA:BD:2A:79:A1:07:6A:31:F2:1D:25:36:35:CB:03:9D:43:29:A5:E8

CKA_CLASS CK_OBJECT_CLASS CKO_CERTIFICATE

CKA_TOKEN CK_BBOOL CK_TRUE

CKA_PRIVATE CK_BBOOL CK_FALSE

CKA_MODIFIABLE CK_BBOOL CK_FALSE

CKA_LABEL UTF8 "ISRG Root X1"

CKA_CERTIFICATE_TYPE CK_CERTIFICATE_TYPE CKC_X_509

CKA_SUBJECT MULTILINE_OCTAL

\060\117\061\013\060\011\006\003\125\004\006\023\002\125\123\061
\051\060\047\006\003\125\004\012\023\040\111\156\164\145\162\156
\145\164\040\123\145\143\165\162\151\164\171\040\122\145\163\145
\141\162\143\150\040\107\162\157\165\160\061\025\060\023\006\003
\125\004\003\023\014\111\123\122\107\040\122\157\157\164\040\130
\061

END

CKA_ID UTF8 "0"

CKA_ISSUER MULTILINE_OCTAL

\060\117\061\013\060\011\006\003\125\004\006\023\002\125\123\061
\051\060\047\006\003\125\004\012\023\040\111\156\164\145\162\156
\145\164\040\123\145\143\165\162\151\164\171\040\122\145\163\145
\141\162\143\150\040\107\162\157\165\160\061\025\060\023\006\003
\125\004\003\023\014\111\123\122\107\040\122\157\157\164\040\130
\061

END

CKA_SERIAL_NUMBER

MULTILINE_OCTAL

\002\021\000\202\020\317\260\322\100\343\131\104\143\340\273\143
\202\213\000

END

CKA_VALUE MULTILINE_OCTAL

\060\202\005\153\060\202\003\123\240\003\002\001\002\002\021\000
\202\020\317\260\322\100\343\131\104\143\340\273\143\202\213\000
\060\015\006\011\052\206\110\206\367\015\001\001\013\005\000\060
\117\061\013\060\011\006\003\125\004\006\023\002\125\123\061\051
\060\047\006\003\125\004\012\023\040\111\156\164\145\162\156\145

\164\040\123\145\143\165\162\151\164\171\040\122\145\163\145\141
\162\143\150\040\107\162\157\165\160\061\025\060\023\006\003\125
\004\003\023\014\111\123\122\107\040\122\157\157\164\040\130\061
\060\036\027\015\061\065\060\066\060\064\061\061\060\064\063\070
\132\027\015\063\065\060\066\060\064\061\061\060\064\063\070\132
\060\117\061\013\060\011\006\003\125\004\006\023\002\125\123\061
\051\060\047\006\003\125\004\012\023\040\111\156\164\145\162\156
\145\164\040\123\145\143\165\162\151\164\171\040\122\145\163\145
\141\162\143\150\040\107\162\157\165\160\061\025\060\023\006\003
\125\004\003\023\014\111\123\122\107\040\122\157\157\164\040\130
\061\060\202\002\042\060\015\006\011\052\206\110\206\367\015\001
\001\001\005\000\003\202\002\017\000\060\202\002\012\002\202\002
\001\000\255\350\044\163\364\024\067\363\233\236\053\127\050\034
\207\276\334\267\337\070\220\214\156\074\346\127\240\170\367\165
\302\242\376\365\152\156\366\000\117\050\333\336\150\206\154\104
\223\266\261\143\375\024\022\153\277\037\322\352\061\233\041\176
\321\063\074\272\110\365\335\171\337\263\270\377\022\361\041\232
\113\301\212\206\161\151\112\146\146\154\217\176\074\160\277\255
\051\042\006\363\344\300\346\200\256\342\113\217\267\231\176\224
\003\237\323\107\227\174\231\110\043\123\350\070\256\117\012\157
\203\056\321\111\127\214\200\164\266\332\057\320\070\215\173\003
\160\041\033\165\362\060\074\372\217\256\335\332\143\253\353\026
\117\302\216\021\113\176\317\013\350\377\265\167\056\364\262\173
\112\340\114\022\045\014\160\215\003\051\240\341\123\044\354\023
\331\356\031\277\020\263\112\214\077\211\243\141\121\336\254\207
\007\224\364\143\161\354\056\342\157\133\230\201\341\211\134\064
\171\154\166\357\073\220\142\171\346\333\244\232\057\046\305\320
\020\341\016\336\331\020\216\026\373\267\367\250\367\307\345\002
\007\230\217\066\010\225\347\342\067\226\015\066\165\236\373\016
\162\261\035\233\274\003\371\111\005\330\201\335\005\264\052\326
\101\351\254\001\166\225\012\017\330\337\325\275\022\037\065\057
\050\027\154\322\230\301\250\011\144\167\156\107\067\272\316\254
\131\136\150\235\177\162\326\211\305\006\101\051\076\131\076\335
\046\365\044\311\021\247\132\243\114\100\037\106\241\231\265\247
\072\121\156\206\073\236\175\162\247\022\005\170\131\355\076\121
\170\025\013\003\217\215\320\057\005\262\076\173\112\034\113\163
\005\022\374\306\352\340\120\023\174\103\223\164\263\312\164\347
\216\037\001\010\320\060\324\133\161\066\264\007\272\301\060\060
\134\110\267\202\073\230\246\175\140\212\242\243\051\202\314\272
\275\203\004\033\242\203\003\101\241\326\005\361\033\302\266\360
\250\174\206\073\106\250\110\052\210\334\166\232\166\277\037\152
\245\075\031\217\353\070\363\144\336\310\053\015\012\050\377\367
\333\342\025\102\324\042\320\047\135\341\171\376\030\347\160\210
\255\116\346\331\213\072\306\335\047\121\156\377\274\144\365\063
\103\117\002\003\001\000\001\243\102\060\100\060\016\006\003\125
\035\017\001\001\377\004\004\003\002\001\006\060\017\006\003\125
\035\023\001\001\377\004\005\060\003\001\001\377\060\035\006\003
\125\035\016\004\026\004\024\171\264\131\346\173\266\345\344\001

\163\200\010\210\310\032\130\366\351\233\156\060\015\006\011\052
\206\110\206\367\015\001\001\013\005\000\003\202\002\001\000\125
\037\130\251\274\262\250\120\320\014\261\330\032\151\040\047\051
\010\254\141\165\134\212\156\370\202\345\151\057\325\366\126\113
\271\270\163\020\131\323\041\227\176\347\114\161\373\262\322\140
\255\071\250\013\352\027\041\126\205\361\120\016\131\353\316\340
\131\351\272\311\025\357\206\235\217\204\200\366\344\351\221\220
\334\027\233\142\033\105\360\146\225\322\174\157\302\352\073\357
\037\317\313\326\256\047\361\251\260\310\256\375\175\176\232\372
\042\004\353\377\331\177\352\221\053\042\261\027\016\217\362\212
\064\133\130\330\374\001\311\124\271\270\046\314\212\210\063\211
\114\055\204\074\202\337\356\226\127\005\272\054\273\367\304\267
\307\116\073\202\276\061\310\042\163\163\222\321\302\200\244\071
\071\020\063\043\202\114\074\237\206\262\125\230\035\276\051\206
\214\042\233\236\342\153\073\127\072\202\160\115\334\011\307\211
\313\012\007\115\154\350\135\216\311\357\316\253\307\273\265\053
\116\105\326\112\320\046\314\345\162\312\010\152\245\225\343\025
\241\367\244\355\311\054\137\245\373\377\254\050\002\056\276\327
\173\273\343\161\173\220\026\323\007\136\106\123\174\067\007\102
\214\323\304\226\234\325\231\265\052\340\225\032\200\110\256\114
\071\007\316\314\107\244\122\225\053\272\270\373\255\322\063\123
\175\345\035\115\155\325\241\261\307\102\157\346\100\047\065\134
\243\050\267\007\215\347\215\063\220\347\043\237\373\120\234\171
\154\106\325\264\025\263\226\156\176\233\014\226\072\270\122\055
\077\326\133\341\373\010\302\204\376\044\250\243\211\332\254\152
\341\030\052\261\250\103\141\133\323\037\334\073\215\166\362\055
\350\215\165\337\027\063\154\075\123\373\173\313\101\137\377\334
\242\320\141\070\341\226\270\254\135\213\067\327\165\325\063\300
\231\021\256\235\101\301\162\165\204\276\002\101\102\137\147\044
\110\224\321\233\047\276\007\077\271\270\117\201\164\121\341\172
\267\355\235\043\342\276\340\325\050\004\023\074\061\003\236\335
\172\154\217\306\007\030\306\177\336\107\216\077\050\236\004\006
\317\245\124\064\167\275\354\211\233\351\027\103\337\133\333\137
\376\216\036\127\242\315\100\235\176\142\042\332\336\030\047

END

CKA_NSS_Mozilla_CA_POLICY

CK_BBOOL CK_TRUE

CKA_NSS_SERVER_DISTRUST_AFTER CK_BBOOL CK_FALSE

CKA_NSS_EMAIL_DISTRUST_AFTER

CK_BBOOL CK_FALSE

Trust for "ISRG Root X1"

Issuer: CN=ISRG Root X1,O=Internet Security Research Group,C=US

Serial Number:00:82:10:cf:b0:d2:40:e3:59:44:63:e0:bb:63:82:8b:00

Subject: CN=ISRG Root X1,O=Internet Security Research Group,C=US

Not Valid Before: Thu Jun 04 11:04:38 2015

Not Valid After : Mon Jun 04 11:04:38 2035

Fingerprint (SHA-256):

```

96:BC:EC:06:26:49:76:F3:74:60:77:9A:CF:28:C5:A7:CF:E8:A3:C0:AA:E1:1A:8F:FC:EE:05:C0:BD:DF:08:C6
# Fingerprint (SHA1): CA:BD:2A:79:A1:07:6A:31:F2:1D:25:36:35:CB:03:9D:43:29:A5:E8
CKA_CLASS CK_OBJECT_CLASS CKO_NSS_TRUST
CKA_TOKEN CK_BBOOL CK_TRUE
CKA_PRIVATE CK_BBOOL CK_FALSE
CKA_MODIFIABLE CK_BBOOL CK_FALSE
CKA_LABEL UTF8 "ISRG Root X1"
CKA_CERT_SHA1_HASH MULTILINE_OCTAL
\312\275\052\171\241\007\152\061\362\035\045\066\065\313\003\235
\103\051\245\350
END
CKA_CERT_MD5_HASH MULTILINE_OCTAL
\014\322\371\340\332\027\163\351\355\206\115\245\343\160\347\116
END
CKA_ISSUER MULTILINE_OCTAL
\060\117\061\013\060\011\006\003\125\004\006\023\002\125\123\061
\051\060\047\006\003\125\004\012\023\040\111\156\164\145\162\156
\145\164\040\123\145\143\165\162\151\164\171\040\122\145\163\145
\141\162\143\150\040\107\162\157\165\160\061\025\060\023\006\003
\125\004\003\023\014\111\123\122\107\040\122\157\157\164\040\130
\061
END
CKA_SERIAL_NUMBER
MULTILINE_OCTAL
\002\021\000\202\020\317\260\322\100\343\131\104\143\340\273\143
\202\213\000
END
CKA_TRUST_SERVER_AUTH CK_TRUST CKT_NSS_TRUSTED_DELEGATOR
CKA_TRUST_EMAIL_PROTECTION CK_TRUST CKT_NSS_MUST_VERIFY_TRUST
CKA_TRUST_CODE_SIGNING CK_TRUST CKT_NSS_MUST_VERIFY_TRUST
CKA_TRUST_STEP_UP_APPROVED CK_BBOOL CK_FALSE

#
# Certificate "AC RAIZ FNMT-RCM"
#
# Issuer: OU=AC RAIZ FNMT-RCM,O=FNMT-RCM,C=ES
# Serial Number:5d:93:8d:30:67:36:c8:06:1d:1a:c7:54:84:69:07
# Subject: OU=AC RAIZ FNMT-RCM,O=FNMT-RCM,C=ES
# Not Valid Before: Wed Oct 29 15:59:56 2008
# Not Valid After : Tue Jan 01 00:00:00 2030
# Fingerprint (SHA-256):
EB:C5:57:0C:29:01:8C:4D:67:B1:AA:12:7B:AF:12:F7:03:B4:61:1E:BC:17:B7:DA:B5:57:38:94:17:9B:93:FA
#
Fingerprint (SHA1): EC:50:35:07:B2:15:C4:95:62:19:E2:A8:9A:5B:42:99:2C:4C:2C:20
CKA_CLASS CK_OBJECT_CLASS CKO_CERTIFICATE
CKA_TOKEN CK_BBOOL CK_TRUE
CKA_PRIVATE CK_BBOOL CK_FALSE
CKA_MODIFIABLE CK_BBOOL CK_FALSE

```

```
CKA_LABEL UTF8 "AC RAIZ FNMT-RCM"
CKA_CERTIFICATE_TYPE CK_CERTIFICATE_TYPE CKC_X_509
CKA_SUBJECT MULTILINE_OCTAL
\060\073\061\013\060\011\006\003\125\004\006\023\002\105\123\061
\021\060\017\006\003\125\004\012\014\010\106\116\115\124\055\122
\103\115\061\031\060\027\006\003\125\004\013\014\020\101\103\040
\122\101\111\132\040\106\116\115\124\055\122\103\115
END
CKA_ID UTF8 "0"
CKA_ISSUER MULTILINE_OCTAL
\060\073\061\013\060\011\006\003\125\004\006\023\002\105\123\061
\021\060\017\006\003\125\004\012\014\010\106\116\115\124\055\122
\103\115\061\031\060\027\006\003\125\004\013\014\020\101\103\040
\122\101\111\132\040\106\116\115\124\055\122\103\115
END
CKA_SERIAL_NUMBER MULTILINE_OCTAL
\002\017\135\223\215\060\147\066\310\006\035\032\307\124\204\151
\007
END
CKA_VALUE
MULTILINE_OCTAL
\060\202\005\203\060\202\003\153\240\003\002\001\002\002\017\135
\223\215\060\147\066\310\006\035\032\307\124\204\151\007\060\015
\006\011\052\206\110\206\367\015\001\001\013\005\000\060\073\061
\013\060\011\006\003\125\004\006\023\002\105\123\061\021\060\017
\006\003\125\004\012\014\010\106\116\115\124\055\122\103\115\061
\031\060\027\006\003\125\004\013\014\020\101\103\040\122\101\111
\132\040\106\116\115\124\055\122\103\115\060\036\027\015\060\070
\061\060\062\071\061\065\065\071\065\066\132\027\015\063\060\060
\061\060\061\060\060\060\060\060\132\060\073\061\013\060\011
\006\003\125\004\006\023\002\105\123\061\021\060\017\006\003\125
\004\012\014\010\106\116\115\124\055\122\103\115\061\031\060\027
\006\003\125\004\013\014\020\101\103\040\122\101\111\132\040\106
\116\115\124\055\122\103\115\060\202\002\042\060\015\006\011\052
\206\110\206\367\015\001\001\001\005\000\003\202\002\017\000\060
\202\002\012\002\202\002\001\000\272\161\200\172\114\206\156\177
\310\023\155\300\306\175\034\000\227\217\054\014\043\273\020\232
\100\251\032\267\207\210\370\233\126\152\373\346\173\216\213\222
\216\247\045\135\131\021\333\066\056\267\121\027\037\251\010\037
\004\027\044\130\252\067\112\030\337\345\071\324\127\375\327\301
\054\221\001\221\342\042\324\003\300\130\374\167\107\354\217\076
\164\103\272\254\064\215\115\070\166\147\216\260\310\157\060\063
\130\161\134\264\365\153\156\324\001\120\270\023\176\154\112\243
\111\321\040\031\356\274\300\051\030\145\247\336\376\357\335\012
\220\041\347\032\147\222\102\020\230\137\117\060\274\076\034\105
\264\020\327\150\100\024\300\100\372\347\167\027\172\346\013\217
\145\133\074\331\232\122\333\265\275\236\106\317\075\353\221\005
\002\300\226\262\166\114\115\020\226\073\222\372\234\177\017\231
```

\337\276\043\065\105\036\002\134\376\265\250\233\231\045\332\136
\363\042\303\071\365\344\052\056\323\306\037\304\154\252\305\034
\152\001\005\112\057\322\305\301\250\064\046\135\146\245\322\002
\041\371\030\267\006\365\116\231\157\250\253\114\121\350\317\120
\030\305\167\310\071\011\054\111\222\062\231\250\273\027\027\171
\260\132\305\346\243\304\131\145\107\065\203\136\251\350\065\013
\231\273\344\315\040\306\233\112\006\071\265\150\374\042\272\356
\125\214\053\116\352\363\261\343\374\266\231\232\325\102\372\161
\115\010\317\207\036\152\161\175\371\323\264\351\245\161\201\173
\302\116\107\226\245\366\166\205\243\050\217\351\200\156\201\123
\245\155\137\270\110\371\302\371\066\246\056\111\377\270\226\302
\214\007\263\233\210\130\374\353\033\034\336\055\160\342\227\222
\060\241\211\343\274\125\250\047\326\113\355\220\255\213\372\143
\045\131\055\250\065\335\312\227\063\274\345\315\307\235\321\354
\357\136\016\112\220\006\046\143\255\271\331\065\055\007\272\166
\145\054\254\127\217\175\364\007\224\327\201\002\226\135\243\007
\111\325\172\320\127\371\033\347\123\106\165\252\260\171\102\313
\150\161\010\351\140\275\071\151\316\364\257\303\126\100\307\255
\122\242\011\344\157\206\107\212\037\353\050\047\135\203\040\257
\004\311\154\126\232\213\106\365\002\003\001\000\001\243\201\203
\060\201\200\060\017\006\003\125\035\023\001\001\377\004\005\060
\003\001\001\377\060\016\006\003\125\035\017\001\001\377\004\004
\003\002\001\006\060\035\006\003\125\035\016\004\026\004\024\367
\175\305\375\304\350\232\033\167\144\247\365\035\240\314\277\207
\140\232\155\060\076\006\003\125\035\040\004\067\060\065\060\063
\006\004\125\035\040\000\060\053\060\051\006\010\053\006\001\005
\005\007\002\001\026\035\150\164\164\160\072\057\057\167\167\167
\056\143\145\162\164\056\146\156\155\164\056\145\163\057\144\160
\143\163\057\060\015\006\011\052\206\110\206\367\015\001\001\013
\005\000\003\202\002\001\000\007\220\112\337\363\043\116\360\303
\234\121\145\233\234\042\242\212\014\205\363\163\051\153\115\376
\001\342\251\014\143\001\277\004\147\245\235\230\137\375\001\023
\372\354\232\142\351\206\376\266\142\322\156\114\224\373\300\165
\105\174\145\014\370\262\067\317\254\017\317\215\157\371\031\367
\217\354\036\362\160\236\360\312\270\357\267\377\166\067\166\133
\366\156\210\363\257\142\062\042\223\015\072\152\216\024\146\014
\055\123\164\127\145\036\325\262\335\043\201\073\245\146\043\047
\147\011\217\341\167\252\103\315\145\121\010\355\121\130\376\346
\071\371\313\107\204\244\025\361\166\273\244\356\244\073\304\137
\357\262\063\226\021\030\267\311\145\276\030\341\243\244\334\372
\030\371\323\274\023\233\071\172\064\272\323\101\373\372\062\212
\052\267\053\206\013\151\203\070\276\315\212\056\013\160\255\215
\046\222\356\036\365\001\053\012\331\326\227\233\156\340\250\031
\034\072\041\213\014\036\100\255\003\347\335\146\176\365\271\040
\015\003\350\226\371\202\105\324\071\340\240\000\135\327\230\346
\175\236\147\163\303\232\052\367\253\213\241\072\024\357\064\274
\122\016\211\230\232\004\100\204\035\176\105\151\223\127\316\353
\316\370\120\174\117\034\156\004\103\233\371\326\073\043\030\351

\352\216\321\115\106\215\361\073\344\152\312\272\373\043\267\233
\372\231\001\051\132\130\132\055\343\371\324\155\016\046\255\301
\156\064\274\062\370\014\005\372\145\243\333\073\067\203\042\351
\326\334\162\063\375\135\362\040\275\166\074\043\332\050\367\371
\033\353\131\144\325\334\137\162\176\040\374\315\211\265\220\147
\115\142\172\077\116\255\035\303\071\376\172\364\050\026\337\101
\366\110\200\005\327\017\121\171\254\020\253\324\354\003\146\346
\152\260\272\061\222\102\100\152\276\072\323\162\341\152\067\125
\274\254\035\225\267\151\141\362\103\221\164\346\240\323\012\044
\106\241\010\257\326\332\105\031\226\324\123\035\133\204\171\360
\300\367\107\357\213\217\305\006\256\235\114\142\235\377\106\004
\370\323\311\266\020\045\100\165\376\026\252\311\112\140\206\057
\272\357\060\167\344\124\342\270\204\231\130\200\252\023\213\121
\072\117\110\366\213\266\263

END

CKA_NSS_MOZILLA_CA_POLICY

CK_BBOOL CK_TRUE

CKA_NSS_SERVER_DISTRUST_AFTER CK_BBOOL CK_FALSE

CKA_NSS_EMAIL_DISTRUST_AFTER CK_BBOOL CK_FALSE

Trust for "AC RAIZ FNMT-RCM"

Issuer: OU=AC RAIZ FNMT-RCM,O=FNMT-RCM,C=ES

#

Serial Number:5d:93:8d:30:67:36:c8:06:1d:1a:c7:54:84:69:07

Subject: OU=AC RAIZ FNMT-RCM,O=FNMT-RCM,C=ES

Not Valid Before: Wed Oct 29 15:59:56 2008

Not Valid After : Tue Jan 01 00:00:00 2030

Fingerprint (SHA-256):

EB:C5:57:0C:29:01:8C:4D:67:B1:AA:12:7B:AF:12:F7:03:B4:61:1E:BC:17:B7:DA:B5:57:38:94:17:9B:93:FA

Fingerprint (SHA1): EC:50:35:07:B2:15:C4:95:62:19:E2:A8:9A:5B:42:99:2C:4C:2C:20

CKA_CLASS CK_OBJECT_CLASS CKO_NSS_TRUST

CKA_TOKEN CK_BBOOL CK_TRUE

CKA_PRIVATE CK_BBOOL CK_FALSE

CKA_MODIFIABLE CK_BBOOL CK_FALSE

CKA_LABEL UTF8 "AC RAIZ FNMT-RCM"

CKA_CERT_SHA1_HASH MULTILINE_OCTAL

\354\120\065\007\262\025\304\225\142\031\342\250\232\133\102\231
\054\114\054\040

END

CKA_CERT_MD5_HASH MULTILINE_OCTAL

\342\011\004\264\323\275\321\240\024\375\032\322\107\304\127\035

END

CKA_ISSUER MULTILINE_OCTAL

\060\073\061\013\060\011\006\003\125\004\006\023\002\105\123\061
\021\060\017\006\003\125\004\012\014\010\106\116\115\124\055\122
\103\115\061\031\060\027\006\003\125\004\013\014\020\101\103\040
\122\101\111\132\040\106\116\115\124\055\122\103\115

END

```

CKA_SERIAL_NUMBER
MULTILINE_OCTAL
\002\017\135\223\215\060\147\066\310\006\035\032\307\124\204\151
\007
END
CKA_TRUST_SERVER_AUTH CK_TRUST CKT_NSS_TRUSTED_DELEGATOR
CKA_TRUST_EMAIL_PROTECTION CK_TRUST CKT_NSS_MUST_VERIFY_TRUST
CKA_TRUST_CODE_SIGNING CK_TRUST CKT_NSS_MUST_VERIFY_TRUST
CKA_TRUST_STEP_UP_APPROVED CK_BBOOL CK_FALSE

#
# Certificate "Amazon Root CA 1"
#
# Issuer: CN=Amazon Root CA 1,O=Amazon,C=US
# Serial Number:06:6c:9f:cf:99:bf:8c:0a:39:e2:f0:78:8a:43:e6:96:36:5b:ca
# Subject: CN=Amazon Root CA 1,O=Amazon,C=US
# Not Valid Before: Tue May 26 00:00:00 2015
# Not Valid After : Sun Jan 17 00:00:00 2038
# Fingerprint (SHA-256):
8E:CD:E6:88:4F:3D:87:B1:12:5B:A3:1A:C3:FC:B1:3D:70:16:DE:7F:57:CC:90:4F:E1:CB:97:C6:AE:98:19:6E
# Fingerprint (SHA1): 8D:A7:F9:65:EC:5E:FC:37:91:0F:1C:6E:59:FD:C1:CC:6A:6E:DE:16
CKA_CLASS CK_OBJECT_CLASS CKO_CERTIFICATE
CKA_TOKEN CK_BBOOL CK_TRUE
CKA_PRIVATE CK_BBOOL CK_FALSE
CKA_MODIFIABLE
CK_BBOOL CK_FALSE
CKA_LABEL UTF8 "Amazon Root CA 1"
CKA_CERTIFICATE_TYPE CK_CERTIFICATE_TYPE CKC_X_509
CKA_SUBJECT MULTILINE_OCTAL
\060\071\061\013\060\011\006\003\125\004\006\023\002\125\123\061
\017\060\015\006\003\125\004\012\023\006\101\155\141\172\157\156
\061\031\060\027\006\003\125\004\003\023\020\101\155\141\172\157
\156\040\122\157\157\164\040\103\101\040\061
END
CKA_ID UTF8 "0"
CKA_ISSUER MULTILINE_OCTAL
\060\071\061\013\060\011\006\003\125\004\006\023\002\125\123\061
\017\060\015\006\003\125\004\012\023\006\101\155\141\172\157\156
\061\031\060\027\006\003\125\004\003\023\020\101\155\141\172\157
\156\040\122\157\157\164\040\103\101\040\061
END
CKA_SERIAL_NUMBER MULTILINE_OCTAL
\002\023\006\154\237\317\231\277\214\012\071\342\360\170\212\103
\346\226\066\133\312
END
CKA_VALUE MULTILINE_OCTAL
\060\202\003\101\060\202\002\051\240\003\002\001\002\002\023\006
\154\237\317\231\277\214\012\071\342\360\170\212\103\346\226\066

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\133\312\060\015\006\011\052\206\110\206\367\015\001\001\013\005
\000\060\071\061\013\060\011\006\003\125\004\006\023\002\125\123
\061\017\060\015\006\003\125\004\012\023\006\101\155\141\172\157
\156\061\031\060\027\006\003\125\004\003\023\020\101\155\141\172
\157\156\040\122\157\157\164\040\103\101\040\061\060\036\027\015
\061\065\060\065\062\066\060\060\060\060\060\132\027\015\063
\070\060\061\061\067\060\060\060\060\060\060\132\060\071\061\013
\060\011\006\003\125\004\006\023\002\125\123\061\017\060\015\006
\003\125\004\012\023\006\101\155\141\172\157\156\061\031\060\027
\006\003\125\004\003\023\020\101\155\141\172\157\156\040\122\157
\157\164\040\103\101\040\061\060\202\001\042\060\015\006\011\052
\206\110\206\367\015\001\001\001\005\000\003\202\001\017\000\060
\202\001\012\002\202\001\001\000\262\170\200\161\312\170\325\343
\161\257\107\200\120\164\175\156\330\327\210\166\364\231\150\367
\130\041\140\371\164\204\001\057\254\002\055\206\323\240\103\172
\116\262\244\320\066\272\001\276\215\333\110\310\007\027\066\114
\364\356\210\043\307\076\353\067\365\265\031\370\111\150\260\336
\327\271\166\070\035\141\236\244\376\202\066\245\345\112\126\344
\105\341\371\375\264\026\372\164\332\234\233\065\071\057\372\260
\040\120\006\154\172\320\200\262\246\371\257\354\107\031\217\120
\070\007\334\242\207\071\130\370\272\325\251\371\110\147\060\226
\356\224\170\136\157\211\243\121\300\060\206\146\241\105\146\272
\124\353\243\303\221\371\110\334\377\321\350\060\055\175\055\164
\160\065\327\210\044\367\236\304\131\156\273\163\207\027\362\062
\106\050\270\103\372\267\035\252\312\264\362\237\044\016\055\113
\367\161\134\136\151\377\352\225\002\313\070\212\256\120\070\157
\333\373\055\142\033\305\307\036\124\341\167\340\147\310\017\234
\207\043\326\077\100\040\177\040\200\304\200\114\076\073\044\046
\216\004\256\154\232\310\252\015\002\003\001\000\001\243\102\060
\100\060\017\006\003\125\035\023\001\001\377\004\005\060\003\001
\001\377\060\016\006\003\125\035\017\001\001\377\004\004\003\002
\001\206\060\035\006\003\125\035\016\004\026\004\024\204\030\314
\205\064\354\274\014\224\224\056\010\131\234\307\262\020\116\012
\010\060\015\006\011\052\206\110\206\367\015\001\001\013\005\000
\003\202\001\001\000\230\362\067\132\101\220\241\032\305\166\121
\050\040\066\043\016\256\346\050\273\252\370\224\256\110\244\060
\177\033\374\044\215\113\264\310\241\227\366\266\361\172\160\310
\123\223\314\010\050\343\230\045\317\043\244\371\336\041\323\174
\205\011\255\116\232\165\072\302\013\152\211\170\166\104\107\030
\145\154\215\101\216\073\177\232\313\364\265\247\120\327\005\054
\067\350\003\113\255\351\141\240\002\156\365\362\360\305\262\355
\133\267\334\372\224\134\167\236\023\245\177\122\255\225\362\370
\223\073\336\213\134\133\312\132\122\133\140\257\024\367\113\357
\243\373\237\100\225\155\061\124\374\102\323\307\106\037\043\255
\331\017\110\160\232\331\165\170\161\321\162\103\064\165\156\127
\131\302\002\134\046\140\051\317\043\031\026\216\210\103\245\324
\344\313\010\373\043\021\103\350\103\051\162\142\241\251\135\136
\010\324\220\256\270\330\316\024\302\320\125\362\206\366\304\223

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\103\167\146\141\300\271\350\101\327\227\170\140\003\156\112\162
\256\245\321\175\272\020\236\206\154\033\212\271\131\063\370\353
\304\220\276\361\271
END
CKA_NSS_Mozilla_CA_POLICY
CK_BBOOL CK_TRUE
CKA_NSS_SERVER_DISTRUST_AFTER CK_BBOOL CK_FALSE
CKA_NSS_EMAIL_DISTRUST_AFTER CK_BBOOL CK_FALSE

# Trust for "Amazon Root CA 1"
# Issuer: CN=Amazon Root CA 1,O=Amazon,C=US
# Serial Number:06:6c:9f:cf:99:bf:8c:0a:39:e2:f0:78:8a:43:e6:96:36:5b:ca
# Subject: CN=Amazon Root CA 1,O=Amazon,C=US
# Not Valid Before: Tue May 26 00:00:00 2015
# Not Valid After : Sun Jan 17 00:00:00 2038
# Fingerprint (SHA-256):
8E:CD:E6:88:4F:3D:87:B1:12:5B:A3:1A:C3:FC:B1:3D:70:16:DE:7F:57:CC:90:4F:E1:CB:97:C6:AE:98:19:6E
# Fingerprint (SHA1): 8D:A7:F9:65:EC:5E:FC:37:91:0F:1C:6E:59:FD:C1:CC:6A:6E:DE:16
CKA_CLASS CK_OBJECT_CLASS CKO_NSS_TRUST
CKA_TOKEN CK_BBOOL CK_TRUE
CKA_PRIVATE CK_BBOOL CK_FALSE
CKA_MODIFIABLE CK_BBOOL CK_FALSE
CKA_LABEL UTF8 "Amazon
Root CA 1"
CKA_CERT_SHA1_HASH MULTILINE_OCTAL
\215\247\371\145\354\136\374\067\221\017\034\156\131\375\301\314
\152\156\336\026
END
CKA_CERT_MD5_HASH MULTILINE_OCTAL
\103\306\277\256\354\376\255\057\030\306\210\150\060\374\310\346
END
CKA_ISSUER MULTILINE_OCTAL
\060\071\061\013\060\011\006\003\125\004\006\023\002\125\123\061
\017\060\015\006\003\125\004\012\023\006\101\155\141\172\157\156
\061\031\060\027\006\003\125\004\003\023\020\101\155\141\172\157
\156\040\122\157\157\164\040\103\101\040\061
END
CKA_SERIAL_NUMBER MULTILINE_OCTAL
\002\023\006\154\237\317\231\277\214\012\071\342\360\170\212\103
\346\226\066\133\312
END
CKA_TRUST_SERVER_AUTH CK_TRUST CKT_NSS_TRUSTED_DELEGATOR
CKA_TRUST_EMAIL_PROTECTION CK_TRUST CKT_NSS_TRUSTED_DELEGATOR
CKA_TRUST_CODE_SIGNING CK_TRUST CKT_NSS_MUST_VERIFY_TRUST
CKA_TRUST_STEP_UP_APPROVED CK_BBOOL CK_FALSE

#
# Certificate "Amazon Root CA 2"

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#
# Issuer: CN=Amazon Root CA 2,O=Amazon,C=US
# Serial Number:06:6c:9f:d2:96:35:86:9f:0a:0f:e5:86:78:f8:5b:26:bb:8a:37
#
Subject: CN=Amazon Root CA 2,O=Amazon,C=US
# Not Valid Before: Tue May 26 00:00:00 2015
# Not Valid After : Sat May 26 00:00:00 2040
# Fingerprint (SHA-256):
1B:A5:B2:AA:8C:65:40:1A:82:96:01:18:F8:0B:EC:4F:62:30:4D:83:CE:C4:71:3A:19:C3:9C:01:1E:A4:6D:B4
# Fingerprint (SHA1): 5A:8C:EF:45:D7:A6:98:59:76:7A:8C:8B:44:96:B5:78:CF:47:4B:1A
CKA_CLASS CK_OBJECT_CLASS CKO_CERTIFICATE
CKA_TOKEN CK_BBOOL CK_TRUE
CKA_PRIVATE CK_BBOOL CK_FALSE
CKA_MODIFIABLE CK_BBOOL CK_FALSE
CKA_LABEL UTF8 "Amazon Root CA 2"
CKA_CERTIFICATE_TYPE CK_CERTIFICATE_TYPE CKC_X_509
CKA_SUBJECT MULTILINE_OCTAL
\060\071\061\013\060\011\006\003\125\004\006\023\002\125\123\061
\017\060\015\006\003\125\004\012\023\006\101\155\141\172\157\156
\061\031\060\027\006\003\125\004\003\023\020\101\155\141\172\157
\156\040\122\157\157\164\040\103\101\040\062
END
CKA_ID UTF8 "0"
CKA_ISSUER MULTILINE_OCTAL
\060\071\061\013\060\011\006\003\125\004\006\023\002\125\123\061
\017\060\015\006\003\125\004\012\023\006\101\155\141\172\157\156
\061\031\060\027\006\003\125\004\003\023\020\101\155\141\172\157
\156\040\122\157\157\164\040\103\101\040\062
END
CKA_SERIAL_NUMBER
MULTILINE_OCTAL
\002\023\006\154\237\322\226\065\206\237\012\017\345\206\170\370
\133\046\273\212\067
END
CKA_VALUE MULTILINE_OCTAL
\060\202\005\101\060\202\003\051\240\003\002\001\002\002\023\006
\154\237\322\226\065\206\237\012\017\345\206\170\370\133\046\273
\212\067\060\015\006\011\052\206\110\206\367\015\001\001\014\005
\000\060\071\061\013\060\011\006\003\125\004\006\023\002\125\123
\061\017\060\015\006\003\125\004\012\023\006\101\155\141\172\157
\156\061\031\060\027\006\003\125\004\003\023\020\101\155\141\172
\157\156\040\122\157\157\164\040\103\101\040\062\060\036\027\015
\061\065\060\065\062\066\060\060\060\060\060\060\132\027\015\064
\060\060\065\062\066\060\060\060\060\060\060\132\060\071\061\013
\060\011\006\003\125\004\006\023\002\125\123\061\017\060\015\006
\003\125\004\012\023\006\101\155\141\172\157\156\061\031\060\027
\006\003\125\004\003\023\020\101\155\141\172\157\156\040\122\157
\157\164\040\103\101\040\062\060\202\002\042\060\015\006\011\052

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\206\110\206\367\015\001\001\001\005\000\003\202\002\017\000\060
\202\002\012\002\202\002\001\000\255\226\237\055\234\112\114\112
\201\171\121\231\354\212\313\153\140\121\023\274\115\155\006\374
\260\010\215\335\031\020\152\307\046\014\065\330\300\157\040\204
\351\224\261\233\205\003\303\133\333\112\350\310\370\220\166\331
\133\117\343\114\350\006\066\115\314\232\254\075\014\220\053\222
\324\006\031\140\254\067\104\171\205\201\202\255\132\067\340\015
\314\235\246\114\122\166\352\103\235\267\004\321\120\366\125\340
\325\322\246\111\205\351\067\351\312\176\256\134\225\115\110\232
\077\256\040\132\155\210\225\331\064\270\122\032\103\220\260\277
\154\005\271\266\170\267\352\320\344\072\074\022\123\142\377\112
\362\173\276\065\005\251\022\064\343\363\144\164\142\054\075\000
\111\132\050\376\062\104\273\207\335\145\047\002\161\073\332\112
\367\037\332\315\367\041\125\220\117\017\354\256\202\341\237\153
\331\105\323\273\360\137\207\355\074\054\071\206\332\077\336\354
\162\125\353\171\243\255\333\335\174\260\272\034\316\374\336\117
\065\166\317\017\370\170\037\152\066\121\106\047\141\133\351\236
\317\360\242\125\175\174\045\212\157\057\264\305\317\204\056\053
\375\015\121\020\154\373\137\033\274\033\176\305\256\073\230\001
\061\222\377\013\127\364\232\262\271\127\351\253\357\015\166\321
\360\356\364\316\206\247\340\156\351\264\151\241\337\151\366\063
\306\151\056\227\023\236\245\207\260\127\020\201\067\311\123\263
\273\177\366\222\321\234\320\030\364\222\156\332\203\117\246\143
\231\114\245\373\136\357\041\144\172\040\137\154\144\205\025\313
\067\351\142\014\013\052\026\334\001\056\062\332\076\113\365\236
\072\366\027\100\224\357\236\221\010\206\372\276\143\250\132\063
\354\313\164\103\225\371\154\151\122\066\307\051\157\374\125\003
\134\037\373\237\275\107\353\347\111\107\225\013\116\211\042\011
\111\340\365\141\036\361\277\056\212\162\156\200\131\377\127\072
\371\165\062\243\116\137\354\355\050\142\331\115\163\362\314\201
\027\140\355\315\353\334\333\247\312\305\176\002\275\362\124\010
\124\375\264\055\011\054\027\124\112\230\321\124\341\121\147\010
\322\355\156\176\157\077\322\055\201\131\051\146\313\220\071\225
\021\036\164\047\376\335\353\257\002\003\001\000\001\243\102\060
\100\060\017\006\003\125\035\023\001\001\377\004\005\060\003\001
\001\377\060\016\006\003\125\035\017\001\001\377\004\004\003\002
\001\206\060\035\006\003\125\035\016\004\026\004\024\260\014\360
\114\060\364\005\130\002\110\375\063\345\122\257\113\204\343\146
\122\060\015\006\011\052\206\110\206\367\015\001\001\014\005\000
\003\202\002\001\000\252\250\200\217\016\170\243\340\242\324\315
\346\365\230\172\073\352\000\003\260\227\016\223\274\132\250\366
\054\214\162\207\251\261\374\177\163\375\143\161\170\245\207\131
\317\060\341\015\020\262\023\132\155\202\365\152\346\200\237\240
\005\013\150\344\107\153\307\152\337\266\375\167\062\162\345\030
\372\011\364\240\223\054\135\322\214\165\205\166\145\220\014\003
\171\267\061\043\143\255\170\203\011\206\150\204\312\377\371\317
\046\232\222\171\347\315\113\305\347\141\247\027\313\363\251\022
\223\223\153\247\350\057\123\222\304\140\130\260\314\002\121\030

\133\205\215\142\131\143\266\255\264\336\232\373\046\367\000\047
\300\135\125\067\164\231\311\120\177\343\131\056\104\343\054\045
\356\354\114\062\167\264\237\032\351\113\135\040\305\332\375\034
\207\026\306\103\350\324\273\046\232\105\160\136\251\013\067\123
\342\106\173\047\375\340\106\362\211\267\314\102\266\313\050\046
\156\331\245\311\072\310\101\023\140\367\120\214\025\256\262\155
\032\025\032\127\170\346\222\052\331\145\220\202\077\154\002\257
\256\022\072\047\226\066\004\327\035\242\200\143\251\233\361\345
\272\264\174\024\260\116\311\261\037\164\137\070\366\121\352\233
\372\054\242\021\324\251\055\047\032\105\261\257\262\116\161\015
\300\130\106\326\151\006\313\123\313\263\376\153\101\315\101\176
\175\114\017\174\162\171\172\131\315\136\112\016\254\233\251\230
\163\171\174\264\364\314\271\270\007\014\262\164\134\270\307\157
\210\241\220\247\364\252\371\277\147\072\364\032\025\142\036\267
\237\276\075\261\051\257\147\241\022\362\130\020\031\123\003\060
\033\270\032\211\366\234\275\227\003\216\243\011\363\035\213\041
\361\264\337\344\034\321\237\145\002\006\352\134\326\023\263\204
\357\242\245\134\214\167\051\247\150\300\153\256\100\322\250\264
\352\315\360\215\113\070\234\031\232\033\050\124\270\211\220\357
\312\165\201\076\036\362\144\044\307\030\257\116\377\107\236\007
\366\065\145\244\323\012\126\377\365\027\144\154\357\250\042\045
\111\223\266\337\000\027\332\130\176\135\356\305\033\260\321\321
\137\041\020\307\371\363\272\002\012\047\007\305\361\326\307\323
\340\373\011\140\154

END

CKA_NSS_Mozilla_CA_POLICY

CK_BBOOL CK_TRUE

CKA_NSS_SERVER_DISTRUST_AFTER CK_BBOOL CK_FALSE

CKA_NSS_EMAIL_DISTRUST_AFTER CK_BBOOL CK_FALSE

Trust for "Amazon Root CA 2"

Issuer: CN=Amazon Root CA 2,O=Amazon,C=US

Serial Number:06:6c:9f:d2:96:35:86:9f:0a:0f:e5:86:78:f8:5b:26:bb:8a:37

#

Subject: CN=Amazon Root CA 2,O=Amazon,C=US

Not Valid Before: Tue May 26 00:00:00 2015

Not Valid After : Sat May 26 00:00:00 2040

Fingerprint (SHA-256):

1B:A5:B2:AA:8C:65:40:1A:82:96:01:18:F8:0B:EC:4F:62:30:4D:83:CE:C4:71:3A:19:C3:9C:01:1E:A4:6D:B4

Fingerprint (SHA1): 5A:8C:EF:45:D7:A6:98:59:76:7A:8C:8B:44:96:B5:78:CF:47:4B:1A

CKA_CLASS CK_OBJECT_CLASS CKO_NSS_TRUST

CKA_TOKEN CK_BBOOL CK_TRUE

CKA_PRIVATE CK_BBOOL CK_FALSE

CKA_MODIFIABLE CK_BBOOL CK_FALSE

CKA_LABEL UTF8 "Amazon Root CA 2"

CKA_CERT_SHA1_HASH MULTILINE OCTAL

\132\214\357\105\327\246\230\131\166\172\214\213\104\226\265\170

\317\107\113\032

```

END
CKA_CERT_MD5_HASH MULTILINE_OCTAL
\310\345\215\316\250\102\342\172\300\052\134\174\236\046\277\146
END
CKA_ISSUER MULTILINE_OCTAL
\060\071\061\013\060\011\006\003\125\004\006\023\002\125\123\061
\017\060\015\006\003\125\004\012\023\006\101\155\141\172\157\156
\061\031\060\027\006\003\125\004\003\023\020\101\155\141\172\157
\156\040\122\157\157\164\040\103\101\040\062
END
CKA_SERIAL_NUMBER
MULTILINE_OCTAL
\002\023\006\154\237\322\226\065\206\237\012\017\345\206\170\370
\133\046\273\212\067
END
CKA_TRUST_SERVER_AUTH CK_TRUST CKT_NSS_TRUSTED_DELEGATOR
CKA_TRUST_EMAIL_PROTECTION CK_TRUST CKT_NSS_TRUSTED_DELEGATOR
CKA_TRUST_CODE_SIGNING CK_TRUST CKT_NSS_MUST_VERIFY_TRUST
CKA_TRUST_STEP_UP_APPROVED CK_BBOOL CK_FALSE

#
# Certificate "Amazon Root CA 3"
#
# Issuer: CN=Amazon Root CA 3,O=Amazon,C=US
# Serial Number:06:6c:9f:d5:74:97:36:66:3f:3b:0b:9a:d9:e8:9e:76:03:f2:4a
# Subject: CN=Amazon Root CA 3,O=Amazon,C=US
# Not Valid Before: Tue May 26 00:00:00 2015
# Not Valid After : Sat May 26 00:00:00 2040
# Fingerprint (SHA-256):
18:CE:6C:FE:7B:F1:4E:60:B2:E3:47:B8:DF:E8:68:CB:31:D0:2E:BB:3A:DA:27:15:69:F5:03:43:B4:6D:B3:A4
# Fingerprint (SHA1): 0D:44:DD:8C:3C:8C:1A:1A:58:75:64:81:E9:0F:2E:2A:FF:B3:D2:6E
CKA_CLASS CK_OBJECT_CLASS CKO_CERTIFICATE
CKA_TOKEN CK_BBOOL CK_TRUE
CKA_PRIVATE CK_BBOOL CK_FALSE
CKA_MODIFIABLE CK_BBOOL
CK_FALSE
CKA_LABEL UTF8 "Amazon Root CA 3"
CKA_CERTIFICATE_TYPE CK_CERTIFICATE_TYPE CKC_X_509
CKA_SUBJECT MULTILINE_OCTAL
\060\071\061\013\060\011\006\003\125\004\006\023\002\125\123\061
\017\060\015\006\003\125\004\012\023\006\101\155\141\172\157\156
\061\031\060\027\006\003\125\004\003\023\020\101\155\141\172\157
\156\040\122\157\157\164\040\103\101\040\063
END
CKA_ID UTF8 "0"
CKA_ISSUER MULTILINE_OCTAL
\060\071\061\013\060\011\006\003\125\004\006\023\002\125\123\061
\017\060\015\006\003\125\004\012\023\006\101\155\141\172\157\156

```

```
\061\031\060\027\006\003\125\004\003\023\020\101\155\141\172\157
\156\040\122\157\157\164\040\103\101\040\063
END
CKA_SERIAL_NUMBER MULTILINE_OCTAL
\002\023\006\154\237\325\164\227\066\146\077\073\013\232\331\350
\236\166\003\362\112
END
CKA_VALUE MULTILINE_OCTAL
\060\202\001\266\060\202\001\133\240\003\002\001\002\002\023\006
\154\237\325\164\227\066\146\077\073\013\232\331\350\236\166\003
\362\112\060\012\006\010\052\206\110\316\075\004\003\002\060\071
\061\013\060\011\006\003\125\004\006\023\002\125\123\061\017\060
\015\006\003\125\004\012\023\006\101\155\141\172\157\156\061\031
\060\027\006\003\125\004\003\023\020\101\155\141\172\157\156\040
\122\157\157\164\040\103\101\040\063\060\036\027\015\061\065\060
\065\062\066\060\060\060\060\060\132\027\015\064\060\060\065
\062\066\060\060\060\060\060\060\132\060\071\061\013\060\011\006
\003\125\004\006\023\002\125\123\061\017\060\015\006\003\125\004
\012\023\006\101\155\141\172\157\156\061\031\060\027\006\003\125
\004\003\023\020\101\155\141\172\157\156\040\122\157\157\164\040
\103\101\040\063\060\131\060\023\006\007\052\206\110\316\075\002
\001\006\010\052\206\110\316\075\003\001\007\003\102\000\004\051
\227\247\306\101\177\300\015\233\350\001\033\126\306\362\122\245
\272\055\262\022\350\322\056\327\372\311\305\330\252\155\037\163
\201\073\073\230\153\071\174\063\245\305\116\206\216\200\027\150
\142\105\127\175\104\130\035\263\067\345\147\010\353\146\336\243
\102\060\100\060\017\006\003\125\035\023\001\001\377\004\005\060
\003\001\001\377\060\016\006\003\125\035\017\001\001\377\004\004
\003\002\001\206\060\035\006\003\125\035\016\004\026\004\024\253
\266\333\327\006\236\067\254\060\206\007\221\160\307\234\304\031
\261\170\300\060\012\006\010\052\206\110\316\075\004\003\002\003
\111\000\060\106\002\041\000\340\205\222\243\027\267\215\371\053
\006\245\223\254\032\230\150\141\162\372\341\241\320\373\034\170
\140\246\103\231\305\270\304\002\041\000\234\002\357\361\224\234
\263\226\371\353\306\052\370\266\054\376\072\220\024\026\327\214
\143\044\110\034\337\060\175\325\150\073
END
CKA_NSS_Mozilla_CA_POLICY
CK_BBOOL CK_TRUE
CKA_NSS_SERVER_DISTRUST_AFTER CK_BBOOL CK_FALSE
CKA_NSS_EMAIL_DISTRUST_AFTER CK_BBOOL CK_FALSE
```

```
# Trust for "Amazon Root CA 3"
# Issuer: CN=Amazon Root CA 3,O=Amazon,C=US
# Serial Number:06:6c:9f:d5:74:97:36:66:3f:3b:0b:9a:d9:e8:9e:76:03:f2:4a
# Subject: CN=Amazon Root CA 3,O=Amazon,C=US
# Not Valid Before: Tue May 26 00:00:00 2015
# Not Valid After
```

```

: Sat May 26 00:00:00 2040
# Fingerprint (SHA-256):
18:CE:6C:FE:7B:F1:4E:60:B2:E3:47:B8:DF:E8:68:CB:31:D0:2E:BB:3A:DA:27:15:69:F5:03:43:B4:6D:B3:A4
# Fingerprint (SHA1): 0D:44:DD:8C:3C:8C:1A:1A:58:75:64:81:E9:0F:2E:2A:FF:B3:D2:6E
CKA_CLASS CK_OBJECT_CLASS CKO_NSS_TRUST
CKA_TOKEN CK_BBOOL CK_TRUE
CKA_PRIVATE CK_BBOOL CK_FALSE
CKA_MODIFIABLE CK_BBOOL CK_FALSE
CKA_LABEL UTF8 "Amazon Root CA 3"
CKA_CERT_SHA1_HASH MULTILINE_OCTAL
\015\104\335\214\074\214\032\032\130\165\144\201\351\017\056\052
\377\263\322\156
END
CKA_CERT_MD5_HASH MULTILINE_OCTAL
\240\324\357\013\367\265\330\111\225\052\354\365\304\374\201\207
END
CKA_ISSUER MULTILINE_OCTAL
\060\071\061\013\060\011\006\003\125\004\006\023\002\125\123\061
\017\060\015\006\003\125\004\012\023\006\101\155\141\172\157\156
\061\031\060\027\006\003\125\004\003\023\020\101\155\141\172\157
\156\040\122\157\157\164\040\103\101\040\063
END
CKA_SERIAL_NUMBER MULTILINE_OCTAL
\002\023\006\154\237\325\164\227\066\146\077\073\013\232\331\350
\236\166\003\362\112
END
CKA_TRUST_SERVER_AUTH
CK_TRUST CKT_NSS_TRUSTED_DELEGATOR
CKA_TRUST_EMAIL_PROTECTION CK_TRUST CKT_NSS_TRUSTED_DELEGATOR
CKA_TRUST_CODE_SIGNING CK_TRUST CKT_NSS_MUST_VERIFY_TRUST
CKA_TRUST_STEP_UP_APPROVED CK_BBOOL CK_FALSE

#
# Certificate "Amazon Root CA 4"
#
# Issuer: CN=Amazon Root CA 4,O=Amazon,C=US
# Serial Number:06:6c:9f:d7:c1:bb:10:4c:29:43:e5:71:7b:7b:2c:c8:1a:c1:0e
# Subject: CN=Amazon Root CA 4,O=Amazon,C=US
# Not Valid Before: Tue May 26 00:00:00 2015
# Not Valid After : Sat May 26 00:00:00 2040
# Fingerprint (SHA-256):
E3:5D:28:41:9E:D0:20:25:CF:A6:90:38:CD:62:39:62:45:8D:A5:C6:95:FB:DE:A3:C2:2B:0B:FB:25:89:70:92
# Fingerprint (SHA1): F6:10:84:07:D6:F8:BB:67:98:0C:C2:E2:44:C2:EB:AE:1C:EF:63:BE
CKA_CLASS CK_OBJECT_CLASS CKO_CERTIFICATE
CKA_TOKEN CK_BBOOL CK_TRUE
CKA_PRIVATE CK_BBOOL CK_FALSE
CKA_MODIFIABLE CK_BBOOL CK_FALSE
CKA_LABEL UTF8 "Amazon Root CA 4"

```


CKA_CERTIFICATE_TYPE CK_CERTIFICATE_TYPE CKC_X_509

CKA_SUBJECT MULTILINE_OCTAL

\060\071\061\013\060\011\006\003\125\004\006\023\002\125\123\061
\017\060\015\006\003\125\004\012\023\006\101\155\141\172\157\156
\061\031\060\027\006\003\125\004\003\023\020\101\155\141\172\157
\156\040\122\157\157\164\040\103\101\040\064

END

CKA_ID

UTF8 "0"

CKA_ISSUER MULTILINE_OCTAL

\060\071\061\013\060\011\006\003\125\004\006\023\002\125\123\061
\017\060\015\006\003\125\004\012\023\006\101\155\141\172\157\156
\061\031\060\027\006\003\125\004\003\023\020\101\155\141\172\157
\156\040\122\157\157\164\040\103\101\040\064

END

CKA_SERIAL_NUMBER MULTILINE_OCTAL

\002\023\006\154\237\327\301\273\020\114\051\103\345\161\173\173
\054\310\032\301\016

END

CKA_VALUE MULTILINE_OCTAL

\060\202\001\362\060\202\001\170\240\003\002\001\002\002\023\006
\154\237\327\301\273\020\114\051\103\345\161\173\173\054\310\032
\301\016\060\012\006\010\052\206\110\316\075\004\003\003\060\071
\061\013\060\011\006\003\125\004\006\023\002\125\123\061\017\060
\015\006\003\125\004\012\023\006\101\155\141\172\157\156\061\031
\060\027\006\003\125\004\003\023\020\101\155\141\172\157\156\040
\122\157\157\164\040\103\101\040\064\060\036\027\015\061\065\060
\065\062\066\060\060\060\060\060\132\027\015\064\060\060\065
\062\066\060\060\060\060\060\060\132\060\071\061\013\060\011\006
\003\125\004\006\023\002\125\123\061\017\060\015\006\003\125\004
\012\023\006\101\155\141\172\157\156\061\031\060\027\006\003\125
\004\003\023\020\101\155\141\172\157\156\040\122\157\157\164\040
\103\101\040\064\060\166\060\020\006\007\052\206\110\316\075\002
\001\006\005\053\201\004\000\042\003\142\000\004\322\253\212\067
\117\243\123\015\376\301\212\173\113\250\173\106\113\143\260\142
\366\055\033\333\010\161\041\322\000\350\143\275\232\047\373\360
\071\156\135\352\075\245\311\201\252\243\133\040\230\105\135\026
\333\375\350\020\155\343\234\340\343\275\137\204\142\363\160\144
\063\240\313\044\057\160\272\210\241\052\240\165\370\201\256\142
\006\304\201\333\071\156\051\260\036\372\056\134\243\102\060\100
\060\017\006\003\125\035\023\001\001\377\004\005\060\003\001\001
\377\060\016\006\003\125\035\017\001\001\377\004\004\003\002\001
\206\060\035\006\003\125\035\016\004\026\004\024\323\354\307\072
\145\156\314\341\332\166\232\126\373\234\363\206\155\127\345\201
\060\012\006\010\052\206\110\316\075\004\003\003\003\150\000\060
\145\002\060\072\213\041\361\275\176\021\255\320\357\130\226\057
\326\353\235\176\220\215\053\317\146\125\303\054\343\050\251\160
\012\107\016\360\067\131\022\377\055\231\224\050\116\052\117\065

```

\115\063\132\002\061\000\352\165\000\116\073\304\072\224\022\221
\311\130\106\235\041\023\162\247\210\234\212\344\114\112\333\226
\324\254\213\153\153\111\022\123\063\255\327\344\276\044\374\265
\012\166\324\245\274\020
END
CKA_NSS_Mozilla_CA_POLICY
CK_BBOOL CK_TRUE
CKA_NSS_SERVER_DISTRUST_AFTER CK_BBOOL CK_FALSE
CKA_NSS_EMAIL_DISTRUST_AFTER CK_BBOOL CK_FALSE

# Trust for "Amazon Root CA 4"
# Issuer: CN=Amazon Root CA 4,O=Amazon,C=US
# Serial Number:06:6c:9f:d7:c1:bb:10:4c:29:43:e5:71:7b:7b:2c:c8:1a:c1:0e
# Subject:
  CN=Amazon Root CA 4,O=Amazon,C=US
# Not Valid Before: Tue May 26 00:00:00 2015
# Not Valid After : Sat May 26 00:00:00 2040
# Fingerprint (SHA-256):
E3:5D:28:41:9E:D0:20:25:CF:A6:90:38:CD:62:39:62:45:8D:A5:C6:95:FB:DE:A3:C2:2B:0B:FB:25:89:70:92
# Fingerprint (SHA1): F6:10:84:07:D6:F8:BB:67:98:0C:C2:E2:44:C2:EB:AE:1C:EF:63:BE
CKA_CLASS CK_OBJECT_CLASS CKO_NSS_TRUST
CKA_TOKEN CK_BBOOL CK_TRUE
CKA_PRIVATE CK_BBOOL CK_FALSE
CKA_MODIFIABLE CK_BBOOL CK_FALSE
CKA_LABEL UTF8 "Amazon Root CA 4"
CKA_CERT_SHA1_HASH MULTILINE_OCTAL
\366\020\204\007\326\370\273\147\230\014\302\342\104\302\353\256
\034\357\143\276
END
CKA_CERT_MD5_HASH MULTILINE_OCTAL
\211\274\047\325\353\027\215\006\152\151\325\375\211\107\264\315
END
CKA_ISSUER MULTILINE_OCTAL
\060\071\061\013\060\011\006\003\125\004\006\023\002\125\123\061
\017\060\015\006\003\125\004\012\023\006\101\155\141\172\157\156
\061\031\060\027\006\003\125\004\003\023\020\101\155\141\172\157
\156\040\122\157\157\164\040\103\101\040\064
END
CKA_SERIAL_NUMBER
  MULTILINE_OCTAL
\002\023\006\154\237\327\301\273\020\114\051\103\345\161\173\173
\054\310\032\301\016
END
CKA_TRUST_SERVER_AUTH CK_TRUST CKT_NSS_TRUSTED_DELEGATOR
CKA_TRUST_EMAIL_PROTECTION CK_TRUST CKT_NSS_TRUSTED_DELEGATOR
CKA_TRUST_CODE_SIGNING CK_TRUST CKT_NSS_MUST_VERIFY_TRUST
CKA_TRUST_STEP_UP_APPROVED CK_BBOOL CK_FALSE

```

```

#
# Certificate "Symantec Class 1 Public Primary Certification Authority - G6"
#
# Issuer: CN=Symantec Class 1 Public Primary Certification Authority - G6,OU=Symantec Trust
Network,O=Symantec Corporation,C=US
# Serial Number:24:32:75:f2:1d:2f:d2:09:33:f7:b4:6a:ca:d0:f3:98
# Subject: CN=Symantec Class 1 Public Primary Certification Authority - G6,OU=Symantec Trust
Network,O=Symantec Corporation,C=US
# Not Valid Before: Tue Oct 18 00:00:00 2011
# Not Valid After : Tue Dec 01 23:59:59 2037
# Fingerprint (SHA-256):
9D:19:0B:2E:31:45:66:68:5B:E8:A8:89:E2:7A:A8:C7:D7:AE:1D:8A:AD:DB:A3:C1:EC:F9:D2:48:63:CD:34:B9
# Fingerprint (SHA1): 51:7F:61:1E:29:91:6B:53:82:FB:72:E7:44:D9:8D:C3:CC:53:6D:64
CKA_CLASS
CK_OBJECT_CLASS CKO_CERTIFICATE
CKA_TOKEN CK_BBOOL CK_TRUE
CKA_PRIVATE CK_BBOOL CK_FALSE
CKA_MODIFIABLE CK_BBOOL CK_FALSE
CKA_LABEL UTF8 "Symantec Class 1 Public Primary Certification Authority - G6"
CKA_CERTIFICATE_TYPE CK_CERTIFICATE_TYPE CKC_X_509
CKA_SUBJECT MULTILINE_OCTAL
\060\201\224\061\013\060\011\006\003\125\004\006\023\002\125\123
\061\035\060\033\006\003\125\004\012\023\024\123\171\155\141\156
\164\145\143\040\103\157\162\160\157\162\141\164\151\157\156\061
\037\060\035\006\003\125\004\013\023\026\123\171\155\141\156\164
\145\143\040\124\162\165\163\164\040\116\145\164\167\157\162\153
\061\105\060\103\006\003\125\004\003\023\074\123\171\155\141\156
\164\145\143\040\103\154\141\163\163\040\061\040\120\165\142\154
\151\143\040\120\162\151\155\141\162\171\040\103\145\162\164\151
\146\151\143\141\164\151\157\156\040\101\165\164\150\157\162\151
\164\171\040\055\040\107\066
END
CKA_ID UTF8 "0"
CKA_ISSUER MULTILINE_OCTAL
\060\201\224\061\013\060\011\006\003\125\004\006\023\002\125\123
\061\035\060\033\006\003\125\004\012\023\024\123\171\155\141\156
\164\145\143\040\103\157\162\160\157\162\141\164\151\157\156\061
\037\060\035\006\003\125\004\013\023\026\123\171\155\141\156\164
\145\143\040\124\162\165\163\164\040\116\145\164\167\157\162\153
\061\105\060\103\006\003\125\004\003\023\074\123\171\155\141\156
\164\145\143\040\103\154\141\163\163\040\061\040\120\165\142\154
\151\143\040\120\162\151\155\141\162\171\040\103\145\162\164\151
\146\151\143\141\164\151\157\156\040\101\165\164\150\157\162\151
\164\171\040\055\040\107\066
END
CKA_SERIAL_NUMBER
MULTILINE_OCTAL
\002\020\044\062\165\362\035\057\322\011\063\367\264\152\312\320

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\363\230

END

CKA_VALUE MULTILINE_OCTAL

\060\202\003\366\060\202\002\336\240\003\002\001\002\002\020\044
\062\165\362\035\057\322\011\063\367\264\152\312\320\363\230\060
\015\006\011\052\206\110\206\367\015\001\001\013\005\000\060\201
\224\061\013\060\011\006\003\125\004\006\023\002\125\123\061\035
\060\033\006\003\125\004\012\023\024\123\171\155\141\156\164\145
\143\040\103\157\162\160\157\162\141\164\151\157\156\061\037\060
\035\006\003\125\004\013\023\026\123\171\155\141\156\164\145\143
\040\124\162\165\163\164\040\116\145\164\167\157\162\153\061\105
\060\103\006\003\125\004\003\023\074\123\171\155\141\156\164\145
\143\040\103\154\141\163\163\040\061\040\120\165\142\154\151\143
\040\120\162\151\155\141\162\171\040\103\145\162\164\151\146\151
\143\141\164\151\157\156\040\101\165\164\150\157\162\151\164\171
\040\055\040\107\066\060\036\027\015\061\061\061\060\061\070\060
\060\060\060\060\060\132\027\015\063\067\061\062\060\061\062\063
\065\071\065\071\132\060\201\224\061\013\060\011\006\003\125\004
\006\023\002\125\123\061\035\060\033\006\003\125\004\012\023\024
\123\171\155\141\156\164\145\143\040\103\157\162\160\157\162\141
\164\151\157\156\061\037\060\035\006\003\125\004\013\023\026\123
\171\155\141\156\164\145\143\040\124\162\165\163\164\040\116\145
\164\167\157\162\153\061\105\060\103\006\003\125\004\003\023\074
\123\171\155\141\156\164\145\143\040\103\154\141\163\163\040\061
\040\120\165\142\154\151\143\040\120\162\151\155\141\162\171\040
\103\145\162\164\151\146\151\143\141\164\151\157\156\040\101\165
\164\150\157\162\151\164\171\040\055\040\107\066\060\202\001\042
\060\015\006\011\052\206\110\206\367\015\001\001\001\005\000\003
\202\001\017\000\060\202\001\012\002\202\001\001\000\307\071\327
\111\144\251\231\202\042\114\352\105\331\007\026\343\173\364\203
\350\231\163\372\153\261\066\340\232\167\240\100\302\201\215\001
\307\314\214\275\217\175\367\171\343\172\114\003\115\331\373\375
\207\070\050\054\335\232\213\124\010\333\147\373\033\214\376\050
\222\057\276\267\262\110\247\201\241\330\136\210\303\314\071\100
\101\132\321\334\345\332\020\237\057\332\001\115\375\056\106\174
\371\056\047\012\151\067\356\221\243\033\152\314\104\277\033\307
\303\324\021\262\120\140\227\011\275\056\042\365\101\204\146\237
\315\100\246\251\000\200\301\037\225\222\237\336\363\110\357\333
\035\167\141\374\177\337\356\226\244\162\320\266\076\377\170\047
\257\313\222\025\151\010\333\143\020\342\346\227\254\156\334\254
\366\242\316\036\107\231\271\211\267\022\346\241\324\315\131\021
\147\303\157\205\330\102\116\050\276\131\125\131\004\225\253\217
\067\200\277\015\360\374\037\072\144\061\130\201\170\327\342\065
\366\040\077\051\270\217\026\156\076\110\334\265\114\007\341\362
\032\352\176\012\171\326\250\275\353\135\206\053\115\002\003\001
\000\001\243\102\060\100\060\016\006\003\125\035\017\001\001\377
\004\004\003\002\001\006\060\017\006\003\125\035\023\001\001\377
\004\005\060\003\001\001\377\060\035\006\003\125\035\016\004\026

\004\024\063\101\350\310\071\022\025\223\110\362\226\062\056\132
\365\332\224\137\123\140\060\015\006\011\052\206\110\206\367\015
\001\001\013\005\000\003\202\001\001\000\025\343\163\127\261\027
\266\137\111\151\104\246\366\136\172\147\254\322\336\165\111\253
\376\045\125\307\072\311\104\025\020\156\277\061\153\313\331\007
\223\177\034\205\143\000\343\062\022\340\314\313\373\071\154\217
\342\123\342\074\100\063\331\244\214\107\346\255\130\373\211\257
\343\336\206\051\126\064\054\105\270\022\372\104\211\156\055\024
\045\050\044\001\145\326\352\122\254\005\156\126\022\011\075\320
\164\364\327\275\006\312\250\072\215\126\102\372\215\162\076\164
\361\003\162\337\207\033\136\016\172\125\226\054\070\267\230\205
\315\115\063\104\311\224\217\132\061\060\067\113\243\072\022\263
\347\066\321\041\150\113\055\070\346\123\256\034\045\126\010\126
\003\147\204\235\306\303\316\044\142\307\114\066\317\260\006\104
\267\365\137\002\335\331\124\351\057\220\116\172\310\116\203\100
\014\232\227\074\067\277\277\354\366\360\264\205\167\050\301\013
\310\147\202\020\027\070\242\267\006\352\233\277\072\370\351\043
\007\277\164\340\230\070\025\125\170\356\162\000\134\031\243\364
\322\063\340\377\275\321\124\071\051\017

END

CKA_NSS_Mozilla_CA_POLICY

CK_BBOOL CK_TRUE

CKA_NSS_SERVER_DISTRUST_AFTER CK_BBOOL CK_FALSE

For Email Distrust After: Wed Aug

31 00:00:00 2022

CKA_NSS_EMAIL_DISTRUST_AFTER MULTILINE_OCTAL

\062\062\060\070\063\061\060\060\060\060\060\060\132

END

Trust for "Symantec Class 1 Public Primary Certification Authority - G6"

Issuer: CN=Symantec Class 1 Public Primary Certification Authority - G6,OU=Symantec Trust
Network,O=Symantec Corporation,C=US

Serial Number:24:32:75:f2:1d:2f:d2:09:33:f7:b4:6a:ca:d0:f3:98

Subject: CN=Symantec Class 1 Public Primary Certification Authority - G6,OU=Symantec Trust
Network,O=Symantec Corporation,C=US

Not Valid Before: Tue Oct 18 00:00:00 2011

Not Valid After : Tue Dec 01 23:59:59 2037

Fingerprint (SHA-256):

9D:19:0B:2E:31:45:66:68:5B:E8:A8:89:E2:7A:A8:C7:D7:AE:1D:8A:AD:DB:A3:C1:EC:F9:D2:48:63:CD:34:B9

Fingerprint (SHA1): 51:7F:61:1E:29:91:6B:53:82:FB:72:E7:44:D9:8D:C3:CC:53:6D:64

CKA_CLASS CK_OBJECT_CLASS CKO_NSS_TRUST

CKA_TOKEN CK_BBOOL CK_TRUE

CKA_PRIVATE CK_BBOOL CK_FALSE

CKA_MODIFIABLE CK_BBOOL CK_FALSE

CKA_LABEL UTF8 "Symantec Class 1 Public Primary Certification
Authority - G6"

CKA_CERT_SHA1_HASH MULTILINE_OCTAL

\121\177\141\036\051\221\153\123\202\373\162\347\104\331\215\303

```

\314\123\155\144
END
CKA_CERT_MD5_HASH MULTILINE_OCTAL
\057\250\264\332\366\144\113\036\202\371\106\075\124\032\174\260
END
CKA_ISSUER MULTILINE_OCTAL
\060\201\224\061\013\060\011\006\003\125\004\006\023\002\125\123
\061\035\060\033\006\003\125\004\012\023\024\123\171\155\141\156
\164\145\143\040\103\157\162\160\157\162\141\164\151\157\156\061
\037\060\035\006\003\125\004\013\023\026\123\171\155\141\156\164
\145\143\040\124\162\165\163\164\040\116\145\164\167\157\162\153
\061\105\060\103\006\003\125\004\003\023\074\123\171\155\141\156
\164\145\143\040\103\154\141\163\163\040\061\040\120\165\142\154
\151\143\040\120\162\151\155\141\162\171\040\103\145\162\164\151
\146\151\143\141\164\151\157\156\040\101\165\164\150\157\162\151
\164\171\040\055\040\107\066
END
CKA_SERIAL_NUMBER MULTILINE_OCTAL
\002\020\044\062\165\362\035\057\322\011\063\367\264\152\312\320
\363\230
END
CKA_TRUST_SERVER_AUTH
CK_TRUST CKT_NSS_MUST_VERIFY_TRUST
CKA_TRUST_EMAIL_PROTECTION CK_TRUST CKT_NSS_TRUSTED_DELEGATOR
CKA_TRUST_CODE_SIGNING CK_TRUST CKT_NSS_MUST_VERIFY_TRUST
CKA_TRUST_STEP_UP_APPROVED CK_BBOOL CK_FALSE

#
# Certificate "Symantec Class 2 Public Primary Certification Authority - G6"
#
# Issuer: CN=Symantec Class 2 Public Primary Certification Authority - G6,OU=Symantec Trust
Network,O=Symantec Corporation,C=US
# Serial Number:64:82:9e:fc:37:1e:74:5d:fc:97:ff:97:c8:b1:ff:41
# Subject: CN=Symantec Class 2 Public Primary Certification Authority - G6,OU=Symantec Trust
Network,O=Symantec Corporation,C=US
# Not Valid Before: Tue Oct 18 00:00:00 2011
# Not Valid After : Tue Dec 01 23:59:59 2037
# Fingerprint (SHA-256):
CB:62:7D:18:B5:8A:D5:6D:DE:33:1A:30:45:6B:C6:5C:60:1A:4E:9B:18:DE:DC:EA:08:E7:DA:AA:07:81:5F:F0
# Fingerprint (SHA1): 40:B3:31:A0:E9:BF:E8:55:BC:39:93:CA:70:4F:4E:C2:51:D4:1D:8F
CKA_CLASS CK_OBJECT_CLASS CKO_CERTIFICATE
CKA_TOKEN CK_BBOOL CK_TRUE
CKA_PRIVATE CK_BBOOL
CK_FALSE
CKA_MODIFIABLE CK_BBOOL CK_FALSE
CKA_LABEL UTF8 "Symantec Class 2 Public Primary Certification Authority - G6"
CKA_CERTIFICATE_TYPE CK_CERTIFICATE_TYPE CKC_X_509
CKA_SUBJECT MULTILINE_OCTAL

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\060\201\224\061\013\060\011\006\003\125\004\006\023\002\125\123
\061\035\060\033\006\003\125\004\012\023\024\123\171\155\141\156
\164\145\143\040\103\157\162\160\157\162\141\164\151\157\156\061
\037\060\035\006\003\125\004\013\023\026\123\171\155\141\156\164
\145\143\040\124\162\165\163\164\040\116\145\164\167\157\162\153
\061\105\060\103\006\003\125\004\003\023\074\123\171\155\141\156
\164\145\143\040\103\154\141\163\163\040\062\040\120\165\142\154
\151\143\040\120\162\151\155\141\162\171\040\103\145\162\164\151
\146\151\143\141\164\151\157\156\040\101\165\164\150\157\162\151
\164\171\040\055\040\107\066

END

CKA_ID UTF8 "0"

CKA_ISSUER MULTILINE_OCTAL

\060\201\224\061\013\060\011\006\003\125\004\006\023\002\125\123
\061\035\060\033\006\003\125\004\012\023\024\123\171\155\141\156
\164\145\143\040\103\157\162\160\157\162\141\164\151\157\156\061
\037\060\035\006\003\125\004\013\023\026\123\171\155\141\156\164
\145\143\040\124\162\165\163\164\040\116\145\164\167\157\162\153
\061\105\060\103\006\003\125\004\003\023\074\123\171\155\141\156
\164\145\143\040\103\154\141\163\163\040\062\040\120\165\142\154
\151\143\040\120\162\151\155\141\162\171\040\103\145\162\164\151
\146\151\143\141\164\151\157\156\040\101\165\164\150\157\162\151
\164\171\040\055\040\107\066

END

CKA_SERIAL_NUMBER

MULTILINE_OCTAL

\002\020\144\202\236\374\067\036\164\135\374\227\377\227\310\261
\377\101

END

CKA_VALUE MULTILINE_OCTAL

\060\202\003\366\060\202\002\336\240\003\002\001\002\002\020\144
\202\236\374\067\036\164\135\374\227\377\227\310\261\377\101\060
\015\006\011\052\206\110\206\367\015\001\001\013\005\000\060\201
\224\061\013\060\011\006\003\125\004\006\023\002\125\123\061\035
\060\033\006\003\125\004\012\023\024\123\171\155\141\156\164\145
\143\040\103\157\162\160\157\162\141\164\151\157\156\061\037\060
\035\006\003\125\004\013\023\026\123\171\155\141\156\164\145\143
\040\124\162\165\163\164\040\116\145\164\167\157\162\153\061\105
\060\103\006\003\125\004\003\023\074\123\171\155\141\156\164\145
\143\040\103\154\141\163\163\040\062\040\120\165\142\154\151\143
\040\120\162\151\155\141\162\171\040\103\145\162\164\151\146\151
\143\141\164\151\157\156\040\101\165\164\150\157\162\151\164\171
\040\055\040\107\066\060\036\027\015\061\061\061\060\061\070\060
\060\060\060\060\060\132\027\015\063\067\061\062\060\061\062\063
\065\071\065\071\132\060\201\224\061\013\060\011\006\003\125\004
\006\023\002\125\123\061\035\060\033\006\003\125\004\012\023\024
\123\171\155\141\156\164\145\143\040\103\157\162\160\157\162\141
\164\151\157\156\061\037\060\035\006\003\125\004\013\023\026\123

\171\155\141\156\164\145\143\040\124\162\165\163\164\040\116\145
\164\167\157\162\153\061\105\060\103\006\003\125\004\003\023\074
\123\171\155\141\156\164\145\143\040\103\154\141\163\163\040\062
\040\120\165\142\154\151\143\040\120\162\151\155\141\162\171\040
\103\145\162\164\151\146\151\143\141\164\151\157\156\040\101\165
\164\150\157\162\151\164\171\040\055\040\107\066\060\202\001\042
\060\015\006\011\052\206\110\206\367\015\001\001\001\005\000\003
\202\001\017\000\060\202\001\012\002\202\001\001\000\315\314\351
\005\310\143\205\313\077\100\143\027\275\030\372\065\346\004\147
\127\145\230\051\244\117\311\134\217\017\064\322\370\332\250\023
\142\252\270\036\120\147\170\260\026\114\240\071\251\025\172\256
\355\322\242\300\360\220\067\051\030\046\134\350\015\074\266\154
\111\077\301\340\334\331\113\266\024\031\013\246\323\226\341\326
\011\343\031\046\034\371\037\145\113\371\032\103\034\000\203\326
\320\252\111\242\324\333\346\142\070\272\120\024\103\155\371\061
\370\126\026\331\070\002\221\317\353\154\335\273\071\116\231\341
\060\147\105\361\324\360\215\303\337\376\362\070\007\041\175\000
\136\126\104\263\344\140\275\221\053\234\253\133\004\162\017\262
\050\331\162\253\005\040\102\045\251\133\003\152\040\020\314\061
\360\053\332\065\054\320\373\232\227\116\360\202\113\053\330\137
\066\243\013\055\257\143\015\035\045\177\241\156\134\142\241\215
\050\076\241\374\034\040\370\001\057\272\125\232\021\260\031\322
\310\120\171\153\016\152\005\327\252\004\066\262\243\362\341\137
\167\247\167\234\345\036\334\351\337\152\301\145\135\002\003\001
\000\001\243\102\060\100\060\016\006\003\125\035\017\001\001\377
\004\004\003\002\001\006\060\017\006\003\125\035\023\001\001\377
\004\005\060\003\001\001\377\060\035\006\003\125\035\016\004\026
\004\024\207\214\040\225\310\230\112\321\326\200\006\112\220\064
\104\337\034\115\277\260\060\015\006\011\052\206\110\206\367\015
\001\001\013\005\000\003\202\001\001\000\201\216\262\245\146\226
\267\041\245\266\357\157\043\132\137\333\201\305\102\245\170\301
\151\375\364\074\327\371\134\153\160\162\032\374\132\227\115\000
\200\210\210\202\212\303\161\015\216\305\211\233\054\355\215\013
\322\162\124\365\175\324\134\103\127\351\363\256\245\002\021\366
\166\053\201\127\335\175\332\164\060\375\124\107\366\340\026\156
\246\264\012\110\346\347\165\007\017\051\031\071\316\171\364\266
\154\305\137\231\325\037\113\372\337\155\054\074\015\124\200\160
\360\210\013\200\317\306\150\242\270\035\160\331\166\214\374\356
\245\311\317\255\035\317\231\045\127\132\142\105\313\026\153\275
\111\315\245\243\214\151\171\045\256\270\114\154\213\100\146\113
\026\077\317\002\032\335\341\154\153\007\141\152\166\025\051\231
\177\033\335\210\200\301\277\265\217\163\305\246\226\043\204\246
\050\206\044\063\152\001\056\127\163\045\266\136\277\217\346\035
\141\250\100\051\147\035\207\233\035\177\233\237\231\315\061\326
\124\276\142\273\071\254\150\022\110\221\040\245\313\261\335\376
\157\374\132\344\202\125\131\257\061\251

END

CKA_NSS_MOZILLA_CA_POLICY


```

CK_BBOOL CK_TRUE
CKA_NSS_SERVER_DISTRUST_AFTER CK_BBOOL CK_FALSE
# For Email Distrust After: Wed Aug 31 00:00:00 2022
CKA_NSS_EMAIL_DISTRUST_AFTER MULTILINE_OCTAL
\062\062\060\070\063\061\060\060\060\060\060\060\132
END

#
Trust for "Symantec Class 2 Public Primary Certification Authority - G6"
# Issuer: CN=Symantec Class 2 Public Primary Certification Authority - G6,OU=Symantec Trust
Network,O=Symantec Corporation,C=US
# Serial Number:64:82:9e:fc:37:1e:74:5d:fc:97:ff:97:c8:b1:ff:41
# Subject: CN=Symantec Class 2 Public Primary Certification Authority - G6,OU=Symantec Trust
Network,O=Symantec Corporation,C=US
# Not Valid Before: Tue Oct 18 00:00:00 2011
# Not Valid After : Tue Dec 01 23:59:59 2037
# Fingerprint (SHA-256):
CB:62:7D:18:B5:8A:D5:6D:DE:33:1A:30:45:6B:C6:5C:60:1A:4E:9B:18:DE:DC:EA:08:E7:DA:AA:07:81:5F:F0
# Fingerprint (SHA1): 40:B3:31:A0:E9:BF:E8:55:BC:39:93:CA:70:4F:4E:C2:51:D4:1D:8F
CKA_CLASS CK_OBJECT_CLASS CKO_NSS_TRUST
CKA_TOKEN CK_BBOOL CK_TRUE
CKA_PRIVATE CK_BBOOL CK_FALSE
CKA_MODIFIABLE CK_BBOOL CK_FALSE
CKA_LABEL UTF8 "Symantec Class 2 Public Primary Certification Authority - G6"
CKA_CERT_SHA1_HASH MULTILINE_OCTAL
\100\263\061\240\351\277\350\125\274\071\223\312\160\117\116\302
\121\324\035\217
END
CKA_CERT_MD5_HASH
MULTILINE_OCTAL
\175\013\203\345\373\174\255\007\117\040\251\265\337\143\355\171
END
CKA_ISSUER MULTILINE_OCTAL
\060\201\224\061\013\060\011\006\003\125\004\006\023\002\125\123
\061\035\060\033\006\003\125\004\012\023\024\123\171\155\141\156
\164\145\143\040\103\157\162\160\157\162\141\164\151\157\156\061
\037\060\035\006\003\125\004\013\023\026\123\171\155\141\156\164
\145\143\040\124\162\165\163\164\040\116\145\164\167\157\162\153
\061\105\060\103\006\003\125\004\003\023\074\123\171\155\141\156
\164\145\143\040\103\154\141\163\163\040\062\040\120\165\142\154
\151\143\040\120\162\151\155\141\162\171\040\103\145\162\164\151
\146\151\143\141\164\151\157\156\040\101\165\164\150\157\162\151
\164\171\040\055\040\107\066
END
CKA_SERIAL_NUMBER MULTILINE_OCTAL
\002\020\144\202\236\374\067\036\164\135\374\227\377\227\310\261
\377\101
END

```

```

CKA_TRUST_SERVER_AUTH CK_TRUST CKT_NSS_MUST_VERIFY_TRUST
CKA_TRUST_EMAIL_PROTECTION CK_TRUST CKT_NSS_TRUSTED_DELEGATOR
CKA_TRUST_CODE_SIGNING
CK_TRUST CKT_NSS_MUST_VERIFY_TRUST
CKA_TRUST_STEP_UP_APPROVED CK_BBOOL CK_FALSE

#
# Certificate "D-TRUST Root CA 3 2013"
#
# Issuer: CN=D-TRUST Root CA 3 2013,O=D-Trust GmbH,C=DE
# Serial Number: 1039788 (0xfddac)
# Subject: CN=D-TRUST Root CA 3 2013,O=D-Trust GmbH,C=DE
# Not Valid Before: Fri Sep 20 08:25:51 2013
# Not Valid After : Wed Sep 20 08:25:51 2028
# Fingerprint (SHA-256):
A1:A8:6D:04:12:1E:B8:7F:02:7C:66:F5:33:03:C2:8E:57:39:F9:43:FC:84:B3:8A:D6:AF:00:90:35:DD:94:57
# Fingerprint (SHA1): 6C:7C:CC:E7:D4:AE:51:5F:99:08:CD:3F:F6:E8:C3:78:DF:6F:EF:97
CKA_CLASS CK_OBJECT_CLASS CKO_CERTIFICATE
CKA_TOKEN CK_BBOOL CK_TRUE
CKA_PRIVATE CK_BBOOL CK_FALSE
CKA_MODIFIABLE CK_BBOOL CK_FALSE
CKA_LABEL UTF8 "D-TRUST Root CA 3 2013"
CKA_CERTIFICATE_TYPE CK_CERTIFICATE_TYPE CKC_X_509
CKA_SUBJECT MULTILINE_OCTAL
\060\105\061\013\060\011\006\003\125\004\006\023\002\104\105\061
\025\060\023\006\003\125\004\012\014\014\104\055\124\162\165\163
\164\040\107\155\142\110\061\037\060\035\006\003\125\004\003\014
\026\104\055\124\122\125\123\124\040\122\157\157\164\040\103\101
\040\063\040\062\060\061\063
END
CKA_ID
UTF8 "0"
CKA_ISSUER MULTILINE_OCTAL
\060\105\061\013\060\011\006\003\125\004\006\023\002\104\105\061
\025\060\023\006\003\125\004\012\014\014\104\055\124\162\165\163
\164\040\107\155\142\110\061\037\060\035\006\003\125\004\003\014
\026\104\055\124\122\125\123\124\040\122\157\157\164\040\103\101
\040\063\040\062\060\061\063
END
CKA_SERIAL_NUMBER MULTILINE_OCTAL
\002\003\017\335\254
END
CKA_VALUE MULTILINE_OCTAL
\060\202\004\016\060\202\002\366\240\003\002\001\002\002\003\017
\335\254\060\015\006\011\052\206\110\206\367\015\001\001\013\005
\000\060\105\061\013\060\011\006\003\125\004\006\023\002\104\105
\061\025\060\023\006\003\125\004\012\014\014\104\055\124\162\165
\163\164\040\107\155\142\110\061\037\060\035\006\003\125\004\003

```

\014\026\104\055\124\122\125\123\124\040\122\157\157\164\040\103
\101\040\063\040\062\060\061\063\060\036\027\015\061\063\060\071
\062\060\060\070\062\065\065\061\132\027\015\062\070\060\071\062
\060\060\070\062\065\065\061\132\060\105\061\013\060\011\006\003
\125\004\006\023\002\104\105\061\025\060\023\006\003\125\004\012
\014\014\104\055\124\162\165\163\164\040\107\155\142\110\061\037
\060\035\006\003\125\004\003\014\026\104\055\124\122\125\123\124
\040\122\157\157\164\040\103\101\040\063\040\062\060\061\063\060
\202\001\042\060\015\006\011\052\206\110\206\367\015\001\001\001
\005\000\003\202\001\017\000\060\202\001\012\002\202\001\001\000
\304\173\102\222\202\037\354\355\124\230\216\022\300\312\011\337
\223\156\072\223\134\033\344\020\167\236\116\151\210\154\366\341
\151\362\366\233\242\141\261\275\007\040\164\230\145\361\214\046
\010\315\250\065\312\200\066\321\143\155\350\104\172\202\303\154
\136\336\273\350\066\322\304\150\066\214\237\062\275\204\042\340
\334\302\356\020\106\071\155\257\223\071\256\207\346\303\274\011
\311\054\153\147\133\331\233\166\165\114\013\340\273\305\327\274
\076\171\362\137\276\321\220\127\371\256\366\146\137\061\277\323
\155\217\247\272\112\363\043\145\273\267\357\243\045\327\012\352
\130\266\357\210\372\372\171\262\122\130\325\360\254\214\241\121
\164\051\225\252\121\073\220\062\003\237\034\162\164\220\336\075
\355\141\322\345\343\375\144\107\345\271\267\112\251\367\037\256
\226\206\004\254\057\343\244\201\167\267\132\026\377\330\017\077
\366\267\170\314\244\257\372\133\074\022\133\250\122\211\162\357
\210\363\325\104\201\206\225\043\237\173\335\274\331\064\357\174
\224\074\252\300\101\302\343\235\120\032\300\344\031\042\374\263
\002\003\001\000\001\243\202\001\005\060\202\001\001\060\017\006
\003\125\035\023\001\001\377\004\005\060\003\001\001\377\060\035
\006\003\125\035\016\004\026\004\024\077\220\310\175\307\025\157
\363\044\217\251\303\057\113\242\017\041\262\057\347\060\016\006
\003\125\035\017\001\001\377\004\004\003\002\001\006\060\201\276
\006\003\125\035\037\004\201\266\060\201\263\060\164\240\162\240
\160\206\156\154\144\141\160\072\057\057\144\151\162\145\143\164
\157\162\171\056\144\055\164\162\165\163\164\056\156\145\164\057
\103\116\075\104\055\124\122\125\123\124\045\062\060\122\157\157
\164\045\062\060\103\101\045\062\060\063\045\062\060\062\060\061
\063\054\117\075\104\055\124\162\165\163\164\045\062\060\107\155
\142\110\054\103\075\104\105\077\143\145\162\164\151\146\151\143
\141\164\145\162\145\166\157\143\141\164\151\157\156\154\151\163
\164\060\073\240\071\240\067\206\065\150\164\164\160\072\057\057
\143\162\154\056\144\055\164\162\165\163\164\056\156\145\164\057
\143\162\154\057\144\055\164\162\165\163\164\137\162\157\157\164
\137\143\141\137\063\137\062\060\061\063\056\143\162\154\060\015
\006\011\052\206\110\206\367\015\001\001\013\005\000\003\202\001
\001\000\016\131\016\130\344\164\110\043\104\317\064\041\265\234
\024\032\255\232\113\267\263\210\155\134\251\027\160\360\052\237
\215\173\371\173\205\372\307\071\350\020\010\260\065\053\137\317
\002\322\323\234\310\013\036\356\005\124\256\067\223\004\011\175

\154\217\302\164\274\370\034\224\276\061\001\100\055\363\044\040
\267\204\125\054\134\310\365\164\112\020\031\213\243\307\355\065
\326\011\110\323\016\300\272\071\250\260\106\002\260\333\306\210
\131\302\276\374\173\261\053\317\176\142\207\125\226\314\001\157
\233\147\041\225\065\213\370\020\374\161\033\267\113\067\151\246
\073\326\354\213\356\301\260\363\045\311\217\222\175\241\352\303
\312\104\277\046\245\164\222\234\343\164\353\235\164\331\313\115
\207\330\374\264\151\154\213\240\103\007\140\170\227\351\331\223
\174\302\106\274\233\067\122\243\355\212\074\023\251\173\123\113
\111\232\021\005\054\013\156\126\254\037\056\202\154\340\151\147
\265\016\155\055\331\344\300\025\361\077\372\030\162\341\025\155
\047\133\055\060\050\053\237\110\232\144\053\231\357\362\165\111
\137\134

END

CKA_NSS_Mozilla_CA_POLICY

CK_BBOOL CK_TRUE

CKA_NSS_SERVER_DISTRUST_AFTER CK_BBOOL CK_FALSE

CKA_NSS_EMAIL_DISTRUST_AFTER CK_BBOOL CK_FALSE

Trust for "D-TRUST Root CA 3 2013"

Issuer: CN=D-TRUST Root

CA 3 2013,O=D-Trust GmbH,C=DE

Serial Number: 1039788 (0xfddac)

Subject: CN=D-TRUST Root CA 3 2013,O=D-Trust GmbH,C=DE

Not Valid Before: Fri Sep 20 08:25:51 2013

Not Valid After : Wed Sep 20 08:25:51 2028

Fingerprint (SHA-256):

A1:A8:6D:04:12:1E:B8:7F:02:7C:66:F5:33:03:C2:8E:57:39:F9:43:FC:84:B3:8A:D6:AF:00:90:35:DD:94:57

Fingerprint (SHA1): 6C:7C:CC:E7:D4:AE:51:5F:99:08:CD:3F:F6:E8:C3:78:DF:6F:EF:97

CKA_CLASS CK_OBJECT_CLASS CKO_NSS_TRUST

CKA_TOKEN CK_BBOOL CK_TRUE

CKA_PRIVATE CK_BBOOL CK_FALSE

CKA_MODIFIABLE CK_BBOOL CK_FALSE

CKA_LABEL UTF8 "D-TRUST Root CA 3 2013"

CKA_CERT_SHA1_HASH MULTILINE_OCTAL

\154\174\314\347\324\256\121\137\231\010\315\077\366\350\303\170
\337\157\357\227

END

CKA_CERT_MD5_HASH MULTILINE_OCTAL

\267\042\146\230\176\326\003\340\301\161\346\165\315\126\105\277

END

CKA_ISSUER MULTILINE_OCTAL

\060\105\061\013\060\011\006\003\125\004\006\023\002\104\105\061
\025\060\023\006\003\125\004\012\014\014\104\055\124\162\165\163
\164\040\107\155\142\110\061\037\060\035\006\003\125\004\003\014
\026\104\055\124\122\125\123\124\040\122\157\157\164\040\103\101
\040\063\040\062\060\061\063

END

```
CKA_SERIAL_NUMBER
MULTILINE_OCTAL
\002\003\017\335\254
END
CKA_TRUST_SERVER_AUTH CK_TRUST CKT_NSS_MUST_VERIFY_TRUST
CKA_TRUST_EMAIL_PROTECTION CK_TRUST CKT_NSS_TRUSTED_DELEGATOR
CKA_TRUST_CODE_SIGNING CK_TRUST CKT_NSS_MUST_VERIFY_TRUST
CKA_TRUST_STEP_UP_APPROVED CK_BBOOL CK_FALSE

#
# Certificate "TUBITAK Kamu SM SSL Kok Sertifikasi - Surum 1"
#
# Issuer: CN=TUBITAK Kamu SM SSL Kok Sertifikasi - Surum 1,OU=Kamu Sertifikasyon Merkezi - Kamu
SM,O=Turkiye Bilimsel ve Teknolojik Arastirma Kurumu - TUBITAK,L=Gebze - Kocaeli,C=TR
# Serial Number: 1 (0x1)
# Subject: CN=TUBITAK Kamu SM SSL Kok Sertifikasi - Surum 1,OU=Kamu Sertifikasyon Merkezi - Kamu
SM,O=Turkiye Bilimsel ve Teknolojik Arastirma Kurumu - TUBITAK,L=Gebze - Kocaeli,C=TR
# Not Valid Before: Mon Nov 25 08:25:55 2013
# Not Valid After : Sun Oct 25 08:25:55 2043
# Fingerprint (SHA-256):
46:ED:C3:68:90:46:D5:3A:45:3F:B3:10:4A:B8:0D:CA:EC:65:8B:26:60:EA:16:29:DD:7E:86:79:90:64:87:16
#
Fingerprint (SHA1): 31:43:64:9B:EC:CE:27:EC:ED:3A:3F:0B:8F:0D:E4:E8:91:DD:EE:CA
CKA_CLASS CK_OBJECT_CLASS CKO_CERTIFICATE
CKA_TOKEN CK_BBOOL CK_TRUE
CKA_PRIVATE CK_BBOOL CK_FALSE
CKA_MODIFIABLE CK_BBOOL CK_FALSE
CKA_LABEL UTF8 "TUBITAK Kamu SM SSL Kok Sertifikasi - Surum 1"
CKA_CERTIFICATE_TYPE CK_CERTIFICATE_TYPE CKC_X_509
CKA_SUBJECT MULTILINE_OCTAL
\060\201\322\061\013\060\011\006\003\125\004\006\023\002\124\122
\061\030\060\026\006\003\125\004\007\023\017\107\145\142\172\145
\040\055\040\113\157\143\141\145\154\151\061\102\060\100\006\003
\125\004\012\023\071\124\165\162\153\151\171\145\040\102\151\154
\151\155\163\145\154\040\166\145\040\124\145\153\156\157\154\157
\152\151\153\040\101\162\141\163\164\151\162\155\141\040\113\165
\162\165\155\165\040\055\040\124\125\102\111\124\101\113\061\055
\060\053\006\003\125\004\013\023\044\113\141\155\165\040\123\145
\162\164\151\146\151\153\141\163\171\157\156\040\115\145\162\153
\145\172\151\040\055\040\113\141\155\165\040\123\115\061\066\060
\064\006\003\125\004\003\023\055\124\125\102\111\124\101\113\040
\113\141\155\165\040\123\115\040\123\123\114\040\113\157\153\040
\123\145\162\164\151\146\151\153\141\163\151\040\055\040\123\165
\162\165\155\040\061
END
CKA_ID
UTF8 "0"
CKA_ISSUER MULTILINE_OCTAL
```

\060\201\322\061\013\060\011\006\003\125\004\006\023\002\124\122
\061\030\060\026\006\003\125\004\007\023\017\107\145\142\172\145
\040\055\040\113\157\143\141\145\154\151\061\102\060\100\006\003
\125\004\012\023\071\124\165\162\153\151\171\145\040\102\151\154
\151\155\163\145\154\040\166\145\040\124\145\153\156\157\154\157
\152\151\153\040\101\162\141\163\164\151\162\155\141\040\113\165
\162\165\155\165\040\055\040\124\125\102\111\124\101\113\061\055
\060\053\006\003\125\004\013\023\044\113\141\155\165\040\123\145
\162\164\151\146\151\153\141\163\171\157\156\040\115\145\162\153
\145\172\151\040\055\040\113\141\155\165\040\123\115\061\066\060
\064\006\003\125\004\003\023\055\124\125\102\111\124\101\113\040
\113\141\155\165\040\123\115\040\123\123\114\040\113\157\153\040
\123\145\162\164\151\146\151\153\141\163\151\040\055\040\123\165
\162\165\155\040\061

END

CKA_SERIAL_NUMBER

MULTILINE_OCTAL

\002\001\001

END

CKA_VALUE MULTILINE_OCTAL

\060\202\004\143\060\202\003\113\240\003\002\001\002\002\001\001
\060\015\006\011\052\206\110\206\367\015\001\001\013\005\000\060
\201\322\061\013\060\011\006\003\125\004\006\023\002\124\122\061
\030\060\026\006\003\125\004\007\023\017\107\145\142\172\145\040
\055\040\113\157\143\141\145\154\151\061\102\060\100\006\003\125
\004\012\023\071\124\165\162\153\151\171\145\040\102\151\154\151
\155\163\145\154\040\166\145\040\124\145\153\156\157\154\157\152
\151\153\040\101\162\141\163\164\151\162\155\141\040\113\165\162
\165\155\165\040\055\040\124\125\102\111\124\101\113\061\055\060
\053\006\003\125\004\013\023\044\113\141\155\165\040\123\145\162
\164\151\146\151\153\141\163\171\157\156\040\115\145\162\153\145
\172\151\040\055\040\113\141\155\165\040\123\115\061\066\060\064
\006\003\125\004\003\023\055\124\125\102\111\124\101\113\040\113
\141\155\165\040\123\115\040\123\123\114\040\113\157\153\040\123
\145\162\164\151\146\151\153\141\163\151\040\055\040\123\165\162
\165\155\040\061\060\036\027\015\061\063\061\061\062\065\060\070
\062\065\065\065\132\027\015\064\063\061\060\062\065\060\070\062
\065\065\065\132\060\201\322\061\013\060\011\006\003\125\004\006
\023\002\124\122\061\030\060\026\006\003\125\004\007\023\017\107
\145\142\172\145\040\055\040\113\157\143\141\145\154\151\061\102
\060\100\006\003\125\004\012\023\071\124\165\162\153\151\171\145
\040\102\151\154\151\155\163\145\154\040\166\145\040\124\145\153
\156\157\154\157\152\151\153\040\101\162\141\163\164\151\162\155
\141\040\113\165\162\165\155\165\040\055\040\124\125\102\111\124
\101\113\061\055\060\053\006\003\125\004\013\023\044\113\141\155
\165\040\123\145\162\164\151\146\151\153\141\163\171\157\156\040
\115\145\162\153\145\172\151\040\055\040\113\141\155\165\040\123
\115\061\066\060\064\006\003\125\004\003\023\055\124\125\102\111

\124\101\113\040\113\141\155\165\040\123\115\040\123\123\114\040
\113\157\153\040\123\145\162\164\151\146\151\153\141\163\151\040
\055\040\123\165\162\165\155\040\061\060\202\001\042\060\015\006
\011\052\206\110\206\367\015\001\001\001\005\000\003\202\001\017
\000\060\202\001\012\002\202\001\001\000\257\165\060\063\252\273
\153\323\231\054\022\067\204\331\215\173\227\200\323\156\347\377
\233\120\225\076\220\225\126\102\327\031\174\046\204\215\222\372
\001\035\072\017\342\144\070\267\214\274\350\210\371\213\044\253
\056\243\365\067\344\100\216\030\045\171\203\165\037\073\377\154
\250\305\306\126\370\264\355\212\104\243\253\154\114\374\035\320
\334\357\150\275\317\344\252\316\360\125\367\242\064\324\203\153
\067\174\034\302\376\265\003\354\127\316\274\264\265\305\355\000
\017\123\067\052\115\364\117\014\203\373\206\317\313\376\214\116
\275\207\371\247\213\041\127\234\172\337\003\147\211\054\235\227
\141\247\020\270\125\220\177\016\055\047\070\164\337\347\375\332
\116\022\343\115\025\042\002\310\340\340\374\017\255\212\327\311
\124\120\314\073\017\312\026\200\204\320\121\126\303\216\126\177
\211\042\063\057\346\205\012\275\245\250\033\066\336\323\334\054
\155\073\307\023\275\131\043\054\346\345\244\367\330\013\355\352
\220\100\104\250\225\273\223\325\320\200\064\266\106\170\016\037
\000\223\106\341\356\351\371\354\117\027\002\003\001\000\001\243
\102\060\100\060\035\006\003\125\035\016\004\026\004\024\145\077
\307\212\206\306\074\335\074\124\134\065\370\072\355\122\014\107
\127\310\060\016\006\003\125\035\017\001\001\377\004\004\003\002
\001\006\060\017\006\003\125\035\023\001\001\377\004\005\060\003
\001\001\377\060\015\006\011\052\206\110\206\367\015\001\001\013
\005\000\003\202\001\001\000\052\077\341\361\062\216\256\341\230
\134\113\136\317\153\036\152\011\322\042\251\022\307\136\127\175
\163\126\144\200\204\172\223\344\011\271\020\315\237\052\047\341
\000\167\276\110\310\065\250\201\237\344\270\054\311\177\016\260
\322\113\067\135\352\271\325\013\136\064\275\364\163\051\303\355
\046\025\234\176\010\123\212\130\215\320\113\050\337\301\263\337
\040\363\371\343\343\072\337\314\234\224\330\116\117\303\153\027
\267\367\162\350\255\146\063\265\045\123\253\340\370\114\251\235
\375\362\015\272\256\271\331\252\306\153\371\223\273\256\253\270
\227\074\003\032\272\103\306\226\271\105\162\070\263\247\241\226
\075\221\173\176\300\041\123\114\207\355\362\013\124\225\121\223
\325\042\245\015\212\361\223\016\076\124\016\260\330\311\116\334
\362\061\062\126\352\144\371\352\265\235\026\146\102\162\363\177
\323\261\061\103\374\244\216\027\361\155\043\253\224\146\370\255
\373\017\010\156\046\055\177\027\007\011\262\214\373\120\300\237
\226\215\317\266\375\000\235\132\024\232\277\002\104\365\301\302
\237\042\136\242\017\241\343

END

CKA_NSS_Mozilla_CA_POLICY

CK_BBOOL CK_TRUE

CKA_NSS_SERVER_DISTRUST_AFTER CK_BBOOL CK_FALSE

CKA_NSS_EMAIL_DISTRUST_AFTER CK_BBOOL

CK_FALSE

```
# Trust for "TUBITAK Kamu SM SSL Kok Sertifikasi - Surum 1"
# Issuer: CN=TUBITAK Kamu SM SSL Kok Sertifikasi - Surum 1,OU=Kamu Sertifikasyon Merkezi - Kamu
SM,O=Turkiye Bilimsel ve Teknolojik Arastirma Kurumu - TUBITAK,L=Gebze - Kocaeli,C=TR
# Serial Number: 1 (0x1)
# Subject: CN=TUBITAK Kamu SM SSL Kok Sertifikasi - Surum 1,OU=Kamu Sertifikasyon Merkezi - Kamu
SM,O=Turkiye Bilimsel ve Teknolojik Arastirma Kurumu - TUBITAK,L=Gebze - Kocaeli,C=TR
# Not Valid Before: Mon Nov 25 08:25:55 2013
# Not Valid After : Sun Oct 25 08:25:55 2043
# Fingerprint (SHA-256):
46:ED:C3:68:90:46:D5:3A:45:3F:B3:10:4A:B8:0D:CA:EC:65:8B:26:60:EA:16:29:DD:7E:86:79:90:64:87:16
# Fingerprint (SHA1): 31:43:64:9B:EC:CE:27:EC:ED:3A:3F:0B:8F:0D:E4:E8:91:DD:EE:CA
CKA_CLASS CK_OBJECT_CLASS CKO_NSS_TRUST
CKA_TOKEN CK_BBOOL CK_TRUE
CKA_PRIVATE CK_BBOOL CK_FALSE
CKA_MODIFIABLE CK_BBOOL CK_FALSE
CKA_LABEL UTF8 "TUBITAK Kamu SM SSL Kok Sertifikasi - Surum 1"
CKA_CERT_SHA1_HASH MULTILINE_OCTAL
\061\103\144\233\354\316\047\354\355\072\077\013\217\015\344\350
\221\335\356\312
END
CKA_CERT_MD5_HASH
MULTILINE_OCTAL
\334\000\201\334\151\057\076\057\260\073\366\075\132\221\216\111
END
CKA_ISSUER MULTILINE_OCTAL
\060\201\322\061\013\060\011\006\003\125\004\006\023\002\124\122
\061\030\060\026\006\003\125\004\007\023\017\107\145\142\172\145
\040\055\040\113\157\143\141\145\154\151\061\102\060\100\006\003
\125\004\012\023\071\124\165\162\153\151\171\145\040\102\151\154
\151\155\163\145\154\040\166\145\040\124\145\153\156\157\154\157
\152\151\153\040\101\162\141\163\164\151\162\155\141\040\113\165
\162\165\155\165\040\055\040\124\125\102\111\124\101\113\061\055
\060\053\006\003\125\004\013\023\044\113\141\155\165\040\123\145
\162\164\151\146\151\153\141\163\171\157\156\040\115\145\162\153
\145\172\151\040\055\040\113\141\155\165\040\123\115\061\066\060
\064\006\003\125\004\003\023\055\124\125\102\111\124\101\113\040
\113\141\155\165\040\123\115\040\123\123\114\040\113\157\153\040
\123\145\162\164\151\146\151\153\141\163\151\040\055\040\123\165
\162\165\155\040\061
END
CKA_SERIAL_NUMBER
MULTILINE_OCTAL
\002\001\001
END
CKA_TRUST_SERVER_AUTH CK_TRUST CKT_NSS_TRUSTED_DELEGATOR
CKA_TRUST_EMAIL_PROTECTION CK_TRUST CKT_NSS_MUST_VERIFY_TRUST
```



```

CKA_TRUST_CODE_SIGNING CK_TRUST CKT_NSS_MUST_VERIFY_TRUST
CKA_TRUST_STEP_UP_APPROVED CK_BBOOL CK_FALSE

#
# Certificate "GDCA TrustAUTH R5 ROOT"
#
# Issuer: CN=GDCA TrustAUTH R5 ROOT,O="GUANG DONG CERTIFICATE AUTHORITY
CO.,LTD.",C=CN
# Serial Number:7d:09:97:fe:f0:47:ea:7a
# Subject: CN=GDCA TrustAUTH R5 ROOT,O="GUANG DONG CERTIFICATE AUTHORITY
CO.,LTD.",C=CN
# Not Valid Before: Wed Nov 26 05:13:15 2014
# Not Valid After : Mon Dec 31 15:59:59 2040
# Fingerprint (SHA-256):
BF:FF:8F:D0:44:33:48:7D:6A:8A:A6:0C:1A:29:76:7A:9F:C2:BB:B0:5E:42:0F:71:3A:13:B9:92:89:1D:38:93
# Fingerprint (SHA1): 0F:36:38:5B:81:1A:25:C3:9B:31:4E:83:CA:E9:34:66:70:CC:74:B4
CKA_CLASS CK_OBJECT_CLASS CKO_CERTIFICATE
CKA_TOKEN CK_BBOOL CK_TRUE
CKA_PRIVATE CK_BBOOL CK_FALSE
CKA_MODIFIABLE
CK_BBOOL CK_FALSE
CKA_LABEL UTF8 "GDCA TrustAUTH R5 ROOT"
CKA_CERTIFICATE_TYPE CK_CERTIFICATE_TYPE CKC_X_509
CKA_SUBJECT MULTILINE_OCTAL
\060\142\061\013\060\011\006\003\125\004\006\023\002\103\116\061
\062\060\060\006\003\125\004\012\014\051\107\125\101\116\107\040
\104\117\116\107\040\103\105\122\124\111\106\111\103\101\124\105
\040\101\125\124\110\117\122\111\124\131\040\103\117\056\054\114
\124\104\056\061\037\060\035\006\003\125\004\003\014\026\107\104
\103\101\040\124\162\165\163\164\101\125\124\110\040\122\065\040
\122\117\117\124
END
CKA_ID UTF8 "0"
CKA_ISSUER MULTILINE_OCTAL
\060\142\061\013\060\011\006\003\125\004\006\023\002\103\116\061
\062\060\060\006\003\125\004\012\014\051\107\125\101\116\107\040
\104\117\116\107\040\103\105\122\124\111\106\111\103\101\124\105
\040\101\125\124\110\117\122\111\124\131\040\103\117\056\054\114
\124\104\056\061\037\060\035\006\003\125\004\003\014\026\107\104
\103\101\040\124\162\165\163\164\101\125\124\110\040\122\065\040
\122\117\117\124
END
CKA_SERIAL_NUMBER
MULTILINE_OCTAL
\002\010\175\011\227\376\360\107\352\172
END
CKA_VALUE MULTILINE_OCTAL
\060\202\005\210\060\202\003\160\240\003\002\001\002\002\010\175

```

\011\227\376\360\107\352\172\060\015\006\011\052\206\110\206\367
\015\001\001\013\005\000\060\142\061\013\060\011\006\003\125\004
\006\023\002\103\116\061\062\060\060\006\003\125\004\012\014\051
\107\125\101\116\107\040\104\117\116\107\040\103\105\122\124\111
\106\111\103\101\124\105\040\101\125\124\110\117\122\111\124\131
\040\103\117\056\054\114\124\104\056\061\037\060\035\006\003\125
\004\003\014\026\107\104\103\101\040\124\162\165\163\164\101\125
\124\110\040\122\065\040\122\117\117\124\060\036\027\015\061\064
\061\061\062\066\060\065\061\063\061\065\132\027\015\064\060\061
\062\063\061\061\065\065\071\065\071\132\060\142\061\013\060\011
\006\003\125\004\006\023\002\103\116\061\062\060\060\006\003\125
\004\012\014\051\107\125\101\116\107\040\104\117\116\107\040\103
\105\122\124\111\106\111\103\101\124\105\040\101\125\124\110\117
\122\111\124\131\040\103\117\056\054\114\124\104\056\061\037\060
\035\006\003\125\004\003\014\026\107\104\103\101\040\124\162\165
\163\164\101\125\124\110\040\122\065\040\122\117\117\124\060\202
\002\042\060\015\006\011\052\206\110\206\367\015\001\001\001\005
\000\003\202\002\017\000\060\202\002\012\002\202\002\001\000\331
\243\026\360\310\164\164\167\233\357\063\015\073\006\176\125\374
\265\140\217\166\206\022\102\175\126\146\076\210\202\355\162\143
\016\236\213\335\064\054\002\121\121\303\031\375\131\124\204\311
\361\153\263\114\260\351\350\106\135\070\306\242\247\056\021\127
\272\202\025\242\234\217\155\260\231\112\012\362\353\211\160\143
\116\171\304\267\133\275\242\135\261\362\101\002\053\255\251\072
\243\354\171\012\354\137\072\343\375\357\200\074\255\064\233\032
\253\210\046\173\126\242\202\206\037\353\065\211\203\177\137\256
\051\116\075\266\156\354\256\301\360\047\233\256\343\364\354\357
\256\177\367\206\075\162\172\353\245\373\131\116\247\353\225\214
\042\071\171\341\055\010\217\314\274\221\270\101\367\024\301\043
\251\303\255\232\105\104\263\262\327\054\315\306\051\342\120\020
\256\134\313\202\216\027\030\066\175\227\346\210\232\260\115\064
\011\364\054\271\132\146\052\260\027\233\236\036\166\235\112\146
\061\101\337\077\373\305\006\357\033\266\176\032\106\066\367\144
\143\073\343\071\030\043\347\147\165\024\325\165\127\222\067\275
\276\152\033\046\120\362\066\046\006\220\305\160\001\144\155\166
\146\341\221\333\156\007\300\141\200\056\262\056\057\214\160\247
\321\073\074\263\221\344\156\266\304\073\160\362\154\222\227\011
\315\107\175\030\300\363\273\236\017\326\213\256\007\266\132\017
\316\013\014\107\247\345\076\270\275\175\307\233\065\240\141\227
\072\101\165\027\314\053\226\167\052\222\041\036\331\225\166\040
\147\150\317\015\275\337\326\037\011\152\232\342\314\163\161\244
\057\175\022\200\267\123\060\106\136\113\124\231\017\147\311\245
\310\362\040\301\202\354\235\021\337\302\002\373\032\073\321\355
\040\232\357\145\144\222\020\015\052\342\336\160\361\030\147\202
\214\141\336\270\274\321\057\234\373\017\320\053\355\033\166\271
\344\071\125\370\370\241\035\270\252\200\000\114\202\347\262\177
\011\270\274\060\240\057\015\365\122\236\216\367\222\263\012\000
\035\000\124\227\006\340\261\007\331\307\017\134\145\175\074\155

\131\127\344\355\245\215\351\100\123\237\025\113\240\161\366\032
\041\343\332\160\006\041\130\024\207\205\167\171\252\202\171\002
\003\001\000\001\243\102\060\100\060\035\006\003\125\035\016\004
\026\004\024\342\311\100\237\115\316\350\232\241\174\317\016\077
\145\305\051\210\152\031\121\060\017\006\003\125\035\023\001\001
\377\004\005\060\003\001\001\377\060\016\006\003\125\035\017\001
\001\377\004\004\003\002\001\206\060\015\006\011\052\206\110\206
\367\015\001\001\013\005\000\003\202\002\001\000\321\111\127\340
\247\314\150\130\272\001\017\053\031\315\215\260\141\105\254\021
\355\143\120\151\370\037\177\276\026\217\375\235\353\013\252\062
\107\166\322\147\044\355\275\174\063\062\227\052\307\005\206\146
\015\027\175\024\025\033\324\353\375\037\232\366\136\227\151\267
\032\045\244\012\263\221\077\137\066\254\213\354\127\250\076\347
\201\212\030\127\071\205\164\032\102\307\351\133\023\137\217\371
\010\351\222\164\215\365\107\322\253\073\326\373\170\146\116\066
\175\371\351\222\351\004\336\375\111\143\374\155\373\024\161\223
\147\057\107\112\267\271\377\036\052\163\160\106\060\277\132\362
\057\171\245\341\215\014\331\371\262\143\067\214\067\145\205\160
\152\134\133\011\162\271\255\143\074\261\335\370\374\062\277\067
\206\344\273\216\230\047\176\272\037\026\341\160\021\362\003\337
\045\142\062\047\046\030\062\204\237\377\000\072\023\272\232\115
\364\117\270\024\160\042\261\312\053\220\316\051\301\160\364\057
\235\177\362\220\036\326\132\337\267\106\374\346\206\372\313\340
\040\166\172\272\246\313\365\174\336\142\245\261\213\356\336\202
\146\212\116\072\060\037\077\200\313\255\047\272\014\136\327\320
\261\126\312\167\161\262\265\165\241\120\251\100\103\027\302\050
\331\317\122\213\133\310\143\324\102\076\240\063\172\106\056\367
\012\040\106\124\176\152\117\061\361\201\176\102\164\070\145\163
\047\356\306\174\270\216\327\245\072\327\230\241\234\214\020\125
\323\333\113\354\100\220\362\315\156\127\322\142\016\174\127\223
\261\247\155\315\235\203\273\052\347\345\266\073\161\130\255\375
\321\105\274\132\221\356\123\025\157\323\105\011\165\156\272\220
\135\036\004\317\067\337\036\250\146\261\214\346\040\152\357\374
\110\116\164\230\102\257\051\157\056\152\307\373\175\321\146\061
\042\314\206\000\176\146\203\014\102\364\275\064\222\303\032\352
\117\312\176\162\115\013\160\214\246\110\273\246\241\024\366\373
\130\104\231\024\256\252\013\223\151\240\051\045\112\245\313\053
\335\212\146\007\026\170\025\127\161\033\354\365\107\204\363\236
\061\067\172\325\177\044\255\344\274\375\375\314\156\203\350\014
\250\267\101\154\007\335\275\074\206\227\057\322

END

CKA_NSS_MOZILLA_CA_POLICY

CK_BBOOL CK_TRUE

CKA_NSS_SERVER_DISTRUST_AFTER CK_BBOOL CK_FALSE

CKA_NSS_EMAIL_DISTRUST_AFTER

CK_BBOOL CK_FALSE

Trust for "GDCA TrustAUTH R5 ROOT"

```

# Issuer: CN=GDCA TrustAUTH R5 ROOT,O="GUANG DONG CERTIFICATE AUTHORITY
CO.,LTD.",C=CN
# Serial Number:7d:09:97:fe:f0:47:ea:7a
# Subject: CN=GDCA TrustAUTH R5 ROOT,O="GUANG DONG CERTIFICATE AUTHORITY
CO.,LTD.",C=CN
# Not Valid Before: Wed Nov 26 05:13:15 2014
# Not Valid After : Mon Dec 31 15:59:59 2040
# Fingerprint (SHA-256):
BF:FF:8F:D0:44:33:48:7D:6A:8A:A6:0C:1A:29:76:7A:9F:C2:BB:B0:5E:42:0F:71:3A:13:B9:92:89:1D:38:93
# Fingerprint (SHA1): 0F:36:38:5B:81:1A:25:C3:9B:31:4E:83:CA:E9:34:66:70:CC:74:B4
CKA_CLASS CK_OBJECT_CLASS CKO_NSS_TRUST
CKA_TOKEN CK_BBOOL CK_TRUE
CKA_PRIVATE CK_BBOOL CK_FALSE
CKA_MODIFIABLE CK_BBOOL CK_FALSE
CKA_LABEL UTF8 "GDCA TrustAUTH R5 ROOT"
CKA_CERT_SHA1_HASH MULTILINE_OCTAL
\017\066\070\133\201\032\045\303\233\061\116\203\312\351\064\146
\160\314\164\264
END
CKA_CERT_MD5_HASH MULTILINE_OCTAL
\143\314\331\075\064\065\134\157\123\243\342\010\160\110\037\264
END
CKA_ISSUER MULTILINE_OCTAL
\060\142\061\013\060\011\006\003\125\004\006\023\002\103\116\061
\062\060\060\006\003\125\004\012\014\051\107\125\101\116\107\040
\104\117\116\107\040\103\105\122\124\111\106\111\103\101\124\105
\040\101\125\124\110\117\122\111\124\131\040\103\117\056\054\114
\124\104\056\061\037\060\035\006\003\125\004\003\014\026\107\104
\103\101\040\124\162\165\163\164\101\125\124\110\040\122\065\040
\122\117\117\124
END
CKA_SERIAL_NUMBER
MULTILINE_OCTAL
\002\010\175\011\227\376\360\107\352\172
END
CKA_TRUST_SERVER_AUTH CK_TRUST CKT_NSS_TRUSTED_DELEGATOR
CKA_TRUST_EMAIL_PROTECTION CK_TRUST CKT_NSS_MUST_VERIFY_TRUST
CKA_TRUST_CODE_SIGNING CK_TRUST CKT_NSS_MUST_VERIFY_TRUST
CKA_TRUST_STEP_UP_APPROVED CK_BBOOL CK_FALSE

#
# Certificate "TrustCor RootCert CA-1"
#
# Issuer: CN=TrustCor RootCert CA-1,OU=TrustCor Certificate Authority,O=TrustCor Systems S. de
R.L.,L=Panama City,ST=Panama,C=PA
# Serial Number:00:da:9b:ec:71:f3:03:b0:19
# Subject: CN=TrustCor RootCert CA-1,OU=TrustCor Certificate Authority,O=TrustCor

```

```
Systems S. de R.L.,L=Panama City,ST=Panama,C=PA
# Not Valid Before: Thu Feb 04 12:32:16 2016
# Not Valid After : Mon Dec 31 17:23:16 2029
# Fingerprint (SHA-256):
D4:0E:9C:86:CD:8F:E4:68:C1:77:69:59:F4:9E:A7:74:FA:54:86:84:B6:C4:06:F3:90:92:61:F4:DC:E2:57:5C
# Fingerprint (SHA1): FF:BD:CD:E7:82:C8:43:5E:3C:6F:26:86:5C:CA:A8:3A:45:5B:C3:0A
CKA_CLASS CK_OBJECT_CLASS CKO_CERTIFICATE
CKA_TOKEN CK_BBOOL CK_TRUE
CKA_PRIVATE CK_BBOOL CK_FALSE
CKA_MODIFIABLE CK_BBOOL CK_FALSE
CKA_LABEL UTF8 "TrustCor RootCert CA-1"
CKA_CERTIFICATE_TYPE CK_CERTIFICATE_TYPE CKC_X_509
CKA_SUBJECT MULTILINE_OCTAL
\060\201\244\061\013\060\011\006\003\125\004\006\023\002\120\101
\061\017\060\015\006\003\125\004\010\014\006\120\141\156\141\155
\141\061\024\060\022\006\003\125\004\007\014\013\120\141\156\141
\155\141\040\103\151\164\171\061\044\060\042\006\003\125\004\012
\014\033\124\162\165\163\164\103\157\162\040\123\171\163\164\145
\155\163\040\123\056\040\144\145\040\122\056\114\056\061\047\060
\045\006\003\125\004\013\014\036\124\162\165\163\164\103\157\162
\040\103\145\162\164\151\146\151\143\141\164\145\040\101\165\164
\150\157\162\151\164\171\061\037\060\035\006\003\125\004\003\014
\026\124\162\165\163\164\103\157\162\040\122\157\157\164\103\145
\162\164\040\103\101\055\061
END
CKA_ID
UTF8 "0"
CKA_ISSUER MULTILINE_OCTAL
\060\201\244\061\013\060\011\006\003\125\004\006\023\002\120\101
\061\017\060\015\006\003\125\004\010\014\006\120\141\156\141\155
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\273\323\127\277\263\363\250\215\234\364\044\113\052\326\231\236
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END

CKA_NSS_Mozilla_CA_POLICY

CK_BBOOL CK_TRUE

For Server Distrust After: Wed Nov 30 00:00:00 2022

CKA_NSS_SERVER_DISTRUST_AFTER MULTILINE_OCTAL

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END

For Email Distrust After: Wed Nov 30 00:00:00 2022

CKA_NSS_EMAIL_DISTRUST_AFTER MULTILINE_OCTAL

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END

Trust for "TrustCor RootCert CA-1"

Issuer: CN=TrustCor RootCert CA-1,OU=TrustCor Certificate Authority,O=TrustCor Systems S. de
R.L.,L=Panama City,ST=Panama,C=PA

#

Serial Number:00:da:9b:ec:71:f3:03:b0:19

Subject: CN=TrustCor RootCert CA-1,OU=TrustCor Certificate Authority,O=TrustCor Systems S. de
R.L.,L=Panama City,ST=Panama,C=PA

Not Valid Before: Thu Feb 04 12:32:16 2016

Not Valid After : Mon Dec 31 17:23:16 2029

Fingerprint (SHA-256):

D4:0E:9C:86:CD:8F:E4:68:C1:77:69:59:F4:9E:A7:74:FA:54:86:84:B6:C4:06:F3:90:92:61:F4:DC:E2:57:5C

Fingerprint (SHA1): FF:BD:CD:E7:82:C8:43:5E:3C:6F:26:86:5C:CA:A8:3A:45:5B:C3:0A

CKA_CLASS CK_OBJECT_CLASS CKO_NSS_TRUST

CKA_TOKEN CK_BBOOL CK_TRUE

CKA_PRIVATE CK_BBOOL CK_FALSE

CKA_MODIFIABLE CK_BBOOL CK_FALSE

CKA_LABEL UTF8 "TrustCor RootCert CA-1"

CKA_CERT_SHA1_HASH MULTILINE_OCTAL

\377\275\315\347\202\310\103\136\074\157\046\206\134\312\250\072

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\150\157\162\151\164\171\061\037\060\035\006\003\125\004\003\014
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CKA_TRUST_EMAIL_PROTECTION CK_TRUST CKT_NSS_TRUSTED_DELEGATOR
CKA_TRUST_CODE_SIGNING CK_TRUST CKT_NSS_MUST_VERIFY_TRUST
CKA_TRUST_STEP_UP_APPROVED CK_BBOOL CK_FALSE

#
# Certificate "TrustCor RootCert CA-2"
#
# Issuer: CN=TrustCor RootCert CA-2,OU=TrustCor Certificate Authority,O=TrustCor
Systems S. de R.L.,L=Panama City,ST=Panama,C=PA
# Serial Number:25:a1:df:ca:33:cb:59:02
# Subject: CN=TrustCor RootCert CA-2,OU=TrustCor Certificate Authority,O=TrustCor Systems S. de
R.L.,L=Panama City,ST=Panama,C=PA
# Not Valid Before: Thu Feb 04 12:32:23 2016
# Not Valid After : Sun Dec 31 17:26:39 2034
# Fingerprint (SHA-256):
07:53:E9:40:37:8C:1B:D5:E3:83:6E:39:5D:AE:A5:CB:83:9E:50:46:F1:BD:0E:AE:19:51:CF:10:FE:C7:C9:65
# Fingerprint (SHA1): B8:BE:6D:CB:56:F1:55:B9:63:D4:12:CA:4E:06:34:C7:94:B2:1C:C0
CKA_CLASS CK_OBJECT_CLASS CKO_CERTIFICATE
CKA_TOKEN CK_BBOOL CK_TRUE
CKA_PRIVATE CK_BBOOL CK_FALSE
CKA_MODIFIABLE CK_BBOOL CK_FALSE
CKA_LABEL UTF8 "TrustCor RootCert CA-2"
CKA_CERTIFICATE_TYPE CK_CERTIFICATE_TYPE CKC_X_509
CKA_SUBJECT MULTILINE_OCTAL
\060\201\244\061\013\060\011\006\003\125\004\006\023\002\120\101

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CKA_ID

UTF8 "0"

CKA_ISSUER MULTILINE_OCTAL

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END

CKA_SERIAL_NUMBER

MULTILINE_OCTAL

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END

CKA_VALUE MULTILINE_OCTAL

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\242\011\310\345\375\200\136\310\140\102\001\033\032\123\132\273
\067\246\267\274\272\204\351\036\154\032\324\144\332\324\103\376
\223\213\113\362\054\171\026\020\324\223\013\210\217\241\330\206
\024\106\221\107\233\050\044\357\127\122\116\134\102\234\252\367
\111\354\047\350\100\036\263\246\211\042\162\234\365\015\063\264
\130\243\060\073\335\324\152\124\223\276\032\115\363\223\224\367
\374\204\013\077\204\040\134\064\003\104\305\332\255\274\012\301
\002\317\036\345\224\331\363\216\133\330\114\360\235\354\141\027
\273\024\062\124\014\002\051\223\036\222\206\366\177\357\347\222
\005\016\131\335\231\010\056\056\372\234\000\122\323\305\146\051
\344\247\227\104\244\016\050\201\023\065\305\366\157\144\346\101
\304\325\057\314\064\105\045\317\101\000\226\075\112\056\302\226
\230\117\116\112\234\227\267\333\037\222\062\310\377\017\121\156
\326\354\011

END

CKA_NSS_MOZILLA_CA_POLICY

CK_BBOOL CK_TRUE

For Server Distrust After: Wed Nov 30 00:00:00 2022

CKA_NSS_SERVER_DISTRUST_AFTER MULTILINE_OCTAL

\062\062\061\061\063\060\060\060\060\060\060\132

END

For Email Distrust After: Wed Nov 30 00:00:00 2022

CKA_NSS_EMAIL_DISTRUST_AFTER

MULTILINE_OCTAL

\062\062\061\061\063\060\060\060\060\060\060\132

END

```

# Trust for "TrustCor RootCert CA-2"
# Issuer: CN=TrustCor RootCert CA-2,OU=TrustCor Certificate Authority,O=TrustCor Systems S. de
R.L.,L=Panama City,ST=Panama,C=PA
# Serial Number:25:a1:df:ca:33:cb:59:02
# Subject: CN=TrustCor RootCert CA-2,OU=TrustCor Certificate Authority,O=TrustCor Systems S. de
R.L.,L=Panama City,ST=Panama,C=PA
# Not Valid Before: Thu Feb 04 12:32:23 2016
# Not Valid After : Sun Dec 31 17:26:39 2034
# Fingerprint (SHA-256):
07:53:E9:40:37:8C:1B:D5:E3:83:6E:39:5D:AE:A5:CB:83:9E:50:46:F1:BD:0E:AE:19:51:CF:10:FE:C7:C9:65
# Fingerprint (SHA1): B8:BE:6D:CB:56:F1:55:B9:63:D4:12:CA:4E:06:34:C7:94:B2:1C:C0
CKA_CLASS CK_OBJECT_CLASS CKO_NSS_TRUST
CKA_TOKEN CK_BBOOL CK_TRUE
CKA_PRIVATE CK_BBOOL CK_FALSE
CKA_MODIFIABLE CK_BBOOL CK_FALSE
CKA_LABEL UTF8 "TrustCor RootCert CA-2"
CKA_CERT_SHA1_HASH MULTILINE_OCTAL
\270\276\155\313\126\361\125\271\143\324\022\312\116\006\064\307
\224\262\034\300
END
CKA_CERT_MD5_HASH
MULTILINE_OCTAL
\242\341\370\030\013\272\105\325\307\101\052\273\067\122\105\144
END
CKA_ISSUER MULTILINE_OCTAL
\060\201\244\061\013\060\011\006\003\125\004\006\023\002\120\101
\061\017\060\015\006\003\125\004\010\014\006\120\141\156\141\155
\141\061\024\060\022\006\003\125\004\007\014\013\120\141\156\141
\155\141\040\103\151\164\171\061\044\060\042\006\003\125\004\012
\014\033\124\162\165\163\164\103\157\162\040\123\171\163\164\145
\155\163\040\123\056\040\144\145\040\122\056\114\056\061\047\060
\045\006\003\125\004\013\014\036\124\162\165\163\164\103\157\162
\040\103\145\162\164\151\146\151\143\141\164\145\040\101\165\164
\150\157\162\151\164\171\061\037\060\035\006\003\125\004\003\014
\026\124\162\165\163\164\103\157\162\040\122\157\157\164\103\145
\162\164\040\103\101\055\062
END
CKA_SERIAL_NUMBER MULTILINE_OCTAL
\002\010\045\241\337\312\063\313\131\002
END
CKA_TRUST_SERVER_AUTH CK_TRUST CKT_NSS_TRUSTED_DELEGATOR
CKA_TRUST_EMAIL_PROTECTION CK_TRUST
CKT_NSS_TRUSTED_DELEGATOR
CKA_TRUST_CODE_SIGNING CK_TRUST CKT_NSS_MUST_VERIFY_TRUST
CKA_TRUST_STEP_UP_APPROVED CK_BBOOL CK_FALSE

#

```

```

# Certificate "TrustCor ECA-1"
#
# Issuer: CN=TrustCor ECA-1,OU=TrustCor Certificate Authority,O=TrustCor Systems S. de R.L.,L=Panama
City,ST=Panama,C=PA
# Serial Number:00:84:82:2c:5f:1c:62:d0:40
# Subject: CN=TrustCor ECA-1,OU=TrustCor Certificate Authority,O=TrustCor Systems S. de R.L.,L=Panama
City,ST=Panama,C=PA
# Not Valid Before: Thu Feb 04 12:32:33 2016
# Not Valid After : Mon Dec 31 17:28:07 2029
# Fingerprint (SHA-256):
5A:88:5D:B1:9C:01:D9:12:C5:75:93:88:93:8C:AF:BB:DF:03:1A:B2:D4:8E:91:EE:15:58:9B:42:97:1D:03:9C
# Fingerprint (SHA1): 58:D1:DF:95:95:67:6B:63:C0:F0:5B:1C:17:4D:8B:84:0B:C8:78:BD
CKA_CLASS CK_OBJECT_CLASS CKO_CERTIFICATE
CKA_TOKEN CK_BBOOL CK_TRUE
CKA_PRIVATE CK_BBOOL CK_FALSE
CKA_MODIFIABLE CK_BBOOL CK_FALSE
CKA_LABEL UTF8 "TrustCor ECA-1"
CKA_CERTIFICATE_TYPE CK_CERTIFICATE_TYPE CKC_X_509
CKA_SUBJECT MULTILINE_OCTAL
\060\201\234\061\013\060\011\006\003\125\004\006\023\002\120\101
\061\017\060\015\006\003\125\004\010\014\006\120\141\156\141\155
\141\061\024\060\022\006\003\125\004\007\014\013\120\141\156\141
\155\141\040\103\151\164\171\061\044\060\042\006\003\125\004\012
\014\033\124\162\165\163\164\103\157\162\040\123\171\163\164\145
\155\163\040\123\056\040\144\145\040\122\056\114\056\061\047\060
\045\006\003\125\004\013\014\036\124\162\165\163\164\103\157\162
\040\103\145\162\164\151\146\151\143\141\164\145\040\101\165\164
\150\157\162\151\164\171\061\027\060\025\006\003\125\004\003\014
\016\124\162\165\163\164\103\157\162\040\105\103\101\055\061
END
CKA_ID
UTF8 "0"
CKA_ISSUER MULTILINE_OCTAL
\060\201\234\061\013\060\011\006\003\125\004\006\023\002\120\101
\061\017\060\015\006\003\125\004\010\014\006\120\141\156\141\155
\141\061\024\060\022\006\003\125\004\007\014\013\120\141\156\141
\155\141\040\103\151\164\171\061\044\060\042\006\003\125\004\012
\014\033\124\162\165\163\164\103\157\162\040\123\171\163\164\145
\155\163\040\123\056\040\144\145\040\122\056\114\056\061\047\060
\045\006\003\125\004\013\014\036\124\162\165\163\164\103\157\162
\040\103\145\162\164\151\146\151\143\141\164\145\040\101\165\164
\150\157\162\151\164\171\061\027\060\025\006\003\125\004\003\014
\016\124\162\165\163\164\103\157\162\040\105\103\101\055\061
END
CKA_SERIAL_NUMBER
MULTILINE_OCTAL
\002\011\000\204\202\054\137\034\142\320\100
END

```

CKA_VALUE MULTILINE_OCTAL

```
\060\202\004\040\060\202\003\010\240\003\002\001\002\002\011\000
\204\202\054\137\034\142\320\100\060\015\006\011\052\206\110\206
\367\015\001\001\013\005\000\060\201\234\061\013\060\011\006\003
\125\004\006\023\002\120\101\061\017\060\015\006\003\125\004\010
\014\006\120\141\156\141\155\141\061\024\060\022\006\003\125\004
\007\014\013\120\141\156\141\155\141\040\103\151\164\171\061\044
\060\042\006\003\125\004\012\014\033\124\162\165\163\164\103\157
\162\040\123\171\163\164\145\155\163\040\123\056\040\144\145\040
\122\056\114\056\061\047\060\045\006\003\125\004\013\014\036\124
\162\165\163\164\103\157\162\040\103\145\162\164\151\146\151\143
\141\164\145\040\101\165\164\150\157\162\151\164\171\061\027\060
\025\006\003\125\004\003\014\016\124\162\165\163\164\103\157\162
\040\105\103\101\055\061\060\036\027\015\061\066\060\062\060\064
\061\062\063\062\063\063\132\027\015\062\071\061\062\063\061\061
\067\062\070\060\067\132\060\201\234\061\013\060\011\006\003\125
\004\006\023\002\120\101\061\017\060\015\006\003\125\004\010\014
\006\120\141\156\141\155\141\061\024\060\022\006\003\125\004\007
\014\013\120\141\156\141\155\141\040\103\151\164\171\061\044\060
\042\006\003\125\004\012\014\033\124\162\165\163\164\103\157\162
\040\123\171\163\164\145\155\163\040\123\056\040\144\145\040\122
\056\114\056\061\047\060\045\006\003\125\004\013\014\036\124\162
\165\163\164\103\157\162\040\103\145\162\164\151\146\151\143\141
\164\145\040\101\165\164\150\157\162\151\164\171\061\027\060\025
\006\003\125\004\003\014\016\124\162\165\163\164\103\157\162\040
\105\103\101\055\061\060\202\001\042\060\015\006\011\052\206\110
\206\367\015\001\001\001\005\000\003\202\001\017\000\060\202\001
\012\002\202\001\001\000\317\217\340\021\265\237\250\166\166\333
\337\017\124\357\163\143\051\202\255\107\306\243\153\355\376\137
\063\370\103\121\351\032\063\221\061\027\240\164\304\324\247\001
\346\262\222\076\152\235\355\016\371\164\230\100\323\077\003\200
\006\202\100\350\261\342\247\121\247\035\203\046\153\253\336\372
\027\221\053\330\306\254\036\261\236\031\001\325\227\246\352\015
\267\304\125\037\047\174\322\010\325\166\037\051\025\207\100\071
\335\070\105\021\165\320\232\247\064\340\277\315\310\122\035\271
\107\176\015\270\273\306\014\366\163\127\026\132\176\103\221\037
\125\072\306\155\104\004\252\234\251\234\247\114\211\027\203\256
\243\004\136\122\200\213\036\022\045\021\031\327\014\175\175\061
\104\101\352\333\257\260\034\357\201\320\054\305\232\041\233\075
\355\102\073\120\046\362\354\316\161\141\006\142\041\124\116\177
\301\235\076\177\040\214\200\313\052\330\227\142\310\203\063\221
\175\260\242\132\017\127\350\073\314\362\045\262\324\174\057\354
\115\306\241\072\025\172\347\266\135\065\365\366\110\112\066\105
\146\324\272\230\130\301\002\003\001\000\001\243\143\060\141\060
\035\006\003\125\035\016\004\026\004\024\104\236\110\365\314\155
\110\324\240\113\177\376\131\044\057\203\227\231\232\206\060\037
\006\003\125\035\043\004\030\060\026\200\024\104\236\110\365\314
\155\110\324\240\113\177\376\131\044\057\203\227\231\232\206\060
```

\017\006\003\125\035\023\001\001\377\004\005\060\003\001\001\377
\060\016\006\003\125\035\017\001\001\377\004\004\003\002\001\206
\060\015\006\011\052\206\110\206\367\015\001\001\013\005\000\003
\202\001\001\000\005\076\065\134\025\160\233\311\307\163\141\157
\162\053\324\302\217\362\103\135\002\316\304\224\271\224\021\203
\147\135\342\147\154\165\166\277\273\014\252\066\306\255\107\223
\143\334\036\176\326\336\056\376\351\031\062\070\003\177\024\366
\000\163\054\131\261\041\006\341\373\254\030\225\014\243\377\231
\226\367\053\047\233\325\044\314\035\335\301\072\340\230\104\260
\304\344\076\167\261\163\251\144\054\366\034\001\174\077\135\105
\205\300\205\347\045\217\225\334\027\363\074\237\032\156\260\312
\343\035\052\351\114\143\372\044\141\142\326\332\176\266\034\154
\365\002\035\324\052\335\125\220\353\052\021\107\074\056\136\164
\262\202\042\245\175\123\037\105\354\047\221\175\347\042\026\350
\300\150\066\330\306\361\117\200\104\062\371\341\321\321\035\252
\336\250\253\234\004\257\255\040\016\144\230\115\245\153\300\110
\130\226\151\115\334\007\214\121\223\242\337\237\017\075\213\140
\264\202\215\252\010\116\142\105\340\371\013\322\340\340\074\133
\336\134\161\047\045\302\346\003\201\213\020\123\343\307\125\242
\264\237\327\346

END

CKA_NSS_Mozilla_CA_POLICY

CK_BBOOL CK_TRUE

For Server Distrust After: Wed Nov 30 00:00:00 2022

CKA_NSS_SERVER_DISTRUST_AFTER MULTILINE_OCTAL

\062\062\061\061\063\060\060\060\060\060\060\060\132

END

For Email Distrust After: Wed Nov 30 00:00:00

2022

CKA_NSS_EMAIL_DISTRUST_AFTER MULTILINE_OCTAL

\062\062\061\061\063\060\060\060\060\060\060\060\132

END

Trust for "TrustCor ECA-1"

Issuer: CN=TrustCor ECA-1,OU=TrustCor Certificate Authority,O=TrustCor Systems S. de R.L.,L=Panama
City,ST=Panama,C=PA

Serial Number:00:84:82:2c:5f:1c:62:d0:40

Subject: CN=TrustCor ECA-1,OU=TrustCor Certificate Authority,O=TrustCor Systems S. de R.L.,L=Panama
City,ST=Panama,C=PA

Not Valid Before: Thu Feb 04 12:32:33 2016

Not Valid After : Mon Dec 31 17:28:07 2029

Fingerprint (SHA-256):

5A:88:5D:B1:9C:01:D9:12:C5:75:93:88:93:8C:AF:BB:DF:03:1A:B2:D4:8E:91:EE:15:58:9B:42:97:1D:03:9C

Fingerprint (SHA1): 58:D1:DF:95:95:67:6B:63:C0:F0:5B:1C:17:4D:8B:84:0B:C8:78:BD

CKA_CLASS CK_OBJECT_CLASS CKO_NSS_TRUST

CKA_TOKEN CK_BBOOL CK_TRUE

CKA_PRIVATE CK_BBOOL CK_FALSE

CKA_MODIFIABLE CK_BBOOL CK_FALSE

```

CKA_LABEL UTF8 "TrustCor ECA-1"
CKA_CERT_SHA1_HASH MULTILINE_OCTAL
\130\321\337\225\225\147\153\143\300\360\133\034\027\115\213\204
\013\310\170\275
END
CKA_CERT_MD5_HASH
MULTILINE_OCTAL
\047\222\043\035\012\365\100\174\351\346\153\235\330\365\347\154
END
CKA_ISSUER MULTILINE_OCTAL
\060\201\234\061\013\060\011\006\003\125\004\006\023\002\120\101
\061\017\060\015\006\003\125\004\010\014\006\120\141\156\141\155
\141\061\024\060\022\006\003\125\004\007\014\013\120\141\156\141
\155\141\040\103\151\164\171\061\044\060\042\006\003\125\004\012
\014\033\124\162\165\163\164\103\157\162\040\123\171\163\164\145
\155\163\040\123\056\040\144\145\040\122\056\114\056\061\047\060
\045\006\003\125\004\013\014\036\124\162\165\163\164\103\157\162
\040\103\145\162\164\151\146\151\143\141\164\145\040\101\165\164
\150\157\162\151\164\171\061\027\060\025\006\003\125\004\003\014
\016\124\162\165\163\164\103\157\162\040\105\103\101\055\061
END
CKA_SERIAL_NUMBER MULTILINE_OCTAL
\002\011\000\204\202\054\137\034\142\320\100
END
CKA_TRUST_SERVER_AUTH CK_TRUST CKT_NSS_TRUSTED_DELEGATOR
CKA_TRUST_EMAIL_PROTECTION CK_TRUST CKT_NSS_TRUSTED_DELEGATOR
CKA_TRUST_CODE_SIGNING
CK_TRUST CKT_NSS_MUST_VERIFY_TRUST
CKA_TRUST_STEP_UP_APPROVED CK_BBOOL CK_FALSE

#
# Certificate "SSL.com Root Certification Authority RSA"
#
# Issuer: CN=SSL.com Root Certification Authority RSA,O=SSL Corporation,L=Houston,ST=Texas,C=US
# Serial Number:7b:2c:9b:d3:16:80:32:99
# Subject: CN=SSL.com Root Certification Authority RSA,O=SSL Corporation,L=Houston,ST=Texas,C=US
# Not Valid Before: Fri Feb 12 17:39:39 2016
# Not Valid After : Tue Feb 12 17:39:39 2041
# Fingerprint (SHA-256):
85:66:6A:56:2E:E0:BE:5C:E9:25:C1:D8:89:0A:6F:76:A8:7E:C1:6D:4D:7D:5F:29:EA:74:19:CF:20:12:3B:69
# Fingerprint (SHA1): B7:AB:33:08:D1:EA:44:77:BA:14:80:12:5A:6F:BD:A9:36:49:0C:BB
CKA_CLASS CK_OBJECT_CLASS CKO_CERTIFICATE
CKA_TOKEN CK_BBOOL CK_TRUE
CKA_PRIVATE CK_BBOOL CK_FALSE
CKA_MODIFIABLE CK_BBOOL CK_FALSE
CKA_LABEL UTF8 "SSL.com Root Certification Authority RSA"
CKA_CERTIFICATE_TYPE CK_CERTIFICATE_TYPE CKC_X_509
CKA_SUBJECT MULTILINE_OCTAL

```


\060\174\061\013\060\011\006\003\125\004\006\023\002\125\123\061
\016\060\014\006\003\125\004\010\014\005\124\145\170\141\163\061
\020\060\016\006\003\125\004\007\014\007\110\157\165\163\164\157
\156\061\030\060\026\006\003\125\004\012\014\017\123\123\114\040
\103\157\162\160\157\162\141\164\151\157\156\061\061\060\057\006
\003\125\004\003\014\050\123\123\114\056\143\157\155\040\122\157
\157\164\040\103\145\162\164\151\146\151\143\141\164\151\157\156
\040\101\165\164\150\157\162\151\164\171\040\122\123\101

END

CKA_ID

UTF8 "0"

CKA_ISSUER MULTILINE_OCTAL

\060\174\061\013\060\011\006\003\125\004\006\023\002\125\123\061
\016\060\014\006\003\125\004\010\014\005\124\145\170\141\163\061
\020\060\016\006\003\125\004\007\014\007\110\157\165\163\164\157
\156\061\030\060\026\006\003\125\004\012\014\017\123\123\114\040
\103\157\162\160\157\162\141\164\151\157\156\061\061\060\057\006
\003\125\004\003\014\050\123\123\114\056\143\157\155\040\122\157
\157\164\040\103\145\162\164\151\146\151\143\141\164\151\157\156
\040\101\165\164\150\157\162\151\164\171\040\122\123\101

END

CKA_SERIAL_NUMBER

MULTILINE_OCTAL

\002\010\173\054\233\323\026\200\062\231

END

CKA_VALUE MULTILINE_OCTAL

\060\202\005\335\060\202\003\305\240\003\002\001\002\002\010\173
\054\233\323\026\200\062\231\060\015\006\011\052\206\110\206\367
\015\001\001\013\005\000\060\174\061\013\060\011\006\003\125\004
\006\023\002\125\123\061\016\060\014\006\003\125\004\010\014\005
\124\145\170\141\163\061\020\060\016\006\003\125\004\007\014\007
\110\157\165\163\164\157\156\061\030\060\026\006\003\125\004\012
\014\017\123\123\114\040\103\157\162\160\157\162\141\164\151\157
\156\061\061\060\057\006\003\125\004\003\014\050\123\123\114\056
\143\157\155\040\122\157\157\164\040\103\145\162\164\151\146\151
\143\141\164\151\157\156\040\101\165\164\150\157\162\151\164\171
\040\122\123\101\060\036\027\015\061\066\060\062\061\062\061\067
\063\071\063\071\132\027\015\064\061\060\062\061\062\061\067\063
\071\063\071\132\060\174\061\013\060\011\006\003\125\004\006\023
\002\125\123\061\016\060\014\006\003\125\004\010\014\005\124\145
\170\141\163\061\020\060\016\006\003\125\004\007\014\007\110\157
\165\163\164\157\156\061\030\060\026\006\003\125\004\012\014\017
\123\123\114\040\103\157\162\160\157\162\141\164\151\157\156\061
\061\060\057\006\003\125\004\003\014\050\123\123\114\056\143\157
\155\040\122\157\157\164\040\103\145\162\164\151\146\151\143\141
\164\151\157\156\040\101\165\164\150\157\162\151\164\171\040\122
\123\101\060\202\002\042\060\015\006\011\052\206\110\206\367\015
\001\001\001\005\000\003\202\002\017\000\060\202\002\012\002\202

\002\001\000\371\017\335\243\053\175\313\320\052\376\354\147\205
\246\347\056\033\272\167\341\343\365\257\244\354\372\112\135\221
\304\127\107\153\030\167\153\166\362\375\223\344\075\017\302\026
\236\013\146\303\126\224\236\027\203\205\316\126\357\362\026\375
\000\142\365\042\011\124\350\145\027\116\101\271\340\117\106\227
\252\033\310\270\156\142\136\151\261\137\333\052\002\176\374\154
\312\363\101\330\355\320\350\374\077\141\110\355\260\003\024\035
\020\016\113\031\340\273\116\354\206\145\377\066\363\136\147\002
\013\235\206\125\141\375\172\070\355\376\342\031\000\267\157\241
\120\142\165\164\074\240\372\310\045\222\264\156\172\042\307\370
\036\241\343\262\335\221\061\253\053\035\004\377\245\112\004\067
\351\205\244\063\053\375\342\326\125\064\174\031\244\112\150\307
\262\250\323\267\312\241\223\210\353\301\227\274\214\371\035\331
\042\204\044\164\307\004\075\152\251\051\223\314\353\270\133\341
\376\137\045\252\064\130\310\301\043\124\235\033\230\021\303\070
\234\176\075\206\154\245\017\100\206\174\002\364\134\002\117\050
\313\256\161\237\017\072\310\063\376\021\045\065\352\374\272\305
\140\075\331\174\030\325\262\251\323\165\170\003\162\042\312\072
\303\037\357\054\345\056\251\372\236\054\266\121\106\375\257\003
\326\352\140\150\352\205\026\066\153\205\351\036\300\263\335\304
\044\334\200\052\201\101\155\224\076\310\340\311\201\101\000\236
\136\277\177\305\010\230\242\030\054\102\100\263\371\157\070\047
\113\116\200\364\075\201\107\340\210\174\352\034\316\265\165\134
\121\056\034\053\177\032\162\050\347\000\265\321\164\306\327\344
\237\255\007\223\266\123\065\065\374\067\344\303\366\135\026\276
\041\163\336\222\012\370\240\143\152\274\226\222\152\076\370\274
\145\125\233\336\365\015\211\046\004\374\045\032\246\045\151\313
\302\155\312\174\342\131\137\227\254\353\357\056\310\274\327\033
\131\074\053\314\362\031\310\223\153\047\143\031\317\374\351\046
\370\312\161\233\177\223\376\064\147\204\116\231\353\374\263\170
\011\063\160\272\146\246\166\355\033\163\353\032\245\015\304\042
\023\040\224\126\012\116\054\154\116\261\375\317\234\011\272\242
\063\355\207\002\003\001\000\001\243\143\060\141\060\035\006\003
\125\035\016\004\026\004\024\335\004\011\007\242\365\172\175\122
\123\022\222\225\356\070\200\045\015\246\131\060\017\006\003\125
\035\023\001\001\377\004\005\060\003\001\001\377\060\037\006\003
\125\035\043\004\030\060\026\200\024\335\004\011\007\242\365\172
\175\122\123\022\222\225\356\070\200\045\015\246\131\060\016\006
\003\125\035\017\001\001\377\004\004\003\002\001\206\060\015\006
\011\052\206\110\206\367\015\001\001\013\005\000\003\202\002\001
\000\040\030\021\224\051\373\046\235\034\036\036\160\141\361\225
\162\223\161\044\255\150\223\130\216\062\257\033\263\160\003\374
\045\053\164\205\220\075\170\152\364\271\213\245\227\073\265\030
\221\273\036\247\371\100\133\221\371\125\231\257\036\021\320\134
\035\247\146\343\261\224\007\014\062\071\246\352\033\260\171\330
\035\234\160\104\343\212\335\304\371\225\037\212\070\103\077\001
\205\245\107\247\075\106\262\274\345\042\150\367\173\234\330\054
\076\012\041\310\055\063\254\277\305\201\231\061\164\301\165\161

\305\276\261\360\043\105\364\235\153\374\031\143\235\243\274\004
\306\030\013\045\273\123\211\017\263\200\120\336\105\356\104\177
\253\224\170\144\230\323\366\050\335\207\330\160\145\164\373\016
\271\023\353\247\017\141\251\062\226\314\336\273\355\143\114\030
\273\251\100\367\240\124\156\040\210\161\165\030\352\172\264\064
\162\340\043\047\167\134\266\220\352\206\045\100\253\357\063\017
\313\237\202\276\242\040\373\366\265\055\032\346\302\205\261\164
\017\373\310\145\002\244\122\001\107\335\111\042\301\277\330\353
\153\254\176\336\354\143\063\025\267\043\010\217\306\017\215\101
\132\335\216\305\271\217\345\105\077\170\333\272\322\033\100\261
\376\161\115\077\340\201\242\272\136\264\354\025\340\223\335\010
\037\176\341\125\231\013\041\336\223\236\012\373\346\243\111\275
\066\060\376\347\167\262\240\165\227\265\055\201\210\027\145\040
\367\332\220\000\237\311\122\314\062\312\065\174\365\075\017\330
\053\327\365\046\154\311\006\064\226\026\352\160\131\032\062\171
\171\013\266\210\177\017\122\110\075\277\154\330\242\104\056\321
\116\267\162\130\323\211\023\225\376\104\253\370\327\213\033\156
\234\274\054\240\133\325\152\000\257\137\067\341\325\372\020\013
\230\234\206\347\046\217\316\360\354\156\212\127\013\200\343\116
\262\300\240\143\141\220\272\125\150\067\164\152\266\222\333\237
\241\206\042\266\145\047\016\354\266\237\102\140\344\147\302\265
\332\101\013\304\323\213\141\033\274\372\037\221\053\327\104\007
\136\272\051\254\331\305\351\357\123\110\132\353\200\361\050\130
\041\315\260\006\125\373\047\077\123\220\160\251\004\036\127\047
\271

END

CKA_NSS_MOZILLA_CA_POLICY

CK_BBOOL CK_TRUE

CKA_NSS_SERVER_DISTRUST_AFTER CK_BBOOL CK_FALSE

CKA_NSS_EMAIL_DISTRUST_AFTER CK_BBOOL CK_FALSE

Trust for "SSL.com Root Certification Authority RSA"

Issuer: CN=SSL.com Root Certification Authority RSA,O=SSL Corporation,L=Houston,ST=Texas,C=US

Serial Number:7b:2c:9b:d3:16:80:32:99

Subject: CN=SSL.com Root Certification Authority RSA,O=SSL Corporation,L=Houston,ST=Texas,C=US

Not Valid Before: Fri Feb 12 17:39:39 2016

Not Valid After : Tue Feb 12 17:39:39 2041

Fingerprint (SHA-256):

85:66:6A:56:2E:E0:BE:5C:E9:25:C1:D8:89:0A:6F:76:A8:7E:C1:6D:4D:7D:5F:29:EA:74:19:CF:20:12:3B:69

Fingerprint (SHA1): B7:AB:33:08:D1:EA:44:77:BA:14:80:12:5A:6F:BD:A9:36:49:0C:BB

CKA_CLASS CK_OBJECT_CLASS CKO_NSS_TRUST

CKA_TOKEN

CK_BBOOL CK_TRUE

CKA_PRIVATE CK_BBOOL CK_FALSE

CKA_MODIFIABLE CK_BBOOL CK_FALSE

CKA_LABEL UTF8 "SSL.com Root Certification Authority RSA"

CKA_CERT_SHA1_HASH MULTILINE_OCTAL

\267\253\063\010\321\352\104\167\272\024\200\022\132\157\275\251

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\066\111\014\273
END
CKA_CERT_MD5_HASH MULTILINE_OCTAL
\206\151\022\300\160\361\354\254\254\302\325\274\245\133\241\051
END
CKA_ISSUER MULTILINE_OCTAL
\060\174\061\013\060\011\006\003\125\004\006\023\002\125\123\061
\016\060\014\006\003\125\004\010\014\005\124\145\170\141\163\061
\020\060\016\006\003\125\004\007\014\007\110\157\165\163\164\157
\156\061\030\060\026\006\003\125\004\012\014\017\123\123\114\040
\103\157\162\160\157\162\141\164\151\157\156\061\061\060\057\006
\003\125\004\003\014\050\123\123\114\056\143\157\155\040\122\157
\157\164\040\103\145\162\164\151\146\151\143\141\164\151\157\156
\040\101\165\164\150\157\162\151\164\171\040\122\123\101
END
CKA_SERIAL_NUMBER MULTILINE_OCTAL
\002\010\173\054\233\323\026\200\062\231
END
CKA_TRUST_SERVER_AUTH
CK_TRUST CKT_NSS_TRUSTED_DELEGATOR
CKA_TRUST_EMAIL_PROTECTION CK_TRUST CKT_NSS_TRUSTED_DELEGATOR
CKA_TRUST_CODE_SIGNING CK_TRUST CKT_NSS_MUST_VERIFY_TRUST
CKA_TRUST_STEP_UP_APPROVED CK_BBOOL CK_FALSE

#
# Certificate "SSL.com Root Certification Authority ECC"
#
# Issuer: CN=SSL.com Root Certification Authority ECC,O=SSL Corporation,L=Houston,ST=Texas,C=US
# Serial Number:75:e6:df:cb:c1:68:5b:a8
# Subject: CN=SSL.com Root Certification Authority ECC,O=SSL Corporation,L=Houston,ST=Texas,C=US
# Not Valid Before: Fri Feb 12 18:14:03 2016
# Not Valid After : Tue Feb 12 18:14:03 2041
# Fingerprint (SHA-256):
34:17:BB:06:CC:60:07:DA:1B:96:1C:92:0B:8A:B4:CE:3F:AD:82:0E:4A:A3:0B:9A:CB:C4:A7:4E:BD:CE:BC:65
# Fingerprint (SHA1): C3:19:7C:39:24:E6:54:AF:1B:C4:AB:20:95:7A:E2:C3:0E:13:02:6A
CKA_CLASS CK_OBJECT_CLASS CKO_CERTIFICATE
CKA_TOKEN CK_BBOOL CK_TRUE
CKA_PRIVATE CK_BBOOL CK_FALSE
CKA_MODIFIABLE CK_BBOOL CK_FALSE
CKA_LABEL UTF8 "SSL.com Root Certification Authority ECC"
CKA_CERTIFICATE_TYPE
CK_CERTIFICATE_TYPE CKC_X_509
CKA_SUBJECT MULTILINE_OCTAL
\060\174\061\013\060\011\006\003\125\004\006\023\002\125\123\061
\016\060\014\006\003\125\004\010\014\005\124\145\170\141\163\061
\020\060\016\006\003\125\004\007\014\007\110\157\165\163\164\157
\156\061\030\060\026\006\003\125\004\012\014\017\123\123\114\040
\103\157\162\160\157\162\141\164\151\157\156\061\061\060\057\006

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\003\125\004\003\014\050\123\123\114\056\143\157\155\040\122\157
\157\164\040\103\145\162\164\151\146\151\143\141\164\151\157\156
\040\101\165\164\150\157\162\151\164\171\040\105\103\103
END
CKA_ID UTF8 "0"
CKA_ISSUER MULTILINE_OCTAL
\060\174\061\013\060\011\006\003\125\004\006\023\002\125\123\061
\016\060\014\006\003\125\004\010\014\005\124\145\170\141\163\061
\020\060\016\006\003\125\004\007\014\007\110\157\165\163\164\157
\156\061\030\060\026\006\003\125\004\012\014\017\123\123\114\040
\103\157\162\160\157\162\141\164\151\157\156\061\061\060\057\006
\003\125\004\003\014\050\123\123\114\056\143\157\155\040\122\157
\157\164\040\103\145\162\164\151\146\151\143\141\164\151\157\156
\040\101\165\164\150\157\162\151\164\171\040\105\103\103
END
CKA_SERIAL_NUMBER
MULTILINE_OCTAL
\002\010\165\346\337\313\301\150\133\250
END
CKA_VALUE MULTILINE_OCTAL
\060\202\002\215\060\202\002\024\240\003\002\001\002\002\010\165
\346\337\313\301\150\133\250\060\012\006\010\052\206\110\316\075
\004\003\002\060\174\061\013\060\011\006\003\125\004\006\023\002
\125\123\061\016\060\014\006\003\125\004\010\014\005\124\145\170
\141\163\061\020\060\016\006\003\125\004\007\014\007\110\157\165
\163\164\157\156\061\030\060\026\006\003\125\004\012\014\017\123
\123\114\040\103\157\162\160\157\162\141\164\151\157\156\061\061
\060\057\006\003\125\004\003\014\050\123\123\114\056\143\157\155
\040\122\157\157\164\040\103\145\162\164\151\146\151\143\141\164
\151\157\156\040\101\165\164\150\157\162\151\164\171\040\105\103
\103\060\036\027\015\061\066\060\062\061\062\061\070\061\064\060
\063\132\027\015\064\061\060\062\061\062\061\070\061\064\060\063
\132\060\174\061\013\060\011\006\003\125\004\006\023\002\125\123
\061\016\060\014\006\003\125\004\010\014\005\124\145\170\141\163
\061\020\060\016\006\003\125\004\007\014\007\110\157\165\163\164
\157\156\061\030\060\026\006\003\125\004\012\014\017\123\123\114
\040\103\157\162\160\157\162\141\164\151\157\156\061\061\060\057
\006\003\125\004\003\014\050\123\123\114\056\143\157\155\040\122
\157\157\164\040\103\145\162\164\151\146\151\143\141\164\151\157
\156\040\101\165\164\150\157\162\151\164\171\040\105\103\103\060
\166\060\020\006\007\052\206\110\316\075\002\001\006\005\053\201
\004\000\042\003\142\000\004\105\156\251\120\304\246\043\066\236
\137\050\215\027\313\226\042\144\077\334\172\216\035\314\010\263
\242\161\044\272\216\111\271\004\033\107\226\130\253\055\225\310
\355\236\010\065\310\047\353\211\214\123\130\353\142\212\376\360
\133\017\153\061\122\143\101\073\211\315\354\354\266\215\031\323
\064\007\334\273\306\006\177\302\105\225\354\313\177\250\043\340
\011\351\201\372\363\107\323\243\143\060\141\060\035\006\003\125

\035\016\004\026\004\024\202\321\205\163\060\347\065\004\323\216
\002\222\373\345\244\321\304\041\350\315\060\017\006\003\125\035
\023\001\001\377\004\005\060\003\001\001\377\060\037\006\003\125
\035\043\004\030\060\026\200\024\202\321\205\163\060\347\065\004
\323\216\002\222\373\345\244\321\304\041\350\315\060\016\006\003
\125\035\017\001\001\377\004\004\003\002\001\206\060\012\006\010
\052\206\110\316\075\004\003\002\003\147\000\060\144\002\060\157
\347\353\131\021\244\140\317\141\260\226\173\355\005\371\057\023
\221\334\355\345\374\120\153\021\106\106\263\034\041\000\142\273
\276\303\347\350\315\007\231\371\015\013\135\162\076\304\252\002
\060\037\274\272\013\342\060\044\373\174\155\200\125\012\231\076
\200\015\063\345\146\243\263\243\273\245\325\213\217\011\054\246
\135\176\342\360\007\010\150\155\322\174\151\156\137\337\345\152
\145

END

CKA_NSS_MOZILLA_CA_POLICY

CK_BBOOL CK_TRUE

CKA_NSS_SERVER_DISTRUST_AFTER

CK_BBOOL CK_FALSE

CKA_NSS_EMAIL_DISTRUST_AFTER CK_BBOOL CK_FALSE

Trust for "SSL.com Root Certification Authority ECC"

Issuer: CN=SSL.com Root Certification Authority ECC,O=SSL Corporation,L=Houston,ST=Texas,C=US

Serial Number:75:e6:df:cb:c1:68:5b:a8

Subject: CN=SSL.com Root Certification Authority ECC,O=SSL Corporation,L=Houston,ST=Texas,C=US

Not Valid Before: Fri Feb 12 18:14:03 2016

Not Valid After : Tue Feb 12 18:14:03 2041

Fingerprint (SHA-256):

34:17:BB:06:CC:60:07:DA:1B:96:1C:92:0B:8A:B4:CE:3F:AD:82:0E:4A:A3:0B:9A:CB:C4:A7:4E:BD:CE:BC:65

Fingerprint (SHA1): C3:19:7C:39:24:E6:54:AF:1B:C4:AB:20:95:7A:E2:C3:0E:13:02:6A

CKA_CLASS CK_OBJECT_CLASS CKO_NSS_TRUST

CKA_TOKEN CK_BBOOL CK_TRUE

CKA_PRIVATE CK_BBOOL CK_FALSE

CKA_MODIFIABLE CK_BBOOL CK_FALSE

CKA_LABEL UTF8 "SSL.com Root Certification Authority ECC"

CKA_CERT_SHA1_HASH MULTILINE_OCTAL

\303\031\174\071\044\346\124\257\033\304\253\040\225\172\342\303
\016\023\002\152

END

CKA_CERT_MD5_HASH MULTILINE_OCTAL

\056\332\344\071\177\234\217\067\321\160\237\046\027\121\072\216

END

CKA_ISSUER

MULTILINE_OCTAL

\060\174\061\013\060\011\006\003\125\004\006\023\002\125\123\061
\016\060\014\006\003\125\004\010\014\005\124\145\170\141\163\061
\020\060\016\006\003\125\004\007\014\007\110\157\165\163\164\157
\156\061\030\060\026\006\003\125\004\012\014\017\123\123\114\040

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\103\157\162\160\157\162\141\164\151\157\156\061\061\060\057\006
\003\125\004\003\014\050\123\123\114\056\143\157\155\040\122\157
\157\164\040\103\145\162\164\151\146\151\143\141\164\151\157\156
\040\101\165\164\150\157\162\151\164\171\040\105\103\103
END
CKA_SERIAL_NUMBER MULTILINE_OCTAL
\002\010\165\346\337\313\301\150\133\250
END
CKA_TRUST_SERVER_AUTH CK_TRUST CKT_NSS_TRUSTED_DELEGATOR
CKA_TRUST_EMAIL_PROTECTION CK_TRUST CKT_NSS_TRUSTED_DELEGATOR
CKA_TRUST_CODE_SIGNING CK_TRUST CKT_NSS_MUST_VERIFY_TRUST
CKA_TRUST_STEP_UP_APPROVED CK_BBOOL CK_FALSE

#
# Certificate "SSL.com EV Root Certification Authority RSA R2"
#
# Issuer: CN=SSL.com EV Root
      Certification Authority RSA R2,O=SSL Corporation,L=Houston,ST=Texas,C=US
# Serial Number:56:b6:29:cd:34:bc:78:f6
# Subject: CN=SSL.com EV Root Certification Authority RSA R2,O=SSL
Corporation,L=Houston,ST=Texas,C=US
# Not Valid Before: Wed May 31 18:14:37 2017
# Not Valid After : Fri May 30 18:14:37 2042
# Fingerprint (SHA-256):
2E:7B:F1:6C:C2:24:85:A7:BB:E2:AA:86:96:75:07:61:B0:AE:39:BE:3B:2F:E9:D0:CC:6D:4E:F7:34:91:42:5C
# Fingerprint (SHA1): 74:3A:F0:52:9B:D0:32:A0:F4:4A:83:CD:D4:BA:A9:7B:7C:2E:C4:9A
CKA_CLASS CK_OBJECT_CLASS CKO_CERTIFICATE
CKA_TOKEN CK_BBOOL CK_TRUE
CKA_PRIVATE CK_BBOOL CK_FALSE
CKA_MODIFIABLE CK_BBOOL CK_FALSE
CKA_LABEL UTF8 "SSL.com EV Root Certification Authority RSA R2"
CKA_CERTIFICATE_TYPE CK_CERTIFICATE_TYPE CKC_X_509
CKA_SUBJECT MULTILINE_OCTAL
\060\201\202\061\013\060\011\006\003\125\004\006\023\002\125\123
\061\016\060\014\006\003\125\004\010\014\005\124\145\170\141\163
\061\020\060\016\006\003\125\004\007\014\007\110\157\165\163\164
\157\156\061\030\060\026\006\003\125\004\012\014\017\123\123\114
\040\103\157\162\160\157\162\141\164\151\157\156\061\067\060\065
\006\003\125\004\003\014\056\123\123\114\056\143\157\155\040\105
\126\040\122\157\157\164\040\103\145\162\164\151\146\151\143\141
\164\151\157\156\040\101\165\164\150\157\162\151\164\171\040\122
\123\101\040\122\062
END
CKA_ID
UTF8 "0"
CKA_ISSUER MULTILINE_OCTAL
\060\201\202\061\013\060\011\006\003\125\004\006\023\002\125\123
\061\016\060\014\006\003\125\004\010\014\005\124\145\170\141\163

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\061\020\060\016\006\003\125\004\007\014\007\110\157\165\163\164
\157\156\061\030\060\026\006\003\125\004\012\014\017\123\123\114
\040\103\157\162\160\157\162\141\164\151\157\156\061\067\060\065
\006\003\125\004\003\014\056\123\123\114\056\143\157\155\040\105
\126\040\122\157\157\164\040\103\145\162\164\151\146\151\143\141
\164\151\157\156\040\101\165\164\150\157\162\151\164\171\040\122
\123\101\040\122\062

END

CKA_SERIAL_NUMBER MULTILINE_OCTAL

\002\010\126\266\051\315\064\274\170\366

END

CKA_VALUE

MULTILINE_OCTAL

\060\202\005\353\060\202\003\323\240\003\002\001\002\002\010\126
\266\051\315\064\274\170\366\060\015\006\011\052\206\110\206\367
\015\001\001\013\005\000\060\201\202\061\013\060\011\006\003\125
\004\006\023\002\125\123\061\016\060\014\006\003\125\004\010\014
\005\124\145\170\141\163\061\020\060\016\006\003\125\004\007\014
\007\110\157\165\163\164\157\156\061\030\060\026\006\003\125\004
\012\014\017\123\123\114\040\103\157\162\160\157\162\141\164\151
\157\156\061\067\060\065\006\003\125\004\003\014\056\123\123\114
\056\143\157\155\040\105\126\040\122\157\157\164\040\103\145\162
\164\151\146\151\143\141\164\151\157\156\040\101\165\164\150\157
\162\151\164\171\040\122\123\101\040\122\062\060\036\027\015\061
\067\060\065\063\061\061\070\061\064\063\067\132\027\015\064\062
\060\065\063\060\061\070\061\064\063\067\132\060\201\202\061\013
\060\011\006\003\125\004\006\023\002\125\123\061\016\060\014\006
\003\125\004\010\014\005\124\145\170\141\163\061\020\060\016\006
\003\125\004\007\014\007\110\157\165\163\164\157\156\061\030\060
\026\006\003\125\004\012\014\017\123\123\114\040\103\157\162\160
\157\162\141\164\151\157\156\061\067\060\065\006\003\125\004\003
\014\056\123\123\114\056\143\157\155\040\105\126\040\122\157\157
\164\040\103\145\162\164\151\146\151\143\141\164\151\157\156\040
\101\165\164\150\157\162\151\164\171\040\122\123\101\040\122\062
\060\202\002\042\060\015\006\011\052\206\110\206\367\015\001\001
\001\005\000\003\202\002\017\000\060\202\002\012\002\202\002\001
\000\217\066\145\100\341\326\115\300\327\264\351\106\332\153\352
\063\107\315\114\371\175\175\276\275\055\075\360\333\170\341\206
\245\331\272\011\127\150\355\127\076\240\320\010\101\203\347\050
\101\044\037\343\162\025\320\001\032\373\136\160\043\262\313\237
\071\343\317\305\116\306\222\155\046\306\173\273\263\332\047\235
\012\206\351\201\067\005\376\360\161\161\354\303\034\351\143\242
\027\024\235\357\033\147\323\205\125\002\002\326\111\311\314\132
\341\261\367\157\062\237\311\324\073\210\101\250\234\275\313\253
\333\155\173\011\037\242\114\162\220\332\053\010\374\317\074\124
\316\147\017\250\317\135\226\031\013\304\343\162\353\255\321\175
\035\047\357\222\353\020\277\133\353\073\257\317\200\335\301\322
\226\004\133\172\176\244\251\074\070\166\244\142\216\240\071\136

\352\167\317\135\000\131\217\146\054\076\007\242\243\005\046\021
\151\227\352\205\267\017\226\013\113\310\100\341\120\272\056\212
\313\367\017\232\042\347\177\232\067\023\315\362\115\023\153\041
\321\300\314\042\362\241\106\366\104\151\234\312\141\065\007\000
\157\326\141\010\021\352\272\270\366\351\263\140\345\115\271\354
\237\024\146\311\127\130\333\315\207\151\370\212\206\022\003\107
\277\146\023\166\254\167\175\064\044\205\203\315\327\252\234\220
\032\237\041\054\177\170\267\144\270\330\350\246\364\170\263\125
\313\204\322\062\304\170\256\243\217\141\335\316\010\123\255\354
\210\374\025\344\232\015\346\237\032\167\316\114\217\270\024\025
\075\142\234\206\070\006\000\146\022\344\131\166\132\123\300\002
\230\242\020\053\150\104\173\216\171\316\063\112\166\252\133\201
\026\033\265\212\330\320\000\173\136\142\264\011\326\206\143\016
\246\005\225\111\272\050\213\210\223\262\064\034\330\244\125\156
\267\034\320\336\231\125\073\043\364\042\340\371\051\146\046\354
\040\120\167\333\112\013\217\276\345\002\140\160\101\136\324\256
\120\071\042\024\046\313\262\073\163\164\125\107\007\171\201\071
\250\060\023\104\345\004\212\256\226\023\045\102\017\271\123\304
\233\374\315\344\034\336\074\372\253\326\006\112\037\147\246\230
\060\034\335\054\333\334\030\225\127\146\306\377\134\213\126\365
\167\002\003\001\000\001\243\143\060\141\060\017\006\003\125\035
\023\001\001\377\004\005\060\003\001\001\377\060\037\006\003\125
\035\043\004\030\060\026\200\024\371\140\273\324\343\325\064\366
\270\365\006\200\045\247\163\333\106\151\250\236\060\035\006\003
\125\035\016\004\026\004\024\371\140\273\324\343\325\064\366\270
\365\006\200\045\247\163\333\106\151\250\236\060\016\006\003\125
\035\017\001\001\377\004\004\003\002\001\206\060\015\006\011\052
\206\110\206\367\015\001\001\013\005\000\003\202\002\001\000\126
\263\216\313\012\235\111\216\277\244\304\221\273\146\027\005\121
\230\165\373\345\120\054\172\236\361\024\372\253\323\212\076\377
\221\051\217\143\213\330\264\251\124\001\015\276\223\206\057\371
\112\155\307\136\365\127\371\312\125\034\022\276\107\017\066\305
\337\152\267\333\165\302\107\045\177\271\361\143\370\150\055\125
\004\321\362\215\260\244\317\274\074\136\037\170\347\245\240\040
\160\260\004\305\267\367\162\247\336\042\015\275\063\045\106\214
\144\222\046\343\076\056\143\226\332\233\214\075\370\030\011\327
\003\314\175\206\202\340\312\004\007\121\120\327\377\222\325\014
\357\332\206\237\231\327\353\267\257\150\342\071\046\224\272\150
\267\277\203\323\352\172\147\075\142\147\256\045\345\162\350\342
\344\354\256\022\366\113\053\074\237\351\260\100\363\070\124\263
\375\267\150\310\332\306\217\121\074\262\373\221\334\034\347\233
\235\341\267\015\162\217\342\244\304\251\170\371\353\024\254\306
\103\005\302\145\071\050\030\002\303\202\262\235\005\276\145\355
\226\137\145\164\074\373\011\065\056\173\234\023\375\033\017\135
\307\155\201\072\126\017\314\073\341\257\002\057\042\254\106\312
\106\074\240\034\114\326\104\264\136\056\134\025\146\011\341\046
\051\376\306\122\141\272\261\163\377\303\014\234\345\154\152\224
\077\024\312\100\026\225\204\363\131\251\254\137\114\141\223\155

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\321\073\314\242\225\014\042\246\147\147\104\056\271\331\322\212
\101\263\146\013\132\373\175\043\245\362\032\260\377\336\233\203
\224\056\321\077\337\222\267\221\257\005\073\145\307\240\154\261
\315\142\022\303\220\033\343\045\316\064\274\157\167\166\261\020
\303\367\005\032\300\326\257\164\142\110\027\167\222\151\220\141
\034\336\225\200\164\124\217\030\034\303\363\003\320\277\244\103
\165\206\123\030\172\012\056\011\034\066\237\221\375\202\212\042
\113\321\016\120\045\335\313\003\014\027\311\203\000\010\116\065
\115\212\213\355\360\002\224\146\054\104\177\313\225\047\226\027
\255\011\060\254\266\161\027\156\213\027\366\034\011\324\055\073
\230\245\161\323\124\023\331\140\363\365\113\146\117\372\361\356
\040\022\215\264\254\127\261\105\143\241\254\166\251\302\373
```

END

CKA_NSS_MOZILLA_CA_POLICY

CK_BBOOL CK_TRUE

CKA_NSS_SERVER_DISTRUST_AFTER CK_BBOOL CK_FALSE

CKA_NSS_EMAIL_DISTRUST_AFTER CK_BBOOL CK_FALSE

Trust for "SSL.com EV Root Certification Authority RSA R2"

Issuer: CN=SSL.com EV Root Certification Authority RSA R2,O=SSL Corporation,L=Houston,ST=Texas,C=US

Serial Number:56:b6:29:cd:34:bc:78:f6

Subject: CN=SSL.com EV Root Certification Authority RSA R2,O=SSL Corporation,L=Houston,ST=Texas,C=US

Not Valid Before: Wed May 31 18:14:37 2017

Not Valid After : Fri May 30 18:14:37 2042

Fingerprint (SHA-256):

2E:7B:F1:6C:C2:24:85:A7:BB:E2:AA:86:96:75:07:61:B0:AE:39:BE:3B:2F:E9:D0:CC:6D:4E:F7:34:91:42:5C

Fingerprint (SHA1): 74:3A:F0:52:9B:D0:32:A0:F4:4A:83:CD:D4:BA:A9:7B:7C:2E:C4:9A

CKA_CLASS CK_OBJECT_CLASS CKO_NSS_TRUST

CKA_TOKEN CK_BBOOL CK_TRUE

CKA_PRIVATE

CK_BBOOL CK_FALSE

CKA_MODIFIABLE CK_BBOOL CK_FALSE

CKA_LABEL UTF8 "SSL.com EV Root Certification Authority RSA R2"

CKA_CERT_SHA1_HASH MULTILINE_OCTAL

```
\164\072\360\122\233\320\062\240\364\112\203\315\324\272\251\173
\174\056\304\232
```

END

CKA_CERT_MD5_HASH MULTILINE_OCTAL

```
\341\036\061\130\032\256\124\123\002\366\027\152\021\173\115\225
```

END

CKA_ISSUER MULTILINE_OCTAL

```
\060\201\202\061\013\060\011\006\003\125\004\006\023\002\125\123
\061\016\060\014\006\003\125\004\010\014\005\124\145\170\141\163
\061\020\060\016\006\003\125\004\007\014\007\110\157\165\163\164
\157\156\061\030\060\026\006\003\125\004\012\014\017\123\123\114
\040\103\157\162\160\157\162\141\164\151\157\156\061\067\060\065
\006\003\125\004\003\014\056\123\123\114\056\143\157\155\040\105
```

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\126\040\122\157\157\164\040\103\145\162\164\151\146\151\143\141
\164\151\157\156\040\101\165\164\150\157\162\151\164\171\040\122
\123\101\040\122\062
END
CKA_SERIAL_NUMBER MULTILINE_OCTAL
\002\010\126\266\051\315\064\274\170\366
END
CKA_TRUST_SERVER_AUTH
CK_TRUST CKT_NSS_TRUSTED_DELEGATOR
CKA_TRUST_EMAIL_PROTECTION CK_TRUST CKT_NSS_MUST_VERIFY_TRUST
CKA_TRUST_CODE_SIGNING CK_TRUST CKT_NSS_MUST_VERIFY_TRUST
CKA_TRUST_STEP_UP_APPROVED CK_BBOOL CK_FALSE

#
# Certificate "SSL.com EV Root Certification Authority ECC"
#
# Issuer: CN=SSL.com EV Root Certification Authority ECC,O=SSL Corporation,L=Houston,ST=Texas,C=US
# Serial Number:2c:29:9c:5b:16:ed:05:95
# Subject: CN=SSL.com EV Root Certification Authority ECC,O=SSL Corporation,L=Houston,ST=Texas,C=US
# Not Valid Before: Fri Feb 12 18:15:23 2016
# Not Valid After : Tue Feb 12 18:15:23 2041
# Fingerprint (SHA-256):
22:A2:C1:F7:BD:ED:70:4C:C1:E7:01:B5:F4:08:C3:10:88:0F:E9:56:B5:DE:2A:4A:44:F9:9C:87:3A:25:A7:C8
# Fingerprint (SHA1): 4C:DD:51:A3:D1:F5:20:32:14:B0:C6:C5:32:23:03:91:C7:46:42:6D
CKA_CLASS CK_OBJECT_CLASS CKO_CERTIFICATE
CKA_TOKEN CK_BBOOL CK_TRUE
CKA_PRIVATE CK_BBOOL CK_FALSE
CKA_MODIFIABLE CK_BBOOL CK_FALSE
CKA_LABEL UTF8 "SSL.com EV Root Certification
Authority ECC"
CKA_CERTIFICATE_TYPE CK_CERTIFICATE_TYPE CKC_X_509
CKA_SUBJECT MULTILINE_OCTAL
\060\177\061\013\060\011\006\003\125\004\006\023\002\125\123\061
\016\060\014\006\003\125\004\010\014\005\124\145\170\141\163\061
\020\060\016\006\003\125\004\007\014\007\110\157\165\163\164\157
\156\061\030\060\026\006\003\125\004\012\014\017\123\123\114\040
\103\157\162\160\157\162\141\164\151\157\156\061\064\060\062\006
\003\125\004\003\014\053\123\123\114\056\143\157\155\040\105\126
\040\122\157\157\164\040\103\145\162\164\151\146\151\143\141\164
\151\157\156\040\101\165\164\150\157\162\151\164\171\040\105\103
\103
END
CKA_ID UTF8 "0"
CKA_ISSUER MULTILINE_OCTAL
\060\177\061\013\060\011\006\003\125\004\006\023\002\125\123\061
\016\060\014\006\003\125\004\010\014\005\124\145\170\141\163\061
\020\060\016\006\003\125\004\007\014\007\110\157\165\163\164\157
\156\061\030\060\026\006\003\125\004\012\014\017\123\123\114\040

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\103\157\162\160\157\162\141\164\151\157\156\061\064\060\062\006
\003\125\004\003\014\053\123\123\114\056\143\157\155\040\105\126
\040\122\157\157\164\040\103\145\162\164\151\146\151\143\141\164
\151\157\156\040\101\165\164\150\157\162\151\164\171\040\105\103
\103
END
CKA_SERIAL_NUMBER
MULTILINE_OCTAL
\002\010\054\051\234\133\026\355\005\225
END
CKA_VALUE MULTILINE_OCTAL
\060\202\002\224\060\202\002\032\240\003\002\001\002\002\010\054
\051\234\133\026\355\005\225\060\012\006\010\052\206\110\316\075
\004\003\002\060\177\061\013\060\011\006\003\125\004\006\023\002
\125\123\061\016\060\014\006\003\125\004\010\014\005\124\145\170
\141\163\061\020\060\016\006\003\125\004\007\014\007\110\157\165
\163\164\157\156\061\030\060\026\006\003\125\004\012\014\017\123
\123\114\040\103\157\162\160\157\162\141\164\151\157\156\061\064
\060\062\006\003\125\004\003\014\053\123\123\114\056\143\157\155
\040\105\126\040\122\157\157\164\040\103\145\162\164\151\146\151
\143\141\164\151\157\156\040\101\165\164\150\157\162\151\164\171
\040\105\103\103\060\036\027\015\061\066\060\062\061\062\061\070
\061\065\062\063\132\027\015\064\061\060\062\061\062\061\070\061
\065\062\063\132\060\177\061\013\060\011\006\003\125\004\006\023
\002\125\123\061\016\060\014\006\003\125\004\010\014\005\124\145
\170\141\163\061\020\060\016\006\003\125\004\007\014\007\110\157
\165\163\164\157\156\061\030\060\026\006\003\125\004\012\014\017
\123\123\114\040\103\157\162\160\157\162\141\164\151\157\156\061
\064\060\062\006\003\125\004\003\014\053\123\123\114\056\143\157
\155\040\105\126\040\122\157\157\164\040\103\145\162\164\151\146
\151\143\141\164\151\157\156\040\101\165\164\150\157\162\151\164
\171\040\105\103\103\060\166\060\020\006\007\052\206\110\316\075
\002\001\006\005\053\201\004\000\042\003\142\000\004\252\022\107
\220\230\033\373\357\303\100\007\203\040\116\361\060\202\242\006
\321\362\222\206\141\362\366\041\150\312\000\304\307\352\103\000
\124\206\334\375\037\337\000\270\101\142\134\334\160\026\062\336
\037\231\324\314\305\007\310\010\037\141\026\007\121\075\175\134
\007\123\343\065\070\214\337\315\237\331\056\015\112\266\031\056
\132\160\132\006\355\276\360\241\260\312\320\011\051\243\143\060
\141\060\035\006\003\125\035\016\004\026\004\024\133\312\136\345
\336\322\201\252\315\250\055\144\121\266\331\162\233\227\346\117
\060\017\006\003\125\035\023\001\001\377\004\005\060\003\001\001
\377\060\037\006\003\125\035\043\004\030\060\026\200\024\133\312
\136\345\336\322\201\252\315\250\055\144\121\266\331\162\233\227
\346\117\060\016\006\003\125\035\017\001\001\377\004\004\003\002
\001\206\060\012\006\010\052\206\110\316\075\004\003\002\003\150
\000\060\145\002\061\000\212\346\100\211\067\353\351\325\023\331
\312\324\153\044\363\260\075\207\106\130\032\354\261\337\157\373

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\126\272\160\153\307\070\314\350\261\214\117\017\367\361\147\166
\016\203\320\036\121\217\002\060\075\366\043\050\046\114\306\140
\207\223\046\233\262\065\036\272\326\367\074\321\034\316\372\045
\074\246\032\201\025\133\363\022\017\154\356\145\212\311\207\250
\371\007\340\142\232\214\134\112
END
CKA_NSS_MOZILLA_CA_POLICY
CK_BBOOL CK_TRUE
CKA_NSS_SERVER_DISTRUST_AFTER CK_BBOOL CK_FALSE
CKA_NSS_EMAIL_DISTRUST_AFTER CK_BBOOL CK_FALSE

# Trust for "SSL.com EV Root Certification Authority ECC"
# Issuer: CN=SSL.com EV Root Certification Authority ECC,O=SSL Corporation,L=Houston,ST=Texas,C=US
# Serial Number:2c:29:9c:5b:16:ed:05:95
# Subject: CN=SSL.com EV Root Certification Authority ECC,O=SSL Corporation,L=Houston,ST=Texas,C=US
# Not Valid Before: Fri Feb 12 18:15:23 2016
# Not Valid After : Tue Feb 12 18:15:23 2041
# Fingerprint (SHA-256):
22:A2:C1:F7:BD:ED:70:4C:C1:E7:01:B5:F4:08:C3:10:88:0F:E9:56:B5:DE:2A:4A:44:F9:9C:87:3A:25:A7:C8
# Fingerprint (SHA1): 4C:DD:51:A3:D1:F5:20:32:14:B0:C6:C5:32:23:03:91:C7:46:42:6D
CKA_CLASS CK_OBJECT_CLASS CKO_NSS_TRUST
CKA_TOKEN CK_BBOOL CK_TRUE
CKA_PRIVATE CK_BBOOL CK_FALSE
CKA_MODIFIABLE CK_BBOOL CK_FALSE
CKA_LABEL UTF8 "SSL.com EV Root Certification Authority ECC"
CKA_CERT_SHA1_HASH MULTILINE_OCTAL
\114\335\121\243\321\365\040\062\024\260\306\305\062\043\003\221
\307\106\102\155
END
CKA_CERT_MD5_HASH
MULTILINE_OCTAL
\131\123\042\145\203\102\001\124\300\316\102\271\132\174\362\220
END
CKA_ISSUER MULTILINE_OCTAL
\060\177\061\013\060\011\006\003\125\004\006\023\002\125\123\061
\016\060\014\006\003\125\004\010\014\005\124\145\170\141\163\061
\020\060\016\006\003\125\004\007\014\007\110\157\165\163\164\157
\156\061\030\060\026\006\003\125\004\012\014\017\123\123\114\040
\103\157\162\160\157\162\141\164\151\157\156\061\064\060\062\006
\003\125\004\003\014\053\123\123\114\056\143\157\155\040\105\126
\040\122\157\157\164\040\103\145\162\164\151\146\151\143\141\164
\151\157\156\040\101\165\164\150\157\162\151\164\171\040\105\103
\103
END
CKA_SERIAL_NUMBER MULTILINE_OCTAL
\002\010\054\051\234\133\026\355\005\225
END
CKA_TRUST_SERVER_AUTH CK_TRUST CKT_NSS_TRUSTED_DELEGATOR

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CKA_TRUST_EMAIL_PROTECTION CK_TRUST CKT_NSS_MUST_VERIFY_TRUST
CKA_TRUST_CODE_SIGNING CK_TRUST CKT_NSS_MUST_VERIFY_TRUST
CKA_TRUST_STEP_UP_APPROVED CK_BBOOL CK_FALSE

#
#
Certificate "GlobalSign Root CA - R6"
#
# Issuer: CN=GlobalSign,O=GlobalSign,OU=GlobalSign Root CA - R6
# Serial Number:45:e6:bb:03:83:33:c3:85:65:48:e6:ff:45:51
# Subject: CN=GlobalSign,O=GlobalSign,OU=GlobalSign Root CA - R6
# Not Valid Before: Wed Dec 10 00:00:00 2014
# Not Valid After : Sun Dec 10 00:00:00 2034
# Fingerprint (SHA-256):
2C:AB:EA:FE:37:D0:6C:A2:2A:BA:73:91:C0:03:3D:25:98:29:52:C4:53:64:73:49:76:3A:3A:B5:AD:6C:CF:69
# Fingerprint (SHA1): 80:94:64:0E:B5:A7:A1:CA:11:9C:1F:DD:D5:9F:81:02:63:A7:FB:D1
CKA_CLASS CK_OBJECT_CLASS CKO_CERTIFICATE
CKA_TOKEN CK_BBOOL CK_TRUE
CKA_PRIVATE CK_BBOOL CK_FALSE
CKA_MODIFIABLE CK_BBOOL CK_FALSE
CKA_LABEL UTF8 "GlobalSign Root CA - R6"
CKA_CERTIFICATE_TYPE CK_CERTIFICATE_TYPE CKC_X_509
CKA_SUBJECT MULTILINE_OCTAL
\060\114\061\040\060\036\006\003\125\004\013\023\027\107\154\157
\142\141\154\123\151\147\156\040\122\157\157\164\040\103\101\040
\055\040\122\066\061\023\060\021\006\003\125\004\012\023\012\107
\154\157\142\141\154\123\151\147\156\061\023\060\021\006\003\125
\004\003\023\012\107\154\157\142\141\154\123\151\147\156
END
CKA_ID
UTF8 "0"
CKA_ISSUER MULTILINE_OCTAL
\060\114\061\040\060\036\006\003\125\004\013\023\027\107\154\157
\142\141\154\123\151\147\156\040\122\157\157\164\040\103\101\040
\055\040\122\066\061\023\060\021\006\003\125\004\012\023\012\107
\154\157\142\141\154\123\151\147\156\061\023\060\021\006\003\125
\004\003\023\012\107\154\157\142\141\154\123\151\147\156
END
CKA_SERIAL_NUMBER MULTILINE_OCTAL
\002\016\105\346\273\003\203\063\303\205\145\110\346\377\105\121
END
CKA_VALUE MULTILINE_OCTAL
\060\202\005\203\060\202\003\153\240\003\002\001\002\002\016\105
\346\273\003\203\063\303\205\145\110\346\377\105\121\060\015\006
\011\052\206\110\206\367\015\001\001\014\005\000\060\114\061\040
\060\036\006\003\125\004\013\023\027\107\154\157\142\141\154\123
\151\147\156\040\122\157\157\164\040\103\101\040\055\040\122\066
\061\023\060\021\006\003\125\004\012\023\012\107\154\157\142\141

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\154\123\151\147\156\061\023\060\021\006\003\125\004\003\023\012
\107\154\157\142\141\154\123\151\147\156\060\036\027\015\061\064
\061\062\061\060\060\060\060\060\060\060\132\027\015\063\064\061
\062\061\060\060\060\060\060\060\060\132\060\114\061\040\060\036
\006\003\125\004\013\023\027\107\154\157\142\141\154\123\151\147
\156\040\122\157\157\164\040\103\101\040\055\040\122\066\061\023
\060\021\006\003\125\004\012\023\012\107\154\157\142\141\154\123
\151\147\156\061\023\060\021\006\003\125\004\003\023\012\107\154
\157\142\141\154\123\151\147\156\060\202\002\042\060\015\006\011
\052\206\110\206\367\015\001\001\001\005\000\003\202\002\017\000
\060\202\002\012\002\202\002\001\000\225\007\350\163\312\146\371
\354\024\312\173\074\367\015\010\361\264\105\013\054\202\264\110
\306\353\133\074\256\203\270\101\222\063\024\244\157\177\351\052
\314\306\260\210\153\305\266\211\321\306\262\377\024\316\121\024
\041\354\112\335\033\132\306\326\207\356\115\072\025\006\355\144
\146\013\222\200\312\104\336\163\224\116\363\247\211\177\117\170
\143\010\310\022\120\155\102\146\057\115\271\171\050\115\122\032
\212\032\200\267\031\201\016\176\304\212\274\144\114\041\034\103
\150\327\075\074\212\305\262\146\325\220\232\267\061\006\305\276
\342\155\062\006\246\036\371\271\353\252\243\270\277\276\202\143
\120\320\360\030\211\337\344\017\171\365\352\242\037\052\322\160
\056\173\347\274\223\273\155\123\342\110\174\214\020\007\070\377
\146\262\167\141\176\340\352\214\074\252\264\244\366\363\225\112
\022\007\155\375\214\262\211\317\320\240\141\167\310\130\164\260
\324\043\072\367\135\072\312\242\333\235\011\336\135\104\055\220
\361\201\315\127\222\372\176\274\120\004\143\064\337\153\223\030
\276\153\066\262\071\344\254\044\066\267\360\357\266\034\023\127
\223\266\336\262\370\342\205\267\163\242\270\065\252\105\362\340
\235\066\241\157\124\212\361\162\126\156\056\210\305\121\102\104
\025\224\356\243\305\070\226\233\116\116\132\013\107\363\006\066
\111\167\060\274\161\067\345\246\354\041\010\165\374\346\141\026
\077\167\325\331\221\227\204\012\154\324\002\115\164\300\024\355
\375\071\373\203\362\136\024\241\004\260\013\351\376\356\217\341
\156\013\262\010\263\141\146\011\152\261\006\072\145\226\131\300
\360\065\375\311\332\050\215\032\021\207\160\201\012\250\232\165
\035\236\072\206\005\000\236\333\200\326\045\371\334\005\236\047
\131\114\166\071\133\352\371\245\241\330\203\017\321\377\337\060
\021\371\205\317\063\110\365\312\155\144\024\054\172\130\117\323
\113\010\111\305\225\144\032\143\016\171\075\365\263\214\312\130
\255\234\102\105\171\156\016\207\031\134\124\261\145\266\277\214
\233\334\023\351\015\157\270\056\334\147\156\311\213\021\265\204
\024\212\000\031\160\203\171\221\227\221\324\032\047\277\067\036
\062\007\330\024\143\074\050\114\257\002\003\001\000\001\243\143
\060\141\060\016\006\003\125\035\017\001\001\377\004\004\003\002
\001\006\060\017\006\003\125\035\023\001\001\377\004\005\060\003
\001\001\377\060\035\006\003\125\035\016\004\026\004\024\256\154
\005\243\223\023\342\242\347\342\327\034\326\307\360\177\310\147
\123\240\060\037\006\003\125\035\043\004\030\060\026\200\024\256

\154\005\243\223\023\342\242\347\342\327\034\326\307\360\177\310
\147\123\240\060\015\006\011\052\206\110\206\367\015\001\001\014
\005\000\003\202\002\001\000\203\045\355\350\321\375\225\122\315
\236\300\004\240\221\151\346\134\320\204\336\334\255\242\117\350
\107\170\326\145\230\251\133\250\074\207\174\002\212\321\156\267
\026\163\346\137\300\124\230\325\164\276\301\315\342\021\221\255
\043\030\075\335\341\162\104\226\264\225\136\300\173\216\231\170
\026\103\023\126\127\263\242\263\073\265\167\334\100\162\254\243
\353\233\065\076\261\010\041\241\347\304\103\067\171\062\276\265
\347\234\054\114\274\103\051\231\216\060\323\254\041\340\343\035
\372\330\007\063\166\124\000\042\052\271\115\040\056\160\150\332
\345\123\374\203\134\323\235\362\377\104\014\104\146\362\322\343
\275\106\000\032\155\002\272\045\135\215\241\061\121\335\124\106
\034\115\333\231\226\357\032\034\004\134\246\025\357\170\340\171
\376\135\333\076\252\114\125\375\232\025\251\157\341\246\373\337
\160\060\351\303\356\102\106\355\302\223\005\211\372\175\143\173
\077\320\161\201\174\000\350\230\256\016\170\064\303\045\373\257
\012\237\040\153\335\073\023\217\022\214\342\101\032\110\172\163
\240\167\151\307\266\134\177\202\310\036\376\130\033\050\053\250
\154\255\136\155\300\005\322\173\267\353\200\376\045\067\376\002
\233\150\254\102\135\303\356\365\314\334\360\120\165\322\066\151
\234\346\173\004\337\156\006\151\266\336\012\011\110\131\207\353
\173\024\140\172\144\252\151\103\357\221\307\114\354\030\335\154
\357\123\055\214\231\341\136\362\162\076\317\124\310\275\147\354
\244\017\114\105\377\323\271\060\043\007\114\217\020\277\206\226
\331\231\132\264\231\127\034\244\314\273\025\211\123\272\054\005
\017\344\304\236\031\261\030\064\325\114\235\272\355\367\037\257
\044\225\004\170\250\003\273\356\201\345\332\137\174\213\112\241
\220\164\045\247\263\076\113\310\054\126\275\307\310\357\070\342
\134\222\360\171\367\234\204\272\164\055\141\001\040\176\176\321
\362\117\007\131\137\213\055\103\122\353\106\014\224\341\365\146
\107\171\167\325\124\133\037\255\044\067\313\105\132\116\240\104
\110\310\330\260\231\305\025\204\011\366\326\111\111\300\145\270
\346\032\161\156\240\250\361\202\350\105\076\154\326\002\327\012
\147\203\005\132\311\244\020

END

CKA_NSS_MOZILLA_CA_POLICY

CK_BBOOL CK_TRUE

CKA_NSS_SERVER_DISTRUST_AFTER CK_BBOOL CK_FALSE

CKA_NSS_EMAIL_DISTRUST_AFTER CK_BBOOL CK_FALSE

Trust for "GlobalSign Root CA - R6"

Issuer: CN=GlobalSign,O=GlobalSign,OU=GlobalSign Root CA - R6

Serial Number:45:e6:bb:03:83:33:c3:85:65:48:e6:ff:45:51

Subject: CN=GlobalSign,O=GlobalSign,OU=GlobalSign Root CA - R6

Not Valid Before: Wed Dec 10 00:00:00 2014

Not Valid After : Sun Dec 10 00:00:00 2034

Fingerprint (SHA-256):


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2C:AB:EA:FE:37:D0:6C:A2:2A:BA:73:91:C0:03:3D:25:98:29:52:C4:53:64:73:49:76:3A:3A:B5:AD:6C:CF:69
# Fingerprint (SHA1): 80:94:64:0E:B5:A7:A1:CA:11:9C:1F:DD:D5:9F:81:02:63:A7:FB:D1
CKA_CLASS
CK_OBJECT_CLASS CKO_NSS_TRUST
CKA_TOKEN CK_BBOOL CK_TRUE
CKA_PRIVATE CK_BBOOL CK_FALSE
CKA_MODIFIABLE CK_BBOOL CK_FALSE
CKA_LABEL UTF8 "GlobalSign Root CA - R6"
CKA_CERT_SHA1_HASH MULTILINE_OCTAL
\200\224\144\016\265\247\241\312\021\234\037\335\325\237\201\002
\143\247\373\321
END
CKA_CERT_MD5_HASH MULTILINE_OCTAL
\117\335\007\344\324\042\144\071\036\014\067\102\352\321\306\256
END
CKA_ISSUER MULTILINE_OCTAL
\060\114\061\040\060\036\006\003\125\004\013\023\027\107\154\157
\142\141\154\123\151\147\156\040\122\157\157\164\040\103\101\040
\055\040\122\066\061\023\060\021\006\003\125\004\012\023\012\107
\154\157\142\141\154\123\151\147\156\061\023\060\021\006\003\125
\004\003\023\012\107\154\157\142\141\154\123\151\147\156
END
CKA_SERIAL_NUMBER MULTILINE_OCTAL
\002\016\105\346\273\003\203\063\303\205\145\110\346\377\105\121
END
CKA_TRUST_SERVER_AUTH CK_TRUST CKT_NSS_TRUSTED_DELEGATOR
CKA_TRUST_EMAIL_PROTECTION CK_TRUST CKT_NSS_TRUSTED_DELEGATOR
CKA_TRUST_CODE_SIGNING CK_TRUST
CKT_NSS_MUST_VERIFY_TRUST
CKA_TRUST_STEP_UP_APPROVED CK_BBOOL CK_FALSE

#
# Certificate "OISTE WISeKey Global Root GC CA"
#
# Issuer: CN=OISTE WISeKey Global Root GC CA,OU=OISTE Foundation Endorsed,O=WISeKey,C=CH
# Serial Number:21:2a:56:0c:ae:da:0c:ab:40:45:bf:2b:a2:2d:3a:ea
# Subject: CN=OISTE WISeKey Global Root GC CA,OU=OISTE Foundation Endorsed,O=WISeKey,C=CH
# Not Valid Before: Tue May 09 09:48:34 2017
# Not Valid After : Fri May 09 09:58:33 2042
# Fingerprint (SHA-256):
85:60:F9:1C:36:24:DA:BA:95:70:B5:FE:A0:DB:E3:6F:F1:1A:83:23:BE:94:86:85:4F:B3:F3:4A:55:71:19:8D
# Fingerprint (SHA1): E0:11:84:5E:34:DE:BE:88:81:B9:9C:F6:16:26:D1:96:1F:C3:B9:31
CKA_CLASS CK_OBJECT_CLASS CKO_CERTIFICATE
CKA_TOKEN CK_BBOOL CK_TRUE
CKA_PRIVATE CK_BBOOL CK_FALSE
CKA_MODIFIABLE CK_BBOOL CK_FALSE
CKA_LABEL UTF8 "OISTE WISeKey Global Root GC CA"
CKA_CERTIFICATE_TYPE CK_CERTIFICATE_TYPE CKC_X_509

```

CKA_SUBJECT MULTILINE_OCTAL

\060\155\061\013\060\011\006\003\125\004\006\023\002\103\110\061
\020\060\016\006\003\125\004\012\023\007\127\111\123\145\113\145
\171\061\042\060\040\006\003\125\004\013\023\031\117\111\123\124
\105\040\106\157\165\156\144\141\164\151\157\156\040\105\156\144
\157\162\163\145\144\061\050\060\046\006\003\125\004\003\023\037
\117\111\123\124\105\040\127\111\123\145\113\145\171\040\107\154
\157\142\141\154\040\122\157\157\164\040\107\103\040\103\101

END

CKA_ID

UTF8 "0"

CKA_ISSUER MULTILINE_OCTAL

\060\155\061\013\060\011\006\003\125\004\006\023\002\103\110\061
\020\060\016\006\003\125\004\012\023\007\127\111\123\145\113\145
\171\061\042\060\040\006\003\125\004\013\023\031\117\111\123\124
\105\040\106\157\165\156\144\141\164\151\157\156\040\105\156\144
\157\162\163\145\144\061\050\060\046\006\003\125\004\003\023\037
\117\111\123\124\105\040\127\111\123\145\113\145\171\040\107\154
\157\142\141\154\040\122\157\157\164\040\107\103\040\103\101

END

CKA_SERIAL_NUMBER MULTILINE_OCTAL

\002\020\041\052\126\014\256\332\014\253\100\105\277\053\242\055
\072\352

END

CKA_VALUE

MULTILINE_OCTAL

\060\202\002\151\060\202\001\357\240\003\002\001\002\002\020\041
\052\126\014\256\332\014\253\100\105\277\053\242\055\072\352\060
\012\006\010\052\206\110\316\075\004\003\003\060\155\061\013\060
\011\006\003\125\004\006\023\002\103\110\061\020\060\016\006\003
\125\004\012\023\007\127\111\123\145\113\145\171\061\042\060\040
\006\003\125\004\013\023\031\117\111\123\124\105\040\106\157\165
\156\144\141\164\151\157\156\040\105\156\144\157\162\163\145\144
\061\050\060\046\006\003\125\004\003\023\037\117\111\123\124\105
\040\127\111\123\145\113\145\171\040\107\154\157\142\141\154\040
\122\157\157\164\040\107\103\040\103\101\060\036\027\015\061\067
\060\065\060\071\060\071\064\070\063\064\132\027\015\064\062\060
\065\060\071\060\071\065\070\063\063\132\060\155\061\013\060\011
\006\003\125\004\006\023\002\103\110\061\020\060\016\006\003\125
\004\012\023\007\127\111\123\145\113\145\171\061\042\060\040\006
\003\125\004\013\023\031\117\111\123\124\105\040\106\157\165\156
\144\141\164\151\157\156\040\105\156\144\157\162\163\145\144\061
\050\060\046\006\003\125\004\003\023\037\117\111\123\124\105\040
\127\111\123\145\113\145\171\040\107\154\157\142\141\154\040\122
\157\157\164\040\107\103\040\103\101\060\166\060\020\006\007\052
\206\110\316\075\002\001\006\005\053\201\004\000\042\003\142\000
\004\114\351\120\300\306\017\162\030\274\330\361\272\263\211\342
\171\112\243\026\247\153\124\044\333\121\377\352\364\011\044\303

\013\042\237\313\152\047\202\201\015\322\300\257\061\344\164\202
\156\312\045\331\214\165\235\361\333\320\232\242\113\041\176\026
\247\143\220\322\071\324\261\207\170\137\030\226\017\120\033\065
\067\017\152\306\334\331\023\115\244\216\220\067\346\275\133\061
\221\243\124\060\122\060\016\006\003\125\035\017\001\001\377\004
\004\003\002\001\006\060\017\006\003\125\035\023\001\001\377\004
\005\060\003\001\001\377\060\035\006\003\125\035\016\004\026\004
\024\110\207\024\254\343\303\236\220\140\072\327\312\211\356\323
\255\214\264\120\146\060\020\006\011\053\006\001\004\001\202\067
\025\001\004\003\002\001\000\060\012\006\010\052\206\110\316\075
\004\003\003\003\150\000\060\145\002\060\046\307\151\133\334\325
\347\262\347\310\014\214\214\303\335\171\214\033\143\325\311\122
\224\116\115\202\112\163\036\262\200\204\251\045\300\114\132\155
\111\051\140\170\023\342\176\110\353\144\002\061\000\333\064\040
\062\010\377\232\111\002\266\210\336\024\257\135\154\231\161\215
\032\077\213\327\340\242\066\206\034\007\202\072\166\123\375\302
\242\355\357\173\260\200\117\130\017\113\123\071\275

END

CKA_NSS_MOZILLA_CA_POLICY

CK_BBOOL CK_TRUE

CKA_NSS_SERVER_DISTRUST_AFTER CK_BBOOL CK_FALSE

CKA_NSS_EMAIL_DISTRUST_AFTER CK_BBOOL CK_FALSE

Trust for "OISTE WiSeKey Global Root GC CA"

Issuer: CN=OISTE WiSeKey Global Root GC CA,OU=OISTE Foundation Endorsed,O=WiSeKey,C=CH

Serial Number:21:2a:56:0c:ae:da:0c:ab:40:45:bf:2b:a2:2d:3a:ea

Subject: CN=OISTE WiSeKey Global Root GC CA,OU=OISTE Foundation Endorsed,O=WiSeKey,C=CH

Not Valid Before: Tue May 09

09:48:34 2017

Not Valid After : Fri May 09 09:58:33 2042

Fingerprint (SHA-256):

85:60:F9:1C:36:24:DA:BA:95:70:B5:FE:A0:DB:E3:6F:F1:1A:83:23:BE:94:86:85:4F:B3:F3:4A:55:71:19:8D

Fingerprint (SHA1): E0:11:84:5E:34:DE:BE:88:81:B9:9C:F6:16:26:D1:96:1F:C3:B9:31

CKA_CLASS CK_OBJECT_CLASS CKO_NSS_TRUST

CKA_TOKEN CK_BBOOL CK_TRUE

CKA_PRIVATE CK_BBOOL CK_FALSE

CKA_MODIFIABLE CK_BBOOL CK_FALSE

CKA_LABEL UTF8 "OISTE WiSeKey Global Root GC CA"

CKA_CERT_SHA1_HASH MULTILINE_OCTAL

\340\021\204\136\064\336\276\210\201\271\234\366\026\046\321\226
\037\303\271\061

END

CKA_CERT_MD5_HASH MULTILINE_OCTAL

\251\326\271\055\057\223\144\370\245\151\312\221\351\150\007\043

END

CKA_ISSUER MULTILINE_OCTAL

\060\155\061\013\060\011\006\003\125\004\006\023\002\103\110\061
\020\060\016\006\003\125\004\012\023\007\127\111\123\145\113\145

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\171\061\042\060\040\006\003\125\004\013\023\031\117\111\123\124
\105\040\106\157\165\156\144\141\164\151\157\156\040\105\156\144
\157\162\163\145\144\061\050\060\046\006\003\125\004\003\023\037
\117\111\123\124\105\040\127\111\123\145\113\145\171\040\107\154
\157\142\141\154\040\122\157\157\164\040\107\103\040\103\101
END
CKA_SERIAL_NUMBER
MULTILINE_OCTAL
\002\020\041\052\126\014\256\332\014\253\100\105\277\053\242\055
\072\352
END
CKA_TRUST_SERVER_AUTH CK_TRUST CKT_NSS_TRUSTED_DELEGATOR
CKA_TRUST_EMAIL_PROTECTION CK_TRUST CKT_NSS_TRUSTED_DELEGATOR
CKA_TRUST_CODE_SIGNING CK_TRUST CKT_NSS_MUST_VERIFY_TRUST
CKA_TRUST_STEP_UP_APPROVED CK_BBOOL CK_FALSE

#
# Certificate "UCA Global G2 Root"
#
# Issuer: CN=UCA Global G2 Root,O=UniTrust,C=CN
# Serial Number:5d:df:b1:da:5a:a3:ed:5d:be:5a:65:20:65:03:90:ef
# Subject: CN=UCA Global G2 Root,O=UniTrust,C=CN
# Not Valid Before: Fri Mar 11 00:00:00 2016
# Not Valid After : Mon Dec 31 00:00:00 2040
# Fingerprint (SHA-256):
9B:EA:11:C9:76:FE:01:47:64:C1:BE:56:A6:F9:14:B5:A5:60:31:7A:BD:99:88:39:33:82:E5:16:1A:A0:49:3C
# Fingerprint (SHA1): 28:F9:78:16:19:7A:FF:18:25:18:AA:44:FE:C1:A0:CE:5C:B6:4C:8A
CKA_CLASS CK_OBJECT_CLASS
CKO_CERTIFICATE
CKA_TOKEN CK_BBOOL CK_TRUE
CKA_PRIVATE CK_BBOOL CK_FALSE
CKA_MODIFIABLE CK_BBOOL CK_FALSE
CKA_LABEL UTF8 "UCA Global G2 Root"
CKA_CERTIFICATE_TYPE CK_CERTIFICATE_TYPE CKC_X_509
CKA_SUBJECT MULTILINE_OCTAL
\060\075\061\013\060\011\006\003\125\004\006\023\002\103\116\061
\021\060\017\006\003\125\004\012\014\010\125\156\151\124\162\165
\163\164\061\033\060\031\006\003\125\004\003\014\022\125\103\101
\040\107\154\157\142\141\154\040\107\062\040\122\157\157\164
END
CKA_ID UTF8 "0"
CKA_ISSUER MULTILINE_OCTAL
\060\075\061\013\060\011\006\003\125\004\006\023\002\103\116\061
\021\060\017\006\003\125\004\012\014\010\125\156\151\124\162\165
\163\164\061\033\060\031\006\003\125\004\003\014\022\125\103\101
\040\107\154\157\142\141\154\040\107\062\040\122\157\157\164
END
CKA_SERIAL_NUMBER MULTILINE_OCTAL

```

\002\020\135\337\261\332\132\243\355\135\276\132\145\040\145\003
\220\357
END
CKA_VALUE MULTILINE_OCTAL
\060\202\005\106\060\202\003\056\240\003\002\001\002\002\020\135
\337\261\332\132\243\355\135\276\132\145\040\145\003\220\357\060
\015\006\011\052\206\110\206\367\015\001\001\013\005\000\060\075
\061\013\060\011\006\003\125\004\006\023\002\103\116\061\021\060
\017\006\003\125\004\012\014\010\125\156\151\124\162\165\163\164
\061\033\060\031\006\003\125\004\003\014\022\125\103\101\040\107
\154\157\142\141\154\040\107\062\040\122\157\157\164\060\036\027
\015\061\066\060\063\061\061\060\060\060\060\060\060\132\027\015
\064\060\061\062\063\061\060\060\060\060\060\060\132\060\075\061
\013\060\011\006\003\125\004\006\023\002\103\116\061\021\060\017
\006\003\125\004\012\014\010\125\156\151\124\162\165\163\164\061
\033\060\031\006\003\125\004\003\014\022\125\103\101\040\107\154
\157\142\141\154\040\107\062\040\122\157\157\164\060\202\002\042
\060\015\006\011\052\206\110\206\367\015\001\001\001\005\000\003
\202\002\017\000\060\202\002\012\002\202\002\001\000\305\346\053
\157\174\357\046\005\047\243\201\044\332\157\313\001\371\231\232
\251\062\302\042\207\141\101\221\073\313\303\150\033\006\305\114
\251\053\301\147\027\042\035\053\355\371\051\211\223\242\170\275
\222\153\240\243\015\242\176\312\223\263\246\321\214\065\325\165
\371\027\366\317\105\305\345\172\354\167\223\240\217\043\256\016
\032\003\177\276\324\320\355\056\173\253\106\043\133\377\054\346
\124\172\224\300\052\025\360\311\215\260\172\073\044\341\327\150
\342\061\074\006\063\106\266\124\021\246\245\057\042\124\052\130
\015\001\002\361\372\025\121\147\154\300\372\327\266\033\177\321
\126\210\057\032\072\215\073\273\202\021\340\107\000\320\122\207
\253\373\206\176\017\044\153\100\235\064\147\274\215\307\055\206
\157\171\076\216\251\074\027\113\177\260\231\343\260\161\140\334
\013\365\144\303\316\103\274\155\161\271\322\336\047\133\212\350
\330\306\256\341\131\175\317\050\055\065\270\225\126\032\361\262
\130\113\267\022\067\310\174\263\355\113\200\341\215\372\062\043
\266\157\267\110\225\010\261\104\116\205\214\072\002\124\040\057
\337\277\127\117\073\072\220\041\327\301\046\065\124\040\354\307
\077\107\354\357\132\277\113\172\301\255\073\027\120\134\142\330
\017\113\112\334\053\372\156\274\163\222\315\354\307\120\350\101
\226\327\251\176\155\330\351\035\217\212\265\271\130\222\272\112
\222\053\014\126\375\200\353\010\360\136\051\156\033\034\014\257
\217\223\211\255\333\275\243\236\041\312\211\031\354\337\265\303
\032\353\026\376\170\066\114\326\156\320\076\027\034\220\027\153
\046\272\373\172\057\277\021\034\030\016\055\163\003\217\240\345
\065\240\132\342\114\165\035\161\341\071\070\123\170\100\314\203
\223\327\012\236\235\133\217\212\344\345\340\110\344\110\262\107
\315\116\052\165\052\173\362\042\366\311\276\011\221\226\127\172
\210\210\254\356\160\254\371\334\051\343\014\034\073\022\116\104
\326\247\116\260\046\310\363\331\032\227\221\150\352\357\215\106

\006\322\126\105\130\232\074\014\017\203\270\005\045\303\071\317
\073\244\064\211\267\171\022\057\107\305\347\251\227\151\374\246
\167\147\265\337\173\361\172\145\025\344\141\126\145\002\003\001
\000\001\243\102\060\100\060\016\006\003\125\035\017\001\001\377
\004\004\003\002\001\006\060\017\006\003\125\035\023\001\001\377
\004\005\060\003\001\001\377\060\035\006\003\125\035\016\004\026
\004\024\201\304\214\314\365\344\060\377\245\014\010\137\214\025
\147\041\164\001\337\337\060\015\006\011\052\206\110\206\367\015
\001\001\013\005\000\003\202\002\001\000\023\145\042\365\216\053
\255\104\344\313\377\271\150\346\303\200\110\075\004\173\372\043
\057\172\355\066\332\262\316\155\366\346\236\345\137\130\217\313
\067\062\241\310\145\266\256\070\075\065\033\076\274\073\266\004
\320\274\371\111\365\233\367\205\305\066\266\313\274\370\310\071
\325\344\137\007\275\025\124\227\164\312\312\355\117\272\272\144
\166\237\201\270\204\105\111\114\215\157\242\353\261\314\321\303
\224\332\104\302\346\342\352\030\350\242\037\047\005\272\327\345
\326\251\315\335\357\166\230\215\000\016\315\033\372\003\267\216
\200\130\016\047\077\122\373\224\242\312\136\145\311\326\204\332
\271\065\161\363\046\300\117\167\346\201\047\322\167\073\232\024
\157\171\364\366\320\341\323\224\272\320\127\121\275\047\005\015
\301\375\310\022\060\356\157\215\021\053\010\235\324\324\277\200
\105\024\232\210\104\332\060\352\264\247\343\356\357\133\202\325
\076\326\255\170\222\333\134\074\363\330\255\372\270\153\177\304
\066\050\266\002\025\212\124\054\234\260\027\163\216\320\067\243
\024\074\230\225\000\014\051\005\133\236\111\111\261\137\307\343
\313\317\047\145\216\065\027\267\127\310\060\331\101\133\271\024
\266\350\302\017\224\061\247\224\230\314\152\353\265\341\047\365
\020\250\001\350\216\022\142\350\210\314\265\177\106\227\300\233
\020\146\070\032\066\106\137\042\150\075\337\311\306\023\047\253
\123\006\254\242\074\206\006\145\157\261\176\261\051\104\232\243
\272\111\151\050\151\217\327\345\137\255\004\206\144\157\032\240
\014\305\010\142\316\200\243\320\363\354\150\336\276\063\307\027
\133\177\200\304\114\114\261\246\204\212\303\073\270\011\315\024
\201\272\030\343\124\127\066\376\333\057\174\107\241\072\063\310
\371\130\073\104\117\261\312\002\211\004\226\050\150\305\113\270
\046\211\273\326\063\057\120\325\376\232\211\272\030\062\222\124
\306\133\340\235\371\136\345\015\042\233\366\332\342\310\041\262
\142\041\252\206\100\262\056\144\323\137\310\343\176\021\147\105
\037\005\376\343\242\357\263\250\263\363\175\217\370\014\037\042
\037\055\160\264\270\001\064\166\060\000\345\043\170\247\126\327
\120\037\212\373\006\365\302\031\360\320

END

CKA_NSS_MOZILLA_CA_POLICY

CK_BBOOL CK_TRUE

CKA_NSS_SERVER_DISTRUST_AFTER CK_BBOOL CK_FALSE

CKA_NSS_EMAIL_DISTRUST_AFTER CK_BBOOL CK_FALSE

Trust for "UCA Global G2 Root"

```

# Issuer: CN=UCA Global G2 Root,O=UniTrust,C=CN
# Serial Number:5d:df:b1:da:5a:a3:ed:5d:be:5a:65:20:65:03:90:ef
# Subject: CN=UCA Global G2 Root,O=UniTrust,C=CN
# Not Valid Before: Fri Mar 11 00:00:00 2016
# Not Valid After : Mon Dec 31 00:00:00 2040
# Fingerprint (SHA-256):
9B:EA:11:C9:76:FE:01:47:64:C1:BE:56:A6:F9:14:B5:A5:60:31:7A:BD:99:88:39:33:82:E5:16:1A:A0:49:3C
# Fingerprint (SHA1): 28:F9:78:16:19:7A:FF:18:25:18:AA:44:FE:C1:A0:CE:5C:B6:4C:8A
CKA_CLASS
CK_OBJECT_CLASS CKO_NSS_TRUST
CKA_TOKEN CK_BBOOL CK_TRUE
CKA_PRIVATE CK_BBOOL CK_FALSE
CKA_MODIFIABLE CK_BBOOL CK_FALSE
CKA_LABEL UTF8 "UCA Global G2 Root"
CKA_CERT_SHA1_HASH MULTILINE_OCTAL
\050\371\170\026\031\172\377\030\045\030\252\104\376\301\240\316
\134\266\114\212
END
CKA_CERT_MD5_HASH MULTILINE_OCTAL
\200\376\360\304\112\360\134\142\062\237\034\272\170\251\120\370
END
CKA_ISSUER MULTILINE_OCTAL
\060\075\061\013\060\011\006\003\125\004\006\023\002\103\116\061
\021\060\017\006\003\125\004\012\014\010\125\156\151\124\162\165
\163\164\061\033\060\031\006\003\125\004\003\014\022\125\103\101
\040\107\154\157\142\141\154\040\107\062\040\122\157\157\164
END
CKA_SERIAL_NUMBER MULTILINE_OCTAL
\002\020\135\337\261\332\132\243\355\135\276\132\145\040\145\003
\220\357
END
CKA_TRUST_SERVER_AUTH CK_TRUST CKT_NSS_TRUSTED_DELEGATOR
CKA_TRUST_EMAIL_PROTECTION CK_TRUST CKT_NSS_TRUSTED_DELEGATOR
CKA_TRUST_CODE_SIGNING CK_TRUST CKT_NSS_MUST_VERIFY_TRUST
CKA_TRUST_STEP_UP_APPROVED
CK_BBOOL CK_FALSE

#
# Certificate "UCA Extended Validation Root"
#
# Issuer: CN=UCA Extended Validation Root,O=UniTrust,C=CN
# Serial Number:4f:d2:2b:8f:f5:64:c8:33:9e:4f:34:58:66:23:70:60
# Subject: CN=UCA Extended Validation Root,O=UniTrust,C=CN
# Not Valid Before: Fri Mar 13 00:00:00 2015
# Not Valid After : Fri Dec 31 00:00:00 2038
# Fingerprint (SHA-256):
D4:3A:F9:B3:54:73:75:5C:96:84:FC:06:D7:D8:CB:70:EE:5C:28:E7:73:FB:29:4E:B4:1E:E7:17:22:92:4D:24
# Fingerprint (SHA1): A3:A1:B0:6F:24:61:23:4A:E3:36:A5:C2:37:FC:A6:FF:DD:F0:D7:3A

```

```
CKA_CLASS CK_OBJECT_CLASS CKO_CERTIFICATE
CKA_TOKEN CK_BBOOL CK_TRUE
CKA_PRIVATE CK_BBOOL CK_FALSE
CKA_MODIFIABLE CK_BBOOL CK_FALSE
CKA_LABEL UTF8 "UCA Extended Validation Root"
CKA_CERTIFICATE_TYPE CK_CERTIFICATE_TYPE CKC_X_509
CKA_SUBJECT MULTILINE_OCTAL
\060\107\061\013\060\011\006\003\125\004\006\023\002\103\116\061
\021\060\017\006\003\125\004\012\014\010\125\156\151\124\162\165
\163\164\061\045\060\043\006\003\125\004\003\014\034\125\103\101
\040\105\170\164\145\156\144\145\144\040\126\141\154\151\144\141
\164\151\157\156\040\122\157\157\164
END
CKA_ID
UTF8 "0"
CKA_ISSUER MULTILINE_OCTAL
\060\107\061\013\060\011\006\003\125\004\006\023\002\103\116\061
\021\060\017\006\003\125\004\012\014\010\125\156\151\124\162\165
\163\164\061\045\060\043\006\003\125\004\003\014\034\125\103\101
\040\105\170\164\145\156\144\145\144\040\126\141\154\151\144\141
\164\151\157\156\040\122\157\157\164
END
CKA_SERIAL_NUMBER MULTILINE_OCTAL
\002\020\117\322\053\217\365\144\310\063\236\117\064\130\146\043
\160\140
END
CKA_VALUE MULTILINE_OCTAL
\060\202\005\132\060\202\003\102\240\003\002\001\002\002\020\117
\322\053\217\365\144\310\063\236\117\064\130\146\043\160\140\060
\015\006\011\052\206\110\206\367\015\001\001\013\005\000\060\107
\061\013\060\011\006\003\125\004\006\023\002\103\116\061\021\060
\017\006\003\125\004\012\014\010\125\156\151\124\162\165\163\164
\061\045\060\043\006\003\125\004\003\014\034\125\103\101\040\105
\170\164\145\156\144\145\144\040\126\141\154\151\144\141\164\151
\157\156\040\122\157\157\164\060\036\027\015\061\065\060\063\061
\063\060\060\060\060\060\060\132\027\015\063\070\061\062\063\061
\060\060\060\060\060\060\132\060\107\061\013\060\011\006\003\125
\004\006\023\002\103\116\061\021\060\017\006\003\125\004\012\014
\010\125\156\151\124\162\165\163\164\061\045\060\043\006\003\125
\004\003\014\034\125\103\101\040\105\170\164\145\156\144\145\144
\040\126\141\154\151\144\141\164\151\157\156\040\122\157\157\164
\060\202\002\042\060\015\006\011\052\206\110\206\367\015\001\001
\001\005\000\003\202\002\017\000\060\202\002\012\002\202\002\001
\000\251\011\007\050\023\002\260\231\340\144\252\036\103\026\172
\163\261\221\240\165\076\250\372\343\070\000\172\354\211\152\040
\017\213\305\260\233\063\003\132\206\306\130\206\325\301\205\273
\117\306\234\100\115\312\276\356\151\226\270\255\201\060\232\174
\222\005\353\005\053\232\110\320\270\166\076\226\310\040\273\322
```


\260\361\217\330\254\105\106\377\252\147\140\264\167\176\152\037
\074\032\122\172\004\075\007\074\205\015\204\320\037\166\012\367
\152\024\337\162\343\064\174\127\116\126\001\076\171\361\252\051
\073\154\372\370\217\155\115\310\065\337\256\353\334\044\356\171
\105\247\205\266\005\210\336\210\135\045\174\227\144\147\011\331
\277\132\025\005\206\363\011\036\354\130\062\063\021\363\167\144
\260\166\037\344\020\065\027\033\362\016\261\154\244\052\243\163
\374\011\037\036\062\031\123\021\347\331\263\054\056\166\056\241
\243\336\176\152\210\011\350\362\007\212\370\262\315\020\347\342
\163\100\223\273\010\321\077\341\374\013\224\263\045\357\174\246
\327\321\257\237\377\226\232\365\221\173\230\013\167\324\176\350
\007\322\142\265\225\071\343\363\361\155\017\016\145\204\212\143
\124\305\200\266\340\236\113\175\107\046\247\001\010\135\321\210
\236\327\303\062\104\372\202\112\012\150\124\177\070\123\003\314
\244\000\063\144\121\131\013\243\202\221\172\136\354\026\302\363
\052\346\142\332\052\333\131\142\020\045\112\052\201\013\107\007
\103\006\160\207\322\372\223\021\051\172\110\115\353\224\307\160
\115\257\147\325\121\261\200\040\001\001\264\172\010\246\220\177
\116\340\357\007\101\207\257\152\245\136\213\373\317\120\262\232
\124\257\303\211\272\130\055\365\060\230\261\066\162\071\176\111
\004\375\051\247\114\171\344\005\127\333\224\271\026\123\215\106
\263\035\225\141\127\126\177\257\360\026\133\141\130\157\066\120
\021\013\330\254\053\225\026\032\016\037\010\315\066\064\145\020
\142\146\325\200\137\024\040\137\055\014\240\170\012\150\326\054
\327\351\157\053\322\112\005\223\374\236\157\153\147\377\210\361
\116\245\151\112\122\067\005\352\306\026\215\322\304\231\321\202
\053\073\272\065\165\367\121\121\130\363\310\007\335\344\264\003
\177\002\003\001\000\001\243\102\060\100\060\035\006\003\125\035
\016\004\026\004\024\331\164\072\344\060\075\015\367\022\334\176
\132\005\237\036\064\232\367\341\024\060\017\006\003\125\035\023
\001\001\377\004\005\060\003\001\001\377\060\016\006\003\125\035
\017\001\001\377\004\004\003\002\001\206\060\015\006\011\052\206
\110\206\367\015\001\001\013\005\000\003\202\002\001\000\066\215
\227\314\102\025\144\051\067\233\046\054\326\373\256\025\151\054
\153\032\032\367\137\266\371\007\114\131\352\363\311\310\271\256
\314\272\056\172\334\300\365\260\055\300\073\257\237\160\005\021
\152\237\045\117\001\051\160\343\345\014\341\352\132\174\334\111
\273\301\036\052\201\365\026\113\162\221\310\242\061\271\252\332
\374\235\037\363\135\100\002\023\374\116\034\006\312\263\024\220
\124\027\031\022\032\361\037\327\014\151\132\366\161\170\364\224
\175\221\013\216\354\220\124\216\274\157\241\114\253\374\164\144
\375\161\232\370\101\007\241\315\221\344\074\232\340\233\062\071
\163\253\052\325\151\310\170\221\046\061\175\342\307\060\361\374
\024\170\167\022\016\023\364\335\026\224\277\113\147\173\160\123
\205\312\260\273\363\070\115\054\220\071\300\015\302\135\153\351
\342\345\325\210\215\326\054\277\253\033\276\265\050\207\022\027
\164\156\374\175\374\217\320\207\046\260\033\373\271\154\253\342
\236\075\025\301\073\056\147\002\130\221\237\357\370\102\037\054

\267\150\365\165\255\317\265\366\377\021\175\302\360\044\245\255
\323\372\240\074\251\372\135\334\245\240\357\104\244\276\326\350
\345\344\023\226\027\173\006\076\062\355\307\267\102\274\166\243
\330\145\070\053\070\065\121\041\016\016\157\056\064\023\100\341
\053\147\014\155\112\101\060\030\043\132\062\125\231\311\027\340
\074\336\366\354\171\255\053\130\031\242\255\054\042\032\225\216
\276\226\220\135\102\127\304\371\024\003\065\053\034\055\121\127
\010\247\072\336\077\344\310\264\003\163\302\301\046\200\273\013
\102\037\255\015\257\046\162\332\314\276\263\243\203\130\015\202
\305\037\106\121\343\234\030\314\215\233\215\354\111\353\165\120
\325\214\050\131\312\164\064\332\214\013\041\253\036\352\033\345
\307\375\025\076\300\027\252\373\043\156\046\106\313\372\371\261
\162\153\151\317\042\204\013\142\017\254\331\031\000\224\242\166
\074\324\055\232\355\004\236\055\006\142\020\067\122\034\205\162
\033\047\345\314\306\061\354\067\354\143\131\233\013\035\166\314
\176\062\232\210\225\010\066\122\273\336\166\137\166\111\111\255
\177\275\145\040\262\311\301\053\166\030\166\237\126\261

END

CKA_NSS_MOZILLA_CA_POLICY

CK_BBOOL CK_TRUE

CKA_NSS_SERVER_DISTRUST_AFTER CK_BBOOL CK_FALSE

CKA_NSS_EMAIL_DISTRUST_AFTER CK_BBOOL CK_FALSE

Trust for "UCA Extended Validation Root"

Issuer: CN=UCA Extended Validation Root,O=UniTrust,C=CN

Serial Number:4f:d2:2b:8f:f5:64:c8:33:9e:4f:34:58:66:23:70:60

Subject: CN=UCA Extended Validation Root,O=UniTrust,C=CN

Not Valid Before: Fri Mar 13 00:00:00 2015

Not Valid After : Fri Dec 31 00:00:00 2038

Fingerprint (SHA-256):

D4:3A:F9:B3:54:73:75:5C:96:84:FC:06:D7:D8:CB:70:EE:5C:28:E7:73:FB:29:4E:B4:1E:E7:17:22:92:4D:24

Fingerprint (SHA1): A3:A1:B0:6F:24:61:23:4A:E3:36:A5:C2:37:FC:A6:FF:DD:F0:D7:3A

CKA_CLASS CK_OBJECT_CLASS CKO_NSS_TRUST

CKA_TOKEN CK_BBOOL CK_TRUE

CKA_PRIVATE CK_BBOOL CK_FALSE

CKA_MODIFIABLE CK_BBOOL CK_FALSE

CKA_LABEL

UTF8 "UCA Extended Validation Root"

CKA_CERT_SHA1_HASH MULTILINE_OCTAL

\243\241\260\157\044\141\043\112\343\066\245\302\067\374\246\377
\335\360\327\072

END

CKA_CERT_MD5_HASH MULTILINE_OCTAL

\241\363\137\103\306\064\233\332\277\214\176\005\123\255\226\342

END

CKA_ISSUER MULTILINE_OCTAL

\060\107\061\013\060\011\006\003\125\004\006\023\002\103\116\061
\021\060\017\006\003\125\004\012\014\010\125\156\151\124\162\165

```

\163\164\061\045\060\043\006\003\125\004\003\014\034\125\103\101
\040\105\170\164\145\156\144\145\144\040\126\141\154\151\144\141
\164\151\157\156\040\122\157\157\164
END
CKA_SERIAL_NUMBER MULTILINE_OCTAL
\002\020\117\322\053\217\365\144\310\063\236\117\064\130\146\043
\160\140
END
CKA_TRUST_SERVER_AUTH CK_TRUST CKT_NSS_TRUSTED_DELEGATOR
CKA_TRUST_EMAIL_PROTECTION CK_TRUST CKT_NSS_MUST_VERIFY_TRUST
CKA_TRUST_CODE_SIGNING CK_TRUST CKT_NSS_MUST_VERIFY_TRUST
CKA_TRUST_STEP_UP_APPROVED CK_BBOOL CK_FALSE

#
# Certificate "Certigna Root CA"
#
# Issuer: CN=Certigna Root
CA,OU=0002 48146308100036,O=Dhimyotis,C=FR
# Serial Number:00:ca:e9:1b:89:f1:55:03:0d:a3:e6:41:6d:c4:e3:a6:e1
# Subject: CN=Certigna Root CA,OU=0002 48146308100036,O=Dhimyotis,C=FR
# Not Valid Before: Tue Oct 01 08:32:27 2013
# Not Valid After : Sat Oct 01 08:32:27 2033
# Fingerprint (SHA-256):
D4:8D:3D:23:EE:DB:50:A4:59:E5:51:97:60:1C:27:77:4B:9D:7B:18:C9:4D:5A:05:95:11:A1:02:50:B9:31:68
# Fingerprint (SHA1): 2D:0D:52:14:FF:9E:AD:99:24:01:74:20:47:6E:6C:85:27:27:F5:43
CKA_CLASS CK_OBJECT_CLASS CKO_CERTIFICATE
CKA_TOKEN CK_BBOOL CK_TRUE
CKA_PRIVATE CK_BBOOL CK_FALSE
CKA_MODIFIABLE CK_BBOOL CK_FALSE
CKA_LABEL UTF8 "Certigna Root CA"
CKA_CERTIFICATE_TYPE CK_CERTIFICATE_TYPE CKC_X_509
CKA_SUBJECT MULTILINE_OCTAL
\060\132\061\013\060\011\006\003\125\004\006\023\002\106\122\061
\022\060\020\006\003\125\004\012\014\011\104\150\151\155\171\157
\164\151\163\061\034\060\032\006\003\125\004\013\014\023\060\060
\060\062\040\064\070\061\064\066\063\060\070\061\060\060\060\063
\066\061\031\060\027\006\003\125\004\003\014\020\103\145\162\164
\151\147\156\141\040\122\157\157\164\040\103\101
END
CKA_ID
UTF8 "0"
CKA_ISSUER MULTILINE_OCTAL
\060\132\061\013\060\011\006\003\125\004\006\023\002\106\122\061
\022\060\020\006\003\125\004\012\014\011\104\150\151\155\171\157
\164\151\163\061\034\060\032\006\003\125\004\013\014\023\060\060
\060\062\040\064\070\061\064\066\063\060\070\061\060\060\060\063
\066\061\031\060\027\006\003\125\004\003\014\020\103\145\162\164
\151\147\156\141\040\122\157\157\164\040\103\101

```

END

CKA_SERIAL_NUMBER MULTILINE_OCTAL

\002\021\000\312\351\033\211\361\125\003\015\243\346\101\155\304
\343\246\341

END

CKA_VALUE MULTILINE_OCTAL

\060\202\006\133\060\202\004\103\240\003\002\001\002\002\021\000
\312\351\033\211\361\125\003\015\243\346\101\155\304\343\246\341
\060\015\006\011\052\206\110\206\367\015\001\001\013\005\000\060
\132\061\013\060\011\006\003\125\004\006\023\002\106\122\061\022
\060\020\006\003\125\004\012\014\011\104\150\151\155\171\157\164
\151\163\061\034\060\032\006\003\125\004\013\014\023\060\060\060
\062\040\064\070\061\064\066\063\060\070\061\060\060\060\063\066
\061\031\060\027\006\003\125\004\003\014\020\103\145\162\164\151
\147\156\141\040\122\157\157\164\040\103\101\060\036\027\015\061
\063\061\060\060\061\060\070\063\062\062\067\132\027\015\063\063
\061\060\060\061\060\070\063\062\062\067\132\060\132\061\013\060
\011\006\003\125\004\006\023\002\106\122\061\022\060\020\006\003
\125\004\012\014\011\104\150\151\155\171\157\164\151\163\061\034
\060\032\006\003\125\004\013\014\023\060\060\060\062\040\064\070
\061\064\066\063\060\070\061\060\060\060\063\066\061\031\060\027
\006\003\125\004\003\014\020\103\145\162\164\151\147\156\141\040
\122\157\157\164\040\103\101\060\202\002\042\060\015\006\011\052
\206\110\206\367\015\001\001\001\005\000\003\202\002\017\000\060
\202\002\012\002\202\002\001\000\315\030\071\145\032\131\261\352
\144\026\016\214\224\044\225\174\203\323\305\071\046\334\014\357
\026\127\215\327\330\254\243\102\177\202\312\355\315\133\333\016
\267\055\355\105\010\027\262\331\263\313\326\027\122\162\050\333
\216\116\236\212\266\013\371\236\204\232\115\166\336\042\051\134
\322\263\322\006\076\060\071\251\164\243\222\126\034\241\157\114
\012\040\155\237\043\172\264\306\332\054\344\035\054\334\263\050
\320\023\362\114\116\002\111\241\124\100\236\346\345\005\240\055
\204\310\377\230\154\320\353\212\032\204\010\036\267\150\043\356
\043\325\160\316\155\121\151\020\356\241\172\302\321\042\061\302
\202\205\322\362\125\166\120\174\045\172\311\204\134\013\254\335
\102\116\053\347\202\242\044\211\313\220\262\320\356\043\272\146
\114\273\142\244\371\123\132\144\173\174\230\372\243\110\236\017
\225\256\247\030\364\152\354\056\003\105\257\360\164\370\052\315
\172\135\321\276\104\046\062\051\361\361\365\154\314\176\002\041
\013\237\157\244\077\276\235\123\342\317\175\251\054\174\130\032
\227\341\075\067\067\030\146\050\322\100\305\121\212\214\303\055
\316\123\210\044\130\144\060\026\305\252\340\326\012\246\100\337
\170\366\365\004\174\151\023\204\274\321\321\247\006\317\001\367
\150\300\250\127\273\072\141\255\004\214\223\343\255\374\360\333
\104\155\131\334\111\131\256\254\232\231\066\060\101\173\166\063
\042\207\243\302\222\206\156\371\160\356\256\207\207\225\033\304
\172\275\061\363\324\322\345\231\377\276\110\354\165\365\170\026
\035\246\160\301\177\074\033\241\222\373\317\310\074\326\305\223

\012\217\365\125\072\166\225\316\131\230\212\011\225\167\062\232
\203\272\054\004\072\227\275\324\057\276\327\154\233\242\312\175
\155\046\311\125\325\317\303\171\122\010\011\231\007\044\055\144
\045\153\246\041\151\233\152\335\164\115\153\227\172\101\275\253
\027\371\220\027\110\217\066\371\055\325\305\333\356\252\205\105
\101\372\315\072\105\261\150\346\066\114\233\220\127\354\043\271
\207\010\302\304\011\361\227\206\052\050\115\342\164\300\332\304
\214\333\337\342\241\027\131\316\044\131\164\061\332\177\375\060
\155\331\334\341\152\341\374\137\002\003\001\000\001\243\202\001
\032\060\202\001\026\060\017\006\003\125\035\023\001\001\377\004
\005\060\003\001\001\377\060\016\006\003\125\035\017\001\001\377
\004\004\003\002\001\006\060\035\006\003\125\035\016\004\026\004
\024\030\207\126\340\156\167\356\044\065\074\116\163\232\037\326
\341\342\171\176\053\060\037\006\003\125\035\043\004\030\060\026
\200\024\030\207\126\340\156\167\356\044\065\074\116\163\232\037
\326\341\342\171\176\053\060\104\006\003\125\035\040\004\075\060
\073\060\071\006\004\125\035\040\000\060\061\060\057\006\010\053
\006\001\005\005\007\002\001\026\043\150\164\164\160\163\072\057
\057\167\167\167\167\056\143\145\162\164\151\147\156\141\056\146
\162\057\141\165\164\157\162\151\164\145\163\057\060\155\006\003
\125\035\037\004\146\060\144\060\057\240\055\240\053\206\051\150
\164\164\160\072\057\057\143\162\154\056\143\145\162\164\151\147
\156\141\056\146\162\057\143\145\162\164\151\147\156\141\162\157
\157\164\143\141\056\143\162\154\060\061\240\057\240\055\206\053
\150\164\164\160\072\057\057\143\162\154\056\144\150\151\155\171
\157\164\151\163\056\143\157\155\057\143\145\162\164\151\147\156
\141\162\157\157\164\143\141\056\143\162\154\060\015\006\011\052
\206\110\206\367\015\001\001\013\005\000\003\202\002\001\000\224
\270\236\117\360\343\225\010\042\347\315\150\101\367\034\125\325
\174\000\342\055\072\211\135\150\070\057\121\042\013\112\215\313
\351\273\135\076\273\134\075\261\050\376\344\123\125\023\317\241
\220\033\002\035\137\146\106\011\063\050\341\015\044\227\160\323
\020\037\352\144\127\226\273\135\332\347\304\214\117\114\144\106
\035\134\207\343\131\336\102\321\233\250\176\246\211\335\217\034
\311\060\202\355\073\234\315\300\351\031\340\152\330\002\165\067
\253\367\064\050\050\221\362\004\012\117\065\343\140\046\001\372
\320\021\214\371\021\152\356\257\075\303\120\323\217\137\063\171
\074\206\250\163\105\220\214\040\266\162\163\027\043\276\007\145
\345\170\222\015\272\001\300\353\214\034\146\277\254\206\167\001
\224\015\234\346\351\071\215\037\246\121\214\231\014\071\167\341
\264\233\372\034\147\127\157\152\152\216\251\053\114\127\171\172
\127\042\317\315\137\143\106\215\134\131\072\206\370\062\107\142
\243\147\015\030\221\334\373\246\153\365\110\141\163\043\131\216
\002\247\274\104\352\364\111\235\361\124\130\371\140\257\332\030
\244\057\050\105\334\172\240\210\206\135\363\073\347\377\051\065
\200\374\144\103\224\346\343\034\157\276\255\016\052\143\231\053
\311\176\205\366\161\350\006\003\225\376\336\217\110\034\132\324
\222\350\053\356\347\061\333\272\004\152\207\230\347\305\137\357

```
\175\247\042\367\001\330\115\371\211\320\016\232\005\131\244\236
\230\331\157\053\312\160\276\144\302\125\243\364\351\257\303\222
\051\334\210\026\044\231\074\215\046\230\266\133\267\314\316\267
\067\007\375\046\331\230\205\044\377\131\043\003\232\355\235\235
\250\344\136\070\316\327\122\015\157\322\077\155\261\005\153\111
\316\212\221\106\163\364\366\057\360\250\163\167\016\145\254\241
\215\146\122\151\176\113\150\014\307\036\067\047\203\245\214\307
\002\344\024\315\111\001\260\163\263\375\306\220\072\157\322\154
\355\073\356\354\221\276\242\103\135\213\000\112\146\045\104\160
\336\100\017\370\174\025\367\242\316\074\327\136\023\214\201\027
\030\027\321\275\361\167\020\072\324\145\071\301\047\254\127\054
\045\124\377\242\332\117\212\141\071\136\256\075\112\214\275
```

END

CKA_NSS_Mozilla_CA_POLICY

CK_BBOOL CK_TRUE

CKA_NSS_SERVER_DISTRUST_AFTER CK_BBOOL CK_FALSE

CKA_NSS_EMAIL_DISTRUST_AFTER CK_BBOOL CK_FALSE

Trust for "Certigna Root CA"

Issuer: CN=Certigna Root CA,OU=0002 48146308100036,O=Dhimyotis,C=FR

Serial Number:00:ca:e9:1b:89:f1:55:03:0d:a3:e6:41:6d:c4:e3:a6:e1

Subject: CN=Certigna Root CA,OU=0002 48146308100036,O=Dhimyotis,C=FR

Not Valid Before: Tue Oct 01 08:32:27 2013

Not Valid After : Sat Oct 01 08:32:27 2033

Fingerprint (SHA-256):

D4:8D:3D:23:EE:DB:50:A4:59:E5:51:97:60:1C:27:77:4B:9D:7B:18:C9:4D:5A:05:95:11:A1:02:50:B9:31:68

Fingerprint (SHA1): 2D:0D:52:14:FF:9E:AD:99:24:01:74:20:47:6E:6C:85:27:27:F5:43

CKA_CLASS CK_OBJECT_CLASS CKO_NSS_TRUST

CKA_TOKEN

CK_BBOOL CK_TRUE

CKA_PRIVATE CK_BBOOL CK_FALSE

CKA_MODIFIABLE CK_BBOOL CK_FALSE

CKA_LABEL UTF8 "Certigna Root CA"

CKA_CERT_SHA1_HASH MULTILINE_OCTAL

```
\055\015\122\024\377\236\255\231\044\001\164\040\107\156\154\205
\047\047\365\103
```

END

CKA_CERT_MD5_HASH MULTILINE_OCTAL

```
\016\134\060\142\047\353\133\274\327\256\142\272\351\325\337\167
```

END

CKA_ISSUER MULTILINE_OCTAL

```
\060\132\061\013\060\011\006\003\125\004\006\023\002\106\122\061
\022\060\020\006\003\125\004\012\014\011\104\150\151\155\171\157
\164\151\163\061\034\060\032\006\003\125\004\013\014\023\060\060
\060\062\040\064\070\061\064\066\063\060\070\061\060\060\060\063
\066\061\031\060\027\006\003\125\004\003\014\020\103\145\162\164
\151\147\156\141\040\122\157\157\164\040\103\101
```

END

```

CKA_SERIAL_NUMBER MULTILINE_OCTAL
\002\021\000\312\351\033\211\361\125\003\015\243\346\101\155\304
\343\246\341
END
CKA_TRUST_SERVER_AUTH CK_TRUST CKT_NSS_TRUSTED_DELEGATOR
CKA_TRUST_EMAIL_PROTECTION CK_TRUST CKT_NSS_TRUSTED_DELEGATOR
CKA_TRUST_CODE_SIGNING
CK_TRUST CKT_NSS_MUST_VERIFY_TRUST
CKA_TRUST_STEP_UP_APPROVED CK_BBOOL CK_FALSE

#
# Certificate "emSign Root CA - G1"
#
# Issuer: CN=emSign Root CA - G1,O=eMudhra Technologies Limited,OU=emSign PKI,C=IN
# Serial Number:31:f5:e4:62:0c:6c:58:ed:d6:d8
# Subject: CN=emSign Root CA - G1,O=eMudhra Technologies Limited,OU=emSign PKI,C=IN
# Not Valid Before: Sun Feb 18 18:30:00 2018
# Not Valid After : Wed Feb 18 18:30:00 2043
# Fingerprint (SHA-256):
40:F6:AF:03:46:A9:9A:A1:CD:1D:55:5A:4E:9C:CE:62:C7:F9:63:46:03:EE:40:66:15:83:3D:C8:C8:D0:03:67
# Fingerprint (SHA1): 8A:C7:AD:8F:73:AC:4E:C1:B5:75:4D:A5:40:F4:FC:CF:7C:B5:8E:8C
CKA_CLASS CK_OBJECT_CLASS CKO_CERTIFICATE
CKA_TOKEN CK_BBOOL CK_TRUE
CKA_PRIVATE CK_BBOOL CK_FALSE
CKA_MODIFIABLE CK_BBOOL CK_FALSE
CKA_LABEL UTF8 "emSign Root CA - G1"
CKA_CERTIFICATE_TYPE CK_CERTIFICATE_TYPE CKC_X_509
CKA_SUBJECT MULTILINE_OCTAL
\060\147\061\013\060\011\006\003\125\004\006\023\002\111\116\061
\023\060\021\006\003\125\004\013\023\012\145\155\123\151\147\156
\040\120\113\111\061\045\060\043\006\003\125\004\012\023\034\145
\115\165\144\150\162\141\040\124\145\143\150\156\157\154\157\147
\151\145\163\040\114\151\155\151\164\145\144\061\034\060\032\006
\003\125\004\003\023\023\145\155\123\151\147\156\040\122\157\157
\164\040\103\101\040\055\040\107\061
END
CKA_ID
UTF8 "0"
CKA_ISSUER MULTILINE_OCTAL
\060\147\061\013\060\011\006\003\125\004\006\023\002\111\116\061
\023\060\021\006\003\125\004\013\023\012\145\155\123\151\147\156
\040\120\113\111\061\045\060\043\006\003\125\004\012\023\034\145
\115\165\144\150\162\141\040\124\145\143\150\156\157\154\157\147
\151\145\163\040\114\151\155\151\164\145\144\061\034\060\032\006
\003\125\004\003\023\023\145\155\123\151\147\156\040\122\157\157
\164\040\103\101\040\055\040\107\061
END
CKA_SERIAL_NUMBER MULTILINE_OCTAL

```

\002\012\061\365\344\142\014\154\130\355\326\330

END

CKA_VALUE MULTILINE_OCTAL

\060\202\003\224\060\202\002\174\240\003\002\001\002\002\012\061
\365\344\142\014\154\130\355\326\330\060\015\006\011\052\206\110
\206\367\015\001\001\013\005\000\060\147\061\013\060\011\006\003
\125\004\006\023\002\111\116\061\023\060\021\006\003\125\004\013
\023\012\145\155\123\151\147\156\040\120\113\111\061\045\060\043
\006\003\125\004\012\023\034\145\115\165\144\150\162\141\040\124
\145\143\150\156\157\154\157\147\151\145\163\040\114\151\155\151
\164\145\144\061\034\060\032\006\003\125\004\003\023\023\145\155
\123\151\147\156\040\122\157\157\164\040\103\101\040\055\040\107
\061\060\036\027\015\061\070\060\062\061\070\061\070\063\060\060
\060\132\027\015\064\063\060\062\061\070\061\070\063\060\060\060
\132\060\147\061\013\060\011\006\003\125\004\006\023\002\111\116
\061\023\060\021\006\003\125\004\013\023\012\145\155\123\151\147
\156\040\120\113\111\061\045\060\043\006\003\125\004\012\023\034
\145\115\165\144\150\162\141\040\124\145\143\150\156\157\154\157
\147\151\145\163\040\114\151\155\151\164\145\144\061\034\060\032
\006\003\125\004\003\023\023\145\155\123\151\147\156\040\122\157
\157\164\040\103\101\040\055\040\107\061\060\202\001\042\060\015
\006\011\052\206\110\206\367\015\001\001\001\005\000\003\202\001
\017\000\060\202\001\012\002\202\001\001\000\223\113\273\351\146
\212\356\235\133\325\064\223\320\033\036\303\347\236\270\144\063
\177\143\170\150\264\315\056\161\165\327\233\040\306\115\051\274
\266\150\140\212\367\041\232\126\065\132\363\166\275\330\315\232
\377\223\126\113\245\131\006\241\223\064\051\335\026\064\165\116
\362\201\264\307\226\116\255\031\025\122\112\376\074\160\165\160
\315\257\053\253\025\232\063\074\252\263\213\252\315\103\375\365
\352\160\377\355\317\021\073\224\316\116\062\026\323\043\100\052
\167\263\257\074\001\054\154\355\231\054\213\331\116\151\230\262
\367\217\101\260\062\170\141\326\015\137\303\372\242\100\222\035
\134\027\346\160\076\065\347\242\267\302\142\342\253\244\070\114
\265\071\065\157\352\003\151\372\072\124\150\205\155\326\362\057
\103\125\036\221\015\016\330\325\152\244\226\321\023\074\054\170
\120\350\072\222\322\027\126\345\065\032\100\034\076\215\054\355
\071\337\102\340\203\101\164\337\243\315\302\206\140\110\150\343
\151\013\124\000\213\344\166\151\041\015\171\116\064\010\136\024
\302\314\261\267\255\327\174\160\212\307\205\002\003\001\000\001
\243\102\060\100\060\035\006\003\125\035\016\004\026\004\024\373
\357\015\206\236\260\343\335\251\271\361\041\027\177\076\374\360
\167\053\032\060\016\006\003\125\035\017\001\001\377\004\004\003
\002\001\006\060\017\006\003\125\035\023\001\001\377\004\005\060
\003\001\001\377\060\015\006\011\052\206\110\206\367\015\001\001
\013\005\000\003\202\001\001\000\131\377\362\214\365\207\175\161
\075\243\237\033\133\321\332\370\323\234\153\066\275\233\251\141
\353\336\026\054\164\075\236\346\165\332\327\272\247\274\102\027
\347\075\221\353\345\175\335\076\234\361\317\222\254\154\110\314

\302\042\077\151\073\305\266\025\057\243\065\306\150\052\034\127
\257\071\357\215\320\065\303\030\014\173\000\126\034\315\213\031
\164\336\276\017\022\340\320\252\241\077\002\064\261\160\316\235
\030\326\010\003\011\106\356\140\340\176\266\304\111\004\121\175
\160\140\274\252\262\377\171\162\172\246\035\075\137\052\370\312
\342\375\071\267\107\271\353\176\337\004\043\257\372\234\006\007
\351\373\143\223\200\100\265\306\154\012\061\050\316\014\237\317
\263\043\065\200\101\215\154\304\067\173\201\057\200\241\100\102
\205\351\331\070\215\350\241\123\315\001\277\151\350\132\006\362
\105\013\220\372\256\341\277\235\362\256\127\074\245\256\262\126
\364\213\145\100\351\375\061\201\054\364\071\011\330\356\153\247
\264\246\035\025\245\230\367\001\201\330\205\175\363\121\134\161
\210\336\272\314\037\200\176\112

END

CKA_NSS_Mozilla_CA_POLICY

CK_BBOOL CK_TRUE

CKA_NSS_SERVER_DISTRUST_AFTER CK_BBOOL CK_FALSE

CKA_NSS_EMAIL_DISTRUST_AFTER CK_BBOOL CK_FALSE

Trust for "emSign Root CA - G1"

Issuer: CN=emSign Root CA - G1,O=eMudhra Technologies Limited,OU=emSign PKI,C=IN

Serial Number:31:f5:e4:62:0c:6c:58:ed:d6:d8

Subject: CN=emSign Root CA - G1,O=eMudhra Technologies
Limited,OU=emSign PKI,C=IN

Not Valid Before: Sun Feb 18 18:30:00 2018

Not Valid After : Wed Feb 18 18:30:00 2043

Fingerprint (SHA-256):

40:F6:AF:03:46:A9:9A:A1:CD:1D:55:5A:4E:9C:CE:62:C7:F9:63:46:03:EE:40:66:15:83:3D:C8:C8:D0:03:67

Fingerprint (SHA1): 8A:C7:AD:8F:73:AC:4E:C1:B5:75:4D:A5:40:F4:FC:CF:7C:B5:8E:8C

CKA_CLASS CK_OBJECT_CLASS CKO_NSS_TRUST

CKA_TOKEN CK_BBOOL CK_TRUE

CKA_PRIVATE CK_BBOOL CK_FALSE

CKA_MODIFIABLE CK_BBOOL CK_FALSE

CKA_LABEL UTF8 "emSign Root CA - G1"

CKA_CERT_SHA1_HASH MULTILINE_OCTAL

\212\307\255\217\163\254\116\301\265\165\115\245\100\364\374\317
\174\265\216\214

END

CKA_CERT_MD5_HASH MULTILINE_OCTAL

\234\102\204\127\335\313\013\247\056\225\255\266\363\332\274\254
END

CKA_ISSUER MULTILINE_OCTAL

\060\147\061\013\060\011\006\003\125\004\006\023\002\111\116\061
\023\060\021\006\003\125\004\013\023\012\145\155\123\151\147\156
\040\120\113\111\061\045\060\043\006\003\125\004\012\023\034\145
\115\165\144\150\162\141\040\124\145\143\150\156\157\154\157\147
\151\145\163\040\114\151\155\151\164\145\144\061\034\060\032\006
\003\125\004\003\023\023\145\155\123\151\147\156\040\122\157\157

```

\164\040\103\101\040\055\040\107\061
END
CKA_SERIAL_NUMBER
MULTILINE_OCTAL
\002\012\061\365\344\142\014\154\130\355\326\330
END
CKA_TRUST_SERVER_AUTH CK_TRUST CKT_NSS_TRUSTED_DELEGATOR
CKA_TRUST_EMAIL_PROTECTION CK_TRUST CKT_NSS_TRUSTED_DELEGATOR
CKA_TRUST_CODE_SIGNING CK_TRUST CKT_NSS_MUST_VERIFY_TRUST
CKA_TRUST_STEP_UP_APPROVED CK_BBOOL CK_FALSE

#
# Certificate "emSign ECC Root CA - G3"
#
# Issuer: CN=emSign ECC Root CA - G3,O=eMudhra Technologies Limited,OU=emSign PKI,C=IN
# Serial Number:3c:f6:07:a9:68:70:0e:da:8b:84
# Subject: CN=emSign ECC Root CA - G3,O=eMudhra Technologies Limited,OU=emSign PKI,C=IN
# Not Valid Before: Sun Feb 18 18:30:00 2018
# Not Valid After : Wed Feb 18 18:30:00 2043
# Fingerprint (SHA-256):
86:A1:EC:BA:08:9C:4A:8D:3B:BE:27:34:C6:12:BA:34:1D:81:3E:04:3C:F9:E8:A8:62:CD:5C:57:A3:6B:BE:6B
# Fingerprint (SHA1): 30:43:FA:4F:F2:57:DC:A0:C3:80:EE:2E:58:EA:78:B2:3F:E6:BB:C1
CKA_CLASS
CK_OBJECT_CLASS CKO_CERTIFICATE
CKA_TOKEN CK_BBOOL CK_TRUE
CKA_PRIVATE CK_BBOOL CK_FALSE
CKA_MODIFIABLE CK_BBOOL CK_FALSE
CKA_LABEL UTF8 "emSign ECC Root CA - G3"
CKA_CERTIFICATE_TYPE CK_CERTIFICATE_TYPE CKC_X_509
CKA_SUBJECT MULTILINE_OCTAL
\060\153\061\013\060\011\006\003\125\004\006\023\002\111\116\061
\023\060\021\006\003\125\004\013\023\012\145\155\123\151\147\156
\040\120\113\111\061\045\060\043\006\003\125\004\012\023\034\145
\115\165\144\150\162\141\040\124\145\143\150\156\157\154\157\147
\151\145\163\040\114\151\155\151\164\145\144\061\040\060\036\006
\003\125\004\003\023\027\145\155\123\151\147\156\040\105\103\103
\040\122\157\157\164\040\103\101\040\055\040\107\063
END
CKA_ID UTF8 "0"
CKA_ISSUER MULTILINE_OCTAL
\060\153\061\013\060\011\006\003\125\004\006\023\002\111\116\061
\023\060\021\006\003\125\004\013\023\012\145\155\123\151\147\156
\040\120\113\111\061\045\060\043\006\003\125\004\012\023\034\145
\115\165\144\150\162\141\040\124\145\143\150\156\157\154\157\147
\151\145\163\040\114\151\155\151\164\145\144\061\040\060\036\006
\003\125\004\003\023\027\145\155\123\151\147\156\040\105\103\103
\040\122\157\157\164\040\103\101\040\055\040\107\063
END

```

```
CKA_SERIAL_NUMBER
MULTILINE_OCTAL
\002\012\074\366\007\251\150\160\016\332\213\204
END
CKA_VALUE MULTILINE_OCTAL
\060\202\002\116\060\202\001\323\240\003\002\001\002\002\012\074
\366\007\251\150\160\016\332\213\204\060\012\006\010\052\206\110
\316\075\004\003\003\060\153\061\013\060\011\006\003\125\004\006
\023\002\111\116\061\023\060\021\006\003\125\004\013\023\012\145
\155\123\151\147\156\040\120\113\111\061\045\060\043\006\003\125
\004\012\023\034\145\115\165\144\150\162\141\040\124\145\143\150
\156\157\154\157\147\151\145\163\040\114\151\155\151\164\145\144
\061\040\060\036\006\003\125\004\003\023\027\145\155\123\151\147
\156\040\105\103\103\040\122\157\157\164\040\103\101\040\055\040
\107\063\060\036\027\015\061\070\060\062\061\070\061\070\063\060
\060\060\132\027\015\064\063\060\062\061\070\061\070\063\060\060
\060\132\060\153\061\013\060\011\006\003\125\004\006\023\002\111
\116\061\023\060\021\006\003\125\004\013\023\012\145\155\123\151
\147\156\040\120\113\111\061\045\060\043\006\003\125\004\012\023
\034\145\115\165\144\150\162\141\040\124\145\143\150\156\157\154
\157\147\151\145\163\040\114\151\155\151\164\145\144\061\040\060
\036\006\003\125\004\003\023\027\145\155\123\151\147\156\040\105
\103\103\040\122\157\157\164\040\103\101\040\055\040\107\063\060
\166\060\020\006\007\052\206\110\316\075\002\001\006\005\053\201
\004\000\042\003\142\000\004\043\245\014\270\055\022\365\050\363
\261\262\335\342\002\022\200\236\071\137\111\115\237\311\045\064
\131\164\354\273\006\034\347\300\162\257\350\256\057\341\101\124
\207\024\250\112\262\350\174\202\346\133\152\265\334\263\165\316
\213\006\320\206\043\277\106\325\216\017\077\004\364\327\034\222
\176\366\245\143\302\365\137\216\056\117\241\030\031\002\053\062
\012\202\144\175\026\223\321\243\102\060\100\060\035\006\003\125
\035\016\004\026\004\024\174\135\002\204\023\324\314\212\233\201
\316\027\034\056\051\036\234\110\143\102\060\016\006\003\125\035
\017\001\001\377\004\004\003\002\001\006\060\017\006\003\125\035
\023\001\001\377\004\005\060\003\001\001\377\060\012\006\010\052
\206\110\316\075\004\003\003\003\151\000\060\146\002\061\000\276
\363\141\317\002\020\035\144\225\007\270\030\156\210\205\005\057
\203\010\027\220\312\037\212\114\350\015\033\172\261\255\325\201
\011\107\357\073\254\010\004\174\134\231\261\355\107\007\322\002
\061\000\235\272\125\374\251\112\350\355\355\346\166\001\102\173
\310\370\140\331\215\121\213\125\073\373\214\173\353\145\011\303
\370\226\315\107\250\202\362\026\125\167\044\176\022\020\225\004
\054\243
END
CKA_NSS_MOZILLA_CA_POLICY
CK_BBOOL CK_TRUE
CKA_NSS_SERVER_DISTRUST_AFTER CK_BBOOL CK_FALSE
CKA_NSS_EMAIL_DISTRUST_AFTER CK_BBOOL CK_FALSE
```

```

# Trust for "emSign ECC Root CA - G3"
# Issuer: CN=emSign ECC Root CA - G3,O=eMudhra Technologies
  Limited,OU=emSign PKI,C=IN
# Serial Number:3c:f6:07:a9:68:70:0e:da:8b:84
# Subject: CN=emSign ECC Root CA - G3,O=eMudhra Technologies Limited,OU=emSign PKI,C=IN
# Not Valid Before: Sun Feb 18 18:30:00 2018
# Not Valid After : Wed Feb 18 18:30:00 2043
# Fingerprint (SHA-256):
86:A1:EC:BA:08:9C:4A:8D:3B:BE:27:34:C6:12:BA:34:1D:81:3E:04:3C:F9:E8:A8:62:CD:5C:57:A3:6B:BE:6B
# Fingerprint (SHA1): 30:43:FA:4F:F2:57:DC:A0:C3:80:EE:2E:58:EA:78:B2:3F:E6:BB:C1
CKA_CLASS CK_OBJECT_CLASS CKO_NSS_TRUST
CKA_TOKEN CK_BBOOL CK_TRUE
CKA_PRIVATE CK_BBOOL CK_FALSE
CKA_MODIFIABLE CK_BBOOL CK_FALSE
CKA_LABEL UTF8 "emSign ECC Root CA - G3"
CKA_CERT_SHA1_HASH MULTILINE_OCTAL
\060\103\372\117\362\127\334\240\303\200\356\056\130\352\170\262
\077\346\273\301
END
CKA_CERT_MD5_HASH MULTILINE_OCTAL
\316\013\162\321\237\210\216\320\120\003\350\343\270\213\147\100
END
CKA_ISSUER MULTILINE_OCTAL
\060\153\061\013\060\011\006\003\125\004\006\023\002\111\116\061
\023\060\021\006\003\125\004\013\023\012\145\155\123\151\147\156
\040\120\113\111\061\045\060\043\006\003\125\004\012\023\034\145
\115\165\144\150\162\141\040\124\145\143\150\156\157\154\157\147
\151\145\163\040\114\151\155\151\164\145\144\061\040\060\036\006
\003\125\004\003\023\027\145\155\123\151\147\156\040\105\103\103
\040\122\157\157\164\040\103\101\040\055\040\107\063
END
CKA_SERIAL_NUMBER
  MULTILINE_OCTAL
\002\012\074\366\007\251\150\160\016\332\213\204
END
CKA_TRUST_SERVER_AUTH CK_TRUST CKT_NSS_TRUSTED_DELEGATOR
CKA_TRUST_EMAIL_PROTECTION CK_TRUST CKT_NSS_TRUSTED_DELEGATOR
CKA_TRUST_CODE_SIGNING CK_TRUST CKT_NSS_MUST_VERIFY_TRUST
CKA_TRUST_STEP_UP_APPROVED CK_BBOOL CK_FALSE

#
# Certificate "emSign Root CA - C1"
#
# Issuer: CN=emSign Root CA - C1,O=eMudhra Inc,OU=emSign PKI,C=US
# Serial Number:00:ae:cf:00:ba:c4:cf:32:f8:43:b2
# Subject: CN=emSign Root CA - C1,O=eMudhra Inc,OU=emSign PKI,C=US
# Not Valid Before: Sun Feb 18 18:30:00 2018

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# Not Valid After : Wed Feb 18 18:30:00 2043
# Fingerprint (SHA-256):
12:56:09:AA:30:1D:A0:A2:49:B9:7A:82:39:CB:6A:34:21:6F:44:DC:AC:9F:39:54:B1:42:92:F2:E8:C8:60:8F
#
Fingerprint (SHA1): E7:2E:F1:DF:FC:B2:09:28:CF:5D:D4:D5:67:37:B1:51:CB:86:4F:01
CKA_CLASS CK_OBJECT_CLASS CKO_CERTIFICATE
CKA_TOKEN CK_BBOOL CK_TRUE
CKA_PRIVATE CK_BBOOL CK_FALSE
CKA_MODIFIABLE CK_BBOOL CK_FALSE
CKA_LABEL UTF8 "emSign Root CA - C1"
CKA_CERTIFICATE_TYPE CK_CERTIFICATE_TYPE CKC_X_509
CKA_SUBJECT MULTILINE_OCTAL
\060\126\061\013\060\011\006\003\125\004\006\023\002\125\123\061
\023\060\021\006\003\125\004\013\023\012\145\155\123\151\147\156
\040\120\113\111\061\024\060\022\006\003\125\004\012\023\013\145
\115\165\144\150\162\141\040\111\156\143\061\034\060\032\006\003
\125\004\003\023\023\145\155\123\151\147\156\040\122\157\157\164
\040\103\101\040\055\040\103\061
END
CKA_ID UTF8 "0"
CKA_ISSUER MULTILINE_OCTAL
\060\126\061\013\060\011\006\003\125\004\006\023\002\125\123\061
\023\060\021\006\003\125\004\013\023\012\145\155\123\151\147\156
\040\120\113\111\061\024\060\022\006\003\125\004\012\023\013\145
\115\165\144\150\162\141\040\111\156\143\061\034\060\032\006\003
\125\004\003\023\023\145\155\123\151\147\156\040\122\157\157\164
\040\103\101\040\055\040\103\061
END
CKA_SERIAL_NUMBER
MULTILINE_OCTAL
\002\013\000\256\317\000\272\304\317\062\370\103\262
END
CKA_VALUE MULTILINE_OCTAL
\060\202\003\163\060\202\002\133\240\003\002\001\002\002\013\000
\256\317\000\272\304\317\062\370\103\262\060\015\006\011\052\206
\110\206\367\015\001\001\013\005\000\060\126\061\013\060\011\006
\003\125\004\006\023\002\125\123\061\023\060\021\006\003\125\004
\013\023\012\145\155\123\151\147\156\040\120\113\111\061\024\060
\022\006\003\125\004\012\023\013\145\115\165\144\150\162\141\040
\111\156\143\061\034\060\032\006\003\125\004\003\023\023\145\155
\123\151\147\156\040\122\157\157\164\040\103\101\040\055\040\103
\061\060\036\027\015\061\070\060\062\061\070\061\070\063\060\060
\060\132\027\015\064\063\060\062\061\070\061\070\063\060\060\060
\132\060\126\061\013\060\011\006\003\125\004\006\023\002\125\123
\061\023\060\021\006\003\125\004\013\023\012\145\155\123\151\147
\156\040\120\113\111\061\024\060\022\006\003\125\004\012\023\013
\145\115\165\144\150\162\141\040\111\156\143\061\034\060\032\006
\003\125\004\003\023\023\145\155\123\151\147\156\040\122\157\157
```

\164\040\103\101\040\055\040\103\061\060\202\001\042\060\015\006
\011\052\206\110\206\367\015\001\001\001\005\000\003\202\001\017
\000\060\202\001\012\002\202\001\001\000\317\353\251\271\361\231
\005\314\330\050\041\112\363\163\064\121\204\126\020\365\240\117
\054\022\343\372\023\232\047\320\317\371\171\032\164\137\035\171
\071\374\133\370\160\216\340\222\122\367\344\045\371\124\203\331
\035\323\310\132\205\077\136\307\266\007\356\076\300\316\232\257
\254\126\102\052\071\045\160\326\277\265\173\066\255\254\366\163
\334\315\327\035\212\203\245\373\053\220\025\067\153\034\046\107
\334\073\051\126\223\152\263\301\152\072\235\075\365\301\227\070
\130\005\213\034\021\343\344\264\270\135\205\035\203\376\170\137
\013\105\150\030\110\245\106\163\064\073\376\017\310\166\273\307
\030\363\005\321\206\363\205\355\347\271\331\062\255\125\210\316
\246\266\221\260\117\254\176\025\043\226\366\077\360\040\064\026
\336\012\306\304\004\105\171\177\247\375\276\322\251\245\257\234
\305\043\052\367\074\041\154\275\257\217\116\305\072\262\363\064
\022\374\337\200\032\111\244\324\251\225\367\236\211\136\242\211
\254\224\313\250\150\233\257\212\145\047\315\211\356\335\214\265
\153\051\160\103\240\151\013\344\271\017\002\003\001\000\001\243
\102\060\100\060\035\006\003\125\035\016\004\026\004\024\376\241
\340\160\036\052\003\071\122\132\102\276\134\221\205\172\030\252
\115\265\060\016\006\003\125\035\017\001\001\377\004\004\003\002
\001\006\060\017\006\003\125\035\023\001\001\377\004\005\060\003
\001\001\377\060\015\006\011\052\206\110\206\367\015\001\001\013
\005\000\003\202\001\001\000\302\112\126\372\025\041\173\050\242
\351\345\035\373\370\055\304\071\226\101\114\073\047\054\304\154
\030\025\200\306\254\257\107\131\057\046\013\343\066\260\357\073
\376\103\227\111\062\231\022\025\133\337\021\051\377\253\123\370
\273\301\170\017\254\234\123\257\127\275\150\214\075\151\063\360
\243\240\043\143\073\144\147\042\104\255\325\161\313\126\052\170
\222\243\117\022\061\066\066\342\336\376\000\304\243\140\017\047
\255\240\260\212\265\066\172\122\241\275\047\364\040\047\142\350
\115\224\044\023\344\012\004\351\074\253\056\310\103\011\112\306
\141\004\345\111\064\176\323\304\310\365\017\300\252\351\272\124
\136\363\143\053\117\117\120\324\376\271\173\231\214\075\300\056
\274\002\053\323\304\100\344\212\007\061\036\233\316\046\231\023
\373\021\352\232\042\014\021\031\307\136\033\201\120\060\310\226
\022\156\347\313\101\177\221\073\242\107\267\124\200\033\334\000
\314\232\220\352\303\303\120\006\142\014\060\300\025\110\247\250
\131\174\341\256\042\242\342\012\172\017\372\142\253\122\114\341
\361\337\312\276\203\015\102

END

CKA_NSS_MOZILLA_CA_POLICY

CK_BBOOL CK_TRUE

CKA_NSS_SERVER_DISTRUST_AFTER CK_BBOOL CK_FALSE

CKA_NSS_EMAIL_DISTRUST_AFTER

CK_BBOOL CK_FALSE

```

# Trust for "emSign Root CA - C1"
# Issuer: CN=emSign Root CA - C1,O=eMudhra Inc,OU=emSign PKI,C=US
# Serial Number:00:ae:cf:00:ba:c4:cf:32:f8:43:b2
# Subject: CN=emSign Root CA - C1,O=eMudhra Inc,OU=emSign PKI,C=US
# Not Valid Before: Sun Feb 18 18:30:00 2018
# Not Valid After : Wed Feb 18 18:30:00 2043
# Fingerprint (SHA-256):
12:56:09:AA:30:1D:A0:A2:49:B9:7A:82:39:CB:6A:34:21:6F:44:DC:AC:9F:39:54:B1:42:92:F2:E8:C8:60:8F
# Fingerprint (SHA1): E7:2E:F1:DF:FC:B2:09:28:CF:5D:D4:D5:67:37:B1:51:CB:86:4F:01
CKA_CLASS CK_OBJECT_CLASS CKO_NSS_TRUST
CKA_TOKEN CK_BBOOL CK_TRUE
CKA_PRIVATE CK_BBOOL CK_FALSE
CKA_MODIFIABLE CK_BBOOL CK_FALSE
CKA_LABEL UTF8 "emSign Root CA - C1"
CKA_CERT_SHA1_HASH MULTILINE_OCTAL
\347\056\361\337\374\262\011\050\317\135\324\325\147\067\261\121
\313\206\117\001
END
CKA_CERT_MD5_HASH MULTILINE_OCTAL
\330\343\135\001\041\372\170\132\260\337\272\322\356\052\137\150
END
CKA_ISSUER MULTILINE_OCTAL
\060\126\061\013\060\011\006\003\125\004\006\023\002\125\123\061
\023\060\021\006\003\125\004\013\023\012\145\155\123\151\147\156
\040\120\113\111\061\024\060\022\006\003\125\004\012\023\013\145
\115\165\144\150\162\141\040\111\156\143\061\034\060\032\006\003
\125\004\003\023\023\145\155\123\151\147\156\040\122\157\157\164
\040\103\101\040\055\040\103\061
END
CKA_SERIAL_NUMBER
MULTILINE_OCTAL
\002\013\000\256\317\000\272\304\317\062\370\103\262
END
CKA_TRUST_SERVER_AUTH CK_TRUST CKT_NSS_TRUSTED_DELEGATOR
CKA_TRUST_EMAIL_PROTECTION CK_TRUST CKT_NSS_TRUSTED_DELEGATOR
CKA_TRUST_CODE_SIGNING CK_TRUST CKT_NSS_MUST_VERIFY_TRUST
CKA_TRUST_STEP_UP_APPROVED CK_BBOOL CK_FALSE

#
# Certificate "emSign ECC Root CA - C3"
#
# Issuer: CN=emSign ECC Root CA - C3,O=eMudhra Inc,OU=emSign PKI,C=US
# Serial Number:7b:71:b6:82:56:b8:12:7c:9c:a8
# Subject: CN=emSign ECC Root CA - C3,O=eMudhra Inc,OU=emSign PKI,C=US
# Not Valid Before: Sun Feb 18 18:30:00 2018
# Not Valid After : Wed Feb 18 18:30:00 2043
# Fingerprint (SHA-256):
BC:4D:80:9B:15:18:9D:78:DB:3E:1D:8C:F4:F9:72:6A:79:5D:A1:64:3C:A5:F1:35:8E:1D:DB:0E:DC:0D:7E:B3

```

#

Fingerprint (SHA1): B6:AF:43:C2:9B:81:53:7D:F6:EF:6B:C3:1F:1F:60:15:0C:EE:48:66

CKA_CLASS CK_OBJECT_CLASS CKO_CERTIFICATE

CKA_TOKEN CK_BBOOL CK_TRUE

CKA_PRIVATE CK_BBOOL CK_FALSE

CKA_MODIFIABLE CK_BBOOL CK_FALSE

CKA_LABEL UTF8 "emSign ECC Root CA - C3"

CKA_CERTIFICATE_TYPE CK_CERTIFICATE_TYPE CKC_X_509

CKA_SUBJECT MULTILINE_OCTAL

\060\132\061\013\060\011\006\003\125\004\006\023\002\125\123\061
\023\060\021\006\003\125\004\013\023\012\145\155\123\151\147\156
\040\120\113\111\061\024\060\022\006\003\125\004\012\023\013\145
\115\165\144\150\162\141\040\111\156\143\061\040\060\036\006\003
\125\004\003\023\027\145\155\123\151\147\156\040\105\103\103\040
\122\157\157\164\040\103\101\040\055\040\103\063

END

CKA_ID UTF8 "0"

CKA_ISSUER MULTILINE_OCTAL

\060\132\061\013\060\011\006\003\125\004\006\023\002\125\123\061
\023\060\021\006\003\125\004\013\023\012\145\155\123\151\147\156
\040\120\113\111\061\024\060\022\006\003\125\004\012\023\013\145
\115\165\144\150\162\141\040\111\156\143\061\040\060\036\006\003
\125\004\003\023\027\145\155\123\151\147\156\040\105\103\103\040
\122\157\157\164\040\103\101\040\055\040\103\063

END

CKA_SERIAL_NUMBER

MULTILINE_OCTAL

\002\012\173\161\266\202\126\270\022\174\234\250

END

CKA_VALUE MULTILINE_OCTAL

\060\202\002\053\060\202\001\261\240\003\002\001\002\002\012\173
\161\266\202\126\270\022\174\234\250\060\012\006\010\052\206\110
\316\075\004\003\003\060\132\061\013\060\011\006\003\125\004\006
\023\002\125\123\061\023\060\021\006\003\125\004\013\023\012\145
\155\123\151\147\156\040\120\113\111\061\024\060\022\006\003\125
\004\012\023\013\145\115\165\144\150\162\141\040\111\156\143\061
\040\060\036\006\003\125\004\003\023\027\145\155\123\151\147\156
\040\105\103\103\040\122\157\157\164\040\103\101\040\055\040\103
\063\060\036\027\015\061\070\060\062\061\070\061\070\063\060\060
\060\132\027\015\064\063\060\062\061\070\061\070\063\060\060\060
\132\060\132\061\013\060\011\006\003\125\004\006\023\002\125\123
\061\023\060\021\006\003\125\004\013\023\012\145\155\123\151\147
\156\040\120\113\111\061\024\060\022\006\003\125\004\012\023\013
\145\115\165\144\150\162\141\040\111\156\143\061\040\060\036\006
\003\125\004\003\023\027\145\155\123\151\147\156\040\105\103\103
\040\122\157\157\164\040\103\101\040\055\040\103\063\060\166\060
\020\006\007\052\206\110\316\075\002\001\006\005\053\201\004\000
\042\003\142\000\004\375\245\141\256\173\046\020\035\351\267\042

\060\256\006\364\201\263\261\102\161\225\071\274\323\122\343\257
\257\371\362\227\065\222\066\106\016\207\225\215\271\071\132\351
\273\337\320\376\310\007\101\074\273\125\157\203\243\152\373\142
\260\201\211\002\160\175\110\305\112\343\351\042\124\042\115\223
\273\102\014\257\167\234\043\246\175\327\141\021\316\145\307\370
\177\376\365\362\251\243\102\060\100\060\035\006\003\125\035\016
\004\026\004\024\373\132\110\320\200\040\100\362\250\351\000\007
\151\031\167\247\346\303\364\317\060\016\006\003\125\035\017\001
\001\377\004\004\003\002\001\006\060\017\006\003\125\035\023\001
\001\377\004\005\060\003\001\001\377\060\012\006\010\052\206\110
\316\075\004\003\003\003\150\000\060\145\002\061\000\264\330\057
\002\211\375\266\114\142\272\103\116\023\204\162\265\256\335\034
\336\326\265\334\126\217\130\100\132\055\336\040\114\042\203\312
\223\250\176\356\022\100\307\326\207\117\370\337\205\002\060\034
\024\144\344\174\226\203\021\234\260\321\132\141\113\246\017\111
\323\000\374\241\374\344\245\377\177\255\327\060\320\307\167\177
\276\201\007\125\060\120\040\024\365\127\070\012\250\061\121

END

CKA_NSS_Mozilla_CA_POLICY

CK_BBOOL CK_TRUE

CKA_NSS_SERVER_DISTRUST_AFTER CK_BBOOL CK_FALSE

CKA_NSS_EMAIL_DISTRUST_AFTER CK_BBOOL CK_FALSE

Trust for "emSign ECC Root CA - C3"

Issuer: CN=emSign ECC Root CA - C3,O=eMudhra Inc,OU=emSign PKI,C=US

Serial Number:7b:71:b6:82:56:b8:12:7c:9c:a8

Subject: CN=emSign ECC Root CA - C3,O=eMudhra Inc,OU=emSign PKI,C=US

Not Valid Before: Sun Feb 18 18:30:00 2018

#

Not Valid After : Wed Feb 18 18:30:00 2043

Fingerprint (SHA-256):

BC:4D:80:9B:15:18:9D:78:DB:3E:1D:8C:F4:F9:72:6A:79:5D:A1:64:3C:A5:F1:35:8E:1D:DB:0E:DC:0D:7E:B3

Fingerprint (SHA1): B6:AF:43:C2:9B:81:53:7D:F6:EF:6B:C3:1F:1F:60:15:0C:EE:48:66

CKA_CLASS CK_OBJECT_CLASS CKO_NSS_TRUST

CKA_TOKEN CK_BBOOL CK_TRUE

CKA_PRIVATE CK_BBOOL CK_FALSE

CKA_MODIFIABLE CK_BBOOL CK_FALSE

CKA_LABEL UTF8 "emSign ECC Root CA - C3"

CKA_CERT_SHA1_HASH MULTILINE_OCTAL

\266\257\103\302\233\201\123\175\366\357\153\303\037\037\140\025
\014\356\110\146

END

CKA_CERT_MD5_HASH MULTILINE_OCTAL

\076\123\263\243\201\356\327\020\370\323\260\035\027\222\365\325

END

CKA_ISSUER MULTILINE_OCTAL

\060\132\061\013\060\011\006\003\125\004\006\023\002\125\123\061
\023\060\021\006\003\125\004\013\023\012\145\155\123\151\147\156

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\040\120\113\111\061\024\060\022\006\003\125\004\012\023\013\145
\115\165\144\150\162\141\040\111\156\143\061\040\060\036\006\003
\125\004\003\023\027\145\155\123\151\147\156\040\105\103\103\040
\122\157\157\164\040\103\101\040\055\040\103\063
END
CKA_SERIAL_NUMBER
MULTILINE_OCTAL
\002\012\173\161\266\202\126\270\022\174\234\250
END
CKA_TRUST_SERVER_AUTH CK_TRUST CKT_NSS_TRUSTED_DELEGATOR
CKA_TRUST_EMAIL_PROTECTION CK_TRUST CKT_NSS_TRUSTED_DELEGATOR
CKA_TRUST_CODE_SIGNING CK_TRUST CKT_NSS_MUST_VERIFY_TRUST
CKA_TRUST_STEP_UP_APPROVED CK_BBOOL CK_FALSE

#
# Certificate "Hongkong Post Root CA 3"
#
# Issuer: CN=Hongkong Post Root CA 3,O=Hongkong Post,L=Hong Kong,ST=Hong Kong,C=HK
# Serial Number:08:16:5f:8a:4c:a5:ec:00:c9:93:40:df:c4:c6:ae:23:b8:1c:5a:a4
# Subject: CN=Hongkong Post Root CA 3,O=Hongkong Post,L=Hong Kong,ST=Hong Kong,C=HK
# Not Valid Before: Sat Jun 03 02:29:46 2017
# Not Valid After : Tue Jun 03 02:29:46 2042
# Fingerprint (SHA-256):
5A:2F:C0:3F:0C:83:B0:90:BB:FA:40:60:4B:09:88:44:6C:76:36:18:3D:F9:84:6E:17:10:1A:44:7F:B8:EF:D6
# Fingerprint (SHA1): 58:A2:D0:EC:20:52:81:5B:C1:F3:F8:64:02:24:4E:C2:8E:02:4B:02
CKA_CLASS CK_OBJECT_CLASS CKO_CERTIFICATE
CKA_TOKEN CK_BBOOL
CK_TRUE
CKA_PRIVATE CK_BBOOL CK_FALSE
CKA_MODIFIABLE CK_BBOOL CK_FALSE
CKA_LABEL UTF8 "Hongkong Post Root CA 3"
CKA_CERTIFICATE_TYPE CK_CERTIFICATE_TYPE CKC_X_509
CKA_SUBJECT MULTILINE_OCTAL
\060\157\061\013\060\011\006\003\125\004\006\023\002\110\113\061
\022\060\020\006\003\125\004\010\023\011\110\157\156\147\040\113
\157\156\147\061\022\060\020\006\003\125\004\007\023\011\110\157
\156\147\040\113\157\156\147\061\026\060\024\006\003\125\004\012
\023\015\110\157\156\147\153\157\156\147\040\120\157\163\164\061
\040\060\036\006\003\125\004\003\023\027\110\157\156\147\153\157
\156\147\040\120\157\163\164\040\122\157\157\164\040\103\101\040
\063
END
CKA_ID UTF8 "0"
CKA_ISSUER MULTILINE_OCTAL
\060\157\061\013\060\011\006\003\125\004\006\023\002\110\113\061
\022\060\020\006\003\125\004\010\023\011\110\157\156\147\040\113
\157\156\147\061\022\060\020\006\003\125\004\007\023\011\110\157
\156\147\040\113\157\156\147\061\026\060\024\006\003\125\004\012

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\023\015\110\157\156\147\153\157\156\147\040\120\157\163\164\061
\040\060\036\006\003\125\004\003\023\027\110\157\156\147\153\157
\156\147\040\120\157\163\164\040\122\157\157\164\040\103\101\040
\063
END
CKA_SERIAL_NUMBER
MULTILINE_OCTAL
\002\024\010\026\137\212\114\245\354\000\311\223\100\337\304\306
\256\043\270\034\132\244
END
CKA_VALUE MULTILINE_OCTAL
\060\202\005\317\060\202\003\267\240\003\002\001\002\002\024\010
\026\137\212\114\245\354\000\311\223\100\337\304\306\256\043\270
\034\132\244\060\015\006\011\052\206\110\206\367\015\001\001\013
\005\000\060\157\061\013\060\011\006\003\125\004\006\023\002\110
\113\061\022\060\020\006\003\125\004\010\023\011\110\157\156\147
\040\113\157\156\147\061\022\060\020\006\003\125\004\007\023\011
\110\157\156\147\040\113\157\156\147\061\026\060\024\006\003\125
\004\012\023\015\110\157\156\147\153\157\156\147\040\120\157\163
\164\061\040\060\036\006\003\125\004\003\023\027\110\157\156\147
\153\157\156\147\040\120\157\163\164\040\122\157\157\164\040\103
\101\040\063\060\036\027\015\061\067\060\066\060\063\060\062\062
\071\064\066\132\027\015\064\062\060\066\060\063\060\062\062\071
\064\066\132\060\157\061\013\060\011\006\003\125\004\006\023\002
\110\113\061\022\060\020\006\003\125\004\010\023\011\110\157\156
\147\040\113\157\156\147\061\022\060\020\006\003\125\004\007\023
\011\110\157\156\147\040\113\157\156\147\061\026\060\024\006\003
\125\004\012\023\015\110\157\156\147\153\157\156\147\040\120\157
\163\164\061\040\060\036\006\003\125\004\003\023\027\110\157\156
\147\153\157\156\147\040\120\157\163\164\040\122\157\157\164\040
\103\101\040\063\060\202\002\042\060\015\006\011\052\206\110\206
\367\015\001\001\001\005\000\003\202\002\017\000\060\202\002\012
\002\202\002\001\000\263\210\327\352\316\017\040\116\276\346\326
\003\155\356\131\374\302\127\337\051\150\241\203\016\076\150\307
\150\130\234\034\140\113\211\103\014\271\324\025\262\356\301\116
\165\351\265\247\357\345\351\065\231\344\314\034\347\113\137\215
\063\060\040\063\123\331\246\273\325\076\023\216\351\037\207\111
\255\120\055\120\312\030\276\001\130\242\023\160\226\273\211\210
\126\200\134\370\275\054\074\341\114\127\210\273\323\271\225\357
\313\307\366\332\061\164\050\246\346\124\211\365\101\061\312\345
\046\032\315\202\340\160\332\073\051\273\325\003\365\231\272\125
\365\144\321\140\016\263\211\111\270\212\057\005\322\204\105\050
\174\217\150\120\022\170\374\013\265\123\313\302\230\034\204\243
\236\260\276\043\244\332\334\310\053\036\332\156\105\036\211\230
\332\371\000\056\006\351\014\073\160\325\120\045\210\231\313\315
\163\140\367\325\377\065\147\305\241\274\136\253\315\112\270\105
\353\310\150\036\015\015\024\106\022\343\322\144\142\212\102\230
\274\264\306\010\010\370\375\250\114\144\234\166\001\275\057\251

\154\063\017\330\077\050\270\074\151\001\102\206\176\151\301\311
\006\312\345\172\106\145\351\302\326\120\101\056\077\267\344\355
\154\327\277\046\001\021\242\026\051\112\153\064\006\220\354\023
\322\266\373\152\166\322\074\355\360\326\055\335\341\025\354\243
\233\057\054\311\076\053\344\151\073\377\162\045\261\066\206\133
\307\177\153\213\125\033\112\305\040\141\075\256\313\120\341\010
\072\276\260\217\143\101\123\060\010\131\074\230\035\167\272\143
\221\172\312\020\120\140\277\360\327\274\225\207\217\227\305\376
\227\152\001\224\243\174\133\205\035\052\071\072\320\124\241\321
\071\161\235\375\041\371\265\173\360\342\340\002\217\156\226\044
\045\054\240\036\054\250\304\211\247\357\355\231\006\057\266\012
\114\117\333\242\314\067\032\257\107\205\055\212\137\304\064\064
\114\000\375\030\223\147\023\321\067\346\110\264\213\006\305\127
\173\031\206\012\171\313\000\311\122\257\102\377\067\217\341\243
\036\172\075\120\253\143\006\347\025\265\077\266\105\067\224\067
\261\176\362\110\303\177\305\165\376\227\215\105\217\032\247\032
\162\050\032\100\017\002\003\001\000\001\243\143\060\141\060\017
\006\003\125\035\023\001\001\377\004\005\060\003\001\001\377\060
\016\006\003\125\035\017\001\001\377\004\004\003\002\001\006\060
\037\006\003\125\035\043\004\030\060\026\200\024\027\235\315\036
\213\326\071\053\160\323\134\324\240\270\037\260\000\374\305\141
\060\035\006\003\125\035\016\004\026\004\024\027\235\315\036\213
\326\071\053\160\323\134\324\240\270\037\260\000\374\305\141\060
\015\006\011\052\206\110\206\367\015\001\001\013\005\000\003\202
\002\001\000\126\325\173\156\346\042\001\322\102\233\030\325\016
\327\146\043\134\343\376\240\307\222\322\351\224\255\113\242\306
\354\022\174\164\325\110\322\131\024\231\300\353\271\321\353\364
\110\060\133\255\247\127\163\231\251\323\345\267\321\056\131\044
\130\334\150\056\056\142\330\152\344\160\013\055\040\120\040\244
\062\225\321\000\230\273\323\375\367\062\362\111\256\306\172\340
\107\276\156\316\313\243\162\072\055\151\135\313\310\350\105\071
\324\372\102\301\021\114\167\135\222\373\152\377\130\104\345\353
\201\236\257\240\231\255\276\251\001\146\313\070\035\074\337\103
\037\364\115\156\264\272\027\106\374\175\375\207\201\171\152\015
\063\017\372\057\370\024\271\200\263\135\115\252\227\341\371\344
\030\305\370\325\070\214\046\074\375\362\050\342\356\132\111\210
\054\337\171\075\216\236\220\074\275\101\112\072\335\133\366\232
\264\316\077\045\060\177\062\175\242\003\224\320\334\172\241\122
\336\156\223\215\030\046\375\125\254\275\217\233\322\317\257\347
\206\054\313\037\011\157\243\157\251\204\324\163\277\115\241\164
\033\116\043\140\362\314\016\252\177\244\234\114\045\250\262\146
\073\070\377\331\224\060\366\162\204\276\150\125\020\017\306\163
\054\026\151\223\007\376\261\105\355\273\242\125\152\260\332\265
\112\002\045\047\205\327\267\267\206\104\026\211\154\200\053\076
\227\251\234\325\176\125\114\306\336\105\020\034\352\351\073\237
\003\123\356\356\172\001\002\026\170\324\350\302\276\106\166\210
\023\077\042\273\110\022\035\122\000\264\002\176\041\032\036\234
\045\364\363\075\136\036\322\034\371\263\055\266\367\067\134\306

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\313\041\116\260\367\231\107\030\205\301\053\272\125\256\006\352
\320\007\262\334\253\320\202\226\165\316\322\120\376\231\347\317
\057\237\347\166\321\141\052\373\041\273\061\320\252\237\107\244
\262\042\312\026\072\120\127\304\133\103\147\305\145\142\003\111
\001\353\103\331\330\370\236\255\317\261\143\016\105\364\240\132
\054\233\055\305\246\300\255\250\107\364\047\114\070\015\056\033
\111\073\122\364\350\210\203\053\124\050\324\362\065\122\264\062
\203\142\151\144\014\221\234\237\227\352\164\026\375\037\021\006
\232\233\364
```

END

CKA_NSS_MOZILLA_CA_POLICY

CK_BBOOL CK_TRUE

CKA_NSS_SERVER_DISTRUST_AFTER CK_BBOOL CK_FALSE

CKA_NSS_EMAIL_DISTRUST_AFTER CK_BBOOL CK_FALSE

Trust for "Hongkong Post Root CA 3"

Issuer: CN=Hongkong Post Root CA 3,O=Hongkong Post,L=Hong Kong,ST=Hong Kong,C=HK

Serial Number:08:16:5f:8a:4c:a5:ec:00:c9:93:40:df:c4:c6:ae:23:b8:1c:5a:a4

Subject: CN=Hongkong Post Root CA 3,O=Hongkong Post,L=Hong Kong,ST=Hong Kong,C=HK

Not Valid Before: Sat Jun 03 02:29:46 2017

Not Valid After : Tue Jun 03 02:29:46 2042

Fingerprint (SHA-256):

5A:2F:C0:3F:0C:83:B0:90:BB:FA:40:60:4B:09:88:44:6C:76:36:18:3D:F9:84:6E:17:10:1A:44:7F:B8:EF:D6

#

Fingerprint (SHA1): 58:A2:D0:EC:20:52:81:5B:C1:F3:F8:64:02:24:4E:C2:8E:02:4B:02

CKA_CLASS CK_OBJECT_CLASS CKO_NSS_TRUST

CKA_TOKEN CK_BBOOL CK_TRUE

CKA_PRIVATE CK_BBOOL CK_FALSE

CKA_MODIFIABLE CK_BBOOL CK_FALSE

CKA_LABEL UTF8 "Hongkong Post Root CA 3"

CKA_CERT_SHA1_HASH MULTILINE_OCTAL

```
\130\242\320\354\040\122\201\133\301\363\370\144\002\044\116\302
\216\002\113\002
```

END

CKA_CERT_MD5_HASH MULTILINE_OCTAL

```
\021\374\237\275\163\060\002\212\375\077\363\130\271\313\040\360
```

END

CKA_ISSUER MULTILINE_OCTAL

```
\060\157\061\013\060\011\006\003\125\004\006\023\002\110\113\061
\022\060\020\006\003\125\004\010\023\011\110\157\156\147\040\113
\157\156\147\061\022\060\020\006\003\125\004\007\023\011\110\157
\156\147\040\113\157\156\147\061\026\060\024\006\003\125\004\012
\023\015\110\157\156\147\153\157\156\147\040\120\157\163\164\061
\040\060\036\006\003\125\004\003\023\027\110\157\156\147\153\157
\156\147\040\120\157\163\164\040\122\157\157\164\040\103\101\040
\063
```

END

CKA_SERIAL_NUMBER MULTILINE_OCTAL

```

\002\024\010\026\137\212\114\245\354\000\311\223\100\337\304\306
\256\043\270\034\132\244
END
CKA_TRUST_SERVER_AUTH
CK_TRUST CKT_NSS_TRUSTED_DELEGATOR
CKA_TRUST_EMAIL_PROTECTION CK_TRUST CKT_NSS_MUST_VERIFY_TRUST
CKA_TRUST_CODE_SIGNING CK_TRUST CKT_NSS_MUST_VERIFY_TRUST
CKA_TRUST_STEP_UP_APPROVED CK_BBOOL CK_FALSE

#
# Certificate "Entrust Root Certification Authority - G4"
#
# Issuer: CN=Entrust Root Certification Authority - G4,OU="(c) 2015 Entrust, Inc. - for authorized use
only",OU=See www.entrust.net/legal-terms,O="Entrust, Inc.",C=US
# Serial Number:00:d9:b5:43:7f:af:a9:39:0f:00:00:00:00:55:65:ad:58
# Subject: CN=Entrust Root Certification Authority - G4,OU="(c) 2015 Entrust, Inc. - for authorized use
only",OU=See www.entrust.net/legal-terms,O="Entrust, Inc.",C=US
# Not Valid Before: Wed May 27 11:11:16 2015
# Not Valid After : Sun Dec 27 11:41:16 2037
# Fingerprint (SHA-256):
DB:35:17:D1:F6:73:2A:2D:5A:B9:7C:53:3E:C7:07:79:EE:32:70:A6:2F:B4:AC:42:38:37:24:60:E6:F0:1E:88
#
Fingerprint (SHA1): 14:88:4E:86:26:37:B0:26:AF:59:62:5C:40:77:EC:35:29:BA:96:01
CKA_CLASS CK_OBJECT_CLASS CKO_CERTIFICATE
CKA_TOKEN CK_BBOOL CK_TRUE
CKA_PRIVATE CK_BBOOL CK_FALSE
CKA_MODIFIABLE CK_BBOOL CK_FALSE
CKA_LABEL UTF8 "Entrust Root Certification Authority - G4"
CKA_CERTIFICATE_TYPE CK_CERTIFICATE_TYPE CKC_X_509
CKA_SUBJECT MULTILINE_OCTAL
\060\201\276\061\013\060\011\006\003\125\004\006\023\002\125\123
\061\026\060\024\006\003\125\004\012\023\015\105\156\164\162\165
\163\164\054\040\111\156\143\056\061\050\060\046\006\003\125\004
\013\023\037\123\145\145\040\167\167\167\056\145\156\164\162\165
\163\164\056\156\145\164\057\154\145\147\141\154\055\164\145\162
\155\163\061\071\060\067\006\003\125\004\013\023\060\050\143\051
\040\062\060\061\065\040\105\156\164\162\165\163\164\054\040\111
\156\143\056\040\055\040\146\157\162\040\141\165\164\150\157\162
\151\172\145\144\040\165\163\145\040\157\156\154\171\061\062\060
\060\006\003\125\004\003\023\051\105\156\164\162\165\163\164\040
\122\157\157\164\040\103\145\162\164\151\146\151\143\141\164\151
\157\156\040\101\165\164\150\157\162\151\164\171\040\055\040\107
\064
END
CKA_ID
UTF8 "0"
CKA_ISSUER MULTILINE_OCTAL
\060\201\276\061\013\060\011\006\003\125\004\006\023\002\125\123

```

\061\026\060\024\006\003\125\004\012\023\015\105\156\164\162\165
\163\164\054\040\111\156\143\056\061\050\060\046\006\003\125\004
\013\023\037\123\145\145\040\167\167\167\056\145\156\164\162\165
\163\164\056\156\145\164\057\154\145\147\141\154\055\164\145\162
\155\163\061\071\060\067\006\003\125\004\013\023\060\050\143\051
\040\062\060\061\065\040\105\156\164\162\165\163\164\054\040\111
\156\143\056\040\055\040\146\157\162\040\141\165\164\150\157\162
\151\172\145\144\040\165\163\145\040\157\156\154\171\061\062\060
\060\006\003\125\004\003\023\051\105\156\164\162\165\163\164\040
\122\157\157\164\040\103\145\162\164\151\146\151\143\141\164\151
\157\156\040\101\165\164\150\157\162\151\164\171\040\055\040\107
\064

END

CKA_SERIAL_NUMBER MULTILINE_OCTAL

\002\021\000\331\265\103\177\257\251\071\017\000\000\000\000\125
\145\255\130

END

CKA_VALUE

MULTILINE_OCTAL

\060\202\006\113\060\202\004\063\240\003\002\001\002\002\021\000
\331\265\103\177\257\251\071\017\000\000\000\000\125\145\255\130
\060\015\006\011\052\206\110\206\367\015\001\001\013\005\000\060
\201\276\061\013\060\011\006\003\125\004\006\023\002\125\123\061
\026\060\024\006\003\125\004\012\023\015\105\156\164\162\165\163
\164\054\040\111\156\143\056\061\050\060\046\006\003\125\004\013
\023\037\123\145\145\040\167\167\167\056\145\156\164\162\165\163
\164\056\156\145\164\057\154\145\147\141\154\055\164\145\162\155
\163\061\071\060\067\006\003\125\004\013\023\060\050\143\051\040
\062\060\061\065\040\105\156\164\162\165\163\164\054\040\111\156
\143\056\040\055\040\146\157\162\040\141\165\164\150\157\162\151
\172\145\144\040\165\163\145\040\157\156\154\171\061\062\060\060
\006\003\125\004\003\023\051\105\156\164\162\165\163\164\040\122
\157\157\164\040\103\145\162\164\151\146\151\143\141\164\151\157
\156\040\101\165\164\150\157\162\151\164\171\040\055\040\107\064
\060\036\027\015\061\065\060\065\062\067\061\061\061\061\066
\132\027\015\063\067\061\062\062\067\061\061\064\061\061\066\132
\060\201\276\061\013\060\011\006\003\125\004\006\023\002\125\123
\061\026\060\024\006\003\125\004\012\023\015\105\156\164\162\165
\163\164\054\040\111\156\143\056\061\050\060\046\006\003\125\004
\013\023\037\123\145\145\040\167\167\167\056\145\156\164\162\165
\163\164\056\156\145\164\057\154\145\147\141\154\055\164\145\162
\155\163\061\071\060\067\006\003\125\004\013\023\060\050\143\051
\040\062\060\061\065\040\105\156\164\162\165\163\164\054\040\111
\156\143\056\040\055\040\146\157\162\040\141\165\164\150\157\162
\151\172\145\144\040\165\163\145\040\157\156\154\171\061\062\060
\060\006\003\125\004\003\023\051\105\156\164\162\165\163\164\040
\122\157\157\164\040\103\145\162\164\151\146\151\143\141\164\151
\157\156\040\101\165\164\150\157\162\151\164\171\040\055\040\107

\064\060\202\002\042\060\015\006\011\052\206\110\206\367\015\001
\001\001\005\000\003\202\002\017\000\060\202\002\012\002\202\002
\001\000\261\354\054\102\356\342\321\060\377\245\222\107\342\055
\303\272\144\227\155\312\367\015\265\131\301\263\313\250\150\031
\330\257\204\155\060\160\135\176\363\056\322\123\231\341\376\037
\136\331\110\257\135\023\215\333\377\143\063\115\323\000\002\274
\304\370\321\006\010\224\171\130\212\025\336\051\263\375\375\304
\117\350\252\342\240\073\171\315\277\153\103\062\335\331\164\020
\271\367\364\150\324\273\320\207\325\252\113\212\052\157\052\004
\265\262\246\307\240\172\346\110\253\322\321\131\314\326\176\043
\346\227\154\360\102\345\334\121\113\025\101\355\111\112\311\336
\020\227\326\166\301\357\245\265\066\024\227\065\330\170\042\065
\122\357\103\275\333\047\333\141\126\202\064\334\313\210\140\014
\013\132\345\054\001\306\124\257\327\252\301\020\173\322\005\132
\270\100\236\206\247\303\220\206\002\126\122\011\172\234\322\047
\202\123\112\145\122\152\365\074\347\250\362\234\257\213\275\323
\016\324\324\136\156\207\236\152\075\105\035\321\135\033\364\351
\012\254\140\231\373\211\264\377\230\054\317\174\035\351\002\252
\004\232\036\270\334\210\156\045\263\154\146\367\074\220\363\127
\301\263\057\365\155\362\373\312\241\370\051\235\106\213\263\152
\366\346\147\007\276\054\147\012\052\037\132\262\076\127\304\323
\041\041\143\145\122\221\033\261\231\216\171\176\346\353\215\000
\331\132\252\352\163\350\244\202\002\107\226\376\133\216\124\141
\243\353\057\113\060\260\213\043\165\162\174\041\074\310\366\361
\164\324\034\173\243\005\125\356\273\115\073\062\276\232\167\146
\236\254\151\220\042\007\037\141\072\226\276\345\232\117\314\005
\074\050\131\323\301\014\124\250\131\141\275\310\162\114\350\334
\237\207\177\275\234\110\066\136\225\243\016\271\070\044\125\374
\165\146\353\002\343\010\064\051\112\306\343\053\057\063\240\332
\243\206\245\022\227\375\200\053\332\024\102\343\222\275\076\362
\135\136\147\164\056\034\210\107\051\064\137\342\062\250\234\045
\067\214\272\230\000\227\213\111\226\036\375\045\212\254\334\332
\330\135\164\156\146\260\377\104\337\241\030\306\276\110\057\067
\224\170\370\225\112\077\177\023\136\135\131\375\164\206\103\143
\163\111\002\003\001\000\001\243\102\060\100\060\017\006\003\125
\035\023\001\001\377\004\005\060\003\001\001\377\060\016\006\003
\125\035\017\001\001\377\004\004\003\002\001\006\060\035\006\003
\125\035\016\004\026\004\024\237\070\304\126\043\303\071\350\240
\161\154\350\124\114\344\350\072\261\277\147\060\015\006\011\052
\206\110\206\367\015\001\001\013\005\000\003\202\002\001\000\022
\345\102\246\173\213\017\014\344\106\245\266\140\100\207\214\045
\176\255\270\150\056\133\306\100\166\074\003\370\311\131\364\363
\253\142\316\020\215\264\132\144\214\150\300\260\162\103\064\322
\033\013\366\054\123\322\312\220\113\206\146\374\252\203\042\364
\213\032\157\046\110\254\166\167\010\277\305\230\134\364\046\211
\236\173\303\271\144\062\001\177\323\303\335\130\155\354\261\253
\204\125\164\167\204\004\047\122\153\206\114\316\335\271\145\377
\326\306\136\237\232\020\231\113\165\152\376\152\351\227\040\344

\344\166\172\306\320\044\252\220\315\040\220\272\107\144\373\177
\007\263\123\170\265\012\142\362\163\103\316\101\053\201\152\056
\205\026\224\123\324\153\137\162\042\253\121\055\102\325\000\234
\231\277\336\273\224\073\127\375\232\365\206\313\126\073\133\210
\001\345\174\050\113\003\371\111\203\174\262\177\174\343\355\216
\241\177\140\123\216\125\235\120\064\022\017\267\227\173\154\207
\112\104\347\365\155\354\200\067\360\130\031\156\112\150\166\360
\037\222\344\352\265\222\323\141\121\020\013\255\247\331\137\307
\137\334\037\243\134\214\241\176\233\267\236\323\126\157\146\136
\007\226\040\355\013\164\373\146\116\213\021\025\351\201\111\176
\157\260\324\120\177\042\327\137\145\002\015\246\364\205\036\330
\256\006\113\112\247\322\061\146\302\370\316\345\010\246\244\002
\226\104\150\127\304\325\063\317\031\057\024\304\224\034\173\244
\331\360\237\016\261\200\342\321\236\021\144\251\210\021\072\166
\202\345\142\302\200\330\244\203\355\223\357\174\057\220\260\062
\114\226\025\150\110\122\324\231\010\300\044\350\034\343\263\245
\041\016\222\300\220\037\317\040\137\312\073\070\307\267\155\072
\363\346\104\270\016\061\153\210\216\160\353\234\027\122\250\101
\224\056\207\266\347\246\022\305\165\337\133\300\012\156\173\244
\344\136\206\371\066\224\337\167\303\351\015\300\071\361\171\273
\106\216\253\103\131\047\267\040\273\043\351\126\100\041\354\061
\075\145\252\103\362\075\337\160\104\341\272\115\046\020\073\230
\237\363\310\216\033\070\126\041\152\121\223\323\221\312\106\332
\211\267\075\123\203\054\010\037\213\217\123\335\377\254\037

END

CKA_NSS_MOZILLA_CA_POLICY

CK_BBOOL CK_TRUE

Trust for "Entrust Root Certification Authority - G4"

Issuer: CN=Entrust Root Certification Authority - G4,OU="(c) 2015 Entrust, Inc. - for authorized use only",OU=See www.entrust.net/legal-terms,O="Entrust, Inc.",C=US

Serial Number:00:d9:b5:43:7f:af:a9:39:0f:00:00:00:00:55:65:ad:58

#

Subject: CN=Entrust Root Certification Authority - G4,OU="(c) 2015 Entrust, Inc. - for authorized use only",OU=See www.entrust.net/legal-terms,O="Entrust, Inc.",C=US

Not Valid Before: Wed May 27 11:11:16 2015

Not Valid After : Sun Dec 27 11:41:16 2037

Fingerprint (SHA-256):

DB:35:17:D1:F6:73:2A:2D:5A:B9:7C:53:3E:C7:07:79:EE:32:70:A6:2F:B4:AC:42:38:37:24:60:E6:F0:1E:88

Fingerprint (SHA1): 14:88:4E:86:26:37:B0:26:AF:59:62:5C:40:77:EC:35:29:BA:96:01

CKA_CLASS CK_OBJECT_CLASS CKO_NSS_TRUST

CKA_TOKEN CK_BBOOL CK_TRUE

CKA_PRIVATE CK_BBOOL CK_FALSE

CKA_MODIFIABLE CK_BBOOL CK_FALSE

CKA_LABEL UTF8 "Entrust Root Certification Authority - G4"

CKA_CERT_SHA1_HASH MULTILINE OCTAL

\024\210\116\206\046\067\260\046\257\131\142\134\100\167\354\065

\051\272\226\001

```

END
CKA_CERT_MD5_HASH MULTILINE_OCTAL
\211\123\361\203\043\267\174\216\005\361\214\161\070\116\037\210
END
CKA_ISSUER MULTILINE_OCTAL
\060\201\276\061\013\060\011\006\003\125\004\006\023\002\125\123
\061\026\060\024\006\003\125\004\012\023\015\105\156\164\162\165
\163\164\054\040\111\156\143\056\061\050\060\046\006\003\125\004
\013\023\037\123\145\145\040\167\167\167\056\145\156\164\162\165
\163\164\056\156\145\164\057\154\145\147\141\154\055\164\145\162
\155\163\061\071\060\067\006\003\125\004\013\023\060\050\143\051
\040\062\060\061\065\040\105\156\164\162\165\163\164\054\040\111
\156\143\056\040\055\040\146\157\162\040\141\165\164\150\157\162
\151\172\145\144\040\165\163\145\040\157\156\154\171\061\062\060
\060\006\003\125\004\003\023\051\105\156\164\162\165\163\164\040
\122\157\157\164\040\103\145\162\164\151\146\151\143\141\164\151
\157\156\040\101\165\164\150\157\162\151\164\171\040\055\040\107
\064
END
CKA_SERIAL_NUMBER
MULTILINE_OCTAL
\002\021\000\331\265\103\177\257\251\071\017\000\000\000\000\125
\145\255\130
END
CKA_TRUST_SERVER_AUTH CK_TRUST CKT_NSS_TRUSTED_DELEGATOR
CKA_TRUST_EMAIL_PROTECTION CK_TRUST CKT_NSS_TRUSTED_DELEGATOR
CKA_TRUST_CODE_SIGNING CK_TRUST CKT_NSS_MUST_VERIFY_TRUST
CKA_TRUST_STEP_UP_APPROVED
CK_BBOOL CK_FALSE

#
# Certificate "Microsoft ECC Root Certificate Authority 2017"
#
# Issuer: CN=Microsoft ECC Root Certificate Authority 2017,O=Microsoft Corporation,C=US
# Serial Number:66:f2:3d:af:87:de:8b:b1:4a:ea:0c:57:31:01:c2:ec
# Subject: CN=Microsoft ECC Root Certificate Authority 2017,O=Microsoft Corporation,C=US
# Not Valid Before: Wed Dec 18 23:06:45 2019
# Not Valid After : Fri Jul 18 23:16:04 2042
# Fingerprint (SHA-256):
35:8D:F3:9D:76:4A:F9:E1:B7:66:E9:C9:72:DF:35:2E:E1:5C:FA:C2:27:AF:6A:D1:D7:0E:8E:4A:6E:DC:BA:02
# Fingerprint (SHA1): 99:9A:64:C3:7F:F4:7D:9F:AB:95:F1:47:69:89:14:60:EE:C4:C3:C5
CKA_CLASS CK_OBJECT_CLASS CKO_CERTIFICATE
CKA_TOKEN CK_BBOOL CK_TRUE
CKA_PRIVATE CK_BBOOL CK_FALSE
CKA_MODIFIABLE CK_BBOOL CK_FALSE
CKA_LABEL UTF8 "Microsoft ECC Root Certificate Authority 2017"
CKA_CERTIFICATE_TYPE CK_CERTIFICATE_TYPE CKC_X_509
CKA_SUBJECT MULTILINE_OCTAL

```

\060\145\061\013\060\011\006\003\125\004\006\023\002\125\123\061
\036\060\034\006\003\125\004\012\023\025\115\151\143\162\157\163
\157\146\164\040\103\157\162\160\157\162\141\164\151\157\156\061
\066\060\064\006\003\125\004\003\023\055\115\151\143\162\157\163
\157\146\164\040\105\103\103\040\122\157\157\164\040\103\145\162
\164\151\146\151\143\141\164\145\040\101\165\164\150\157\162\151
\164\171\040\062\060\061\067

END

CKA_ID

UTF8 "0"

CKA_ISSUER MULTILINE_OCTAL

\060\145\061\013\060\011\006\003\125\004\006\023\002\125\123\061
\036\060\034\006\003\125\004\012\023\025\115\151\143\162\157\163
\157\146\164\040\103\157\162\160\157\162\141\164\151\157\156\061
\066\060\064\006\003\125\004\003\023\055\115\151\143\162\157\163
\157\146\164\040\105\103\103\040\122\157\157\164\040\103\145\162
\164\151\146\151\143\141\164\145\040\101\165\164\150\157\162\151
\164\171\040\062\060\061\067

END

CKA_SERIAL_NUMBER MULTILINE_OCTAL

\002\020\146\362\075\257\207\336\213\261\112\352\014\127\061\001
\302\354

END

CKA_VALUE MULTILINE_OCTAL

\060\202\002\131\060\202\001\337\240\003\002\001\002\002\020\146
\362\075\257\207\336\213\261\112\352\014\127\061\001\302\354\060
\012\006\010\052\206\110\316\075\004\003\003\060\145\061\013\060
\011\006\003\125\004\006\023\002\125\123\061\036\060\034\006\003
\125\004\012\023\025\115\151\143\162\157\163\157\146\164\040\103
\157\162\160\157\162\141\164\151\157\156\061\066\060\064\006\003
\125\004\003\023\055\115\151\143\162\157\163\157\146\164\040\105
\103\103\040\122\157\157\164\040\103\145\162\164\151\146\151\143
\141\164\145\040\101\165\164\150\157\162\151\164\171\040\062\060
\061\067\060\036\027\015\061\071\061\062\061\070\062\063\060\066
\064\065\132\027\015\064\062\060\067\061\070\062\063\061\066\060
\064\132\060\145\061\013\060\011\006\003\125\004\006\023\002\125
\123\061\036\060\034\006\003\125\004\012\023\025\115\151\143\162
\157\163\157\146\164\040\103\157\162\160\157\162\141\164\151\157
\156\061\066\060\064\006\003\125\004\003\023\055\115\151\143\162
\157\163\157\146\164\040\105\103\103\040\122\157\157\164\040\103
\145\162\164\151\146\151\143\141\164\145\040\101\165\164\150\157
\162\151\164\171\040\062\060\061\067\060\166\060\020\006\007\052
\206\110\316\075\002\001\006\005\053\201\004\000\042\003\142\000
\004\324\274\075\002\102\165\101\023\043\315\200\004\206\002\121
\057\152\250\201\142\013\145\314\366\312\235\036\157\112\146\121
\242\003\331\235\221\372\266\026\261\214\156\336\174\315\333\171
\246\057\316\273\316\161\057\345\245\253\050\354\143\004\146\231
\370\372\362\223\020\005\341\201\050\102\343\306\150\364\346\033

\204\140\112\211\257\355\171\017\073\316\361\366\104\365\001\170
\300\243\124\060\122\060\016\006\003\125\035\017\001\001\377\004
\004\003\002\001\206\060\017\006\003\125\035\023\001\001\377\004
\005\060\003\001\001\377\060\035\006\003\125\035\016\004\026\004
\024\310\313\231\162\160\122\014\370\346\276\262\004\127\051\052
\317\102\020\355\065\060\020\006\011\053\006\001\004\001\202\067
\025\001\004\003\002\001\000\060\012\006\010\052\206\110\316\075
\004\003\003\003\150\000\060\145\002\060\130\362\115\352\014\371
\137\136\356\140\051\313\072\362\333\326\062\204\031\077\174\325
\057\302\261\314\223\256\120\273\011\062\306\306\355\176\311\066
\224\022\344\150\205\006\242\033\320\057\002\061\000\231\351\026
\264\016\372\126\110\324\244\060\026\221\170\333\124\214\145\001
\212\347\120\146\302\061\267\071\272\270\032\042\007\116\374\153
\124\026\040\377\053\265\347\114\014\115\246\117\163

END

CKA_NSS_MOZILLA_CA_POLICY

CK_BBOOL CK_TRUE

CKA_NSS_SERVER_DISTRUST_AFTER CK_BBOOL CK_FALSE

CKA_NSS_EMAIL_DISTRUST_AFTER CK_BBOOL CK_FALSE

Trust for "Microsoft ECC Root Certificate Authority 2017"

Issuer: CN=Microsoft ECC Root Certificate Authority 2017,O=Microsoft Corporation,C=US

Serial Number:66:f2:3d:af:87:de:8b:b1:4a:ea:0c:57:31:01:c2:ec

Subject: CN=Microsoft ECC Root Certificate Authority 2017,O=Microsoft Corporation,C=US

Not Valid Before: Wed Dec 18 23:06:45 2019

Not Valid After : Fri Jul 18 23:16:04 2042

Fingerprint (SHA-256):

35:8D:F3:9D:76:4A:F9:E1:B7:66:E9:C9:72:DF:35:2E:E1:5C:FA:C2:27:AF:6A:D1:D7:0E:8E:4A:6E:DC:BA:02

#

Fingerprint (SHA1): 99:9A:64:C3:7F:F4:7D:9F:AB:95:F1:47:69:89:14:60:EE:C4:C3:C5

CKA_CLASS CK_OBJECT_CLASS CKO_NSS_TRUST

CKA_TOKEN CK_BBOOL CK_TRUE

CKA_PRIVATE CK_BBOOL CK_FALSE

CKA_MODIFIABLE CK_BBOOL CK_FALSE

CKA_LABEL UTF8 "Microsoft ECC Root Certificate Authority 2017"

CKA_CERT_SHA1_HASH MULTILINE_OCTAL

\231\232\144\303\177\364\175\237\253\225\361\107\151\211\024\140
\356\304\303\305

END

CKA_CERT_MD5_HASH MULTILINE_OCTAL

\335\241\003\346\112\223\020\321\277\360\031\102\313\376\355\147

END

CKA_ISSUER MULTILINE_OCTAL

\060\145\061\013\060\011\006\003\125\004\006\023\002\125\123\061
\036\060\034\006\003\125\004\012\023\025\115\151\143\162\157\163
\157\146\164\040\103\157\162\160\157\162\141\164\151\157\156\061
\066\060\064\006\003\125\004\003\023\055\115\151\143\162\157\163
\157\146\164\040\105\103\103\040\122\157\157\164\040\103\145\162

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\164\151\146\151\143\141\164\145\040\101\165\164\150\157\162\151
\164\171\040\062\060\061\067
END
CKA_SERIAL_NUMBER
MULTILINE_OCTAL
\002\020\146\362\075\257\207\336\213\261\112\352\014\127\061\001
\302\354
END
CKA_TRUST_SERVER_AUTH CK_TRUST CKT_NSS_TRUSTED_DELEGATOR
CKA_TRUST_EMAIL_PROTECTION CK_TRUST CKT_NSS_MUST_VERIFY_TRUST
CKA_TRUST_CODE_SIGNING CK_TRUST CKT_NSS_MUST_VERIFY_TRUST
CKA_TRUST_STEP_UP_APPROVED CK_BBOOL CK_FALSE

#
# Certificate "Microsoft RSA Root Certificate Authority 2017"
#
# Issuer: CN=Microsoft RSA Root Certificate Authority 2017,O=Microsoft Corporation,C=US
# Serial Number:1e:d3:97:09:5f:d8:b4:b3:47:70:1e:aa:be:7f:45:b3
# Subject: CN=Microsoft RSA Root Certificate Authority 2017,O=Microsoft Corporation,C=US
# Not Valid Before: Wed Dec 18 22:51:22 2019
# Not Valid After : Fri Jul 18 23:00:23 2042
# Fingerprint (SHA-256):
C7:41:F7:0F:4B:2A:8D:88:BF:2E:71:C1:41:22:EF:53:EF:10:EB:A0:CF:A5:E6:4C:FA:20:F4:18:85:30:73:E0
# Fingerprint (SHA1): 73:A5:E6:4A:3B:FF:83:16:FF:0E:DC:CC:61:8A:90:6E:4E:AE:4D:74
CKA_CLASS CK_OBJECT_CLASS CKO_CERTIFICATE
CKA_TOKEN CK_BBOOL
CK_TRUE
CKA_PRIVATE CK_BBOOL CK_FALSE
CKA_MODIFIABLE CK_BBOOL CK_FALSE
CKA_LABEL UTF8 "Microsoft RSA Root Certificate Authority 2017"
CKA_CERTIFICATE_TYPE CK_CERTIFICATE_TYPE CKC_X_509
CKA_SUBJECT MULTILINE_OCTAL
\060\145\061\013\060\011\006\003\125\004\006\023\002\125\123\061
\036\060\034\006\003\125\004\012\023\025\115\151\143\162\157\163
\157\146\164\040\103\157\162\160\157\162\141\164\151\157\156\061
\066\060\064\006\003\125\004\003\023\055\115\151\143\162\157\163
\157\146\164\040\122\123\101\040\122\157\157\164\040\103\145\162
\164\151\146\151\143\141\164\145\040\101\165\164\150\157\162\151
\164\171\040\062\060\061\067
END
CKA_ID UTF8 "0"
CKA_ISSUER MULTILINE_OCTAL
\060\145\061\013\060\011\006\003\125\004\006\023\002\125\123\061
\036\060\034\006\003\125\004\012\023\025\115\151\143\162\157\163
\157\146\164\040\103\157\162\160\157\162\141\164\151\157\156\061
\066\060\064\006\003\125\004\003\023\055\115\151\143\162\157\163
\157\146\164\040\122\123\101\040\122\157\157\164\040\103\145\162
\164\151\146\151\143\141\164\145\040\101\165\164\150\157\162\151

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\164\171\040\062\060\061\067
END
CKA_SERIAL_NUMBER
MULTILINE_OCTAL
\002\020\036\323\227\011\137\330\264\263\107\160\036\252\276\177
\105\263
END
CKA_VALUE MULTILINE_OCTAL
\060\202\005\250\060\202\003\220\240\003\002\001\002\002\020\036
\323\227\011\137\330\264\263\107\160\036\252\276\177\105\263\060
\015\006\011\052\206\110\206\367\015\001\001\014\005\000\060\145
\061\013\060\011\006\003\125\004\006\023\002\125\123\061\036\060
\034\006\003\125\004\012\023\025\115\151\143\162\157\163\157\146
\164\040\103\157\162\160\157\162\141\164\151\157\156\061\066\060
\064\006\003\125\004\003\023\055\115\151\143\162\157\163\157\146
\164\040\122\123\101\040\122\157\157\164\040\103\145\162\164\151
\146\151\143\141\164\145\040\101\165\164\150\157\162\151\164\171
\040\062\060\061\067\060\036\027\015\061\071\061\062\061\070\062
\062\065\061\062\062\132\027\015\064\062\060\067\061\070\062\063
\060\060\062\063\132\060\145\061\013\060\011\006\003\125\004\006
\023\002\125\123\061\036\060\034\006\003\125\004\012\023\025\115
\151\143\162\157\163\157\146\164\040\103\157\162\160\157\162\141
\164\151\157\156\061\066\060\064\006\003\125\004\003\023\055\115
\151\143\162\157\163\157\146\164\040\122\123\101\040\122\157\157
\164\040\103\145\162\164\151\146\151\143\141\164\145\040\101\165
\164\150\157\162\151\164\171\040\062\060\061\067\060\202\002\042
\060\015\006\011\052\206\110\206\367\015\001\001\001\005\000\003
\202\002\017\000\060\202\002\012\002\202\002\001\000\312\133\276
\224\063\214\051\225\221\026\012\225\275\107\142\301\211\363\231
\066\337\106\220\311\245\355\170\152\157\107\221\150\370\047\147
\120\063\035\241\246\373\340\345\103\243\204\002\127\001\135\234
\110\100\202\123\020\274\277\307\073\150\220\266\202\055\345\364
\145\320\314\155\031\314\225\371\173\254\112\224\255\016\336\113
\103\035\207\007\222\023\220\200\203\144\065\071\004\374\345\351
\154\263\266\037\120\224\070\145\120\134\027\106\271\266\205\265
\034\265\027\350\326\105\235\330\262\046\260\312\304\160\112\256
\140\244\335\263\331\354\374\073\325\127\162\274\077\310\311\262
\336\113\153\370\043\154\003\300\005\275\225\307\315\163\073\146
\200\144\343\032\254\056\371\107\005\362\006\266\233\163\365\170
\063\133\307\241\373\047\052\241\264\232\221\214\221\323\072\202
\076\166\100\264\315\122\141\121\160\050\077\305\305\132\362\311
\214\111\273\024\133\115\310\377\147\115\114\022\226\255\365\376
\170\250\227\207\327\375\136\040\200\334\241\113\042\373\324\211
\255\272\316\107\227\107\125\173\217\105\310\147\050\204\225\034
\150\060\357\357\111\340\065\173\144\347\230\260\224\332\115\205
\073\076\125\304\050\257\127\363\236\023\333\106\047\237\036\242
\136\104\203\244\245\312\325\023\263\113\077\304\343\302\346\206
\141\244\122\060\271\172\040\117\157\017\070\123\313\063\014\023

\053\217\326\232\275\052\310\055\261\034\175\113\121\312\107\321
\110\047\162\135\207\353\325\105\346\110\145\235\257\122\220\272
\133\242\030\145\127\022\237\150\271\324\025\153\224\304\151\042
\230\364\063\340\355\371\121\216\101\120\311\064\117\166\220\254
\374\070\301\330\341\173\271\343\343\224\341\106\151\313\016\012
\120\153\023\272\254\017\067\132\267\022\265\220\201\036\126\256
\127\042\206\331\311\322\321\327\121\343\253\073\306\125\375\036
\016\323\164\012\321\332\252\352\151\270\227\050\217\110\304\007
\370\122\103\072\364\312\125\065\054\260\246\152\300\234\371\362
\201\341\022\152\300\105\331\147\263\316\377\043\242\211\012\124
\324\024\271\052\250\327\354\371\253\315\045\130\062\171\217\220
\133\230\071\304\010\006\301\254\177\016\075\000\245\002\003\001
\000\001\243\124\060\122\060\016\006\003\125\035\017\001\001\377
\004\004\003\002\001\206\060\017\006\003\125\035\023\001\001\377
\004\005\060\003\001\001\377\060\035\006\003\125\035\016\004\026
\004\024\011\313\131\177\206\262\160\217\032\303\071\343\300\331
\351\277\273\115\262\043\060\020\006\011\053\006\001\004\001\202
\067\025\001\004\003\002\001\000\060\015\006\011\052\206\110\206
\367\015\001\001\014\005\000\003\202\002\001\000\254\257\076\135
\302\021\226\211\216\243\347\222\326\227\025\270\023\242\246\102
\056\002\315\026\005\131\047\312\040\350\272\270\350\032\354\115
\250\227\126\256\145\103\261\217\000\233\122\315\125\315\123\071
\155\142\114\213\015\133\174\056\104\277\203\020\217\363\123\202
\200\303\117\072\307\156\021\077\346\343\026\221\204\373\155\204
\177\064\164\255\211\247\316\271\327\327\237\204\144\222\276\225
\241\255\011\123\063\335\356\012\352\112\121\216\157\125\253\272
\265\224\106\256\214\177\330\242\120\045\145\140\200\106\333\063
\004\256\154\265\230\164\124\045\334\223\344\370\343\125\025\075
\270\155\303\012\244\022\301\151\205\156\337\144\361\123\231\341
\112\165\040\235\225\017\344\326\334\003\361\131\030\350\107\211
\262\127\132\224\266\251\330\027\053\027\111\345\166\313\301\126
\231\072\067\261\377\151\054\221\221\223\341\337\114\243\067\166
\115\241\237\370\155\036\035\323\372\354\373\364\105\035\023\155
\317\367\131\345\042\047\162\053\206\363\127\273\060\355\044\115
\334\175\126\273\243\263\370\064\171\211\301\340\362\002\141\367
\246\374\017\273\034\027\013\256\101\331\174\275\047\243\375\056
\072\321\223\224\261\163\035\044\213\257\133\040\211\255\267\147
\146\171\365\072\306\246\226\063\376\123\222\310\106\261\021\221
\306\231\177\217\311\326\146\061\040\101\020\207\055\014\326\301
\257\064\230\312\144\203\373\023\127\321\301\360\074\172\214\245
\301\375\225\041\240\161\301\223\147\161\022\352\217\210\012\151
\031\144\231\043\126\373\254\052\056\160\276\146\304\014\204\357
\345\213\363\223\001\370\152\220\223\147\113\262\150\243\265\142
\217\351\077\214\172\073\136\017\347\214\270\306\174\357\067\375
\164\342\310\117\063\162\341\224\071\155\275\022\257\276\014\116
\160\174\033\157\215\263\062\223\163\104\026\155\350\364\367\340
\225\200\217\226\135\070\244\364\253\336\012\060\207\223\330\115
\000\161\142\105\047\113\072\102\204\133\177\145\267\147\064\122

\055\234\026\153\252\250\330\173\243\102\114\161\307\014\312\076
\203\344\246\357\267\001\060\136\121\243\171\365\160\151\246\101
\104\017\206\260\054\221\306\075\352\256\017\204
END

CKA_NSS_MOZILLA_CA_POLICY
CK_BBOOL CK_TRUE
CKA_NSS_SERVER_DISTRUST_AFTER CK_BBOOL CK_FALSE
CKA_NSS_EMAIL_DISTRUST_AFTER CK_BBOOL CK_FALSE

Trust for "Microsoft RSA Root Certificate Authority 2017"
Issuer: CN=Microsoft RSA Root Certificate Authority 2017,O=Microsoft Corporation,C=US
Serial Number:1e:d3:97:09:5f:d8:b4:b3:47:70:1e:aa:be:7f:45:b3
Subject: CN=Microsoft RSA Root Certificate Authority 2017,O=Microsoft Corporation,C=US
Not Valid Before: Wed Dec 18 22:51:22 2019
Not Valid After : Fri Jul 18 23:00:23 2042
Fingerprint (SHA-256):
C7:41:F7:0F:4B:2A:8D:88:BF:2E:71:C1:41:22:EF:53:EF:10:EB:A0:CF:A5:E6:4C:FA:20:F4:18:85:30:73:E0
Fingerprint (SHA1): 73:A5:E6:4A:3B:FF:83:16:FF:0E:DC:CC:61:8A:90:6E:4E:AE:4D:74
CKA_CLASS CK_OBJECT_CLASS CKO_NSS_TRUST
CKA_TOKEN CK_BBOOL CK_TRUE
CKA_PRIVATE CK_BBOOL CK_FALSE
CKA_MODIFIABLE CK_BBOOL
CK_FALSE
CKA_LABEL UTF8 "Microsoft RSA Root Certificate Authority 2017"
CKA_CERT_SHA1_HASH MULTILINE_OCTAL
\163\245\346\112\073\377\203\026\377\016\334\314\141\212\220\156
\116\256\115\164
END

CKA_CERT_MD5_HASH MULTILINE_OCTAL
\020\377\000\377\317\311\370\307\172\300\356\065\216\311\017\107
END

CKA_ISSUER MULTILINE_OCTAL
\060\145\061\013\060\011\006\003\125\004\006\023\002\125\123\061
\036\060\034\006\003\125\004\012\023\025\115\151\143\162\157\163
\157\146\164\040\103\157\162\160\157\162\141\164\151\157\156\061
\066\060\064\006\003\125\004\003\023\055\115\151\143\162\157\163
\157\146\164\040\122\123\101\040\122\157\157\164\040\103\145\162
\164\151\146\151\143\141\164\145\040\101\165\164\150\157\162\151
\164\171\040\062\060\061\067
END

CKA_SERIAL_NUMBER MULTILINE_OCTAL
\002\020\036\323\227\011\137\330\264\263\107\160\036\252\276\177
\105\263
END

CKA_TRUST_SERVER_AUTH CK_TRUST CKT_NSS_TRUSTED_DELEGATOR
CKA_TRUST_EMAIL_PROTECTION CK_TRUST CKT_NSS_MUST_VERIFY_TRUST
CKA_TRUST_CODE_SIGNING


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CKA_TRUST CKT_NSS_MUST_VERIFY_TRUST
CKA_TRUST_STEP_UP_APPROVED CK_BBOOL CK_FALSE

#
# Certificate "e-Szigno Root CA 2017"
#
# Issuer: CN=e-Szigno Root CA 2017,OID.2.5.4.97=VATHU-23584497,O=Microsec Ltd.,L=Budapest,C=HU
# Serial Number:01:54:48:ef:21:fd:97:59:0d:f5:04:0a
# Subject: CN=e-Szigno Root CA 2017,OID.2.5.4.97=VATHU-23584497,O=Microsec Ltd.,L=Budapest,C=HU
# Not Valid Before: Tue Aug 22 12:07:06 2017
# Not Valid After : Fri Aug 22 12:07:06 2042
# Fingerprint (SHA-256):
BE:B0:0B:30:83:9B:9B:C3:2C:32:E4:44:79:05:95:06:41:F2:64:21:B1:5E:D0:89:19:8B:51:8A:E2:EA:1B:99
# Fingerprint (SHA1): 89:D4:83:03:4F:9E:9A:48:80:5F:72:37:D4:A9:A6:EF:CB:7C:1F:D1
CKA_CLASS CK_OBJECT_CLASS CKO_CERTIFICATE
CKA_TOKEN CK_BBOOL CK_TRUE
CKA_PRIVATE CK_BBOOL CK_FALSE
CKA_MODIFIABLE CK_BBOOL CK_FALSE
CKA_LABEL UTF8 "e-Szigno Root CA 2017"
CKA_CERTIFICATE_TYPE CK_CERTIFICATE_TYPE CKC_X_509
CKA_SUBJECT MULTILINE_OCTAL
\060\161\061\013\060\011\006\003\125\004\006\023\002\110\125\061
\021\060\017\006\003\125\004\007\014\010\102\165\144\141\160\145
\163\164\061\026\060\024\006\003\125\004\012\014\015\115\151\143
\162\157\163\145\143\040\114\164\144\056\061\027\060\025\006\003
\125\004\141\014\016\126\101\124\110\125\055\062\063\065\070\064
\064\071\067\061\036\060\034\006\003\125\004\003\014\025\145\055
\123\172\151\147\156\157\040\122\157\157\164\040\103\101\040\062
\060\061\067
END
CKA_ID
UTF8 "0"
CKA_ISSUER MULTILINE_OCTAL
\060\161\061\013\060\011\006\003\125\004\006\023\002\110\125\061
\021\060\017\006\003\125\004\007\014\010\102\165\144\141\160\145
\163\164\061\026\060\024\006\003\125\004\012\014\015\115\151\143
\162\157\163\145\143\040\114\164\144\056\061\027\060\025\006\003
\125\004\141\014\016\126\101\124\110\125\055\062\063\065\070\064
\064\071\067\061\036\060\034\006\003\125\004\003\014\025\145\055
\123\172\151\147\156\157\040\122\157\157\164\040\103\101\040\062
\060\061\067
END
CKA_SERIAL_NUMBER MULTILINE_OCTAL
\002\014\001\124\110\357\041\375\227\131\015\365\004\012
END
CKA_VALUE
MULTILINE_OCTAL
\060\202\002\100\060\202\001\345\240\003\002\001\002\002\014\001

```

\124\110\357\041\375\227\131\015\365\004\012\060\012\006\010\052
\206\110\316\075\004\003\002\060\161\061\013\060\011\006\003\125
\004\006\023\002\110\125\061\021\060\017\006\003\125\004\007\014
\010\102\165\144\141\160\145\163\164\061\026\060\024\006\003\125
\004\012\014\015\115\151\143\162\157\163\145\143\040\114\164\144
\056\061\027\060\025\006\003\125\004\141\014\016\126\101\124\110
\125\055\062\063\065\070\064\064\071\067\061\036\060\034\006\003
\125\004\003\014\025\145\055\123\172\151\147\156\157\040\122\157
\157\164\040\103\101\040\062\060\061\067\060\036\027\015\061\067
\060\070\062\062\061\062\060\067\060\066\132\027\015\064\062\060
\070\062\062\061\062\060\067\060\066\132\060\161\061\013\060\011
\006\003\125\004\006\023\002\110\125\061\021\060\017\006\003\125
\004\007\014\010\102\165\144\141\160\145\163\164\061\026\060\024
\006\003\125\004\012\014\015\115\151\143\162\157\163\145\143\040
\114\164\144\056\061\027\060\025\006\003\125\004\141\014\016\126
\101\124\110\125\055\062\063\065\070\064\064\071\067\061\036\060
\034\006\003\125\004\003\014\025\145\055\123\172\151\147\156\157
\040\122\157\157\164\040\103\101\040\062\060\061\067\060\131\060
\023\006\007\052\206\110\316\075\002\001\006\010\052\206\110\316
\075\003\001\007\003\102\000\004\226\334\075\212\330\260\173\157
\306\047\276\104\220\261\263\126\025\173\216\103\044\175\032\204
\131\356\143\150\262\306\136\207\320\025\110\036\250\220\255\275
\123\242\332\336\072\220\246\140\137\150\062\265\206\101\337\207
\133\054\173\305\376\174\172\332\243\143\060\141\060\017\006\003
\125\035\023\001\001\377\004\005\060\003\001\001\377\060\016\006
\003\125\035\017\001\001\377\004\004\003\002\001\006\060\035\006
\003\125\035\016\004\026\004\024\207\021\025\010\321\252\301\170
\014\261\257\316\306\311\220\357\277\060\004\300\060\037\006\003
\125\035\043\004\030\060\026\200\024\207\021\025\010\321\252\301
\170\014\261\257\316\306\311\220\357\277\060\004\300\060\012\006
\010\052\206\110\316\075\004\003\002\003\111\000\060\106\002\041
\000\265\127\335\327\212\125\013\066\341\206\104\372\324\331\150
\215\270\334\043\212\212\015\324\057\175\352\163\354\277\115\154
\250\002\041\000\313\245\264\022\372\347\265\350\317\176\223\374
\363\065\217\157\116\132\174\264\274\116\262\374\162\252\133\131
\371\347\334\061

END

CKA_NSS_Mozilla_CA_POLICY

CK_BBOOL CK_TRUE

CKA_NSS_SERVER_DISTRUST_AFTER CK_BBOOL CK_FALSE

CKA_NSS_EMAIL_DISTRUST_AFTER CK_BBOOL CK_FALSE

Trust for "e-Szigno Root CA 2017"

Issuer: CN=e-Szigno Root CA 2017,OID.2.5.4.97=VATHU-23584497,O=Microsec Ltd.,L=Budapest,C=HU

Serial Number:01:54:48:ef:21:fd:97:59:0d:f5:04:0a

Subject: CN=e-Szigno Root CA 2017,OID.2.5.4.97=VATHU-23584497,O=Microsec Ltd.,L=Budapest,C=HU

Not Valid Before: Tue Aug 22 12:07:06 2017

Not Valid After : Fri Aug 22 12:07:06 2042

```

# Fingerprint (SHA-256):
BE:B0:0B:30:83:9B:9B:C3:2C:32:E4:44:79:05:95:06:41:F2:64:21:B1:5E:D0:89:19:8B:51:8A:E2:EA:1B:99
#
Fingerprint (SHA1): 89:D4:83:03:4F:9E:9A:48:80:5F:72:37:D4:A9:A6:EF:CB:7C:1F:D1
CKA_CLASS CK_OBJECT_CLASS CKO_NSS_TRUST
CKA_TOKEN CK_BBOOL CK_TRUE
CKA_PRIVATE CK_BBOOL CK_FALSE
CKA_MODIFIABLE CK_BBOOL CK_FALSE
CKA_LABEL UTF8 "e-Szigno Root CA 2017"
CKA_CERT_SHA1_HASH MULTILINE_OCTAL
\211\324\203\003\117\236\232\110\200\137\162\067\324\251\246\357
\313\174\037\321
END
CKA_CERT_MD5_HASH MULTILINE_OCTAL
\336\037\366\236\204\256\247\264\041\316\036\130\175\321\204\230
END
CKA_ISSUER MULTILINE_OCTAL
\060\161\061\013\060\011\006\003\125\004\006\023\002\110\125\061
\021\060\017\006\003\125\004\007\014\010\102\165\144\141\160\145
\163\164\061\026\060\024\006\003\125\004\012\014\015\115\151\143
\162\157\163\145\143\040\114\164\144\056\061\027\060\025\006\003
\125\004\141\014\016\126\101\124\110\125\055\062\063\065\070\064
\064\071\067\061\036\060\034\006\003\125\004\003\014\025\145\055
\123\172\151\147\156\157\040\122\157\157\164\040\103\101\040\062
\060\061\067
END
CKA_SERIAL_NUMBER
MULTILINE_OCTAL
\002\014\001\124\110\357\041\375\227\131\015\365\004\012
END
CKA_TRUST_SERVER_AUTH CK_TRUST CKT_NSS_TRUSTED_DELEGATOR
CKA_TRUST_EMAIL_PROTECTION CK_TRUST CKT_NSS_TRUSTED_DELEGATOR
CKA_TRUST_CODE_SIGNING CK_TRUST CKT_NSS_MUST_VERIFY_TRUST
CKA_TRUST_STEP_UP_APPROVED CK_BBOOL CK_FALSE

#
# Certificate "certSIGN Root CA G2"
#
# Issuer: OU=certSIGN ROOT CA G2,O=CERTSIGN SA,C=RO
# Serial Number:11:00:34:b6:4e:c6:36:2d:36
# Subject: OU=certSIGN ROOT CA G2,O=CERTSIGN SA,C=RO
# Not Valid Before: Mon Feb 06 09:27:35 2017
# Not Valid After : Thu Feb 06 09:27:35 2042
# Fingerprint (SHA-256):
65:7C:FE:2F:A7:3F:AA:38:46:25:71:F3:32:A2:36:3A:46:FC:E7:02:09:51:71:07:02:CD:FB:B6:EE:DA:33:05
# Fingerprint (SHA1): 26:F9:93:B4:ED:3D:28:27:B0:B9:4B:A7:E9:15:1D:A3:8D:92:E5:32
CKA_CLASS CK_OBJECT_CLASS CKO_CERTIFICATE
CKA_TOKEN CK_BBOOL CK_TRUE

```

```
CKA_PRIVATE CK_BBOOL CK_FALSE
CKA_MODIFIABLE CK_BBOOL CK_FALSE
CKA_LABEL UTF8 "certSIGN Root CA G2"
CKA_CERTIFICATE_TYPE CK_CERTIFICATE_TYPE CKC_X_509
CKA_SUBJECT
MULTILINE_OCTAL
\060\101\061\013\060\011\006\003\125\004\006\023\002\122\117\061
\024\060\022\006\003\125\004\012\023\013\103\105\122\124\123\111
\107\116\040\123\101\061\034\060\032\006\003\125\004\013\023\023
\143\145\162\164\123\111\107\116\040\122\117\117\124\040\103\101
\040\107\062
END
CKA_ID UTF8 "0"
CKA_ISSUER MULTILINE_OCTAL
\060\101\061\013\060\011\006\003\125\004\006\023\002\122\117\061
\024\060\022\006\003\125\004\012\023\013\103\105\122\124\123\111
\107\116\040\123\101\061\034\060\032\006\003\125\004\013\023\023
\143\145\162\164\123\111\107\116\040\122\117\117\124\040\103\101
\040\107\062
END
CKA_SERIAL_NUMBER MULTILINE_OCTAL
\002\011\021\000\064\266\116\306\066\055\066
END
CKA_VALUE MULTILINE_OCTAL
\060\202\005\107\060\202\003\057\240\003\002\001\002\002\011\021
\000\064\266\116\306\066\055\066\060\015\006\011\052\206\110\206
\367\015\001\001\013\005\000\060\101\061\013\060\011\006\003\125
\004\006\023\002\122\117\061\024\060\022\006\003\125\004\012\023
\013\103\105\122\124\123\111\107\116\040\123\101\061\034\060\032
\006\003\125\004\013\023\023\143\145\162\164\123\111\107\116\040
\122\117\117\124\040\103\101\040\107\062\060\036\027\015\061\067
\060\062\060\066\060\071\062\067\063\065\132\027\015\064\062\060
\062\060\066\060\071\062\067\063\065\132\060\101\061\013\060\011
\006\003\125\004\006\023\002\122\117\061\024\060\022\006\003\125
\004\012\023\013\103\105\122\124\123\111\107\116\040\123\101\061
\034\060\032\006\003\125\004\013\023\023\143\145\162\164\123\111
\107\116\040\122\117\117\124\040\103\101\040\107\062\060\202\002
\042\060\015\006\011\052\206\110\206\367\015\001\001\001\005\000
\003\202\002\017\000\060\202\002\012\002\202\002\001\000\300\305
\165\031\221\175\104\164\164\207\376\016\073\226\334\330\001\026
\314\356\143\221\347\013\157\316\073\012\151\032\174\302\343\257
\202\216\206\327\136\217\127\353\323\041\131\375\071\067\102\060
\276\120\352\266\017\251\210\330\056\055\151\041\347\321\067\030
\116\175\221\325\026\137\153\133\000\302\071\103\015\066\205\122
\271\123\145\017\035\102\345\217\317\005\323\356\334\014\032\331
\270\213\170\042\147\344\151\260\150\305\074\344\154\132\106\347
\315\307\372\357\304\354\113\275\152\244\254\375\314\050\121\357
\222\264\051\253\253\065\232\114\344\304\010\306\046\314\370\151
```

\237\344\234\360\051\323\134\371\306\026\045\236\043\303\040\301
\075\017\077\070\100\260\376\202\104\070\252\132\032\212\153\143
\130\070\264\025\323\266\021\151\173\036\124\356\214\032\042\254
\162\227\077\043\131\233\311\042\204\301\007\117\314\177\342\127
\312\022\160\273\246\145\363\151\165\143\275\225\373\033\227\315
\344\250\257\366\321\116\250\331\212\161\044\315\066\075\274\226
\304\361\154\251\256\345\317\015\156\050\015\260\016\265\312\121
\173\170\024\303\040\057\177\373\024\125\341\021\231\375\325\012
\241\236\002\343\142\137\353\065\113\054\270\162\350\076\075\117
\254\054\273\056\206\342\243\166\217\345\223\052\317\245\253\310
\134\215\113\006\377\022\106\254\170\313\024\007\065\340\251\337
\213\351\257\025\117\026\211\133\275\366\215\306\131\256\210\205
\016\301\211\353\037\147\305\105\216\377\155\067\066\053\170\146
\203\221\121\053\075\377\121\167\166\142\241\354\147\076\076\201
\203\340\126\251\120\037\037\172\231\253\143\277\204\027\167\361
\015\073\337\367\234\141\263\065\230\212\072\262\354\074\032\067
\077\176\217\222\317\331\022\024\144\332\020\002\025\101\377\117
\304\353\034\243\311\372\231\367\106\351\341\030\331\261\270\062
\055\313\024\014\120\330\203\145\203\356\271\134\317\313\005\132
\114\372\031\227\153\326\135\023\323\302\134\124\274\062\163\240
\170\365\361\155\036\313\237\245\246\237\042\334\321\121\236\202
\171\144\140\051\023\076\243\375\117\162\152\253\342\324\345\270
\044\125\054\104\113\212\210\104\234\312\204\323\052\073\002\003
\001\000\001\243\102\060\100\060\017\006\003\125\035\023\001\001
\377\004\005\060\003\001\001\377\060\016\006\003\125\035\017\001
\001\377\004\004\003\002\001\006\060\035\006\003\125\035\016\004
\026\004\024\202\041\055\146\306\327\240\340\025\353\316\114\011
\167\304\140\236\124\156\003\060\015\006\011\052\206\110\206\367
\015\001\001\013\005\000\003\202\002\001\000\140\336\032\270\347
\362\140\202\325\003\063\201\313\006\212\361\042\111\351\350\352
\221\177\306\063\136\150\031\003\206\073\103\001\317\007\160\344
\010\036\145\205\221\346\021\042\267\365\002\043\216\256\271\036
\175\037\176\154\346\275\045\325\225\032\362\005\246\257\205\002
\157\256\370\326\061\377\045\311\112\310\307\212\251\331\237\113
\111\233\021\127\231\222\103\021\336\266\063\244\314\327\215\144
\175\324\315\074\050\054\264\232\226\352\115\365\304\104\304\045
\252\040\200\330\051\125\367\340\101\374\006\046\377\271\066\365
\103\024\003\146\170\341\021\261\332\040\137\106\000\170\000\041
\245\036\000\050\141\170\157\250\001\001\217\235\064\232\377\364
\070\220\373\270\321\263\162\006\311\161\346\201\305\171\355\013
\246\171\362\023\013\234\367\135\016\173\044\223\264\110\333\206
\137\336\120\206\170\347\100\346\061\250\220\166\160\141\257\234
\067\054\021\265\202\267\252\256\044\064\133\162\014\151\015\315
\131\237\366\161\257\234\013\321\012\070\371\006\042\203\123\045
\014\374\121\304\346\276\342\071\225\013\044\255\257\321\225\344
\226\327\164\144\153\161\116\002\074\252\205\363\040\243\103\071
\166\133\154\120\376\232\234\024\036\145\024\212\025\275\243\202
\105\132\111\126\152\322\234\261\143\062\345\141\340\123\042\016

\247\012\111\352\313\176\037\250\342\142\200\366\020\105\122\230
\006\030\336\245\315\057\177\252\324\351\076\010\162\354\043\003
\002\074\246\252\330\274\147\164\075\024\027\373\124\113\027\343
\323\171\075\155\153\111\311\050\016\056\164\120\277\014\331\106
\072\020\206\311\247\077\351\240\354\177\353\245\167\130\151\161
\346\203\012\067\362\206\111\152\276\171\010\220\366\002\026\144
\076\345\332\114\176\014\064\311\371\137\266\263\050\121\247\247
\053\252\111\372\215\145\051\116\343\153\023\247\224\243\055\121
\155\170\014\104\313\337\336\010\157\316\243\144\253\323\225\204
\324\271\122\124\162\173\226\045\314\274\151\343\110\156\015\320
\307\235\047\232\252\370\023\222\335\036\337\143\237\065\251\026
\066\354\214\270\203\364\075\211\217\315\264\027\136\327\263\027
\101\020\135\047\163\140\205\127\111\042\007

END

CKA_NSS_MOZILLA_CA_POLICY

CK_BBOOL CK_TRUE

CKA_NSS_SERVER_DISTRUST_AFTER CK_BBOOL CK_FALSE

CKA_NSS_EMAIL_DISTRUST_AFTER CK_BBOOL CK_FALSE

Trust for "certSIGN Root CA G2"

Issuer: OU=certSIGN ROOT CA G2,O=CERTSIGN SA,C=RO

Serial Number:11:00:34:b6:4e:c6:36:2d:36

Subject: OU=certSIGN ROOT CA G2,O=CERTSIGN SA,C=RO

Not Valid Before: Mon Feb 06 09:27:35 2017

Not Valid After : Thu Feb 06 09:27:35 2042

Fingerprint (SHA-256):

65:7C:FE:2F:A7:3F:AA:38:46:25:71:F3:32:A2:36:3A:46:FC:E7:02:09:51:71:07:02:CD:FB:B6:EE:DA:33:05

Fingerprint (SHA1): 26:F9:93:B4:ED:3D:28:27:B0:B9:4B:A7:E9:15:1D:A3:8D:92:E5:32

CKA_CLASS CK_OBJECT_CLASS CKO_NSS_TRUST

CKA_TOKEN CK_BBOOL CK_TRUE

CKA_PRIVATE CK_BBOOL CK_FALSE

CKA_MODIFIABLE CK_BBOOL CK_FALSE

CKA_LABEL

UTF8 "certSIGN Root CA G2"

CKA_CERT_SHA1_HASH MULTILINE_OCTAL

\046\371\223\264\355\075\050\047\260\271\113\247\351\025\035\243
\215\222\345\062

END

CKA_CERT_MD5_HASH MULTILINE_OCTAL

\214\361\165\212\306\031\317\224\267\367\145\040\207\303\227\307

END

CKA_ISSUER MULTILINE_OCTAL

\060\101\061\013\060\011\006\003\125\004\006\023\002\122\117\061
\024\060\022\006\003\125\004\012\023\013\103\105\122\124\123\111
\107\116\040\123\101\061\034\060\032\006\003\125\004\013\023\023
\143\145\162\164\123\111\107\116\040\122\117\117\124\040\103\101
\040\107\062

END

```

CKA_SERIAL_NUMBER MULTILINE_OCTAL
\002\011\021\000\064\266\116\306\066\055\066
END
CKA_TRUST_SERVER_AUTH CK_TRUST CKT_NSS_TRUSTED_DELEGATOR
CKA_TRUST_EMAIL_PROTECTION CK_TRUST CKT_NSS_MUST_VERIFY_TRUST
CKA_TRUST_CODE_SIGNING CK_TRUST CKT_NSS_MUST_VERIFY_TRUST
CKA_TRUST_STEP_UP_APPROVED CK_BBOOL CK_FALSE

#
# Certificate "Trustwave Global Certification Authority"
#
# Issuer: CN=Trustwave Global Certification Authority,O="Trustwave Holdings,
Inc.",L=Chicago,ST=Illinois,C=US
#
Serial Number:05:f7:0e:86:da:49:f3:46:35:2e:ba:b2
# Subject: CN=Trustwave Global Certification Authority,O="Trustwave Holdings,
Inc.",L=Chicago,ST=Illinois,C=US
# Not Valid Before: Wed Aug 23 19:34:12 2017
# Not Valid After : Sat Aug 23 19:34:12 2042
# Fingerprint (SHA-256):
97:55:20:15:F5:DD:FC:3C:87:88:C0:06:94:45:55:40:88:94:45:00:84:F1:00:86:70:86:BC:1A:2B:B5:8D:C8
# Fingerprint (SHA1): 2F:8F:36:4F:E1:58:97:44:21:59:87:A5:2A:9A:D0:69:95:26:7F:B5
CKA_CLASS CK_OBJECT_CLASS CKO_CERTIFICATE
CKA_TOKEN CK_BBOOL CK_TRUE
CKA_PRIVATE CK_BBOOL CK_FALSE
CKA_MODIFIABLE CK_BBOOL CK_FALSE
CKA_LABEL UTF8 "Trustwave Global Certification Authority"
CKA_CERTIFICATE_TYPE CK_CERTIFICATE_TYPE CKC_X_509
CKA_SUBJECT MULTILINE_OCTAL
\060\201\210\061\013\060\011\006\003\125\004\006\023\002\125\123
\061\021\060\017\006\003\125\004\010\014\010\111\154\154\151\156
\157\151\163\061\020\060\016\006\003\125\004\007\014\007\103\150
\151\143\141\147\157\061\041\060\037\006\003\125\004\012\014\030
\124\162\165\163\164\167\141\166\145\040\110\157\154\144\151\156
\147\163\054\040\111\156\143\056\061\061\060\057\006\003\125\004
\003\014\050\124\162\165\163\164\167\141\166\145\040\107\154\157
\142\141\154\040\103\145\162\164\151\146\151\143\141\164\151\157
\156\040\101\165\164\150\157\162\151\164\171
END
CKA_ID
UTF8 "0"
CKA_ISSUER MULTILINE_OCTAL
\060\201\210\061\013\060\011\006\003\125\004\006\023\002\125\123
\061\021\060\017\006\003\125\004\010\014\010\111\154\154\151\156
\157\151\163\061\020\060\016\006\003\125\004\007\014\007\103\150
\151\143\141\147\157\061\041\060\037\006\003\125\004\012\014\030
\124\162\165\163\164\167\141\166\145\040\110\157\154\144\151\156
\147\163\054\040\111\156\143\056\061\061\060\057\006\003\125\004

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\003\014\050\124\162\165\163\164\167\141\166\145\040\107\154\157
\142\141\154\040\103\145\162\164\151\146\151\143\141\164\151\157
\156\040\101\165\164\150\157\162\151\164\171
END
CKA_SERIAL_NUMBER MULTILINE_OCTAL
\002\014\005\367\016\206\332\111\363\106\065\056\272\262
END
CKA_VALUE
MULTILINE_OCTAL
\060\202\005\332\060\202\003\302\240\003\002\001\002\002\014\005
\367\016\206\332\111\363\106\065\056\272\262\060\015\006\011\052
\206\110\206\367\015\001\001\013\005\000\060\201\210\061\013\060
\011\006\003\125\004\006\023\002\125\123\061\021\060\017\006\003
\125\004\010\014\010\111\154\154\151\156\157\151\163\061\020\060
\016\006\003\125\004\007\014\007\103\150\151\143\141\147\157\061
\041\060\037\006\003\125\004\012\014\030\124\162\165\163\164\167
\141\166\145\040\110\157\154\144\151\156\147\163\054\040\111\156
\143\056\061\061\060\057\006\003\125\004\003\014\050\124\162\165
\163\164\167\141\166\145\040\107\154\157\142\141\154\040\103\145
\162\164\151\146\151\143\141\164\151\157\156\040\101\165\164\150
\157\162\151\164\171\060\036\027\015\061\067\060\070\062\063\061
\071\063\064\061\062\132\027\015\064\062\060\070\062\063\061\071
\063\064\061\062\132\060\201\210\061\013\060\011\006\003\125\004
\006\023\002\125\123\061\021\060\017\006\003\125\004\010\014\010
\111\154\154\151\156\157\151\163\061\020\060\016\006\003\125\004
\007\014\007\103\150\151\143\141\147\157\061\041\060\037\006\003
\125\004\012\014\030\124\162\165\163\164\167\141\166\145\040\110
\157\154\144\151\156\147\163\054\040\111\156\143\056\061\061\060
\057\006\003\125\004\003\014\050\124\162\165\163\164\167\141\166
\145\040\107\154\157\142\141\154\040\103\145\162\164\151\146\151
\143\141\164\151\157\156\040\101\165\164\150\157\162\151\164\171
\060\202\002\042\060\015\006\011\052\206\110\206\367\015\001\001
\001\005\000\003\202\002\017\000\060\202\002\012\002\202\002\001
\000\271\135\121\050\113\074\067\222\321\202\316\275\035\275\315
\335\270\253\317\012\076\341\135\345\334\252\011\271\127\002\076
\346\143\141\337\362\017\202\143\256\243\367\254\163\321\174\347
\263\013\257\010\000\011\131\177\315\051\052\210\223\207\027\030
\200\355\210\262\264\266\020\037\055\326\137\125\242\023\135\321
\306\353\006\126\211\210\376\254\062\235\375\134\303\005\307\156
\356\206\211\272\210\003\235\162\041\206\220\256\217\003\245\334
\237\210\050\313\243\222\111\017\354\320\017\342\155\104\117\200
\152\262\324\347\240\012\123\001\272\216\227\221\166\156\274\374
\325\153\066\346\100\210\326\173\057\137\005\350\054\155\021\363
\347\262\276\222\104\114\322\227\244\376\322\162\201\103\007\234
\351\021\076\365\213\032\131\175\037\150\130\335\004\000\054\226
\363\103\263\176\230\031\164\331\234\163\331\030\276\101\307\064
\171\331\364\142\302\103\271\263\047\260\042\313\371\075\122\307
\060\107\263\311\076\270\152\342\347\350\201\160\136\102\213\117

\046\245\376\072\302\040\156\273\370\026\216\315\014\251\264\033
\154\166\020\341\130\171\106\076\124\316\200\250\127\011\067\051
\033\231\023\217\014\310\326\054\034\373\005\350\010\225\075\145
\106\334\356\315\151\342\115\217\207\050\116\064\013\076\317\024
\331\273\335\266\120\232\255\167\324\031\326\332\032\210\310\116
\033\047\165\330\262\010\361\256\203\060\271\021\016\315\207\360
\204\215\025\162\174\241\357\314\362\210\141\272\364\151\273\014
\214\013\165\127\004\270\116\052\024\056\075\017\034\036\062\246
\142\066\356\146\342\042\270\005\100\143\020\042\363\063\035\164
\162\212\054\365\071\051\240\323\347\033\200\204\055\305\075\343
\115\261\375\032\157\272\145\007\073\130\354\102\105\046\373\330
\332\045\162\304\366\000\261\042\171\275\343\174\131\142\112\234
\005\157\075\316\346\326\107\143\231\306\044\157\162\022\310\254
\177\220\264\013\221\160\350\267\346\026\020\161\027\316\336\006
\117\110\101\175\065\112\243\211\362\311\113\173\101\021\155\147
\267\010\230\114\345\021\031\256\102\200\334\373\220\005\324\370
\120\312\276\344\255\307\302\224\327\026\235\346\027\217\257\066
\373\002\003\001\000\001\243\102\060\100\060\017\006\003\125\035
\023\001\001\377\004\005\060\003\001\001\377\060\035\006\003\125
\035\016\004\026\004\024\231\340\031\147\015\142\333\166\263\332
\075\270\133\350\375\102\322\061\016\207\060\016\006\003\125\035
\017\001\001\377\004\004\003\002\001\006\060\015\006\011\052\206
\110\206\367\015\001\001\013\005\000\003\202\002\001\000\230\163
\160\342\260\323\355\071\354\114\140\331\251\022\206\027\036\226
\320\350\124\050\073\144\055\041\246\370\235\126\023\152\110\075
\117\307\076\051\333\155\130\203\124\075\207\175\043\005\324\344
\034\334\350\070\145\206\305\165\247\132\333\065\005\275\167\336
\273\051\067\100\005\007\303\224\122\237\312\144\335\361\033\053
\334\106\012\020\002\061\375\112\150\015\007\144\220\346\036\365
\052\241\250\273\074\135\371\243\010\013\021\014\361\077\055\020
\224\157\376\342\064\207\203\326\317\345\033\065\155\322\003\341
\260\015\250\240\252\106\047\202\066\247\025\266\010\246\102\124
\127\266\231\132\342\013\171\220\327\127\022\121\065\031\210\101
\150\045\324\067\027\204\025\373\001\162\334\225\336\122\046\040
\230\046\342\166\365\047\157\372\000\073\112\141\331\015\313\121
\223\052\375\026\006\226\247\043\232\043\110\376\121\275\266\304
\260\261\124\316\336\154\101\255\026\147\176\333\375\070\315\271
\070\116\262\301\140\313\235\027\337\130\236\172\142\262\046\217
\164\225\233\344\133\035\322\017\335\230\034\233\131\271\043\323
\061\240\246\377\070\335\317\040\117\351\130\126\072\147\303\321
\366\231\231\235\272\066\266\200\057\210\107\117\206\277\104\072
\200\344\067\034\246\272\352\227\230\021\320\204\142\107\144\036
\252\356\100\277\064\261\234\217\116\341\362\222\117\037\216\363
\236\227\336\363\246\171\152\211\161\117\113\047\027\110\376\354
\364\120\017\117\111\175\314\105\343\275\172\100\305\101\334\141
\126\047\006\151\345\162\101\201\323\266\001\211\240\057\072\162
\171\376\072\060\277\101\354\307\142\076\221\113\307\331\061\166
\102\371\367\074\143\354\046\214\163\014\175\032\035\352\250\174

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\207\250\302\047\174\341\063\101\017\317\317\374\000\240\042\200
\236\112\247\157\000\260\101\105\267\042\312\150\110\305\102\242
\256\335\035\362\340\156\116\005\130\261\300\220\026\052\244\075
\020\100\276\217\142\143\203\251\234\202\175\055\002\351\203\060
\174\313\047\311\375\036\146\000\260\056\323\041\057\216\063\026
\154\230\355\020\250\007\326\314\223\317\333\321\151\034\344\312
\311\340\266\234\351\316\161\161\336\154\077\026\244\171
```

END

CKA_NSS_Mozilla_CA_POLICY

CK_BBOOL CK_TRUE

CKA_NSS_SERVER_DISTRUST_AFTER CK_BBOOL CK_FALSE

CKA_NSS_EMAIL_DISTRUST_AFTER CK_BBOOL CK_FALSE

Trust for "Trustwave Global Certification Authority"

Issuer: CN=Trustwave Global Certification Authority,O="Trustwave Holdings,
Inc.",L=Chicago,ST=Illinois,C=US

Serial Number:05:f7:0e:86:da:49:f3:46:35:2e:ba:b2

Subject: CN=Trustwave Global Certification Authority,O="Trustwave Holdings,
Inc.",L=Chicago,ST=Illinois,C=US

Not Valid Before: Wed Aug 23 19:34:12 2017

Not Valid After : Sat Aug 23 19:34:12 2042

Fingerprint (SHA-256):

97:55:20:15:F5:DD:FC:3C:87:88:C0:06:94:45:55:40:88:94:45:00:84:F1:00:86:70:86:BC:1A:2B:B5:8D:C8

Fingerprint (SHA1): 2F:8F:36:4F:E1:58:97:44:21:59:87:A5:2A:9A:D0:69:95:26:7F:B5

CKA_CLASS CK_OBJECT_CLASS CKO_NSS_TRUST

CKA_TOKEN CK_BBOOL CK_TRUE

CKA_PRIVATE

CK_BBOOL CK_FALSE

CKA_MODIFIABLE CK_BBOOL CK_FALSE

CKA_LABEL UTF8 "Trustwave Global Certification Authority"

CKA_CERT_SHA1_HASH MULTILINE_OCTAL

```
\057\217\066\117\341\130\227\104\041\131\207\245\052\232\320\151
\225\046\177\265
```

END

CKA_CERT_MD5_HASH MULTILINE_OCTAL

```
\370\034\030\055\057\272\137\155\241\154\274\307\253\221\307\016
```

END

CKA_ISSUER MULTILINE_OCTAL

```
\060\201\210\061\013\060\011\006\003\125\004\006\023\002\125\123
\061\021\060\017\006\003\125\004\010\014\010\111\154\154\151\156
\157\151\163\061\020\060\016\006\003\125\004\007\014\007\103\150
\151\143\141\147\157\061\041\060\037\006\003\125\004\012\014\030
\124\162\165\163\164\167\141\166\145\040\110\157\154\144\151\156
\147\163\054\040\111\156\143\056\061\061\060\057\006\003\125\004
\003\014\050\124\162\165\163\164\167\141\166\145\040\107\154\157
\142\141\154\040\103\145\162\164\151\146\151\143\141\164\151\157
\156\040\101\165\164\150\157\162\151\164\171
```

END

```

CKA_SERIAL_NUMBER MULTILINE_OCTAL
\002\014\005\367\016\206\332\111\363\106\065\056\272\262
END
CKA_TRUST_SERVER_AUTH
CK_TRUST CKT_NSS_TRUSTED_DELEGATOR
CKA_TRUST_EMAIL_PROTECTION CK_TRUST CKT_NSS_TRUSTED_DELEGATOR
CKA_TRUST_CODE_SIGNING CK_TRUST CKT_NSS_MUST_VERIFY_TRUST
CKA_TRUST_STEP_UP_APPROVED CK_BBOOL CK_FALSE

#
# Certificate "Trustwave Global ECC P256 Certification Authority"
#
# Issuer: CN=Trustwave Global ECC P256 Certification Authority,O="Trustwave Holdings,
Inc.",L=Chicago,ST=Illinois,C=US
# Serial Number:0d:6a:5f:08:3f:28:5c:3e:51:95:df:5d
# Subject: CN=Trustwave Global ECC P256 Certification Authority,O="Trustwave Holdings,
Inc.",L=Chicago,ST=Illinois,C=US
# Not Valid Before: Wed Aug 23 19:35:10 2017
# Not Valid After : Sat Aug 23 19:35:10 2042
# Fingerprint (SHA-256):
94:5B:BC:82:5E:A5:54:F4:89:D1:FD:51:A7:3D:DF:2E:A6:24:AC:70:19:A0:52:05:22:5C:22:A7:8C:CF:A8:B4
# Fingerprint (SHA1): B4:90:82:DD:45:0C:BE:8B:5B:B1:66:D3:E2:A4:08:26:CD:ED:42:CF
CKA_CLASS CK_OBJECT_CLASS CKO_CERTIFICATE
CKA_TOKEN CK_BBOOL CK_TRUE
CKA_PRIVATE CK_BBOOL CK_FALSE
CKA_MODIFIABLE
CK_BBOOL CK_FALSE
CKA_LABEL UTF8 "Trustwave Global ECC P256 Certification Authority"
CKA_CERTIFICATE_TYPE CK_CERTIFICATE_TYPE CKC_X_509
CKA_SUBJECT MULTILINE_OCTAL
\060\201\221\061\013\060\011\006\003\125\004\006\023\002\125\123
\061\021\060\017\006\003\125\004\010\023\010\111\154\154\151\156
\157\151\163\061\020\060\016\006\003\125\004\007\023\007\103\150
\151\143\141\147\157\061\041\060\037\006\003\125\004\012\023\030
\124\162\165\163\164\167\141\166\145\040\110\157\154\144\151\156
\147\163\054\040\111\156\143\056\061\072\060\070\006\003\125\004
\003\023\061\124\162\165\163\164\167\141\166\145\040\107\154\157
\142\141\154\040\105\103\103\040\120\062\065\066\040\103\145\162
\164\151\146\151\143\141\164\151\157\156\040\101\165\164\150\157
\162\151\164\171
END
CKA_ID UTF8 "0"
CKA_ISSUER MULTILINE_OCTAL
\060\201\221\061\013\060\011\006\003\125\004\006\023\002\125\123
\061\021\060\017\006\003\125\004\010\023\010\111\154\154\151\156
\157\151\163\061\020\060\016\006\003\125\004\007\023\007\103\150
\151\143\141\147\157\061\041\060\037\006\003\125\004\012\023\030
\124\162\165\163\164\167\141\166\145\040\110\157\154\144\151\156

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\147\163\054\040\111\156\143\056\061\072\060\070\006\003\125\004
\003\023\061\124\162\165\163\164\167\141\166\145\040\107\154\157
\142\141\154\040\105\103\103\040\120\062\065\066\040\103\145\162
\164\151\146\151\143\141\164\151\157\156\040\101\165\164\150\157
\162\151\164\171

END

CKA_SERIAL_NUMBER

MULTILINE_OCTAL

\002\014\015\152\137\010\077\050\134\076\121\225\337\135

END

CKA_VALUE MULTILINE_OCTAL

\060\202\002\140\060\202\002\007\240\003\002\001\002\002\014\015
\152\137\010\077\050\134\076\121\225\337\135\060\012\006\010\052
\206\110\316\075\004\003\002\060\201\221\061\013\060\011\006\003
\125\004\006\023\002\125\123\061\021\060\017\006\003\125\004\010
\023\010\111\154\154\151\156\157\151\163\061\020\060\016\006\003
\125\004\007\023\007\103\150\151\143\141\147\157\061\041\060\037
\006\003\125\004\012\023\030\124\162\165\163\164\167\141\166\145
\040\110\157\154\144\151\156\147\163\054\040\111\156\143\056\061
\072\060\070\006\003\125\004\003\023\061\124\162\165\163\164\167
\141\166\145\040\107\154\157\142\141\154\040\105\103\103\040\120
\062\065\066\040\103\145\162\164\151\146\151\143\141\164\151\157
\156\040\101\165\164\150\157\162\151\164\171\060\036\027\015\061
\067\060\070\062\063\061\071\063\065\061\060\132\027\015\064\062
\060\070\062\063\061\071\063\065\061\060\132\060\201\221\061\013
\060\011\006\003\125\004\006\023\002\125\123\061\021\060\017\006
\003\125\004\010\023\010\111\154\154\151\156\157\151\163\061\020
\060\016\006\003\125\004\007\023\007\103\150\151\143\141\147\157
\061\041\060\037\006\003\125\004\012\023\030\124\162\165\163\164
\167\141\166\145\040\110\157\154\144\151\156\147\163\054\040\111
\156\143\056\061\072\060\070\006\003\125\004\003\023\061\124\162
\165\163\164\167\141\166\145\040\107\154\157\142\141\154\040\105
\103\103\040\120\062\065\066\040\103\145\162\164\151\146\151\143
\141\164\151\157\156\040\101\165\164\150\157\162\151\164\171\060
\131\060\023\006\007\052\206\110\316\075\002\001\006\010\052\206
\110\316\075\003\001\007\003\102\000\004\176\373\154\346\043\343
\163\062\010\312\140\346\123\234\272\164\215\030\260\170\220\122
\200\335\070\300\112\035\321\250\314\223\244\227\006\070\312\015
\025\142\306\216\001\052\145\235\252\337\064\221\056\201\301\344
\063\222\061\304\375\011\072\246\077\255\243\103\060\101\060\017
\006\003\125\035\023\001\001\377\004\005\060\003\001\001\377\060
\017\006\003\125\035\017\001\001\377\004\005\003\003\007\006\000
\060\035\006\003\125\035\016\004\026\004\024\243\101\006\254\220
\155\321\112\353\165\245\112\020\231\263\261\241\213\112\367\060
\012\006\010\052\206\110\316\075\004\003\002\003\107\000\060\104
\002\040\007\346\124\332\016\240\132\262\256\021\237\207\305\266
\377\151\336\045\276\370\240\267\010\363\104\316\052\337\010\041
\014\067\002\040\055\046\003\240\005\275\153\321\366\134\370\145

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\314\206\155\263\234\064\110\143\204\011\305\215\167\032\342\314
\234\341\164\173
END
CKA_NSS_Mozilla_CA_POLICY
CK_BBOOL CK_TRUE
CKA_NSS_SERVER_DISTRUST_AFTER CK_BBOOL CK_FALSE
CKA_NSS_EMAIL_DISTRUST_AFTER CK_BBOOL CK_FALSE

# Trust for "Trustwave Global ECC P256 Certification Authority"
# Issuer: CN=Trustwave Global ECC P256 Certification Authority,O="Trustwave Holdings,
Inc.",L=Chicago,ST=Illinois,C=US
# Serial Number:0d:6a:5f:08:3f:28:5c:3e:51:95:df:5d
# Subject: CN=Trustwave Global ECC P256 Certification Authority,O="Trustwave Holdings,
Inc.",L=Chicago,ST=Illinois,C=US
# Not Valid Before: Wed Aug 23 19:35:10 2017
# Not Valid After : Sat Aug 23 19:35:10 2042
# Fingerprint (SHA-256):
94:5B:BC:82:5E:A5:54:F4:89:D1:FD:51:A7:3D:DF:2E:A6:24:AC:70:19:A0:52:05:22:5C:22:A7:8C:CF:A8:B4
# Fingerprint (SHA1): B4:90:82:DD:45:0C:BE:8B:5B:B1:66:D3:E2:A4:08:26:CD:ED:42:CF
CKA_CLASS CK_OBJECT_CLASS CKO_NSS_TRUST
CKA_TOKEN CK_BBOOL CK_TRUE
CKA_PRIVATE CK_BBOOL CK_FALSE
CKA_MODIFIABLE CK_BBOOL CK_FALSE
CKA_LABEL UTF8 "Trustwave Global
ECC P256 Certification Authority"
CKA_CERT_SHA1_HASH MULTILINE_OCTAL
\264\220\202\335\105\014\276\213\133\261\146\323\342\244\010\046
\315\355\102\317
END
CKA_CERT_MD5_HASH MULTILINE_OCTAL
\133\104\343\215\135\066\206\046\350\015\005\322\131\247\203\124
END
CKA_ISSUER MULTILINE_OCTAL
\060\201\221\061\013\060\011\006\003\125\004\006\023\002\125\123
\061\021\060\017\006\003\125\004\010\023\010\111\154\154\151\156
\157\151\163\061\020\060\016\006\003\125\004\007\023\007\103\150
\151\143\141\147\157\061\041\060\037\006\003\125\004\012\023\030
\124\162\165\163\164\167\141\166\145\040\110\157\154\144\151\156
\147\163\054\040\111\156\143\056\061\072\060\070\006\003\125\004
\003\023\061\124\162\165\163\164\167\141\166\145\040\107\154\157
\142\141\154\040\105\103\103\040\120\062\065\066\040\103\145\162
\164\151\146\151\143\141\164\151\157\156\040\101\165\164\150\157
\162\151\164\171
END
CKA_SERIAL_NUMBER MULTILINE_OCTAL
\002\014\015\152\137\010\077\050\134\076\121\225\337\135
END
CKA_TRUST_SERVER_AUTH

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CKA_TRUST CKT_NSS_TRUSTED_DELEGATOR
CKA_TRUST_EMAIL_PROTECTION CK_TRUST CKT_NSS_TRUSTED_DELEGATOR
CKA_TRUST_CODE_SIGNING CK_TRUST CKT_NSS_MUST_VERIFY_TRUST
CKA_TRUST_STEP_UP_APPROVED CK_BBOOL CK_FALSE

#
# Certificate "Trustwave Global ECC P384 Certification Authority"
#
# Issuer: CN=Trustwave Global ECC P384 Certification Authority,O="Trustwave Holdings,
Inc.",L=Chicago,ST=Illinois,C=US
# Serial Number:08:bd:85:97:6c:99:27:a4:80:68:47:3b
# Subject: CN=Trustwave Global ECC P384 Certification Authority,O="Trustwave Holdings,
Inc.",L=Chicago,ST=Illinois,C=US
# Not Valid Before: Wed Aug 23 19:36:43 2017
# Not Valid After : Sat Aug 23 19:36:43 2042
# Fingerprint (SHA-256):
55:90:38:59:C8:C0:C3:EB:B8:75:9E:CE:4E:25:57:22:5F:F5:75:8B:BD:38:EB:D4:82:76:60:1E:1B:D5:80:97
# Fingerprint (SHA1): E7:F3:A3:C8:CF:6F:C3:04:2E:6D:0E:67:32:C5:9E:68:95:0D:5E:D2
CKA_CLASS CK_OBJECT_CLASS CKO_CERTIFICATE
CKA_TOKEN CK_BBOOL CK_TRUE
CKA_PRIVATE CK_BBOOL CK_FALSE
CKA_MODIFIABLE CK_BBOOL CK_FALSE
CKA_LABEL
UTF8 "Trustwave Global ECC P384 Certification Authority"
CKA_CERTIFICATE_TYPE CK_CERTIFICATE_TYPE CKC_X_509
CKA_SUBJECT MULTILINE_OCTAL
\060\201\221\061\013\060\011\006\003\125\004\006\023\002\125\123
\061\021\060\017\006\003\125\004\010\023\010\111\154\154\151\156
\157\151\163\061\020\060\016\006\003\125\004\007\023\007\103\150
\151\143\141\147\157\061\041\060\037\006\003\125\004\012\023\030
\124\162\165\163\164\167\141\166\145\040\110\157\154\144\151\156
\147\163\054\040\111\156\143\056\061\072\060\070\006\003\125\004
\003\023\061\124\162\165\163\164\167\141\166\145\040\107\154\157
\142\141\154\040\105\103\103\040\120\063\070\064\040\103\145\162
\164\151\146\151\143\141\164\151\157\156\040\101\165\164\150\157
\162\151\164\171
END
CKA_ID UTF8 "0"
CKA_ISSUER MULTILINE_OCTAL
\060\201\221\061\013\060\011\006\003\125\004\006\023\002\125\123
\061\021\060\017\006\003\125\004\010\023\010\111\154\154\151\156
\157\151\163\061\020\060\016\006\003\125\004\007\023\007\103\150
\151\143\141\147\157\061\041\060\037\006\003\125\004\012\023\030
\124\162\165\163\164\167\141\166\145\040\110\157\154\144\151\156
\147\163\054\040\111\156\143\056\061\072\060\070\006\003\125\004
\003\023\061\124\162\165\163\164\167\141\166\145\040\107\154\157
\142\141\154\040\105\103\103\040\120\063\070\064\040\103\145\162
\164\151\146\151\143\141\164\151\157\156\040\101\165\164\150\157

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\162\151\164\171
END
CKA_SERIAL_NUMBER
MULTILINE_OCTAL
\002\014\010\275\205\227\154\231\047\244\200\150\107\073
END
CKA_VALUE MULTILINE_OCTAL
\060\202\002\235\060\202\002\044\240\003\002\001\002\002\014\010
\275\205\227\154\231\047\244\200\150\107\073\060\012\006\010\052
\206\110\316\075\004\003\003\060\201\221\061\013\060\011\006\003
\125\004\006\023\002\125\123\061\021\060\017\006\003\125\004\010
\023\010\111\154\154\151\156\157\151\163\061\020\060\016\006\003
\125\004\007\023\007\103\150\151\143\141\147\157\061\041\060\037
\006\003\125\004\012\023\030\124\162\165\163\164\167\141\166\145
\040\110\157\154\144\151\156\147\163\054\040\111\156\143\056\061
\072\060\070\006\003\125\004\003\023\061\124\162\165\163\164\167
\141\166\145\040\107\154\157\142\141\154\040\105\103\103\040\120
\063\070\064\040\103\145\162\164\151\146\151\143\141\164\151\157
\156\040\101\165\164\150\157\162\151\164\171\060\036\027\015\061
\067\060\070\062\063\061\071\063\066\064\063\132\027\015\064\062
\060\070\062\063\061\071\063\066\064\063\132\060\201\221\061\013
\060\011\006\003\125\004\006\023\002\125\123\061\021\060\017\006
\003\125\004\010\023\010\111\154\154\151\156\157\151\163\061\020
\060\016\006\003\125\004\007\023\007\103\150\151\143\141\147\157
\061\041\060\037\006\003\125\004\012\023\030\124\162\165\163\164
\167\141\166\145\040\110\157\154\144\151\156\147\163\054\040\111
\156\143\056\061\072\060\070\006\003\125\004\003\023\061\124\162
\165\163\164\167\141\166\145\040\107\154\157\142\141\154\040\105
\103\103\040\120\063\070\064\040\103\145\162\164\151\146\151\143
\141\164\151\157\156\040\101\165\164\150\157\162\151\164\171\060
\166\060\020\006\007\052\206\110\316\075\002\001\006\005\053\201
\004\000\042\003\142\000\004\153\332\015\165\065\010\061\107\005
\256\105\231\125\361\021\023\056\112\370\020\061\043\243\176\203
\323\177\050\010\072\046\032\072\317\227\202\037\200\267\047\011
\217\321\216\060\304\012\233\016\254\130\004\253\367\066\175\224
\043\244\233\012\212\213\253\353\375\071\045\146\361\136\376\214
\256\215\101\171\235\011\140\316\050\251\323\212\155\363\326\105
\324\362\230\204\070\145\240\243\103\060\101\060\017\006\003\125
\035\023\001\001\377\004\005\060\003\001\001\377\060\017\006\003
\125\035\017\001\001\377\004\005\003\003\007\006\000\060\035\006
\003\125\035\016\004\026\004\024\125\251\204\211\322\301\062\275
\030\313\154\246\007\116\310\347\235\276\202\220\060\012\006\010
\052\206\110\316\075\004\003\003\003\147\000\060\144\002\060\067
\001\222\227\105\022\176\240\363\076\255\031\072\162\335\364\120
\223\003\022\276\104\322\117\101\244\214\234\235\037\243\366\302
\222\347\110\024\376\116\233\245\221\127\256\306\067\162\273\002
\060\147\045\012\261\014\136\356\251\143\222\157\345\220\013\376
\146\042\312\107\375\212\061\367\203\376\172\277\020\276\030\053

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\036\217\366\051\036\224\131\357\216\041\067\313\121\230\245\156
\113
END
CKA_NSS_Mozilla_CA_POLICY
CK_BBOOL CK_TRUE
CKA_NSS_SERVER_DISTRUST_AFTER CK_BBOOL CK_FALSE
CKA_NSS_EMAIL_DISTRUST_AFTER CK_BBOOL CK_FALSE

# Trust for "Trustwave Global ECC P384 Certification Authority"
# Issuer: CN=Trustwave Global ECC P384 Certification Authority,O="Trustwave Holdings,
Inc.",L=Chicago,ST=Illinois,C=US
# Serial Number:08:bd:85:97:6c:99:27:a4:80:68:47:3b
# Subject: CN=Trustwave Global ECC P384 Certification Authority,O="Trustwave Holdings,
Inc.",L=Chicago,ST=Illinois,C=US
# Not Valid Before: Wed Aug 23 19:36:43 2017
# Not Valid After : Sat Aug 23 19:36:43 2042
# Fingerprint (SHA-256):
55:90:38:59:C8:C0:C3:EB:B8:75:9E:CE:4E:25:57:22:5F:F5:75:8B:BD:38:EB:D4:82:76:60:1E:1B:D5:80:97
# Fingerprint (SHA1): E7:F3:A3:C8:CF:6F:C3:04:2E:6D:0E:67:32:C5:9E:68:95:0D:5E:D2
CKA_CLASS
CK_OBJECT_CLASS CKO_NSS_TRUST
CKA_TOKEN CK_BBOOL CK_TRUE
CKA_PRIVATE CK_BBOOL CK_FALSE
CKA_MODIFIABLE CK_BBOOL CK_FALSE
CKA_LABEL UTF8 "Trustwave Global ECC P384 Certification Authority"
CKA_CERT_SHA1_HASH MULTILINE_OCTAL
\347\363\243\310\317\157\303\004\056\155\016\147\062\305\236\150
\225\015\136\322
END
CKA_CERT_MD5_HASH MULTILINE_OCTAL
\352\317\140\304\073\271\025\051\100\241\227\355\170\047\223\326
END
CKA_ISSUER MULTILINE_OCTAL
\060\201\221\061\013\060\011\006\003\125\004\006\023\002\125\123
\061\021\060\017\006\003\125\004\010\023\010\111\154\154\151\156
\157\151\163\061\020\060\016\006\003\125\004\007\023\007\103\150
\151\143\141\147\157\061\041\060\037\006\003\125\004\012\023\030
\124\162\165\163\164\167\141\166\145\040\110\157\154\144\151\156
\147\163\054\040\111\156\143\056\061\072\060\070\006\003\125\004
\003\023\061\124\162\165\163\164\167\141\166\145\040\107\154\157
\142\141\154\040\105\103\103\040\120\063\070\064\040\103\145\162
\164\151\146\151\143\141\164\151\157\156\040\101\165\164\150\157
\162\151\164\171
END
CKA_SERIAL_NUMBER
MULTILINE_OCTAL
\002\014\010\275\205\227\154\231\047\244\200\150\107\073
END

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CKA_TRUST_SERVER_AUTH CK_TRUST CKT_NSS_TRUSTED_DELEGATOR
CKA_TRUST_EMAIL_PROTECTION CK_TRUST CKT_NSS_TRUSTED_DELEGATOR
CKA_TRUST_CODE_SIGNING CK_TRUST CKT_NSS_MUST_VERIFY_TRUST
CKA_TRUST_STEP_UP_APPROVED CK_BBOOL CK_FALSE

#
# Certificate "NAVER Global Root Certification Authority"
#
# Issuer: CN=NAVER Global Root Certification Authority,O=NAVER BUSINESS PLATFORM Corp.,C=KR
# Serial Number:01:94:30:1e:a2:0b:dd:f5:c5:33:2a:b1:43:44:71:f8:d6:50:4d:0d
# Subject: CN=NAVER Global Root Certification Authority,O=NAVER BUSINESS PLATFORM Corp.,C=KR
# Not Valid Before: Fri Aug 18 08:58:42 2017
# Not Valid After : Tue Aug 18 23:59:59 2037
# Fingerprint (SHA-256):
88:F4:38:DC:F8:FF:D1:FA:8F:42:91:15:FF:E5:F8:2A:E1:E0:6E:0C:70:C3:75:FA:AD:71:7B:34:A4:9E:72:65
# Fingerprint (SHA1): 8F:6B:F2:A9:27:4A:DA:14:A0:C4:F4:8E:61:27:F9:C0:1E:78:5D:D1
CKA_CLASS
CK_OBJECT_CLASS CKO_CERTIFICATE
CKA_TOKEN CK_BBOOL CK_TRUE
CKA_PRIVATE CK_BBOOL CK_FALSE
CKA_MODIFIABLE CK_BBOOL CK_FALSE
CKA_LABEL UTF8 "NAVER Global Root Certification Authority"
CKA_CERTIFICATE_TYPE CK_CERTIFICATE_TYPE CKC_X_509
CKA_SUBJECT MULTILINE_OCTAL
\060\151\061\013\060\011\006\003\125\004\006\023\002\113\122\061
\046\060\044\006\003\125\004\012\014\035\116\101\126\105\122\040
\102\125\123\111\116\105\123\123\040\120\114\101\124\106\117\122
\115\040\103\157\162\160\056\061\062\060\060\006\003\125\004\003
\014\051\116\101\126\105\122\040\107\154\157\142\141\154\040\122
\157\157\164\040\103\145\162\164\151\146\151\143\141\164\151\157
\156\040\101\165\164\150\157\162\151\164\171
END
CKA_ID UTF8 "0"
CKA_ISSUER MULTILINE_OCTAL
\060\151\061\013\060\011\006\003\125\004\006\023\002\113\122\061
\046\060\044\006\003\125\004\012\014\035\116\101\126\105\122\040
\102\125\123\111\116\105\123\123\040\120\114\101\124\106\117\122
\115\040\103\157\162\160\056\061\062\060\060\006\003\125\004\003
\014\051\116\101\126\105\122\040\107\154\157\142\141\154\040\122
\157\157\164\040\103\145\162\164\151\146\151\143\141\164\151\157
\156\040\101\165\164\150\157\162\151\164\171
END
CKA_SERIAL_NUMBER
MULTILINE_OCTAL
\002\024\001\224\060\036\242\013\335\365\305\063\052\261\103\104
\161\370\326\120\115\015
END
CKA_VALUE MULTILINE_OCTAL

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\060\202\005\242\060\202\003\212\240\003\002\001\002\002\024\001
\224\060\036\242\013\335\365\305\063\052\261\103\104\161\370\326
\120\115\015\060\015\006\011\052\206\110\206\367\015\001\001\014
\005\000\060\151\061\013\060\011\006\003\125\004\006\023\002\113
\122\061\046\060\044\006\003\125\004\012\014\035\116\101\126\105
\122\040\102\125\123\111\116\105\123\123\040\120\114\101\124\106
\117\122\115\040\103\157\162\160\056\061\062\060\060\006\003\125
\004\003\014\051\116\101\126\105\122\040\107\154\157\142\141\154
\040\122\157\157\164\040\103\145\162\164\151\146\151\143\141\164
\151\157\156\040\101\165\164\150\157\162\151\164\171\060\036\027
\015\061\067\060\070\061\070\060\070\065\070\064\062\132\027\015
\063\067\060\070\061\070\062\063\065\071\065\071\132\060\151\061
\013\060\011\006\003\125\004\006\023\002\113\122\061\046\060\044
\006\003\125\004\012\014\035\116\101\126\105\122\040\102\125\123
\111\116\105\123\123\040\120\114\101\124\106\117\122\115\040\103
\157\162\160\056\061\062\060\060\006\003\125\004\003\014\051\116
\101\126\105\122\040\107\154\157\142\141\154\040\122\157\157\164
\040\103\145\162\164\151\146\151\143\141\164\151\157\156\040\101
\165\164\150\157\162\151\164\171\060\202\002\042\060\015\006\011
\052\206\110\206\367\015\001\001\001\005\000\003\202\002\017\000
\060\202\002\012\002\202\002\001\000\266\324\361\223\134\265\100
\211\012\253\015\220\133\120\143\256\220\224\164\027\105\162\326
\173\145\132\051\113\247\126\240\113\270\057\102\165\351\331\173
\044\132\061\145\253\027\027\321\063\072\331\021\334\100\066\207
\337\307\152\351\046\136\131\212\167\343\350\110\234\061\026\372
\076\221\261\312\311\243\342\237\316\041\123\243\002\066\060\313
\122\002\345\332\062\135\303\305\346\371\356\021\307\213\311\104
\036\204\223\030\112\264\237\345\022\144\151\320\046\205\142\001
\266\311\002\035\276\203\121\273\134\332\370\255\025\152\231\367
\222\124\367\064\133\351\277\352\051\201\022\324\123\221\226\263
\221\132\335\376\220\163\050\373\060\106\265\312\010\007\307\161
\162\311\146\323\064\227\366\214\364\030\112\341\320\075\132\105
\266\151\247\051\373\043\316\210\330\022\234\000\110\250\246\017
\263\073\222\215\161\016\164\305\213\310\114\371\364\233\216\270
\074\151\355\157\073\120\057\130\355\304\260\320\034\033\152\014
\342\274\104\252\330\315\024\135\224\170\141\277\016\156\332\052
\274\057\014\013\161\246\263\026\077\234\346\371\314\237\123\065
\342\003\240\240\030\277\273\361\276\364\326\214\207\015\102\367
\006\271\361\155\355\004\224\250\376\266\323\006\306\100\141\337
\235\235\363\124\166\316\123\072\001\246\222\101\354\004\243\217
\015\242\325\011\312\326\313\232\361\357\103\135\300\253\245\101
\317\134\123\160\160\311\210\246\055\324\153\141\163\120\046\206
\141\016\137\033\302\053\342\214\325\273\235\301\003\102\272\224
\332\137\251\260\312\314\115\012\357\107\151\003\057\042\373\361
\050\316\277\135\120\145\250\220\155\263\164\260\010\307\254\250
\321\353\076\234\374\135\032\203\056\053\313\265\363\104\235\072
\247\027\141\226\242\161\323\160\226\025\115\267\114\163\356\031
\134\305\133\076\101\376\254\165\140\073\033\143\316\000\335\332

\010\220\142\264\345\055\356\110\247\153\027\231\124\276\207\112
\343\251\136\004\114\353\020\155\124\326\357\361\350\362\142\026
\313\200\153\355\075\355\365\037\060\245\256\113\311\023\355\212
\001\001\311\270\121\130\300\146\072\261\146\113\304\325\061\002
\142\351\164\204\014\333\115\106\055\002\003\001\000\001\243\102
\060\100\060\035\006\003\125\035\016\004\026\004\024\322\237\210
\337\241\315\054\275\354\365\073\001\001\223\063\047\262\353\140
\113\060\016\006\003\125\035\017\001\001\377\004\004\003\002\001
\006\060\017\006\003\125\035\023\001\001\377\004\005\060\003\001
\001\377\060\015\006\011\052\206\110\206\367\015\001\001\014\005
\000\003\202\002\001\000\062\312\200\263\235\075\124\006\335\322
\322\056\360\244\001\041\013\147\110\312\155\216\340\310\252\015
\252\215\041\127\217\306\076\172\312\333\121\324\122\263\324\226
\204\245\130\140\177\345\013\216\037\365\334\012\025\201\345\073
\266\267\042\057\011\234\023\026\261\154\014\065\010\155\253\143
\162\355\334\276\354\307\127\346\060\040\161\326\327\020\301\023
\125\001\214\052\103\344\101\361\317\072\172\123\222\316\242\003
\005\015\070\337\002\273\020\056\331\073\322\233\172\300\241\246
\370\265\061\346\364\165\311\271\123\231\165\107\042\132\024\025
\307\170\033\266\235\351\014\370\033\166\361\205\204\336\241\332
\022\357\244\342\020\227\172\170\336\014\121\227\250\041\100\213
\206\275\015\360\136\116\113\066\273\073\040\037\212\102\126\341
\013\032\277\173\320\042\103\054\104\214\373\345\052\264\154\034
\034\272\224\340\023\176\041\346\232\302\313\305\102\144\264\036
\224\173\010\045\310\161\314\207\105\127\205\323\237\051\142\042
\203\121\227\000\030\227\167\152\230\222\311\174\140\154\337\154
\175\112\344\160\114\302\236\270\035\367\320\064\307\017\314\373
\247\377\003\276\255\160\220\332\013\335\310\155\227\137\232\177
\011\062\101\375\315\242\314\132\155\114\362\252\111\376\146\370
\351\330\065\353\016\050\036\356\110\057\072\320\171\011\070\174
\246\042\202\223\225\320\003\276\276\002\240\005\335\040\042\343
\157\035\210\064\140\306\346\012\271\011\165\013\360\007\350\151
\226\065\307\373\043\201\216\070\071\270\105\053\103\170\242\321
\054\024\377\015\050\162\162\225\233\136\011\333\211\104\230\252
\241\111\273\161\122\362\277\366\377\047\241\066\257\270\266\167
\210\335\072\244\155\233\064\220\334\024\135\060\277\267\353\027
\344\207\267\161\320\241\327\167\025\324\102\327\362\363\061\231
\135\233\335\026\155\077\352\006\043\370\106\242\042\355\223\366
\335\232\346\052\207\261\230\124\361\042\367\153\105\343\342\216
\166\035\232\215\304\006\215\066\267\024\363\235\124\151\267\216
\074\325\244\155\223\201\267\255\366\275\144\173\302\311\150\071
\240\222\234\315\064\206\221\220\372\144\121\235\376\376\353\245
\365\165\336\211\367\162

END

CKA_NSS_MOZILLA_CA_POLICY

CK_BBOOL CK_TRUE

CKA_NSS_SERVER_DISTRUST_AFTER CK_BBOOL CK_FALSE

CKA_NSS_EMAIL_DISTRUST_AFTER CK_BBOOL CK_FALSE

```

# Trust for "NAVER Global Root Certification Authority"
# Issuer: CN=NAVER Global Root Certification Authority,O=NAVER BUSINESS PLATFORM Corp.,C=KR
# Serial Number:01:94:30:1e:a2:0b:dd:f5:c5:33:2a:b1:43:44:71:f8:d6:50:4d:0d
# Subject: CN=NAVER Global Root Certification Authority,O=NAVER BUSINESS PLATFORM Corp.,C=KR
# Not Valid Before: Fri Aug 18 08:58:42 2017
# Not Valid After : Tue Aug 18 23:59:59 2037
# Fingerprint (SHA-256):
88:F4:38:DC:F8:FF:D1:FA:8F:42:91:15:FF:E5:F8:2A:E1:E0:6E:0C:70:C3:75:FA:AD:71:7B:34:A4:9E:72:65
# Fingerprint (SHA1): 8F:6B:F2:A9:27:4A:DA:14:A0:C4:F4:8E:61:27:F9:C0:1E:78:5D:D1
CKA_CLASS
CK_OBJECT_CLASS CKO_NSS_TRUST
CKA_TOKEN CK_BBOOL CK_TRUE
CKA_PRIVATE CK_BBOOL CK_FALSE
CKA_MODIFIABLE CK_BBOOL CK_FALSE
CKA_LABEL UTF8 "NAVER Global Root Certification Authority"
CKA_CERT_SHA1_HASH MULTILINE_OCTAL
\217\153\362\251\047\112\332\024\240\304\364\216\141\047\371\300
\036\170\135\321
END
CKA_CERT_MD5_HASH MULTILINE_OCTAL
\310\176\101\366\045\073\365\011\263\027\350\106\075\277\320\233
END
CKA_ISSUER MULTILINE_OCTAL
\060\151\061\013\060\011\006\003\125\004\006\023\002\113\122\061
\046\060\044\006\003\125\004\012\014\035\116\101\126\105\122\040
\102\125\123\111\116\105\123\123\040\120\114\101\124\106\117\122
\115\040\103\157\162\160\056\061\062\060\060\006\003\125\004\003
\014\051\116\101\126\105\122\040\107\154\157\142\141\154\040\122
\157\157\164\040\103\145\162\164\151\146\151\143\141\164\151\157
\156\040\101\165\164\150\157\162\151\164\171
END
CKA_SERIAL_NUMBER MULTILINE_OCTAL
\002\024\001\224\060\036\242\013\335\365\305\063\052\261\103\104
\161\370\326\120\115\015
END
CKA_TRUST_SERVER_AUTH
CK_TRUST CKT_NSS_TRUSTED_DELEGATOR
CKA_TRUST_EMAIL_PROTECTION CK_TRUST CKT_NSS_MUST_VERIFY_TRUST
CKA_TRUST_CODE_SIGNING CK_TRUST CKT_NSS_MUST_VERIFY_TRUST
CKA_TRUST_STEP_UP_APPROVED CK_BBOOL CK_FALSE

#
# Certificate "AC RAIZ FNMT-RCM SERVIDORES SEGUROS"
#
# Issuer: CN=AC RAIZ FNMT-RCM SERVIDORES SEGUROS,OID.2.5.4.97=VATES-
Q2826004J,OU=Ceres,O=FNMT-RCM,C=ES
# Serial Number:62:f6:32:6c:e5:c4:e3:68:5c:1b:62:dd:9c:2e:9d:95

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# Subject: CN=AC RAIZ FNMT-RCM SERVIDORES SEGUROS,OID.2.5.4.97=VATES-
Q2826004J,OU=Ceres,O=FNMT-RCM,C=ES
# Not Valid Before: Thu Dec 20 09:37:33 2018
# Not Valid After : Sun Dec 20 09:37:33 2043
# Fingerprint (SHA-256):
55:41:53:B1:3D:2C:F9:DD:B7:53:BF:BE:1A:4E:0A:E0:8D:0A:A4:18:70:58:FE:60:A2:B8:62:B2:E4:B8:7B:CB
# Fingerprint (SHA1): 62:FF:D9:9E:C0:65:0D:03:CE:75:93:D2:ED:3F:2D:32:C9:E3:E5:4A
CKA_CLASS CK_OBJECT_CLASS CKO_CERTIFICATE
CKA_TOKEN CK_BBOOL CK_TRUE
CKA_PRIVATE CK_BBOOL CK_FALSE
CKA_MODIFIABLE CK_BBOOL CK_FALSE
CKA_LABEL UTF8
"AC RAIZ FNMT-RCM SERVIDORES SEGUROS"
CKA_CERTIFICATE_TYPE CK_CERTIFICATE_TYPE CKC_X_509
CKA_SUBJECT MULTILINE_OCTAL
\060\170\061\013\060\011\006\003\125\004\006\023\002\105\123\061
\021\060\017\006\003\125\004\012\014\010\106\116\115\124\055\122
\103\115\061\016\060\014\006\003\125\004\013\014\005\103\145\162
\145\163\061\030\060\026\006\003\125\004\141\014\017\126\101\124
\105\123\055\121\062\070\062\066\060\060\064\112\061\054\060\052
\006\003\125\004\003\014\043\101\103\040\122\101\111\132\040\106
\116\115\124\055\122\103\115\040\123\105\122\126\111\104\117\122
\105\123\040\123\105\107\125\122\117\123
END
CKA_ID UTF8 "0"
CKA_ISSUER MULTILINE_OCTAL
\060\170\061\013\060\011\006\003\125\004\006\023\002\105\123\061
\021\060\017\006\003\125\004\012\014\010\106\116\115\124\055\122
\103\115\061\016\060\014\006\003\125\004\013\014\005\103\145\162
\145\163\061\030\060\026\006\003\125\004\141\014\017\126\101\124
\105\123\055\121\062\070\062\066\060\060\064\112\061\054\060\052
\006\003\125\004\003\014\043\101\103\040\122\101\111\132\040\106
\116\115\124\055\122\103\115\040\123\105\122\126\111\104\117\122
\105\123\040\123\105\107\125\122\117\123
END
CKA_SERIAL_NUMBER
MULTILINE_OCTAL
\002\020\142\366\062\154\345\304\343\150\134\033\142\335\234\056
\235\225
END
CKA_VALUE MULTILINE_OCTAL
\060\202\002\156\060\202\001\363\240\003\002\001\002\002\020\142
\366\062\154\345\304\343\150\134\033\142\335\234\056\235\225\060
\012\006\010\052\206\110\316\075\004\003\003\060\170\061\013\060
\011\006\003\125\004\006\023\002\105\123\061\021\060\017\006\003
\125\004\012\014\010\106\116\115\124\055\122\103\115\061\016\060
\014\006\003\125\004\013\014\005\103\145\162\145\163\061\030\060
\026\006\003\125\004\141\014\017\126\101\124\105\123\055\121\062

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\070\062\066\060\060\064\112\061\054\060\052\006\003\125\004\003
\014\043\101\103\040\122\101\111\132\040\106\116\115\124\055\122
\103\115\040\123\105\122\126\111\104\117\122\105\123\040\123\105
\107\125\122\117\123\060\036\027\015\061\070\061\062\062\060\060
\071\063\067\063\063\132\027\015\064\063\061\062\062\060\060\071
\063\067\063\063\132\060\170\061\013\060\011\006\003\125\004\006
\023\002\105\123\061\021\060\017\006\003\125\004\012\014\010\106
\116\115\124\055\122\103\115\061\016\060\014\006\003\125\004\013
\014\005\103\145\162\145\163\061\030\060\026\006\003\125\004\141
\014\017\126\101\124\105\123\055\121\062\070\062\066\060\060\064
\112\061\054\060\052\006\003\125\004\003\014\043\101\103\040\122
\101\111\132\040\106\116\115\124\055\122\103\115\040\123\105\122
\126\111\104\117\122\105\123\040\123\105\107\125\122\117\123\060
\166\060\020\006\007\052\206\110\316\075\002\001\006\005\053\201
\004\000\042\003\142\000\004\366\272\127\123\310\312\253\337\066
\112\122\041\344\227\322\203\147\236\360\145\121\320\136\207\307
\107\261\131\362\127\107\233\000\002\223\104\027\151\333\102\307
\261\262\072\030\016\264\135\214\263\146\135\241\064\371\066\054
\111\333\363\106\374\263\104\151\104\023\146\375\327\305\375\257
\066\115\316\003\115\007\161\317\257\152\005\322\242\103\132\012
\122\157\001\003\116\216\213\243\102\060\100\060\017\006\003\125
\035\023\001\001\377\004\005\060\003\001\001\377\060\016\006\003
\125\035\017\001\001\377\004\004\003\002\001\006\060\035\006\003
\125\035\016\004\026\004\024\001\271\057\357\277\021\206\140\362
\117\320\101\156\253\163\037\347\322\156\111\060\012\006\010\052
\206\110\316\075\004\003\003\003\151\000\060\146\002\061\000\256
\112\343\053\100\303\164\021\362\225\255\026\043\336\116\014\032
\346\135\245\044\136\153\104\173\374\070\342\117\313\234\105\027
\021\114\024\047\046\125\071\165\112\003\314\023\220\237\222\002
\061\000\372\112\154\140\210\163\363\356\270\230\142\251\316\053
\302\331\212\246\160\061\035\257\260\224\114\353\117\306\343\321
\363\142\247\074\377\223\056\007\134\111\001\147\151\022\002\162
\277\347

END

CKA_NSS_MOZILLA_CA_POLICY

CK_BBOOL CK_TRUE

CKA_NSS_SERVER_DISTRUST_AFTER CK_BBOOL CK_FALSE

CKA_NSS_EMAIL_DISTRUST_AFTER CK_BBOOL CK_FALSE

Trust for "AC

RAIZ FNMT-RCM SERVIDORES SEGUROS"

Issuer: CN=AC RAIZ FNMT-RCM SERVIDORES SEGUROS,OID.2.5.4.97=VATES-
Q2826004J,OU=Ceres,O=FNMT-RCM,C=ES

Serial Number:62:f6:32:6c:e5:c4:e3:68:5c:1b:62:dd:9c:2e:9d:95

Subject: CN=AC RAIZ FNMT-RCM SERVIDORES SEGUROS,OID.2.5.4.97=VATES-
Q2826004J,OU=Ceres,O=FNMT-RCM,C=ES

Not Valid Before: Thu Dec 20 09:37:33 2018

Not Valid After : Sun Dec 20 09:37:33 2043

```

# Fingerprint (SHA-256):
55:41:53:B1:3D:2C:F9:DD:B7:53:BF:BE:1A:4E:0A:E0:8D:0A:A4:18:70:58:FE:60:A2:B8:62:B2:E4:B8:7B:CB
# Fingerprint (SHA1): 62:FF:D9:9E:C0:65:0D:03:CE:75:93:D2:ED:3F:2D:32:C9:E3:E5:4A
CKA_CLASS CK_OBJECT_CLASS CKO_NSS_TRUST
CKA_TOKEN CK_BBOOL CK_TRUE
CKA_PRIVATE CK_BBOOL CK_FALSE
CKA_MODIFIABLE CK_BBOOL CK_FALSE
CKA_LABEL UTF8 "AC RAIZ FNMT-RCM SERVIDORES SEGUROS"
CKA_CERT_SHA1_HASH MULTILINE_OCTAL
\142\377\331\236\300\145\015\003\316\165\223\322\355\077\055\062
\311\343\345\112
END
CKA_CERT_MD5_HASH MULTILINE_OCTAL
\031\066\234\122\003\057\322\321\273\043\314\335\036\022\125\273
END
CKA_ISSUER
MULTILINE_OCTAL
\060\170\061\013\060\011\006\003\125\004\006\023\002\105\123\061
\021\060\017\006\003\125\004\012\014\010\106\116\115\124\055\122
\103\115\061\016\060\014\006\003\125\004\013\014\005\103\145\162
\145\163\061\030\060\026\006\003\125\004\141\014\017\126\101\124
\105\123\055\121\062\070\062\066\060\060\064\112\061\054\060\052
\006\003\125\004\003\014\043\101\103\040\122\101\111\132\040\106
\116\115\124\055\122\103\115\040\123\105\122\126\111\104\117\122
\105\123\040\123\105\107\125\122\117\123
END
CKA_SERIAL_NUMBER MULTILINE_OCTAL
\002\020\142\366\062\154\345\304\343\150\134\033\142\335\234\056
\235\225
END
CKA_TRUST_SERVER_AUTH CK_TRUST CKT_NSS_TRUSTED_DELEGATOR
CKA_TRUST_EMAIL_PROTECTION CK_TRUST CKT_NSS_MUST_VERIFY_TRUST
CKA_TRUST_CODE_SIGNING CK_TRUST CKT_NSS_MUST_VERIFY_TRUST
CKA_TRUST_STEP_UP_APPROVED CK_BBOOL CK_FALSE

#
# Certificate "GlobalSign Secure Mail Root R45"
#
# Issuer: CN=GlobalSign Secure Mail Root R45,O=GlobalSign nv-sa,C=BE
# Serial Number:76:53:fe:a8:4c:50:ab:9f:8d:32:b5:1d:03:8f:57:dc
#
Subject: CN=GlobalSign Secure Mail Root R45,O=GlobalSign nv-sa,C=BE
# Not Valid Before: Wed Mar 18 00:00:00 2020
# Not Valid After : Sat Mar 18 00:00:00 2045
# Fingerprint (SHA-256):
31:9A:F0:A7:72:9E:6F:89:26:9C:13:1E:A6:A3:A1:6F:CD:86:38:9F:DC:AB:3C:47:A4:A6:75:C1:61:A3:F9:74
# Fingerprint (SHA1): 76:18:D1:F3:80:24:3D:52:40:C6:11:6A:AD:57:77:09:7D:81:30:A0
CKA_CLASS CK_OBJECT_CLASS CKO_CERTIFICATE

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```
CKA_TOKEN CK_BBOOL CK_TRUE
CKA_PRIVATE CK_BBOOL CK_FALSE
CKA_MODIFIABLE CK_BBOOL CK_FALSE
CKA_LABEL UTF8 "GlobalSign Secure Mail Root R45"
CKA_CERTIFICATE_TYPE CK_CERTIFICATE_TYPE CKC_X_509
CKA_SUBJECT MULTILINE_OCTAL
\060\122\061\013\060\011\006\003\125\004\006\023\002\102\105\061
\031\060\027\006\003\125\004\012\023\020\107\154\157\142\141\154
\123\151\147\156\040\156\166\055\163\141\061\050\060\046\006\003
\125\004\003\023\037\107\154\157\142\141\154\123\151\147\156\040
\123\145\143\165\162\145\040\115\141\151\154\040\122\157\157\164
\040\122\064\065
END
CKA_ID
UTF8 "0"
CKA_ISSUER MULTILINE_OCTAL
\060\122\061\013\060\011\006\003\125\004\006\023\002\102\105\061
\031\060\027\006\003\125\004\012\023\020\107\154\157\142\141\154
\123\151\147\156\040\156\166\055\163\141\061\050\060\046\006\003
\125\004\003\023\037\107\154\157\142\141\154\123\151\147\156\040
\123\145\143\165\162\145\040\115\141\151\154\040\122\157\157\164
\040\122\064\065
END
CKA_SERIAL_NUMBER MULTILINE_OCTAL
\002\020\166\123\376\250\114\120\253\237\215\062\265\035\003\217
\127\334
END
CKA_VALUE MULTILINE_OCTAL
\060\202\005\160\060\202\003\130\240\003\002\001\002\002\020\166
\123\376\250\114\120\253\237\215\062\265\035\003\217\127\334\060
\015\006\011\052\206\110\206\367\015\001\001\014\005\000\060\122
\061\013\060\011\006\003\125\004\006\023\002\102\105\061\031\060
\027\006\003\125\004\012\023\020\107\154\157\142\141\154\123\151
\147\156\040\156\166\055\163\141\061\050\060\046\006\003\125\004
\003\023\037\107\154\157\142\141\154\123\151\147\156\040\123\145
\143\165\162\145\040\115\141\151\154\040\122\157\157\164\040\122
\064\065\060\036\027\015\062\060\060\063\061\070\060\060\060\060
\060\060\132\027\015\064\065\060\063\061\070\060\060\060\060\060
\060\132\060\122\061\013\060\011\006\003\125\004\006\023\002\102
\105\061\031\060\027\006\003\125\004\012\023\020\107\154\157\142
\141\154\123\151\147\156\040\156\166\055\163\141\061\050\060\046
\006\003\125\004\003\023\037\107\154\157\142\141\154\123\151\147
\156\040\123\145\143\165\162\145\040\115\141\151\154\040\122\157
\157\164\040\122\064\065\060\202\002\042\060\015\006\011\052\206
\110\206\367\015\001\001\001\005\000\003\202\002\017\000\060\202
\002\012\002\202\002\001\000\334\171\314\155\006\371\155\273\340
\126\004\154\177\340\165\314\055\005\111\350\113\334\124\354\133
\167\225\162\277\177\142\235\205\251\212\044\120\137\123\345\333
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\164\157\244\051\133\023\052\011\255\232\305\057\302\367\166\073
\241\105\106\252\103\346\044\376\053\260\157\062\160\031\106\132
\171\046\057\374\075\175\137\144\313\127\314\141\141\250\331\225
\156\343\225\240\156\177\107\022\030\326\357\003\311\373\212\372
\232\275\202\025\251\125\167\113\021\117\131\340\153\303\161\363
\014\330\124\325\201\150\076\023\271\025\056\207\212\074\104\047
\066\142\044\156\370\054\005\162\060\141\275\102\221\043\304\235
\045\247\331\124\232\024\243\061\255\200\171\014\247\143\154\230
\243\254\127\107\063\037\145\226\341\320\322\065\332\371\161\367
\241\246\045\265\101\135\337\076\140\330\321\366\237\245\362\270
\314\023\252\217\371\262\156\341\203\055\223\335\076\205\032\335
\350\261\134\046\001\313\111\205\374\374\322\324\177\205\142\206
\164\371\313\354\065\042\242\014\060\217\073\253\171\353\126\362
\372\102\363\355\371\037\105\211\100\051\255\352\222\164\352\122
\375\126\264\053\332\242\355\165\302\156\253\316\122\220\113\366
\336\360\111\217\232\110\324\210\031\155\105\346\314\214\271\335
\144\140\140\002\100\370\271\317\274\130\353\075\205\271\306\012
\323\234\007\146\217\307\030\071\043\106\341\074\036\243\057\120
\141\222\013\075\053\154\361\243\107\070\127\221\253\015\217\306
\235\115\004\322\046\122\134\345\245\375\052\055\026\052\001\151
\347\251\175\341\066\267\261\052\305\331\261\215\275\271\213\316
\314\213\241\076\013\110\315\120\225\064\304\330\010\131\330\153
\046\364\276\365\324\042\027\000\127\311\256\233\004\060\063\237
\013\373\337\126\242\311\156\124\166\332\261\227\142\047\131\017
\021\212\042\033\144\226\077\250\361\267\044\112\215\074\123\174
\155\203\166\075\262\046\110\163\365\104\026\001\055\011\052\216
\026\226\120\320\163\006\135\273\042\110\202\114\012\106\132\077
\200\377\134\362\362\232\254\054\010\340\326\352\360\022\070\201
\117\246\020\355\106\253\314\026\234\013\317\144\246\231\002\205
\104\147\106\255\375\115\347\002\003\001\000\001\243\102\060\100
\060\016\006\003\125\035\017\001\001\377\004\004\003\002\001\206
\060\017\006\003\125\035\023\001\001\377\004\005\060\003\001\001
\377\060\035\006\003\125\035\016\004\026\004\024\240\223\025\050
\156\356\217\010\262\065\306\236\142\171\164\247\261\016\053\173
\060\015\006\011\052\206\110\206\367\015\001\001\014\005\000\003
\202\002\001\000\105\012\370\321\134\254\142\201\320\004\327\266
\377\127\121\211\013\014\313\336\044\145\067\373\253\236\355\146
\364\352\014\031\151\211\270\031\261\060\126\264\331\366\367\276
\306\256\227\313\105\366\021\214\072\060\144\114\301\237\131\300
\106\102\010\006\107\144\027\170\340\225\007\006\326\214\242\254
\251\331\077\323\173\126\117\374\304\207\050\337\266\053\026\043
\300\237\037\133\343\326\104\136\042\117\043\004\214\065\026\265
\171\007\206\134\057\227\342\366\010\144\246\334\333\250\212\343
\244\173\167\015\321\051\223\050\040\264\123\243\113\116\137\336
\301\366\165\043\374\037\074\170\117\160\061\170\057\242\065\124
\161\004\254\310\304\155\303\366\221\261\376\315\356\104\156\201
\366\100\305\076\052\001\277\253\114\261\003\077\015\021\344\017
\322\044\343\042\210\233\237\137\107\075\121\111\340\011\067\176

```
\027\041\061\166\267\147\161\110\050\113\045\327\020\350\237\141
\131\026\305\076\062\116\037\014\316\243\314\017\344\307\021\007
\042\057\070\010\335\133\227\353\102\154\131\232\232\356\172\320
\235\337\305\333\011\103\056\012\252\031\075\153\350\152\060\172
\127\346\277\263\152\071\251\217\343\361\117\145\150\266\275\237
\050\217\241\026\132\011\120\072\062\056\035\057\104\021\102\246
\000\346\061\230\377\055\241\017\346\244\140\126\317\171\327\262
\116\327\260\372\156\014\127\043\307\316\037\245\261\114\155\031
\111\236\016\177\160\217\161\077\130\050\237\165\335\141\340\072
\267\071\266\356\227\324\065\121\373\213\111\140\310\074\146\256
\227\356\215\046\131\127\273\170\360\172\120\060\011\260\140\252
\237\116\334\311\076\036\072\334\142\223\063\260\072\124\164\157
\054\061\105\321\153\021\062\152\150\166\366\075\366\152\023\136
\044\230\347\352\035\232\317\170\202\007\140\367\115\020\323\201
\232\105\215\236\257\233\334\200\307\103\262\225\150\244\303\016
\350\012\107\025\277\124\063\334\001\347\325\246\036\163\330\172
\262\277\057\255\343\125\060\236\337\016\101\274\340\021\365\241
\014\250\042\341\343\000\243\116\160\174\222\343\004\321\172\102
\212\165\220\131\343\233\321\114\242\144\275\163\171\233\157\362
\263\301\366\074
```

END

CKA_NSS_MOZILLA_CA_POLICY

CK_BBOOL CK_TRUE

CKA_NSS_SERVER_DISTRUST_AFTER CK_BBOOL CK_FALSE

CKA_NSS_EMAIL_DISTRUST_AFTER CK_BBOOL CK_FALSE

Trust for "GlobalSign Secure Mail Root R45"

Issuer: CN=GlobalSign Secure Mail Root R45,O=GlobalSign nv-sa,C=BE

Serial Number:76:53:fe:a8:4c:50:ab:9f:8d:32:b5:1d:03:8f:57:dc

Subject: CN=GlobalSign Secure Mail Root R45,O=GlobalSign nv-sa,C=BE

Not Valid Before: Wed Mar 18 00:00:00 2020

Not Valid After : Sat Mar 18 00:00:00 2045

Fingerprint (SHA-256):

31:9A:F0:A7:72:9E:6F:89:26:9C:13:1E:A6:A3:A1:6F:CD:86:38:9F:DC:AB:3C:47:A4:A6:75:C1:61:A3:F9:74

Fingerprint (SHA1): 76:18:D1:F3:80:24:3D:52:40:C6:11:6A:AD:57:77:09:7D:81:30:A0

CKA_CLASS CK_OBJECT_CLASS CKO_NSS_TRUST

CKA_TOKEN CK_BBOOL CK_TRUE

CKA_PRIVATE CK_BBOOL CK_FALSE

CKA_MODIFIABLE

CK_BBOOL CK_FALSE

CKA_LABEL UTF8 "GlobalSign Secure Mail Root R45"

CKA_CERT_SHA1_HASH MULTILINE_OCTAL

```
\166\030\321\363\200\044\075\122\100\306\021\152\255\127\167\011
\175\201\060\240
```

END

CKA_CERT_MD5_HASH MULTILINE_OCTAL

```
\223\304\173\263\016\124\107\034\103\054\213\276\160\205\142\051
END
```

```

CKA_ISSUER MULTILINE_OCTAL
\060\122\061\013\060\011\006\003\125\004\006\023\002\102\105\061
\031\060\027\006\003\125\004\012\023\020\107\154\157\142\141\154
\123\151\147\156\040\156\166\055\163\141\061\050\060\046\006\003
\125\004\003\023\037\107\154\157\142\141\154\123\151\147\156\040
\123\145\143\165\162\145\040\115\141\151\154\040\122\157\157\164
\040\122\064\065
END
CKA_SERIAL_NUMBER MULTILINE_OCTAL
\002\020\166\123\376\250\114\120\253\237\215\062\265\035\003\217
\127\334
END
CKA_TRUST_SERVER_AUTH CK_TRUST CKT_NSS_MUST_VERIFY_TRUST
CKA_TRUST_EMAIL_PROTECTION CK_TRUST CKT_NSS_TRUSTED_DELEGATOR
CKA_TRUST_CODE_SIGNING CK_TRUST CKT_NSS_MUST_VERIFY_TRUST
CKA_TRUST_STEP_UP_APPROVED CK_BBOOL
CK_FALSE

#
# Certificate "GlobalSign Secure Mail Root E45"
#
# Issuer: CN=GlobalSign Secure Mail Root E45,O=GlobalSign nv-sa,C=BE
# Serial Number:76:53:fe:aa:27:1d:95:46:5d:d6:f1:9e:e5:b8:90:0a
# Subject: CN=GlobalSign Secure Mail Root E45,O=GlobalSign nv-sa,C=BE
# Not Valid Before: Wed Mar 18 00:00:00 2020
# Not Valid After : Sat Mar 18 00:00:00 2045
# Fingerprint (SHA-256):
5C:BF:6F:B8:1F:D4:17:EA:41:28:CD:6F:81:72:A3:C9:40:20:94:F7:4A:B2:ED:3A:06:B4:40:5D:04:F3:0B:19
# Fingerprint (SHA1): 18:2E:1F:32:4F:89:DF:BE:FE:88:89:F0:93:C2:C4:A0:2B:67:75:21
CKA_CLASS CK_OBJECT_CLASS CKO_CERTIFICATE
CKA_TOKEN CK_BBOOL CK_TRUE
CKA_PRIVATE CK_BBOOL CK_FALSE
CKA_MODIFIABLE CK_BBOOL CK_FALSE
CKA_LABEL UTF8 "GlobalSign Secure Mail Root E45"
CKA_CERTIFICATE_TYPE CK_CERTIFICATE_TYPE CKC_X_509
CKA_SUBJECT MULTILINE_OCTAL
\060\122\061\013\060\011\006\003\125\004\006\023\002\102\105\061
\031\060\027\006\003\125\004\012\023\020\107\154\157\142\141\154
\123\151\147\156\040\156\166\055\163\141\061\050\060\046\006\003
\125\004\003\023\037\107\154\157\142\141\154\123\151\147\156\040
\123\145\143\165\162\145\040\115\141\151\154\040\122\157\157\164
\040\105\064\065
END
CKA_ID
UTF8 "0"
CKA_ISSUER MULTILINE_OCTAL
\060\122\061\013\060\011\006\003\125\004\006\023\002\102\105\061
\031\060\027\006\003\125\004\012\023\020\107\154\157\142\141\154

```

\123\151\147\156\040\156\166\055\163\141\061\050\060\046\006\003
\125\004\003\023\037\107\154\157\142\141\154\123\151\147\156\040
\123\145\143\165\162\145\040\115\141\151\154\040\122\157\157\164
\040\105\064\065

END

CKA_SERIAL_NUMBER MULTILINE_OCTAL

\002\020\166\123\376\252\047\035\225\106\135\326\361\236\345\270
\220\012

END

CKA_VALUE MULTILINE_OCTAL

\060\202\002\041\060\202\001\247\240\003\002\001\002\002\020\166
\123\376\252\047\035\225\106\135\326\361\236\345\270\220\012\060
\012\006\010\052\206\110\316\075\004\003\003\060\122\061\013\060
\011\006\003\125\004\006\023\002\102\105\061\031\060\027\006\003
\125\004\012\023\020\107\154\157\142\141\154\123\151\147\156\040
\156\166\055\163\141\061\050\060\046\006\003\125\004\003\023\037
\107\154\157\142\141\154\123\151\147\156\040\123\145\143\165\162
\145\040\115\141\151\154\040\122\157\157\164\040\105\064\065\060
\036\027\015\062\060\060\063\061\070\060\060\060\060\060\060\132
\027\015\064\065\060\063\061\070\060\060\060\060\060\060\132\060
\122\061\013\060\011\006\003\125\004\006\023\002\102\105\061\031
\060\027\006\003\125\004\012\023\020\107\154\157\142\141\154\123
\151\147\156\040\156\166\055\163\141\061\050\060\046\006\003\125
\004\003\023\037\107\154\157\142\141\154\123\151\147\156\040\123
\145\143\165\162\145\040\115\141\151\154\040\122\157\157\164\040
\105\064\065\060\166\060\020\006\007\052\206\110\316\075\002\001
\006\005\053\201\004\000\042\003\142\000\004\371\171\213\201\107
\067\211\226\077\105\111\120\177\032\046\013\223\062\176\056\300
\300\247\010\232\303\156\217\233\076\013\042\354\067\123\267\157
\212\260\274\047\067\113\155\251\106\073\331\037\377\245\241\104
\273\055\163\277\236\101\007\134\123\233\121\010\072\132\273\157
\070\307\026\221\170\302\112\023\151\035\202\337\132\057\000\210
\226\242\056\034\164\371\235\176\146\067\212\243\102\060\100\060
\016\006\003\125\035\017\001\001\377\004\004\003\002\001\206\060
\017\006\003\125\035\023\001\001\377\004\005\060\003\001\001\377
\060\035\006\003\125\035\016\004\026\004\024\337\023\136\213\137
\302\100\002\375\126\267\224\114\266\036\325\246\261\024\226\060
\012\006\010\052\206\110\316\075\004\003\003\003\150\000\060\145
\002\060\023\260\276\327\161\040\076\344\253\234\316\066\022\175
\137\114\037\052\265\151\105\063\137\323\055\132\262\344\210\307
\336\012\066\102\062\171\235\246\153\272\341\371\104\052\173\212
\303\022\002\061\000\240\146\034\116\207\235\207\311\355\231\114
\033\012\356\055\140\303\067\307\035\315\265\162\260\331\306\357
\274\362\377\077\360\122\335\010\347\252\144\171\303\344\151\127
\221\057\244\313\174

END

CKA_NSS_MOZILLA_CA_POLICY

```

CK_BBOOL CK_TRUE
CKA_NSS_SERVER_DISTRUST_AFTER
CK_BBOOL CK_FALSE
CKA_NSS_EMAIL_DISTRUST_AFTER CK_BBOOL CK_FALSE

# Trust for "GlobalSign Secure Mail Root E45"
# Issuer: CN=GlobalSign Secure Mail Root E45,O=GlobalSign nv-sa,C=BE
# Serial Number:76:53:fe:aa:27:1d:95:46:5d:d6:f1:9e:e5:b8:90:0a
# Subject: CN=GlobalSign Secure Mail Root E45,O=GlobalSign nv-sa,C=BE
# Not Valid Before: Wed Mar 18 00:00:00 2020
# Not Valid After : Sat Mar 18 00:00:00 2045
# Fingerprint (SHA-256):
5C:BF:6F:B8:1F:D4:17:EA:41:28:CD:6F:81:72:A3:C9:40:20:94:F7:4A:B2:ED:3A:06:B4:40:5D:04:F3:0B:19
# Fingerprint (SHA1): 18:2E:1F:32:4F:89:DF:BE:FE:88:89:F0:93:C2:C4:A0:2B:67:75:21
CKA_CLASS CK_OBJECT_CLASS CKO_NSS_TRUST
CKA_TOKEN CK_BBOOL CK_TRUE
CKA_PRIVATE CK_BBOOL CK_FALSE
CKA_MODIFIABLE CK_BBOOL CK_FALSE
CKA_LABEL UTF8 "GlobalSign Secure Mail Root E45"
CKA_CERT_SHA1_HASH MULTILINE_OCTAL
\030\056\037\062\117\211\337\276\376\210\211\360\223\302\304\240
\053\147\165\041
END
CKA_CERT_MD5_HASH MULTILINE_OCTAL
\305\374\306\056\237\364\122\055\052\250\244\272\373\147\062\377
END
CKA_ISSUER
MULTILINE_OCTAL
\060\122\061\013\060\011\006\003\125\004\006\023\002\102\105\061
\031\060\027\006\003\125\004\012\023\020\107\154\157\142\141\154
\123\151\147\156\040\156\166\055\163\141\061\050\060\046\006\003
\125\004\003\023\037\107\154\157\142\141\154\123\151\147\156\040
\123\145\143\165\162\145\040\115\141\151\154\040\122\157\157\164
\040\105\064\065
END
CKA_SERIAL_NUMBER MULTILINE_OCTAL
\002\020\166\123\376\252\047\035\225\106\135\326\361\236\345\270
\220\012
END
CKA_TRUST_SERVER_AUTH CK_TRUST CKT_NSS_MUST_VERIFY_TRUST
CKA_TRUST_EMAIL_PROTECTION CK_TRUST CKT_NSS_TRUSTED_DELEGATOR
CKA_TRUST_CODE_SIGNING CK_TRUST CKT_NSS_MUST_VERIFY_TRUST
CKA_TRUST_STEP_UP_APPROVED CK_BBOOL CK_FALSE

#
# Certificate "GlobalSign Root R46"
#
# Issuer: CN=GlobalSign Root R46,O=GlobalSign nv-sa,C=BE

```

```
# Serial Number:11:d2:bb:b9:d7:23:18:9e:40:5f:0a:9d:2d:d0:df:25:67:d1
# Subject: CN=GlobalSign Root R46,O=GlobalSign nv-sa,C=BE
# Not Valid Before: Wed Mar 20 00:00:00 2019
# Not
Valid After : Tue Mar 20 00:00:00 2046
# Fingerprint (SHA-256):
4F:A3:12:6D:8D:3A:11:D1:C4:85:5A:4F:80:7C:BA:D6:CF:91:9D:3A:5A:88:B0:3B:EA:2C:63:72:D9:3C:40:C9
# Fingerprint (SHA1): 53:A2:B0:4B:CA:6B:D6:45:E6:39:8A:8E:C4:0D:D2:BF:77:C3:A2:90
CKA_CLASS CK_OBJECT_CLASS CKO_CERTIFICATE
CKA_TOKEN CK_BBOOL CK_TRUE
CKA_PRIVATE CK_BBOOL CK_FALSE
CKA_MODIFIABLE CK_BBOOL CK_FALSE
CKA_LABEL UTF8 "GlobalSign Root R46"
CKA_CERTIFICATE_TYPE CK_CERTIFICATE_TYPE CKC_X_509
CKA_SUBJECT MULTILINE_OCTAL
\060\106\061\013\060\011\006\003\125\004\006\023\002\102\105\061
\031\060\027\006\003\125\004\012\023\020\107\154\157\142\141\154
\123\151\147\156\040\156\166\055\163\141\061\034\060\032\006\003
\125\004\003\023\023\107\154\157\142\141\154\123\151\147\156\040
\122\157\157\164\040\122\064\066
END
CKA_ID UTF8 "0"
CKA_ISSUER MULTILINE_OCTAL
\060\106\061\013\060\011\006\003\125\004\006\023\002\102\105\061
\031\060\027\006\003\125\004\012\023\020\107\154\157\142\141\154
\123\151\147\156\040\156\166\055\163\141\061\034\060\032\006\003
\125\004\003\023\023\107\154\157\142\141\154\123\151\147\156\040
\122\157\157\164\040\122\064\066
END
CKA_SERIAL_NUMBER
MULTILINE_OCTAL
\002\022\021\322\273\271\327\043\030\236\100\137\012\235\055\320
\337\045\147\321
END
CKA_VALUE MULTILINE_OCTAL
\060\202\005\132\060\202\003\102\240\003\002\001\002\002\022\021
\322\273\271\327\043\030\236\100\137\012\235\055\320\337\045\147
\321\060\015\006\011\052\206\110\206\367\015\001\001\014\005\000
\060\106\061\013\060\011\006\003\125\004\006\023\002\102\105\061
\031\060\027\006\003\125\004\012\023\020\107\154\157\142\141\154
\123\151\147\156\040\156\166\055\163\141\061\034\060\032\006\003
\125\004\003\023\023\107\154\157\142\141\154\123\151\147\156\040
\122\157\157\164\040\122\064\066\060\036\027\015\061\071\060\063
\062\060\060\060\060\060\060\060\132\027\015\064\066\060\063\062
\060\060\060\060\060\060\060\132\060\106\061\013\060\011\006\003
\125\004\006\023\002\102\105\061\031\060\027\006\003\125\004\012
\023\020\107\154\157\142\141\154\123\151\147\156\040\156\166\055
\163\141\061\034\060\032\006\003\125\004\003\023\023\107\154\157
```

\142\141\154\123\151\147\156\040\122\157\157\164\040\122\064\066
\060\202\002\042\060\015\006\011\052\206\110\206\367\015\001\001
\001\005\000\003\202\002\017\000\060\202\002\012\002\202\002\001
\000\254\254\164\062\350\263\145\345\272\355\103\046\035\246\211
\015\105\272\051\210\262\244\035\143\335\323\301\054\011\127\211
\071\241\125\351\147\064\167\014\156\344\125\035\122\045\322\023
\153\136\341\035\251\267\175\211\062\137\015\236\237\054\172\143
\140\100\037\246\260\266\170\217\231\124\226\010\130\256\344\006
\274\142\005\002\026\277\257\250\043\003\266\224\017\274\156\154
\302\313\325\246\273\014\351\366\301\002\373\041\336\146\335\027
\253\164\102\357\360\164\057\045\364\352\153\125\133\220\333\235
\337\136\207\012\100\373\255\031\153\373\367\312\140\210\336\332
\301\217\326\256\325\177\324\074\203\356\327\026\114\203\105\063
\153\047\320\206\320\034\055\153\363\253\175\361\205\251\365\050
\322\255\357\363\204\113\034\207\374\023\243\072\162\242\132\021
\053\326\047\161\047\355\201\055\155\146\201\222\207\264\033\130
\172\314\077\012\372\106\117\115\170\134\370\053\110\343\004\204
\313\135\366\264\152\263\145\374\102\236\121\046\043\040\313\075
\024\371\201\355\145\026\000\117\032\144\227\146\010\317\214\173
\343\053\300\235\371\024\362\033\361\126\152\026\277\054\205\205
\315\170\070\232\353\102\152\002\064\030\203\027\116\224\126\370
\266\202\265\363\226\335\075\363\276\177\040\167\076\173\031\043
\153\054\324\162\163\103\127\175\340\370\327\151\117\027\066\004
\371\300\220\140\067\105\336\346\014\330\164\215\256\234\242\155
\164\135\102\276\006\365\331\144\156\002\020\254\211\260\114\073
\007\115\100\176\044\305\212\230\202\171\216\244\247\202\040\215
\043\372\047\161\311\337\306\101\164\240\115\366\221\026\334\106
\214\137\051\143\061\131\161\014\330\157\302\266\062\175\373\346
\135\123\246\176\025\374\273\165\174\135\354\370\366\027\034\354
\307\153\031\313\363\173\360\053\007\245\331\154\171\124\166\154
\235\034\246\156\016\351\171\014\250\043\152\243\337\033\060\061
\237\261\124\173\376\152\313\146\252\334\145\320\242\236\112\232
\007\041\153\201\217\333\304\131\372\336\042\300\004\234\343\252
\133\066\223\350\075\275\172\241\235\013\166\261\013\307\235\375
\317\230\250\006\302\370\052\243\241\203\240\267\045\162\245\002
\343\002\003\001\000\001\243\102\060\100\060\016\006\003\125\035
\017\001\001\377\004\004\003\002\001\206\060\017\006\003\125\035
\023\001\001\377\004\005\060\003\001\001\377\060\035\006\003\125
\035\016\004\026\004\024\003\134\253\163\201\207\250\314\260\246
\325\224\342\066\226\111\377\005\231\054\060\015\006\011\052\206
\110\206\367\015\001\001\014\005\000\003\202\002\001\000\174\170
\354\366\002\054\273\133\176\222\053\135\071\334\276\330\035\242
\102\063\115\371\357\244\052\073\104\151\036\254\331\105\243\116
\074\247\330\044\121\262\124\034\223\116\304\357\173\223\205\140
\046\352\011\110\340\365\273\307\351\150\322\273\152\061\161\314
\171\256\021\250\360\231\375\345\037\274\057\250\314\127\353\166
\304\041\246\107\123\125\115\150\277\005\244\356\327\046\253\142
\332\103\067\113\342\306\265\345\262\203\031\072\307\323\333\115

\236\010\172\363\356\317\076\142\373\254\350\140\314\321\307\241
\134\203\105\304\105\314\363\027\153\024\311\004\002\076\322\044
\246\171\351\036\316\242\347\301\131\025\237\035\342\113\232\076
\237\166\010\055\153\330\272\127\024\332\203\352\376\214\125\351
\320\116\251\314\167\061\261\104\021\172\134\261\076\323\024\105
\025\030\142\044\023\322\313\115\316\134\203\301\066\362\020\265
\016\210\155\270\341\126\237\211\336\226\146\071\107\144\054\156
\115\256\142\173\277\140\164\031\270\126\254\222\254\026\062\355
\255\150\125\376\230\272\323\064\336\364\311\141\303\016\206\366
\113\204\140\356\015\173\265\062\130\171\221\125\054\201\103\263
\164\037\172\252\045\236\035\327\241\213\271\315\102\056\004\244
\146\203\115\211\065\266\154\250\066\112\171\041\170\042\320\102
\274\321\100\061\220\241\276\004\317\312\147\355\365\360\200\323
\140\311\203\052\042\005\320\007\073\122\277\014\236\252\053\371
\273\346\037\217\045\272\205\215\027\036\002\376\135\120\004\127
\317\376\055\274\357\134\300\032\253\266\237\044\306\337\163\150
\110\220\054\024\364\077\122\032\344\322\313\024\303\141\151\317
\342\371\030\305\272\063\237\024\243\004\135\271\161\367\265\224
\330\366\063\301\132\301\064\213\174\233\335\223\072\347\023\242
\160\141\237\257\217\353\330\305\165\370\063\146\324\164\147\072
\067\167\234\347\335\244\017\166\103\146\212\103\362\237\373\014
\102\170\143\321\342\017\157\173\324\241\075\164\227\205\267\110
\071\101\326\040\374\320\072\263\372\350\157\304\212\272\161\067
\276\213\227\261\170\061\117\263\347\266\003\023\316\124\235\256
\045\131\314\177\065\137\010\367\100\105\061\170\052\172

END

CKA_NSS_MOZILLA_CA_POLICY

CK_BBOOL CK_TRUE

CKA_NSS_SERVER_DISTRUST_AFTER CK_BBOOL CK_FALSE

CKA_NSS_EMAIL_DISTRUST_AFTER CK_BBOOL CK_FALSE

#

Trust for "GlobalSign Root R46"

Issuer: CN=GlobalSign Root R46,O=GlobalSign nv-sa,C=BE

Serial Number:11:d2:bb:b9:d7:23:18:9e:40:5f:0a:9d:2d:d0:df:25:67:d1

Subject: CN=GlobalSign Root R46,O=GlobalSign nv-sa,C=BE

Not Valid Before: Wed Mar 20 00:00:00 2019

Not Valid After : Tue Mar 20 00:00:00 2046

Fingerprint (SHA-256):

4F:A3:12:6D:8D:3A:11:D1:C4:85:5A:4F:80:7C:BA:D6:CF:91:9D:3A:5A:88:B0:3B:EA:2C:63:72:D9:3C:40:C9

Fingerprint (SHA1): 53:A2:B0:4B:CA:6B:D6:45:E6:39:8A:8E:C4:0D:D2:BF:77:C3:A2:90

CKA_CLASS CK_OBJECT_CLASS CKO_NSS_TRUST

CKA_TOKEN CK_BBOOL CK_TRUE

CKA_PRIVATE CK_BBOOL CK_FALSE

CKA_MODIFIABLE CK_BBOOL CK_FALSE

CKA_LABEL UTF8 "GlobalSign Root R46"

CKA_CERT_SHA1_HASH MULTILINE_OCTAL

\123\242\260\113\312\153\326\105\346\071\212\216\304\015\322\277


```

\167\303\242\220
END
CKA_CERT_MD5_HASH MULTILINE_OCTAL
\304\024\060\344\372\146\103\224\052\152\033\044\137\031\320\357
END
CKA_ISSUER MULTILINE_OCTAL
\060\106\061\013\060\011\006\003\125\004\006\023\002\102\105\061
\031\060\027\006\003\125\004\012\023\020\107\154\157\142\141\154
\123\151\147\156\040\156\166\055\163\141\061\034\060\032\006\003
\125\004\003\023\023\107\154\157\142\141\154\123\151\147\156\040
\122\157\157\164\040\122\064\066
END
CKA_SERIAL_NUMBER
MULTILINE_OCTAL
\002\022\021\322\273\271\327\043\030\236\100\137\012\235\055\320
\337\045\147\321
END
CKA_TRUST_SERVER_AUTH CK_TRUST CKT_NSS_TRUSTED_DELEGATOR
CKA_TRUST_EMAIL_PROTECTION CK_TRUST CKT_NSS_MUST_VERIFY_TRUST
CKA_TRUST_CODE_SIGNING CK_TRUST CKT_NSS_MUST_VERIFY_TRUST
CKA_TRUST_STEP_UP_APPROVED CK_BBOOL CK_FALSE

#
# Certificate "GlobalSign Root E46"
#
# Issuer: CN=GlobalSign Root E46,O=GlobalSign nv-sa,C=BE
# Serial Number:11:d2:bb:ba:33:6e:d4:bc:e6:24:68:c5:0d:84:1d:98:e8:43
# Subject: CN=GlobalSign Root E46,O=GlobalSign nv-sa,C=BE
# Not Valid Before: Wed Mar 20 00:00:00 2019
# Not Valid After : Tue Mar 20 00:00:00 2046
# Fingerprint (SHA-256):
CB:B9:C4:4D:84:B8:04:3E:10:50:EA:31:A6:9F:51:49:55:D7:BF:D2:E2:C6:B4:93:01:01:9A:D6:1D:9F:50:58
#
Fingerprint (SHA1): 39:B4:6C:D5:FE:80:06:EB:E2:2F:4A:BB:08:33:A0:AF:DB:B9:DD:84
CKA_CLASS CK_OBJECT_CLASS CKO_CERTIFICATE
CKA_TOKEN CK_BBOOL CK_TRUE
CKA_PRIVATE CK_BBOOL CK_FALSE
CKA_MODIFIABLE CK_BBOOL CK_FALSE
CKA_LABEL UTF8 "GlobalSign Root E46"
CKA_CERTIFICATE_TYPE CK_CERTIFICATE_TYPE CKC_X_509
CKA_SUBJECT MULTILINE_OCTAL
\060\106\061\013\060\011\006\003\125\004\006\023\002\102\105\061
\031\060\027\006\003\125\004\012\023\020\107\154\157\142\141\154
\123\151\147\156\040\156\166\055\163\141\061\034\060\032\006\003
\125\004\003\023\023\107\154\157\142\141\154\123\151\147\156\040
\122\157\157\164\040\105\064\066
END
CKA_ID UTF8 "0"

```

CKA_ISSUER MULTILINE_OCTAL
\060\106\061\013\060\011\006\003\125\004\006\023\002\102\105\061
\031\060\027\006\003\125\004\012\023\020\107\154\157\142\141\154
\123\151\147\156\040\156\166\055\163\141\061\034\060\032\006\003
\125\004\003\023\023\107\154\157\142\141\154\123\151\147\156\040
\122\157\157\164\040\105\064\066
END
CKA_SERIAL_NUMBER MULTILINE_OCTAL
\002\022\021\322\273\272\063\156\324\274\346\044\150\305\015\204
\035\230\350\103
END
CKA_VALUE
MULTILINE_OCTAL
\060\202\002\013\060\202\001\221\240\003\002\001\002\002\022\021
\322\273\272\063\156\324\274\346\044\150\305\015\204\035\230\350
\103\060\012\006\010\052\206\110\316\075\004\003\003\060\106\061
\013\060\011\006\003\125\004\006\023\002\102\105\061\031\060\027
\006\003\125\004\012\023\020\107\154\157\142\141\154\123\151\147
\156\040\156\166\055\163\141\061\034\060\032\006\003\125\004\003
\023\023\107\154\157\142\141\154\123\151\147\156\040\122\157\157
\164\040\105\064\066\060\036\027\015\061\071\060\063\062\060\060
\060\060\060\060\060\132\027\015\064\066\060\063\062\060\060\060
\060\060\060\060\132\060\106\061\013\060\011\006\003\125\004\006
\023\002\102\105\061\031\060\027\006\003\125\004\012\023\020\107
\154\157\142\141\154\123\151\147\156\040\156\166\055\163\141\061
\034\060\032\006\003\125\004\003\023\023\107\154\157\142\141\154
\123\151\147\156\040\122\157\157\164\040\105\064\066\060\166\060
\020\006\007\052\206\110\316\075\002\001\006\005\053\201\004\000
\042\003\142\000\004\234\016\261\317\267\350\236\122\167\165\064
\372\245\106\247\255\062\031\062\264\007\251\047\312\224\273\014
\322\012\020\307\332\211\260\227\014\160\023\011\001\216\330\352
\107\352\276\262\200\053\315\374\050\015\333\254\274\244\206\067
\355\160\010\000\165\352\223\013\173\056\122\234\043\150\043\006
\103\354\222\057\123\204\333\373\107\024\007\350\137\224\147\135
\311\172\201\074\040\243\102\060\100\060\016\006\003\125\035\017
\001\001\377\004\004\003\002\001\206\060\017\006\003\125\035\023
\001\001\377\004\005\060\003\001\001\377\060\035\006\003\125\035
\016\004\026\004\024\061\012\220\217\266\306\235\322\104\113\200
\265\242\346\037\261\022\117\033\225\060\012\006\010\052\206\110
\316\075\004\003\003\003\150\000\060\145\002\061\000\337\124\220
\355\233\357\213\224\002\223\027\202\231\276\263\236\054\366\013
\221\214\237\112\024\261\366\144\274\273\150\121\023\014\003\367
\025\213\204\140\271\213\377\122\216\347\214\274\034\002\060\074
\371\021\324\214\116\300\301\141\302\025\114\252\253\035\013\061
\137\073\034\342\000\227\104\061\346\376\163\226\057\332\226\323
\376\010\007\263\064\211\274\005\237\367\036\206\356\213\160
END
CKA_NSS_MOZILLA_CA_POLICY

```

CK_BBOOL CK_TRUE
CKA_NSS_SERVER_DISTRUST_AFTER CK_BBOOL CK_FALSE
CKA_NSS_EMAIL_DISTRUST_AFTER CK_BBOOL CK_FALSE

# Trust for "GlobalSign Root E46"
# Issuer: CN=GlobalSign Root E46,O=GlobalSign nv-sa,C=BE
# Serial Number:11:d2:bb:ba:33:6e:d4:bc:e6:24:68:c5:0d:84:1d:98:e8:43
# Subject: CN=GlobalSign Root E46,O=GlobalSign nv-sa,C=BE
# Not Valid Before: Wed Mar 20 00:00:00 2019
# Not Valid After : Tue Mar 20 00:00:00 2046
# Fingerprint (SHA-256):
CB:B9:C4:4D:84:B8:04:3E:10:50:EA:31:A6:9F:51:49:55:D7:BF:D2:E2:C6:B4:93:01:01:9A:D6:1D:9F:50:58
# Fingerprint (SHA1): 39:B4:6C:D5:FE:80:06:EB:E2:2F:4A:BB:08:33:A0:AF:DB:B9:DD:84
CKA_CLASS CK_OBJECT_CLASS CKO_NSS_TRUST
CKA_TOKEN CK_BBOOL CK_TRUE
CKA_PRIVATE CK_BBOOL
CK_FALSE
CKA_MODIFIABLE CK_BBOOL CK_FALSE
CKA_LABEL UTF8 "GlobalSign Root E46"
CKA_CERT_SHA1_HASH MULTILINE_OCTAL
\071\264\154\325\376\200\006\353\342\057\112\273\010\063\240\257
\333\271\335\204
END
CKA_CERT_MD5_HASH MULTILINE_OCTAL
\265\270\146\355\336\010\203\343\311\342\001\064\006\254\121\157
END
CKA_ISSUER MULTILINE_OCTAL
\060\106\061\013\060\011\006\003\125\004\006\023\002\102\105\061
\031\060\027\006\003\125\004\012\023\020\107\154\157\142\141\154
\123\151\147\156\040\156\166\055\163\141\061\034\060\032\006\003
\125\004\003\023\023\107\154\157\142\141\154\123\151\147\156\040
\122\157\157\164\040\105\064\066
END
CKA_SERIAL_NUMBER MULTILINE_OCTAL
\002\022\021\322\273\272\063\156\324\274\346\044\150\305\015\204
\035\230\350\103
END
CKA_TRUST_SERVER_AUTH CK_TRUST CKT_NSS_TRUSTED_DELEGATOR
CKA_TRUST_EMAIL_PROTECTION CK_TRUST CKT_NSS_MUST_VERIFY_TRUST
CKA_TRUST_CODE_SIGNING CK_TRUST CKT_NSS_MUST_VERIFY_TRUST
CKA_TRUST_STEP_UP_APPROVED CK_BBOOL CK_FALSE

#
# Certificate "GLOBALTRUST
2020"
#
# Issuer: CN=GLOBALTRUST 2020,O=e-commerce monitoring GmbH,C=AT
# Serial Number:5a:4b:bd:5a:fb:4f:8a:5b:fa:65:e5

```

```
# Subject: CN=GLOBALTRUST 2020,O=e-commerce monitoring GmbH,C=AT
# Not Valid Before: Mon Feb 10 00:00:00 2020
# Not Valid After : Sun Jun 10 00:00:00 2040
# Fingerprint (SHA-256):
9A:29:6A:51:82:D1:D4:51:A2:E3:7F:43:9B:74:DA:AF:A2:67:52:33:29:F9:0F:9A:0D:20:07:C3:34:E2:3C:9A
# Fingerprint (SHA1): D0:67:C1:13:51:01:0C:AA:D0:C7:6A:65:37:31:16:26:4F:53:71:A2
CKA_CLASS CK_OBJECT_CLASS CKO_CERTIFICATE
CKA_TOKEN CK_BBOOL CK_TRUE
CKA_PRIVATE CK_BBOOL CK_FALSE
CKA_MODIFIABLE CK_BBOOL CK_FALSE
CKA_LABEL UTF8 "GLOBALTRUST 2020"
CKA_CERTIFICATE_TYPE CK_CERTIFICATE_TYPE CKC_X_509
CKA_SUBJECT MULTILINE_OCTAL
\060\115\061\013\060\011\006\003\125\004\006\023\002\101\124\061
\043\060\041\006\003\125\004\012\023\032\145\055\143\157\155\155
\145\162\143\145\040\155\157\156\151\164\157\162\151\156\147\040
\107\155\142\110\061\031\060\027\006\003\125\004\003\023\020\107
\114\117\102\101\114\124\122\125\123\124\040\062\060\062\060
END
CKA_ID
UTF8 "0"
CKA_ISSUER MULTILINE_OCTAL
\060\115\061\013\060\011\006\003\125\004\006\023\002\101\124\061
\043\060\041\006\003\125\004\012\023\032\145\055\143\157\155\155
\145\162\143\145\040\155\157\156\151\164\157\162\151\156\147\040
\107\155\142\110\061\031\060\027\006\003\125\004\003\023\020\107
\114\117\102\101\114\124\122\125\123\124\040\062\060\062\060
END
CKA_SERIAL_NUMBER MULTILINE_OCTAL
\002\013\132\113\275\132\373\117\212\133\372\145\345
END
CKA_VALUE MULTILINE_OCTAL
\060\202\005\202\060\202\003\152\240\003\002\001\002\002\013\132
\113\275\132\373\117\212\133\372\145\345\060\015\006\011\052\206
\110\206\367\015\001\001\013\005\000\060\115\061\013\060\011\006
\003\125\004\006\023\002\101\124\061\043\060\041\006\003\125\004
\012\023\032\145\055\143\157\155\155\145\162\143\145\040\155\157
\156\151\164\157\162\151\156\147\040\107\155\142\110\061\031\060
\027\006\003\125\004\003\023\020\107\114\117\102\101\114\124\122
\125\123\124\040\062\060\062\060\060\036\027\015\062\060\060\062
\061\060\060\060\060\060\060\060\132\027\015\064\060\060\066\061
\060\060\060\060\060\060\060\132\060\115\061\013\060\011\006\003
\125\004\006\023\002\101\124\061\043\060\041\006\003\125\004\012
\023\032\145\055\143\157\155\155\145\162\143\145\040\155\157\156
\151\164\157\162\151\156\147\040\107\155\142\110\061\031\060\027
\006\003\125\004\003\023\020\107\114\117\102\101\114\124\122\125
\123\124\040\062\060\062\060\060\060\202\002\042\060\015\006\011\052
\206\110\206\367\015\001\001\001\005\000\003\202\002\017\000\060
```

\202\002\012\002\202\002\001\000\256\056\126\255\033\034\357\366
\225\217\240\167\033\053\323\143\217\204\115\105\242\017\237\133
\105\253\131\173\121\064\371\354\213\212\170\305\335\153\257\275
\304\337\223\105\036\277\221\070\013\256\016\026\347\101\163\370
\333\273\321\270\121\340\313\203\073\163\070\156\167\212\017\131
\143\046\315\247\052\316\124\373\270\342\300\174\107\316\140\174
\077\262\163\362\300\031\266\212\222\207\065\015\220\050\242\344
\025\004\143\076\272\257\356\174\136\314\246\213\120\262\070\367
\101\143\312\316\377\151\217\150\016\225\066\345\314\271\214\011
\312\113\335\061\220\226\310\314\037\375\126\226\064\333\216\034
\352\054\276\205\056\143\335\252\251\225\323\375\051\225\023\360
\310\230\223\331\055\026\107\220\021\203\242\072\042\242\050\127
\242\353\376\300\214\050\240\246\175\347\052\102\073\202\200\143
\245\143\037\031\314\174\262\146\250\302\323\155\067\157\342\176
\006\121\331\105\204\037\022\316\044\122\144\205\013\110\200\116
\207\261\042\042\060\252\353\256\276\340\002\340\100\350\260\102
\200\003\121\252\264\176\252\104\327\103\141\363\242\153\026\211
\111\244\243\244\053\212\002\304\170\364\150\212\301\344\172\066
\261\157\033\226\033\167\111\215\324\311\006\162\217\317\123\343
\334\027\205\040\112\334\230\047\323\221\046\053\107\036\151\007
\257\336\242\344\344\324\153\013\263\136\174\324\044\200\107\051
\151\073\156\350\254\375\100\353\330\355\161\161\053\362\350\130
\035\353\101\227\042\305\037\324\071\320\047\217\207\343\030\364
\340\251\106\015\365\164\072\202\056\320\156\054\221\243\061\134
\073\106\352\173\004\020\126\136\200\035\365\245\145\350\202\374
\342\007\214\142\105\365\040\336\106\160\206\241\274\223\323\036
\164\246\154\260\054\367\003\014\210\014\313\324\162\123\206\274
\140\106\363\230\152\302\361\277\103\371\160\040\167\312\067\101
\171\125\122\143\215\133\022\237\305\150\304\210\235\254\362\060
\253\267\243\061\227\147\255\217\027\017\154\307\163\355\044\224
\153\310\203\232\320\232\067\111\004\253\261\026\310\154\111\111
\055\253\241\320\214\222\362\101\112\171\041\045\333\143\327\266
\234\247\176\102\151\373\072\143\002\003\001\000\001\243\143\060
\141\060\017\006\003\125\035\023\001\001\377\004\005\060\003\001
\001\377\060\016\006\003\125\035\017\001\001\377\004\004\003\002
\001\006\060\035\006\003\125\035\016\004\026\004\024\334\056\037
\321\141\067\171\344\253\325\325\263\022\161\150\075\152\150\234
\042\060\037\006\003\125\035\043\004\030\060\026\200\024\334\056
\037\321\141\067\171\344\253\325\325\263\022\161\150\075\152\150
\234\042\060\015\006\011\052\206\110\206\367\015\001\001\013\005
\000\003\202\002\001\000\221\360\102\002\150\100\356\303\150\300
\124\057\337\354\142\303\303\236\212\240\061\050\252\203\216\244
\126\226\022\020\206\126\272\227\162\322\124\060\174\255\031\325
\035\150\157\373\024\102\330\215\016\363\265\321\245\343\002\102
\136\334\350\106\130\007\065\002\060\340\274\164\112\301\103\052
\377\333\032\320\260\257\154\303\375\313\263\365\177\155\003\056
\131\126\235\055\055\065\214\262\326\103\027\054\222\012\313\135
\350\214\017\113\160\103\320\202\377\250\314\277\244\224\300\276

\207\275\212\343\223\173\306\217\233\026\235\047\145\274\172\305
\102\202\154\134\007\320\251\301\210\140\104\351\230\205\026\137
\370\217\312\001\020\316\045\303\371\140\033\240\305\227\303\323
\054\210\061\242\275\060\354\320\320\300\022\361\301\071\343\345
\365\370\326\112\335\064\315\373\157\301\117\343\000\213\126\342
\222\367\050\262\102\167\162\043\147\307\077\021\025\262\304\003
\005\276\273\021\173\012\277\250\156\347\377\130\103\317\233\147
\240\200\007\266\035\312\255\155\352\101\021\176\055\164\223\373
\302\274\276\121\104\305\357\150\045\047\200\343\310\240\324\022
\354\331\245\067\035\067\174\264\221\312\332\324\261\226\201\357
\150\134\166\020\111\257\176\245\067\200\261\034\122\275\063\201
\114\217\371\335\145\331\024\315\212\045\130\364\342\305\203\245
\011\220\324\154\024\143\265\100\337\353\300\374\304\130\176\015
\024\026\207\124\047\156\126\344\160\204\270\154\062\022\176\202
\061\103\276\327\335\174\241\255\256\326\253\040\022\357\012\303
\020\214\111\226\065\334\013\165\136\261\117\325\117\064\016\021
\040\007\165\103\105\351\243\021\332\254\243\231\302\266\171\047
\342\271\357\310\342\366\065\051\172\164\372\305\177\202\005\142
\246\012\352\150\262\171\107\006\156\362\127\250\025\063\306\367
\170\112\075\102\173\153\176\376\367\106\352\321\353\216\357\210
\150\133\350\301\331\161\176\375\144\357\377\147\107\210\130\045
\057\076\206\007\275\373\250\345\202\250\254\245\323\151\103\315
\061\210\111\204\123\222\300\261\071\033\071\203\001\060\304\362
\251\372\320\003\275\162\067\140\126\037\066\174\275\071\221\365
\155\015\277\173\327\222

END

CKA_NSS_MOZILLA_CA_POLICY

CK_BBOOL CK_TRUE

CKA_NSS_SERVER_DISTRUST_AFTER CK_BBOOL CK_FALSE

CKA_NSS_EMAIL_DISTRUST_AFTER CK_BBOOL CK_FALSE

Trust for "GLOBALTRUST 2020"

Issuer: CN=GLOBALTRUST 2020,O=e-commerce monitoring GmbH,C=AT

Serial Number:5a:4b:bd:5a:fb:4f:8a:5b:fa:65:e5

Subject: CN=GLOBALTRUST 2020,O=e-commerce monitoring GmbH,C=AT

Not Valid Before: Mon Feb 10 00:00:00 2020

Not Valid After : Sun Jun 10 00:00:00 2040

Fingerprint (SHA-256):

9A:29:6A:51:82:D1:D4:51:A2:E3:7F:43:9B:74:DA:AF:A2:67:52:33:29:F9:0F:9A:0D:20:07:C3:34:E2:3C:9A

Fingerprint (SHA1): D0:67:C1:13:51:01:0C:AA:D0:C7:6A:65:37:31:16:26:4F:53:71:A2

CKA_CLASS CK_OBJECT_CLASS CKO_NSS_TRUST

CKA_TOKEN CK_BBOOL CK_TRUE

CKA_PRIVATE

CK_BBOOL CK_FALSE

CKA_MODIFIABLE CK_BBOOL CK_FALSE

CKA_LABEL UTF8 "GLOBALTRUST 2020"

CKA_CERT_SHA1_HASH MULTILINE_OCTAL

\320\147\301\023\121\001\014\252\320\307\152\145\067\061\026\046

```

\117\123\161\242
END
CKA_CERT_MD5_HASH MULTILINE_OCTAL
\212\307\157\313\155\343\314\242\361\174\203\372\016\170\327\350
END
CKA_ISSUER MULTILINE_OCTAL
\060\115\061\013\060\011\006\003\125\004\006\023\002\101\124\061
\043\060\041\006\003\125\004\012\023\032\145\055\143\157\155\155
\145\162\143\145\040\155\157\156\151\164\157\162\151\156\147\040
\107\155\142\110\061\031\060\027\006\003\125\004\003\023\020\107
\114\117\102\101\114\124\122\125\123\124\040\062\060\062\060
END
CKA_SERIAL_NUMBER MULTILINE_OCTAL
\002\013\132\113\275\132\373\117\212\133\372\145\345
END
CKA_TRUST_SERVER_AUTH CK_TRUST CKT_NSS_TRUSTED_DELEGATOR
CKA_TRUST_EMAIL_PROTECTION CK_TRUST CKT_NSS_TRUSTED_DELEGATOR
CKA_TRUST_CODE_SIGNING CK_TRUST CKT_NSS_MUST_VERIFY_TRUST
CKA_TRUST_STEP_UP_APPROVED CK_BBOOL CK_FALSE

#
# Certificate "ANF
# Secure Server Root CA"
#
# Issuer: CN=ANF Secure Server Root CA,OU=ANF CA Raiz,O=ANF Autoridad de
# Certificacion,C=ES,serialNumber=G63287510
# Serial Number:0d:d3:e3:bc:6c:f9:6b:b1
# Subject: CN=ANF Secure Server Root CA,OU=ANF CA Raiz,O=ANF Autoridad de
# Certificacion,C=ES,serialNumber=G63287510
# Not Valid Before: Wed Sep 04 10:00:38 2019
# Not Valid After : Tue Aug 30 10:00:38 2039
# Fingerprint (SHA-256):
FB:8F:EC:75:91:69:B9:10:6B:1E:51:16:44:C6:18:C5:13:04:37:3F:6C:06:43:08:8D:8B:EF:FD:1B:99:75:99
# Fingerprint (SHA1): 5B:6E:68:D0:CC:15:B6:A0:5F:1E:C1:5F:AE:02:FC:6B:2F:5D:6F:74
CKA_CLASS CK_OBJECT_CLASS CKO_CERTIFICATE
CKA_TOKEN CK_BBOOL CK_TRUE
CKA_PRIVATE CK_BBOOL CK_FALSE
CKA_MODIFIABLE CK_BBOOL CK_FALSE
CKA_LABEL UTF8 "ANF Secure Server Root CA"
CKA_CERTIFICATE_TYPE CK_CERTIFICATE_TYPE CKC_X_509
CKA_SUBJECT MULTILINE_OCTAL
\060\201\204\061\022\060\020\006\003\125\004\005\023\011\107\066
\063\062\070\067\065\061\060\061\013\060\011\006\003\125\004\006
\023\002\105\123\061\047\060\045\006\003\125\004\012\023\036\101
\116\106\040\101\165\164\157\162\151\144\141\144\040\144\145\040
\103\145\162\164\151\146\151\143\141\143\151\157\156\061\024\060
\022\006\003\125\004\013\023\013\101\116\106\040\103\101\040\122
\141\151\172\061\042\060\040\006\003\125\004\003\023\031\101\116

```

\106\040\123\145\143\165\162\145\040\123\145\162\166\145\162\040
\122\157\157\164\040\103\101
END
CKA_ID
UTF8 "0"
CKA_ISSUER MULTILINE_OCTAL
\060\201\204\061\022\060\020\006\003\125\004\005\023\011\107\066
\063\062\070\067\065\061\060\061\013\060\011\006\003\125\004\006
\023\002\105\123\061\047\060\045\006\003\125\004\012\023\036\101
\116\106\040\101\165\164\157\162\151\144\141\144\040\144\145\040
\103\145\162\164\151\146\151\143\141\143\151\157\156\061\024\060
\022\006\003\125\004\013\023\013\101\116\106\040\103\101\040\122
\141\151\172\061\042\060\040\006\003\125\004\003\023\031\101\116
\106\040\123\145\143\165\162\145\040\123\145\162\166\145\162\040
\122\157\157\164\040\103\101
END
CKA_SERIAL_NUMBER
MULTILINE_OCTAL
\002\010\015\323\343\274\154\371\153\261
END
CKA_VALUE MULTILINE_OCTAL
\060\202\005\357\060\202\003\327\240\003\002\001\002\002\010\015
\323\343\274\154\371\153\261\060\015\006\011\052\206\110\206\367
\015\001\001\013\005\000\060\201\204\061\022\060\020\006\003\125
\004\005\023\011\107\066\063\062\070\067\065\061\060\061\013\060
\011\006\003\125\004\006\023\002\105\123\061\047\060\045\006\003
\125\004\012\023\036\101\116\106\040\101\165\164\157\162\151\144
\141\144\040\144\145\040\103\145\162\164\151\146\151\143\141\143
\151\157\156\061\024\060\022\006\003\125\004\013\023\013\101\116
\106\040\103\101\040\122\141\151\172\061\042\060\040\006\003\125
\004\003\023\031\101\116\106\040\123\145\143\165\162\145\040\123
\145\162\166\145\162\040\122\157\157\164\040\103\101\060\036\027
\015\061\071\060\071\060\064\061\060\060\060\063\070\132\027\015
\063\071\060\070\063\060\061\060\060\060\063\070\132\060\201\204
\061\022\060\020\006\003\125\004\005\023\011\107\066\063\062\070
\067\065\061\060\061\013\060\011\006\003\125\004\006\023\002\105
\123\061\047\060\045\006\003\125\004\012\023\036\101\116\106\040
\101\165\164\157\162\151\144\141\144\040\144\145\040\103\145\162
\164\151\146\151\143\141\143\151\157\156\061\024\060\022\006\003
\125\004\013\023\013\101\116\106\040\103\101\040\122\141\151\172
\061\042\060\040\006\003\125\004\003\023\031\101\116\106\040\123
\145\143\165\162\145\040\123\145\162\166\145\162\040\122\157\157
\164\040\103\101\060\202\002\042\060\015\006\011\052\206\110\206
\367\015\001\001\001\005\000\003\202\002\017\000\060\202\002\012
\002\202\002\001\000\333\353\153\053\346\144\124\225\202\220\243
\162\244\031\001\235\234\013\201\137\163\111\272\247\254\363\004
\116\173\226\013\354\021\340\133\246\034\316\033\322\015\203\034
\053\270\236\035\176\105\062\140\017\007\351\167\130\176\237\152

\310\141\116\266\046\301\114\215\377\114\357\064\262\037\145\330
\271\170\365\255\251\161\271\357\117\130\035\245\336\164\040\227
\241\355\150\114\336\222\027\113\274\253\377\145\232\236\373\107
\331\127\162\363\011\241\256\166\104\023\156\234\055\104\071\274
\371\307\073\244\130\075\101\275\264\302\111\243\310\015\322\227
\057\007\145\122\000\247\156\310\257\150\354\364\024\226\266\127
\037\126\303\071\237\053\155\344\363\076\366\065\144\332\014\034
\241\204\113\057\113\113\342\054\044\235\155\223\100\353\265\043
\216\062\312\157\105\323\250\211\173\036\317\036\372\133\103\213
\315\315\250\017\152\312\014\136\271\236\107\217\360\331\266\012
\013\130\145\027\063\271\043\344\167\031\175\313\112\056\222\173
\117\057\020\167\261\215\057\150\234\142\314\340\120\370\354\221
\247\124\114\127\011\325\166\143\305\350\145\036\356\155\152\317
\011\235\372\174\117\255\140\010\375\126\231\017\025\054\173\251
\200\253\214\141\217\112\007\166\102\336\075\364\335\262\044\063
\133\270\265\243\104\311\254\177\167\074\035\043\354\202\251\246
\342\310\006\114\002\376\254\134\231\231\013\057\020\212\246\364
\177\325\207\164\015\131\111\105\366\360\161\134\071\051\326\277
\112\043\213\365\137\001\143\322\207\163\050\265\113\012\365\370
\253\202\054\176\163\045\062\035\013\143\012\027\201\000\377\266
\166\136\347\264\261\100\312\041\273\325\200\121\345\110\122\147
\054\322\141\211\007\015\017\316\102\167\300\104\163\234\104\120
\240\333\020\012\055\225\034\201\257\344\034\345\024\036\361\066
\101\001\002\057\175\163\247\336\102\314\114\351\211\015\126\367
\237\221\324\003\306\154\311\217\333\330\034\340\100\230\135\146
\231\230\200\156\055\377\001\305\316\313\106\037\254\002\306\103
\346\256\242\204\074\305\116\036\075\155\311\024\114\343\056\101
\273\312\071\277\066\074\052\031\252\101\207\116\245\316\113\062
\171\335\220\111\177\002\003\001\000\001\243\143\060\141\060\037
\006\003\125\035\043\004\030\060\026\200\024\234\137\320\154\143
\243\137\223\312\223\230\010\255\214\207\245\054\134\301\067\060
\035\006\003\125\035\016\004\026\004\024\234\137\320\154\143\243
\137\223\312\223\230\010\255\214\207\245\054\134\301\067\060\016
\006\003\125\035\017\001\001\377\004\004\003\002\001\206\060\017
\006\003\125\035\023\001\001\377\004\005\060\003\001\001\377\060
\015\006\011\052\206\110\206\367\015\001\001\013\005\000\003\202
\002\001\000\116\036\271\212\306\240\230\077\156\303\151\300\152
\134\111\122\254\313\053\135\170\070\301\325\124\204\237\223\360
\207\031\075\054\146\211\353\015\102\374\314\360\165\205\077\213
\364\200\135\171\345\027\147\275\065\202\342\362\074\216\175\133
\066\313\132\200\000\051\362\316\053\054\361\217\252\155\005\223
\154\162\307\126\353\337\120\043\050\345\105\020\075\350\147\243
\257\016\125\017\220\011\142\357\113\131\242\366\123\361\300\065
\344\057\301\044\275\171\057\116\040\042\073\375\032\040\260\244
\016\054\160\355\164\077\270\023\225\006\121\310\350\207\046\312
\244\133\152\026\041\222\335\163\140\236\020\030\336\074\201\352
\350\030\303\174\211\362\213\120\076\275\021\342\025\003\250\066
\175\063\001\154\110\025\327\210\220\231\004\305\314\346\007\364

\274\364\220\355\023\342\352\213\303\217\243\063\017\301\051\114
\023\116\332\025\126\161\163\162\202\120\366\232\063\174\242\261
\250\032\064\164\145\134\316\321\353\253\123\340\032\200\330\352
\072\111\344\046\060\233\345\034\212\250\251\025\062\206\231\222
\012\020\043\126\022\340\366\316\114\342\273\276\333\215\222\163
\001\146\057\142\076\262\162\047\105\066\355\115\126\343\227\231
\377\072\065\076\245\124\112\122\131\113\140\333\356\376\170\021
\177\112\334\024\171\140\266\153\144\003\333\025\203\341\242\276
\366\043\227\120\360\011\063\066\247\161\226\045\363\271\102\175
\333\070\077\054\130\254\350\102\341\016\330\323\073\114\056\202
\351\203\056\153\061\331\335\107\206\117\155\227\221\056\117\342
\050\161\065\026\321\362\163\376\045\053\007\107\044\143\047\310
\370\366\331\153\374\022\061\126\010\300\123\102\257\234\320\063
\176\374\006\360\061\104\003\024\361\130\352\362\152\015\251\021
\262\203\276\305\032\277\007\352\131\334\243\210\065\357\234\166
\062\074\115\006\042\316\025\345\335\236\330\217\332\336\322\304
\071\345\027\201\317\070\107\353\177\210\155\131\033\337\237\102
\024\256\176\317\250\260\146\145\332\067\257\237\252\075\352\050
\266\336\325\061\130\026\202\133\352\273\031\165\002\163\032\312
\110\032\041\223\220\012\216\223\204\247\175\073\043\030\222\211
\240\215\254

END

CKA_NSS_MOZILLA_CA_POLICY

CK_BBOOL CK_TRUE

CKA_NSS_SERVER_DISTRUST_AFTER CK_BBOOL CK_FALSE

CKA_NSS_EMAIL_DISTRUST_AFTER CK_BBOOL CK_FALSE

Trust for "ANF Secure Server Root CA"

Issuer: CN=ANF Secure Server Root CA,OU=ANF CA Raiz,O=ANF Autoridad de
Certificacion,C=ES,serialNumber=G63287510

Serial Number:0d:d3:e3:bc:6c:f9:6b:b1

Subject: CN=ANF Secure Server Root CA,OU=ANF CA Raiz,O=ANF Autoridad de
Certificacion,C=ES,serialNumber=G63287510

Not Valid Before: Wed Sep 04 10:00:38 2019

Not Valid After : Tue Aug 30 10:00:38 2039

Fingerprint (SHA-256):

FB:8F:EC:75:91:69:B9:10:6B:1E:51:16:44:C6:18:C5:13:04:37:3F:6C:06:43:08:8D:8B:EF:FD:1B:99:75:99

Fingerprint (SHA1): 5B:6E:68:D0:CC:15:B6:A0:5F:1E:C1:5F:AE:02:FC:6B:2F:5D:6F:74

CKA_CLASS

CK_OBJECT_CLASS CKO_NSS_TRUST

CKA_TOKEN CK_BBOOL CK_TRUE

CKA_PRIVATE CK_BBOOL CK_FALSE

CKA_MODIFIABLE CK_BBOOL CK_FALSE

CKA_LABEL UTF8 "ANF Secure Server Root CA"

CKA_CERT_SHA1_HASH MULTILINE_OCTAL

\133\156\150\320\314\025\266\240\137\036\301\137\256\002\374\153
\057\135\157\164

END

```

CKA_CERT_MD5_HASH MULTILINE_OCTAL
\046\246\104\132\331\257\116\057\262\035\266\145\260\116\350\226
END
CKA_ISSUER MULTILINE_OCTAL
\060\201\204\061\022\060\020\006\003\125\004\005\023\011\107\066
\063\062\070\067\065\061\060\061\013\060\011\006\003\125\004\006
\023\002\105\123\061\047\060\045\006\003\125\004\012\023\036\101
\116\106\040\101\165\164\157\162\151\144\141\144\040\144\145\040
\103\145\162\164\151\146\151\143\141\143\151\157\156\061\024\060
\022\006\003\125\004\013\023\013\101\116\106\040\103\101\040\122
\141\151\172\061\042\060\040\006\003\125\004\003\023\031\101\116
\106\040\123\145\143\165\162\145\040\123\145\162\166\145\162\040
\122\157\157\164\040\103\101
END
CKA_SERIAL_NUMBER
MULTILINE_OCTAL
\002\010\015\323\343\274\154\371\153\261
END
CKA_TRUST_SERVER_AUTH CK_TRUST CKT_NSS_TRUSTED_DELEGATOR
CKA_TRUST_EMAIL_PROTECTION CK_TRUST CKT_NSS_MUST_VERIFY_TRUST
CKA_TRUST_CODE_SIGNING CK_TRUST CKT_NSS_MUST_VERIFY_TRUST
CKA_TRUST_STEP_UP_APPROVED CK_BBOOL CK_FALSE

#
# Certificate "Certum EC-384 CA"
#
# Issuer: CN=Certum EC-384 CA,OU=Certum Certification Authority,O=Asseco Data Systems S.A.,C=PL
# Serial Number:78:8f:27:5c:81:12:52:20:a5:04:d0:2d:dd:ba:73:f4
# Subject: CN=Certum EC-384 CA,OU=Certum Certification Authority,O=Asseco Data Systems S.A.,C=PL
# Not Valid Before: Mon Mar 26 07:24:54 2018
# Not Valid After : Thu Mar 26 07:24:54 2043
# Fingerprint (SHA-256):
6B:32:80:85:62:53:18:AA:50:D1:73:C9:8D:8B:DA:09:D5:7E:27:41:3D:11:4C:F7:87:A0:F5:D0:6C:03:0C:F6
# Fingerprint (SHA1): F3:3E:78:3C:AC:DF:F4:A2:CC:AC:67:55:69:56:D7:E5:16:3C:E1:ED
CKA_CLASS CK_OBJECT_CLASS CKO_CERTIFICATE
CKA_TOKEN CK_BBOOL CK_TRUE
CKA_PRIVATE CK_BBOOL CK_FALSE
CKA_MODIFIABLE
CK_BBOOL CK_FALSE
CKA_LABEL UTF8 "Certum EC-384 CA"
CKA_CERTIFICATE_TYPE CK_CERTIFICATE_TYPE CKC_X_509
CKA_SUBJECT MULTILINE_OCTAL
\060\164\061\013\060\011\006\003\125\004\006\023\002\120\114\061
\041\060\037\006\003\125\004\012\023\030\101\163\163\145\143\157
\040\104\141\164\141\040\123\171\163\164\145\155\163\040\123\056
\101\056\061\047\060\045\006\003\125\004\013\023\036\103\145\162
\164\165\155\040\103\145\162\164\151\146\151\143\141\164\151\157
\156\040\101\165\164\150\157\162\151\164\171\061\031\060\027\006

```

\003\125\004\003\023\020\103\145\162\164\165\155\040\105\103\055
\063\070\064\040\103\101
END
CKA_ID UTF8 "0"
CKA_ISSUER MULTILINE_OCTAL
\060\164\061\013\060\011\006\003\125\004\006\023\002\120\114\061
\041\060\037\006\003\125\004\012\023\030\101\163\163\145\143\157
\040\104\141\164\141\040\123\171\163\164\145\155\163\040\123\056
\101\056\061\047\060\045\006\003\125\004\013\023\036\103\145\162
\164\165\155\040\103\145\162\164\151\146\151\143\141\164\151\157
\156\040\101\165\164\150\157\162\151\164\171\061\031\060\027\006
\003\125\004\003\023\020\103\145\162\164\165\155\040\105\103\055
\063\070\064\040\103\101
END
CKA_SERIAL_NUMBER
MULTILINE_OCTAL
\002\020\170\217\047\134\201\022\122\040\245\004\320\055\335\272
\163\364
END
CKA_VALUE MULTILINE_OCTAL
\060\202\002\145\060\202\001\353\240\003\002\001\002\002\020\170
\217\047\134\201\022\122\040\245\004\320\055\335\272\163\364\060
\012\006\010\052\206\110\316\075\004\003\003\060\164\061\013\060
\011\006\003\125\004\006\023\002\120\114\061\041\060\037\006\003
\125\004\012\023\030\101\163\163\145\143\157\040\104\141\164\141
\040\123\171\163\164\145\155\163\040\123\056\101\056\061\047\060
\045\006\003\125\004\013\023\036\103\145\162\164\165\155\040\103
\145\162\164\151\146\151\143\141\164\151\157\156\040\101\165\164
\150\157\162\151\164\171\061\031\060\027\006\003\125\004\003\023
\020\103\145\162\164\165\155\040\105\103\055\063\070\064\040\103
\101\060\036\027\015\061\070\060\063\062\066\060\067\062\064\065
\064\132\027\015\064\063\060\063\062\066\060\067\062\064\065\064
\132\060\164\061\013\060\011\006\003\125\004\006\023\002\120\114
\061\041\060\037\006\003\125\004\012\023\030\101\163\163\145\143
\157\040\104\141\164\141\040\123\171\163\164\145\155\163\040\123
\056\101\056\061\047\060\045\006\003\125\004\013\023\036\103\145
\162\164\165\155\040\103\145\162\164\151\146\151\143\141\164\151
\157\156\040\101\165\164\150\157\162\151\164\171\061\031\060\027
\006\003\125\004\003\023\020\103\145\162\164\165\155\040\105\103
\055\063\070\064\040\103\101\060\166\060\020\006\007\052\206\110
\316\075\002\001\006\005\053\201\004\000\042\003\142\000\004\304
\050\216\253\030\133\152\276\156\144\067\143\344\315\354\253\072
\367\314\241\270\016\202\111\327\206\051\237\241\224\362\343\140
\170\230\201\170\006\115\362\354\232\016\127\140\203\237\264\346
\027\057\032\263\135\002\133\211\043\074\302\021\005\052\247\210
\023\030\363\120\204\327\275\064\054\047\211\125\377\316\114\347
\337\246\037\050\304\360\124\303\271\174\267\123\255\353\302\243
\102\060\100\060\017\006\003\125\035\023\001\001\377\004\005\060

\003\001\001\377\060\035\006\003\125\035\016\004\026\004\024\215
\006\146\164\044\166\072\363\211\367\274\326\275\107\175\057\274
\020\137\113\060\016\006\003\125\035\017\001\001\377\004\004\003
\002\001\006\060\012\006\010\052\206\110\316\075\004\003\003\003
\150\000\060\145\002\060\003\125\055\246\346\030\304\174\357\311
\120\156\301\047\017\234\207\257\156\325\033\010\030\275\222\051
\301\357\224\221\170\322\072\034\125\211\142\345\033\011\036\272
\144\153\361\166\264\324\002\061\000\264\102\204\231\377\253\347
\236\373\221\227\047\135\334\260\133\060\161\316\136\070\032\152
\331\045\347\352\367\141\222\126\370\352\332\066\302\207\145\226
\056\162\045\057\177\337\303\023\311

END

CKA_NSS_Mozilla_CA_POLICY

CK_BBOOL CK_TRUE

CKA_NSS_SERVER_DISTRUST_AFTER CK_BBOOL CK_FALSE

CKA_NSS_EMAIL_DISTRUST_AFTER CK_BBOOL CK_FALSE

Trust for "Certum EC-384 CA"

Issuer: CN=Certum EC-384

CA,OU=Certum Certification Authority,O=Asseco Data Systems S.A.,C=PL

Serial Number:78:8f:27:5c:81:12:52:20:a5:04:d0:2d:dd:ba:73:f4

Subject: CN=Certum EC-384 CA,OU=Certum Certification Authority,O=Asseco Data Systems S.A.,C=PL

Not Valid Before: Mon Mar 26 07:24:54 2018

Not Valid After : Thu Mar 26 07:24:54 2043

Fingerprint (SHA-256):

6B:32:80:85:62:53:18:AA:50:D1:73:C9:8D:8B:DA:09:D5:7E:27:41:3D:11:4C:F7:87:A0:F5:D0:6C:03:0C:F6

Fingerprint (SHA1): F3:3E:78:3C:AC:DF:F4:A2:CC:AC:67:55:69:56:D7:E5:16:3C:E1:ED

CKA_CLASS CK_OBJECT_CLASS CKO_NSS_TRUST

CKA_TOKEN CK_BBOOL CK_TRUE

CKA_PRIVATE CK_BBOOL CK_FALSE

CKA_MODIFIABLE CK_BBOOL CK_FALSE

CKA_LABEL UTF8 "Certum EC-384 CA"

CKA_CERT_SHA1_HASH MULTILINE_OCTAL

\363\076\170\074\254\337\364\242\314\254\147\125\151\126\327\345
\026\074\341\355

END

CKA_CERT_MD5_HASH MULTILINE_OCTAL

\266\145\263\226\140\227\022\241\354\116\341\075\243\306\311\361
END

CKA_ISSUER MULTILINE_OCTAL

\060\164\061\013\060\011\006\003\125\004\006\023\002\120\114\061
\041\060\037\006\003\125\004\012\023\030\101\163\163\145\143\157
\040\104\141\164\141\040\123\171\163\164\145\155\163\040\123\056
\101\056\061\047\060\045\006\003\125\004\013\023\036\103\145\162
\164\165\155\040\103\145\162\164\151\146\151\143\141\164\151\157
\156\040\101\165\164\150\157\162\151\164\171\061\031\060\027\006
\003\125\004\003\023\020\103\145\162\164\165\155\040\105\103\055
\063\070\064\040\103\101

```

END
CKA_SERIAL_NUMBER
MULTILINE_OCTAL
\002\020\170\217\047\134\201\022\122\040\245\004\320\055\335\272
\163\364
END
CKA_TRUST_SERVER_AUTH CK_TRUST CKT_NSS_TRUSTED_DELEGATOR
CKA_TRUST_EMAIL_PROTECTION CK_TRUST CKT_NSS_TRUSTED_DELEGATOR
CKA_TRUST_CODE_SIGNING CK_TRUST CKT_NSS_MUST_VERIFY_TRUST
CKA_TRUST_STEP_UP_APPROVED CK_BBOOL CK_FALSE

#
# Certificate "Certum Trusted Root CA"
#
# Issuer: CN=Certum Trusted Root CA,OU=Certum Certification Authority,O=Asseco Data Systems S.A.,C=PL
# Serial Number:1e:bf:59:50:b8:c9:80:37:4c:06:f7:eb:55:4f:b5:ed
# Subject: CN=Certum Trusted Root
CA,OU=Certum Certification Authority,O=Asseco Data Systems S.A.,C=PL
# Not Valid Before: Fri Mar 16 12:10:13 2018
# Not Valid After : Mon Mar 16 12:10:13 2043
# Fingerprint (SHA-256):
FE:76:96:57:38:55:77:3E:37:A9:5E:7A:D4:D9:CC:96:C3:01:57:C1:5D:31:76:5B:A9:B1:57:04:E1:AE:78:FD
# Fingerprint (SHA1): C8:83:44:C0:18:AE:9F:CC:F1:87:B7:8F:22:D1:C5:D7:45:84:BA:E5
CKA_CLASS CK_OBJECT_CLASS CKO_CERTIFICATE
CKA_TOKEN CK_BBOOL CK_TRUE
CKA_PRIVATE CK_BBOOL CK_FALSE
CKA_MODIFIABLE CK_BBOOL CK_FALSE
CKA_LABEL UTF8 "Certum Trusted Root CA"
CKA_CERTIFICATE_TYPE CK_CERTIFICATE_TYPE CKC_X_509
CKA_SUBJECT MULTILINE_OCTAL
\060\172\061\013\060\011\006\003\125\004\006\023\002\120\114\061
\041\060\037\006\003\125\004\012\023\030\101\163\163\145\143\157
\040\104\141\164\141\040\123\171\163\164\145\155\163\040\123\056
\101\056\061\047\060\045\006\003\125\004\013\023\036\103\145\162
\164\165\155\040\103\145\162\164\151\146\151\143\141\164\151\157
\156\040\101\165\164\150\157\162\151\164\171\061\037\060\035\006
\003\125\004\003\023\026\103\145\162\164\165\155\040\124\162\165
\163\164\145\144\040\122\157\157\164\040\103\101
END
CKA_ID
UTF8 "0"
CKA_ISSUER MULTILINE_OCTAL
\060\172\061\013\060\011\006\003\125\004\006\023\002\120\114\061
\041\060\037\006\003\125\004\012\023\030\101\163\163\145\143\157
\040\104\141\164\141\040\123\171\163\164\145\155\163\040\123\056
\101\056\061\047\060\045\006\003\125\004\013\023\036\103\145\162
\164\165\155\040\103\145\162\164\151\146\151\143\141\164\151\157
\156\040\101\165\164\150\157\162\151\164\171\061\037\060\035\006

```

\003\125\004\003\023\026\103\145\162\164\165\155\040\124\162\165
\163\164\145\144\040\122\157\157\164\040\103\101
END
CKA_SERIAL_NUMBER MULTILINE_OCTAL
\002\020\036\277\131\120\270\311\200\067\114\006\367\353\125\117
\265\355
END
CKA_VALUE MULTILINE_OCTAL
\060\202\005\300\060\202\003\250\240\003\002\001\002\002\020\036
\277\131\120\270\311\200\067\114\006\367\353\125\117\265\355\060
\015\006\011\052\206\110\206\367\015\001\001\015\005\000\060\172
\061\013\060\011\006\003\125\004\006\023\002\120\114\061\041\060
\037\006\003\125\004\012\023\030\101\163\163\145\143\157\040\104
\141\164\141\040\123\171\163\164\145\155\163\040\123\056\101\056
\061\047\060\045\006\003\125\004\013\023\036\103\145\162\164\165
\155\040\103\145\162\164\151\146\151\143\141\164\151\157\156\040
\101\165\164\150\157\162\151\164\171\061\037\060\035\006\003\125
\004\003\023\026\103\145\162\164\165\155\040\124\162\165\163\164
\145\144\040\122\157\157\164\040\103\101\060\036\027\015\061\070
\060\063\061\066\061\062\061\060\061\063\132\027\015\064\063\060
\063\061\066\061\062\061\060\061\063\132\060\172\061\013\060\011
\006\003\125\004\006\023\002\120\114\061\041\060\037\006\003\125
\004\012\023\030\101\163\163\145\143\157\040\104\141\164\141\040
\123\171\163\164\145\155\163\040\123\056\101\056\061\047\060\045
\006\003\125\004\013\023\036\103\145\162\164\165\155\040\103\145
\162\164\151\146\151\143\141\164\151\157\156\040\101\165\164\150
\157\162\151\164\171\061\037\060\035\006\003\125\004\003\023\026
\103\145\162\164\165\155\040\124\162\165\163\164\145\144\040\122
\157\157\164\040\103\101\060\202\002\042\060\015\006\011\052\206
\110\206\367\015\001\001\001\005\000\003\202\002\017\000\060\202
\002\012\002\202\002\001\000\321\055\216\273\267\066\352\155\067
\221\237\116\223\247\005\344\051\003\045\316\034\202\367\174\231
\237\101\006\315\355\243\272\300\333\011\054\301\174\337\051\176
\113\145\057\223\247\324\001\153\003\050\030\243\330\235\005\301
\052\330\105\361\221\336\337\073\320\200\002\214\317\070\017\352
\247\134\170\021\244\301\310\205\134\045\323\323\262\347\045\317
\021\124\227\253\065\300\036\166\034\357\000\123\237\071\334\024
\245\054\042\045\263\162\162\374\215\263\345\076\010\036\024\052
\067\013\210\074\312\260\364\310\302\241\256\274\301\276\051\147
\125\342\374\255\131\134\376\275\127\054\260\220\215\302\355\067
\266\174\231\210\265\325\003\232\075\025\015\075\072\250\250\105
\360\225\116\045\131\035\315\230\151\273\323\314\062\311\215\357
\201\376\255\175\211\273\272\140\023\312\145\225\147\240\363\031
\366\003\126\324\152\323\047\342\241\255\203\360\112\022\042\167
\034\005\163\342\031\161\102\300\354\165\106\232\220\130\340\152
\216\053\245\106\060\004\216\031\262\027\343\276\251\272\177\126
\361\044\003\327\262\041\050\166\016\066\060\114\171\325\101\232
\232\250\270\065\272\014\072\362\104\033\040\210\367\305\045\327

\075\306\343\076\103\335\207\376\304\352\365\123\076\114\145\377
\073\112\313\170\132\153\027\137\015\307\303\117\116\232\052\242
\355\127\115\042\342\106\232\077\017\221\064\044\175\125\343\214
\225\067\323\032\360\011\053\054\322\311\215\264\015\000\253\147
\051\050\330\001\365\031\004\266\035\276\166\376\162\134\304\205
\312\322\200\101\337\005\250\243\325\204\220\117\013\363\340\077
\233\031\322\067\211\077\362\173\122\034\214\366\341\367\074\007
\227\214\016\242\131\201\014\262\220\075\323\343\131\106\355\017
\251\247\336\200\153\132\252\007\266\031\313\274\127\363\227\041
\172\014\261\053\164\076\353\332\247\147\055\114\304\230\236\066
\011\166\146\146\374\032\077\352\110\124\034\276\060\275\200\120
\277\174\265\316\000\366\014\141\331\347\044\003\340\343\001\201
\016\275\330\205\064\210\275\262\066\250\173\134\010\345\104\200
\214\157\370\057\325\041\312\035\034\320\373\304\265\207\321\072
\116\307\166\265\065\110\265\002\003\001\000\001\243\102\060\100
\060\017\006\003\125\035\023\001\001\377\004\005\060\003\001\001
\377\060\035\006\003\125\035\016\004\026\004\024\214\373\034\165
\274\002\323\237\116\056\110\331\371\140\124\252\304\263\117\372
\060\016\006\003\125\035\017\001\001\377\004\004\003\002\001\006
\060\015\006\011\052\206\110\206\367\015\001\001\015\005\000\003
\202\002\001\000\110\242\325\000\013\056\320\077\274\034\325\265
\124\111\036\132\153\364\344\362\340\100\067\340\314\024\173\271
\311\372\065\265\165\027\223\152\005\151\205\234\315\117\031\170
\133\031\201\363\143\076\303\316\133\217\365\057\136\001\166\023
\077\054\000\271\315\226\122\071\111\155\004\116\305\351\017\206
\015\341\372\263\137\202\022\361\072\316\146\006\044\064\053\350
\314\312\347\151\334\207\235\302\064\327\171\321\323\167\270\252
\131\130\376\235\046\372\070\206\076\235\212\207\144\127\345\027
\072\342\371\215\271\343\063\170\301\220\330\270\335\267\203\121
\344\304\314\043\325\006\174\346\121\323\315\064\061\300\366\106
\273\013\255\374\075\020\005\052\073\112\221\045\356\214\324\204
\207\200\052\274\011\214\252\072\023\137\350\064\171\120\301\020
\031\371\323\050\036\324\321\121\060\051\263\256\220\147\326\037
\012\143\261\305\251\306\102\061\143\027\224\357\151\313\057\372
\214\024\175\304\103\030\211\331\360\062\100\346\200\342\106\137
\345\343\301\000\131\250\371\350\040\274\211\054\016\107\064\013
\352\127\302\123\066\374\247\324\257\061\315\376\002\345\165\372
\271\047\011\371\363\365\073\312\175\237\251\042\313\210\311\252
\321\107\075\066\167\250\131\144\153\047\317\357\047\301\343\044
\265\206\367\256\176\062\115\260\171\150\321\071\350\220\130\303
\203\274\017\054\326\227\353\316\014\341\040\307\332\267\076\303
\077\277\057\334\064\244\373\053\041\315\147\217\113\364\343\352
\324\077\347\117\272\271\245\223\105\034\146\037\041\372\144\136
\157\340\166\224\062\313\165\365\156\345\366\217\307\270\244\314
\250\226\175\144\373\044\132\112\003\154\153\070\306\350\003\103
\232\367\127\271\263\051\151\223\070\364\003\362\273\373\202\153
\007\040\321\122\037\232\144\002\173\230\146\333\134\115\132\017
\320\204\225\240\074\024\103\006\312\312\333\270\101\066\332\152


```
\104\147\207\257\257\343\105\021\025\151\010\262\276\026\071\227
\044\157\022\105\321\147\135\011\250\311\025\332\372\322\246\137
\023\141\037\277\205\254\264\255\255\005\224\010\203\036\165\027
\323\161\073\223\120\043\131\240\355\074\221\124\235\166\000\305
\303\270\070\333
```

END

CKA_NSS_MOZILLA_CA_POLICY

CK_BBOOL CK_TRUE

CKA_NSS_SERVER_DISTRUST_AFTER CK_BBOOL CK_FALSE

CKA_NSS_EMAIL_DISTRUST_AFTER CK_BBOOL CK_FALSE

Trust for "Certum Trusted Root CA"

Issuer: CN=Certum

Trusted Root CA,OU=Certum Certification Authority,O=Asseco Data Systems S.A.,C=PL

Serial Number:1e:bf:59:50:b8:c9:80:37:4c:06:f7:eb:55:4f:b5:ed

Subject: CN=Certum Trusted Root CA,OU=Certum Certification Authority,O=Asseco Data Systems S.A.,C=PL

Not Valid Before: Fri Mar 16 12:10:13 2018

Not Valid After : Mon Mar 16 12:10:13 2043

Fingerprint (SHA-256):

FE:76:96:57:38:55:77:3E:37:A9:5E:7A:D4:D9:CC:96:C3:01:57:C1:5D:31:76:5B:A9:B1:57:04:E1:AE:78:FD

Fingerprint (SHA1): C8:83:44:C0:18:AE:9F:CC:F1:87:B7:8F:22:D1:C5:D7:45:84:BA:E5

CKA_CLASS CK_OBJECT_CLASS CKO_NSS_TRUST

CKA_TOKEN CK_BBOOL CK_TRUE

CKA_PRIVATE CK_BBOOL CK_FALSE

CKA_MODIFIABLE CK_BBOOL CK_FALSE

CKA_LABEL UTF8 "Certum Trusted Root CA"

CKA_CERT_SHA1_HASH MULTILINE_OCTAL

```
\310\203\104\300\030\256\237\314\361\207\267\217\042\321\305\327
\105\204\272\345
```

END

CKA_CERT_MD5_HASH MULTILINE_OCTAL

```
\121\341\302\347\376\114\204\257\131\016\057\364\124\157\352\051
```

END

CKA_ISSUER MULTILINE_OCTAL

```
\060\172\061\013\060\011\006\003\125\004\006\023\002\120\114\061
\041\060\037\006\003\125\004\012\023\030\101\163\163\145\143\157
\040\104\141\164\141\040\123\171\163\164\145\155\163\040\123\056
\101\056\061\047\060\045\006\003\125\004\013\023\036\103\145\162
\164\165\155\040\103\145\162\164\151\146\151\143\141\164\151\157
\156\040\101\165\164\150\157\162\151\164\171\061\037\060\035\006
\003\125\004\003\023\026\103\145\162\164\165\155\040\124\162\165
\163\164\145\144\040\122\157\157\164\040\103\101
```

END

CKA_SERIAL_NUMBER

MULTILINE_OCTAL

```
\002\020\036\277\131\120\270\311\200\067\114\006\367\353\125\117
\265\355
```

END

```

CKA_TRUST_SERVER_AUTH CK_TRUST CKT_NSS_TRUSTED_DELEGATOR
CKA_TRUST_EMAIL_PROTECTION CK_TRUST CKT_NSS_TRUSTED_DELEGATOR
CKA_TRUST_CODE_SIGNING CK_TRUST CKT_NSS_MUST_VERIFY_TRUST
CKA_TRUST_STEP_UP_APPROVED CK_BBOOL CK_FALSE

#
# Certificate "TunTrust Root CA"
#
# Issuer: CN=TunTrust Root CA,O=Agence Nationale de Certification Electronique,C=TN
# Serial Number:13:02:d5:e2:40:4c:92:46:86:16:67:5d:b4:bb:bb:b2:6b:3e:fc:13
#
Subject: CN=TunTrust Root CA,O=Agence Nationale de Certification Electronique,C=TN
# Not Valid Before: Fri Apr 26 08:57:56 2019
# Not Valid After : Tue Apr 26 08:57:56 2044
# Fingerprint (SHA-256):
2E:44:10:2A:B5:8C:B8:54:19:45:1C:8E:19:D9:AC:F3:66:2C:AF:BC:61:4B:6A:53:96:0A:30:F7:D0:E2:EB:41
# Fingerprint (SHA1): CF:E9:70:84:0F:E0:73:0F:9D:F6:0C:7F:2C:4B:EE:20:46:34:9C:BB
CKA_CLASS CK_OBJECT_CLASS CKO_CERTIFICATE
CKA_TOKEN CK_BBOOL CK_TRUE
CKA_PRIVATE CK_BBOOL CK_FALSE
CKA_MODIFIABLE CK_BBOOL CK_FALSE
CKA_LABEL UTF8 "TunTrust Root CA"
CKA_CERTIFICATE_TYPE CK_CERTIFICATE_TYPE CKC_X_509
CKA_SUBJECT MULTILINE_OCTAL
\060\141\061\013\060\011\006\003\125\004\006\023\002\124\116\061
\067\060\065\006\003\125\004\012\014\056\101\147\145\156\143\145
\040\116\141\164\151\157\156\141\154\145\040\144\145\040\103\145
\162\164\151\146\151\143\141\164\151\157\156\040\105\154\145\143
\164\162\157\156\151\161\165\145\061\031\060\027\006\003\125\004
\003\014\020\124\165\156\124\162\165\163\164\040\122\157\157\164
\040\103\101
END
CKA_ID
UTF8 "0"
CKA_ISSUER MULTILINE_OCTAL
\060\141\061\013\060\011\006\003\125\004\006\023\002\124\116\061
\067\060\065\006\003\125\004\012\014\056\101\147\145\156\143\145
\040\116\141\164\151\157\156\141\154\145\040\144\145\040\103\145
\162\164\151\146\151\143\141\164\151\157\156\040\105\154\145\143
\164\162\157\156\151\161\165\145\061\031\060\027\006\003\125\004
\003\014\020\124\165\156\124\162\165\163\164\040\122\157\157\164
\040\103\101
END
CKA_SERIAL_NUMBER MULTILINE_OCTAL
\002\024\023\002\325\342\100\114\222\106\206\026\147\135\264\273
\273\262\153\076\374\023
END
CKA_VALUE MULTILINE_OCTAL

```

\060\202\005\263\060\202\003\233\240\003\002\001\002\002\024\023
\002\325\342\100\114\222\106\206\026\147\135\264\273\273\262\153
\076\374\023\060\015\006\011\052\206\110\206\367\015\001\001\013
\005\000\060\141\061\013\060\011\006\003\125\004\006\023\002\124
\116\061\067\060\065\006\003\125\004\012\014\056\101\147\145\156
\143\145\040\116\141\164\151\157\156\141\154\145\040\144\145\040
\103\145\162\164\151\146\151\143\141\164\151\157\156\040\105\154
\145\143\164\162\157\156\151\161\165\145\061\031\060\027\006\003
\125\004\003\014\020\124\165\156\124\162\165\163\164\040\122\157
\157\164\040\103\101\060\036\027\015\061\071\060\064\062\066\060
\070\065\067\065\066\132\027\015\064\064\060\064\062\066\060\070
\065\067\065\066\132\060\141\061\013\060\011\006\003\125\004\006
\023\002\124\116\061\067\060\065\006\003\125\004\012\014\056\101
\147\145\156\143\145\040\116\141\164\151\157\156\141\154\145\040
\144\145\040\103\145\162\164\151\146\151\143\141\164\151\157\156
\040\105\154\145\143\164\162\157\156\151\161\165\145\061\031\060
\027\006\003\125\004\003\014\020\124\165\156\124\162\165\163\164
\040\122\157\157\164\040\103\101\060\202\002\042\060\015\006\011
\052\206\110\206\367\015\001\001\001\005\000\003\202\002\017\000
\060\202\002\012\002\202\002\001\000\303\315\323\374\275\004\123
\335\014\040\072\325\210\056\005\113\101\365\203\202\176\367\131
\237\236\236\143\350\163\332\366\006\251\117\037\264\371\013\037
\071\214\232\040\320\176\006\324\354\064\331\206\274\165\133\207
\210\360\322\331\324\243\012\262\154\033\353\111\054\076\254\135
\330\224\003\240\354\064\345\060\304\065\175\373\046\115\033\156
\060\124\330\365\200\105\234\071\255\234\311\045\004\115\232\220
\076\116\100\156\212\153\315\051\147\306\314\055\340\164\350\005
\127\012\110\120\372\172\103\332\176\354\133\232\016\142\166\376
\352\235\035\205\162\354\021\273\065\350\037\047\277\301\241\307
\273\110\026\335\126\327\314\116\240\341\271\254\333\325\203\031
\032\205\321\224\227\327\312\243\145\013\363\070\371\002\256\335
\366\147\317\311\077\365\212\054\107\032\231\157\005\015\375\320
\035\202\061\374\051\314\000\130\227\221\114\200\000\034\063\205
\226\057\313\101\302\213\020\204\303\011\044\211\037\265\017\331
\331\167\107\030\222\224\140\134\307\231\003\074\376\367\225\247
\175\120\241\200\302\251\203\255\130\226\125\041\333\206\131\324
\257\306\274\335\201\156\007\333\140\142\376\354\020\156\332\150
\001\364\203\033\251\076\242\133\043\327\144\306\337\334\242\175
\330\113\272\202\322\121\370\146\277\006\106\344\171\052\046\066
\171\217\037\116\231\035\262\217\014\016\034\377\311\135\300\375
\220\020\246\261\067\363\315\072\044\156\264\205\220\277\200\271
\014\214\325\233\326\310\361\126\077\032\200\211\172\251\342\033
\062\121\054\076\362\337\173\366\135\172\051\031\216\345\310\275
\066\161\213\135\114\302\035\077\255\130\242\317\075\160\115\246
\120\230\045\334\043\371\270\130\101\010\161\277\117\270\204\240
\217\000\124\025\374\221\155\130\247\226\073\353\113\226\047\315
\153\242\241\206\254\015\174\124\346\146\114\146\137\220\276\041
\232\002\106\055\344\203\302\200\271\317\113\076\350\177\074\001

\354\217\136\315\177\322\050\102\001\225\212\342\227\075\020\041
\175\366\235\034\305\064\241\354\054\016\012\122\054\022\125\160
\044\075\313\302\024\065\103\135\047\116\276\300\275\252\174\226
\347\374\236\141\255\104\323\000\227\002\003\001\000\001\243\143
\060\141\060\035\006\003\125\035\016\004\026\004\024\006\232\233
\037\123\175\361\365\244\310\323\206\076\241\163\131\264\367\104
\041\060\017\006\003\125\035\023\001\001\377\004\005\060\003\001
\001\377\060\037\006\003\125\035\043\004\030\060\026\200\024\006
\232\233\037\123\175\361\365\244\310\323\206\076\241\163\131\264
\367\104\041\060\016\006\003\125\035\017\001\001\377\004\004\003
\002\001\006\060\015\006\011\052\206\110\206\367\015\001\001\013
\005\000\003\202\002\001\000\252\005\156\266\335\025\311\277\263
\306\040\366\006\107\260\206\223\045\323\215\271\310\000\077\227
\365\122\047\210\161\311\164\375\353\312\144\333\133\357\036\135
\272\277\321\353\356\134\151\272\026\310\363\271\217\323\066\056
\100\111\007\015\131\336\213\020\260\111\005\342\377\221\077\113
\267\335\002\216\370\201\050\134\314\334\155\257\137\024\234\175
\130\170\015\366\200\011\271\351\016\227\051\031\270\267\353\370
\026\313\125\022\344\306\175\273\304\354\370\265\034\116\076\147
\277\305\137\033\155\155\107\050\252\004\130\141\326\166\277\042
\177\320\007\152\247\144\123\360\227\215\235\200\077\273\301\007
\333\145\257\346\233\062\232\303\124\223\304\034\010\303\104\373
\173\143\021\103\321\152\032\141\152\171\155\220\117\051\216\107
\005\301\022\151\151\326\306\066\061\341\374\372\200\272\134\117
\304\353\267\062\254\370\165\141\027\327\020\031\271\361\322\011
\357\172\102\235\133\132\013\324\306\225\116\052\316\377\007\327
\117\176\030\006\210\361\031\265\331\230\273\256\161\304\034\347
\164\131\130\357\014\211\317\213\037\165\223\032\004\024\222\110
\120\251\353\127\051\000\026\343\066\034\310\370\277\360\063\325
\101\017\304\314\074\335\351\063\103\001\221\020\053\036\321\271
\135\315\062\031\213\217\214\040\167\327\042\304\102\334\204\026
\233\045\155\350\264\125\161\177\260\174\263\323\161\111\271\317
\122\244\004\077\334\075\240\273\257\063\236\012\060\140\216\333
\235\135\224\250\275\140\347\142\200\166\201\203\014\214\314\060
\106\111\342\014\322\250\257\353\141\161\357\347\042\142\251\367
\134\144\154\237\026\214\147\066\047\105\365\011\173\277\366\020
\012\361\260\215\124\103\214\004\272\243\077\357\342\065\307\371
\164\340\157\064\101\320\277\163\145\127\040\371\233\147\172\146
\150\044\116\200\145\275\020\231\006\131\362\145\257\270\306\107
\273\375\220\170\213\101\163\056\257\125\037\334\073\222\162\156
\204\323\320\141\114\015\314\166\127\342\055\205\042\025\066\015
\353\001\235\353\330\353\304\204\231\373\300\014\314\062\350\343
\167\332\203\104\213\236\125\050\300\213\130\323\220\076\116\033
\000\361\025\255\203\053\232

END

CKA_NSS_MOZILLA_CA_POLICY

CK_BBOOL CK_TRUE

CKA_NSS_SERVER_DISTRUST_AFTER CK_BBOOL CK_FALSE

CKA_NSS_EMAIL_DISTRUST_AFTER CK_BBOOL CK_FALSE

Trust for "TunTrust Root CA"

Issuer: CN=TunTrust Root CA,O=Agence Nationale de Certification Electronique,C=TN

Serial Number:13:02:d5:e2:40:4c:92:46:86:16:67:5d:b4:bb:bb:b2:6b:3e:fc:13

Subject: CN=TunTrust Root CA,O=Agence Nationale de Certification Electronique,C=TN

#

Not Valid Before: Fri Apr 26 08:57:56 2019

Not Valid After : Tue Apr 26 08:57:56 2044

Fingerprint (SHA-256):

2E:44:10:2A:B5:8C:B8:54:19:45:1C:8E:19:D9:AC:F3:66:2C:AF:BC:61:4B:6A:53:96:0A:30:F7:D0:E2:EB:41

Fingerprint (SHA1): CF:E9:70:84:0F:E0:73:0F:9D:F6:0C:7F:2C:4B:EE:20:46:34:9C:BB

CKA_CLASS CK_OBJECT_CLASS CKO_NSS_TRUST

CKA_TOKEN CK_BBOOL CK_TRUE

CKA_PRIVATE CK_BBOOL CK_FALSE

CKA_MODIFIABLE CK_BBOOL CK_FALSE

CKA_LABEL UTF8 "TunTrust Root CA"

CKA_CERT_SHA1_HASH MULTILINE_OCTAL

\317\351\160\204\017\340\163\017\235\366\014\177\054\113\356\040

\106\064\234\273

END

CKA_CERT_MD5_HASH MULTILINE_OCTAL

\205\023\271\220\133\066\134\266\136\270\132\370\340\061\127\264

END

CKA_ISSUER MULTILINE_OCTAL

\060\141\061\013\060\011\006\003\125\004\006\023\002\124\116\061

\067\060\065\006\003\125\004\012\014\056\101\147\145\156\143\145

\040\116\141\164\151\157\156\141\154\145\040\144\145\040\103\145

\162\164\151\146\151\143\141\164\151\157\156\040\105\154\145\143

\164\162\157\156\151\161\165\145\061\031\060\027\006\003\125\004

\003\014\020\124\165\156\124\162\165\163\164\040\122\157\157\164

\040\103\101

END

CKA_SERIAL_NUMBER

MULTILINE_OCTAL

\002\024\023\002\325\342\100\114\222\106\206\026\147\135\264\273

\273\262\153\076\374\023

END

CKA_TRUST_SERVER_AUTH CK_TRUST CKT_NSS_TRUSTED_DELEGATOR

CKA_TRUST_EMAIL_PROTECTION CK_TRUST CKT_NSS_MUST_VERIFY_TRUST

CKA_TRUST_CODE_SIGNING CK_TRUST CKT_NSS_MUST_VERIFY_TRUST

CKA_TRUST_STEP_UP_APPROVED CK_BBOOL CK_FALSE

#

Certificate "HARICA TLS RSA Root CA 2021"

#

Issuer: CN=HARICA TLS RSA Root CA 2021,O=Hellenic Academic and Research Institutions CA,C=GR

Serial Number:39:ca:93:1c:ef:43:f3:c6:8e:93:c7:f4:64:89:38:7e

```
# Subject: CN=HARICA TLS RSA Root CA 2021,O=Hellenic Academic and Research Institutions CA,C=GR
# Not Valid Before: Fri Feb 19 10:55:38 2021
# Not Valid After : Mon Feb 13 10:55:37 2045
# Fingerprint (SHA-256):
D9:5D:0E:8E:DA:79:52:5B:F9:BE:B1:1B:14:D2:10:0D:32:94:98:5F:0C:62:D9:FA:BD:9C:D9:99:EC:CB:7B:1D
# Fingerprint
(SHA1): 02:2D:05:82:FA:88:CE:14:0C:06:79:DE:7F:14:10:E9:45:D7:A5:6D
CKA_CLASS CK_OBJECT_CLASS CKO_CERTIFICATE
CKA_TOKEN CK_BBOOL CK_TRUE
CKA_PRIVATE CK_BBOOL CK_FALSE
CKA_MODIFIABLE CK_BBOOL CK_FALSE
CKA_LABEL UTF8 "HARICA TLS RSA Root CA 2021"
CKA_CERTIFICATE_TYPE CK_CERTIFICATE_TYPE CKC_X_509
CKA_SUBJECT MULTILINE_OCTAL
\060\154\061\013\060\011\006\003\125\004\006\023\002\107\122\061
\067\060\065\006\003\125\004\012\014\056\110\145\154\154\145\156
\151\143\040\101\143\141\144\145\155\151\143\040\141\156\144\040
\122\145\163\145\141\162\143\150\040\111\156\163\164\151\164\165
\164\151\157\156\163\040\103\101\061\044\060\042\006\003\125\004
\003\014\033\110\101\122\111\103\101\040\124\114\123\040\122\123
\101\040\122\157\157\164\040\103\101\040\062\060\062\061
END
CKA_ID UTF8 "0"
CKA_ISSUER MULTILINE_OCTAL
\060\154\061\013\060\011\006\003\125\004\006\023\002\107\122\061
\067\060\065\006\003\125\004\012\014\056\110\145\154\154\145\156
\151\143\040\101\143\141\144\145\155\151\143\040\141\156\144\040
\122\145\163\145\141\162\143\150\040\111\156\163\164\151\164\165
\164\151\157\156\163\040\103\101\061\044\060\042\006\003\125\004
\003\014\033\110\101\122\111\103\101\040\124\114\123\040\122\123
\101\040\122\157\157\164\040\103\101\040\062\060\062\061
END
CKA_SERIAL_NUMBER
MULTILINE_OCTAL
\002\020\071\312\223\034\357\103\363\306\216\223\307\364\144\211
\070\176
END
CKA_VALUE MULTILINE_OCTAL
\060\202\005\244\060\202\003\214\240\003\002\001\002\002\020\071
\312\223\034\357\103\363\306\216\223\307\364\144\211\070\176\060
\015\006\011\052\206\110\206\367\015\001\001\013\005\000\060\154
\061\013\060\011\006\003\125\004\006\023\002\107\122\061\067\060
\065\006\003\125\004\012\014\056\110\145\154\154\145\156\151\143
\040\101\143\141\144\145\155\151\143\040\141\156\144\040\122\145
\163\145\141\162\143\150\040\111\156\163\164\151\164\165\164\151
\157\156\163\040\103\101\061\044\060\042\006\003\125\004\003\014
\033\110\101\122\111\103\101\040\124\114\123\040\122\123\101\040
\122\157\157\164\040\103\101\040\062\060\062\061\060\036\027\015
```

\062\061\060\062\061\071\061\060\065\065\063\070\132\027\015\064
\065\060\062\061\063\061\060\065\065\063\067\132\060\154\061\013
\060\011\006\003\125\004\006\023\002\107\122\061\067\060\065\006
\003\125\004\012\014\056\110\145\154\154\145\156\151\143\040\101
\143\141\144\145\155\151\143\040\141\156\144\040\122\145\163\145
\141\162\143\150\040\111\156\163\164\151\164\165\164\151\157\156
\163\040\103\101\061\044\060\042\006\003\125\004\003\014\033\110
\101\122\111\103\101\040\124\114\123\040\122\123\101\040\122\157
\157\164\040\103\101\040\062\060\062\061\060\202\002\042\060\015
\006\011\052\206\110\206\367\015\001\001\001\005\000\003\202\002
\017\000\060\202\002\012\002\202\002\001\000\213\302\347\257\145
\233\005\147\226\311\015\044\271\320\016\144\374\316\342\044\030
\054\204\177\167\121\313\004\021\066\270\136\355\151\161\247\236
\344\045\011\227\147\301\107\302\317\221\026\066\142\075\070\004
\341\121\202\377\254\322\264\151\335\056\354\021\243\105\356\153
\153\073\114\277\214\215\244\036\235\021\271\351\070\371\172\016
\014\230\342\043\035\321\116\143\324\347\270\101\104\373\153\257
\153\332\037\323\305\221\210\133\244\211\222\321\201\346\214\071
\130\240\326\151\103\251\255\230\122\130\156\333\012\373\153\317
\150\372\343\244\136\072\105\163\230\007\352\137\002\162\336\014
\245\263\237\256\251\035\267\035\263\374\212\131\347\156\162\145
\255\365\060\224\043\007\363\202\026\113\065\230\234\123\273\057
\312\344\132\331\307\215\035\374\230\231\373\054\244\202\153\360
\052\037\216\013\137\161\134\134\256\102\173\051\211\201\313\003
\243\231\312\210\236\013\100\011\101\063\333\346\130\172\375\256
\231\160\300\132\017\326\023\206\161\057\166\151\374\220\335\333
\055\156\321\362\233\365\032\153\236\157\025\214\172\360\113\050
\240\042\070\200\044\154\066\244\073\362\060\221\363\170\023\317
\301\077\065\253\361\035\021\043\265\103\042\236\001\222\267\030
\002\345\021\321\202\333\025\000\314\141\067\301\052\174\232\341
\320\272\263\120\106\356\202\254\235\061\370\373\043\342\003\000
\110\160\243\011\046\171\025\123\140\363\070\134\255\070\352\201
\000\143\024\271\063\136\335\013\333\240\105\007\032\063\011\370
\115\264\247\002\246\151\364\302\131\005\210\145\205\126\256\113
\313\340\336\074\175\055\032\310\351\373\037\243\141\112\326\052
\023\255\167\114\032\030\233\221\017\130\330\006\124\305\227\370
\252\077\040\212\246\205\246\167\366\246\374\034\342\356\156\224
\063\052\203\120\204\012\345\117\206\370\120\105\170\000\201\353
\133\150\343\046\215\314\173\134\121\364\024\054\100\276\032\140
\035\172\162\141\035\037\143\055\210\252\316\242\105\220\010\374
\153\276\263\120\052\132\375\250\110\030\106\326\220\100\222\220
\012\204\136\150\061\370\353\355\015\323\035\306\175\231\030\125
\126\047\145\056\215\105\305\044\354\316\343\002\003\001\000\001
\243\102\060\100\060\017\006\003\125\035\023\001\001\377\004\005
\060\003\001\001\377\060\035\006\003\125\035\016\004\026\004\024
\012\110\043\246\140\244\222\012\063\352\223\133\305\127\352\045
\115\275\022\356\060\016\006\003\125\035\017\001\001\377\004\004
\003\002\001\206\060\015\006\011\052\206\110\206\367\015\001\001

\013\005\000\003\202\002\001\000\076\220\110\252\156\142\025\045
\146\173\014\325\214\213\211\235\327\355\116\007\357\234\320\024
\137\136\120\275\150\226\220\244\024\021\252\150\155\011\065\071
\100\011\332\364\011\054\064\245\173\131\204\111\051\227\164\310
\007\036\107\155\362\316\034\120\046\343\236\075\100\123\077\367
\177\226\166\020\305\106\245\320\040\113\120\364\065\073\030\364
\125\152\101\033\107\006\150\074\273\011\010\142\331\137\125\102
\252\254\123\205\254\225\126\066\126\253\344\005\214\305\250\332
\037\243\151\275\123\017\304\377\334\312\343\176\362\114\210\206
\107\106\032\363\000\365\200\221\242\334\103\102\224\233\040\360
\321\315\262\353\054\123\302\123\170\112\117\004\224\101\232\217
\047\062\301\345\111\031\277\361\362\302\213\250\012\071\061\050
\264\175\142\066\054\115\354\037\063\266\176\167\155\176\120\360
\237\016\327\021\217\317\030\305\343\047\376\046\357\005\235\317
\317\067\305\320\173\332\073\260\026\204\014\072\223\326\276\027
\333\017\076\016\031\170\011\307\251\002\162\042\113\367\067\166
\272\165\304\205\003\132\143\325\261\165\005\302\271\275\224\255
\214\025\231\247\223\175\366\305\363\252\164\317\004\205\224\230
\000\364\342\371\312\044\145\277\340\142\257\310\305\372\262\311
\236\126\110\332\171\375\226\166\025\276\243\216\126\304\263\064
\374\276\107\364\301\264\250\374\325\060\210\150\356\313\256\311
\143\304\166\276\254\070\030\341\136\134\317\256\072\042\121\353
\321\213\263\363\053\063\007\124\207\372\264\262\023\173\272\123
\004\142\001\235\361\300\117\356\341\072\324\213\040\020\372\002
\127\346\357\301\013\267\220\106\234\031\051\214\334\157\240\112
\151\151\224\267\044\145\240\377\254\077\316\001\373\041\056\375
\150\370\233\362\245\317\061\070\134\025\252\346\227\000\301\337
\132\245\247\071\252\351\204\177\074\121\250\072\331\224\133\214
\277\117\010\161\345\333\250\134\324\322\246\376\000\243\306\026
\307\017\350\200\316\034\050\144\164\031\010\323\102\343\316\000
\135\177\261\334\023\260\341\005\313\321\040\252\206\164\236\071
\347\221\375\377\133\326\367\255\246\057\003\013\155\343\127\124
\353\166\123\030\215\021\230\272

END

CKA_NSS_MOZILLA_CA_POLICY

CK_BBOOL CK_TRUE

CKA_NSS_SERVER_DISTRUST_AFTER CK_BBOOL CK_FALSE

CKA_NSS_EMAIL_DISTRUST_AFTER CK_BBOOL CK_FALSE

Trust for "HARICA TLS RSA Root CA 2021"

Issuer: CN=HARICA TLS RSA Root CA 2021,O=Hellenic Academic and Research Institutions CA,C=GR

Serial Number:39:ca:93:1c:ef:43:f3:c6:8e:93:c7:f4:64:89:38:7e

Subject: CN=HARICA TLS RSA Root CA 2021,O=Hellenic Academic and Research Institutions CA,C=GR

Not Valid Before: Fri Feb 19 10:55:38 2021

Not Valid After : Mon Feb 13 10:55:37 2045

Fingerprint (SHA-256):

D9:5D:0E:8E:DA:79:52:5B:F9:BE:B1:1B:14:D2:10:0D:32:94:98:5F:0C:62:D9:FA:BD:9C:D9:99:EC:CB:7B:1D

Fingerprint (SHA1): 02:2D:05:82:FA:88:CE:14:0C:06:79:DE:7F:14:10:E9:45:D7:A5:6D


```

CKA_CLASS
CK_OBJECT_CLASS CKO_NSS_TRUST
CKA_TOKEN CK_BBOOL CK_TRUE
CKA_PRIVATE CK_BBOOL CK_FALSE
CKA_MODIFIABLE CK_BBOOL CK_FALSE
CKA_LABEL UTF8 "HARICA TLS RSA Root CA 2021"
CKA_CERT_SHA1_HASH MULTILINE_OCTAL
\002\055\005\202\372\210\316\024\014\006\171\336\177\024\020\351
\105\327\245\155
END
CKA_CERT_MD5_HASH MULTILINE_OCTAL
\145\107\233\130\206\335\054\360\374\242\204\037\036\226\304\221
END
CKA_ISSUER MULTILINE_OCTAL
\060\154\061\013\060\011\006\003\125\004\006\023\002\107\122\061
\067\060\065\006\003\125\004\012\014\056\110\145\154\154\145\156
\151\143\040\101\143\141\144\145\155\151\143\040\141\156\144\040
\122\145\163\145\141\162\143\150\040\111\156\163\164\151\164\165
\164\151\157\156\163\040\103\101\061\044\060\042\006\003\125\004
\003\014\033\110\101\122\111\103\101\040\124\114\123\040\122\123
\101\040\122\157\157\164\040\103\101\040\062\060\062\061
END
CKA_SERIAL_NUMBER MULTILINE_OCTAL
\002\020\071\312\223\034\357\103\363\306\216\223\307\364\144\211
\070\176
END
CKA_TRUST_SERVER_AUTH
CK_TRUST CKT_NSS_TRUSTED_DELEGATOR
CKA_TRUST_EMAIL_PROTECTION CK_TRUST CKT_NSS_MUST_VERIFY_TRUST
CKA_TRUST_CODE_SIGNING CK_TRUST CKT_NSS_MUST_VERIFY_TRUST
CKA_TRUST_STEP_UP_APPROVED CK_BBOOL CK_FALSE

#
# Certificate "HARICA TLS ECC Root CA 2021"
#
# Issuer: CN=HARICA TLS ECC Root CA 2021,O=Hellenic Academic and Research Institutions CA,C=GR
# Serial Number:67:74:9d:8d:77:d8:3b:6a:db:22:f4:ff:59:e2:bf:ce
# Subject: CN=HARICA TLS ECC Root CA 2021,O=Hellenic Academic and Research Institutions CA,C=GR
# Not Valid Before: Fri Feb 19 11:01:10 2021
# Not Valid After : Mon Feb 13 11:01:09 2045
# Fingerprint (SHA-256):
3F:99:CC:47:4A:CF:CE:4D:FE:D5:87:94:66:5E:47:8D:15:47:73:9F:2E:78:0F:1B:B4:CA:9B:13:30:97:D4:01
# Fingerprint (SHA1): BC:B0:C1:9D:E9:98:92:70:19:38:57:E9:8D:A7:B4:5D:6E:EE:01:48
CKA_CLASS CK_OBJECT_CLASS CKO_CERTIFICATE
CKA_TOKEN CK_BBOOL CK_TRUE
CKA_PRIVATE CK_BBOOL CK_FALSE
CKA_MODIFIABLE CK_BBOOL CK_FALSE
CKA_LABEL UTF8 "HARICA TLS ECC Root

```

CA 2021"

CKA_CERTIFICATE_TYPE CK_CERTIFICATE_TYPE CKC_X_509

CKA_SUBJECT MULTILINE_OCTAL

\060\154\061\013\060\011\006\003\125\004\006\023\002\107\122\061
\067\060\065\006\003\125\004\012\014\056\110\145\154\154\145\156
\151\143\040\101\143\141\144\145\155\151\143\040\141\156\144\040
\122\145\163\145\141\162\143\150\040\111\156\163\164\151\164\165
\164\151\157\156\163\040\103\101\061\044\060\042\006\003\125\004
\003\014\033\110\101\122\111\103\101\040\124\114\123\040\105\103
\103\040\122\157\157\164\040\103\101\040\062\060\062\061

END

CKA_ID UTF8 "0"

CKA_ISSUER MULTILINE_OCTAL

\060\154\061\013\060\011\006\003\125\004\006\023\002\107\122\061
\067\060\065\006\003\125\004\012\014\056\110\145\154\154\145\156
\151\143\040\101\143\141\144\145\155\151\143\040\141\156\144\040
\122\145\163\145\141\162\143\150\040\111\156\163\164\151\164\165
\164\151\157\156\163\040\103\101\061\044\060\042\006\003\125\004
\003\014\033\110\101\122\111\103\101\040\124\114\123\040\105\103
\103\040\122\157\157\164\040\103\101\040\062\060\062\061

END

CKA_SERIAL_NUMBER

MULTILINE_OCTAL

\002\020\147\164\235\215\167\330\073\152\333\042\364\377\131\342
\277\316

END

CKA_VALUE MULTILINE_OCTAL

\060\202\002\124\060\202\001\333\240\003\002\001\002\002\020\147
\164\235\215\167\330\073\152\333\042\364\377\131\342\277\316\060
\012\006\010\052\206\110\316\075\004\003\003\060\154\061\013\060
\011\006\003\125\004\006\023\002\107\122\061\067\060\065\006\003
\125\004\012\014\056\110\145\154\154\145\156\151\143\040\101\143
\141\144\145\155\151\143\040\141\156\144\040\122\145\163\145\141
\162\143\150\040\111\156\163\164\151\164\165\164\151\157\156\163
\040\103\101\061\044\060\042\006\003\125\004\003\014\033\110\101
\122\111\103\101\040\124\114\123\040\105\103\103\040\122\157\157
\164\040\103\101\040\062\060\062\061\060\036\027\015\062\061\060
\062\061\071\061\061\060\061\061\060\132\027\015\064\065\060\062
\061\063\061\061\060\061\060\071\132\060\154\061\013\060\011\006
\003\125\004\006\023\002\107\122\061\067\060\065\006\003\125\004
\012\014\056\110\145\154\154\145\156\151\143\040\101\143\141\144
\145\155\151\143\040\141\156\144\040\122\145\163\145\141\162\143
\150\040\111\156\163\164\151\164\165\164\151\157\156\163\040\103
\101\061\044\060\042\006\003\125\004\003\014\033\110\101\122\111
\103\101\040\124\114\123\040\105\103\103\040\122\157\157\164\040
\103\101\040\062\060\062\061\060\166\060\020\006\007\052\206\110
\316\075\002\001\006\005\053\201\004\000\042\003\142\000\004\070
\010\376\261\240\226\322\172\254\257\111\072\320\300\340\303\073

\050\252\361\162\155\145\000\107\210\204\374\232\046\153\252\113
\272\154\004\012\210\136\027\362\125\207\374\060\260\064\342\064
\130\127\032\204\123\351\060\331\251\362\226\164\303\121\037\130
\111\061\314\230\116\140\021\207\165\323\162\224\220\117\233\020
\045\052\250\170\055\276\220\101\130\220\025\162\247\241\267\243
\102\060\100\060\017\006\003\125\035\023\001\001\377\004\005\060
\003\001\001\377\060\035\006\003\125\035\016\004\026\004\024\311
\033\123\201\022\376\004\325\026\321\252\274\232\157\267\240\225
\031\156\312\060\016\006\003\125\035\017\001\001\377\004\004\003
\002\001\206\060\012\006\010\052\206\110\316\075\004\003\003\003
\147\000\060\144\002\060\021\336\256\370\334\116\210\260\251\360
\042\255\302\121\100\357\140\161\055\356\217\002\304\135\003\160
\111\244\222\352\305\024\210\160\246\323\015\260\252\312\054\100
\234\373\351\202\156\232\002\060\053\107\232\007\306\321\302\201
\174\312\013\226\030\101\033\243\364\060\011\236\265\043\050\015
\237\024\266\074\123\242\114\006\151\175\372\154\221\306\052\111
\105\346\354\267\023\341\072\154

END

CKA_NSS_Mozilla_CA_POLICY

CK_BBOOL CK_TRUE

CKA_NSS_SERVER_DISTRUST_AFTER CK_BBOOL CK_FALSE

CKA_NSS_EMAIL_DISTRUST_AFTER CK_BBOOL CK_FALSE

Trust for "HARICA TLS ECC Root CA 2021"

Issuer: CN=HARICA TLS ECC Root CA 2021,O=Hellenic Academic and Research Institutions CA,C=GR

Serial Number:67:74:9d:8d:77:d8:3b:6a:db:22:f4:ff:59:e2:bf:ce

Subject: CN=HARICA TLS ECC Root CA 2021,O=Hellenic

Academic and Research Institutions CA,C=GR

Not Valid Before: Fri Feb 19 11:01:10 2021

Not Valid After : Mon Feb 13 11:01:09 2045

Fingerprint (SHA-256):

3F:99:CC:47:4A:CF:CE:4D:FE:D5:87:94:66:5E:47:8D:15:47:73:9F:2E:78:0F:1B:B4:CA:9B:13:30:97:D4:01

Fingerprint (SHA1): BC:B0:C1:9D:E9:98:92:70:19:38:57:E9:8D:A7:B4:5D:6E:EE:01:48

CKA_CLASS CK_OBJECT_CLASS CKO_NSS_TRUST

CKA_TOKEN CK_BBOOL CK_TRUE

CKA_PRIVATE CK_BBOOL CK_FALSE

CKA_MODIFIABLE CK_BBOOL CK_FALSE

CKA_LABEL UTF8 "HARICA TLS ECC Root CA 2021"

CKA_CERT_SHA1_HASH MULTILINE_OCTAL

\274\260\301\235\351\230\222\160\031\070\127\351\215\247\264\135
\156\356\001\110

END

CKA_CERT_MD5_HASH MULTILINE_OCTAL

\256\367\114\345\146\065\321\267\233\214\042\223\164\323\113\260

END

CKA_ISSUER MULTILINE_OCTAL

\060\154\061\013\060\011\006\003\125\004\006\023\002\107\122\061
\067\060\065\006\003\125\004\012\014\056\110\145\154\154\154\156

```

\151\143\040\101\143\141\144\145\155\151\143\040\141\156\144\040
\122\145\163\145\141\162\143\150\040\111\156\163\164\151\164\165
\164\151\157\156\163\040\103\101\061\044\060\042\006\003\125\004
\003\014\033\110\101\122\111\103\101\040\124\114\123\040\105\103
\103\040\122\157\157\164\040\103\101\040\062\060\062\061
END
CKA_SERIAL_NUMBER
MULTILINE_OCTAL
\002\020\147\164\235\215\167\330\073\152\333\042\364\377\131\342
\277\316
END
CKA_TRUST_SERVER_AUTH CK_TRUST CKT_NSS_TRUSTED_DELEGATOR
CKA_TRUST_EMAIL_PROTECTION CK_TRUST CKT_NSS_MUST_VERIFY_TRUST
CKA_TRUST_CODE_SIGNING CK_TRUST CKT_NSS_MUST_VERIFY_TRUST
CKA_TRUST_STEP_UP_APPROVED CK_BBOOL CK_FALSE

#
# Certificate "HARICA Client RSA Root CA 2021"
#
# Issuer: CN=HARICA Client RSA Root CA 2021,O=Hellenic Academic and Research Institutions CA,C=GR
# Serial Number:55:52:f8:1e:db:1b:24:2c:9e:bb:96:18:cd:02:28:3e
# Subject: CN=HARICA Client RSA Root CA 2021,O=Hellenic Academic and Research Institutions CA,C=GR
# Not Valid Before: Fri Feb 19 10:58:46 2021
# Not Valid After : Mon Feb 13 10:58:45 2045
# Fingerprint (SHA-256):
1B:E7:AB:E3:06:86:B1:63:48:AF:D1:C6:1B:68:66:A0:EA:7F:48:21:E6:7D:5E:8A:F9:37:CF:80:11:BC:75:0D
#
Fingerprint (SHA1): 46:C6:90:0A:77:3A:B6:BC:F4:65:AD:AC:FC:E3:F7:07:00:6E:DE:6E
CKA_CLASS CK_OBJECT_CLASS CKO_CERTIFICATE
CKA_TOKEN CK_BBOOL CK_TRUE
CKA_PRIVATE CK_BBOOL CK_FALSE
CKA_MODIFIABLE CK_BBOOL CK_FALSE
CKA_LABEL UTF8 "HARICA Client RSA Root CA 2021"
CKA_CERTIFICATE_TYPE CK_CERTIFICATE_TYPE CKC_X_509
CKA_SUBJECT MULTILINE_OCTAL
\060\157\061\013\060\011\006\003\125\004\006\023\002\107\122\061
\067\060\065\006\003\125\004\012\014\056\110\145\154\154\145\156
\151\143\040\101\143\141\144\145\155\151\143\040\141\156\144\040
\122\145\163\145\141\162\143\150\040\111\156\163\164\151\164\165
\164\151\157\156\163\040\103\101\061\047\060\045\006\003\125\004
\003\014\036\110\101\122\111\103\101\040\103\154\151\145\156\164
\040\122\123\101\040\122\157\157\164\040\103\101\040\062\060\062
\061
END
CKA_ID UTF8 "0"
CKA_ISSUER MULTILINE_OCTAL
\060\157\061\013\060\011\006\003\125\004\006\023\002\107\122\061
\067\060\065\006\003\125\004\012\014\056\110\145\154\154\145\156

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\151\143\040\101\143\141\144\145\155\151\143\040\141\156\144\040
\122\145\163\145\141\162\143\150\040\111\156\163\164\151\164\165
\164\151\157\156\163\040\103\101\061\047\060\045\006\003\125\004
\003\014\036\110\101\122\111\103\101\040\103\154\151\145\156\164
\040\122\123\101\040\122\157\157\164\040\103\101\040\062\060\062
\061
END
CKA_SERIAL_NUMBER
MULTILINE_OCTAL
\002\020\125\122\370\036\333\033\044\054\236\273\226\030\315\002
\050\076
END
CKA_VALUE MULTILINE_OCTAL
\060\202\005\252\060\202\003\222\240\003\002\001\002\002\020\125
\122\370\036\333\033\044\054\236\273\226\030\315\002\050\076\060
\015\006\011\052\206\110\206\367\015\001\001\013\005\000\060\157
\061\013\060\011\006\003\125\004\006\023\002\107\122\061\067\060
\065\006\003\125\004\012\014\056\110\145\154\154\145\156\151\143
\040\101\143\141\144\145\155\151\143\040\141\156\144\040\122\145
\163\145\141\162\143\150\040\111\156\163\164\151\164\165\164\151
\157\156\163\040\103\101\061\047\060\045\006\003\125\004\003\014
\036\110\101\122\111\103\101\040\103\154\151\145\156\164\040\122
\123\101\040\122\157\157\164\040\103\101\040\062\060\062\061\060
\036\027\015\062\061\060\062\061\071\061\060\065\070\064\066\132
\027\015\064\065\060\062\061\063\061\060\065\070\064\065\132\060
\157\061\013\060\011\006\003\125\004\006\023\002\107\122\061\067
\060\065\006\003\125\004\012\014\056\110\145\154\154\145\156\151
\143\040\101\143\141\144\145\155\151\143\040\141\156\144\040\122
\145\163\145\141\162\143\150\040\111\156\163\164\151\164\165\164
\151\157\156\163\040\103\101\061\047\060\045\006\003\125\004\003
\014\036\110\101\122\111\103\101\040\103\154\151\145\156\164\040
\122\123\101\040\122\157\157\164\040\103\101\040\062\060\062\061
\060\202\002\042\060\015\006\011\052\206\110\206\367\015\001\001
\001\005\000\003\202\002\017\000\060\202\002\012\002\202\002\001
\000\201\333\127\102\220\054\164\065\364\370\270\164\031\115\253
\011\132\167\105\201\163\142\260\065\237\370\320\267\063\000\207
\023\266\226\253\016\124\022\060\007\274\233\267\110\327\321\031
\203\256\216\330\251\361\251\000\204\260\214\136\236\350\014\217
\124\151\277\366\324\010\117\046\160\376\030\101\143\032\263\062
\213\100\370\007\253\127\061\360\306\026\166\147\232\264\335\057
\362\321\153\305\320\222\204\221\161\156\017\056\143\351\037\123
\244\335\122\023\314\011\203\051\201\014\305\123\165\104\261\016
\147\123\030\320\303\037\210\113\237\224\044\264\051\274\273\350
\116\375\157\322\025\035\111\334\215\160\362\021\032\040\121\125
\021\272\210\157\304\367\120\171\326\252\061\342\204\075\136\062
\310\167\052\120\161\345\013\057\351\266\352\357\253\012\063\071
\016\375\217\245\147\103\202\216\230\151\011\011\033\100\315\070
\147\107\352\311\354\227\161\022\336\044\365\162\074\321\367\103

\114\046\367\220\262\211\351\105\113\125\075\061\005\172\101\342
\225\272\103\300\027\305\266\205\075\031\215\144\160\363\133\254
\315\237\323\051\165\207\113\225\147\152\246\370\321\335\274\220
\206\211\103\051\251\067\133\365\135\260\046\132\123\102\166\220
\053\317\236\126\154\053\124\317\134\232\145\337\133\213\110\140
\070\174\373\305\013\317\166\004\143\002\063\052\175\365\203\147
\347\372\306\103\375\053\017\324\046\057\167\244\062\301\044\352
\144\235\277\263\070\161\061\104\362\107\270\242\146\101\241\373
\233\173\274\307\106\152\165\277\132\242\214\350\152\104\301\270
\226\265\300\062\010\055\173\164\065\163\262\312\306\376\257\021
\162\030\366\347\310\302\317\245\052\352\173\326\131\350\174\240
\262\152\100\011\151\016\245\226\333\321\000\271\361\210\156\066
\360\210\262\235\361\122\362\303\174\277\060\211\074\012\151\371
\042\244\145\341\233\340\164\306\261\205\227\226\054\256\224\217
\120\246\071\022\037\276\107\362\201\170\323\165\066\236\175\132
\040\227\342\122\256\231\237\306\174\233\146\363\376\330\317\356
\275\227\006\035\055\205\334\076\066\123\226\173\040\272\350\310
\341\255\226\142\076\021\174\263\000\204\236\247\114\161\253\112
\067\002\003\001\000\001\243\102\060\100\060\017\006\003\125\035
\023\001\001\377\004\005\060\003\001\001\377\060\035\006\003\125
\035\016\004\026\004\024\240\326\007\075\136\044\367\173\240\104
\056\044\122\015\031\252\053\004\221\247\060\016\006\003\125\035
\017\001\001\377\004\004\003\002\001\206\060\015\006\011\052\206
\110\206\367\015\001\001\013\005\000\003\202\002\001\000\015\107
\371\011\146\061\122\354\171\356\302\250\362\150\076\355\226\105
\313\072\246\230\143\077\352\053\115\116\003\320\034\202\341\313
\323\345\326\253\133\147\050\274\235\376\014\231\012\200\125\247
\316\033\043\141\015\260\127\360\376\340\312\276\346\220\333\203
\054\276\203\216\364\171\266\376\320\015\102\247\130\037\151\352
\201\365\005\245\376\106\150\353\154\170\311\340\352\347\346\336
\061\305\322\325\054\202\143\050\235\135\250\032\176\210\346\347
\053\361\054\325\320\005\236\334\055\275\067\146\324\004\242\247
\255\277\072\302\250\073\255\377\215\235\063\340\271\232\204\241
\207\037\166\364\202\164\327\016\371\060\110\076\133\210\076\252
\134\153\326\057\014\350\216\163\302\030\221\203\071\266\146\132
\320\037\140\047\135\115\343\366\072\015\146\120\234\170\173\253
\363\023\020\256\017\057\253\350\144\263\030\040\235\106\065\144
\045\163\352\233\020\134\130\065\211\261\106\110\247\364\254\324
\035\236\133\314\251\245\032\023\117\044\120\252\331\033\155\261
\100\373\235\335\130\164\304\302\157\024\162\354\333\065\237\270
\124\165\105\303\246\310\032\050\065\072\256\145\362\251\230\316
\257\133\311\070\214\061\073\177\314\334\226\375\342\133\326\320
\131\364\166\272\013\313\117\203\020\307\100\320\035\140\351\052
\345\110\130\167\014\105\151\276\031\161\004\044\342\343\044\037
\112\310\301\076\231\365\226\230\070\110\045\241\025\260\033\327
\342\204\030\133\366\161\065\232\150\173\100\314\030\134\014\044
\235\324\225\365\231\252\106\352\256\254\277\364\024\031\044\350
\214\354\343\365\274\006\150\212\052\014\005\137\012\227\165\247

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\334\176\300\375\327\172\030\337\060\321\070\113\037\260\230\160
\277\314\174\163\360\156\304\061\245\244\227\035\254\277\316\154
\041\112\276\047\043\147\363\006\126\201\012\221\216\266\341\003
\005\063\054\332\064\010\115\116\120\043\255\037\245\305\324\172
\376\352\011\354\247\050\140\213\106\174\265\352\233\335\117\371
\347\153\025\306\210\317\103\333\345\047\334\004\126\156\157\106
\025\361\126\055\350\134\014\163\303\043\201\070\040\313\311\014
\151\317\054\253\073\204\140\063\031\122\375\151\024\063
```

END

CKA_NSS_MOZILLA_CA_POLICY

CK_BBOOL CK_TRUE

CKA_NSS_SERVER_DISTRUST_AFTER CK_BBOOL CK_FALSE

CKA_NSS_EMAIL_DISTRUST_AFTER CK_BBOOL CK_FALSE

Trust for "HARICA Client RSA Root CA 2021"

Issuer: CN=HARICA Client RSA Root CA 2021,O=Hellenic Academic and Research Institutions CA,C=GR

Serial Number:55:52:f8:1e:db:1b:24:2c:9e:bb:96:18:cd:02:28:3e

Subject: CN=HARICA Client RSA Root CA 2021,O=Hellenic Academic and Research Institutions CA,C=GR

Not Valid Before: Fri Feb 19 10:58:46 2021

Not Valid After : Mon Feb 13 10:58:45 2045

Fingerprint (SHA-256):

1B:E7:AB:E3:06:86:B1:63:48:AF:D1:C6:1B:68:66:A0:EA:7F:48:21:E6:7D:5E:8A:F9:37:CF:80:11:BC:75:0D

#

Fingerprint (SHA1): 46:C6:90:0A:77:3A:B6:BC:F4:65:AD:AC:FC:E3:F7:07:00:6E:DE:6E

CKA_CLASS CK_OBJECT_CLASS CKO_NSS_TRUST

CKA_TOKEN CK_BBOOL CK_TRUE

CKA_PRIVATE CK_BBOOL CK_FALSE

CKA_MODIFIABLE CK_BBOOL CK_FALSE

CKA_LABEL UTF8 "HARICA Client RSA Root CA 2021"

CKA_CERT_SHA1_HASH MULTILINE_OCTAL

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\106\306\220\012\167\072\266\274\364\145\255\254\374\343\367\007
\000\156\336\156
```

END

CKA_CERT_MD5_HASH MULTILINE_OCTAL

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\157\355\134\327\210\314\070\251\334\351\335\331\135\333\330\355
```

END

CKA_ISSUER MULTILINE_OCTAL

```
\060\157\061\013\060\011\006\003\125\004\006\023\002\107\122\061
\067\060\065\006\003\125\004\012\014\056\110\145\154\154\145\156
\151\143\040\101\143\141\144\145\155\151\143\040\141\156\144\040
\122\145\163\145\141\162\143\150\040\111\156\163\164\151\164\165
\164\151\157\156\163\040\103\101\061\047\060\045\006\003\125\004
\003\014\036\110\101\122\111\103\101\040\103\154\151\145\156\164
\040\122\123\101\040\122\157\157\164\040\103\101\040\062\060\062
\061
```

END

CKA_SERIAL_NUMBER

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MULTILINE_OCTAL
\002\020\125\122\370\036\333\033\044\054\236\273\226\030\315\002
\050\076
END
CKA_TRUST_SERVER_AUTH CK_TRUST CKT_NSS_MUST_VERIFY_TRUST
CKA_TRUST_EMAIL_PROTECTION CK_TRUST CKT_NSS_TRUSTED_DELEGATOR
CKA_TRUST_CODE_SIGNING CK_TRUST CKT_NSS_MUST_VERIFY_TRUST
CKA_TRUST_STEP_UP_APPROVED CK_BBOOL CK_FALSE

#
# Certificate "HARICA Client ECC Root CA 2021"
#
# Issuer: CN=HARICA Client ECC Root CA 2021,O=Hellenic Academic and Research Institutions CA,C=GR
# Serial Number:31:68:d9:d8:e1:62:57:1e:d2:19:44:88:e6:10:7d:f0
# Subject: CN=HARICA Client ECC Root CA 2021,O=Hellenic Academic and Research Institutions CA,C=GR
# Not Valid Before: Fri Feb 19 11:03:34 2021
# Not Valid After : Mon Feb 13 11:03:33 2045
# Fingerprint (SHA-256):
8D:D4:B5:37:3C:B0:DE:36:76:9C:12:33:92:80:D8:27:46:B3:AA:6C:D4:26:E7:97:A3:1B:AB:E4:27:9C:F0:0B
# Fingerprint (SHA1): BE:64:D3:DA:14:4B:D2:6B:CD:AF:8F:DB:A6:A6:72:F8:DE:26:F9:00
CKA_CLASS
CK_OBJECT_CLASS CKO_CERTIFICATE
CKA_TOKEN CK_BBOOL CK_TRUE
CKA_PRIVATE CK_BBOOL CK_FALSE
CKA_MODIFIABLE CK_BBOOL CK_FALSE
CKA_LABEL UTF8 "HARICA Client ECC Root CA 2021"
CKA_CERTIFICATE_TYPE CK_CERTIFICATE_TYPE CKC_X_509
CKA_SUBJECT MULTILINE_OCTAL
\060\157\061\013\060\011\006\003\125\004\006\023\002\107\122\061
\067\060\065\006\003\125\004\012\014\056\110\145\154\154\145\156
\151\143\040\101\143\141\144\145\155\151\143\040\141\156\144\040
\122\145\163\145\141\162\143\150\040\111\156\163\164\151\164\165
\164\151\157\156\163\040\103\101\061\047\060\045\006\003\125\004
\003\014\036\110\101\122\111\103\101\040\103\154\151\145\156\164
\040\105\103\103\040\122\157\157\164\040\103\101\040\062\060\062
\061
END
CKA_ID UTF8 "0"
CKA_ISSUER MULTILINE_OCTAL
\060\157\061\013\060\011\006\003\125\004\006\023\002\107\122\061
\067\060\065\006\003\125\004\012\014\056\110\145\154\154\145\156
\151\143\040\101\143\141\144\145\155\151\143\040\141\156\144\040
\122\145\163\145\141\162\143\150\040\111\156\163\164\151\164\165
\164\151\157\156\163\040\103\101\061\047\060\045\006\003\125\004
\003\014\036\110\101\122\111\103\101\040\103\154\151\145\156\164
\040\105\103\103\040\122\157\157\164\040\103\101\040\062\060\062
\061
END

```



```
CKA_SERIAL_NUMBER
MULTILINE_OCTAL
\002\020\061\150\331\330\341\142\127\036\322\031\104\210\346\020
\175\360
END
CKA_VALUE MULTILINE_OCTAL
\060\202\002\132\060\202\001\341\240\003\002\001\002\002\020\061
\150\331\330\341\142\127\036\322\031\104\210\346\020\175\360\060
\012\006\010\052\206\110\316\075\004\003\003\060\157\061\013\060
\011\006\003\125\004\006\023\002\107\122\061\067\060\065\006\003
\125\004\012\014\056\110\145\154\154\145\156\151\143\040\101\143
\141\144\145\155\151\143\040\141\156\144\040\122\145\163\145\141
\162\143\150\040\111\156\163\164\151\164\165\164\151\157\156\163
\040\103\101\061\047\060\045\006\003\125\004\003\014\036\110\101
\122\111\103\101\040\103\154\151\145\156\164\040\105\103\103\040
\122\157\157\164\040\103\101\040\062\060\062\061\060\036\027\015
\062\061\060\062\061\071\061\061\060\063\063\064\132\027\015\064
\065\060\062\061\063\061\061\060\063\063\063\132\060\157\061\013
\060\011\006\003\125\004\006\023\002\107\122\061\067\060\065\006
\003\125\004\012\014\056\110\145\154\154\145\156\151\143\040\101
\143\141\144\145\155\151\143\040\141\156\144\040\122\145\163\145
\141\162\143\150\040\111\156\163\164\151\164\165\164\151\157\156
\163\040\103\101\061\047\060\045\006\003\125\004\003\014\036\110
\101\122\111\103\101\040\103\154\151\145\156\164\040\105\103\103
\040\122\157\157\164\040\103\101\040\062\060\062\061\060\166\060
\020\006\007\052\206\110\316\075\002\001\006\005\053\201\004\000
\042\003\142\000\004\007\030\255\225\226\224\320\134\017\202\367
\052\100\372\002\311\311\075\066\246\243\004\152\301\155\225\001
\210\140\022\124\154\134\242\053\156\023\072\210\225\014\034\046
\206\066\112\211\031\267\030\336\073\350\250\120\037\312\337\133
\277\111\200\025\333\343\060\341\035\132\307\052\212\001\007\376
\155\054\064\357\050\050\227\274\301\371\127\206\225\213\065\317
\236\132\321\150\225\243\102\060\100\060\017\006\003\125\035\023
\001\001\377\004\005\060\003\001\001\377\060\035\006\003\125\035
\016\004\026\004\024\122\010\322\276\062\201\045\375\365\032\227
\354\116\137\032\273\123\315\220\255\060\016\006\003\125\035\017
\001\001\377\004\004\003\002\001\206\060\012\006\010\052\206\110
\316\075\004\003\003\003\147\000\060\144\002\060\114\061\105\106
\117\250\346\276\303\167\262\032\030\113\055\210\173\130\346\253
\224\153\104\003\260\027\377\337\202\163\104\121\054\375\223\035
\006\173\024\322\211\354\100\014\357\041\001\056\002\060\057\311
\056\132\154\054\035\331\225\340\236\260\271\134\122\174\366\370
\070\312\056\361\324\035\362\242\111\242\225\370\301\130\136\117
\376\163\012\357\061\260\253\043\130\023\214\213\336\073
END
CKA_NSS_MOZILLA_CA_POLICY
CK_BBOOL CK_TRUE
CKA_NSS_SERVER_DISTRUST_AFTER CK_BBOOL CK_FALSE
```

CKA_NSS_EMAIL_DISTRICT_AFTER CK_BBOOL CK_FALSE

Trust for "HARICA

Client ECC Root CA 2021"

Issuer: CN=HARICA Client ECC Root CA 2021,O=Hellenic Academic and Research Institutions CA,C=GR

Serial Number:31:68:d9:d8:e1:62:57:1e:d2:19:44:88:e6:10:7d:f0

Subject: CN=HARICA Client ECC Root CA 2021,O=Hellenic Academic and Research Institutions CA,C=GR

Not Valid Before: Fri Feb 19 11:03:34 2021

Not Valid After : Mon Feb 13 11:03:33 2045

Fingerprint (SHA-256):

8D:D4:B5:37:3C:B0:DE:36:76:9C:12:33:92:80:D8:27:46:B3:AA:6C:D4:26:E7:97:A3:1B:AB:E4:27:9C:F0:0B

Fingerprint (SHA1): BE:64:D3:DA:14:4B:D2:6B:CD:AF:8F:DB:A6:A6:72:F8:DE:26:F9:00

CKA_CLASS CK_OBJECT_CLASS CKO_NSS_TRUST

CKA_TOKEN CK_BBOOL CK_TRUE

CKA_PRIVATE CK_BBOOL CK_FALSE

CKA_MODIFIABLE CK_BBOOL CK_FALSE

CKA_LABEL UTF8 "HARICA Client ECC Root CA 2021"

CKA_CERT_SHA1_HASH MULTILINE_OCTAL

\276\144\323\332\024\113\322\153\315\257\217\333\246\246\162\370

\336\046\371\000

END

CKA_CERT_MD5_HASH MULTILINE_OCTAL

\255\270\120\246\251\202\172\154\075\032\252\244\322\143\244\104

END

CKA_ISSUER MULTILINE_OCTAL

\060\157\061\013\060\011\006\003\125\004\006\023\002\107\122\061

\067\060\065\006\003\125\004\012\014\056\110\145\154\154\145\156

\151\143\040\101\143\141\144\145\155\151\143\040\141\156\144\040

\122\145\163\145\141\162\143\150\040\111\156\163\164\151\164\165

\164\151\157\156\163\040\103\101\061\047\060\045\006\003\125\004

\003\014\036\110\101\122\111\103\101\040\103\154\151\145\156\164

\040\105\103\103\040\122\157\157\164\040\103\101\040\062\060\062

\061

END

CKA_SERIAL_NUMBER

MULTILINE_OCTAL

\002\020\061\150\331\330\341\142\127\036\322\031\104\210\346\020

\175\360

END

CKA_TRUST_SERVER_AUTH CK_TRUST CKT_NSS_MUST_VERIFY_TRUST

CKA_TRUST_EMAIL_PROTECTION CK_TRUST CKT_NSS_TRUSTED_DELEGATOR

CKA_TRUST_CODE_SIGNING CK_TRUST CKT_NSS_MUST_VERIFY_TRUST

CKA_TRUST_STEP_UP_APPROVED CK_BBOOL CK_FALSE

#

Certificate "Autoridad de Certificacion Firmaprofesional CIF A62634068"

#

Issuer: CN=Autoridad de Certificacion Firmaprofesional CIF A62634068,C=ES

```
# Serial Number:1b:70:e9:d2:ff:ae:6c:71
#
Subject: CN=Autoridad de Certificacion Firmaprofesional CIF A62634068,C=ES
# Not Valid Before: Tue Sep 23 15:22:07 2014
# Not Valid After : Mon May 05 15:22:07 2036
# Fingerprint (SHA-256):
57:DE:05:83:EF:D2:B2:6E:03:61:DA:99:DA:9D:F4:64:8D:EF:7E:E8:44:1C:3B:72:8A:FA:9B:CD:E0:F9:B2:6A
# Fingerprint (SHA1): 0B:BE:C2:27:22:49:CB:39:AA:DB:35:5C:53:E3:8C:AE:78:FF:B6:FE
CKA_CLASS CK_OBJECT_CLASS CKO_CERTIFICATE
CKA_TOKEN CK_BBOOL CK_TRUE
CKA_PRIVATE CK_BBOOL CK_FALSE
CKA_MODIFIABLE CK_BBOOL CK_FALSE
CKA_LABEL UTF8 "Autoridad de Certificacion Firmaprofesional CIF A62634068"
CKA_CERTIFICATE_TYPE CK_CERTIFICATE_TYPE CKC_X_509
CKA_SUBJECT MULTILINE_OCTAL
\060\121\061\013\060\011\006\003\125\004\006\023\002\105\123\061
\102\060\100\006\003\125\004\003\014\071\101\165\164\157\162\151
\144\141\144\040\144\145\040\103\145\162\164\151\146\151\143\141
\143\151\157\156\040\106\151\162\155\141\160\162\157\146\145\163
\151\157\156\141\154\040\103\111\106\040\101\066\062\066\063\064
\060\066\070
END
CKA_ID
UTF8 "0"
CKA_ISSUER MULTILINE_OCTAL
\060\121\061\013\060\011\006\003\125\004\006\023\002\105\123\061
\102\060\100\006\003\125\004\003\014\071\101\165\164\157\162\151
\144\141\144\040\144\145\040\103\145\162\164\151\146\151\143\141
\143\151\157\156\040\106\151\162\155\141\160\162\157\146\145\163
\151\157\156\141\154\040\103\111\106\040\101\066\062\066\063\064
\060\066\070
END
CKA_SERIAL_NUMBER MULTILINE_OCTAL
\002\010\033\160\351\322\377\256\154\161
END
CKA_VALUE MULTILINE_OCTAL
\060\202\006\024\060\202\003\374\240\003\002\001\002\002\010\033
\160\351\322\377\256\154\161\060\015\006\011\052\206\110\206\367
\015\001\001\013\005\000\060\121\061\013\060\011\006\003\125\004
\006\023\002\105\123\061\102\060\100\006\003\125\004\003\014\071
\101\165\164\157\162\151\144\141\144\040\144\145\040\103\145\162
\164\151\146\151\143\141\143\151\157\156\040\106\151\162\155\141
\160\162\157\146\145\163\151\157\156\141\154\040\103\111\106\040
\101\066\062\066\063\064\060\066\070\060\036\027\015\061\064\060
\071\062\063\061\065\062\062\060\067\132\027\015\063\066\060\065
\060\065\061\065\062\062\060\067\132\060\121\061\013\060\011\006
\003\125\004\006\023\002\105\123\061\102\060\100\006\003\125\004
\003\014\071\101\165\164\157\162\151\144\141\144\040\144\145\040
```

\103\145\162\164\151\146\151\143\141\143\151\157\156\040\106\151
\162\155\141\160\162\157\146\145\163\151\157\156\141\154\040\103
\111\106\040\101\066\062\066\063\064\060\066\070\060\202\002\042
\060\015\006\011\052\206\110\206\367\015\001\001\001\005\000\003
\202\002\017\000\060\202\002\012\002\202\002\001\000\312\226\153
\216\352\370\373\361\242\065\340\177\114\332\340\303\122\327\175
\266\020\310\002\136\263\103\052\304\117\152\262\312\034\135\050
\232\170\021\032\151\131\127\257\265\040\102\344\213\017\346\337
\133\246\003\222\057\365\021\344\142\327\062\161\070\331\004\014
\161\253\075\121\176\017\007\337\143\005\134\351\277\224\157\301
\051\202\300\264\332\121\260\301\074\273\255\067\112\134\312\361
\113\066\016\044\253\277\303\204\167\375\250\120\364\261\347\306
\057\322\055\131\215\172\012\116\226\151\122\002\252\066\230\354
\374\372\024\203\014\067\037\311\222\067\177\327\201\055\345\304
\271\340\076\064\376\147\364\076\146\321\323\364\100\317\136\142
\064\017\160\006\076\040\030\132\316\367\162\033\045\154\223\164
\024\223\243\163\261\016\252\207\020\043\131\137\040\005\031\107
\355\150\216\222\022\312\135\374\326\053\262\222\074\040\317\341
\137\257\040\276\240\166\177\166\345\354\032\206\141\063\076\347
\173\264\077\240\017\216\242\271\152\157\271\207\046\157\101\154
\210\246\120\375\152\143\013\365\223\026\033\031\217\262\355\233
\233\311\220\365\001\014\337\031\075\017\076\070\043\311\057\217
\014\321\002\376\033\125\326\116\320\215\074\257\117\244\363\376
\257\052\323\005\235\171\010\241\313\127\061\264\234\310\220\262
\147\364\030\026\223\072\374\107\330\321\170\226\061\037\272\053
\014\137\135\231\255\143\211\132\044\040\166\330\337\375\253\116
\246\042\252\235\136\346\047\212\175\150\051\243\347\212\270\332
\021\273\027\055\231\235\023\044\106\367\305\342\330\237\216\177
\307\217\164\155\132\262\350\162\365\254\356\044\020\255\057\024
\332\377\055\232\106\161\107\276\102\337\273\001\333\364\177\323
\050\217\061\131\133\323\311\002\246\264\122\312\156\227\373\103
\305\010\046\157\212\364\273\375\237\050\252\015\325\105\363\023
\072\035\330\300\170\217\101\147\074\036\224\144\256\173\013\305
\350\331\001\210\071\032\227\206\144\101\325\073\207\014\156\372
\017\306\275\110\024\277\071\115\324\236\101\266\217\226\035\143
\226\223\331\225\006\170\061\150\236\067\006\073\200\211\105\141
\071\043\307\033\104\243\025\345\034\370\222\060\273\002\003\001
\000\001\243\201\357\060\201\354\060\035\006\003\125\035\016\004
\026\004\024\145\315\353\253\065\036\000\076\176\325\164\300\034
\264\163\107\016\032\144\057\060\022\006\003\125\035\023\001\001
\377\004\010\060\006\001\001\377\002\001\001\060\201\246\006\003
\125\035\040\004\201\236\060\201\233\060\201\230\006\004\125\035
\040\000\060\201\217\060\057\006\010\053\006\001\005\005\007\002
\001\026\043\150\164\164\160\072\057\057\167\167\167\056\146\151
\162\155\141\160\162\157\146\145\163\151\157\156\141\154\056\143
\157\155\057\143\160\163\060\134\006\010\053\006\001\005\005\007
\002\002\060\120\036\116\000\120\000\141\000\163\000\145\000\157
\000\040\000\144\000\145\000\040\000\154\000\141\000\040\000\102

\000\157\000\156\000\141\000\156\000\157\000\166\000\141\000\040
\000\064\000\067\000\040\000\102\000\141\000\162\000\143\000\145
\000\154\000\157\000\156\000\141\000\040\000\060\000\070\000\060
\000\061\000\067\060\016\006\003\125\035\017\001\001\377\004\004
\003\002\001\006\060\015\006\011\052\206\110\206\367\015\001\001
\013\005\000\003\202\002\001\000\164\207\050\002\053\167\037\146
\211\144\355\217\164\056\106\034\273\250\370\370\013\035\203\266
\072\247\350\105\212\007\267\340\076\040\313\341\010\333\023\010
\370\050\241\065\262\200\263\013\121\300\323\126\232\215\063\105
\111\257\111\360\340\075\007\172\105\023\132\377\310\227\330\323
\030\054\175\226\370\335\242\145\103\160\223\220\025\272\220\337
\350\031\260\333\054\212\140\017\267\157\224\007\036\035\246\311
\205\366\275\064\370\100\170\142\020\160\072\276\175\113\071\201
\251\020\324\226\101\273\370\137\034\013\035\010\362\261\260\211
\172\362\367\240\340\304\217\213\170\265\073\130\245\043\216\117
\125\376\066\073\340\014\267\312\052\060\101\040\264\200\315\256
\374\166\146\163\250\256\156\341\174\332\003\350\224\040\346\042
\243\320\037\220\135\040\123\024\046\127\332\124\227\337\026\104
\020\001\036\210\146\217\162\070\223\335\040\267\064\276\327\361
\356\143\216\107\171\050\006\374\363\131\105\045\140\042\063\033
\243\137\250\272\052\332\032\075\315\100\352\214\356\005\025\225
\325\245\054\040\057\247\230\050\356\105\374\361\270\210\000\054
\217\102\332\121\325\234\345\023\150\161\105\103\213\236\013\041
\074\113\134\005\334\032\237\230\216\332\275\042\236\162\315\255
\012\313\314\243\147\233\050\164\304\233\327\032\074\004\130\246
\202\235\255\307\173\157\377\200\226\351\370\215\152\275\030\220
\035\377\111\032\220\122\067\223\057\074\002\135\202\166\013\121
\347\026\307\127\370\070\371\247\315\233\042\124\357\143\260\025
\155\123\145\003\112\136\112\240\262\247\216\111\000\131\070\325
\307\364\200\144\365\156\225\120\270\021\176\025\160\070\112\260
\177\320\304\062\160\300\031\377\311\070\055\024\054\146\364\102
\104\346\125\166\033\200\025\127\377\300\247\247\252\071\252\330
\323\160\320\056\272\353\224\152\372\137\064\206\347\142\265\375
\212\360\060\205\224\311\257\044\002\057\157\326\335\147\376\343
\260\125\117\004\230\117\244\101\126\342\223\320\152\350\326\363
\373\145\340\316\165\304\061\131\014\356\202\310\014\140\063\112
\031\272\204\147\047\017\274\102\135\275\044\124\015\354\035\160
\006\137\244\274\372\040\174\125

END

CKA_NSS_Mozilla_CA_POLICY

CK_BBOOL CK_TRUE

CKA_NSS_SERVER_DISTRUST_AFTER CK_BBOOL CK_FALSE

CKA_NSS_EMAIL_DISTRUST_AFTER CK_BBOOL CK_FALSE

Trust for "Autoridad de Certificacion

Firmaprofesional CIF A62634068"

Issuer: CN=Autoridad de Certificacion Firmaprofesional CIF A62634068,C=ES

Serial Number:1b:70:e9:d2:ff:ae:6c:71

```

# Subject: CN=Autoridad de Certificacion Firmaprofesional CIF A62634068,C=ES
# Not Valid Before: Tue Sep 23 15:22:07 2014
# Not Valid After : Mon May 05 15:22:07 2036
# Fingerprint (SHA-256):
57:DE:05:83:EF:D2:B2:6E:03:61:DA:99:DA:9D:F4:64:8D:EF:7E:E8:44:1C:3B:72:8A:FA:9B:CD:E0:F9:B2:6A
# Fingerprint (SHA1): 0B:BE:C2:27:22:49:CB:39:AA:DB:35:5C:53:E3:8C:AE:78:FF:B6:FE
CKA_CLASS CK_OBJECT_CLASS CKO_NSS_TRUST
CKA_TOKEN CK_BBOOL CK_TRUE
CKA_PRIVATE CK_BBOOL CK_FALSE
CKA_MODIFIABLE CK_BBOOL CK_FALSE
CKA_LABEL UTF8 "Autoridad de Certificacion Firmaprofesional CIF A62634068"
CKA_CERT_SHA1_HASH MULTILINE_OCTAL
\013\276\302\047\042\111\313\071\252\333\065\134\123\343\214\256
\170\377\266\376
END
CKA_CERT_MD5_HASH MULTILINE_OCTAL
\116\156\233\124\114\312\267\372\110\344\220\261\025\113\034\243
END
CKA_ISSUER MULTILINE_OCTAL
\060\121\061\013\060\011\006\003\125\004\006\023\002\105\123\061
\102\060\100\006\003\125\004\003\014\071\101\165\164\157\162\151
\144\141\144\040\144\145\040\103\145\162\164\151\146\151\143\141
\143\151\157\156\040\106\151\162\155\141\160\162\157\146\145\163
\151\157\156\141\154\040\103\111\106\040\101\066\062\066\063\064
\060\066\070
END
CKA_SERIAL_NUMBER
MULTILINE_OCTAL
\002\010\033\160\351\322\377\256\154\161
END
CKA_TRUST_SERVER_AUTH CK_TRUST CKT_NSS_TRUSTED_DELEGATOR
CKA_TRUST_EMAIL_PROTECTION CK_TRUST CKT_NSS_TRUSTED_DELEGATOR
CKA_TRUST_CODE_SIGNING CK_TRUST CKT_NSS_MUST_VERIFY_TRUST
CKA_TRUST_STEP_UP_APPROVED CK_BBOOL CK_FALSE

#
# Certificate "vTrus ECC Root CA"
#
# Issuer: CN=vTrus ECC Root CA,O="iTrusChina Co.,Ltd.",C=CN
# Serial Number:6e:6a:bc:59:aa:53:be:98:39:67:a2:d2:6b:a4:3b:e6:6d:1c:d6:da
# Subject: CN=vTrus ECC Root CA,O="iTrusChina Co.,Ltd.",C=CN
# Not Valid Before: Tue Jul 31 07:26:44 2018
# Not Valid After : Fri Jul 31 07:26:44 2043
# Fingerprint (SHA-256):
30:FB:BA:2C:32:23:8E:2A:98:54:7A:F9:79:31:E5:50:42:8B:9B:3F:1C:8E:EB:66:33:DC:FA:86:C5:B2:7D:D3
#
Fingerprint (SHA1): F6:9C:DB:B0:FC:F6:02:13:B6:52:32:A6:A3:91:3F:16:70:DA:C3:E1
CKA_CLASS CK_OBJECT_CLASS CKO_CERTIFICATE

```

```
CKA_TOKEN CK_BBOOL CK_TRUE
CKA_PRIVATE CK_BBOOL CK_FALSE
CKA_MODIFIABLE CK_BBOOL CK_FALSE
CKA_LABEL UTF8 "vTrus ECC Root CA"
CKA_CERTIFICATE_TYPE CK_CERTIFICATE_TYPE CKC_X_509
CKA_SUBJECT MULTILINE_OCTAL
\060\107\061\013\060\011\006\003\125\004\006\023\002\103\116\061
\034\060\032\006\003\125\004\012\023\023\151\124\162\165\163\103
\150\151\156\141\040\103\157\056\054\114\164\144\056\061\032\060
\030\006\003\125\004\003\023\021\166\124\162\165\163\040\105\103
\103\040\122\157\157\164\040\103\101
END
CKA_ID UTF8 "0"
CKA_ISSUER MULTILINE_OCTAL
\060\107\061\013\060\011\006\003\125\004\006\023\002\103\116\061
\034\060\032\006\003\125\004\012\023\023\151\124\162\165\163\103
\150\151\156\141\040\103\157\056\054\114\164\144\056\061\032\060
\030\006\003\125\004\003\023\021\166\124\162\165\163\040\105\103
\103\040\122\157\157\164\040\103\101
END
CKA_SERIAL_NUMBER
MULTILINE_OCTAL
\002\024\156\152\274\131\252\123\276\230\071\147\242\322\153\244
\073\346\155\034\326\332
END
CKA_VALUE MULTILINE_OCTAL
\060\202\002\017\060\202\001\225\240\003\002\001\002\002\024\156
\152\274\131\252\123\276\230\071\147\242\322\153\244\073\346\155
\034\326\332\060\012\006\010\052\206\110\316\075\004\003\003\060
\107\061\013\060\011\006\003\125\004\006\023\002\103\116\061\034
\060\032\006\003\125\004\012\023\023\151\124\162\165\163\103\150
\151\156\141\040\103\157\056\054\114\164\144\056\061\032\060\030
\006\003\125\004\003\023\021\166\124\162\165\163\040\105\103\103
\040\122\157\157\164\040\103\101\060\036\027\015\061\070\060\067
\063\061\060\067\062\066\064\064\132\027\015\064\063\060\067\063
\061\060\067\062\066\064\064\132\060\107\061\013\060\011\006\003
\125\004\006\023\002\103\116\061\034\060\032\006\003\125\004\012
\023\023\151\124\162\165\163\103\150\151\156\141\040\103\157\056
\054\114\164\144\056\061\032\060\030\006\003\125\004\003\023\021
\166\124\162\165\163\040\105\103\103\040\122\157\157\164\040\103
\101\060\166\060\020\006\007\052\206\110\316\075\002\001\006\005
\053\201\004\000\042\003\142\000\004\145\120\112\256\214\171\226
\112\252\034\010\303\243\242\315\376\131\126\101\167\375\046\224
\102\273\035\315\010\333\163\262\133\165\363\317\234\116\202\364
\277\370\141\046\205\154\326\205\133\162\160\322\375\333\142\264
\337\123\213\275\261\104\130\142\102\011\307\372\177\133\020\347
\376\100\375\300\330\303\053\062\347\160\246\267\246\040\125\035
\173\200\135\113\217\147\114\361\020\243\102\060\100\060\035\006
```

```
\003\125\035\016\004\026\004\024\230\071\315\276\330\262\214\367
\262\253\341\255\044\257\173\174\241\333\037\317\060\017\006\003
\125\035\023\001\001\377\004\005\060\003\001\001\377\060\016\006
\003\125\035\017\001\001\377\004\004\003\002\001\006\060\012\006
\010\052\206\110\316\075\004\003\003\003\150\000\060\145\002\060
\127\235\335\126\361\307\343\351\270\111\120\153\233\151\303\157
\354\303\175\045\344\127\225\023\100\233\122\323\073\363\100\031
\274\046\307\055\006\236\265\173\066\237\365\045\324\143\153\000
\002\061\000\351\323\306\236\126\232\052\314\241\332\077\310\146
\053\323\130\234\040\205\372\253\221\212\160\160\021\070\140\144
\013\142\011\221\130\000\371\115\373\064\150\332\011\255\041\006
\030\224\316
```

END

CKA_NSS_MOZILLA_CA_POLICY

CK_BBOOL CK_TRUE

CKA_NSS_SERVER_DISTRUST_AFTER CK_BBOOL CK_FALSE

CKA_NSS_EMAIL_DISTRUST_AFTER CK_BBOOL CK_FALSE

Trust for "vTrus ECC Root CA"

Issuer: CN=vTrus ECC Root CA,O="iTrusChina Co.,Ltd.",C=CN

Serial Number:6e:6a:bc:59:aa:53:be:98:39:67:a2:d2:6b:a4:3b:e6:6d:1c:d6:da

Subject: CN=vTrus ECC Root CA,O="iTrusChina Co.,Ltd.",C=CN

Not Valid Before: Tue Jul 31 07:26:44 2018

Not Valid After : Fri Jul 31 07:26:44 2043

Fingerprint (SHA-256):

30:FB:BA:2C:32:23:8E:2A:98:54:7A:F9:79:31:E5:50:42:8B:9B:3F:1C:8E:EB:66:33:DC:FA:86:C5:B2:7D:D3

Fingerprint (SHA1): F6:9C:DB:B0:FC:F6:02:13:B6:52:32:A6:A3:91:3F:16:70:DA:C3:E1

CKA_CLASS

CK_OBJECT_CLASS CKO_NSS_TRUST

CKA_TOKEN CK_BBOOL CK_TRUE

CKA_PRIVATE CK_BBOOL CK_FALSE

CKA_MODIFIABLE CK_BBOOL CK_FALSE

CKA_LABEL UTF8 "vTrus ECC Root CA"

CKA_CERT_SHA1_HASH MULTILINE_OCTAL

```
\366\234\333\260\374\366\002\023\266\122\062\246\243\221\077\026
\160\332\303\341
```

END

CKA_CERT_MD5_HASH MULTILINE_OCTAL

```
\336\113\301\365\122\214\233\103\341\076\217\125\124\027\215\205
```

END

CKA_ISSUER MULTILINE_OCTAL

```
\060\107\061\013\060\011\006\003\125\004\006\023\002\103\116\061
\034\060\032\006\003\125\004\012\023\023\151\124\162\165\163\103
\150\151\156\141\040\103\157\056\054\114\164\144\056\061\032\060
\030\006\003\125\004\003\023\021\166\124\162\165\163\040\105\103
\103\040\122\157\157\164\040\103\101
```

END

CKA_SERIAL_NUMBER MULTILINE_OCTAL


```

\002\024\156\152\274\131\252\123\276\230\071\147\242\322\153\244
\073\346\155\034\326\332
END
CKA_TRUST_SERVER_AUTH CK_TRUST CKT_NSS_TRUSTED_DELEGATOR
CKA_TRUST_EMAIL_PROTECTION CK_TRUST CKT_NSS_MUST_VERIFY_TRUST
CKA_TRUST_CODE_SIGNING
CK_TRUST CKT_NSS_MUST_VERIFY_TRUST
CKA_TRUST_STEP_UP_APPROVED CK_BBOOL CK_FALSE

#
# Certificate "vTrus Root CA"
#
# Issuer: CN=vTrus Root CA,O="iTrusChina Co.,Ltd.",C=CN
# Serial Number:43:e3:71:13:d8:b3:59:14:5d:b7:ce:8c:fd:35:fd:6f:bc:05:8d:45
# Subject: CN=vTrus Root CA,O="iTrusChina Co.,Ltd.",C=CN
# Not Valid Before: Tue Jul 31 07:24:05 2018
# Not Valid After : Fri Jul 31 07:24:05 2043
# Fingerprint (SHA-256):
8A:71:DE:65:59:33:6F:42:6C:26:E5:38:80:D0:0D:88:A1:8D:A4:C6:A9:1F:0D:CB:61:94:E2:06:C5:C9:63:87
# Fingerprint (SHA1): 84:1A:69:FB:F5:CD:1A:25:34:13:3D:E3:F8:FC:B8:99:D0:C9:14:B7
CKA_CLASS CK_OBJECT_CLASS CKO_CERTIFICATE
CKA_TOKEN CK_BBOOL CK_TRUE
CKA_PRIVATE CK_BBOOL CK_FALSE
CKA_MODIFIABLE CK_BBOOL CK_FALSE
CKA_LABEL UTF8 "vTrus Root CA"
CKA_CERTIFICATE_TYPE CK_CERTIFICATE_TYPE CKC_X_509
CKA_SUBJECT MULTILINE_OCTAL
\060\103\061\013\060\011\006\003\125\004\006\023\002\103\116\061
\034\060\032\006\003\125\004\012\023\023\151\124\162\165\163\103
\150\151\156\141\040\103\157\056\054\114\164\144\056\061\026\060
\024\006\003\125\004\003\023\015\166\124\162\165\163\040\122\157
\157\164\040\103\101
END
CKA_ID
UTF8 "0"
CKA_ISSUER MULTILINE_OCTAL
\060\103\061\013\060\011\006\003\125\004\006\023\002\103\116\061
\034\060\032\006\003\125\004\012\023\023\151\124\162\165\163\103
\150\151\156\141\040\103\157\056\054\114\164\144\056\061\026\060
\024\006\003\125\004\003\023\015\166\124\162\165\163\040\122\157
\157\164\040\103\101
END
CKA_SERIAL_NUMBER MULTILINE_OCTAL
\002\024\103\343\161\023\330\263\131\024\135\267\316\214\375\065
\375\157\274\005\215\105
END
CKA_VALUE MULTILINE_OCTAL
\060\202\005\126\060\202\003\076\240\003\002\001\002\002\024\103

```

\343\161\023\330\263\131\024\135\267\316\214\375\065\375\157\274
\005\215\105\060\015\006\011\052\206\110\206\367\015\001\001\013
\005\000\060\103\061\013\060\011\006\003\125\004\006\023\002\103
\116\061\034\060\032\006\003\125\004\012\023\023\151\124\162\165
\163\103\150\151\156\141\040\103\157\056\054\114\164\144\056\061
\026\060\024\006\003\125\004\003\023\015\166\124\162\165\163\040
\122\157\157\164\040\103\101\060\036\027\015\061\070\060\067\063
\061\060\067\062\064\060\065\132\027\015\064\063\060\067\063\061
\060\067\062\064\060\065\132\060\103\061\013\060\011\006\003\125
\004\006\023\002\103\116\061\034\060\032\006\003\125\004\012\023
\023\151\124\162\165\163\103\150\151\156\141\040\103\157\056\054
\114\164\144\056\061\026\060\024\006\003\125\004\003\023\015\166
\124\162\165\163\040\122\157\157\164\040\103\101\060\202\002\042
\060\015\006\011\052\206\110\206\367\015\001\001\001\005\000\003
\202\002\017\000\060\202\002\012\002\202\002\001\000\275\125\174
\141\323\270\035\004\142\005\240\256\154\267\160\264\101\352\113
\003\136\020\077\220\132\034\213\073\260\146\213\154\110\246\034
\042\272\325\100\222\356\063\262\043\131\311\216\274\130\332\213
\236\320\031\362\057\131\306\214\143\132\272\237\243\013\260\263
\232\134\272\021\270\022\351\014\273\317\156\154\200\207\051\024
\003\054\215\044\232\310\144\203\265\152\254\023\054\063\361\237
\334\054\141\074\032\077\160\125\233\255\000\122\177\317\004\271
\376\066\372\234\300\026\256\142\376\226\114\103\176\125\024\276
\032\263\322\155\302\257\166\146\225\153\052\260\224\167\205\136
\004\017\142\035\143\165\367\153\347\313\133\232\160\354\076\147
\005\360\376\007\010\200\317\050\333\005\306\024\047\057\206\175
\360\047\336\377\346\176\063\110\347\013\036\130\321\047\053\123
\016\127\112\145\327\373\242\200\140\374\114\274\065\123\001\152
\227\162\202\257\361\035\160\350\234\365\357\136\302\154\307\107
\176\132\224\205\046\115\073\272\353\114\350\260\011\302\145\302
\235\235\011\233\116\265\227\005\254\365\006\240\367\066\005\176
\364\220\262\153\304\264\371\144\352\351\032\012\310\015\250\355
\047\311\324\347\263\271\253\202\042\220\047\075\052\350\174\220
\357\274\117\375\342\012\044\247\336\145\044\244\135\352\300\166
\060\323\167\120\370\015\004\233\224\066\001\163\312\006\130\246
\323\073\334\372\004\106\023\125\212\311\104\107\270\121\071\032
\056\350\064\342\171\313\131\112\012\177\274\246\357\037\003\147
\152\131\053\045\142\223\331\123\031\146\074\047\142\051\206\115
\244\153\356\377\324\116\272\325\264\342\216\110\132\000\031\011
\361\005\331\316\221\261\367\353\351\071\117\366\157\004\103\232
\125\365\076\005\024\275\277\263\131\264\330\216\063\204\243\220
\122\252\263\002\225\140\371\014\114\150\371\356\325\027\015\370
\161\127\265\045\344\051\356\145\135\257\321\356\074\027\013\132
\103\305\245\206\352\044\236\342\005\007\334\064\102\022\221\326
\071\164\256\114\101\202\333\362\246\110\321\263\233\363\063\252
\363\246\300\305\116\365\364\235\166\143\346\002\306\042\113\301
\225\077\120\144\054\124\345\266\360\074\051\317\127\002\003\001
\000\001\243\102\060\100\060\035\006\003\125\035\016\004\026\004

\024\124\142\160\143\361\165\204\103\130\216\321\026\040\261\306
\254\032\274\366\211\060\017\006\003\125\035\023\001\001\377\004
\005\060\003\001\001\377\060\016\006\003\125\035\017\001\001\377
\004\004\003\002\001\006\060\015\006\011\052\206\110\206\367\015
\001\001\013\005\000\003\202\002\001\000\051\272\222\111\247\255
\360\361\160\303\344\227\360\237\251\045\325\153\236\064\376\346
\032\144\366\072\153\122\262\020\170\032\237\114\332\212\332\354
\034\067\122\340\102\113\373\154\166\312\044\013\071\022\025\235
\237\021\055\374\171\144\334\340\340\365\335\340\127\311\245\262
\166\160\120\244\376\267\012\160\325\240\064\361\165\327\115\111
\272\021\321\263\330\354\202\377\353\016\304\277\144\055\175\143
\156\027\170\354\135\174\210\310\353\216\127\166\331\131\004\372
\274\122\037\105\254\360\172\200\354\354\157\166\256\221\333\020
\216\004\334\222\337\240\366\346\256\111\323\301\154\022\033\314
\051\252\371\010\245\342\067\024\312\261\270\146\357\032\202\344
\360\370\361\247\026\151\267\333\251\141\074\237\365\061\313\344
\000\106\302\057\164\261\261\327\201\356\250\046\225\274\210\257
\114\065\007\052\002\312\170\024\155\107\053\100\126\351\313\052
\140\241\147\003\240\316\214\274\260\162\147\304\061\316\333\064
\345\045\003\140\045\173\161\230\344\300\033\053\137\164\102\322
\113\305\131\010\007\207\276\305\303\177\347\226\331\341\334\050
\227\326\217\005\343\365\233\116\312\035\120\107\005\123\260\312
\071\347\205\240\211\301\005\073\001\067\323\077\111\342\167\353
\043\310\210\146\073\075\071\166\041\106\361\354\137\043\270\353
\242\146\165\164\301\100\367\330\150\232\223\342\055\251\056\275
\034\243\036\310\164\306\244\055\172\040\253\073\270\260\106\375
\157\335\137\122\125\165\142\360\227\240\174\327\070\375\045\337
\315\240\233\020\317\213\270\070\136\136\305\264\246\002\066\241
\036\137\034\317\342\226\235\051\252\375\230\256\122\341\363\101
\122\373\251\056\162\226\237\047\343\252\163\175\370\032\043\146
\173\073\253\145\260\062\001\113\025\076\075\242\117\014\053\065
\242\306\331\147\022\065\060\315\166\056\026\263\231\236\115\117
\116\055\073\064\103\341\232\016\015\244\146\227\272\322\034\112
\114\054\052\213\213\201\117\161\032\251\335\134\173\173\010\305
\000\015\067\100\343\174\173\124\137\057\205\137\166\366\367\247
\260\034\127\126\301\162\350\255\242\257\215\063\111\272\037\212
\334\346\164\174\140\206\157\207\227\173

END

CKA_NSS_MOZILLA_CA_POLICY

CK_BBOOL CK_TRUE

CKA_NSS_SERVER_DISTRUST_AFTER CK_BBOOL CK_FALSE

CKA_NSS_EMAIL_DISTRUST_AFTER CK_BBOOL CK_FALSE

Trust for "vTrus Root CA"

Issuer: CN=vTrus Root CA,O="iTrusChina Co.,Ltd.",C=CN

Serial Number:43:e3:71:13:d8:b3:59:14:5d:b7:ce:8c:fd:35:fd:6f:bc:05:8d:45

Subject: CN=vTrus Root CA,O="iTrusChina Co.,Ltd.",C=CN

Not Valid Before: Tue Jul 31 07:24:05 2018

```

# Not Valid After : Fri Jul 31 07:24:05 2043
# Fingerprint (SHA-256):
8A:71:DE:65:59:33:6F:42:6C:26:E5:38:80:D0:0D:88:A1:8D:A4:C6:A9:1F:0D:CB:61:94:E2:06:C5:C9:63:87
# Fingerprint (SHA1): 84:1A:69:FB:F5:CD:1A:25:34:13:3D:E3:F8:FC:B8:99:D0:C9:14:B7
CKA_CLASS CK_OBJECT_CLASS CKO_NSS_TRUST
CKA_TOKEN CK_BBOOL CK_TRUE
CKA_PRIVATE CK_BBOOL CK_FALSE
CKA_MODIFIABLE CK_BBOOL CK_FALSE
CKA_LABEL UTF8 "vTrus Root CA"
CKA_CERT_SHA1_HASH
MULTILINE_OCTAL
\204\032\151\373\365\315\032\045\064\023\075\343\370\374\270\231
\320\311\024\267
END
CKA_CERT_MD5_HASH MULTILINE_OCTAL
\270\311\067\337\372\153\061\204\144\305\352\021\152\033\165\374
END
CKA_ISSUER MULTILINE_OCTAL
\060\103\061\013\060\011\006\003\125\004\006\023\002\103\116\061
\034\060\032\006\003\125\004\012\023\023\151\124\162\165\163\103
\150\151\156\141\040\103\157\056\054\114\164\144\056\061\026\060
\024\006\003\125\004\003\023\015\166\124\162\165\163\040\122\157
\157\164\040\103\101
END
CKA_SERIAL_NUMBER MULTILINE_OCTAL
\002\024\103\343\161\023\330\263\131\024\135\267\316\214\375\065
\375\157\274\005\215\105
END
CKA_TRUST_SERVER_AUTH CK_TRUST CKT_NSS_TRUSTED_DELEGATOR
CKA_TRUST_EMAIL_PROTECTION CK_TRUST CKT_NSS_MUST_VERIFY_TRUST
CKA_TRUST_CODE_SIGNING CK_TRUST CKT_NSS_MUST_VERIFY_TRUST
CKA_TRUST_STEP_UP_APPROVED CK_BBOOL CK_FALSE

#
# Certificate "ISRG Root X2"
#
# Issuer: CN=ISRG Root X2,O=Internet Security Research Group,C=US
# Serial Number:41:d2:9d:d1:72:ea:ee:a7:80:c1:2c:6c:e9:2f:87:52
#
Subject: CN=ISRG Root X2,O=Internet Security Research Group,C=US
# Not Valid Before: Fri Sep 04 00:00:00 2020
# Not Valid After : Mon Sep 17 16:00:00 2040
# Fingerprint (SHA-256):
69:72:9B:8E:15:A8:6E:FC:17:7A:57:AF:B7:17:1D:FC:64:AD:D2:8C:2F:CA:8C:F1:50:7E:34:45:3C:CB:14:70
# Fingerprint (SHA1): BD:B1:B9:3C:D5:97:8D:45:C6:26:14:55:F8:DB:95:C7:5A:D1:53:AF
CKA_CLASS CK_OBJECT_CLASS CKO_CERTIFICATE
CKA_TOKEN CK_BBOOL CK_TRUE
CKA_PRIVATE CK_BBOOL CK_FALSE

```

```
CKA_MODIFIABLE CK_BBOOL CK_FALSE
CKA_LABEL UTF8 "ISRG Root X2"
CKA_CERTIFICATE_TYPE CK_CERTIFICATE_TYPE CKC_X_509
CKA_SUBJECT MULTILINE_OCTAL
\060\117\061\013\060\011\006\003\125\004\006\023\002\125\123\061
\051\060\047\006\003\125\004\012\023\040\111\156\164\145\162\156
\145\164\040\123\145\143\165\162\151\164\171\040\122\145\163\145
\141\162\143\150\040\107\162\157\165\160\061\025\060\023\006\003
\125\004\003\023\014\111\123\122\107\040\122\157\157\164\040\130
\062
END
CKA_ID UTF8 "0"
CKA_ISSUER
MULTILINE_OCTAL
\060\117\061\013\060\011\006\003\125\004\006\023\002\125\123\061
\051\060\047\006\003\125\004\012\023\040\111\156\164\145\162\156
\145\164\040\123\145\143\165\162\151\164\171\040\122\145\163\145
\141\162\143\150\040\107\162\157\165\160\061\025\060\023\006\003
\125\004\003\023\014\111\123\122\107\040\122\157\157\164\040\130
\062
END
CKA_SERIAL_NUMBER MULTILINE_OCTAL
\002\020\101\322\235\321\162\352\356\247\200\301\054\154\351\057
\207\122
END
CKA_VALUE MULTILINE_OCTAL
\060\202\002\033\060\202\001\241\240\003\002\001\002\002\020\101
\322\235\321\162\352\356\247\200\301\054\154\351\057\207\122\060
\012\006\010\052\206\110\316\075\004\003\003\060\117\061\013\060
\011\006\003\125\004\006\023\002\125\123\061\051\060\047\006\003
\125\004\012\023\040\111\156\164\145\162\156\145\164\040\123\145
\143\165\162\151\164\171\040\122\145\163\145\141\162\143\150\040
\107\162\157\165\160\061\025\060\023\006\003\125\004\003\023\014
\111\123\122\107\040\122\157\157\164\040\130\062\060\036\027\015
\064\060\060\071\060\064\060\060\060\060\060\132\027\015\064
\060\060\071\061\067\061\066\060\060\060\060\132\060\117\061\013
\060\011\006\003\125\004\006\023\002\125\123\061\051\060\047\006
\003\125\004\012\023\040\111\156\164\145\162\156\145\164\040\123
\145\143\165\162\151\164\171\040\122\145\163\145\141\162\143\150
\040\107\162\157\165\160\061\025\060\023\006\003\125\004\003\023
\014\111\123\122\107\040\122\157\157\164\040\130\062\060\166\060
\020\006\007\052\206\110\316\075\002\001\006\005\053\201\004\000
\042\003\142\000\004\315\233\325\237\200\203\012\354\011\112\363
\026\112\076\134\317\167\254\336\147\005\015\035\007\266\334\026
\373\132\213\024\333\342\161\140\304\272\105\225\021\211\216\352
\006\337\367\052\026\034\244\271\305\305\062\340\003\340\036\202
\030\070\213\327\105\330\012\152\156\346\000\167\373\002\121\175
\042\330\012\156\232\133\167\337\360\372\101\354\071\334\165\312
```

```
\150\007\014\037\352\243\102\060\100\060\016\006\003\125\035\017
\001\001\377\004\004\003\002\001\006\060\017\006\003\125\035\023
\001\001\377\004\005\060\003\001\001\377\060\035\006\003\125\035
\016\004\026\004\024\174\102\226\256\336\113\110\073\372\222\370
\236\214\317\155\213\251\162\067\225\060\012\006\010\052\206\110
\316\075\004\003\003\003\150\000\060\145\002\060\173\171\116\106
\120\204\302\104\207\106\033\105\160\377\130\231\336\364\375\244
\322\125\246\040\055\164\326\064\274\101\243\120\137\001\047\126
\264\276\047\165\006\257\022\056\165\230\215\374\002\061\000\213
\365\167\154\324\310\145\252\340\013\054\356\024\235\047\067\244
\371\123\245\121\344\051\203\327\370\220\061\133\102\237\012\365
\376\256\000\150\347\214\111\017\266\157\133\133\025\362\347
```

END

CKA_NSS_Mozilla_CA_POLICY

CK_BBOOL CK_TRUE

CKA_NSS_SERVER_DISTRUST_AFTER CK_BBOOL CK_FALSE

CKA_NSS_EMAIL_DISTRUST_AFTER CK_BBOOL CK_FALSE

Trust for "ISRG Root X2"

Issuer: CN=ISRG Root X2,O=Internet Security Research Group,C=US

Serial Number:41:d2:9d:d1:72:ea:ee:a7:80:c1:2c:6c:e9:2f:87:52

#

Subject: CN=ISRG Root X2,O=Internet Security Research Group,C=US

Not Valid Before: Fri Sep 04 00:00:00 2020

Not Valid After : Mon Sep 17 16:00:00 2040

Fingerprint (SHA-256):

69:72:9B:8E:15:A8:6E:FC:17:7A:57:AF:B7:17:1D:FC:64:AD:D2:8C:2F:CA:8C:F1:50:7E:34:45:3C:CB:14:70

Fingerprint (SHA1): BD:B1:B9:3C:D5:97:8D:45:C6:26:14:55:F8:DB:95:C7:5A:D1:53:AF

CKA_CLASS CK_OBJECT_CLASS CKO_NSS_TRUST

CKA_TOKEN CK_BBOOL CK_TRUE

CKA_PRIVATE CK_BBOOL CK_FALSE

CKA_MODIFIABLE CK_BBOOL CK_FALSE

CKA_LABEL UTF8 "ISRG Root X2"

CKA_CERT_SHA1_HASH MULTILINE_OCTAL

```
\275\261\271\074\325\227\215\105\306\046\024\125\370\333\225\307
\132\321\123\257
```

END

CKA_CERT_MD5_HASH MULTILINE_OCTAL

```
\323\236\304\036\043\074\246\337\317\243\176\155\340\024\346\345
```

END

CKA_ISSUER MULTILINE_OCTAL

```
\060\117\061\013\060\011\006\003\125\004\006\023\002\125\123\061
\051\060\047\006\003\125\004\012\023\040\111\156\164\145\162\156
\145\164\040\123\145\143\165\162\151\164\171\040\122\145\163\145
\141\162\143\150\040\107\162\157\165\160\061\025\060\023\006\003
\125\004\003\023\014\111\123\122\107\040\122\157\157\164\040\130
\062
```

END

```

CKA_SERIAL_NUMBER
MULTILINE_OCTAL
\002\020\101\322\235\321\162\352\356\247\200\301\054\154\351\057
\207\122
END
CKA_TRUST_SERVER_AUTH CK_TRUST CKT_NSS_TRUSTED_DELEGATOR
CKA_TRUST_EMAIL_PROTECTION CK_TRUST CKT_NSS_MUST_VERIFY_TRUST
CKA_TRUST_CODE_SIGNING CK_TRUST CKT_NSS_MUST_VERIFY_TRUST
CKA_TRUST_STEP_UP_APPROVED CK_BBOOL CK_FALSE

#
# Certificate "HiPKI Root CA - G1"
#
# Issuer: CN=HiPKI Root CA - G1,O="Chunghwa Telecom Co., Ltd.",C=TW
# Serial Number:2d:dd:ac:ce:62:97:94:a1:43:e8:b0:cd:76:6a:5e:60
# Subject: CN=HiPKI Root CA - G1,O="Chunghwa Telecom Co., Ltd.",C=TW
# Not Valid Before: Fri Feb 22 09:46:04 2019
# Not Valid After : Thu Dec 31 15:59:59 2037
# Fingerprint (SHA-256):
F0:15:CE:3C:C2:39:BF:EF:06:4B:E9:F1:D2:C4:17:E1:A0:26:4A:0A:94:BE:1F:0C:8D:12:18:64:EB:69:49:CC
# Fingerprint (SHA1): 6A:92:E4:A8:EE:1B:EC:96:45:37:E3:29:57:49:CD:96:E3:E5:D2:60
CKA_CLASS CK_OBJECT_CLASS
CKO_CERTIFICATE
CKA_TOKEN CK_BBOOL CK_TRUE
CKA_PRIVATE CK_BBOOL CK_FALSE
CKA_MODIFIABLE CK_BBOOL CK_FALSE
CKA_LABEL UTF8 "HiPKI Root CA - G1"
CKA_CERTIFICATE_TYPE CK_CERTIFICATE_TYPE CKC_X_509
CKA_SUBJECT MULTILINE_OCTAL
\060\117\061\013\060\011\006\003\125\004\006\023\002\124\127\061
\043\060\041\006\003\125\004\012\014\032\103\150\165\156\147\150
\167\141\040\124\145\154\145\143\157\155\040\103\157\056\054\040
\114\164\144\056\061\033\060\031\006\003\125\004\003\014\022\110
\151\120\113\111\040\122\157\157\164\040\103\101\040\055\040\107
\061
END
CKA_ID UTF8 "0"
CKA_ISSUER MULTILINE_OCTAL
\060\117\061\013\060\011\006\003\125\004\006\023\002\124\127\061
\043\060\041\006\003\125\004\012\014\032\103\150\165\156\147\150
\167\141\040\124\145\154\145\143\157\155\040\103\157\056\054\040
\114\164\144\056\061\033\060\031\006\003\125\004\003\014\022\110
\151\120\113\111\040\122\157\157\164\040\103\101\040\055\040\107
\061
END
CKA_SERIAL_NUMBER MULTILINE_OCTAL
\002\020\055\335\254\316\142\227\224\241\103\350\260\315\166\152
\136\140

```

END

CKA_VALUE

MULTILINE_OCTAL

\060\202\005\152\060\202\003\122\240\003\002\001\002\002\020\055
\335\254\316\142\227\224\241\103\350\260\315\166\152\136\140\060
\015\006\011\052\206\110\206\367\015\001\001\013\005\000\060\117
\061\013\060\011\006\003\125\004\006\023\002\124\127\061\043\060
\041\006\003\125\004\012\014\032\103\150\165\156\147\150\167\141
\040\124\145\154\145\143\157\155\040\103\157\056\054\040\114\164
\144\056\061\033\060\031\006\003\125\004\003\014\022\110\151\120
\113\111\040\122\157\157\164\040\103\101\040\055\040\107\061\060
\036\027\015\061\071\060\062\062\062\060\071\064\066\060\064\132
\027\015\063\067\061\062\063\061\061\065\065\071\065\071\132\060
\117\061\013\060\011\006\003\125\004\006\023\002\124\127\061\043
\060\041\006\003\125\004\012\014\032\103\150\165\156\147\150\167
\141\040\124\145\154\145\143\157\155\040\103\157\056\054\040\114
\164\144\056\061\033\060\031\006\003\125\004\003\014\022\110\151
\120\113\111\040\122\157\157\164\040\103\101\040\055\040\107\061
\060\202\002\042\060\015\006\011\052\206\110\206\367\015\001\001
\001\005\000\003\202\002\017\000\060\202\002\012\002\202\002\001
\000\364\036\177\122\163\062\014\163\344\275\023\164\243\324\060
\250\320\256\113\330\266\337\165\107\146\364\174\347\071\004\036
\152\160\040\322\132\107\162\147\125\364\245\350\235\325\036\041
\241\360\147\272\314\041\150\276\104\123\277\215\371\342\334\057
\125\310\067\077\037\244\300\234\263\344\167\134\240\106\376\167
\372\032\240\070\352\355\232\162\336\053\275\224\127\072\272\354
\171\347\137\175\102\144\071\172\046\066\367\044\360\325\057\272
\225\230\021\146\255\227\065\326\165\001\200\340\257\364\204\141
\214\015\036\137\174\207\226\136\101\257\353\207\352\370\135\361
\056\210\005\076\114\042\273\332\037\052\335\122\106\144\071\363
\102\316\331\236\014\263\260\167\227\144\234\300\364\243\056\037
\225\007\260\027\337\060\333\000\030\226\114\241\201\113\335\004
\155\123\243\075\374\007\254\324\305\067\202\353\344\225\010\031
\050\202\322\102\072\243\330\123\354\171\211\140\110\140\310\162
\222\120\334\003\217\203\077\262\102\127\132\333\152\351\021\227
\335\205\050\274\060\114\253\343\302\261\105\104\107\037\340\212
\026\007\226\322\041\017\123\300\355\251\176\324\116\354\233\011
\354\257\102\254\060\326\277\321\020\105\340\246\026\262\245\305
\323\117\163\224\063\161\002\241\152\243\326\063\227\117\041\143
\036\133\217\331\301\136\105\161\167\017\201\135\137\041\232\255
\203\314\372\136\326\215\043\137\033\075\101\257\040\165\146\132
\112\366\237\373\253\030\367\161\300\266\035\061\354\073\040\353
\313\342\270\365\256\222\262\367\341\204\113\362\242\362\223\232
\042\236\323\024\157\066\124\275\037\136\131\025\271\163\250\301
\174\157\173\142\351\026\154\107\132\145\363\016\021\233\106\331
\375\155\334\326\234\300\264\175\245\260\335\077\126\157\241\371
\366\344\022\110\375\006\177\022\127\266\251\043\117\133\003\303
\340\161\052\043\267\367\260\261\073\274\230\275\326\230\250\014

\153\366\216\022\147\246\362\262\130\344\002\011\023\074\251\273
\020\264\322\060\105\361\354\367\000\021\337\145\370\334\053\103
\125\277\026\227\304\017\325\054\141\204\252\162\206\376\346\072
\176\302\077\175\356\374\057\024\076\346\205\335\120\157\267\111
\355\002\003\001\000\001\243\102\060\100\060\017\006\003\125\035
\023\001\001\377\004\005\060\003\001\001\377\060\035\006\003\125
\035\016\004\026\004\024\362\167\027\372\136\250\376\366\075\161
\325\150\272\311\106\014\070\330\257\260\060\016\006\003\125\035
\017\001\001\377\004\004\003\002\001\206\060\015\006\011\052\206
\110\206\367\015\001\001\013\005\000\003\202\002\001\000\120\121
\360\165\334\160\004\343\377\252\165\324\161\242\313\236\217\250
\251\323\257\165\307\124\317\072\034\004\231\042\254\304\021\342
\357\063\112\246\043\035\016\015\107\330\067\307\157\257\064\177
\117\201\153\065\117\351\162\245\061\342\170\347\367\116\224\030
\133\100\175\317\153\041\124\206\346\225\172\373\306\312\352\234
\110\116\127\011\135\057\254\364\245\264\227\063\130\325\254\171
\251\314\137\371\205\372\122\305\215\370\221\024\353\072\015\027
\320\122\302\173\343\302\163\216\106\170\006\070\054\350\134\332
\146\304\364\244\360\126\031\063\051\132\145\222\005\107\106\112
\253\204\303\036\047\241\037\021\222\231\047\165\223\017\274\066
\073\227\127\217\046\133\014\273\234\017\324\156\060\007\324\334
\137\066\150\146\071\203\226\047\046\212\310\304\071\376\232\041
\157\325\162\206\351\177\142\345\227\116\320\044\320\100\260\320
\165\010\216\275\150\356\010\327\156\174\020\160\106\033\174\340
\210\262\236\162\206\231\001\343\277\237\111\031\264\045\276\126
\145\256\027\143\345\036\337\350\377\107\245\277\341\046\005\204
\344\260\300\257\347\010\231\250\014\136\046\200\105\324\370\150
\057\226\217\256\342\112\034\234\026\014\023\157\070\207\366\273
\310\064\137\222\003\121\171\160\246\337\313\365\231\115\171\315
\116\274\127\237\103\116\153\056\053\030\370\152\163\214\272\305
\065\357\071\152\101\036\317\161\250\242\262\206\007\133\072\311
\341\357\077\145\004\200\107\062\104\160\225\116\061\147\152\164
\133\020\105\165\352\260\237\320\346\065\376\116\237\213\314\053
\222\105\133\156\045\140\205\106\315\321\252\260\166\146\223\167
\226\276\203\276\070\266\044\116\046\013\314\355\172\126\032\340
\351\132\306\144\255\114\172\000\110\104\057\271\100\273\023\076
\276\025\170\235\205\201\112\052\127\336\325\031\103\332\333\312
\133\107\206\203\013\077\266\015\166\170\163\171\042\136\261\200
\037\317\276\321\077\126\020\230\053\225\207\241\037\235\144\024
\140\071\054\263\000\125\056\344\365\263\016\127\304\221\101\000
\234\077\350\245\337\352\366\377\310\360\255\155\122\250\027\253
\233\141\374\022\121\065\344\045\375\257\252\152\206\071

END

CKA_NSS_Mozilla_CA_POLICY

CK_BBOOL CK_TRUE

CKA_NSS_SERVER_DISTRUST_AFTER CK_BBOOL CK_FALSE

CKA_NSS_EMAIL_DISTRUST_AFTER CK_BBOOL CK_FALSE

```

# Trust for "HiPKI Root CA - G1"
# Issuer: CN=HiPKI Root CA - G1,O="Chunghwa Telecom Co., Ltd.",C=TW
# Serial Number:2d:dd:ac:ce:62:97:94:a1:43:e8:b0:cd:76:6a:5e:60
#
Subject: CN=HiPKI Root CA - G1,O="Chunghwa Telecom Co., Ltd.",C=TW
# Not Valid Before: Fri Feb 22 09:46:04 2019
# Not Valid After : Thu Dec 31 15:59:59 2037
# Fingerprint (SHA-256):
F0:15:CE:3C:C2:39:BF:EF:06:4B:E9:F1:D2:C4:17:E1:A0:26:4A:0A:94:BE:1F:0C:8D:12:18:64:EB:69:49:CC
# Fingerprint (SHA1): 6A:92:E4:A8:EE:1B:EC:96:45:37:E3:29:57:49:CD:96:E3:E5:D2:60
CKA_CLASS CK_OBJECT_CLASS CKO_NSS_TRUST
CKA_TOKEN CK_BBOOL CK_TRUE
CKA_PRIVATE CK_BBOOL CK_FALSE
CKA_MODIFIABLE CK_BBOOL CK_FALSE
CKA_LABEL UTF8 "HiPKI Root CA - G1"
CKA_CERT_SHA1_HASH MULTILINE_OCTAL
\152\222\344\250\356\033\354\226\105\067\343\051\127\111\315\226
\343\345\322\140
END
CKA_CERT_MD5_HASH MULTILINE_OCTAL
\151\105\337\026\145\113\350\150\232\217\166\137\377\200\236\323
END
CKA_ISSUER MULTILINE_OCTAL
\060\117\061\013\060\011\006\003\125\004\006\023\002\124\127\061
\043\060\041\006\003\125\004\012\014\032\103\150\165\156\147\150
\167\141\040\124\145\154\145\143\157\155\040\103\157\056\054\040
\114\164\144\056\061\033\060\031\006\003\125\004\003\014\022\110
\151\120\113\111\040\122\157\157\164\040\103\101\040\055\040\107
\061
END
CKA_SERIAL_NUMBER
MULTILINE_OCTAL
\002\020\055\335\254\316\142\227\224\241\103\350\260\315\166\152
\136\140
END
CKA_TRUST_SERVER_AUTH CK_TRUST CKT_NSS_TRUSTED_DELEGATOR
CKA_TRUST_EMAIL_PROTECTION CK_TRUST CKT_NSS_MUST_VERIFY_TRUST
CKA_TRUST_CODE_SIGNING CK_TRUST CKT_NSS_MUST_VERIFY_TRUST
CKA_TRUST_STEP_UP_APPROVED CK_BBOOL CK_FALSE

#
# Certificate "GlobalSign ECC Root CA - R4"
#
# Issuer: CN=GlobalSign,O=GlobalSign,OU=GlobalSign ECC Root CA - R4
# Serial Number:02:03:e5:7e:f5:3f:93:fd:a5:09:21:b2:a6
# Subject: CN=GlobalSign,O=GlobalSign,OU=GlobalSign ECC Root CA - R4
# Not Valid Before: Tue Nov 13 00:00:00 2012
# Not Valid After : Tue Jan 19 03:14:07 2038

```

```
# Fingerprint (SHA-256):
B0:85:D7:0B:96:4F:19:1A:73:E4:AF:0D:54:AE:7A:0E:07:AA:FD:AF:9B:71:DD:08:62:13:8A:B7:32:5A:24:A2
# Fingerprint (SHA1): 6B:A0:B0:98:E1:71:EF:5A:AD:FE:48:15:80:77:10:F4:BD:6F:0B:28
CKA_CLASS
CK_OBJECT_CLASS CKO_CERTIFICATE
CKA_TOKEN CK_BBOOL CK_TRUE
CKA_PRIVATE CK_BBOOL CK_FALSE
CKA_MODIFIABLE CK_BBOOL CK_FALSE
CKA_LABEL UTF8 "GlobalSign ECC Root CA - R4"
CKA_CERTIFICATE_TYPE CK_CERTIFICATE_TYPE CKC_X_509
CKA_SUBJECT MULTILINE_OCTAL
\060\120\061\044\060\042\006\003\125\004\013\023\033\107\154\157
\142\141\154\123\151\147\156\040\105\103\103\040\122\157\157\164
\040\103\101\040\055\040\122\064\061\023\060\021\006\003\125\004
\012\023\012\107\154\157\142\141\154\123\151\147\156\061\023\060
\021\006\003\125\004\003\023\012\107\154\157\142\141\154\123\151
\147\156
END
CKA_ID UTF8 "0"
CKA_ISSUER MULTILINE_OCTAL
\060\120\061\044\060\042\006\003\125\004\013\023\033\107\154\157
\142\141\154\123\151\147\156\040\105\103\103\040\122\157\157\164
\040\103\101\040\055\040\122\064\061\023\060\021\006\003\125\004
\012\023\012\107\154\157\142\141\154\123\151\147\156\061\023\060
\021\006\003\125\004\003\023\012\107\154\157\142\141\154\123\151
\147\156
END
CKA_SERIAL_NUMBER
MULTILINE_OCTAL
\002\015\002\003\345\176\365\077\223\375\245\011\041\262\246
END
CKA_VALUE MULTILINE_OCTAL
\060\202\001\334\060\202\001\203\240\003\002\001\002\002\015\002
\003\345\176\365\077\223\375\245\011\041\262\246\060\012\006\010
\052\206\110\316\075\004\003\002\060\120\061\044\060\042\006\003
\125\004\013\023\033\107\154\157\142\141\154\123\151\147\156\040
\105\103\103\040\122\157\157\164\040\103\101\040\055\040\122\064
\061\023\060\021\006\003\125\004\012\023\012\107\154\157\142\141
\154\123\151\147\156\061\023\060\021\006\003\125\004\003\023\012
\107\154\157\142\141\154\123\151\147\156\060\036\027\015\061\062
\061\061\061\063\060\060\060\060\060\060\132\027\015\063\070\060
\061\061\071\060\063\061\064\060\067\132\060\120\061\044\060\042
\006\003\125\004\013\023\033\107\154\157\142\141\154\123\151\147
\156\040\105\103\103\040\122\157\157\164\040\103\101\040\055\040
\122\064\061\023\060\021\006\003\125\004\012\023\012\107\154\157
\142\141\154\123\151\147\156\061\023\060\021\006\003\125\004\003
\023\012\107\154\157\142\141\154\123\151\147\156\060\131\060\023
\006\007\052\206\110\316\075\002\001\006\010\052\206\110\316\075
```

```
\003\001\007\003\102\000\004\270\306\171\323\217\154\045\016\237
\056\071\031\034\003\244\256\232\345\071\007\011\026\312\143\261
\271\206\370\212\127\301\127\316\102\372\163\241\367\145\102\377
\036\301\000\262\156\163\016\377\307\041\345\030\244\252\331\161
\077\250\324\271\316\214\035\243\102\060\100\060\016\006\003\125
\035\017\001\001\377\004\004\003\002\001\206\060\017\006\003\125
\035\023\001\001\377\004\005\060\003\001\001\377\060\035\006\003
\125\035\016\004\026\004\024\124\260\173\255\105\270\342\100\177
\373\012\156\373\276\063\311\074\243\204\325\060\012\006\010\052
\206\110\316\075\004\003\002\003\107\000\060\104\002\040\042\117
\164\162\271\140\257\361\346\234\240\026\005\120\137\303\136\073
\156\141\164\357\276\001\304\276\030\110\131\141\202\062\002\040
\046\235\124\143\100\336\067\140\120\317\310\330\355\235\202\256
\067\230\274\243\217\114\114\251\064\053\154\357\373\225\233\046
END
```

CKA_NSS_MOZILLA_CA_POLICY

CK_BBOOL CK_TRUE

CKA_NSS_SERVER_DISTRUST_AFTER CK_BBOOL CK_FALSE

CKA_NSS_EMAIL_DISTRUST_AFTER CK_BBOOL CK_FALSE

Trust for "GlobalSign ECC Root CA - R4"

Issuer: CN=GlobalSign,O=GlobalSign,OU=GlobalSign ECC Root CA - R4

Serial Number:02:03:e5:7e:f5:3f:93:fd:a5:09:21:b2:a6

Subject: CN=GlobalSign,O=GlobalSign,OU=GlobalSign ECC Root CA - R4

Not Valid Before: Tue Nov 13 00:00:00 2012

Not Valid After : Tue Jan 19 03:14:07 2038

Fingerprint (SHA-256):

B0:85:D7:0B:96:4F:19:1A:73:E4:AF:0D:54:AE:7A:0E:07:AA:FD:AF:9B:71:DD:08:62:13:8A:B7:32:5A:24:A2

Fingerprint (SHA1): 6B:A0:B0:98:E1:71:EF:5A:AD:FE:48:15:80:77:10:F4:BD:6F:0B:28

CKA_CLASS CK_OBJECT_CLASS CKO_NSS_TRUST

CKA_TOKEN CK_BBOOL CK_TRUE

CKA_PRIVATE CK_BBOOL CK_FALSE

CKA_MODIFIABLE CK_BBOOL CK_FALSE

CKA_LABEL UTF8 "GlobalSign ECC Root CA - R4"

CKA_CERT_SHA1_HASH MULTILINE_OCTAL

```
\153\240\260\230\341\161\357\132\255\376\110\025\200\167\020\364
\275\157\013\050
```

END

CKA_CERT_MD5_HASH

MULTILINE_OCTAL

```
\046\051\370\155\341\210\277\242\145\177\252\304\315\017\177\374
END
```

CKA_ISSUER MULTILINE_OCTAL

```
\060\120\061\044\060\042\006\003\125\004\013\023\033\107\154\157
\142\141\154\123\151\147\156\040\105\103\103\040\122\157\157\164
\040\103\101\040\055\040\122\064\061\023\060\021\006\003\125\004
\012\023\012\107\154\157\142\141\154\123\151\147\156\061\023\060
\021\006\003\125\004\003\023\012\107\154\157\142\141\154\123\151
```

```

\147\156
END
CKA_SERIAL_NUMBER MULTILINE_OCTAL
\002\015\002\003\345\176\365\077\223\375\245\011\041\262\246
END
CKA_TRUST_SERVER_AUTH CK_TRUST CKT_NSS_TRUSTED_DELEGATOR
CKA_TRUST_EMAIL_PROTECTION CK_TRUST CKT_NSS_TRUSTED_DELEGATOR
CKA_TRUST_CODE_SIGNING CK_TRUST CKT_NSS_MUST_VERIFY_TRUST
CKA_TRUST_STEP_UP_APPROVED CK_BBOOL CK_FALSE

#
# Certificate "GTS Root R1"
#
# Issuer: CN=GTS Root R1,O=Google Trust Services LLC,C=US
# Serial Number:02:03:e5:93:6f:31:b0:13:49:88:6b:a2:17
# Subject: CN=GTS Root R1,O=Google Trust
Services LLC,C=US
# Not Valid Before: Wed Jun 22 00:00:00 2016
# Not Valid After : Sun Jun 22 00:00:00 2036
# Fingerprint (SHA-256):
D9:47:43:2A:BD:E7:B7:FA:90:FC:2E:6B:59:10:1B:12:80:E0:E1:C7:E4:E4:0F:A3:C6:88:7F:FF:57:A7:F4:CF
# Fingerprint (SHA1): E5:8C:1C:C4:91:3B:38:63:4B:E9:10:6E:E3:AD:8E:6B:9D:D9:81:4A
CKA_CLASS CK_OBJECT_CLASS CKO_CERTIFICATE
CKA_TOKEN CK_BBOOL CK_TRUE
CKA_PRIVATE CK_BBOOL CK_FALSE
CKA_MODIFIABLE CK_BBOOL CK_FALSE
CKA_LABEL UTF8 "GTS Root R1"
CKA_CERTIFICATE_TYPE CK_CERTIFICATE_TYPE CKC_X_509
CKA_SUBJECT MULTILINE_OCTAL
\060\107\061\013\060\011\006\003\125\004\006\023\002\125\123\061
\042\060\040\006\003\125\004\012\023\031\107\157\157\147\154\145
\040\124\162\165\163\164\040\123\145\162\166\151\143\145\163\040
\114\114\103\061\024\060\022\006\003\125\004\003\023\013\107\124
\123\040\122\157\157\164\040\122\061
END
CKA_ID UTF8 "0"
CKA_ISSUER MULTILINE_OCTAL
\060\107\061\013\060\011\006\003\125\004\006\023\002\125\123\061
\042\060\040\006\003\125\004\012\023\031\107\157\157\147\154\145
\040\124\162\165\163\164\040\123\145\162\166\151\143\145\163\040
\114\114\103\061\024\060\022\006\003\125\004\003\023\013\107\124
\123\040\122\157\157\164\040\122\061
END
CKA_SERIAL_NUMBER
MULTILINE_OCTAL
\002\015\002\003\345\223\157\061\260\023\111\210\153\242\027
END
CKA_VALUE MULTILINE_OCTAL

```

\060\202\005\127\060\202\003\077\240\003\002\001\002\002\015\002
\003\345\223\157\061\260\023\111\210\153\242\027\060\015\006\011
\052\206\110\206\367\015\001\001\014\005\000\060\107\061\013\060
\011\006\003\125\004\006\023\002\125\123\061\042\060\040\006\003
\125\004\012\023\031\107\157\157\147\154\145\040\124\162\165\163
\164\040\123\145\162\166\151\143\145\163\040\114\114\103\061\024
\060\022\006\003\125\004\003\023\013\107\124\123\040\122\157\157
\164\040\122\061\060\036\027\015\061\066\060\066\062\062\060\060
\060\060\060\060\132\027\015\063\066\060\066\062\062\060\060\060
\060\060\060\132\060\107\061\013\060\011\006\003\125\004\006\023
\002\125\123\061\042\060\040\006\003\125\004\012\023\031\107\157
\157\147\154\145\040\124\162\165\163\164\040\123\145\162\166\151
\143\145\163\040\114\114\103\061\024\060\022\006\003\125\004\003
\023\013\107\124\123\040\122\157\157\164\040\122\061\060\202\002
\042\060\015\006\011\052\206\110\206\367\015\001\001\001\005\000
\003\202\002\017\000\060\202\002\012\002\202\002\001\000\266\021
\002\213\036\343\241\167\233\073\334\277\224\076\267\225\247\100
\074\241\375\202\371\175\062\006\202\161\366\366\214\177\373\350
\333\274\152\056\227\227\243\214\113\371\053\366\261\371\316\204
\035\261\371\305\227\336\357\271\362\243\351\274\022\211\136\247
\252\122\253\370\043\047\313\244\261\234\143\333\327\231\176\360
\012\136\353\150\246\364\306\132\107\015\115\020\063\343\116\261
\023\243\310\030\154\113\354\374\011\220\337\235\144\051\045\043
\007\241\264\322\075\056\140\340\317\322\011\207\273\315\110\360
\115\302\302\172\210\212\273\272\317\131\031\326\257\217\260\007
\260\236\061\361\202\301\300\337\056\246\155\154\031\016\265\330
\176\046\032\105\003\075\260\171\244\224\050\255\017\177\046\345
\250\010\376\226\350\074\150\224\123\356\203\072\210\053\025\226
\011\262\340\172\214\056\165\326\234\353\247\126\144\217\226\117
\150\256\075\227\302\204\217\300\274\100\300\013\134\275\366\207
\263\065\154\254\030\120\177\204\340\114\315\222\323\040\351\063
\274\122\231\257\062\265\051\263\045\052\264\110\371\162\341\312
\144\367\346\202\020\215\350\235\302\212\210\372\070\146\212\374
\143\371\001\371\170\375\173\134\167\372\166\207\372\354\337\261
\016\171\225\127\264\275\046\357\326\001\321\353\026\012\273\216
\013\265\305\305\212\125\253\323\254\352\221\113\051\314\031\244
\062\045\116\052\361\145\104\320\002\316\252\316\111\264\352\237
\174\203\260\100\173\347\103\253\247\154\243\217\175\211\201\372
\114\245\377\325\216\303\316\113\340\265\330\263\216\105\317\166
\300\355\100\053\375\123\017\260\247\325\073\015\261\212\242\003
\336\061\255\314\167\352\157\173\076\326\337\221\042\022\346\276
\372\330\062\374\020\143\024\121\162\336\135\326\026\223\275\051
\150\063\357\072\146\354\007\212\046\337\023\327\127\145\170\047
\336\136\111\024\000\242\000\177\232\250\041\266\251\261\225\260
\245\271\015\026\021\332\307\154\110\074\100\340\176\015\132\315
\126\074\321\227\005\271\313\113\355\071\113\234\304\077\322\125
\023\156\044\260\326\161\372\364\301\272\314\355\033\365\376\201
\101\330\000\230\075\072\310\256\172\230\067\030\005\225\002\003

\001\000\001\243\102\060\100\060\016\006\003\125\035\017\001\001
\377\004\004\003\002\001\206\060\017\006\003\125\035\023\001\001
\377\004\005\060\003\001\001\377\060\035\006\003\125\035\016\004
\026\004\024\344\257\053\046\161\032\053\110\047\205\057\122\146
\054\357\360\211\023\161\076\060\015\006\011\052\206\110\206\367
\015\001\001\014\005\000\003\202\002\001\000\237\252\102\046\333
\013\233\276\377\036\226\222\056\076\242\145\112\152\230\272\042
\313\175\301\072\330\202\012\006\306\366\245\336\300\116\207\146
\171\241\371\246\130\234\252\371\265\346\140\347\340\350\261\036
\102\101\063\013\067\075\316\211\160\025\312\265\044\250\317\153
\265\322\100\041\230\317\042\064\317\073\305\042\204\340\305\016
\212\174\135\210\344\065\044\316\233\076\032\124\036\156\333\262
\207\247\374\363\372\201\125\024\142\012\131\251\042\005\061\076
\202\326\356\333\127\064\274\063\225\323\027\033\350\047\242\213
\173\116\046\032\172\132\144\266\321\254\067\361\375\240\363\070
\354\162\360\021\165\235\313\064\122\215\346\166\153\027\306\337
\206\253\047\216\111\053\165\146\201\020\041\246\352\076\364\256
\045\377\174\025\336\316\214\045\077\312\142\160\012\367\057\011
\146\007\310\077\034\374\360\333\105\060\337\142\210\301\265\017
\235\303\237\112\336\131\131\107\305\207\042\066\346\202\247\355
\012\271\342\007\240\215\173\172\112\074\161\322\342\003\241\037
\062\007\335\033\344\102\316\014\000\105\141\200\265\013\040\131
\051\170\275\371\125\313\143\305\074\114\364\266\377\333\152\137
\061\153\231\236\054\301\153\120\244\327\346\030\024\275\205\077
\147\253\106\237\240\377\102\247\072\177\134\313\135\260\160\035
\053\064\365\324\166\011\014\353\170\114\131\005\363\063\102\303
\141\025\020\033\167\115\316\042\214\324\205\362\105\175\267\123
\352\357\100\132\224\012\134\040\137\116\100\135\142\042\166\337
\377\316\141\275\214\043\170\322\067\002\340\216\336\321\021\067
\211\366\277\355\111\007\142\256\222\354\100\032\257\024\011\331
\320\116\262\242\367\276\356\356\330\377\334\032\055\336\270\066
\161\342\374\171\267\224\045\321\110\163\133\241\065\347\263\231
\147\165\301\031\072\053\107\116\323\102\216\375\061\310\026\146
\332\322\014\074\333\263\216\311\241\015\200\017\173\026\167\024
\277\377\333\011\224\262\223\274\040\130\025\351\333\161\103\363
\336\020\303\000\334\250\052\225\266\302\326\077\220\153\166\333
\154\376\214\274\362\160\065\014\334\231\031\065\334\327\310\106
\143\325\066\161\256\127\373\267\202\155\334

END

CKA_NSS_Mozilla_CA_POLICY

CK_BBOOL CK_TRUE

CKA_NSS_SERVER_DISTRUST_AFTER CK_BBOOL CK_FALSE

CKA_NSS_EMAIL_DISTRUST_AFTER

CK_BBOOL CK_FALSE

Trust for "GTS Root R1"

Issuer: CN=GTS Root R1,O=Google Trust Services LLC,C=US

Serial Number:02:03:e5:93:6f:31:b0:13:49:88:6b:a2:17

```

# Subject: CN=GTS Root R1,O=Google Trust Services LLC,C=US
# Not Valid Before: Wed Jun 22 00:00:00 2016
# Not Valid After : Sun Jun 22 00:00:00 2036
# Fingerprint (SHA-256):
D9:47:43:2A:BD:E7:B7:FA:90:FC:2E:6B:59:10:1B:12:80:E0:E1:C7:E4:E4:0F:A3:C6:88:7F:FF:57:A7:F4:CF
# Fingerprint (SHA1): E5:8C:1C:C4:91:3B:38:63:4B:E9:10:6E:E3:AD:8E:6B:9D:D9:81:4A
CKA_CLASS CK_OBJECT_CLASS CKO_NSS_TRUST
CKA_TOKEN CK_BBOOL CK_TRUE
CKA_PRIVATE CK_BBOOL CK_FALSE
CKA_MODIFIABLE CK_BBOOL CK_FALSE
CKA_LABEL UTF8 "GTS Root R1"
CKA_CERT_SHA1_HASH MULTILINE_OCTAL
\345\214\034\304\221\073\070\143\113\351\020\156\343\255\216\153
\235\331\201\112
END
CKA_CERT_MD5_HASH MULTILINE_OCTAL
\005\376\320\277\161\250\243\166\143\332\001\340\330\122\334\100
END
CKA_ISSUER MULTILINE_OCTAL
\060\107\061\013\060\011\006\003\125\004\006\023\002\125\123\061
\042\060\040\006\003\125\004\012\023\031\107\157\157\147\154\145
\040\124\162\165\163\164\040\123\145\162\166\151\143\145\163\040
\114\114\103\061\024\060\022\006\003\125\004\003\023\013\107\124
\123\040\122\157\157\164\040\122\061
END
CKA_SERIAL_NUMBER
MULTILINE_OCTAL
\002\015\002\003\345\223\157\061\260\023\111\210\153\242\027
END
CKA_TRUST_SERVER_AUTH CK_TRUST CKT_NSS_TRUSTED_DELEGATOR
CKA_TRUST_EMAIL_PROTECTION CK_TRUST CKT_NSS_TRUSTED_DELEGATOR
CKA_TRUST_CODE_SIGNING CK_TRUST CKT_NSS_MUST_VERIFY_TRUST
CKA_TRUST_STEP_UP_APPROVED CK_BBOOL CK_FALSE

#
# Certificate "GTS Root R2"
#
# Issuer: CN=GTS Root R2,O=Google Trust Services LLC,C=US
# Serial Number:02:03:e5:ae:c5:8d:04:25:1a:ab:11:25:aa
# Subject: CN=GTS Root R2,O=Google Trust Services LLC,C=US
# Not Valid Before: Wed Jun 22 00:00:00 2016
# Not Valid After : Sun Jun 22 00:00:00 2036
# Fingerprint (SHA-256):
8D:25:CD:97:22:9D:BF:70:35:6B:DA:4E:B3:CC:73:40:31:E2:4C:F0:0F:AF:CF:D3:2D:C7:6E:B5:84:1C:7E:A8
# Fingerprint (SHA1): 9A:44:49:76:32:DB:DE:FA:D0:BC:FB:5A:7B:17:BD:9E:56:09:24:94
CKA_CLASS
CK_OBJECT_CLASS CKO_CERTIFICATE
CKA_TOKEN CK_BBOOL CK_TRUE

```



```
CKA_PRIVATE CK_BBOOL CK_FALSE
CKA_MODIFIABLE CK_BBOOL CK_FALSE
CKA_LABEL UTF8 "GTS Root R2"
CKA_CERTIFICATE_TYPE CK_CERTIFICATE_TYPE CKC_X_509
CKA_SUBJECT MULTILINE_OCTAL
\060\107\061\013\060\011\006\003\125\004\006\023\002\125\123\061
\042\060\040\006\003\125\004\012\023\031\107\157\157\147\154\145
\040\124\162\165\163\164\040\123\145\162\166\151\143\145\163\040
\114\114\103\061\024\060\022\006\003\125\004\003\023\013\107\124
\123\040\122\157\157\164\040\122\062
END
CKA_ID UTF8 "0"
CKA_ISSUER MULTILINE_OCTAL
\060\107\061\013\060\011\006\003\125\004\006\023\002\125\123\061
\042\060\040\006\003\125\004\012\023\031\107\157\157\147\154\145
\040\124\162\165\163\164\040\123\145\162\166\151\143\145\163\040
\114\114\103\061\024\060\022\006\003\125\004\003\023\013\107\124
\123\040\122\157\157\164\040\122\062
END
CKA_SERIAL_NUMBER MULTILINE_OCTAL
\002\015\002\003\345\256\305\215\004\045\032\253\021\045\252
END
CKA_VALUE
MULTILINE_OCTAL
\060\202\005\127\060\202\003\077\240\003\002\001\002\002\015\002
\003\345\256\305\215\004\045\032\253\021\045\252\060\015\006\011
\052\206\110\206\367\015\001\001\014\005\000\060\107\061\013\060
\011\006\003\125\004\006\023\002\125\123\061\042\060\040\006\003
\125\004\012\023\031\107\157\157\147\154\145\040\124\162\165\163
\164\040\123\145\162\166\151\143\145\163\040\114\114\103\061\024
\060\022\006\003\125\004\003\023\013\107\124\123\040\122\157\157
\164\040\122\062\060\036\027\015\061\066\060\066\062\062\060\060
\060\060\060\060\132\027\015\063\066\060\066\062\062\060\060\060
\060\060\060\132\060\107\061\013\060\011\006\003\125\004\006\023
\002\125\123\061\042\060\040\006\003\125\004\012\023\031\107\157
\157\147\154\145\040\124\162\165\163\164\040\123\145\162\166\151
\143\145\163\040\114\114\103\061\024\060\022\006\003\125\004\003
\023\013\107\124\123\040\122\157\157\164\040\122\062\060\202\002
\042\060\015\006\011\052\206\110\206\367\015\001\001\001\005\000
\003\202\002\017\000\060\202\002\012\002\202\002\001\000\316\336
\375\246\373\354\354\024\064\074\007\006\132\154\131\367\031\065
\335\367\301\235\125\252\323\315\073\244\223\162\357\012\372\155
\235\366\360\205\200\133\241\110\122\237\071\305\267\356\050\254
\357\313\166\150\024\271\337\255\001\154\231\037\304\042\035\237
\376\162\167\340\054\133\257\344\004\277\117\162\240\032\064\230
\350\071\150\354\225\045\173\166\241\346\151\271\205\031\275\211
\214\376\255\355\066\352\163\274\377\203\342\313\175\301\322\316
\112\263\215\005\236\213\111\223\337\301\133\320\156\136\360\056
```

\060\056\202\374\372\274\264\027\012\110\345\210\233\305\233\153
\336\260\312\264\003\360\332\364\220\270\145\144\367\134\114\255
\350\176\146\136\231\327\270\302\076\310\320\023\235\255\356\344
\105\173\211\125\367\212\037\142\122\204\022\263\302\100\227\343
\212\037\107\221\246\164\132\322\370\261\143\050\020\270\263\011
\270\126\167\100\242\046\230\171\306\376\337\045\356\076\345\240
\177\324\141\017\121\113\074\077\214\332\341\160\164\330\302\150
\241\371\301\014\351\241\342\177\273\125\074\166\006\356\152\116
\314\222\210\060\115\232\275\117\013\110\232\204\265\230\243\325
\373\163\301\127\141\335\050\126\165\023\256\207\216\347\014\121
\011\020\165\210\114\274\215\371\173\074\324\042\110\037\052\334
\353\153\273\104\261\313\063\161\062\106\257\255\112\361\214\350
\164\072\254\347\032\042\163\200\322\060\367\045\102\307\042\073
\073\022\255\226\056\306\303\166\007\252\040\267\065\111\127\351
\222\111\350\166\026\162\061\147\053\226\176\212\243\307\224\126
\042\277\152\113\176\001\041\262\043\062\337\344\232\104\155\131
\133\135\365\000\240\034\233\306\170\227\215\220\377\233\310\252
\264\257\021\121\071\136\331\373\147\255\325\133\021\235\062\232
\033\275\325\272\133\245\311\313\045\151\123\125\047\134\340\312
\066\313\210\141\373\036\267\320\313\356\026\373\323\246\114\336
\222\245\324\342\337\365\006\124\336\056\235\113\264\223\060\252
\201\316\335\032\334\121\163\015\117\160\351\345\266\026\041\031
\171\262\346\211\013\165\144\312\325\253\274\011\301\030\241\377
\324\124\241\205\074\375\024\044\003\262\207\323\244\267\002\003
\001\000\001\243\102\060\100\060\016\006\003\125\035\017\001\001
\377\004\004\003\002\001\206\060\017\006\003\125\035\023\001\001
\377\004\005\060\003\001\001\377\060\035\006\003\125\035\016\004
\026\004\024\273\377\312\216\043\237\117\231\312\333\342\150\246
\245\025\047\027\036\331\016\060\015\006\011\052\206\110\206\367
\015\001\001\014\005\000\003\202\002\001\000\037\312\316\335\307
\276\241\237\331\047\114\013\334\027\230\021\152\210\336\075\346
\161\126\162\262\236\032\116\234\325\053\230\044\135\233\153\173
\260\063\202\011\275\337\045\106\352\230\236\266\033\376\203\074
\322\142\141\301\004\355\316\340\305\311\310\023\023\125\347\250
\143\255\214\173\001\376\167\060\341\316\150\233\005\370\022\356
\171\061\240\101\105\065\050\012\161\244\044\117\214\334\074\202
\007\137\146\334\175\020\376\014\141\263\005\225\356\341\256\201
\017\250\370\307\217\115\250\043\002\046\153\035\203\122\125\316
\265\057\000\312\200\100\340\341\164\254\140\365\207\200\235\256
\066\144\221\135\260\150\030\352\212\141\311\167\250\227\304\311
\307\245\374\125\113\363\360\177\271\145\075\047\150\320\314\153
\372\123\235\341\221\032\311\135\032\226\155\062\207\355\003\040
\310\002\316\132\276\331\352\375\262\115\304\057\033\337\137\172
\365\370\213\306\356\061\072\045\121\125\147\215\144\062\173\351
\236\303\202\272\052\055\351\036\264\340\110\006\242\374\147\257
\037\042\002\163\373\040\012\257\235\124\113\241\315\377\140\107
\260\077\135\357\033\126\275\227\041\226\055\012\321\136\235\070
\002\107\154\271\364\366\043\045\270\240\152\232\053\167\010\372

\304\261\050\220\046\130\010\074\342\176\252\327\075\157\272\061
\210\012\005\353\047\265\241\111\356\240\105\124\173\346\047\145
\231\040\041\250\243\274\373\030\226\273\122\157\014\355\203\121
\114\351\131\342\040\140\305\302\145\222\202\214\363\020\037\016
\212\227\276\167\202\155\077\217\035\135\274\111\047\275\314\117
\017\341\316\166\206\004\043\305\300\214\022\133\375\333\204\240
\044\361\110\377\144\174\320\276\134\026\321\357\231\255\300\037
\373\313\256\274\070\042\006\046\144\332\332\227\016\077\050\025
\104\250\117\000\312\360\232\314\317\164\152\264\076\074\353\225
\354\265\323\132\330\201\231\351\103\030\067\353\263\273\321\130
\142\101\363\146\322\217\252\170\225\124\040\303\132\056\164\053
\325\321\276\030\151\300\254\325\244\317\071\272\121\204\003\145
\351\142\300\142\376\330\115\125\226\342\320\021\372\110\064\021
\354\236\355\005\035\344\310\326\035\206\313

END

CKA_NSS_Mozilla_CA_POLICY

CK_BBOOL CK_TRUE

CKA_NSS_SERVER_DISTRUST_AFTER CK_BBOOL CK_FALSE

CKA_NSS_EMAIL_DISTRUST_AFTER CK_BBOOL CK_FALSE

Trust for "GTS Root R2"

Issuer: CN=GTS Root R2,O=Google Trust Services LLC,C=US

Serial Number:02:03:e5:ae:c5:8d:04:25:1a:ab:11:25:aa

Subject: CN=GTS Root R2,O=Google Trust Services LLC,C=US

Not Valid Before: Wed

Jun 22 00:00:00 2016

Not Valid After : Sun Jun 22 00:00:00 2036

Fingerprint (SHA-256):

8D:25:CD:97:22:9D:BF:70:35:6B:DA:4E:B3:CC:73:40:31:E2:4C:F0:0F:AF:CF:D3:2D:C7:6E:B5:84:1C:7E:A8

Fingerprint (SHA1): 9A:44:49:76:32:DB:DE:FA:D0:BC:FB:5A:7B:17:BD:9E:56:09:24:94

CKA_CLASS CK_OBJECT_CLASS CKO_NSS_TRUST

CKA_TOKEN CK_BBOOL CK_TRUE

CKA_PRIVATE CK_BBOOL CK_FALSE

CKA_MODIFIABLE CK_BBOOL CK_FALSE

CKA_LABEL UTF8 "GTS Root R2"

CKA_CERT_SHA1_HASH MULTILINE_OCTAL

\232\104\111\166\062\333\336\372\320\274\373\132\173\027\275\236
\126\011\044\224

END

CKA_CERT_MD5_HASH MULTILINE_OCTAL

\036\071\300\123\346\036\051\202\013\312\122\125\066\135\127\334
END

CKA_ISSUER MULTILINE_OCTAL

\060\107\061\013\060\011\006\003\125\004\006\023\002\125\123\061
\042\060\040\006\003\125\004\012\023\031\107\157\157\147\154\145
\040\124\162\165\163\164\040\123\145\162\166\151\143\145\163\040
\114\114\103\061\024\060\022\006\003\125\004\003\023\013\107\124
\123\040\122\157\157\164\040\122\062

```

END
CKA_SERIAL_NUMBER
MULTILINE_OCTAL
\002\015\002\003\345\256\305\215\004\045\032\253\021\045\252
END
CKA_TRUST_SERVER_AUTH CK_TRUST CKT_NSS_TRUSTED_DELEGATOR
CKA_TRUST_EMAIL_PROTECTION CK_TRUST CKT_NSS_TRUSTED_DELEGATOR
CKA_TRUST_CODE_SIGNING CK_TRUST CKT_NSS_MUST_VERIFY_TRUST
CKA_TRUST_STEP_UP_APPROVED CK_BBOOL CK_FALSE

#
# Certificate "GTS Root R3"
#
# Issuer: CN=GTS Root R3,O=Google Trust Services LLC,C=US
# Serial Number:02:03:e5:b8:82:eb:20:f8:25:27:6d:3d:66
# Subject: CN=GTS Root R3,O=Google Trust Services LLC,C=US
# Not Valid Before: Wed Jun 22 00:00:00 2016
# Not Valid After : Sun Jun 22 00:00:00 2036
# Fingerprint (SHA-256):
34:D8:A7:3E:E2:08:D9:BC:DB:0D:95:65:20:93:4B:4E:40:E6:94:82:59:6E:8B:6F:73:C8:42:6B:01:0A:6F:48
# Fingerprint (SHA1): ED:E5:71:80:2B:C8:92:B9:5B:83:3C:D2:32:68:3F:09:CD:A0:1E:46
CKA_CLASS CK_OBJECT_CLASS CKO_CERTIFICATE
CKA_TOKEN CK_BBOOL CK_TRUE
CKA_PRIVATE CK_BBOOL CK_FALSE
CKA_MODIFIABLE CK_BBOOL CK_FALSE
CKA_LABEL UTF8 "GTS Root R3"
CKA_CERTIFICATE_TYPE CK_CERTIFICATE_TYPE
CKC_X_509
CKA_SUBJECT MULTILINE_OCTAL
\060\107\061\013\060\011\006\003\125\004\006\023\002\125\123\061
\042\060\040\006\003\125\004\012\023\031\107\157\157\147\154\145
\040\124\162\165\163\164\040\123\145\162\166\151\143\145\163\040
\114\114\103\061\024\060\022\006\003\125\004\003\023\013\107\124
\123\040\122\157\157\164\040\122\063
END
CKA_ID UTF8 "0"
CKA_ISSUER MULTILINE_OCTAL
\060\107\061\013\060\011\006\003\125\004\006\023\002\125\123\061
\042\060\040\006\003\125\004\012\023\031\107\157\157\147\154\145
\040\124\162\165\163\164\040\123\145\162\166\151\143\145\163\040
\114\114\103\061\024\060\022\006\003\125\004\003\023\013\107\124
\123\040\122\157\157\164\040\122\063
END
CKA_SERIAL_NUMBER MULTILINE_OCTAL
\002\015\002\003\345\270\202\353\040\370\045\047\155\075\146
END
CKA_VALUE MULTILINE_OCTAL
\060\202\002\011\060\202\001\216\240\003\002\001\002\002\015\002

```

\003\345\270\202\353\040\370\045\047\155\075\146\060\012\006\010
\052\206\110\316\075\004\003\003\060\107\061\013\060\011\006\003
\125\004\006\023\002\125\123\061\042\060\040\006\003\125\004\012
\023\031\107\157\157\147\154\145\040\124\162\165\163\164\040\123
\145\162\166\151\143\145\163\040\114\114\103\061\024\060\022\006
\003\125\004\003\023\013\107\124\123\040\122\157\157\164\040\122
\063\060\036\027\015\061\066\060\066\062\062\060\060\060\060
\060\132\027\015\063\066\060\066\062\062\060\060\060\060\060
\132\060\107\061\013\060\011\006\003\125\004\006\023\002\125\123
\061\042\060\040\006\003\125\004\012\023\031\107\157\157\147\154
\145\040\124\162\165\163\164\040\123\145\162\166\151\143\145\163
\040\114\114\103\061\024\060\022\006\003\125\004\003\023\013\107
\124\123\040\122\157\157\164\040\122\063\060\166\060\020\006\007
\052\206\110\316\075\002\001\006\005\053\201\004\000\042\003\142
\000\004\037\117\063\207\063\051\212\241\204\336\313\307\041\130
\101\211\352\126\235\053\113\205\306\035\114\047\274\177\046\121
\162\157\342\237\326\243\312\314\105\024\106\213\255\357\176\206
\214\354\261\176\057\377\251\161\235\030\204\105\004\101\125\156
\053\352\046\177\273\220\001\343\113\031\272\344\124\226\105\011
\261\325\154\221\104\255\204\023\216\232\214\015\200\014\062\366
\340\047\243\102\060\100\060\016\006\003\125\035\017\001\001\377
\004\004\003\002\001\206\060\017\006\003\125\035\023\001\001\377
\004\005\060\003\001\001\377\060\035\006\003\125\035\016\004\026
\004\024\301\361\046\272\240\055\256\205\201\317\323\361\052\022
\275\270\012\147\375\274\060\012\006\010\052\206\110\316\075\004
\003\003\003\151\000\060\146\002\061\000\366\341\040\225\024\173
\124\243\220\026\021\277\204\310\352\157\153\027\236\036\106\230
\040\233\237\323\015\331\254\323\057\315\174\370\133\056\125\273
\277\335\222\367\244\014\334\061\341\242\002\061\000\374\227\146
\146\345\103\026\023\203\335\307\337\057\276\024\070\355\001\316
\261\027\032\021\165\351\275\003\217\046\176\204\345\311\140\246
\225\327\124\131\267\347\021\054\211\324\271\356\027

END

CKA_NSS_Mozilla_CA_POLICY

CK_BBOOL CK_TRUE

CKA_NSS_SERVER_DISTRUST_AFTER

CK_BBOOL CK_FALSE

CKA_NSS_EMAIL_DISTRUST_AFTER CK_BBOOL CK_FALSE

Trust for "GTS Root R3"

Issuer: CN=GTS Root R3,O=Google Trust Services LLC,C=US

Serial Number:02:03:e5:b8:82:eb:20:f8:25:27:6d:3d:66

Subject: CN=GTS Root R3,O=Google Trust Services LLC,C=US

Not Valid Before: Wed Jun 22 00:00:00 2016

Not Valid After : Sun Jun 22 00:00:00 2036

Fingerprint (SHA-256):

34:D8:A7:3E:E2:08:D9:BC:DB:0D:95:65:20:93:4B:4E:40:E6:94:82:59:6E:8B:6F:73:C8:42:6B:01:0A:6F:48

Fingerprint (SHA1): ED:E5:71:80:2B:C8:92:B9:5B:83:3C:D2:32:68:3F:09:CD:A0:1E:46

```

CKA_CLASS CK_OBJECT_CLASS CKO_NSS_TRUST
CKA_TOKEN CK_BBOOL CK_TRUE
CKA_PRIVATE CK_BBOOL CK_FALSE
CKA_MODIFIABLE CK_BBOOL CK_FALSE
CKA_LABEL UTF8 "GTS Root R3"
CKA_CERT_SHA1_HASH MULTILINE_OCTAL
\355\345\161\200\053\310\222\271\133\203\074\322\062\150\077\011
\315\240\036\106
END
CKA_CERT_MD5_HASH MULTILINE_OCTAL
\076\347\235\130\002\224\106\121\224\345\340\042\112\213\347\163
END
CKA_ISSUER MULTILINE_OCTAL
\060\107\061\013\060\011\006\003\125\004\006\023\002\125\123\061
\042\060\040\006\003\125\004\012\023\031\107\157\157\147\154\145
\040\124\162\165\163\164\040\123\145\162\166\151\143\145\163\040
\114\114\103\061\024\060\022\006\003\125\004\003\023\013\107\124
\123\040\122\157\157\164\040\122\063
END
CKA_SERIAL_NUMBER
MULTILINE_OCTAL
\002\015\002\003\345\270\202\353\040\370\045\047\155\075\146
END
CKA_TRUST_SERVER_AUTH CK_TRUST CKT_NSS_TRUSTED_DELEGATOR
CKA_TRUST_EMAIL_PROTECTION CK_TRUST CKT_NSS_TRUSTED_DELEGATOR
CKA_TRUST_CODE_SIGNING CK_TRUST CKT_NSS_MUST_VERIFY_TRUST
CKA_TRUST_STEP_UP_APPROVED CK_BBOOL CK_FALSE

#
# Certificate "GTS Root R4"
#
# Issuer: CN=GTS Root R4,O=Google Trust Services LLC,C=US
# Serial Number:02:03:e5:c0:68:ef:63:1a:9c:72:90:50:52
# Subject: CN=GTS Root R4,O=Google Trust Services LLC,C=US
# Not Valid Before: Wed Jun 22 00:00:00 2016
# Not Valid After : Sun Jun 22 00:00:00 2036
# Fingerprint (SHA-256):
34:9D:FA:40:58:C5:E2:63:12:3B:39:8A:E7:95:57:3C:4E:13:13:C8:3F:E6:8F:93:55:6C:D5:E8:03:1B:3C:7D
#
Fingerprint (SHA1): 77:D3:03:67:B5:E0:0C:15:F6:0C:38:61:DF:7C:E1:3B:92:46:4D:47
CKA_CLASS CK_OBJECT_CLASS CKO_CERTIFICATE
CKA_TOKEN CK_BBOOL CK_TRUE
CKA_PRIVATE CK_BBOOL CK_FALSE
CKA_MODIFIABLE CK_BBOOL CK_FALSE
CKA_LABEL UTF8 "GTS Root R4"
CKA_CERTIFICATE_TYPE CK_CERTIFICATE_TYPE CKC_X_509
CKA_SUBJECT MULTILINE_OCTAL
\060\107\061\013\060\011\006\003\125\004\006\023\002\125\123\061

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\042\060\040\006\003\125\004\012\023\031\107\157\157\147\154\145
\040\124\162\165\163\164\040\123\145\162\166\151\143\145\163\040
\114\114\103\061\024\060\022\006\003\125\004\003\023\013\107\124
\123\040\122\157\157\164\040\122\064

END

CKA_ID UTF8 ""

CKA_ISSUER MULTILINE_OCTAL

\060\107\061\013\060\011\006\003\125\004\006\023\002\125\123\061
\042\060\040\006\003\125\004\012\023\031\107\157\157\147\154\145
\040\124\162\165\163\164\040\123\145\162\166\151\143\145\163\040
\114\114\103\061\024\060\022\006\003\125\004\003\023\013\107\124
\123\040\122\157\157\164\040\122\064

END

CKA_SERIAL_NUMBER

MULTILINE_OCTAL

\002\015\002\003\345\300\150\357\143\032\234\162\220\120\122

END

CKA_VALUE MULTILINE_OCTAL

\060\202\002\011\060\202\001\216\240\003\002\001\002\002\015\002
\003\345\300\150\357\143\032\234\162\220\120\122\060\012\006\010
\052\206\110\316\075\004\003\003\060\107\061\013\060\011\006\003
\125\004\006\023\002\125\123\061\042\060\040\006\003\125\004\012
\023\031\107\157\157\147\154\145\040\124\162\165\163\164\040\123
\145\162\166\151\143\145\163\040\114\114\103\061\024\060\022\006
\003\125\004\003\023\013\107\124\123\040\122\157\157\164\040\122
\064\060\036\027\015\061\066\060\066\062\062\060\060\060\060\060
\060\132\027\015\063\066\060\066\062\062\060\060\060\060\060\060
\132\060\107\061\013\060\011\006\003\125\004\006\023\002\125\123
\061\042\060\040\006\003\125\004\012\023\031\107\157\157\147\154
\145\040\124\162\165\163\164\040\123\145\162\166\151\143\145\163
\040\114\114\103\061\024\060\022\006\003\125\004\003\023\013\107
\124\123\040\122\157\157\164\040\122\064\060\166\060\020\006\007
\052\206\110\316\075\002\001\006\005\053\201\004\000\042\003\142
\000\004\363\164\163\247\150\213\140\256\103\270\065\305\201\060
\173\113\111\235\373\301\141\316\346\336\106\275\153\325\141\030
\065\256\100\335\163\367\211\221\060\132\353\074\356\205\174\242
\100\166\073\251\306\270\107\330\052\347\222\221\152\163\351\261
\162\071\237\051\237\242\230\323\137\136\130\206\145\017\241\204
\145\006\321\334\213\311\307\163\310\214\152\057\345\304\253\321
\035\212\243\102\060\100\060\016\006\003\125\035\017\001\001\377
\004\004\003\002\001\206\060\017\006\003\125\035\023\001\001\377
\004\005\060\003\001\001\377\060\035\006\003\125\035\016\004\026
\004\024\200\114\326\353\164\377\111\066\243\325\330\374\265\076
\305\152\360\224\035\214\060\012\006\010\052\206\110\316\075\004
\003\003\003\151\000\060\146\002\061\000\350\100\377\203\336\003
\364\237\256\035\172\247\056\271\257\117\366\203\035\016\055\205
\001\035\321\331\152\354\017\302\257\307\136\126\136\134\325\034
\130\042\050\013\367\060\266\057\261\174\002\061\000\360\141\074

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\247\364\240\202\343\041\325\204\035\163\206\234\055\257\312\064
\233\361\237\271\043\066\342\274\140\003\235\200\263\232\126\310
\341\342\273\024\171\312\315\041\324\224\265\111\103
END
CKA_NSS_MOZILLA_CA_POLICY
CK_BBOOL CK_TRUE
CKA_NSS_SERVER_DISTRUST_AFTER CK_BBOOL CK_FALSE
CKA_NSS_EMAIL_DISTRUST_AFTER CK_BBOOL CK_FALSE

# Trust for "GTS Root R4"
# Issuer: CN=GTS Root R4,O=Google Trust Services LLC,C=US
# Serial Number:02:03:e5:c0:68:ef:63:1a:9c:72:90:50:52
# Subject: CN=GTS Root R4,O=Google Trust Services LLC,C=US
# Not Valid Before: Wed Jun 22 00:00:00 2016
# Not Valid After : Sun Jun 22 00:00:00 2036
# Fingerprint (SHA-256):
34:9D:FA:40:58:C5:E2:63:12:3B:39:8A:E7:95:57:3C:4E:13:13:C8:3F:E6:8F:93:55:6C:D5:E8:03:1B:3C:7D
# Fingerprint (SHA1): 77:D3:03:67:B5:E0:0C:15:F6:0C:38:61:DF:7C:E1:3B:92:46:4D:47
CKA_CLASS CK_OBJECT_CLASS CKO_NSS_TRUST
CKA_TOKEN CK_BBOOL CK_TRUE
CKA_PRIVATE CK_BBOOL CK_FALSE
CKA_MODIFIABLE CK_BBOOL
CK_FALSE
CKA_LABEL UTF8 "GTS Root R4"
CKA_CERT_SHA1_HASH MULTILINE_OCTAL
\167\323\003\147\265\340\014\025\366\014\070\141\337\174\341\073
\222\106\115\107
END
CKA_CERT_MD5_HASH MULTILINE_OCTAL
\103\226\203\167\031\115\166\263\235\145\122\344\035\042\245\350
END
CKA_ISSUER MULTILINE_OCTAL
\060\107\061\013\060\011\006\003\125\004\006\023\002\125\123\061
\042\060\040\006\003\125\004\012\023\031\107\157\157\147\154\145
\040\124\162\165\163\164\040\123\145\162\166\151\143\145\163\040
\114\114\103\061\024\060\022\006\003\125\004\003\023\013\107\124
\123\040\122\157\157\164\040\122\064
END
CKA_SERIAL_NUMBER MULTILINE_OCTAL
\002\015\002\003\345\300\150\357\143\032\234\162\220\120\122
END
CKA_TRUST_SERVER_AUTH CK_TRUST CKT_NSS_TRUSTED_DELEGATOR
CKA_TRUST_EMAIL_PROTECTION CK_TRUST CKT_NSS_TRUSTED_DELEGATOR
CKA_TRUST_CODE_SIGNING CK_TRUST CKT_NSS_MUST_VERIFY_TRUST
CKA_TRUST_STEP_UP_APPROVED CK_BBOOL CK_FALSE

#
# Certificate "Telia Root CA v2"
```



```

#
# Issuer: CN=Telia Root CA v2,O=Telia Finland
# Oyj,C=FI
# Serial Number:01:67:5f:27:d6:fe:7a:e3:e4:ac:be:09:5b:05:9e
# Subject: CN=Telia Root CA v2,O=Telia Finland Oyj,C=FI
# Not Valid Before: Thu Nov 29 11:55:54 2018
# Not Valid After : Sun Nov 29 11:55:54 2043
# Fingerprint (SHA-256):
24:2B:69:74:2F:CB:1E:5B:2A:BF:98:89:8B:94:57:21:87:54:4E:5B:4D:99:11:78:65:73:62:1F:6A:74:B8:2C
# Fingerprint (SHA1): B9:99:CD:D1:73:50:8A:C4:47:05:08:9C:8C:88:FB:BE:A0:2B:40:CD
CKA_CLASS CK_OBJECT_CLASS CKO_CERTIFICATE
CKA_TOKEN CK_BBOOL CK_TRUE
CKA_PRIVATE CK_BBOOL CK_FALSE
CKA_MODIFIABLE CK_BBOOL CK_FALSE
CKA_LABEL UTF8 "Telia Root CA v2"
CKA_CERTIFICATE_TYPE CK_CERTIFICATE_TYPE CKC_X_509
CKA_SUBJECT MULTILINE_OCTAL
\060\104\061\013\060\011\006\003\125\004\006\023\002\106\111\061
\032\060\030\006\003\125\004\012\014\021\124\145\154\151\141\040
\106\151\156\154\141\156\144\040\117\171\152\061\031\060\027\006
\003\125\004\003\014\020\124\145\154\151\141\040\122\157\157\164
\040\103\101\040\166\062
END
CKA_ID UTF8 "0"
CKA_ISSUER MULTILINE_OCTAL
\060\104\061\013\060\011\006\003\125\004\006\023\002\106\111\061
\032\060\030\006\003\125\004\012\014\021\124\145\154\151\141\040
\106\151\156\154\141\156\144\040\117\171\152\061\031\060\027\006
\003\125\004\003\014\020\124\145\154\151\141\040\122\157\157\164
\040\103\101\040\166\062
END
CKA_SERIAL_NUMBER
MULTILINE_OCTAL
\002\017\001\147\137\047\326\376\172\343\344\254\276\011\133\005
\236
END
CKA_VALUE MULTILINE_OCTAL
\060\202\005\164\060\202\003\134\240\003\002\001\002\002\017\001
\147\137\047\326\376\172\343\344\254\276\011\133\005\236\060\015
\006\011\052\206\110\206\367\015\001\001\013\005\000\060\104\061
\013\060\011\006\003\125\004\006\023\002\106\111\061\032\060\030
\006\003\125\004\012\014\021\124\145\154\151\141\040\106\151\156
\154\141\156\144\040\117\171\152\061\031\060\027\006\003\125\004
\003\014\020\124\145\154\151\141\040\122\157\157\164\040\103\101
\040\166\062\060\036\027\015\061\070\061\061\062\071\061\061\065
\065\065\064\132\027\015\064\063\061\061\062\071\061\061\065\065
\065\064\132\060\104\061\013\060\011\006\003\125\004\006\023\002
\106\111\061\032\060\030\006\003\125\004\012\014\021\124\145\154

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\151\141\040\106\151\156\154\141\156\144\040\117\171\152\061\031
\060\027\006\003\125\004\003\014\020\124\145\154\151\141\040\122
\157\157\164\040\103\101\040\166\062\060\202\002\042\060\015\006
\011\052\206\110\206\367\015\001\001\001\005\000\003\202\002\017
\000\060\202\002\012\002\202\002\001\000\262\320\077\007\274\342
\173\320\153\231\370\342\167\151\347\316\235\244\003\274\202\155
\241\376\201\145\037\114\047\254\216\000\272\026\173\353\060\152
\000\300\263\164\150\176\262\257\307\325\142\263\172\077\120\312
\214\066\104\044\143\322\066\351\014\205\366\103\166\325\114\241
\140\162\147\342\050\063\245\313\061\270\072\042\043\064\270\175
\275\126\042\100\235\352\364\173\003\255\150\374\262\201\117\230
\320\164\352\215\345\175\315\143\303\243\366\336\222\302\130\031
\340\226\273\305\304\251\075\245\164\226\376\257\371\211\252\275
\225\027\124\330\170\104\361\014\167\025\222\340\230\102\247\244
\326\252\040\222\315\301\240\263\226\262\072\204\102\215\175\325
\225\344\326\333\351\142\304\130\263\171\305\214\323\065\063\203
\237\165\241\122\047\141\070\361\131\075\216\120\340\275\171\074
\347\154\226\376\136\331\002\145\264\216\134\320\021\064\337\135
\277\122\247\201\000\303\177\231\105\231\025\325\027\310\012\123
\354\143\363\231\175\314\151\022\206\302\027\360\001\236\277\204
\274\321\122\313\033\222\146\316\244\123\345\241\277\304\333\011
\326\346\211\126\053\310\343\174\336\343\377\211\345\065\156\050
\350\154\013\043\121\251\045\005\353\110\370\335\261\312\372\154
\010\121\357\267\030\154\104\312\046\341\163\306\211\006\201\345
\212\254\260\342\051\306\271\044\263\153\104\021\364\245\103\302
\114\103\345\160\066\214\266\063\127\172\225\056\202\240\364\134
\020\263\141\203\366\002\005\206\056\174\055\154\334\003\106\156
\065\223\325\172\225\057\336\040\330\133\176\224\220\004\152\272
\131\075\004\005\165\235\067\242\016\056\075\353\301\244\122\203
\376\320\153\324\146\216\334\306\351\022\116\035\052\127\252\020
\274\174\136\202\175\246\246\311\362\055\271\365\027\047\255\321
\016\211\124\053\225\372\300\255\035\230\024\170\063\102\206\012
\251\163\265\373\164\015\267\033\060\031\304\132\016\034\047\267
\332\030\320\377\212\310\005\272\361\252\034\242\067\267\346\110
\244\106\054\224\352\250\166\142\107\213\020\123\007\110\127\154
\342\222\115\266\256\005\313\334\301\112\136\217\254\075\031\116
\302\355\140\165\053\333\301\312\102\325\002\003\001\000\001\243
\143\060\141\060\037\006\003\125\035\043\004\030\060\026\200\024
\162\254\344\063\171\252\105\207\366\375\254\035\236\326\307\057
\206\330\044\071\060\035\006\003\125\035\016\004\026\004\024\162
\254\344\063\171\252\105\207\366\375\254\035\236\326\307\057\206
\330\044\071\060\016\006\003\125\035\017\001\001\377\004\004\003
\002\001\006\060\017\006\003\125\035\023\001\001\377\004\005\060
\003\001\001\377\060\015\006\011\052\206\110\206\367\015\001\001
\013\005\000\003\202\002\001\000\240\073\131\247\011\224\076\066
\204\322\176\057\071\245\226\227\372\021\255\374\147\363\161\011
\362\262\211\204\147\104\257\271\357\355\226\354\234\144\333\062
\060\157\147\232\254\176\137\262\253\001\066\176\201\372\344\204

\136\322\254\066\340\153\142\305\175\113\016\202\155\322\166\142
\321\376\227\370\237\060\174\030\371\264\122\167\202\035\166\333
\323\035\251\360\301\232\000\275\155\165\330\175\347\372\307\070
\243\234\160\350\106\171\003\257\056\164\333\165\370\156\123\014
\003\310\231\032\211\065\031\074\323\311\124\174\250\360\054\346
\156\007\171\157\152\341\346\352\221\202\151\012\035\303\176\131
\242\236\153\106\025\230\133\323\257\106\035\142\310\316\200\122
\111\021\077\311\004\022\303\023\174\077\073\212\226\333\074\240
\036\012\264\213\124\262\044\147\015\357\202\313\276\074\175\321
\342\177\256\026\326\126\130\271\332\040\261\203\025\241\357\212
\115\062\157\101\057\023\122\202\224\327\032\301\170\242\121\335
\053\160\155\267\032\371\367\260\340\147\227\126\333\174\141\123
\011\003\050\002\100\307\263\330\375\234\160\152\306\050\303\205
\351\342\355\032\223\240\336\113\230\242\204\076\005\167\001\226
\075\373\264\040\017\234\162\002\172\022\057\325\243\272\121\170
\257\052\053\104\145\116\265\375\012\350\301\315\171\207\141\053
\336\200\127\105\277\147\361\233\221\136\245\244\354\131\110\020
\015\070\307\260\372\303\104\155\004\365\170\120\034\222\226\133
\332\365\270\056\272\133\317\345\360\152\235\113\057\130\163\055
\117\055\304\034\076\364\263\077\253\025\016\073\031\101\212\244
\301\127\022\146\161\114\372\123\343\127\353\142\225\011\236\124
\335\321\302\074\127\074\275\070\255\230\144\267\270\003\232\123
\126\140\135\263\330\102\033\134\113\022\212\034\353\353\175\306
\172\151\307\047\177\244\370\213\362\344\224\146\207\113\351\224
\007\011\022\171\212\262\353\164\004\334\316\364\104\131\340\026
\312\305\054\130\327\074\173\317\142\206\152\120\175\065\066\146
\247\373\067\347\050\307\330\320\255\245\151\224\217\350\301\337
\044\370\033\007\061\207\201\330\135\366\350\050\330\112\122\200
\254\023\356\120\024\036\230\307

END

CKA_NSS_Mozilla_CA_POLICY

CK_BBOOL CK_TRUE

CKA_NSS_SERVER_DISTRUST_AFTER CK_BBOOL CK_FALSE

CKA_NSS_EMAIL_DISTRUST_AFTER CK_BBOOL CK_FALSE

Trust for "Telia Root CA v2"

Issuer: CN=Telia Root CA v2,O=Telia Finland Oyj,C=FI

Serial Number:01:67:5f:27:d6:fe:7a:e3:e4:ac:be:09:5b:05:9e

Subject: CN=Telia Root CA v2,O=Telia Finland Oyj,C=FI

Not Valid Before: Thu Nov 29 11:55:54 2018

Not Valid After : Sun Nov 29 11:55:54 2043

Fingerprint (SHA-256):

24:2B:69:74:2F:CB:1E:5B:2A:BF:98:89:8B:94:57:21:87:54:4E:5B:4D:99:11:78:65:73:62:1F:6A:74:B8:2C

Fingerprint (SHA1): B9:99:CD:D1:73:50:8A:C4:47:05:08:9C:8C:88:FB:BE:A0:2B:40:CD

CKA_CLASS CK_OBJECT_CLASS CKO_NSS_TRUST

CKA_TOKEN CK_BBOOL CK_TRUE

CKA_PRIVATE CK_BBOOL CK_FALSE

CKA_MODIFIABLE CK_BBOOL CK_FALSE

```

CKA_LABEL UTF8 "Telia Root CA v2"
CKA_CERT_SHA1_HASH MULTILINE_OCTAL
\271\231\315\321\163\120\212\304\107\005\010\234\214\210\373\276
\240\053\100\315
END
CKA_CERT_MD5_HASH
MULTILINE_OCTAL
\016\217\254\252\202\337\205\261\364\334\020\034\374\231\331\110
END
CKA_ISSUER MULTILINE_OCTAL
\060\104\061\013\060\011\006\003\125\004\006\023\002\106\111\061
\032\060\030\006\003\125\004\012\014\021\124\145\154\151\141\040
\106\151\156\154\141\156\144\040\117\171\152\061\031\060\027\006
\003\125\004\003\014\020\124\145\154\151\141\040\122\157\157\164
\040\103\101\040\166\062
END
CKA_SERIAL_NUMBER MULTILINE_OCTAL
\002\017\001\147\137\047\326\376\172\343\344\254\276\011\133\005
\236
END
CKA_TRUST_SERVER_AUTH CK_TRUST CKT_NSS_TRUSTED_DELEGATOR
CKA_TRUST_EMAIL_PROTECTION CK_TRUST CKT_NSS_TRUSTED_DELEGATOR
CKA_TRUST_CODE_SIGNING CK_TRUST CKT_NSS_MUST_VERIFY_TRUST
CKA_TRUST_STEP_UP_APPROVED CK_BBOOL CK_FALSE

#
# Certificate "D-TRUST BR Root CA 1 2020"
#
# Issuer: CN=D-TRUST BR Root CA 1 2020,O=D-Trust GmbH,C=DE
# Serial Number:7c:c9:8f:2b:84:d7:df:ea:0f:c9:65:9a:d3:4b:4d:96
# Subject: CN=D-TRUST BR Root CA 1 2020,O=D-Trust
GmbH,C=DE
# Not Valid Before: Tue Feb 11 09:45:00 2020
# Not Valid After : Sun Feb 11 09:44:59 2035
# Fingerprint (SHA-256):
E5:9A:AA:81:60:09:C2:2B:FF:5B:25:BA:D3:7D:F3:06:F0:49:79:7C:1F:81:D8:5A:B0:89:E6:57:BD:8F:00:44
# Fingerprint (SHA1): 1F:5B:98:F0:E3:B5:F7:74:3C:ED:E6:B0:36:7D:32:CD:F4:09:41:67
CKA_CLASS CK_OBJECT_CLASS CKO_CERTIFICATE
CKA_TOKEN CK_BBOOL CK_TRUE
CKA_PRIVATE CK_BBOOL CK_FALSE
CKA_MODIFIABLE CK_BBOOL CK_FALSE
CKA_LABEL UTF8 "D-TRUST BR Root CA 1 2020"
CKA_CERTIFICATE_TYPE CK_CERTIFICATE_TYPE CKC_X_509
CKA_SUBJECT MULTILINE_OCTAL
\060\110\061\013\060\011\006\003\125\004\006\023\002\104\105\061
\025\060\023\006\003\125\004\012\023\014\104\055\124\162\165\163
\164\040\107\155\142\110\061\042\060\040\006\003\125\004\003\023
\031\104\055\124\122\125\123\124\040\102\122\040\122\157\157\164

```

\040\103\101\040\061\040\062\060\062\060
END
CKA_ID UTF8 "0"
CKA_ISSUER MULTILINE_OCTAL
\060\110\061\013\060\011\006\003\125\004\006\023\002\104\105\061
\025\060\023\006\003\125\004\012\023\014\104\055\124\162\165\163
\164\040\107\155\142\110\061\042\060\040\006\003\125\004\003\023
\031\104\055\124\122\125\123\124\040\102\122\040\122\157\157\164
\040\103\101\040\061\040\062\060\062\060
END
CKA_SERIAL_NUMBER
MULTILINE_OCTAL
\002\020\174\311\217\053\204\327\337\352\017\311\145\232\323\113
\115\226
END
CKA_VALUE MULTILINE_OCTAL
\060\202\002\333\060\202\002\140\240\003\002\001\002\002\020\174
\311\217\053\204\327\337\352\017\311\145\232\323\113\115\226\060
\012\006\010\052\206\110\316\075\004\003\003\060\110\061\013\060
\011\006\003\125\004\006\023\002\104\105\061\025\060\023\006\003
\125\004\012\023\014\104\055\124\162\165\163\164\040\107\155\142
\110\061\042\060\040\006\003\125\004\003\023\031\104\055\124\122
\125\123\124\040\102\122\040\122\157\157\164\040\103\101\040\061
\040\062\060\062\060\060\036\027\015\062\060\060\062\061\061\060
\071\064\065\060\060\132\027\015\063\065\060\062\061\061\060\071
\064\064\065\071\132\060\110\061\013\060\011\006\003\125\004\006
\023\002\104\105\061\025\060\023\006\003\125\004\012\023\014\104
\055\124\162\165\163\164\040\107\155\142\110\061\042\060\040\006
\003\125\004\003\023\031\104\055\124\122\125\123\124\040\102\122
\040\122\157\157\164\040\103\101\040\061\040\062\060\062\060\060
\166\060\020\006\007\052\206\110\316\075\002\001\006\005\053\201
\004\000\042\003\142\000\004\306\313\307\050\321\373\204\365\232
\357\102\024\040\341\103\153\156\165\255\374\053\003\204\324\166
\223\045\327\131\073\101\145\153\036\346\064\052\273\164\366\022
\316\350\155\347\253\344\074\116\077\104\010\213\315\026\161\313
\277\222\231\364\244\327\074\120\124\122\220\205\203\170\224\147
\147\243\034\011\031\075\165\064\205\336\355\140\175\307\014\264
\101\122\271\156\345\356\102\243\202\001\015\060\202\001\011\060
\017\006\003\125\035\023\001\001\377\004\005\060\003\001\001\377
\060\035\006\003\125\035\016\004\026\004\024\163\221\020\253\377
\125\263\132\174\011\045\325\262\272\010\240\153\253\037\155\060
\016\006\003\125\035\017\001\001\377\004\004\003\002\001\006\060
\201\306\006\003\125\035\037\004\201\276\060\201\273\060\076\240
\074\240\072\206\070\150\164\164\160\072\057\057\143\162\154\056
\144\055\164\162\165\163\164\056\156\145\164\057\143\162\154\057
\144\055\164\162\165\163\164\137\142\162\137\162\157\157\164\137
\143\141\137\061\137\062\060\062\060\056\143\162\154\060\171\240
\167\240\165\206\163\154\144\141\160\072\057\057\144\151\162\145

\143\164\157\162\171\056\144\055\164\162\165\163\164\056\156\145
\164\057\103\116\075\104\055\124\122\125\123\124\045\062\060\102
\122\045\062\060\122\157\157\164\045\062\060\103\101\045\062\060
\061\045\062\060\062\060\062\060\054\117\075\104\055\124\162\165
\163\164\045\062\060\107\155\142\110\054\103\075\104\105\077\143
\145\162\164\151\146\151\143\141\164\145\162\145\166\157\143\141
\164\151\157\156\154\151\163\164\060\012\006\010\052\206\110\316
\075\004\003\003\003\151\000\060\146\002\061\000\224\220\055\023
\372\341\143\370\141\143\350\255\205\170\124\221\234\270\223\070
\076\032\101\332\100\026\123\102\010\312\057\216\361\076\201\126
\300\252\330\355\030\304\260\256\364\076\372\046\002\061\000\363
\050\342\306\333\053\231\373\267\121\270\044\243\244\224\172\032
\077\346\066\342\003\127\063\212\060\313\202\307\326\024\021\325
\165\143\133\024\225\234\037\001\317\330\325\162\247\017\073

END

CKA_NSS_Mozilla_CA_POLICY

CK_BBOOL CK_TRUE

CKA_NSS_SERVER_DISTRUST_AFTER CK_BBOOL CK_FALSE

CKA_NSS_EMAIL_DISTRUST_AFTER CK_BBOOL CK_FALSE

Trust for "D-TRUST BR Root CA 1 2020"

Issuer: CN=D-TRUST BR Root CA 1 2020,O=D-Trust GmbH,C=DE

Serial Number:7c:c9:8f:2b:84:d7:df:ea:0f:c9:65:9a:d3:4b:4d:96

Subject: CN=D-TRUST BR Root CA 1 2020,O=D-Trust GmbH,C=DE

Not Valid Before: Tue Feb 11 09:45:00 2020

Not Valid After : Sun Feb 11 09:44:59 2035

Fingerprint (SHA-256):

E5:9A:AA:81:60:09:C2:2B:FF:5B:25:BA:D3:7D:F3:06:F0:49:79:7C:1F:81:D8:5A:B0:89:E6:57:BD:8F:00:44

Fingerprint (SHA1): 1F:5B:98:F0:E3:B5:F7:74:3C:ED:E6:B0:36:7D:32:CD:F4:09:41:67

CKA_CLASS

CK_OBJECT_CLASS CKO_NSS_TRUST

CKA_TOKEN CK_BBOOL CK_TRUE

CKA_PRIVATE CK_BBOOL CK_FALSE

CKA_MODIFIABLE CK_BBOOL CK_FALSE

CKA_LABEL UTF8 "D-TRUST BR Root CA 1 2020"

CKA_CERT_SHA1_HASH MULTILINE_OCTAL

\037\133\230\360\343\265\367\164\074\355\346\260\066\175\062\315
\364\011\101\147

END

CKA_CERT_MD5_HASH MULTILINE_OCTAL

\265\252\113\325\355\367\343\125\056\217\162\012\363\165\270\355

END

CKA_ISSUER MULTILINE_OCTAL

\060\110\061\013\060\011\006\003\125\004\006\023\002\104\105\061
\025\060\023\006\003\125\004\012\023\014\104\055\124\162\165\163
\164\040\107\155\142\110\061\042\060\040\006\003\125\004\003\023
\031\104\055\124\122\125\123\124\040\102\122\040\122\157\157\164
\040\103\101\040\061\040\062\060\062\060

```

END
CKA_SERIAL_NUMBER MULTILINE_OCTAL
\002\020\174\311\217\053\204\327\337\352\017\311\145\232\323\113
\115\226
END
CKA_TRUST_SERVER_AUTH CK_TRUST CKT_NSS_TRUSTED_DELEGATOR
CKA_TRUST_EMAIL_PROTECTION CK_TRUST CKT_NSS_MUST_VERIFY_TRUST
CKA_TRUST_CODE_SIGNING CK_TRUST CKT_NSS_MUST_VERIFY_TRUST
CKA_TRUST_STEP_UP_APPROVED
CK_BBOOL CK_FALSE

#
# Certificate "D-TRUST EV Root CA 1 2020"
#
# Issuer: CN=D-TRUST EV Root CA 1 2020,O=D-Trust GmbH,C=DE
# Serial Number:5f:02:41:d7:7a:87:7c:4c:03:a3:ac:96:8d:fb:ff:d0
# Subject: CN=D-TRUST EV Root CA 1 2020,O=D-Trust GmbH,C=DE
# Not Valid Before: Tue Feb 11 10:00:00 2020
# Not Valid After : Sun Feb 11 09:59:59 2035
# Fingerprint (SHA-256):
08:17:0D:1A:A3:64:53:90:1A:2F:95:92:45:E3:47:DB:0C:8D:37:AB:AA:BC:56:B8:1A:A1:00:DC:95:89:70:DB
# Fingerprint (SHA1): 61:DB:8C:21:59:69:03:90:D8:7C:9C:12:86:54:CF:9D:3D:F4:DD:07
CKA_CLASS CK_OBJECT_CLASS CKO_CERTIFICATE
CKA_TOKEN CK_BBOOL CK_TRUE
CKA_PRIVATE CK_BBOOL CK_FALSE
CKA_MODIFIABLE CK_BBOOL CK_FALSE
CKA_LABEL UTF8 "D-TRUST EV Root CA 1 2020"
CKA_CERTIFICATE_TYPE CK_CERTIFICATE_TYPE CKC_X_509
CKA_SUBJECT MULTILINE_OCTAL
\060\110\061\013\060\011\006\003\125\004\006\023\002\104\105\061
\025\060\023\006\003\125\004\012\023\014\104\055\124\162\165\163
\164\040\107\155\142\110\061\042\060\040\006\003\125\004\003\023
\031\104\055\124\122\125\123\124\040\105\126\040\122\157\157\164
\040\103\101\040\061\040\062\060\062\060
END
CKA_ID
UTF8 "0"
CKA_ISSUER MULTILINE_OCTAL
\060\110\061\013\060\011\006\003\125\004\006\023\002\104\105\061
\025\060\023\006\003\125\004\012\023\014\104\055\124\162\165\163
\164\040\107\155\142\110\061\042\060\040\006\003\125\004\003\023
\031\104\055\124\122\125\123\124\040\105\126\040\122\157\157\164
\040\103\101\040\061\040\062\060\062\060
END
CKA_SERIAL_NUMBER MULTILINE_OCTAL
\002\020\137\002\101\327\172\207\174\114\003\243\254\226\215\373
\377\320
END

```

CKA_VALUE MULTILINE_OCTAL

\060\202\002\333\060\202\002\140\240\003\002\001\002\002\020\137
\002\101\327\172\207\174\114\003\243\254\226\215\373\377\320\060
\012\006\010\052\206\110\316\075\004\003\003\060\110\061\013\060
\011\006\003\125\004\006\023\002\104\105\061\025\060\023\006\003
\125\004\012\023\014\104\055\124\162\165\163\164\040\107\155\142
\110\061\042\060\040\006\003\125\004\003\023\031\104\055\124\122
\125\123\124\040\105\126\040\122\157\157\164\040\103\101\040\061
\040\062\060\062\060\060\036\027\015\062\060\060\062\061\061\061
\060\060\060\060\060\132\027\015\063\065\060\062\061\061\060\071
\065\071\065\071\132\060\110\061\013\060\011\006\003\125\004\006
\023\002\104\105\061\025\060\023\006\003\125\004\012\023\014\104
\055\124\162\165\163\164\040\107\155\142\110\061\042\060\040\006
\003\125\004\003\023\031\104\055\124\122\125\123\124\040\105\126
\040\122\157\157\164\040\103\101\040\061\040\062\060\062\060\060
\166\060\020\006\007\052\206\110\316\075\002\001\006\005\053\201
\004\000\042\003\142\000\004\361\013\335\206\103\040\031\337\227
\205\350\042\112\233\317\235\230\277\264\005\046\311\313\343\246
\322\217\305\236\170\173\061\211\251\211\255\047\074\145\020\202
\374\337\303\235\116\360\063\043\304\322\062\365\034\260\337\063
\027\135\305\360\261\212\371\357\271\267\024\312\051\112\302\017
\251\177\165\145\111\052\060\147\364\144\367\326\032\167\332\303
\302\227\141\102\173\111\255\243\202\001\015\060\202\001\011\060
\017\006\003\125\035\023\001\001\377\004\005\060\003\001\001\377
\060\035\006\003\125\035\016\004\026\004\024\177\020\001\026\067
\072\244\050\344\120\370\244\367\354\153\062\266\376\351\213\060
\016\006\003\125\035\017\001\001\377\004\004\003\002\001\006\060
\201\306\006\003\125\035\037\004\201\276\060\201\273\060\076\240
\074\240\072\206\070\150\164\164\160\072\057\057\143\162\154\056
\144\055\164\162\165\163\164\056\156\145\164\057\143\162\154\057
\144\055\164\162\165\163\164\137\145\166\137\162\157\157\164\137
\143\141\137\061\137\062\060\062\060\056\143\162\154\060\171\240
\167\240\165\206\163\154\144\141\160\072\057\057\144\151\162\145
\143\164\157\162\171\056\144\055\164\162\165\163\164\056\156\145
\164\057\103\116\075\104\055\124\122\125\123\124\045\062\060\105
\126\045\062\060\122\157\157\164\045\062\060\103\101\045\062\060
\061\045\062\060\062\060\062\060\054\117\075\104\055\124\162\165
\163\164\045\062\060\107\155\142\110\054\103\075\104\105\077\143
\145\162\164\151\146\151\143\141\164\145\162\145\166\157\143\141
\164\151\157\156\154\151\163\164\060\012\006\010\052\206\110\316
\075\004\003\003\003\151\000\060\146\002\061\000\312\074\306\052
\165\302\136\165\142\071\066\000\140\132\213\301\223\231\314\331
\333\101\073\073\207\231\027\073\325\314\117\312\042\367\240\200
\313\371\264\261\033\126\365\162\322\374\031\321\002\061\000\221
\367\060\223\077\020\106\053\161\244\320\073\104\233\300\051\002
\005\262\101\167\121\363\171\132\236\216\024\240\116\102\322\133
\201\363\064\152\003\347\042\070\120\133\355\031\117\103\026

END


```

CKA_NSS_Mozilla_CA_POLICY
CK_BBOOL CK_TRUE
CKA_NSS_SERVER_DISTRUST_AFTER CK_BBOOL CK_FALSE
CKA_NSS_EMAIL_DISTRUST_AFTER CK_BBOOL CK_FALSE

# Trust for "D-TRUST EV Root CA 1 2020"
# Issuer: CN=D-TRUST EV Root CA 1 2020,O=D-Trust GmbH,C=DE
# Serial Number:5f:02:41:d7:7a:87:7c:4c:03:a3:ac:96:8d:fb:ff:d0
# Subject: CN=D-TRUST EV Root CA 1 2020,O=D-Trust GmbH,C=DE
# Not Valid Before: Tue
Feb 11 10:00:00 2020
# Not Valid After : Sun Feb 11 09:59:59 2035
# Fingerprint (SHA-256):
08:17:0D:1A:A3:64:53:90:1A:2F:95:92:45:E3:47:DB:0C:8D:37:AB:AA:BC:56:B8:1A:A1:00:DC:95:89:70:DB
# Fingerprint (SHA1): 61:DB:8C:21:59:69:03:90:D8:7C:9C:12:86:54:CF:9D:3D:F4:DD:07
CKA_CLASS CK_OBJECT_CLASS CKO_NSS_TRUST
CKA_TOKEN CK_BBOOL CK_TRUE
CKA_PRIVATE CK_BBOOL CK_FALSE
CKA_MODIFIABLE CK_BBOOL CK_FALSE
CKA_LABEL UTF8 "D-TRUST EV Root CA 1 2020"
CKA_CERT_SHA1_HASH MULTILINE_OCTAL
\141\333\214\041\131\151\003\220\330\174\234\022\206\124\317\235
\075\364\335\007
END
CKA_CERT_MD5_HASH MULTILINE_OCTAL
\214\055\235\160\237\110\231\021\006\021\373\351\313\060\300\156
END
CKA_ISSUER MULTILINE_OCTAL
\060\110\061\013\060\011\006\003\125\004\006\023\002\104\105\061
\025\060\023\006\003\125\004\012\023\014\104\055\124\162\165\163
\164\040\107\155\142\110\061\042\060\040\006\003\125\004\003\023
\031\104\055\124\122\125\123\124\040\105\126\040\122\157\157\164
\040\103\101\040\061\040\062\060\062\060
END
CKA_SERIAL_NUMBER
MULTILINE_OCTAL
\002\020\137\002\101\327\172\207\174\114\003\243\254\226\215\373
\377\320
END
CKA_TRUST_SERVER_AUTH CK_TRUST CKT_NSS_TRUSTED_DELEGATOR
CKA_TRUST_EMAIL_PROTECTION CK_TRUST CKT_NSS_MUST_VERIFY_TRUST
CKA_TRUST_CODE_SIGNING CK_TRUST CKT_NSS_MUST_VERIFY_TRUST
CKA_TRUST_STEP_UP_APPROVED CK_BBOOL CK_FALSE

#
# Certificate "DigiCert TLS ECC P384 Root G5"
#
# Issuer: CN=DigiCert TLS ECC P384 Root G5,O="DigiCert, Inc.",C=US

```

```
# Serial Number:09:e0:93:65:ac:f7:d9:c8:b9:3e:1c:0b:04:2a:2e:f3
# Subject: CN=DigiCert TLS ECC P384 Root G5,O="DigiCert, Inc.",C=US
# Not Valid Before: Fri Jan 15 00:00:00 2021
# Not Valid After : Sun Jan 14 23:59:59 2046
# Fingerprint (SHA-256):
01:8E:13:F0:77:25:32:CF:80:9B:D1:B1:72:81:86:72:83:FC:48:C6:E1:3B:E9:C6:98:12:85:4A:49:0C:1B:05
# Fingerprint (SHA1): 17:F3:DE:5E:9F:0F:19:E9:8E:F6:1F:32:26:6E:20:C4:07:AE:30:EE
CKA_CLASS CK_OBJECT_CLASS CKO_CERTIFICATE
CKA_TOKEN CK_BBOOL CK_TRUE
CKA_PRIVATE CK_BBOOL CK_FALSE
CKA_MODIFIABLE CK_BBOOL
CK_FALSE
CKA_LABEL UTF8 "DigiCert TLS ECC P384 Root G5"
CKA_CERTIFICATE_TYPE CK_CERTIFICATE_TYPE CKC_X_509
CKA_SUBJECT MULTILINE_OCTAL
\060\116\061\013\060\011\006\003\125\004\006\023\002\125\123\061
\027\060\025\006\003\125\004\012\023\016\104\151\147\151\103\145
\162\164\054\040\111\156\143\056\061\046\060\044\006\003\125\004
\003\023\035\104\151\147\151\103\145\162\164\040\124\114\123\040
\105\103\103\040\120\063\070\064\040\122\157\157\164\040\107\065
END
CKA_ID UTF8 "0"
CKA_ISSUER MULTILINE_OCTAL
\060\116\061\013\060\011\006\003\125\004\006\023\002\125\123\061
\027\060\025\006\003\125\004\012\023\016\104\151\147\151\103\145
\162\164\054\040\111\156\143\056\061\046\060\044\006\003\125\004
\003\023\035\104\151\147\151\103\145\162\164\040\124\114\123\040
\105\103\103\040\120\063\070\064\040\122\157\157\164\040\107\065
END
CKA_SERIAL_NUMBER MULTILINE_OCTAL
\002\020\011\340\223\145\254\367\331\310\271\076\034\013\004\052
\056\363
END
CKA_VALUE MULTILINE_OCTAL
\060\202\002\031\060\202\001\237\240\003\002\001\002\002\020\011
\340\223\145\254\367\331\310\271\076\034\013\004\052\056\363\060
\012\006\010\052\206\110\316\075\004\003\003\060\116\061\013\060
\011\006\003\125\004\006\023\002\125\123\061\027\060\025\006\003
\125\004\012\023\016\104\151\147\151\103\145\162\164\054\040\111
\156\143\056\061\046\060\044\006\003\125\004\003\023\035\104\151
\147\151\103\145\162\164\040\124\114\123\040\105\103\103\040\120
\063\070\064\040\122\157\157\164\040\107\065\060\036\027\015\062
\061\060\061\061\065\060\060\060\060\060\060\132\027\015\064\066
\060\061\061\064\062\063\065\071\065\071\132\060\116\061\013\060
\011\006\003\125\004\006\023\002\125\123\061\027\060\025\006\003
\125\004\012\023\016\104\151\147\151\103\145\162\164\054\040\111
\156\143\056\061\046\060\044\006\003\125\004\003\023\035\104\151
\147\151\103\145\162\164\040\124\114\123\040\105\103\103\040\120
```

\063\070\064\040\122\157\157\164\040\107\065\060\166\060\020\006
\007\052\206\110\316\075\002\001\006\005\053\201\004\000\042\003
\142\000\004\301\104\241\317\021\227\120\232\336\043\202\065\007
\315\320\313\030\235\322\361\177\167\065\117\073\335\224\162\122
\355\302\073\370\354\372\173\153\130\040\354\231\256\311\374\150
\263\165\271\333\011\354\310\023\365\116\306\012\035\146\060\114
\273\037\107\012\074\141\020\102\051\174\245\010\016\340\042\351
\323\065\150\316\233\143\237\204\265\231\115\130\240\216\365\124
\347\225\311\243\102\060\100\060\035\006\003\125\035\016\004\026
\004\024\301\121\105\120\131\253\076\347\054\132\372\040\042\022
\007\200\210\174\021\152\060\016\006\003\125\035\017\001\001\377
\004\004\003\002\001\206\060\017\006\003\125\035\023\001\001\377
\004\005\060\003\001\001\377\060\012\006\010\052\206\110\316\075
\004\003\003\003\150\000\060\145\002\061\000\211\152\215\107\347
\354\374\156\125\003\331\147\154\046\116\203\306\375\311\373\053
\023\274\267\172\214\264\145\322\151\151\143\023\143\073\046\120
\056\001\241\171\006\221\235\110\277\302\276\002\060\107\303\025
\173\261\240\221\231\111\223\250\074\174\350\106\006\213\054\362
\061\000\224\235\142\310\211\275\031\204\024\351\245\373\001\270
\015\166\103\214\056\123\313\174\337\014\027\226\120

END

CKA_NSS_MOZILLA_CA_POLICY

CK_BBOOL CK_TRUE

CKA_NSS_SERVER_DISTRUST_AFTER CK_BBOOL CK_FALSE

CKA_NSS_EMAIL_DISTRUST_AFTER CK_BBOOL CK_FALSE

Trust for "DigiCert TLS ECC P384 Root G5"

Issuer: CN=DigiCert TLS ECC P384 Root G5,O="DigiCert, Inc.",C=US

Serial Number:09:e0:93:65:ac:f7:d9:c8:b9:3e:1c:0b:04:2a:2e:f3

Subject: CN=DigiCert TLS ECC P384 Root G5,O="DigiCert, Inc.",C=US

Not Valid Before: Fri Jan 15 00:00:00 2021

Not Valid After : Sun Jan 14 23:59:59 2046

Fingerprint (SHA-256):

01:8E:13:F0:77:25:32:CF:80:9B:D1:B1:72:81:86:72:83:FC:48:C6:E1:3B:E9:C6:98:12:85:4A:49:0C:1B:05

Fingerprint (SHA1): 17:F3:DE:5E:9F:0F:19:E9:8E:F6:1F:32:26:6E:20:C4:07:AE:30:EE

CKA_CLASS CK_OBJECT_CLASS CKO_NSS_TRUST

CKA_TOKEN CK_BBOOL CK_TRUE

CKA_PRIVATE CK_BBOOL CK_FALSE

CKA_MODIFIABLE CK_BBOOL CK_FALSE

CKA_LABEL UTF8 "DigiCert

TLS ECC P384 Root G5"

CKA_CERT_SHA1_HASH MULTILINE_OCTAL

\027\363\336\136\237\017\031\351\216\366\037\062\046\156\040\304
\007\256\060\356

END

CKA_CERT_MD5_HASH MULTILINE_OCTAL

\323\161\004\152\103\034\333\246\131\341\250\243\252\305\161\355
END

CKA_ISSUER MULTILINE_OCTAL

\060\116\061\013\060\011\006\003\125\004\006\023\002\125\123\061
\027\060\025\006\003\125\004\012\023\016\104\151\147\151\103\145
\162\164\054\040\111\156\143\056\061\046\060\044\006\003\125\004
\003\023\035\104\151\147\151\103\145\162\164\040\124\114\123\040
\105\103\103\040\120\063\070\064\040\122\157\157\164\040\107\065

END

CKA_SERIAL_NUMBER MULTILINE_OCTAL

\002\020\011\340\223\145\254\367\331\310\271\076\034\013\004\052
\056\363

END

CKA_TRUST_SERVER_AUTH CK_TRUST CKT_NSS_TRUSTED_DELEGATOR

CKA_TRUST_EMAIL_PROTECTION CK_TRUST CKT_NSS_MUST_VERIFY_TRUST

CKA_TRUST_CODE_SIGNING CK_TRUST CKT_NSS_MUST_VERIFY_TRUST

CKA_TRUST_STEP_UP_APPROVED CK_BBOOL CK_FALSE

#

Certificate "DigiCert TLS RSA4096 Root G5"

#

Issuer:

CN=DigiCert TLS RSA4096 Root G5,O="DigiCert, Inc.",C=US

Serial Number:08:f9:b4:78:a8:fa:7e:da:6a:33:37:89:de:7c:cf:8a

Subject: CN=DigiCert TLS RSA4096 Root G5,O="DigiCert, Inc.",C=US

Not Valid Before: Fri Jan 15 00:00:00 2021

Not Valid After : Sun Jan 14 23:59:59 2046

Fingerprint (SHA-256):

37:1A:00:DC:05:33:B3:72:1A:7E:EB:40:E8:41:9E:70:79:9D:2B:0A:0F:2C:1D:80:69:31:65:F7:CE:C4:AD:75

Fingerprint (SHA1): A7:88:49:DC:5D:7C:75:8C:8C:DE:39:98:56:B3:AA:D0:B2:A5:71:35

CKA_CLASS CK_OBJECT_CLASS CKO_CERTIFICATE

CKA_TOKEN CK_BBOOL CK_TRUE

CKA_PRIVATE CK_BBOOL CK_FALSE

CKA_MODIFIABLE CK_BBOOL CK_FALSE

CKA_LABEL UTF8 "DigiCert TLS RSA4096 Root G5"

CKA_CERTIFICATE_TYPE CK_CERTIFICATE_TYPE CKC_X_509

CKA_SUBJECT MULTILINE_OCTAL

\060\115\061\013\060\011\006\003\125\004\006\023\002\125\123\061
\027\060\025\006\003\125\004\012\023\016\104\151\147\151\103\145
\162\164\054\040\111\156\143\056\061\045\060\043\006\003\125\004
\003\023\034\104\151\147\151\103\145\162\164\040\124\114\123\040
\122\123\101\064\060\071\066\040\122\157\157\164\040\107\065

END

CKA_ID

UTF8 "0"

CKA_ISSUER MULTILINE_OCTAL

\060\115\061\013\060\011\006\003\125\004\006\023\002\125\123\061
\027\060\025\006\003\125\004\012\023\016\104\151\147\151\103\145
\162\164\054\040\111\156\143\056\061\045\060\043\006\003\125\004
\003\023\034\104\151\147\151\103\145\162\164\040\124\114\123\040

\122\123\101\064\060\071\066\040\122\157\157\164\040\107\065
END
CKA_SERIAL_NUMBER MULTILINE_OCTAL
\002\020\010\371\264\170\250\372\176\332\152\063\067\211\336\174
\317\212
END
CKA_VALUE MULTILINE_OCTAL
\060\202\005\146\060\202\003\116\240\003\002\001\002\002\020\010
\371\264\170\250\372\176\332\152\063\067\211\336\174\317\212\060
\015\006\011\052\206\110\206\367\015\001\001\014\005\000\060\115
\061\013\060\011\006\003\125\004\006\023\002\125\123\061\027\060
\025\006\003\125\004\012\023\016\104\151\147\151\103\145\162\164
\054\040\111\156\143\056\061\045\060\043\006\003\125\004\003\023
\034\104\151\147\151\103\145\162\164\040\124\114\123\040\122\123
\101\064\060\071\066\040\122\157\157\164\040\107\065\060\036\027
\015\062\061\060\061\061\065\060\060\060\060\060\060\132\027\015
\064\066\060\061\061\064\062\063\065\071\065\071\132\060\115\061
\013\060\011\006\003\125\004\006\023\002\125\123\061\027\060\025
\006\003\125\004\012\023\016\104\151\147\151\103\145\162\164\054
\040\111\156\143\056\061\045\060\043\006\003\125\004\003\023\034
\104\151\147\151\103\145\162\164\040\124\114\123\040\122\123\101
\064\060\071\066\040\122\157\157\164\040\107\065\060\202\002\042
\060\015\006\011\052\206\110\206\367\015\001\001\001\005\000\003
\202\002\017\000\060\202\002\012\002\202\002\001\000\263\320\364
\311\171\021\235\375\374\146\201\347\314\325\344\274\354\201\076
\152\065\216\056\267\347\336\257\371\007\115\317\060\235\352\011
\013\231\275\154\127\332\030\112\270\170\254\072\071\250\246\110
\254\056\162\345\275\353\361\032\315\347\244\003\251\077\021\264
\330\057\211\026\373\224\001\075\273\057\370\023\005\241\170\034
\216\050\340\105\340\203\364\131\033\225\263\256\176\003\105\345
\276\302\102\376\356\362\074\266\205\023\230\062\235\026\250\051
\302\013\034\070\334\237\061\167\134\277\047\243\374\047\254\267
\053\275\164\233\027\055\362\201\332\135\260\341\043\027\076\210
\112\022\043\320\352\317\235\336\003\027\261\102\112\240\026\114
\244\155\223\351\077\072\356\072\174\235\130\235\364\116\217\374
\073\043\310\155\270\342\005\332\314\353\354\303\061\364\327\247
\051\124\200\317\104\133\114\157\060\236\363\314\335\037\224\103
\235\115\177\160\160\015\324\072\321\067\360\154\235\233\300\024
\223\130\357\315\101\070\165\274\023\003\225\174\177\343\134\351
\325\015\325\342\174\020\142\252\153\360\075\166\363\077\243\350
\260\301\375\357\252\127\115\254\206\247\030\264\051\301\054\016
\277\144\276\051\214\330\002\055\315\134\057\362\177\357\025\364
\014\025\254\012\260\361\323\015\117\152\115\167\227\001\240\361
\146\267\267\316\357\316\354\354\245\165\312\254\343\341\143\367
\270\241\004\310\274\173\077\135\055\026\042\126\355\110\111\376
\247\057\171\060\045\233\272\153\055\077\235\073\304\027\347\035
\056\373\362\317\246\374\343\024\054\226\230\041\214\264\221\351
\031\140\203\362\060\053\006\163\120\325\230\073\006\351\307\212

\014\140\214\050\370\122\233\156\341\366\115\273\006\044\233\327
\053\046\077\375\052\057\161\365\326\044\276\177\061\236\017\155
\350\217\117\115\243\077\377\065\352\337\111\136\101\217\206\371
\361\167\171\113\033\264\243\136\057\373\106\002\320\146\023\136
\136\205\117\316\330\160\210\173\316\001\265\226\227\327\315\175
\375\202\370\302\044\301\312\001\071\117\215\242\301\024\100\037
\234\146\325\014\011\106\326\362\320\321\110\166\126\072\103\313
\266\012\021\071\272\214\023\154\006\265\236\317\353\002\003\001
\000\001\243\102\060\100\060\035\006\003\125\035\016\004\026\004
\024\121\063\034\355\066\100\257\027\323\045\315\151\150\362\257
\116\043\076\263\101\060\016\006\003\125\035\017\001\001\377\004
\004\003\002\001\206\060\017\006\003\125\035\023\001\001\377\004
\005\060\003\001\001\377\060\015\006\011\052\206\110\206\367\015
\001\001\014\005\000\003\202\002\001\000\140\246\257\133\137\127
\332\211\333\113\120\251\304\043\065\041\377\320\141\060\204\221
\267\077\020\317\045\216\311\277\106\064\331\301\041\046\034\160
\031\162\036\243\311\207\376\251\103\144\226\072\310\123\004\012
\266\101\273\304\107\000\331\237\030\030\073\262\016\363\064\352
\044\367\335\257\040\140\256\222\050\137\066\347\135\344\336\307
\074\333\120\071\255\273\075\050\115\226\174\166\306\133\364\301
\333\024\245\253\031\142\007\030\100\137\227\221\334\234\307\253
\265\121\015\346\151\123\125\314\071\175\332\305\021\125\162\305
\073\213\211\370\064\055\244\027\345\027\346\231\175\060\210\041
\067\315\060\027\075\270\362\274\250\165\240\103\334\076\211\113
\220\256\155\003\340\034\243\240\226\011\273\175\243\267\052\020
\104\113\106\007\064\143\355\061\271\004\356\243\233\232\256\346
\061\170\364\352\044\141\073\253\130\144\377\273\207\047\142\045
\201\337\334\241\057\366\355\247\377\172\217\121\056\060\370\244
\001\322\205\071\137\001\231\226\157\132\133\160\031\106\376\206
\140\076\255\200\020\011\335\071\045\057\130\177\273\322\164\360
\367\106\037\106\071\112\330\123\320\363\056\073\161\245\324\157
\374\363\147\344\007\217\335\046\031\341\215\133\372\243\223\021
\233\351\310\072\303\125\150\232\222\341\122\166\070\350\341\272
\275\373\117\325\357\263\347\110\203\061\360\202\041\343\266\276
\247\253\157\357\237\337\114\317\001\270\142\152\043\075\347\011
\115\200\033\173\060\244\303\335\007\177\064\276\244\046\262\366
\101\350\011\035\343\040\230\252\067\117\377\367\361\342\051\160
\061\107\077\164\320\024\026\372\041\212\002\325\212\011\224\167
\056\362\131\050\213\174\120\222\012\146\170\070\203\165\304\265
\132\250\021\306\345\301\235\146\125\317\123\304\257\327\165\205
\251\102\023\126\354\041\167\201\223\132\014\352\226\331\111\312
\241\010\362\227\073\155\233\004\030\044\104\216\174\001\362\334
\045\330\136\206\232\261\071\333\365\221\062\152\321\246\160\212
\242\367\336\244\105\205\046\250\036\214\135\051\133\310\113\330
\232\152\003\136\160\362\205\117\154\113\150\057\312\124\366\214
\332\062\376\303\153\203\077\070\306\176

END

CKA_NSS_MOZILLA_CA_POLICY

```

CK_BBOOL CK_TRUE
CKA_NSS_SERVER_DISTRUST_AFTER CK_BBOOL CK_FALSE
CKA_NSS_EMAIL_DISTRUST_AFTER CK_BBOOL CK_FALSE

# Trust for "DigiCert TLS RSA4096 Root G5"
# Issuer: CN=DigiCert TLS RSA4096 Root G5,O="DigiCert, Inc.",C=US
# Serial Number:08:f9:b4:78:a8:fa:7e:da:6a:33:37:89:de:7c:cf:8a
# Subject: CN=DigiCert TLS RSA4096 Root G5,O="DigiCert, Inc.",C=US
# Not Valid Before: Fri Jan 15 00:00:00 2021
# Not Valid After : Sun Jan 14 23:59:59 2046
# Fingerprint (SHA-256):
37:1A:00:DC:05:33:B3:72:1A:7E:EB:40:E8:41:9E:70:79:9D:2B:0A:0F:2C:1D:80:69:31:65:F7:CE:C4:AD:75
# Fingerprint (SHA1): A7:88:49:DC:5D:7C:75:8C:8C:DE:39:98:56:B3:AA:D0:B2:A5:71:35
CKA_CLASS CK_OBJECT_CLASS CKO_NSS_TRUST
CKA_TOKEN CK_BBOOL CK_TRUE
CKA_PRIVATE CK_BBOOL CK_FALSE
CKA_MODIFIABLE CK_BBOOL CK_FALSE
CKA_LABEL
UTF8 "DigiCert TLS RSA4096 Root G5"
CKA_CERT_SHA1_HASH MULTILINE_OCTAL
\247\210\111\334\135\174\165\214\214\336\071\230\126\263\252\320
\262\245\161\065
END
CKA_CERT_MD5_HASH MULTILINE_OCTAL
\254\376\367\064\226\251\362\263\264\022\113\344\047\101\157\341
END
CKA_ISSUER MULTILINE_OCTAL
\060\115\061\013\060\011\006\003\125\004\006\023\002\125\123\061
\027\060\025\006\003\125\004\012\023\016\104\151\147\151\103\145
\162\164\054\040\111\156\143\056\061\045\060\043\006\003\125\004
\003\023\034\104\151\147\151\103\145\162\164\040\124\114\123\040
\122\123\101\064\060\071\066\040\122\157\157\164\040\107\065
END
CKA_SERIAL_NUMBER MULTILINE_OCTAL
\002\020\010\371\264\170\250\372\176\332\152\063\067\211\336\174
\317\212
END
CKA_TRUST_SERVER_AUTH CK_TRUST CKT_NSS_TRUSTED_DELEGATOR
CKA_TRUST_EMAIL_PROTECTION CK_TRUST CKT_NSS_MUST_VERIFY_TRUST
CKA_TRUST_CODE_SIGNING CK_TRUST CKT_NSS_MUST_VERIFY_TRUST
CKA_TRUST_STEP_UP_APPROVED CK_BBOOL CK_FALSE

#
# Certificate "DigiCert SMIME ECC
P384 Root G5"
#
# Issuer: CN=DigiCert SMIME ECC P384 Root G5,O="DigiCert, Inc.",C=US
# Serial Number:05:3f:6e:a0:06:01:72:7d:ed:3f:c3:a3:b6:a3:d6:ef

```

```
# Subject: CN=DigiCert SMIME ECC P384 Root G5,O="DigiCert, Inc.",C=US
# Not Valid Before: Fri Jan 15 00:00:00 2021
# Not Valid After : Sun Jan 14 23:59:59 2046
# Fingerprint (SHA-256):
E8:E8:17:65:36:A6:0C:C2:C4:E1:01:87:C3:BE:FC:A2:0E:F2:63:49:70:18:F5:66:D5:BE:A0:F9:4D:0C:11:1B
# Fingerprint (SHA1): 1C:B8:A7:08:C9:0D:20:79:01:A0:B2:36:7F:F0:95:65:E4:53:24:FE
CKA_CLASS CK_OBJECT_CLASS CKO_CERTIFICATE
CKA_TOKEN CK_BBOOL CK_TRUE
CKA_PRIVATE CK_BBOOL CK_FALSE
CKA_MODIFIABLE CK_BBOOL CK_FALSE
CKA_LABEL UTF8 "DigiCert SMIME ECC P384 Root G5"
CKA_CERTIFICATE_TYPE CK_CERTIFICATE_TYPE CKC_X_509
CKA_SUBJECT MULTILINE_OCTAL
\060\120\061\013\060\011\006\003\125\004\006\023\002\125\123\061
\027\060\025\006\003\125\004\012\023\016\104\151\147\151\103\145
\162\164\054\040\111\156\143\056\061\050\060\046\006\003\125\004
\003\023\037\104\151\147\151\103\145\162\164\040\123\115\111\115
\105\040\105\103\103\040\120\063\070\064\040\122\157\157\164\040
\107\065
END
CKA_ID
UTF8 "0"
CKA_ISSUER MULTILINE_OCTAL
\060\120\061\013\060\011\006\003\125\004\006\023\002\125\123\061
\027\060\025\006\003\125\004\012\023\016\104\151\147\151\103\145
\162\164\054\040\111\156\143\056\061\050\060\046\006\003\125\004
\003\023\037\104\151\147\151\103\145\162\164\040\123\115\111\115
\105\040\105\103\103\040\120\063\070\064\040\122\157\157\164\040
\107\065
END
CKA_SERIAL_NUMBER MULTILINE_OCTAL
\002\020\005\077\156\240\006\001\162\175\355\077\303\243\266\243
\326\357
END
CKA_VALUE MULTILINE_OCTAL
\060\202\002\034\060\202\001\243\240\003\002\001\002\002\020\005
\077\156\240\006\001\162\175\355\077\303\243\266\243\326\357\060
\012\006\010\052\206\110\316\075\004\003\003\060\120\061\013\060
\011\006\003\125\004\006\023\002\125\123\061\027\060\025\006\003
\125\004\012\023\016\104\151\147\151\103\145\162\164\054\040\111
\156\143\056\061\050\060\046\006\003\125\004\003\023\037\104\151
\147\151\103\145\162\164\040\123\115\111\115\105\040\105\103\103
\040\120\063\070\064\040\122\157\157\164\040\107\065\060\036\027
\015\062\061\060\061\061\065\060\060\060\060\060\060\132\027\015
\064\066\060\061\061\064\062\063\065\071\065\071\132\060\120\061
\013\060\011\006\003\125\004\006\023\002\125\123\061\027\060\025
\006\003\125\004\012\023\016\104\151\147\151\103\145\162\164\054
\040\111\156\143\056\061\050\060\046\006\003\125\004\003\023\037
```


\104\151\147\151\103\145\162\164\040\123\115\111\115\105\040\105
\103\103\040\120\063\070\064\040\122\157\157\164\040\107\065\060
\166\060\020\006\007\052\206\110\316\075\002\001\006\005\053\201
\004\000\042\003\142\000\004\026\235\125\345\266\324\373\373\147
\153\032\324\241\252\322\167\225\076\210\345\007\237\266\160\146
\040\050\244\210\354\160\065\257\263\062\377\067\023\112\236\274
\001\003\336\204\301\270\306\346\145\107\211\362\023\125\277\315
\245\036\010\140\177\255\177\350\141\222\051\317\011\107\136\013
\034\300\037\244\277\362\133\274\230\357\231\114\314\160\153\266
\272\320\050\035\277\276\004\243\102\060\100\060\035\006\003\125
\035\016\004\026\004\024\163\172\153\226\333\102\007\213\122\146
\302\144\062\027\376\340\147\220\056\255\060\016\006\003\125\035
\017\001\001\377\004\004\003\002\001\206\060\017\006\003\125\035
\023\001\001\377\004\005\060\003\001\001\377\060\012\006\010\052
\206\110\316\075\004\003\003\003\147\000\060\144\002\060\067\104
\365\062\200\343\161\353\364\155\317\174\314\221\232\303\156\161
\330\322\043\135\222\115\202\102\155\134\141\225\366\221\365\247
\010\366\152\227\351\234\224\055\230\160\375\063\266\011\002\060
\007\074\057\271\130\202\136\017\243\142\250\223\147\360\040\303
\151\277\003\054\073\120\247\073\257\101\070\311\122\110\221\326
\016\373\274\140\060\174\144\077\022\036\105\177\121\076\364\246
END

CKA_NSS_MOZILLA_CA_POLICY

CK_BBOOL CK_TRUE

CKA_NSS_SERVER_DISTRUST_AFTER CK_BBOOL CK_FALSE

CKA_NSS_EMAIL_DISTRUST_AFTER CK_BBOOL CK_FALSE

Trust for "DigiCert

SMIME ECC P384 Root G5"

Issuer: CN=DigiCert SMIME ECC P384 Root G5,O="DigiCert, Inc.",C=US

Serial Number:05:3f:6e:a0:06:01:72:7d:ed:3f:c3:a3:b6:a3:d6:ef

Subject: CN=DigiCert SMIME ECC P384 Root G5,O="DigiCert, Inc.",C=US

Not Valid Before: Fri Jan 15 00:00:00 2021

Not Valid After : Sun Jan 14 23:59:59 2046

Fingerprint (SHA-256):

E8:E8:17:65:36:A6:0C:C2:C4:E1:01:87:C3:BE:FC:A2:0E:F2:63:49:70:18:F5:66:D5:BE:A0:F9:4D:0C:11:1B

Fingerprint (SHA1): 1C:B8:A7:08:C9:0D:20:79:01:A0:B2:36:7F:F0:95:65:E4:53:24:FE

CKA_CLASS CK_OBJECT_CLASS CKO_NSS_TRUST

CKA_TOKEN CK_BBOOL CK_TRUE

CKA_PRIVATE CK_BBOOL CK_FALSE

CKA_MODIFIABLE CK_BBOOL CK_FALSE

CKA_LABEL UTF8 "DigiCert SMIME ECC P384 Root G5"

CKA_CERT_SHA1_HASH MULTILINE_OCTAL

\034\270\247\010\311\015\040\171\001\240\262\066\177\360\225\145
\344\123\044\376

END

CKA_CERT_MD5_HASH MULTILINE_OCTAL

\246\376\364\122\066\104\330\356\015\267\003\013\357\164\263\003

```

END
CKA_ISSUER MULTILINE_OCTAL
\060\120\061\013\060\011\006\003\125\004\006\023\002\125\123\061
\027\060\025\006\003\125\004\012\023\016\104\151\147\151\103\145
\162\164\054\040\111\156\143\056\061\050\060\046\006\003\125\004
\003\023\037\104\151\147\151\103\145\162\164\040\123\115\111\115
\105\040\105\103\103\040\120\063\070\064\040\122\157\157\164\040
\107\065
END
CKA_SERIAL_NUMBER
MULTILINE_OCTAL
\002\020\005\077\156\240\006\001\162\175\355\077\303\243\266\243
\326\357
END
CKA_TRUST_SERVER_AUTH CK_TRUST CKT_NSS_MUST_VERIFY_TRUST
CKA_TRUST_EMAIL_PROTECTION CK_TRUST CKT_NSS_TRUSTED_DELEGATOR
CKA_TRUST_CODE_SIGNING CK_TRUST CKT_NSS_MUST_VERIFY_TRUST
CKA_TRUST_STEP_UP_APPROVED CK_BBOOL CK_FALSE

#
# Certificate "DigiCert SMIME RSA4096 Root G5"
#
# Issuer: CN=DigiCert SMIME RSA4096 Root G5,O="DigiCert, Inc.",C=US
# Serial Number:05:f6:ba:04:23:83:46:cb:7d:5c:e6:b9:5b:ba:1c:55
# Subject: CN=DigiCert SMIME RSA4096 Root G5,O="DigiCert, Inc.",C=US
# Not Valid Before: Fri Jan 15 00:00:00 2021
# Not Valid After : Sun Jan 14 23:59:59 2046
# Fingerprint (SHA-256):
90:37:0D:3E:FA:88:BF:58:C3:01:05:BA:25:10:4A:35:84:60:A7:FA:52:DF:C2:01:1D:F2:33:A0:F4:17:91:2A
#
Fingerprint (SHA1): 5B:C5:AD:E2:9A:A7:54:DA:84:89:53:A5:FE:D7:5B:46:86:D0:57:08
CKA_CLASS CK_OBJECT_CLASS CKO_CERTIFICATE
CKA_TOKEN CK_BBOOL CK_TRUE
CKA_PRIVATE CK_BBOOL CK_FALSE
CKA_MODIFIABLE CK_BBOOL CK_FALSE
CKA_LABEL UTF8 "DigiCert SMIME RSA4096 Root G5"
CKA_CERTIFICATE_TYPE CK_CERTIFICATE_TYPE CKC_X_509
CKA_SUBJECT MULTILINE_OCTAL
\060\117\061\013\060\011\006\003\125\004\006\023\002\125\123\061
\027\060\025\006\003\125\004\012\023\016\104\151\147\151\103\145
\162\164\054\040\111\156\143\056\061\047\060\045\006\003\125\004
\003\023\036\104\151\147\151\103\145\162\164\040\123\115\111\115
\105\040\122\123\101\064\060\071\066\040\122\157\157\164\040\107
\065
END
CKA_ID UTF8 "0"
CKA_ISSUER MULTILINE_OCTAL
\060\117\061\013\060\011\006\003\125\004\006\023\002\125\123\061

```

\027\060\025\006\003\125\004\012\023\016\104\151\147\151\103\145
\162\164\054\040\111\156\143\056\061\047\060\045\006\003\125\004
\003\023\036\104\151\147\151\103\145\162\164\040\123\115\111\115
\105\040\122\123\101\064\060\071\066\040\122\157\157\164\040\107
\065
END
CKA_SERIAL_NUMBER
MULTILINE_OCTAL
\002\020\005\366\272\004\043\203\106\313\175\134\346\271\133\272
\034\125
END
CKA_VALUE MULTILINE_OCTAL
\060\202\005\152\060\202\003\122\240\003\002\001\002\002\020\005
\366\272\004\043\203\106\313\175\134\346\271\133\272\034\125\060
\015\006\011\052\206\110\206\367\015\001\001\014\005\000\060\117
\061\013\060\011\006\003\125\004\006\023\002\125\123\061\027\060
\025\006\003\125\004\012\023\016\104\151\147\151\103\145\162\164
\054\040\111\156\143\056\061\047\060\045\006\003\125\004\003\023
\036\104\151\147\151\103\145\162\164\040\123\115\111\115\105\040
\122\123\101\064\060\071\066\040\122\157\157\164\040\107\065\060
\036\027\015\062\061\060\061\061\065\060\060\060\060\060\060\132
\027\015\064\066\060\061\061\064\062\063\065\071\065\071\132\060
\117\061\013\060\011\006\003\125\004\006\023\002\125\123\061\027
\060\025\006\003\125\004\012\023\016\104\151\147\151\103\145\162
\164\054\040\111\156\143\056\061\047\060\045\006\003\125\004\003
\023\036\104\151\147\151\103\145\162\164\040\123\115\111\115\105
\040\122\123\101\064\060\071\066\040\122\157\157\164\040\107\065
\060\202\002\042\060\015\006\011\052\206\110\206\367\015\001\001
\001\005\000\003\202\002\017\000\060\202\002\012\002\202\002\001
\000\340\152\133\331\370\371\175\354\265\173\357\137\335\134\064
\330\332\135\321\313\145\165\253\041\174\133\000\324\202\157\105
\205\101\212\251\022\002\162\062\360\024\365\003\165\273\143\227
\111\017\100\231\013\032\036\126\247\322\320\341\253\335\345\004
\033\343\037\024\022\002\210\365\240\200\011\366\047\232\120\360
\272\343\242\340\254\152\024\221\265\153\070\020\172\242\061\341
\221\033\267\271\360\053\133\310\167\011\166\267\121\304\066\012
\231\123\124\104\045\267\011\065\206\027\005\126\223\075\101\267
\002\327\142\037\212\222\021\207\352\021\155\352\010\021\334\261
\170\110\111\222\366\264\121\200\170\043\330\376\341\126\032\072
\220\023\126\064\211\325\342\225\213\137\336\262\314\373\077\070
\267\205\367\352\236\277\056\241\056\057\115\175\152\021\056\066
\240\377\021\010\004\225\125\340\033\073\147\223\251\224\125\352
\062\355\006\072\177\302\177\343\255\023\047\321\064\101\263\060
\303\277\264\210\370\003\202\244\337\076\253\170\167\240\131\223
\161\347\335\353\000\004\173\314\110\071\050\340\036\243\025\151
\310\066\262\241\013\227\337\125\326\357\221\234\244\366\026\367
\121\012\356\003\043\221\334\004\377\340\335\070\366\042\003\000
\302\007\161\032\022\311\327\106\052\224\033\315\326\273\033\356

\277\276\115\120\130\260\013\315\060\166\051\365\317\345\266\152
\057\166\260\260\151\152\320\155\145\030\065\176\223\274\162\027
\301\125\102\315\057\302\045\273\364\375\035\241\144\042\124\135
\342\236\162\101\204\156\161\226\352\105\007\266\136\172\112\206
\235\163\144\167\070\003\322\017\123\245\125\040\304\115\377\150
\157\125\251\352\335\161\344\117\331\205\243\174\116\051\002\236
\013\011\362\032\123\314\000\246\335\321\064\366\015\301\060\261
\234\002\144\254\065\355\245\260\051\261\322\225\063\017\322\040
\063\275\354\043\113\362\031\371\332\230\144\344\054\061\037\056
\341\215\034\004\225\050\115\214\130\315\113\345\163\202\206\214
\354\250\326\171\134\373\144\273\334\014\114\050\366\027\257\342
\150\326\026\206\230\333\374\001\334\061\272\370\234\016\371\050
\106\112\341\375\226\006\105\171\021\150\027\145\134\213\046\207
\133\002\003\001\000\001\243\102\060\100\060\035\006\003\125\035
\016\004\026\004\024\321\243\324\127\035\117\125\333\165\114\134
\102\236\143\026\316\264\306\073\037\060\016\006\003\125\035\017
\001\001\377\004\004\003\002\001\206\060\017\006\003\125\035\023
\001\001\377\004\005\060\003\001\001\377\060\015\006\011\052\206
\110\206\367\015\001\001\014\005\000\003\202\002\001\000\007\247
\012\336\123\273\232\353\160\277\262\066\220\315\344\247\270\361
\014\344\135\132\035\170\145\374\311\270\036\043\021\127\174\151
\065\155\001\377\123\120\277\007\016\272\307\001\077\130\052\224
\165\003\253\034\013\043\334\033\212\036\067\075\035\130\217\163
\331\263\052\157\337\020\240\133\014\247\312\260\177\271\044\242
\001\065\062\345\136\106\101\353\330\177\163\347\102\351\244\121
\046\167\201\012\250\353\017\012\120\235\176\212\040\147\374\013
\216\072\021\323\305\214\140\030\331\113\261\374\324\361\264\111
\116\256\207\341\321\373\166\241\137\363\006\317\227\226\014\351
\236\165\201\134\123\015\042\374\066\346\111\156\164\333\000\205
\215\174\042\240\216\373\020\114\324\142\023\133\357\113\162\046
\213\374\116\212\217\376\227\020\123\305\170\213\102\144\033\137
\340\211\375\273\011\177\120\340\124\205\046\021\152\035\145\371
\111\051\334\174\066\337\373\075\367\322\254\356\062\215\156\246
\175\071\234\105\304\312\015\365\073\264\171\123\245\057\126\307
\121\305\212\114\144\135\220\103\043\216\153\114\027\170\314\350
\277\365\073\344\250\110\317\255\233\014\337\062\112\323\331\022
\216\043\170\015\055\257\237\257\236\074\011\302\227\000\355\072
\151\034\161\077\071\337\323\217\304\146\365\357\066\224\017\363
\335\222\266\226\137\220\246\335\163\252\246\040\224\224\045\152
\011\014\162\344\023\043\140\114\243\312\027\056\173\147\000\333
\320\315\352\172\037\071\046\127\211\060\167\313\116\345\225\105
\117\137\373\066\134\075\371\040\265\072\020\045\117\223\062\132
\356\301\226\350\351\126\004\260\111\141\115\354\170\250\235\030
\301\377\330\352\057\126\357\225\053\173\004\136\147\343\125\100
\355\071\004\371\013\171\365\152\214\134\017\211\232\220\307\315
\213\336\333\046\065\241\156\315\263\102\362\242\017\073\014\216
\223\377\024\317\374\367\223\367\344\101\010\156\031\122\021\017
\123\031\163\170\014\317\330\205\201\370\255\125\310\260\236\106

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\143\257\234\122\356\134\277\360\300\133\067\036\011\040\322\076
\043\306\241\025\112\016\066\176\060\305\171\152\274\042\210\331
\014\122\100\037\335\116\017\147\046\026\322\255\027\034
END
CKA_NSS_Mozilla_CA_POLICY
CK_BBOOL CK_TRUE
CKA_NSS_SERVER_DISTRUST_AFTER
CK_BBOOL CK_FALSE
CKA_NSS_EMAIL_DISTRUST_AFTER CK_BBOOL CK_FALSE

# Trust for "DigiCert SMIME RSA4096 Root G5"
# Issuer: CN=DigiCert SMIME RSA4096 Root G5,O="DigiCert, Inc.",C=US
# Serial Number:05:f6:ba:04:23:83:46:cb:7d:5c:e6:b9:5b:ba:1c:55
# Subject: CN=DigiCert SMIME RSA4096 Root G5,O="DigiCert, Inc.",C=US
# Not Valid Before: Fri Jan 15 00:00:00 2021
# Not Valid After : Sun Jan 14 23:59:59 2046
# Fingerprint (SHA-256):
90:37:0D:3E:FA:88:BF:58:C3:01:05:BA:25:10:4A:35:84:60:A7:FA:52:DF:C2:01:1D:F2:33:A0:F4:17:91:2A
# Fingerprint (SHA1): 5B:C5:AD:E2:9A:A7:54:DA:84:89:53:A5:FE:D7:5B:46:86:D0:57:08
CKA_CLASS CK_OBJECT_CLASS CKO_NSS_TRUST
CKA_TOKEN CK_BBOOL CK_TRUE
CKA_PRIVATE CK_BBOOL CK_FALSE
CKA_MODIFIABLE CK_BBOOL CK_FALSE
CKA_LABEL UTF8 "DigiCert SMIME RSA4096 Root G5"
CKA_CERT_SHA1_HASH MULTILINE_OCTAL
\133\305\255\342\232\247\124\332\204\211\123\245\376\327\133\106
\206\320\127\010
END
CKA_CERT_MD5_HASH MULTILINE_OCTAL
\321\173\340\265\077\065\162\237\175\276\013\245\244\035\251\156
END
CKA_ISSUER
MULTILINE_OCTAL
\060\117\061\013\060\011\006\003\125\004\006\023\002\125\123\061
\027\060\025\006\003\125\004\012\023\016\104\151\147\151\103\145
\162\164\054\040\111\156\143\056\061\047\060\045\006\003\125\004
\003\023\036\104\151\147\151\103\145\162\164\040\123\115\111\115
\105\040\122\123\101\064\060\071\066\040\122\157\157\164\040\107
\065
END
CKA_SERIAL_NUMBER MULTILINE_OCTAL
\002\020\005\366\272\004\043\203\106\313\175\134\346\271\133\272
\034\125
END
CKA_TRUST_SERVER_AUTH CK_TRUST CKT_NSS_MUST_VERIFY_TRUST
CKA_TRUST_EMAIL_PROTECTION CK_TRUST CKT_NSS_TRUSTED_DELEGATOR
CKA_TRUST_CODE_SIGNING CK_TRUST CKT_NSS_MUST_VERIFY_TRUST
CKA_TRUST_STEP_UP_APPROVED CK_BBOOL CK_FALSE

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#
# Certificate "Certainly Root R1"
#
# Issuer: CN=Certainly Root R1,O=Certainly,C=US
# Serial Number:00:8e:0f:f9:4b:90:71:68:65:33:54:f4:d4:44:39:b7:e0
# Subject: CN=Certainly Root R1,O=Certainly,C=US
# Not Valid Before: Thu Apr 01 00:00:00 2021
# Not Valid After : Sun Apr 01 00:00:00 2046
#
Fingerprint (SHA-256):
77:B8:2C:D8:64:4C:43:05:F7:AC:C5:CB:15:6B:45:67:50:04:03:3D:51:C6:0C:62:02:A8:E0:C3:34:67:D3:A0
# Fingerprint (SHA1): A0:50:EE:0F:28:71:F4:27:B2:12:6D:6F:50:96:25:BA:CC:86:42:AF
CKA_CLASS CK_OBJECT_CLASS CKO_CERTIFICATE
CKA_TOKEN CK_BBOOL CK_TRUE
CKA_PRIVATE CK_BBOOL CK_FALSE
CKA_MODIFIABLE CK_BBOOL CK_FALSE
CKA_LABEL UTF8 "Certainly Root R1"
CKA_CERTIFICATE_TYPE CK_CERTIFICATE_TYPE CKC_X_509
CKA_SUBJECT MULTILINE_OCTAL
\060\075\061\013\060\011\006\003\125\004\006\023\002\125\123\061
\022\060\020\006\003\125\004\012\023\011\103\145\162\164\141\151
\156\154\171\061\032\060\030\006\003\125\004\003\023\021\103\145
\162\164\141\151\156\154\171\040\122\157\157\164\040\122\061
END
CKA_ID UTF8 "0"
CKA_ISSUER MULTILINE_OCTAL
\060\075\061\013\060\011\006\003\125\004\006\023\002\125\123\061
\022\060\020\006\003\125\004\012\023\011\103\145\162\164\141\151
\156\154\171\061\032\060\030\006\003\125\004\003\023\021\103\145
\162\164\141\151\156\154\171\040\122\157\157\164\040\122\061
END
CKA_SERIAL_NUMBER
MULTILINE_OCTAL
\002\021\000\216\017\371\113\220\161\150\145\063\124\364\324\104
\071\267\340
END
CKA_VALUE MULTILINE_OCTAL
\060\202\005\107\060\202\003\057\240\003\002\001\002\002\021\000
\216\017\371\113\220\161\150\145\063\124\364\324\104\071\267\340
\060\015\006\011\052\206\110\206\367\015\001\001\013\005\000\060
\075\061\013\060\011\006\003\125\004\006\023\002\125\123\061\022
\060\020\006\003\125\004\012\023\011\103\145\162\164\141\151\156
\154\171\061\032\060\030\006\003\125\004\003\023\021\103\145\162
\164\141\151\156\154\171\040\122\157\157\164\040\122\061\060\036
\027\015\062\061\060\064\060\061\060\060\060\060\060\132\027
\015\064\066\060\064\060\061\060\060\060\060\060\132\060\075
\061\013\060\011\006\003\125\004\006\023\002\125\123\061\022\060

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\020\006\003\125\004\012\023\011\103\145\162\164\141\151\156\154
\171\061\032\060\030\006\003\125\004\003\023\021\103\145\162\164
\141\151\156\154\171\040\122\157\157\164\040\122\061\060\202\002
\042\060\015\006\011\052\206\110\206\367\015\001\001\001\005\000
\003\202\002\017\000\060\202\002\012\002\202\002\001\000\320\066
\324\037\352\335\253\344\321\266\346\373\042\300\335\023\015\152
\173\042\023\034\227\074\150\143\146\062\234\003\265\215\244\201
\203\332\170\060\021\317\334\262\053\276\222\277\216\344\304\023
\276\244\150\114\332\002\150\026\164\276\262\335\004\344\153\052
\335\067\037\140\054\333\365\367\241\174\225\267\014\160\206\056
\361\072\357\122\367\314\323\233\371\213\276\016\337\061\267\235
\150\134\222\246\365\345\363\012\064\265\377\173\242\344\207\241
\306\257\027\000\357\003\221\355\251\034\116\161\075\322\213\154
\211\364\170\206\346\152\111\240\316\265\322\260\253\233\366\364
\324\056\343\162\371\066\306\353\025\267\045\214\072\374\045\015
\263\042\163\041\164\310\112\226\141\222\365\057\013\030\245\364
\255\342\356\101\275\001\171\372\226\214\215\027\002\060\264\371
\257\170\032\214\264\066\020\020\007\005\160\320\364\061\220\212
\121\305\206\046\171\262\021\210\136\305\360\012\124\315\111\246
\277\002\234\322\104\247\355\343\170\357\106\136\155\161\321\171
\160\034\106\137\121\351\311\067\334\137\176\151\173\101\337\064
\105\340\073\204\364\241\212\012\066\236\067\314\142\122\341\211
\015\050\371\172\043\261\015\075\075\232\375\235\201\357\054\220
\300\173\104\116\273\111\340\016\112\126\222\274\313\265\335\171
\027\211\221\336\141\211\164\222\250\343\062\205\276\116\205\244
\113\131\313\053\305\170\216\161\124\320\002\067\231\214\345\111
\352\340\124\162\244\021\006\057\013\214\301\133\276\265\241\260
\123\156\234\270\140\221\037\131\153\371\055\364\224\012\227\265
\354\305\166\003\124\033\145\122\272\114\222\126\121\065\240\100
\330\051\333\256\122\166\073\055\060\100\233\212\320\102\126\264
\267\210\001\244\207\073\123\226\315\243\026\217\363\146\252\027
\261\307\140\340\301\103\005\014\356\233\133\140\157\006\134\207
\133\047\371\100\021\236\234\063\301\267\345\065\127\005\177\047
\316\027\040\214\034\374\361\373\332\061\051\111\355\365\013\204
\247\117\301\366\116\302\050\234\372\356\340\257\007\373\063\021
\172\041\117\013\041\020\266\100\072\253\042\072\004\234\213\233
\204\206\162\232\322\247\245\304\264\165\221\251\053\043\002\003
\001\000\001\243\102\060\100\060\016\006\003\125\035\017\001\001
\377\004\004\003\002\001\006\060\017\006\003\125\035\023\001\001
\377\004\005\060\003\001\001\377\060\035\006\003\125\035\016\004
\026\004\024\340\252\077\045\215\237\104\134\301\072\350\056\256
\167\114\204\076\147\014\364\060\015\006\011\052\206\110\206\367
\015\001\001\013\005\000\003\202\002\001\000\271\127\257\270\022
\332\127\203\217\150\013\063\035\003\123\125\364\225\160\344\053
\075\260\071\353\372\211\142\375\367\326\030\004\057\041\064\335
\361\150\360\325\226\132\336\302\200\243\301\215\306\152\367\131
\167\256\025\144\317\133\171\005\167\146\352\214\323\153\015\335
\361\131\054\301\063\245\060\200\025\105\007\105\032\061\042\266

\222\000\253\231\115\072\217\167\257\251\042\312\057\143\312\025
\326\307\306\360\075\154\374\034\015\230\020\141\236\021\242\042
\327\012\362\221\172\153\071\016\057\060\303\066\111\237\340\351
\017\002\104\120\067\224\125\175\352\237\366\073\272\224\245\114
\351\274\076\121\264\350\312\222\066\124\155\134\045\050\332\335
\255\024\375\323\356\342\042\005\353\320\362\267\150\022\327\132
\212\101\032\306\222\245\132\073\143\105\117\277\341\072\167\042
\057\134\277\106\371\132\003\205\023\102\137\312\336\123\327\142
\265\246\065\004\302\107\377\231\375\204\337\134\316\351\136\200
\050\101\362\175\347\036\220\330\117\166\076\202\074\015\374\245
\003\372\173\032\331\105\036\140\332\304\216\371\374\053\311\173
\225\305\052\377\252\211\337\202\061\017\162\377\014\047\327\012
\036\126\000\120\036\014\220\301\226\265\330\024\205\273\247\015
\026\301\370\007\044\033\272\205\241\032\005\011\200\272\225\143
\311\072\354\045\237\177\235\272\244\107\025\233\104\160\361\152
\113\326\070\136\103\363\030\176\120\156\351\132\050\346\145\346
\167\033\072\375\035\276\003\046\243\333\324\341\273\176\226\047
\053\035\356\244\373\332\045\124\023\003\336\071\306\303\037\115
\220\354\217\033\112\322\034\355\205\225\070\120\171\106\326\301
\220\120\061\251\134\232\156\035\365\063\126\213\247\231\322\362
\310\054\063\223\222\060\307\116\214\145\063\020\144\027\375\044
\027\226\321\215\302\072\152\053\353\023\213\104\362\041\363\112
\032\267\167\137\327\355\210\244\162\345\071\037\225\235\276\147
\301\160\021\075\273\364\370\111\267\343\046\227\072\237\322\137
\174\373\300\231\174\071\051\340\173\035\277\015\247\217\322\051
\064\156\044\025\313\336\220\136\277\032\304\146\352\302\346\272
\071\137\212\231\251\101\131\007\260\054\257

END

CKA_NSS_MOZILLA_CA_POLICY

CK_BBOOL CK_TRUE

CKA_NSS_SERVER_DISTRUST_AFTER CK_BBOOL CK_FALSE

CKA_NSS_EMAIL_DISTRUST_AFTER CK_BBOOL CK_FALSE

Trust for "Certainly Root R1"

Issuer: CN=Certainly Root R1,O=Certainly,C=US

Serial Number:00:8e:0f:f9:4b:90:71:68:65:33:54:f4:d4:44:39:b7:e0

Subject: CN=Certainly Root R1,O=Certainly,C=US

Not

Valid Before: Thu Apr 01 00:00:00 2021

Not Valid After : Sun Apr 01 00:00:00 2046

Fingerprint (SHA-256):

77:B8:2C:D8:64:4C:43:05:F7:AC:C5:CB:15:6B:45:67:50:04:03:3D:51:C6:0C:62:02:A8:E0:C3:34:67:D3:A0

Fingerprint (SHA1): A0:50:EE:0F:28:71:F4:27:B2:12:6D:6F:50:96:25:BA:CC:86:42:AF

CKA_CLASS CK_OBJECT_CLASS CKO_NSS_TRUST

CKA_TOKEN CK_BBOOL CK_TRUE

CKA_PRIVATE CK_BBOOL CK_FALSE

CKA_MODIFIABLE CK_BBOOL CK_FALSE

CKA_LABEL UTF8 "Certainly Root R1"


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CKA_CERT_SHA1_HASH MULTILINE_OCTAL
\240\120\356\017\050\161\364\047\262\022\155\157\120\226\045\272
\314\206\102\257
END
CKA_CERT_MD5_HASH MULTILINE_OCTAL
\007\160\324\076\202\207\240\372\063\066\023\364\372\063\347\022
END
CKA_ISSUER MULTILINE_OCTAL
\060\075\061\013\060\011\006\003\125\004\006\023\002\125\123\061
\022\060\020\006\003\125\004\012\023\011\103\145\162\164\141\151
\156\154\171\061\032\060\030\006\003\125\004\003\023\021\103\145
\162\164\141\151\156\154\171\040\122\157\157\164\040\122\061
END
CKA_SERIAL_NUMBER MULTILINE_OCTAL
\002\021\000\216\017\371\113\220\161\150\145\063\124\364\324\104
\071\267\340
END
CKA_TRUST_SERVER_AUTH
CK_TRUST CKT_NSS_TRUSTED_DELEGATOR
CKA_TRUST_EMAIL_PROTECTION CK_TRUST CKT_NSS_MUST_VERIFY_TRUST
CKA_TRUST_CODE_SIGNING CK_TRUST CKT_NSS_MUST_VERIFY_TRUST
CKA_TRUST_STEP_UP_APPROVED CK_BBOOL CK_FALSE

#
# Certificate "Certainly Root E1"
#
# Issuer: CN=Certainly Root E1,O=Certainly,C=US
# Serial Number:06:25:33:b1:47:03:33:27:5c:f9:8d:9a:b9:bf:cc:f8
# Subject: CN=Certainly Root E1,O=Certainly,C=US
# Not Valid Before: Thu Apr 01 00:00:00 2021
# Not Valid After : Sun Apr 01 00:00:00 2046
# Fingerprint (SHA-256):
B4:58:5F:22:E4:AC:75:6A:4E:86:12:A1:36:1C:5D:9D:03:1A:93:FD:84:FE:BB:77:8F:A3:06:8B:0F:C4:2D:C2
# Fingerprint (SHA1): F9:E1:6D:DC:01:89:CF:D5:82:45:63:3E:C5:37:7D:C2:EB:93:6F:2B
CKA_CLASS CK_OBJECT_CLASS CKO_CERTIFICATE
CKA_TOKEN CK_BBOOL CK_TRUE
CKA_PRIVATE CK_BBOOL CK_FALSE
CKA_MODIFIABLE CK_BBOOL CK_FALSE
CKA_LABEL UTF8 "Certainly Root E1"
CKA_CERTIFICATE_TYPE CK_CERTIFICATE_TYPE
CKC_X_509
CKA_SUBJECT MULTILINE_OCTAL
\060\075\061\013\060\011\006\003\125\004\006\023\002\125\123\061
\022\060\020\006\003\125\004\012\023\011\103\145\162\164\141\151
\156\154\171\061\032\060\030\006\003\125\004\003\023\021\103\145
\162\164\141\151\156\154\171\040\122\157\157\164\040\105\061
END
CKA_ID UTF8 "0"

```

CKA_ISSUER MULTILINE_OCTAL
\060\075\061\013\060\011\006\003\125\004\006\023\002\125\123\061
\022\060\020\006\003\125\004\012\023\011\103\145\162\164\141\151
\156\154\171\061\032\060\030\006\003\125\004\003\023\021\103\145
\162\164\141\151\156\154\171\040\122\157\157\164\040\105\061

END

CKA_SERIAL_NUMBER MULTILINE_OCTAL
\002\020\006\045\063\261\107\003\063\047\134\371\215\232\271\277
\314\370

END

CKA_VALUE MULTILINE_OCTAL
\060\202\001\367\060\202\001\175\240\003\002\001\002\002\020\006
\045\063\261\107\003\063\047\134\371\215\232\271\277\314\370\060
\012\006\010\052\206\110\316\075\004\003\003\060\075\061\013\060
\011\006\003\125\004\006\023\002\125\123\061\022\060\020\006\003
\125\004\012\023\011\103\145\162\164\141\151\156\154\171\061\032
\060\030\006\003\125\004\003\023\021\103\145\162\164\141\151\156
\154\171\040\122\157\157\164\040\105\061\060\036\027\015\062\061
\060\064\060\061\060\060\060\060\060\060\132\027\015\064\066\060
\064\060\061\060\060\060\060\060\060\132\060\075\061\013\060\011
\006\003\125\004\006\023\002\125\123\061\022\060\020\006\003\125
\004\012\023\011\103\145\162\164\141\151\156\154\171\061\032\060
\030\006\003\125\004\003\023\021\103\145\162\164\141\151\156\154
\171\040\122\157\157\164\040\105\061\060\166\060\020\006\007\052
\206\110\316\075\002\001\006\005\053\201\004\000\042\003\142\000
\004\336\157\370\177\034\337\355\371\107\207\206\261\244\300\212
\370\202\227\200\352\217\310\112\136\052\175\210\150\247\001\142
\024\221\044\172\134\236\243\027\175\212\206\041\064\030\120\033
\020\336\320\067\113\046\307\031\140\200\351\064\275\140\031\066
\100\326\051\207\011\074\221\172\366\274\023\043\335\131\116\004
\136\317\310\002\034\030\123\301\061\330\332\040\351\104\215\344
\166\243\102\060\100\060\016\006\003\125\035\017\001\001\377\004
\004\003\002\001\006\060\017\006\003\125\035\023\001\001\377\004
\005\060\003\001\001\377\060\035\006\003\125\035\016\004\026\004
\024\363\050\030\313\144\165\356\051\052\353\355\256\043\130\070
\205\353\310\042\007\060\012\006\010\052\206\110\316\075\004\003
\003\003\150\000\060\145\002\061\000\261\216\132\040\303\262\031
\142\115\336\260\117\337\156\322\160\212\361\237\176\152\214\346
\272\336\203\151\312\151\263\251\005\265\226\222\027\207\302\322
\352\320\173\316\330\101\133\174\256\002\060\106\336\352\313\135
\232\354\062\302\145\026\260\114\060\134\060\363\332\116\163\206
\006\330\316\211\004\110\067\067\370\335\063\121\235\160\257\173
\125\330\001\056\175\005\144\016\206\270\221

END

CKA_NSS_MOZILLA_CA_POLICY
CK_BBOOL CK_TRUE
CKA_NSS_SERVER_DISTRUST_AFTER CK_BBOOL CK_FALSE
CKA_NSS_EMAIL_DISTRUST_AFTER CK_BBOOL CK_FALSE

```

# Trust for "Certainly Root E1"
# Issuer: CN=Certainly
Root E1,O=Certainly,C=US
# Serial Number:06:25:33:b1:47:03:33:27:5c:f9:8d:9a:b9:bf:cc:f8
# Subject: CN=Certainly Root E1,O=Certainly,C=US
# Not Valid Before: Thu Apr 01 00:00:00 2021
# Not Valid After : Sun Apr 01 00:00:00 2046
# Fingerprint (SHA-256):
B4:58:5F:22:E4:AC:75:6A:4E:86:12:A1:36:1C:5D:9D:03:1A:93:FD:84:FE:BB:77:8F:A3:06:8B:0F:C4:2D:C2
# Fingerprint (SHA1): F9:E1:6D:DC:01:89:CF:D5:82:45:63:3E:C5:37:7D:C2:EB:93:6F:2B
CKA_CLASS CK_OBJECT_CLASS CKO_NSS_TRUST
CKA_TOKEN CK_BBOOL CK_TRUE
CKA_PRIVATE CK_BBOOL CK_FALSE
CKA_MODIFIABLE CK_BBOOL CK_FALSE
CKA_LABEL UTF8 "Certainly Root E1"
CKA_CERT_SHA1_HASH MULTILINE_OCTAL
\371\341\155\334\001\211\317\325\202\105\143\076\305\067\175\302
\353\223\157\053
END
CKA_CERT_MD5_HASH MULTILINE_OCTAL
\012\236\312\315\076\122\120\306\066\363\113\243\355\247\123\351
END
CKA_ISSUER MULTILINE_OCTAL
\060\075\061\013\060\011\006\003\125\004\006\023\002\125\123\061
\022\060\020\006\003\125\004\012\023\011\103\145\162\164\141\151
\156\154\171\061\032\060\030\006\003\125\004\003\023\021\103\145
\162\164\141\151\156\154\171\040\122\157\157\164\040\105\061
END
CKA_SERIAL_NUMBER
MULTILINE_OCTAL
\002\020\006\045\063\261\107\003\063\047\134\371\215\232\271\277
\314\370
END
CKA_TRUST_SERVER_AUTH CK_TRUST CKT_NSS_TRUSTED_DELEGATOR
CKA_TRUST_EMAIL_PROTECTION CK_TRUST CKT_NSS_MUST_VERIFY_TRUST
CKA_TRUST_CODE_SIGNING CK_TRUST CKT_NSS_MUST_VERIFY_TRUST
CKA_TRUST_STEP_UP_APPROVED CK_BBOOL CK_FALSE

#
# Certificate "E-Tugra Global Root CA RSA v3"
#
# Issuer: CN=E-Tugra Global Root CA RSA v3,OU=E-Tugra Trust Center,O=E-Tugra EBG A.S.,L=Ankara,C=TR
# Serial Number:0d:4d:c5:cd:16:22:95:96:08:7e:b8:0b:7f:15:06:34:fb:79:10:34
# Subject: CN=E-Tugra Global Root CA RSA v3,OU=E-Tugra Trust Center,O=E-Tugra EBG
A.S.,L=Ankara,C=TR
# Not Valid Before: Wed Mar 18 09:07:17 2020
# Not Valid After : Sun Mar 12 09:07:17 2045

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# Fingerprint (SHA-256):
EF:66:B0:B1:0A:3C:DB:9F:2E:36:48:C7:6B:D2:AF:18:EA:D2:BF:E6:F1:17:65:5E:28:C4:06:0D:A1:A3:F4:C2
# Fingerprint (SHA1):
E9:A8:5D:22:14:52:1C:5B:AA:0A:B4:BE:24:6A:23:8A:C9:BA:E2:A9
CKA_CLASS CK_OBJECT_CLASS CKO_CERTIFICATE
CKA_TOKEN CK_BBOOL CK_TRUE
CKA_PRIVATE CK_BBOOL CK_FALSE
CKA_MODIFIABLE CK_BBOOL CK_FALSE
CKA_LABEL UTF8 "E-Tugra Global Root CA RSA v3"
CKA_CERTIFICATE_TYPE CK_CERTIFICATE_TYPE CKC_X_509
CKA_SUBJECT MULTILINE_OCTAL
\060\201\200\061\013\060\011\006\003\125\004\006\023\002\124\122
\061\017\060\015\006\003\125\004\007\023\006\101\156\153\141\162
\141\061\031\060\027\006\003\125\004\012\023\020\105\055\124\165
\147\162\141\040\105\102\107\040\101\056\123\056\061\035\060\033
\006\003\125\004\013\023\024\105\055\124\165\147\162\141\040\124
\162\165\163\164\040\103\145\156\164\145\162\061\046\060\044\006
\003\125\004\003\023\035\105\055\124\165\147\162\141\040\107\154
\157\142\141\154\040\122\157\157\164\040\103\101\040\122\123\101
\040\166\063
END
CKA_ID UTF8 "0"
CKA_ISSUER MULTILINE_OCTAL
\060\201\200\061\013\060\011\006\003\125\004\006\023\002\124\122
\061\017\060\015\006\003\125\004\007\023\006\101\156\153\141\162
\141\061\031\060\027\006\003\125\004\012\023\020\105\055\124\165
\147\162\141\040\105\102\107\040\101\056\123\056\061\035\060\033
\006\003\125\004\013\023\024\105\055\124\165\147\162\141\040\124
\162\165\163\164\040\103\145\156\164\145\162\061\046\060\044\006
\003\125\004\003\023\035\105\055\124\165\147\162\141\040\107\154
\157\142\141\154\040\122\157\157\164\040\103\101\040\122\123\101
\040\166\063
END
CKA_SERIAL_NUMBER
MULTILINE_OCTAL
\002\024\015\115\305\315\026\042\225\226\010\176\270\013\177\025
\006\064\373\171\020\064
END
CKA_VALUE MULTILINE_OCTAL
\060\202\005\363\060\202\003\333\240\003\002\001\002\002\024\015
\115\305\315\026\042\225\226\010\176\270\013\177\025\006\064\373
\171\020\064\060\015\006\011\052\206\110\206\367\015\001\001\013
\005\000\060\201\200\061\013\060\011\006\003\125\004\006\023\002
\124\122\061\017\060\015\006\003\125\004\007\023\006\101\156\153
\141\162\141\061\031\060\027\006\003\125\004\012\023\020\105\055
\124\165\147\162\141\040\105\102\107\040\101\056\123\056\061\035
\060\033\006\003\125\004\013\023\024\105\055\124\165\147\162\141
\040\124\162\165\163\164\040\103\145\156\164\145\162\061\046\060

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\044\006\003\125\004\003\023\035\105\055\124\165\147\162\141\040
\107\154\157\142\141\154\040\122\157\157\164\040\103\101\040\122
\123\101\040\166\063\060\036\027\015\062\060\060\063\061\070\060
\071\060\067\061\067\132\027\015\064\065\060\063\061\062\060\071
\060\067\061\067\132\060\201\200\061\013\060\011\006\003\125\004
\006\023\002\124\122\061\017\060\015\006\003\125\004\007\023\006
\101\156\153\141\162\141\061\031\060\027\006\003\125\004\012\023
\020\105\055\124\165\147\162\141\040\105\102\107\040\101\056\123
\056\061\035\060\033\006\003\125\004\013\023\024\105\055\124\165
\147\162\141\040\124\162\165\163\164\040\103\145\156\164\145\162
\061\046\060\044\006\003\125\004\003\023\035\105\055\124\165\147
\162\141\040\107\154\157\142\141\154\040\122\157\157\164\040\103
\101\040\122\123\101\040\166\063\060\202\002\042\060\015\006\011
\052\206\110\206\367\015\001\001\001\005\000\003\202\002\017\000
\060\202\002\012\002\202\002\001\000\242\146\360\211\267\162\173
\356\011\311\143\322\323\103\335\136\303\246\204\070\112\361\215
\201\273\024\275\107\350\100\027\363\075\303\170\105\162\246\056
\220\336\232\072\324\040\161\312\274\237\035\113\227\012\307\061
\272\076\327\376\045\251\052\216\066\364\321\057\307\267\251\135
\063\334\060\160\370\100\154\113\262\246\061\141\321\064\074\075
\061\172\307\257\304\247\247\204\341\227\244\350\113\366\027\174
\356\074\007\355\342\212\127\334\266\373\370\103\045\120\352\047
\201\250\206\274\217\122\112\226\072\140\032\226\273\375\163\364
\205\375\203\375\177\204\155\064\154\177\152\267\113\001\003\277
\255\151\267\327\062\331\365\127\152\351\206\202\076\245\146\061
\263\026\075\302\363\046\140\062\323\122\036\260\154\244\067\076
\364\365\257\353\341\337\200\006\317\052\101\347\146\011\341\113
\227\347\167\275\041\155\051\266\147\303\055\176\355\326\171\145
\321\317\072\266\321\261\136\126\141\120\172\132\316\116\120\061
\200\003\230\107\347\344\030\174\104\132\306\244\263\073\306\306
\303\072\360\154\303\213\310\244\221\005\363\365\331\266\252\006
\241\267\253\344\261\352\041\024\134\203\244\374\377\266\120\323
\214\022\046\231\166\160\351\300\017\246\164\374\273\320\033\170
\316\162\222\342\050\234\274\346\351\011\330\072\323\211\346\276
\056\167\337\001\012\157\226\366\345\215\074\115\122\166\032\126
\341\163\176\027\254\075\255\154\243\122\022\030\160\346\200\116
\063\362\176\046\062\254\005\215\070\244\346\166\074\237\020\151
\016\155\235\322\301\171\040\153\133\317\063\215\321\224\166\065
\347\135\125\307\267\254\050\253\106\314\347\073\041\265\012\012
\344\112\131\334\201\065\113\104\225\022\012\147\245\241\377\133
\000\007\322\300\314\371\077\374\237\063\362\000\370\214\154\207
\235\006\055\361\357\343\346\006\372\305\146\023\133\374\120\007
\236\161\206\262\332\157\164\060\317\223\123\350\334\042\326\336
\040\037\141\215\243\056\243\170\062\220\154\334\254\062\265\005
\344\365\074\063\015\326\340\207\167\027\114\235\260\330\011\250
\015\127\367\104\205\360\310\004\276\134\135\132\343\027\216\124
\143\151\177\111\164\144\005\214\243\002\003\001\000\001\243\143
\060\141\060\017\006\003\125\035\023\001\001\377\004\005\060\003

\001\001\377\060\037\006\003\125\035\043\004\030\060\026\200\024
\262\264\256\346\055\367\046\325\252\165\055\166\113\300\033\123
\041\320\110\357\060\035\006\003\125\035\016\004\026\004\024\262
\264\256\346\055\367\046\325\252\165\055\166\113\300\033\123\041
\320\110\357\060\016\006\003\125\035\017\001\001\377\004\004\003
\002\001\006\060\015\006\011\052\206\110\206\367\015\001\001\013
\005\000\003\202\002\001\000\211\250\162\177\214\353\316\056\030
\304\020\200\055\020\014\377\373\024\315\004\340\024\074\116\232
\373\237\051\277\042\236\127\271\202\163\022\143\046\265\314\220
\351\322\052\051\356\234\055\314\054\231\276\105\047\344\261\161
\355\344\070\225\061\101\362\175\172\143\170\337\312\066\026\057
\202\210\237\274\021\107\117\166\115\310\055\216\353\337\055\174
\116\073\332\256\366\343\332\135\024\246\256\350\205\104\235\006
\156\216\373\357\172\112\152\055\053\050\030\376\277\220\054\165
\026\237\017\352\226\175\005\356\233\023\245\104\154\370\003\320
\335\043\341\375\003\022\022\010\364\030\064\263\340\067\013\167
\021\001\110\277\141\264\265\370\031\331\313\115\352\243\214\357
\375\360\006\265\155\222\364\112\141\120\204\355\354\111\323\344
\276\150\346\056\343\061\013\124\013\032\222\326\202\330\266\242
\145\074\146\004\371\125\332\154\373\333\265\024\146\115\224\203
\073\315\036\246\053\262\376\167\100\206\253\347\337\012\311\375
\366\335\207\126\030\330\260\054\125\140\226\372\010\176\122\220
\365\113\246\056\207\174\313\040\333\006\076\240\135\003\167\175
\242\074\023\033\051\242\023\125\240\075\024\042\257\157\270\320
\232\033\162\335\005\001\215\206\140\277\244\147\356\265\245\015
\321\177\346\032\053\142\146\303\007\272\347\240\110\034\070\303
\351\105\373\247\177\374\355\002\150\032\312\167\022\167\246\000
\125\050\024\354\326\307\022\242\033\145\102\351\221\350\313\076
\207\211\124\135\331\257\235\227\234\151\347\012\377\017\132\170
\213\143\052\114\175\107\224\077\336\113\351\123\320\060\361\305
\366\236\111\337\073\240\221\243\243\376\315\130\314\352\337\257
\157\050\073\240\151\233\217\354\254\256\053\124\235\233\004\261
\107\040\257\226\022\076\143\224\035\004\347\056\273\206\307\014
\232\210\277\166\107\357\367\260\013\227\146\322\104\317\140\122
\007\341\325\054\112\072\047\141\167\312\327\217\347\207\016\060
\377\014\273\004\342\141\303\242\310\227\141\216\264\060\152\074
\155\302\007\137\112\163\057\077\371\026\212\001\146\357\272\221
\312\122\127\173\256\324\346\017\335\013\172\177\213\236\046\040
\317\073\357\201\161\203\131

END

CKA_NSS_MOZILLA_CA_POLICY

CK_BBOOL CK_TRUE

CKA_NSS_SERVER_DISTRUST_AFTER CK_BBOOL CK_FALSE

CKA_NSS_EMAIL_DISTRUST_AFTER CK_BBOOL CK_FALSE

Trust for "E-Tugra Global Root CA RSA v3"

Issuer: CN=E-Tugra

```
Global Root CA RSA v3,OU=E-Tugra Trust Center,O=E-Tugra EBG A.S.,L=Ankara,C=TR
# Serial Number:0d:4d:c5:cd:16:22:95:96:08:7e:b8:0b:7f:15:06:34:fb:79:10:34
# Subject: CN=E-Tugra Global Root CA RSA v3,OU=E-Tugra Trust Center,O=E-Tugra EBG
A.S.,L=Ankara,C=TR
# Not Valid Before: Wed Mar 18 09:07:17 2020
# Not Valid After : Sun Mar 12 09:07:17 2045
# Fingerprint (SHA-256):
EF:66:B0:B1:0A:3C:DB:9F:2E:36:48:C7:6B:D2:AF:18:EA:D2:BF:E6:F1:17:65:5E:28:C4:06:0D:A1:A3:F4:C2
# Fingerprint (SHA1): E9:A8:5D:22:14:52:1C:5B:AA:0A:B4:BE:24:6A:23:8A:C9:BA:E2:A9
CKA_CLASS CK_OBJECT_CLASS CKO_NSS_TRUST
CKA_TOKEN CK_BBOOL CK_TRUE
CKA_PRIVATE CK_BBOOL CK_FALSE
CKA_MODIFIABLE CK_BBOOL CK_FALSE
CKA_LABEL UTF8 "E-Tugra Global Root CA RSA v3"
CKA_CERT_SHA1_HASH MULTILINE_OCTAL
\351\250\135\042\024\122\034\133\252\012\264\276\044\152\043\212
\311\272\342\251
END
CKA_CERT_MD5_HASH MULTILINE_OCTAL
\042\276\020\366\302\370\003\210\163\137\063\051\107\050\107\244
END
CKA_ISSUER MULTILINE_OCTAL
\060\201\200\061\013\060\011\006\003\125\004\006\023\002\124\122
\061\017\060\015\006\003\125\004\007\023\006\101\156\153\141\162
\141\061\031\060\027\006\003\125\004\012\023\020\105\055\124\165
\147\162\141\040\105\102\107\040\101\056\123\056\061\035\060\033
\006\003\125\004\013\023\024\105\055\124\165\147\162\141\040\124
\162\165\163\164\040\103\145\156\164\145\162\061\046\060\044\006
\003\125\004\003\023\035\105\055\124\165\147\162\141\040\107\154
\157\142\141\154\040\122\157\157\164\040\103\101\040\122\123\101
\040\166\063
END
CKA_SERIAL_NUMBER
MULTILINE_OCTAL
\002\024\015\115\305\315\026\042\225\226\010\176\270\013\177\025
\006\064\373\171\020\064
END
CKA_TRUST_SERVER_AUTH CK_TRUST CKT_NSS_TRUSTED_DELEGATOR
CKA_TRUST_EMAIL_PROTECTION CK_TRUST CKT_NSS_MUST_VERIFY_TRUST
CKA_TRUST_CODE_SIGNING CK_TRUST CKT_NSS_MUST_VERIFY_TRUST
CKA_TRUST_STEP_UP_APPROVED CK_BBOOL CK_FALSE

#
# Certificate "E-Tugra Global Root CA ECC v3"
#
# Issuer: CN=E-Tugra Global Root CA ECC v3,OU=E-Tugra Trust Center,O=E-Tugra EBG
A.S.,L=Ankara,C=TR
# Serial Number:26:46:19:77:31:e1:4f:6f:28:36:de:39:51:86:e6:d4:97:88:22:c1
```

```
# Subject: CN=E-Tugra Global Root CA ECC v3,OU=E-Tugra Trust Center,O=E-Tugra EBG
A.S.,L=Ankara,C=TR
# Not Valid Before: Wed Mar 18 09:46:58 2020
# Not Valid After : Sun Mar 12 09:46:58 2045
# Fingerprint (SHA-256):
87:3F:46:85:FA:7F:56:36:25:25:2E:6D:36:BC:D7:F1:6F:C2:49:51:F2:64:E4:7E:1B:95:4F:49:08:CD:CA:13
# Fingerprint (SHA1): 8A:2F:AF:57:53:B1:B0:E6:A1:04:EC:5B:6A:69:71:6D:F6:1C:E2:84
CKA_CLASS CK_OBJECT_CLASS CKO_CERTIFICATE
CKA_TOKEN CK_BBOOL CK_TRUE
CKA_PRIVATE CK_BBOOL CK_FALSE
CKA_MODIFIABLE CK_BBOOL CK_FALSE
CKA_LABEL UTF8 "E-Tugra Global Root CA ECC v3"
CKA_CERTIFICATE_TYPE CK_CERTIFICATE_TYPE CKC_X_509
CKA_SUBJECT MULTILINE_OCTAL
\060\201\200\061\013\060\011\006\003\125\004\006\023\002\124\122
\061\017\060\015\006\003\125\004\007\023\006\101\156\153\141\162
\141\061\031\060\027\006\003\125\004\012\023\020\105\055\124\165
\147\162\141\040\105\102\107\040\101\056\123\056\061\035\060\033
\006\003\125\004\013\023\024\105\055\124\165\147\162\141\040\124
\162\165\163\164\040\103\145\156\164\145\162\061\046\060\044\006
\003\125\004\003\023\035\105\055\124\165\147\162\141\040\107\154
\157\142\141\154\040\122\157\157\164\040\103\101\040\105\103\103
\040\166\063
END
CKA_ID
UTF8 "0"
CKA_ISSUER MULTILINE_OCTAL
\060\201\200\061\013\060\011\006\003\125\004\006\023\002\124\122
\061\017\060\015\006\003\125\004\007\023\006\101\156\153\141\162
\141\061\031\060\027\006\003\125\004\012\023\020\105\055\124\165
\147\162\141\040\105\102\107\040\101\056\123\056\061\035\060\033
\006\003\125\004\013\023\024\105\055\124\165\147\162\141\040\124
\162\165\163\164\040\103\145\156\164\145\162\061\046\060\044\006
\003\125\004\003\023\035\105\055\124\165\147\162\141\040\107\154
\157\142\141\154\040\122\157\157\164\040\103\101\040\105\103\103
\040\166\063
END
CKA_SERIAL_NUMBER MULTILINE_OCTAL
\002\024\046\106\031\167\061\341\117\157\050\066\336\071\121\206
\346\324\227\210\042\301
END
CKA_VALUE
MULTILINE_OCTAL
\060\202\002\245\060\202\002\052\240\003\002\001\002\002\024\046
\106\031\167\061\341\117\157\050\066\336\071\121\206\346\324\227
\210\042\301\060\012\006\010\052\206\110\316\075\004\003\003\060
\201\200\061\013\060\011\006\003\125\004\006\023\002\124\122\061
\017\060\015\006\003\125\004\007\023\006\101\156\153\141\162\141
```


\061\031\060\027\006\003\125\004\012\023\020\105\055\124\165\147
\162\141\040\105\102\107\040\101\056\123\056\061\035\060\033\006
\003\125\004\013\023\024\105\055\124\165\147\162\141\040\124\162
\165\163\164\040\103\145\156\164\145\162\061\046\060\044\006\003
\125\004\003\023\035\105\055\124\165\147\162\141\040\107\154\157
\142\141\154\040\122\157\157\164\040\103\101\040\105\103\103\040
\166\063\060\036\027\015\062\060\060\063\061\070\060\071\064\066
\065\070\132\027\015\064\065\060\063\061\062\060\071\064\066\065
\070\132\060\201\200\061\013\060\011\006\003\125\004\006\023\002
\124\122\061\017\060\015\006\003\125\004\007\023\006\101\156\153
\141\162\141\061\031\060\027\006\003\125\004\012\023\020\105\055
\124\165\147\162\141\040\105\102\107\040\101\056\123\056\061\035
\060\033\006\003\125\004\013\023\024\105\055\124\165\147\162\141
\040\124\162\165\163\164\040\103\145\156\164\145\162\061\046\060
\044\006\003\125\004\003\023\035\105\055\124\165\147\162\141\040
\107\154\157\142\141\154\040\122\157\157\164\040\103\101\040\105
\103\103\040\166\063\060\166\060\020\006\007\052\206\110\316\075
\002\001\006\005\053\201\004\000\042\003\142\000\004\216\230\051
\277\307\020\036\047\333\253\003\314\050\054\330\136\110\031\020
\051\314\313\131\201\314\214\270\222\027\211\203\052\222\366\303
\244\035\114\142\325\237\326\240\106\334\034\274\166\301\343\107
\320\133\023\332\347\245\263\146\110\347\041\232\112\117\206\012
\175\154\352\115\062\200\012\262\172\011\233\151\113\230\201\342
\056\354\002\160\226\037\375\365\106\316\312\334\202\243\143\060
\141\060\017\006\003\125\035\023\001\001\377\004\005\060\003\001
\001\377\060\037\006\003\125\035\043\004\030\060\026\200\024\377
\202\061\162\076\371\304\146\154\255\070\236\321\260\121\210\245
\220\314\365\060\035\006\003\125\035\016\004\026\004\024\377\202
\061\162\076\371\304\146\154\255\070\236\321\260\121\210\245\220
\314\365\060\016\006\003\125\035\017\001\001\377\004\004\003\002
\001\006\060\012\006\010\052\206\110\316\075\004\003\003\003\151
\000\060\146\002\061\000\346\005\130\151\141\345\055\312\015\313
\361\031\010\275\326\375\121\222\032\176\143\124\004\220\221\232
\065\221\071\231\372\007\251\146\223\272\310\150\324\212\077\372
\355\156\026\002\047\267\002\061\000\335\132\027\053\166\035\145
\102\226\246\254\135\212\171\126\330\212\033\337\232\336\137\307
\120\217\261\133\161\014\046\337\152\100\000\354\063\221\041\161
\276\150\344\043\244\331\255\241\067

END

CKA_NSS_Mozilla_CA_POLICY

CK_BBOOL CK_TRUE

CKA_NSS_SERVER_DISTRUST_AFTER CK_BBOOL CK_FALSE

CKA_NSS_EMAIL_DISTRUST_AFTER CK_BBOOL CK_FALSE

Trust for "E-Tugra Global Root CA ECC v3"

Issuer: CN=E-Tugra Global

Root CA ECC v3,OU=E-Tugra Trust Center,O=E-Tugra EBG A.S.,L=Ankara,C=TR

Serial Number:26:46:19:77:31:e1:4f:6f:28:36:de:39:51:86:e6:d4:97:88:22:c1

```

# Subject: CN=E-Tugra Global Root CA ECC v3,OU=E-Tugra Trust Center,O=E-Tugra EBG
A.S.,L=Ankara,C=TR
# Not Valid Before: Wed Mar 18 09:46:58 2020
# Not Valid After : Sun Mar 12 09:46:58 2045
# Fingerprint (SHA-256):
87:3F:46:85:FA:7F:56:36:25:25:2E:6D:36:BC:D7:F1:6F:C2:49:51:F2:64:E4:7E:1B:95:4F:49:08:CD:CA:13
# Fingerprint (SHA1): 8A:2F:AF:57:53:B1:B0:E6:A1:04:EC:5B:6A:69:71:6D:F6:1C:E2:84
CKA_CLASS CK_OBJECT_CLASS CKO_NSS_TRUST
CKA_TOKEN CK_BBOOL CK_TRUE
CKA_PRIVATE CK_BBOOL CK_FALSE
CKA_MODIFIABLE CK_BBOOL CK_FALSE
CKA_LABEL UTF8 "E-Tugra Global Root CA ECC v3"
CKA_CERT_SHA1_HASH MULTILINE_OCTAL
\212\057\257\127\123\261\260\346\241\004\354\133\152\151\161\155
\366\034\342\204
END
CKA_CERT_MD5_HASH MULTILINE_OCTAL
\106\274\201\273\361\265\036\367\113\226\274\024\342\347\047\144
END
CKA_ISSUER MULTILINE_OCTAL
\060\201\200\061\013\060\011\006\003\125\004\006\023\002\124\122
\061\017\060\015\006\003\125\004\007\023\006\101\156\153\141\162
\141\061\031\060\027\006\003\125\004\012\023\020\105\055\124\165
\147\162\141\040\105\102\107\040\101\056\123\056\061\035\060\033
\006\003\125\004\013\023\024\105\055\124\165\147\162\141\040\124
\162\165\163\164\040\103\145\156\164\145\162\061\046\060\044\006
\003\125\004\003\023\035\105\055\124\165\147\162\141\040\107\154
\157\142\141\154\040\122\157\157\164\040\103\101\040\105\103\103
\040\166\063
END
CKA_SERIAL_NUMBER
MULTILINE_OCTAL
\002\024\046\106\031\167\061\341\117\157\050\066\336\071\121\206
\346\324\227\210\042\301
END
CKA_TRUST_SERVER_AUTH CK_TRUST CKT_NSS_TRUSTED_DELEGATOR
CKA_TRUST_EMAIL_PROTECTION CK_TRUST CKT_NSS_MUST_VERIFY_TRUST
CKA_TRUST_CODE_SIGNING CK_TRUST CKT_NSS_MUST_VERIFY_TRUST
CKA_TRUST_STEP_UP_APPROVED CK_BBOOL CK_FALSE

#
# Certificate "DIGITALSIGN GLOBAL ROOT RSA CA"
#
# Issuer: CN=DIGITALSIGN GLOBAL ROOT RSA CA,O=DigitalSign Certificadora Digital,C=PT
# Serial
Number:5d:59:c8:ca:ab:09:57:f5:e6:b5:da:29:94:04:6a:ff:c5:d4:95:87
# Subject: CN=DIGITALSIGN GLOBAL ROOT RSA CA,O=DigitalSign Certificadora Digital,C=PT
# Not Valid Before: Thu Jan 21 10:50:34 2021

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# Not Valid After : Mon Jan 15 10:50:34 2046
# Fingerprint (SHA-256):
82:BD:5D:85:1A:CF:7F:6E:1B:A7:BF:CB:C5:30:30:D0:E7:BC:3C:21:DF:77:2D:85:8C:AB:41:D1:99:BD:F5:95
# Fingerprint (SHA1): B9:82:07:97:AE:52:A5:68:6F:46:07:DF:FD:03:72:3D:92:86:88:2D
CKA_CLASS CK_OBJECT_CLASS CKO_CERTIFICATE
CKA_TOKEN CK_BBOOL CK_TRUE
CKA_PRIVATE CK_BBOOL CK_FALSE
CKA_MODIFIABLE CK_BBOOL CK_FALSE
CKA_LABEL UTF8 "DIGITALSIGN GLOBAL ROOT RSA CA"
CKA_CERTIFICATE_TYPE CK_CERTIFICATE_TYPE CKC_X_509
CKA_SUBJECT MULTILINE_OCTAL
\060\142\061\013\060\011\006\003\125\004\006\023\002\120\124\061
\052\060\050\006\003\125\004\012\014\041\104\151\147\151\164\141
\154\123\151\147\156\040\103\145\162\164\151\146\151\143\141\144
\157\162\141\040\104\151\147\151\164\141\154\061\047\060\045\006
\003\125\004\003\014\036\104\111\107\111\124\101\114\123\111\107
\116\040\107\114\117\102\101\114\040\122\117\117\124\040\122\123
\101\040\103\101
END
CKA_ID
UTF8 "0"
CKA_ISSUER MULTILINE_OCTAL
\060\142\061\013\060\011\006\003\125\004\006\023\002\120\124\061
\052\060\050\006\003\125\004\012\014\041\104\151\147\151\164\141
\154\123\151\147\156\040\103\145\162\164\151\146\151\143\141\144
\157\162\141\040\104\151\147\151\164\141\154\061\047\060\045\006
\003\125\004\003\014\036\104\111\107\111\124\101\114\123\111\107
\116\040\107\114\117\102\101\114\040\122\117\117\124\040\122\123
\101\040\103\101
END
CKA_SERIAL_NUMBER MULTILINE_OCTAL
\002\024\135\131\310\312\253\011\127\365\346\265\332\051\224\004
\152\377\305\324\225\207
END
CKA_VALUE MULTILINE_OCTAL
\060\202\005\265\060\202\003\235\240\003\002\001\002\002\024\135
\131\310\312\253\011\127\365\346\265\332\051\224\004\152\377\305
\324\225\207\060\015\006\011\052\206\110\206\367\015\001\001\015
\005\000\060\142\061\013\060\011\006\003\125\004\006\023\002\120
\124\061\052\060\050\006\003\125\004\012\014\041\104\151\147\151
\164\141\154\123\151\147\156\040\103\145\162\164\151\146\151\143
\141\144\157\162\141\040\104\151\147\151\164\141\154\061\047\060
\045\006\003\125\004\003\014\036\104\111\107\111\124\101\114\123
\111\107\116\040\107\114\117\102\101\114\040\122\117\117\124\040
\122\123\101\040\103\101\060\036\027\015\062\061\060\061\062\061
\061\060\065\060\063\064\132\027\015\064\066\060\061\061\065\061
\060\065\060\063\064\132\060\142\061\013\060\011\006\003\125\004
\006\023\002\120\124\061\052\060\050\006\003\125\004\012\014\041
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\104\151\147\151\164\141\154\123\151\147\156\040\103\145\162\164
\151\146\151\143\141\144\157\162\141\040\104\151\147\151\164\141
\154\061\047\060\045\006\003\125\004\003\014\036\104\111\107\111
\124\101\114\123\111\107\116\040\107\114\117\102\101\114\040\122
\117\117\124\040\122\123\101\040\103\101\060\202\002\042\060\015
\006\011\052\206\110\206\367\015\001\001\001\005\000\003\202\002
\017\000\060\202\002\012\002\202\002\001\000\310\207\266\070\323
\034\360\336\022\370\203\307\304\212\342\211\270\264\042\172\170
\370\014\146\121\150\166\067\012\325\117\302\132\010\270\026\134
\367\162\001\011\067\204\201\052\124\153\327\222\320\154\372\250
\247\103\022\064\353\016\333\067\017\051\376\212\061\121\102\350
\113\234\220\250\310\054\021\323\375\240\051\176\316\336\224\366
\202\340\130\264\116\105\045\361\042\362\075\323\017\173\124\032
\334\062\266\326\121\116\176\101\264\127\270\054\306\271\016\056
\312\127\361\325\310\323\130\347\245\351\102\021\256\323\040\045
\224\151\327\217\312\242\015\303\323\237\007\150\077\025\322\147
\056\123\375\166\202\233\013\163\251\051\015\236\021\223\024\010
\230\354\236\124\022\112\126\242\006\025\354\153\154\056\222\140
\056\206\015\256\202\037\121\115\343\262\007\327\020\031\127\042
\366\251\151\104\204\363\331\075\240\006\277\314\210\176\177\365
\316\133\245\302\052\152\164\102\352\157\246\377\371\150\261\320
\137\275\221\322\125\157\063\127\114\036\235\344\342\213\301\205
\145\240\340\152\234\000\000\210\222\335\130\010\026\362\160\061
\250\034\341\336\275\116\161\351\326\276\176\265\241\132\303\115
\367\277\233\275\224\244\375\365\252\123\223\106\311\046\001\004
\160\304\240\161\272\316\045\146\373\221\176\125\160\356\111\012
\115\142\177\302\120\232\162\362\030\147\235\351\105\250\064\204
\350\370\201\366\321\132\042\036\007\117\073\263\177\335\021\245
\163\334\276\251\031\072\151\251\155\033\062\342\211\252\245\047
\013\132\176\164\342\017\144\071\135\176\134\271\301\027\374\307
\215\136\311\354\044\355\322\362\077\172\204\105\067\002\276\076
\153\131\304\346\133\026\155\300\252\236\252\265\131\056\054\160
\125\234\314\231\226\230\044\124\321\216\332\312\264\021\264\267
\160\103\037\157\220\013\040\240\250\166\023\145\333\333\043\132
\165\113\241\013\061\167\012\356\175\150\141\032\023\214\352\121
\176\134\126\243\127\114\135\241\353\023\145\277\124\024\314\363
\356\334\327\354\074\227\362\170\126\270\337\162\134\160\374\316
\006\335\237\322\007\061\357\347\122\221\236\315\272\327\300\030
\104\007\061\145\111\062\151\023\112\353\217\002\003\001\000\001
\243\143\060\141\060\017\006\003\125\035\023\001\001\377\004\005
\060\003\001\001\377\060\037\006\003\125\035\043\004\030\060\026
\200\024\265\066\274\074\214\032\253\054\366\131\031\055\203\024
\332\223\045\025\326\206\060\035\006\003\125\035\016\004\026\004
\024\265\066\274\074\214\032\253\054\366\131\031\055\203\024\332
\223\045\025\326\206\060\016\006\003\125\035\017\001\001\377\004
\004\003\002\001\006\060\015\006\011\052\206\110\206\367\015\001
\001\015\005\000\003\202\002\001\000\024\373\061\045\070\061\370
\312\010\262\043\166\070\255\370\323\131\365\314\264\127\045\341

\104\276\176\374\026\354\256\372\046\237\117\147\026\112\126\360
\375\355\307\031\001\064\216\220\132\055\326\200\134\354\161\322
\201\045\202\036\000\161\337\232\321\325\035\042\273\321\245\363
\142\017\264\353\334\044\163\376\246\126\315\232\024\305\004\065
\026\061\242\007\353\245\000\342\266\370\137\162\375\077\141\111
\216\336\176\115\070\327\172\036\164\067\154\121\334\276\000\004
\270\070\024\363\040\301\355\233\247\043\375\015\102\204\035\177
\362\163\303\320\170\143\361\237\354\327\133\351\361\276\154\240
\113\003\236\215\151\341\024\332\210\020\201\043\123\377\332\124
\053\013\306\271\226\225\004\030\106\363\173\250\227\330\133\150
\244\344\070\034\016\105\345\230\323\011\256\232\136\354\263\171
\015\071\162\362\364\224\235\016\236\140\042\346\250\366\114\205
\315\007\202\072\150\071\315\075\137\343\070\364\266\257\073\153
\112\237\140\121\105\242\100\002\345\252\014\343\076\321\170\324
\242\164\234\046\272\005\232\050\160\112\076\246\013\320\035\111
\360\272\370\256\101\020\176\244\007\022\275\250\317\051\075\127
\273\307\361\103\107\000\076\256\160\030\132\040\173\011\313\072
\072\160\200\345\114\140\230\301\025\301\035\112\367\310\360\233
\341\162\255\347\135\150\130\013\004\261\214\274\237\267\373\156
\213\133\004\125\373\353\043\125\327\170\120\332\045\313\276\047
\066\273\044\032\171\034\121\321\376\023\273\377\170\054\334\244
\276\057\366\305\113\123\317\247\114\231\136\160\254\131\210\004
\256\144\004\277\173\246\172\115\323\350\167\275\241\176\120\025
\363\357\111\060\205\115\041\127\252\333\054\165\227\255\201\001
\207\242\261\160\235\036\006\132\003\140\261\077\246\155\202\054
\324\024\261\201\245\350\075\210\035\264\162\054\130\067\212\216
\070\224\270\163\335\251\340\270\366\167\242\263\174\130\336\256
\151\072\265\213\245\032\273\362\330\164\006\234\375\142\163\040
\041\166\261\176\160\236\031\324\353\027\142\031\070\231\315\066
\053\107\376\061\313\337\271\344\254\010\323\330\246\353\324\236
\176\113\144\244\125\135\053\027\311

END

CKA_NSS_MOZILLA_CA_POLICY

CK_BBOOL CK_TRUE

CKA_NSS_SERVER_DISTRUST_AFTER CK_BBOOL CK_FALSE

CKA_NSS_EMAIL_DISTRUST_AFTER CK_BBOOL CK_FALSE

Trust for "DIGITALSIGN GLOBAL ROOT RSA CA"

Issuer: CN=DIGITALSIGN GLOBAL ROOT RSA CA,O=DigitalSign Certificadora Digital,C=PT

Serial Number:5d:59:c8:ca:ab:09:57:f5:e6:b5:da:29:94:04:6a:ff:c5:d4:95:87

#

Subject: CN=DIGITALSIGN GLOBAL ROOT RSA CA,O=DigitalSign Certificadora Digital,C=PT

Not Valid Before: Thu Jan 21 10:50:34 2021

Not Valid After : Mon Jan 15 10:50:34 2046

Fingerprint (SHA-256):

82:BD:5D:85:1A:CF:7F:6E:1B:A7:BF:CB:C5:30:30:D0:E7:BC:3C:21:DF:77:2D:85:8C:AB:41:D1:99:BD:F5:95

Fingerprint (SHA1): B9:82:07:97:AE:52:A5:68:6F:46:07:DF:FD:03:72:3D:92:86:88:2D

CKA_CLASS CK_OBJECT_CLASS CKO_NSS_TRUST

```

CKA_TOKEN CK_BBOOL CK_TRUE
CKA_PRIVATE CK_BBOOL CK_FALSE
CKA_MODIFIABLE CK_BBOOL CK_FALSE
CKA_LABEL UTF8 "DIGITALSIGN GLOBAL ROOT RSA CA"
CKA_CERT_SHA1_HASH MULTILINE_OCTAL
\271\202\007\227\256\122\245\150\157\106\007\337\375\003\162\075
\222\206\210\055
END
CKA_CERT_MD5_HASH MULTILINE_OCTAL
\033\032\275\032\171\306\333\264\355\263\207\314\251\323\116\170
END
CKA_ISSUER MULTILINE_OCTAL
\060\142\061\013\060\011\006\003\125\004\006\023\002\120\124\061
\052\060\050\006\003\125\004\012\014\041\104\151\147\151\164\141
\154\123\151\147\156\040\103\145\162\164\151\146\151\143\141\144
\157\162\141\040\104\151\147\151\164\141\154\061\047\060\045\006
\003\125\004\003\014\036\104\111\107\111\124\101\114\123\111\107
\116\040\107\114\117\102\101\114\040\122\117\117\124\040\122\123
\101\040\103\101
END
CKA_SERIAL_NUMBER
MULTILINE_OCTAL
\002\024\135\131\310\312\253\011\127\365\346\265\332\051\224\004
\152\377\305\324\225\207
END
CKA_TRUST_SERVER_AUTH CK_TRUST CKT_NSS_MUST_VERIFY_TRUST
CKA_TRUST_EMAIL_PROTECTION CK_TRUST CKT_NSS_TRUSTED_DELEGATOR
CKA_TRUST_CODE_SIGNING CK_TRUST CKT_NSS_MUST_VERIFY_TRUST
CKA_TRUST_STEP_UP_APPROVED CK_BBOOL CK_FALSE

#
# Certificate "DIGITALSIGN GLOBAL ROOT ECDSA CA"
#
# Issuer: CN=DIGITALSIGN GLOBAL ROOT ECDSA CA,O=DigitalSign Certificadora Digital,C=PT
# Serial Number:36:2d:8f:72:88:a2:28:27:e4:00:ff:24:c6:2d:e4:eb:fa:9d:b6:e1
# Subject: CN=DIGITALSIGN GLOBAL ROOT ECDSA CA,O=DigitalSign Certificadora Digital,C=PT
# Not Valid Before: Thu Jan 21 11:07:50 2021
# Not Valid After : Mon Jan 15 11:07:50 2046
# Fingerprint
(SHA-256):
26:1D:71:14:AE:5F:8F:F2:D8:C7:20:9A:9D:E4:28:9E:6A:FC:9D:71:70:23:D8:54:50:90:91:99:F1:85:7C:FE
# Fingerprint (SHA1): 67:A8:08:EB:8F:88:F5:80:6C:05:45:1B:17:F3:D7:00:2F:D2:4A:8A
CKA_CLASS CK_OBJECT_CLASS CKO_CERTIFICATE
CKA_TOKEN CK_BBOOL CK_TRUE
CKA_PRIVATE CK_BBOOL CK_FALSE
CKA_MODIFIABLE CK_BBOOL CK_FALSE
CKA_LABEL UTF8 "DIGITALSIGN GLOBAL ROOT ECDSA CA"
CKA_CERTIFICATE_TYPE CK_CERTIFICATE_TYPE CKC_X_509

```

CKA_SUBJECT MULTILINE_OCTAL
\\060\\144\\061\\013\\060\\011\\006\\003\\125\\004\\006\\023\\002\\120\\124\\061
\\052\\060\\050\\006\\003\\125\\004\\012\\014\\041\\104\\151\\147\\151\\164\\141
\\154\\123\\151\\147\\156\\040\\103\\145\\162\\164\\151\\146\\151\\143\\141\\144
\\157\\162\\141\\040\\104\\151\\147\\151\\164\\141\\154\\061\\051\\060\\047\\006
\\003\\125\\004\\003\\014\\040\\104\\111\\107\\111\\124\\101\\114\\123\\111\\107
\\116\\040\\107\\114\\117\\102\\101\\114\\040\\122\\117\\117\\124\\040\\105\\103
\\104\\123\\101\\040\\103\\101
END
CKA_ID UTF8 "0"
CKA_ISSUER MULTILINE_OCTAL
\\060\\144\\061\\013\\060\\011\\006\\003\\125\\004\\006\\023\\002\\120\\124\\061
\\052\\060\\050\\006\\003\\125\\004\\012\\014\\041\\104\\151\\147\\151\\164\\141
\\154\\123\\151\\147\\156\\040\\103\\145\\162\\164\\151\\146\\151\\143\\141\\144
\\157\\162\\141\\040\\104\\151\\147\\151\\164\\141\\154\\061\\051\\060\\047\\006
\\003\\125\\004\\003\\014\\040\\104\\111\\107\\111\\124\\101\\114\\123\\111\\107
\\116\\040\\107\\114\\117\\102\\101\\114\\040\\122\\117\\117\\124\\040\\105\\103
\\104\\123\\101\\040\\103\\101
END
CKA_SERIAL_NUMBER
MULTILINE_OCTAL
\\002\\024\\066\\055\\217\\162\\210\\242\\050\\047\\344\\000\\377\\044\\306\\055
\\344\\353\\372\\235\\266\\341
END
CKA_VALUE MULTILINE_OCTAL
\\060\\202\\002\\152\\060\\202\\001\\360\\240\\003\\002\\001\\002\\002\\024\\066
\\055\\217\\162\\210\\242\\050\\047\\344\\000\\377\\044\\306\\055\\344\\353\\372
\\235\\266\\341\\060\\012\\006\\010\\052\\206\\110\\316\\075\\004\\003\\003\\060
\\144\\061\\013\\060\\011\\006\\003\\125\\004\\006\\023\\002\\120\\124\\061\\052
\\060\\050\\006\\003\\125\\004\\012\\014\\041\\104\\151\\147\\151\\164\\141\\154
\\123\\151\\147\\156\\040\\103\\145\\162\\164\\151\\146\\151\\143\\141\\144\\157
\\162\\141\\040\\104\\151\\147\\151\\164\\141\\154\\061\\051\\060\\047\\006\\003
\\125\\004\\003\\014\\040\\104\\111\\107\\111\\124\\101\\114\\123\\111\\107\\116
\\040\\107\\114\\117\\102\\101\\114\\040\\122\\117\\117\\124\\040\\105\\103\\104
\\123\\101\\040\\103\\101\\060\\036\\027\\015\\062\\061\\060\\061\\062\\061\\061
\\061\\060\\067\\065\\060\\132\\027\\015\\064\\066\\060\\061\\061\\065\\061\\061
\\060\\067\\065\\060\\132\\060\\144\\061\\013\\060\\011\\006\\003\\125\\004\\006
\\023\\002\\120\\124\\061\\052\\060\\050\\006\\003\\125\\004\\012\\014\\041\\104
\\151\\147\\151\\164\\141\\154\\123\\151\\147\\156\\040\\103\\145\\162\\164\\151
\\146\\151\\143\\141\\144\\157\\162\\141\\040\\104\\151\\147\\151\\164\\141\\154
\\061\\051\\060\\047\\006\\003\\125\\004\\003\\014\\040\\104\\111\\107\\111\\124
\\101\\114\\123\\111\\107\\116\\040\\107\\114\\117\\102\\101\\114\\040\\122\\117
\\117\\124\\040\\105\\103\\104\\123\\101\\040\\103\\101\\060\\166\\060\\020\\006
\\007\\052\\206\\110\\316\\075\\002\\001\\006\\005\\053\\201\\004\\000\\042\\003
\\142\\000\\004\\156\\013\\243\\253\\063\\115\\034\\352\\112\\350\\374\\004\\215
\\024\\240\\175\\360\\010\\054\\137\\203\\253\\223\\321\\322\\173\\272\\327\\111
\\175\\217\\354\\022\\120\\137\\324\\271\\313\\345\\360\\371\\063\\143\\037\\311
\\127\\354\\100\\330\\021\\013\\227\\350\\122\\026\\314\\051\\216\\364\\006\\206

```
\036\070\334\075\127\304\356\252\275\310\124\004\046\132\047\023
\121\107\075\037\037\032\216\250\225\244\063\320\314\107\314\155
\270\374\110\243\143\060\141\060\017\006\003\125\035\023\001\001
\377\004\005\060\003\001\001\377\060\037\006\003\125\035\043\004
\030\060\026\200\024\316\257\112\213\032\165\342\361\070\347\002
\360\026\255\136\352\144\325\173\264\060\035\006\003\125\035\016
\004\026\004\024\316\257\112\213\032\165\342\361\070\347\002\360
\026\255\136\352\144\325\173\264\060\016\006\003\125\035\017\001
\001\377\004\004\003\002\001\006\060\012\006\010\052\206\110\316
\075\004\003\003\003\150\000\060\145\002\060\012\210\304\161\234
\104\003\115\215\264\307\274\250\256\331\060\047\065\152\153\026
\143\327\374\347\131\341\247\211\033\114\061\232\043\125\104\346
\363\103\041\325\107\047\157\155\127\001\252\002\061\000\373\262
\352\342\227\177\121\265\237\110\353\274\157\065\211\250\144\160
\253\127\166\315\300\306\024\140\312\177\342\202\000\163\367\314
\065\352\216\044\233\345\010\131\307\004\214\163\170\376
```

END

CKA_NSS_Mozilla_CA_POLICY

CK_BBOOL CK_TRUE

CKA_NSS_SERVER_DISTRUST_AFTER CK_BBOOL CK_FALSE

CKA_NSS_EMAIL_DISTRUST_AFTER CK_BBOOL CK_FALSE

Trust for "DIGITALSIGN GLOBAL ROOT ECDSA CA"

Issuer: CN=DIGITALSIGN GLOBAL ROOT ECDSA CA,O=DigitalSign Certificadora Digital,C=PT

Serial Number:36:2d:8f:72:88:a2:28:27:e4:00:ff:24:c6:2d:e4:eb:fa:9d:b6:e1

Subject: CN=DIGITALSIGN GLOBAL ROOT ECDSA CA,O=DigitalSign Certificadora Digital,C=PT

Not Valid Before: Thu Jan 21 11:07:50 2021

Not Valid After : Mon Jan 15 11:07:50 2046

Fingerprint (SHA-256):

26:1D:71:14:AE:5F:8F:F2:D8:C7:20:9A:9D:E4:28:9E:6A:FC:9D:71:70:23:D8:54:50:90:91:99:F1:85:7C:FE

Fingerprint (SHA1): 67:A8:08:EB:8F:88:F5:80:6C:05:45:1B:17:F3:D7:00:2F:D2:4A:8A

CKA_CLASS CK_OBJECT_CLASS CKO_NSS_TRUST

CKA_TOKEN CK_BBOOL CK_TRUE

CKA_PRIVATE CK_BBOOL CK_FALSE

CKA_MODIFIABLE CK_BBOOL CK_FALSE

CKA_LABEL UTF8 "DIGITALSIGN GLOBAL ROOT ECDSA CA"

CKA_CERT_SHA1_HASH MULTILINE_OCTAL

```
\147\250\010\353\217\210\365\200\154\005\105\033\027\363\327\000
\057\322\112\212
```

END

CKA_CERT_MD5_HASH

MULTILINE_OCTAL

```
\252\055\241\316\377\041\302\210\313\132\036\214\341\311\222\217
END
```

CKA_ISSUER MULTILINE_OCTAL

```
\060\144\061\013\060\011\006\003\125\004\006\023\002\120\124\061
\052\060\050\006\003\125\004\012\014\041\104\151\147\151\164\141
\154\123\151\147\156\040\103\145\162\164\151\146\151\143\141\144
```



```

\157\162\141\040\104\151\147\151\164\141\154\061\051\060\047\006
\003\125\004\003\014\040\104\111\107\111\124\101\114\123\111\107
\116\040\107\114\117\102\101\114\040\122\117\117\124\040\105\103
\104\123\101\040\103\101
END
CKA_SERIAL_NUMBER MULTILINE_OCTAL
\002\024\066\055\217\162\210\242\050\047\344\000\377\044\306\055
\344\353\372\235\266\341
END
CKA_TRUST_SERVER_AUTH CK_TRUST CKT_NSS_MUST_VERIFY_TRUST
CKA_TRUST_EMAIL_PROTECTION CK_TRUST CKT_NSS_TRUSTED_DELEGATOR
CKA_TRUST_CODE_SIGNING CK_TRUST CKT_NSS_MUST_VERIFY_TRUST
CKA_TRUST_STEP_UP_APPROVED CK_BBOOL CK_FALSE

#
# Certificate "Security Communication RootCA3"
#
#
Issuer: CN=Security Communication RootCA3,O="SECOM Trust Systems CO.,LTD.",C=JP
# Serial Number:00:e1:7c:37:40:fd:1b:fe:67
# Subject: CN=Security Communication RootCA3,O="SECOM Trust Systems CO.,LTD.",C=JP
# Not Valid Before: Thu Jun 16 06:17:16 2016
# Not Valid After : Mon Jan 18 06:17:16 2038
# Fingerprint (SHA-256):
24:A5:5C:2A:B0:51:44:2D:06:17:76:65:41:23:9A:4A:D0:32:D7:C5:51:75:AA:34:FF:DE:2F:BC:4F:5C:52:94
# Fingerprint (SHA1): C3:03:C8:22:74:92:E5:61:A2:9C:5F:79:91:2B:1E:44:13:91:30:3A
CKA_CLASS CK_OBJECT_CLASS CKO_CERTIFICATE
CKA_TOKEN CK_BBOOL CK_TRUE
CKA_PRIVATE CK_BBOOL CK_FALSE
CKA_MODIFIABLE CK_BBOOL CK_FALSE
CKA_LABEL UTF8 "Security Communication RootCA3"
CKA_CERTIFICATE_TYPE CK_CERTIFICATE_TYPE CKC_X_509
CKA_SUBJECT MULTILINE_OCTAL
\060\135\061\013\060\011\006\003\125\004\006\023\002\112\120\061
\045\060\043\006\003\125\004\012\023\034\123\105\103\117\115\040
\124\162\165\163\164\040\123\171\163\164\145\155\163\040\103\117
\056\054\114\124\104\056\061\047\060\045\006\003\125\004\003\023
\036\123\145\143\165\162\151\164\171\040\103\157\155\155\165\156
\151\143\141\164\151\157\156\040\122\157\157\164\103\101\063
END
CKA_ID
UTF8 "0"
CKA_ISSUER MULTILINE_OCTAL
\060\135\061\013\060\011\006\003\125\004\006\023\002\112\120\061
\045\060\043\006\003\125\004\012\023\034\123\105\103\117\115\040
\124\162\165\163\164\040\123\171\163\164\145\155\163\040\103\117
\056\054\114\124\104\056\061\047\060\045\006\003\125\004\003\023
\036\123\145\143\165\162\151\164\171\040\103\157\155\155\165\156

```

\151\143\141\164\151\157\156\040\122\157\157\164\103\101\063
END
CKA_SERIAL_NUMBER MULTILINE_OCTAL
\002\011\000\341\174\067\100\375\033\376\147
END
CKA_VALUE MULTILINE_OCTAL
\060\202\005\177\060\202\003\147\240\003\002\001\002\002\011\000
\341\174\067\100\375\033\376\147\060\015\006\011\052\206\110\206
\367\015\001\001\014\005\000\060\135\061\013\060\011\006\003\125
\004\006\023\002\112\120\061\045\060\043\006\003\125\004\012\023
\034\123\105\103\117\115\040\124\162\165\163\164\040\123\171\163
\164\145\155\163\040\103\117\056\054\114\124\104\056\061\047\060
\045\006\003\125\004\003\023\036\123\145\143\165\162\151\164\171
\040\103\157\155\155\165\156\151\143\141\164\151\157\156\040\122
\157\157\164\103\101\063\060\036\027\015\061\066\060\066\061\066
\060\066\061\067\061\066\132\027\015\063\070\060\061\061\070\060
\066\061\067\061\066\132\060\135\061\013\060\011\006\003\125\004
\006\023\002\112\120\061\045\060\043\006\003\125\004\012\023\034
\123\105\103\117\115\040\124\162\165\163\164\040\123\171\163\164
\145\155\163\040\103\117\056\054\114\124\104\056\061\047\060\045
\006\003\125\004\003\023\036\123\145\143\165\162\151\164\171\040
\103\157\155\155\165\156\151\143\141\164\151\157\156\040\122\157
\157\164\103\101\063\060\202\002\042\060\015\006\011\052\206\110
\206\367\015\001\001\001\005\000\003\202\002\017\000\060\202\002
\012\002\202\002\001\000\343\311\162\111\367\060\336\011\174\251
\100\201\130\323\264\072\335\272\141\017\223\120\156\151\074\065
\302\356\133\163\220\033\147\114\041\354\137\065\273\071\076\053
\012\140\357\273\155\053\206\373\161\242\310\254\344\126\224\371
\311\257\261\162\324\040\254\164\322\270\025\255\121\376\205\164
\241\271\020\376\005\200\371\122\223\263\100\075\165\020\254\300
\226\267\247\176\166\274\343\033\122\031\316\021\037\013\004\064
\365\330\365\151\074\167\363\144\364\015\252\205\336\340\011\120
\004\027\226\204\267\310\212\274\115\162\374\034\273\317\363\006
\115\371\237\144\367\176\246\146\206\065\161\310\021\200\114\301
\161\100\130\036\276\240\163\366\374\076\120\341\340\057\046\075
\176\134\043\265\171\160\336\372\340\321\245\326\014\101\161\173
\367\352\214\034\210\307\354\213\365\321\057\125\226\106\174\132
\073\130\073\373\272\330\055\265\045\332\172\116\317\104\256\041
\246\236\230\312\040\156\174\273\210\205\133\373\300\020\142\273
\362\371\047\107\357\321\211\071\103\304\337\336\341\101\277\124
\163\040\227\055\154\332\363\324\007\243\346\271\330\157\256\374
\214\031\056\323\147\147\053\225\333\130\134\265\152\002\363\270
\203\136\264\153\276\101\176\127\011\165\104\120\125\315\132\021
\141\041\012\141\302\251\210\375\023\274\055\211\057\315\141\340
\225\276\312\265\173\341\173\064\147\013\037\266\014\307\174\036
\031\123\312\247\261\112\025\040\126\024\160\075\053\202\054\017
\235\025\035\107\200\107\377\170\231\016\061\257\157\076\217\355
\206\151\036\173\030\210\024\262\302\374\202\063\056\234\113\055

\373\160\073\161\252\053\173\046\047\363\032\302\334\373\027\270
\241\352\313\240\264\256\323\224\176\172\320\253\303\354\070\055
\021\056\210\277\324\077\255\022\073\102\254\217\002\156\175\314
\321\137\141\276\241\274\072\152\110\352\046\125\042\026\135\137
\015\377\047\063\237\030\003\164\212\133\122\040\107\153\105\115
\042\167\214\125\047\360\257\036\214\311\203\042\124\267\232\320
\117\331\316\374\331\056\034\226\050\261\002\323\003\275\045\122
\034\064\146\117\043\253\364\167\202\226\035\321\127\060\010\021
\005\375\127\321\331\307\002\003\001\000\001\243\102\060\100\060
\035\006\003\125\035\016\004\026\004\024\144\024\174\374\130\162
\026\246\012\051\064\025\157\052\313\274\374\257\250\253\060\016
\006\003\125\035\017\001\001\377\004\004\003\002\001\006\060\017
\006\003\125\035\023\001\001\377\004\005\060\003\001\001\377\060
\015\006\011\052\206\110\206\367\015\001\001\014\005\000\003\202
\002\001\000\334\002\043\010\342\357\041\072\307\015\267\046\322
\142\223\247\245\043\162\007\040\202\140\337\030\327\124\255\151
\045\222\236\331\024\317\231\271\122\201\317\256\154\212\073\132
\071\310\154\001\103\302\042\155\002\360\142\315\116\143\103\300
\024\332\364\143\360\352\364\161\356\116\207\343\161\251\364\311
\127\345\056\137\034\171\273\043\252\207\104\127\351\275\065\115
\101\273\113\050\243\230\262\033\331\013\027\007\345\367\352\235
\365\166\327\277\304\266\201\130\377\310\377\144\151\142\171\255
\156\016\037\177\356\035\151\345\267\162\161\263\376\245\001\065
\224\124\053\300\122\155\217\125\304\311\322\270\313\312\064\010
\121\205\240\365\274\264\027\130\352\012\134\172\275\143\306\072
\057\377\226\111\031\204\352\147\330\004\261\141\364\000\133\112
\267\234\161\067\031\205\171\277\201\260\307\023\016\166\161\076
\072\200\006\256\006\026\247\215\265\302\304\313\377\100\245\134
\215\245\311\072\355\162\201\312\134\230\074\322\064\003\167\010
\375\360\051\131\135\041\010\307\140\277\244\161\173\270\331\036
\202\276\011\257\145\157\050\253\277\113\265\356\076\010\107\047
\240\017\157\017\213\077\254\225\030\363\271\016\334\147\125\156
\142\236\106\016\321\004\170\312\162\256\166\331\245\370\262\337
\210\011\141\213\357\044\116\321\131\077\132\324\075\311\223\074
\053\144\365\201\015\026\226\367\222\303\376\061\157\350\052\062
\164\016\364\114\230\112\030\016\060\124\325\305\353\274\305\025
\236\350\231\041\353\047\053\011\012\333\361\346\160\030\126\273
\014\344\276\371\350\020\244\023\222\270\034\340\333\147\035\123
\003\244\042\247\334\135\222\020\074\352\377\374\033\020\032\303
\330\320\234\235\145\313\320\053\047\061\003\036\066\341\075\166
\165\014\377\105\046\271\335\121\274\043\307\137\330\330\207\020
\100\022\015\075\070\067\347\104\074\030\300\123\011\144\217\377
\325\232\246\174\160\056\163\125\041\350\337\377\203\271\035\076
\062\036\326\246\175\054\361\146\351\134\035\247\243\316\136\045
\062\053\343\225\254\052\007\316\264\050\170\206\074\055\246\235
\115\322\164\060\335\144\121\025\333\203\203\121\327\257\375\063
\235\115\146

END

```

CKA_NSS_Mozilla_CA_POLICY
CK_BBOOL CK_TRUE
CKA_NSS_SERVER_DISTRUST_AFTER CK_BBOOL CK_FALSE
CKA_NSS_EMAIL_DISTRUST_AFTER CK_BBOOL CK_FALSE

# Trust for "Security Communication RootCA3"
# Issuer: CN=Security Communication RootCA3,O="SECOM Trust Systems CO.,LTD.",C=JP
# Serial Number:00:e1:7c:37:40:fd:1b:fe:67
# Subject: CN=Security Communication RootCA3,O="SECOM Trust Systems CO.,LTD.",C=JP
# Not Valid Before: Thu Jun 16 06:17:16 2016
# Not Valid After : Mon Jan 18 06:17:16 2038
# Fingerprint (SHA-256):
24:A5:5C:2A:B0:51:44:2D:06:17:76:65:41:23:9A:4A:D0:32:D7:C5:51:75:AA:34:FF:DE:2F:BC:4F:5C:52:94
#
Fingerprint (SHA1): C3:03:C8:22:74:92:E5:61:A2:9C:5F:79:91:2B:1E:44:13:91:30:3A
CKA_CLASS CK_OBJECT_CLASS CKO_NSS_TRUST
CKA_TOKEN CK_BBOOL CK_TRUE
CKA_PRIVATE CK_BBOOL CK_FALSE
CKA_MODIFIABLE CK_BBOOL CK_FALSE
CKA_LABEL UTF8 "Security Communication RootCA3"
CKA_CERT_SHA1_HASH MULTILINE_OCTAL
\303\003\310\042\164\222\345\141\242\234\137\171\221\053\036\104
\023\221\060\072
END
CKA_CERT_MD5_HASH MULTILINE_OCTAL
\034\232\026\377\236\134\340\115\212\024\001\364\065\135\051\046
END
CKA_ISSUER MULTILINE_OCTAL
\060\135\061\013\060\011\006\003\125\004\006\023\002\112\120\061
\045\060\043\006\003\125\004\012\023\034\123\105\103\117\115\040
\124\162\165\163\164\040\123\171\163\164\145\155\163\040\103\117
\056\054\114\124\104\056\061\047\060\045\006\003\125\004\003\023
\036\123\145\143\165\162\151\164\171\040\103\157\155\155\165\156
\151\143\141\164\151\157\156\040\122\157\157\164\103\101\063
END
CKA_SERIAL_NUMBER MULTILINE_OCTAL
\002\011\000\341\174\067\100\375\033\376\147
END
CKA_TRUST_SERVER_AUTH
CK_TRUST CKT_NSS_TRUSTED_DELEGATOR
CKA_TRUST_EMAIL_PROTECTION CK_TRUST CKT_NSS_TRUSTED_DELEGATOR
CKA_TRUST_CODE_SIGNING CK_TRUST CKT_NSS_MUST_VERIFY_TRUST
CKA_TRUST_STEP_UP_APPROVED CK_BBOOL CK_FALSE

#
# Certificate "Security Communication ECC RootCA1"
#
# Issuer: CN=Security Communication ECC RootCA1,O="SECOM Trust Systems CO.,LTD.",C=JP

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```
# Serial Number:00:d6:5d:9b:b3:78:81:2e:eb
# Subject: CN=Security Communication ECC RootCA1,O="SECOM Trust Systems CO.,LTD.",C=JP
# Not Valid Before: Thu Jun 16 05:15:28 2016
# Not Valid After : Mon Jan 18 05:15:28 2038
# Fingerprint (SHA-256):
E7:4F:BD:A5:5B:D5:64:C4:73:A3:6B:44:1A:A7:99:C8:A6:8E:07:74:40:E8:28:8B:9F:A1:E5:0E:4B:BA:CA:11
# Fingerprint (SHA1): B8:0E:26:A9:BF:D2:B2:3B:C0:EF:46:C9:BA:C7:BB:F6:1D:0D:41:41
CKA_CLASS CK_OBJECT_CLASS CKO_CERTIFICATE
CKA_TOKEN CK_BBOOL CK_TRUE
CKA_PRIVATE CK_BBOOL CK_FALSE
CKA_MODIFIABLE CK_BBOOL CK_FALSE
CKA_LABEL UTF8 "Security Communication ECC RootCA1"
CKA_CERTIFICATE_TYPE
CK_CERTIFICATE_TYPE CKC_X_509
CKA_SUBJECT MULTILINE_OCTAL
\060\141\061\013\060\011\006\003\125\004\006\023\002\112\120\061
\045\060\043\006\003\125\004\012\023\034\123\105\103\117\115\040
\124\162\165\163\164\040\123\171\163\164\145\155\163\040\103\117
\056\054\114\124\104\056\061\053\060\051\006\003\125\004\003\023
\042\123\145\143\165\162\151\164\171\040\103\157\155\155\165\156
\151\143\141\164\151\157\156\040\105\103\103\040\122\157\157\164
\103\101\061
END
CKA_ID UTF8 "0"
CKA_ISSUER MULTILINE_OCTAL
\060\141\061\013\060\011\006\003\125\004\006\023\002\112\120\061
\045\060\043\006\003\125\004\012\023\034\123\105\103\117\115\040
\124\162\165\163\164\040\123\171\163\164\145\155\163\040\103\117
\056\054\114\124\104\056\061\053\060\051\006\003\125\004\003\023
\042\123\145\143\165\162\151\164\171\040\103\157\155\155\165\156
\151\143\141\164\151\157\156\040\105\103\103\040\122\157\157\164
\103\101\061
END
CKA_SERIAL_NUMBER MULTILINE_OCTAL
\002\011\000\326\135\233\263\170\201\056\353
END
CKA_VALUE
MULTILINE_OCTAL
\060\202\002\070\060\202\001\276\240\003\002\001\002\002\011\000
\326\135\233\263\170\201\056\353\060\012\006\010\052\206\110\316
\075\004\003\003\060\141\061\013\060\011\006\003\125\004\006\023
\002\112\120\061\045\060\043\006\003\125\004\012\023\034\123\105
\103\117\115\040\124\162\165\163\164\040\123\171\163\164\145\155
\163\040\103\117\056\054\114\124\104\056\061\053\060\051\006\003
\125\004\003\023\042\123\145\143\165\162\151\164\171\040\103\157
\155\155\165\156\151\143\141\164\151\157\156\040\105\103\103\040
\122\157\157\164\103\101\061\060\036\027\015\061\066\060\066\061
\066\060\065\061\065\062\070\132\027\015\063\070\060\061\061\070
```

\060\065\061\065\062\070\132\060\141\061\013\060\011\006\003\125
\004\006\023\002\112\120\061\045\060\043\006\003\125\004\012\023
\034\123\105\103\117\115\040\124\162\165\163\164\040\123\171\163
\164\145\155\163\040\103\117\056\054\114\124\104\056\061\053\060
\051\006\003\125\004\003\023\042\123\145\143\165\162\151\164\171
\040\103\157\155\155\165\156\151\143\141\164\151\157\156\040\105
\103\103\040\122\157\157\164\103\101\061\060\166\060\020\006\007
\052\206\110\316\075\002\001\006\005\053\201\004\000\042\003\142
\000\004\244\245\157\140\003\003\303\275\061\364\323\027\234\053
\204\165\254\345\375\075\127\156\327\143\277\346\004\211\222\216
\201\234\343\351\107\156\312\220\022\310\023\340\247\235\367\145
\164\037\154\020\262\350\344\351\357\155\205\062\231\104\261\136
\375\314\166\020\330\133\275\242\306\371\326\102\344\127\166\334
\220\302\065\251\113\210\074\022\107\155\134\377\111\117\032\112
\120\261\243\102\060\100\060\035\006\003\125\035\016\004\026\004
\024\206\034\347\376\055\245\112\213\010\376\050\021\372\276\243
\146\370\140\131\057\060\016\006\003\125\035\017\001\001\377\004
\004\003\002\001\006\060\017\006\003\125\035\023\001\001\377\004
\005\060\003\001\001\377\060\012\006\010\052\206\110\316\075\004
\003\003\003\150\000\060\145\002\060\025\135\102\075\374\266\356
\367\073\261\066\350\236\366\304\106\050\111\063\320\130\103\052
\143\051\314\115\261\264\172\242\271\015\070\245\135\110\052\375
\313\262\163\135\243\210\010\307\014\002\061\000\300\253\055\016
\155\355\030\242\333\123\351\045\333\125\010\340\120\314\337\104
\141\026\202\253\111\260\262\201\354\163\207\170\264\114\262\142
\033\022\372\026\115\045\113\143\275\036\067\331

END

CKA_NSS_MOZILLA_CA_POLICY

CK_BBOOL CK_TRUE

CKA_NSS_SERVER_DISTRUST_AFTER CK_BBOOL CK_FALSE

CKA_NSS_EMAIL_DISTRUST_AFTER CK_BBOOL CK_FALSE

Trust for "Security Communication ECC RootCA1"

Issuer: CN=Security Communication ECC RootCA1,O="SECOM Trust Systems CO.,LTD.",C=JP

Serial Number:00:d6:5d:9b:b3:78:81:2e:eb

Subject: CN=Security Communication ECC RootCA1,O="SECOM Trust Systems CO.,LTD.",C=JP

Not Valid Before: Thu Jun 16 05:15:28 2016

Not Valid After : Mon Jan 18 05:15:28 2038

Fingerprint (SHA-256):

E7:4F:BD:A5:5B:D5:64:C4:73:A3:6B:44:1A:A7:99:C8:A6:8E:07:74:40:E8:28:8B:9F:A1:E5:0E:4B:BA:CA:11

Fingerprint (SHA1):

B8:0E:26:A9:BF:D2:B2:3B:C0:EF:46:C9:BA:C7:BB:F6:1D:0D:41:41

CKA_CLASS CK_OBJECT_CLASS CKO_NSS_TRUST

CKA_TOKEN CK_BBOOL CK_TRUE

CKA_PRIVATE CK_BBOOL CK_FALSE

CKA_MODIFIABLE CK_BBOOL CK_FALSE

CKA_LABEL UTF8 "Security Communication ECC RootCA1"

CKA_CERT_SHA1_HASH MULTILINE_OCTAL

\270\016\046\251\277\322\262\073\300\357\106\311\272\307\273\366

\035\015\101\101

END

CKA_CERT_MD5_HASH MULTILINE_OCTAL

\176\103\260\222\150\354\005\103\114\230\253\135\065\056\176\206

END

CKA_ISSUER MULTILINE_OCTAL

\060\141\061\013\060\011\006\003\125\004\006\023\002\112\120\061

\045\060\043\006\003\125\004\012\023\034\123\105\103\117\115\040

\124\162\165\163\164\040\123\171\163\164\145\155\163\040\103\117

\056\054\114\124\104\056\061\053\060\051\006\003\125\004\003\023

\042\123\145\143\165\162\151\164\171\040\103\157\155\155\165\156

\151\143\141\164\151\157\156\040\105\103\103\040\122\157\157\164

\103\101\061

END

CKA_SERIAL_NUMBER MULTILINE_OCTAL

\002\011\000\326\135\233\263\170\201\056\353

END

CKA_TRUST_SERVER_AUTH

CK_TRUST CKT_NSS_TRUSTED_DELEGATOR

CKA_TRUST_EMAIL_PROTECTION CK_TRUST CKT_NSS_TRUSTED_DELEGATOR

CKA_TRUST_CODE_SIGNING CK_TRUST CKT_NSS_MUST_VERIFY_TRUST

CKA_TRUST_STEP_UP_APPROVED CK_BBOOL CK_FALSE

#

Certificate "BJCA Global Root CA1"

#

Issuer: CN=BJCA Global Root CA1,O=BEIJING CERTIFICATE AUTHORITY,C=CN

Serial Number:55:6f:65:e3:b4:d9:90:6a:1b:09:d1:6c:3e:c0:6c:20

Subject: CN=BJCA Global Root CA1,O=BEIJING CERTIFICATE AUTHORITY,C=CN

Not Valid Before: Thu Dec 19 03:16:17 2019

Not Valid After : Mon Dec 12 03:16:17 2044

Fingerprint (SHA-256):

F3:89:6F:88:FE:7C:0A:88:27:66:A7:FA:6A:D2:74:9F:B5:7A:7F:3E:98:FB:76:9C:1F:A7:B0:9C:2C:44:D5:AE

Fingerprint (SHA1): D5:EC:8D:7B:4C:BA:79:F4:E7:E8:CB:9D:6B:AE:77:83:10:03:21:6A

CKA_CLASS CK_OBJECT_CLASS CKO_CERTIFICATE

CKA_TOKEN CK_BBOOL CK_TRUE

CKA_PRIVATE CK_BBOOL CK_FALSE

CKA_MODIFIABLE CK_BBOOL CK_FALSE

CKA_LABEL UTF8 "BJCA Global Root CA1"

CKA_CERTIFICATE_TYPE CK_CERTIFICATE_TYPE CKC_X_509

CKA_SUBJECT MULTILINE_OCTAL

\060\124\061\013\060\011\006\003\125\004\006\023\002\103\116\061

\046\060\044\006\003\125\004\012\014\035\102\105\111\112\111\116

\107\040\103\105\122\124\111\106\111\103\101\124\105\040\101\125

\124\110\117\122\111\124\131\061\035\060\033\006\003\125\004\003

\014\024\102\112\103\101\040\107\154\157\142\141\154\040\122\157

\157\164\040\103\101\061

END
CKA_ID
UTF8 "0"
CKA_ISSUER MULTILINE_OCTAL
\060\124\061\013\060\011\006\003\125\004\006\023\002\103\116\061
\046\060\044\006\003\125\004\012\014\035\102\105\111\112\111\116
\107\040\103\105\122\124\111\106\111\103\101\124\105\040\101\125
\124\110\117\122\111\124\131\061\035\060\033\006\003\125\004\003
\014\024\102\112\103\101\040\107\154\157\142\141\154\040\122\157
\157\164\040\103\101\061
END
CKA_SERIAL_NUMBER MULTILINE_OCTAL
\002\020\125\157\145\343\264\331\220\152\033\011\321\154\076\300
\154\040
END
CKA_VALUE MULTILINE_OCTAL
\060\202\005\164\060\202\003\134\240\003\002\001\002\002\020\125
\157\145\343\264\331\220\152\033\011\321\154\076\300\154\040\060
\015\006\011\052\206\110\206\367\015\001\001\013\005\000\060\124
\061\013\060\011\006\003\125\004\006\023\002\103\116\061\046\060
\044\006\003\125\004\012\014\035\102\105\111\112\111\116\107\040
\103\105\122\124\111\106\111\103\101\124\105\040\101\125\124\110
\117\122\111\124\131\061\035\060\033\006\003\125\004\003\014\024
\102\112\103\101\040\107\154\157\142\141\154\040\122\157\157\164
\040\103\101\061\060\036\027\015\061\071\061\062\061\071\060\063
\061\066\061\067\132\027\015\064\064\061\062\061\062\060\063\061
\066\061\067\132\060\124\061\013\060\011\006\003\125\004\006\023
\002\103\116\061\046\060\044\006\003\125\004\012\014\035\102\105
\111\112\111\116\107\040\103\105\122\124\111\106\111\103\101\124
\105\040\101\125\124\110\117\122\111\124\131\061\035\060\033\006
\003\125\004\003\014\024\102\112\103\101\040\107\154\157\142\141
\154\040\122\157\157\164\040\103\101\061\060\202\002\042\060\015
\006\011\052\206\110\206\367\015\001\001\001\005\000\003\202\002
\017\000\060\202\002\012\002\202\002\001\000\361\146\010\275\331
\305\025\141\313\204\004\101\245\151\067\167\035\301\260\173\372
\303\167\110\220\023\162\144\321\270\174\220\065\235\030\171\210
\343\227\001\074\107\201\362\016\242\230\015\236\077\067\340\031
\262\220\362\106\034\222\261\072\141\316\372\267\106\236\003\206
\327\063\156\355\367\105\214\166\067\336\156\226\221\367\327\176
\053\207\027\325\213\065\356\204\221\162\127\334\140\303\303\271
\347\307\147\044\043\117\143\012\143\366\146\175\113\125\247\077
\170\144\111\151\022\227\340\114\015\323\011\240\062\060\072\372
\237\300\362\234\305\022\052\056\034\265\004\063\332\244\070\021
\152\336\306\030\366\107\072\042\101\207\042\374\304\211\050\124
\330\214\245\060\012\370\027\026\312\254\067\375\171\247\221\027
\170\070\231\255\130\355\262\336\314\211\175\003\234\263\211\145
\347\343\073\261\042\206\217\006\155\170\007\375\221\022\177\260
\153\034\211\015\371\270\313\164\133\007\302\310\364\065\321\144

\143\172\351\156\232\050\326\060\275\346\033\335\025\257\204\352
\234\307\312\365\016\352\362\135\051\207\217\151\163\071\276\056
\044\157\105\041\254\305\324\151\045\006\203\255\172\110\205\023
\054\015\006\270\154\171\126\374\243\147\062\201\365\127\245\312
\127\102\151\351\134\044\141\357\342\060\030\116\104\230\125\157
\172\302\223\330\031\266\336\174\107\212\021\116\111\107\333\050
\224\002\013\224\112\054\371\022\320\117\350\061\176\154\172\277
\246\077\233\071\075\002\026\243\030\263\147\254\133\077\054\203
\053\147\071\201\134\271\176\224\325\144\335\236\217\156\256\350
\174\133\264\327\152\107\110\327\176\263\324\055\216\126\166\116
\317\151\361\156\104\154\324\044\352\215\044\241\030\277\275\127
\376\251\231\065\265\333\020\167\270\075\110\272\326\301\347\361
\043\076\327\337\205\235\047\074\324\100\275\012\014\275\365\347
\215\045\326\201\164\207\106\324\051\165\242\102\154\367\163\211
\347\175\277\172\112\037\323\042\311\025\125\317\337\157\174\125
\320\244\213\007\021\067\137\203\246\046\127\246\001\133\176\376
\130\150\007\251\351\172\331\271\350\377\120\037\253\302\264\300
\316\350\352\375\017\275\215\115\270\274\161\002\003\001\000\001
\243\102\060\100\060\035\006\003\125\035\016\004\026\004\024\305
\357\355\314\330\215\041\306\110\344\343\327\024\056\247\026\223
\345\230\001\060\017\006\003\125\035\023\001\001\377\004\005\060
\003\001\001\377\060\016\006\003\125\035\017\001\001\377\004\004
\003\002\001\006\060\015\006\011\052\206\110\206\367\015\001\001
\013\005\000\003\202\002\001\000\122\202\254\041\064\037\043\362
\242\330\371\270\257\067\066\040\211\321\067\003\326\151\237\270
\141\020\272\242\061\230\131\107\350\321\015\045\036\025\101\014
\340\052\125\325\127\122\313\370\344\307\151\243\035\115\161\002
\136\137\041\105\140\110\134\011\216\111\020\301\004\334\251\142
\153\002\360\103\310\116\235\070\111\164\311\062\160\124\155\301
\107\374\216\264\066\236\324\234\275\335\040\326\123\311\030\251
\265\126\271\166\213\225\147\146\356\275\230\376\256\357\276\156
\373\140\366\375\131\306\052\033\077\043\112\224\044\060\047\310
\211\274\353\104\044\232\313\075\276\117\325\172\316\216\027\313
\142\301\331\336\036\016\172\377\103\206\064\122\274\141\077\074
\137\273\331\166\264\123\274\227\263\376\212\114\022\056\053\363
\327\316\341\242\377\335\173\160\373\073\241\115\244\143\002\375
\070\227\225\077\005\160\240\153\337\142\201\103\213\264\131\015
\112\214\124\234\305\273\201\237\315\175\245\357\013\045\036\072
\040\333\034\374\037\230\147\002\012\324\163\104\023\333\121\204
\032\125\003\126\340\000\176\164\006\377\070\304\162\035\323\250
\077\150\061\135\323\011\307\056\214\133\143\340\350\334\036\322
\354\141\036\362\336\345\357\366\231\166\140\055\036\224\162\161
\306\013\052\062\307\222\116\325\106\327\035\371\251\031\012\310
\372\225\316\155\043\230\252\013\070\255\232\126\015\157\215\361
\061\000\210\301\027\234\315\031\066\065\376\125\123\240\340\074
\063\137\226\136\342\062\351\337\063\273\006\112\251\330\204\163
\316\167\322\306\254\161\341\134\243\035\014\273\012\337\137\342
\243\161\330\332\067\132\240\170\053\364\324\175\353\166\355\362

\141\160\245\145\232\323\211\064\030\253\373\162\076\327\264\075
\171\134\330\037\241\063\173\331\202\120\014\223\027\252\154\334
\302\202\273\002\127\066\257\230\047\052\071\120\341\260\211\365
\045\227\176\107\150\020\264\354\163\312\263\227\321\044\334\366
\142\240\050\323\265\243\270\144\267\210\142\102\317\235\123\315
\231\276\144\150\217\117\036\022\110\367\322\051\303\230\050\312
\362\062\013\223\214\051\117\074\140\062\315\005\226\141\354\362
\257\376\263\160\054\056\246\362

END

CKA_NSS_MOZILLA_CA_POLICY

CK_BBOOL CK_TRUE

CKA_NSS_SERVER_DISTRUST_AFTER CK_BBOOL CK_FALSE

CKA_NSS_EMAIL_DISTRUST_AFTER CK_BBOOL CK_FALSE

Trust for "BJCA Global Root CA1"

Issuer: CN=BJCA Global Root CA1,O=BEIJING CERTIFICATE AUTHORITY,C=CN

Serial Number:55:6f:65:e3:b4:d9:90:6a:1b:09:d1:6c:3e:c0:6c:20

Subject: CN=BJCA Global Root CA1,O=BEIJING CERTIFICATE AUTHORITY,C=CN

Not Valid Before: Thu Dec 19 03:16:17

2019

Not Valid After : Mon Dec 12 03:16:17 2044

Fingerprint (SHA-256):

F3:89:6F:88:FE:7C:0A:88:27:66:A7:FA:6A:D2:74:9F:B5:7A:7F:3E:98:FB:76:9C:1F:A7:B0:9C:2C:44:D5:AE

Fingerprint (SHA1): D5:EC:8D:7B:4C:BA:79:F4:E7:E8:CB:9D:6B:AE:77:83:10:03:21:6A

CKA_CLASS CK_OBJECT_CLASS CKO_NSS_TRUST

CKA_TOKEN CK_BBOOL CK_TRUE

CKA_PRIVATE CK_BBOOL CK_FALSE

CKA_MODIFIABLE CK_BBOOL CK_FALSE

CKA_LABEL UTF8 "BJCA Global Root CA1"

CKA_CERT_SHA1_HASH MULTILINE_OCTAL

\325\354\215\173\114\272\171\364\347\350\313\235\153\256\167\203
\020\003\041\152

END

CKA_CERT_MD5_HASH MULTILINE_OCTAL

\102\062\231\166\103\063\066\044\065\007\202\233\050\371\320\220
END

CKA_ISSUER MULTILINE_OCTAL

\060\124\061\013\060\011\006\003\125\004\006\023\002\103\116\061
\046\060\044\006\003\125\004\012\014\035\102\105\111\112\111\116
\107\040\103\105\122\124\111\106\111\103\101\124\105\040\101\125
\124\110\117\122\111\124\131\061\035\060\033\006\003\125\004\003
\014\024\102\112\103\101\040\107\154\157\142\141\154\040\122\157
\157\164\040\103\101\061

END

CKA_SERIAL_NUMBER

MULTILINE_OCTAL

\002\020\125\157\145\343\264\331\220\152\033\011\321\154\076\300
\154\040

```

END
CKA_TRUST_SERVER_AUTH CK_TRUST CKT_NSS_TRUSTED_DELEGATOR
CKA_TRUST_EMAIL_PROTECTION CK_TRUST CKT_NSS_TRUSTED_DELEGATOR
CKA_TRUST_CODE_SIGNING CK_TRUST CKT_NSS_MUST_VERIFY_TRUST
CKA_TRUST_STEP_UP_APPROVED CK_BBOOL CK_FALSE

#
# Certificate "BJCA Global Root CA2"
#
# Issuer: CN=BJCA Global Root CA2,O=BEIJING CERTIFICATE AUTHORITY,C=CN
# Serial Number:2c:17:08:7d:64:2a:c0:fe:85:18:59:06:cf:b4:4a:eb
# Subject: CN=BJCA Global Root CA2,O=BEIJING CERTIFICATE AUTHORITY,C=CN
# Not Valid Before: Thu Dec 19 03:18:21 2019
# Not Valid After : Mon Dec 12 03:18:21 2044
# Fingerprint (SHA-256):
57:4D:F6:93:1E:27:80:39:66:7B:72:0A:FD:C1:60:0F:C2:7E:B6:6D:D3:09:29:79:FB:73:85:64:87:21:28:82
# Fingerprint (SHA1): F4:27:86:EB:6E:B8:6D:88:31:67:02:FB:BA:66:A4:53:00:AA:7A:A6
CKA_CLASS CK_OBJECT_CLASS CKO_CERTIFICATE
CKA_TOKEN CK_BBOOL CK_TRUE
CKA_PRIVATE CK_BBOOL CK_FALSE
CKA_MODIFIABLE
CK_BBOOL CK_FALSE
CKA_LABEL UTF8 "BJCA Global Root CA2"
CKA_CERTIFICATE_TYPE CK_CERTIFICATE_TYPE CKC_X_509
CKA_SUBJECT MULTILINE_OCTAL
\060\124\061\013\060\011\006\003\125\004\006\023\002\103\116\061
\046\060\044\006\003\125\004\012\014\035\102\105\111\112\111\116
\107\040\103\105\122\124\111\106\111\103\101\124\105\040\101\125
\124\110\117\122\111\124\131\061\035\060\033\006\003\125\004\003
\014\024\102\112\103\101\040\107\154\157\142\141\154\040\122\157
\157\164\040\103\101\062
END
CKA_ID UTF8 "0"
CKA_ISSUER MULTILINE_OCTAL
\060\124\061\013\060\011\006\003\125\004\006\023\002\103\116\061
\046\060\044\006\003\125\004\012\014\035\102\105\111\112\111\116
\107\040\103\105\122\124\111\106\111\103\101\124\105\040\101\125
\124\110\117\122\111\124\131\061\035\060\033\006\003\125\004\003
\014\024\102\112\103\101\040\107\154\157\142\141\154\040\122\157
\157\164\040\103\101\062
END
CKA_SERIAL_NUMBER MULTILINE_OCTAL
\002\020\054\027\010\175\144\052\300\376\205\030\131\006\317\264
\112\353
END
CKA_VALUE
MULTILINE_OCTAL
\060\202\002\045\060\202\001\253\240\003\002\001\002\002\020\054

```

\027\010\175\144\052\300\376\205\030\131\006\317\264\112\353\060
\012\006\010\052\206\110\316\075\004\003\003\060\124\061\013\060
\011\006\003\125\004\006\023\002\103\116\061\046\060\044\006\003
\125\004\012\014\035\102\105\111\112\111\116\107\040\103\105\122
\124\111\106\111\103\101\124\105\040\101\125\124\110\117\122\111
\124\131\061\035\060\033\006\003\125\004\003\014\024\102\112\103
\101\040\107\154\157\142\141\154\040\122\157\157\164\040\103\101
\062\060\036\027\015\061\071\061\062\061\071\060\063\061\070\062
\061\132\027\015\064\064\061\062\061\062\060\063\061\070\062\061
\132\060\124\061\013\060\011\006\003\125\004\006\023\002\103\116
\061\046\060\044\006\003\125\004\012\014\035\102\105\111\112\111
\116\107\040\103\105\122\124\111\106\111\103\101\124\105\040\101
\125\124\110\117\122\111\124\131\061\035\060\033\006\003\125\004
\003\014\024\102\112\103\101\040\107\154\157\142\141\154\040\122
\157\157\164\040\103\101\062\060\166\060\020\006\007\052\206\110
\316\075\002\001\006\005\053\201\004\000\042\003\142\000\004\235
\313\200\221\215\123\147\265\271\120\261\003\370\345\111\037\101
\042\011\260\121\122\130\326\053\064\217\305\022\106\024\305\213
\057\054\204\377\054\156\250\325\361\011\343\003\041\024\304\103
\075\174\301\054\304\113\152\112\315\351\207\340\175\366\042\276
\372\112\121\270\060\212\375\341\336\030\022\012\366\107\267\347
\027\277\047\212\324\101\114\226\074\140\226\301\375\025\034\243
\102\060\100\060\035\006\003\125\035\016\004\026\004\024\322\112
\261\121\177\006\360\321\202\037\116\156\137\253\203\374\110\324
\260\221\060\017\006\003\125\035\023\001\001\377\004\005\060\003
\001\001\377\060\016\006\003\125\035\017\001\001\377\004\004\003
\002\001\006\060\012\006\010\052\206\110\316\075\004\003\003\003
\150\000\060\145\002\060\032\274\133\327\376\251\322\124\016\112
\135\322\155\261\100\334\364\103\325\322\112\231\031\022\126\200
\367\203\064\341\065\116\110\155\004\017\127\061\060\060\055\261
\252\235\003\070\333\006\002\061\000\313\314\207\123\313\172\337
\040\121\163\220\300\250\133\141\320\305\120\071\375\205\376\301
\343\170\370\246\326\113\275\233\207\217\017\345\326\123\226\253
\074\310\100\332\141\367\123\243\367

END

CKA_NSS_Mozilla_CA_POLICY

CK_BBOOL CK_TRUE

CKA_NSS_SERVER_DISTRUST_AFTER CK_BBOOL CK_FALSE

CKA_NSS_EMAIL_DISTRUST_AFTER CK_BBOOL CK_FALSE

Trust for "BJCA Global Root CA2"

Issuer: CN=BJCA Global Root CA2,O=BEIJING CERTIFICATE AUTHORITY,C=CN

Serial Number:2c:17:08:7d:64:2a:c0:fe:85:18:59:06:cf:b4:4a:eb

Subject: CN=BJCA Global Root CA2,O=BEIJING CERTIFICATE AUTHORITY,C=CN

Not Valid Before: Thu Dec 19 03:18:21 2019

Not Valid After : Mon Dec 12 03:18:21 2044

Fingerprint (SHA-256):

57:4D:F6:93:1E:27:80:39:66:7B:72:0A:FD:C1:60:0F:C2:7E:B6:6D:D3:09:29:79:FB:73:85:64:87:21:28:82

```
# Fingerprint (SHA1): F4:27:86:EB:6E:B8:6D:88:31:67:02:FB:BA:66:A4:53:00:AA:7A:A6
CKA_CLASS CK_OBJECT_CLASS CKO_NSS_TRUST
CKA_TOKEN
CK_BBOOL CK_TRUE
CKA_PRIVATE CK_BBOOL CK_FALSE
CKA_MODIFIABLE CK_BBOOL CK_FALSE
CKA_LABEL UTF8 "BJCA Global Root CA2"
CKA_CERT_SHA1_HASH MULTILINE_OCTAL
\364\047\206\353\156\270\155\210\061\147\002\373\272\146\244\123
\000\252\172\246
END
CKA_CERT_MD5_HASH MULTILINE_OCTAL
\136\012\366\107\137\246\024\350\021\001\225\077\115\001\353\074
END
CKA_ISSUER MULTILINE_OCTAL
\060\124\061\013\060\011\006\003\125\004\006\023\002\103\116\061
\046\060\044\006\003\125\004\012\014\035\102\105\111\112\111\116
\107\040\103\105\122\124\111\106\111\103\101\124\105\040\101\125
\124\110\117\122\111\124\131\061\035\060\033\006\003\125\004\003
\014\024\102\112\103\101\040\107\154\157\142\141\154\040\122\157
\157\164\040\103\101\062
END
CKA_SERIAL_NUMBER MULTILINE_OCTAL
\002\020\054\027\010\175\144\052\300\376\205\030\131\006\317\264
\112\353
END
CKA_TRUST_SERVER_AUTH CK_TRUST CKT_NSS_TRUSTED_DELEGATOR
CKA_TRUST_EMAIL_PROTECTION CK_TRUST CKT_NSS_TRUSTED_DELEGATOR
CKA_TRUST_CODE_SIGNING CK_TRUST
CKT_NSS_MUST_VERIFY_TRUST
CKA_TRUST_STEP_UP_APPROVED CK_BBOOL CK_FALSE
```

Found in path(s):

```
* /ca-certificates-bundle-20230506-r0-os-alpine-3-18-0-tar-xz/ca-certificates-20230506-tar-bz2/ca-certificates-20230506/certdata.txt
```

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

```
/* c_rehash.c - Create hash symlinks for certificates
* C implementation based on the original Perl and shell versions
*
* Copyright (c) 2013-2014 Timo Teräs <timo.teras@iki.fi>
* All rights reserved.
*
* This software is licensed under the MIT License.
* Full license available at: http://opensource.org/licenses/MIT
*/
```

Found in path(s):

```
* /ca-certificates-bundle-20230506-r0-os-alpine-3-18-0-tar-xz/ca-certificates-20230506-tar-bz2/ca-certificates-20230506/c_rehash.c
```

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

```
#!/usr/bin/env perl
```

```
# *****
```

```
# *
```

```
# * Project      _ _ _ _ _
```

```
# *            / _ | | | | _ \ |
```

```
# *            | ( _ | | | _ < | _
```

```
# *            \ _ | \ _ / | \ \ _ |
```

```
# *
```

```
# * Copyright (C) 1998 - 2020, Daniel Stenberg, <daniel@haxx.se>, et al.
```

```
# *
```

```
# * This software is licensed as described in the file COPYING, which
```

```
# * you should have received as part of this distribution. The terms
```

```
# * are also available at https://curl.haxx.se/docs/copyright.html.
```

```
# *
```

```
# * You may opt to use, copy, modify, merge, publish, distribute and/or sell
```

```
# * copies of the Software, and permit persons to whom the Software is
```

```
# * furnished to do so, under the terms of the COPYING file.
```

```
# *
```

```
# * This software is distributed on an "AS IS" basis, WITHOUT
```

```
WARRANTY OF ANY
```

```
# * KIND, either express or implied.
```

```
# *
```

```
# *****
```

```
# This Perl script creates a fresh ca-bundle.crt file for use with libcurl.
```

```
# It downloads certdata.txt from Mozilla's source tree (see URL below),
```

```
# then parses certdata.txt and extracts CA Root Certificates into PEM format.
```

```
# These are then processed with the OpenSSL commandline tool to produce the
```

```
# final ca-bundle.crt file.
```

```
# The script is based on the parse-certs script written by Roland Krikava.
```

```
# This Perl script works on almost any platform since its only external
```

```
# dependency is the OpenSSL commandline tool for optional text listing.
```

```
# Hacked by Guenter Knauf.
```

```
#
```

```
use Encode;
```

```
use Getopt::Std;
```

```
use MIME::Base64;
```

```
use strict;
```

```
use warnings;
```

```
use vars qw($opt_b $opt_d $opt_f $opt_h $opt_i $opt_k $opt_l $opt_m $opt_n $opt_p $opt_q $opt_s $opt_t $opt_u  
$opt_v $opt_w);
```

```
use List::Util;
```

```
use Text::Wrap;
```

```
use Time::Local;
```

```
my $MOD_SHA = "Digest::SHA";
```

```

eval "require
$MOD_SHA";
if ($@) {
$MOD_SHA = "Digest::SHA::PurePerl";
eval "require $MOD_SHA";
}
eval "require LWP::UserAgent";

my %urls = (
'nss' =>
'https://hg.mozilla.org/projects/nss/raw-file/default/lib/ckfw/builtins/certdata.txt',
'central' =>
'https://hg.mozilla.org/mozilla-central/raw-file/default/security/nss/lib/ckfw/builtins/certdata.txt',
'beta' =>
'https://hg.mozilla.org/releases/mozilla-beta/raw-file/default/security/nss/lib/ckfw/builtins/certdata.txt',
'release' =>
'https://hg.mozilla.org/releases/mozilla-release/raw-file/default/security/nss/lib/ckfw/builtins/certdata.txt',
);

$opt_d = 'release';

# If the OpenSSL commandline is not in search path you can configure it here!
my $openssl = 'openssl';

my $version = '1.27';

$opt_w = 76; # default base64 encoded lines length

# default cert types to include in the output (default is to include CAs which may issue SSL server certs)
my $default_mozilla_trust_purposes = "SERVER_AUTH";
my $default_mozilla_trust_levels
= "TRUSTED_DELEGATOR";
$opt_p = $default_mozilla_trust_purposes . ":" . $default_mozilla_trust_levels;

my @valid_mozilla_trust_purposes = (
"DIGITAL_SIGNATURE",
"NON_REPUDIATION",
"KEY_ENCIPHERMENT",
"DATA_ENCIPHERMENT",
"KEY_AGREEMENT",
"KEY_CERT_SIGN",
"CRL_SIGN",
"SERVER_AUTH",
"CLIENT_AUTH",
"CODE_SIGNING",
"EMAIL_PROTECTION",
"IPSEC_END_SYSTEM",
"IPSEC_TUNNEL",

```

```

"IPSEC_USER",
"TIME_STAMPING",
"STEP_UP_APPROVED"
);

my @valid_mozilla_trust_levels = (
"TRUSTED_DELEGATOR", # CAs
"NOT_TRUSTED",      # Don't trust these certs.
"MUST_VERIFY_TRUST", # This explicitly tells us that it ISN'T a CA but is otherwise ok. In other words, this
                    # should tell the app to ignore any other sources that claim this is a CA.
"TRUSTED"           # This cert is trusted, but only for itself and not for delegates (i.e. it is not a CA).
);

my $default_signature_algorithms = $opt_s = "MD5";

my @valid_signature_algorithms = (
"MD5",
"SHA1",
"SHA256",
"SHA384",
"SHA512"
);

$0 =~ s@.*(\/\\)@@;
$Getopt::Std::STANDARD_HELP_VERSION = 1;
getopts('bd:fhiklmnp:qs:tuvw:');

if(!defined($opt_d)) {
    # to make plain "-d" use not cause warnings, and actually still work
    $opt_d = 'release';
}

# Use predefined URL or else custom URL specified on command line.
my $url;
if(defined($urls{$opt_d})) {
    $url = $urls{$opt_d};
    if(!$opt_k && $url !~ /^https:\/\//i) {
        die "The URL for '$opt_d' is not HTTPS. Use -k to override (insecure).\n";
    }
}
else {
    $url = $opt_d;
}

my $curl = `curl -V`;

if ($opt_i) {
    print ("=" x 78 . "\n");

```



```

print "Script Version          : $version\n";
print "Perl Version            : $]\n";
print "Operating System Name    : $^O\n";
print "Getopt::Std.pm Version     : ${Getopt::Std::VERSION}\n";
print "Encode::Encoding.pm Version : ${Encode::Encoding::VERSION}\n";
print "MIME::Base64.pm Version     : ${MIME::Base64::VERSION}\n";
print "LWP::UserAgent.pm
Version      : ${LWP::UserAgent::VERSION}\n" if($LWP::UserAgent::VERSION);
print "LWP.pm Version            : ${LWP::VERSION}\n" if($LWP::VERSION);
print "Digest::SHA.pm Version     : ${Digest::SHA::VERSION}\n" if ($Digest::SHA::VERSION);
print "Digest::SHA::PurePerl.pm Version : ${Digest::SHA::PurePerl::VERSION}\n" if
($Digest::SHA::PurePerl::VERSION);
print ("=" x 78 . "\n");
}

```

```

sub warning_message() {
if ( $opt_d =~ m/^\risk$/i ) { # Long Form Warning and Exit
    print "Warning: Use of this script may pose some risk:\n";
    print "\n";
    print " 1) If you use HTTP URLs they are subject to a man in the middle attack\n";
    print " 2) Default to 'release', but more recent updates may be found in other trees\n";
    print " 3) certdata.txt file format may change, lag time to update this script\n";
    print " 4) Generally unwise to blindly trust CAs without manual review & verification\n";
    print " 5) Mozilla apps use additional security
checks aren't represented in certdata\n";
    print " 6) Use of this script will make a security engineer grind his teeth and\n";
    print "    swear at you. ;) \n";
    exit;
} else { # Short Form Warning
    print "Warning: Use of this script may pose some risk, -d risk for more details.\n";
}
}

```

```

sub HELP_MESSAGE() {
    print "Usage:\t{0} [-b] [-d<certdata>] [-f] [-i] [-k] [-l] [-n] [-p<purposes:levels>] [-q] [-s<algorithms>] [-t] [-u] [-v] [-w<l>] [<outputfile>]\n";
    print "\t-b\tbackup an existing version of ca-bundle.crt\n";
    print "\t-d\tspecify Mozilla tree to pull certdata.txt or custom URL\n";
    print "\t\t Valid names are:\n";
    print "\t\t  ", join( ", ", map { ( $_ =~ m/$opt_d/ ) ? "$_ (default)" : "$_" } sort keys %urls ), "\n";
    print "\t-f\tforce rebuild even if certdata.txt is current\n";
    print "\t-i\tprint version info about used modules\n";
    print "\t-k\tallow URLs other than HTTPS, enable HTTP fallback (insecure)\n";
    print "\t-l\tprint license info
about certdata.txt\n";
    print "\t-m\tinclude meta data in output\n";
    print "\t-n\tno download of certdata.txt (to use existing)\n";
    print wrap("\t", "\t", "-p\tlist of Mozilla trust purposes and levels for certificates to include in output. Takes the

```

```

form of a comma separated list of purposes, a colon, and a comma separated list of levels. (default:
$default_mozilla_trust_purposes:$default_mozilla_trust_levels)), "\n";
print "\t\t Valid purposes are:\n";
print wrap("\t\t ", "\t\t ", join( " ", "ALL", @valid_mozilla_trust_purposes ) ), "\n";
print "\t\t Valid levels are:\n";
print wrap("\t\t ", "\t\t ", join( " ", "ALL", @valid_mozilla_trust_levels ) ), "\n";
print "\t-q\tbe really quiet (no progress output at all)\n";
print wrap("\t\t", "\t\t", "-s\tcomma separated list of certificate signatures/ hashes to output in plain text mode. (default:
$default_signature_algorithms)\n");
print "\t\t Valid signature algorithms are:\n";
print wrap("\t\t ", "\t\t ",
    join( " ", "ALL", @valid_signature_algorithms ) ), "\n";
print "\t-t\tinclude plain text listing of certificates\n";
print "\t-u\tunlink (remove) certdata.txt after processing\n";
print "\t-v\tbe verbose and print out processed CAs\n";
print "\t-w <l>\twrap base64 output lines after <l> chars (default: ${opt_w})\n";
exit;
}

```

```

sub VERSION_MESSAGE() {
    print "${0} version ${version} running Perl ${}] on ${^O}\n";
}

```

```

warning_message() unless ($opt_q || $url =~ m/^(ht|f)tps:/i );
HELP_MESSAGE() if ($opt_h);

```

```

sub report($@) {
    my $output = shift;

    print STDERR $output . "\n" unless $opt_q;
}

```

```

sub is_in_list($@) {
    my $target = shift;

    return defined(List::Util::first { $target eq $_ } @_);
}

```

```

# Parses $param_string as a case insensitive comma separated list with optional whitespace
# validates that only allowed parameters are supplied

```

```

sub parse_csv_param($$@) {
    my $description = shift;
    my $param_string = shift;
    my @valid_values = @_;

```

```

    my @values = map {
        s/^\s+//; # strip leading spaces
        s/\s+$//; # strip trailing spaces
    } $param_string;

```

```

    uc $_    # return the modified string as upper case
} split( ',', $param_string );

# Find all values which are not in the list of valid values or "ALL"
my @invalid = grep { !is_in_list($_,"ALL",@valid_values) } @values;

if ( scalar(@invalid) > 0 ) {
    # Tell the user which parameters were invalid and print the standard help message which will exit
    print "Error: Invalid ", $description, scalar(@invalid) == 1 ? " : " : "s: ", join( " ", map { "\"$_\"" } @invalid ),
"\n";
    HELP_MESSAGE();
}

@values = @valid_values if ( is_in_list("ALL",@values) );

return @values;
}

sub sha256 {
    my $result;
    if ($Digest::SHA::VERSION || $Digest::SHA::PurePerl::VERSION) {
        open(FILE, $_[0]) or die "Can't open '$_[0]': $!";
        binmode(FILE);
        $result = $MOD_SHA->new(256)->addfile(*FILE)->hexdigest;
        close(FILE);
    } else {
        # Use OpenSSL command if Perl Digest::SHA modules not available
        $result = `"$openssl" dgst -r -sha256 "$_[0]"`;
        $result =~ s/^\s*([0-9a-f]{64})\s*/$1/is;
    }
    return $result;
}

sub oldhash {
    my $hash = "";
    open(C, "<$_[0]") || return 0;
    while(<C>) {
        chomp;
        if($_ =~ /\#\# SHA256: (.*)/) {
            $hash = $1;
            last;
        }
    }
    close(C);
    return $hash;
}

```

```

if ( $opt_p !~ m/:// ) {
    print "Error: Mozilla trust identifier list must include both purposes and levels\n";
    HELP_MESSAGE();
}

(my $included_mozilla_trust_purposes_string, my $included_mozilla_trust_levels_string) = split( ':', $opt_p );
my @included_mozilla_trust_purposes = parse_csv_param( "trust purpose",
$included_mozilla_trust_purposes_string, @valid_mozilla_trust_purposes );
my @included_mozilla_trust_levels = parse_csv_param( "trust level", $included_mozilla_trust_levels_string,
@valid_mozilla_trust_levels );

my @included_signature_algorithms = parse_csv_param( "signature algorithm", $opt_s,
@valid_signature_algorithms );

sub should_output_cert(%) {
    my
    %trust_purposes_by_level = @_;

    foreach my $level (@included_mozilla_trust_levels) {
        # for each level we want to output, see if any of our desired purposes are included
        return 1 if ( defined( List::Util::first { is_in_list( $_, @included_mozilla_trust_purposes ) }
@{$trust_purposes_by_level{$level}} ) );
    }

    return 0;
}

my $crt = $ARGV[0] || 'ca-bundle.crt';
(my $txt = $url) =~ s@(.*/\|?.*)@@g;

my $stdout = $crt eq '-';
my $resp;
my $fetched;

my $oldhash = oldhash($crt);

report "SHA256 of old file: $oldhash";

if(!$opt_n) {
    report "Downloading $txt ...";

    # If we have an HTTPS URL then use curl
    if($url =~ /^https:\/\//i) {
        if($curl) {
            if($curl =~ /^Protocols:.* https( |$)/m) {
                report "Get certdata with curl!";
                my $proto = !$opt_k ? "--proto=https" : "";
                my $quiet = $opt_q ? "-s" : "";
            }
        }
    }
}

```

```

my @out = `curl -w %{response_code} $proto $quiet -o "$txt" "$url"`;
if(!$? && @out && $out[0] == 200) {
    $fetched = 1;
    report "Downloaded $txt";
}
else {
    report "Failed downloading via HTTPS with curl";
    if(-e $txt && !unlink($txt)) {
        report "Failed to remove '$txt': $!";
    }
}
}
else {
    report "curl lacks https support";
}
}
else {
    report "curl not found";
}
}

# If nothing was fetched then use LWP
if(!$fetched) {
    if($url =~ /^https:\//i) {
        report "Falling back to HTTP";
        $url =~ s/^https:\//http:\//i;
    }
    if(!$opt_k) {
        report "URLs other than HTTPS are disabled by default, to enable use -k";
        exit 1;
    }
    report "Get certdata with LWP!";
    if(!defined(${LWP::UserAgent::VERSION})) {
        report "LWP is not available (LWP::UserAgent not found)";
        exit 1;
    }
    my $ua = new LWP::UserAgent(agent => "$0/$version");
    $ua->env_proxy();
    $resp = $ua->mirror($url, $txt);
    if($resp && $resp->code eq '304') {
        report "Not modified";
        exit 0 if -e $crt && !$opt_f;
    }
    else {
        $fetched = 1;
        report "Downloaded $txt";
    }
    if(!$resp || $resp->code !~ /^(?:200|304)$/) {

```

```

report "Unable to download latest data: "
. ($resp? $resp->code . ' - ' . $resp->message : "LWP failed");
exit 1 if -e $crt || ! -r $txt;
}
}
}

my $filedate = $resp ? $resp->last_modified : (stat($txt))[9];
my $datesrc = "as of";
if(!$filedate) {
    # mxr.mozilla.org gave us a time, hg.mozilla.org does not!
    $filedate = time();
    $datesrc="downloaded on";
}

# get the hash from the download file
my $newhash= sha256($txt);

if(!$opt_f && $oldhash eq $newhash) {
    report "Downloaded file identical to previous run's source file. Exiting";
    if($opt_u && -e $txt && !unlink($txt)) {
        report "Failed to remove $txt: $!\n";
    }
    exit;
}

report "SHA256 of new file: $newhash";

my $currentdate = scalar gmtime($filedate);

my $format = $opt_t ? "plain text and " : "";
if( $stdout
) {
    open(CRT, '> -') or die "Couldn't open STDOUT: $!\n";
} else {
    open(CRT,">$crt.~") or die "Couldn't open $crt.~: $!\n";
}
print CRT <<EOT;
##
## Bundle of CA Root Certificates
##
## Certificate data from Mozilla ${datesrc}: ${currentdate} GMT
##
## This is a bundle of X.509 certificates of public Certificate Authorities
## (CA). These were automatically extracted from Mozilla's root certificates
## file (certdata.txt). This file can be found in the mozilla source tree:
## ${url}
##

```

```
## It contains the certificates in ${format}PEM format and therefore
## can be directly used with curl / libcurl / php_curl, or with
## an Apache+mod_ssl webserver for SSL client authentication.
## Just configure this file as the SSLCACertificateFile.
##
## Conversion done with mk-ca-bundle.pl version $version.
## SHA256: $newhash
##
```

EOT

```
report "Processing '$txt' ...";
my $cname;
my $certnum = 0;
my $skipnum = 0;
my $start_of_cert = 0;
my @precert;
my $cka_value;
my $valid = 1;

open(TXT,"$txt")
or die "Couldn't open $txt: $!\n";
while (<TXT>) {
    if (/^.*\*\*\* BEGIN LICENSE BLOCK \*\*\*\*\*/) {
        print CRT;
        print if ($opt_l);
        while (<TXT>) {
            print CRT;
            print if ($opt_l);
            last if (/^.*\*\*\* END LICENSE BLOCK \*\*\*\*\*/);
        }
    }
    elsif(/^(# (Issuer|Serial Number|Subject|Not Valid Before|Not Valid After |Fingerprint \(\MD5\)|Fingerprint
\(\SHA1\))):/) {
        push @precert, $_;
        $valid = 1;
        next;
    }
    elsif(/^(#|\\s*$)/) {
        undef @precert;
        next;
    }
}
chomp;

# Example:
# CKA_NSS_SERVER_DISTRUST_AFTER MULTILINE_OCTAL
# \062\060\060\066\061\067\060\060\060\060\060\060\132
# END
```

```

if (/^CKA_NSS_SERVER_DISTRUST_AFTER (CK_BBOOL CK_FALSE|MULTILINE_OCTAL)/) {
    if($1 eq "MULTILINE_OCTAL") {
        my @timestamp;
        while (<TXT>) {
            last if (/^END/);
            chomp;
            my @octets = split(/\v/);
            shift @octets;
            for (@octets) {
                push
@timestamp, chr(oct);
            }
        }
        # A trailing Z in the timestamp signifies UTC
        if($timestamp[12] ne "Z") {
            report "distrust date stamp is not using UTC";
        }
        # Example date: 200617000000Z
        # Means 2020-06-17 00:00:00 UTC
        my $distrustat =
            timegm($timestamp[10] . $timestamp[11], # second
                $timestamp[8] . $timestamp[9], # minute
                $timestamp[6] . $timestamp[7], # hour
                $timestamp[4] . $timestamp[5], # day
                ($timestamp[2] . $timestamp[3]) - 1, # month
                "20" . $timestamp[0] . $timestamp[1]); # year
        if(time >= $distrustat) {
            # not trusted anymore
            $skipnum++;
            report "Skipping: $scaname is not trusted anymore" if ($opt_v);
            $valid = 0;
        }
        else {
            # still trusted
        }
    }
    next;
}

# this
is a match for the start of a certificate
if (/^CKA_CLASS CK_OBJECT_CLASS CKO_CERTIFICATE/) {
    $start_of_cert = 1
}
if ($start_of_cert && /^CKA_LABEL UTF8 \"(.*)\"/) {
    $scaname = $1;
}

```



```

my %trust_purposes_by_level;
if ($start_of_cert && /^CKA_VALUE MULTILINE_OCTAL/) {
    $ska_value="";
    while (<TXT>) {
        last if (/^END/);
        chomp;
        my @octets = split(/\n/);
        shift @octets;
        for (@octets) {
            $ska_value .= chr(oct);
        }
    }
}
if(/^CKA_CLASS CK_OBJECT_CLASS CKO_NSS_TRUST/ && $valid) {
    # now scan the trust part to determine how we should trust this cert
    while (<TXT>) {
        last if (/^#/);
        if (/^CKA_TRUST_([A-Z_]+)\s+CK_TRUST\s+CKT_NSS_([A-Z_]+)\s*$/) {
            if ( !is_in_list($1,@valid_mozilla_trust_purposes) ) {
                report "Warning: Unrecognized trust purpose for cert: $aname. Trust purpose: $1. Trust Level: $2";
            } elsif ( !is_in_list($2,@valid_mozilla_trust_levels) ) {
                report "Warning:
Unrecognized trust level for cert: $aname. Trust purpose: $1. Trust Level: $2";
            } else {
                push @{$trust_purposes_by_level{$2}}, $1;
            }
        }
    }

    if ( !should_output_cert(%trust_purposes_by_level) ) {
        $skipnum ++;
        report "Skipping: $aname" if ($opt_v);
    } else {
        my $data = $ska_value;
        $ska_value = "";
        my $encoded = MIME::Base64::encode_base64($data, "");
        $encoded =~ s/(\{1,$opt_w\})/$1\n/g;
        my $pem = "-----BEGIN CERTIFICATE-----\n"
            . $encoded
            . "-----END CERTIFICATE-----\n";
        print CRT "\n$aname\n";
        print CRT @precert if($opt_m);
        my $maxLength = length(decode('UTF-8', $aname, Encode::FB_CROAK | Encode::LEAVE_SRC));
        if ($opt_t) {
            foreach my $key (keys %trust_purposes_by_level) {
                my $string = $key . " : " . join(" , ", @{$trust_purposes_by_level{$key}});
                $maxLength = List::Util::max( length($string), $maxLength);
            }
        }
    }
}

```

```

);
    print CRT $string . "\n";
}
}
print CRT ("=" x $maxStringLength . "\n");
if (!$opt_t) {
    print CRT $pem;
} else {
    my $pipe = "";
    foreach my $hash (@included_signature_algorithms) {
        $pipe = "|$openssl x509 -" . $hash . " -fingerprint -noout -inform PEM";
        if (!$stdout) {
            $pipe .= " >> $crt.~";
            close(CRT) or die "Couldn't close $crt.~: $!";
        }
        open(TMP, $pipe) or die "Couldn't open openssl pipe: $!";
        print TMP $pem;
        close(TMP) or die "Couldn't close openssl pipe: $!";
        if (!$stdout) {
            open(CRT, ">>$crt.~") or die "Couldn't open $crt.~: $!";
        }
    }
    $pipe = "|$openssl x509 -text -inform PEM";
    if (!$stdout) {
        $pipe .= " >> $crt.~";
        close(CRT) or die "Couldn't close $crt.~: $!";
    }
    open(TMP, $pipe) or die "Couldn't open openssl pipe: $!";
    print TMP
    $pem;
    close(TMP) or die "Couldn't close openssl pipe: $!";
    if (!$stdout) {
        open(CRT, ">>$crt.~") or die "Couldn't open $crt.~: $!";
    }
}
report "Parsing: $aname" if ($opt_v);
$certnum ++;
$start_of_cert = 0;
}
undef @precert;
}

}
close(TXT) or die "Couldn't close $txt: $!\n";
close(CRT) or die "Couldn't close $crt.~: $!\n";
unless( $stdout ) {
    if ($opt_b && -e $crt) {
        my $bk = 1;

```

```

while (-e "$crt.~${bk}~") {
    $bk++;
}
rename $crt, "$crt.~${bk}~" or die "Failed to create backup $crt.~$bk}~: $!\n";
} elsif( -e $crt ) {
    unlink( $crt ) or die "Failed to remove $crt: $!\n";
}
rename "$crt.~", $crt or die "Failed to rename $crt.~ to $crt: $!\n";
}
if($opt_u && -e $txt && !unlink($txt)) {
    report "Failed to remove $txt: $!\n";
}
report "Done ($certnum CA certs processed, $skipnum skipped).";

```

Found in path(s):

* /ca-certificates-bundle-20230506-r0-os-alpine-3-18-0-tar-xz/ca-certificates-20230506-tar-bz2/ca-certificates-20230506/mk-ca-bundle.pl

1.123 xxhash v2.2.0

1.123.1 Available under license :

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```
if n == 0 {
```

```

return
}

switch {
case len(a) < (m-1)*lda+n:
    panic(shortA)
case len(tau) < k:
    panic(shortTau)
case len(work) < n:
    panic(shortWork)
}

// Initialize columns 0:n-k to columns of the unit matrix.
for j := 0; j < n-k; j++ {
    for l := 0; l < m; l++ {
        a[l*lda+j] = 0
    }
    a[(m-n+j)*lda+j] = 1
}

bi := blas64.Implementation()
for i := 0; i < k; i++ {
    ii := n - k + i

    // Apply H_i to A[0:m-k+i, 0:n-k+i] from the left.
    a[(m-n+ii)*lda+ii] = 1
    impl.Dlarf(blas.Left, m-n+ii+1, ii, a[ii:], lda, tau[i], a, lda, work)
    bi.Dscal(m-n+ii, -tau[i], a[ii:], lda)
    a[(m-n+ii)*lda+ii] = 1 - tau[i]

    // Set A[m-k+i:m, n-k+i+1] to zero.
    for l := m - n + ii + 1; l < m; l++ {
        a[l*lda+ii] = 0
    }
}

graph{{DIG}{{DIG}DIG}{{DIG}DIG}DIG}
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// license that can be found in the LICENSE file.

package testlapack

import (
    "testing"

    "golang.org/x/exp/rand"

```

```

"gonum.org/v1/gonum/blas"
"gonum.org/v1/gonum/blas/blas64"
"gonum.org/v1/gonum/floats"
)

```

```

type Dgetrser interface {
    Dgetrf
    Dgetrs(trans blas.Transpose, n, nrhs int, a []float64, lda int, ipiv []int, b []float64, ldb int)
}

```

```

func DgetrsTest(t *testing.T, impl Dgetrser) {
    rnd := rand.New(rand.NewSource(1))
    // TODO(btracey): Put more thought into creating more regularized matrices
    // and what correct tolerances should be. Consider also seeding the random
    // number in this test to make it more robust to code changes in other
    // parts of the suite.
    for _, trans := range []blas.Transpose{blas.NoTrans, blas.Trans} {
        for _, test := range []struct {
            n, nrhs, lda, ldb int
            tol               float64
        }{
            {3, 3, 0, 0, 1e-12},
            {3, 5, 0, 0, 1e-12},
            {5,
            3, 0, 0, 1e-12},

            {3, 3, 8, 10, 1e-12},
            {3, 5, 8, 10, 1e-12},
            {5, 3, 8, 10, 1e-12},

            {300, 300, 0, 0, 1e-8},
            {300, 500, 0, 0, 1e-8},
            {500, 300, 0, 0, 1e-6},

            {300, 300, 700, 600, 1e-8},
            {300, 500, 700, 600, 1e-8},
            {500, 300, 700, 600, 1e-6},
        } {
            n := test.n
            nrhs := test.nrhs
            lda := test.lda
            if lda == 0 {
                lda = n
            }
            ldb := test.ldb
            if ldb == 0 {
                ldb = nrhs
            }
        }
    }
}

```

```

a := make([]float64, n*lda)
for i := range a {
    a[i] = rnd.Float64()
}
b := make([]float64, n*ldb)
for i := range b {
    b[i] = rnd.Float64()
}
aCopy := make([]float64, len(a))
copy(aCopy, a)
bCopy := make([]float64, len(b))
copy(bCopy, b)

ipiv := make([]int, n)
for i := range ipiv {
    ipiv[i] = rnd.Int()
}

// Compute the LU factorization.
impl.Dgetrf(n, n, a, lda, ipiv)
// Solve the system of equations given the result.
impl.Dgetrs(trans, n, nrhs, a, lda, ipiv, b, ldb)

// Check that the system of equations
holds.
A := blas64.General{
    Rows:  n,
    Cols:  n,
    Stride: lda,
    Data:  aCopy,
}
B := blas64.General{
    Rows:  n,
    Cols:  nrhs,
    Stride: ldb,
    Data:  bCopy,
}
X := blas64.General{
    Rows:  n,
    Cols:  nrhs,
    Stride: ldb,
    Data:  b,
}
tmp := blas64.General{
    Rows:  n,
    Cols:  nrhs,
    Stride: ldb,
    Data:  make([]float64, n*ldb),

```

```

    }
    copy(tmp.Data, bCopy)
    blas64.Gemm(trans, blas.NoTrans, 1, A, X, 0, B)
    if !floats.EqualApprox(tmp.Data, bCopy, test.tol) {
        t.Errorf("Linear solve mismatch. trans = %v, n = %v, nrhs = %v, lda = %v, ldb = %v", trans, n, nrhs, lda, ldb)
    }
}
}
}
}
graph{{s4 s5}}
graph{SUBGRA0{{SUBGRA5{SUBGRA0{{SUBGRA5{SUBGRA0}}}}}}}
graph{{{E4{E4}E4}E4}E4}E4}
// Copyright 2018 The Gonum Authors. All rights reserved.
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// license that can be found in the LICENSE file.

// Package parser provides generated internal parsing functions for DOT parsing.
package parser // import "gonum.org/v1/gonum/graph/formats/dot/internal/parser"
graph{{NO{{NO{{NO}}NO}}}}
graph{{GRA}}GRA}
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package mathext

import "gonum.org/v1/gonum/mathext/internal/cephes"

// Zeta computes the Riemann zeta function of two arguments.
// 
$$\text{Zeta}(x, q) = \sum_{k=0}^{\infty} (k+q)^{-x}$$

// Note that Zeta returns +Inf if x is 1 and will panic if x is less than 1,
// q is either zero or a negative integer, or q is negative and x is not an
// integer.
//
// See http://mathworld.wolfram.com/HurwitzZetaFunction.html
// or https://en.wikipedia.org/wiki/Multiple\_zeta\_function#Two\_parameters\_case
// for more detailed information.
func Zeta(x, q float64) float64 {
    return cephes.Zeta(x, q)
}
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package gonum

import "gonum.org/v1/gonum/lapack"

```



```
// Implementation is the native Go implementation of LAPACK routines. It
// is built on top of calls to the return of blas64.Implementation(), so while
// this code is in pure Go, the underlying BLAS implementation may not be.
type Implementation struct{}
```

```
var _ lapack.Float64 = Implementation{}
```

```
func min(a, b int) int {
    if a < b {
        return a
    }
    return b
}
```

```
func max(a, b int) int {
    if a > b {
        return a
    }
    return b
}
```

```
func abs(a int) int {
    if a < 0 {
        return -a
    }
    return a
}
```

```
const (
    // dlamchE is the machine epsilon. For IEEE this is 2-53.
    dlamchE = 1.0 / (1 << 53)
    // TODO(kortschak) Replace this with 0x1p-53 when go1.12 is no
    // longer supported.
```

```
// dlamchB is the radix of the machine (the base of the number system).
    dlamchB = 2
```

```
// dlamchP is base * eps.
    dlamchP
    = dlamchB * dlamchE
```

```
// dlamchS is the "safe minimum", that is, the lowest number such that
// 1/dlamchS does not overflow, or also the smallest normal number.
// For IEEE this is 2-1022.
    dlamchS = 1.0 / (1 << 256) / (1 << 256) / (1 << 256) / (1 << 254)
    // TODO(kortschak) Replace this with 0x1p-1022 when go1.12 is no
    // longer supported.
)
```

```
graph{{SU_}SU_{}SU_{}SU_{SU_}}
```

```
---
```

name: Question

about: Ask at the Gonum discussion list <https://groups.google.com/forum/#!forum/gonum-dev>

```
---
```

<!--

For question about usage or similar, please ask at the Gonum discussion list rather than filing an issue:

<https://groups.google.com/forum/#!forum/gonum-dev>

-->

```
# :no_entry_sign: INVALID :no_entry_sign:
```

```
graph{STRU{STRW}{STRW}}
```

```
graph{{SubGraG{{SubGraG}{SubGraU}}}}
```

```
graph{{{SUBG0{SUBG0{SUBG9}}}SUBG0{SUBG9}}SUBG0}
```

```
graph{{{DIG}DIG}{DIG}{DIG{DIG}DIG}}
```

```
digraph{G:c J:c}
```

```
graph{{DiGraU}DiGraQ}
```

```
graph{STRICS{{STRICS}{STRICS{{STRICS{STRICI}{STRICS{{STRICS{STRICI}}}}}}}}
```

```
graph{{{Digp}Digg}}
```

```
graph{{GR{GR1}GR1}GR1}
```

```
graph{{GRAPA{GRAPA GRAPG}GRAPG}}
```

```
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```

```
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```

```
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```

```
package distmv
```

```
import (
```

```
    "log"
```

```
    "testing"
```

```
    "golang.org/x/exp/rand"
```

```
    "gonum.org/v1/gonum/mat"
```

```
)
```

```
func BenchmarkMarginalNormal10(b *testing.B) {
```

```
    sz := 10
```

```
    rnd := rand.New(rand.NewSource(1))
```

```
    normal := randomNormal(sz, rnd)
```

```
    normal.CovarianceMatrix(&mat.SymDense{}) // pre-compute sigma
```

```
    b.ResetTimer()
```

```
    for i := 0; i < b.N; i++ {
```

```
        marg, ok := normal.MarginalNormal([]int{1}, nil)
```

```
        if !ok {
```

```

    b.Error("bad test")
}
_ = marg
}
}

func BenchmarkMarginalNormalReset10(b *testing.B) {
    sz := 10
    rnd := rand.New(rand.NewSource(1))
    normal := randomNormal(sz, rnd)
    b.ResetTimer()
    for i := 0; i < b.N; i++ {
        marg, ok := normal.MarginalNormal([]int{1}, nil)
        if !ok {
            b.Error("bad test")
        }
        _ = marg
    }
}

func BenchmarkMarginalNormalSingle10(b *testing.B) {
    sz := 10
    rnd := rand.New(rand.NewSource(1))
    normal := randomNormal(sz,
    rnd)
    b.ResetTimer()
    for i := 0; i < b.N; i++ {
        marg := normal.MarginalNormalSingle(1, nil)
        _ = marg
    }
}

func randomNormal(sz int, rnd *rand.Rand) *Normal {
    mu := make([]float64, sz)
    for i := range mu {
        mu[i] = rnd.Float64()
    }
    data := make([]float64, sz*sz)
    for i := range data {
        data[i] = rnd.Float64()
    }
    dM := mat.NewDense(sz, sz, data)
    var sigma mat.SymDense
    sigma.SymOuterK(1, dM)

    normal, ok := NewNormal(mu, &sigma, nil)
    if !ok {
        log.Fatal("bad test, not pos def")
    }
}

```

```

}
return normal
}
graph{Su}
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{{Types "CC0-1.0"}}

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  ))
))
graph{{SubGrap_}}
graph{{{stricc}{stricm}}stricc}{stricm}}
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package samplemv

import (

```

```

"math"
"testing"

"golang.org/x/exp/rand"

"gonum.org/v1/gonum/mat"
"gonum.org/v1/gonum/stat/distmv"
)

func TestHalton(t *testing.T) {
    for cas, test := range []struct {
        n int
        d int
    }{
        {10, 1},
        {100, 2},
        {1000, 3},
    } {
        src := rand.New(rand.NewSource(1))
        // Generate the samples.
        batch := mat.NewDense(test.n, test.d, nil)
        Halton{Kind: Owen, Q: distmv.NewUnitUniform(test.d, nil), Src: src}.Sample(batch)

        // In each dimension, the samples should be stratified according to the
        // prime for that dimension. There should be at most 1 sample per
        // 1/b^k block, where k is log(n)/log(b).
        for d := 0; d < test.d; d++ {
            b := float64(nthPrime(d))
            fk := math.Log(float64(test.n)) / math.Log(b)
            k := math.Ceil(fk)
            den := math.Pow(b, k)
            m := make(map[int]int)
            for i :=
0; i < test.n; i++ {
                bucket := int(batch.At(i, d) * den)
                m[bucket]++
            }
            for bucket, n := range m {
                if n > 1 {
                    t.Errorf("case %d: bucket %v has %v samples", cas, bucket, n)
                }
            }
        }
    }
}
graph{{NO_}{NO_}{NO_}{NO_}NO_}
<!--
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```

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-->

```
{{define "main"}}
<style>
.LicenseTypes-list {
  line-height: 1.25rem;
  list-style: initial;
  padding-left: 2.25rem;
}
</style>
<main class="go-Container" id="main-content">
  <div class="go-Content">
    <h1 data-test-id="license-policy-heading">License Disclaimer</h1>
    <p>
      The Go website displays license information in order to help users evaluate
      packages for their intended use. Licenses are detected using heuristics
      based on their file name and contents. We hope this information is helpful,
      but this is not legal advice and we do not make any guarantees regarding
      the accuracy of our license detection.
    </p>
    <p>
      If we are not able to detect one of the licenses below, only
      limited package and module information will be made
      available. If you are
      a package author seeking to make your content available on the Go
      website, please be aware that our detection algorithms can be affected by
      any modifications of the license text, or by the use of an uncommon
      license file name.
    </p>
    <p>
      We currently use
      <a href="https://pkg.go.dev/github.com/google/licensecheck">github.com/google/licensecheck</a>
      for license detection, and look for licenses in files with the following names:
      {{commaseparate .LicenseFileNames}}. The match is case-insensitive.
    </p>
    <p>
      We currently detect and recognize the following licenses:
      <ul class="LicenseTypes-list">
        {{range .LicenseTypes -}}
          <li>
            {{if .URL -}}
              <a href="{{.URL}}" target="_blank" rel="noopener">{{.Name}}</a>
            {{else}}
              {{.Name}}
            {{- end}}
          </li>
        {{end}}
```

```

    {{- end}}

</ul>
</p>
<p>
    If you are using an <a href="https://opensource.org/licenses/">OSI approved license</a>
    but it is not in our recognized license list,
    please <a href="https://golang.org/s/pkgsite-feedback">file an issue</a>.
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</p>
<p>
    If you use a package whose license is not detected, please inform the package author.
    If you are a package author who believes a license for one of your packages
    should have been detected and was not, please check for discrepancies between your license
    and the official text. If you still believe there is an error, please
    <a href="https://golang.org/s/pkgsite-feedback">file an issue</a>.
</p>
</div>
</main>
{{end}}
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package gonum

import (
    "gonum.org/v1/gonum/blas"
    "gonum.org/v1/gonum/blas/blas64"
)

// Dgetrs solves a system of equations using an LU factorization.
// The system of equations solved is
// A * X = B if trans == blas.Trans
// A * X = B if trans == blas.NoTrans
// A is a general nn matrix with stride lda. B is a general matrix of size nnrhs.
//
// On entry b contains the elements of the matrix B. On exit, b contains the
// elements of X, the solution to the system of equations.
//
// a and ipiv contain the LU factorization of A and the permutation indices as
// computed by Dgetrf. ipiv is zero-indexed.
func (impl Implementation) Dgetrs(trans blas.Transpose, n, nrhs int, a []float64, lda int, ipiv []int, b []float64, ldb int) {
    switch {
    case trans != blas.NoTrans && trans != blas.Trans && trans != blas.ConjTrans:
        panic(badTrans)
    case

```

```

n < 0:
    panic(nLT0)
case nrhs < 0:
    panic(nrhsLT0)
case lda < max(1, n):
    panic(badLdA)
case ldb < max(1, nrhs):
    panic(badLdB)
}

// Quick return if possible.
if n == 0 || nrhs == 0 {
    return
}

switch {
case len(a) < (n-1)*lda+n:
    panic(shortA)
case len(b) < (n-1)*ldb+nrhs:
    panic(shortB)
case len(ipiv) != n:
    panic(badLenIpiv)
}

bi := blas64.Implementation()

if trans == blas.NoTrans {
    // Solve A * X = B.
    impl.Dlaswp(nrhs, b, ldb, 0, n-1, ipiv, 1)
    // Solve L * X = B, updating b.
    bi.Dtrsm(blas.Left, blas.Lower, blas.NoTrans, blas.Unit,
        n, nrhs, 1, a, lda, b, ldb)
    // Solve U * X = B, updating b.
    bi.Dtrsm(blas.Left, blas.Upper, blas.NoTrans, blas.NonUnit,
        n, nrhs, 1, a, lda, b, ldb)
    return
}
// Solve A * X = B.
// Solve U * X = B, updating b.
bi.Dtrsm(blas.Left, blas.Upper, blas.Trans, blas.NonUnit,
    n, nrhs, 1, a, lda, b, ldb)
// Solve L * X = B, updating b.
bi.Dtrsm(blas.Left, blas.Lower, blas.Trans, blas.Unit,
    n,
    nrhs, 1, a, lda, b, ldb)
impl.Dlaswp(nrhs, b, ldb, 0, n-1, ipiv, -1)
}

```


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package c128

// ScalUnitaryTo is

// for i, v := range x {

// dst[i] = alpha * v

// }

func ScalUnitaryTo(dst []complex128, alpha complex128, x []complex128) {

for i, v := range x {

dst[i] = alpha * v

}

}

// ScalIncTo is

// var idst, ix uintptr

// for i := 0; i < int(n); i++ {

// dst[idst] = alpha * x[ix]

// ix += incX

// idst += incDst

// }

func ScalIncTo(dst []complex128, incDst uintptr, alpha complex128, x []complex128, n, incX uintptr) {

var idst, ix uintptr

for i := 0; i < int(n); i++ {

dst[idst] = alpha * x[ix]

ix += incX

idst += incDst

}

}

graph{diGrapS{{diGrapC}diGrapS}}

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package vptree_test

import (

"fmt"

"log"

"gonum.org/v1/gonum/spatial/vptree"

)

func ExampleTree() {

// Example data from https://en.wikipedia.org/wiki/K-d_tree

points := []vptree.Comparable{

```

vptree.Point{2, 3},
vptree.Point{5, 4},
vptree.Point{9, 6},
vptree.Point{4, 7},
vptree.Point{8, 1},
vptree.Point{7, 2},
}

t, err := vptree.New(points, 3, nil)
if err != nil {
    log.Fatal(err)
}
q := vptree.Point{8, 7}
p, d := t.Nearest(q)
fmt.Printf("%v is closest point to %v, d=%f\n", p, q, d)
// Output:
// [9 6] is closest point to [8 7], d=1.414214
}

func ExampleTree_Do() {
    // Example data from https://en.wikipedia.org/wiki/K-d_tree
    points := []vptree.Comparable{
        vptree.Point{2, 3},
        vptree.Point{5, 4},
        vptree.Point{9, 6},
        vptree.Point{4, 7},
        vptree.Point{8, 1},
        vptree.Point{7, 2},
    }

    // Print
    all points in the data set within 3 of (3, 5).
    t, err := vptree.New(points, 0, nil)
    if err != nil {
        log.Fatal(err)
    }
    q := vptree.Point{3, 5}
    t.Do(func(c vptree.Comparable, _ int) (done bool) {
        // Compare each distance and output points
        // with a Euclidean distance less than or
        // equal to 3. Distance returns the
        // Euclidean distance between points.
        if q.Distance(c) <= 3 {
            fmt.Println(c)
        }
        return
    })
    // Unordered output:

```

```

// [2 3]
// [4 7]
// [5 4]
}
graph{{strictg}}
graph{{SUq}SUf{{SUq}
graph{{{{Digraa}Digraa}}}
    SUBROUTINE ZBUNK(ZR, ZI, FNU, KODE, MR, N, YR, YI, NZ, TOL, ELIM,
    * ALIM)
C***BEGIN PROLOGUE  ZBUNK
C***REFER TO  ZBESK,ZBESH
C
C  ZBUNK COMPUTES THE K BESSEL FUNCTION FOR FNU.GT.FNUL.
C  ACCORDING TO THE UNIFORM ASYMPTOTIC EXPANSION FOR K(FNU,Z)
C  IN ZUNK1 AND THE EXPANSION FOR H(2,FNU,Z) IN ZUNK2
C
C***ROUTINES CALLED  ZUNK1,ZUNK2
C***END PROLOGUE  ZBUNK
C  COMPLEX Y,Z
    DOUBLE PRECISION ALIM, AX, AY, ELIM, FNU, TOL, YI, YR, ZI, ZR
    INTEGER KODE, MR, N, NZ
    DIMENSION YR(N), YI(N)
    NZ = 0
    AX = DABS(ZR)*1.7321D0
    AY = DABS(ZI)
    IF (AY.GT.AX) GO TO 10
C-----
C  ASYMPTOTIC EXPANSION FOR K(FNU,Z) FOR LARGE FNU APPLIED IN
C  -PI/3.LE.ARG(Z).LE.PI/3
C-----
    CALL ZUNK1(ZR, ZI, FNU, KODE, MR, N, YR, YI, NZ, TOL, ELIM, ALIM)
    GO TO 20
10 CONTINUE
C-----
C
    ASYMPTOTIC EXPANSION FOR H(2,FNU,Z*EXP(M*HPI)) FOR LARGE FNU
C  APPLIED IN PI/3.LT.ABS(ARG(Z)).LE.PI/2 WHERE M=+I OR -I
C  AND HPI=PI/2
C-----
    CALL ZUNK2(ZR, ZI, FNU, KODE, MR, N, YR, YI, NZ, TOL, ELIM, ALIM)
20 CONTINUE
    RETURN
    END
graph{diG{diG{diG}{diG{diG}diG}}}
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```

```

package testlapack

import (
    "testing"

    "golang.org/x/exp/rand"

    "gonum.org/v1/gonum/blas"
    "gonum.org/v1/gonum/blas/blas64"
    "gonum.org/v1/gonum/floats"
)

type Dgeql2er interface {
    Dgeql2(m, n int, a []float64, lda int, tau, work []float64)
}

func Dgeql2Test(t *testing.T, impl Dgeql2er) {
    rnd := rand.New(rand.NewSource(1))
    // TODO(btracey): Add tests for m < n.
    for _, test := range []struct {
        m, n, lda int
    }{
        {5, 5, 0},
        {5, 3, 0},
        {5, 4, 0},
    } {
        m := test.m
        n := test.n
        lda := test.lda
        if lda == 0 {
            lda = n
        }
        a := make([]float64, m*lda)
        for i := range a {
            a[i] = rnd.NormFloat64()
        }
        tau := nanSlice(min(m, n))
        work := nanSlice(n)

        aCopy := make([]float64, len(a))
        copy(aCopy, a)
        impl.Dgeql2(m, n, a, lda, tau, work)

        k := min(m, n)
        // Construct Q.
        q := blas64.General{
            Rows:

```

```

m,
Cols: m,
Stride: m,
Data: make([]float64, m*m),
}
for i := 0; i < m; i++ {
    q.Data[i*q.Stride+i] = 1
}
for i := 0; i < k; i++ {
    h := blas64.General{Rows: m, Cols: m, Stride: m, Data: make([]float64, m*m)}
    for j := 0; j < m; j++ {
        h.Data[j*h.Stride+j] = 1
    }
    v := blas64.Vector{Inc: 1, Data: make([]float64, m)}
    v.Data[m-k+i] = 1
    for j := 0; j < m-k+i; j++ {
        v.Data[j] = a[j*lda+n-k+i]
    }
    blas64.Ger(-tau[i], v, v, h)
    qTmp := blas64.General{Rows: q.Rows, Cols: q.Cols, Stride: q.Stride, Data: make([]float64, len(q.Data))}
    copy(qTmp.Data, q.Data)
    blas64.Gemm(blas.NoTrans, blas.NoTrans, 1, h, qTmp, 0, q)
}
if !isOrthogonal(q) {
    t.Errorf("Q is not orthogonal")
}
l := blas64.General{
    Rows: m,
    Cols: n,
    Stride: n,
    Data: make([]float64, m*n),
}
if m >= n {
    for i := m - n; i < m; i++ {
        for j := 0; j <= min(i-(m-n), n-1); j++ {
            l.Data[i*l.Stride+j] = a[i*lda+j]
        }
    }
} else {
    panic("untested")
}
ans
:= blas64.General{Rows: m, Cols: n, Stride: lda, Data: make([]float64, len(a))}
copy(ans.Data, a)

blas64.Gemm(blas.NoTrans, blas.NoTrans, 1, q, l, 0, ans)
if !floats.EqualApprox(ans.Data, aCopy, 1e-10) {
    t.Errorf("Reconstruction mismatch: m = %v, n = %v", m, n)
}

```

```

    }
    }
    }
    graph{{subgh}}
    digraph{B:e->G:e->G:e->B:e->B:e->G:e->G:e->B:e->B:e->G:e}
    // Copyright 2015 The Gonum Authors. All rights reserved.
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    // +build tomita

    package topo

    const tomitaTanakaTakahashi = true
    graph s2{{s4 s5}}
    digraph{A:ne->B:sw C->D:r:se E:_->F G:n H:e I:s J:w K:nw L:c}
    graph{{SUBGRAPR}}
    graph{{Sub}Sub{Sub}SU_}
    #
    graph{#
    {#
    }}
    // Code generated by "go generate gonum.org/v1/gonum/blas; DO NOT EDIT.

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    // license that can be found in the LICENSE file.

    package cblas64

    import "gonum.org/v1/gonum/blas"

    // HermitianCols represents a matrix using the conventional column-major storage scheme.
    type HermitianCols Hermitian

    // From fills the receiver with elements from a. The receiver
    // must have the same dimensions and uplo as a and have adequate
    // backing data storage.
    func (t HermitianCols) From(a Hermitian) {
        if t.N != a.N {
            panic("cblas64: mismatched dimension")
        }
        if t.Uplo != a.Uplo {
            panic("cblas64: mismatched BLAS uplo")
        }
        switch a.Uplo {
        default:
            panic("cblas64: bad BLAS uplo")
        }
    }

```

```

case blas.Upper:
    for i := 0; i < a.N; i++ {
        for j := i; j < a.N; j++ {
            t.Data[i+j*t.Stride] = a.Data[i*a.Stride+j]
        }
    }
case blas.Lower:
    for i := 0; i < a.N; i++ {
        for j := 0; j <= i; j++ {
            t.Data[i+j*t.Stride]
        = a.Data[i*a.Stride+j]
        }
    }
}

// From fills the receiver with elements from a. The receiver
// must have the same dimensions and uplo as a and have adequate
// backing data storage.
func (t Hermitian) From(a HermitianCols) {
    if t.N != a.N {
        panic("cblas64: mismatched dimension")
    }
    if t.Uplo != a.Uplo {
        panic("cblas64: mismatched BLAS uplo")
    }
    switch a.Uplo {
    default:
        panic("cblas64: bad BLAS uplo")
    case blas.Upper:
        for i := 0; i < a.N; i++ {
            for j := i; j < a.N; j++ {
                t.Data[i*t.Stride+j] = a.Data[i+j*a.Stride]
            }
        }
    case blas.Lower:
        for i := 0; i < a.N; i++ {
            for j := 0; j <= i; j++ {
                t.Data[i*t.Stride+j] = a.Data[i+j*a.Stride]
            }
        }
    }
}

// HermitianBandCols represents an Hermitian matrix using the band column-major storage scheme.
type HermitianBandCols HermitianBand

// From fills the receiver with elements from a. The receiver

```

```

// must have the same dimensions, bandwidth and uplo as a and
// have adequate backing
data storage.
func (t HermitianBandCols) From(a HermitianBand) {
    if t.N != a.N {
        panic("cblas64: mismatched dimension")
    }
    if t.K != a.K {
        panic("cblas64: mismatched bandwidth")
    }
    if a.Stride < a.K+1 {
        panic("cblas64: short stride for source")
    }
    if t.Stride < t.K+1 {
        panic("cblas64: short stride for destination")
    }
    if t.Uplo != a.Uplo {
        panic("cblas64: mismatched BLAS uplo")
    }
    dst := BandCols{
        Rows: t.N, Cols: t.N,
        Stride: t.Stride,
        Data: t.Data,
    }
    src := Band{
        Rows: a.N, Cols: a.N,
        Stride: a.Stride,
        Data: a.Data,
    }
    switch a.Uplo {
    default:
        panic("cblas64: bad BLAS uplo")
    case blas.Upper:
        dst.KU = t.K
        src.KU = a.K
    case blas.Lower:
        dst.KL = t.K
        src.KL = a.K
    }
    dst.From(src)
}

// From fills the receiver with elements from a. The receiver
// must have the same dimensions, bandwidth and uplo as a and
// have adequate backing data storage.
func (t HermitianBand) From(a HermitianBandCols) {
    if t.N != a.N {
        panic("cblas64: mismatched

```



```

dimension")
}
if t.K != a.K {
    panic("cblas64: mismatched bandwidth")
}
if a.Stride < a.K+1 {
    panic("cblas64: short stride for source")
}
if t.Stride < t.K+1 {
    panic("cblas64: short stride for destination")
}
if t.Uplo != a.Uplo {
    panic("cblas64: mismatched BLAS uplo")
}
dst := Band{
    Rows: t.N, Cols: t.N,
    Stride: t.Stride,
    Data: t.Data,
}
src := BandCols{
    Rows: a.N, Cols: a.N,
    Stride: a.Stride,
    Data: a.Data,
}
switch a.Uplo {
default:
    panic("cblas64: bad BLAS uplo")
case blas.Upper:
    dst.KU = t.K
    src.KU = a.K
case blas.Lower:
    dst.KL = t.K
    src.KL = a.K
}
dst.From(src)
}
graph{{D55{{D55}}}}
digraph{n_}
graph{NOA{NOA{NOA{{NOA{NOA{NOA}}NOA}}NOA}}
graph{{{EB}}EB{EB}}
graph{{{{n{n}}n{{{{n}}n}}}}n}
graph{{ST_{{{{ST_}}ST_}}ST_}
graph{{SUU}}
graph{{ST6}{ST6{ST6{ST6}ST6}ST6}}
graph{{{{{e}e}}e}e}
graph{{d{{d{{d}}d}}d}}
graph{Stric{Strica-9Strica-9Strica-9Strica-9Strica-9Strica-9Strica-9Stric}}

```

```
digraph{Edgee}
graph{9[f=DiGra_]}
graph{{Dib{Dib}Dia}Dia}
```

This set of codes generates tests for the dlasq* routines.

The high level routines are testdlasq*.f90. The testdlasq*.f90 routines are intended in combination with the routines in gonum/lapack/testlapack.

During execution, these high-level routines record the inputs and outputs to the executed subroutines. For example, testdlasq3, when executed, generates files gen4tests.txt and gen5tests.txt that record the inputs and outputs to the evaluation of dlasq4 and dlasq5 respectively. The output format in gen*tests.txt is the struct literal that matches the respective test in gonum/lapack/testlapack/dlasq*.go. Thus, these generated tests can be copied into the testing routine to test the native implementation.

The testing routines in testlapack have code for generating inputs for these fortran routines. Typically, one would isolate the particular failing test, and modify the testlapack routine to print it to the terminal, for example in testlapack/dlasq3.go one might add

```
printDlasq3FortranInput(test)
os.Exit(1)
```

This prints variable initialization for dlasq3 routine to the terminal, which can be copied and pasted into testdlasq3.f90. Please note that this process is not completely automated. Some of the other initialization may need to change, particularly the size allocation of the data array(s).

```
Graph{{DIGR}DIGR{{DIGR}DIGR}DIGR{{DIGR}DIGR{DIGR}{DIGR}}}
graph{{{EDGE}EDGE}}
package layout_test
```

```
import (
    "fmt"
    "image"
```

```
    "gioui.org/layout"
    "gioui.org/unit"
)
```

```
func ExampleInset() {
    gtx := new(layout.Context)
    gtx.Reset(nil, image.Point{X: 100, Y: 100})
    // Loose constraints with no minimal size.
    gtx.Constraints.Width.Min = 0
    gtx.Constraints.Height.Min = 0
```

```
    // Inset all edges by 10.
    inset := layout.UniformInset(unit.Dp(10))
```

```

inset.Layout(gtx, func() {
    // Lay out a 50x50 sized widget.
    layoutWidget(gtx, 50, 50)
    fmt.Println(gtx.Dimensions.Size)
})

fmt.Println(gtx.Dimensions.Size)

// Output:
// (50,50)
// (70,70)
}

func ExampleAlign() {
    gtx := new(layout.Context)
    // Rigid constraints with both minimum and maximum set.
    gtx.Reset(nil, image.Point{X: 100, Y: 100})

    align := layout.Align(layout.Center)
    align.Layout(gtx, func() {
        // Lay out a 50x50 sized widget.
        layoutWidget(gtx, 50, 50)
        fmt.Println(gtx.Dimensions.Size)
    })

    fmt.Println(gtx.Dimensions.Size)

    // Output:
    // (50,50)
    // (100,100)
}

func ExampleFlex() {
    gtx := new(layout.Context)
    gtx.Reset(nil,
        image.Point{X: 100, Y: 100})

    layout.Flex{}.Layout(gtx,
        // Rigid 10x10 widget.
        layout.Rigid(func() {
            fmt.Printf("Rigid: %v\n", gtx.Constraints.Width)
            layoutWidget(gtx, 10, 10)
        }),
        // Child with 50% space allowance.
        layout.Flexed(0.5, func() {
            fmt.Printf("50%%: %v\n", gtx.Constraints.Width)
            layoutWidget(gtx, 10, 10)
        }),

```

```
)
```

```
// Output:
```

```
// Rigid: {0 100}
```

```
// 50%: {45 45}
```

```
}
```

```
func ExampleStack() {  
    gtx := new(layout.Context)  
    gtx.Reset(nil, image.Point{X: 100, Y: 100})  
    gtx.Constraints.Width.Min = 0  
    gtx.Constraints.Height.Min = 0  
  
    layout.Stack{}.Layout(gtx,  
        // Force widget to the same size as the second.  
        layout.Expanded(func() {  
            fmt.Printf("Expand: %v\n", gtx.Constraints)  
            layoutWidget(gtx, 10, 10)  
        })),  
        // Rigid 50x50 widget.  
        layout.Stacked(func() {  
            layoutWidget(gtx, 50, 50)  
        })),  
    )  
}
```

```
// Output:
```

```
// Expand: {{50 100} {50 100}}
```

```
}
```

```
func ExampleList() {  
    gtx := new(layout.Context)  
    gtx.Reset(nil, image.Point{X: 100, Y:  
        100})  
  
    // The list is 1e6 elements, but only 5 fit the constraints.  
    const listLen = 1e6  
  
    var list layout.List  
    count := 0  
    list.Layout(gtx, listLen, func(i int) {  
        count++  
        layoutWidget(gtx, 20, 20)  
    })  
  
    fmt.Println(count)  
  
    // Output:  
    // 5  
}
```

```

}

func layoutWidget(ctx *layout.Context, width, height int) {
ctx.Dimensions = layout.Dimensions{
Size: image.Point{
X: width,
Y: height,
},
}
}
}

graph{D5{{D5}}D5{{D7{D5}}D5}}
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graph{<=====>}
Graph{{{EDGG}{EDGG}}}
Graph{Subgrg{{{Subgrg}}}}
graph{{{gra}{gra}}}}
digraph{5[h=graph5]}
graph{GRAPU{{GRAPU{GRAPU}GRAPU{GRAPU}}}}
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language: go
go:
- "1.12.x"
env:
- env GO111MODULE=on
os:
- linux
- osx
- windows
script:
- go test -v ./...
Graph{{{DIGRp}DIGRl{DIGRp}{DIGRp}}}

```

```
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package gonum

// Dcombssq adds two scaled sum-of-squares quantities,  $V := V_1 + V_2$ ,
//  $V\_scale^2 * V\_ssq := V_1\_scale^2 * V_1\_ssq + V_2\_scale^2 * V_2\_ssq$ 
// and returns the result V.
//
// Dcombssq is an internal routine. It is exported for testing purposes.
func (Implementation) Dcombssq(scale1, ssq1, scale2, ssq2 float64) (scale, ssq float64) {
    if scale1 >= scale2 {
        if scale1 != 0 {
            return scale1, ssq1 + (scale2/scale1)*(scale2/scale1)*ssq2
        }
        // If the input is non-negative and we are here, then scale2 must inevitably be 0, too.
        return 0, 0
    }
    return scale2, ssq2 + (scale1/scale2)*(scale1/scale2)*ssq1
}
graph{{stric}stric}
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// license that can be found in the LICENSE file.
```

```
package testlapack
```

```
import (
    "testing"
```

```
    "golang.org/x/exp/rand"
```

```
    "gonum.org/v1/gonum/blas"
    "gonum.org/v1/gonum/floats"
```

```
)
```

```
type Dormlqer interface {
    Dorml2er
    Dormlq(side blas.Side, trans blas.Transpose, m, n, k int, a []float64, lda int, tau, c []float64, ldc int, work []float64,
    lwork int)
}
```

```
func DormlqTest(t *testing.T, impl Dormlqer) {
    rnd := rand.New(rand.NewSource(1))
    for _, side := range []blas.Side{blas.Left, blas.Right} {
        for _, trans := range []blas.Transpose{blas.NoTrans, blas.Trans} {
            for _, wl := range []worklen{minimumWork, mediumWork, optimumWork} {
```

```

for _, test := range []struct {
    common, adim, cdim, lda, ldc int
}{
    {0, 0, 0, 0, 0},
    {6, 7, 8, 0, 0},
    {6, 8, 7, 0, 0},
    {7, 6, 8, 0, 0},
    {7, 8, 6, 0, 0},
    {8, 6, 7, 0, 0},
    {8, 7, 6, 0, 0},
    {100, 200, 300,
0, 0},
    {100, 300, 200, 0, 0},
    {200, 100, 300, 0, 0},
    {200, 300, 100, 0, 0},
    {300, 100, 200, 0, 0},
    {300, 200, 100, 0, 0},
    {100, 200, 300, 400, 500},
    {100, 300, 200, 400, 500},
    {200, 100, 300, 400, 500},
    {200, 300, 100, 400, 500},
    {300, 100, 200, 400, 500},
    {300, 200, 100, 400, 500},
    {100, 200, 300, 500, 400},
    {100, 300, 200, 500, 400},
    {200, 100, 300, 500, 400},
    {200, 300, 100, 500, 400},
    {300, 100, 200, 500, 400},
    {300, 200, 100, 500, 400},
} {
    var ma, na, mc, nc int
    if side == blas.Left {
        ma = test.adim
        na = test.common
        mc = test.common
        nc = test.cdim
    } else {
        ma = test.adim
        na = test.common
        mc = test.cdim
        nc = test.common
    }
    // Generate a random matrix
    lda := test.lda
    if lda == 0 {
        lda = max(1, na)
    }
    a := make([]float64, ma*lda)

```

```

    for i := range a {
        a[i] = rnd.Float64()
    }
    // Compute
random C matrix
    ldc := test.ldc
    if ldc == 0 {
        ldc = nc
    }
    c := make([]float64, mc*ldc)
    for i := range c {
        c[i] = rnd.Float64()
    }

    // Compute LQ
    k := min(ma, na)
    tau := make([]float64, k)
    work := make([]float64, 1)
    impl.Dgelqf(ma, na, a, lda, tau, work, -1)
    work = make([]float64, int(work[0]))
    impl.Dgelqf(ma, na, a, lda, tau, work, len(work))

    cCopy := make([]float64, len(c))
    copy(cCopy, c)
    ans := make([]float64, len(c))
    copy(ans, cCopy)

    var nw int
    if side == blas.Left {
        nw = nc
    } else {
        nw = mc
    }
    work = make([]float64, max(1, nw))
    impl.Dorml2(side, trans, mc, nc, k, a, lda, tau, ans, ldc, work)

    var lwork int
    switch wl {
    case minimumWork:
        lwork = nw
    case optimumWork:
        impl.Dormlq(side, trans, mc, nc, k, a, lda, tau, c, ldc, work, -1)
        lwork = int(work[0])
    case mediumWork:
        work := make([]float64, 1)
        impl.Dormlq(side,
trans, mc, nc, k, a, lda, tau, c, ldc, work, -1)
        lwork = (int(work[0]) + nw) / 2

```



```

    }
    lwork = max(1, lwork)
    work = make([]float64, lwork)

    impl.Dormlq(side, trans, mc, nc, k, a, lda, tau, c, ldc, work, lwork)
    if !floats.EqualApprox(c, ans, 1e-13) {
        t.Errorf("Dormqr and Dorm2r results mismatch")
    }
}
}
}
}
}
}

graph{{su_}}
graph{{{{{str9}}}str1}}}}}
graph{{g3{g2{g3{g2}}}}
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// license that can be found in the LICENSE file.

package gonum

import (
    "math"

    "gonum.org/v1/gonum/lapack"
)

// Dlanst computes the specified norm of a symmetric tridiagonal matrix A.
// The diagonal elements of A are stored in d and the off-diagonal elements
// are stored in e.
func (impl Implementation) Dlanst(norm lapack.MatrixNorm, n int, d, e []float64) float64 {
    switch {
    case norm != lapack.MaxRowSum && norm != lapack.MaxColumnSum && norm != lapack.Frobenius && norm
    != lapack.MaxAbs:
        panic(badNorm)
    case n < 0:
        panic(nLT0)
    }
    if n == 0 {
        return 0
    }
    switch {
    case len(d) < n:
        panic(shortD)
    case len(e) < n-1:
        panic(shortE)
    }

```

```
graph{{{{{{{{edge5}}}edge5}}edge5{edge5}}}}
graph{graph[]Graph[]{graph[]Graph[]graph[]}Graph[]}
```

```

graph{{Su_{Su_}}}
*DECK I1MACH
      INTEGER FUNCTION I1MACH(I)
C***BEGIN PROLOGUE  I1MACH
C***DATE WRITTEN  750101  (YYMMDD)
C***REVISION DATE 890213  (YYMMDD)
C***CATEGORY NO.  R1
C***KEYWORDS  LIBRARY=SLATEC,TYPE=INTEGER(I1MACH-I),MACHINE CONSTANTS
C***AUTHOR  FOX, P. A., (BELL LABS)
C      HALL, A. D., (BELL LABS)
C      SCHRYER, N. L., (BELL LABS)
C***PURPOSE  Returns integer machine dependent constants
C***DESCRIPTION
C
C  I1MACH can be used to obtain machine-dependent parameters
C  for the local machine environment.  It is a function
C  subroutine with one (input) argument, and can be called
C  as follows, for example
C
C      K = I1MACH(I)
C
C  where I=1,...,16.  The (output) value of K above is
C  determined by the (input) value of I.  The results for
C  various values of I are discussed below.
C
C  I/O unit numbers.
C  I1MACH( 1) = the standard input unit.
C  I1MACH( 2) = the standard output unit.
C  I1MACH( 3) = the standard punch unit.
C  I1MACH(
C  4) = the standard error message unit.
C
C  Words.
C  I1MACH( 5) = the number of bits per integer storage unit.
C  I1MACH( 6) = the number of characters per integer storage unit.
C
C  Integers.
C  assume integers are represented in the S-digit, base-A form
C
C      sign (  $X(S-1)*A^{(S-1)} + \dots + X(1)*A + X(0)$  )
C
C      where  $0 \leq X(I) < A$  for  $I=0,\dots,S-1$ .
C  I1MACH( 7) = A, the base.
C  I1MACH( 8) = S, the number of base-A digits.
C  I1MACH( 9) =  $A^S - 1$ , the largest magnitude.
C
C  Floating-Point Numbers.
C  Assume floating-point numbers are represented in the T-digit,

```

```

C  base-B form
C      sign (B**E)*( (X(1)/B) + ... + (X(T)/B**T) )
C
C      where 0 .LE. X(I) .LT. B for I=1,...,T,
C      0 .LT. X(1), and EMIN .LE. E .LE. EMAX.
C  I1MACH(10) = B, the base.
C
C  Single-Precision
C  I1MACH(11) = T, the number of base-B digits.
C  I1MACH(12) = EMIN, the smallest exponent E.
C  I1MACH(13) = EMAX, the largest exponent
E.
C
C  Double-Precision
C  I1MACH(14) = T, the number of base-B digits.
C  I1MACH(15) = EMIN, the smallest exponent E.
C  I1MACH(16) = EMAX, the largest exponent E.
C
C  To alter this function for a particular environment,
C  the desired set of DATA statements should be activated by
C  removing the C from column 1. Also, the values of
C  I1MACH(1) - I1MACH(4) should be checked for consistency
C  with the local operating system.
C
C***REFERENCES  FOX P.A., HALL A.D., SCHRYER N.L., *FRAMEWORK FOR A
C      PORTABLE LIBRARY*, ACM TRANSACTIONS ON MATHEMATICAL
C      SOFTWARE, VOL. 4, NO. 2, JUNE 1978, PP. 177-188.
C***ROUTINES CALLED  (NONE)
C***END PROLOGUE  I1MACH
C
C      INTEGER IMACH(16),OUTPUT
C      SAVE IMACH
C      EQUIVALENCE (IMACH(4),OUTPUT)
C
C  MACHINE CONSTANTS FOR THE IBM PC
C
C      DATA IMACH( 1) /  5 /
C      DATA IMACH( 2) /  6 /
C      DATA IMACH( 3) /  0 /
C      DATA IMACH( 4) /  0 /
C      DATA IMACH( 5) / 32 /
C      DATA IMACH(
6) /  4 /
C      DATA IMACH( 7) /  2 /
C      DATA IMACH( 8) / 31 /
C      DATA IMACH( 9) / 2147483647 /
C      DATA IMACH(10) /  2 /
C      DATA IMACH(11) / 24 /

```

```

DATA IMACH(12) / -125 /
DATA IMACH(13) / 127 /
DATA IMACH(14) / 53 /
DATA IMACH(15) / -1021 /
DATA IMACH(16) / 1023 /
C
C***FIRST EXECUTABLE STATEMENT I1MACH
  IF (I .LT. 1 .OR. I .GT. 16) GO TO 10
C
  I1MACH = IMACH(I)
  RETURN
C
10 CONTINUE
  WRITE (UNIT = OUTPUT, FMT = 9000)
9000 FORMAT ('1ERROR 1 IN I1MACH - I OUT OF BOUNDS')
C
C  CALL FDUMP
C
C
  STOP
  END
graph{diG8{}diG5{}diG5{}diG5{}diG5}
digraph{DE}
// Code generated by "go generate gonum.org/v1/gonum/unit/constant; DO NOT EDIT.

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// license that can be found in the LICENSE file.

package constant

import (
    "fmt"
    "testing"
)

func TestPlanckFormat(t *testing.T) {
    for _, test := range []struct {
        format string
        want string
    }{
        {"%v", "6.62607015e-34 kg m^2 s^-1"},
        {"%.1v", "7e-34 kg m^2 s^-1"},
        {"%50.1v", "7e-34 kg m^2 s^-1"},
        {"%50v", "6.62607015e-34 kg m^2 s^-1"},
        {"%1v", "6.62607015e-34 kg m^2 s^-1"},
        {"%#v", "constant.planckUnits(6.62607015e-34)"},
        {"%s", "%!s(constant.planckUnits=6.62607015e-34 kg m^2 s^-1)"},
    }{
        t.Run(test.format, func(t *testing.T) {
            got := fmt.Sprintf(test.format, constant.planckUnits)
            if got != test.want {
                t.Errorf("TestPlanckFormat(%s) = %s, want %s", test.format, got, test.want)
            }
        })
    }
}

```

```

} {
got := fmt.Sprintf(test.format, Planck)
if got != test.want {
    t.Errorf("Format %q: got: %q want: %q", test.format, got, test.want)
}
}
}

graph{Nodd{Nodd{{Nodd{{Nodd{{Nodd{{Nodd}}Nodd}}}}{{Nodd{{Nodd}}Nodd}}}}}
graph{{{Digr_}{Digr_}{Digr_}{Digr_}{Digr_}{Digr_}{Digr_}{Digr_}{Digr_}}}
graph{{{SUBGRAP0}}}
graph{{{D{D{D{D}D}D}}}
graph{{{{{DI_}{DI_}{DI_}DI_}{DI_{DI_}}}}}
graph{{{{{Gra_}Gra_}Gra_}Gra{{{Gra_{Gra_}Gra_}Gra_}Gra_}}}
graph{e[=<<"><"></></></></></></><"></></></></></></></></>]}]
graph{{{SubGrap}{SubGrapp{{{SubGrap}}}}}
Graph{{{SubGr4}{SubGr4{SubGr4}}}
graph{{{DIGRA}{DIGRA}{DIGRA}{DIGRA}}}

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package gonum

import (
    "gonum.org/v1/gonum/blas"
    "gonum.org/v1/gonum/blas/blas64"
)


// Dgetri computes the inverse of the matrix A using the LU factorization computed
// by Dgetrf. On entry, a contains the PLU decomposition of A as computed by
// Dgetrf and on exit contains the reciprocal of the original matrix.
//
// Dgetri will not perform the inversion if the matrix is singular, and returns
// a boolean indicating whether the inversion was successful.
//
// work is temporary storage, and lwork specifies the usable memory length.
// At minimum, lwork >= n and this function will panic otherwise.
// Dgetri is a blocked inversion, but the block size is limited
// by the temporary space available. If lwork == -1, instead of performing Dgetri,
// the optimal work length will be stored into work[0].
func (impl Implementation)
Dgetri(n int, a []float64, lda int, ipiv []int, work []float64, lwork int) (ok bool) {
    iws := max(1, n)
    switch {
    case n < 0:
        panic(nLT0)
    case lda < max(1, n):
        panic(badLdA)

```

```

case lwork < iws && lwork != -1:
    panic(badLWork)
case len(work) < max(1, lwork):
    panic(shortWork)
}

if n == 0 {
    work[0] = 1
    return true
}

nb := impl.Ilaenv(1, "DGETRI", " ", n, -1, -1, -1)
if lwork == -1 {
    work[0] = float64(n * nb)
    return true
}

switch {
case len(a) < (n-1)*lda+n:
    panic(shortA)
case len(ipiv) != n:
    panic(badLenIpiv)
}

// Form inv(U).
ok = impl.Dtrtri(blas.Upper, blas.NonUnit, n, a, lda)
if !ok {
    return false
}

nbmin := 2
if 1 < nb && nb < n {
    iws = max(n*nb, 1)
    if lwork < iws {
        nb = lwork / n
        nbmin = max(2, impl.Ilaenv(2, "DGETRI", " ", n, -1, -1, -1))
    }
}
ldwork := nb

bi := blas64.Implementation()
// Solve the equation inv(A)*L = inv(U) for inv(A).
// TODO(btracey): Replace this with a more row-major oriented algorithm.
if nb < nbmin
|| n <= nb {
    // Unblocked code.
    for j := n - 1; j >= 0; j-- {
        for i := j + 1; i < n; i++ {

```

```

// Copy current column of L to work and replace with zeros.
work[i] = a[i*lda+j]
a[i*lda+j] = 0
}
// Compute current column of inv(A).
if j < n-1 {
    bi.Dgemv(blas.NoTrans, n, n-j-1, -1, a[(j+1):], lda, work[(j+1):], 1, 1, a[j:], lda)
}
}
} else {
    // Blocked code.
    nn := ((n - 1) / nb) * nb
    for j := nn; j >= 0; j -= nb {
        jb := min(nb, n-j)
        // Copy current block column of L to work and replace
        // with zeros.
        for jj := j; jj < j+jb; jj++ {
            for i := jj + 1; i < n; i++ {
                work[i*ldwork+(jj-j)] = a[i*lda+jj]
                a[i*lda+jj] = 0
            }
        }
        // Compute current block column of inv(A).
        if j+jb < n {
            bi.Dgemm(blas.NoTrans, blas.NoTrans, n, jb, n-j-jb, -1, a[(j+jb):], lda, work[(j+jb)*ldwork:], ldwork, 1, a[j:], lda)
        }
        bi.Dtrsm(blas.Right, blas.Lower, blas.NoTrans, blas.Unit, n, jb, 1, work[j*ldwork:], ldwork, a[j:], lda)
    }
}
//
Apply column interchanges.
for j := n - 2; j >= 0; j-- {
    jp := ipiv[j]
    if jp != j {
        bi.Dswap(n, a[j:], lda, a[jp:], lda)
    }
}
work[0] = float64(iws)
return true
}
graph{{{edgg}edgg}edgg}edgw}
graph{SUA{SUA{SUA}SUA}{SUA{SUA{SUA}SUA}{SUA}SUA}SUA}
graph{"\\\\"}
graph{{{{{str{{{str}}}}}str}}}}
graph{SUBA}
    DOUBLE PRECISION FUNCTION MYABS(A)
    DOUBLE PRECISION A
    MYABS = DABS(A)

```



```

// Send a major iteration with the starting location.
task.Op = MajorIteration
operation <- task
task = <-result
if task.Op == PostIteration {
  l.finish(operation, result)
  return NotTerminated, nil
}
op, err := method.initLocal(task.Location)
if err != nil {
  l.finishMethodDone(operation, result, task)
  return Failure, err
}
task.Op = op
operation <- task
Loop:
for {
  r := <-result
  switch r.Op {
  case PostIteration:
    break Loop
  case MajorIteration:
    // The last operation was a MajorIteration. Check if the gradient
    // is below the threshold.
    if status := l.checkGradientConvergence(r.Gradient, gradThresh); status != NotTerminated {
      l.finishMethodDone(operation, result, task)
      return GradientThreshold, nil
    }
    fallthrough
  default:
    op, err := method.iterateLocal(r.Location)
    if
err != nil {
      l.finishMethodDone(operation, result, r)
      return Failure, err
    }
    r.Op = op
    operation <- r
  }
}
l.finish(operation, result)
return NotTerminated, nil
}

// initialOperation returns the Operation needed to fill the initial location
// based on the needs of the method and the values already supplied.
func (localOptimizer) initialOperation(task Task, n needser) Operation {
  var newOp Operation

```

```

op := task.Op
if op&FuncEvaluation == 0 {
    newOp |= FuncEvaluation
}
needs := n.needs()
if needs.Gradient && op&GradEvaluation == 0 {
    newOp |= GradEvaluation
}
if needs.Hessian && op&HessEvaluation == 0 {
    newOp |= HessEvaluation
}
return newOp
}

// initialLocation fills the initial location based on the needs of the method.
// The task passed to initialLocation should be the first task sent in RunGlobal.
func (l localOptimizer) initialLocation(operation chan<- Task, result <-chan Task, task Task, needs needser) Task {
    task.Op = l.initialOperation(task,
        needs)
    operation <- task
    return <-result
}

func (l localOptimizer) checkStartingLocation(task Task, gradThresh float64) (Status, error) {
    if math.IsInf(task.F, 1) || math.IsNaN(task.F) {
        return Failure, ErrFunc(task.F)
    }
    for i, v := range task.Gradient {
        if math.IsInf(v, 0) || math.IsNaN(v) {
            return Failure, ErrGrad{Grad: v, Index: i}
        }
    }
    status := l.checkGradientConvergence(task.Gradient, gradThresh)
    return status, nil
}

func (localOptimizer) checkGradientConvergence(gradient []float64, gradThresh float64) Status {
    if gradient == nil || math.IsNaN(gradThresh) {
        return NotTerminated
    }
    if gradThresh == 0 {
        gradThresh = defaultGradientAbsTol
    }
    if norm := floats.Norm(gradient, math.Inf(1)); norm < gradThresh {
        return GradientThreshold
    }
    return NotTerminated
}

```

```

// finish completes the channel operations to finish an optimization.
func (localOptimizer) finish(operation chan<- Task, result <-chan Task) {
    // Guarantee that result is closed before operation
    is closed.
    for range result {
    }
}

// finishMethodDone sends a MethodDone signal on operation, reads the result,
// and completes the channel operations to finish an optimization.
func (l localOptimizer) finishMethodDone(operation chan<- Task, result <-chan Task, task Task) {
    task.Op = MethodDone
    operation <- task
    task = <-result
    if task.Op != PostIteration {
        panic("optimize: task should have returned post iteration")
    }
    l.finish(operation, result)
}

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// license that can be found in the LICENSE file.

```

```
package testlapack
```

```
import (
    "testing"
```

```
    "golang.org/x/exp/rand"
```

```
    "gonum.org/v1/gonum/blas"
```

```
    "gonum.org/v1/gonum/blas/blas64"
```

```
    "gonum.org/v1/gonum/floats"
```

```
)
```

```
type Dorgtr interface {
```

```
    Dorgtr(uplo blas.Uplo, n int, a []float64, lda int, tau, work []float64, lwork int)
```

```
    Dsytrder
```

```
}
```

```
func DorgtrTest(t *testing.T, impl Dorgtr) {
```

```
    rnd := rand.New(rand.NewSource(1))
```

```
    for _, uplo := range []blas.Uplo{blas.Upper, blas.Lower} {
```

```
        for _, wl := range []worklen{minimumWork, mediumWork, optimumWork} {
```

```
            for _, test := range []struct {
```

```
                n, lda int
```

```
            }{
```

```

{1, 0},
{2, 0},
{3, 0},
{6, 0},
{33, 0},
{100, 0},

{1, 3},
{2, 5},
{3, 7},
{6, 10},
{33, 50},
{100, 120},
} {
n := test.n
lda := test.lda
if lda == 0 {
    lda = n
}
// Allocate nn matrix A and fill it with random
numbers.
a := make([]float64, n*lda)
for i := range a {
    a[i] = rnd.NormFloat64()
}
aCopy := make([]float64, len(a))
copy(aCopy, a)

// Allocate slices for the main diagonal and the
// first off-diagonal of the tri-diagonal matrix.
d := make([]float64, n)
e := make([]float64, n-1)
// Allocate slice for elementary reflector scales.
tau := make([]float64, n-1)

// Compute optimum workspace size for Dorgtr call.
work := make([]float64, 1)
impl.Dsytrd(uplo, n, a, lda, d, e, tau, work, -1)
work = make([]float64, int(work[0]))

// Compute elementary reflectors that reduce the
// symmetric matrix defined by the uplo triangle
// of A to a tridiagonal matrix.
impl.Dsytrd(uplo, n, a, lda, d, e, tau, work, len(work))

// Compute workspace size for Dorgtr call.
var lwork int
switch wl {

```

```

case minimumWork:
    lwork = max(1, n-1)
case mediumWork:
    work := make([]float64, 1)
    impl.Dorgtr(uplo,
n, a, lda, tau, work, -1)
    lwork = (int(work[0]) + n - 1) / 2
    lwork = max(1, lwork)
case optimumWork:
    work := make([]float64, 1)
    impl.Dorgtr(uplo, n, a, lda, tau, work, -1)
    lwork = int(work[0])
}
work = nanSlice(lwork)

// Generate an orthogonal matrix Q that reduces
// the uplo triangle of A to a tridiagonal matrix.
impl.Dorgtr(uplo, n, a, lda, tau, work, len(work))
q := blas64.General{
    Rows:  n,
    Cols:  n,
    Stride: lda,
    Data:  a,
}

if !isOrthogonal(q) {
    t.Errorf("Case uplo=%v,n=%v: Q is not orthogonal", uplo, n)
    continue
}

// Create the tridiagonal matrix explicitly in
// dense representation from the diagonals d and e.
tri := blas64.General{
    Rows:  n,
    Cols:  n,
    Stride: n,
    Data:  make([]float64, n*n),
}
for i := 0; i < n; i++ {
    tri.Data[i*tri.Stride+i] = d[i]
    if i != n-1 {
        tri.Data[i*tri.Stride+i+1] = e[i]
        tri.Data[(i+1)*tri.Stride+i]
= e[i]
    }
}

// Create the symmetric matrix A from the uplo

```

```

// triangle of aCopy, storing it explicitly in dense form.
aMat := blas64.General{
  Rows: n,
  Cols: n,
  Stride: n,
  Data: make([]float64, n*n),
}
if uplo == blas.Upper {
  for i := 0; i < n; i++ {
    for j := i; j < n; j++ {
      v := aCopy[i*lda+j]
      aMat.Data[i*aMat.Stride+j] = v
      aMat.Data[j*aMat.Stride+i] = v
    }
  }
} else {
  for i := 0; i < n; i++ {
    for j := 0; j <= i; j++ {
      v := aCopy[i*lda+j]
      aMat.Data[i*aMat.Stride+j] = v
      aMat.Data[j*aMat.Stride+i] = v
    }
  }
}

// Compute Q * A * Q and store the result in ans.
tmp := blas64.General{Rows: n, Cols: n, Stride: n, Data: make([]float64, n*n)}
blas64.Gemm(blas.NoTrans, blas.NoTrans, 1, aMat, q, 0, tmp)
ans := blas64.General{Rows: n, Cols: n, Stride: n, Data: make([]float64, n*n)}
blas64.Gemm(blas.Trans, blas.NoTrans,
1, q, tmp, 0, ans)

// Compare the tridiagonal matrix tri from
// Dorgtr with the explicit computation ans.
if !floats.EqualApprox(ans.Data, tri.Data, 1e-13) {
  t.Errorf("Recombination mismatch. n = %v, isUpper = %v", n, uplo == blas.Upper)
}
}
}
}
}
graph{{subGraph_}}
graph{<=><=>{<=><=><=>{<=>}}}
  SUBROUTINE ZSHCH(ZR, ZI, CSHR, CSHI, CCHR, CCHI)
C***BEGIN PROLOGUE ZSHCH
C***REFER TO ZBESK,ZBESH
C
C   ZSHCH COMPUTES THE COMPLEX HYPERBOLIC FUNCTIONS CSH=SINH(X+I*Y)

```

```
C  AND CCH=COSH(X+I*Y), WHERE I**2=-1.
```

```
C
```

```
C***ROUTINES CALLED  (NONE)
```

```
C***END PROLOGUE  ZSHCH
```

```
C
```

```
    DOUBLE PRECISION CCHI, CCHR, CH, CN, CSHI, CSHR, SH, SN, ZI, ZR,
```

```
    * DCOSH, DSINH
```

```
    SH = DSINH(ZR)
```

```
    CH = DCOSH(ZR)
```

```
    SN = DSIN(ZI)
```

```
    CN = DCOS(ZI)
```

```
    CSHR = SH*CN
```

```
    CSHI = CH*SN
```

```
    CCHR = CH*CN
```

```
    CCHI = SH*SN
```

```
    RETURN
```

```
    END
```

```
Graph{subg2{subg4}}
```

```
graph{NoN{NoR{NoR}NoR}}
```

```
graph{diGra}
```

```
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```

```
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```

```
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```

```
package gonum
```

```
import "math"
```

```
// Dlasq5 computes one dqds transform in ping-pong form.
```

```
// i0 and n0 are zero-indexed.
```

```
//
```

```
// Dlasq5 is an internal routine. It is exported for testing purposes.
```

```
func (impl Implementation) Dlasq5(i0, n0 int, z []float64, pp int, tau, sigma float64) (i0Out, n0Out, ppOut int,  
tauOut, sigmaOut, dmin, dmin1, dmin2, dn, dnm1, dnm2 float64) {
```

```
    // The lapack function has inputs for iee and eps, but Go requires iee so
```

```
    // these are unnecessary.
```

```
    switch {
```

```
    case i0 < 0:
```

```
        panic(i0LT0)
```

```
    case n0 < 0:
```

```
        panic(n0LT0)
```

```
    case len(z) < 4*n0:
```

```
        panic(shortZ)
```

```
    case pp != 0 && pp != 1:
```

```
        panic(badPp)
```

```
    }
```



```

if n0-i0-1 <= 0 {
    return i0, n0, pp, tau, sigma, dmin, dmin1, dmin2, dn, dnm1, dnm2
}

eps := dlamchP
dthresh := eps * (sigma + tau)
if tau < dthresh*0.5 {
    tau = 0
}
var j4 int
var emin float64
if tau
!= 0 {
    j4 = 4*i0 + pp
    emin = z[j4+4]
    d := z[j4] - tau
    dmin = d
    // In the reference there are code paths that actually return this value.
    // dmin1 = -z[j4]
    if pp == 0 {
        for j4loop := 4 * (i0 + 1); j4loop <= 4*((n0+1)-3); j4loop += 4 {
            j4 := j4loop - 1
            z[j4-2] = d + z[j4-1]
            tmp := z[j4+1] / z[j4-2]
            d = d*tmp - tau
            dmin = math.Min(dmin, d)
            z[j4] = z[j4-1] * tmp
            emin = math.Min(z[j4], emin)
        }
    } else {
        for j4loop := 4 * (i0 + 1); j4loop <= 4*((n0+1)-3); j4loop += 4 {
            j4 := j4loop - 1
            z[j4-3] = d + z[j4]
            tmp := z[j4+2] / z[j4-3]
            d = d*tmp - tau
            dmin = math.Min(dmin, d)
            z[j4-1] = z[j4] * tmp
            emin = math.Min(z[j4-1], emin)
        }
    }
}
// Unroll the last two steps.
dnm2 = d
dmin2 = dmin
j4 = 4*((n0+1)-2) - pp - 1
j4p2 := j4 + 2*pp - 1
z[j4-2] = dnm2 + z[j4p2]
z[j4] = z[j4p2+2] * (z[j4p2] / z[j4-2])
dnm1 = z[j4p2+2]*(dnm2/z[j4-2]) - tau

```

```

dmin = math.Min(dmin, dnm1)

dmin1 = dmin
j4 += 4
j4p2 = j4
+ 2*pp - 1
z[j4-2] = dnm1 + z[j4p2]
z[j4] = z[j4p2+2] * (z[j4p2] / z[j4-2])
dn = z[j4p2+2]*(dnm1/z[j4-2]) - tau
dmin = math.Min(dmin, dn)
} else {
// This is the version that sets d's to zero if they are small enough.
j4 = 4*(i0+1) + pp - 4
emin = z[j4+4]
d := z[j4] - tau
dmin = d
// In the reference there are code paths that actually return this value.
// dmin1 = -z[j4]
if pp == 0 {
for j4loop := 4 * (i0 + 1); j4loop <= 4*((n0+1)-3); j4loop += 4 {
j4 := j4loop - 1
z[j4-2] = d + z[j4-1]
tmp := z[j4+1] / z[j4-2]
d = d*tmp - tau
if d < dthresh {
d = 0
}
dmin = math.Min(dmin, d)
z[j4] = z[j4-1] * tmp
emin = math.Min(z[j4], emin)
}
} else {
for j4loop := 4 * (i0 + 1); j4loop <= 4*((n0+1)-3); j4loop += 4 {
j4 := j4loop - 1
z[j4-3] = d + z[j4]
tmp := z[j4+2] / z[j4-3]
d = d*tmp - tau
if d < dthresh {
d = 0
}
dmin = math.Min(dmin, d)
z[j4-1] = z[j4] * tmp
emin = math.Min(z[j4-1],
emin)
}
}
// Unroll the last two steps.
dnm2 = d

```

```

dmin2 = dmin
j4 = 4*((n0+1)-2) - pp - 1
j4p2 := j4 + 2*pp - 1
z[j4-2] = dnm2 + z[j4p2]
z[j4] = z[j4p2+2] * (z[j4p2] / z[j4-2])
dnm1 = z[j4p2+2]*(dnm2/z[j4-2]) - tau
dmin = math.Min(dmin, dnm1)

dmin1 = dmin
j4 += 4
j4p2 = j4 + 2*pp - 1
z[j4-2] = dnm1 + z[j4p2]
z[j4] = z[j4p2+2] * (z[j4p2] / z[j4-2])
dn = z[j4p2+2]*(dnm1/z[j4-2]) - tau
dmin = math.Min(dmin, dn)
}
z[j4+2] = dn
z[4*(n0+1)-pp-1] = emin
return i0, n0, pp, tau, sigma, dmin, dmin1, dmin2, dn, dnm1, dnm2
}
graph{SUB_{SUB_{SUB_}}}
graph{{{edgN{{{edgN{{{edgN}}}edgJ}}edgJ}}}}}
graph{"\
\
\
\
\
\
\\\"}
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package distuv

const (
    // oneOverRoot2Pi is the value of 1/(2Pi)^(1/2)
    // http://www.wolframalpha.com/input/?i=1%2F%282+*+pi%29%5E%281%2F%29
    oneOverRoot2Pi =
0.39894228040143267793994605993438186847585863116493465766592582967065792589930183850125233390
730693643030255886263518268

    //LogRoot2Pi is the value of log(sqrt(2*Pi))
    logRoot2Pi =
0.91893853320467274178032973640561763986139747363778341281715154048276569592726039769474329863
595419762200564662463433744
    negLogRoot2Pi = -logRoot2Pi
    log2Pi = 1.8378770664093454835606594728112352797227949472755668

```

```

ln2      =
0.69314718055994530941723212145817656807550013436025525412068000949339362196969471560586332699
641868754200148102057068573368552023

// EulerMascheroni constant.
eulerGamma =
0.57721566490153286060651209008240243104215933593992359880576723488486772677766467093694706329
17467495146314472498070824809605
)

const
(
panicNameMismatch = "parameter name mismatch"
)
digraph{{digrape}{digrape}{digrape}{digrape}}
digraph { z[l="o\ld",c="",e=24,e="",e=d,r=""] [e=d] [c=d] grn[c=grn] b[c=b,r=b] c[c=c] [c=a] [r=w] [c=e] d->grn ->b b->c
b->a grn->w grn->e}
graph{{Subg1}{Subg1}Subg1}{Subg1}}
// Code generated by "go generate gonum.org/v1/gonum/unit; DO NOT EDIT.

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package unit

import (
    "fmt"
    "testing"
)

func TestFrequencyFormat(t *testing.T) {
    for _, test := range []struct {
        value Frequency
        format string
        want string
    }{
        {1.23456789, "%v", "1.23456789 Hz"},
        {1.23456789, "%.1v", "1 Hz"},
        {1.23456789, "%20.1v", "1 Hz"},
        {1.23456789, "%20v", "1.23456789 Hz"},
        {1.23456789, "%1v", "1.23456789 Hz"},
        {1.23456789, "%#v", "unit.Frequency(1.23456789)"},
        {1.23456789, "%s", "%!s(unit.Frequency=1.23456789 Hz)"},
    } {
        got := fmt.Sprintf(test.format, test.value)
        if got != test.want {
            t.Errorf("Format %q %v: got: %q want: %q", test.format, float64(test.value), got, test.want)
        }
    }
}

```

```

    }
    }
    }
graph{<<=====>>}
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package integrate

import "sort"

// Trapezoidal returns an approximate value of the integral
//  $\int_a^b f(x) dx$ 
// computed using the trapezoidal rule. The function f is given as a slice of
// samples evaluated at locations in x, that is,
//  $f[i] = f(x[i])$ ,  $x[0] = a$ ,  $x[\text{len}(x)-1] = b$ 
// The slice x must be sorted in strictly increasing order. x and f must be of
// equal length and the length must be at least 2.
//
// The trapezoidal rule approximates f by a piecewise linear function and
// estimates
//  $\int_{x[i]}^{x[i+1]} f(x) dx$ 
// as
//  $(x[i+1] - x[i]) * (f[i] + f[i+1])/2$ 
// More details on the trapezoidal rule can be found at:
// https://en.wikipedia.org/wiki/Trapezoidal\_rule
func Trapezoidal(x, f []float64) float64 {
    n := len(x)
    switch {
    case len(f) != n:
        panic("integrate: slice length mismatch")
    case n < 2:
        panic("integrate:
input data too small")
    case !sort.Float64sAreSorted(x):
        panic("integrate: input must be sorted")
    }

    integral := 0.0
    for i := 0; i < n-1; i++ {
        integral += 0.5 * (x[i+1] - x[i]) * (f[i+1] + f[i])
    }

    return integral
}

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```

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package integrate

import (
"math"
"testing"

"gonum.org/v1/gonum/floats"
"gonum.org/v1/gonum/integrate/testquad"
)

```
func TestRomberg(t *testing.T) {  
    for i, test := range []struct {  
        integral testquad.Integral  
        n      int  
        tol    float64  
    }{  
        {integral: testquad.Constant(0), n: 3, tol: 0},  
        {integral: testquad.Constant(0), n: 1<<5 + 1, tol: 0},  
        {integral: testquad.Poly(0), n: 3, tol: 1e-14},  
        {integral: testquad.Poly(0), n: 1<<5 + 1, tol: 1e-14},  
        {integral: testquad.Poly(1), n: 3, tol: 1e-14},  
        {integral: testquad.Poly(1), n: 1<<5 + 1, tol: 1e-14},  
        {integral: testquad.Poly(2), n: 3, tol: 1e-14},  
        {integral: testquad.Poly(2), n: 1<<5 + 1, tol: 1e-14},  
        {integral: testquad.Poly(3), n: 3, tol: 1e-14},  
        {integral: testquad.Poly(3), n: 1<<5 + 1, tol: 1e-14},  
        {integral: testquad.Poly(4), n: 5, tol: 1e-14},  
        {integral:  
testquad.Poly(4), n: 1<<5 + 1, tol: 1e-14},  
        {integral: testquad.Poly(5), n: 5, tol: 1e-14},  
        {integral: testquad.Poly(5), n: 1<<5 + 1, tol: 1e-14},  
        {integral: testquad.Sin(), n: 1<<3 + 1, tol: 1e-10},  
        {integral: testquad.Sin(), n: 1<<5 + 1, tol: 1e-14},  
        {integral: testquad.XExpMinusX(), n: 1<<3 + 1, tol: 1e-9},  
        {integral: testquad.XExpMinusX(), n: 1<<5 + 1, tol: 1e-14},  
        {integral: testquad.Sqrt(), n: 1<<10 + 1, tol: 1e-5},  
        {integral: testquad.ExpOverX2Plus1(), n: 1<<4 + 1, tol: 1e-7},  
        {integral: testquad.ExpOverX2Plus1(), n: 1<<6 + 1, tol: 1e-14},  
    } {  
        n := test.n  
        a := test.integral.A  
        b := test.integral.B  
  
        x := make([]float64, n)  
        floats.Span(x, a, b)
```

```

y := make([]float64, n)
for i, xi := range x {
    y[i] = test.integral.F(xi)
}

dx := (b - a) / float64(n-1)
got := Romberg(y, dx)

want := test.integral.Value
diff := math.Abs(got - want)
if diff > test.tol {
    t.Errorf("Test #%d: %v, n=%v: unexpected result; got=%v want=%v diff=%v",
        i,
        test.integral.Name, n, got, want, diff)
    }
}
}
}
digraph {
    A [style=filled, fillcolor=red; color=blue]
}
digraph{D->D->D:D->D->D->D->D->D}
graph{{{ {_____} } } {_____} } {_____} }
graph{SUA{SUA{SUA}SUA}}
Graph{{gr4}gr7{{gr4}gr7}}
graph{Edgh{Edgr}}
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// license that can be found in the LICENSE file.

package testblas

import (
    "fmt"
    "testing"

    "golang.org/x/exp/rand"
    "gonum.org/v1/gonum/blas"
)

type Zgbmver interface {
    Zgbmv(trans blas.Transpose, m, n, kL, kU int, alpha complex128, ab []complex128, ldab int, x []complex128, incX
    int, beta complex128, y []complex128, incY int)

    Zgemver
}

func ZgbmvTest(t *testing.T, impl Zgbmver) {
    rnd := rand.New(rand.NewSource(1))

```

```

for _, trans := range []blas.Transpose{blas.NoTrans, blas.Trans, blas.ConjTrans} {
    // Generate all possible size combinations.
    for _, mn := range allPairs([]int{1, 2, 3, 5}, []int{1, 2, 3, 5}) {
        m := mn[0]
        n := mn[1]
        // Generate all possible numbers of lower and upper
        // diagonals. Use slices to reduce indentation.
        kLs := make([]int, max(1, m))
        for i := range kLs {
            kLs[i] = i
        }
        kUs := make([]int, max(1, n))
        for i := range
        kUs {
            kUs[i] = i
        }
        for _, ks := range allPairs(kLs, kUs) {
            kL := ks[0]
            kU := ks[1]
            for _, ab := range []struct {
                alpha complex128
                beta  complex128
            }{
                // All potentially relevant values of
                // alpha and beta.
                {0, 0},
                {0, 1},
                {0, complex(rnd.NormFloat64(), rnd.NormFloat64())},
                {complex(rnd.NormFloat64(), rnd.NormFloat64()), 0},
                {complex(rnd.NormFloat64(), rnd.NormFloat64()), 1},
                {complex(rnd.NormFloat64(), rnd.NormFloat64()), complex(rnd.NormFloat64(), rnd.NormFloat64())},
            } {
                for _, ldab := range []int{kL + kU + 1, kL + kU + 20} {
                    for _, inc := range allPairs([]int{-3, -2, -1, 1, 2, 3}, []int{-3, -2, -1, 1, 2, 3}) {
                        incX := inc[0]
                        incY := inc[1]
                        testZgbmv(t, impl, rnd, trans, m, n, kL, kU, ab.alpha, ab.beta, ldab, incX, incY)
                    }
                }
            }
        }
    }
}

// testZgbmv tests Zgbmv by comparing its output to that of Zgemv.
func testZgbmv(t *testing.T, impl Zgbmver, rnd

```



```

*rand.Rand, trans blas.Transpose, m, n, kL, kU int, alpha, beta complex128, ldab, incX, incY int) {
const tol = 1e-13

// Allocate a dense-storage band matrix filled with NaNs that will be
// used as the reference matrix for Zgemv.
lda := max(1, n)
a := makeZGeneral(nil, m, n, lda)
// Fill the matrix with zeros.
for i := 0; i < m; i++ {
    for j := 0; j < n; j++ {
        a[i*lda+j] = 0
    }
}
// Fill the band with random data.
for i := 0; i < m; i++ {
    for j := max(0, i-kL); j < min(n, i+kU+1); j++ {
        re := rnd.NormFloat64()
        im := rnd.NormFloat64()
        a[i*lda+j] = complex(re, im)
    }
}
// Create the actual band matrix.
ab := zPackBand(kL, kU, ldab, m, n, a, lda)
abCopy := make([]complex128, len(ab))
copy(abCopy, ab)

// Compute correct lengths of vectors x and y.
var lenX, lenY int
switch trans {
case blas.NoTrans:
    lenX = n
    lenY = m
case blas.Trans, blas.ConjTrans:
    lenX = m
    lenY = n
}

// Generate a random complex vector x.
xtest := make([]complex128, lenX)
for
    i := range xtest {
        re := rnd.NormFloat64()
        im := rnd.NormFloat64()
        xtest[i] = complex(re, im)
    }
x := makeZVector(xtest, incX)
xCopy := make([]complex128, len(x))
copy(xCopy, x)

```

```

// Generate a random complex vector y.
ytest := make([]complex128, lenY)
for i := range ytest {
    re := rnd.NormFloat64()
    im := rnd.NormFloat64()
    ytest[i] = complex(re, im)
}
y := makeZVector(ytest, incY)

want := make([]complex128, len(y))
copy(want, y)

// Compute the reference result of alpha*op(A)*x + beta*y, storing it
// into want.
impl.Zgemv(trans, m, n, alpha, a, lda, x, incX, beta, want, incY)
// Compute alpha*op(A)*x + beta*y, storing the result in-place into y.
impl.Zgbmv(trans, m, n, kL, kU, alpha, ab, ldab, x, incX, beta, y, incY)

name := fmt.Sprintf("trans=%v,m=%v,n=%v,kL=%v,kU=%v,lda=%v,incX=%v,incY=%v", trans, m, n, kL, kU, lda,
incX, incY)
if !zsame(ab, abCopy) {
    t.Errorf("%v: unexpected modification of ab", name)
}
if !zsame(x, xCopy) {
    t.Errorf("%v:
unexpected modification of x", name)
}
if !zSameAtNonstrided(y, want, incY) {
    t.Errorf("%v: unexpected modification of y", name)
}
if !zEqualApproxAtStrided(y, want, incY, tol) {
    t.Errorf("%v: unexpected result\ngot  %v\nwant %v\n", name, y, want)
}
}
}
graph{Strica{Strica-9Strica-9Strica}}
graph{graph[]Graph[]graph[]}}
// Copyright 2017 The Gonum Authors. All rights reserved.
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// Package c64 provides complex64 vector primitives.
package c64 // import "gonum.org/v1/gonum/internal/asm/c64"
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package dualquat_test

```

```

import (
    "fmt"

    "gonum.org/v1/gonum/num/dualquat"
    "gonum.org/v1/gonum/num/quat"
)

func Example_displace() {
    // Displace a point [3, 4, 5] by [4, 2, 6].
    // See http://www.euclideanspace.com/maths/algebra/realNormedAlgebra/other/dualQuaternion/index.htm

    // Point to be transformed in the dual imaginary vector.
    p := dualquat.Number{Real: quat.Number{Real: 1}, Dual: quat.Number{Imag: 3, Jmag: 4, Kmag: 5}}

    // Displacement vector, half [4, 2, 6], in the dual imaginary vector.
    d := dualquat.Number{Real: quat.Number{Real: 1}, Dual: quat.Number{Imag: 2, Jmag: 1, Kmag: 3}}

    fmt.Println(dualquat.Mul(dualquat.Mul(d, p), dualquat.Conj(d)).Dual)

    // Output:
    //
    // (0+7i+6j+11k)
}

func Example_rotate() {
    // Rotate a point [3, 4, 5] by 180 around the x axis.
    // See http://www.euclideanspace.com/maths/algebra/realNormedAlgebra/other/dualQuaternion/index.htm

    //
    // Point to be transformed in the dual imaginary vector.
    p := dualquat.Number{Real: quat.Number{Real: 1}, Dual: quat.Number{Imag: 3, Jmag: 4, Kmag: 5}}

    // Rotation in the real quaternion.
    r := dualquat.Number{Real: quat.Number{Real: 0, Imag: 1}}

    fmt.Println(dualquat.Mul(dualquat.Mul(r, p), dualquat.Conj(r)).Dual)

    // Output:
    //
    // (0+3i-4j-5k)
}

func Example_displaceAndRotate() {
    // Displace a point [3, 4, 5] by [4, 2, 6] and then rotate
    // by 180 around the x axis.
    // See http://www.euclideanspace.com/maths/algebra/realNormedAlgebra/other/dualQuaternion/index.htm

```

```

// Point to be transformed in the dual imaginary vector.
p := dualquat.Number{Real: quat.Number{Real: 1}, Dual: quat.Number{Imag: 3, Jmag: 4, Kmag: 5}}

// Displacement vector, half [4, 2, 6], in the dual imaginary vector.
d := dualquat.Number{Real: quat.Number{Real: 1}, Dual: quat.Number{Imag: 2, Jmag: 1, Kmag: 3}}

// Rotation in the real quaternion.
r
:= dualquat.Number{Real: quat.Number{Real: 0, Imag: 1}}

// Combine the rotation and displacement so
// the displacement is performed first.
q := dualquat.Mul(r, d)

fmt.Println(dualquat.Mul(dualquat.Mul(q, p), dualquat.Conj(q)).Dual)

// Output:
//
// (0+7i-6j-11k)
}

func Example_rotateAndDisplace() {
// Rotate a point [3, 4, 5] by 180 around the x axis and then
// displace by [4, 2, 6]

// Point to be transformed in the dual imaginary vector.
p := dualquat.Number{Real: quat.Number{Real: 1}, Dual: quat.Number{Imag: 3, Jmag: 4, Kmag: 5}}

// Displacement vector, half [4, 2, 6], in the dual imaginary vector.
d := dualquat.Number{Real: quat.Number{Real: 1}, Dual: quat.Number{Imag: 2, Jmag: 1, Kmag: 3}}

// Rotation in the real quaternion.
r := dualquat.Number{Real: quat.Number{Real: 0, Imag: 1}}

// Combine the rotation and displacement so
// the rotations is performed first.
q := dualquat.Mul(d, r)

fmt.Println(dualquat.Mul(dualquat.Mul(q, p), dualquat.Conj(q)).Dual)

//
Output:
//
// (0+7i-2j+1k)
}

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```

```

package testlapack

import (
    "testing"

    "golang.org/x/exp/rand"

    "gonum.org/v1/gonum/blas"
    "gonum.org/v1/gonum/blas/blas64"
)

type Dgerqfer interface {
    Dgerqf(m, n int, a []float64, lda int, tau, work []float64, lwork int)
}

func DgerqfTest(t *testing.T, impl Dgerqfer) {
    const tol = 1e-13

    rnd := rand.New(rand.NewSource(1))
    for c, test := range []struct {
        m, n, lda int
    }{
        {1, 1, 0},
        {2, 2, 0},
        {3, 2, 0},
        {2, 3, 0},
        {1, 12, 0},
        {2, 6, 0},
        {3, 4, 0},
        {4, 3, 0},
        {6, 2, 0},
        {12, 1, 0},
        {200, 180, 0},
        {180, 200, 0},
        {200, 200, 0},
        {1, 1, 20},
        {2, 2, 20},
        {3, 2, 20},
        {2, 3, 20},
        {1, 12, 20},
        {2, 6, 20},
        {3, 4, 20},
        {4, 3, 20},
        {6, 2, 20},
        {12, 1, 20},
        {200, 180, 220},
        {180, 200, 220},
    }{

```

```

{200, 200, 220},
} {
n := test.n
m := test.m
lda := test.lda
if lda == 0 {
lda
= test.n
}
a := make([]float64, m*lda)
for i := range a {
a[i] = rnd.Float64()
}
aCopy := make([]float64, len(a))
copy(aCopy, a)
k := min(m, n)
tau := make([]float64, k)
for i := range tau {
tau[i] = rnd.Float64()
}
work := []float64{0}
impl.Dgerqf(m, n, a, lda, tau, work, -1)
lwkopt := int(work[0])
for _, wk := range []struct {
name string
length int
}{
{name: "short", length: m},
{name: "medium", length: lwkopt - 1},
{name: "long", length: lwkopt},
} {
if wk.length < max(1, m) {
continue
}
lwork := wk.length
work = make([]float64, lwork)
for i := range work {
work[i] = rnd.Float64()
}
copy(a, aCopy)
impl.Dgerqf(m, n, a, lda, tau, work, lwork)

// Test that the RQ factorization has completed successfully. Compute
// Q based on the vectors.
q := constructQ("RQ", m, n, a, lda, tau)

// Check that Q is orthogonal.
if !isOrthogonal(q) {

```

```

    t.Errorf("Case %v, Q not orthogonal", c)
}
//
Check that A = R * Q
r := blas64.General{
    Rows:  m,
    Cols:  n,
    Stride: n,
    Data:  make([]float64, m*n),
}
for i := 0; i < m; i++ {
    off := m - n
    for j := max(0, i-off); j < n; j++ {
        r.Data[i*r.Stride+j] = a[i*lda+j]
    }
}

got := blas64.General{
    Rows:  m,
    Cols:  n,
    Stride: lda,
    Data:  make([]float64, m*lda),
}
blas64.Gemm(blas.NoTrans, blas.NoTrans, 1, r, q, 0, got)
want := blas64.General{
    Rows:  m,
    Cols:  n,
    Stride: lda,
    Data:  aCopy,
}
if !equalApproxGeneral(got, want, tol) {
    t.Errorf("Case %d, R*Q != a %s\ngot: %+v\nwant: %+v", c, wk.name, got, want)
}
}
}
}
graph{strg}
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package gen

import (
    "testing"

    "gonum.org/v1/gonum/graph"
    "gonum.org/v1/gonum/graph/simple"

```

)

```
type duplication struct {
    UndirectedMutator
    addBackwards bool
    addSelfLoop bool
    addMultipleEdge bool
}
```

```
func (g *duplication) SetEdge(e graph.Edge) {
    switch {
    case e.From().ID() == e.To().ID():
        g.addSelfLoop = true
        return
    case e.From().ID() > e.To().ID():
        g.addBackwards = true
    case g.UndirectedMutator.HasEdgeBetween(e.From().ID(), e.To().ID()):
        g.addMultipleEdge = true
    }
}
```

```
g.UndirectedMutator.SetEdge(e)
}
```

```
func TestDuplication(t *testing.T) {
    for n := 2; n <= 50; n++ {
        for alpha := 0.1; alpha <= 1; alpha += 0.1 {
            for delta := 0.; delta <= 1; delta += 0.2 {
                for sigma := 0.; sigma <= 1; sigma += 0.2 {
                    g := &duplication{UndirectedMutator: simple.NewUndirectedGraph()}
                    err := Duplication(g,
n, delta, alpha, sigma, nil)
                    if err != nil {
                        t.Fatalf("unexpected error: n=%d, alpha=%v, delta=%v sigma=%v: %v", n, alpha, delta, sigma, err)
                    }
                    if g.addBackwards {
                        t.Errorf("edge added with From.ID > To.ID: n=%d, alpha=%v, delta=%v sigma=%v", n, alpha, delta, sigma)
                    }
                    if g.addSelfLoop {
                        t.Errorf("unexpected self edge: n=%d, alpha=%v, delta=%v sigma=%v", n, alpha, delta, sigma)
                    }
                    if g.addMultipleEdge {
                        t.Errorf("unexpected multiple edge: n=%d, alpha=%v, delta=%v sigma=%v", n, alpha, delta, sigma)
                    }
                }
            }
        }
    }
}
```



```

graph{{SUBGRAPHE}}{SUBGRAPHE}{SUBGRAPHE}{{SUBGRAPHE}}{SUBGRAPHE}{{}}
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package gonum

import (
    "gonum.org/v1/gonum/blas"
    "gonum.org/v1/gonum/blas/blas64"
)

// Dlauu2 computes the product
// U * U if uplo is blas.Upper
// L * L if uplo is blas.Lower
// where U or L is stored in the upper or lower triangular part of A.
// Only the upper or lower triangle of the result is stored, overwriting
// the corresponding factor in A.
func (impl Implementation) Dlauu2(uplo blas.Uplo, n int, a []float64, lda int) {
    switch {
    case uplo != blas.Upper && uplo != blas.Lower:
        panic(badUplo)
    case n < 0:
        panic(nLT0)
    case lda < max(1, n):
        panic(badLdA)
    }

    // Quick return if possible.
    if n == 0 {
        return
    }

    if len(a) < (n-1)*lda+n {
        panic(shortA)
    }

    bi := blas64.Implementation()

    if uplo == blas.Upper {
        // Compute the product U*U.
        for i := 0; i < n; i++ {
            aii := a[i*lda+i]
            if i < n-1 {
                {
                    a[i*lda+i] = bi.Ddot(n-i, a[i*lda+i:], 1, a[i*lda+i:], 1)
                }
            }
        }
    }
}

```

```

    bi.Dgemv(blas.NoTrans, i, n-i-1, 1, a[i+1:], lda, a[i*lda+i+1:], 1,
        aii, a[i:], lda)
} else {
    bi.Dscal(i+1, aii, a[i:], lda)
}
}
} else {
    // Compute the product L*L.
    for i := 0; i < n; i++ {
        aii := a[i*lda+i]
        if i < n-1 {
            a[i*lda+i] = bi.Ddot(n-i, a[i*lda+i:], lda, a[i*lda+i:], lda)
            bi.Dgemv(blas.Trans, n-i-1, i, 1, a[(i+1)*lda:], lda, a[(i+1)*lda+i:], lda,
                aii, a[i*lda:], 1)
        } else {
            bi.Dscal(i+1, aii, a[i*lda:], 1)
        }
    }
}
}
graph{{{dig{dig}dig{dig}}}}
// Code generated by "go generate gonum.org/v1/gonum/unit; DO NOT EDIT.

```

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package unit

```

import (
    "errors"
    "fmt"
    "math"
    "unicode/utf8"
)

```

// Area represents an area in square metres.

type Area float64

// Unit converts the Area to a *Unit

```

func (a Area) Unit() *Unit {
    return New(float64(a), Dimensions{
        LengthDim: 2,
    })
}

```

// Area allows Area to implement a Areaer interface

```

func (a Area) Area() Area {

```

```

return a
}

// From converts the unit into the receiver. From returns an
// error if there is a mismatch in dimension
func (a *Area) From(u Uniter) error {
    if !DimensionsMatch(u, Area(0)) {
        *a = Area(math.NaN())
        return errors.New("Dimension mismatch")
    }
    *a = Area(u.Unit().Value())
    return nil
}

func (a Area) Format(fs fmt.State, c rune) {
    switch c {
    case 'v':
        if fs.Flag('#') {
            fmt.Fprintf(fs, "%T(%v)", a, float64(a))
            return
        }
        fallthrough
    case
    'e', 'E', 'f', 'F', 'g', 'G':
        p, pOk := fs.Precision()
        w, wOk := fs.Width()
        const unit = " m^2"
        switch {
        case pOk && wOk:
            fmt.Fprintf(fs, "%*.*"+string(c), pos(w-utf8.RuneCount([]byte(unit))), p, float64(a))
        case pOk:
            fmt.Fprintf(fs, "%.*"+string(c), p, float64(a))
        case wOk:
            fmt.Fprintf(fs, "%*"+string(c), pos(w-utf8.RuneCount([]byte(unit))), float64(a))
        default:
            fmt.Fprintf(fs, "%"+string(c), float64(a))
        }
        fmt.Fprint(fs, unit)
    default:
        fmt.Fprintf(fs, "%%!%c(%T=%g m^2)", c, a, float64(a))
    }
}

graph{{sub_}{sub_{sub_}}}}
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package mathext

```

```

import "gonum.org/v1/gonum/mathext/internal/cephes"

// RegIncBeta returns the value of the regularized incomplete beta function
// I(x;a,b). It is defined as
//  $I(x;a,b) = B(x;a,b) / B(a,b)$ 
//  $= (a+b) / ((a)*(b)) * \int_0^x u^{a-1} * (1-u)^{b-1} du.$ 
// The domain of definition is  $0 \leq x \leq 1$ , and the parameters a and b must be positive.
// For other values of x, a, and b RegIncBeta will panic.
func RegIncBeta(a, b float64, x float64) float64 {
    return cephes.Incbet(a, b, x)
}

// InvRegIncBeta computes the inverse of the regularized incomplete beta function.
// It returns the x for which
//  $y = I(x;a,b)$ 
// The domain of definition is  $0 \leq y \leq 1$ , and the parameters a and b must be
// positive. For other values of x, a, and b InvRegIncBeta will panic.
func InvRegIncBeta(a, b float64, y float64) float64
{
    if y < 0 || y > 1 {
        panic("mathext: parameter out of range")
    }
    return cephes.Incbi(a, b, y)
}
graph{{d_}}{{d_}}
graph{stric9{stric4}stric9{stric4}{stric4}}
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// Package f64 provides float64 vector primitives.
package f64 // import "gonum.org/v1/gonum/internal/asm/f64"
graph{{{Digraa}{Digraa{Digraa}}}{Digraa{Digraa}{Digraa}Digrag}Digrag}Digrag}}}
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package fd

import (
    "testing"

    "gonum.org/v1/gonum/floats"
    "gonum.org/v1/gonum/mat"
)

func TestLaplacian(t *testing.T) {

```

```

for cas, test := range hessianTestCases {
    // Modify the test cases where the formula is set.
    settings := test.settings
    if settings != nil && !settings.Formula.isZero() {
        settings.Formula = Forward2nd
    }

    n := len(test.x)
    got := Laplacian(test.h.Func, test.x, test.settings)
    hess := mat.NewSymDense(n, nil)
    test.h.Hess(hess, test.x)
    var want float64
    for i := 0; i < n; i++ {
        want += hess.At(i, i)
    }
    if !floats.EqualWithinAbsOrRel(got, want, test.tol, test.tol) {
        t.Errorf("Cas %d: Laplacian mismatch. got %v, want %v", cas, got, want)
    }

    // Test that concurrency works.
    if settings == nil {
        settings = &Settings{}
    }
    settings.Concurrent = true
    got2 := Laplacian(test.h.Func,
        test.x, settings)
    if !floats.EqualWithinAbsOrRel(got, got2, 1e-5, 1e-5) {
        t.Errorf("Cas %d: Laplacian mismatch. got %v, want %v", cas, got2, got)
    }
}

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// Copyright 2017 The Gonum Authors. All rights reserved.
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// license that can be found in the LICENSE file.

package mat_test

import "gonum.org/v1/gonum/mat"

// FAO is a dataset extracted from Food and Agriculture Organization of the

```

// United Nations "FAO Statistical Pocketbook: World Food and Agriculture 2015".

// pp49-52.

```
var FAO = struct {
  Africa          *mat.Dense
  Asia            *mat.Dense
  LatinAmericaCaribbean *mat.Dense
  Oceania         *mat.Dense
}{}

Africa: mat.NewDense(21, 3, []float64{
  // 1990, 2000, 2014
  35.3, 38, 30.7, // Employment in agriculture (%)
  9.2, 20.3, 25.2, // Employment in agriculture, female (%)
  3163, 14718, 20667, // Energy consump, power irrigation (mln kWh)

  2597, 2717, 2903, // Dietary energy supply (kcal/pc/day)
  113, 116, 123, // Average dietary energy supply adequacy (%)
  58, 55, 52, // Dietary en supp, cereals/roots/tubers (%)
  18.6, 15, 10.8, // Prevalence of undernourishment
  (%)
  8832, 10241, 13915, // GDP per capita (US$, PPP)
  -0.4, -0.2, 50.7, // Cereal import dependency ratio (%)
  78.5, 83, 88.7, // Improved water source (% pop)

  // Production indices (2004-06=100)
  73, 90, 121, // Net food
  72, 89, 123, // Net crops
  82, 92, 123, // Cereals
  51, 77, 141, // Vegetable oils
  74, 94, 119, // Roots and tubers
  58, 86, 127, // Fruit and vegetables
  86, 93, 132, // Sugar
  76, 92, 115, // Livestock
  83, 89, 114, // Milk
  74, 91, 118, // Meat
  72, 92, 119, // Fish
}),
```

```
Asia: mat.NewDense(21, 3, []float64{
  // 1990, 2000, 2014
  30.9, 24.5, 27.6, // Employment in agriculture (%)
  40.9, 29.4, 31.1, // Employment in agriculture, female (%)
  7614, 38316, 82411, // Energy consump, power irrigation (mln kWh)

  2320, 2402, 2581, // Dietary energy supply (kcal/pc/day)
  107, 110, 117, // Average dietary energy supply adequacy (%)
  66, 65, 63, // Dietary en supp, cereals/roots/tubers (%)
  27.6, 25.7, 19.8, // Prevalence of undernourishment
```

```
(%)
3315, 3421, 4575, // GDP per capita (US$, PPP)
25.9, 28.1, 42, // Cereal import dependency ratio (%)
55.5, 61.1, 68.7, // Improved water source (% pop)

// Production indices (2004-06=100)
60, 82, 129, // Net food
59, 82, 127, // Net crops
66, 79, 131, // Cereals
58, 79, 128, // Vegetable oils
50, 80, 133, // Roots and tubers
58, 82, 124, // Fruit and vegetables
76, 94, 114, // Sugar
65, 84, 126, // Livestock
59, 77, 125, // Milk
67, 87, 127, // Meat
65, 90, 119, // Fish
}),
```

```
LatinAmericaCaribbean: mat.NewDense(14, 3, []float64{
// 1990, 2000, 2014
19.5, 14.2, 15.8, // Employment in agriculture (%)
13.7, 6.2, 7.6, // Employment in agriculture, female (%)

2669, 2787, 3069, // Dietary energy supply (kcal/pc/day)
117, 120, 129, // Average dietary energy supply adequacy (%)
42, 41, 40, // Dietary en supp, cereals/roots/tubers (%)
14.7, 12.1, 5.5, // Prevalence of undernourishment (%)
9837, 10976, 13915, // GDP per capita (US$,
PPP)
13, 12, 49.7, // Cereal import dependency ratio (%)
85.1, 89.8, 94, // Improved water source (% pop)
```

```
// Production indices (2004-06=100)
60, 83, 129, // Net food
64, 83, 131, // Net crops
62, 88, 139, // Cereals
58, 84, 123, // Livestock
82, 107, 71, // Fish
}),
```

```
Oceania: mat.NewDense(21, 3, []float64{
// 1990, 2000, 2014
6.2, 17.1, 3.8, // Employment in agriculture (%)
4.5, 3.9, 4.4, // Employment in agriculture, female (%)
415, 1028, 8667, // Energy consump, power irrigation (mln kWh)

2454, 2436, 2542, // Dietary energy supply (kcal/pc/day)
```

```

113, 112, 114, // Average dietary energy supply adequacy (%)
49, 50, 48, // Dietary en supp, cereals/roots/tubers (%)
15.7, 16.1, 14.2, // Prevalence of undernourishment (%)
2269, 2536, 3110, // GDP per capita (US$, PPP)
95.2, 95.9, 95.4, // Cereal import dependency ratio (%)
49.7, 53.2, 55.5, // Improved water source (% pop)

// Production indices (2004-06=100)
72, 99, 116, // Net food
69, 105,
126, // Net crops
77, 113, 117, // Cereals
41, 122, 215, // Vegetable oils
80, 90, 110, // Roots and tubers
66, 88, 104, // Fruit and vegetables
70, 104, 71, // Sugar
79, 97, 107, // Livestock
56, 92, 113, // Milk
79, 96, 105, // Meat
51, 78, 85, // Fish
}),
}
graph{DiG{{{DiG}DiG{DiG}}}DiG{DiG}}DiG}
graph{{{DIG}{DIG}DIG}{DIG}DIG}}
graph{{{not not}noe not}{{noe not not}noe not}<>{{noe not not}noe}{{noe not not}noe}}
graph{Dig5}
graph{stri}
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// license that can be found in the LICENSE file.

package distuv

import (
    "sort"
    "testing"

    "golang.org/x/exp/rand"
    "gonum.org/v1/gonum/floats"
)

func TestParetoProb(t *testing.T) {
    for _, test := range []struct {
        x, xm, alpha, want float64
    }{
        {0, 1, 1, 0},
        {0.5, 1, 1, 0},
        {1, 1, 1, 1.0},
    }

```



```

{1.5, 1, 1, 0.4444444444444444},
{2, 1, 1, 0.25},
{2.5, 1, 1, 0.16},
{3, 1, 1, 0.1111111111111111},
{3.5, 1, 1, 0.081632653061224},
{4, 1, 1, 0.0625},
{4.5, 1, 1, 0.049382716049383},
{5, 1, 1, 0.04},

{0, 1, 2, 0},
{0.5, 1, 2, 0},
{1, 1, 2, 2},
{1.5, 1, 2, 0.592592592592593},
{2, 1, 2, 0.25},
{2.5, 1, 2, 0.128},
{3, 1, 2, 0.074074074074074},
{3.5, 1, 2, 0.046647230320700},
{4, 1, 2, 0.03125},
{4.5, 1, 2, 0.021947873799726},
{5, 1, 2, 0.016},

{0, 1, 3, 0},
{0.5, 1, 3, 0},
{1, 1, 3, 3.0},
{1.5, 1, 3, 0.592592592592593},
{2, 1, 3,
0.1875},
{2.5, 1, 3, 0.0768},
{3, 1, 3, 0.037037037037037},
{3.5, 1, 3, 0.019991670137443},
{4, 1, 3, 0.011718750000000},
{4.5, 1, 3, 0.007315957933242},
{5, 1, 3, 0.0048},
} {
pdf := Pareto{test.xm, test.alpha, nil}.Prob(test.x)
if !floats.EqualWithinAbsOrRel(pdf, test.want, 1e-10, 1e-10) {
t.Errorf("Pdf mismatch, x = %v, xm = %v, alpha = %v. Got %v, want %v", test.x, test.xm, test.alpha, pdf, test.want)
}
}
}

func TestParetoCDF(t *testing.T) {
for _, test := range []struct {
x, xm, alpha, want float64
}{
{0, 1, 1, 0},
{0.5, 1, 1, 0},
{1, 1, 1, 0},

```

{1.5, 1, 1, 0.3333333333333333},
{2, 1, 1, 0.5},
{2.5, 1, 1, 0.6},
{3, 1, 1, 0.6666666666666667},
{3.5, 1, 1, 0.714285714285714},
{4, 1, 1, 0.75},
{4.5, 1, 1, 0.7777777777777778},
{5, 1, 1, 0.80},
{5.5, 1, 1, 0.8181818181818181},
{6, 1, 1, 0.8333333333333333},
{6.5, 1, 1, 0.846153846153846},
{7, 1, 1, 0.857142857142857},
{7.5, 1, 1, 0.8666666666666667},
{8, 1, 1, 0.875},
{8.5, 1, 1,
0.882352941176471},
{9, 1, 1, 0.8888888888888889},
{9.5, 1, 1, 0.894736842105263},
{10, 1, 1, 0.90},

{0, 1, 2, 0},
{0.5, 1, 2, 0},
{1, 1, 2, 0},
{1.5, 1, 2, 0.5555555555555556},
{2, 1, 2, 0.75},
{2.5, 1, 2, 0.84},
{3, 1, 2, 0.8888888888888889},
{3.5, 1, 2, 0.918367346938776},
{4, 1, 2, 0.9375},
{4.5, 1, 2, 0.950617283950617},
{5, 1, 2, 0.96},
{5.5, 1, 2, 0.966942148760331},
{6, 1, 2, 0.9722222222222222},
{6.5, 1, 2, 0.976331360946746},
{7, 1, 2, 0.979591836734694},
{7.5, 1, 2, 0.9822222222222222},
{8, 1, 2, 0.9843750000000000},
{8.5, 1, 2, 0.986159169550173},
{9, 1, 2, 0.987654320987654},
{9.5, 1, 2, 0.988919667590028},
{10, 1, 2, 0.99},

{0, 1, 3, 0},
{0.5, 1, 3, 0},
{1, 1, 3, 0},
{1.5, 1, 3, 0.703703703703704},
{2, 1, 3, 0.875},
{2.5, 1, 3, 0.936},

```

{3, 1, 3, 0.962962962962963},
{3.5, 1, 3, 0.976676384839650},
{4, 1, 3, 0.984375000000000},
{4.5, 1, 3, 0.989026063100137},
{5, 1, 3, 0.992},
{5.5, 1, 3, 0.993989481592787},
{6,
1, 3, 0.995370370370370},
{6.5, 1, 3, 0.996358670914884},
{7, 1, 3, 0.997084548104956},
{7.5, 1, 3, 0.997629629629630},
{8, 1, 3, 0.998046875000000},
{8.5, 1, 3, 0.998371667005903},
{9, 1, 3, 0.998628257887517},
{9.5, 1, 3, 0.998833649220003},
{10, 1, 3, 0.999},
} {
cdf := Pareto{test.xm, test.alpha, nil}.CDF(test.x)
if !floats.EqualWithinAbsOrRel(cdf, test.want, 1e-10, 1e-10) {
t.Errorf("CDF mismatch, x = %v, xm = %v, alpha = %v. Got %v, want %v", test.x, test.xm, test.alpha, cdf,
test.want)
}
}
}

func TestPareto(t *testing.T) {
src := rand.New(rand.NewSource(1))
for i, p := range []Pareto{
{1, 10, src},
{1, 20, src},
} {
testPareto(t, p, i)
}
}

func testPareto(t *testing.T, p Pareto, i int) {
tol := 1e-2
const n = 1e6
const bins = 50
x := make([]float64, n)
generateSamples(x, p)
sort.Float64s(x)

testRandLogProbContinuous(t, i, 0, x, p, tol, bins)
checkMean(t, i, x, p, tol)
checkVarAndStd(t, i, x, p, tol)
checkExKurtosis(t, i,

```

```

x, p, 7e-2)
checkProbContinuous(t, i, x, p, 1e-3)
}
graph{{{{{subGrn}subGr{subGrn}subGrc}{subGrc}{subGrn}}}}}
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graph{Gra}
graph{{{ST}ST}{ST}ST{ST}ST}
graph{/*****/}
graph{Stt{Stt}Stt{{Stt}}}
graph{{SubGrh{{SubGr}}}SubGr}
graph{{digr{digr}}}
graph{{EdgU}{EdgW}{EdgU}{EdgU}{EdgW}{EdgW}}
graph{{SubGrt}{SubGrt}{SubGrh{{SubGrt}{SubGrt}}}}}
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graph{{NOD}NOD}
graph<<>>{<<>>}
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// license that can be found in the LICENSE file.

package testlapack

import (
    "testing"

    "golang.org/x/exp/rand"

    "gonum.org/v1/gonum/blas"
    "gonum.org/v1/gonum/blas/blas64"
    "gonum.org/v1/gonum/floats"
    "gonum.org/v1/gonum/lapack"
)

type Dlarfter interface {
    Dgeqr2er
    Dlarft(direct lapack.Direct, store lapack.StoreV, n, k int, v []float64, ldv int, tau []float64, t []float64, ldt int)
}

func DlarftTest(t *testing.T, impl Dlarfter) {
    rnd := rand.New(rand.NewSource(1))
    for _, store := range []lapack.StoreV{lapack.ColumnWise, lapack.RowWise} {
        for _, direct := range []lapack.Direct{lapack.Forward, lapack.Backward} {
            for _, test := range []struct {
                m, n, ldv, ldt int
            }{
                {6, 6, 0, 0},
                {8, 6, 0, 0},
                {6, 8, 0, 0},
            } {

```

```

{6, 6, 10, 15},
{8, 6, 10, 15},
{6, 8, 10, 15},
{6, 6, 15, 10},
{8, 6, 15, 10},
{6, 8, 15, 10},
} {
// Generate
a matrix
m := test.m
n := test.n
lda := n
if lda == 0 {
lda = n
}

a := make([]float64, m*lda)
for i := 0; i < m; i++ {
for j := 0; j < lda; j++ {
a[i*lda+j] = rnd.Float64()
}
}
// Use dgeqr2 to find the v vectors
tau := make([]float64, n)
work := make([]float64, n)
impl.Dgeqr2(m, n, a, lda, tau, work)

// Construct H using these answers
vMatTmp := extractVMat(m, n, a, lda, lapack.Forward, lapack.ColumnWise)
vMat := constructVMat(vMatTmp, store, direct)
v := vMat.Data
ldv := vMat.Stride

h := constructH(tau, vMat, store, direct)

k := min(m, n)
ldt := test.ldt
if ldt == 0 {
ldt = k
}
// Find T from the actual function
tm := make([]float64, k*ldt)
for i := range tm {
tm[i] = 100 + rnd.Float64()
}
// The v data has been put into a.
impl.Dlarft(direct, store, m, k, v, ldv, tau, tm, ldt)

```

```

tData := make([]float64, len(tm))
copy(tData, tm)
if
direct == lapack.Forward {
    // Zero out the lower traingular portion.
    for i := 0; i < k; i++ {
        for j := 0; j < i; j++ {
            tData[i*ldt+j] = 0
        }
    }
} else {
    // Zero out the upper traingular portion.
    for i := 0; i < k; i++ {
        for j := i + 1; j < k; j++ {
            tData[i*ldt+j] = 0
        }
    }
}

T := blas64.General{
    Rows:  k,
    Cols:  k,
    Stride: ldt,
    Data:  tData,
}

vMatT := blas64.General{
    Rows:  vMat.Cols,
    Cols:  vMat.Rows,
    Stride: vMat.Rows,
    Data:  make([]float64, vMat.Cols*vMat.Rows),
}
for i := 0; i < vMat.Rows; i++ {
    for j := 0; j < vMat.Cols; j++ {
        vMatT.Data[j*vMatT.Stride+i] = vMat.Data[i*vMat.Stride+j]
    }
}
var comp blas64.General
if store == lapack.ColumnWise {
    //  $H = I - V * T * V$ 
    tmp := blas64.General{
        Rows:  T.Rows,
        Cols:  vMatT.Cols,
        Stride: vMatT.Cols,
        Data:  make([]float64, T.Rows*vMatT.Cols),
    }
}
//

```

```

T * V
blas64.Gemm(blas.NoTrans, blas.NoTrans, 1, T, vMatT, 0, tmp)
comp = blas64.General{
    Rows: vMat.Rows,
    Cols: tmp.Cols,
    Stride: tmp.Cols,
    Data: make([]float64, vMat.Rows*tmp.Cols),
}
// V * (T * V)
blas64.Gemm(blas.NoTrans, blas.NoTrans, 1, vMat, tmp, 0, comp)
} else {
    // H = I - V * T * V
    tmp := blas64.General{
        Rows: T.Rows,
        Cols: vMat.Cols,
        Stride: vMat.Cols,
        Data: make([]float64, T.Rows*vMat.Cols),
    }
    // T * V
    blas64.Gemm(blas.NoTrans, blas.NoTrans, 1, T, vMat, 0, tmp)
    comp = blas64.General{
        Rows: vMatT.Rows,
        Cols: tmp.Cols,
        Stride: tmp.Cols,
        Data: make([]float64, vMatT.Rows*tmp.Cols),
    }
    // V * (T * V)
    blas64.Gemm(blas.NoTrans, blas.NoTrans, 1, vMatT, tmp, 0, comp)
}
// I - V * T * V
for i := 0; i < comp.Rows; i++ {
    for j := 0; j < comp.Cols; j++ {
        comp.Data[i*m+j] *= -1
        if
i == j {
            comp.Data[i*m+j] += 1
        }
    }
}
if !floats.EqualApprox(comp.Data, h.Data, 1e-14) {
    t.Errorf("T does not construct proper H. Store = %v, Direct = %v.\nWant %v\ngot %v.", string(store), string(direct),
h.Data, comp.Data)
}
}
}
}
}
}
}
}

```

```

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// license that can be found in the LICENSE file.

package gonum

import (
    "gonum.org/v1/gonum/blas"
    "gonum.org/v1/gonum/lapack"
)

// Dormlq multiplies the matrix C by the orthogonal matrix Q defined by the
// slices a and tau. A and tau are as returned from Dgelqf.
// C = Q * C if side == blas.Left and trans == blas.NoTrans
// C = Q * C if side == blas.Left and trans == blas.Trans
// C = C * Q if side == blas.Right and trans == blas.NoTrans
// C = C * Q if side == blas.Right and trans == blas.Trans
// If side == blas.Left, A is a matrix of side km, and if side == blas.Right
// A is of size kn. This uses a blocked algorithm.
//
// work is temporary storage, and lwork specifies the usable memory length.
// At minimum, lwork >= m if side == blas.Left and lwork >= n if side == blas.Right,
// and this function will panic otherwise.
// Dormlq uses a block algorithm, but
// the block size is limited
// by the temporary space available. If lwork == -1, instead of performing Dormlq,
// the optimal work length will be stored into work[0].
//
// tau contains the Householder scales and must have length at least k, and
// this function will panic otherwise.
func (impl Implementation) Dormlq(side blas.Side, trans blas.Transpose, m, n, k int, a []float64, lda int, tau, c
[]float64, ldc int, work []float64, lwork int) {
    left := side == blas.Left
    nw := m
    if left {
        nw = n
    }
    switch {
    case !left && side != blas.Right:
        panic(badSide)
    case trans != blas.Trans && trans != blas.NoTrans:
        panic(badTrans)
    case m < 0:
        panic(mLT0)
    case n < 0:
        panic(nLT0)
    case k < 0:
        panic(kLT0)
    }
}

```



```

case left && k > m:
    panic(kGTM)
case !left && k > n:
    panic(kGTN)
case left && lda < max(1, m):
    panic(badLdA)
case !left && lda < max(1, n):
    panic(badLdA)
case lwork < max(1, nw) && lwork != -1:
    panic(badLWork)
case len(work) < max(1, lwork):
    panic(shortWork)
}

//
Quick return if possible.
if m == 0 || n == 0 || k == 0 {
    work[0] = 1
    return
}

const (
    nbmax = 64
    ldt   = nbmax
    tsize = nbmax * ldt
)
opts := string(side) + string(trans)
nb := min(nbmax, impl.Ilaenv(1, "DORMLQ", opts, m, n, k, -1))
lworkopt := max(1, nw)*nb + tsize
if lwork == -1 {
    work[0] = float64(lworkopt)
    return
}

switch {
case left && len(a) < (k-1)*lda+m:
    panic(shortA)
case !left && len(a) < (k-1)*lda+n:
    panic(shortA)
case len(tau) < k:
    panic(shortTau)
case len(c) < (m-1)*ldc+n:
    panic(shortC)
}

nbmin := 2
if 1 < nb && nb < k {
    iws := nw*nb + tsize

```

```

if lwork < iws {
    nb = (lwork - tsize) / nw
    nbmin = max(2, impl.Ilaenv(2, "DORMLQ", opts, m, n, k, -1))
}
}
if nb < nbmin || k <= nb {
    // Call unblocked code.
    impl.Dorml2(side, trans, m, n, k, a, lda, tau, c, ldc, work)
    work[0] = float64(lworkopt)
    return
}

t := work[:tsize]
wrk := work[tsize:]
ldwrk := nb

notrans := trans == blas.NoTrans
transt := blas.NoTrans
if
notrans {
    transt = blas.Trans
}

switch {
case left && notrans:
    for i := 0; i < k; i += nb {
        ib := min(nb, k-i)
        impl.Dlarft(lapack.Forward, lapack.RowWise, m-i, ib,
            a[i*lda+i:], lda,
            tau[i:],
            t, ldt)
        impl.Dlarfb(side, transt, lapack.Forward, lapack.RowWise, m-i, n, ib,
            a[i*lda+i:], lda,
            t, ldt,
            c[i*ldc:], ldc,
            wrk, ldwrk)
    }

case left && !notrans:
    for i := ((k - 1) / nb) * nb; i >= 0; i -= nb {
        ib := min(nb, k-i)
        impl.Dlarft(lapack.Forward, lapack.RowWise, m-i, ib,
            a[i*lda+i:], lda,
            tau[i:],
            t, ldt)
        impl.Dlarfb(side, transt, lapack.Forward, lapack.RowWise, m-i, n, ib,
            a[i*lda+i:], lda,
            t, ldt,

```

```

c[i*ldc:], ldc,
wrk, ldwrk)
}

case !left && notrans:
for i := ((k - 1) / nb) * nb; i >= 0; i -= nb {
ib := min(nb, k-i)
impl.Dlarft(lapack.Forward, lapack.RowWise, n-i, ib,
a[i*lda+i:], lda,
tau[i:],
t, ldt)
impl.Dlarfb(side, transt, lapack.Forward, lapack.RowWise, m, n-i, ib,
a[i*lda+i:],
lda,
t, ldt,
c[i:], ldc,
wrk, ldwrk)
}

case !left && !notrans:
for i := 0; i < k; i += nb {
ib := min(nb, k-i)
impl.Dlarft(lapack.Forward, lapack.RowWise, n-i, ib,
a[i*lda+i:], lda,
tau[i:],
t, ldt)
impl.Dlarfb(side, transt, lapack.Forward, lapack.RowWise, m, n-i, ib,
a[i*lda+i:], lda,
t, ldt,
c[i:], ldc,
wrk, ldwrk)
}
}

work[0] = float64(lworkopt)
}

graph{"\////////////////////////////////"}
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graph{{o o q}}
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graph{{{gr}gr}gr{{gr}gr}}
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```

digraph{E->E->E->E}
graph{{{digra4}{digra4}digra4{digra4}{digra4}{digra4}}}}
// Copyright 2016 The Gonum Authors. All rights reserved.
// Use of this source code is governed by a BSD-style
// license that can be found in the LICENSE file.

package distmv

import (
    "math"

    "golang.org/x/exp/rand"

    "gonum.org/v1/gonum/floats"
    "gonum.org/v1/gonum/mat"
    "gonum.org/v1/gonum/stat/distuv"
)

// Dirichlet implements the Dirichlet probability distribution.
//
// The Dirichlet distribution is a continuous probability distribution that
// generates elements over the probability simplex, i.e.  $\|x\|_1 = 1$ . The Dirichlet
// distribution is the conjugate prior to the categorical distribution and the
// multivariate version of the beta distribution. The probability of a point  $x$  is
//  $1/\text{Beta}() \prod_i x_i^{(\alpha_i - 1)}$ 
// where  $\text{Beta}()$  is the multivariate Beta function (see the mathext package).
//
// For more information see https://en.wikipedia.org/wiki/Dirichlet\_distribution
type Dirichlet struct {
    alpha []float64
    dim   int
    src   rand.Source

    lbeta float64
    sumAlpha float64
}

//
// NewDirichlet creates a new dirichlet distribution with the given parameters alpha.
// NewDirichlet will panic if len(alpha) == 0, or if any alpha is <= 0.
func NewDirichlet(alpha []float64, src rand.Source) *Dirichlet {
    dim := len(alpha)
    if dim == 0 {
        panic(badZeroDimension)
    }
    for _, v := range alpha {
        if v <= 0 {
            panic("dirichlet: non-positive alpha")
        }
    }
}

```

```

    }
    }
    a := make([]float64, len(alpha))
    copy(a, alpha)
    d := &Dirichlet{
        alpha: a,
        dim:   dim,
        src:   src,
    }
    d.lbeta, d.sumAlpha = d.genLBeta(a)
    return d
}

// CovarianceMatrix calculates the covariance matrix of the distribution,
// storing the result in dst. Upon return, the value at element {i, j} of the
// covariance matrix is equal to the covariance of the ith and jth variables.
// covariance(i, j) = E[(xi - E[xi])(xj - E[xj])]
// If the dst matrix is empty it will be resized to the correct dimensions,
// otherwise dst must match the dimension of the receiver or CovarianceMatrix
// will panic.
func
(d *Dirichlet) CovarianceMatrix(dst *mat.SymDense) {
    if dst.IsEmpty() {
        *dst = *(dst.GrowSym(d.dim).(*mat.SymDense))
    } else if dst.Symmetric() != d.dim {
        panic("dirichelet: input matrix size mismatch")
    }
    scale := 1 / (d.sumAlpha * d.sumAlpha * (d.sumAlpha + 1))
    for i := 0; i < d.dim; i++ {
        ai := d.alpha[i]
        v := ai * (d.sumAlpha - ai) * scale
        dst.SetSym(i, i, v)
        for j := i + 1; j < d.dim; j++ {
            aj := d.alpha[j]
            v := -ai * aj * scale
            dst.SetSym(i, j, v)
        }
    }
}

// genLBeta computes the generalized LBeta function.
func (d *Dirichlet) genLBeta(alpha []float64) (lbeta, sumAlpha float64) {
    for _, alpha := range d.alpha {
        lg, _ := math.Lgamma(alpha)
        lbeta += lg
        sumAlpha += alpha
    }
    lg, _ := math.Lgamma(sumAlpha)

```

```

return lbeta - lg, sumAlpha
}

// Dim returns the dimension of the distribution.
func (d *Dirichlet) Dim() int {
    return d.dim
}

// LogProb computes the log of the pdf of the point x.
//
// It does not check that  $\|x\|_1 = 1$ .
func (d *Dirichlet)
LogProb(x []float64) float64 {
    dim := d.dim
    if len(x) != dim {
        panic(badSizeMismatch)
    }
    var lprob float64
    for i, x := range x {
        lprob += (d.alpha[i] - 1) * math.Log(x)
    }
    lprob -= d.lbeta
    return lprob
}

// Mean returns the mean of the probability distribution at x. If the
// input argument is nil, a new slice will be allocated, otherwise the result
// will be put in-place into the receiver.
func (d *Dirichlet) Mean(x []float64) []float64 {
    x = reuseAs(x, d.dim)
    copy(x, d.alpha)
    floats.Scale(1/d.sumAlpha, x)
    return x
}

// Prob computes the value of the probability density function at x.
func (d *Dirichlet) Prob(x []float64) float64 {
    return math.Exp(d.LogProb(x))
}

// Rand generates a random number according to the distributon.
// If the input slice is nil, new memory is allocated, otherwise the result is stored
// in place.
func (d *Dirichlet) Rand(x []float64) []float64 {
    x = reuseAs(x, d.dim)
    for i := range x {
        x[i] = distuv.Gamma{Alpha: d.alpha[i], Beta:

```

```

1, Src: d.src}.Rand()
}
sum := floats.Sum(x)
floats.Scale(1/sum, x)
return x
}
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// license that can be found in the LICENSE file.

package quat

import (
    "math"
    "testing"
)

var inf = math.Inf(1)

var infTests = []struct {
    q    Number
    want bool
}{
    {q: Inf(), want: true},
    {q: Number{Real: inf, Imag: inf, Jmag: inf, Kmag: inf}, want: true},
    {q: Number{Real: -inf, Imag: -inf, Jmag: -inf, Kmag: -inf}, want: true},
    {q: Number{Real: inf, Imag: nan, Jmag: nan, Kmag: nan}, want: true},
    {q: Number{Real: nan, Imag: inf, Jmag: nan, Kmag: nan}, want: true},
    {q: Number{Real: nan, Imag: nan, Jmag: inf, Kmag: nan}, want: true},
    {q: Number{Real: nan, Imag: nan, Jmag: nan, Kmag: inf}, want: true},
    {q: Number{Real: -inf, Imag: nan, Jmag: nan, Kmag: nan}, want: true},
    {q: Number{Real: nan, Imag: -inf, Jmag: nan, Kmag: nan}, want: true},
    {q: Number{Real: nan, Imag: nan, Jmag: -inf, Kmag: nan}, want: true},
    {q: Number{Real: nan, Imag: nan, Jmag: nan, Kmag: -inf},
    want: true},
    {q: Number{Real: inf}, want: true},
    {q: Number{Imag: inf}, want: true},
    {q: Number{Jmag: inf}, want: true},
    {q: Number{Kmag: inf}, want: true},
    {q: Number{Real: -inf}, want: true},
    {q: Number{Imag: -inf}, want: true},
    {q: Number{Jmag: -inf}, want: true},
    {q: Number{Kmag: -inf}, want: true},
    {q: Number{}, want: false},
}

func TestIsInf(t *testing.T) {
    for _, test := range infTests {

```

```

got := IsInf(test.q)
if got != test.want {
    t.Errorf("unexpected result for IsInf(%v): got:%t want:%t", test.q, got, test.want)
}
}
}
graph{{{s}s}s}s}
graph{{sub_}}
image: debian/testing
packages:
- clang
- cmake
- python
- autoconf
- libxml2-dev
- libssl-dev
- libz-dev
- llvm-dev # for cctools
- uuid-dev ## for cctools
- libplist-utils # for gogio
- go-lang
sources:
- git@git.sr.ht:~eliasnaur/applesdks
- https://git.sr.ht/~eliasnaur/gio
- https://git.sr.ht/~eliasnaur/giouiorg
- https://github.com/tpoechtrager/cctools-port.git
- https://github.com/tpoechtrager/apple-libtapi.git
- https://github.com/mackyle/xar.git
environment:
    APPLE_TOOLCHAIN_ROOT: /home/build/appletools
    PATH: /home/build/go/bin:/usr/bin
secrets:
- 6363dfe0-15d9-4bd2-88a5-ae53243568c9
tasks:
- prepare_toolchain: |
    mkdir -p $APPLE_TOOLCHAIN_ROOT
    cd $APPLE_TOOLCHAIN_ROOT
    tar xJf /home/build/applesdks/applesdks.tar.xz
    mkdir bin tools
    cd bin
    ln -s ../toolchain/bin/x86_64-apple-darwin19-ld ld
    ln -s ../toolchain/bin/x86_64-apple-darwin19-ar ar
    ln -s /home/build/cctools-port/cctools/misc/lipo lipo
    ln -s ../tools/appletoolchain
xcrun
    ln -s /usr/bin/plistutil plutil
    cd ../tools
    ln -s appletoolchain clang-ios

```



```

ln -s appletoolchain clang-macos
- install_gogio: |
  cd gio/cmd
  go install ./gogio
- install_appletoolchain: |
  cd giouiorg
  go build -o $APPLE_TOOLCHAIN_ROOT/tools ./cmd/appletoolchain
- build_xar: |
  cd xar/xar
  ac_cv_lib_crypto_OpenSSL_add_all_ciphers=yes CC=clang ./autogen.sh --prefix=/usr
  make
  sudo make install
- build_libtapi: |
  cd apple-libtapi
  INSTALLPREFIX=$APPLE_TOOLCHAIN_ROOT/libtapi ./build.sh
  ./install.sh
- build_cctools: |
  cd cctools-port/cctools
  ./configure --prefix $APPLE_TOOLCHAIN_ROOT/toolchain --with-
libtapi=$APPLE_TOOLCHAIN_ROOT/libtapi --target=x86_64-apple-darwin19
  make install
- test_macos: |
  cd gio/example
  export PATH=/home/build/appletools/bin:$PATH
  CC=$APPLE_TOOLCHAIN_ROOT/tools/clang-macos CGO_CFLAGS="--sysroot
$APPLE_TOOLCHAIN_ROOT/MacOSX.sdk -arch x86_64" CGO_LDFLAGS="--sysroot
$APPLE_TOOLCHAIN_ROOT/MacOSX.sdk -arch x86_64" GOOS=darwin CGO_ENABLED=1 go build -o
/dev/null ./kitchen
- test_ios: |
  cd gio/example
  export PATH=/home/build/appletools/bin:$PATH
  gogio -target ios -o app.app ./kitchen
graph{Sub}
graph{NoN{NoR{NoR}NoR{NoR}NoR}}
graph{Gr_}
graph{{SUBGRA0{{SUBGRA0}}}}
graph{{GRAr}}
Graph{SubgrK{{{SubgrN}{SubgrN}SubgrN}{SubgrN}}}
graph{Edgh{Edgh{Edgr}{Edgr}}Edgh{Edgr}}
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// license that can be found in the LICENSE file.

package optimize

import (
  "math"

```

```

"gonum.org/v1/gonum/stat/distmv"
)

var _ Method = (*GuessAndCheck)(nil)

// GuessAndCheck is a global optimizer that evaluates the function at random
// locations. Not a good optimizer, but useful for comparison and debugging.
type GuessAndCheck struct {
    Rander distmv.Rander

    bestF float64
    bestX []float64
}

func (*GuessAndCheck) Uses(has Available) (uses Available, err error) {
    return has.function()
}

func (g *GuessAndCheck) Init(dim, tasks int) int {
    if dim <= 0 {
        panic(nonpositiveDimension)
    }
    if tasks < 0 {
        panic(negativeTasks)
    }
    g.bestF = math.Inf(1)
    g.bestX = resize(g.bestX, dim)
    return tasks
}

func (g *GuessAndCheck) sendNewLoc(operation chan<- Task, task Task) {
    g.Rander.Rand(task.X)
    task.Op = FuncEvaluation
    operation <- task
}

func (g *GuessAndCheck) updateMajor(operation
chan<- Task, task Task) {
    // Update the best value seen so far, and send a MajorIteration.
    if task.F < g.bestF {
        g.bestF = task.F
        copy(g.bestX, task.X)
    } else {
        task.F = g.bestF
        copy(task.X, g.bestX)
    }
    task.Op = MajorIteration
    operation <- task
}

```

```

}

func (g *GuessAndCheck) Run(operation chan<- Task, result <-chan Task, tasks []Task) {
    // Send initial tasks to evaluate
    for _, task := range tasks {
        g.sendNewLoc(operation, task)
    }

    // Read from the channel until PostIteration is sent.
Loop:
    for {
        task := <-result
        switch task.Op {
        default:
            panic("unknown operation")
        case PostIteration:
            break Loop
        case MajorIteration:
            g.sendNewLoc(operation, task)
        case FuncEvaluation:
            g.updateMajor(operation, task)
        }
    }

    // PostIteration was sent. Update the best new values.
    for task := range result {
        switch task.Op {
        default:
            panic("unknown operation")
        case MajorIteration:
        case FuncEvaluation:
            g.updateMajor(operation, task)
        }
    }
    close(operation)
}

graph{ED{ED{ED}ED}ED{ED}ED{ED{ED}ED}}
graph{strn}
graph{{e_{e_}}}}
graph{{noU{noU}noU}noO{noU{noU}}}}
graph{{GRAP}GRAP{{GRAP}}GRAP}
graph{{{digra}dig{{{dig}}}}digz{{{dig}}dig{{{dig}}}}}
// Code generated by "go generate gonum.org/v1/gonum/unit; DO NOT EDIT.

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// license that can be found in the LICENSE file.

```

```

package unit

import (
    "errors"
    "fmt"
    "math"
    "unicode/utf8"
)

// EquivalentRadioactiveDose is a measure of equivalent dose of ionizing radiation in sieverts.
type EquivalentRadioactiveDose float64

const Sievert EquivalentRadioactiveDose = 1

// Unit converts the EquivalentRadioactiveDose to a *Unit
func (a EquivalentRadioactiveDose) Unit() *Unit {
    return New(float64(a), Dimensions{
        LengthDim: 2,
        TimeDim: -2,
    })
}

// EquivalentRadioactiveDose allows EquivalentRadioactiveDose to implement a EquivalentRadioactiveDoseer
interface
func (a EquivalentRadioactiveDose) EquivalentRadioactiveDose() EquivalentRadioactiveDose {
    return a
}

// From converts the unit into the receiver. From returns an
// error if there is a mismatch in dimension
func (a
*EquivalentRadioactiveDose) From(u Uniter) error {
    if !DimensionsMatch(u, Sievert) {
        *a = EquivalentRadioactiveDose(math.NaN())
        return errors.New("Dimension mismatch")
    }
    *a = EquivalentRadioactiveDose(u.Unit().Value())
    return nil
}

func (a EquivalentRadioactiveDose) Format(fs fmt.State, c rune) {
    switch c {
    case 'v':
        if fs.Flag('#') {
            fmt.Fprintf(fs, "%T(%v)", a, float64(a))
            return
        }
        fallthrough

```

```

case 'e', 'E', 'f', 'F', 'g', 'G':
    p, pOk := fs.Precision()
    w, wOk := fs.Width()
    const unit = " Sy"
    switch {
    case pOk && wOk:
        fmt.Fprintf(fs, "%*.*"+string(c), pos(w-utf8.RuneCount([]byte(unit))), p, float64(a))
    case pOk:
        fmt.Fprintf(fs, "%.*"+string(c), p, float64(a))
    case wOk:
        fmt.Fprintf(fs, "%*"+string(c), pos(w-utf8.RuneCount([]byte(unit))), float64(a))
    default:
        fmt.Fprintf(fs, "%"+string(c), float64(a))
    }
    fmt.Fprint(fs, unit)
default:
    fmt.Fprint(fs, "%%!%c(%T=%g Sy)", c, a, float64(a))
}
}
# Gonum optimize
[![GoDoc](https://godoc.org/gonum.org/v1/gonum/optimize?status.svg)](https://godoc.org/gonum.org/v1/gonum/optimize)

```

Package optimize is an optimization package for the Go language.

```

graph{ {Digra{ }Digra{ } }
graph{nw:nw K:nw nw:nw nw:nw K:nw nw:nw}
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```

```

// Package topo provides graph topology analysis functions.
package topo // import "gonum.org/v1/gonum/graph/topo"
graph{Sua}
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```

```

package gonum

```

```

import (
    "testing"

    "gonum.org/v1/gonum/lapack/testlapack"
)

```

```

func BenchmarkDgeev(b *testing.B) { testlapack.DgeevBenchmark(b, impl) }
graph{{{EDG_}EDG_}}}

```

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```
package kdtree_test
```

```
import (
```

```
    "fmt"
```

```
    "math"
```

```
    "gonum.org/v1/gonum/spatial/kdtree"
```

```
)
```

```
func ExampleTree() {
```

```
    // Example data from https://en.wikipedia.org/wiki/K-d_tree
```

```
    points := kdtree.Points{{2, 3}, {5, 4}, {9, 6}, {4, 7}, {8, 1}, {7, 2}}
```

```
    t := kdtree.New(points, false)
```

```
    q := kdtree.Point{8, 7}
```

```
    p, d := t.Nearest(q)
```

```
    fmt.Printf("%v is closest point to %v, d=%f\n", p, q, math.Sqrt(d))
```

```
    // Output:
```

```
    // [9 6] is closest point to [8 7], d=1.414214
```

```
}
```

```
func ExampleTree_bounds() {
```

```
    // Example data from https://en.wikipedia.org/wiki/K-d_tree
```

```
    points := kdtree.Points{{2, 3}, {5, 4}, {9, 6}, {4, 7}, {8, 1}, {7, 2}}
```

```
    t := kdtree.New(points, true)
```

```
    fmt.Printf("Bounding box of points is %+v\n", t.Root.Bounding)
```

```
    // Output:
```

```
    // Bounding box of points is &{Min:[2 1] Max:[9 7]}
```

```
}
```

```
func ExampleTree_Do() {
```

```
    // Example data from https://en.wikipedia.org/wiki/K-d_tree
```

```
    points
```

```
    := kdtree.Points{{2, 3}, {5, 4}, {9, 6}, {4, 7}, {8, 1}, {7, 2}}
```

```
    // Print all points in the data set within 3 of (3, 5).
```

```
    t := kdtree.New(points, false)
```

```
    q := kdtree.Point{3, 5}
```

```
    t.Do(func(c kdtree.Comparable, _ *kdtree.Bounding, _ int) (done bool) {
```

```
        // Compare each distance and output points
```

```
        // with a Euclidean distance less than 3.
```

```
        // Distance returns the square of the
```

```
        // Euclidean distance between points.
```

```

    if q.Distance(c) <= 3*3 {
        fmt.Println(c)
    }
    return
})
// Unordered output:
// [2 3]
// [4 7]
// [5 4]
}

func ExampleTree_DoBounded() {
    // Example data from https://en.wikipedia.org/wiki/K-d_tree
    points := kdtree.Points{{2, 3}, {5, 4}, {9, 6}, {4, 7}, {8, 1}, {7, 2}}

    // Find all points within the bounding box ((3, 3), (6, 8))
    // and print them with their bounding boxes and tree depth.
    t := kdtree.New(points, true) // Construct tree with bounding boxes.
    b := &kdtree.Bounding{
        Min: kdtree.Point{3, 3},
        Max: kdtree.Point{6,
8},
    }
    t.DoBounded(b, func(c kdtree.Comparable, bound *kdtree.Bounding, depth int) (done bool) {
        fmt.Printf("p=%v bound=%v+v depth=%d\n", c, bound, depth)
        return
    })
    // Output:
    // p=[5 4] bound=&{Min:[2 3] Max:[5 7]} depth=1
    // p=[4 7] bound=&{Min:[4 7] Max:[4 7]} depth=2
}
graph{DIGS}
graph{diGra_[diGra_=""]}
graph{{{Digra9}}Digra5}Digra9}
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package gonum

import (
    "gonum.org/v1/gonum/internal/asm/f64"
)

// Ddot computes the dot product of the two vectors
// \sum_i x[i]*y[i]
func (Implementation) Ddot(n int, x []float64, incX int, y []float64, incY int) float64 {
    if incX == 0 {

```

```

panic(zeroIncX)
}
if incY == 0 {
panic(zeroIncY)
}
if n <= 0 {
if n == 0 {
return 0
}
panic(nLT0)
}
if incX == 1 && incY == 1 {
if len(x) < n {
panic(shortX)
}
if len(y) < n {
panic(shortY)
}
return f64.DotUnitary(x[:n], y[:n])
}
var ix, iy int
if incX < 0 {
ix = (-n + 1) * incX
}
if incY < 0 {
iy = (-n + 1) * incY
}
if ix >= len(x) || ix+(n-1)*incX >= len(x) {
panic(shortX)
}
if iy >= len(y) || iy+(n-1)*incY >= len(y) {
panic(shortY)
}
return f64.DotInc(x, y, uintptr(n), uintptr(incX), uintptr(incY), uintptr(ix), uintptr(iy))
}
graph{{{Digra9}}Digra5}}
digraph {
A [name="hello world"]
}
graph{DIGR}
graph{Subgra{ }Subgra}
graph{{{gr}gr}}
digraph{ea}
graph{NODEG}
graph{GRAP0{GRAP1}GRAP0{ }GRAP0{GRAP1}GRAP9}
Graph{Sun{Sur{Sur}{Sur}{Sun{Sun{Sur{Sur}{Sur}{Sun{Sur}}}}Sur}}}}
graph{"\
""\

```



```

""\
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graph{{di}di}}
Graph{{Subgr}}
# Gonum matrix
[![GoDoc](https://godoc.org/gonum.org/v1/gonum/mat?status.svg)](https://godoc.org/gonum.org/v1/gonum/mat)

```

Package mat is a matrix package for the Go language.

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```
package optimize_test
```

```

import (
    "fmt"
    "log"

    "gonum.org/v1/gonum/optimize"
    "gonum.org/v1/gonum/optimize/functions"
)

```

```

func ExampleMinimize() {
    p := optimize.Problem{
        Func: functions.ExtendedRosenbrock{}.Func,
        Grad: functions.ExtendedRosenbrock{}.Grad,
    }

    x := []float64{1.3, 0.7, 0.8, 1.9, 1.2}
    result, err := optimize.Minimize(p, x, nil, nil)
    if err != nil {
        log.Fatal(err)
    }
    if err = result.Status.Err(); err != nil {
        log.Fatal(err)
    }
    fmt.Printf("result.Status: %v\n", result.Status)
    fmt.Printf("result.X: %0.4g\n", result.X)
    fmt.Printf("result.F: %0.4g\n", result.F)
    fmt.Printf("result.Stats.FuncEvaluations: %d\n", result.Stats.FuncEvaluations)
    // Output:
    // result.Status: GradientThreshold
    // result.X: [1 1 1 1 1]
    // result.F: 4.98e-30
    // result.Stats.FuncEvaluations: 31
}

```

```

}
graph{graphh{graphe}}
graph{{SubGr_}{SubGr_}{SubGr_}}
graph{SUBGRA0{{SUBGRA5{SUBGRA0}}}}
graph{subGra9}

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package cmplx64

// Conj returns the complex conjugate of x.
func Conj(x complex64) complex64 { return complex(real(x), -imag(x)) }

graph{{{Strict}}}}
graph{di9{{di9{di9}{di9{{di9{di9}di3}}}}}}
graph{{edd{eda{edc}}}}
graph{{GRAP}}
graph{""}
graph{{{subgr{}}subgr{}}}
Graph{Sun{Sur{Sun{Sur}}}}
graph{{DiGrag}{DiGrag}}
graph{{dig{{dig{dig}}dig{dig{dig}}}}}}
digraph{""""{k[e=e][e=e]}{k[e=m]""[l=""]""""[l=""]""[l=""]][e=n]""[l=""]][e=m]""[l=""]""""[l=""]""[l=""]]}->P->P-
>P->DP->E->F->G->H->I->J->K->L->M->N->O->P->Q->R->S->T->U->V->W->X->Y->Z{k[e=e][e=n]}->m->n-
>m->n->m->n->m->n->m->n->m->n->m->n->m->n->m->n->m->n->m->n->m->n->m->n->m->n->m->n->m->n-
>m->n->m->n->m->n->m->n->m->n->m->n->m->n->m->n->m->n->m->n}
graph{{digrai}}

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package multi

import "gonum.org/v1/gonum/graph"

// Node here is a duplication of simple.Node
// to avoid needing to import both packages.

// Node is a simple graph node.
type Node int64

// ID returns the ID number of the node.
func (n Node) ID() int64 {
    return int64(n)
}

```

```

}

// Edge is a collection of multigraph edges sharing end points.
type Edge struct {
    F, T graph.Node

    graph.Lines
}

// From returns the from-node of the edge.
func (e Edge) From() graph.Node { return e.F }

// To returns the to-node of the edge.
func (e Edge) To() graph.Node { return e.T }

// ReversedEdge returns a new Edge with the F and T fields
// swapped.
func (e Edge) ReversedEdge() graph.Edge { return Edge{F: e.T, T: e.F} }

// Line is a multigraph edge.
type Line struct {
    F, T graph.Node

    UID int64
}

// From returns the from-node of the line.
func
(l Line) From() graph.Node { return l.F }

// To returns the to-node of the line.
func (l Line) To() graph.Node { return l.T }

// ReversedLine returns a new Line with the F and T fields
// swapped. The UID of the new Line is the same as the
// UID of the receiver. The Lines within the Edge are
// not altered.
func (l Line) ReversedLine() graph.Line { l.F, l.T = l.T, l.F; return l }

// ID returns the ID of the line.
func (l Line) ID() int64 { return l.UID }

// WeightedEdge is a collection of weighted multigraph edges sharing end points.
type WeightedEdge struct {
    F, T graph.Node

    graph.WeightedLines

```

```

// WeightFunc calculates the aggregate
// weight of the lines in Lines. If
// WeightFunc is nil, the sum of weights
// is used as the edge weight.
// The graph.WeightedLines can be expected
// to be positioned at the first line of
// the iterator on entry and must be
// Reset before exit.
// WeightFunc must accept a nil input.
WeightFunc func(graph.WeightedLines) float64
}

//
From returns the from-node of the edge.
func (e WeightedEdge) From() graph.Node { return e.F }

// To returns the to-node of the edge.
func (e WeightedEdge) To() graph.Node { return e.T }

// ReversedEdge returns a new Edge with the F and T fields
// swapped. The Lines within the WeightedEdge are not
// altered.
func (e WeightedEdge) ReversedEdge() graph.Edge { e.F, e.T = e.T, e.F; return e }

// Weight returns the weight of the edge. Weight uses WeightFunc
// field to calculate the weight, so the WeightedLines field is
// expected to be positioned at the first line and is reset before
// Weight returns.
func (e WeightedEdge) Weight() float64 {
    if e.WeightFunc != nil {
        return e.WeightFunc(e.WeightedLines)
    }
    if e.WeightedLines == nil {
        return 0
    }
    var w float64
    for e.Next() {
        w += e.WeightedLine().Weight()
    }
    e.WeightedLines.Reset()
    return w
}

// WeightedLine is a weighted multigraph edge.
type WeightedLine struct {
    F, T graph.Node
    W    float64

```

```

    UID int64
}

//
// From returns the from-node of the line.
func (l WeightedLine) From() graph.Node { return l.F }

// To returns the to-node of the line.
func (l WeightedLine) To() graph.Node { return l.T }

// ReversedLine returns a new Line with the F and T fields
// swapped. The UID and W of the new Line are the same as the
// UID and W of the receiver.
func (l WeightedLine) ReversedLine() graph.Line { l.F, l.T = l.T, l.F; return l }

// ID returns the ID of the line.
func (l WeightedLine) ID() int64 { return l.UID }

// Weight returns the weight of the edge.
func (l WeightedLine) Weight() float64 { return l.W }
graph{{diGrap}diGr{diGrap}diGrap}
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package testlapack

import (
    "fmt"
    "testing"

    "golang.org/x/exp/rand"

    "gonum.org/v1/gonum/blas"
    "gonum.org/v1/gonum/blas/blas64"
)

type Dpbtrfer interface {
    Dpbtrf(uplo blas.Uplo, n, kd int, ab []float64, ldab int) (ok bool)
}

// DpbtrfTest tests a band Cholesky factorization on random symmetric positive definite
// band matrices by checking that the Cholesky factors multiply back to the original matrix.
func DpbtrfTest(t *testing.T, impl Dpbtrfer) {
    // TODO(vladimir-ch): include expected-failure test case.

    // With the current implementation of Ilaenv the blocked code path is taken if kd > 64.
    // Unfortunately, with the block size nb=32 this also means that in Dpbtrf

```

```

// it never happens that i2 <= 0 and the state coverage (unlike code coverage) is not complete.
rnd := rand.New(rand.NewSource(1))
for _, n := range
[]int{0, 1, 2, 3, 4, 5, 64, 65, 66, 91, 96, 97, 101, 128, 130} {
    for _, kd := range []int{0, (n + 1) / 4, (3*n - 1) / 4, (5*n + 1) / 4} {
        for _, uplo := range []blas.Uplo{blas.Upper, blas.Lower} {
            for _, ldab := range []int{kd + 1, kd + 1 + 7} {
                dpbtrfTest(t, impl, uplo, n, kd, ldab, rnd)
            }
        }
    }
}

func dpbtrfTest(t *testing.T, impl Dpbtrfer, uplo blas.Uplo, n, kd int, ldab int, rnd *rand.Rand) {
    const tol = 1e-12

    name := fmt.Sprintf("uplo=%v,n=%v,kd=%v,ldab=%v", string(uplo), n, kd, ldab)

    // Generate a random symmetric positive definite band matrix.
    ab := randSymBand(uplo, n, kd, ldab, rnd)

    // Compute the Cholesky decomposition of A.
    abFac := make([]float64, len(ab))
    copy(abFac, ab)
    ok := impl.Dpbtrf(uplo, n, kd, abFac, ldab)
    if !ok {
        t.Fatalf("%v: bad test matrix, Dpbtrf failed", name)
    }

    // Reconstruct an symmetric band matrix from the U*U or L*L factorization, overwriting abFac.
    dsbmm(uplo, n, kd, abFac, ldab)

    // Compute and check the
    max-norm distance between the reconstructed and original matrix A.
    dist := distSymBand(uplo, n, kd, abFac, ldab, ab, ldab)
    if dist > tol*float64(n) {
        t.Errorf("%v: unexpected result, diff=%v", name, dist)
    }
}

// dsbmm computes a symmetric band matrix A
// A = U*U if uplo == blas.Upper,
// A = L*L if uplo == blas.Lower,
// where U and L is an upper, respectively lower, triangular band matrix
// stored on entry in ab. The result is stored in-place into ab.
func dsbmm(uplo blas.Uplo, n, kd int, ab []float64, ldab int) {
    bi := blas64.Implementation()

```

```

switch uplo {
case blas.Upper:
// Compute the product U * U.
for k := n - 1; k >= 0; k-- {
klen := min(kd, n-k-1) // Number of stored off-diagonal elements in the row
// Add a multiple of row k of the factor U to each of rows k+1 through n.
if klen > 0 {
bi.Dsyr(blas.Upper, klen, 1, ab[k*ldab+1:], 1, ab[(k+1)*ldab:], ldab-1)
}
// Scale row k by the diagonal element.
bi.Dscal(klen+1, ab[k*ldab], ab[k*ldab:],
1)
}
case blas.Lower:
// Compute the product L * L.
for k := n - 1; k >= 0; k-- {
kc := max(0, kd-k) // Index of the first valid element in the row
klen := kd - kc // Number of stored off-diagonal elements in the row
// Compute the diagonal [k,k] element.
ab[k*ldab+kd] = bi.Ddot(klen+1, ab[k*ldab+kc:], 1, ab[k*ldab+kc:], 1)
// Compute the rest of column k.
if klen > 0 {
bi.Dtrmv(blas.Lower, blas.NoTrans, blas.NonUnit, klen,
ab[(k-klen)*ldab+kd:], ldab-1, ab[k*ldab+kc:], 1)
}
}
}
}
graph{{SUBGG{SUBGH}SUBGG}{SUBGG{SUBGH}}}}
graph {sw sw}
graph{subGraA{{subGraA{subGraB}}GraB}}
graph{{EdgU}{EdgW{{EdgU}{EdgW}{EdgU}{EdgU}}}{EdgU}{EdgU}}{EdgW}{}}
digraph{{{{SW}}->{{SW}}}}
graph{{SubG}SubG}
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package quad_test

import (
    "fmt"
    "math"
    "runtime"

    "gonum.org/v1/gonum/integrate/quad"
    "gonum.org/v1/gonum/stat/distuv"
)

```

```

func Example() {
    fmt.Println("Evaluate the expected value of  $x^2 + 3$  under a Weibull distribution")
    f := func(x float64) float64 {
        d := distuv.Weibull{Lambda: 1, K: 1.5}
        return (x*x + 3) * d.Prob(x)
    }
    ev := quad.Fixed(f, 0, math.Inf(1), 10, nil, 0)
    fmt.Printf("EV with 10 points = %0.6v\n", ev)

    ev = quad.Fixed(f, 0, math.Inf(1), 30, nil, 0)
    fmt.Printf("EV with 30 points = %0.6v\n", ev)

    ev = quad.Fixed(f, 0, math.Inf(1), 100, nil, 0)
    fmt.Printf("EV with 100 points = %0.6v\n", ev)

    ev = quad.Fixed(f, 0, math.Inf(1), 10000, nil, 0)
    fmt.Printf("EV with 10000 points = %0.6v\n", ev)

    fmt.Println("Estimate using parallel evaluations of f.")
    concurrent := runtime.GOMAXPROCS(0)
    ev = quad.Fixed(f,
        0, math.Inf(1), 100, nil, concurrent)
    fmt.Printf("EV = %0.6v\n", ev)
    // Output:
    // Evaluate the expected value of  $x^2 + 3$  under a Weibull distribution
    // EV with 10 points = 4.20175
    // EV with 30 points = 4.19066
    // EV with 100 points = 4.19064
    // EV with 10000 points = 4.19064
    //
    // Estimate using parallel evaluations of f.
    // EV = 4.19064
}
graph{GrapA}
graph{{subGr_{{subGr_}subGr_}subGr_}}
Graph{<><><><><><><><>}
graph{DI9{DI9{DI9}}}}
graph{{digrP{{digrA}digrA}digrP{digrA}}}
graph{Digraph0}
graph{{Dig_}Dig_{Dig_}}
graph{"\Zd{"\Z{"}\Zd"}
graph{SubGra9}
The MIT License (MIT)

```

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package token

```
import (  
    "fmt"  
)
```

```
type Token struct {  
    Type  
    Lit []byte  
    Pos  
}
```

```
type Type int
```

```
const (  
    INVALID Type = iota  
    EOF  
)
```

```
type Pos struct {
```

```

Offset int
Line  int
Column int
}

func (p Pos) String() string {
    return fmt.Sprintf("Pos(offset=%d, line=%d, column=%d)", p.Offset, p.Line, p.Column)
}

type TokenMap struct {
    typeMap []string
    idMap   map[string]Type
}

func (m TokenMap) Id(tok Type) string {
    if int(tok) < len(m.typeMap) {
        return m.typeMap[tok]
    }
    return "unknown"
}

func (m TokenMap) Type(tok string) Type {
    if typ, exist := m.idMap[tok]; exist {
        return typ
    }
    return
    INVALID
}

func (m TokenMap) TokenString(tok *Token) string {
    //TODO: refactor to print pos & token string properly
    return fmt.Sprintf("%s(%d,%s)", m.Id(tok.Type), tok.Type, tok.Lit)
}

func (m TokenMap) StringType(typ Type) string {
    return fmt.Sprintf("%s(%d)", m.Id(typ), typ)
}

var TokMap = TokenMap{
    typeMap: []string{
        "INVALID",
        "$",
        "{",
        "}",
        "empty",
        "strict",
        "graphx",
        "digraph",
    },
}

```

```

",",
"--",
"->",
"node",
"edge",
"[",
"]",
",",
"=",
"subgraph",
":",
"id",
},

```

```
idMap: map[string]Type{
```

```

    "INVALID": 0,
    "$":      1,
    "{":      2,
    "}":      3,
    "empty":  4,
    "strict": 5,
    "graphx": 6,
    "digraph": 7,
    ";":      8,
    "--":     9,
    "->":    10,
    "node":   11,
    "edge":   12,
    "[":      13,
    "]":      14,
    ",":      15,
    "=":     16,
    "subgraph": 17,
    ":":      18,
    "id":     19,
},

```

```
}
```

```
graph{{{striN}{striN}striN{striN}striN{striN}}}
```

```
graph{{GG{{GG}}}}
```

```
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```

```
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```

```
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```

```
package distuv
```

```
import (
```

```
    "math"
```

```
    "sort"
```

"testing"

"golang.org/x/exp/rand"

)

```
func TestHalfKStandardWeibullProb(t *testing.T) {
pts := []univariateProbPoint{
{
loc: 0,
prob: math.Inf(1),
cumProb: 0,
logProb: math.Inf(1),
},
{
loc: -1,
prob: 0,
cumProb: 0,
logProb: 0,
},
{
loc: 1,
prob: 0.183939720585721,
cumProb: 0.632120558828558,
logProb: -1.693147180559950,
},
{
loc: 20,
prob: 0.001277118038048,
cumProb: 0.988577109006533,
logProb: -6.663149272336520,
},
}
testDistributionProbs(t, Weibull{K: 0.5, Lambda: 1}, "0.5K Standard Weibull", pts)
}
```

```
func TestExponentialStandardWeibullProb(t *testing.T) {
pts := []univariateProbPoint{
{
loc: 0,
prob: 1,
cumProb: 0,
logProb: math.Inf(1),
},
{
loc: -1,
prob:
0,
cumProb: 0,
```

```

logProb: 0,
},
{
loc: 1,
prob: 0.367879441171442,
cumProb: 0.632120558828558,
logProb: -1.0,
},
{
loc: 20,
prob: 0.000000002061154,
cumProb: 0.999999997938846,
logProb: -20.0,
},
}
testDistributionProbs(t, Weibull{K: 1, Lambda: 1}, "1K (Exponential) Standard Weibull", pts)
}

func TestRayleighStandardWeibullProb(t *testing.T) {
pts := []univariateProbPoint{
{
loc: 0,
prob: 0,
cumProb: 0,
logProb: math.Inf(-1),
},
{
loc: -1,
prob: 0,
cumProb: 0,
logProb: 0,
},
{
loc: 1,
prob: 0.735758882342885,
cumProb: 0.632120558828558,
logProb: -0.306852819440055,
},
{
loc: 20,
prob: 0,
cumProb: 1,
logProb: -396.31112054588607,
},
}
testDistributionProbs(t, Weibull{K: 2, Lambda: 1}, "2K (Rayleigh) Standard Weibull", pts)
}

```

```

func TestFiveKStandardWeibullProb(t *testing.T) {
    pts := []univariateProbPoint{
        {
            loc: 0,
            prob: 0,
            cumProb: 0,
            logProb: math.Inf(-1),
        },
        {
            loc: -1,
            prob: 0,
            cumProb: 0,
            logProb: 0,
        },
        {
            loc: 1,
            prob: 1.839397205857210,
            cumProb: 0.632120558828558,
            logProb: 0.609437912434100,
        },
        {
            loc: 20,
            prob: 0,
            cumProb: 1,
            logProb: -3199986.4076329935,
        },
    }
    testDistributionProbs(t, Weibull{K: 5, Lambda: 1}, "5K Standard Weibull", pts)
}

```

```

func TestScaledUpHalfKStandardWeibullProb(t *testing.T) {
    pts := []univariateProbPoint{
        {
            loc: 0,
            prob: math.Inf(1),
            cumProb: 0,
            logProb: math.Inf(1),
        },
        {
            loc: -1,
            prob: 0,
            cumProb: 0,
            logProb: 0,
        },
        {
            loc: 1,
            prob: 0.180436508682207,

```

```

        cumProb: 0.558022622759326,
        logProb: -1.712376315541750,
    },
    {
        loc: 20,
        prob: 0.002369136850928,
        cumProb: 0.974047406098605,
        logProb: -6.045229588092130,
    },
}
testDistributionProbs(t, Weibull{K: 0.5, Lambda: 1.5}, "0.5K 1.5 Weibull", pts)
}

```

```

func TestScaledDownHalfKStandardWeibullProb(t
*testing.T) {
pts := []univariateProbPoint{
{
loc: 0,
prob: math.Inf(1),
cumProb: 0,
logProb: math.Inf(1),
},
{
loc: -1,
prob: 0,
cumProb: 0,
logProb: 0,
},
{
loc: 1,
prob: 0.171909491538362,
cumProb: 0.756883265565786,
logProb: -1.760787152653070,
},
{
loc: 20,
prob: 0.000283302579100,
cumProb: 0.998208237166091,
logProb: -8.168995047393730,
},
}
testDistributionProbs(t, Weibull{K: 0.5, Lambda: 0.5}, "0.5K 0.5 Weibull", pts)
}

```

```

func TestWeibullScore(t *testing.T) {
for _, test := range []*Weibull{
{
K: 1,

```

```

    Lambda: 1,
},
{
    K:    2,
    Lambda: 3.6,
},
{
    K:    3.4,
    Lambda: 8,
},
} {
    testDerivParam(t, test)
}
}

```

```

func TestWeibull(t *testing.T) {
    src := rand.New(rand.NewSource(1))
    for i, dist := range []Weibull{
        {K: 1, Lambda: 1, Src: src},
        {K: 2, Lambda: 3.6, Src: src},
        {K: 3.4, Lambda: 8, Src: src},
    } {
        testWeibull(t,
            dist, i)
    }
}

```

```

func testWeibull(t *testing.T, dist Weibull, i int) {
    const (
        tol = 1e-2
        n    = 3e6
        bins = 50
    )
    x := make([]float64, n)
    generateSamples(x, dist)
    sort.Float64s(x)

```

```

    checkMean(t, i, x, dist, tol)
    checkVarAndStd(t, i, x, dist, tol)
    checkEntropy(t, i, x, dist, tol)
    checkExKurtosis(t, i, x, dist, tol)
    checkSkewness(t, i, x, dist, tol)
    checkMedian(t, i, x, dist, tol)
    checkQuantileCDFSurvival(t, i, x, dist, tol)
    checkProbContinuous(t, i, x, dist, 1e-10)
    checkProbQuantContinuous(t, i, x, dist, tol)
}

```



```

{
    data: []float64{1, 2, -3},
    wantInc: []float64{-3, 1, 2},
    wantDec: []float64{2, 1, -3},
},
{
    data: []float64{-5, -4, -3, -2, -1, 0, 1, 2, 3, 4, 5},
    wantInc: []float64{-5,
-4, -3, -2, -1, 0, 1, 2, 3, 4, 5},
    wantDec: []float64{5, 4, 3, 2, 1, 0, -1, -2, -3, -4, -5},
},
{
    data: []float64{5, 4, 3, 2, 1, 0, -1, -2, -3, -4, -5},
    wantInc: []float64{-5, -4, -3, -2, -1, 0, 1, 2, 3, 4, 5},
    wantDec: []float64{5, 4, 3, 2, 1, 0, -1, -2, -3, -4, -5},
},
{
    data: []float64{-2, 4, -1, 2, -4, 0, 3, 5, -5, 1, -3},
    wantInc: []float64{-5, -4, -3, -2, -1, 0, 1, 2, 3, 4, 5},
    wantDec: []float64{5, 4, 3, 2, 1, 0, -1, -2, -3, -4, -5},
},
} {
    n := len(test.data)
    ds := make([]float64, n)

    copy(ds, test.data)
    impl.Dlasrt(lapack.SortIncreasing, n, ds)
    if !floats.Equal(ds, test.wantInc) {
        t.Errorf("Case #%v: unexpected result of SortIncreasing", ti)
    }

    copy(ds, test.data)
    impl.Dlasrt(lapack.SortDecreasing, n, ds)
    if !floats.Equal(ds, test.wantDec) {
        t.Errorf("Case #%v: unexpected result of SortIncreasing", ti)
    }
}
}
graph{{GR1}}
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package testlapack

import (
    "math"
    "testing"

```

"golang.org/x/exp/rand"

"gonum.org/v1/gonum/blas"

"gonum.org/v1/gonum/blas/blas64"

)

type Dlacn2er interface {

Dlacn2(n int, v, x []float64, isgn []int, est float64, kase int, isave *[3]int) (float64, int)

}

func Dlacn2Test(t *testing.T, impl Dlacn2er) {

rnd := rand.New(rand.NewSource(1))

for _, n := range []int{1, 2, 3, 4, 5, 7, 10, 15, 20, 100} {

for cas := 0; cas < 10; cas++ {

a := randomGeneral(n, n, n, rnd)

// Compute the 1-norm of A explicitly.

var norm1 float64

for j := 0; j < n; j++ {

var sum float64

for i := 0; i < n; i++ {

sum += math.Abs(a.Data[i*a.Stride+j])

}

if sum > norm1 {

norm1 = sum

}

}

// Compute the estimate of 1-norm using Dlacn2.

x := make([]float64, n)

work := make([]float64, n)

v := make([]float64,

n)

isgn := make([]int, n)

var (

kase int

isave [3]int

got float64

)

loop:

for {

got, kase = impl.Dlacn2(n, v, x, isgn, got, kase, &isave)

switch kase {

default:

panic("Dlacn2 returned invalid value of kase")

case 0:

break loop

```

case 1:
blas64.Gemv(blas.NoTrans, 1, a, blas64.Vector{Data: x, Inc: 1}, 0, blas64.Vector{Data: work, Inc: 1})
copy(x, work)
case 2:
blas64.Gemv(blas.Trans, 1, a, blas64.Vector{Data: x, Inc: 1}, 0, blas64.Vector{Data: work, Inc: 1})
copy(x, work)
}
}

// Check that got is either accurate enough or a
// lower estimate of the 1-norm of A.
if math.Abs(got-norm1) > 1e-8 && got > norm1 {
t.Errorf("Case n=%v: not lower estimate. 1-norm %v, estimate %v", n, norm1, got)
}
}
}
}

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package lp_test

import (
    "fmt"
    "log"

    "gonum.org/v1/gonum/mat"
    "gonum.org/v1/gonum/optimize/convex/lp"
)

func ExampleSimplex() {
    c := []float64{-1, -2, 0, 0}
    A := mat.NewDense(2, 4, []float64{-1, 2, 1, 0, 3, 1, 0, 1})
    b := []float64{4, 9}

    opt, x, err := lp.Simplex(c, A, b, 0, nil)
    if err != nil {
        log.Fatal(err)
    }
    fmt.Printf("opt: %v\n", opt)
    fmt.Printf("x: %v\n", x)
    // Output:
    // opt: -8
    // x: [2 3 0 0]
}
Graph{{{subgraM}subgraS{subgraM}}}
```

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package distuv

import (

"sort"

"testing"

"golang.org/x/exp/rand"

)

func TestLognormal(t *testing.T) {

src := rand.New(rand.NewSource(1))

for i, dist := range []LogNormal{

{Mu: 0.1, Sigma: 0.3, Src: src},

{Mu: 0.01, Sigma: 0.01, Src: src},

{Mu: 2, Sigma: 0.01, Src: src},

} {

const (

tol = 1e-2

n = 1e5

)

x := make([]float64, n)

generateSamples(x, dist)

sort.Float64s(x)

checkMean(t, i, x, dist, tol)

checkVarAndStd(t, i, x, dist, tol)

checkEntropy(t, i, x, dist, tol)

checkExKurtosis(t, i, x, dist, 2e-1)

checkSkewness(t, i, x, dist, 5e-2)

checkMedian(t, i, x, dist, tol)

checkQuantileCDFSurvival(t, i, x, dist, tol)

checkProbContinuous(t, i, x, dist, 1e-10)

checkProbQuantContinuous(t, i, x, dist, tol)

}

}

// See <https://github.com/gonum/gonum/issues/577> for details.

func TestLognormalIssue577(t

*testing.T) {

x := 1.0e-16

max := 1.0e-295

cdf := LogNormal{Mu: 0, Sigma: 1}.CDF(x)

if cdf <= 0 {

t.Errorf("LogNormal{0,1}.CDF(%e) should be positive. got: %e", x, cdf)

```

}
if cdf > max {
    t.Errorf("LogNormal{0,1}.CDF(%e) is greater than %e. got: %e", x, max, cdf)
}
}

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// Package dual provides the dual numeric type and functions. Dual numbers
// are an extension of the real numbers in the form a+b where ^2=0, but 0.
//
// See https://en.wikipedia.org/wiki/Dual_number for details of their properties
// and uses.
package dual // imports "gonum.org/v1/gonum/num/dual"

// TODO(kortschak): Handle special cases properly.
// - Pow
graph{{{grap5}grap5}grap5{grap5}grap5}grap5}
graph{{{gra}{gra}}gra{{{gra}{gra{{{gra}}}}}gra}}gra}}}}
graph{[_diGra_=""diGra_[diGra_=""diGra_]
graph{Edg{Edg{Edg}Edg}Edg{Edg}Edg{Edg}Edg}}
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// Package testlapack implements a set of testing routines for Lapack functions.
package testlapack // import "gonum.org/v1/gonum/lapack/testlapack"
Graph{{{subgrap{subgrap}subgrap}}subgrap{subgrap}subgrap}
// Code generated by "go generate gonum.org/v1/gonum/unit/constant; DO NOT EDIT.

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package constant

import (
    "fmt"
    "testing"
)

func TestMagneticConstantFormat(t *testing.T) {
    for _, test := range []struct {
        format string
        want string
    }{
        {"%v", "1.2566370621238374e-06 A^2 s^4 kg^-1 m^-3"},
    }

```

```
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```

```

package testblas

import (
    "fmt"
    "testing"

    "golang.org/x/exp/rand"
    "gonum.org/v1/gonum/blas"
)

type Ztbsver interface {
    Ztbsv(uplo blas.Uplo, trans blas.Transpose, diag blas.Diag, n, k int, ab []complex128, ldab int, x []complex128, incX int)

    Ztbmver
}

func ZtbsvTest(t *testing.T, impl Ztbsver) {
    rnd := rand.New(rand.NewSource(1))
    for _, uplo := range []blas.Uplo{blas.Upper, blas.Lower} {
        for _, trans := range []blas.Transpose{blas.NoTrans, blas.Trans, blas.ConjTrans} {
            for _, diag := range []blas.Diag{blas.NonUnit, blas.Unit} {
                for _, n := range []int{1, 2, 3, 4, 10} {
                    for k := 0; k < n; k++ {
                        for _, ldab := range []int{k + 1, k + 1 + 10} {
                            for _, incX := range []int{-4, 1, 5} {
                                ztbsvTest(t, impl, rnd, uplo, trans, diag, n, k, ldab, incX)
                            }
                        }
                    }
                }
            }
        }
    }
}

//
// ztbsvTest tests Ztbsv by checking whether Ztbmv followed by Ztbsv
// round-trip.
func ztbsvTest(t *testing.T, impl Ztbsver, rnd *rand.Rand, uplo blas.Uplo, trans blas.Transpose, diag blas.Diag, n, k, ldab, incX int) {
    const tol = 1e-10

    // Allocate a dense-storage triangular band matrix filled with NaNs that
    // will be used as a for creating the actual triangular band matrix.
    lda := max(1, n)
    a := makeZGeneral(nil, n, n, lda)
    // Fill the referenced triangle of A with random data within the band

```



```

// and with zeros outside.
if uplo == blas.Upper {
  for i := 0; i < n; i++ {
    for j := i; j < min(n, i+k+1); j++ {
      re := rnd.NormFloat64()
      im := rnd.NormFloat64()
      a[i*lda+j] = complex(re, im)
    }
    for j := i + k + 1; j < n; j++ {
      a[i*lda+j] = 0
    }
  }
} else {
  for i := 0; i < n; i++ {
    for j := 0; j < i-k; j++ {
      a[i*lda+j] = 0
    }
    for j := max(0, i-k); j <= i; j++ {
      re := rnd.NormFloat64()
      im := rnd.NormFloat64()
      a[i*lda+j] = complex(re,
im)
    }
  }
}
if diag == blas.Unit {
  // The diagonal should not be referenced by Ztbmv and Ztbsv, so
  // invalidate it with NaNs.
  for i := 0; i < n; i++ {
    a[i*lda+i] = znan
  }
}
// Create the triangular band matrix.
ab := zPackTriBand(k, ldab, uplo, n, a, lda)
abCopy := make([]complex128, len(ab))
copy(abCopy, ab)

// Generate a random complex vector x.
xtest := make([]complex128, n)
for i := range xtest {
  re := rnd.NormFloat64()
  im := rnd.NormFloat64()
  xtest[i] = complex(re, im)
}
x := makeZVector(xtest, incX)

// Store a copy of x as the correct result that we want.
want := make([]complex128, len(x))

```

```

copy(want, x)

// Compute A*x, denoting the result by b and storing it in x.
impl.Ztbmv(uplo, trans, diag, n, k, ab, ldab, x, incX)
// Solve A*x = b, that is,  $x = A^{-1} * b = A^{-1} * A * x$ .
impl.Ztbsv(uplo, trans, diag, n, k, ab, ldab, x, incX)
// If Ztbsv is correct,  $A^{-1} * A = I$  and x contains again its original value.

name := fmt.Sprintf("uplo=%v,trans=%v,diag=%v,n=%v,k=%v,ldab=%v,incX=%v",
uplo, trans, diag, n, k, ldab, incX)
if !zsame(ab, abCopy) {
    t.Errorf("%v: unexpected modification of A", name)
}
if !zSameAtNonstrided(x, want, incX) {
    t.Errorf("%v: unexpected modification of x\nwant %v\ngot %v", name, want, x)
}
if !zEqualApproxAtStrided(x, want, incX, tol) {
    t.Errorf("%v: unexpected result\nwant %v\ngot %v", name, want, x)
}
}
graph{{nodU{nodU}{nodU}{nodU}{nodU}{nodU}}}
graph{{{{GRA_}GRA_}GRA_{{GRA_}GRA_}{{GRA_}GRA_}{{GRA_}{{GRA_}GRA_}GRA_}}}
graph{{subgr{{subgr}subgr}}subgr}
graph{SUB7{SUB2}}
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package topo

import (
    "fmt"
    "testing"

    "gonum.org/v1/gonum/graph/encoding"
    "gonum.org/v1/gonum/graph/encoding/dot"
    "gonum.org/v1/gonum/graph/simple"
)

var cliqueGraphTests = []struct {
    name string
    g    []intset
    want string
}{
    {
        name: "simple",
        g: []intset{
            0: linksTo(1, 2, 4, 6),

```

```

1: linksTo(2, 4, 6),
2: linksTo(3, 6),
3: linksTo(4, 5),
4: linksTo(6),
5: nil,
6: nil,
},
want: `strict graph {
// Node definitions.
0 [nodes="[0 1 2 6]"];
1 [nodes="[0 1 4 6]"];
2 [nodes="[2 3]"];
3 [nodes="[3 4]"];
4 [nodes="[3 5]"];

// Edge definitions.
0 -- 1 [nodes="[0 1 6]"];
0 -- 2 [nodes="[2]"];
1 -- 3 [nodes="[4]"];
2 -- 3 [nodes="[3]"];
2 -- 4 [nodes="[3]"];
3 -- 4 [nodes="[3]"];
}`
},
{
name: "Batagelj-Zaversnik Graph",
g: batageljZaversnikGraph,
want: `strict graph
{
// Node definitions.
0 [nodes="[0]"];
1 [nodes="[1 2]"];
2 [nodes="[1 3]"];
3 [nodes="[2 4]"];
4 [nodes="[3 4]"];
5 [nodes="[4 5]"];
6 [nodes="[6 7 8 14]"];
7 [nodes="[7 11 12]"];
8 [nodes="[9 11]"];
9 [nodes="[10 11]"];
10 [nodes="[12 18]"];
11 [nodes="[13 14 15]"];
12 [nodes="[14 15 17]"];
13 [nodes="[15 16]"];
14 [nodes="[17 18 19 20]"];

// Edge definitions.
1 -- 2 [nodes="[1]"];

```

```

1 -- 3 [nodes="[2]"];
2 -- 4 [nodes="[3]"];
3 -- 4 [nodes="[4]"];
3 -- 5 [nodes="[4]"];
4 -- 5 [nodes="[4]"];
6 -- 7 [nodes="[7]"];
6 -- 11 [nodes="[14]"];
6 -- 12 [nodes="[14]"];
7 -- 8 [nodes="[11]"];
7 -- 9 [nodes="[11]"];
7 -- 10 [nodes="[12]"];
8 -- 9 [nodes="[11]"];
10 -- 14 [nodes="[18]"];
11 -- 12 [nodes="[14 15]"];
11 -- 13 [nodes="[15]"];
12 -- 13 [nodes="[15]"];
12 -- 14 [nodes="[17]"];
},
},
}

```

```

func TestCliqueGraph(t *testing.T) {
    for _, test := range cliqueGraphTests {
        g := simple.NewUndirectedGraph()
        for u, e
        := range test.g {
            // Add nodes that are not defined by an edge.
            if g.Node(int64(u)) == nil {
                g.AddNode(simple.Node(u))
            }
            for v := range e {
                g.SetEdge(simple.Edge{F: simple.Node(u), T: simple.Node(v)})
            }
        }
        dst := simple.NewUndirectedGraph()
        CliqueGraph(dst, g)

        b, _ := dot.Marshal(dst, "", "", " ")
        got := string(b)

        if got != test.want {
            t.Errorf("unexpected clique graph result for %q: got:\n%s\nwant:\n%s", test.name, got, test.want)
        }
    }
}

```

```

func (n Clique) Attributes() []encoding.Attribute {
    return []encoding.Attribute{{Key: "nodes", Value: fmt.Sprintf("%v", n.Nodes())}}
}

```

[illegible]

```

func TestResistanceFormat(t *testing.T) {
    for _, test := range []struct {
        value Resistance
        format string
        want string
    }{
        {1.23456789, "%v", "1.23456789 "},
        {1.23456789, "%.1v", "1 "},
        {1.23456789, "%20.1v", "          1 "},
        {1.23456789, "%20v", "      1.23456789 "},
        {1.23456789, "%1v", "1.23456789 "},
        {1.23456789, "%#v", "unit.Resistance(1.23456789)"},
        {1.23456789, "%s", "%!s(unit.Resistance=1.23456789)"},
    } {
        got := fmt.Sprintf(test.format, test.value)
        if got != test.want {
            t.Errorf("Format %q %v: got: %q want: %q", test.format, float64(test.value), got, test.want)
        }
    }
}

graph{{ {digrap}digrap{{ {digrap}digrap}}}
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// +build !appengine,!safe

package mat

import "unsafe"

// offset returns the number of float64 values b[0] is after a[0].
func offset(a, b []float64) int {
    if &a[0] == &b[0] {
        return 0
    }
    // This expression must be atomic with respect to GC moves.
    // At this stage this is true, because the GC does not
    // move. See https://golang.org/issue/12445.
    return int(uintptr(unsafe.Pointer(&b[0]))-uintptr(unsafe.Pointer(&a[0]))) / int(unsafe.Sizeof(float64(0)))
}

// offsetComplex returns the number of complex128 values b[0] is after a[0].
func offsetComplex(a, b []complex128) int {
    if &a[0] == &b[0] {
        return 0
    }
    // This expression must be atomic with respect to GC moves.

```

```
// At this stage this is true, because the GC does not
// move. See https://golang.org/issue/12445.
return int(uintptr(unsafe.Pointer(&b[0]))-uintptr(unsafe.Pointer(&a[0])))
/ int(unsafe.Sizeof(complex128(0)))
}
graph{gO}gJ{gO}
graph{SUBGRAU{SUBGRAV{SUBGRAU}}{SUBGRAV{SUBGRAU{SUBGRAV{SUBGRAU}}SUBGRAU}}
SUBGRAV}
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```

```
// Package encoding provides a common graph encoding API.
package encoding // import "gonum.org/v1/gonum/graph/encoding"
graph{{SubGrag{SubGrag}SubGrag}}
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```

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```
graph{{diGrp}}
graph{{SubGra_}{SubGra_}{SubGra_}{SubGra_}}{SubGra_}{SubGra_}{SubGra_}{SubGra_}{SubGra_}
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```

```
package gonum
```

```

import (
    "gonum.org/v1/gonum/blas"
    "gonum.org/v1/gonum/blas/blas64"
)

// Dpbtrs solves a system of linear equations  $A \cdot X = B$  with an nn symmetric
// positive definite band matrix A using the Cholesky factorization
//  $A = U * U$  if uplo == blas.Upper
//  $A = L * L$  if uplo == blas.Lower
// computed by Dpbtrf. kd is the number of super- or sub-diagonals of A. See the
// documentation for Dpbtrf for a description of the band storage format of A.
//
// On entry, b contains the nnrhs right hand side matrix B. On return, it is
// overwritten with the solution matrix X.
func (Implementation) Dpbtrs(uplo blas.Uplo, n, kd, nrhs int, ab []float64, ldab int, b []float64, ldb int) {
    switch {
    case uplo != blas.Upper && uplo != blas.Lower:
        panic(badUplo)
    case n < 0:
        panic(nLT0)
    case kd < 0:
        panic(kdLT0)
    case nrhs
    < 0:
        panic(nrhsLT0)
    case ldab < kd+1:
        panic(badLdA)
    case ldb < max(1, nrhs):
        panic(badLdB)
    }

    // Quick return if possible.
    if n == 0 || nrhs == 0 {
        return
    }

    if len(ab) < (n-1)*ldab+kd+1 {
        panic(shortAB)
    }
    if len(b) < (n-1)*ldb+nrhs {
        panic(shortB)
    }

    bi := blas64.Implementation()
    if uplo == blas.Upper {
        // Solve  $A \cdot X = B$  where  $A = U \cdot U$ .
        for j := 0; j < nrhs; j++ {

```



```

// Solve  $U*Y = B$ , overwriting B with Y.
bi.Dtbsv(blas.Upper, blas.Trans, blas.NonUnit, n, kd, ab, ldab, b[j:], ldb)
// Solve  $U*X = Y$ , overwriting Y with X.
bi.Dtbsv(blas.Upper, blas.NoTrans, blas.NonUnit, n, kd, ab, ldab, b[j:], ldb)
}
} else {
// Solve  $A*X = B$  where  $A = L*L$ .
for j := 0; j < nrhs; j++ {
// Solve  $L*Y = B$ , overwriting B with Y.
bi.Dtbsv(blas.Lower, blas.NoTrans, blas.NonUnit, n, kd, ab, ldab, b[j:], ldb)
// Solve  $L*X = Y$ , overwriting Y with X.
bi.Dtbsv(blas.Lower, blas.Trans, blas.NonUnit, n, kd, ab, ldab, b[j:], ldb)
}
}
}
graph{strict_}
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package layout

import (
    "gonum.org/v1/gonum/graph"
    "gonum.org/v1/gonum/spatial/r2"
)

// GraphR2 is a graph with planar spatial representation of node positions.
type GraphR2 interface {
    graph.Graph
    LayoutNodeR2(id int64) NodeR2
}

// NodeR2 is a graph node with planar spatial representation of its position.
// A NodeR2 is only valid when the graph.Node is not nil.
type NodeR2 struct {
    graph.Node
    Coord2 r2.Vec
}
graph{grap}
/** github.com/prashanth26/machine-controller-manager@v0.0.0-20181102103410-c6b285941cf9 **/

{{Types "Apache-2.0 BSD-3-Clause"}}

...

```

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[https://cloud.google.com/compute/docs/api/libraries#google\\_apis\\_go\\_client\\_library](https://cloud.google.com/compute/docs/api/libraries#google_apis_go_client_library).

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...

```
graph{{sur{sur{sur}sur}}}
graph{{{{{subGra{{subGrax}}subGraul}subGrax}}subGra}}subGrax}
graph{{{{{Edge[]}}}}}
```

```
 DOUBLE PRECISION FUNCTION MZABS(ZR, ZI)
C***BEGIN PROLOGUE ZABS
C***REFER TO ZBESH,ZBESI,ZBESJ,ZBESK,ZBESY,ZAIRY,ZBIRY
C
C ZABS COMPUTES THE ABSOLUTE VALUE OR MAGNITUDE OF A DOUBLE
C PRECISION COMPLEX VARIABLE CMPLX(ZR,ZI)
C
C***ROUTINES CALLED (NONE)
C***END PROLOGUE ZABS
 DOUBLE PRECISION ZR, ZI, U, V, Q, S

 MZABS = ZABS(CMPLX(ZR,ZI,kind=KIND(1.0D0)))
 RETURN
 END
```

```
c U = DABS(ZR)
```

```

c V = DABS(ZI)
c S = U + V
C-----
C S*1.0D0 MAKES AN UNNORMALIZED UNDERFLOW ON CDC MACHINES INTO A
C TRUE FLOATING ZERO
C-----
c S = S*1.0D+0
c IF (S.EQ.0.0D+0) GO TO 20
c IF (U.GT.V) GO TO 10
c Q = U/V
c ZABS = V*DSQRT(1.D+0+Q*Q)
c RETURN
c 10 Q = V/U
c ZABS = U*DSQRT(1.D+0+Q*Q)
c RETURN
c 20 ZABS = 0.0D+0
c RETURN
c END
graph{Digrap{{Digrap}Digrap}Digrap}
graph{DIGRA{DIGRA}}
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package testblas

import (
 "fmt"
 "testing"

 "golang.org/x/exp/rand"

 "gonum.org/v1/gonum/blas"
)

type Ztrmm interface {
 Ztrmm(side blas.Side, uplo blas.Uplo, trans blas.Transpose, diag blas.Diag, m, n int, alpha complex128, a
[]complex128, lda int, b []complex128, ldb int)
}

func ZtrmmTest(t *testing.T, impl Ztrmm) {
 for _, side := range []blas.Side{blas.Left, blas.Right} {
 for _, uplo := range []blas.Uplo{blas.Lower, blas.Upper} {
 for _, trans := range []blas.Transpose{blas.NoTrans, blas.Trans, blas.ConjTrans} {
 for _, diag := range []blas.Diag{blas.Unit, blas.NonUnit} {
 name := sideString(side) + "-" + uploString(uplo) + "-" + transString(trans) + "-" + diagString(diag)
 t.Run(name, func(t *testing.T) {
 for _, m := range []int{0, 1, 2, 3, 4, 5} {

```

```

 for _, n := range []int{0, 1, 2, 3,
4, 5} {
 ztrmmTest(t, impl, side, uplo, trans, diag, m, n)
 }
}
})
}
}
}
}
}

func ztrmmTest(t *testing.T, impl Ztrmmr, side blas.Side, uplo blas.Uplo, trans blas.Transpose, diag blas.Diag, m,
n int) {
 const tol = 1e-13

 rnd := rand.New(rand.NewSource(1))

 nA := m
 if side == blas.Right {
 nA = n
 }
 for _, lda := range []int{max(1, nA), nA + 2} {
 for _, ldb := range []int{max(1, n), n + 3} {
 for _, alpha := range []complex128{0, 1, complex(0.7, -0.9)} {
 // Allocate the matrix A and fill it with random numbers.
 a := make([]complex128, nA*lda)
 for i := range a {
 a[i] = rndComplex128(rnd)
 }
 // Put a zero into A to cover special cases in Ztrmm.
 if nA > 1 {
 if uplo == blas.Upper {
 a[nA-1] = 0
 } else {
 a[(nA-1)*lda] = 0
 }
 }
 // Create a copy of A for checking that Ztrmm
 // does not modify its triangle opposite to
 // uplo.
 aCopy := make([]complex128, len(a))
 copy(aCopy,
a)
 // Create a dense representation of A for
 // computing the expected result using zmm.
 aTri := make([]complex128, len(a))
 copy(aTri, a)

```

```

if uplo == blas.Upper {
 for i := 0; i < nA; i++ {
 // Zero out the lower triangle.
 for j := 0; j < i; j++ {
 aTri[i*lda+j] = 0
 }
 if diag == blas.Unit {
 aTri[i*lda+i] = 1
 }
 }
} else {
 for i := 0; i < nA; i++ {
 if diag == blas.Unit {
 aTri[i*lda+i] = 1
 }
 // Zero out the upper triangle.
 for j := i + 1; j < nA; j++ {
 aTri[i*lda+j] = 0
 }
 }
}

// Allocate the matrix B and fill it with random numbers.
b := make([]complex128, m*ldb)
for i := range b {
 b[i] = rndComplex128(rnd)
}
// Put a zero into B to cover special cases in Ztrmm.
if m > 0 && n > 0 {
 b[0] = 0
}

// Compute the expected result using an internal Zgemm implementation.
var want []complex128
if side == blas.Left {
 want
= zmm(trans, blas.NoTrans, m, n, m, alpha, aTri, lda, b, ldb, 0, b, ldb)
} else {
 want = zmm(blas.NoTrans, trans, m, n, n, alpha, b, ldb, aTri, lda, 0, b, ldb)
}

// Compute the result using Ztrmm.
impl.Ztrmm(side, uplo, trans, diag, m, n, alpha, a, lda, b, ldb)

prefix := fmt.Sprintf("m=%v,n=%v,lda=%v,ldb=%v,alpha=%v", m, n, lda, ldb, alpha)
if !same(a, aCopy) {
 t.Errorf("%v: unexpected modification of A", prefix)
 continue
}

```

```

 }

 if !zEqualApprox(b, want, tol) {
 t.Errorf("%v: unexpected result", prefix)
 }
}
}
}
}
}
*> \brief \b DNRM2
*
* ===== DOCUMENTATION =====
*
* Online html documentation available at
* http://www.netlib.org/lapack/explore-html/
*
* Definition:
* =====
*
* DOUBLE PRECISION FUNCTION DNRM2(N,X,INCX)
*
* .. Scalar Arguments ..
* INTEGER INCX,N
* ..
* .. Array Arguments ..
* DOUBLE PRECISION X(*)
* ..
*
*
*> \par Purpose:
* =====
*>
*> \verbatim
*>
*> DNRM2 returns the euclidean norm of a vector via the function
*> name, so that
*>
*> DNRM2 := sqrt(x'*x)
*> \endverbatim
*
* Authors:
* =====
*
*> \author Univ. of Tennessee
*> \author Univ. of California Berkeley
*> \author Univ. of Colorado Denver
*> \author NAG Ltd.
*

```

```

*> \date November 2011
*
*> \ingroup double_blas_level1
*
*> \par Further Details:
* =====
*>
*> \verbatim
*>
*> -- This version written on 25-October-1982.
*> Modified on 14-October-1993 to inline the call to DLASSQ.
*> Sven Hammarling, Nag
 Ltd.
*> \endverbatim
*>
* =====
 DOUBLE PRECISION FUNCTION DNRM2(N,X,INCX)
*
* -- Reference BLAS level1 routine (version 3.4.0) --
* -- Reference BLAS is a software package provided by Univ. of Tennessee, --
* -- Univ. of California Berkeley, Univ. of Colorado Denver and NAG Ltd.--
* November 2011
*
* .. Scalar Arguments ..
 INTEGER INCX,N
*
* ..
* .. Array Arguments ..
 DOUBLE PRECISION X(*)
*
* ..
*
* =====
*
* .. Parameters ..
 DOUBLE PRECISION ONE,ZERO
 PARAMETER (ONE=1.0D+0,ZERO=0.0D+0)
*
* ..
* .. Local Scalars ..
 DOUBLE PRECISION ABSXI,NORM,SCALE,SSQ
 INTEGER IX
*
* ..
* .. Intrinsic Functions ..
 INTRINSIC ABS,SQRT
*
* ..
 IF (N.LT.1 .OR. INCX.LT.1) THEN
 NORM = ZERO
 ELSE IF (N.EQ.1) THEN
 NORM = ABS(X(1))
 ELSE

```

```

 SCALE = ZERO
 SSQ = ONE
* The following loop is equivalent to this call to the LAPACK
* auxiliary routine:
* CALL Dlassq(N, X, INCX, SCALE, SSQ)
*
 DO 10 IX = 1,1 + (N-1)*INCX,INCX
 IF (X(IX).NE.ZERO) THEN
 ABSXI = ABS(X(IX))
 IF (SCALE.LT.ABSXI) THEN
 SSQ = ONE + SSQ* (SCALE/ABSXI)**2
 SCALE = ABSXI
 ELSE
 SSQ = SSQ + (ABSXI/SCALE)**2
 END IF
 END IF
 10 CONTINUE
 NORM = SCALE*SQRT(SSQ)
 END IF
*
 DNRM2 = NORM
 RETURN
*
* End of DNRM2.
*
 END
graph{{{GrI}}GrH}}
graph{{sq{sq{sq sq}sq}sq}}
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// Package blas64 provides a simple interface to the float64 BLAS API.
package blas64 // import "gonum.org/v1/gonum/blas/blas64"
graph{{SUBGRA_}SUBGRA_}
Graph{Subgrg{{{Subgrg}{Subgrg}}}}
graph{{DG{DG{DG}DG}}}}
graph{{{subg_}subg_}}
graph{{{ED8}}}}
graph{GRAP0{GRAP1}GRAP0{GRAP1}GRAP9}
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package testblas

import (
 "testing"

```

```

"gonum.org/v1/gonum/blas"
"gonum.org/v1/gonum/floats"
)

```

```

type Dsyr2er interface {
 Dsyr2(ul blas.Uplo, n int, alpha float64, x []float64, incX int, y []float64, incY int, a []float64, lda int)
}

```

```

func Dsyr2Test(t *testing.T, blasser Dsyr2er) {
 for i, test := range []struct {
 n int
 a [][]float64
 ul blas.Uplo
 x []float64
 y []float64
 alpha float64
 ans [][]float64
 }{
 {
 n: 3,
 a: [][]float64{
 {7, 2, 4},
 {0, 3, 5},
 {0, 0, 6},
 },
 x: []float64{2, 3, 4},
 y: []float64{5, 6, 7},
 alpha: 2,
 ul: blas.Upper,
 ans: [][]float64{
 {47, 56, 72},
 {0, 75, 95},
 {0, 0, 118},
 },
 },
 {
 n: 3,
 a: [][]float64{
 {7, 0, 0},
 {2, 3, 0},
 {4, 5, 6},
 },
 x: []float64{2, 3, 4},
 y: []float64{5,
6, 7},
 alpha: 2,
 ul: blas.Lower,

```



```

ans: [][]float64{
 {47, 0, 0},
 {56, 75, 0},
 {72, 95, 118},
},
},
} {
incTest := func(incX, incY, extra int) {
 aFlat := flatten(test.a)
 x := makeIncremented(test.x, incX, extra)
 y := makeIncremented(test.y, incY, extra)
 blasser.Dsyr2(test.ul, test.n, test.alpha, x, incX, y, incY, aFlat, test.n)
 ansFlat := flatten(test.ans)
 if !floats.EqualApprox(aFlat, ansFlat, 1e-14) {
 t.Errorf("Case %v, incX = %v, incY = %v. Want %v, got %v.", i, incX, incY, ansFlat, aFlat)
 }
}
incTest(1, 1, 0)
incTest(-2, 1, 0)
incTest(-2, 3, 0)
incTest(2, -3, 0)
incTest(3, -2, 0)
incTest(-3, -4, 0)
}
}
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```

```

package testblas

```

```

import (
 "fmt"
 "math/cmplx"
 "testing"

```

```

 "golang.org/x/exp/rand"

```

```

 "gonum.org/v1/gonum/blas"
)

```

```

type Zherker interface {
 Zherk(uplo blas.Uplo, trans blas.Transpose, n, k int, alpha float64, a []complex128, lda int, beta float64, c
 []complex128, ldc int)
}

```

```

func ZherkTest(t *testing.T, impl Zherker) {
 for _, uplo := range []blas.Uplo{blas.Upper, blas.Lower} {

```

```

for _, trans := range []blas.Transpose{blas.NoTrans, blas.ConjTrans} {
 name := uploString(uplo) + "-" + transString(trans)
 t.Run(name, func(t *testing.T) {
 for _, n := range []int{0, 1, 2, 3, 4, 5} {
 for _, k := range []int{0, 1, 2, 3, 4, 5, 7} {
 zherkTest(t, impl, uplo, trans, n, k)
 }
 }
 })
}
}

func zherkTest(t *testing.T, impl Zherker, uplo blas.Uplo, trans blas.Transpose, n, k int) {
 const tol = 1e-13

 rnd
 := rand.New(rand.NewSource(1))

 rowA, colA := n, k
 if trans == blas.ConjTrans {
 rowA, colA = k, n
 }
 for _, lda := range []int{max(1, colA), colA + 2} {
 for _, ldc := range []int{max(1, n), n + 4} {
 for _, alpha := range []float64{0, 1, 0.7} {
 for _, beta := range []float64{0, 1, 1.3} {
 // Allocate the matrix A and fill it with random numbers.
 a := make([]complex128, rowA*lda)
 for i := range a {
 a[i] = rndComplex128(rnd)
 }
 // Create a copy of A for checking that
 // Zherk does not modify A.
 aCopy := make([]complex128, len(a))
 copy(aCopy, a)

 // Allocate the matrix C and fill it with random numbers.
 c := make([]complex128, n*ldc)
 for i := range c {
 c[i] = rndComplex128(rnd)
 }
 if (alpha == 0 || k == 0) && beta == 1 {
 // In case of a quick return
 // zero out the diagonal.
 for i := 0; i < n; i++ {
 c[i*ldc+i] = complex(real(c[i*ldc+i]), 0)
 }
 }
 }
 }
 }
 }
}

```

```

 }
 // Create a copy of
C for checking that
 // Zherk does not modify its triangle
 // opposite to uplo.
 cCopy := make([]complex128, len(c))
 copy(cCopy, c)
 // Create a copy of C expanded into a
 // full hermitian matrix for computing
 // the expected result using zmm.
 cHer := make([]complex128, len(c))
 copy(cHer, c)
 if uplo == blas.Upper {
 for i := 0; i < n; i++ {
 cHer[i*ldc+i] = complex(real(cHer[i*ldc+i]), 0)
 for j := i + 1; j < n; j++ {
 cHer[j*ldc+i] = cmplx.Conj(cHer[i*ldc+j])
 }
 }
 } else {
 for i := 0; i < n; i++ {
 for j := 0; j < i; j++ {
 cHer[j*ldc+i] = cmplx.Conj(cHer[i*ldc+j])
 }
 cHer[i*ldc+i] = complex(real(cHer[i*ldc+i]), 0)
 }
 }

 // Compute the expected result using an internal Zgemm implementation.
 var want []complex128
 if trans == blas.NoTrans {
 want = zmm(blas.NoTrans, blas.ConjTrans, n, n, k, complex(alpha, 0), a, lda, a, lda, complex(beta,
0), cHer, ldc)
 } else {
 want = zmm(blas.ConjTrans, blas.NoTrans, n, n, k, complex(alpha, 0), a, lda, a, lda, complex(beta, 0), cHer, ldc)
 }

 // Compute the result using Zherk.
 impl.Zherk(uplo, trans, n, k, alpha, a, lda, beta, c, ldc)

 prefix := fmt.Sprintf("n=%v,k=%v,lda=%v,ldc=%v,alpha=%v,beta=%v", n, k, lda, ldc, alpha, beta)

 if !zsame(a, aCopy) {
 t.Errorf("%v: unexpected modification of A", prefix)
 continue
 }
 if uplo == blas.Upper && !zSameLowerTri(n, c, ldc, cCopy, ldc) {
 t.Errorf("%v: unexpected modification in lower triangle of C", prefix)
 }

```

```

 continue
}
if uplo == blas.Lower && !zSameUpperTri(n, c, ldc, cCopy, ldc) {
 t.Errorf("%v: unexpected modification in upper triangle of C", prefix)
 continue
}

// Check that the diagonal of C has only real elements.
hasRealDiag := true
for i := 0; i < n; i++ {
 if imag(c[i*ldc+i]) != 0 {
 hasRealDiag = false
 break
 }
}
if
!hasRealDiag {
 t.Errorf("%v: diagonal of C has imaginary elements\n got=%v", prefix, c)
 continue
}

// Expand C into a full hermitian matrix
// for comparison with the result from zmm.
if uplo == blas.Upper {
 for i := 0; i < n-1; i++ {
 for j := i + 1; j < n; j++ {
 c[j*ldc+i] = cmplx.Conj(c[i*ldc+j])
 }
 }
} else {
 for i := 1; i < n; i++ {
 for j := 0; j < i; j++ {
 c[j*ldc+i] = cmplx.Conj(c[i*ldc+j])
 }
 }
}
if !zEqualApprox(c, want, tol) {
 t.Errorf("%v: unexpected result\n want=%v\n got= %v", prefix, want, c)
}
}
}
}
}
}
graph{{striN}{striN}}
digraph{B C}
// SPDX-License-Identifier: Unlicense OR MIT

```

```
package opconst
```

```
type OpType byte
```

```
// Start at a high number for easier debugging.
```

```
const firstOpIndex = 200
```

```
const (
```

```
 TypeMacroDef OpType = iota + firstOpIndex
```

```
 TypeMacro
```

```
 TypeTransform
```

```
 TypeLayer
```

```
 TypeInvalidate
```

```
 TypeImage
```

```
 TypePaint
```

```
 TypeColor
```

```
 TypeArea
```

```
 TypePointerInput
```

```
 TypePass
```

```
 TypeKeyInput
```

```
 TypeHideInput
```

```
 TypePush
```

```
 TypePop
```

```
 TypeAux
```

```
 TypeClip
```

```
 TypeProfile
```

```
 TypeCall
```

```
)
```

```
const (
```

```
 TypeMacroDefLen = 1 + 4 + 4
```

```
 TypeMacroLen = 1 + 4 + 4
```

```
 TypeTransformLen = 1 + 4*2
```

```
 TypeLayerLen = 1
```

```
 TypeRedrawLen = 1 + 8
```

```
 TypeImageLen = 1
```

```
 TypePaintLen = 1 + 4*4
```

```
 TypeColorLen = 1 + 4
```

```
 TypeAreaLen = 1 + 1 + 4*4
```

```
 TypePointerInputLen = 1 + 1
```

```
 TypePassLen = 1 + 1
```

```
 TypeKeyInputLen = 1 + 1
```

```
 TypeHideInputLen = 1
```

```
 TypePushLen = 1
```

```
 TypePopLen = 1
```

```
 TypeAuxLen = 1
```

```
 TypeClipLen = 1 + 4*4
```

```
 TypeProfileLen = 1
```

```
TypeCallLen = 1
)
```

```
func (t OpType) Size() int {
 return
 [...]int{
 TypeMacroDefLen,
 TypeMacroLen,
 TypeTransformLen,
 TypeLayerLen,
 TypeRedrawLen,
 TypeImageLen,
 TypePaintLen,
 TypeColorLen,
 TypeAreaLen,
 TypePointerInputLen,
 TypePassLen,
 TypeKeyInputLen,
 TypeHideInputLen,
 TypePushLen,
 TypePopLen,
 TypeAuxLen,
 TypeClipLen,
 TypeProfileLen,
 TypeCallLen,
 }[t-firstOpIndex]
}
```

```
func (t OpType) NumRefs() int {
 switch t {
 case TypeKeyInput, TypePointerInput, TypeProfile, TypeCall:
 return 1
 case TypeImage:
 return 2
 default:
 return 0
 }
}
graph{{su_}{su_}}
// Code generated by "go generate gonum.org/v1/gonum/unit; DO NOT EDIT.
```

```
// Copyright 2019 The Gonum Authors. All rights reserved.
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// license that can be found in the LICENSE file.
```

```
package unit
```

```
import (
```

```

"fmt"
"testing"
)

func TestVoltageFormat(t *testing.T) {
 for _, test := range []struct {
 value Voltage
 format string
 want string
 }{
 {1.23456789, "%v", "1.23456789 V"},
 {1.23456789, "%.1v", "1 V"},
 {1.23456789, "%20.1v", "1 V"},
 {1.23456789, "%20v", "1.23456789 V"},
 {1.23456789, "%1v", "1.23456789 V"},
 {1.23456789, "%#v", "unit.Voltage(1.23456789)"},
 {1.23456789, "%s", "%!s(unit.Voltage=1.23456789 V)"},
 } {
 got := fmt.Sprintf(test.format, test.value)
 if got != test.want {
 t.Errorf("Format %q %v: got: %q want: %q", test.format, float64(test.value), got, test.want)
 }
 }
}

graph{{G_{G_ G_}G_}}
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// license that can be found in the LICENSE file.

package testlapack

import (
 "math"
 "testing"

 "golang.org/x/exp/rand"

 "gonum.org/v1/gonum/blas"
 "gonum.org/v1/gonum/blas/blas64"
 "gonum.org/v1/gonum/floats"
)

type Dlags2er interface {
 Dlags2(upper bool, a1, a2, a3, b1, b2, b3 float64) (csu, snu, csv, snv, csq, snq float64)
}

func Dlags2Test(t *testing.T, impl Dlags2er) {
 rnd := rand.New(rand.NewSource(1))

```

```

for _, upper := range []bool{true, false} {
 for i := 0; i < 100; i++ {
 // Generate randomly the elements of a 22 matrix A
 // [a1 a2] or [a1 0]
 // [0 a3] [a2 a3]
 a1 := rnd.Float64()
 a2 := rnd.Float64()
 a3 := rnd.Float64()
 // Generate randomly the elements of a 22 matrix B.
 // [b1 b2] or [b1 0]
 // [0 b3] [b2 b3]
 b1 := rnd.Float64()
 b2 := rnd.Float64()
 b3 := rnd.Float64()

 // Compute orthogonal matrices
 U, V, Q
 // U = [csu snu], V = [csv snv], Q = [csq snq]
 // [-snu csu] [-snv csv] [-snq csq]
 // that transform A and B.
 csu, snu, csv, snv, csq, snq := impl.Dlags2(upper, a1, a2, a3, b1, b2, b3)

 // Check that U, V, Q are orthogonal matrices (their
 // determinant is equal to 1).
 detU := det2x2(csu, snu, -snu, csu)
 if !floats.EqualWithinAbsOrRel(math.Abs(detU), 1, 1e-14, 1e-14) {
 t.Errorf("U not orthogonal: det(U)=%v", detU)
 }
 detV := det2x2(csv, snv, -snv, csv)
 if !floats.EqualWithinAbsOrRel(math.Abs(detV), 1, 1e-14, 1e-14) {
 t.Errorf("V not orthogonal: det(V)=%v", detV)
 }
 detQ := det2x2(csq, snq, -snq, csq)
 if !floats.EqualWithinAbsOrRel(math.Abs(detQ), 1, 1e-14, 1e-14) {
 t.Errorf("Q not orthogonal: det(Q)=%v", detQ)
 }

 // Create U, V, Q explicitly as dense matrices.
 u := blas64.General{
 Rows: 2,
 Cols: 2,
 Stride: 2,
 Data: []float64{csu, snu, -snu, csu},
 }
 v
 := blas64.General{
 Rows: 2,
 Cols: 2,

```



```

Stride: 2,
Data: []float64{csv, snv, -snv, csv},
}
q := blas64.General{
Rows: 2,
Cols: 2,
Stride: 2,
Data: []float64{csq, snq, -snq, csq},
}

// Create A and B explicitly as dense matrices.
a := blas64.General{Rows: 2, Cols: 2, Stride: 2}
b := blas64.General{Rows: 2, Cols: 2, Stride: 2}
if upper {
a.Data = []float64{a1, a2, 0, a3}
b.Data = []float64{b1, b2, 0, b3}
} else {
a.Data = []float64{a1, 0, a2, a3}
b.Data = []float64{b1, 0, b2, b3}
}

tmp := blas64.General{Rows: 2, Cols: 2, Stride: 2, Data: make([]float64, 4)}
// Transform A as U*A*Q.
blas64.Gemm(blas.Trans, blas.NoTrans, 1, u, a, 0, tmp)
blas64.Gemm(blas.NoTrans, blas.NoTrans, 1, tmp, q, 0, a)
// Transform B as V*A*Q.
blas64.Gemm(blas.Trans, blas.NoTrans, 1, v, b, 0, tmp)
blas64.Gemm(blas.NoTrans, blas.NoTrans, 1, tmp, q, 0, b)

// Extract elements of transformed A and B that should
be equal to zero.
var gotA, gotB float64
if upper {
gotA = a.Data[1]
gotB = b.Data[1]
} else {
gotA = a.Data[2]
gotB = b.Data[2]
}
// Check that they are indeed zero.
if !floats.EqualWithinAbsOrRel(gotA, 0, 1e-14, 1e-14) {
t.Errorf("unexpected non-zero value for zero triangle of U*A*Q: %v", gotA)
}
if !floats.EqualWithinAbsOrRel(gotB, 0, 1e-14, 1e-14) {
t.Errorf("unexpected non-zero value for zero triangle of V*B*Q: %v", gotB)
}
}
}

```

```

}

func det2x2(a, b, c, d float64) float64 { return a*d - b*c }
graph{STRICm{STRICu}}
graph{{sua}{sua}{sua}}
digraph {r[l=" "]a:a->b:t a:1d:2y:""c:""d:d->x:""c:""y:""b:t->z:""}
graph{{digr_}digr_}
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// license that can be found in the LICENSE file.

package mathext

import (
 "math"
 "testing"

 "gonum.org/v1/gonum/floats"
)

var result float64

func TestDigamma(t *testing.T) {
 const tol = 1e-10

 for i, test := range []struct {
 x, want float64
 }{
 // Results computed using WolframAlpha.
 {0.0, math.Inf(-1)},
 {math.Copysign(0.0, -1.0), math.Inf(1)},
 {math.Inf(1), math.Inf(1)},
 {math.Inf(-1), math.NaN()},
 {math.NaN(), math.NaN()},
 {-1.0, math.NaN()},
 {-100.5, 4.615124601338064117341315601525112558522917517910505881343},
 {.5, -1.96351002602142347944097633299875556719315960466043},
 {10, 2.251752589066721107647456163885851537211808918028330369448},
 {math.Pow(10, 20), 46.05170185988091368035482909368728415202202143924212618733},
 {-1.111111111e9, math.NaN()},
 {1.46, -0.001580561987083417676105544023567034348339520110000},
 } {
 got := Digamma(test.x)
 if
 !(math.IsNaN(got) && math.IsNaN(test.want)) && !floats.EqualWithinAbsOrRel(got, test.want, tol, tol) {
 t.Errorf("test %d Digamma(%g) failed: got %g want %g", i, test.x, got, test.want)
 }
 }
}

```



If you submit source code you would like YottaDB to include, please ensure that you understand and agree with the above clarification.

```
graph{G:c J:c J:c J:c J:c}
```

```
// Copyright 2016 The Gonum Authors. All rights reserved.
```

```
// Use of this source code is governed by a BSD-style
```

```
// license that can be found in the LICENSE file.
```

```
package f64
```

```
import (
```

```
 "fmt"
```

```
 "testing"
```

```
 "golang.org/x/exp/rand"
```

```
)
```

```
var scalTests = []struct {
```

```
 alpha float64
```

```
 x []float64
```

```
 want []float64
```

```
}{
```

```
{
```

```
 alpha: 0,
```

```
 x: []float64{},
```

```
 want: []float64{},
```

```
},
```

```
{
```

```
 alpha: 0,
```

```
 x: []float64{1},
```

```
 want: []float64{0},
```

```
},
```

```
{
```

```
 alpha: 1,
```

```
 x: []float64{1},
```

```
 want: []float64{1},
```

```
},
```

```
{
```

```
 alpha: 2,
```

```
 x: []float64{1, -2},
```

```
 want: []float64{2, -4},
```

```
},
```

```
{
```

```
 alpha: 2,
```

```
 x: []float64{1, -2, 3},
```

```
 want: []float64{2, -4, 6},
```

```
},
```

```
{
```

```
 alpha: 2,
```

```

x: []float64{1, -2, 3, 4},
want: []float64{2, -4, 6, 8},
},
{
alpha: 2,
x: []float64{1, -2, 3, 4, -5},
want: []float64{2, -4, 6, 8, -10},
},
{
alpha: 2,
x: []float64{0, 1, -2, 3, 4, -5, 6, -7},
want: []float64{0, 2, -4, 6, 8, -10, 12, -14},
},
{
alpha: 2,
x: []float64{0, 1, -2, 3, 4, -5, 6, -7, 8},
want: []float64{0, 2, -4, 6, 8, -10, 12, -14, 16},
},
{
alpha: 2,
x: []float64{0, 1, -2, 3, 4, -5, 6, -7, 8, 9},
want: []float64{0, 2, -4, 6, 8, -10, 12, -14, 16, 18},
},
{
alpha: 3,
x: []float64{0, 1, -2, 3, 4, -5, 6, -7, 8, 9, 12},
want: []float64{0, 3, -6, 9, 12, -15, 18, -21, 24, 27, 36},
},
}

```

```

func TestScalUnitary(t *testing.T) {
const xGdVal = -0.5
for i, test := range scalTests {
for _, align := range align1 {
prefix := fmt.Sprintf("Test %v (x:%v)", i, align)
xgLn := 4 + align
xg := guardVector(test.x, xGdVal, xgLn)
x := xg[xgLn : len(xg)-xgLn]

ScalUnitary(test.alpha, x)

for i := range test.want {
if !same(x[i], test.want[i]) {
t.Errorf(msgVal, prefix, i, x[i], test.want[i])
}
}
if !isValidGuard(xg, xGdVal, xgLn) {

```

```

 t.Errorf(msgGuard, prefix, "x", xg[:xgLn], xg[len(xg)-xgLn:])
}
}
}
}

func TestScalUnitaryTo(t *testing.T) {
 const xGdVal, dstGdVal = -1, 0.5
 rng := rand.New(rand.NewSource(42))
 for
 i, test := range scalTests {
 n := len(test.x)
 for _, align := range align2 {
 prefix := fmt.Sprintf("Test %v (x:%v dst:%v)", i, align.x, align.y)
 xgLn, dgLn := 4+align.x, 4+align.y
 xg := guardVector(test.x, xGdVal, xgLn)
 dg := guardVector(randSlice(n, 1, rng), dstGdVal, dgLn)
 x, dst := xg[xgLn:len(xg)-xgLn], dg[dgLn:len(dg)-dgLn]

 ScalUnitaryTo(dst, test.alpha, x)

 for i := range test.want {
 if !same(dst[i], test.want[i]) {
 t.Errorf(msgVal, prefix, i, dst[i], test.want[i])
 }
 }
 if !isValidGuard(xg, xGdVal, xgLn) {
 t.Errorf(msgGuard, prefix, "x", xg[:xgLn], xg[len(xg)-xgLn:])
 }
 if !isValidGuard(dg, dstGdVal, dgLn) {
 t.Errorf(msgGuard, prefix, "y", dg[:dgLn], dg[len(dg)-dgLn:])
 }
 if !equalStrided(test.x, x, 1) {
 t.Errorf(msgReadOnly, prefix, "x")
 }
 }
 }
}

func TestScalInc(t *testing.T) {
 const xGdVal = -0.5
 gdLn := 4
 for i, test := range scalTests {
 n := len(test.x)
 for _, incX := range []int{1,
 2, 3, 4, 7, 10} {
 prefix := fmt.Sprintf("Test %v (x:%v)", i, incX)
 xg := guardIncVector(test.x, xGdVal, incX, gdLn)

```

```

x := xg[gdLn : len(xg)-gdLn]

ScalInc(test.alpha, x, uintptr(n), uintptr(incX))

for i := range test.want {
 if !same(x[i*incX], test.want[i]) {
 t.Errorf(msgVal, prefix, i, x[i*incX], test.want[i])
 }
}
checkValidIncGuard(t, xg, xGdVal, incX, gdLn)
}
}
}

func TestScalIncTo(t *testing.T) {
 const xGdVal, dstGdVal = -1, 0.5
 gdLn := 4
 rng := rand.New(rand.NewSource(42))
 for i, test := range scalTests {
 n := len(test.x)
 for _, inc := range newIncSet(1, 2, 3, 4, 7, 10) {
 prefix := fmt.Sprintf("test %v (x:%v dst:%v)", i, inc.x, inc.y)
 xg := guardIncVector(test.x, xGdVal, inc.x, gdLn)
 dg := guardIncVector(randSlice(n, 1, rng), dstGdVal, inc.y, gdLn)
 x, dst := xg[gdLn:len(xg)-gdLn], dg[gdLn:len(dg)-gdLn]

 ScalIncTo(dst, uintptr(inc.y), test.alpha, x, uintptr(n), uintptr(inc.x))

 for i := range test.want {
 if !same(dst[i*inc.y],
test.want[i]) {
 t.Errorf(msgVal, prefix, i, dst[i*inc.y], test.want[i])
 }
 }
 checkValidIncGuard(t, xg, xGdVal, inc.x, gdLn)
 checkValidIncGuard(t, dg, dstGdVal, inc.y, gdLn)
 if !equalStrided(test.x, x, inc.x) {
 t.Errorf("%v: modified read-only x argument", prefix)
 }
 }
 }
}

graph{{Digrh}Digrr}
graph{"\3\3\3{" "\3\3\3"}
Graph{{{subgr_}subgr_}subgr_}
// Code generated by "go generate gonum.org/v1/gonum/unit; DO NOT EDIT.

```

```

// Copyright 2014 The Gonum Authors. All rights reserved.
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// license that can be found in the LICENSE file.

package unit

import (
 "errors"
 "fmt"
 "math"
 "unicode/utf8"
)

// Radioactivity represents a rate of radioactive decay in becquerels.
type Radioactivity float64

const Becquerel Radioactivity = 1

// Unit converts the Radioactivity to a *Unit
func (r Radioactivity) Unit() *Unit {
 return New(float64(r), Dimensions{
 TimeDim: -1,
 })
}

// Radioactivity allows Radioactivity to implement a Radioactivityer interface
func (r Radioactivity) Radioactivity() Radioactivity {
 return r
}

// From converts the unit into the receiver. From returns an
// error if there is a mismatch in dimension
func (r *Radioactivity) From(u Uniter) error {
 if !DimensionsMatch(u, Becquerel) {
 *r = Radioactivity(math.NaN())
 return errors.New("Dimension mismatch")
 }
 *r = Radioactivity(u.Unit().Value())
 return nil
}

func (r Radioactivity) Format(fs fmt.State, c rune) {
 switch c {
 case 'v':
 if fs.Flag('#') {
 fmt.Fprintf(fs, "%T(%v)", r, float64(r))
 return
 }
 }
}

```



```

 }
 fallthrough
case 'e', 'E', 'f', 'F', 'g', 'G':
 p, pOk := fs.Precision()
 w, wOk := fs.Width()
 const unit = " Bq"
 switch {
 case pOk && wOk:
 fmt.Fprintf(fs, "%*.*"+string(c), pos(w-utf8.RuneCount([]byte(unit))), p, float64(r))
 case pOk:
 fmt.Fprintf(fs, "%.*"+string(c), p, float64(r))
 case wOk:
 fmt.Fprintf(fs, "%*"+string(c), pos(w-utf8.RuneCount([]byte(unit))), float64(r))
 default:
 fmt.Fprintf(fs, "%"+string(c), float64(r))
 }
 fmt.Fprint(fs, unit)
default:
 fmt.Fprintf(fs, "%%!%c(%T=%g Bq)", c, r, float64(r))
}
}
graph{____}
graph{{nod}nod{nod}}
graph{{{n}}}}
graph{{{subG}{subG}}}}
// SPDX-License-Identifier: Unlicense OR MIT

package gl

import "syscall/js"

type (
 Buffer js.Value
 Framebuffer js.Value
 Program js.Value
 Renderbuffer js.Value
 Shader js.Value
 Texture js.Value
 Query js.Value
 Uniform js.Value
 Object js.Value
)

func (p Program) Valid() bool {
 return !js.Value(p).IsUndefined() && !js.Value(p).IsNull()
}

func (s Shader) Valid() bool {

```

```

return !js.Value(s).IsUndefined() && !js.Value(s).IsNull()
}

```

```

func (u Uniform) Valid() bool {
return !js.Value(u).IsUndefined() && !js.Value(u).IsNull()
}

```

```

func (t Texture) Valid() bool {
return !js.Value(t).IsUndefined() && !js.Value(t).IsNull()
}

```

```

func (t Texture) Equal(t2 Texture) bool {
return js.Value(t).Equal(js.Value(t2))
}

```

```

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```

```

package gonum

```

```

import (
"math"

```

```

"gonum.org/v1/gonum/blas"
"gonum.org/v1/gonum/blas/blas64"
"gonum.org/v1/gonum/lapack"
)

```

```

// Dtrcon estimates the reciprocal of the condition number of a triangular matrix A.
// The condition number computed may be based on the 1-norm or the -norm.
//
// work is a temporary data slice of length at least 3*n and Dtrcon will panic otherwise.
//

```

```

// iwork is a temporary data slice of length at least n and Dtrcon will panic otherwise.
func (impl Implementation) Dtrcon(norm lapack.MatrixNorm, uplo blas.Uplo, diag blas.Diag, n int, a []float64, lda
int, work []float64, iwork []int) float64 {
switch {
case norm != lapack.MaxColumnSum && norm != lapack.MaxRowSum:
panic(badNorm)
case uplo != blas.Upper && uplo != blas.Lower:
panic(badUplo)
case diag != blas.NonUnit && diag != blas.Unit:
panic(badDiag)
case
n < 0:
panic(nLT0)
case lda < max(1, n):
panic(badLdA)

```

```

}

if n == 0 {
 return 1
}

switch {
case len(a) < (n-1)*lda+n:
 panic(shortA)
case len(work) < 3*n:
 panic(shortWork)
case len(iwork) < n:
 panic(shortIWork)
}

bi := blas64.Implementation()

var rcond float64
smlnum := dlamchS * float64(n)

anorm := impl.Dlantr(norm, uplo, diag, n, n, a, lda, work)

if anorm <= 0 {
 return rcond
}
var ainvm float64
var normin bool
kase1 := 2
if norm == lapack.MaxColumnSum {
 kase1 = 1
}
var kase int
isave := new([3]int)
var scale float64
for {
 ainvm, kase = impl.Dlacn2(n, work[n:], work, iwork, ainvm, kase, isave)
 if kase == 0 {
 if ainvm != 0 {
 rcond = (1 / anorm) / ainvm
 }
 return rcond
 }
 if kase == kase1 {
 scale = impl.Dlatrs(uplo, blas.NoTrans, diag, normin, n, a, lda, work, work[2*n:])
 } else {
 scale = impl.Dlatrs(uplo, blas.Trans, diag, normin, n, a, lda, work, work[2*n:])
 }
 normin = true
}

```

```

if scale != 1
{
 ix := bi.Idamax(n, work, 1)
 xnorm := math.Abs(work[ix])
 if scale == 0 || scale < xnorm*smlnum {
 return rcond
 }
 impl.Drscl(n, scale, work, 1)
}
}
}
graph{SubGraB}
graph{{GS{GS}}{GS{GS}}{GS}}
// SPDX-License-Identifier: Unlicense OR MIT

package layout

import (
 "image"
 "math"
 "time"

 "gioui.org/io/event"
 "gioui.org/io/system"
 "gioui.org/op"
 "gioui.org/unit"
)

// Context carries the state needed by almost all layouts and widgets.
// A zero value Context never returns events, map units to pixels
// with a scale of 1.0, and returns the zero time from Now.
type Context struct {
 // Constraints track the constraints for the active widget or
 // layout.
 Constraints Constraints
 // Dimensions track the result of the most recent layout
 // operation.
 Dimensions Dimensions

 cfg system.Config
 queue event.Queue
 *op.Ops
}

// NewContext returns a Context for an event queue.
func NewContext(q event.Queue) *Context {
 return &Context{
 queue: q,

```

```

}
}

// layout a widget with a set of constraints and return its
// dimensions. The widget dimensions are constrained abd the previous
// constraints are restored after layout.
func ctxLayout(gtx *Context, cs Constraints, w Widget)
Dimensions {
 saved := gtx.Constraints
 gtx.Constraints = cs
 gtx.Dimensions = Dimensions{}
 w()
 gtx.Dimensions.Size = cs.Constrain(gtx.Dimensions.Size)
 gtx.Constraints = saved
 return gtx.Dimensions
}

// Reset the context. The constraints' minimum and maximum values are
// set to the size.
func (c *Context) Reset(cfg system.Config, size image.Point) {
 c.Constraints = RigidConstraints(size)
 c.Dimensions = Dimensions{}
 c.cfg = cfg
 if c.Ops == nil {
 c.Ops = new(op.Ops)
 }
 c.Ops.Reset()
}

// Now returns the configuration time or the the zero time.
func (c *Context) Now() time.Time {
 if c.cfg == nil {
 return time.Time{}
 }
 return c.cfg.Now()
}

// Px maps the value to pixels. If no configuration is set,
// Px returns the rounded value of v.
func (c *Context) Px(v unit.Value) int {
 if c.cfg == nil {
 return int(math.Round(float64(v.V)))
 }
 return c.cfg.Px(v)
}

// Events returns the events available for the key. If no
// queue is configured, Events returns nil.

```

```

func (c
*Context) Events(k event.Key) []event.Event {
if c.queue == nil {
return nil
}
return c.queue.Events(k)
}
graph{{diGrag}diGrai{diGrag}diGrai}
graph{{EI}EI{{EI}EI}}
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// license that can be found in the LICENSE file.

package testblas

import (
 "fmt"
 "testing"

 "golang.org/x/exp/rand"
 "gonum.org/v1/gonum/blas"
)

type Ztrsver interface {
 Ztrsv(uplo blas.Uplo, trans blas.Transpose, diag blas.Diag, n int, a []complex128, lda int, x []complex128, incX int)

 Ztrmver
}

func ZtrsvTest(t *testing.T, impl Ztrsver) {
 rnd := rand.New(rand.NewSource(1))
 for _, uplo := range []blas.Uplo{blas.Upper, blas.Lower} {
 for _, trans := range []blas.Transpose{blas.NoTrans, blas.Trans, blas.ConjTrans} {
 for _, diag := range []blas.Diag{blas.NonUnit, blas.Unit} {
 for _, n := range []int{0, 1, 2, 3, 4, 10} {
 for _, lda := range []int{max(1, n), n + 11} {
 for _, incX := range []int{-11, -3, -2, -1, 1, 2, 3, 7} {
 ztrsvTest(t, impl, uplo, trans, diag, n, lda, incX, rnd)
 }
 }
 }
 }
 }
 }
}

// ztrsvTest tests Ztrsv by

```

```

checking whether Ztrmv followed by Ztrsv
// round-trip.
func ztrsvTest(t *testing.T, impl Ztrsver, uplo blas.Uplo, trans blas.Transpose, diag blas.Diag, n, lda, incX int, rnd
*rand.Rand) {
 const tol = 1e-10

 // Allocate a dense-storage triangular matrix A filled with NaNs.
 a := makeZGeneral(nil, n, n, lda)
 // Fill the referenced triangle of A with random data.
 if uplo == blas.Upper {
 for i := 0; i < n; i++ {
 for j := i; j < n; j++ {
 re := rnd.NormFloat64()
 im := rnd.NormFloat64()
 a[i*lda+j] = complex(re, im)
 }
 }
 } else {
 for i := 0; i < n; i++ {
 for j := 0; j <= i; j++ {
 re := rnd.NormFloat64()
 im := rnd.NormFloat64()
 a[i*lda+j] = complex(re, im)
 }
 }
 }
 if diag == blas.Unit {
 // The diagonal should not be referenced by Ztrmv and Ztrsv, so
 // invalidate it with NaNs.
 for i := 0; i < n; i++ {
 a[i*lda+i] = znan
 }
 }
 aCopy := make([]complex128, len(a))
 copy(aCopy, a)

 // Generate a random complex vector x.
 xtest := make([]complex128,
n)
 for i := range xtest {
 re := rnd.NormFloat64()
 im := rnd.NormFloat64()
 xtest[i] = complex(re, im)
 }
 x := makeZVector(xtest, incX)

 // Store a copy of x as the correct result that we want.
 want := make([]complex128, len(x))

```

```

copy(want, x)

// Compute A*x, denoting the result by b and storing it in x.
impl.Ztrmv(uplo, trans, diag, n, a, lda, x, incX)
// Solve A*x = b, that is, $x = A^{-1} * b = A^{-1} * A * x$.
impl.Ztrsv(uplo, trans, diag, n, a, lda, x, incX)
// If Ztrsv is correct, $A^{-1} * A = I$ and x contains again its original value.

name := fmt.Sprintf("uplo=%v,trans=%v,diag=%v,n=%v,lda=%v,incX=%v", uplo, trans, diag, n, lda, incX)
if !zsame(a, aCopy) {
 t.Errorf("%v: unexpected modification of A", name)
}
if !zSameAtNonstrided(x, want, incX) {
 t.Errorf("%v: unexpected modification of x\nwant %v\ngot %v", name, want, x)
}
if !EqualApproxAtStrided(x, want, incX, tol) {
 t.Errorf("%v: unexpected result\nwant %v\ngot %v", name, want, x)
}
}
}
graph{diGo}
digraph{E4}
graph{{Sub}Sub{Sub}Sub{Sub}}
graph{{SUBGS{SUBGS{SUBGS{SUBGS{SUBGV}}SUBGV}}SUBGV}}
graph{diGr_[diGr_=""]diGr_}
graph{{diGrar{diGrar}diGrar{diGrar}diGrar}diGrar}
graph{{{di{di}{di{di{di}}di}}di}di{di{di}{di{di}{di{di}}di}}}}
graph{eP}
graph{m:m t:NodeS}
// Code generated by "go generate gonum.org/v1/gonum/unit; DO NOT EDIT.

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// license that can be found in the LICENSE file.

package unit

import (
 "fmt"
 "testing"
)

func TestCurrentFormat(t *testing.T) {
 for _, test := range []struct {
 value Current
 format string
 want string
 }{
 {1.23456789, "%v", "1.23456789 A"},
 }

```



```

{1.23456789, "%.1v", "1 A"},
{1.23456789, "%20.1v", " 1 A"},
{1.23456789, "%20v", " 1.23456789 A"},
{1.23456789, "%1v", "1.23456789 A"},
{1.23456789, "%#v", "unit.Current(1.23456789)"},
{1.23456789, "%s", "%!s(unit.Current=1.23456789 A)"},
} {
 got := fmt.Sprintf(test.format, test.value)
 if got != test.want {
 t.Errorf("Format %q %v: got: %q want: %q", test.format, float64(test.value), got, test.want)
 }
}
}
graph{StR{StR{StR}StR}StR{StR}}
graph{{DiGrap_}}
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// license that can be found in the LICENSE file.

package testblas

import (
 "fmt"
 "testing"

 "golang.org/x/exp/rand"
)

type Zcopyer interface {
 Zcopy(n int, x []complex128, incX int, y []complex128, incY int)
}

func ZcopyTest(t *testing.T, impl Zcopyer) {
 rnd := rand.New(rand.NewSource(1))
 for n := 0; n <= 20; n++ {
 for _, inc := range allPairs([]int{-7, -3, 1, 13}, []int{-11, -5, 1, 17}) {
 incX := inc[0]
 incY := inc[1]
 aincX := abs(incX)
 aincY := abs(incY)

 var x []complex128
 if n > 0 {
 x = make([]complex128, (n-1)*aincX+1)
 }
 for i := range x {
 x[i] = znan
 }

```

```

for i := 0; i < n; i++ {
 x[i*aincX] = complex(rnd.NormFloat64(), rnd.NormFloat64())
}
xCopy := make([]complex128, len(x))
copy(xCopy, x)

var y []complex128
if n > 0 {
 y = make([]complex128, (n-1)*aincY+1)
}
for i := range y {
 y[i] = znan
}

want
:= make([]complex128, len(y))
for i := range want {
 want[i] = znan
}
if incX*incY > 0 {
 for i := 0; i < n; i++ {
 want[i*aincY] = x[i*aincX]
 }
} else {
 for i := 0; i < n; i++ {
 want[i*aincY] = x[(n-1-i)*aincX]
 }
}

impl.Zcopy(n, x, incX, y, incY)

prefix := fmt.Sprintf("Case n=%v,incX=%v,incY=%v:", n, incX, incY)

if !zsame(x, xCopy) {
 t.Errorf("%v: unexpected modification of x", prefix)
}
if !zsame(y, want) {
 t.Errorf("%v: unexpected y:\nwant %v\ngot %v", prefix, want, y)
}
}
}

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// This file must be kept in sync with array_no_bound_checks.go.

```

```

// +build bounds

package fftpack

import "fmt"

// The types in array.go implement Fortran-like arrays for bootstrapping
// the implementation of the FFT functions translated from FFTPACK; they
// are column-major.

type twoArray struct {
 i, j int
 jStride int
 data []float64
}

func newTwoArray(i, j int, data []float64) twoArray {
 if len(data) < i*j {
 panic(fmt.Sprintf("short data: len(data)=%d, i=%d, j=%d", len(data), i, j))
 }
 return twoArray{
 i: i,
 j: j,
 jStride: i,
 data: data[i*j:],
 }
}

func (a twoArray) at(i, j int) float64 {
 if i < 0 || a.i <= i || j < 0 || a.j <= j {
 panic(fmt.Sprintf("out of bounds at(%d, %d): bounds i=%d, j=%d", i, j, a.i, a.j))
 }
 return a.data[i+a.jStride*j]
}

func (a twoArray) set(i, j int,
 v float64) {
 if i < 0 || a.i <= i || j < 0 || a.j <= j {
 panic(fmt.Sprintf("out of bounds set(%d, %d): bounds i=%d, j=%d", i, j, a.i, a.j))
 }
 a.data[i+a.jStride*j] = v
}

func (a twoArray) add(i, j int, v float64) {
 if i < 0 || a.i <= i || j < 0 || a.j <= j {
 panic(fmt.Sprintf("out of bounds set(%d, %d): bounds i=%d, j=%d", i, j, a.i, a.j))
 }
 a.data[i+a.jStride*j] += v
}

```

```

}

type threeArray struct {
 i, j, k int
 jStride, kStride int
 data []float64
}

func newThreeArray(i, j, k int, data []float64) threeArray {
 if len(data) < i*j*k {
 panic(fmt.Sprintf("short data: len(data)=%d, i=%d, j=%d, k=%d", len(data), i, j, k))
 }
 return threeArray{
 i: i,
 j: j,
 k: k,
 jStride: i,
 kStride: i * j,
 data: data[:i*j*k],
 }
}

func (a threeArray) at(i, j, k int) float64 {
 if i < 0 || a.i <= i || j < 0 || a.j <= j || k < 0 || a.k <= k {
 panic(fmt.Sprintf("out of bounds at(%d, %d, %d): bounds i=%d, j=%d, k=%d", i, j, k, a.i, a.j, a.k))
 }
 return
 a.data[i+a.jStride*j+a.kStride*k]
}

func (a threeArray) set(i, j, k int, v float64) {
 if i < 0 || a.i <= i || j < 0 || a.j <= j || k < 0 || a.k <= k {
 panic(fmt.Sprintf("out of bounds set(%d, %d, %d): bounds i=%d, j=%d, k=%d", i, j, k, a.i, a.j, a.k))
 }
 a.data[i+a.jStride*j+a.kStride*k] = v
}

graph{diG{diG}}
graph{{{Ea}{Ea}{Ea}{Ea}{Ea}{Ea}{Ea}{Ea}{Ea}{Ea}{Ea}{Ea}{Ea}{Ea}{Ea}{Ea}{Ea}{Ea}{Ea}{Ea}}}
graph{{Su}Su{Su}}
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```

```

graph{dir{dir{{dir{dir}}dir}}}
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// license that can be found in the LICENSE file.

package distuv

import (
 "math"

 "golang.org/x/exp/rand"
)

// UnitUniform is an instantiation of the uniform distribution with Min = 0
// and Max = 1.
var UnitUniform = Uniform{Min: 0, Max: 1}

// Uniform represents a continuous uniform distribution
(https://en.wikipedia.org/wiki/Uniform_distribution_%28continuous%29).
type Uniform struct {
 Min float64
 Max float64
 Src rand.Source
}

// CDF computes the value of the cumulative density function at x.
func (u Uniform) CDF(x float64) float64 {
 if x < u.Min {
 return 0
 }
 if x > u.Max {
 return 1
 }
 return (x - u.Min) / (u.Max - u.Min)
}

// Uniform doesn't have any of the DLogProbD? because the derivative is 0 everywhere
// except where it's undefined

// Entropy returns the entropy of the distribution.
func (u Uniform) Entropy() float64 {
 return math.Log(u.Max - u.Min)
}

//
ExKurtosis returns the excess kurtosis of the distribution.
func (Uniform) ExKurtosis() float64 {
 return -6.0 / 5.0
}

```

```

}

// Uniform doesn't have Fit because it's a bad idea to fit a uniform from data.

// LogProb computes the natural logarithm of the value of the probability density function at x.
func (u Uniform) LogProb(x float64) float64 {
 if x < u.Min {
 return math.Inf(-1)
 }
 if x > u.Max {
 return math.Inf(-1)
 }
 return -math.Log(u.Max - u.Min)
}

// MarshalParameters implements the ParameterMarshaler interface
func (u Uniform) MarshalParameters(p []Parameter) {
 if len(p) != u.NumParameters() {
 panic("uniform: improper parameter length")
 }
 p[0].Name = "Min"
 p[0].Value = u.Min
 p[1].Name = "Max"
 p[1].Value = u.Max
}

// Mean returns the mean of the probability distribution.
func (u Uniform) Mean() float64 {
 return (u.Max + u.Min) / 2
}

// Median returns the median of the probability distribution.
func (u Uniform) Median() float64 {
 return (u.Max + u.Min) / 2
}

//
Uniform doesn't have a mode because it's any value in the distribution

// NumParameters returns the number of parameters in the distribution.
func (Uniform) NumParameters() int {
 return 2
}

// Prob computes the value of the probability density function at x.
func (u Uniform) Prob(x float64) float64 {
 if x < u.Min {
 return 0
 }

```

```

}
if x > u.Max {
 return 0
}
return 1 / (u.Max - u.Min)
}

// Quantile returns the inverse of the cumulative probability distribution.
func (u Uniform) Quantile(p float64) float64 {
 if p < 0 || p > 1 {
 panic(badPercentile)
 }
 return p*(u.Max-u.Min) + u.Min
}

// Rand returns a random sample drawn from the distribution.
func (u Uniform) Rand() float64 {
 var rnd float64
 if u.Src == nil {
 rnd = rand.Float64()
 } else {
 rnd = rand.New(u.Src).Float64()
 }
 return rnd*(u.Max-u.Min) + u.Min
}

// Skewness returns the skewness of the distribution.
func (Uniform) Skewness() float64 {
 return 0
}

// StdDev returns the standard deviation of the probability
distribution.
func (u Uniform) StdDev() float64 {
 return math.Sqrt(u.Variance())
}

// Survival returns the survival function (complementary CDF) at x.
func (u Uniform) Survival(x float64) float64 {
 if x < u.Min {
 return 1
 }
 if x > u.Max {
 return 0
 }
 return (u.Max - x) / (u.Max - u.Min)
}

```

// Weighted provides sampling without replacement from a collection of items with



```

// non-uniform probability.
type Weighted struct {
 weights []float64
 // heap is a weight heap.
 //
 // It keeps a heap-organised sum of remaining
 // index weights that are available to be taken
 // from.
 //
 // Each element holds the sum of weights for
 // the corresponding index, plus the sum of
 // its children's weights; the children of
 // an element i can be found at positions
 // $2*(i+1)-1$ and $2*(i+1)$. The root of the
 // weight heap is at element 0.
 //
 // See comments in container/heap for an
 // explanation of the layout of a heap.
 heap []float64
 rnd *rand.Rand
}

// NewWeighted returns a Weighted for the weights w. If src is nil, rand.Rand is
// used as
// the random number generator.
//
// Note that sampling from weights with a high variance or overall low absolute
// value sum may result in problems with numerical stability.
func NewWeighted(w []float64, src rand.Source) Weighted {
 s := Weighted{
 weights: make([]float64, len(w)),
 heap: make([]float64, len(w)),
 }
 if src != nil {
 s.rnd = rand.New(src)
 }
 s.ReweightAll(w)
 return s
}

// Len returns the number of items held by the Weighted, including items
// already taken.
func (s Weighted) Len() int { return len(s.weights) }

// Take returns an index from the Weighted with probability proportional
// to the weight of the item. The weight of the item is then set to zero.
// Take returns false if there are no items remaining.
func (s Weighted) Take() (idx int, ok bool) {

```

```

const small = 1e-12
if floats.EqualWithinAbsOrRel(s.heap[0], 0, small, small) {
 return -1, false
}

```

```

var r float64
if s.rnd == nil {
 r = s.heap[0] * rand.Float64()
} else {
 r = s.heap[0] * s.rnd.Float64()
}
i
:= 1
last := -1
left := len(s.weights)
for {
 if r -= s.weights[i-1]; r <= 0 {
 break // Fall within item i-1.
 }
 i <= 1 // Move to left child.
 if d := s.heap[i-1]; r > d {
 r -= d
 // If enough r to pass left child
 // move to right child state will
 // be caught at break above.
 i++
 }
 if i == last || left < 0 {
 // No progression.
 return -1, false
 }
 last = i
 left--
}

```

```

w, idx := s.weights[i-1], i-1

```

```

s.weights[i-1] = 0
for i > 0 {
 s.heap[i-1] -= w
 // The following condition is necessary to
 // handle floating point error. If we see
 // a heap value below zero, we know we need
 // to rebuild it.
 if s.heap[i-1] < 0 {
 s.reset()
 return idx, true
 }
}

```

```

 i >>= 1
}

return idx, true
}

// Reweight sets the weight of item idx to w.
func (s Weighted) Reweight(idx int, w float64) {
 w, s.weights[idx] = s.weights[idx]-w, w
 idx++
 for idx > 0 {
 s.heap[idx-1] -= w
 idx >>= 1
 }
}

// ReweightAll sets the weight of all items
// in the Weighted. ReweightAll
// panics if len(w) != s.Len.
func (s Weighted) ReweightAll(w []float64) {
 if len(w) != s.Len() {
 panic("floats: length of the slices do not match")
 }
 copy(s.weights, w)
 s.reset()
}

func (s Weighted) reset() {
 copy(s.heap, s.weights)
 for i := len(s.heap) - 1; i > 0; i-- {
 // Sometimes 1-based counting makes sense.
 s.heap[((i+1)>>1)-1] += s.heap[i]
 }
}
graph{"\Z\Z"}
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package mat

import "testing"

func leaksPanic(fn func()) (panicked bool) {
 defer func() {
 r := recover()
 panicked = r != nil
 }()
}

```

```

Maybe(fn)
return
}

func TestMaybe(t *testing.T) {
 for i, test := range []struct {
 fn func()
 panics bool
 errors bool
 }{
 {
 fn: func() {},
 panics: false,
 errors: false,
 },
 {
 fn: func() { panic("panic") },
 panics: true,
 errors: false,
 },
 {
 fn: func() { panic(Error{"panic"}) },
 panics: false,
 errors: true,
 },
 } {
 panicked := leaksPanic(test.fn)
 if panicked != test.panics {
 t.Errorf("unexpected panic state for test %d: got: panicked=%t want: panicked=%t",
 i, panicked, test.panics)
 }
 if test.errors {
 err := Maybe(test.fn)
 stack, ok := err.(ErrorStack)
 if !ok {
 t.Errorf("unexpected error type: got:%T want:%T",
 stack, ErrorStack{})
 }
 if stack.StackTrace == "" {
 t.Error("expected non-empty stack trace")
 }
 }
 }
}

graph{Digrap}
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```

```

package distuv

import (
 "math"

 "golang.org/x/exp/rand"

 "gonum.org/v1/gonum/mathext"
)

// Beta implements the Beta distribution, a two-parameter continuous distribution
// with support between 0 and 1.
//
// The beta distribution has density function
// $x^{(-1)} * (1-x)^{(-1)} * (+) / (()*())$
//
// For more information, see https://en.wikipedia.org/wiki/Beta_distribution
type Beta struct {
 // Alpha is the left shape parameter of the distribution. Alpha must be greater
 // than 0.
 Alpha float64
 // Beta is the right shape parameter of the distribution. Beta must be greater
 // than 0.
 Beta float64

 Src rand.Source
}

// CDF computes the value of the cumulative distribution function at x.
func (b Beta) CDF(x float64) float64 {
 if x <= 0 {
 return 0
 }
 if x >= 1 {
 return 1
 }
 return mathext.RegIncBeta(b.Alpha, b.Beta,
 x)
}

// Entropy returns the differential entropy of the distribution.
func (b Beta) Entropy() float64 {
 if b.Alpha <= 0 || b.Beta <= 0 {
 panic("beta: negative parameters")
 }
 return mathext.Lbeta(b.Alpha, b.Beta) - (b.Alpha-1)*mathext.Digamma(b.Alpha) -
 (b.Beta-1)*mathext.Digamma(b.Beta) + (b.Alpha+b.Beta-2)*mathext.Digamma(b.Alpha+b.Beta)
}

```

```

}

// ExKurtosis returns the excess kurtosis of the distribution.
func (b Beta) ExKurtosis() float64 {
 num := 6 * ((b.Alpha-b.Beta)*(b.Alpha-b.Beta)*(b.Alpha+b.Beta+1) - b.Alpha*b.Beta*(b.Alpha+b.Beta+2))
 den := b.Alpha * b.Beta * (b.Alpha + b.Beta + 2) * (b.Alpha + b.Beta + 3)
 return num / den
}

// LogProb computes the natural logarithm of the value of the probability
// density function at x.
func (b Beta) LogProb(x float64) float64 {
 if x < 0 || x > 1 {
 return math.Inf(-1)
 }

 if b.Alpha <= 0 || b.Beta <= 0 {
 panic("beta: negative parameters")
 }

 lab, _ := math.Lgamma(b.Alpha + b.Beta)
 la, _ := math.Lgamma(b.Alpha)
 lb, _ :=
 math.Lgamma(b.Beta)
 return lab - la - lb + (b.Alpha-1)*math.Log(x) + (b.Beta-1)*math.Log(1-x)
}

// Mean returns the mean of the probability distribution.
func (b Beta) Mean() float64 {
 return b.Alpha / (b.Alpha + b.Beta)
}

// Mode returns the mode of the distribution.
//
// Mode returns NaN if either parameter is less than or equal to 1 as a special case.
func (b Beta) Mode() float64 {
 if b.Alpha <= 1 || b.Beta <= 1 {
 return math.NaN()
 }
 return (b.Alpha - 1) / (b.Alpha + b.Beta - 2)
}

// NumParameters returns the number of parameters in the distribution.
func (b Beta) NumParameters() int {
 return 2
}

// Prob computes the value of the probability density function at x.

```

```

func (b Beta) Prob(x float64) float64 {
 return math.Exp(b.LogProb(x))
}

// Quantile returns the inverse of the cumulative distribution function.
func (b Beta) Quantile(p float64) float64 {
 if p < 0 || p > 1 {
 panic(badPercentile)
 }
 return mathext.InvRegIncBeta(b.Alpha, b.Beta, p)
}

// Rand returns a random
// sample drawn from the distribution.
func (b Beta) Rand() float64 {
 ga := Gamma{Alpha: b.Alpha, Beta: 1, Src: b.Src}.Rand()
 gb := Gamma{Alpha: b.Beta, Beta: 1, Src: b.Src}.Rand()
 return ga / (ga + gb)
}

// StdDev returns the standard deviation of the probability distribution.
func (b Beta) StdDev() float64 {
 return math.Sqrt(b.Variance())
}

// Survival returns the survival function (complementary CDF) at x.
func (b Beta) Survival(x float64) float64 {
 switch {
 case x <= 0:
 return 1
 case x >= 1:
 return 0
 }
 return mathext.RegIncBeta(b.Beta, b.Alpha, 1-x)
}

// Variance returns the variance of the probability distribution.
func (b Beta) Variance() float64 {
 return b.Alpha * b.Beta / ((b.Alpha + b.Beta) * (b.Alpha + b.Beta) * (b.Alpha + b.Beta + 1))
}

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package layout

import (
 "bytes"

```

```

"encoding/base64"
"image"
"image/png"
"io/ioutil"
"os"
"path/filepath"
"sort"
"strings"
"testing"

"gonum.org/v1/gonum/graph"
"gonum.org/v1/gonum/graph/internal/ordered"
"gonum.org/v1/gonum/graph/iterator"
"gonum.org/v1/plot/cmpimg"
)

// orderedGraph wraps a graph.Graph ensuring consistent ordering of nodes
// in graph queries. Removal of this causes tests to fail due to changes
// in node iteration order, but the produced graph layouts are still good.
type orderedGraph struct {
 graph.Graph
}

func (g orderedGraph) Nodes() graph.Nodes {
 n := graph.NodesOf(g.Graph.Nodes())
 sort.Sort(ordered.ByID(n))
 return iterator.NewOrderedNodes(n)
}

func (g orderedGraph) From(id int64) graph.Nodes {
 n := graph.NodesOf(g.Graph.From(id))
 sort.Sort(ordered.ByID(n))
 return iterator.NewOrderedNodes(n)
}

func
goldenPath(path string) string {
 ext := filepath.Ext(path)
 noext := strings.TrimSuffix(path, ext)
 return noext + "_golden" + ext
}

func checkRenderedLayout(t *testing.T, path string) (ok bool) {
 if *cmpimg.GenerateTestData {
 // Recreate Golden image and exit.
 golden := goldenPath(path)
 _ = os.Remove(golden)
 if err := os.Rename(path, golden); err != nil {

```



```

 t.Fatal(err)
}
return true
}

// Read the images we've just generated and check them against the
// Golden Images.
got, err := ioutil.ReadFile(path)
if err != nil {
 t.Errorf("failed to read %s: %v", path, err)
 return true
}
golden := goldenPath(path)
want, err := ioutil.ReadFile(golden)
if err != nil {
 t.Errorf("failed to read golden file %s: %v", golden, err)
 return true
}
typ := filepath.Ext(path)[1:] // remove the dot in ".png"
ok, err = cmpimg.Equal(typ, got, want)
if err != nil {
 t.Errorf("failed to compare image for %s: %v", path, err)
 return true
}
if !ok {
 t.Errorf("image
mismatch for %s\n", path)
 v1, _, err := image.Decode(bytes.NewReader(got))
 if err != nil {
 t.Errorf("failed to decode %s: %v", path, err)
 return false
 }
 v2, _, err := image.Decode(bytes.NewReader(want))
 if err != nil {
 t.Errorf("failed to decode %s: %v", golden, err)
 return false
 }

 dst := image.NewRGBA64(v1.Bounds().Union(v2.Bounds()))
 rect := cmpimg.Diff(dst, v1, v2)
 t.Logf("image bounds union:%+v diff bounds intersection:%+v", dst.Bounds(), rect)

 var buf bytes.Buffer
 err = png.Encode(&buf, dst)
 if err != nil {
 t.Errorf("failed to encode difference png: %v", err)
 return false
 }
}

```

```

t.Log("IMAGE:" + base64.StdEncoding.EncodeToString(buf.Bytes()))
}
return ok
}
Gonum graph
[![GoDoc](https://godoc.org/gonum.org/v1/gonum/graph?status.svg)](https://godoc.org/gonum.org/v1/gonum/graph
)

```

This is a generalized graph package for the Go language.

```

graph{Dig}
graph{{{digrar}digrat}}}
graph{STRICTR}
graph{No0{No0}No0{No0{No0}No0}}
graph{{{{{subGrc}{subGrc}{subGrn}}}}}
// Code generated by "go generate gonum.org/v1/gonum/unit; DO NOT EDIT.

```

```

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```

```

package unit

```

```

import (
 "fmt"
 "testing"
)

```

```

func TestLuminousIntensityFormat(t *testing.T) {
 for _, test := range []struct {
 value LuminousIntensity
 format string
 want string
 }{
 {1.23456789, "%v", "1.23456789 cd"},
 {1.23456789, "%.1v", "1 cd"},
 {1.23456789, "%20.1v", "1 cd"},
 {1.23456789, "%20v", "1.23456789 cd"},
 {1.23456789, "%1v", "1.23456789 cd"},
 {1.23456789, "%#v", "unit.LuminousIntensity(1.23456789)"},
 {1.23456789, "%s", "%!s(unit.LuminousIntensity=1.23456789 cd)"},
 } {
 got := fmt.Sprintf(test.format, test.value)
 if got != test.want {
 t.Errorf("Format %q %v: got: %q want: %q", test.format, float64(test.value), got, test.want)
 }
 }
}

```

```

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package kdtree

var (
 _ Interface = nbPoints{}
 _ Comparable = nbPoint{}
)

// nbRandoms is the maximum number of random values to sample for calculation of median of
// random elements.
var nbRandoms = 100

// nbPoint represents a point in a k-d space that satisfies the Comparable interface.
type nbPoint Point

func (p nbPoint) Compare(c Comparable, d Dim) float64 { q := c.(nbPoint); return p[d] - q[d] }
func (p nbPoint) Dims() int { return len(p) }
func (p nbPoint) Distance(c Comparable) float64 {
 q := c.(nbPoint)
 var sum float64
 for dim, c := range p {
 d := c - q[dim]
 sum += d * d
 }
 return sum
}

// nbPoints is a collection of point values that satisfies the Interface.
type nbPoints []nbPoint

func (p nbPoints) Index(i int) Comparable { return p[i] }
func (p nbPoints) Len() int { return len(p) }
func (p nbPoints) Pivot(d Dim) int { return nbPlane{nbPoints: p, Dim: d}.Pivot() }
func (p nbPoints) Slice(start, end int) Interface { return p[start:end] }

// nbPlane is a wrapping type that allows a Points type be pivoted on a dimension.
type nbPlane struct {
 Dim
 nbPoints
}

func (p nbPlane) Less(i, j int) bool { return p.nbPoints[i][p.Dim] < p.nbPoints[j][p.Dim] }
func (p nbPlane) Pivot() int { return Partition(p, MedianOfRandoms(p, nbRandoms)) }
func (p nbPlane) Slice(start, end int) SortSlicer { p.nbPoints = p.nbPoints[start:end]; return p }

```

```

func (p nbPlane) Swap(i, j int) {
 p.nbPoints[i], p.nbPoints[j] = p.nbPoints[j], p.nbPoints[i]
}
graph{{stri{stri}stri{stri}stri}}
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// license that can be found in the LICENSE file.

package mathext

import (
 "testing"

 "gonum.org/v1/gonum/floats"
)

func TestIncBeta(t *testing.T) {
 tol := 1e-14
 tol2 := 1e-10
 // Test against values from scipy
 for i, test := range []struct {
 a, b, x, ans float64
 }{
 {1, 1, 0.8, 0.8},
 {1, 5, 0.8, 0.999680000000000001},
 {10, 10, 0.8, 0.99842087945083291},
 {10, 10, 0.1, 3.929882327128003e-06},
 {10, 2, 0.4, 0.000734003200000000028},
 {0.1, 0.2, 0.6, 0.69285678232066683},
 {1, 10, 0.7489, 0.99999900352334858},
 } {
 y := RegIncBeta(test.a, test.b, test.x)
 if !floats.EqualWithinAbsOrRel(y, test.ans, tol, tol) {
 t.Errorf("Incomplete beta mismatch. Case %v: Got %v, want %v", i, y, test.ans)
 }

 yc := 1 - RegIncBeta(test.b, test.a, 1-test.x)
 if !floats.EqualWithinAbsOrRel(y, yc, tol, tol) {
 t.Errorf("Incomplete beta complementary mismatch. Case %v: Got %v, want %v", i, y, yc)
 }

 x := InvRegIncBeta(test.a, test.b, y)
 if !floats.EqualWithinAbsOrRel(x, test.x, tol2, tol2) {
 t.Errorf("Inverse incomplete beta mismatch. Case %v: Got %v, want %v", i, x, test.x)
 }
 }
}

```

```

// Confirm that Invincbeta and Incbeta agree. Sweep over a variety of
// a, b, and y values.
tol = 1e-6
steps := 201
ints := make([]float64, steps)
floats.Span(ints, 0, 1)

sz := 51
min := 1e-2
max := 1e2
as := make([]float64, sz)
floats.LogSpan(as, min, max)
bs := make([]float64, sz)
floats.LogSpan(bs, min, max)

for _, a := range as {
 for _, b := range bs {
 for _, yr := range ints {
 x := InvRegIncBeta(a, b, yr)
 if x > 1-1e-6 {
 // Numerical error too large
 continue
 }
 y := RegIncBeta(a, b, x)
 if !floats.EqualWithinAbsOrRel(yr, y, tol, tol) {
 t.Errorf("Mismatch between inv inc beta and inc beta. a = %v, b = %v, x = %v, got %v, want %v.", a, b, x, y, yr)
 break
 }
 }
 }
}

graph{"\E\Z"}
program testdlasq3
implicit none

! Dlasq3 tests
integer :: i0, n0, pp, ttype, nFail, iter, nDiv, n
real(kind=8), dimension(84) :: z
real(kind=8) :: dmin, desig, qmax, dmin1, dmin2, dn, dn1, dn2, g, tau, sigma
logical :: ieee

n = 84

ieee = .True.

z(1:84) = (/1.9143652461808209D+00, &
1.5643842977038900D+00, &

```

2.4933891621438989D-01, &  
3.4998094847693051D-01, &  
1.3159965131315450D+00, &  
1.3638621124906269D+00, &  
9.8984666119707590D-02, &  
2.0147331685530781D-01, &  
6.0239739795872871D-01, &  
6.4655447927417942D-01, &  
2.2100334106387809D-03, &  
5.4827584804256833D-02, &  
9.8618572336789667D-02, &  
2.4281908107454921D-02, &  
4.7563214844548191D-01, &  
7.6546697639973529D-02, &  
2.5887481436771148D-01, &  
6.1277840695087704D-01, &  
1.0786113766900041D-01, &  
1.2172855586231640D-01, &  
6.4428964922552456D-01, &  
2.2938358048981550D-01, &  
6.2032304866397048D-01, &  
5.2276720640470942D-01, &  
3.6956606786075852D-01, &  
7.6452331847458654D-01, &  
5.3788380542522651D-01, &  
2.2536579805014259D-01, &  
3.5625331812646233D-01, &  
8.8204867223354833D-01,  
&  
2.2221324964361449D-02, &  
1.2088451318140349D-02, &  
1.2750943030216850D+00, &  
6.5487468521633574D-01, &  
1.6473243548212180D-01, &  
6.4244094276971109D-01, &  
1.0075305765438660D+00, &  
3.2695517365467008D-01, &  
3.4538816017831181D-01, &  
8.4530783837131718D-01, &  
2.6793917191534039D-01, &  
4.1167148387782809D-01, &  
7.3286777366837230D-01, &  
2.0165584821582411D-01, &  
8.3608281383074101D-01, &  
9.7375794521953263D-01, &  
4.8136607095928219D-01, &  
5.9519264227958080D-01, &  
6.4953705136764595D-01, &

6.7618762481481709D-01, &  
2.3254758802226480D-01, &  
4.5471549751211121D-01, &  
1.9936248028938069D-01, &  
3.3218193673422552D-01, &  
3.7823189169112570D-01, &  
9.9728131577419957D-02, &  
9.8304494035037460D-01, &  
7.5610809968448423D-01, &  
4.4297338640403672D-01, &  
6.0516873235701607D-01, &  
1.1732795506024030D+00, &  
7.1957244803166864D-01, &  
5.0355240691445868D-01, &  
8.9668048897477137D-01, &  
3.0589803950585209D-01, &  
6.5888323539286620D-01, &  
3.0146344334154529D-01, &  
1.5056721102744461D-01,  
&  
1.2894222375675779D+00, &  
6.1246453109936005D-01, &  
7.5833643057994404D-01, &  
9.7842114980976291D-01, &  
4.9778147794615712D-01, &  
9.9938135774918690D-01, &  
2.8414688478625982D-01, &  
2.5673655077691432D-01, &  
9.2575397942057647D-01, &  
5.5092683856146663D-01, &  
5.2313556054509897D-05, &  
6.5897402564536967D-01, &  
2.1178692213810329D-05, &  
7.3492248268320243D-05, &  
0.0000000000000000D+00, &  
0.0000000000000000D+00/)  
i0 = 1  
n0 = 21  
pp = 0  
dmin = -0.0000000000000000D+00  
sigma = 0.0000000000000000D+00  
desig = 0.0000000000000000D+00  
qmax = 2.1637041623952107D+00  
nFail = 0  
iter = 2  
nDiv = 40  
ttype = 0  
dmin1 = 0.0000000000000000D+00

```

dmin2 = 0.0000000000000000D+00
dn = 0.0000000000000000D+00
dn1 = 0.0000000000000000D+00
dn2 = 0.0000000000000000D+00
g = 0.0000000000000000D+00
tau = 0.0000000000000000D+00

print *, "Starting Dlasq3"
open(unit = 4, file = "gen4tests.txt")
open(unit = 5, file = "gen5tests.txt")
call Dlasq3(i0, n0, z, pp, dmin, sigma, desig, qmax, nFail, iter, nDiv, ieee,
 ttype, dmin1, dmin2, dn, dn1, dn2, g, tau)
close(4)
close(5)

print *, "Done calling dlasq3"
print *, Z(1:n)

print *, I0, N0, PP
print *, DMIN, DESIG, SIGMA, QMAX
print *, NFAIL, ITER, NDIV, TTYPE
print *, DMIN1, DMIN2, DN, DN1, DN2, G, TAU

end
graph{ed""ed}
graph{{{Sh{{{Sh{{{Sb}}Sh}So}}}}So{{{Sb}}So}}}}So}
graph{{gr{{gr}gr{gr}}gr}}
graph{diG{{diG{{diG{{diG{{diG}diG}}}}diG{diG}diG}}}
// SPDX-License-Identifier: Unlicense OR MIT

package material

import (
 "image"
 "image/color"

 "gioui.org/f32"
 "gioui.org/io/pointer"
 "gioui.org/layout"
 "gioui.org/op"
 "gioui.org/op/clip"
 "gioui.org/op/paint"
 "gioui.org/text"
 "gioui.org/unit"
 "gioui.org/widget"
)

type Button struct {

```



```

Text string
// Color is the text color.
Color color.RGBA
Font text.Font
Background color.RGBA
CornerRadius unit.Value
shaper *text.Shaper
}

```

```

type IconButton struct {
 Background color.RGBA
 Color color.RGBA
 Icon *Icon
 Size unit.Value
 Padding unit.Value
}

```

```

func (t *Theme) Button(txt string) Button {
 return Button{
 Text: txt,
 Color: rgb(0xffffffff),
 Background: t.Color.Primary,
 Font: text.Font{
 Size: t.TextSize.Scale(14.0 / 16.0),
 },
 shaper: t.Shaper,
 }
}

```

```

func (t *Theme) IconButton(icon *Icon) IconButton {
 return IconButton{
 Background: t.Color.Primary,
 Color: t.Color.InvText,
 Icon: icon,
 Size:
 unit.Dp(56),
 Padding: unit.Dp(16),
 }
}

```

```

func (b Button) Layout(gtx *layout.Context, button *widget.Button) {
 col := b.Color
 bgcol := b.Background
 hmin := gtx.Constraints.Width.Min
 vmin := gtx.Constraints.Height.Min
 layout.Stack{Alignment: layout.Center}.Layout(gtx,
 layout.Expanded(func() {
 rr := float32(gtx.Px(unit.Dp(4)))

```

```

clip.Rect{
 Rect: f32.Rectangle{Max: f32.Point{
 X: float32(gtx.Constraints.Width.Min),
 Y: float32(gtx.Constraints.Height.Min),
 }},
 NE: rr, NW: rr, SE: rr, SW: rr,
}.Op(gtx.Ops).Add(gtx.Ops)
fill(gtx, bgcol)
for _, c := range button.History() {
 drawInk(gtx, c)
}
}),
layout.Stacked(func() {
 gtx.Constraints.Width.Min = hmin
 gtx.Constraints.Height.Min = vmin
 layout.Align(layout.Center).Layout(gtx, func() {
 layout.Inset{Top: unit.Dp(10), Bottom: unit.Dp(10), Left: unit.Dp(12), Right: unit.Dp(12)}.Layout(gtx, func() {
 paint.ColorOp{Color: col}.Add(gtx.Ops)
 widget.Label{}.Layout(gtx, b.shaper,
b.Font, b.Text)
 })
 })
 pointer.Rect(image.Rectangle{Max: gtx.Dimensions.Size}).Add(gtx.Ops)
 button.Layout(gtx)
}),
)
}

func (b IconButton) Layout(gtx *layout.Context, button *widget.Button) {
 layout.Stack{}.Layout(gtx,
 layout.Expanded(func() {
 size := float32(gtx.Constraints.Width.Min)
 rr := float32(size) * .5
 clip.Rect{
 Rect: f32.Rectangle{Max: f32.Point{X: size, Y: size}},
 NE: rr, NW: rr, SE: rr, SW: rr,
 }.Op(gtx.Ops).Add(gtx.Ops)
 fill(gtx, b.Background)
 for _, c := range button.History() {
 drawInk(gtx, c)
 }
 })),
 layout.Stacked(func() {
 layout.UniformInset(b.Padding).Layout(gtx, func() {
 size := gtx.Px(b.Size) - 2*gtx.Px(b.Padding)
 if b.Icon != nil {
 b.Icon.Color = b.Color
 b.Icon.Layout(gtx, unit.Px(float32(size)))
 }
 })
 })
}

```

```

 }
 gtx.Dimensions = layout.Dimensions{
 Size: image.Point{X: size, Y: size},
 }
})
pointer.Ellipse(image.Rectangle{Max: gtx.Dimensions.Size}).Add(gtx.Ops)
button.Layout(gtx)
}),
)
}

```

```

func
toPointF(p image.Point) f32.Point {
return f32.Point{X: float32(p.X), Y: float32(p.Y)}
}

```

```

func toRectF(r image.Rectangle) f32.Rectangle {
return f32.Rectangle{
 Min: toPointF(r.Min),
 Max: toPointF(r.Max),
}
}

```

```

func drawInk(gtx *layout.Context, c widget.Click) {
d := gtx.Now().Sub(c.Time)
t := float32(d.Seconds())
const duration = 0.5
if t > duration {
return
}
t = t / duration
var stack op.StackOp
stack.Push(gtx.Ops)
size := float32(gtx.Px(unit.Dp(700))) * t
rr := size * .5
col := byte(0xaa * (1 - t*t))
ink := paint.ColorOp{Color: color.RGBA{A: col, R: col, G: col, B: col}}
ink.Add(gtx.Ops)
op.TransformOp{ }.Offset(c.Position).Offset(f32.Point{
 X: -rr,
 Y: -rr,
}).Add(gtx.Ops)
clip.Rect{
 Rect: f32.Rectangle{Max: f32.Point{
 X: float32(size),
 Y: float32(size),
 }},
 NE: rr, NW: rr, SE: rr, SW: rr,
}

```

```
.Op(gtx.Ops).Add(gtx.Ops)
paint.PaintOp{Rect: f32.Rectangle{Max: f32.Point{X: float32(size), Y: float32(size)}}}.Add(gtx.Ops)
stack.Pop()
op.InvalidateOp{}.Add(gtx.Ops)
}

graph{<=>{<=><=>{<=>}}}
graph{{Gr}{Gr}{Gr}{Gr}{Gr}{Gr}{Gr}{Gr}{Gr}}
graph{<<=>=>}
graph{SUBH}
graph{{{digr}}digr{digr}{digr}{digr}}
digraph{e[l=<<E "0">
<R>
 <D "9023" ""17464450787444112>a<D>
606162636465666768693552713678800500929355621337890625 </"23430">a<D>' <D>cfdswr<D>
<R>
 <E>>l=""n->g[l=""g->l[l=""}]
graph{{EDG{EDG}EDG{EDG}{EDG{EDG}}}}
graph{{{DiGr2}DiGr1}DiGr1}

// Code generated by "go generate gonum.org/v1/gonum/unit; DO NOT EDIT.
```

```
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// license that can be found in the LICENSE file.
```

package unit

```
import (
 "errors"
 "fmt"
 "math"
 "unicode/utf8"
)
```

```
// Mole represents an amount in moles.
type Mole float64
```

$$\text{const Mol Mole} = 1$$

```
// Unit converts the Mole to a *Unit
func (n Mole) Unit() *Unit {
 return New(float64(n), Dimensions{
 MoleDim: 1,
 })
}
```

```
// Mole allows Mole to implement a Moleer interface
func (n Mole) Mole() Mole {
 return n
}
```

```

}

// From converts the unit into the receiver. From returns an
// error if there is a mismatch in dimension
func (n *Mole) From(u Uniter) error {
 if !DimensionsMatch(u, Mol) {
 *n = Mole(math.NaN())
 return errors.New("Dimension mismatch")
 }
 *n = Mole(u.Unit().Value())
 return nil
}

func (n Mole) Format(fs fmt.State, c rune) {
 switch c {
 case 'v':
 if fs.Flag('#') {
 fmt.Fprintf(fs, "%T(%v)",
n, float64(n))
 return
 }
 fallthrough
 case 'e', 'E', 'f', 'F', 'g', 'G':
 p, pOk := fs.Precision()
 w, wOk := fs.Width()
 const unit = " mol"
 switch {
 case pOk && wOk:
 fmt.Fprintf(fs, "%*.*"+string(c), pos(w-utf8.RuneCount([]byte(unit))), p, float64(n))
 case pOk:
 fmt.Fprintf(fs, "%.*"+string(c), p, float64(n))
 case wOk:
 fmt.Fprintf(fs, "%*"+string(c), pos(w-utf8.RuneCount([]byte(unit))), float64(n))
 default:
 fmt.Fprintf(fs, "%"+string(c), float64(n))
 }
 fmt.Fprint(fs, unit)
 default:
 fmt.Fprintf(fs, "%%!c(%T=%g mol)", c, n, float64(n))
 }
}

/** github.com/glycerine/fast-elliptic-curve-p256 **/

{{Types "Apache-2.0"}}

#####
#
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```

```

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EXEMPLARY, OR CONSEQUENTIAL DAMAGES (INCLUDING, BUT NOT LIMITED TO,
PROCUREMENT OF SUBSTITUTE GOODS OR SERVICES; LOSS OF USE, DATA, OR

```

```

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#
#
#####
Developers and authors:
Shay Gueron (1, 2), and Vlad Krasnov (1, 3)
(1) Intel Corporation, Israel Development Center
(2) University of Haifa
(3) CloudFlare, Inc.
Reference:
S.Gueron and V.Krasnov, "Fast Prime Field Elliptic Curve Cryptography with#
256 Bit Primes"
https://eprint.iacr.org/2013/816.pdf
#
#####

Further optimization by <appro@openssl.org>:
#
this/original with/without -DECP_NISTZ256_ASM(*)
Opteron +12-49% +110-150%
Bulldozer +14-45% +175-210%
P4 +18-46% n/a :-(
Westmere +12-34% +80-87%
Sandy Bridge +9-35% +110-120%
Ivy Bridge +9-35% +110-125%
Haswell +8-37% +140-160%
Broadwell +18-58% +145-210%
Atom +15-50% +130-180%
VIA Nano +43-160% +300-480%
#
(*) "without -DECP_NISTZ256_ASM" refers to build with
"enable-ec_nistp_64_gcc_128";
#
Ranges denote minimum and maximum improvement coefficients depending
on benchmark. Lower coefficients are for ECDSA sign, relatively fastest
#
server-side operation. Keep in mind that +100% means 2x improvement.
*/

graph{{{digrr}}{digrr}digh{{{digrr}}{digrr}digr}}}}
graph{"\\
\\\\{ssssssss}\\"}
graph{SUBGRAV{{{SUBGRAU}}}}
graph{EDA{EDA}EDA{EDA{EDA}EDA}{EDA{EDA}EDA}}
graph{grap238418577910191015625}

```

```

// Copyright 2015 The Gonum Authors. All rights reserved.
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// license that can be found in the LICENSE file.

package gonum

import "gonum.org/v1/gonum/blas"

// Dgebd2 reduces an mn matrix A to upper or lower bidiagonal form by an orthogonal
// transformation.
// $Q * A * P = B$
// if $m \geq n$, B is upper diagonal, otherwise B is lower bidiagonal.
// d is the diagonal, $\text{len} = \min(m, n)$
// e is the off-diagonal $\text{len} = \min(m, n) - 1$
//
// Dgebd2 is an internal routine. It is exported for testing purposes.
func (impl Implementation) Dgebd2(m, n int, a []float64, lda int, d, e, tauQ, tauP, work []float64) {
 switch {
 case m < 0:
 panic(mLT0)
 case n < 0:
 panic(nLT0)
 case lda < max(1, n):
 panic(badLdA)
 }

 // Quick return if possible.
 minmn := min(m, n)
 if minmn == 0 {
 return
 }

 switch {
 case len(d) < minmn:
 panic(shortD)
 case len(e) < minmn-1:
 panic(shortE)
 case len(tauQ) < minmn:
 panic(shortTauQ)
 case len(tauP) < minmn:
 panic(shortTauP)
 case
 len(work) < max(m, n):
 panic(shortWork)
 }

 if m >= n {
 for i := 0; i < n; i++ {

```



```

a[i*lda+i], tauQ[i] = impl.Dlarfg(m-i, a[i*lda+i], a[min(i+1, m-1)*lda+i:], lda)
d[i] = a[i*lda+i]
a[i*lda+i] = 1
// Apply H_i to A[i:m, i+1:n] from the left.
if i < n-1 {
 impl.Dlarf(blas.Left, m-i, n-i-1, a[i*lda+i:], lda, tauQ[i], a[i*lda+i+1:], lda, work)
}
a[i*lda+i] = d[i]
if i < n-1 {
 a[i*lda+i+1], tauP[i] = impl.Dlarfg(n-i-1, a[i*lda+i+1], a[i*lda+min(i+2, n-1):], 1)
 e[i] = a[i*lda+i+1]
 a[i*lda+i+1] = 1
 impl.Dlarf(blas.Right, m-i-1, n-i-1, a[i*lda+i+1:], 1, tauP[i], a[(i+1)*lda+i+1:], lda, work)
 a[i*lda+i+1] = e[i]
} else {
 tauP[i] = 0
}
}
return
}
for i := 0; i < m; i++ {
 a[i*lda+i], tauP[i] = impl.Dlarfg(n-i, a[i*lda+i], a[i*lda+min(i+1, n-1):], 1)
 d[i] = a[i*lda+i]
 a[i*lda+i] = 1
 if i < m-1 {
 impl.Dlarf(blas.Right, m-i-1, n-i, a[i*lda+i:], 1, tauP[i], a[(i+1)*lda+i:], lda, work)
 }
 a[i*lda+i]
= d[i]
 if i < m-1 {
 a[(i+1)*lda+i], tauQ[i] = impl.Dlarfg(m-i-1, a[(i+1)*lda+i], a[min(i+2, m-1)*lda+i:], lda)
 e[i] = a[(i+1)*lda+i]
 a[(i+1)*lda+i] = 1
 impl.Dlarf(blas.Left, m-i-1, n-i-1, a[(i+1)*lda+i:], lda, tauQ[i], a[(i+1)*lda+i+1:], lda, work)
 a[(i+1)*lda+i] = e[i]
 } else {
 tauQ[i] = 0
 }
}
}
graph{{ {di{di}{di{di{di}}di}}di}di{di{di}{di{di}{di{di{di}}di}}di}}
graph{"\\3\\3\\3\\#" }
graph{{ {Sub{Subg1{Subg1}Subg1}Sub{Subg1}Subg1}Subg1}{Subg1}}
// SPDX-License-Identifier: Unlicense OR MIT

```

package headless

import (

```

"errors"
"syscall/js"

"gioui.org/app/internal/gl"
)

type jsContext struct {
 ctx js.Value
 f *gl.Functions
}

func newContext() (*jsContext, error) {
 version := 2
 doc := js.Global().Get("document")
 cnv := doc.Call("createElement", "canvas")
 ctx := cnv.Call("getContext", "webgl2")
 if ctx.IsNull() {
 version = 1
 ctx = cnv.Call("getContext", "webgl")
 }
 if ctx.IsNull() {
 return nil, errors.New("headless: webgl is not supported")
 }
 f := &gl.Functions{Ctx: ctx}
 if err := f.Init(version); err != nil {
 return nil, err
 }
 c := &jsContext{
 ctx: ctx,
 f: f,
 }
 return c, nil
}

func (c *jsContext) Functions() *gl.Functions {
 return c.f
}

func (c *jsContext) Release() {
}

func (c *jsContext) ReleaseCurrent() {
}

func (c *jsContext) MakeCurrent() error {
 return nil
}

```

```

#!/usr/bin/env bash
MIT licenses will each have a unique MD5 sum since they contain a unique copyright.
This script will read the license file into memory, strip out the copyright, and then
generate an MD5 that is not unique and can be matched against a known MIT MD5 sum.
set -e

calculate_md5_sum() {
 local FILE="$1"

 # Read the contents of the file into a variable
 local raw_license_text=$(<"$FILE")

 # Convert to lowercase
 local lowercase_license_text="{raw_license_text,,}"

 # Remove anything before the beginning of the license
 local stripped_license_text=$(awk '/permission is hereby granted/{p=1} p' <<< "$lowercase_license_text")

 # Replace line breaks (Windows or Linux) with a single space
 local replaced_linebreaks=$(tr '\r\n' ' ' <<< "$stripped_license_text")

 # Replace multiple spaces with a single space
 local normalized_license_text=$(tr -s ' ' <<< "$replaced_linebreaks")

 # Strip away any non-printable, non-whitespace characters
 local clean_unprintable_license_text=$(tr
-cd '[:print:][:space:]' <<< "$normalized_license_text")

 # Remove punctuation and special characters
 local clean_license_text=$(echo "$clean_unprintable_license_text" | sed 's/[^a-zA-Z]//g')

 # Calculate the MD5 sum of the cleaned license text
 local MD5SUM=$(echo -n "$clean_license_text" | md5sum | awk '{print $1}')

 # Output the MD5 sum
 echo "$MD5SUM"
}

Check if the FILE argument is provided
if [-z "$1"]; then
 echo "Please provide a FILE as an argument."
 exit 1
fi

Invoke the function with the provided FILE argument
calculate_md5_sum "$1"
graph{{nodU}}

```

```

graph{DiGra}
graph{Edged}
graph{{D55}}
graph{{{grN}}grO}}
graph{{DIGRAG}{DIGRAG}{DIGRAG}DIGRAG}{DIGRAG}}
graph{{STRI}}
// Copyright 2018 The Gonum Authors. All rights reserved.
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package iterator

import "gonum.org/v1/gonum/graph"

// OrderedLines implements the graph.Lines and graph.LineSlicer interfaces.
// The iteration order of OrderedLines is the order of lines passed to
// NewLineIterator.
type OrderedLines struct {
 idx int
 lines []graph.Line
}

// NewOrderedLines returns an OrderedLines initialized with the provided lines.
func NewOrderedLines(lines []graph.Line) *OrderedLines {
 return &OrderedLines{idx: -1, lines: lines}
}

// Len returns the remaining number of lines to be iterated over.
func (e *OrderedLines) Len() int {
 if e.idx >= len(e.lines) {
 return 0
 }
 if e.idx <= 0 {
 return len(e.lines)
 }
 return len(e.lines[e.idx:])
}

// Next returns whether the next call of Line will return a valid line.
func (e *OrderedLines) Next() bool {
 if uint(e.idx)+1 < uint(len(e.lines)) {
 e.idx++
 return true
 }
 e.idx = len(e.lines)
 return false
}

```

```

// Line returns the current line of the iterator. Next must have been
// called prior to a call to Line.
func (e *OrderedLines) Line() graph.Line {
 if e.idx >= len(e.lines) || e.idx < 0 {
 return nil
 }
 return e.lines[e.idx]
}

// LineSlice returns all the remaining lines in the iterator and advances
// the iterator.
func (e *OrderedLines) LineSlice() []graph.Line {
 if e.idx >= len(e.lines) {
 return nil
 }
 idx := e.idx
 if idx == -1 {
 idx = 0
 }
 e.idx = len(e.lines)
 return e.lines[idx:]
}

// Reset returns the iterator to its initial state.
func (e *OrderedLines) Reset() {
 e.idx = -1
}

// OrderedWeightedLines implements the graph.Lines and graph.LineSlicer interfaces.
// The iteration order of OrderedWeightedLines is the order of lines passed to
// NewLineIterator.
type OrderedWeightedLines struct {
 idx int
 lines []graph.WeightedLine
}

// NewWeightedLineIterator returns an OrderedWeightedLines initialized with
// the provided lines.
func NewOrderedWeightedLines(lines []graph.WeightedLine) *OrderedWeightedLines {
 return &OrderedWeightedLines{idx: -1, lines: lines}
}

// Len returns the remaining number of lines to be iterated over.
func (e *OrderedWeightedLines) Len() int {
 if e.idx >= len(e.lines) {
 return 0
 }
}

```

```

if e.idx <= 0 {
 return len(e.lines)
}
return len(e.lines[e.idx:])
}

// Next returns whether the next call of WeightedLine will return a valid line.
func (e *OrderedWeightedLines) Next() bool {
 if uint(e.idx)+1 < uint(len(e.lines)) {
 e.idx++
 return true
 }
 e.idx = len(e.lines)
 return false
}

// WeightedLine returns the current line of the iterator. Next must have been
// called prior to a call to WeightedLine.
func (e *OrderedWeightedLines) WeightedLine() graph.WeightedLine {
 if e.idx >= len(e.lines) || e.idx < 0 {
 return nil
 }
 return e.lines[e.idx]
}

// WeightedLineSlice returns all the remaining lines in the iterator and advances
// the iterator.
func (e *OrderedWeightedLines)
WeightedLineSlice() []graph.WeightedLine {
 if e.idx >= len(e.lines) {
 return nil
 }
 idx := e.idx
 if idx == -1 {
 idx = 0
 }
 e.idx = len(e.lines)
 return e.lines[idx:]
}

// Reset returns the iterator to its initial state.
func (e *OrderedWeightedLines) Reset() {
 e.idx = -1
}
graph{{ {E4} {E4} E4 } E4 }
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```

```

// Package r2 provides 2D vectors and boxes and operations on them.
package r2 // import "gonum.org/v1/gonum/spatial/r2"
graph{NO5{NO5}}
graph{NOD_}
digraph{{D:G:_->G:G:_->G:G:_}}
// Copyright 2017 The Gonum Authors. All rights reserved.
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package encoding

import "gonum.org/v1/gonum/graph"

// Builder is a graph that can have user-defined nodes and edges added.
type Builder interface {
 graph.Graph
 graph.Builder
}

// MultiBuilder is a graph that can have user-defined nodes and edges added.
type MultiBuilder interface {
 graph.Multigraph
 graph.MultigraphBuilder
}

// AttributeSetter is implemented by types that can set an encoded graph
// attribute.
type AttributeSetter interface {
 SetAttribute(Attribute) error
}

// Attributer defines graph.Node or graph.Edge values that can
// specify graph attributes.
type Attributer interface {
 Attributes() []Attribute
}

// Attribute is an encoded key value attribute pair use in graph encoding.
type Attribute struct {
 Key, Value string
}

graph{{ND{ND}{ND}ND}{ND}{ND{ND}ND}{ND}}
graph{i4{i2}}
graph{{su}{su}}
digraph {rankdir=LR;T[ape=point]H[abel=""]T->H[rrowsize=1.5arrowhead=vee]}
graph{Digra1{{Digra1{Digra9}}Digra5}Digra1{Digra5}}

```

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// license that can be found in the LICENSE file.

package testlapack

import (

"testing"

"golang.org/x/exp/rand"

"gonum.org/v1/gonum/blas"

"gonum.org/v1/gonum/blas/blas64"

"gonum.org/v1/gonum/floats"

"gonum.org/v1/gonum/lapack"

)

type Dlarfber interface {

Dlarfter

Dlarfb(side blas.Side, trans blas.Transpose, direct lapack.Direct,  
 store lapack.StoreV, m, n, k int, v []float64, ldv int, t []float64, ldt int,  
 c []float64, ldc int, work []float64, ldwork int)

}

func DlarfbTest(t \*testing.T, impl Dlarfber) {

rnd := rand.New(rand.NewSource(1))

for \_, store := range []lapack.StoreV{lapack.ColumnWise, lapack.RowWise} {

for \_, direct := range []lapack.Direct{lapack.Forward, lapack.Backward} {

for \_, side := range []blas.Side{blas.Left, blas.Right} {

for \_, trans := range []blas.Transpose{blas.Trans, blas.NoTrans} {

for cas, test := range []struct {

ma,

na, cdim, lda, ldt, ldc int

}{

{6, 6, 6, 0, 0, 0},

{6, 8, 10, 0, 0, 0},

{6, 10, 8, 0, 0, 0},

{8, 6, 10, 0, 0, 0},

{8, 10, 6, 0, 0, 0},

{10, 6, 8, 0, 0, 0},

{10, 8, 6, 0, 0, 0},

{6, 6, 6, 12, 15, 30},

{6, 8, 10, 12, 15, 30},

{6, 10, 8, 12, 15, 30},

{8, 6, 10, 12, 15, 30},

{8, 10, 6, 12, 15, 30},

{10, 6, 8, 12, 15, 30},

{10, 8, 6, 12, 15, 30},



```

{6, 6, 6, 15, 12, 30},
{6, 8, 10, 15, 12, 30},
{6, 10, 8, 15, 12, 30},
{8, 6, 10, 15, 12, 30},
{8, 10, 6, 15, 12, 30},
{10, 6, 8, 15, 12, 30},
{10, 8, 6, 15, 12, 30},
} {
// Generate a matrix for QR
ma := test.ma
na := test.na
lda := test.lda
if lda == 0 {
 lda = na
}
a := make([]float64, ma*lda)
for i := 0; i < ma; i++ {
 for j := 0; j < lda; j++ {
 a[i*lda+j] = rnd.Float64()
 }
}
k := min(ma, na)

// H is always ma x
ma
var m, n, rowsWork int
switch {
default:
 panic("not implemented")
case side == blas.Left:
 m = test.ma
 n = test.cdim
 rowsWork = n
case side == blas.Right:
 m = test.cdim
 n = test.ma
 rowsWork = m
}

// Use dgeqr2 to find the v vectors
tau := make([]float64, na)
work := make([]float64, na)
impl.Dgeqr2(ma, k, a, lda, tau, work)

// Correct the v vectors based on the direct and store
vMatTmp := extractVMat(ma, na, a, lda, lapack.Forward, lapack.ColumnWise)
vMat := constructVMat(vMatTmp, store, direct)
v := vMat.Data

```

```

ldv := vMat.Stride

// Use dlarft to find the t vector
ldt := test.ldt
if ldt == 0 {
 ldt = k
}
tm := make([]float64, k*ldt)

impl.Dlarft(direct, store, ma, k, v, ldv, tau, tm, ldt)

// Generate c matrix
ldc := test.ldc
if ldc == 0 {
 ldc = n
}
c := make([]float64,
m*ldc)
for i := 0; i < m; i++ {
 for j := 0; j < ldc; j++ {
 c[i*ldc+j] = rnd.Float64()
 }
}
cCopy := make([]float64, len(c))
copy(cCopy, c)

ldwork := k
work = make([]float64, rowsWork*k)

// Call Dlarfb with this information
impl.Dlarfb(side, trans, direct, store, m, n, k, v, ldv, tm, ldt, c, ldc, work, ldwork)

h := constructH(tau, vMat, store, direct)

cMat := blas64.General{
 Rows: m,
 Cols: n,
 Stride: ldc,
 Data: make([]float64, m*ldc),
}
copy(cMat.Data, cCopy)
ans := blas64.General{
 Rows: m,
 Cols: n,
 Stride: ldc,
 Data: make([]float64, m*ldc),
}
copy(ans.Data, cMat.Data)

```

```
switch {
default:
 panic("not implemented")
case side == blas.Left && trans == blas.NoTrans:
 blas64.Gemm(blas.NoTrans, blas.NoTrans, 1, h, cMat, 0, ans)
case side == blas.Left && trans == blas.Trans:
 blas64.Gemm(blas.Trans,
blas.NoTrans, 1, h, cMat, 0, ans)
case side == blas.Right && trans == blas.NoTrans:
 blas64.Gemm(blas.NoTrans, blas.NoTrans, 1, cMat, h, 0, ans)
case side == blas.Right && trans == blas.Trans:
 blas64.Gemm(blas.NoTrans, blas.Trans, 1, cMat, h, 0, ans)
}
if !floats.EqualApprox(ans.Data, c, 1e-14) {
 t.Errorf("Cas %v mismatch. Want %v, got %v.", cas, ans.Data, c)
}
}
}
}
}
}
```

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```
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```

```
// license that can be found in the LICENSE file.
```

```
package testblas
```

```
import (
```

"testing"

"gonum.org/v1/gonum/blas"

"gonum.org/v1/gonum/floats"

)

```
type Dtpmver interface {
```

Dtpmv(ul blas.Uplo, tA blas.Transpose, d blas.Diag, n int, ap []float64, x []float64, incX int)

}

```
func DtpmvTest(t *testing.T, blasser Dtpmver) {
```

```
for i, test := range []struct {
```

n int

```
a [][]float64
```

```
x []float64
```

d blas.Diag

- blas.Uplo

tA blas.Transpose

ans []float64

```

}{
{
n: 3,
a: [][]float64{
{5, 6, 7},
{0, 9, 10},
{0, 0, 13},
},
x: []float64{3, 4, 5},
d: blas.NonUnit,
ul: blas.Upper,
tA: blas.NoTrans,
ans: []float64{74, 86, 65},
},
{
n: 3,
a: [][]float64{
{5, 6, 7},
{0, 9, 10},
{0, 0, 13},
},
x: []float64{3, 4, 5},
d: blas.Unit,
ul: blas.Upper,
tA: blas.NoTrans,
ans: []float64{62, 54, 5},
},
{
n:
3,
a: [][]float64{
{5, 0, 0},
{6, 9, 0},
{7, 10, 13},
},
x: []float64{3, 4, 5},
d: blas.NonUnit,
ul: blas.Lower,
tA: blas.NoTrans,
ans: []float64{15, 54, 126},
},
{
n: 3,
a: [][]float64{
{1, 0, 0},
{6, 1, 0},
{7, 10, 1},
},

```

```

x: []float64{3, 4, 5},
d: blas.Unit,
ul: blas.Lower,
tA: blas.NoTrans,
ans: []float64{3, 22, 66},
},
{
n: 3,
a: [][]float64{
{5, 6, 7},
{0, 9, 10},
{0, 0, 13},
},
x: []float64{3, 4, 5},
d: blas.NonUnit,
ul: blas.Upper,
tA: blas.Trans,
ans: []float64{15, 54, 126},
},
{
n: 3,
a: [][]float64{
{1, 6, 7},
{0, 1, 10},
{0, 0, 1},
},
x: []float64{3, 4, 5},
d: blas.Unit,
ul: blas.Upper,
tA: blas.Trans,
ans: []float64{3, 22, 66},
},
{
n: 3,
a: [][]float64{
{5, 0, 0},
{6, 9, 0},
{7, 10, 13},
},
x: []float64{3, 4, 5},
d: blas.NonUnit,
ul: blas.Lower,
tA:
blas.Trans,
ans: []float64{74, 86, 65},
},
} {
incTest := func(incX, extra int) {

```

```

aFlat := flattenTriangular(test.a, test.ul)
x := makeIncremented(test.x, incX, extra)
blasser.Dtpmv(test.ul, test.tA, test.d, test.n, aFlat, x, incX)
ans := makeIncremented(test.ans, incX, extra)
if !floats.EqualApprox(x, ans, 1e-14) {
 t.Errorf("Case %v, idx %v: Want %v, got %v.", i, incX, ans, x)
}
}
incTest(1, 0)
incTest(-3, 3)
incTest(4, 3)
}
}
graph{{SU2}SU0{SU2}SU2{{SU2}SU2}{SU2}SU0{SU2}}
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// license that can be found in the LICENSE file.

package frontend

import (
 "bytes"
 "context"
 "sort"
 "strconv"

 "github.com/google/safehtml"
 "golang.org/x/pkg/site/internal"
 "golang.org/x/pkg/site/internal/licenses"
)

// License contains information used for a single license section.
type License struct {
 *licenses.License
 Anchor safehtml.Identifier
 Source string
}

// LicensesDetails contains license information for a package or module.
type LicensesDetails struct {
 IsRedistributable bool
 Licenses []License
}

// LicenseMetadata contains license metadata that is used in the package
// header.
type LicenseMetadata struct {
 Type string

```

Anchor safehtml.Identifier

}

// fetchLicensesDetails fetches license data for the package version specified by

// path and version from the database and returns a LicensesDetails.

func fetchLicensesDetails(ctx context.Context,

ds internal.DataSource, um \*internal.UnitMeta) (\*LicensesDetails, error) {

u, err := ds.GetUnit(ctx, um, internal.WithMain|internal.WithLicenses, internal.BuildContext{})

if err != nil {

return nil, err

}

return &LicensesDetails{IsRedistributable: u.IsRedistributable, Licenses: transformLicenses(um.ModulePath,  
um.Version, u.LicenseContents)}, nil

}

// transformLicenses transforms licenses.License into a License

// by adding an anchor field.

func transformLicenses(modulePath, requestedVersion string, dbLicenses []\*licenses.License) []License {

licenses := make([]License, len(dbLicenses))

var filePaths []string

for \_, l := range dbLicenses {

filePaths = append(filePaths, l.FilePath)

}

anchors := licenseAnchors(filePaths)

for i, l := range dbLicenses {

l.Content = bytes.ReplaceAll(l.Content, []byte("\r"), nil)

licenses[i] = License{

Anchor: anchors[i],

License: l,

Source: fileSource(modulePath, requestedVersion, l.FilePath),

}

}

return licenses

}

//

transformLicenseMetadata transforms licenses.Metadata into a LicenseMetadata

// by adding an anchor field.

func transformLicenseMetadata(dbLicenses []\*licenses.Metadata) []LicenseMetadata {

var mds []LicenseMetadata

var filePaths []string

for \_, l := range dbLicenses {

filePaths = append(filePaths, l.FilePath)

}

anchors := licenseAnchors(filePaths)

for i, l := range dbLicenses {

anchor := anchors[i]

for \_, typ := range l.Types {

```

 mds = append(mds, LicenseMetadata{
 Type: typ,
 Anchor: anchor,
 })
}
}
return mds
}

// licenseAnchors returns anchors (HTML identifiers) for all the paths, in the
// same order. If the paths are unique, it ensures that the resulting anchors
// are unique. The argument is modified.
func licenseAnchors(paths []string) []safehtml.Identifier {
 // Remember the original index of each path.
 index := map[string]int{}
 for i, p := range paths {
 index[p] = i
 }
 // Pick a canonical order for the paths, so we assign the same anchors
 //
 the same set of paths regardless of the order they're given to use.
 sort.Strings(paths)
 ids := make([]safehtml.Identifier, len(paths))
 for i, p := range paths {
 ids[index[p]] = safehtml.IdentifierFromConstantPrefix("lic", strconv.Itoa(i))
 }
 return ids
}

graph{{STRE{STRE}}STRE}
graph{{{{subO:subO}}}}
graph{{g{{g}}g{{g}}g}}
graph{{EDG_}}
image: debian/testing
packages:
- curl
- unzip
- golang
sources:
- https://git.sr.ht/~eliasnaur/gio
environment:
 PATH: /usr/bin:/home/build/go/bin:/home/build/android/tools/bin
 ANDROID_HOME: /home/build/android
 android_sdk_tools_zip: sdk-tools-linux-3859397.zip
 android_ndk_zip: android-ndk-r20-linux-x86_64.zip
tasks:
- install_jdk8: |
 curl -so jdk.deb "https://cdn.azul.com/zulu/bin/zulu8.42.0.21-ca-jdk8.0.232-linux_amd64.deb"
 sudo apt install -y -f ./jdk.deb

```



```

- install_android: |
 mkdir android
 cd android
 curl -so sdk-tools.zip https://dl.google.com/android/repository/$android_sdk_tools_zip
 unzip -q sdk-tools.zip
 rm sdk-tools.zip
 curl -so ndk.zip https://dl.google.com/android/repository/$android_ndk_zip
 unzip -q ndk.zip
 rm ndk.zip
 mv android-ndk-* ndk-bundle
 yes|sdkmanager --licenses
 sdkmanager "platforms;android-29" "build-tools;29.0.2"
- install_gogio: |
 cd gio/cmd
 go install ./gogio
- test_android:
 |
 cd gio/example
 gogio -target android ./kitchen
graph{{DIGRAG{{DIGRAG{DIGRAG}DIGRAG}DIGRAG}{DIGRAG}}}
graph{{{sua{{{sua}{sua}{sua}}}sua}{sua}}}
graph{GR{GR{{GR{{GR}GR}}}}}
Gonum diff
[![GoDoc](https://godoc.org/gonum.org/v1/gonum/diff?status.svg)](https://godoc.org/gonum.org/v1/gonum/diff)

```

Package diff is a package for computing derivatives of functions for the Go language.

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```
package r1
```

```
// Interval represents an interval.
```

```
type Interval struct {
```

```
 Min, Max float64
```

```
}
```

```
graph{graph[]Graph[]}
```

```
digraph{STm}
```

```
Graph{{{Subgr}{Subgr}}Subgr}
```

```
// SPDX-License-Identifier: Unlicense OR MIT
```

```
package gpu
```

```
import (
```

```
 "errors"
```

```
 "strings"
```

```
 "gioui.org/app/internal/gl"
```

```

)

type context struct {
 caps caps
 *gl.Functions
}

type caps struct {
 EXT_disjoint_timer_query bool
 // floatTriple holds the settings for floating point
 // textures.
 floatTriple textureTriple
 // Single channel alpha textures.
 alphaTriple textureTriple
 srgbaTriple textureTriple
}

// textureTriple holds the type settings for
// a TexImage2D call.
type textureTriple struct {
 internalFormat int
 format gl.Enum
 typ gl.Enum
}

func newContext(glctx *gl.Functions) (*context, error) {
 ctx := &context{
 Functions: glctx,
 }
 exts := strings.Split(ctx.GetString(gl.EXTENSIONS), " ")
 glVer := ctx.GetString(gl.VERSION)
 ver, err := gl.ParseGLVersion(glVer)
 if err != nil {
 return nil, err
 }
 floatTriple, err := floatTripleFor(ctx, ver, exts)
 if err != nil {
 return nil, err
 }
 srgbaTriple, err := srgbaTripleFor(ver, exts)
 if err != nil {
 return
 nil, err
 }
 hasTimers := hasExtension(exts, "GL_EXT_disjoint_timer_query_webgl2") || hasExtension(exts,
 "GL_EXT_disjoint_timer_query")
 ctx.caps = caps{
 EXT_disjoint_timer_query: hasTimers,

```

```

floatTriple: floatTriple,
alphaTriple: alphaTripleFor(ver),
srgbaTriple: srgbaTriple,
}
return ctx, nil
}

// floatTripleFor determines the best texture triple for floating point FBOs.
func floatTripleFor(ctx *context, ver [2]int, exts []string) (textureTriple, error) {
var triples []textureTriple
if ver[0] >= 3 {
triples = append(triples, textureTriple{gl.R16F, gl.Enum(gl.RED), gl.Enum(gl.HALF_FLOAT)})
}
if hasExtension(exts, "GL_OES_texture_half_float") && hasExtension(exts, "GL_EXT_color_buffer_half_float") {
// Try single channel.
triples = append(triples, textureTriple{gl.LUMINANCE, gl.Enum(gl.LUMINANCE),
gl.Enum(gl.HALF_FLOAT_OES)})
// Fallback to 4 channels.
triples = append(triples, textureTriple{gl.RGBA, gl.Enum(gl.RGBA),
gl.Enum(gl.HALF_FLOAT_OES)})
}
if hasExtension(exts, "GL_OES_texture_float") || hasExtension(exts, "GL_EXT_color_buffer_float") {
triples = append(triples, textureTriple{gl.RGBA, gl.Enum(gl.RGBA), gl.Enum(gl.FLOAT)})
}
tex := ctx.CreateTexture()
defer ctx.DeleteTexture(tex)
ctx.BindTexture(gl.TEXTURE_2D, tex)
ctx TexParameteri(gl.TEXTURE_2D, gl.TEXTURE_WRAP_S, gl.CLAMP_TO_EDGE)
ctx TexParameteri(gl.TEXTURE_2D, gl.TEXTURE_WRAP_T, gl.CLAMP_TO_EDGE)
ctx TexParameteri(gl.TEXTURE_2D, gl.TEXTURE_MAG_FILTER, gl.NEAREST)
ctx TexParameteri(gl.TEXTURE_2D, gl.TEXTURE_MIN_FILTER, gl.NEAREST)
fbo := ctx.CreateFramebuffer()
defer ctx.DeleteFramebuffer(fbo)
defFBO := gl.Framebuffer(ctx.GetBinding(gl.FRAMEBUFFER_BINDING))
ctx.BindFramebuffer(gl.FRAMEBUFFER, fbo)
defer ctx.BindFramebuffer(gl.FRAMEBUFFER, defFBO)
for _, tt := range triples {
const size = 256
ctx TexImage2D(gl.TEXTURE_2D, 0, tt.internalFormat, size, size, tt.format, tt.typ, nil)
ctx.FramebufferTexture2D(gl.FRAMEBUFFER,
gl.COLOR_ATTACHMENT0, gl.TEXTURE_2D, tex, 0)
if st := ctx.CheckFramebufferStatus(gl.FRAMEBUFFER); st == gl.FRAMEBUFFER_COMPLETE {
return tt, nil
}
}
}
return textureTriple{}, errors.New("floating point fbos not supported")
}

```

```

func srgbaTripleFor(ver [2]int, exts []string) (textureTriple, error) {
 switch {
 case ver[0] >= 3:
 return textureTriple{gl.SRGB8_ALPHA8, gl.Enum(gl.RGBA), gl.Enum(gl.UNSIGNED_BYTE)}, nil
 case hasExtension(exts, "GL_EXT_sRGB"):
 return textureTriple{gl.SRGB_ALPHA_EXT, gl.Enum(gl.SRGB_ALPHA_EXT),
gl.Enum(gl.UNSIGNED_BYTE)}, nil
 default:
 return textureTriple{}, errors.New("no sRGB texture formats found")
 }
}

```

```

func alphaTripleFor(ver [2]int) textureTriple {
 intf, f := gl.R8, gl.Enum(gl.RED)
 if ver[0] < 3 {
 // R8, RED not supported on OpenGL ES 2.0.
 intf, f = gl.LUMINANCE, gl.Enum(gl.LUMINANCE)
 }
 return textureTriple{intf, f, gl.UNSIGNED_BYTE}
}

```

```

func hasExtension(exts []string, ext string) bool {
 for _, e := range exts {
 if ext == e
 {
 return true
 }
 }
 return false
}

```

/\*\* github.com/ecletus-pkg/fontawesome\_com@v0.0.0-20200904170934-0e02fad1db22 \*\*/

{{Types "MIT"}}

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graph{{Nod}Nod}

graph{STs{STe}}

Graph{Grap[]Grap}

graph{{digraq}}

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package testblas

import (  
"testing"

"golang.org/x/exp/rand"

"gonum.org/v1/gonum/blas"

)

func DgemmBenchmark(b \*testing.B, dgemm Dgemmer, m, n, k int, tA, tB blas.Transpose) {

a := make([]float64, m\*k)

for i := range a {

a[i] = rand.Float64()

}

bv := make([]float64, k\*n)

for i := range bv {

bv[i] = rand.Float64()

}

```

c := make([]float64, m*n)
for i := range c {
 c[i] = rand.Float64()
}
var lda, ldb int
if tA == blas.Trans {
 lda = m
} else {
 lda = k
}
if tB == blas.Trans {
 ldb = k
} else {
 ldb = n
}
ldc := n
b.ResetTimer()
for i := 0; i < b.N; i++ {
 dgemm.Dgemm(tA, tB, m, n, k, 3.0, a, lda, bv, ldb, 1.0, c, ldc)
}
}
graph{{SU}}{SU{SU}}{SU}SU}}
graph{{{digh}}{digg}digd{{{digh}}}}digh}
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// +build !amd64 noasm appengine safe

package f32

// Ger performs the rank-one operation
// A += alpha * x * y
// where A is an mn dense matrix, x and y are vectors, and alpha is a scalar.
func Ger(m, n uintptr, alpha float32, x []float32, incX uintptr, y []float32, incY uintptr, a []float32, lda uintptr) {

 if incX == 1 && incY == 1 {
 x = x[:m]
 y = y[:n]
 for i, xv := range x {
 AxpyUnitary(alpha*xv, y, a[uintptr(i)*lda:uintptr(i)*lda+n])
 }
 return
 }

 var ky, kx uintptr
 if int(incY) < 0 {
 ky = uintptr(-int(n-1) * int(incY))
 }

```

```

}
if int(incX) < 0 {
 kx = uintptr(-int(m-1) * int(incX))
}

ix := kx
for i := 0; i < int(m); i++ {
 AxyInc(alpha*x[ix], y, a[uintptr(i)*lda:uintptr(i)*lda+n], uintptr(n), uintptr(incY), 1, uintptr(ky), 0)
 ix += incX
}
}
graph{Di{Di{{{Di{Di}}Di}}Di}}
Graph{{{SubD{SubD{SubF}}SubD{SubF}}}}
graph{N{N}N{N}N{N}N{N}{N}N{N}N{N}{N}N{N}N{N}N{N}N{N}{N}N{N}N{N}N{N}}
// SPDX-License-Identifier: Unlicense OR MIT

```

```
package window
```

```

import (
 "errors"
 "syscall/js"

 "gioui.org/app/internal/gl"
)

```

```

type context struct {
 ctx js.Value
 cnv js.Value
 f *gl.Functions
 srgbFBO *gl.SRGBFBO
}

```

```

func newContext(w *window) (*context, error) {
 args := map[string]interface{}{
 // Enable low latency rendering.
 // See https://developers.google.com/web/updates/2019/05/desynchronized.
 "desynchronized": true,
 "preserveDrawingBuffer": true,
 }
 version := 2
 ctx := w.cnv.Call("getContext", "webgl2", args)
 if ctx.IsNull() {
 version = 1
 ctx = w.cnv.Call("getContext", "webgl", args)
 }
 if ctx.IsNull() {
 return nil, errors.New("app: webgl is not supported")
 }
}

```

```

f := &gl.Functions{Ctx: ctx}
if err := f.Init(version); err != nil {
 return nil, err
}
c := &context{
 ctx: ctx,
 cnv: w.cnv,
 f: f,
}
return c, nil
}

func (c *context) Functions() *gl.Functions {
 return c.f
}

func (c *context) Release() {
 if c.srgbFBO != nil {
 c.srgbFBO.Release()
 c.srgbFBO
 = nil
 }
}

func (c *context) Present() error {
 if c.srgbFBO != nil {
 c.srgbFBO.Blit()
 }
 if c.srgbFBO != nil {
 c.srgbFBO.AfterPresent()
 }
 if c.ctx.Call("isContextLost").Bool() {
 return errors.New("context lost")
 }
 return nil
}

func (c *context) Lock() {}

func (c *context) Unlock() {}

func (c *context) MakeCurrent() error {
 if c.srgbFBO == nil {
 var err error
 c.srgbFBO, err = gl.NewSRGBFBO(c.f)
 if err != nil {
 c.Release()
 c.srgbFBO = nil
 }
 }
}

```



```

return err
}
}

w, h := c.cnv.Get("width").Int(), c.cnv.Get("height").Int()
if err := c.srgbFBO.Refresh(w, h); err != nil {
 c.Release()
 return err
}

return nil
}

func (w *window) NewContext() (Context, error) {
 return newContext(w)
}

graph{{{{{stR}stI{{stR}stI}}stI}{stR}stR}stI}}stI}
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package iterator

import (
 "reflect"

 "gonum.org/v1/gonum/graph"
)

// OrderedNodes implements the graph.Nodes and graph.NodeSlicer interfaces.
// The iteration order of OrderedNodes is the order of nodes passed to
// NewNodeIterator.
type OrderedNodes struct {
 idx int
 nodes []graph.Node
}

// NewOrderedNodes returns a OrderedNodes initialized with the provided nodes.
func NewOrderedNodes(nodes []graph.Node) *OrderedNodes {
 return &OrderedNodes{idx: -1, nodes: nodes}
}

// Len returns the remaining number of nodes to be iterated over.
func (n *OrderedNodes) Len() int {
 if n.idx >= len(n.nodes) {
 return 0
 }
 if n.idx <= 0 {
 return len(n.nodes)
 }
}
```

```

return len(n.nodes[n.idx:])
}

// Next returns whether the next call of Node will return a valid node.
func (n *OrderedNodes) Next() bool {
 if uint(n.idx)+1 < uint(len(n.nodes))
 {
 n.idx++
 return true
 }
 n.idx = len(n.nodes)
 return false
}

// Node returns the current node of the iterator. Next must have been
// called prior to a call to Node.
func (n *OrderedNodes) Node() graph.Node {
 if n.idx >= len(n.nodes) || n.idx < 0 {
 return nil
 }
 return n.nodes[n.idx]
}

// NodeSlice returns all the remaining nodes in the iterator and advances
// the iterator.
func (n *OrderedNodes) NodeSlice() []graph.Node {
 if n.idx >= len(n.nodes) {
 return nil
 }
 idx := n.idx
 if idx == -1 {
 idx = 0
 }
 n.idx = len(n.nodes)
 return n.nodes[idx:]
}

// Reset returns the iterator to its initial state.
func (n *OrderedNodes) Reset() {
 n.idx = -1
}

// ImplicitNodes implements the graph.Nodes interface for a set of nodes over
// a contiguous ID range.
type ImplicitNodes struct {
 beg, end int
 curr int
 newNode func(id int) graph.Node

```

```

}

// NewImplicitNodes returns a new implicit node iterator spanning nodes in [beg,end).
// The provided new func maps the
// id to a graph.Node. NewImplicitNodes will panic
// if beg is greater than end.
func NewImplicitNodes(beg, end int, new func(id int) graph.Node) *ImplicitNodes {
 if beg > end {
 panic("iterator: invalid range")
 }
 return &ImplicitNodes{beg: beg, end: end, curr: beg - 1, newNode: new}
}

// Len returns the remaining number of nodes to be iterated over.
func (n *ImplicitNodes) Len() int {
 return n.end - n.curr - 1
}

// Next returns whether the next call of Node will return a valid node.
func (n *ImplicitNodes) Next() bool {
 if n.curr == n.end {
 return false
 }
 n.curr++
 return n.curr < n.end
}

// Node returns the current node of the iterator. Next must have been
// called prior to a call to Node.
func (n *ImplicitNodes) Node() graph.Node {
 if n.Len() == -1 || n.curr < n.beg {
 return nil
 }
 return n.newNode(n.curr)
}

// Reset returns the iterator to its initial state.
func (n *ImplicitNodes) Reset() {
 n.curr = n.beg - 1
}

// NodeSlice returns all the remaining nodes in the
// iterator and advances
// the iterator.
func (n *ImplicitNodes) NodeSlice() []graph.Node {
 nodes := make([]graph.Node, 0, n.Len())
 for n.curr++; n.curr < n.end; n.curr++ {
 nodes = append(nodes, n.newNode(n.curr))
 }
}

```

```

 }
 return nodes
}

// Nodes implements the graph.Nodes interfaces.
// The iteration order of Nodes is randomized.
type Nodes struct {
 nodes reflect.Value
 iter *reflect.MapIter
 pos int
 curr graph.Node
}

// NewNodes returns a Nodes initialized with the provided nodes, a
// map of node IDs to graph.Nodes. No check is made that the keys
// match the graph.Node IDs, and the map keys are not used.
//
// Behavior of the Nodes is unspecified if nodes is mutated after
// the call the NewNodes.
func NewNodes(nodes map[int64]graph.Node) *Nodes {
 rv := reflect.ValueOf(nodes)
 return &Nodes{nodes: rv, iter: rv.MapRange()}
}

// Len returns the remaining number of nodes to be iterated over.
func (n *Nodes) Len() int {
 return n.nodes.Len() - n.pos
}

// Next returns whether the
// next call of Node will return a valid node.
func (n *Nodes) Next() bool {
 if n.pos >= n.nodes.Len() {
 return false
 }
 ok := n.iter.Next()
 if ok {
 n.pos++
 n.curr = n.iter.Value().Interface().(graph.Node)
 }
 return ok
}

// Node returns the current node of the iterator. Next must have been
// called prior to a call to Node.
func (n *Nodes) Node() graph.Node {
 return n.curr
}

```



```

return &Icon{src: data, Color: rgb(0x000000)}, nil
}

func (ic *Icon) Layout(gtx *layout.Context, sz unit.Value) {
 ico := ic.image(gtx.Px(sz))
 ico.Add(gtx.Ops)
 paint.PaintOp{
 Rect: f32.Rectangle{
 Max: toPointF(ico.Size()),
 },
 }.Add(gtx.Ops)
}

func (ic *Icon) image(sz int) paint.ImageOp {
 if sz == ic.imgSize && ic.Color == ic.imgColor {
 return ic.op
 }
 m, _ := iconvg.DecodeMetadata(ic.src)
 dx, dy := m.ViewBox.AspectRatio()
 img := image.NewRGBA(image.Rectangle{Max:
 image.Point{X: sz, Y: int(float32(sz) * dy / dx)}})
 var ico iconvg.Rasterizer
 ico.SetDstImage(img, img.Bounds(), draw.Src)
 m.Palette[0] = ic.Color
 iconvg.Decode(&ico, ic.src, &iconvg.DecodeOptions{
 Palette: &m.Palette,
 })
 ic.op = paint.NewImageOp(img)
 ic.imgSize = sz
 ic.imgColor = ic.Color
 return ic.op
}
graph{{gr4}gr7{{{gr7{{{gr4}{gr4}}}gr4}gr4}gr7{gr4}}}}
graph{"\#I\I3\#I\I3"}
graph{{{digrap{digrap}digrap{digrap}digrap}digrap}}
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// SPDX-License-Identifier: Unlicense OR MIT

// Package headless implements headless windows for rendering
// an operation list to an image.
package headless

import (
 "fmt"
 "image"
 "runtime"

```

```

"gioui.org/app/internal/gl"
"gioui.org/app/internal/gpu"
"gioui.org/op"
)

// Window is a headless window.
type Window struct {
 size image.Point
 ctx context
 fbo *gl.SRGBFBO
 gpu *gpu.GPU
}

type context interface {
 Functions() *gl.Functions
 MakeCurrent() error
 ReleaseCurrent()
 Release()
}

// NewWindow creates a new headless window.
func NewWindow(width, height int) (*Window, error) {
 ctx, err := newContext()
 if err != nil {
 return nil, err
 }
 w := &Window{
 size: image.Point{X: width, Y: height},
 ctx: ctx,
 }
 err = contextDo(ctx, func() error {
 f := ctx.Functions()
 fbo, err := gl.NewSRGBFBO(f)
 if err != nil {
 ctx.Release()
 return err
 }
 if err := fbo.Refresh(width, height); err != nil {
 fbo.Release()
 ctx.Release()
 return err
 }
 gpu, err := gpu.New(f)
 if
 err != nil {
 fbo.Release()
 ctx.Release()

```

```

 return err
}
w.fbo = fbo
w.gpu = gpu
return err
}))
if err != nil {
 return nil, err
}
return w, nil
}

// Release resources associated with the window.
func (w *Window) Release() {
 contextDo(w.ctx, func() error {
 if w.gpu != nil {
 w.gpu.Release()
 w.gpu = nil
 }
 if w.fbo != nil {
 w.fbo.Release()
 w.fbo = nil
 }
 if w.ctx != nil {
 w.ctx.Release()
 w.ctx = nil
 }
 return nil
 })
}

// Frame replace the window content and state with the
// operation list.
func (w *Window) Frame(frame *op.Ops) {
 contextDo(w.ctx, func() error {
 w.gpu.Collect(false, w.size, frame)
 w.gpu.Frame(false, w.size)
 w.gpu.EndFrame(false)
 return nil
 })
}

// Screenshot returns an image with the content of the window.
func (w *Window) Screenshot() (*image.RGBA, error) {
 img := image.NewRGBA(image.Rectangle{Max: w.size})
 if len(img.Pix) != w.size.X*w.size.Y*4 {
 panic("unexpected RGBA size")
 }
}

```



```

contextDo(w.ctx,
func() error {
 f := w.ctx.Functions()
 f.ReadPixels(0, 0, w.size.X, w.size.Y, gl.RGBA, gl.UNSIGNED_BYTE, img.Pix)
 if glErr := f.GetError(); glErr != gl.NO_ERROR {
 return fmt.Errorf("glReadPixels failed: %d", glErr)
 }
 return nil
})
// Flip image in y-direction. OpenGL's origin is in the lower
// left corner.
row := make([]uint8, img.Stride)
for y := 0; y < w.size.Y/2; y++ {
 y1 := w.size.Y - y - 1
 dest := img.PixOffset(0, y1)
 src := img.PixOffset(0, y)
 copy(row, img.Pix[dest:])
 copy(img.Pix[dest:], img.Pix[src:src+len(row)])
 copy(img.Pix[src:], row)
}
return img, nil
}

```

```

func contextDo(ctx context, f func() error) error {
 errCh := make(chan error)
 go func() {
 runtime.LockOSThread()
 defer runtime.UnlockOSThread()
 if err := ctx.MakeCurrent(); err != nil {
 errCh <- err
 return
 }
 defer ctx.ReleaseCurrent()
 errCh <- f()
 }()
 return <-errCh
}

graph{{Digh{{Digrh}Digrh{{Digrh}Digrh}}}Digrh{{Digrh}Digrh}}
graph{{Subgi{Subgc}}}
graph{<TTDDTT>}
digraph{E->E->E->E->E->E}
// Code generated by "go generate gonum.org/v1/gonum/unit; DO NOT EDIT.

```

```

// Copyright 2014 The Gonum Authors. All rights reserved.
// Use of this source code is governed by a BSD-style
// license that can be found in the LICENSE file.

```

```

package unit

```

```

import (
 "errors"
 "fmt"
 "math"
 "unicode/utf8"
)

// Resistance represents an electrical resistance, impedance or reactance in Ohms.
type Resistance float64

const Ohm Resistance = 1

// Unit converts the Resistance to a *Unit
func (r Resistance) Unit() *Unit {
 return New(float64(r), Dimensions{
 CurrentDim: -2,
 LengthDim: 2,
 MassDim: 1,
 TimeDim: -3,
 })
}

// Resistance allows Resistance to implement a Resistancer interface
func (r Resistance) Resistance() Resistance {
 return r
}

// From converts the unit into the receiver. From returns an
// error if there is a mismatch in dimension
func (r *Resistance) From(u Uniter) error {
 if !DimensionsMatch(u, Ohm) {
 *r = Resistance(math.NaN())
 return errors.New("Dimension mismatch")
 }
 *r
 = Resistance(u.Unit().Value())
 return nil
}

func (r Resistance) Format(fs fmt.State, c rune) {
 switch c {
 case 'v':
 if fs.Flag('#') {
 fmt.Fprintf(fs, "%T(%v)", r, float64(r))
 return
 }
 fallthrough
 }

```

```

case 'e', 'E', 'f', 'F', 'g', 'G':
 p, pOk := fs.Precision()
 w, wOk := fs.Width()
 const unit = " "
 switch {
 case pOk && wOk:
 fmt.Fprintf(fs, "%*.*"+string(c), pos(w-utf8.RuneCount([]byte(unit))), p, float64(r))
 case pOk:
 fmt.Fprintf(fs, "%.*"+string(c), p, float64(r))
 case wOk:
 fmt.Fprintf(fs, "%*"+string(c), pos(w-utf8.RuneCount([]byte(unit))), float64(r))
 default:
 fmt.Fprintf(fs, "%"+string(c), float64(r))
 }
 fmt.Fprint(fs, unit)
default:
 fmt.Fprintf(fs, "%%!%c(%T=%g)", c, r, float64(r))
}
}
graph{"\
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graph{{{digrar}digrat}digrat}}
graph{{_Q_E_Q_Z_N_D_Y_W_C_U}_J_P_T_T_J_I_V}}
graph{SUBGR9{{SUBGR5}{SUBGR5}}}
graph{{{stricN}stricN}{stricN{stricN}{stricN{stricN}}}stricN}{stricN{stricN{stricN{stricN{stricN}}}}
graph{diGd{diGo}{diGi}diGd{{diGo}{diGi}diGd{diGo}{diGo}diGo}{diGo}}
Graph{{Subgr}{Subgr{Subgr}{Subgr}{Subgr}}Subgr}
graph{.9{.5{.5{.5}.5{.5{.5{.5}.55}}.5}.5{.5{.5{.5}.55}}}}
// Copyright 2016 The Gonum Authors. All rights reserved.
// Use of this source code is governed by a BSD-style
// license that can be found in the LICENSE file.

// Package path provides graph path finding functions.
package path // import "gonum.org/v1/gonum/graph/path"
graph{{{subgrap{subgrap}subgrap}}}
graph{{STRIC0}STRIC0}
// Copyright 2016 The Gonum Authors. All rights reserved.
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```

```

package testlapack

import (
 "testing"

 "golang.org/x/exp/rand"

 "gonum.org/v1/gonum/blas"
 "gonum.org/v1/gonum/blas/blas64"
 "gonum.org/v1/gonum/floats"
 "gonum.org/v1/gonum/lapack"
)

type Dsteqrer interface {
 Dsteqr(compz lapack.EVComp, n int, d, e, z []float64, ldz int, work []float64) (ok bool)
 Dorgtrr
}

func DsteqrTest(t *testing.T, impl Dsteqrer) {
 rnd := rand.New(rand.NewSource(1))
 for _, compz := range []lapack.EVComp{lapack.EVOrig, lapack.EVTridiag} {
 for _, test := range []struct {
 n, lda int
 }{
 {1, 0},
 {4, 0},
 {8, 0},
 {10, 0},

 {2, 10},
 {8, 10},
 {10, 20},
 } {
 for cas := 0; cas < 100; cas++ {
 n := test.n
 lda := test.lda
 if lda == 0 {
 lda = n
 }
 d := make([]float64, n)
 for i := range d {
 d[i] = rnd.Float64()
 }
 e := make([]float64, n-1)
 for
 i := range e {
 e[i] = rnd.Float64()
 }
 }
 }
}

```

```

a := make([]float64, n*lda)
for i := range a {
 a[i] = rnd.Float64()
}
dCopy := make([]float64, len(d))
copy(dCopy, d)
eCopy := make([]float64, len(e))
copy(eCopy, e)
aCopy := make([]float64, len(a))
copy(aCopy, a)
if compz == lapack.EVOrig {
 uplo := blas.Upper
 tau := make([]float64, n)
 work := make([]float64, 1)
 impl.Dsytrd(blas.Upper, n, a, lda, d, e, tau, work, -1)
 work = make([]float64, int(work[0]))
 // Reduce A to symmetric tridiagonal form.
 impl.Dsytrd(uplo, n, a, lda, d, e, tau, work, len(work))
 // Compute the orthogonal matrix Q.
 impl.Dorgtr(uplo, n, a, lda, tau, work, len(work))
} else {
 for i := 0; i < n; i++ {
 for j := 0; j < n; j++ {
 a[i*lda+j] = 0
 if i == j {
 a[i*lda+j] = 1
 }
 }
 }
}
work := make([]float64, 2*n)

aDecomp := make([]float64, len(a))
copy(aDecomp, a)
dDecomp
:= make([]float64, len(d))
copy(dDecomp, d)
eDecomp := make([]float64, len(e))
copy(eDecomp, e)
impl.Dsteqr(compz, n, d, e, a, lda, work)
dAns := make([]float64, len(d))
copy(dAns, d)

var truth blas64.General
if compz == lapack.EVOrig {
 truth = blas64.General{
 Rows: n,
 Cols: n,

```

```

 Stride: n,
 Data: make([]float64, n*n),
}
for i := 0; i < n; i++ {
 for j := i; j < n; j++ {
 v := aCopy[i*lda+j]
 truth.Data[i*truth.Stride+j] = v
 truth.Data[j*truth.Stride+i] = v
 }
}
} else {
 truth = blas64.General{
 Rows: n,
 Cols: n,
 Stride: n,
 Data: make([]float64, n*n),
 }
 for i := 0; i < n; i++ {
 truth.Data[i*truth.Stride+i] = dCopy[i]
 if i != n-1 {
 truth.Data[(i+1)*truth.Stride+i] = eCopy[i]
 truth.Data[i*truth.Stride+i+1] = eCopy[i]
 }
 }
}

V := blas64.General{
 Rows: n,
 Cols: n,
 Stride:
lda,
 Data: a,
}
if !eigenDecompCorrect(d, truth, V) {
 t.Errorf("Eigen reconstruction mismatch. fromFull = %v, n = %v",
 compz == lapack.EVOrig, n)
}

// Compare eigenvalues when not computing eigenvectors.
for i := range work {
 work[i] = rnd.Float64()
}
impl.Dsteqr(lapack.EVCompNone, n, dDecomp, eDecomp, aDecomp, lda, work)
if !floats.EqualApprox(d, dAns, 1e-8) {
 t.Errorf("Eigenvalue mismatch when eigenvectors not computed")
}
}
}
}

```

```

}
}

// eigenDecompCorrect returns whether the eigen decomposition is correct.
// It checks if
// A * v == v
// where the eigenvalues are stored in values, and the eigenvectors are stored
// in the columns of v.
func eigenDecompCorrect(values []float64, A, V blas64.General) bool {
 n := A.Rows
 for i := 0; i < n; i++ {
 lambda := values[i]
 vector := make([]float64, n)
 ans2 := make([]float64, n)
 for j := range vector {
 v := V.Data[j*V.Stride+i]
 vector[j] = v
 ans2[j]
 }
 = lambda * v
 }
 v := blas64.Vector{Inc: 1, Data: vector}
 ans1 := blas64.Vector{Inc: 1, Data: make([]float64, n)}
 blas64.Gemv(blas.NoTrans, 1, A, v, 0, ans1)
 if !floats.EqualApprox(ans1.Data, ans2, 1e-8) {
 return false
 }
}
return true
}

graph{SUBGR{SUBGR}}
graph{>{{>{{>{{edge5}}}}}}edge5}}}
graph{subGrap}
graph{ subgraph{} subgraph {} }
// SPDX-License-Identifier: Unlicense OR MIT

package widget

import (
 "time"

 "gioui.org/f32"
 "gioui.org/gesture"
 "gioui.org/layout"
 "gioui.org/op"
)

type Button struct {
 click gesture.Click

```

```

// clicks tracks the number of unreported clicks.
clicks int
// prevClicks tracks the number of unreported clicks
// that belong to the previous frame.
prevClicks int
history []Click
}

// Click represents a historic click.
type Click struct {
 Position f32.Point
 Time time.Time
}

func (b *Button) Clicked(gtx *layout.Context) bool {
 b.processEvents(gtx)
 if b.clicks > 0 {
 b.clicks--
 if b.prevClicks > 0 {
 b.prevClicks--
 }
 if b.clicks > 0 {
 // Ensure timely delivery of remaining clicks.
 op.InvalidateOp{}.Add(gtx.Ops)
 }
 return true
 }
 return false
}

func (b *Button) History() []Click {
 return b.history
}

func (b *Button) Layout(gtx *layout.Context) {
 // Flush clicks from before the previous frame.
 b.clicks -= b.prevClicks
 b.prevClicks = 0
 b.processEvents(gtx)
 b.click.Add(gtx.Ops)
 for
 len(b.history) > 0 {
 c := b.history[0]
 if gtx.Now().Sub(c.Time) < 1*time.Second {
 break
 }
 copy(b.history, b.history[1:])
 b.history = b.history[:len(b.history)-1]
 }
}

```



```

}
}

func (b *Button) processEvents(gtx *layout.Context) {
 for _, e := range b.click.Events(gtx) {
 switch e.Type {
 case gesture.TypeClick:
 b.clicks++
 case gesture.TypePress:
 b.history = append(b.history, Click{
 Position: e.Position,
 Time: gtx.Now(),
 })
 }
 }
}
graph{{SuG{SuG}SuG}SuG{SuG}SuG}
// SPDX-License-Identifier: Unlicense OR MIT

```

```
package layout
```

```
import (
 "image"

 "gioui.org/op"
 "gioui.org/unit"
)
```

```

// Constraints represent a set of acceptable ranges for
// a widget's width and height.
type Constraints struct {
 Width Constraint
 Height Constraint
}

```

```

// Constraint is a range of acceptable sizes in a single
// dimension.
type Constraint struct {
 Min, Max int
}

```

```

// Dimensions are the resolved size and baseline for a widget.
type Dimensions struct {
 Size image.Point
 Baseline int
}

```

```
// Axis is the Horizontal or Vertical direction.
```

```

type Axis uint8

// Alignment is the mutual alignment of a list of widgets.
type Alignment uint8

// Direction is the alignment of widgets relative to a containing
// space.
type Direction uint8

// Widget is a function scope for drawing, processing events and
// computing dimensions for a user interface element.
type Widget func()

const (
 Start Alignment = iota
 End
 Middle
 Baseline
)

const (
 NW Direction = iota
 N
 NE
 E
 SE
 S
 SW
 W
 Center
)

const
(
 Horizontal Axis = iota
 Vertical
)

// Constrain a value to the range [Min; Max].
func (c Constraint) Constrain(v int) int {
 if v < c.Min {
 return c.Min
 } else if v > c.Max {
 return c.Max
 }
 return v
}

```

```

// Constrain a size to the Width and Height ranges.
func (c Constraints) Constrain(size image.Point) image.Point {
 return image.Point{X: c.Width.Constrain(size.X), Y: c.Height.Constrain(size.Y)}
}

// RigidConstraints returns the constraints that can only be
// satisfied by the given dimensions.
func RigidConstraints(size image.Point) Constraints {
 return Constraints{
 Width: Constraint{Min: size.X, Max: size.X},
 Height: Constraint{Min: size.Y, Max: size.Y},
 }
}

// Inset adds space around a widget.
type Inset struct {
 Top, Right, Bottom, Left unit.Value
}

// Align aligns a widget in the available space.
type Align Direction

// Layout a widget.
func (in Inset) Layout(gtx *Context, w Widget) {
 top := gtx.Px(in.Top)
 right := gtx.Px(in.Right)
 bottom
 := gtx.Px(in.Bottom)
 left := gtx.Px(in.Left)
 mcs := gtx.Constraints
 mcs.Width.Max -= left + right
 if mcs.Width.Max < 0 {
 left = 0
 right = 0
 mcs.Width.Max = 0
 }
 if mcs.Width.Min > mcs.Width.Max {
 mcs.Width.Min = mcs.Width.Max
 }
 mcs.Height.Max -= top + bottom
 if mcs.Height.Max < 0 {
 bottom = 0
 top = 0
 mcs.Height.Max = 0
 }
 if mcs.Height.Min > mcs.Height.Max {
 mcs.Height.Min = mcs.Height.Max
 }
}

```

```

var stack op.StackOp
stack.Push(gtx.Ops)
op.TransformOp{ }.Offset(toPointF(image.Point{X: left, Y: top})).Add(gtx.Ops)
dims := ctxLayout(gtx, mcs, w)
stack.Pop()
gtx.Dimensions = Dimensions{
 Size: dims.Size.Add(image.Point{X: right + left, Y: top + bottom}),
 Baseline: dims.Baseline + bottom,
}
}

```

// UniformInset returns an Inset with a single inset applied to all  
// edges.

```

func UniformInset(v unit.Value) Inset {
 return Inset{Top: v, Right: v, Bottom: v, Left: v}
}

```

// Layout a widget.

```

func (a Align) Layout(gtx *Context, w Widget) {
 var macro op.MacroOp
 macro.Record(gtx.Ops)
 cs
 := gtx.Constraints
 mcs := cs
 mcs.Width.Min = 0
 mcs.Height.Min = 0
 dims := ctxLayout(gtx, mcs, w)
 macro.Stop()
 sz := dims.Size
 if sz.X < cs.Width.Min {
 sz.X = cs.Width.Min
 }
 if sz.Y < cs.Height.Min {
 sz.Y = cs.Height.Min
 }
 var p image.Point
 switch Direction(a) {
 case N, S, Center:
 p.X = (sz.X - dims.Size.X) / 2
 case NE, SE, E:
 p.X = sz.X - dims.Size.X
 }
 switch Direction(a) {
 case W, Center, E:
 p.Y = (sz.Y - dims.Size.Y) / 2
 case SW, S, SE:
 p.Y = sz.Y - dims.Size.Y
 }
}

```

```

var stack op.StackOp
stack.Push(gtx.Ops)
op.TransformOp{ }.Offset(toPointF(p)).Add(gtx.Ops)
macro.Add()
stack.Pop()
gtx.Dimensions = Dimensions{
 Size: sz,
 Baseline: dims.Baseline + sz.Y - dims.Size.Y - p.Y,
}
}

```

```

func (a Alignment) String() string {
 switch a {
 case Start:
 return "Start"
 case End:
 return "End"
 case Middle:
 return "Middle"
 case Baseline:
 return "Baseline"
 default:
 panic("unreachable")
 }
}

```

```

func (a Axis) String() string {
 switch
 a {
 case Horizontal:
 return "Horizontal"
 case Vertical:
 return "Vertical"
 default:
 panic("unreachable")
 }
}

```

```

func (d Direction) String() string {
 switch d {
 case NW:
 return "NW"
 case N:
 return "N"
 case NE:
 return "NE"
 case E:
 return "E"

```



```

// ifac An integer work array of length at least
15.
func Costi(n int, work []float64, ifac []int) {
 if len(work) < 3*n {
 panic("fourier: short work")
 }
 if len(ifac) < 15 {
 panic("fourier: short ifac")
 }
 if n < 4 {
 return
 }
 dt := math.Pi / float64(n-1)
 for k := 1; k < n/2; k++ {
 fk := float64(k)
 work[k] = 2 * math.Sin(fk*dt)
 work[n-k-1] = 2 * math.Cos(fk*dt)
 }
 Rffti(n-1, work[n:], ifac)
}

// Cost computes the Discrete Fourier Cosine Transform of an even
// sequence x(i). The transform is defined below at output parameter x.
//
// Cost is the unnormalized inverse of itself since a call of Cost
// followed by another call of Cost will multiply the input sequence
// x by 2*(n-1). The transform is defined below at output parameter x
//
// The array work which is used by subroutine Cost must be
// initialized by calling subroutine Costi(n,work).
//
// Input parameters
//
// n The length of the sequence x. n must be greater than 1.
// The method is most efficient when n-1 is a product of
//
// small primes.
//
// x An array which contains the sequence to be transformed.
//
// work A work array which must be dimensioned at least 3*n
// in the program that calls Cost. The work array must be
// initialized by calling subroutine Costi(n,work) and a
// different work array must be used for each different
// value of n. This initialization does not have to be
// repeated so long as n remains unchanged thus subsequent
// transforms can be obtained faster than the first.
//

```

```

// ifac An integer work array of length at least 15.
//
// Output parameters
//
// x for i=1,...,n
// $x(i) = x(1) + (-1)^{(i-1)} x(n)$
// + the sum from k=2 to k=n-1
// $2 * x(k) * \cos((k-1) * (i-1) * \pi / (n-1))$
//
// A call of Cost followed by another call of
// Cost will multiply the sequence x by $2^{(n-1)}$.
// Hence Cost is the unnormalized inverse
// of itself.
//
// work Contains initialization
// calculations which must not be
// destroyed between calls of Cost.
//
// ifac An integer work array of length at least 15.
func Cost(n int, x, work []float64, ifac []int) {
 if len(x) < n {
 panic("fourier: short sequence")
 }
 if len(work) < 3*n {
 panic("fourier: short work")
 }
 if len(ifac) < 15 {
 panic("fourier: short ifac")
 }
 if n < 2 {
 return
 }
 switch n {
 case 2:
 x[0], x[1] = x[0]+x[1], x[0]-x[1]
 case 3:
 x1p3 := x[0] + x[2]
 tx2 := 2 * x[1]
 x[1] = x[0] - x[2]
 x[0] = x1p3 + tx2
 x[2] = x1p3 - tx2
 default:
 c1 := x[0] - x[n-1]
 x[0] += x[n-1]
 for k := 1; k < n/2; k++ {
 kc := n - k - 1
 t1 := x[k] + x[kc]
 t2 := x[k] - x[kc]

```



```

c1 += work[kc] * t2
t2 *= work[k]
x[k] = t1 - t2
x[kc] = t1 + t2
}
if n%2 != 0 {
x[n/2] *= 2
}
Rfftf(n-1, x, work[n:], ifac)
xim2 := x[1]
x[1] = c1
for i := 3; i < n; i += 2 {
xi := x[i]
x[i] = x[i-2] - x[i-1]
x[i-1] = xim2
xim2 = xi
}
if n%2 != 0 {
x[n-1] = xim2
}
}
}
graph{{nodU{nodU}{nodU}}}
graph{{GR{GR1}GR1{{GR{GR1}GR1}GR1}}GR1}
graph{{Ed3{{Ed2}}Ed3{{Ed2}{Ed2}}Ed2}}
graph{_____}
graph{{e_{{e_}{e_}}e_}e_}
graph{digY{{digD}}}
graph{SUBGRAV{SUBGRAV{SUBGRAU{SUBGRAV{SUBGRAU}}SUBGRAU}}SUBGRAV}
graph{{SU2}SU2}

```

// Code generated by "go generate gonum.org/v1/gonum/unit; DO NOT EDIT.

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// license that can be found in the LICENSE file.

package unit

```

import (
 "fmt"
 "testing"
)

```

```

func TestForceFormat(t *testing.T) {
 for _, test := range []struct {
 value Force
 format string
 want string
 }{

```

[illegible]

```

panic("blas32: bad BLAS uplo")
case blas.Upper:
for i := 0; i < a.N; i++ {
for j := i; j < a.N; j++ {
t.Data[i+j*t.Stride] = a.Data[i*a.Stride+j]
}
}
case blas.Lower:
for i := 0; i < a.N; i++ {
for j := 0; j <= i; j++ {
t.Data[i+j*t.Stride]
= a.Data[i*a.Stride+j]
}
}
}
}

// From fills the receiver with elements from a. The receiver
// must have the same dimensions and uplo as a and have adequate
// backing data storage.
func (t Symmetric) From(a SymmetricCols) {
if t.N != a.N {
panic("blas32: mismatched dimension")
}
if t.Uplo != a.Uplo {
panic("blas32: mismatched BLAS uplo")
}
switch a.Uplo {
default:
panic("blas32: bad BLAS uplo")
case blas.Upper:
for i := 0; i < a.N; i++ {
for j := i; j < a.N; j++ {
t.Data[i*t.Stride+j] = a.Data[i+j*a.Stride]
}
}
case blas.Lower:
for i := 0; i < a.N; i++ {
for j := 0; j <= i; j++ {
t.Data[i*t.Stride+j] = a.Data[i+j*a.Stride]
}
}
}
}

// SymmetricBandCols represents a symmetric matrix using the band column-major storage scheme.
type SymmetricBandCols SymmetricBand

```

```
// From fills the receiver with elements from a. The receiver
// must have the same dimensions, bandwidth and uplo as a and
// have adequate backing data storage.
```

```
func
```

```
(t SymmetricBandCols) From(a SymmetricBand) {
```

```
 if t.N != a.N {
```

```
 panic("blas32: mismatched dimension")
```

```
 }
```

```
 if t.K != a.K {
```

```
 panic("blas32: mismatched bandwidth")
```

```
 }
```

```
 if a.Stride < a.K+1 {
```

```
 panic("blas32: short stride for source")
```

```
 }
```

```
 if t.Stride < t.K+1 {
```

```
 panic("blas32: short stride for destination")
```

```
 }
```

```
 if t.Uplo != a.Uplo {
```

```
 panic("blas32: mismatched BLAS uplo")
```

```
 }
```

```
 dst := BandCols{
```

```
 Rows: t.N, Cols: t.N,
```

```
 Stride: t.Stride,
```

```
 Data: t.Data,
```

```
 }
```

```
 src := Band{
```

```
 Rows: a.N, Cols: a.N,
```

```
 Stride: a.Stride,
```

```
 Data: a.Data,
```

```
 }
```

```
 switch a.Uplo {
```

```
 default:
```

```
 panic("blas32: bad BLAS uplo")
```

```
 case blas.Upper:
```

```
 dst.KU = t.K
```

```
 src.KU = a.K
```

```
 case blas.Lower:
```

```
 dst.KL = t.K
```

```
 src.KL = a.K
```

```
 }
```

```
 dst.From(src)
```

```
}
```

```
// From fills the receiver with elements from a. The receiver
```

```
// must have the same dimensions, bandwidth and uplo as a and
```

```
// have adequate backing data storage.
```

```
func (t SymmetricBand) From(a SymmetricBandCols) {
```

```
 if t.N != a.N {
```

```

 panic("blas32: mismatched dimension")
}
if
t.K != a.K {
 panic("blas32: mismatched bandwidth")
}
if a.Stride < a.K+1 {
 panic("blas32: short stride for source")
}
if t.Stride < t.K+1 {
 panic("blas32: short stride for destination")
}
if t.Uplo != a.Uplo {
 panic("blas32: mismatched BLAS uplo")
}
dst := Band{
 Rows: t.N, Cols: t.N,
 Stride: t.Stride,
 Data: t.Data,
}
src := BandCols{
 Rows: a.N, Cols: a.N,
 Stride: a.Stride,
 Data: a.Data,
}
switch a.Uplo {
default:
 panic("blas32: bad BLAS uplo")
case blas.Upper:
 dst.KU = t.K
 src.KU = a.K
case blas.Lower:
 dst.KL = t.K
 src.KL = a.K
}
dst.From(src)
}
graph{no}
// Code generated by "go generate gonum.org/v1/gonum/unit; DO NOT EDIT.

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// license that can be found in the LICENSE file.

package unit

import (
 "errors"

```

```

"fmt"
"math"
"unicode/utf8"
)

// Conductance represents an electrical conductance in Siemens.
type Conductance float64

const Siemens Conductance = 1

// Unit converts the Conductance to a *Unit
func (co Conductance) Unit() *Unit {
 return New(float64(co), Dimensions{
 CurrentDim: 2,
 LengthDim: -2,
 MassDim: -1,
 TimeDim: 3,
 })
}

// Conductance allows Conductance to implement a Conductancer interface
func (co Conductance) Conductance() Conductance {
 return co
}

// From converts the unit into the receiver. From returns an
// error if there is a mismatch in dimension
func (co *Conductance) From(u Uniter) error {
 if !DimensionsMatch(u, Siemens) {
 *co = Conductance(math.NaN())
 return errors.New("Dimension
mismatch")
 }
 *co = Conductance(u.Unit().Value())
 return nil
}

func (co Conductance) Format(fs fmt.State, c rune) {
 switch c {
 case 'v':
 if fs.Flag('#') {
 fmt.Fprintf(fs, "%T(%v)", co, float64(co))
 return
 }
 fallthrough
 case 'e', 'E', 'f', 'F', 'g', 'G':
 p, pOk := fs.Precision()
 w, wOk := fs.Width()

```

```

const unit = " S"
switch {
case pOk && wOk:
 fmt.Fprintf(fs, "%*.*"+string(c), pos(w-utf8.RuneCount([]byte(unit))), p, float64(co))
case pOk:
 fmt.Fprintf(fs, "%*.*"+string(c), p, float64(co))
case wOk:
 fmt.Fprintf(fs, "%*.*"+string(c), pos(w-utf8.RuneCount([]byte(unit))), float64(co))
default:
 fmt.Fprintf(fs, "%"+string(c), float64(co))
}
fmt.Fprint(fs, unit)
default:
 fmt.Fprintf(fs, "%%!%c(%T=%g S)", c, co, float64(co))
}
}
graph{NO3{NO5{NO5}}}
graph{NOZ{{NOZ{NOZ{NOZ}}}NOG{NOZ}}}
graph{{D{D}}}
package widget

import (
 "gioui.org/gesture"
 "gioui.org/layout"
)

type Enum struct {
 clicks []gesture.Click
 values []string
 value string
}

func index(vs []string, t string) int {
 for i, v := range vs {
 if v == t {
 return i
 }
 }
 return -1
}

// Value processes events and returns the last selected value, or
// the empty string.
func (e *Enum) Value(gtx *layout.Context) string {
 for i := range e.clicks {
 for _, ev := range e.clicks[i].Events(gtx) {
 switch ev.Type {
 case gesture.TypeClick:

```

```

 e.value = e.values[i]
}
}
}
return e.value
}

// Layout adds the event handler for key.
func (rg *Enum) Layout(gtx *layout.Context, key string) {
 if index(rg.values, key) == -1 {
 rg.values = append(rg.values, key)
 rg.clicks = append(rg.clicks, gesture.Click{})
 rg.clicks[len(rg.clicks)-1].Add(gtx.Ops)
 } else {
 idx := index(rg.values, key)
 rg.clicks[idx].Add(gtx.Ops)
 }
}

func (rg *Enum) SetValue(value string) {
 rg.value = value
}
graph{<<aua>>}
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package gonum

import "gonum.org/v1/gonum/blas"

// Dormhr multiplies an mn general matrix C with an nqnq orthogonal matrix Q
// Q * C if side == blas.Left and trans == blas.NoTrans,
// Q * C if side == blas.Left and trans == blas.Trans,
// C * Q if side == blas.Right and trans == blas.NoTrans,
// C * Q if side == blas.Right and trans == blas.Trans,
// where nq == m if side == blas.Left and nq == n if side == blas.Right.
//
// Q is defined implicitly as the product of ihi-ilo elementary reflectors, as
// returned by Dgehrd:
// Q = H_{ilo} H_{ilo+1} ... H_{ihi-1}.
// Q is equal to the identity matrix except in the submatrix
// Q[ilo+1:ihi+1,ilo+1:ihi+1].
//
// ilo and ihi must have the same values as in the previous call of Dgehrd. It
// must hold that
// 0 <= ilo <= ihi < m if m > 0 and side == blas.Left,
// ilo

```



```

= 0 and ihi = -1 if m = 0 and side == blas.Left,
// 0 <= ilo <= ihi < n if n > 0 and side == blas.Right,
// ilo = 0 and ihi = -1 if n = 0 and side == blas.Right.
//
// a and lda represent an mm matrix if side == blas.Left and an nn matrix if
// side == blas.Right. The matrix contains vectors which define the elementary
// reflectors, as returned by Dgehrd.
//
// tau contains the scalar factors of the elementary reflectors, as returned by
// Dgehrd. tau must have length m-1 if side == blas.Left and n-1 if side ==
// blas.Right.
//
// c and ldc represent the mn matrix C. On return, c is overwritten by the
// product with Q.
//
// work must have length at least max(1,lwork), and lwork must be at least
// max(1,n), if side == blas.Left, and max(1,m), if side == blas.Right. For
// optimum performance lwork should be at least n*nb if side == blas.Left and
// m*nb if side == blas.Right, where nb is the optimal block size. On return,
// work[0] will contain the optimal value of lwork.
//
//
// If lwork == -1, instead of performing Dormhr, only the optimal value of lwork
// will be stored in work[0].
//
// If any requirement on input sizes is not met, Dormhr will panic.
//
// Dormhr is an internal routine. It is exported for testing purposes.
func (impl Implementation) Dormhr(side blas.Side, trans blas.Transpose, m, n, ilo, ihi int, a []float64, lda int, tau, c
[]float64, ldc int, work []float64, lwork int) {
 nq := n // The order of Q.
 nw := m // The minimum length of work.
 if side == blas.Left {
 nq = m
 nw = n
 }
 switch {
 case side != blas.Left && side != blas.Right:
 panic(badSide)
 case trans != blas.NoTrans && trans != blas.Trans:
 panic(badTrans)
 case m < 0:
 panic(mLT0)
 case n < 0:
 panic(nLT0)
 case ilo < 0 || max(1, nq) <= ilo:
 panic(badIlo)
 case ihi < min(ilo, nq-1) || nq <= ihi:

```

```

panic(badIhi)
case lda < max(1, nq):
 panic(badLdA)
case lwork < max(1, nw) && lwork != -1:
 panic(badLWork)
case len(work) < max(1, lwork):
 panic(shortWork)
}

//
Quick return if possible.
if m == 0 || n == 0 {
 work[0] = 1
 return
}

nh := ihi - ilo
var nb int
if side == blas.Left {
 opts := "LN"
 if trans == blas.Trans {
 opts = "LT"
 }
 nb = impl.Ilaenv(1, "DORMQR", opts, nh, n, nh, -1)
} else {
 opts := "RN"
 if trans == blas.Trans {
 opts = "RT"
 }
 nb = impl.Ilaenv(1, "DORMQR", opts, m, nh, nh, -1)
}
lwkopt := max(1, nw) * nb
if lwork == -1 {
 work[0] = float64(lwkopt)
 return
}

if nh == 0 {
 work[0] = 1
 return
}

switch {
case len(a) < (nq-1)*lda+nq:
 panic(shortA)
case len(c) < (m-1)*ldc+n:
 panic(shortC)
case len(tau) != nq-1:

```

```

panic(badLenTau)
}

if side == blas.Left {
impl.Dormqr(side, trans, nh, n, nh, a[(ilo+1)*lda+ilo:], lda,
tau[ilo:ihi], c[(ilo+1)*ldc:], ldc, work, lwork)
} else {
impl.Dormqr(side, trans, m, nh, nh, a[(ilo+1)*lda+ilo:], lda,
tau[ilo:ihi], c[ilo+1:], ldc, work, lwork)
}
work[0] = float64(lwkopt)
}
graph{Subgraphe}
graph{Digraph_}
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package mathext

import "gonum.org/v1/gonum/mathext/internal/gonum"

// Beta returns the value of the complete beta function B(a, b). It is defined as
// (a)(b) / (a+b)
// Special cases are:
// B(a,b) returns NaN if a or b is Inf
// B(a,b) returns NaN if a and b are 0
// B(a,b) returns NaN if a or b is NaN
// B(a,b) returns NaN if a or b is < 0
// B(a,b) returns +Inf if a xor b is 0.
//
// See http://mathworld.wolfram.com/BetaFunction.html for more detailed informations.
func Beta(a, b float64) float64 {
return gonum.Beta(a, b)
}

// Lbeta returns the natural logarithm of the complete beta function B(a,b).
// Lbeta is defined as:
// Ln((a)(b)/(a+b))
// Special cases are:
// Lbeta(a,b) returns NaN if a or b is Inf
// Lbeta(a,b) returns NaN if a and b are 0
// Lbeta(a,b) returns NaN if a or b is NaN
// Lbeta(a,b) returns
// NaN if a or b is < 0
// Lbeta(a,b) returns +Inf if a xor b is 0.
func Lbeta(a, b float64) float64 {
return gonum.Lbeta(a, b)
}

```

```

}
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package gonum

import (
 "gonum.org/v1/gonum/blas"
 "gonum.org/v1/gonum/blas/blas64"
)

// Dpotrf computes the Cholesky decomposition of the symmetric positive definite
// matrix a. If ul == blas.Upper, then a is stored as an upper-triangular matrix,
// and a = U U is stored in place into a. If ul == blas.Lower, then a = L L
// is computed and stored in-place into a. If a is not positive definite, false
// is returned. This is the blocked version of the algorithm.
func (impl Implementation) Dpotrf(ul blas.Uplo, n int, a []float64, lda int) (ok bool) {
 switch {
 case ul != blas.Upper && ul != blas.Lower:
 panic(badUplo)
 case n < 0:
 panic(nLT0)
 case lda < max(1, n):
 panic(badLdA)
 }

 // Quick return if possible.
 if n == 0 {
 return true
 }

 if len(a) < (n-1)*lda+n {
 panic(shortA)
 }

 nb := impl.Ilaenv(1, "DPOTRF",
 string(ul), n, -1, -1, -1)
 if nb <= 1 || n <= nb {
 return impl.Dpotf2(ul, n, a, lda)
 }
 bi := blas64.Implementation()
 if ul == blas.Upper {
 for j := 0; j < n; j += nb {
 jb := min(nb, n-j)
 bi.Dsyk(blas.Upper, blas.Trans, jb, j,
 -1, a[j:], lda,
 1, a[j*lda+j:], lda)
 }
 }
}

```

```

ok = impl.Dpotf2(blas.Upper, jb, a[j*lda+j:], lda)
if !ok {
 return ok
}
if j+jb < n {
 bi.Dgemm(blas.Trans, blas.NoTrans, jb, n-j-jb, j,
 -1, a[j:], lda, a[j+jb:], lda,
 1, a[j*lda+j+jb:], lda)
 bi.Dtrsm(blas.Left, blas.Upper, blas.Trans, blas.NonUnit, jb, n-j-jb,
 1, a[j*lda+j:], lda,
 a[j*lda+j+jb:], lda)
}
}
return true
}
for j := 0; j < n; j += nb {
 jb := min(nb, n-j)
 bi.Dsyk(blas.Lower, blas.NoTrans, jb, j,
 -1, a[j*lda:], lda,
 1, a[j*lda+j:], lda)
 ok := impl.Dpotf2(blas.Lower, jb, a[j*lda+j:], lda)
 if !ok {
 return ok
 }
 if j+jb < n {
 bi.Dgemm(blas.NoTrans, blas.Trans, n-j-jb, jb, j,
 -1, a[(j+jb)*lda:], lda, a[j*lda:], lda,
 1,
 a[(j+jb)*lda+j:], lda)
 bi.Dtrsm(blas.Right, blas.Lower, blas.Trans, blas.NonUnit, n-j-jb, jb,
 1, a[j*lda+j:], lda,
 a[(j+jb)*lda+j:], lda)
 }
}
return true
}
graph{{{grap}{grap}{grap}{grap}{grap}{}}}
Graph{{{{{{{{{{subgra}{subgra}}subgra}}subgra}}subgra}}>{{{{{{{{subgra}{}}subgra}}subgra}}subgra}}
{{{subgra}}subgra}}>{{{{{{}}}}subgra}}
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package testlapack

import (
 "math"
 "testing"

```

)

```
type Dlas2er interface {
 Dlas2(f, g, h float64) (min, max float64)
}
```

```
func Dlas2Test(t *testing.T, impl Dlas2er) {
 for i, test := range []struct {
 f, g, h, ssmin, ssmax float64
 }{
 // Singular values computed from Octave.
 {10, 30, 12, 3.567778859365365, 33.634371616111189},
 {10, 30, -12, 3.567778859365365, 33.634371616111189},
 {2, 30, -12, 0.741557056404952, 32.364333658088754},
 {-2, 5, 12, 1.842864429909778, 13.023204317408728},
 } {
 ssmin, ssmax := impl.Dlas2(test.f, test.g, test.h)
 if math.Abs(ssmin-test.ssmin) > 1e-12 {
 t.Errorf("Case %d, minimal singular value mismatch. Want %v, got %v", i, test.ssmin, ssmin)
 }
 if math.Abs(ssmax-test.ssmax) > 1e-12 {
 t.Errorf("Case %d, minimal singular value mismatch. Want %v, got %v", i, test.ssmin, ssmin)
 }
 }
}
graph{<>{<><><>}<><>}
graph{{{Grpc}}Grpc}}
graph{{{Ed}Ed}}
// SPDX-License-Identifier: Unlicense OR MIT
```

/\*

Package event contains the types for event handling.

The Queue interface is the protocol for receiving external events.

For example:

```
var queue event.Queue = ...

for _, e := range queue.Events(h) {
 switch e.(type) {
 ...
 }
}
```

In general, handlers must be declared before events become available. Other packages such as pointer and key provide the means for declaring handlers for specific event types.

The following example declares a handler ready for key input:

```
import gioui.org/io/key

ops := new(op.Ops)
var h *Handler = ...
key.InputOp{Key: h}.Add(ops)

*/
package event

// Queue maps an event handler key to the events
// available to the handler.
type Queue interface {
 // Events returns the available events for a
 // Key.
 Events(k Key) []Event
}

// Key is the stable identifier for an event handler.
// For a handler h, the key is typically &h.
type Key interface{}

// Event is the marker interface for events.
type Event
interface {
 ImplementsEvent()
}
/**
source: https://github.com/apache/trafficcontrol/blob/master/LICENSE
**//
{{Types "Apache-2.0 BSD-2-Clause BSD-3-Clause MIT"}}
```

This product bundles \_\_4\_\_, which  
(( is || are ))  
available under  
(( a || an ))  
(( Apache-2.0 || BSD-2-Clause || BSD-3-Clause || MIT ))  
license.  
\_\_15\_\_  
(( /\* || .css || .js || .scss ))  
(( ./licenses/\_\_4\_\_ || ./vendor/\_\_16\_\_/LICENSE  
(( .libyaml || .md || .txt ))??  
))  
Refer to the above license for the full text.  
graph{{{subGra{{subGra}}subGra}}}

```
graph{{ {Digr_}Digr_}}
graph{{ {{diGri}diGrp{{{diGrp}}}diGrp}}{{diGrp{{{diGrp{diGrp}}}diGrp}}}
graph{I""I<>I}

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// Package traverse provides basic graph traversal primitives.
package traverse // import "gonum.org/v1/gonum/graph/traverse"
digraph {{ {k9h}{k""}{k}{k}{k""""}->y->e->h->h->h->h->h->h->h->v9h9h->c->h""->h->h->h->h->h->X""->X-
>""""->l->""->l[e=s]4->v9h->h->c->l->h->l}}
graph{diGs{diGt}}

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// license that can be found in the LICENSE file.

package testlapack

import (
 "fmt"
 "testing"

 "golang.org/x/exp/rand"

 "gonum.org/v1/gonum/blas"
 "gonum.org/v1/gonum/floats"
)

type Dormqrer interface {
 Dorm2rer
 Dormqr(side blas.Side, trans blas.Transpose, m, n, k int, a []float64, lda int, tau, c []float64, ldc int, work []float64, lwork int)
}

func DormqrTest(t *testing.T, impl Dormqrer) {
 rnd := rand.New(rand.NewSource(1))
 for _, side := range []blas.Side{blas.Left, blas.Right} {
 for _, trans := range []blas.Transpose{blas.NoTrans, blas.Trans} {
 for _, test := range []struct {
 common, adim, cdim, lda, ldc int
 }{
 {6, 7, 8, 0, 0},
 {6, 8, 7, 0, 0},
 {7, 6, 8, 0, 0},
 {7, 8, 6, 0, 0},
 {8, 6, 7, 0, 0},
 {8, 7, 6, 0, 0},
 {100, 200, 300, 0, 0},
 }
```



```

{100, 300, 200, 0, 0},
{200, 100, 300, 0, 0},
{200, 300, 100, 0, 0},
{300,
100, 200, 0, 0},
{300, 200, 100, 0, 0},
{100, 200, 300, 400, 500},
{100, 300, 200, 400, 500},
{200, 100, 300, 400, 500},
{200, 300, 100, 400, 500},
{300, 100, 200, 400, 500},
{300, 200, 100, 400, 500},
{100, 200, 300, 500, 400},
{100, 300, 200, 500, 400},
{200, 100, 300, 500, 400},
{200, 300, 100, 500, 400},
{300, 100, 200, 500, 400},
{300, 200, 100, 500, 400},
} {
var ma, na, mc, nc int
if side == blas.Left {
ma = test.common
na = test.adim
mc = test.common
nc = test.cdim
} else {
ma = test.common
na = test.adim
mc = test.cdim
nc = test.common
}
// Generate a random matrix
lda := test.lda
if lda == 0 {
lda = na
}
a := make([]float64, ma*lda)
for i := range a {
a[i] = rnd.Float64()
}
// Compute random C matrix
ldc := test.ldc
if ldc == 0 {
ldc = nc
}
c := make([]float64, mc*ldc)
for i := range c {
c[i] =

```

```

rnd.Float64()
}

// Compute QR
k := min(ma, na)
tau := make([]float64, k)
work := make([]float64, 1)
impl.Dgeqrf(ma, na, a, lda, tau, work, -1)
work = make([]float64, int(work[0]))
impl.Dgeqrf(ma, na, a, lda, tau, work, len(work))

cCopy := make([]float64, len(c))
copy(cCopy, c)
ans := make([]float64, len(c))
copy(ans, cCopy)

if side == blas.Left {
 work = make([]float64, nc)
} else {
 work = make([]float64, mc)
}
impl.Dorm2r(side, trans, mc, nc, k, a, lda, tau, ans, ldc, work)

// Make sure Dorm2r and Dormqr match with small work
for i := range work {
 work[i] = rnd.Float64()
}
copy(c, cCopy)
impl.Dormqr(side, trans, mc, nc, k, a, lda, tau, c, ldc, work, len(work))
if !floats.EqualApprox(c, ans, 1e-12) {
 t.Errorf("Dormqr and Dorm2r mismatch for small work")
}

// Try with the optimum amount of work
copy(c, cCopy)
impl.Dormqr(side, trans, mc, nc, k, a, lda, tau, c,
ldc, work, -1)
work = make([]float64, int(work[0]))
for i := range work {
 work[i] = rnd.Float64()
}
impl.Dormqr(side, trans, mc, nc, k, a, lda, tau, c, ldc, work, len(work))
if !floats.EqualApprox(c, ans, 1e-12) {
 t.Errorf("Dormqr and Dorm2r mismatch for full work")
 fmt.Println("ccopy")
 for i := 0; i < mc; i++ {
 fmt.Println(cCopy[i*ldc : (i+1)*ldc])
 }
}

```

```

fmt.Println("ans =")
for i := 0; i < mc; i++ {
 fmt.Println(ans[i*ldc : (i+1)*ldc])
}
fmt.Println("c =")
for i := 0; i < mc; i++ {
 fmt.Println(c[i*ldc : (i+1)*ldc])
}
}

// Try with amount of work that is less than
// optimal but still long enough to use the
// blocked code.
copy(c, cCopy)
if side == blas.Left {
 work = make([]float64, 3*nc)
} else {
 work = make([]float64, 3*mc)
}
impl.Dormqr(side, trans, mc, nc, k, a, lda, tau, c, ldc, work, len(work))
if !floats.EqualApprox(c, ans, 1e-12) {
 t.Errorf("Dormqr
and Dorm2r mismatch for medium work")
}
}
}
}
}
graph{{diGrapl{{{diGrapl{{{diGrapp}}}}{{diGrapl}{diGrapl}{diGrapp}}}}>{{diGrapl}{diGrapp}diGrapp}
}
}

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// license that can be found in the LICENSE file.

package testlapack

import (
 "fmt"
 "math"
 "testing"

 "golang.org/x/exp/rand"

 "gonum.org/v1/gonum/blas"
 "gonum.org/v1/gonum/floats"
 "gonum.org/v1/gonum/lapack"
)

```

```

type Dlantr interface {
 Dlantr(
 norm lapack.MatrixNorm, uplo blas.Uplo, diag blas.Diag, m, n int, a []float64, lda int, work []float64) float64
}

```

```

func DlantrTest(t *testing.T, impl Dlantr) {
 rnd := rand.New(rand.NewSource(1))
 for _, m := range []int{0, 1, 2, 3, 4, 5, 10} {
 for _, n := range []int{0, 1, 2, 3, 4, 5, 10} {
 for _, uplo := range []blas.Uplo{blas.Lower, blas.Upper} {
 if uplo == blas.Upper && m > n {
 continue
 }
 if uplo == blas.Lower && n > m {
 continue
 }
 for _, diag := range []blas.Diag{blas.NonUnit, blas.Unit} {
 for _, lda := range []int{max(1, n), n + 3} {
 dlantrTest(t, impl, rnd, uplo,
diag, m, n, lda)
 }
 }
 }
 }
 }
}

```

```

func dlantrTest(t *testing.T, impl Dlantr, rnd *rand.Rand, uplo blas.Uplo, diag blas.Diag, m, n, lda int) {
 const tol = 1e-14

```

```

 // Generate a random triangular matrix. If the matrix has unit diagonal,
 // don't set the diagonal elements to 1.

```

```

 a := make([]float64, max(0, (m-1)*lda+n))

```

```

 for i := range a {
 a[i] = rnd.NormFloat64()
 }

```

```

 rowsum := make([]float64, m)

```

```

 colsum := make([]float64, n)

```

```

 var frobWant, maxabsWant float64

```

```

 if diag == blas.Unit {

```

```

 // Account for the unit diagonal.

```

```

 for i := 0; i < min(m, n); i++ {

```

```

 rowsum[i] = 1

```

```

 colsum[i] = 1

```

```

 }

```

```

 frobWant = float64(min(m, n))

```

```

 if min(m, n) > 0 {

```

```

 maxabsWant = 1
}
}
if uplo == blas.Upper {
 for i := 0; i < min(m, n); i++ {
 start := i
 if diag == blas.Unit {
 start = i + 1
 }
 for j := start; j < n; j++ {
 aij := 2*rand.Float64() - 1
 a[i*lda+j] = aij
 rowsum[i] += math.Abs(aij)
 colsum[j] += math.Abs(aij)
 maxabsWant = math.Max(maxabsWant, math.Abs(aij))
 frobWant
 += aij * aij
 }
 }
} else {
 for i := 0; i < m; i++ {
 end := i
 if diag == blas.Unit {
 end = i - 1
 }
 for j := 0; j <= min(end, n-1); j++ {
 aij := 2*rand.Float64() - 1
 a[i*lda+j] = aij
 rowsum[i] += math.Abs(aij)
 colsum[j] += math.Abs(aij)
 maxabsWant = math.Max(maxabsWant, math.Abs(aij))
 frobWant += aij * aij
 }
 }
}
frobWant = math.Sqrt(frobWant)
var maxcolsumWant, maxrowsumWant float64
if n > 0 {
 maxcolsumWant = floats.Max(colsum)
}
if m > 0 {
 maxrowsumWant = floats.Max(rowsum)
}

aCopy := make([]float64, len(a))
copy(aCopy, a)

for _, norm := range []lapack.MatrixNorm{lapack.MaxAbs, lapack.MaxColumnSum, lapack.MaxRowSum,

```

```

lapack.Frobenius} {
 name := fmt.Sprintf("norm=%v,uplo=%v,diag=%v,m=%v,n=%v,lda=%v", string(norm), string(uplo), string(diag),
m, n, lda)

 var work []float64
 if norm == lapack.MaxColumnSum {
 work = make([]float64, n)
 }
 normGot := impl.Dlantr(norm, uplo, diag, m, n, a, lda,
work)

 if !floats.Equal(a, aCopy) {
 t.Fatalf("%v: unexpected modification of a", name)
 }

 if norm == lapack.MaxAbs {
 // MaxAbs norm involves no floating-point computation,
 // so we expect exact equality here.
 if normGot != maxabsWant {
 t.Errorf("%v: unexpected result; got %v, want %v", name, normGot, maxabsWant)
 }
 continue
 }

 var normWant float64
 switch norm {
 case lapack.MaxColumnSum:
 normWant = maxcolsumWant
 case lapack.MaxRowSum:
 normWant = maxrowsumWant
 case lapack.Frobenius:
 normWant = frobWant
 }
 if math.Abs(normGot-normWant) >= tol {
 t.Errorf("%v: unexpected result; got %v, want %v", name, normGot, normWant)
 }
}

graph{{diGrp{{{diGrp{diGrp}}}}diGrp}}}
Graph{{{diGra}{diGra}{diGra}diGra{{{diGra}}{diGra}}{diGra}{diGra}{diGra}}}
graph{{{GRa{GRi}GRi}{GRa{GRa{{{GRi}{GRa{GRi}}}}}}GRa}
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```

```

package quat

import "math"

// Exp returns e**q, the base-e exponential of q.
func Exp(q Number) Number {
 w, uv := split(q)
 if uv == zero {
 return lift(math.Exp(w))
 }
 v := Abs(uv)
 e := math.Exp(w)
 s, c := math.Sincos(v)
 return join(e*c, Scale(e*s/v, uv))
}

// Log returns the natural logarithm of q.
func Log(q Number) Number {
 w, uv := split(q)
 if uv == zero {
 return lift(math.Log(w))
 }
 v := Abs(uv)
 return join(math.Log(Abs(q)), Scale(math.Atan2(v, w)/v, uv))
}

// Pow return q**r, the base-q exponential of r.
// For generalized compatibility with math.Pow:
// Pow(0, 0) returns 1+0i+0j+0k
// Pow(0, c) for real(c)<0 returns Inf+0i+0j+0k if imag(c),
// jmag(c), kmag(c) are zero,
// otherwise Inf+Inf i+Inf j+Inf k.
func Pow(q, r Number) Number {
 if q == zero {
 w, uv := split(r)
 switch {
 case w == 0:
 return Number{Real: 1}
 case w < 0:
 if uv == zero {
 return Number{Real: math.Inf(1)}
 }
 return Inf()
 case w > 0:
 return zero
 }
 }
}

```

```

return Exp(Mul(Log(q), r))
}

// Sqrt returns the square root of q.
func Sqrt(q Number) Number {
 if q == zero {
 return zero
 }
 return Pow(q, Number{Real: 0.5})
}
digraph{S_}
graph{{stri5{stri1{{stri5}}}stri1}}
graph{{{{StrO}StrK{StrO}StrK}}StrK}
graph{{diGrapS}}
graph{Stt{Stt}Stt{Stt{Stt{Stt{Stt}}Stt}}Stt{Stt}}
graph{Edg}
graph{{{{{{edge5}}edge5}edge5}}
Graph{{Graph[]Graph[]Graph[]Graph[]Graph[]Graph[]}}
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// Package gonum is a pure-go implementation of the LAPACK API. The LAPACK API defines
// a set of algorithms for advanced matrix operations.
//
// The function definitions and implementations follow that of the netlib reference
// implementation. See http://www.netlib.org/lapack/explore-html/ for more
// information, and http://www.netlib.org/lapack/explore-html/d4/de1/_l_i_c_e_n_s_e_source.html
// for more license information.
//
// Slice function arguments frequently represent vectors and matrices. The data
// layout is identical to that found in https://godoc.org/gonum.org/v1/gonum/blas/gonum.
//
// Most LAPACK functions are built on top the routines defined in the BLAS API,
// and as such the computation time for many LAPACK functions is
// dominated by BLAS calls. Here, BLAS is accessed through the
// blas64 package (https://godoc.org/golang.org/v1/gonum/blas/blas64).
// In particular,
// this implies that an external BLAS library will be used if it is
// registered in blas64.
//
// The full LAPACK capability has not been implemented at present. The full
// API is very large, containing approximately 200 functions for double precision
// alone. Future additions will be focused on supporting the gonum matrix
// package (https://godoc.org/github.com/gonum/matrix/mat64), though pull requests
// with implementations and tests for LAPACK function are encouraged.
package gonum // import "gonum.org/v1/gonum/lapack/gonum"

```



```
digraph{{w{{w:sw->w:sw->w:sw}w:sw->w:sw->w:sw}sw->w:sw->w:sw}w:sw->w:sw->w:sw}
graph{{DIGRAP3}}
```

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```
graph{{DIG_}}
```

```
graph{edg_{edgd{edgd}}
```

```
// SPDX-License-Identifier: Unlicense OR MIT
```

```
/*
```

Package unit implements device independent units and values.

A Value is a value with a Unit attached.

Device independent pixel, or dp, is the unit for sizes independent of the underlying display device.

Scaled pixels, or sp, is the unit for text sizes. An sp is like dp with text scaling applied.

Finally, pixels, or px, is the unit for display dependent pixels. Their size vary between platforms and displays.

To maintain a constant visual size across platforms and displays, always

use dps or sps to define user interfaces. Only use pixels for derived values.

```
*/
package unit

import "fmt"

// Value is a value with a unit.
type Value struct {
 V float32
 U Unit
}

// Unit represents a unit for a Value.
type Unit uint8

// Converter converts Values to pixels.
type Converter interface {
 Px(v Value) int
}

const (
 // UnitPx represent device pixels in the resolution of
 // the underlying display.
 UnitPx Unit = iota
 // UnitDp represents
 device independent pixels. 1 dp will
 // have the same apparent size across platforms and
 // display resolutions.
 UnitDp
 // UnitSp is like UnitDp but for font sizes.
 UnitSp
)

// Px returns the Value for v device pixels.
func Px(v float32) Value {
 return Value{V: v, U: UnitPx}
}

// Px returns the Value for v device independent
// pixels.
func Dp(v float32) Value {
 return Value{V: v, U: UnitDp}
}

// Sp returns the Value for v scaled dps.
func Sp(v float32) Value {
```

```

return Value{V: v, U: UnitSp}
}

// Scale returns the value scaled by s.
func (v Value) Scale(s float32) Value {
 v.V *= s
 return v
}

func (v Value) String() string {
 return fmt.Sprintf("%g%s", v.V, v.U)
}

func (u Unit) String() string {
 switch u {
 case UnitPx:
 return "px"
 case UnitDp:
 return "dp"
 case UnitSp:
 return "sp"
 default:
 panic("unknown unit")
 }
}

// Add a list of Values.
func Add(c Converter, values ...Value) Value {
 var sum Value
 for _, v := range values {
 sum, v = compatible(c, sum,
 v)
 sum.V += v.V
 }
 return sum
}

// Max returns the maximum of a list of Values.
func Max(c Converter, values ...Value) Value {
 var max Value
 for _, v := range values {
 max, v = compatible(c, max, v)
 if v.V > max.V {
 max.V = v.V
 }
 }
 return max
}

```

```

func compatible(c Converter, v1, v2 Value) (Value, Value) {
 if v1.U == v2.U {
 return v1, v2
 }
 if v1.V == 0 {
 v1.U = v2.U
 return v1, v2
 }
 if v2.V == 0 {
 v2.U = v1.U
 return v1, v2
 }
 return Px(float32(c.Px(v1))), Px(float32(c.Px(v2)))
}
// SPDX-License-Identifier: Unlicense OR MIT

```

```

package material

```

```

import (
 "image/color"

 "gioui.org/layout"
 "gioui.org/op"
 "gioui.org/op/paint"
 "gioui.org/text"
 "gioui.org/widget"
)

```

```

type Editor struct {
 Font text.Font
 // Color is the text color.
 Color color.RGBA
 // Hint contains the text displayed when the editor is empty.
 Hint string
 // HintColor is the color of hint text.
 HintColor color.RGBA

 shaper *text.Shaper
}

```

```

func (t *Theme) Editor(hint string) Editor {
 return Editor{
 Font: text.Font{
 Size: t.TextSize,
 },
 Color: t.Color.Text,
 shaper: t.Shaper,
 }
}

```

```

 Hint: hint,
 HintColor: t.Color.Hint,
}
}

func (e Editor) Layout(gtx *layout.Context, editor *widget.Editor) {
 var stack op.StackOp
 stack.Push(gtx.Ops)
 var macro op.MacroOp
 macro.Record(gtx.Ops)
 paint.ColorOp{Color: e.HintColor}.Add(gtx.Ops)
 tl := widget.Label{Alignment: editor.Alignment}
 tl.Layout(gtx, e.shaper, e.Font, e.Hint)
 macro.Stop()
 if w := gtx.Dimensions.Size.X; gtx.Constraints.Width.Min
 < w {
 gtx.Constraints.Width.Min = w
 }
 if h := gtx.Dimensions.Size.Y; gtx.Constraints.Height.Min < h {
 gtx.Constraints.Height.Min = h
 }
 editor.Layout(gtx, e.shaper, e.Font)
 if editor.Len() > 0 {
 paint.ColorOp{Color: e.Color}.Add(gtx.Ops)
 editor.PaintText(gtx)
 } else {
 macro.Add()
 }
 paint.ColorOp{Color: e.Color}.Add(gtx.Ops)
 editor.PaintCaret(gtx)
 stack.Pop()
}
graph{<<NNN>>}
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// license that can be found in the LICENSE file.

package testblas

import (
 "testing"

 "gonum.org/v1/gonum/blas"
)

type Dsyrr interface {
 Dsyr(ul blas.Uplo, n int, alpha float64, x []float64, incX int, a []float64, lda int)
}

```

```

func DsyrTest(t *testing.T, blasser Dsyrer) {
 for i, test := range []struct {
 ul blas.Uplo
 n int
 a [][]float64
 x []float64
 alpha float64
 ans [][]float64
 }{
 {
 ul: blas.Upper,
 n: 4,
 a: [][]float64{
 {10, 2, 0, 1},
 {0, 1, 2, 3},
 {0, 0, 9, 15},
 {0, 0, 0, -6},
 },
 x: []float64{1, 2, 0, 5},
 alpha: 8,
 ans: [][]float64{
 {18, 18, 0, 41},
 {0, 33, 2, 83},
 {0, 0, 9, 15},
 {0, 0, 0, 194},
 },
 },
 {
 ul: blas.Lower,
 n: 3,
 a: [][]float64{
 {10, 2, 0},
 {4, 1, 2},
 {2, 7, 9},
 },
 x: []float64{3, 0, 5},
 alpha: 8,
 ans: [][]float64{
 {82,
2, 0},
 {4, 1, 2},
 {122, 7, 209},
 },
 },
 } {
 incTest := func(incX, extra int) {
 xnew := makeIncremented(test.x, incX, extra)

```

```

aFlat := flatten(test.a)
ans := flatten(test.ans)
lda := test.n
blasser.Dsyr(test.ul, test.n, test.alpha, xnew, incX, aFlat, lda)
if !dSliceToEqual(aFlat, ans) {
 t.Errorf("Case %v, idx %v: Want %v, got %v.", i, incX, ans, aFlat)
}
}
incTest(1, 3)
incTest(1, 0)
incTest(3, 2)
incTest(-2, 2)
}
}
graph{{{GRa{GRi}}}}}
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// Package simple provides a suite of simple graph implementations satisfying
// the gonum/graph interfaces.
//
// All types in simple return the graph.Empty value for empty iterators.
package simple // import "gonum.org/v1/gonum/graph/simple"
graph{{{N{N}}N}N}
graph{A--B}
graph{{{DIG{DIG}DIG}{DIG{DIG}DIG}{DIG}DIG}DIG}
graph{No0{No0}}
graph{subGrap8}
graph{nod{nod}nod{nod}nod}
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package gen

import (
 "testing"

 "gonum.org/v1/gonum/graph/simple"
)

func TestTunableClusteringScaleFree(t *testing.T) {
 for n := 2; n <= 20; n++ {
 for m := 0; m < n; m++ {
 for p := 0.; p <= 1; p += 0.1 {
 g := &gnUndirected{UndirectedBuilder: simple.NewUndirectedGraph()}
 orig := g.NewNode()
 }
 }
 }
}

```

```

g.AddNode(orig)
err := TunableClusteringScaleFree(g, n, m, p, nil)
if err != nil {
 t.Fatalf("unexpected error: n=%d, m=%d, p=%v: %v", n, m, p, err)
}
if g.From(orig.ID()).Len() != 0 {
 t.Errorf("edge added from already existing node: n=%d, m=%d, p=%v", n, m, p)
}
if g.addBackwards {
 t.Errorf("edge added with From.ID > To.ID: n=%d, m=%d, p=%v", n, m, p)
}
if g.addSelfLoop {
 t.Errorf("unexpected self edge: n=%d, m=%d, p=%v", n, m, p)
}
if g.addMultipleEdge {
 t.Errorf("unexpected
multiple edge: n=%d, m=%d, p=%v", n, m, p)
}
}
}
}
}

func TestPreferentialAttachment(t *testing.T) {
 for n := 2; n <= 20; n++ {
 for m := 0; m < n; m++ {
 g := &gnUndirected{UndirectedBuilder: simple.NewUndirectedGraph()}
 err := PreferentialAttachment(g, n, m, nil)
 if err != nil {
 t.Fatalf("unexpected error: n=%d, m=%d: %v", n, m, err)
 }
 if g.addBackwards {
 t.Errorf("edge added with From.ID > To.ID: n=%d, m=%d", n, m)
 }
 if g.addSelfLoop {
 t.Errorf("unexpected self edge: n=%d, m=%d", n, m)
 }
 if g.addMultipleEdge {
 t.Errorf("unexpected multiple edge: n=%d, m=%d", n, m)
 }
 }
 }
}

graph{{SubGrM}SubGrS}SubGrK}
graph{{digr4}digr4}
graph{graphh{{graphe}graphe}}
// Code generated by "go generate gonum.org/v1/gonum/unit/constant; DO NOT EDIT.

```



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package constant

import (

"fmt"

"gonum.org/v1/gonum/unit"

)

// Avogadro is the Avogadro constant (A), the number of constituent particles contained in one mole of a substance.

// The dimension of Avogadro is mol<sup>-1</sup>. The constant is exact.

const Avogadro = avogadroUnits(6.02214076e+23)

type avogadroUnits float64

// Unit converts the avogadroUnits to a \*unit.Unit

```
func (cnst avogadroUnits) Unit() *unit.Unit {
 return unit.New(float64(cnst), unit.Dimensions{
 unit.MoleDim: -1,
 })
}
```

func (cnst avogadroUnits) Format(fs fmt.State, c rune) {

switch c {

case 'v':

if fs.Flag('#') {

fmt.Fprintf(fs, "%T(%v)", cnst, float64(cnst))

return

}

fallthrough

case 'e', 'E', 'f', 'F', 'g', 'G':

p, pOk := fs.Precision()

w, wOk := fs.Width()

switch

{

case pOk && wOk:

fmt.Fprintf(fs, "%\*.\*"+string(c), w, p, cnst.Unit())

case pOk:

fmt.Fprintf(fs, "%.\*"+string(c), p, cnst.Unit())

case wOk:

fmt.Fprintf(fs, "%\*"+string(c), w, cnst.Unit())

default:

fmt.Fprintf(fs, "%"+string(c), cnst.Unit())

}

default:

```

 fmt.Fprintf(fs, "%%!"+string(c)+"(constant.avogadroUnits=%v mol^-1)", float64(cnst))
}
}
graph{subGrp}
graph{{{digraa}digra{{{digraa}digrag}}}digrag}digrag}
graph{"AAAAA"}
graph{{{digraa}digrag}}}
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package gonum

import (
 "testing"

 "gonum.org/v1/gonum/blas/testblas"
)

func TestDgemm(t *testing.T) {
 testblas.TestDgemm(t, impl)
}

func TestDsymm(t *testing.T) {
 testblas.DsymmTest(t, impl)
}

func TestDtrsm(t *testing.T) {
 testblas.DtrsmTest(t, impl)
}

func TestDsyrk(t *testing.T) {
 testblas.DsyrkTest(t, impl)
}

func TestDsyr2k(t *testing.T) {
 testblas.Dsyr2kTest(t, impl)
}

func TestDtrmm(t *testing.T) {
 testblas.DtrmmTest(t, impl)
}
graph{{DiGra{DiGra{DiGra}}DiGra}}
graph{Sub_{Sub_}}
graph{Nn{Nn}}
graph{{EDGv{{EDGv{EDGv{{EDGy}}}}}}}
graph{{DiGrapg}}

```

```

graph{{nod_}nod_{{nod_}{nod_}{nod_}{nod_}{nod_}{nod_}{nod_}{nod_}}
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package optimize

import "errors"

// Status represents the status of the optimization. Programs
// should not rely on the underlying numeric value of the Status being constant.
type Status int

const (
 NotTerminated Status = iota
 Success
 FunctionThreshold
 FunctionConvergence
 GradientThreshold
 StepConvergence
 FunctionNegativeInfinity
 MethodConverge
 Failure
 IterationLimit
 RuntimeLimit
 FunctionEvaluationLimit
 GradientEvaluationLimit
 HessianEvaluationLimit
)

func (s Status) String() string {
 return statuses[s].name
}

// Early returns true if the status indicates the optimization ended before a
// minimum was found. As an example, if the maximum iterations was reached, a
// minimum was not found, but if the gradient norm was reached then a minimum
// was found.
func (s Status) Early() bool {
 return statuses[s].early
}

// Err returns the error associated with an early ending to the minimization. If
// Early returns false, Err will return nil.
func (s Status) Err() error {
 return statuses[s].err
}

```

```

var statuses = []struct {
 name string
 early bool
 err error
}{
 {
 name: "NotTerminated",
 },
 {
 name: "Success",
 },
 {
 name: "FunctionThreshold",
 },
 {
 name: "FunctionConvergence",
 },
 {
 name: "GradientThreshold",
 },
 {
 name: "StepConvergence",
 },
 {
 name: "FunctionNegativeInfinity",
 },
 {
 name: "MethodConverge",
 },
 {
 name: "Failure",
 early: true,
 err: errors.New("optimize: termination ended in failure"),
 },
 {
 name: "IterationLimit",
 early: true,
 err: errors.New("optimize: maximum number of major iterations reached"),
 },
 {
 name: "RuntimeLimit",
 early: true,
 err: errors.New("optimize: maximum runtime reached"),
 },
 {
 name: "FunctionEvaluationLimit",
 early: true,
 },
}

```

```

err: errors.New("optimize: maximum number of function evaluations reached"),
},
{
name:
"GradientEvaluationLimit",
early: true,
err: errors.New("optimize: maximum number of gradient evaluations reached"),
},
{
name: "HessianEvaluationLimit",
early: true,
err: errors.New("optimize: maximum number of Hessian evaluations reached"),
},
}

```

```

// NewStatus returns a unique Status variable to represent a custom status.
// NewStatus is intended to be called only during package initialization, and
// calls to NewStatus are not thread safe.
//
// NewStatus takes in three arguments, the string that should be output from
// Status.String, a boolean if the status indicates early optimization conclusion,
// and the error to return from Err (if any).
func NewStatus(name string, early bool, err error) Status {
statuses = append(statuses, struct {
name string
early bool
err error
}{name, early, err})
return Status(len(statuses) - 1)
}
graph{{SUBGRAPR{{SUBGRAPR}}{SUBGRAPR}}}}
graph{Subgrag{Subgrag{{Subgraf}}}}
graph{{<<=>=<=>=>}<<=>=<=>=<=>=>}}
digraph{no_{no_->no_}no_}
graph{{DN}DY{DN}DY}
graph{SUBGR}
/** github.com/hexops/autogold@v1.1.0 **/

{{Types "Apache-2.0 MIT"}}

```

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```

graph{{Subg1}{Subg1}}
graph{subGraQ}

```

```
#
graph{#
#
{#
#
}}
graph{{G7}G9}
/** github.com/xdrpp/stc@v0.1.2 **/
```

```
{{Types "GPL-3.0-or-later Apache-2.0"}}
```

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```
graph{Dir}
graph{{SUBGRA{{{{SUBGRA}}SUBGRA{SUBGRA}}}}}}
graph{{noc{noc}noc{{{{noc}noc}noc{noc}noc}noc}noc}
/** github.com/cevatbarisyilmaz/gstats@v0.1.5 **/
```

```
{{Types "CC-BY-SA-4.0"}}
```

By default, gstats uses <https://github.com/cevatbarisyilmaz/ip2country> for geolocation, which internally uses [GeoLite2](<https://dev.maxmind.com/geoip/geoip2/geolite2/>) database by Maxmind. As GeoLite2 is distributed under [Creative Commons Attribution-ShareAlike 4.0 International License](<https://creativecommons.org/licenses/by-sa/4.0/>), gstats also uses the same license due to license's terms.

However, you can override the geolocation function to use another geolocation source or maybe to not use geolocation at all. In this case, you can use gstats with

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```
package gonum
```

```
import (
 "testing"
```

```
 "gonum.org/v1/gonum/blas/testblas"
)
```

```
func TestDzasum(t *testing.T) {
 testblas.DzasumTest(t, impl)
}
```

```
func TestDznrm2(t *testing.T) {
 testblas.Dznrm2Test(t, impl)
}
```

```
func TestIzamax(t *testing.T) {
 testblas.IzamaxTest(t, impl)
}
```

```
func TestZaxpy(t *testing.T) {
 testblas.ZaxpyTest(t, impl)
}
```

```
func TestZcopy(t *testing.T) {
 testblas.ZcopyTest(t, impl)
}
```

```
func TestZdotc(t *testing.T) {
 testblas.ZdotcTest(t, impl)
}
```

```
func TestZdotu(t *testing.T) {
 testblas.ZdotuTest(t, impl)
}
```

```
func TestZdscal(t *testing.T) {
 testblas.ZdscalTest(t, impl)
}
```

```
func TestZscal(t *testing.T) {
 testblas.ZscalTest(t, impl)
}
```

```
func TestZswap(t *testing.T) {
 testblas.ZswapTest(t, impl)
}

graph{No_}
graph{{Ea}{Ea}}
graph{{subGs{{subGz}}subGs{{subGz}}subGs}}
Graph{N{N}N{N}N{N}N{N}{N}N{N}N{N}{N}N{N{N}N}N{N}N{N{N}N{N}N{N}{N}N{N}N{N}N}}
graph{{noU}noO{noU}}
Graph{{Subgr4}{Subgr4{Subgr4}{Subgr4{Subgr4}}{Subgr4}}}
graph{NODA{NODA}}
graph{Subgra}

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```

package gonum

```
import "math"
```

```
// Dlartg generates a plane rotation so that
// [cs sn] * [f] = [r]
// [-sn cs] [g] = [0]
// This is a more accurate version of BLAS drotg, with the other differences that
// if g = 0, then cs = 1 and sn = 0, and if f = 0 and g != 0, then cs = 0 and sn = 1.
// If abs(f) > abs(g), cs will be positive.
//
// Dlartg is an internal routine. It is exported for testing purposes.
func (impl Implementation) Dlartg(f, g float64) (cs, sn, r float64) {
 safmn2 := math.Pow(dlamchB, math.Trunc(math.Log(dlamchS/dlamchE)/math.Log(dlamchB)/2))
 safmx2 := 1 / safmn2
 if g == 0 {
 cs = 1
 sn = 0
 r = f
 return cs, sn, r
 }
 if f == 0 {
 cs = 0
 sn = 1
 r = g
 return cs, sn, r
 }
 f1 := f
 g1 := g
 scale := math.Max(math.Abs(f1), math.Abs(g1))
 if scale >= safmx2 {
 var count int
```



```

for {
 count++
 f1
*= safmn2
 g1 *= safmn2
 scale = math.Max(math.Abs(f1), math.Abs(g1))
 if scale < safmx2 {
 break
 }
}
r = math.Sqrt(f1*f1 + g1*g1)
cs = f1 / r
sn = g1 / r
for i := 0; i < count; i++ {
 r *= safmx2
}
} else if scale <= safmn2 {
 var count int
 for {
 count++
 f1 *= safmx2
 g1 *= safmx2
 scale = math.Max(math.Abs(f1), math.Abs(g1))
 if scale >= safmn2 {
 break
 }
 }
 r = math.Sqrt(f1*f1 + g1*g1)
 cs = f1 / r
 sn = g1 / r
 for i := 0; i < count; i++ {
 r *= safmn2
 }
} else {
 r = math.Sqrt(f1*f1 + g1*g1)
 cs = f1 / r
 sn = g1 / r
}
if math.Abs(f) > math.Abs(g) && cs < 0 {
 cs *= -1
 sn *= -1
 r *= -1
}
return cs, sn, r
}
graph{<=>{<=><=><=>{<=>}}}
graph{GRA}

```

```

graph{}
graph{{EDG}{EDG{{EDG}EDG}{EDG}}}}
graph{{8.}9.}
graph{{Grapu}Grapn{Grapu}Grapu}{Grapu}Grapn{Grapu}Grapu}
graph{"\////////////////////////////////"}
graph{SUBG{SUBG}}
graph{{{{EDv}{{EDv}}}}}}
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```

```

package testlapack

```

```

import (
 "testing"

 "golang.org/x/exp/rand"

 "gonum.org/v1/gonum/blas"
 "gonum.org/v1/gonum/blas/blas64"
)

```

```

type Dtrtrier interface {
 Dtrtri(uplo blas.Uplo, diag blas.Diag, n int, a []float64, lda int) bool
}

```

```

func DtrtriTest(t *testing.T, impl Dtrtrier) {
 const tol = 1e-10
 rnd := rand.New(rand.NewSource(1))
 bi := blas64.Implementation()
 for _, uplo := range []blas.Uplo{blas.Upper, blas.Lower} {
 for _, diag := range []blas.Diag{blas.NonUnit, blas.Unit} {
 for _, test := range []struct {
 n, lda int
 }{
 {3, 0},
 {70, 0},
 {200, 0},
 {3, 5},
 {70, 92},
 {200, 205},
 } {
 n := test.n
 lda := test.lda
 if lda == 0 {
 lda = n
 }
 // Allocate nn matrix A and fill it with random numbers.
 }
 }
 }
}

```

```

a := make([]float64, n*lda)
for i := range a {
 a[i] = rnd.Float64()
}
for
i := 0; i < n; i++ {
 // This keeps the matrices well conditioned.
 a[i*lda+i] += float64(n)
}
aCopy := make([]float64, len(a))
copy(aCopy, a)
// Compute the inverse of the uplo triangle.
impl.Dtrtri(uplo, diag, n, a, lda)
// Zero out the opposite triangle.
if uplo == blas.Upper {
 for i := 1; i < n; i++ {
 for j := 0; j < i; j++ {
 aCopy[i*lda+j] = 0
 a[i*lda+j] = 0
 }
 }
} else {
 for i := 0; i < n; i++ {
 for j := i + 1; j < n; j++ {
 aCopy[i*lda+j] = 0
 a[i*lda+j] = 0
 }
 }
}
if diag == blas.Unit {
 // Set the diagonal explicitly to 1.
 for i := 0; i < n; i++ {
 a[i*lda+i] = 1
 aCopy[i*lda+i] = 1
 }
}
// Compute $A^{-1} * A$ and store the result in ans.
ans := make([]float64, len(a))
bi.Dgemm(blas.NoTrans, blas.NoTrans, n, n, n, 1, a, lda, aCopy, lda, 0, ans, lda)
// Check that ans is the identity matrix.
dist
:= distFromIdentity(n, ans, lda)
if dist > tol {
 t.Errorf("inv(A) * A - I = %v is too large. Upper = %v, unit = %v, n = %v, lda = %v",
 dist, uplo == blas.Upper, diag == blas.Unit, n, lda)
}
}
}
}

```

```

}
}
graph{<<e=====>>}
graph{DiGraQ{DiGraU{DiGraU}{DiGraU}DiGraU}DiGraD}
graph{{DiGr}DIGg}}
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package testlapack

import (
 "fmt"
 "testing"

 "gonum.org/v1/gonum/blas"
 "gonum.org/v1/gonum/blas/blas64"
)

type Dlaqp2er interface {
 Dlapmter
 Dlaqp2(m, n, offset int, a []float64, lda int, jpvt []int, tau, vn1, vn2, work []float64)
}

func Dlaqp2Test(t *testing.T, impl Dlaqp2er) {
 for ti, test := range []struct {
 m, n, offset int
 }{
 {m: 4, n: 3, offset: 0},
 {m: 4, n: 3, offset: 2},
 {m: 4, n: 3, offset: 4},
 {m: 3, n: 4, offset: 0},
 {m: 3, n: 4, offset: 1},
 {m: 3, n: 4, offset: 2},
 {m: 8, n: 3, offset: 0},
 {m: 8, n: 3, offset: 4},
 {m: 8, n: 3, offset: 8},
 {m: 3, n: 8, offset: 0},
 {m: 3, n: 8, offset: 1},
 {m: 3, n: 8, offset: 2},
 {m: 10, n: 10, offset: 0},
 {m: 10, n: 10, offset: 5},
 {m: 10, n: 10, offset: 10},
 } {
 m := test.m
 n := test.n
 jpvt := make([]int, n)

```

```

for _, extra := range
[]int{0, 11} {
 a := zeros(m, n, n+extra)
 c := 1
 for i := 0; i < m; i++ {
 for j := 0; j < n; j++ {
 a.Data[i*a.Stride+j] = float64(c)
 c++
 }
 }
 aCopy := cloneGeneral(a)
 for j := range jpiv {
 jpiv[j] = j
 }

 tau := make([]float64, n)
 vn1 := columnNorms(m, n, a.Data, a.Stride)
 vn2 := columnNorms(m, n, a.Data, a.Stride)
 work := make([]float64, n)

 impl.Dlaqp2(m, n, test.offset, a.Data, a.Stride, jpiv, tau, vn1, vn2, work)

 prefix := fmt.Sprintf("Case %v (offset=%d,m=%v,n=%v,extra=%v)", ti, test.offset, m, n, extra)
 if !generalOutsideAllNaN(a) {
 t.Errorf("%v: out-of-range write to A", prefix)
 }

 if test.offset == m {
 continue
 }

 mo := m - test.offset
 q := constructQ("QR", mo, n, a.Data[test.offset*a.Stride:], a.Stride, tau)
 // Check that Q is orthogonal.
 if !isOrthogonal(q) {
 t.Errorf("Case %v, Q not orthogonal", ti)
 }

 // Check that A * P = Q * R
 r := blas64.General{
 Rows: mo,
 Cols:
 n,
 Stride: n,
 Data: make([]float64, mo*n),
 }
 for i := 0; i < mo; i++ {
 for j := i; j < n; j++ {

```

```

 r.Data[i*n+j] = a.Data[(test.offset+i)*a.Stride+j]
 }
}
got := nanGeneral(mo, n, n)
blas64.Gemm(blas.NoTrans, blas.NoTrans, 1, q, r, 0, got)

want := aCopy
impl.Dlapmt(true, want.Rows, want.Cols, want.Data, want.Stride, jpiv)
want.Rows = mo
want.Data = want.Data[test.offset*want.Stride:]
if !equalApproxGeneral(got, want, 1e-12) {
 t.Errorf("Case %v, Q*R != A*P\nQ*R=%v\nA*P=%v", ti, got, want)
}
}
}
}
}
digraph{e[l=<

>]}
/**
source: https://github.com/apache/mynewt-artifact/blob/v0.0.15/LICENSE
**/
{{Types "Apache-2.0"}}

{{template "Apache-2.0.lre"}}

```

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- \* [newt/vendor/mynewt.apache.org/newt/yaml/writerc.go](https://github.com/newt/mynewt.apache.org/newt/yaml/writerc.go)
- \* [newt/vendor/mynewt.apache.org/newt/yaml/yamlh.go](https://github.com/newt/mynewt.apache.org/newt/yaml/yamlh.go)
- \* [newt/vendor/mynewt.apache.org/newt/yaml/yamlprivateh.go](https://github.com/newt/mynewt.apache.org/newt/yaml/yamlprivateh.go)
- \* [newtmgr/vendor/mynewt.apache.org/newt/yaml/apic.go](https://github.com/newtmgr/newt/mynewt.apache.org/newt/yaml/apic.go)
- \* [newtmgr/vendor/mynewt.apache.org/newt/yaml/emitterc.go](https://github.com/newtmgr/newt/mynewt.apache.org/newt/yaml/emitterc.go)
- \* [newtmgr/vendor/mynewt.apache.org/newt/yaml/parserc.go](https://github.com/newtmgr/newt/mynewt.apache.org/newt/yaml/parserc.go)
- \* [newtmgr/vendor/mynewt.apache.org/newt/yaml/readerc.go](https://github.com/newtmgr/newt/mynewt.apache.org/newt/yaml/readerc.go)
- \* [newtmgr/vendor/mynewt.apache.org/newt/yaml/scannerc.go](https://github.com/newtmgr/newt/mynewt.apache.org/newt/yaml/scannerc.go)
- \* [newtmgr/vendor/mynewt.apache.org/newt/yaml/writerc.go](https://github.com/newtmgr/newt/mynewt.apache.org/newt/yaml/writerc.go)
- \* [newtmgr/vendor/mynewt.apache.org/newt/yaml/yamlh.go](https://github.com/newtmgr/newt/mynewt.apache.org/newt/yaml/yamlh.go)
- \* [newtmgr/vendor/mynewt.apache.org/newt/yaml/yamlprivateh.go](https://github.com/newtmgr/newt/mynewt.apache.org/newt/yaml/yamlprivateh.go)
- \* [yaml/apic.go](https://github.com/yaml/apic.go)
- \* [yaml/emitterc.go](https://github.com/yaml/emitterc.go)

- \* yaml/parserc.go
- \* yaml/readerc.go
- \* yaml/scannerc.go
- \* yaml/writerc.go
- \* yaml/yamlh.go
- \* yaml/yamlprivateh.go

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```

```
package ast_test
```

```
import (
 "bytes"
 "io/ioutil"
 "testing"

 "gonum.org/v1/gonum/graph/formats/dot"
 "gonum.org/v1/gonum/graph/formats/dot/ast"
)
```

```
func TestParseFile(t *testing.T) {
 golden := []struct {
 in string
 out string
 }{
 {in: "../internal/testdata/empty.dot"},
 {in: "../internal/testdata/graph.dot"},
 {in: "../internal/testdata/digraph.dot"},
 {in: "../internal/testdata/strict.dot"},
 {in: "../internal/testdata/multi.dot"},
 {in: "../internal/testdata/named_graph.dot"},
 {in: "../internal/testdata/node_stmt.dot"},
 {in: "../internal/testdata/edge_stmt.dot"},
 {in: "../internal/testdata/attr_stmt.dot"},
 {in:
 "../internal/testdata/attr.dot"},
 {
 in: "../internal/testdata/subgraph.dot",
 out: "../internal/testdata/subgraph.golden",
 },
 {
 in: "../internal/testdata/semi.dot",
 out: "../internal/testdata/semi.golden",
 },
 {
 in: "../internal/testdata/empty_attr.dot",
 out: "../internal/testdata/empty_attr.golden",
 },
 {
 in: "../internal/testdata/attr_lists.dot",
```

```

 out: "../internal/testdata/attr_lists.golden",
 },
 {
 in: "../internal/testdata/attr_sep.dot",
 out: "../internal/testdata/attr_sep.golden",
 },
 {in: "../internal/testdata/subgraph_vertex.dot"},
 {in: "../internal/testdata/port.dot"},
}
for _, g := range golden {
 file, err := dot.ParseFile(g.in)
 if err != nil {
 t.Errorf("%q: unable to parse file; %v", g.in, err)
 continue
 }
 // If no output path is specified, the input is already golden.
 out := g.in
 if len(g.out) > 0 {
 out = g.out
 }
 buf, err := ioutil.ReadFile(out)
 if err != nil {
 t.Errorf("%q: unable to
read file; %v", g.in, err)
 continue
 }
 got := file.String()
 // Remove trailing newline.
 want := string(bytes.TrimSpace(buf))
 if got != want {
 t.Errorf("%q: graph mismatch; expected %q, got %q", g.in, want, got)
 }
}
}

```

// Verify that all statements implement the Stmt interface.

```

var (
 _ ast.Stmt = (*ast.NodeStmt)(nil)
 _ ast.Stmt = (*ast.EdgeStmt)(nil)
 _ ast.Stmt = (*ast.AttrStmt)(nil)
 _ ast.Stmt = (*ast.Attr)(nil)
 _ ast.Stmt = (*ast.Subgraph)(nil)
)

```

// Verify that all vertices implement the Vertex interface.

```

var (
 _ ast.Vertex = (*ast.Node)(nil)
 _ ast.Vertex = (*ast.Subgraph)(nil)
)

```

```

)
graph{ED}
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package community

import (
 "gonum.org/v1/gonum/graph"
 "gonum.org/v1/gonum/graph/internal/set"
 "gonum.org/v1/gonum/graph/simple"
 "gonum.org/v1/gonum/graph/topo"
 "gonum.org/v1/gonum/graph/traverse"
)

// KCliqueCommunities returns the k-clique communities of the undirected graph g for
// k greater than zero. The returned communities are identified by linkage via k-clique
// adjacency, where adjacency is defined as having k-1 common nodes. KCliqueCommunities
// returns a single component including the full set of nodes of g when k is 1,
// and the classical connected components of g when k is 2. Note that k-clique
// communities may contain common nodes from g.
//
// k-clique communities are described in Palla et al. doi:10.1038/nature03607.
func KCliqueCommunities(k int, g graph.Undirected) [][]graph.Node {
 if k < 1 {
 panic("community:
invalid k for k-clique communities")
 }
 switch k {
 case 1:
 return [][]graph.Node{graph.NodesOf(g.Nodes())}
 case 2:
 return topo.ConnectedComponents(g)
 default:
 cg := simple.NewUndirectedGraph()
 topo.CliqueGraph(cg, g)
 cc := kConnectedComponents(k, cg)

 // Extract the nodes in g from cg,
 // removing duplicates and separating
 // cliques smaller than k into separate
 // single nodes.
 var kcc [][]graph.Node
 single := set.NewNodes()
 inCommunity := set.NewNodes()
 for _, c := range cc {
 nodes := set.NewNodesSize(len(c))

```

```

for _, cn := range c {
 for _, n := range cn.(topo.Clique).Nodes() {
 nodes.Add(n)
 }
}
if len(nodes) < k {
 for _, n := range nodes {
 single.Add(n)
 }
 continue
}
var kc []graph.Node
for _, n := range nodes {
 inCommunity.Add(n)
 kc = append(kc, n)
}
kcc = append(kcc, kc)
}
for _, n := range single {
 if !inCommunity.Has(n) {
 kcc = append(kcc, []graph.Node{n})
 }
}

return
kcc
}
}

// kConnectedComponents returns the connected components of topo.Clique nodes that
// are joined by k-1 underlying shared nodes in the graph that created the clique
// graph cg.
func kConnectedComponents(k int, cg graph.Undirected) [][]graph.Node {
 var (
 c []graph.Node
 cc [][]graph.Node
)
 during := func(n graph.Node) {
 c = append(c, n)
 }
 after := func() {
 cc = append(cc, []graph.Node{nil})
 cc[len(cc)-1] = append(cc[len(cc)-1], c...)
 c = c[:0]
 }
 w := traverse.DepthFirst{
 Traverse: func(e graph.Edge) bool {
 return len(e.(topo.CliqueGraphEdge).Nodes()) >= k-1

```

```

 },
}

w.WalkAll(cg, nil, after, during)

return cc
}

graph{{ED}ED{ED}}
graph{{{EB}}EB{{EB}}EB{EB}}}
graph{{GRAP_ GRAP_ GRAP_}}
digraph {
{A B} -> C
}

graph{{SubGra_}{SubGra_}{SubGra_}}
graph{no{{no{no}{no}}no}}
graph{SUB}
graph{diG{diG{diG{di9}diG}}diG{diG{di9}diG}}
Graph{Subgra}
graph{{{Digrapn}{Digrap}{Digrap}{Digrap}}}
graph{{stricN}}
graph{{Subg{Subg}{Subg}{Subg{Subg}{Subg}Subg}{Subg}{Subg}}}
graph{su_{su_{su_{su_{}}su_{su_{}}}}su_{su_{}}}
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// Package uid implements unique ID provision for graphs.
package uid

import "gonum.org/v1/gonum/graph/internal/set"

// Max is the maximum value of int64.
const Max = int64(^uint64(0) >> 1)

// Set implements available ID storage.
type Set struct {
 maxID int64
 used, free set.Int64s
}

// NewSet returns a new Set. The returned value should not be passed except by pointer.
func NewSet() Set {
 return Set{maxID: -1, used: make(set.Int64s), free: make(set.Int64s)}
}

// NewID returns a new unique ID. The ID returned is not considered used
// until passed in a call to use.
func (s *Set) NewID() int64 {
 for id := range s.free {

```

```

 return id
}
if s.maxID != Max {
 return s.maxID + 1
}
for id := int64(0); id <= s.maxID+1; id++ {
 if !s.used.Has(id) {
 return id
 }
}
panic("unreachable")
}

// Use adds the id to the
// used IDs in the Set.
func (s *Set) Use(id int64) {
 s.used.Add(id)
 s.free.Remove(id)
 if id > s.maxID {
 s.maxID = id
 }
}

// Release frees the id for reuse.
func (s *Set) Release(id int64) {
 s.free.Add(id)
 s.used.Remove(id)
}
graph{Dir{Dir{Dir}Dir}Dir{Dir}}
Graph{Graph[]{}Graph[]{}Graph[]}
graph{{N}N}
graph{{{gra}{gra}}gra}}
graph{{SUBGRAPHE}{SUBGRAPHE}{SUBGRAPHP}}
graph{{Edg_}Edg_{}Edg_{}Edg_}
digraph {
 A -> B
}
digraph {
 C -> D
}
graph{Nod}
/** github.com/daveadams/vax **/

{{Types "CC0-1.0"}}

```

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```
graph{{nN{nN{nN{nN}nD}nD}}nN{nN}nD}
graph{{Grai}}
graph{edN{edG}}
graph{N9{{N9{N9{N7}}}N9{N7}}}
graph{{{{grapg}grape}{grape{grapg}}}{grape{grapg}}}}
graph{{St_}St_}
graph{{su}{su}su}{su}}
graph{{sur{sur}}}}
graph{SUA}
graph{{stria{{stria}stria{stria}}}stria{stria}}
digraph{d_}
graph{{Subg{Subg}{Subg}{Subg}{Subg}{Subg}}}
graph{{Digraz}Digraz}
```

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package material

```
import (
 "gioui.org/layout"
 "gioui.org/text"
 "gioui.org/unit"
 "gioui.org/widget"
)
```

```
type RadioButton struct {
 checkable
 Key string
}
```

// RadioButton returns a RadioButton with a label. The key specifies  
// the value for the Enum.

```
func (t *Theme) RadioButton(key, label string) RadioButton {
 return RadioButton{
 checkable: checkable{
 Label: label,

 Color: t.Color.Text,
 IconColor: t.Color.Primary,
 Font: text.Font{
 Size: t.TextSize.Scale(14.0 / 16.0),
 },
 Size: unit.Dp(26),
 shaper: t.Shaper,
 checkedStateIcon: t.radioCheckedIcon,
 uncheckedStateIcon: t.radioUncheckedIcon,
 },
 Key: key,
 }
}
```

```
func (r RadioButton) Layout(gtx *layout.Context, enum *widget.Enum) {
 r.layout(gtx, enum.Value(gtx) == r.Key)
 enum.Layout(gtx, r.Key)
}
graph{{Di6}{Di6}{{Di6}{Di6}Di6}{Di6}}}
graph{{P}{{GRAP_ GRAP_ GRAP_}}GRAP_ GRAP_}}
graph{{STR6{STR6}}STR6{{STR6}STR6}}STR6{{STR6}}STR6{STR6{STR6}}}
graph{____{____}_}
```



```

graph{c5{{{c5c5}z9v6k6}{i5l4{F6d3o5j6V2E4k1P7O8N6{c5}}}{c5}}{c5{c5}}}{{{{k1P7O8T9R2X2{T7c5c
5}}}{c5}}{}}}{c5}
graph{{stric_}}
graph{SUBGR9{{SUBGR5}}}
graph{Strr-9Strr}
graph{ND{ND}}
graph{{{Stricy}{{{Stricy}}Stricy}{Stricy}}Stricy}}
/*]*/graph{/**/}
graph{{S}S{S{S}S}S}
graph{{SUU{{SUU}}}}
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```

```

package functions

```

```

import (
 "math"
 "testing"

```

```

 "gonum.org/v1/gonum/diff/fd"
 "gonum.org/v1/gonum/floats"
)

```

```

func TestMinimalSurface(t *testing.T) {
 for _, size := range [][]int{
 {20, 30},
 {30, 30},
 {50, 40},
 } {
 f := NewMinimalSurface(size[0], size[1])
 x0 := f.InitX()
 grad := make([]float64, len(x0))
 f.Grad(grad, x0)
 fdGrad := fd.Gradient(nil, f.Func, x0, &fd.Settings{Formula: fd.Central})

```

```

 // Test that the numerical and analytical gradients agree.
 dist := floats.Distance(grad, fdGrad, math.Inf(1))
 if dist > 1e-9 {
 t.Errorf("grid %v x %v: numerical and analytical gradient do not match. |fdGrad - grad|_ = %v",
 size[0], size[1], dist)
 }

```

```

 // Test that the gradient at the minimum is small enough.
 // In some sense this test is not completely correct because ExactX
 // returns the exact solution
 to the continuous problem projected on the
 // grid, not the exact solution to the discrete problem which we are

```



```

func (r *resourceCache) get(key interface{}) (resource, bool) {
 v, exists := r.res[key]
 if exists {
 r.newRes[key] = v
 }
 return v, exists
}

```

```

func (r *resourceCache) put(key interface{}, val resource) {
 if _, exists := r.newRes[key]; exists {
 panic(fmt.Errorf("key exists, %p", key))
 }
 r.res[key] = val
 r.newRes[key] = val
}

```

```

func (r *resourceCache) frame(ctx *context) {
 for k, v := range r.res {
 if _, exists := r.newRes[k]; !exists {
 delete(r.res, k)
 v.release(ctx)
 }
 }
 for
 k, v := range r.newRes {
 delete(r.newRes, k)
 r.res[k] = v
 }
}

```

```

func (r *resourceCache) release(ctx *context) {
 for _, v := range r.newRes {
 v.release(ctx)
 }
 r.newRes = nil
 r.res = nil
}

```

```

func newOpCache() *opCache {
 return &opCache{
 res: make(map[ops.Key]resource),
 newRes: make(map[ops.Key]resource),
 }
}

```

```

func (r *opCache) get(key ops.Key) (resource, bool) {
 v, exists := r.res[key]
 if exists {

```

```

 r.newRes[key] = v
}
return v, exists
}

func (r *opCache) put(key ops.Key, val resource) {
 if _, exists := r.newRes[key]; exists {
 panic(fmt.Errorf("key exists, %#v", key))
 }
 r.res[key] = val
 r.newRes[key] = val
}

func (r *opCache) frame(ctx *context) {
 for k, v := range r.res {
 if _, exists := r.newRes[k]; !exists {
 delete(r.res, k)
 v.release(ctx)
 }
 }
 for k, v := range r.newRes {
 delete(r.newRes, k)
 r.res[k] = v
 }
}

func (r *opCache) release(ctx *context) {
 for _, v := range r.newRes {
 v.release(ctx)
 }
 r.newRes
 = nil
 r.res = nil
}
graph{{ {digrap{digrap}digrap{digrap}digrap}}}
graph{{{ {Str}Str}}}
digraph {
 A [style=filled fillcolor=red color=blue]
}
graph{{{ {Ed}Ed}Ed}Ed}}
graph{{{ {gra}}}}
graph{{Edge_}{Edge_}}
// SPDX-License-Identifier: Unlicense OR MIT

package ops

import (
 "encoding/binary"

```

```

"math"

"gioui.org/f32"
"gioui.org/internal/opconst"
"gioui.org/op"
)

func DecodeTransformOp(d []byte) op.TransformOp {
 bo := binary.LittleEndian
 if opconst.OpType(d[0]) != opconst.TypeTransform {
 panic("invalid op")
 }
 return op.TransformOp{}.Offset(f32.Point{
 X: math.Float32frombits(bo.Uint32(d[1:])),
 Y: math.Float32frombits(bo.Uint32(d[5:])),
 })
}

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// Package r1 provides 1D vectors and intervals and operations on them.
package r1 // import "gonum.org/v1/gonum/spatial/r1"
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package testlapack

import (
 "fmt"
 "math"
 "testing"

 "golang.org/x/exp/rand"

 "gonum.org/v1/gonum/blas"
 "gonum.org/v1/gonum/blas/blas64"
)

type Dlatrser interface {
 Dlatrs(uplo blas.Uplo, trans blas.Transpose, diag blas.Diag, normin bool, n int, a []float64, lda int, x []float64,
 cnorm []float64) (scale float64)
}

func DlatrsTest(t *testing.T, impl Dlatrser) {
 rnd := rand.New(rand.NewSource(1))
 for _, uplo := range []blas.Uplo{blas.Upper, blas.Lower} {

```

```

for _, trans := range []blas.Transpose{blas.Trans, blas.NoTrans} {
 for _, n := range []int{0, 1, 2, 3, 4, 5, 6, 7, 10, 20, 50, 100} {
 for _, lda := range []int{n, 2*n + 1} {
 lda = max(1, lda)
 imats := []int{7, 11, 12, 13, 14, 15, 16, 17, 18}
 if n < 6 {
 imats = append(imats, 19)
 }
 for _, imat := range imats {
 testDlatrs(t,
impl, imat, uplo, trans, n, lda, rnd)
 }
 }
 }
}

func testDlatrs(t *testing.T, impl Dlatrser, imat int, uplo blas.Uplo, trans blas.Transpose, n, lda int, rnd *rand.Rand)
{
 const tol = 1e-14

 a := nanSlice(n * lda)
 b := nanSlice(n)
 work := make([]float64, 3*n)

 // Generate triangular test matrix and right hand side.
 diag := dlattr(imat, uplo, trans, n, a, lda, b, work, rnd)
 if imat <= 10 {
 // b has not been generated.
 dlarnv(b, 3, rnd)
 }

 cnorm := nanSlice(n)
 x := make([]float64, n)

 // Call Dlatrs with normin=false.
 copy(x, b)
 scale := impl.Dlatrs(uplo, trans, diag, false, n, a, lda, x, cnorm)
 prefix := fmt.Sprintf("Case imat=%v (n=%v,lda=%v,trans=%v,uplo=%v,diag=%v", imat, n, lda, trans, uplo, diag)
 for i, v := range cnorm {
 if math.IsNaN(v) {
 t.Errorf("%v: cnorm[%v] not computed (scale=%v,normin=false)", prefix, i, scale)
 }
 }
 resid, hasNaN := dlatrsResidual(uplo, trans, diag, n, a, lda, scale, cnorm, x, b, work[:n])
 if hasNaN {
 t.Errorf("%v:

```

```

unexpected NaN (scale=%v,normin=false)", prefix, scale)
} else if resid > tol {
 t.Errorf("%v: residual %v too large (scale=%v,normin=false)", prefix, resid, scale)
}

// Call Dlatrs with normin=true because cnorm has been filled.
copy(x, b)
scale = impl.Dlatrs(uplo, trans, diag, true, n, a, lda, x, cnorm)
resid, hasNaN = dlatrsResidual(uplo, trans, diag, n, a, lda, scale, cnorm, x, b, work[:n])
if hasNaN {
 t.Errorf("%v: unexpected NaN (scale=%v,normin=true)", prefix, scale)
} else if resid > tol {
 t.Errorf("%v: residual %v too large (scale=%v,normin=true)", prefix, resid, scale)
}
}

// dlatrsResidual returns norm(trans(A)*x-scale*b) / (norm(trans(A))*norm(x)*eps)
// and whether NaN has been encountered in the process.
func dlatrsResidual(uplo blas.Uplo, trans blas.Transpose, diag blas.Diag, n int, a []float64, lda int, scale float64,
 cnorm []float64, x, b, work []float64) (resid float64, hasNaN bool) {
 if n == 0 {
 return 0, false
 }

 // Compute the norm of the
 // triangular matrix A using the column norms
 // already computed by Dlatrs.
 var tnorm float64
 if diag == blas.NonUnit {
 for j := 0; j < n; j++ {
 tnorm = math.Max(tnorm, math.Abs(a[j*lda+j])+cnorm[j])
 }
 } else {
 for j := 0; j < n; j++ {
 tnorm = math.Max(tnorm, 1+cnorm[j])
 }
 }

 eps := dlamchE
 smlnum := dlamchS
 bi := blas64.Implementation()

 // Compute norm(trans(A)*x-scale*b) / (norm(trans(A))*norm(x)*eps)
 copy(work, x)
 ix := bi.Idamax(n, work, 1)
 xnorm := math.Max(1, math.Abs(work[ix]))
 xscal := 1 / xnorm / float64(n)
 bi.Dscal(n, xscal, work, 1)

```

```

bi.Dtrmv(uplo, trans, diag, n, a, lda, work, 1)
bi.Daxpy(n, -scale*xscal, b, 1, work, 1)
for _, v := range work {
 if math.IsNaN(v) {
 return 1 / eps, true
 }
}
ix = bi.Idamax(n, work, 1)
resid = math.Abs(work[ix])
ix = bi.Idamax(n, x, 1)
xnorm = math.Abs(x[ix])
if resid*smlnum <= xnorm {
 if xnorm > 0 {
 resid /= xnorm
 }
} else if resid > 0 {
 resid = 1 / eps
}
if resid*smlnum <= tnorm {
 if tnorm
> 0 {
 resid /= tnorm
 }
} else if resid > 0 {
 resid = 1 / eps
}
return resid, false
}
Graph{{{D}D{{{D}D}{D}}D}}}
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package gonum

// Dorghr generates an nn orthogonal matrix Q which is defined as the product
// of ihi-ilo elementary reflectors:
// $Q = H_{\{ilo\}} H_{\{ilo+1\}} \dots H_{\{ihi-1\}}$.
//
// a and lda represent an nn matrix that contains the elementary reflectors, as
// returned by Dgehrd. On return, a is overwritten by the nn orthogonal matrix
// Q. Q will be equal to the identity matrix except in the submatrix
// $Q[ilo+1:ihi+1, ilo+1:ihi+1]$.
//
// ilo and ihi must have the same values as in the previous call of Dgehrd. It
// must hold that
// $0 \leq ilo \leq ihi < n$ if $n > 0$,
// $ilo = 0, ihi = -1$ if $n == 0$.

```



```

//
// tau contains the scalar factors of the elementary reflectors, as returned by
// Dgehrd. tau must have length n-1.
//
// work must have length at least max(1,lwork) and lwork must be at least
// ihi-ilo. For optimum performance lwork
// must be at least (ihi-ilo)*nb where nb
// is the optimal blocksize. On return, work[0] will contain the optimal value
// of lwork.
//
// If lwork == -1, instead of performing Dorghr, only the optimal value of lwork
// will be stored into work[0].
//
// If any requirement on input sizes is not met, Dorghr will panic.
//
// Dorghr is an internal routine. It is exported for testing purposes.
func (impl Implementation) Dorghr(n, ilo, ihi int, a []float64, lda int, tau, work []float64, lwork int) {
 nh := ihi - ilo
 switch {
 case ilo < 0 || max(1, n) <= ilo:
 panic(badIlo)
 case ihi < min(ilo, n-1) || n <= ihi:
 panic(badIhi)
 case lda < max(1, n):
 panic(badLdA)
 case lwork < max(1, nh) && lwork != -1:
 panic(badLWork)
 case len(work) < max(1, lwork):
 panic(shortWork)
 }

 // Quick return if possible.
 if n == 0 {
 work[0] = 1
 return
 }

 lwkopt := max(1, nh) * impl.Ilaenv(1, "DORGQR", " ", nh, nh, nh, -1)
 if lwork == -1 {
 work[0] = float64(lwkopt)
 return
 }

 switch {
 case
 len(a) < (n-1)*lda+n:
 panic(shortA)
 case len(tau) < n-1:

```

```

panic(shortTau)
}

// Shift the vectors which define the elementary reflectors one column
// to the right.
for i := ilo + 2; i < ihi+1; i++ {
 copy(a[i*lda+ilo+1:i*lda+i], a[i*lda+ilo:i*lda+i-1])
}
// Set the first ilo+1 and the last n-ihl-1 rows and columns to those of
// the identity matrix.
for i := 0; i < ilo+1; i++ {
 for j := 0; j < n; j++ {
 a[i*lda+j] = 0
 }
 a[i*lda+i] = 1
}
for i := ilo + 1; i < ihi+1; i++ {
 for j := 0; j <= ilo; j++ {
 a[i*lda+j] = 0
 }
 for j := i; j < n; j++ {
 a[i*lda+j] = 0
 }
}
for i := ihi + 1; i < n; i++ {
 for j := 0; j < n; j++ {
 a[i*lda+j] = 0
 }
 a[i*lda+i] = 1
}
if nh > 0 {
 // Generate Q[ilo+1:ihl+1,ilo+1:ihl+1].
 impl.Dorgqr(nh, nh, nh, a[(ilo+1)*lda+ilo+1:], lda, tau[ilo:ihl], work, lwork)
}
work[0] = float64(lwkopt)
}
graph{{Dig_}Dig_{{Dig_}Dig_{{Dig_}Dig_{{Dig_}Dig_{{Dig_}Dig_{{Dig_}Dig_}}
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package community

import (
 "fmt"
 "reflect"
 "sort"
 "testing"

```

```

"gonum.org/v1/gonum/graph"
"gonum.org/v1/gonum/graph/internal/ordered"
"gonum.org/v1/gonum/graph/simple"
)

// batageljZaversnikGraph is the example graph from
// figure 1 of http://arxiv.org/abs/cs/0310049v1
var batageljZaversnikGraph = []intset{
 0: nil,

 1: linksTo(2, 3),
 2: linksTo(4),
 3: linksTo(4),
 4: linksTo(5),
 5: nil,

 6: linksTo(7, 8, 14),
 7: linksTo(8, 11, 12, 14),
 8: linksTo(14),
 9: linksTo(11),
 10: linksTo(11),
 11: linksTo(12),
 12: linksTo(18),
 13: linksTo(14, 15),
 14: linksTo(15, 17),
 15: linksTo(16, 17),
 16: nil,
 17: linksTo(18, 19, 20),
 18: linksTo(19, 20),
 19: linksTo(20),
 20: nil,
}

var kCliqueCommunitiesTests = []struct {
 name string
 g []intset
 k int
 want [][]graph.Node
}{
 {
 name: "simple",
 g: []intset{
 0:
linksTo(1, 2, 4, 6),
 1: linksTo(2, 4, 6),
 2: linksTo(3, 6),
 3: linksTo(4, 5),

```

```

4: linksTo(6),
5: nil,
6: nil,
},
k: 3,
want: [][]graph.Node{
 {simple.Node(0), simple.Node(1), simple.Node(2), simple.Node(4), simple.Node(6)},
 {simple.Node(3)},
 {simple.Node(5)},
},
},
{
 name: "Batagelj-Zaversnik Graph",
 g: batageljZaversnikGraph,
 k: 3,
 want: [][]graph.Node{
 {simple.Node(0)},
 {simple.Node(1)},
 {simple.Node(2)},
 {simple.Node(3)},
 {simple.Node(4)},
 {simple.Node(5)},
 {simple.Node(6), simple.Node(7), simple.Node(8), simple.Node(14)},
 {simple.Node(7), simple.Node(11), simple.Node(12)},
 {simple.Node(9)},
 {simple.Node(10)},
 {simple.Node(13), simple.Node(14), simple.Node(15), simple.Node(17)},
 {simple.Node(16)},
 {simple.Node(17), simple.Node(18), simple.Node(19), simple.Node(20)},
 },
},
{
 name: "Batagelj-Zaversnik Graph",
 g: batageljZaversnikGraph,
 k: 4,
 want: [][]graph.Node{
 {simple.Node(0)},
 {simple.Node(1)},
 {simple.Node(2)},
 {simple.Node(3)},
 {simple.Node(4)},
 {simple.Node(5)},
 {simple.Node(6),
simple.Node(7), simple.Node(8), simple.Node(14)},
 {simple.Node(9)},
 {simple.Node(10)},
 {simple.Node(11)},
 {simple.Node(12)},

```

```

 {simple.Node(13)},
 {simple.Node(15)},
 {simple.Node(16)},
 {simple.Node(17), simple.Node(18), simple.Node(19), simple.Node(20)},
 },
},
}

func TestKCliqueCommunities(t *testing.T) {
 for _, test := range kCliqueCommunitiesTests {
 g := simple.NewUndirectedGraph()
 for u, e := range test.g {
 // Add nodes that are not defined by an edge.
 if g.Node(int64(u)) == nil {
 g.AddNode(simple.Node(u))
 }
 for v := range e {
 g.SetEdge(simple.Edge{F: simple.Node(u), T: simple.Node(v)})
 }
 }
 got := KCliqueCommunities(test.k, g)

 for _, c := range got {
 sort.Sort(ordered.ByID(c))
 }
 sort.Sort(ordered.BySliceIDs(got))

 if !reflect.DeepEqual(got, test.want) {
 t.Errorf("unexpected k-connected components for %q k=%d:\ngot: %v\nwant:%v", test.name, test.k, got, test.want)
 }
 }
}

func BenchmarkKCliqueCommunities(b *testing.B) {
 for _, test := range kCliqueCommunitiesTests {
 g := simple.NewUndirectedGraph()
 for u, e := range test.g {
 // Add nodes that are not defined by an edge.
 if g.Node(int64(u)) == nil {
 g.AddNode(simple.Node(u))
 }
 for v := range e {
 g.SetEdge(simple.Edge{F: simple.Node(u), T: simple.Node(v)})
 }
 }

 b.Run(fmt.Sprintf("%s-k=%d", test.name, test.k), func(b *testing.B) {

```

```

var got [][]graph.Node
for i := 0; i < b.N; i++ {
 got = KCliqueCommunities(test.k, g)
}
if len(got) != len(test.want) {
 b.Errorf("unexpected k-connected components for %q k=%d:\ngot: %v\nwant:%v", test.name, test.k, got, test.want)
}
})
}
}

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```

```

package path

```

```

import (
 "math"
 "reflect"
 "testing"

 "gonum.org/v1/gonum/graph"
 "gonum.org/v1/gonum/graph/path/internal/testgraphs"
)

```

```

func TestBellmanFordFrom(t *testing.T) {
 for _, test := range testgraphs.ShortestPathTests {
 g := test.Graph()
 for _, e := range test.Edges {
 g.SetWeightedEdge(e)
 }
 }
}

```

```

pt, ok := BellmanFordFrom(test.Query.From(), g.(graph.Graph))
if test.HasNegativeCycle {
 if ok {
 t.Errorf("%q: expected negative cycle", test.Name)
 }
 continue
}
if !ok {
 t.Fatalf("%q: unexpected negative cycle", test.Name)
}

if pt.From().ID() != test.Query.From().ID() {
 t.Fatalf("%q: unexpected from node ID: got:%d want:%d", test.Name, pt.From().ID(), test.Query.From().ID())
}

```

```

p, weight := pt.To(test.Query.To().ID())

```

```

if weight != test.Weight {
 t.Errorf("%q: unexpected weight from
Between: got:%f want:%f",
 test.Name, weight, test.Weight)
}
if weight := pt.WeightTo(test.Query.To().ID()); weight != test.Weight {
 t.Errorf("%q: unexpected weight from Weight: got:%f want:%f",
 test.Name, weight, test.Weight)
}

var got []int64
for _, n := range p {
 got = append(got, n.ID())
}
ok = len(got) == 0 && len(test.WantPaths) == 0
for _, sp := range test.WantPaths {
 if reflect.DeepEqual(got, sp) {
 ok = true
 break
 }
}
if !ok {
 t.Errorf("%q: unexpected shortest path:\ngot: %v\nwant from:%v",
 test.Name, p, test.WantPaths)
}

np, weight := pt.To(test.NoPathFor.To().ID())
if pt.From().ID() == test.NoPathFor.From().ID() && (np != nil || !math.IsInf(weight, 1)) {
 t.Errorf("%q: unexpected path:\ngot: path=%v weight=%f\nwant:path=<nil> weight=+Inf",
 test.Name, np, weight)
}
}
}

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package quat

import "math"

// IsNaN returns true if any of real(q), imag(q), jmag(q), or kmag(q) is NaN
// and none are an infinity.
func IsNaN(q Number) bool {

```

```

if math.IsInf(q.Real, 0) || math.IsInf(q.Imag, 0) || math.IsInf(q.Jmag, 0) || math.IsInf(q.Kmag, 0) {
 return false
}
return math.IsNaN(q.Real) || math.IsNaN(q.Imag) || math.IsNaN(q.Jmag) || math.IsNaN(q.Kmag)
}

```

```

// NaN returns a quaternion ``not-a-number" value.
func NaN() Number {
 nan := math.NaN()
 return Number{Real: nan, Imag: nan, Jmag: nan, Kmag: nan}
}

```

```

graph{DiGra{{{DiGra}}}DiGra}}
graph{{{Str}}}
graph{{{DiGu}DiGv}}
graph{diGra_[diGra_=""]diGra_}
graph{{{{{digraa}digrag}}}digrag}}digrag}
graph{DIR}{DIR}{DIR}DIR}
graph{Subc{{Subc{{Suba}Suba}}}Suba}}

```

```

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```

```

// Package integrate provides functions to compute an integral given a
// specific list of evaluations.
package integrate // import "gonum.org/v1/gonum/integrate"
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```

```

package testlapack

```

```

import (
 "fmt"
 "testing"

 "golang.org/x/exp/rand"

 "gonum.org/v1/gonum/blas"
 "gonum.org/v1/gonum/blas/blas64"
)

```

```

type Dlarfxer interface {
 Dlarfx(side blas.Side, m, n int, v []float64, tau float64, c []float64, ldc int, work []float64)
}

```

```

func DlarfxTest(t *testing.T, impl Dlarfxer) {
 rnd := rand.New(rand.NewSource(1))
 for _, side := range []blas.Side{blas.Right, blas.Left} {

```



```

// For m and n greater than 10 we are testing Dlarf, so avoid unnecessary work.
for m := 1; m < 12; m++ {
 for n := 1; n < 12; n++ {
 for _, extra := range []int{0, 1, 11} {
 for cas := 0; cas < 10; cas++ {
 testDlarfx(t, impl, side, m, n, extra, rnd)
 }
 }
 }
}

func testDlarfx(t *testing.T, impl Dlarfxer, side blas.Side, m, n, extra int, rnd *rand.Rand) {
 const tol = 1e-13

 // Generate random
 input data.
 var v []float64
 if side == blas.Left {
 v = randomSlice(m, rnd)
 } else {
 v = randomSlice(n, rnd)
 }
 tau := rnd.NormFloat64()
 ldc := n + extra
 c := randomGeneral(m, n, ldc, rnd)

 // Compute the matrix H explicitly as $H := I - \tau * v * v$.
 var h blas64.General
 if side == blas.Left {
 h = eye(m, m+extra)
 } else {
 h = eye(n, n+extra)
 }
 blas64.Ger(-tau, blas64.Vector{Inc: 1, Data: v}, blas64.Vector{Inc: 1, Data: v}, h)

 // Compute the product $H * C$ or $C * H$ explicitly.
 cWant := nanGeneral(m, n, ldc)
 if side == blas.Left {
 blas64.Gemm(blas.NoTrans, blas.NoTrans, 1, h, c, 0, cWant)
 } else {
 blas64.Gemm(blas.NoTrans, blas.NoTrans, 1, c, h, 0, cWant)
 }

 var work []float64
 if h.Rows > 10 {
 // Allocate work only if H has order > 10.

```

```

if side == blas.Left {
 work = make([]float64, n)
} else {
 work = make([]float64, m)
}
}

impl.Dlarfx(side, m, n, v, tau, c.Data, c.Stride, work)

prefix := fmt.Sprintf("Case side=%v, m=%v, n=%v, extra=%v", side,
m, n, extra)

// Check any invalid modifications of c.
if !generalOutsideAllNaN(c) {
 t.Errorf("%v: out-of-range write to C\n%v", prefix, c.Data)
}

if !equalApproxGeneral(c, cWant, tol) {
 t.Errorf("%v: unexpected C\n%v", prefix, c.Data)
}
}
graph {node}
// Code generated by "go generate gonum.org/v1/gonum/unit/constant; DO NOT EDIT.

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package constant

import "gonum.org/v1/gonum/unit"

// StandardGravity is the standard gravity constant (g), the nominal gravitational acceleration of an object in a
vacuum near the surface of the Earth
// The dimensions of StandardGravity are m s^-2. The constant is exact.
const StandardGravity = unit.Acceleration(9.80665)
graph{{NodeW}NodeW{NodeW}{NodeS NodeS}}
graph edl{{edn}edh edl}
graph{{SUBGRAv}SUBGRA}
graph{{Nodeh{Nodeh}Nodeh}}
graph{{DIGRAP_}{DIGRAP_}}
graph{stri_{{stri_}stri_{stri_}}}
graph{Su1{Su5{{Su1}}}}
 SUBROUTINE ZSQRT(AR, AI, BR, BI)
C***BEGIN PROLOGUE ZSQRT
C***REFER TO ZBESH,ZBESI,ZBESJ,ZBESK,ZBESY,ZAIRY,ZBIRY
C
C DOUBLE PRECISION COMPLEX SQUARE ROOT, B=CSQRT(A)

```

C

C\*\*\*ROUTINES CALLED ZABS

C\*\*\*END PROLOGUE ZSQRT

DOUBLE PRECISION AR, AI, BR, BI, ZM, DTHETA, DPI, DRT  
DOUBLE PRECISION ZABS

DATA DRT , DPI / 7.071067811865475244008443621D-1,  
1 3.141592653589793238462643383D+0/  
ZM = ZABS(CMPLX(AR, AI, kind=KIND(1.0D0)))  
ZM = DSQRT(ZM)  
IF (AR.EQ.0.0D+0) GO TO 10  
IF (AI.EQ.0.0D+0) GO TO 20  
DTHETA = DATAN(AI/AR)  
IF (DTHETA.LE.0.0D+0) GO TO 40  
IF (AR.LT.0.0D+0) DTHETA = DTHETA - DPI  
GO TO 50  
10 IF (AI.GT.0.0D+0) GO TO 60  
IF (AI.LT.0.0D+0) GO TO 70  
BR = 0.0D+0  
BI = 0.0D+0  
RETURN  
20 IF (AR.GT.0.0D+0) GO TO 30  
BR = 0.0D+0  
BI = DSQRT(DABS(AR))  
RETURN  
30 BR = DSQRT(AR)  
BI = 0.0D+0  
RETURN  
40 IF (AR.LT.0.0D+0) DTHETA = DTHETA + DPI  
50  
DTHETA = DTHETA\*0.5D+0  
BR = ZM\*DCOS(DTHETA)  
BI = ZM\*DSIN(DTHETA)  
RETURN  
60 BR = ZM\*DRT  
BI = ZM\*DRT  
RETURN  
70 BR = ZM\*DRT  
BI = -ZM\*DRT  
RETURN  
END

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// Package vptree implements a vantage point tree. Vantage point

// trees provide an efficient search for nearest neighbors in a

// metric space.

```
//
// See http://pnylab.com/papers/vptree/vptree.pdf for details of vp-trees.
package vptree // import "gonum.org/v1/gonum/spatial/vptree"
// SPDX-License-Identifier: Unlicense OR MIT

// Package system contains events usually handled at the top-level
// program level.
package system

import (
 "image"
 "time"

 "gioui.org/op"
 "gioui.org/unit"
)

// A FrameEvent asks for a new frame in the form of a list of
// operations.
type FrameEvent struct {
 Config Config
 // Size is the dimensions of the window.
 Size image.Point
 // Insets is the insets to apply.
 Insets Insets
 // Frame replaces the window's frame with the new
 // frame.
 Frame func(frame *op.Ops)
 // Whether this draw is system generated and needs a complete
 // frame before proceeding.
 sync bool
}

// Config defines the essential properties of
// the environment.
type Config interface {
 // Now returns the current animation time.
 Now() time.Time

 unit.Converter
}

// DestroyEvent is the last event sent through
// a window event channel.
type DestroyEvent struct {
 // Err is nil for normal window closures. If a
 // window is prematurely closed, Err is the cause.
 Err
}
```

```

error
}

// Insets is the space taken up by
// system decoration such as translucent
// system bars and software keyboards.
type Insets struct {
 Top, Bottom, Left, Right unit.Value
}

// A StageEvent is generated whenever the stage of a
// Window changes.
type StageEvent struct {
 Stage Stage
}

// CommandEvent is a system event.
type CommandEvent struct {
 Type CommandType
 // Suppress the default action of the command.
 Cancel bool
}

// Stage of a Window.
type Stage uint8

// CommandType is the type of a CommandEvent.
type CommandType uint8

const (
 // StagePaused is the Stage for inactive Windows.
 // Inactive Windows don't receive FrameEvents.
 StagePaused Stage = iota
 // StateRunning is for active Windows.
 StageRunning
)

const (
 // CommandBack is the command for a back action
 // such as the Android back button.
 CommandBack CommandType = iota
)

func (l Stage) String() string {
 switch l {
 case StagePaused:
 return "StagePaused"
 case StageRunning:

```

```

 return "StageRunning"
default:
 panic("unexpected
Stage value")
}
}

func (_ FrameEvent) ImplementsEvent() {}
func (_ StageEvent) ImplementsEvent() {}
func (_ *CommandEvent) ImplementsEvent() {}
func (_ DestroyEvent) ImplementsEvent() {}
graph{{{subO:subO{subO:subO}}}}}
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package optimize

import "math"

const (
 defaultBisectionCurvature = 0.9
)

// Bisection is a Linesearcher that uses a bisection to find a point that
// satisfies the strong Wolfe conditions with the given curvature factor and
// a decrease factor of zero.
type Bisection struct {
 // CurvatureFactor is the constant factor in the curvature condition.
 // Smaller values result in a more exact line search.
 // A set value must be in the interval (0, 1), otherwise Init will panic.
 // If it is zero, it will be defaulted to 0.9.
 CurvatureFactor float64

 minStep float64
 maxStep float64
 currStep float64

 initF float64
 minF float64
 maxF float64
 lastF float64

 initGrad float64

 lastOp Operation
}

```

```

func (b *Bisection) Init(f, g float64, step float64) Operation {
 if step <= 0 {
 panic("bisection: bad step size")
 }
 if g
 >= 0 {
 panic("bisection: initial derivative is non-negative")
 }

 if b.CurvatureFactor == 0 {
 b.CurvatureFactor = defaultBisectionCurvature
 }
 if b.CurvatureFactor <= 0 || b.CurvatureFactor >= 1 {
 panic("bisection: CurvatureFactor not between 0 and 1")
 }

 b.minStep = 0
 b.maxStep = math.Inf(1)
 b.currStep = step

 b.initF = f
 b.minF = f
 b.maxF = math.NaN()

 b.initGrad = g

 // Only evaluate the gradient when necessary.
 b.lastOp = FuncEvaluation
 return b.lastOp
}

func (b *Bisection) Iterate(f, g float64) (Operation, float64, error) {
 if b.lastOp != FuncEvaluation && b.lastOp != GradEvaluation {
 panic("bisection: Init has not been called")
 }
 minF := b.initF
 if b.maxF < minF {
 minF = b.maxF
 }
 if b.minF < minF {
 minF = b.minF
 }
 if b.lastOp == FuncEvaluation {
 // See if the function value is good enough to make progress. If it is,
 // evaluate the gradient. If not, set it to the upper bound if the bound
 // has not yet been found, otherwise iterate toward
 the minimum location.
 if f <= minF {

```

```

b.lastF = f
b.lastOp = GradEvaluation
return b.lastOp, b.currStep, nil
}
if math.IsInf(b.maxStep, 1) {
 b.maxStep = b.currStep
 b.maxF = f
 return b.nextStep((b.minStep + b.maxStep) / 2)
}
if b.minF <= b.maxF {
 b.maxStep = b.currStep
 b.maxF = f
} else {
 b.minStep = b.currStep
 b.minF = f
}
return b.nextStep((b.minStep + b.maxStep) / 2)
}
f = b.lastF
// The function value was lower. Check if this location is sufficient to
// converge the linesearch, otherwise iterate.
if StrongWolfeConditionsMet(f, g, minF, b.initGrad, b.currStep, 0, b.CurvatureFactor) {
 b.lastOp = MajorIteration
 return b.lastOp, b.currStep, nil
}
if math.IsInf(b.maxStep, 1) {
 // The function value is lower. If the gradient is positive, an upper bound
 // of the minimum been found. If the gradient is negative, search farther
 // in that direction.
 if g > 0 {
 b.maxStep = b.currStep
 b.maxF = f
 return b.nextStep((b.minStep
+ b.maxStep) / 2)
 }
 b.minStep = b.currStep
 b.minF = f
 return b.nextStep(b.currStep * 2)
}
// The interval has been bounded, and we have found a new lowest value. Use
// the gradient to decide which direction.
if g < 0 {
 b.minStep = b.currStep
 b.minF = f
} else {
 b.maxStep = b.currStep
 b.maxF = f
}

```



```

return b.nextStep((b.minStep + b.maxStep) / 2)
}

// nextStep checks if the new step is equal to the old step.
// This can happen if min and max are the same, or if the step size is infinity,
// both of which indicate the minimization must stop. If the steps are different,
// it sets the new step size and returns the evaluation type and the step. If the steps
// are the same, it returns an error.
func (b *Bisection) nextStep(step float64) (Operation, float64, error) {
 if b.currStep == step {
 b.lastOp = NoOperation
 return b.lastOp, b.currStep, ErrLinesearcherFailure
 }
 b.currStep = step
 b.lastOp = FuncEvaluation
 return b.lastOp, b.currStep, nil
}
Graph{{{EDGG}{EDGG}{EDGG}{EDGG}EDGG}{EDGG}}
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// license that can be found in the LICENSE file.

package gonum

import (
 "gonum.org/v1/gonum/blas"
 "gonum.org/v1/gonum/lapack"
)

// Dgelqf computes the LQ factorization of the mn matrix A using a blocked
// algorithm. See the documentation for Dgelq2 for a description of the
// parameters at entry and exit.
//
// work is temporary storage, and lwork specifies the usable memory length.
// At minimum, lwork >= m, and this function will panic otherwise.
// Dgelqf is a blocked LQ factorization, but the block size is limited
// by the temporary space available. If lwork == -1, instead of performing Dgelqf,
// the optimal work length will be stored into work[0].
//
// tau must have length at least min(m,n), and this function will panic otherwise.
func (impl Implementation) Dgelqf(m, n int, a []float64, lda int, tau, work []float64, lwork int) {
 switch {
 case m < 0:
 panic(mLT0)
 case
 n < 0:
 panic(nLT0)
 case lda < max(1, n):

```

```

panic(badLdA)
case lwork < max(1, m) && lwork != -1:
 panic(badLWork)
case len(work) < max(1, lwork):
 panic(shortWork)
}

k := min(m, n)
if k == 0 {
 work[0] = 1
 return
}

nb := impl.Ilaenv(1, "DGELQF", " ", m, n, -1, -1)
if lwork == -1 {
 work[0] = float64(m * nb)
 return
}

if len(a) < (m-1)*lda+n {
 panic(shortA)
}
if len(tau) < k {
 panic(shortTau)
}

// Find the optimal blocking size based on the size of available memory
// and optimal machine parameters.
nbmin := 2
var nx int
iws := m
if 1 < nb && nb < k {
 nx = max(0, impl.Ilaenv(3, "DGELQF", " ", m, n, -1, -1))
 if nx < k {
 iws = m * nb
 if lwork < iws {
 nb = lwork / m
 nbmin = max(2, impl.Ilaenv(2, "DGELQF", " ", m, n, -1, -1))
 }
 }
}
ldwork := nb
// Computed blocked LQ factorization.
var i int
if nbmin <= nb && nb < k && nx < k {
 for i = 0; i < k-nx; i += nb {
 ib := min(k-i, nb)
 impl.Dgelq2(ib, n-i, a[i*lda+i:],

```



```

func gammaIncReg(x float64, params []float64) float64 {
 return cephes.Igam(params[0], x) - params[1]
}

// gammaIncRegInv is the inverse of the regularized incomplete Gamma integral. That is, it
// returns x such that:
// Igam(a, x) = y
// The input argument a must be positive and y must be between 0 and 1
// inclusive or gammaIncRegInv will panic. gammaIncRegInv should return a
// positive number, but can return NaN if there is a failure to converge.
func gammaIncRegInv(a, y float64) float64 {
 // For y not small, we just use
 // IgamI(a, 1-y)
 // (inverse
 // of the complemented incomplete Gamma integral). For y small,
 // however, 1-y is about 1, and we lose digits.
 if a <= 0 || y <= 0 || y >= 0.25 {
 return cephes.IgamI(a, 1-y)
 }

 lo := 0.0
 flo := -y
 hi := cephes.IgamI(a, 0.75)
 fhi := 0.25 - y

 params := []float64{a, y}

 // Also, after we generate a small interval by bisection above, false
 // position will do a large step from an interval of width ~1e-4 to ~1e-14
 // in one step (a=10, x=0.05, but similar for other values).
 result, bestX, _, errEst := falsePosition(lo, hi, flo, fhi, 2*machEp, 2*machEp, 1e-2*a, gammaIncReg, params)
 if result == fSolveMaxIterations && errEst > allowedATol+allowedRTol*math.Abs(bestX) {
 bestX = math.NaN()
 }

 return bestX
}

graph{"\phID "{""}NewSubgraph(X[0], X[2]) >>\s}\}"}
digraph {e[e=ee]ey[l=""]l[""]l[""]l[""]ey->l[l=""]ey->n[l="t=8]n->l[l=""]n->g[l=""]g->l[l=""]}
graph{{striN}{striN}{striN}}
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package gonum

import "gonum.org/v1/gonum/blas"

```

```

// Dpotri computes the inverse of a real symmetric positive definite matrix A
// using its Cholesky factorization.
//
// On entry, a contains the triangular factor U or L from the Cholesky
// factorization $A = U*U$ or $A = L*L$, as computed by Dpotrf.
// On return, a contains the upper or lower triangle of the (symmetric)
// inverse of A, overwriting the input factor U or L.
func (impl Implementation) Dpotri(uplo blas.Uplo, n int, a []float64, lda int) (ok bool) {
 switch {
 case uplo != blas.Upper && uplo != blas.Lower:
 panic(badUplo)
 case n < 0:
 panic(nLT0)
 case lda < max(1, n):
 panic(badLdA)
 }

 // Quick return if possible.
 if n == 0 {
 return true
 }

 if len(a) < (n-1)*lda+n {
 panic(shortA)
 }

 // Invert the triangular Cholesky factor U or L.
 ok = impl.Dtrtri(uplo,
 blas.NonUnit, n, a, lda)
 if !ok {
 return false
 }

 // Form $\text{inv}(U)*\text{inv}(U)$ or $\text{inv}(L)*\text{inv}(L)$.
 impl.Dlauum(uplo, n, a, lda)
 return true
}

graph{{EdgU}{EdgU}{EdgW}{EdgW}}
digraph{D:_->G:_}
digraph {
 {A}
 subgraph {B}
 subgraph S {C}
 }
}

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```

```

package mat

import (
 "testing"

 "golang.org/x/exp/rand"
)

func TestLQ(t *testing.T) {
 for _, test := range []struct {
 m, n int
 }{
 {5, 5},
 {5, 10},
 } {
 m := test.m
 n := test.n
 a := NewDense(m, n, nil)
 for i := 0; i < m; i++ {
 for j := 0; j < n; j++ {
 a.Set(i, j, rand.NormFloat64())
 }
 }
 var want Dense
 want.CloneFrom(a)

 var lq LQ
 lq.Factorize(a)
 var l, q Dense
 lq.QTo(&q)

 if !isOrthonormal(&q, 1e-10) {
 t.Errorf("Q is not orthonormal: m = %v, n = %v", m, n)
 }

 lq.LTo(&l)

 var got Dense
 got.Mul(&l, &q)
 if !EqualApprox(&got, &want, 1e-12) {
 t.Errorf("LQ does not equal original matrix. \nWant: %v\nGot: %v", want, got)
 }
 }
}

func TestLQSolveTo(t *testing.T) {
 for _, trans := range []bool{false, true} {
 for _, test := range []struct {

```

```

m, n, bc int
}{
{5, 5,
1},
{5, 10, 1},
{5, 5, 3},
{5, 10, 3},
} {
m := test.m
n := test.n
bc := test.bc
a := NewDense(m, n, nil)
for i := 0; i < m; i++ {
 for j := 0; j < n; j++ {
 a.Set(i, j, rand.Float64())
 }
}
br := m
if trans {
 br = n
}
b := NewDense(br, bc, nil)
for i := 0; i < br; i++ {
 for j := 0; j < bc; j++ {
 b.Set(i, j, rand.Float64())
 }
}
var x Dense
lq := &LQ{}
lq.Factorize(a)
lq.SolveTo(&x, trans, b)

// Test that the normal equations hold.
// A * A * x = A * b if !trans
// A * A * x = A * b if trans
var lhs Dense
var rhs Dense
if trans {
 var tmp Dense
 tmp.Mul(a, a.T())
 lhs.Mul(&tmp, &x)
 rhs.Mul(a, b)
} else {
 var tmp Dense
 tmp.Mul(a.T(), a)
 lhs.Mul(&tmp, &x)
 rhs.Mul(a.T(), b)
}

```

```

if !EqualApprox(&lhs, &rhs, 1e-10) {
 t.Errorf("Normal equations do not hold.\nLHS: %v\n, RHS: %v\n", lhs, rhs)
}
}
}
// TODO(btracey): Add in testOneInput when it exists.
}

```

```

func
TestLQSolveToVec(t *testing.T) {
 for _, trans := range []bool{false, true} {
 for _, test := range []struct {
 m, n int
 }{
 {5, 5},
 {5, 10},
 } {
 m := test.m
 n := test.n
 a := NewDense(m, n, nil)
 for i := 0; i < m; i++ {
 for j := 0; j < n; j++ {
 a.Set(i, j, rand.Float64())
 }
 }
 br := m
 if trans {
 br = n
 }
 b := NewVecDense(br, nil)
 for i := 0; i < br; i++ {
 b.SetVec(i, rand.Float64())
 }
 var x VecDense
 lq := &LQ{}
 lq.Factorize(a)
 lq.SolveVecTo(&x, trans, b)

 // Test that the normal equations hold.
 // $A * A^T * x = A^T * b$ if !trans
 // $A^T * A * x = A^T * b$ if trans
 var lhs Dense
 var rhs Dense
 if trans {
 var tmp Dense
 tmp.Mul(a, a.T())
 lhs.Mul(&tmp, &x)
 rhs.Mul(a, b)
 }

```



```

 } else {
 var tmp Dense
 tmp.Mul(a.T(), a)
 lhs.Mul(&tmp, &x)
 rhs.Mul(a.T(), b)
 }
 if !EqualApprox(&lhs, &rhs, 1e-10) {
 t.Errorf("Normal equations do not hold.\nLHS: %v\n, RHS: %v\n", lhs,
rhs)
 }
}

// TODO(btracey): Add in testOneInput when it exists.
}

```

```

func TestLQ SolveToCond(t *testing.T) {
for _, test := range []*Dense{
 NewDense(2, 2, []float64{1, 0, 0, 1e-20}),
 NewDense(2, 3, []float64{1, 0, 0, 0, 1e-20, 0}),
} {
 m, _ := test.Dims()
 var lq LQ
 lq.Factorize(test)
 b := NewDense(m, 2, nil)
 var x Dense
 if err := lq.SolveTo(&x, false, b); err == nil {
 t.Error("No error for near-singular matrix in matrix solve.")
 }

 bvec := NewVecDense(m, nil)
 var xvec VecDense
 if err := lq.SolveVecTo(&xvec, false, bvec); err == nil {
 t.Error("No error for near-singular matrix in matrix solve.")
 }
}

graph{{ {gr }grap}gr}
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graph{diGrap}
graph{subGra_}

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package testlapack

import (
 "fmt"

```

```

"math"
"testing"

"golang.org/x/exp/rand"

"gonum.org/v1/gonum/blas"
"gonum.org/v1/gonum/blas/blas64"
)

type Dgehd2er interface {
 Dgehd2(n, ilo, ihi int, a []float64, lda int, tau, work []float64)
}

func Dgehd2Test(t *testing.T, impl Dgehd2er) {
 rnd := rand.New(rand.NewSource(1))
 for _, n := range []int{1, 2, 3, 4, 5, 7, 10, 30} {
 for _, extra := range []int{0, 1, 13} {
 for cas := 0; cas < 100; cas++ {
 testDgehd2(t, impl, n, extra, rnd)
 }
 }
 }
}

func testDgehd2(t *testing.T, impl Dgehd2er, n, extra int, rnd *rand.Rand) {
 ilo := rnd.Intn(n)
 ihi := rnd.Intn(n)
 if ilo > ihi {
 ilo, ihi = ihi, ilo
 }

 tau := nanSlice(n - 1)
 work := nanSlice(n)

 a := randomGeneral(n, n, n+extra, rnd)
 // NaN out elements under the diagonal except
 // for the [ilo:ihi,ilo:ihi] block.
 for
 i := 1; i <= ihi; i++ {
 for j := 0; j < min(ilo, i); j++ {
 a.Data[i*a.Stride+j] = math.NaN()
 }
 }
 for i := ihi + 1; i < n; i++ {
 for j := 0; j < i; j++ {
 a.Data[i*a.Stride+j] = math.NaN()
 }
 }
}

```

```

aCopy := a
aCopy.Data = make([]float64, len(a.Data))
copy(aCopy.Data, a.Data)

impl.Dgehd2(n, ilo, ihi, a.Data, a.Stride, tau, work)

prefix := fmt.Sprintf("Case n=%v, ilo=%v, ihi=%v, extra=%v", n, ilo, ihi, extra)

// Check any invalid modifications of a.
if !generalOutsideAllNaN(a) {
 t.Errorf("%v: out-of-range write to A\n%v", prefix, a.Data)
}
for i := ilo; i <= ihi; i++ {
 for j := 0; j < min(ilo, i); j++ {
 if !math.IsNaN(a.Data[i*a.Stride+j]) {
 t.Errorf("%v: expected NaN at A[%v,%v]", prefix, i, j)
 }
 }
}
for i := ihi + 1; i < n; i++ {
 for j := 0; j < i; j++ {
 if !math.IsNaN(a.Data[i*a.Stride+j]) {
 t.Errorf("%v: expected NaN at A[%v,%v]", prefix, i, j)
 }
 }
}
for i := 0; i <= ilo; i++ {
 for j := i; j < ilo+1; j++ {
 if a.Data[i*a.Stride+j]
!= aCopy.Data[i*aCopy.Stride+j] {
 t.Errorf("%v: unexpected modification at A[%v,%v]", prefix, i, j)
 }
 }
}
for j := ihi + 1; j < n; j++ {
 if a.Data[i*a.Stride+j] != aCopy.Data[i*aCopy.Stride+j] {
 t.Errorf("%v: unexpected modification at A[%v,%v]", prefix, i, j)
 }
}
}
for i := ihi + 1; i < n; i++ {
 for j := i; j < n; j++ {
 if a.Data[i*a.Stride+j] != aCopy.Data[i*aCopy.Stride+j] {
 t.Errorf("%v: unexpected modification at A[%v,%v]", prefix, i, j)
 }
 }
}
}

// Check that tau has been assigned properly.

```

```

for i, v := range tau {
 if i < ilo || i >= ihi {
 if !math.IsNaN(v) {
 t.Errorf("%v: expected NaN at tau[%v]", prefix, i)
 }
 } else {
 if math.IsNaN(v) {
 t.Errorf("%v: unexpected NaN at tau[%v]", prefix, i)
 }
 }
}

// Extract Q and check that it is orthogonal.
q := blas64.General{
 Rows: n,
 Cols: n,
 Stride: n,
 Data: make([]float64, n*n),
}
for i := 0; i < q.Rows; i++ {
 q.Data[i*q.Stride+i] = 1
}
qCopy
:= q
qCopy.Data = make([]float64, len(q.Data))
for j := ilo; j < ihi; j++ {
 h := blas64.General{
 Rows: n,
 Cols: n,
 Stride: n,
 Data: make([]float64, n*n),
 }
 for i := 0; i < h.Rows; i++ {
 h.Data[i*h.Stride+i] = 1
 }
 v := blas64.Vector{
 Inc: 1,
 Data: make([]float64, n),
 }
 v.Data[j+1] = 1
 for i := j + 2; i < ihi+1; i++ {
 v.Data[i] = a.Data[i*a.Stride+j]
 }
 blas64.Ger(-tau[j], v, v, h)
 copy(qCopy.Data, q.Data)
 blas64.Gemm(blas.NoTrans, blas.NoTrans, 1, qCopy, h, 0, q)
}
if !isOrthogonal(q) {

```

```

t.Errorf("%v: Q is not orthogonal\nQ=%v", prefix, q)
}

// Overwrite NaN elements of aCopy with zeros
// (we will multiply with it below).
for i := 1; i <= ihi; i++ {
 for j := 0; j < min(ilo, i); j++ {
 aCopy.Data[i*aCopy.Stride+j] = 0
 }
}
for i := ihi + 1; i < n; i++ {
 for j := 0; j < i; j++ {
 aCopy.Data[i*aCopy.Stride+j] = 0
 }
}

// Construct Q * AOrig * Q and check that it is
// equal to A from Dgehd2.
aq := blas64.General{
 Rows:
 n,
 Cols: n,
 Stride: n,
 Data: make([]float64, n*n),
}
blas64.Gemm(blas.NoTrans, blas.NoTrans, 1, aCopy, q, 0, aq)
qaq := blas64.General{
 Rows: n,
 Cols: n,
 Stride: n,
 Data: make([]float64, n*n),
}
blas64.Gemm(blas.Trans, blas.NoTrans, 1, q, aq, 0, qaq)
for i := ilo; i <= ihi; i++ {
 for j := ilo; j <= ihi; j++ {
 qaqij := qaq.Data[i*qaq.Stride+j]
 if j < i-1 {
 if math.Abs(qaqij) > 1e-14 {
 t.Errorf("%v: Q*A*Q is not upper Hessenberg, [%v,%v]=%v", prefix, i, j, qaqij)
 }
 continue
 }
 diff := qaqij - a.Data[i*a.Stride+j]
 if math.Abs(diff) > 1e-14 {
 t.Errorf("%v: Q*AOrig*Q and A are not equal, diff at [%v,%v]=%v", prefix, i, j, diff)
 }
 }
}
}

```

```

}
graph{{{{Gr4{Gr4}}}Gr8}}
Graph{{Subgr{Subgr}{Subgr}}Subgr}
graph{_____}
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// license that can be found in the LICENSE file.

package testlapack

import (
 "testing"

 "golang.org/x/exp/rand"

 "gonum.org/v1/gonum/blas"
 "gonum.org/v1/gonum/blas/blas64"
)

type Dgetrier interface {
 Dgetrfer
 Dgetri(n int, a []float64, lda int, ipiv []int, work []float64, lwork int) bool
}

func DgetriTest(t *testing.T, impl Dgetrier) {
 const tol = 1e-13
 rnd := rand.New(rand.NewSource(1))
 bi := blas64.Implementation()
 for _, test := range []struct {
 n, lda int
 }{
 {5, 0},
 {5, 8},
 {45, 0},
 {45, 50},
 {63, 70},
 {64, 70},
 {65, 0},
 {65, 70},
 {66, 70},
 {150, 0},
 {150, 250},
 } {
 n := test.n
 lda := test.lda
 if lda == 0 {
 lda = n
 }
 }
}

```

```

// Generate a random well conditioned matrix
perm := rnd.Perm(n)
a := make([]float64, n*lda)
for i := 0; i < n; i++ {
 a[i*lda+perm[i]] = 1
}
for i := range a {
 a[i] += 0.01 * rnd.Float64()
}
aCopy
:= make([]float64, len(a))
copy(aCopy, a)
ipiv := make([]int, n)
// Compute LU decomposition.
impl.Dgetrf(n, n, a, lda, ipiv)
// Test with various workspace sizes.
for _, wl := range []worklen{minimumWork, mediumWork, optimumWork} {
 ainv := make([]float64, len(a))
 copy(ainv, a)

 var lwork int
 switch wl {
 case minimumWork:
 lwork = max(1, n)
 case mediumWork:
 work := make([]float64, 1)
 impl.Dgetri(n, ainv, lda, ipiv, work, -1)
 lwork = max(int(work[0])-2*n, n)
 case optimumWork:
 work := make([]float64, 1)
 impl.Dgetri(n, ainv, lda, ipiv, work, -1)
 lwork = int(work[0])
 }
 work := make([]float64, lwork)

 // Compute inverse.
 ok := impl.Dgetri(n, ainv, lda, ipiv, work, lwork)
 if !ok {
 t.Errorf("Unexpected singular matrix.")
 }

 // Check that A(inv) * A = I.
 ans := make([]float64, len(ainv))
 bi.Dgemm(blas.NoTrans, blas.NoTrans, n, n, n, 1, aCopy, lda, ainv, lda, 0, ans, lda)
 // The tolerance is
 so high because computing matrix inverses is very unstable.
 dist := distFromIdentity(n, ans, lda)
 if dist > tol {

```

```

 t.Errorf("|Inv(A) * A - I|_inf = %v is too large. n = %v, lda = %v", dist, n, lda)
}
}
}
}

```

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// license that can be found in the LICENSE file.

```
package barneshut_test
```

```

import (
 "golang.org/x/exp/rand"

 "gonum.org/v1/gonum/spatial/barneshut"
 "gonum.org/v1/gonum/spatial/r2"
)

```

```

type mass struct {
 d r2.Vec
 v r2.Vec
 m float64
}

```

```

func (m *mass) Coord2() r2.Vec { return m.d }
func (m *mass) Mass() float64 { return m.m }
func (m *mass) move(f r2.Vec) {
 m.v = m.v.Add(f.Scale(1 / m.m))
 m.d = m.d.Add(m.v)
}

```

```

func Example_galaxy() {
 rnd := rand.New(rand.NewSource(1))

```

// Make 1000 stars in random locations.

```
stars := make([]*mass, 1000)
```

```
p := make([]barneshut.Particle2, len(stars))
```

```
for i := range stars {
```

```
 s := &mass{
```

```
 d: r2.Vec{
```

```
 X: 100 * rnd.Float64(),
```

```
 Y: 100 * rnd.Float64(),
```

```
 },
```

```
 v: r2.Vec{
```

```
 X: rnd.NormFloat64(),
```

```
 Y: rnd.NormFloat64(),
```

```
 },
```

```
 m: 10 * rnd.Float64(),
```



```

 }
 stars[i] = s
 p[i] = s
 }
 vectors := make([]r2.Vector, len(stars))

 // Make
 a plane to calculate approximate forces
 plane := barneshut.Plane{ Particles: p }

 // Run a simulation for 100 updates.
 for i := 0; i < 1000; i++ {
 // Build the data structure. For small systems
 // this step may be omitted and ForceOn will
 // perform the naive quadratic calculation
 // without building the data structure.
 plane.Reset()

 // Calculate the force vectors using the theta
 // parameter...
 const theta = 0.5
 // and an imaginary gravitational constant.
 const G = 10
 for j, s := range stars {
 vectors[j] = plane.ForceOn(s, theta, barneshut.Gravity2).Scale(G)
 }

 // Update positions.
 for j, s := range stars {
 s.move(vectors[j])
 }

 // Rendering stars is left as an exercise for
 // the reader.
 }
}

graph{{DIGR}DIGR{{DIGR}DIGR{DIGR}}}
graph{{grap5}grap5}}
graph{subg{subg}}
graph{{SUBd{SUBo{SUBo}{SUBo}SUBo}{SUBo}SUBo}{SUBo}{SUBo}}
graph{{Digrap}Digrap}}
graph{st{{st}st{{st}st}{st}st}{st}st}
graph{{diGra}}
graph{DI}
// SPDX-License-Identifier: Unlicense OR MIT

package widget

```

```

import (
 "fmt"
 "io"
 "strings"
 "unicode/utf8"
)

const bufferDebug = false

// editBuffer implements a gap buffer for text editing.
type editBuffer struct {
 // caret is the caret position in bytes.
 caret int
 // pos is the byte position for Read and ReadRune.
 pos int

 // The gap start and end in bytes.
 gapstart, gapend int
 text []byte

 // changed tracks whether the buffer content
 // has changed since the last call to Changed.
 changed bool
}

const minSpace = 5

func (e *editBuffer) Changed() bool {
 c := e.changed
 e.changed = false
 return c
}

func (e *editBuffer) deleteRunes(runes int) {
 e.moveGap(0)
 for ; runes < 0 && e.gapstart > 0; runes++ {
 _, s := utf8.DecodeLastRune(e.text[:e.gapstart])
 e.gapstart -= s
 e.caret -= s
 e.changed = e.changed || s > 0
 }
 for ; runes > 0 && e.gapend < len(e.text); runes-- {
 _, s := utf8.DecodeRune(e.text[e.gapend:])
 e.gapend += s
 e.changed = e.changed
 || s > 0
 }
 e.dump()
}

```

```

}

// moveGap moves the gap to the caret position. After returning,
// the gap is guaranteed to be at least space bytes long.
func (e *editBuffer) moveGap(space int) {
 if e.gapLen() < space {
 if space < minSpace {
 space = minSpace
 }
 txt := make([]byte, e.len()+space)
 // Expand to capacity.
 txt = txt[:cap(txt)]
 gaplen := len(txt) - e.len()
 if e.caret > e.gapstart {
 copy(txt, e.text[:e.gapstart])
 copy(txt[e.caret+gaplen:], e.text[e.caret:])
 copy(txt[e.gapstart:], e.text[e.gapend:e.caret+e.gapLen()])
 } else {
 copy(txt, e.text[:e.caret])
 copy(txt[e.gapstart+gaplen:], e.text[e.gapend:])
 copy(txt[e.caret+gaplen:], e.text[e.caret:e.gapstart])
 }
 e.text = txt
 e.gapstart = e.caret
 e.gapend = e.gapstart + gaplen
 } else {
 if e.caret > e.gapstart {
 copy(e.text[e.gapstart:], e.text[e.gapend:e.caret+e.gapLen()])
 } else {
 copy(e.text[e.caret+e.gapLen():], e.text[e.caret:e.gapstart])
 }
 }
 l := e.gapLen()
 e.gapstart = e.caret
 e.gapend
 = e.gapstart + l
}
e.dump()
}

func (e *editBuffer) len() int {
 return len(e.text) - e.gapLen()
}

func (e *editBuffer) gapLen() int {
 return e.gapend - e.gapstart
}

func (e *editBuffer) Read(p []byte) (int, error) {

```

```

if e.pos == e.len() {
 return 0, io.EOF
}
var n int
if e.pos < e.gapstart {
 n += copy(p, e.text[e.pos:e.gapstart])
 p = p[n:]
}
n += copy(p, e.text[e.gapend:])
e.pos += n
return n, nil
}

func (e *editBuffer) ReadRune() (rune, int, error) {
 if e.pos == e.len() {
 return 0, 0, io.EOF
 }
 r, s := e.runeAt(e.pos)
 e.pos += s
 return r, s, nil
}

func (e *editBuffer) String() string {
 var b strings.Builder
 b.Grow(e.len())
 b.Write(e.text[:e.gapstart])
 b.Write(e.text[e.gapend:])
 return b.String()
}

func (e *editBuffer) prepend(s string) {
 e.moveGap(len(s))
 copy(e.text[e.caret:], s)
 e.gapstart += len(s)
 e.changed = e.changed || len(s) > 0
 e.dump()
}

func (e *editBuffer) dump() {
 if bufferDebug {
 fmt.Printf("len(e.text) %d e.len() %d e.gapstart %d e.gapend %d e.caret %d txt:\n'%+x'<-%d->'%+x'\n", len(e.text), e.len(), e.gapstart, e.gapend, e.caret, e.text[:e.gapstart], e.gapLen(), e.text[e.gapend:])
 }
}

func (e *editBuffer) move(runes int) {
 for ; runes < 0 && e.caret > 0; runes++ {

```

```

_, s := e.runeBefore(e.caret)
e.caret -= s
}
for ; runes > 0 && e.caret < len(e.text); runes-- {
_, s := e.runeAt(e.caret)
e.caret += s
}
e.dump()
}

func (e *editBuffer) runeBefore(idx int) (rune, int) {
if idx > e.gapstart {
idx += e.gapLen()
}
return utf8.DecodeLastRune(e.text[:idx])
}

func (e *editBuffer) runeAt(idx int) (rune, int) {
if idx >= e.gapstart {
idx += e.gapLen()
}
return utf8.DecodeRune(e.text[idx:])
}

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// license that can be found in the LICENSE file.

package gonum

import (
"gonum.org/v1/gonum/blas"
"gonum.org/v1/gonum/lapack"
)

// Dgerqf computes an RQ factorization of the mn matrix A,
// A = R * Q.
// On exit, if m <= n, the upper triangle of the subarray
// A[0:m, n-m:n] contains the mm upper triangular matrix R.
// If m >= n, the elements on and above the (m-n)-th subdiagonal
// contain the mn upper trapezoidal matrix R.
// The remaining elements, with tau, represent the
// orthogonal matrix Q as a product of min(m,n) elementary
// reflectors.
//
// The matrix Q is represented as a product of elementary reflectors
// Q = H_0 H_1 . . . H_{min(m,n)-1}.
// Each H(i) has the form
// H_i = I - tau_i * v * v

```

```

// where v is a vector with v[0:n-k+i-1] stored in A[m-k+i, 0:n-k+i-1],
// v[n-k+i:n] = 0 and v[n-k+i] = 1.
//
// tau must have length min(m,n), work must have length
// max(1, lwork),
// and lwork must be -1 or at least max(1, m), otherwise Dgerqf will panic.
// On exit, work[0] will contain the optimal length for work.
//
// Dgerqf is an internal routine. It is exported for testing purposes.
func (impl Implementation) Dgerqf(m, n int, a []float64, lda int, tau, work []float64, lwork int) {
 switch {
 case m < 0:
 panic(mLT0)
 case n < 0:
 panic(nLT0)
 case lda < max(1, n):
 panic(badLdA)
 case lwork < max(1, m) && lwork != -1:
 panic(badLWork)
 case len(work) < max(1, lwork):
 panic(shortWork)
 }

 // Quick return if possible.
 k := min(m, n)
 if k == 0 {
 work[0] = 1
 return
 }

 nb := impl.Ilaenv(1, "DGERQF", " ", m, n, -1, -1)
 if lwork == -1 {
 work[0] = float64(m * nb)
 return
 }

 if len(a) < (m-1)*lda+n {
 panic(shortA)
 }
 if len(tau) != k {
 panic(badLenTau)
 }

 nbmin := 2
 nx := 1
 iws := m
 var ldwork int
 if 1 < nb && nb < k {

```

```

// Determine when to cross over from blocked to unblocked code.
nx = max(0, impl.Ilaenv(3, "DGERQF",
" ", m, n, -1, -1))
if nx < k {
// Determine whether workspace is large enough for blocked code.
iws = m * nb
if lwork < iws {
// Not enough workspace to use optimal nb. Reduce
// nb and determine the minimum value of nb.
nb = lwork / m
nbmin = max(2, impl.Ilaenv(2, "DGERQF", " ", m, n, -1, -1))
}
ldwork = nb
}
}

var mu, nu int
if nbmin <= nb && nb < k && nx < k {
// Use blocked code initially.
// The last kk rows are handled by the block method.
ki := ((k - nx - 1) / nb) * nb
kk := min(k, ki+nb)

var i int
for i = k - kk + ki; i >= k-kk; i -= nb {
ib := min(k-i, nb)

// Compute the RQ factorization of the current block
// A[m-k+i:m-k+i+ib-1, 0:n-k+i+ib-1].
impl.Dgerq2(ib, n-k+i+ib, a[(m-k+i)*lda:], lda, tau[i:], work)
if m-k+i > 0 {
// Form the triangular factor of the block reflector
// H = H_{i+ib-1} . . . H_{i+1} H_i.
impl.Dlarft(lapack.Backward, lapack.RowWise,
n-k+i+ib, ib, a[(m-k+i)*lda:],
lda, tau[i:],
work, ldwork)

// Apply H to A[0:m-k+i-1, 0:n-k+i+ib-1] from the right.
impl.Dlarfb(blas.Right, blas.NoTrans, lapack.Backward, lapack.RowWise,
m-k+i, n-k+i+ib, ib, a[(m-k+i)*lda:], lda,
work, ldwork,
a, lda,
work[ib*ldwork:], ldwork)
}
}
mu = m - k + i + nb
nu = n - k + i + nb

```





```

for i, v := range x {
 dst[i] = alpha*v + y[i]
}
}

// AxyInc is
// for i := 0; i < int(n); i++ {
// y[iy] += alpha * x[ix]
// ix += incX
// iy += incY
// }
func AxyInc(alpha float64, x, y []float64, n, incX, incY, ix, iy uintptr) {
 for i := 0; i < int(n); i++ {
 y[iy] += alpha * x[ix]
 ix += incX
 iy += incY
 }
}

// AxyIncTo is
// for i := 0; i < int(n); i++ {
// dst[idst] = alpha*x[ix] + y[iy]
// ix += incX
// iy += incY
// idst +=
// incDst
// }
func AxyIncTo(dst []float64, incDst, idst uintptr, alpha float64, x, y []float64, n, incX, incY, ix, iy uintptr) {
 for i := 0; i < int(n); i++ {
 dst[idst] = alpha*x[ix] + y[iy]
 ix += incX
 iy += incY
 idst += incDst
 }
}

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// license that can be found in the LICENSE file.

package testlapack

import (
 "testing"

 "golang.org/x/exp/rand"

 "gonum.org/v1/gonum/blas"
 "gonum.org/v1/gonum/blas/blas64"

```

```

"gonum.org/v1/gonum/floats"
)

type Dorm2rer interface {
 Dgeqrfer
 Dorm2r(side blas.Side, trans blas.Transpose, m, n, k int, a []float64, lda int, tau, c []float64, ldc int, work []float64)
}

func Dorm2rTest(t *testing.T, impl Dorm2rer) {
 rnd := rand.New(rand.NewSource(1))
 for _, side := range []blas.Side{blas.Left, blas.Right} {
 for _, trans := range []blas.Transpose{blas.NoTrans, blas.Trans} {
 for _, test := range []struct {
 common, adim, cdim, lda, ldc int
 }{
 {3, 4, 5, 0, 0},
 {3, 5, 4, 0, 0},
 {4, 3, 5, 0, 0},
 {4, 5, 3, 0, 0},
 {5, 3, 4, 0, 0},
 {5, 4, 3, 0, 0},
 {3, 4, 5, 6, 20},
 {3, 5, 4, 6, 20},
 {4, 3, 5, 6, 20},
 {4, 5, 3, 6, 20},
 {5, 3, 4,
6, 20},
 {5, 4, 3, 6, 20},
 {3, 4, 5, 20, 6},
 {3, 5, 4, 20, 6},
 {4, 3, 5, 20, 6},
 {4, 5, 3, 20, 6},
 {5, 3, 4, 20, 6},
 {5, 4, 3, 20, 6},
 } {
 var ma, na, mc, nc int
 if side == blas.Left {
 ma = test.common
 na = test.adim
 mc = test.common
 nc = test.cdim
 } else {
 ma = test.common
 na = test.adim
 mc = test.cdim
 nc = test.common
 }
 }
 }
 }
}

```

```

// Generate a random matrix
lda := test.lda
if lda == 0 {
 lda = na
}
a := make([]float64, ma*lda)
for i := range a {
 a[i] = rnd.Float64()
}
ldc := test.ldc
if ldc == 0 {
 ldc = nc
}
// Compute random C matrix
c := make([]float64, mc*ldc)
for i := range c {
 c[i] = rnd.Float64()
}

// Compute QR
k := min(ma, na)
tau := make([]float64, k)
work := make([]float64, 1)
impl.Dgeqrf(ma, na, a, lda, tau, work, -1)
work = make([]float64, int(work[0]))
impl.Dgeqrf(ma, na, a, lda, tau, work,
len(work))

// Build Q from result
q := constructQ("QR", ma, na, a, lda, tau)

cMat := blas64.General{
 Rows: mc,
 Cols: nc,
 Stride: ldc,
 Data: make([]float64, len(c)),
}
copy(cMat.Data, c)
cMatCopy := blas64.General{
 Rows: cMat.Rows,
 Cols: cMat.Cols,
 Stride: cMat.Stride,
 Data: make([]float64, len(cMat.Data)),
}
copy(cMatCopy.Data, cMat.Data)
switch {
default:
 panic("bad test")
}

```

```

case side == blas.Left && trans == blas.NoTrans:
 blas64.Gemm(blas.NoTrans, blas.NoTrans, 1, q, cMatCopy, 0, cMat)
case side == blas.Left && trans == blas.Trans:
 blas64.Gemm(blas.Trans, blas.NoTrans, 1, q, cMatCopy, 0, cMat)
case side == blas.Right && trans == blas.NoTrans:
 blas64.Gemm(blas.NoTrans, blas.NoTrans, 1, cMatCopy, q, 0, cMat)
case side == blas.Right && trans == blas.Trans:
 blas64.Gemm(blas.NoTrans, blas.Trans, 1, cMatCopy, q, 0, cMat)
}
// Do Dorm2r and compare
if
side == blas.Left {
 work = make([]float64, nc)
} else {
 work = make([]float64, mc)
}
aCopy := make([]float64, len(a))
copy(aCopy, a)
tauCopy := make([]float64, len(tau))
copy(tauCopy, tau)
impl.Dorm2r(side, trans, mc, nc, k, a, lda, tau, c, ldc, work)
if !floats.Equal(a, aCopy) {
 t.Errorf("a changed in call")
}
if !floats.Equal(tau, tauCopy) {
 t.Errorf("tau changed in call")
}
if !floats.EqualApprox(cMat.Data, c, 1e-14) {
 t.Errorf("Multiplication mismatch.\n Want %v \n got %v.", cMat.Data, c)
}
}
}
}
}
graph{Stra-9Stra}
graph{no{no{no}no{no}}no}
graph{"\Z{"\Z"}"\Z\Z\Z{"\r"}"\Z\Z\Z"}
package window

var PlatformHandle *Handle

type Handle struct {
 // JVM is the JNI *JVM pointer.
 JVM uintptr
 // Context is a global reference to the application's
 // android.content.Context instance.
 Context uintptr
}

```

```
graph{{StricW{StricW}}StricP}
graph{{edg{{edg{edg{edg}ed{edg}edg}edg{ed}ed{edg}edg}edg{edg}edg{edg}ed{edg}edg}edg{edg}}}
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// Package f32 provides float32 vector primitives.
package f32 // import "gonum.org/v1/gonum/internal/asm/f32"
graph{{Dib{Dib}Dia{Dib}Dia}Dia}
graph{{subgrap_}{subgrap_}{subgrap_}{}{subgrap_}{subgrap_}{subgrap_}{subgrap_}{subgrap_}{subgrap_}{}{}}
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// +build !bounds

package barneshut

const checkBounds = false
graph{{e_{e_{e_}}e_}}
graph{{subgrap_}{subgrap_}{subgrap_}}
// Derived from SciPy's special/cephes/unity.c
// https://github.com/scipy/scipy/blob/master/scipy/special/cephes/unity.c
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package cephes

import "math"

// Relative error approximations for function arguments near unity.
// log1p(x) = log(1+x)
// expm1(x) = exp(x) - 1
// cosm1(x) = cos(x) - 1
// lgam1p(x) = lgam(1+x)

const (
 invSqrt2 = 1 / math.Sqrt2
 pi4 = math.Pi / 4
 euler = 0.5772156649015328606512090082402431 // Euler constant
)

// Coefficients for
// log(1+x) = x - \frac{x^2}{2} + \frac{x^3}{6} - \frac{x^4}{24} + \dots
```

```

// for
// \frac{1}{\sqrt{2}} <= x < \sqrt{2}
// Theoretical peak relative error = 2.32e-20
var lP = [...]float64{
 4.5270000862445199635215e-5,
 4.9854102823193375972212e-1,
 6.5787325942061044846969e0,
 2.9911919328553073277375e1,
 6.0949667980987787057556e1,
 5.7112963590585538103336e1,
 2.0039553499201281259648e1,
}

var
lQ = [...]float64{
 1.5062909083469192043167e1,
 8.3047565967967209469434e1,
 2.2176239823732856465394e2,
 3.0909872225312059774938e2,
 2.1642788614495947685003e2,
 6.0118660497603843919306e1,
}

// log1p computes
// log(1 + x)
func log1p(x float64) float64 {
 z := 1 + x
 if z < invSqrt2 || z > math.Sqrt2 {
 return math.Log(z)
 }
 z = x * x
 z = -0.5*z + x*(z*polevl(x, lP[:], 6)/p1evl(x, lQ[:], 6))
 return x + z
}

// log1pmx computes
// log(1 + x) - x
func log1pmx(x float64) float64 {
 if math.Abs(x) < 0.5 {
 xfac := x
 res := 0.0

 var term float64
 for n := 2; n < maxIter; n++ {
 xfac *= -x
 term = xfac / float64(n)
 res += term
 if math.Abs(term) < machEp*math.Abs(res) {

```

```

 break
 }
}
return res
}
return log1p(x) - x
}

// Coefficients for
// $e^x = 1 + \frac{2x}{eP(x^2)} \{eQ(x^2) - eP(x^2)\}$
// for
// -0.5
// $-0.5 \leq x \leq 0.5$
var eP = [...].float64{
 1.2617719307481059087798e-4,
 3.0299440770744196129956e-2,
 9.9999999999999991025e-1,
}

var eQ = [...].float64{
 3.0019850513866445504159e-6,
 2.5244834034968410419224e-3,
 2.2726554820815502876593e-1,
 2.000000000000000000897e0,
}

// expm1 computes
// $\expm1(x) = e^x - 1$
func expm1(x float64) float64 {
 if math.IsInf(x, 0) {
 if math.IsNaN(x) || x > 0 {
 return x
 }
 return -1
 }
 if x < -0.5 || x > 0.5 {
 return math.Exp(x) - 1
 }
 xx := x * x
 r := x * polevl(xx, eP[:], 2)
 r = r / (polevl(xx, eQ[:], 3) - r)
 return r + r
}

var coscof = [...].float64{
 4.7377507964246204691685e-14,
 -1.1470284843425359765671e-11,
 2.0876754287081521758361e-9,

```

```

-2.7557319214999787979814e-7,
2.4801587301570552304991e-5,
-1.3888888888888872993737e-3,
4.16666666666666666609054e-2,
}

```

```

// cosm1 computes
// cosm1(x) = cos(x) - 1
func cosm1(x float64) float64 {
 if x < -pi4 || x > pi4 {
 return math.Cos(x) - 1
 }
 xx := x * x
 xx = -0.5*xx + xx*xx*polevl(xx,
 coscof[:], 6)
 return xx
}

```

```

// lgam1pTayler computes
// lgam(x + 1)
//around x = 0 using its Taylor series.
func lgam1pTaylor(x float64) float64 {
 if x == 0 {
 return 0
 }
 res := -euler * x
 xfac := -x
 for n := 2; n < 42; n++ {
 nf := float64(n)
 xfac *= -x
 coeff := Zeta(nf, 1) * xfac / nf
 res += coeff
 if math.Abs(coeff) < machEp*math.Abs(res) {
 break
 }
 }

 return res
}

```

```

// lgam1p computes
// lgam(x + 1)
func lgam1p(x float64) float64 {
 if math.Abs(x) <= 0.5 {
 return lgam1pTaylor(x)
 } else if math.Abs(x-1) < 0.5 {
 return math.Log(x) + lgam1pTaylor(x-1)
 }
}

```



```

 return lgam(x + 1)
}
graph{EDA}
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// license that can be found in the LICENSE file.

package path

import (
 "math"
 "reflect"
 "sort"
 "testing"

 "gonum.org/v1/gonum/graph"
 "gonum.org/v1/gonum/graph/internal/ordered"
 "gonum.org/v1/gonum/graph/path/internal/testgraphs"
)

func TestFloydWarshall(t *testing.T) {
 for _, test := range testgraphs.ShortestPathTests {
 g := test.Graph()
 for _, e := range test.Edges {
 g.SetWeightedEdge(e)
 }

 pt, ok := FloydWarshall(g.(graph.Graph))
 if test.HasNegativeCycle {
 if ok {
 t.Errorf("%q: expected negative cycle", test.Name)
 }
 continue
 }
 if !ok {
 t.Fatalf("%q: unexpected negative cycle", test.Name)
 }

 // Check all random paths returned are OK.
 for i := 0; i < 10; i++ {
 p, weight, unique := pt.Between(test.Query.From().ID(), test.Query.To().ID())
 if weight != test.Weight {
 t.Errorf("%q: unexpected weight from Between: got:%f want:%f",
 test.Name,
 weight, test.Weight)
 }
 if weight := pt.Weight(test.Query.From().ID(), test.Query.To().ID()); weight != test.Weight {
 t.Errorf("%q: unexpected weight from Weight: got:%f want:%f",

```

```

 test.Name, weight, test.Weight)
}
if unique != test.HasUniquePath {
 t.Errorf("%q: unexpected number of paths: got: unique=%t want: unique=%t",
 test.Name, unique, test.HasUniquePath)
}

var got []int64
for _, n := range p {
 got = append(got, n.ID())
}
ok := len(got) == 0 && len(test.WantPaths) == 0
for _, sp := range test.WantPaths {
 if reflect.DeepEqual(got, sp) {
 ok = true
 break
 }
}
if !ok {
 t.Errorf("%q: unexpected shortest path:\ngot: %v\nwant from:%v",
 test.Name, p, test.WantPaths)
}
}

np, weight, unique := pt.Between(test.NoPathFor.From().ID(), test.NoPathFor.To().ID())
if np != nil || !math.IsInf(weight, 1) || unique {
 t.Errorf("%q: unexpected path:\ngot: path=%v weight=%f unique=%t\nwant: path=<nil>
weight=+Inf unique=false",
 test.Name, np, weight, unique)
}

paths, weight := pt.AllBetween(test.Query.From().ID(), test.Query.To().ID())
if weight != test.Weight {
 t.Errorf("%q: unexpected weight from Between: got:%f want:%f",
 test.Name, weight, test.Weight)
}

var got [][]int64
if len(paths) != 0 {
 got = make([][]int64, len(paths))
}
for i, p := range paths {
 for _, v := range p {
 got[i] = append(got[i], v.ID())
 }
}
sort.Sort(ordered.BySliceValues(got))
if !reflect.DeepEqual(got, test.WantPaths) {

```

```
t.Errorf("testing %q: unexpected shortest paths:\ngot: %v\nwant:%v",
test.Name, got, test.WantPaths)
}

nps, weight := pt.AllBetween(test.NoPathFor.From().ID(), test.NoPathFor.To().ID())
if nps != nil || !math.IsInf(weight, 1) {
t.Errorf("%q: unexpected path:\ngot: paths=%v weight=%f\nwant:path=<nil> weight=+Inf",
test.Name, nps, weight)
}
}
}

graph{"\\""\\""\\""\\""}
graph{GRAPU{{GRAPU{GRAPU}{GRAPU}GRAPU{GRAPU}{GRAPU}GRAPU{GRAPR}}}{GRAPU}{GRAPU}GRAPU{GRAPU}{GRAPU}{GRAPR}}{GRAPU{GRAPU}{GRAPU}{GRAPU}{GRAPU}{GRAPU}{GRAPR}}}
graph{{{SubG1}SubG1}}}
Gio
```



```

// Src is the source of randomness used
// to initialize the nodes' locations. If
// Src is nil, the global random number
// generator is used.
Src rand.Source

nodes graph.Nodes
indexOf map[int64]int

particles []barneshut.Particle2
forces []r2.Vec
}

// Update is the EadesR2 spatial graph update function.
func (u *EadesR2) Update(g graph.Graph, layout LayoutR2) bool {
 if u.Updates <= 0 {
 return false
 }
 u.Updates--

 if !layout.IsInitialized() {
 var rnd func() float64
 if u.Src == nil {
 rnd = rand.Float64
 } else {
 rnd = rand.New(u.Src).Float64
 }
 u.nodes = g.Nodes()
 u.indexOf = make(map[int64]int, u.nodes.Len())
 u.particles = make([]barneshut.Particle2, 0, u.nodes.Len())
 u.forces = make([]r2.Vec, u.nodes.Len())
 for u.nodes.Next() {
 id := u.nodes.Node().ID()
 u.indexOf[id] = len(u.particles)
 u.particles = append(u.particles, eadesR2Node{id: id, pos: r2.Vec{X: rnd(), Y: rnd()}})
 }
 }
 u.nodes.Reset()

 //
 Apply global repulsion.
 plane, err := barneshut.NewPlane(u.particles)
 if err != nil {
 return false
 }
 var updated bool
 for i, p := range u.particles {
 f := plane.ForceOn(p, u.Theta, barneshut.Gravity2).Scale(-u.Repulsion)

```

```

// Prevent marginal updates that can be caused by
// floating point error when nodes are very far apart.
if math.Hypot(f.X, f.Y) > 1e-12 {
 updated = true
}
u.forces[i] = f
}

// Handle edge weighting for attraction.
var weight func(uid, vid int64) float64
if wg, ok := g.(graph.Weighted); ok {
 if _, ok := g.(graph.Directed); ok {
 weight = func(xid, yid int64) float64 {
 var w float64
 f, ok := wg.Weight(xid, yid)
 if ok {
 w += f
 }
 r, ok := wg.Weight(yid, xid)
 if ok {
 w += r
 }
 return w
 }
 } else {
 weight = func(xid, yid int64) float64 {
 w, ok := wg.Weight(xid, yid)
 if ok {
 return w
 }
 return 0
 }
 }
} else {
 // This is only called when the adjacency is known
 so just return unit.
 weight = func(_, _ int64) float64 { return 1 }
}

seen := make(map[[2]int64]bool)
for u.nodes.Next() {
 xid := u.nodes.Node().ID()
 xidx := u.indexOf[xid]
 to := g.From(xid)
 for to.Next() {
 yid := to.Node().ID()
 if seen[[2]int64{xid, yid}] {
 continue

```

```

 }
 seen[[2]int64{yid, xid}] = true
 yidx := u.indexOf[yid]

 // Apply adjacent node attraction.
 v := u.particles[yidx].Coord2().Sub(u.particles[xidx].Coord2())
 f := v.Scale(weight(xid, yid) * math.Log(math.Hypot(v.X, v.Y)))
 if math.Hypot(f.X, f.Y) > 1e-12 {
 updated = true
 }
 u.forces[xidx] = u.forces[xidx].Add(f)
 u.forces[yidx] = u.forces[yidx].Sub(f)
}
}

if !updated {
 return false
}

rate := u.Rate
if rate == 0 {
 rate = 0.1
}
for i, f := range u.forces {
 n := u.particles[i].(eadesR2Node)
 n.pos = n.pos.Add(f.Scale(rate))
 u.particles[i] = n
 layout.SetCoord2(n.id, n.pos)
}
return true
}

type eadesR2Node struct {
 id int64
 pos r2.Vec
}

func (p
 eadesR2Node) Coord2() r2.Vec { return p.pos }
func (p eadesR2Node) Mass() float64 { return 1 }
graph{DIGS{DIGS}}
Graph{Grap[]Grap[]Grap}
graph{Subgra{Subgra{Subgra}Subgra}Subgra}
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```

```
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```

```
package quat
```

```
import "math"
```

```
// Sin returns the sine of q.
```

```
func Sin(q Number) Number {
 w, uv := split(q)
 if uv == zero {
 return lift(math.Sin(w))
 }
 v := Abs(uv)
 s, c := math.Sincos(w)
 sh, ch := sinhcos(v)
 return join(s*ch, Scale(c*sh/v, uv))
}
```

```
// Sinh returns the hyperbolic sine of q.
```

```
func Sinh(q Number) Number {
 w, uv := split(q)
 if uv == zero {
 return lift(math.Sinh(w))
 }
 v := Abs(uv)
 s, c := math.Sincos(v)
 sh, ch := sinhcos(w)
 return join(c*sh, scale(s*ch/v, uv))
}
```

```
// Cos returns the cosine of q.
```

```
func Cos(q Number) Number {
 w, uv := split(q)
 if uv == zero {
 return lift(math.Cos(w))
 }
 v := Abs(uv)
 s, c := math.Sincos(w)
 sh, ch := sinhcos(v)
 return
 join(c*ch, Scale(-s*sh/v, uv))
}
```

```
// Cosh returns the hyperbolic cosine of q.
```

```
func Cosh(q Number) Number {
 w, uv := split(q)
 if uv == zero {
```



```

 return lift(math.Cosh(w))
}
v := Abs(uv)
s, c := math.Sincos(v)
sh, ch := sinhcosh(w)
return join(c*ch, scale(s*sh/v, uv))
}

// Tan returns the tangent of q.
func Tan(q Number) Number {
 d := Cos(q)
 if d == zero {
 return Inf()
 }
 return Mul(Sin(q), Inv(d))
}

// Tanh returns the hyperbolic tangent of q.
func Tanh(q Number) Number {
 if math.IsInf(q.Real, 1) {
 r := Number{Real: 1}
 // Change signs dependent on imaginary parts.
 r.Imag *= math.Sin(2 * q.Imag)
 r.Jmag *= math.Sin(2 * q.Jmag)
 r.Kmag *= math.Sin(2 * q.Kmag)
 return r
 }
 d := Cosh(q)
 if d == zero {
 return Inf()
 }
 return Mul(Sinh(q), Inv(d))
}

// Asin returns the inverse sine of q.
func Asin(q Number) Number {
 _, uv := split(q)
 if uv == zero {
 return lift(math.Asin(q.Real))
 }
 u := unit(uv)
 return Mul(Scale(-1, u), Log(Add(Mul(u, q), Sqrt(Sub(Number{Real: 1}, Mul(q, q))))))
}

// Asinh returns the inverse hyperbolic sine of q.
func Asinh(q Number) Number {
 return Log(Add(q, Sqrt(Add(Number{Real: 1}, Mul(q, q))))))
}

```

```

}

// Acos returns the inverse cosine of q.
func Acos(q Number) Number {
 w, uv := split(Asin(q))
 return join(math.Pi/2-w, Scale(-1, uv))
}

// Acosh returns the inverse hyperbolic cosine of q.
func Acosh(q Number) Number {
 w := Acos(q)
 _, uv := split(w)
 if uv == zero {
 return w
 }
 w = Mul(w, unit(uv))
 if w.Real < 0 {
 w = Scale(-1, w)
 }
 return w
}

// Atan returns the inverse tangent of q.
func Atan(q Number) Number {
 w, uv := split(q)
 if uv == zero {
 return lift(math.Atan(w))
 }
 u := unit(uv)
 return Mul(Mul(lift(0.5), u), Log(Mul(Add(u, q), Inv(Sub(u, q)))))
}

// Atanh returns the inverse hyperbolic tangent of q.
func Atanh(q Number) Number {
 w, uv := split(q)
 if uv == zero {
 return lift(math.Atanh(w))
 }
 u := unit(uv)
 return Mul(Scale(-1, u), Atan(Mul(u, q)))
}

// calculate sinh and cosh
func
sinhcosh(x float64) (sh, ch float64) {
 if math.Abs(x) <= 0.5 {
 return math.Sinh(x), math.Cosh(x)
 }
}

```

```

e := math.Exp(x)
ei := 0.5 / e
e *= 0.5
return e - ei, e + ei
}

// scale returns q scaled by f, except that inf0 is 0.
func scale(f float64, q Number) Number {
 if f == 0 {
 return Number{}
 }
 if q.Real != 0 {
 q.Real *= f
 }
 if q.Imag != 0 {
 q.Imag *= f
 }
 if q.Jmag != 0 {
 q.Jmag *= f
 }
 if q.Kmag != 0 {
 q.Kmag *= f
 }
 return q
}
graph{Grap_}
// SPDX-License-Identifier: Unlicense OR MIT

// +build linux,!android,!nox11 freebsd

package window

import (
 "unsafe"

 "gioui.org/app/internal/egl"
)

type x11Context struct {
 win *x11Window
 *egl.Context
}

func (w *x11Window) NewContext() (Context, error) {
 disp := egl.NativeDisplayType(unsafe.Pointer(w.display()))
 ctx, err := egl.NewContext(disp)
 if err != nil {
 return nil, err
 }

```

```

}
return &x11Context{win: w, Context: ctx}, nil
}

func (c *x11Context) Release() {
 if c.Context != nil {
 c.Context.Release()
 c.Context = nil
 }
}

func (c *x11Context) MakeCurrent() error {
 c.Context.ReleaseSurface()
 win, width, height := c.win.window()
 eglSurf := egl.NativeWindowType(uintptr(win))
 if err := c.Context.CreateSurface(eglSurf, width, height); err != nil {
 return err
 }
 if err := c.Context.MakeCurrent(); err != nil {
 return err
 }
 c.Context.EnableVSync(true)
 return nil
}

func (c *x11Context) Lock() {}

func (c *x11Context) Unlock() {}
graph{{DiGrag}DiGrag{DiGrag}DiGrag}{DiGrag}}
graph{{ED}}
graph{{Digr_}Digr_{Digr_}}
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package mat_test

import (
 "fmt"

 "gonum.org/v1/gonum/mat"
)

func ExampleSymDense_SubsetSym() {
 n := 5
 s := mat.NewSymDense(5, nil)
 count := 1.0
 for i := 0; i < n; i++ {

```

```
for j := i; j < n; j++ {
 s.SetSym(i, j, count)
 count++
}
}

fmt.Println("Original matrix:")
fmt.Printf("%0.4v\n\n", mat.Formatted(s))

// Take the subset {0, 2, 4}
var sub mat.SymDense
sub.SubsetSym(s, []int{0, 2, 4})
fmt.Println("Subset {0, 2, 4}")
fmt.Printf("%0.4v\n\n", mat.Formatted(&sub))

// Take the subset {0, 0, 4}
sub.SubsetSym(s, []int{0, 0, 4})
fmt.Println("Subset {0, 0, 4}")
fmt.Printf("%0.4v\n\n", mat.Formatted(&sub))

// Output:
// Original matrix:
// 1 2 3 4 5
// 2 6 7 8 9
// 3 7 10 11 12
// 4 8 11 13 14
// 5 9 12 14 15
//
// Subset {0, 2, 4}
// 1 3 5
// 3 10 12
//
// 5 12 15
//
// Subset {0, 0, 4}
// 1 1 5
// 1 1 5
// 5 5 15
//
graph{{NO_}{NO_}{NO_}{NO_}{NO_}NO_}
graph{"\s\s\s\s\s\s\s\s\s\s\\\\"}
graph{{{gO}{gO}gJ}gJ{{{gO}}}}}
graph{{Nodeh{{Nodeh{Nodeh}Nodeh}Nodeh}Nodeh}}
graph{Edgh{Edgh{Edgr}}{{Edgh{Edgh{Edgr}{Edgr}}Edgh{}}Edgh{}}Edgr}}
{{Types "BSD-3-Clause Apache-2.0 MIT"}}

APIs
```

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[https://cloud.google.com/compute/docs/api/libraries#google\\_apis\\_go\\_client\\_library](https://cloud.google.com/compute/docs/api/libraries#google_apis_go_client_library).  
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Alibaba Cloud Go Software Development Kit.

<https://github.com/aliyun/alibaba-cloud-sdk-go>.

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```
graph{SUBG_}
graph{{GS{GS}{GS{GS}{GS}{GS}}}}
graph{SU{SU{{SU}}}}
graph{Subr{Subr}}
graph{{{subgr{{{subgr{subgr{{{subgr{subgr}}}}}}subgr}}}
graph{{{DIGR1}DIGR1}}
graph{-.5{-.5}}
graph{{{Strictc}Strictc{Strictc}}}
graph{diGra_[diGra_=""]diGra_[diGra_=""]diGra_}
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```

```
package gonum
```

```
import "math"
```

```
// Dlasq6 computes one dqd transform in ping-pong form with protection against
// overflow and underflow. z has length at least 4*(n0+1) and holds the qd array.
// i0 is the zero-based first index.
// n0 is the zero-based last index.
//
// Dlasq6 is an internal routine. It is exported for testing purposes.
func (impl Implementation) Dlasq6(i0, n0 int, z []float64, pp int) (dmin, dmin1, dmin2, dn, dnm1, dnm2 float64) {
 switch {
 case i0 < 0:
 panic(i0LT0)
 case n0 < 0:
 panic(n0LT0)
 case len(z) < 4*n0:
 panic(shortZ)
 case pp != 0 && pp != 1:
 panic(badPp)
 }

 if n0-i0-1 <= 0 {
 return dmin, dmin1, dmin2, dn, dnm1, dnm2
 }

 safmin := dlamchS
```



```

j4 := 4*(i0+1) + pp - 4 // -4 rather than -3 for zero indexing
emin := z[j4+4]
d := z[j4]
dmin = d
if pp == 0 {
 for j4loop := 4 * (i0 + 1); j4loop
 <= 4*((n0+1)-3); j4loop += 4 {
 j4 := j4loop - 1 // Translate back to zero-indexed.
 z[j4-2] = d + z[j4-1]
 if z[j4-2] == 0 {
 z[j4] = 0
 d = z[j4+1]
 dmin = d
 emin = 0
 } else if safmin*z[j4+1] < z[j4-2] && safmin*z[j4-2] < z[j4+1] {
 tmp := z[j4+1] / z[j4-2]
 z[j4] = z[j4-1] * tmp
 d *= tmp
 } else {
 z[j4] = z[j4+1] * (z[j4-1] / z[j4-2])
 d = z[j4+1] * (d / z[j4-2])
 }
 dmin = math.Min(dmin, d)
 emin = math.Min(emin, z[j4])
 }
} else {
 for j4loop := 4 * (i0 + 1); j4loop <= 4*((n0+1)-3); j4loop += 4 {
 j4 := j4loop - 1
 z[j4-3] = d + z[j4]
 if z[j4-3] == 0 {
 z[j4-1] = 0
 d = z[j4+2]
 dmin = d
 emin = 0
 } else if safmin*z[j4+2] < z[j4-3] && safmin*z[j4-3] < z[j4+2] {
 tmp := z[j4+2] / z[j4-3]
 z[j4-1] = z[j4] * tmp
 d *= tmp
 } else {
 z[j4-1] = z[j4+2] * (z[j4] / z[j4-3])
 d = z[j4+2] * (d / z[j4-3])
 }
 dmin = math.Min(dmin, d)
 emin = math.Min(emin, z[j4-1])
 }
}
// Unroll last two steps.
dnm2

```

```
= d
dmin2 = dmin
j4 = 4*(n0-1) - pp - 1
j4p2 := j4 + 2*pp - 1
z[j4-2] = dnm2 + z[j4p2]
if z[j4-2] == 0 {
 z[j4] = 0
 dnm1 = z[j4p2+2]
 dmin = dnm1
 emin = 0
} else if safmin*z[j4p2+2] < z[j4-2] && safmin*z[j4-2] < z[j4p2+2] {
 tmp := z[j4p2+2] / z[j4-2]
 z[j4] = z[j4p2] * tmp
 dnm1 = dnm2 * tmp
} else {
 z[j4] = z[j4p2+2] * (z[j4p2] / z[j4-2])
 dnm1 = z[j4p2+2] * (dnm2 / z[j4-2])
}
dmin = math.Min(dmin, dnm1)
dmin1 = dmin
j4 += 4
j4p2 = j4 + 2*pp - 1
z[j4-2] = dnm1 + z[j4p2]
if z[j4-2] == 0 {
 z[j4] = 0
 dn = z[j4p2+2]
 dmin = dn
 emin = 0
} else if safmin*z[j4p2+2] < z[j4-2] && safmin*z[j4-2] < z[j4p2+2] {
 tmp := z[j4p2+2] / z[j4-2]
 z[j4] = z[j4p2] * tmp
 dn = dnm1 * tmp
} else {
 z[j4] = z[j4p2+2] * (z[j4p2] / z[j4-2])
 dn = z[j4p2+2] * (dnm1 / z[j4-2])
}
dmin = math.Min(dmin, dn)
z[j4+2] = dn
z[4*(n0+1)-pp-1] = emin
return dmin, dmin1, dmin2, dn, dnm1, dnm2
}
```

```
graph{{SUBGG{SUBGH}SUBGG}{SUBGG{SUBGH}SUBGG}}
Graph{GraphG{GraphG{GraphG}}GraphG}
graph{Strr-9Strr-9Strr-9Strr-9Strr-9Strr}
graph{{{sur{{{sur}sur{sur}sur}}}}}
graph{{{{{dig}}}}dig{{{dig}}}}dig{{{dig}}}}dig{{{dig}}dig{{{dig}}}}}
graph{"\L"}
```

```

graph{{Edd{{{Edd}Edd}Edd}Edd}}Edd}
graph{{diGrap}diGr{diGrap}diGr{diGrap}diGrap}
graph{Nodr{Nodr}Nodr{Nodr}}
graph{Nodd{Nodd}}
graph{Stric5{{{Stric5}{Stric5{Stric5{Stric5}}Stric5}}}{Stric5{Stric5{Stric5}}Stric5}{Stric5}}{Stric5{Stric5}}
}{{{Stric5{Stric5{Stric5}}Stric5}}{}}{Stric5}
graph{{diGrap3}{diGrap3}{diGrap3}{diGrap3}diGrap7}
 SUBROUTINE ZKSCL(ZRR,ZRI,FNU,N,YR,YI,NZ,RZR,RZI,ASCLE,TOL,ELIM)
C***BEGIN PROLOGUE ZKSCL
C***REFER TO ZBESK
C
C SET K FUNCTIONS TO ZERO ON UNDERFLOW, CONTINUE RECURRENCE
C ON SCALED FUNCTIONS UNTIL TWO MEMBERS COME ON SCALE, THEN
C RETURN WITH MIN(NZ+2,N) VALUES SCALED BY 1/TOL.
C
C***ROUTINES CALLED ZUCHK,ZABS,ZLOG
C***END PROLOGUE ZKSCL
C COMPLEX CK,CS,CY,CZERO,RZ,S1,S2,Y,ZR,ZD,CELM
 DOUBLE PRECISION ACS, AS, ASCLE, CKI, CKR, CSI, CSR, CYI,
 * CYR, ELIM, FN, FNU, RZI, RZR, STR, S1I, S1R, S2I,
 * S2R, TOL, YI, YR, ZEROI, ZEROR, ZRI, ZRR, ZABS,
 * ZDR, ZDI, CELMR, ELM, HELIM, ALAS
 INTEGER I, IC, IDUM, KK, N, NN, NW, NZ
 DIMENSION YR(N), YI(N), CYR(2), CYI(2)
 DATA ZEROR,ZEROI / 0.0D0 , 0.0D0 /
C
 NZ = 0
 IC = 0
 NN = MIN0(2,N)
 DO 10 I=1,NN
 S1R = YR(I)
 S1I = YI(I)
 CYR(I) = S1R
 CYI(I) = S1I
 AS = ZABS(CMPLX(S1R,S1I,kind=KIND(1.0D0)))
 ACS = -ZRR + DLOG(AS)

 NZ = NZ + 1
 YR(I) = ZEROR
 YI(I) = ZEROI
 IF (ACS.LT.(-ELIM)) GO TO 10
 CALL ZLOG(S1R, S1I, CSR, CSI, IDUM)
 CSR = CSR - ZRR
 CSI = CSI - ZRI
 STR = DEXP(CSR)/TOL
 CSR = STR*DCOS(CSI)
 CSI = STR*DSIN(CSI)
 CALL ZUCHK(CSR, CSI, NW, ASCLE, TOL)

```

```

 IF (NW.NE.0) GO TO 10
 YR(I) = CSR
 YI(I) = CSI
 IC = I
 NZ = NZ - 1
10 CONTINUE
 IF (N.EQ.1) RETURN
 IF (IC.GT.1) GO TO 20
 YR(1) = ZEROR
 YI(1) = ZEROI
 NZ = 2
20 CONTINUE
 IF (N.EQ.2) RETURN
 IF (NZ.EQ.0) RETURN
 FN = FNU + 1.0D0
 CKR = FN*RZR
 CKI = FN*RZI
 S1R = CYR(1)
 S1I = CYI(1)
 S2R = CYR(2)
 S2I = CYI(2)
 HELIM = 0.5D0*ELIM
 ELM = DEXP(-ELIM)
 CELMR = ELM
 ZDR = ZRR
 ZDI = ZRI
C
C FIND TWO CONSECUTIVE Y VALUES ON SCALE. SCALE RECURRENCE IF
C S2 GETS LARGER THAN EXP(ELIM/2)
C
 DO 30 I=3,N
 KK = I
 CSR = S2R
 CSI = S2I
 S2R = CKR*CSR - CKI*CSI + S1R
 S2I = CKI*CSR + CKR*CSI + S1I
 S1R = CSR
 S1I = CSI
 CKR = CKR + RZR
 CKI = CKI + RZI
 AS = ZABS(CMPLX(S2R,S2I,kind=KIND(1.0D0)))
 ALAS = DLOG(AS)
 ACS = -ZDR + ALAS
 NZ = NZ + 1
 YR(I) = ZEROR
 YI(I) = ZEROI
 IF (ACS.LT.(-ELIM)) GO TO 25
 CALL ZLOG(S2R, S2I, CSR, CSI, IDUM)

```

```

CSR = CSR - ZDR
CSI = CSI - ZDI
STR = DEXP(CSR)/TOL
CSR = STR*DCOS(CSI)
CSI = STR*DSIN(CSI)
CALL ZUCHK(CSR, CSI, NW, ASCLE, TOL)
IF (NW.NE.0) GO TO 25
YR(I) = CSR
YI(I) = CSI
NZ = NZ - 1
IF (IC.EQ.KK-1) GO TO 40
IC = KK
GO TO 30
25 CONTINUE
IF(ALAS.LT.HELIM) GO TO 30
ZDR = ZDR - ELIM
S1R = S1R*CELMR
S1I = S1I*CELMR
S2R = S2R*CELMR
S2I = S2I*CELMR
30 CONTINUE
NZ = N
IF(IC.EQ.N) NZ=N-1
GO TO 45
40 CONTINUE
NZ = KK - 2
45 CONTINUE
DO 50 I=1,NZ
 YR(I) = ZEROR
 YI(I) = ZEROI
50 CONTINUE
RETURN
END
graph{{{DIG }}}
graph{<>}
graph{sub{sub}{sub{sub{sub}{sub}}}}
// Copyright 2015 The Gonum Authors. All rights reserved.
// Use of this source code is governed by a BSD-style
// license that can be found in the LICENSE file.

package testlapack

import (
 "math"
 "testing"

 "golang.org/x/exp/rand"

```

```
"gonum.org/v1/gonum/blas"
"gonum.org/v1/gonum/lapack"
)
```

```
type Dlansyer interface {
 Dlanger
 Dlansy(norm lapack.MatrixNorm, uplo blas.Uplo, n int, a []float64, lda int, work []float64) float64
}
```

```
func DlansyTest(t *testing.T, impl Dlansyer) {
 rnd := rand.New(rand.NewSource(1))
 for _, norm := range []lapack.MatrixNorm{lapack.MaxAbs, lapack.MaxColumnSum, lapack.MaxRowSum,
lapack.Frobenius} {
 for _, uplo := range []blas.Uplo{blas.Lower, blas.Upper} {
 for _, test := range []struct {
 n, lda int
 }{
 {1, 0},
 {3, 0},

 {1, 10},
 {3, 10},
 } {
 for trial := 0; trial < 100; trial++ {
 n := test.n
 lda := test.lda
 if lda == 0 {
 lda = n
 }
 // Allocate nn matrix A and fill it.
 // Only the uplo triangle
of A will be used below
 // to represent a symmetric matrix.
 a := make([]float64, lda*n)
 if trial == 0 {
 // In the first trial fill the matrix
 // with predictable integers.
 for i := range a {
 a[i] = float64(i)
 }
 } else {
 // Otherwise fill it with random numbers.
 for i := range a {
 a[i] = rnd.NormFloat64()
 }
 }

 // Create a dense representation of the symmetric matrix
```

```

// stored in the uplo triangle of A.
aDense := make([]float64, n*n)
if uplo == blas.Upper {
 for i := 0; i < n; i++ {
 for j := i; j < n; j++ {
 v := a[i*lda+j]
 aDense[i*n+j] = v
 aDense[j*n+i] = v
 }
 }
} else {
 for i := 0; i < n; i++ {
 for j := 0; j <= i; j++ {
 v := a[i*lda+j]
 aDense[i*n+j] = v
 aDense[j*n+i] = v
 }
 }
}

work := make([]float64, n)
// Compute the norm of the symmetric matrix A.
got := impl.Dlansy(norm,
uplo, n, a, lda, work)
// Compute the reference norm value using Dlange
// and the dense representation of A.
want := impl.Dlange(norm, n, n, aDense, n, work)
if math.Abs(want-got) > 1e-14 {
 t.Errorf("Norm mismatch. norm = %c, upper = %v, n = %v, lda = %v, want %v, got %v.",
 norm, uplo == blas.Upper, n, lda, got, want)
}
}
}
}
}
}
}
graph{St{{St{St{{St}}St}}St{{St}}St}}
graph{Np{Np{Np}}}
// Copyright 2016 The Gonum Authors. All rights reserved.
// Use of this source code is governed by a BSD-style
// license that can be found in the LICENSE file.

package gonum

import (
 "gonum.org/v1/gonum/blas/blas64"
 "gonum.org/v1/gonum/lapack"
)

```

```

// Dgebak updates an nm matrix V as
// $V = P D V$ if side == lapack.EVRight,
// $V = P D^{-1} V$ if side == lapack.EVLeft,
// where P and D are nn permutation and scaling matrices, respectively,
// implicitly represented by job, scale, ilo and ihi as returned by Dgebal.
//
// Typically, columns of the matrix V contain the right or left (determined by
// side) eigenvectors of the balanced matrix output by Dgebal, and Dgebak forms
// the eigenvectors of the original matrix.
//
// Dgebak is an internal routine. It is exported for testing purposes.
func (impl Implementation) Dgebak(job lapack.BalanceJob, side lapack.EVSide, n, ilo, ihi int, scale []float64, m int,
v []float64, ldv int) {
 switch {
 case job != lapack.BalanceNone && job
 != lapack.Permute && job != lapack.Scale && job != lapack.PermuteScale:
 panic(badBalanceJob)
 case side != lapack.EVLeft && side != lapack.EVRight:
 panic(badEVSide)
 case n < 0:
 panic(nLT0)
 case ilo < 0 || max(0, n-1) < ilo:
 panic(badIlo)
 case ihi < min(ilo, n-1) || n <= ihi:
 panic(badIhi)
 case m < 0:
 panic(mLT0)
 case ldv < max(1, m):
 panic(badLdV)
 }

 // Quick return if possible.
 if n == 0 || m == 0 {
 return
 }

 if len(scale) < n {
 panic(shortScale)
 }
 if len(v) < (n-1)*ldv+m {
 panic(shortV)
 }

 // Quick return if possible.
 if job == lapack.BalanceNone {
 return
 }

```



```

bi := blas64.Implementation()
if ilo != ihi && job != lapack.Permute {
 // Backward balance.
 if side == lapack.EVRight {
 for i := ilo; i <= ihi; i++ {
 bi.Dscal(m, scale[i], v[i*ldv:], 1)
 }
 } else {
 for i := ilo; i <= ihi; i++ {
 bi.Dscal(m, 1/scale[i], v[i*ldv:], 1)
 }
 }
}
if job == lapack.Scale {
 return
}
// Backward permutation.
for i := ilo - 1; i >= 0; i--
{
 k := int(scale[i])
 if k == i {
 continue
 }
 bi.Dswap(m, v[i*ldv:], 1, v[k*ldv:], 1)
}
for i := ihi + 1; i < n; i++ {
 k := int(scale[i])
 if k == i {
 continue
 }
 bi.Dswap(m, v[i*ldv:], 1, v[k*ldv:], 1)
}
graph{GR{GR{GR}GR}}
graph{{{DiGg}}DiGa{{DiGg}}}}
graph{G:c J:c J:c}
graph{{di9{di9}di3}}
graph{SUBGRAPH{SUBGRAPH{SUBGRAPH{{SUBGRAPH{}}}}}}
graph{{NO{{NO{{NO{NO{}}NO}}}}NO{NO{}}NO}NO}}
graph{NOA{NOA}}
graph{{digrap4}}
graph{{dn d}d{dn d}d{dn d}d{dn d}d{d}d{dn d}}
graph{{DiGra{{DiGra{DiGra}{DiGra{DiGra}}DiGra}DiGra{DiGra}}DiGra}}
graph{{DIGRAe{{DIGRAe{{DIGRAe{DIGRAe}}DIGRAe}}{DIGRAe{DIGRAe}}DIGRAe}}DIGRAe}
image: freebsd/latest
packages:
- libX11

```

```

- libxkbcommon
- wayland
- mesa-libs
- xorg-vfbserver
- go
sources:
- https://git.sr.ht/~eliasnaur/gio
environment:
 PATH: /home/build/bin:/bin:/usr/local/bin:/usr/bin
tasks:
- install_gotip: |
 go get golang.org/dl/gotip
 /home/build/go/bin/gotip download
 mkdir /home/build/bin
 ln -s /home/build/go/bin/gotip /home/build/bin/go
- test_gio: |
 cd gio
 go test ./...
- test_example: |
 cd gio/example
 go test ./...
- test_cmd: |
 cd gio/cmd
 go test ./...
// Copyright 2015 The Gonum Authors. All rights reserved.
// Use of this source code is governed by a BSD-style
// license that can be found in the LICENSE file.

```

```
package gonum
```

```

import (
 "gonum.org/v1/gonum/blas"
 "gonum.org/v1/gonum/blas/testblas"
)

```

```

const (
 Sm = testblas.SmallMat
 Med = testblas.MediumMat
 Lg = testblas.LargeMat
 Hg = testblas.HugeMat
)

```

```

const (
 T = blas.Trans
 NT = blas.NoTrans
)
// Copyright 2017 The Gonum Authors. All rights reserved.
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```

```

// license that can be found in the LICENSE file.

package distuv

import (
 "math"

 "golang.org/x/exp/rand"
)

// Pareto implements the Pareto (Type I) distribution, a one parameter distribution
// with support above the scale parameter.
//
// The density function is given by
// $(x_m^{\alpha})/(x^{\alpha+1})$ for $x \geq x_m$.
//
// For more information, see https://en.wikipedia.org/wiki/Pareto_distribution.
type Pareto struct {
 // Xm is the scale parameter.
 // Xm must be greater than 0.
 Xm float64

 // Alpha is the shape parameter.
 // Alpha must be greater than 0.
 Alpha float64
}

Src rand.Source

}

// CDF computes the value of the cumulative density function at x.
func (p Pareto) CDF(x float64) float64 {
 if x < p.Xm {
 return 0
 }
 return 1 - p.Survival(x)
}

// Entropy returns the differential entropy of the distribution.
func (p Pareto) Entropy() float64 {
 return math.Log(p.Xm)
 - math.Log(p.Alpha) + (1 + 1/p.Alpha)
}

// ExKurtosis returns the excess kurtosis of the distribution.
func (p Pareto) ExKurtosis() float64 {
 if p.Alpha <= 4 {
 return 0
 }
}

```

```

return 6 * (p.Alpha*p.Alpha*p.Alpha + p.Alpha*p.Alpha - 6*p.Alpha - 2) / (p.Alpha * (p.Alpha - 3) * (p.Alpha - 4))

}

// LogProb computes the natural logarithm of the value of the probability
// density function at x.
func (p Pareto) LogProb(x float64) float64 {
 if x < p.Xm {
 return math.Inf(-1)
 }
 return math.Log(p.Alpha) + p.Alpha*math.Log(p.Xm) - (p.Alpha+1)*math.Log(x)
}

// Mean returns the mean of the probability distribution.
func (p Pareto) Mean() float64 {
 if p.Alpha <= 1 {
 return math.Inf(1)
 }
 return p.Alpha * p.Xm / (p.Alpha - 1)
}

// Median returns the median of the pareto distribution.
func (p Pareto) Median() float64 {
 return p.Xm * math.Pow(2, 1/p.Alpha)
}

// Mode returns the mode of the distribution.
func (p Pareto) Mode() float64 {
 return p.Xm
}

// NumParameters returns the number
// of parameters in the distribution.
func (p Pareto) NumParameters() int {
 return 2
}

// Prob computes the value of the probability density function at x.
func (p Pareto) Prob(x float64) float64 {
 return math.Exp(p.LogProb(x))
}

// Rand returns a random sample drawn from the distribution.
func (p Pareto) Rand() float64 {
 var rnd float64
 if p.Src == nil {
 rnd = rand.ExpFloat64()
 } else {

```

```

 rnd = rand.New(p.Src).ExpFloat64()
}
return math.Exp(math.Log(p.Xm) + 1/p.Alpha*rnd)
}

// StdDev returns the standard deviation of the probability distribution.
func (p Pareto) StdDev() float64 {
 return math.Sqrt(p.Variance())
}

// Survival returns the survival function (complementary CDF) at x.
func (p Pareto) Survival(x float64) float64 {
 if x < p.Xm {
 return 1
 }
 return math.Exp(p.Alpha * (math.Log(p.Xm) - math.Log(x)))
}

// Variance returns the variance of the probability distribution.
func (p Pareto) Variance() float64 {
 if p.Alpha <= 2 {
 return math.Inf(1)
 }
 am1 := p.Alpha
 - 1
 return p.Xm * p.Xm * p.Alpha / (am1 * am1 * (p.Alpha - 2))
}
graph{DigrJ{DigrJ{{{DigrJ}DigrJ{DigrJ}}DigrT}}}
Graph{{{{{{{{{{subgra}}subgra}}subgra}}subgra}}subgra}}}
*> \brief \b DLASSQ updates a sum of squares represented in scaled form.
*
* ===== DOCUMENTATION =====
*
* Online html documentation available at
* http://www.netlib.org/lapack/explore-html/
*
*> \htmlonly
*> Download DLASSQ + dependencies
*>
*> [TGZ]
*>
*> [ZIP]
*>
*> [TXT]
*> \endhtmlonly
*
* Definition:
* =====

```

```

*
* SUBROUTINE DLASSQ(N, X, INCX, SCALE, SUMSQ)
*
* .. Scalar Arguments ..
* INTEGER INCX, N
* DOUBLE PRECISION SCALE, SUMSQ
* ..
* .. Array Arguments ..
* DOUBLE PRECISION X(*)
* ..
*
*
*
*> \par Purpose:
* =====
*>
*> \verbatim
*>
*>
DLASSQ returns the values scl and smsq such that
*>
*> (scl**2)*smsq = x(1)**2 +...+ x(n)**2 + (scale**2)*sumsq,
*>
*> where x(i) = X(1 + (i - 1)*INCX). The value of sumsq is
*> assumed to be non-negative and scl returns the value
*>
*> scl = max(scale, abs(x(i))).
*>
*>
*> scale and sumsq must be supplied in SCALE and SUMSQ and
*> scl and smsq are overwritten on SCALE and SUMSQ respectively.
*>
*> The routine makes only one pass through the vector x.
*> \endverbatim
*
* Arguments:
* =====
*
*> \param[in] N
*> \verbatim
*> N is INTEGER
*> The number of elements to be used from the vector X.
*> \endverbatim
*>
*> \param[in] X
*> \verbatim
*> X is DOUBLE PRECISION array, dimension (N)
*> The vector for which a scaled sum of squares is computed.
*> x(i) = X(1 + (i - 1)*INCX), 1 <= i <= n.
*> \endverbatim

```

```

*>
*> \param[in] INCX
*> \verbatim
*> INCX is INTEGER
*> The increment
between successive values of the vector X.
*> INCX > 0.
*> \endverbatim
*>
*> \param[in,out] SCALE
*> \verbatim
*> SCALE is DOUBLE PRECISION
*> On entry, the value scale in the equation above.
*> On exit, SCALE is overwritten with scl , the scaling factor
*> for the sum of squares.
*> \endverbatim
*>
*> \param[in,out] SUMSQ
*> \verbatim
*> SUMSQ is DOUBLE PRECISION
*> On entry, the value sumsq in the equation above.
*> On exit, SUMSQ is overwritten with smsq , the basic sum of
*> squares from which scl has been factored out.
*> \endverbatim
*
* Authors:
* =====
*
*> \author Univ. of Tennessee
*> \author Univ. of California Berkeley
*> \author Univ. of Colorado Denver
*> \author NAG Ltd.
*
*> \date September 2012
*
*> \ingroup auxOTHERauxiliary
*
* =====
SUBROUTINE DCLASSQ(N, X, INCX, SCALE, SUMSQ)
*
* -- LAPACK auxiliary
routine (version 3.4.2) --
* -- LAPACK is a software package provided by Univ. of Tennessee, --
* -- Univ. of California Berkeley, Univ. of Colorado Denver and NAG Ltd.--
* September 2012
*
* .. Scalar Arguments ..
INTEGER INCX, N

```

```

DOUBLE PRECISION SCALE, SUMSQ
*
* ..
* .. Array Arguments ..
DOUBLE PRECISION X(*)
*
* ..
*
* =====
*
* .. Parameters ..
DOUBLE PRECISION ZERO
PARAMETER (ZERO = 0.0D+0)
*
* ..
* .. Local Scalars ..
INTEGER IX
DOUBLE PRECISION ABSXI
*
* ..
* .. External Functions ..
LOGICAL DISNAN
EXTERNAL DISNAN
*
* ..
* .. Intrinsic Functions ..
INTRINSIC ABS
*
* ..
* .. Executable Statements ..
*
IF(N.GT.0) THEN
 DO 10 IX = 1, 1 + (N-1)*INCX, INCX
 ABSXI = ABS(X(IX))
 IF(ABSXI.GT.ZERO.OR.DISNAN(
ABSXI)) THEN
 IF(SCALE.LT.ABSXI) THEN
 SUMSQ = 1 + SUMSQ*(SCALE / ABSXI)**2
 SCALE = ABSXI
 ELSE
 SUMSQ = SUMSQ + (ABSXI / SCALE)**2
 END IF
 END IF
 10 CONTINUE
END IF
RETURN
*
* End of DLASSQ
*
END
graph{{GRA_{{GRA_}GRA_}GRA_}}
graph{STRICU}
// Copyright 2015 The Gonum Authors. All rights reserved.
// Use of this source code is governed by a BSD-style

```



```

// license that can be found in the LICENSE file.

package distuv

type LogProber interface {
 LogProb(float64) float64
}

type Rander interface {
 Rand() float64
}

type RandLogProber interface {
 Rander
 LogProber
}

type Quantiler interface {
 Quantile(p float64) float64
}

graph{_____}
graph{"\""}
graph{{nod}}
graph{{NO{NO}}NO{NO}NO{NO}}
graph{{{DigrJ}DigrT}}
// Copyright 2019 The Gonum Authors. All rights reserved.
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// license that can be found in the LICENSE file.

// Package testquad provides integrals for testing quadrature algorithms.
package testquad

import (
 "fmt"
 "math"
)

// Integral is a definite integral
// $\int_a^b f(x) dx$
// with a known value.
type Integral struct {
 Name string
 A, B float64 // Integration limits
 F func(float64) float64 // Integrand
 Value float64
}

// Constant returns the integral of a constant function

```

```

// _{-1}^2 alpha dx
func Constant(alpha float64) Integral {
return Integral{
 Name: fmt.Sprintf("_{-1}^{2} %vdx", alpha),
 A: -1,
 B: 2,
 F: func(float64) float64 {
 return alpha
 },
 Value: 3 * alpha,
}
}

// Poly returns the integral of a polynomial
// _{-1}^2 x^degree dx
func Poly(degree int) Integral {
d := float64(degree)
return Integral{
 Name: fmt.Sprintf("_{-1}^{2} x^{%vdx", degree),
 A: -1,
 B: 2,
 F:
func(x float64) float64 {
 return math.Pow(x, d)
},
 Value: (math.Pow(2, d+1) - math.Pow(-1, d+1)) / (d + 1),
}
}

// Sin returns the integral
// _0^1 sin(x)dx
func Sin() Integral {
return Integral{
 Name: "_0^1 sin(x)dx",
 A: 0,
 B: 1,
 F: func(x float64) float64 {
 return math.Sin(x)
 },
 Value: 1 - math.Cos(1),
}
}

// XExpMinusX returns the integral
// _0^1 x*exp(-x)dx
func XExpMinusX() Integral {
return Integral{
 Name: "_0^1 x*exp(-x)dx",

```

```

A: 0,
B: 1,
F: func(x float64) float64 {
 return x * math.Exp(-x)
},
Value: (math.E - 2) / math.E,
}
}

// Sqrt returns the integral
// _0^1 sqrt(x)dx
func Sqrt() Integral {
 return Integral{
 Name: "_0^1 sqrt(x)dx",
 A: 0,
 B: 1,
 F: func(x float64) float64 {
 return math.Sqrt(x)
 },
 Value: 2 / 3.0,
 }
}

// ExpOverX2Plus1 returns the integral
// _0^1 exp(x)/(x*x+1)dx
func ExpOverX2Plus1() Integral {
 return Integral{
 Name: "_0^1 exp(x)/(x*x+1)dx",
 A: 0,
 B: 1,
 F: func(x
float64) float64 {
 return math.Exp(x) / (x*x + 1)
 },
 Value: 1.270724139833620220138,
 }
}
graph{{diGrar{diGrar}diGrar}diGrar}
graph{{{{{subGrn}subGrb{subGrn}subGrc}{subGrc}{subGrn}}}}}
graph{{{edgN{{{edgN{{{edgN}edgN}}edgJ}}edgJ}}}}}
// Copyright 2016 The Gonum Authors. All rights reserved.
// Use of this source code is governed by a BSD-style
// license that can be found in the LICENSE file.

package distuv

import (
 "math"

```

```

"sort"
"testing"

"golang.org/x/exp/rand"

"gonum.org/v1/gonum/floats"
)

func TestStudentsTProb(t *testing.T) {
 for _, test := range []struct {
 x, mu, sigma, nu, want float64
 }{
 // Values comparison with scipy.
 {0.01, 0, 1, 2.74, 0.364778548181318},
 {-0.01, 0, 1, 2.74, 0.364778548181318},
 {0.4, 0, 1, 1.6, 0.30376391362582678},
 {-0.4, 0, 1, 1.6, 0.30376391362582678},
 {0.2, 15, 5, 10, 0.0024440848858034393},
 } {
 pdf := StudentsT{test.mu, test.sigma, test.nu, nil}.Prob(test.x)
 if !floats.EqualWithinAbsOrRel(pdf, test.want, 1e-10, 1e-10) {
 t.Errorf("Pdf mismatch, x = %v, Nu = %v. Got %v, want %v", test.x, test.nu, pdf, test.want)
 }
 }
}

func TestStudentsT(t *testing.T) {
 src := rand.New(rand.NewSource(1))
 for i, b := range []StudentsT{
 {0, 1, 3.3, src},
 {0, 1,
 7.2, src},
 {0, 1, 12, src},
 {0.9, 0.8, 6, src},
 } {
 testStudentsT(t, b, i)
 }
}

func testStudentsT(t *testing.T, c StudentsT, i int) {
 const (
 tol = 1e-2
 n = 1e5
 bins = 50
)
 x := make([]float64, n)
 generateSamples(x, c)
 sort.Float64s(x)
}

```

```

testRandLogProbContinuous(t, i, math.Inf(-1), x, c, tol, bins)
checkMean(t, i, x, c, tol)
if c.Nu > 2 {
 checkVarAndStd(t, i, x, c, 5e-2)
}
checkProbContinuous(t, i, x, c, 1e-3)
checkQuantileCDFSurvival(t, i, x, c, tol)
checkProbQuantContinuous(t, i, x, c, tol)
}

func TestStudentsTQuantile(t *testing.T) {
 nSteps := 101
 probs := make([]float64, nSteps)
 floats.Span(probs, 0, 1)
 for i, b := range []StudentsT{
 {0, 1, 3.3, nil},
 {0, 1, 7.2, nil},
 {0, 1, 12, nil},
 {0.9, 0.8, 6, nil},
 } {
 for _, p := range probs {
 x := b.Quantile(p)
 p2 := b.CDF(x)
 if !floats.EqualWithinAbsOrRel(p, p2, 1e-10, 1e-10) {
 t.Errorf("mismatch between CDF and Quantile. Case %v. Want %v, got %v", i, p, p2)
 break
 }
 }
 }
}

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package sampleuv

import "gonum.org/v1/gonum/stat/distuv"

type ProposalDist struct {
 Sigma float64
}

func (p ProposalDist) ConditionalRand(y float64) float64 {
 return distuv.Normal{Mu: y, Sigma: p.Sigma}.Rand()
}

func (p ProposalDist) ConditionalLogProb(x, y float64) float64 {

```

```

return distuv.Normal{Mu: y, Sigma: p.Sigma}.LogProb(x)
}

func ExampleMetropolisHastings_burnin() {
 n := 1000 // The number of samples to generate.
 burnin := 50 // Number of samples to ignore at the start.
 var initial float64
 // target is the distribution from which we would like to sample.
 target := distuv.Weibull{K: 5, Lambda: 0.5}
 // proposal is the proposal distribution. Here, we are choosing
 // a tight Gaussian distribution around the current location. In
 // typical problems, if Sigma is too small, it takes a lot of samples
 // to move
 // around the distribution. If Sigma is too large, it can be hard
 // to find acceptable samples.
 proposal := ProposalDist{Sigma: 0.2}

 samples := make([]float64, n)
 mh := MetropolisHastings{Initial: initial, Target: target, Proposal: proposal, BurnIn: burnin}
 mh.Sample(samples)
}

graph{
 {{{{subGras{{subGrax}}subGau}}>{{subGrax}}}}{{{{subGrax}}subGau}}>{{subGras{{}}subGau}}>{{
 {<>}subGau}subGrax}}}}}
 graph{diGra{diGra}{diGra}}
}
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package path

import (
 "math"

 "gonum.org/v1/gonum/graph"
)

// FloydWarshall returns a shortest-path tree for the graph g or false indicating
// that a negative cycle exists in the graph. If a negative cycle exists in the graph
// the returned paths will be valid and edge weights on the negative cycle will be
// set to -Inf. If the graph does not implement Weighted, UniformCost is used.
//
// The time complexity of FloydWarshall is $O(|V|^3)$.
func FloydWarshall(g graph.Graph) (paths AllShortest, ok bool) {
 var weight Weighting
 if wg, ok := g.(Weighted); ok {
 weight = wg.Weight
 } else {
 weight = UniformCost(g)
 }
}

```

```

}

nodes := graph.NodesOf(g.Nodes())
paths = newAllShortest(nodes, true)
for i, u := range nodes {
 paths.dist.Set(i, i, 0)
 uid := u.ID()
 to := g.From(uid)
 for to.Next() {
 vid := to.Node().ID()
 j
:= paths.indexOf[vid]
 w, ok := weight(uid, vid)
 if !ok {
 panic("floyd-warshall: unexpected invalid weight")
 }
 paths.set(i, j, w, j)
 }
}

for k := range nodes {
 for i := range nodes {
 for j := range nodes {
 ij := paths.dist.At(i, j)
 joint := paths.dist.At(i, k) + paths.dist.At(k, j)
 if ij > joint {
 paths.set(i, j, joint, paths.at(i, k)...)
 } else if ij-joint == 0 {
 paths.add(i, j, paths.at(i, k)...)
 }
 }
 }
}

ok = true
for i := range nodes {
 if paths.dist.At(i, i) < 0 {
 ok = false
 break
 }
}

if !ok {
 // If we have a negative cycle, mark all
 // the edges in the cycles with NaN(0xdefaced)
 // weight. These weights are internal, being
 // returned as -Inf in user calls.

```

```

d := paths.dist
for i := range nodes {
 for j := range nodes {
 for k := range nodes {
 if math.IsInf(d.At(i, k), 1) || math.IsInf(d.At(k, j), 1) {
 continue
 }
 if d.At(k, k) < 0 {
 d.Set(k, k, defaced)
 d.Set(i,
j, defaced)
 } else if math.Float64bits(d.At(k, k)) == defacedBits {
 d.Set(i, j, defaced)
 }
 }
 }
}
}

return paths, ok
}

graph{{Str5}Str5}
graph{{diGrapg}{diGrapg}{diGrapg}}
graph{edN{edG}{edG}}
digraph{gs->gt[r=n]n->s[r=e]n->gt[r=n]n->s[r=e]n->s->s[r=n]n->c[r=n]gt[r=n]n->r[r=e]n->s[r=n]a:gs->c[r=e]s-
>i[r=n]s->t[r=n]s->t[r=n]s->c[r=n]t->e[r=e]t->c[r=n]t->c[r=n]t->r[r=e]t->e[r=n]c->c[r=n]c->r[r=e]r->t[r=e]r-
>f[r=e]r->r[r=e]e->s[r=d]e->f[r=d]e->d[r=n]s->e[r=n]s->n[r=n]s->t[r=n]s->e[r=e]}
graph{{s{{s}s}s{{s}s}s}}
graph{{grape{grapg}}}}
graph{{DIGRC DIGRB}{DIGRC{DIGRB}DIGRB}}
graph{"\a"}
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// +build !noasm,!appengine,!safe

package f64

// Ger performs the rank-one operation
// A += alpha * x * y
// where A is an mn dense matrix, x and y are vectors, and alpha is a scalar.
func Ger(m, n uintptr, alpha float64, x []float64, incX uintptr, y []float64, incY uintptr, a []float64, lda uintptr)

// GemvN computes
// y = alpha * A * x + beta * y
// where A is an mn dense matrix, x and y are vectors, and alpha and beta are scalars.
func GemvN(m, n uintptr, alpha float64, a []float64, lda uintptr, x []float64, incX uintptr, beta float64, y []float64,

```



```

incY uintptr)

// GemvT computes
// y = alpha * A * x + beta * y
// where A is an mn dense matrix, x and y are vectors, and alpha and beta are scalars.
func GemvT(m, n uintptr, alpha float64, a []float64, lda uintptr, x []float64, incX uintptr, beta float64, y []float64,
incY uintptr)
graph{{{DiGrr{{{DiGre}}DiGru}}DiGrr{{{DiGre}}DiGru}}DiGru}
graph{{{gra{{{gra}}gra{{{gra{{{gra{{{gra{{{gra{{{gra}}}gr}}}gr}}}gr}}}gr}}}gr}}}
graph{{{d3{d9{d3{d9}{d9}{d9}}}}}
graph{{{subgr{{{subgr}{subgr}}subgr}}}
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// Package cblas128 provides a simple interface to the complex128 BLAS API.
package cblas128 // import "gonum.org/v1/gonum/blas/cblas128"
graph{{{graph_}{graph_}{graph_}{graph_}}graph_}
graph
{node[f=4][f=8][f=2][f=2][f=3][f=7][f=2][f=4][f=6][f=6][f=4][f=4][f=9][f=4][D=4][f=4][f=4][f=4][f=1][f=4][f=6][
f=6][f=4][f=1][f=6][f=1][f=2][f=7][f=8][f=2][f=2][f=3][f=7][f=2][f=4][f=6][f=6][d=4][f=4][f=9][f=4][f=4][f=4][f=
4][f=4][f=1][f=4][f=6][f=6][f=4][f=1][f=6][f=1][f=2][f=7][f=1][f=1][f=1][f=1][f=8][f=1][f=1][f=1][f=1][f=8][
f=1][f=3][f=5][f=1][f=1][f=1][f=9]}
graph{{{EDG8}}EDG4}}EDG4}}}EDG4}}}
graph{"\////////////////////////////////"}
graph{NO5}
graph{{DIGRAP3}{DIGRAP3}{DIGRAP3}}
graph{{SubGp}SubGp}
graph{Grs</></>Grs</></>Grs}
graph{"\I\3\I#\3\3\I#"}
graph{{{graa{{{graa}}}grai}}}grai}grag}
graph{{{diGri}diGrp{{{diGrp}}}diGrp{diGri}}}diGrp{{{diGrp{diGrp}}}diGrp}}}
graph{{{Subgrat{{{Subgray}Subgrat{{{Subgray}}}}}}}}
graph{{SubG}{SubG}{SubG}{SubG}SubGb}{SubG{SubG}{SubG}SubG}{}}
// SPDX-License-Identifier: Unlicense OR MIT

package text

import (
 "golang.org/x/image/font"
 "unicode/utf8"

 "gioui.org/op"
 "gioui.org/unit"
 "golang.org/x/image/math/fixd"
)

// Shaper implements layout and shaping of text and a cache of

```

```

// computed results.
//
// Specify the default and fallback font by calling Register with the
// empty Font.
type Shaper struct {
 def Typeface
 faces map[Font]*face
}

type face struct {
 face Face
 layoutCache layoutCache
 pathCache pathCache
}

func (s *Shaper) Register(font Font, tf Face) {
 if s.faces == nil {
 s.def = font.Typeface
 s.faces = make(map[Font]*face)
 }
 // Treat all font sizes equally.
 font.Size = unit.Value{}
 if font.Weight == 0 {
 font.Weight = Normal
 }
 s.faces[font] = &face{
 face: tf,
 }
}

func (s *Shaper) Layout(c unit.Converter, font Font, str string, opts LayoutOptions) *Layout {
 tf := s.faceForFont(font)
 return tf.layout(fixed.I(c.Px(font.Size)), str, opts)
}

func (s *Shaper) Shape(c unit.Converter,
 font Font, str String) op.CallOp {
 tf := s.faceForFont(font)
 return tf.shape(fixed.I(c.Px(font.Size)), str)
}

func (s *Shaper) Metrics(c unit.Converter, font Font) font.Metrics {
 tf := s.faceForFont(font)
 return tf.metrics(fixed.I(c.Px(font.Size)))
}

func (s *Shaper) faceForStyle(font Font) *face {
 tf := s.faces[font]

```

```

if tf == nil {
 font := font
 font.Weight = Normal
 tf = s.faces[font]
}
if tf == nil {
 font := font
 font.Style = Regular
 tf = s.faces[font]
}
if tf == nil {
 font := font
 font.Style = Regular
 font.Weight = Normal
 tf = s.faces[font]
}
return tf
}

func (s *Shaper) faceForFont(font Font) *face {
 font.Size = unit.Value{}
 tf := s.faceForStyle(font)
 if tf == nil {
 font.Typeface = s.def
 tf = s.faceForStyle(font)
 }
 return tf
}

func (t *face) layout(ppem fixed.Int26_6, str string, opts LayoutOptions) *Layout {
 if t == nil {
 return fallbackLayout(str)
 }
 lk := layoutKey{
 ppem: ppem,
 str: str,
 opts: opts,
 }
 if l, ok := t.layoutCache.Get(lk);
 ok {
 return l
 }
 l := t.face.Layout(ppem, str, opts)
 t.layoutCache.Put(lk, l)
 return l
}

func (t *face) shape(ppem fixed.Int26_6, str String) op.CallOp {

```

```

if t == nil {
 return op.CallOp{}
}
pk := pathKey{
 ppem: ppem,
 str: str.String,
}
if clip, ok := t.pathCache.Get(pk); ok {
 return clip
}
clip := t.face.Shape(ppem, str)
t.pathCache.Put(pk, clip)
return clip
}

func (t *face) metrics(ppem fixed.Int26_6) font.Metrics {
 return t.face.Metrics(ppem)
}

func fallbackLayout(str string) *Layout {
 l := &Layout{
 Lines: []Line{
 {Text: String{
 String: str,
 }},
 },
 }
 strlen := utf8.RuneCountInString(str)
 l.Lines[0].Text.Advances = make([]fixed.Int26_6, strlen)
 return l
}
graph{{{gr_}{gr_}}}
graph{SubGr}
graph{SubGp{SubGp}{SubGp{SubGp}}SubGh{SubGp}{SubGp<>SubGp}{}}
graph{<<ggggrrggg>>}
graph{{<><>}<><>}
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package gonum

import (
 "gonum.org/v1/gonum/blas"
 "gonum.org/v1/gonum/blas/blas64"
)

// Dgetrf computes the LU decomposition of the mn matrix A.

```

```

// The LU decomposition is a factorization of A into
// $A = P * L * U$
// where P is a permutation matrix, L is a unit lower triangular matrix, and
// U is a (usually) non-unit upper triangular matrix. On exit, L and U are stored
// in place into a.
//
// ipiv is a permutation vector. It indicates that row i of the matrix was
// changed with ipiv[i]. ipiv must have length at least min(m,n), and will panic
// otherwise. ipiv is zero-indexed.
//
// Dgetrf is the blocked version of the algorithm.
//
// Dgetrf returns whether the matrix A is singular. The LU decomposition will
// be computed regardless of the singularity of A, but division by zero
// will occur if the false is returned
// and the result is used to solve a
// system of equations.
func (impl Implementation) Dgetrf(m, n int, a []float64, lda int, ipiv []int) (ok bool) {
 mn := min(m, n)
 switch {
 case m < 0:
 panic(mLT0)
 case n < 0:
 panic(nLT0)
 case lda < max(1, n):
 panic(badLdA)
 }

 // Quick return if possible.
 if mn == 0 {
 return true
 }

 switch {
 case len(a) < (m-1)*lda+n:
 panic(shortA)
 case len(ipiv) != mn:
 panic(badLenIpiv)
 }

 bi := blas64.Implementation()

 nb := impl.Ilaenv(1, "DGETRF", "", m, n, -1, -1)
 if nb <= 1 || mn <= nb {
 // Use the unblocked algorithm.
 return impl.Dgetf2(m, n, a, lda, ipiv)
 }
 ok = true
}

```

```

for j := 0; j < mn; j += nb {
 jb := min(mn-j, nb)
 blockOk := impl.Dgetf2(m-j, jb, a[j*lda+j:], lda, ipiv[j+jb])
 if !blockOk {
 ok = false
 }
 for i := j; i <= min(m-1, j+jb-1); i++ {
 ipiv[i] = j + ipiv[i]
 }
 impl.Dlaswp(j, a, lda, j, j+jb-1, ipiv[j+jb], 1)
 if j+jb < n {
 impl.Dlaswp(n-j-jb, a[j+jb:], lda, j, j+jb-1, ipiv[j+jb], 1)
 bi.Dtrsm(blas.Left,
blas.Lower, blas.NoTrans, blas.Unit,
 jb, n-j-jb, 1,
 a[j*lda+j:], lda,
 a[j*lda+j+jb:], lda)
 if j+jb < m {
 bi.Dgemm(blas.NoTrans, blas.NoTrans, m-j-jb, n-j-jb, jb, -1,
 a[(j+jb)*lda+j:], lda,
 a[j*lda+j+jb:], lda,
 1, a[(j+jb)*lda+j+jb:], lda)
 }
 }
}
return ok
}

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package quat

import "math"

// IsInf returns true if any of real(q), imag(q), jmag(q), or kmag(q) is an infinity.
func IsInf(q Number) bool {
 return math.IsInf(q.Real, 0) || math.IsInf(q.Imag, 0) || math.IsInf(q.Jmag, 0) || math.IsInf(q.Kmag, 0)
}

// Inf returns a quaternion infinity, quaternion(+Inf, +Inf, +Inf, +Inf).
func Inf() Number {
 inf := math.Inf(1)
 return Number{Real: inf, Imag: inf, Jmag: inf, Kmag: inf}
}

```



```

}

var v mat.Dense
gsvd.VTo(&v)
fmt.Printf("\nCommon
basis vectors\n\n\tV = %.4f",
mat.Formatted(v.T(), mat.Prefix("\t ")))

// Output:
//
// Africa
// s_0 = [45507.3278 18541.9293 21503.0778]
//
// U_0 = -0.0005 -0.0039 -0.0019
// -0.0010 -0.0007 -0.0012
// -1.0000 -0.0507 -0.9964
// -0.0022 -0.2906 -0.0415
// 0.0001 -0.0127 -0.0016
// 0.0003 -0.0067 -0.0010
// 0.0003 -0.0022 -0.0003
// -0.0086 -0.9550 0.0734
// 0.0017 0.0002 0.0059
// -0.0002 -0.0088 -0.0014
// -0.0006 -0.0078 -0.0001
// -0.0005 -0.0076 0.0003
// 0.0001 -0.0090 0.0008
// -0.0005 -0.0050 0.0029
// -0.0011 -0.0078 -0.0012
// -0.0014 -0.0058 -0.0002
// 0.0007 -0.0095 0.0020
// -0.0008 -0.0081 -0.0009
// 0.0004 -0.0092 0.0006
// -0.0007 -0.0079 -0.0006
// -0.0011 -0.0076 -0.0010
// Asia
// s_1 = [77228.2804 8413.7024 14711.1879]
//
// U_1
// = 0.0005 -0.0080 0.0011
// 0.0008 -0.0108 0.0016
// -0.9998 0.0612 0.9949
// 0.0007 -0.5734 -0.0468
// 0.0001 -0.0265 -0.0022
// 0.0001 -0.0165 -0.0019
// 0.0000 -0.0070 -0.0013
// 0.0196 -0.8148 0.0893
// 0.0002 -0.0063 0.0012
// -0.0001 -0.0135 -0.0013

```



```

// -0.0004 -0.0135 0.0019
// -0.0005 -0.0132 0.0014
// 0.0003 -0.0155 0.0045
// -0.0003 -0.0130 0.0025
// -0.0007 -0.0105 0.0016
// -0.0006 -0.0129 0.0007
// -0.0006 -0.0178 -0.0023
// -0.0003 -0.0149 0.0016
// -0.0001 -0.0134 0.0030
// -0.0004 -0.0154 0.0010
// -0.0009 -0.0147 -0.0019
// Latin America/Caribbean
// s_2 = [274.1364 20736.3116 729.6947]
//
// U_2 = 0.1060 -0.0021 0.0174
// 0.1415 -0.0016 0.0289
// 0.2350 -0.2669 -0.9212
// 0.0290 -0.0118 -0.0429
//
0.0226 -0.0043 -0.0213
// 0.0117 -0.0016 -0.0197
// -0.6263 -0.9635 0.2234
// 0.2334 -0.0013 0.1275
// -0.0358 -0.0085 -0.0498
// -0.1238 -0.0054 0.0313
// -0.0421 -0.0059 0.0528
// -0.1471 -0.0056 0.0350
// -0.2158 -0.0052 -0.0044
// -0.6154 -0.0078 -0.2717
// Oceania
// s_3 = [8954.1914 6942.6316 17233.0561]
//
// U_3 = -0.0080 -0.0012 -0.0040
// 0.0004 -0.0014 0.0001
// 0.9973 -0.0315 0.9991
// 0.0473 -0.7426 -0.0359
// 0.0018 -0.0342 -0.0020
// -0.0005 -0.0148 -0.0016
// -0.0004 -0.0047 -0.0007
// -0.0246 -0.6642 -0.0138
// 0.0003 -0.0287 -0.0023
// -0.0011 -0.0148 -0.0014
// -0.0108 -0.0198 -0.0039
// -0.0149 -0.0183 -0.0048
// -0.0178 -0.0208 -0.0075
// -0.0266 -0.0063 -0.0016
// -0.0012 -0.0234 -0.0006
// -0.0084 -0.0184

```

```

-0.0030
// -0.0232 -0.0191 -0.0124
// -0.0072 -0.0226 -0.0035
// -0.0150 -0.0144 -0.0045
// -0.0068 -0.0227 -0.0034
// -0.0127 -0.0136 -0.0049
//
// Common basis vectors
//
// V = -0.0897 -0.4460 -0.8905
// -0.4911 -0.5432 -0.6810
// 0.0644 0.2841 0.9566
}
graph{diGS}
[](https://github.com/gonum) Working
Together

```

The Gonum project welcomes contributions from all. Contributors should foster an open and welcoming environment. When contributing or otherwise participating, please:

- Be friendly and welcoming
- Be patient
- Be thoughtful
- Be respectful
- Be charitable
- Avoid destructive behavior

Excerpted from the [Go conduct document](https://golang.org/conduct).

```

graph{GRAPU{{GRAPU{GRAPU}{GRAPU}GRAPU{GRAPU}}}}
graph{_____}
graph{E4}
digraph {subgraD}
graph{{{SUBGRAP}}}}
graph{<<34694469519536141888238489656843418860808014869689944062527838134765625>>}
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```

```
package testlapack
```

```

import (
 "testing"

 "gonum.org/v1/gonum/blas"
)

```

```

type Dlauumer interface {
 Dlauum(uplo blas.Uplo, n int, a []float64, lda int)
}

```

```

}

func DlauumTest(t *testing.T, impl Dlauumer) {
 for _, uplo := range []blas.Uplo{blas.Upper, blas.Lower} {
 name := "Upper"
 if uplo == blas.Lower {
 name = "Lower"
 }
 t.Run(name, func(t *testing.T) {
 // Include small and large sizes to make sure that both
 // unblocked and blocked paths are taken.
 ns := []int{0, 1, 2, 3, 4, 5, 10, 25, 31, 32, 33, 63, 64, 65, 127, 128, 129}
 dlauuTest(t, impl.Dlauum, uplo, ns)
 })
 }
}

graph{{{subgJ{{{{{subgJ{subgO}}}}}subgJ{subgO}}
graph{SubGp{SubGp}SubGp}
graph{{EDG4{{{{EDG9{{{{EDG9{EDG9}}EDG4}}}}}EDG4}}}
graph{{{subgJ{{{{{subgJ{subgO}}}}}}}}
graph{{die{die{die}die}die}}
graph{{{{EB}}EB}}
graph{{{{subg}}}}
graph{{_2F}}
graph{Grapu}
graph{{DiGrap8}DiGrap8}
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package distuv

import (
 "sort"
 "testing"

 "golang.org/x/exp/rand"
)

func TestBernouilli(t *testing.T) {
 src := rand.New(rand.NewSource(1))
 for i, dist := range []Bernouilli{
 {P: 0.5, Src: src},
 {P: 0.9, Src: src},
 {P: 0.2, Src: src},
 } {
 testBernouilli(t, dist, i)
 }
}

```



```

func raise(p point) quat.Number {
 return quat.Number{Imag: p.x, Jmag: p.y, Kmag: p.z}
}

// rotate performs the quaternion rotation of p by the given quaternion
// and scaling by the scale factor.
func rotate(p point, by quat.Number, scale float64) point {
 // Ensure the modulus of by is correctly scaled.
 if len := quat.Abs(by); len != scale {
 by = quat.Scale(math.Sqrt(scale)/len, by)
 }

 // Perform the rotation/scaling.
 pp := quat.Mul(quat.Mul(by, raise(p)), quat.Conj(by))

 // Extract the point.
 return point{x: pp.Imag, y: pp.Jmag, z: pp.Kmag}
}

// Rotate a cube 120 around
// the diagonal vector [1, 1, 1].
func Example_rotate() {
 alpha := 2 * math.Pi / 3
 q := raise(point{1, 1, 1})
 scale := 1.0

 q = quat.Scale(math.Sin(alpha/2)/quat.Abs(q), q)
 q.Real += math.Cos(alpha / 2)

 for i, p := range []point{
 {x: 0, y: 0, z: 0},
 {x: 0, y: 0, z: 1},
 {x: 0, y: 1, z: 0},
 {x: 0, y: 1, z: 1},
 {x: 1, y: 0, z: 0},
 {x: 1, y: 0, z: 1},
 {x: 1, y: 1, z: 0},
 {x: 1, y: 1, z: 1},
 } {
 pp := rotate(p, q, scale)

 // Clean up floating point error for clarity.
 pp.x = floats.Round(pp.x, 2)
 pp.y = floats.Round(pp.y, 2)
 pp.z = floats.Round(pp.z, 2)

 fmt.Printf("%d %v -> %v\n", i, p, pp)
 }
}

```

```

// Output:
//
// 0 {x:0 y:0 z:0} -> {x:0 y:0 z:0}
// 1 {x:0 y:0 z:1} -> {x:1 y:0 z:0}
// 2 {x:0 y:1 z:0} -> {x:0 y:0 z:1}
// 3 {x:0 y:1 z:1} -> {x:1 y:0 z:1}
// 4 {x:1 y:0 z:0} -> {x:0 y:1 z:0}
// 5 {x:1 y:0 z:1} -> {x:1 y:1 z:0}
// 6 {x:1 y:1 z:0} -> {x:0 y:1 z:1}
// 7 {x:1 y:1 z:1} -> {x:1 y:1 z:1}
}
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package gonum

import (
 "gonum.org/v1/gonum/blas"
 "gonum.org/v1/gonum/blas/blas64"
)

// Dorg2r generates an mn matrix Q with orthonormal columns defined by the
// product of elementary reflectors as computed by Dgeqrf.
// $Q = H_0 * H_1 * \dots * H_{k-1}$
// len(tau) >= k, 0 <= k <= n, 0 <= n <= m, len(work) >= n.
// Dorg2r will panic if these conditions are not met.
//
// Dorg2r is an internal routine. It is exported for testing purposes.
func (impl Implementation) Dorg2r(m, n, k int, a []float64, lda int, tau []float64, work []float64) {
 switch {
 case m < 0:
 panic(mLT0)
 case n < 0:
 panic(nLT0)
 case n > m:
 panic(nGTM)
 case k < 0:
 panic(kLT0)
 case k > n:
 panic(kGTN)
 case lda < max(1, n):
 panic(badLdA)
 }

 if n == 0 {
 return
 }

```

```

}

switch {
case len(a) < (m-1)*lda+n:
 panic(shortA)
case len(tau) < k:
 panic(shortTau)
case
len(work) < n:
 panic(shortWork)
}

bi := blas64.Implementation()

// Initialize columns k+1:n to columns of the unit matrix.
for l := 0; l < m; l++ {
 for j := k; j < n; j++ {
 a[l*lda+j] = 0
 }
}
for j := k; j < n; j++ {
 a[j*lda+j] = 1
}
for i := k - 1; i >= 0; i-- {
 for i := range work {
 work[i] = 0
 }
 if i < n-1 {
 a[i*lda+i] = 1
 impl.Dlarf(blas.Left, m-i, n-i-1, a[i*lda+i:], lda, tau[i], a[i*lda+i+1:], lda, work)
 }
 if i < m-1 {
 bi.Dscal(m-i-1, -tau[i], a[(i+1)*lda+i:], lda)
 }
 a[i*lda+i] = 1 - tau[i]
 for l := 0; l < i; l++ {
 a[l*lda+i] = 0
 }
}
}
graph{{D55{{D5555}}}}
graph{"\\\\"\\\\"\\\\"\\\\"\\\\"\\\\""}
graph{{SU_}SU_}{SU_}
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package mat

```

```

// TriKind represents the triangularity of the matrix.
type TriKind bool

const (
 // Upper specifies an upper triangular matrix.
 Upper TriKind = true
 // Lower specifies a lower triangular matrix.
 Lower TriKind = false
)

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package gonum

import (
 "math"

 "gonum.org/v1/gonum/blas"
 "gonum.org/v1/gonum/blas/blas64"
 "gonum.org/v1/gonum/lapack"
)

// Dgecon estimates the reciprocal of the condition number of the nn matrix A
// given the LU decomposition of the matrix. The condition number computed may
// be based on the 1-norm or the -norm.
//
// The slice a contains the result of the LU decomposition of A as computed by Dgetrf.
//
// anorm is the corresponding 1-norm or -norm of the original matrix A.
//
// work is a temporary data slice of length at least 4*n and Dgecon will panic otherwise.
//
// iwork is a temporary data slice of length at least n and Dgecon will panic otherwise.
func (impl Implementation) Dgecon(norm lapack.MatrixNorm, n int, a []float64, lda int, anorm float64, work
[]float64, iwork []int) float64 {
 switch {
 case norm !=
lapack.MaxColumnSum && norm != lapack.MaxRowSum:
 panic(badNorm)
 case n < 0:
 panic(nLT0)
 case lda < max(1, n):
 panic(badLdA)
 }

 // Quick return if possible.

```



```

if n == 0 {
 return 1
}

switch {
case len(a) < (n-1)*lda+n:
 panic(shortA)
case len(work) < 4*n:
 panic(shortWork)
case len(iwork) < n:
 panic(shortIWork)
}

// Quick return if possible.
if anorm == 0 {
 return 0
}

bi := blas64.Implementation()
var rcond, ainvm float64
var kase int
var normin bool
isave := new([3]int)
onenrm := norm == lapack.MaxColumnSum
smlnum := dlamchS
kase1 := 2
if onenrm {
 kase1 = 1
}
for {
 ainvm, kase = impl.Dlacn2(n, work[n:], work, iwork, ainvm, kase, isave)
 if kase == 0 {
 if ainvm != 0 {
 rcond = (1 / ainvm) / anorm
 }
 return rcond
 }
 var sl, su float64
 if kase == kase1 {
 sl = impl.Dlatrs(blas.Lower, blas.NoTrans, blas.Unit, normin, n, a, lda, work, work[2*n:])
 su = impl.Dlatrs(blas.Upper, blas.NoTrans, blas.NonUnit, normin, n, a, lda,
work, work[3*n:])
 } else {
 su = impl.Dlatrs(blas.Upper, blas.Trans, blas.NonUnit, normin, n, a, lda, work, work[3*n:])
 sl = impl.Dlatrs(blas.Lower, blas.Trans, blas.Unit, normin, n, a, lda, work, work[2*n:])
 }
 scale := sl * su
 normin = true
}

```

```

if scale != 1 {
 ix := bi.Idamax(n, work, 1)
 if scale == 0 || scale < math.Abs(work[ix])*smlnum {
 return rcond
 }
 impl.Drscl(n, scale, work, 1)
}
}
}
graph{"1_1_BO{s4TupuTsd_3_3VO1_1wgYc8kRij8q8_1PyG1YO0_iryntlS5u4T4zbq9VH7G1_ZAB_8tO9W}""
siQ0p2wJVKq9_9vW_0_YXH3_9tuvOtt3AdM6_esq_5_0wvni{ }o1h1PyG1YOedae{s4TupuTsd_3_3VO1_1wgYc
8kRij8q8_1PyG1YO0_iryntlS5u4T4zbq9VH7G1_ZAB_8tO9W}""siQ0p2wJVKq9_9vW_0_YXH3_9tuvOtt3AdM
6_esq_5_0wvni{W}o1h1PyG1YOedae{s4TupuTsd_3_3VO1_1wgYc8kRij8q8_1PyG1YO0_iryntlS5u4T4zbq9VH
7G1_ZAB_8tO9W}""siQ0p2wJVKq9_9vW_0_YXH3_9tuvOtt3AdM6_esq_5_0wvni{W}Gr_Gr_Gr_Gr_Gr_Gr_{s
4TupuTsd_3_3VO1_1wgYc8kRij8q8_1PyG1YO0_iryntlS5u4T4zbq9VH7G1_ZAB_8tO9W}"}
graph{st}
graph{GRAP}
digraph {
 bgcolor=transparent
 A
}
graph{{DIGR{DIGR}}}
graph{<e>}
graph{{grapj{grapr}{gQ}}}}
graph{{SUBG_}SUBG_{SUBG_}{SUBG_}{SUBG_}}
graph{SubGraphg}
graph{<"\}>}
graph{{DIGRAPA}{DIGRAPA}DIGRAPA}}
graph{{st}st}
graph{{d{{d}}}}
Gonum floats
[![GoDoc](https://godoc.org/gonum.org/v1/gonum/floats?status.svg)](https://godoc.org/gonum.org/v1/gonum/floats
)

```

Package floats provides a set of helper routines for dealing with slices of float64.

The functions avoid allocations to allow for use within tight loops without garbage collection overhead.

```
graph{{subGG}subGT{subGG}}
```

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```
package testlapack
```

```
import (
```

```
"testing"
```

```
"golang.org/x/exp/rand"
```

```

"gonum.org/v1/gonum/floats"
)

type Dorgl2er interface {
 Dgelqfer
 Dorgl2(m, n, k int, a []float64, lda int, tau []float64, work []float64)
}

func Dorgl2Test(t *testing.T, impl Dorgl2er) {
 rnd := rand.New(rand.NewSource(1))
 for _, test := range []struct {
 m, n, lda int
 }{
 {3, 3, 0},
 {3, 4, 0},

 {5, 5, 20},
 {5, 10, 20},
 } {
 m := test.m
 n := test.n
 lda := test.lda
 if lda == 0 {
 lda = test.n
 }
 a := make([]float64, m*lda)
 for i := range a {
 a[i] = rnd.NormFloat64()
 }
 k := min(m, n)
 tau := make([]float64, k)
 work := make([]float64, 1)
 impl.Dgelqf(m, n, a, lda, tau, work, -1)
 work = make([]float64, int(work[0]))
 impl.Dorgl2(m, n, k, a, lda, tau, work, len(work))

 q := constructQ("LQ", m, n, a, lda, tau)

 impl.Dorgl2(m,
 n, k, a, lda, tau, work)

 // Check that the first m rows match.
 same := true
 for i := 0; i < m; i++ {
 for j := 0; j < n; j++ {
 if !floats.EqualWithinAbsOrRel(q.Data[i*q.Stride+j], a[i*lda+j], 1e-12, 1e-12) {
 same = false
 break
 }
 }
 }
 }
}

```

```

 }
 }
 }
 if !same {
 t.Errorf("Q mismatch")
 }
 }
 }
 graph{{GRAPHe}GRAPHe}
 graph{"\Z"}
 graph{{st}st{st}st}
 graph{su}
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package testlapack

import (
 "testing"

 "golang.org/x/exp/rand"

 "gonum.org/v1/gonum/floats"
)

type Dgeqrfer interface {
 Dgeqr2er
 Dgeqr(m, n int, a []float64, lda int, tau, work []float64, lwork int)
}

func DgeqrTest(t *testing.T, impl Dgeqrfer) {
 const tol = 1e-12
 rnd := rand.New(rand.NewSource(1))
 for c, test := range []struct {
 m, n, lda int
 }{
 {10, 5, 0},
 {5, 10, 0},
 {10, 10, 0},
 {300, 5, 0},
 {3, 500, 0},
 {200, 200, 0},
 {300, 200, 0},
 {204, 300, 0},
 {1, 3000, 0},
 {3000, 1, 0},
 {10, 5, 20},
 }{

```

```

{5, 10, 20},
{10, 10, 20},
{300, 5, 400},
{3, 500, 600},
{200, 200, 300},
{300, 200, 300},
{204, 300, 400},
{1, 3000, 4000},
{3000, 1, 4000},
} {
m := test.m
n := test.n
lda := test.llda
if lda == 0 {
 lda = test.n
}

// Allocate mn matrix A and fill it with random numbers.
a
:= make([]float64, m*lda)
for i := range a {
 a[i] = rnd.NormFloat64()
}
// Store a copy of A for later comparison.
aCopy := make([]float64, len(a))
copy(aCopy, a)

// Allocate a slice for scalar factors of elementary reflectors
// and fill it with random numbers.
tau := make([]float64, n)
for i := 0; i < n; i++ {
 tau[i] = rnd.Float64()
}

// Compute the expected result using unblocked QR algorithm and
// store it in want.
want := make([]float64, len(a))
copy(want, a)
impl.Dgeqr2(m, n, want, lda, tau, make([]float64, n))

for _, wl := range []worklen{minimumWork, mediumWork, optimumWork} {
 copy(a, aCopy)

 var lwork int
 switch wl {
 case minimumWork:
 lwork = n
 case mediumWork:

```

```

 work := make([]float64, 1)
 impl.Dgeqrf(m, n, a, lda, tau, work, -1)
 lwork = int(work[0]) - 2*n
case optimumWork:
 work := make([]float64, 1)
 impl.Dgeqrf(m, n, a, lda, tau, work, -1)
 lwork = int(work[0])
}
work := make([]float64,
lwork)

// Compute the QR factorization of A.
impl.Dgeqrf(m, n, a, lda, tau, work, len(work))
// Compare the result with Dgeqr2.
if !floats.EqualApprox(want, a, tol) {
 t.Errorf("Case %v, workspace %v, unexpected result.", c, wl)
}
}
}
}
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```

```
package sampleuv
```

```

import (
 "testing"

 "golang.org/x/exp/rand"

 "gonum.org/v1/gonum/floats"
)

```

```

func TestWithoutReplacement(t *testing.T) {
 for cas, test := range []struct {
 N int
 K int
 Src *rand.Rand
 Trials int
 Tol float64
 }{
 {
 // Test with perm and source.
 N: 10, K: 5, Src: rand.New(rand.NewSource(1)),
 Trials: 100000, Tol: 1e-3,
 },
 {

```

```

// Test without perm and with source.
N: 10, K: 3, Src: rand.New(rand.NewSource(1)),
Trials: 100000, Tol: 1e-3,
},
} {
dist := make([]float64, test.N)
for trial := 0; trial < test.Trials; trial++ {
idxs := make([]int, test.K)
WithoutReplacement(idxs, test.N, test.Src)

allDiff := true
for i := 0; i < len(idxs); i++ {
v := idxs[i]
for j := i + 1; j < len(idxs); j++ {
if v == idxs[j] {
allDiff = false
break
}
}
}
if
!allDiff {
t.Errorf("Cas %d: Repeat in sampling. Idxs =%v", cas, idxs)
}
for _, v := range idxs {
dist[v]++
}
}
div := 1 / (float64(test.Trials) * float64(test.K))
floats.Scale(div, dist)
want := make([]float64, test.N)
for i := range want {
want[i] = 1 / float64(test.N)
}
if !floats.EqualApprox(want, dist, test.Tol) {
t.Errorf("Cas %d: biased sampling. Want = %v, got = %v", cas, want, dist)
}
}
}
graph{{{Ed3{{Ed2}}Ed3}}}
graph{{{{EDG_{{{{EDG_{{EDG_}EDG_}EDG_}}EDG_}}}}}
graph{{{stri}stri{stri}stri{stri{stri}stri{stri}stri}}
graph{{{{subO:subO{subO:subO{subO:subO}}}}}
Graph{DIGRAP{DIGRAP{DIGRAP{DIGRAP}}}
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```

package path

```
import (
 "math"
```

```
 "gonum.org/v1/gonum/graph"
 "gonum.org/v1/gonum/graph/traverse"
)
```

```
// Weighted is a weighted graph. It is a subset of graph.Weighted.
```

```
type Weighted interface {
```

```
 // Weight returns the weight for the edge between
```

```
 // x and y with IDs xid and yid if Edge(xid, yid)
```

```
 // returns a non-nil Edge.
```

```
 // If x and y are the same node or there is no
```

```
 // joining edge between the two nodes the weight
```

```
 // value returned is implementation dependent.
```

```
 // Weight returns true if an edge exists between
```

```
 // x and y or if x and y have the same ID, false
```

```
 // otherwise.
```

```
 Weight(xid, yid int64) (w float64, ok bool)
```

```
}
```

```
// Weighting is a mapping between a pair of nodes and a weight. It follows the
```

```
// semantics of the Weighter interface.
```

```
type Weighting func(xid, yid int64) (w float64, ok bool)
```

```
// UniformCost returns a Weighting
```

```
 that returns an edge cost of 1 for existing
```

```
// edges, zero for node identity and Inf for otherwise absent edges.
```

```
func UniformCost(g traverse.Graph) Weighting {
```

```
 return func(xid, yid int64) (w float64, ok bool) {
```

```
 if xid == yid {
```

```
 return 0, true
```

```
 }
```

```
 if e := g.Edge(xid, yid); e != nil {
```

```
 return 1, true
```

```
 }
```

```
 return math.Inf(1), false
```

```
 }
```

```
}
```

```
// Heuristic returns an estimate of the cost of travelling between two nodes.
```

```
type Heuristic func(x, y graph.Node) float64
```

```
// HeuristicCoster wraps the HeuristicCost method. A graph implementing the
```

```
// interface provides a heuristic between any two given nodes.
```

```
type HeuristicCoster interface {
```



```

 HeuristicCost(x, y graph.Node) float64
}
graph{{AA}AAAAA}
graph{{SUBGRAPe{B{{SUBGRAPk}}}}}
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// Package dynamic provides incremental heuristic graph path finding functions.
package dynamic // import "gonum.org/v1/gonum/graph/path/dynamic"
// Code generated by gocc; DO NOT EDIT.

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//
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// license that can be found in the LICENSE file.
//
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// Universal Public Domain Dedication.

package lexer

import (
 "io/ioutil"
 "unicode/utf8"

 "gonum.org/v1/gonum/graph/formats/dot/internal/token"
)

const (
 NoState = -1
 NumStates = 143
 NumSymbols = 184
)

type Lexer struct {
 src []byte
 pos int
 line int
 column int
}

func NewLexer(src []byte) *Lexer {
 lexer := &Lexer{
 src: src,
 pos: 0,

```

```

 line: 1,
 column: 1,
}
return lexer
}

func NewLexerFile(fpath string) (*Lexer, error) {
 src, err := ioutil.ReadFile(fpath)
 if err != nil {
 return nil, err
 }
 return NewLexer(src), nil
}

func (l *Lexer) Scan() (tok *token.Token) {
 tok = new(token.Token)
 if
 l.pos >= len(l.src) {
 tok.Type = token.EOF
 tok.Pos.Offset, tok.Pos.Line, tok.Pos.Column = l.pos, l.line, l.column
 return
 }
 start, startLine, startColumn, end := l.pos, l.line, l.column, 0
 tok.Type = token.INVALID
 state, rune1, size := 0, rune(-1), 0
 for state != -1 {
 if l.pos >= len(l.src) {
 rune1 = -1
 } else {
 rune1, size = utf8.DecodeRune(l.src[l.pos:])
 l.pos += size
 }

 nextState := -1
 if rune1 != -1 {
 nextState = TransTab[state](rune1)
 }
 state = nextState

 if state != -1 {

 switch rune1 {
 case '\n':
 l.line++
 l.column = 1
 case '\r':
 l.column = 1
 case '\t':

```

```

 l.column += 4
default:
 l.column++
}

switch {
case ActTab[state].Accept != -1:
 tok.Type = ActTab[state].Accept
 end = l.pos
case ActTab[state].Ignore != "":
 start, startLine, startColumn = l.pos, l.line, l.column
 state = 0
 if start >= len(l.src) {
 tok.Type = token.EOF
 }

}
} else {
 if tok.Type == token.INVALID
{
 end = l.pos
 }
}
}
if end > start {
 l.pos = end
 tok.Lit = l.src[start:end]
} else {
 tok.Lit = []byte{}
}
tok.Pos.Offset, tok.Pos.Line, tok.Pos.Column = start, startLine, startColumn

return
}

func (l *Lexer) Reset() {
 l.pos = 0
}

/*
Lexer symbols:
0: 'n'
1: 'o'
2: 'd'
3: 'e'
4: 'N'
5: 'o'
6: 'd'

```

7: 'e'  
8: 'N'  
9: 'O'  
10: 'D'  
11: 'E'  
12: 'e'  
13: 'd'  
14: 'g'  
15: 'e'  
16: 'E'  
17: 'd'  
18: 'g'  
19: 'e'  
20: 'E'  
21: 'D'  
22: 'G'  
23: 'E'  
24: 'g'  
25: 'r'  
26: 'a'  
27: 'p'  
28: 'h'  
29: 'G'  
30: 'r'  
31: 'a'  
32: 'p'  
33: 'h'  
34: 'G'  
35: 'R'  
36: 'A'  
37: 'P'  
38: 'H'  
39: 'd'  
40: 'i'  
41: 'g'  
42: 'r'  
43: 'a'  
44: 'p'  
45: 'h'  
46: 'D'  
47: 'i'  
48: 'g'  
49: 'r'  
50: 'a'  
51: 'p'  
52: 'h'  
53: 'd'  
54: 'i'

55: 'G'  
56: 'r'  
57: 'a'  
58: 'p'  
59: 'h'  
60: 'D'  
61: 'i'  
62: 'G'  
63: 'r'  
64: 'a'  
65: 'p'  
66: 'h'  
67: 'D'  
68: 'I'  
69: 'G'  
70: 'R'  
71: 'A'  
72: 'P'  
73: 'H'  
74: 's'  
75: 'u'  
76: 'b'  
77: 'g'  
78: 'r'  
79: 'a'  
80: 'p'  
81: 'h'  
82: 'S'  
83: 'u'  
84: 'b'  
85: 'g'  
86: 'r'  
87: 'a'  
88: 'p'  
89: 'h'  
90: 's'  
91:  
'u'  
92: 'b'  
93: 'G'  
94: 'r'  
95: 'a'  
96: 'p'  
97: 'h'  
98: 'S'  
99: 'u'  
100: 'b'  
101: 'G'

102: 'r'  
103: 'a'  
104: 'p'  
105: 'h'  
106: 'S'  
107: 'U'  
108: 'B'  
109: 'G'  
110: 'R'  
111: 'A'  
112: 'P'  
113: 'H'  
114: 's'  
115: 't'  
116: 'r'  
117: 'i'  
118: 'c'  
119: 't'  
120: 'S'  
121: 't'  
122: 'r'  
123: 'i'  
124: 'c'  
125: 't'  
126: 'S'  
127: 'T'  
128: 'R'  
129: 'T'  
130: 'C'  
131: 'T'  
132: '{'  
133: '}'  
134: ';'   
135: ' '  
136: ' '  
137: ' '  
138: '>'  
139: '['  
140: ']'  
141: ','  
142: '='  
143: ':'  
144: '\_'  
145: ' '  
146: ' '  
147: ' '  
148: ' '  
149: '\'

```

150: ""
151: `
152: ""
153: ""
154: '='
155: '<'
156: '>'
157: '<'
158: '>'
159: '/'
160: '/'
161: '\n'
162: '#'
163: '\n'
164: '/'
165: '*'
166: '*'
167: '*'
168: '/'
169: ' '
170: '\t'
171: '\r'
172: '\n'
173: '\u0001-!'
174: '#-['
175: ']-\u007f'
176: 'a'-z'
177: 'A'-Z'
178: '0'-9'
179: '\u0080-\ufffc'
180: '\ufffe-\U0010ffff'
181: '\u0001-;'
182: '?'-\u00ff'
183: .
*/

```

```
// Code generated by "go generate gonum.org/v1/gonum/unit; DO NOT EDIT.
```

```
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```

```
// Use of this source code is governed by a BSD-style
```

```
// license that can be found in the LICENSE file.
```

```
package unit
```

```
import (
 "errors"
 "fmt"
 "math"
 "unicode/utf8"

```

```

)

// MagneticFlux represents a magnetic flux in Weber.
type MagneticFlux float64

const Weber MagneticFlux = 1

// Unit converts the MagneticFlux to a *Unit
func (m MagneticFlux) Unit() *Unit {
 return New(float64(m), Dimensions{
 CurrentDim: -1,
 LengthDim: 2,
 MassDim: 1,
 TimeDim: -2,
 })
}

// MagneticFlux allows MagneticFlux to implement a MagneticFluxer interface
func (m MagneticFlux) MagneticFlux() MagneticFlux {
 return m
}

// From converts the unit into the receiver. From returns an
// error if there is a mismatch in dimension
func (m *MagneticFlux) From(u Uniter) error {
 if !DimensionsMatch(u, Weber) {
 *m = MagneticFlux(math.NaN())
 return errors.New("Dimension mismatch")
 }
 *m
 = MagneticFlux(u.Unit().Value())
 return nil
}

func (m MagneticFlux) Format(fs fmt.State, c rune) {
 switch c {
 case 'v':
 if fs.Flag('#') {
 fmt.Fprintf(fs, "%T(%v)", m, float64(m))
 return
 }
 fallthrough
 case 'e', 'E', 'f', 'F', 'g', 'G':
 p, pOk := fs.Precision()
 w, wOk := fs.Width()
 const unit = " Wb"
 switch {
 case pOk && wOk:

```



```

 fmt.Fprintf(fs, "%*.*"+string(c), pos(w-utf8.RuneCount([]byte(unit))), p, float64(m))
case pOk:
 fmt.Fprintf(fs, "%.*"+string(c), p, float64(m))
case wOk:
 fmt.Fprintf(fs, "%*.*"+string(c), pos(w-utf8.RuneCount([]byte(unit))), float64(m))
default:
 fmt.Fprintf(fs, "%"+string(c), float64(m))
}
fmt.Fprint(fs, unit)
default:
 fmt.Fprintf(fs, "%!%c(%T=%g Wb)", c, m, float64(m))
}
}
digraph{nodee[]noded->nodee}
graph{{ {Subg}{Subg}{SubgS}} }
graph{""[diGr_=""]}
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package gonum

import (
 "math"

 "gonum.org/v1/gonum/blas/blas64"
)

// Dlarfg generates an elementary reflector for a Householder matrix. It creates
// a real elementary reflector of order n such that
// $H * (\alpha) = (\beta)$
// $\begin{pmatrix} 1 & x \\ 0 & 0 \end{pmatrix}$
// $H * H = I$
// H is represented in the form
// $H = 1 - \tau * (1; v) * (1 \ v)$
// where tau is a real scalar.
//
// On entry, x contains the vector x, on exit it contains v.
//
// Dlarfg is an internal routine. It is exported for testing purposes.
func (impl Implementation) Dlarfg(n int, alpha float64, x []float64, incX int) (beta, tau float64) {
 switch {
 case n < 0:
 panic(nLT0)
 case incX <= 0:
 panic(badIncX)
 }
}

```

```

if n <= 1 {
 return alpha, 0
}

if len(x) < 1+(n-2)*abs(incX) {
 panic(shortX)
}

bi := blas64.Implementation()

xnorm := bi.Dnrm2(n-1, x, incX)
if xnorm
== 0 {
 return alpha, 0
}
beta = -math.Copysign(impl.Dlapy2(alpha, xnorm), alpha)
safmin := dlamchS / dlamchE
knt := 0
if math.Abs(beta) < safmin {
 // xnorm and beta may be inaccurate, scale x and recompute.
 rsafmn := 1 / safmin
 for {
 knt++
 bi.Dscal(n-1, rsafmn, x, incX)
 beta *= rsafmn
 alpha *= rsafmn
 if math.Abs(beta) >= safmin {
 break
 }
 }
 xnorm = bi.Dnrm2(n-1, x, incX)
 beta = -math.Copysign(impl.Dlapy2(alpha, xnorm), alpha)
}
tau = (beta - alpha) / beta
bi.Dscal(n-1, 1/(alpha-beta), x, incX)
for j := 0; j < knt; j++ {
 beta *= safmin
}
return beta, tau
}
graph{Stric}
graph{subd{{subd{suba}}}}}
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```

```
package gonum
```

```

import (
 "gonum.org/v1/gonum/blas"
 "gonum.org/v1/gonum/blas/blas64"
 "gonum.org/v1/gonum/lapack"
)

// Dlarft forms the triangular factor T of a block reflector H, storing the answer
// in t.
// $H = I - V * T * V$ if store == lapack.ColumnWise
// $H = I - V * T * V$ if store == lapack.RowWise
// H is defined by a product of the elementary reflectors where
// $H = H_0 * H_1 * \dots * H_{k-1}$ if direct == lapack.Forward
// $H = H_{k-1} * \dots * H_1 * H_0$ if direct == lapack.Backward
//
// t is a kk triangular matrix. t is upper triangular if direct = lapack.Forward
// and lower triangular otherwise. This function will panic if t is not of
// sufficient size.
//
// store describes the storage of the elementary reflectors in v. See
// Dlarfb for a description of layout.
//
// tau contains the scalar factors of the
// elementary reflectors Hi.
//
// Dlarft is an internal routine. It is exported for testing purposes.
func (Implementation) Dlarft(direct lapack.Direct, store lapack.StoreV, n, k int, v []float64, ldv int, tau []float64, t
[]float64, ldt int) {
 mv, nv := n, k
 if store == lapack.RowWise {
 mv, nv = k, n
 }
 switch {
 case direct != lapack.Forward && direct != lapack.Backward:
 panic(badDirect)
 case store != lapack.RowWise && store != lapack.ColumnWise:
 panic(badStoreV)
 case n < 0:
 panic(nLT0)
 case k < 1:
 panic(kLT1)
 case ldv < max(1, nv):
 panic(badLdV)
 case len(tau) < k:
 panic(shortTau)
 case ldt < max(1, k):
 panic(shortT)
 }
}

```

```

if n == 0 {
 return
}

switch {
case len(v) < (mv-1)*ldv+nv:
 panic(shortV)
case len(t) < (k-1)*ldt+k:
 panic(shortT)
}

bi := blas64.Implementation()

// TODO(btracey): There are a number of minor obvious loop optimizations here.
// TODO(btracey): It may be possible to rearrange some of the code so that
// index of 1 is more common
in the Dgemv.
if direct == lapack.Forward {
 prevlastv := n - 1
 for i := 0; i < k; i++ {
 prevlastv = max(i, prevlastv)
 if tau[i] == 0 {
 for j := 0; j <= i; j++ {
 t[j*ldt+i] = 0
 }
 continue
 }
 var lastv int
 if store == lapack.ColumnWise {
 // skip trailing zeros
 for lastv = n - 1; lastv >= i+1; lastv-- {
 if v[lastv*ldv+i] != 0 {
 break
 }
 }
 for j := 0; j < i; j++ {
 t[j*ldt+i] = -tau[i] * v[i*ldv+j]
 }
 j := min(lastv, prevlastv)
 bi.Dgemv(blas.Trans, j-i, i,
 -tau[i], v[(i+1)*ldv:], ldv, v[(i+1)*ldv+i:], ldv,
 1, t[i:], ldt)
 } else {
 for lastv = n - 1; lastv >= i+1; lastv-- {
 if v[i*ldv+lastv] != 0 {
 break
 }
 }
 }
 }
}

```

```

 for j := 0; j < i; j++ {
 t[j*ldt+i] = -tau[i] * v[j*ldv+i]
 }
 j := min(lastv, prevlastv)
 bi.Dgemv(blas.NoTrans, i, j-i,
 -tau[i], v[i+1:], ldv, v[i*ldv+i+1:], 1,
 1, t[i:], ldt)
}
bi.Dtrmv(blas.Upper, blas.NoTrans, blas.NonUnit, i, t,
ldt, t[i:], ldt)
t[i*ldt+i] = tau[i]
if i > 1 {
 prevlastv = max(prevlastv, lastv)
} else {
 prevlastv = lastv
}
}
return
}
prevlastv := 0
for i := k - 1; i >= 0; i-- {
 if tau[i] == 0 {
 for j := i; j < k; j++ {
 t[j*ldt+i] = 0
 }
 continue
 }
 var lastv int
 if i < k-1 {
 if store == lapack.ColumnWise {
 for lastv = 0; lastv < i; lastv++ {
 if v[lastv*ldv+i] != 0 {
 break
 }
 }
 }
 for j := i + 1; j < k; j++ {
 t[j*ldt+i] = -tau[i] * v[(n-k+i)*ldv+j]
 }
 j := max(lastv, prevlastv)
 bi.Dgemv(blas.Trans, n-k+i-j, k-i-1,
 -tau[i], v[j*ldv+i+1:], ldv, v[j*ldv+i:], ldv,
 1, t[(i+1)*ldt+i:], ldt)
 } else {
 for lastv = 0; lastv < i; lastv++ {
 if v[i*ldv+lastv] != 0 {
 break
 }
 }
 }
}

```

```

 for j := i + 1; j < k; j++ {
 t[j*ldt+i] = -tau[i] * v[j*ldv+n-k+i]
 }
 j := max(lastv, prevlastv)
 bi.Dgemv(blas.NoTrans, k-i-1, n-k+i-j,
 -tau[i], v[(i+1)*ldv+j:], ldv, v[i*ldv+j:], 1,
 1,
 t[(i+1)*ldt+i:], ldt)
 }
 bi.Dtrmv(blas.Lower, blas.NoTrans, blas.NonUnit, k-i-1,
 t[(i+1)*ldt+i+1:], ldt,
 t[(i+1)*ldt+i:], ldt)
 if i > 0 {
 prevlastv = min(prevlastv, lastv)
 } else {
 prevlastv = lastv
 }
 }
 t[i*ldt+i] = tau[i]
}
}
graph{{digrap}}
digraph{G:nw K:nw}
// SPDX-License-Identifier: Unlicense OR MIT

```

```

package text

```

```

import (
 "strconv"
 "testing"

 "gioui.org/op"
)

```

```

func TestLayoutLRU(t *testing.T) {
 c := new(layoutCache)
 put := func(i int) {
 c.Put(layoutKey{str: strconv.Itoa(i)}, nil)
 }
 get := func(i int) bool {
 _, ok := c.Get(layoutKey{str: strconv.Itoa(i)})
 return ok
 }
 testLRU(t, put, get)
}

```

```

func TestPathLRU(t *testing.T) {
 c := new(pathCache)

```

```

put := func(i int) {
 c.Put(pathKey{str: strconv.Itoa(i)}, op.CallOp{})
}
get := func(i int) bool {
 _, ok := c.Get(pathKey{str: strconv.Itoa(i)})
 return ok
}
testLRU(t, put, get)
}

func testLRU(t *testing.T, put func(i int), get func(i int) bool) {
 for i := 0; i < maxSize; i++ {
 put(i)
 }
 for i := 0; i < maxSize; i++ {
 if !get(i) {
 t.Fatalf("key %d was evicted", i)
 }
 }
 put(maxSize)
 for i := 1; i < maxSize+1; i++ {
 if !get(i) {
 t.Fatalf("key %d was evicted", i)
 }
 }
 if i := 0; get(i) {
 t.Fatalf("key %d was not evicted", i)
 }
}
graph{{rrr}rrr}
graph{{{dig}}}}
/**/graph{}
graph{""e""e""n""n""n""n""{""e""e""n""n""n""n""n""n""n""n""n""n""}""n""n""}
graph{"\0_0_1RRcrqU_86JW_d_977_4__9y78_Ph_4n_j__4RAJdz_JiyF_\0\1\1\3\3\I#\4__HAur6u1_xS7_7__2
_Yzs5EF__RG02}}8}\13\I#\I#"}
graph{{grap5}}
graph{{diGrag}diGrai}
graph{{Edg_}Edg_{Edg_{Edg_}Edg_}Edg_{Edg_}{Edg_{Edg_}Edg_}}
graph{{{E4}E4}E4}
graph{subGp}
graph{{digra_}}
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// license that can be found in the LICENSE file.

package testblas

import (

```

"testing"

"gonum.org/v1/gonum/blas"

)

type Dsbmver interface {

Dsbmv(ul blas.Uplo, n, k int, alpha float64, a [][]float64, lda int, x []float64, incX int, beta float64, y []float64, incY int)

}

func DsbmvTest(t \*testing.T, blasser Dsbmver) {

for i, test := range []struct {

ul blas.Uplo

n int

k int

alpha float64

beta float64

a [][]float64

x []float64

y []float64

ans []float64

}{

{

ul: blas.Upper,

n: 4,

k: 2,

alpha: 2,

beta: 3,

a: [][]float64{

{7, 8, 2, 0},

{0, 8, 2, -3},

{0, 0, 3, 6},

{0, 0, 0, 9},

},

x: []float64{1, 2, 3, 4},

y: []float64{-1, -2, -3, -4},

ans: []float64{55, 30, 69, 84},

},

{

ul: blas.Lower,

n: 4,

k: 2,

alpha: 2,

beta: 3,

a: [][]float64{

{7,



```

0, 0, 0},
 {8, 8, 0, 0},
 {2, 2, 3, 0},
 {0, -3, 6, 9},
},
x: []float64{1, 2, 3, 4},
y: []float64{-1, -2, -3, -4},
ans: []float64{55, 30, 69, 84},
},
} {
extra := 0
var aFlat []float64
if test.ul == blas.Upper {
 aFlat = flattenBanded(test.a, test.k, 0)
} else {
 aFlat = flattenBanded(test.a, 0, test.k)
}
incTest := func(incX, incY, extra int) {
 xnew := makeIncremented(test.x, incX, extra)
 ynew := makeIncremented(test.y, incY, extra)
 ans := makeIncremented(test.ans, incY, extra)
 blasser.Dsbmv(test.ul, test.n, test.k, test.alpha, aFlat, test.k+1, xnew, incX, test.beta, ynew, incY)
 if !dSliceTolEqual(ans, ynew) {
 t.Errorf("Case %v: Want %v, got %v", i, ans, ynew)
 }
}
incTest(1, 1, extra)
incTest(1, 3, extra)
incTest(1, -3, extra)
incTest(2, 3, extra)
incTest(2, -3, extra)
incTest(3, 2, extra)
incTest(-3, 2, extra)
}
}
*> \brief \b IEEECK
*
* ===== DOCUMENTATION =====
*
* Online html documentation available at
* http://www.netlib.org/lapack/explore-html/
*
*> \htmlonly
*> Download IEEECK + dependencies
*>
*> [TGZ]
*>
*> [ZIP]

```

```

*>
*> [TXT]
*> \endhtmlonly
*
* Definition:
* =====
*
* INTEGER FUNCTION IEEECK(ISPEC, ZERO, ONE)
*
* .. Scalar Arguments ..
* INTEGER ISPEC
* REAL ONE, ZERO
* ..
*
*> \par Purpose:
* =====
*>
*> \verbatim
*>
*> IEEECK is called from the ILAENV to verify that Infinity and
*> possibly NaN arithmetic is safe (i.e. will not trap).
*>
\endverbatim
*
* Arguments:
* =====
*
*> \param[in] ISPEC
*> \verbatim
*> ISPEC is INTEGER
*> Specifies whether to test just for infinity arithmetic
*> or whether to test for infinity and NaN arithmetic.
*> = 0: Verify infinity arithmetic only.
*> = 1: Verify infinity and NaN arithmetic.
*> \endverbatim
*>
*> \param[in] ZERO
*> \verbatim
*> ZERO is REAL
*> Must contain the value 0.0
*> This is passed to prevent the compiler from optimizing
*> away this code.
*> \endverbatim
*>
*> \param[in] ONE
*> \verbatim
*> ONE is REAL

```

```

*> Must contain the value 1.0
*> This is passed to prevent the compiler from optimizing
*> away this code.
*>
*> RETURN VALUE: INTEGER
*> = 0: Arithmetic failed to produce the correct answers
*> = 1: Arithmetic produced the correct answers
*> \endverbatim
*
* Authors:
* =====
*
*> \author Univ. of Tennessee
*> \author
Univ. of California Berkeley
*> \author Univ. of Colorado Denver
*> \author NAG Ltd.
*
*> \date November 2011
*
*> \ingroup auxOTHERauxiliary
*
* =====
INTEGER FUNCTION IEEECK(ISPEC, ZERO, ONE)
*
* -- LAPACK auxiliary routine (version 3.4.0) --
* -- LAPACK is a software package provided by Univ. of Tennessee, --
* -- Univ. of California Berkeley, Univ. of Colorado Denver and NAG Ltd.--
* November 2011
*
* .. Scalar Arguments ..
INTEGER ISPEC
REAL ONE, ZERO
*
* ..
*
* =====
*
* .. Local Scalars ..
REAL NAN1, NAN2, NAN3, NAN4, NAN5, NAN6, NEGINF,
$ NEGZRO, NEWZRO, POSINF
*
* .. Executable Statements ..
IEEECK = 1
*
POSINF = ONE / ZERO
IF(POSINF.LE.ONE) THEN
 IEEECK = 0
 RETURN

```

```

END IF
*
 NEGINF = -ONE / ZERO
 IF(NEGINF.GE.ZERO) THEN
 IEEECK = 0
 RETURN
 END IF
*
 NEGZRO = ONE / (NEGINF+ONE)
 IF(NEGZRO.NE.ZERO) THEN
 IEEECK = 0
 RETURN
 END IF
*
 NEGINF = ONE / NEGZRO
 IF(NEGINF.GE.ZERO) THEN
 IEEECK = 0
 RETURN
 END IF
*
 NEWZRO = NEGZRO + ZERO
 IF(NEWZRO.NE.ZERO) THEN
 IEEECK = 0
 RETURN
 END IF
*
 POSINF = ONE / NEWZRO
 IF(POSINF.LE.ONE) THEN
 IEEECK = 0
 RETURN
 END IF
*
 NEGINF = NEGINF*POSINF
 IF(NEGINF.GE.ZERO) THEN
 IEEECK = 0
 RETURN
 END IF
*
 POSINF = POSINF*POSINF
 IF(POSINF.LE.ONE) THEN
 IEEECK = 0
 RETURN
 END IF
*
*
*
*
* Return if we were only asked to check infinity arithmetic

```

```

*
 IF(ISPEC.EQ.0)
 $ RETURN
*
 NAN1 = POSINF + NEGINF
*
 NAN2 = POSINF / NEGINF
*
 NAN3 = POSINF / POSINF
*
 NAN4
= POSINF*ZERO
*
 NAN5 = NEGINF*NEGZRO
*
 NAN6 = NAN5*ZERO
*
 IF(NAN1.EQ.NAN1) THEN
 IEEECK = 0
 RETURN
 END IF
*
 IF(NAN2.EQ.NAN2) THEN
 IEEECK = 0
 RETURN
 END IF
*
 IF(NAN3.EQ.NAN3) THEN
 IEEECK = 0
 RETURN
 END IF
*
 IF(NAN4.EQ.NAN4) THEN
 IEEECK = 0
 RETURN
 END IF
*
 IF(NAN5.EQ.NAN5) THEN
 IEEECK = 0
 RETURN
 END IF
*
 IF(NAN6.EQ.NAN6) THEN
 IEEECK = 0
 RETURN
 END IF
*
 RETURN

```

```
END
graph{STRE}
graph{{strig stri}}
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// license that can be found in the LICENSE file.
```

```
package gonum
```

```
import (
 "testing"
```

```
 "gonum.org/v1/gonum/blas/testblas"
)
```

```
func TestZgbmv(t *testing.T) {
 testblas.ZgbmvTest(t, impl)
}
```

```
func TestZgemv(t *testing.T) {
 testblas.ZgemvTest(t, impl)
}
```

```
func TestZgerc(t *testing.T) {
 testblas.ZgercTest(t, impl)
}
```

```
func TestZgeru(t *testing.T) {
 testblas.ZgeruTest(t, impl)
}
```

```
func TestZhbmV(t *testing.T) {
 testblas.ZhbmVTest(t, impl)
}
```

```
func TestZhemv(t *testing.T) {
 testblas.ZhemvTest(t, impl)
}
```

```
func TestZher(t *testing.T) {
 testblas.ZherTest(t, impl)
}
```

```
func TestZher2(t *testing.T) {
 testblas.Zher2Test(t, impl)
}
```

```
func TestZhpmv(t *testing.T) {
```

```

testblas.ZhpmvTest(t, impl)
}

func TestZhpr(t *testing.T) {
testblas.ZhprTest(t, impl)
}

func TestZhpr2(t *testing.T) {
testblas.Zhpr2Test(t, impl)
}

func TestZtbmv(t *testing.T) {
testblas.ZtbmvTest(t, impl)
}

func TestZtbsv(t
*testing.T) {
testblas.ZtbsvTest(t, impl)
}

func TestZtpmv(t *testing.T) {
testblas.ZtpmvTest(t, impl)
}

func TestZtpsv(t *testing.T) {
testblas.ZtpsvTest(t, impl)
}

func TestZtrmv(t *testing.T) {
testblas.ZtrmvTest(t, impl)
}

func TestZtrsv(t *testing.T) {
testblas.ZtrsvTest(t, impl)
}
graph{stri{stri}}
graph{Subgrat{{{Subgrat{{{Subgray}}}}}}}
graph{SUBGRAP{{{SUBGRAP{SUBGRAP}SUBGRAP}}}}
graph{dig_{dig_{dig_{dig_}}}
Graph{{{D}D}{D}}}
graph{DiGraphd{{DiGraphg}{DiGraphg}DiGraphg}}
graph{Gs{Gy}Gs{Gt}Gs{Gt}}
graph{GRAR{GRAR}}
graph{{{Edga}{Edga}Edga}Edga}
// SPDX-License-Identifier: Unlicense OR MIT

package input

```

```

import (
 "gioui.org/internal/opconst"
 "gioui.org/internal/ops"
 "gioui.org/io/event"
 "gioui.org/io/key"
 "gioui.org/op"
)

type TextInputState uint8

type keyQueue struct {
 focus event.Key
 handlers map[event.Key]*keyHandler
 reader ops.Reader
 state TextInputState
}

type keyHandler struct {
 active bool
}

type listenerPriority uint8

const (
 priNone listenerPriority = iota
 priDefault
 priCurrentFocus
 priNewFocus
)

const (
 TextInputKeep TextInputState = iota
 TextInputClose
 TextInputOpen
)

// InputState returns the last text input state as
// determined in Frame.
func (q *keyQueue) InputState() TextInputState {
 return q.state
}

func (q *keyQueue) Frame(root *op.Ops, events *handlerEvents) {
 if q.handlers == nil {
 q.handlers = make(map[event.Key]*keyHandler)
 }
 for _, h := range q.handlers {
 h.active = false
 }
}

```



```

}
q.reader.Reset(root)
focus, pri, hide := q.resolveFocus(events)
for k, h := range q.handlers
{
 if !h.active {
 delete(q.handlers, k)
 if q.focus == k {
 q.focus = nil
 hide = true
 }
 }
}
if focus != q.focus {
 if q.focus != nil {
 events.Add(q.focus, key.FocusEvent{Focus: false})
 }
 q.focus = focus
 if q.focus != nil {
 events.Add(q.focus, key.FocusEvent{Focus: true})
 } else {
 hide = true
 }
}
switch {
case pri == priNewFocus:
 q.state = TextInputOpen
case hide:
 q.state = TextInputClose
default:
 q.state = TextInputKeep
}
}

func (q *keyQueue) Push(e event.Event, events *handlerEvents) {
 if q.focus != nil {
 events.Add(q.focus, e)
 }
}

func (q *keyQueue) resolveFocus(events *handlerEvents) (event.Key, listenerPriority, bool) {
 var k event.Key
 var pri listenerPriority
 var hide bool
loop:
 for encOp, ok := q.reader.Decode(); ok; encOp, ok = q.reader.Decode() {
 switch opconst.OpType(encOp.Data[0]) {
 case opconst.TypeKeyInput:

```

```

op := decodeKeyInputOp(encOp.Data, encOp.Refs)
var newPri listenerPriority
switch {
case
op.Focus:
 newPri = priNewFocus
case op.Key == q.focus:
 newPri = priCurrentFocus
default:
 newPri = priDefault
}
// Switch focus if higher priority or if focus requested.
if newPri.replaces(pri) {
 k, pri = op.Key, newPri
}
h, ok := q.handlers[op.Key]
if !ok {
 h = new(keyHandler)
 q.handlers[op.Key] = h
 // Reset the handler on (each) first appearance.
 events.Set(op.Key, []event.Event{key.FocusEvent{Focus: false}})
}
h.active = true
case opconst.TypeHideInput:
 hide = true
case opconst.TypePush:
 newK, newPri, h := q.resolveFocus(events)
 hide = hide || h
 if newPri.replaces(pri) {
 k, pri = newK, newPri
 }
case opconst.TypePop:
 break loop
}
}
return k, pri, hide
}

```

```

func (p listenerPriority) replaces(p2 listenerPriority) bool {
 // Favor earliest default focus or latest requested focus.
 return p > p2 || p == p2 && p == priNewFocus
}

```

```

func decodeKeyInputOp(d []byte, refs []interface{}) key.InputOp {
 if
opconst.OpType(d[0]) != opconst.TypeKeyInput {
 panic("invalid op")
 }
}

```

```

return key.InputOp{
 Focus: d[1] != 0,
 Key: refs[0].(event.Key),
}
}

graph{{{SubGrM}SubGrS}SubGrK{SubGrM}SubGrS}SubGrK}
graph{{DigV}{DigV}{DigR}{DigV}{DigV}DigP}
graph{DiGr{{DiGr}DiGr}}
graph{{{{Sh{{{Sh{{{Sb}}}So}}}}So{{{Sb}}}So}}}}So}
graph{subGr}
digraph {e=""{k=e S8 S4 S1 S5 S0}{k=e}{k=e}{k=e}{k=e}{k=e}{k=e}{k=e}{k=e}S8->9S4->5S4->7S1->2S1->0S5->3S5->6S0->1S0->3->2->1->1->6->4->{3}->{1}->1->2->0->4->4->4->4->5->9->9->4->5->{9}->9->9->8->0->9->3->9->5->9->4->9->5->{1}->{6}->2->5->9->7->1->5->3->0->8->4->1}
// Code generated by "go generate gonum.org/v1/gonum/unit; DO NOT EDIT.

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// license that can be found in the LICENSE file.

package unit

import (
 "fmt"
 "testing"
)

func TestLengthFormat(t *testing.T) {
 for _, test := range []struct {
 value Length
 format string
 want string
 }{
 {1.23456789, "%v", "1.23456789 m"},
 {1.23456789, "%.1v", "1 m"},
 {1.23456789, "%20.1v", "1 m"},
 {1.23456789, "%20v", "1.23456789 m"},
 {1.23456789, "%1v", "1.23456789 m"},
 {1.23456789, "%#v", "unit.Length(1.23456789)"},
 {1.23456789, "%s", "%!s(unit.Length=1.23456789 m)"},
 } {
 got := fmt.Sprintf(test.format, test.value)
 if got != test.want {
 t.Errorf("Format %q %v: got: %q want: %q", test.format, float64(test.value), got, test.want)
 }
 }
}

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```

```

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package gonum

import (
 "gonum.org/v1/gonum/blas"
 "gonum.org/v1/gonum/lapack"
)

// Dgeqrf computes the QR factorization of the mn matrix A using a blocked
// algorithm. See the documentation for Dgeqr2 for a description of the
// parameters at entry and exit.
//
// work is temporary storage, and lwork specifies the usable memory length.
// The length of work must be at least max(1, lwork) and lwork must be -1
// or at least n, otherwise this function will panic.
// Dgeqrf is a blocked QR factorization, but the block size is limited
// by the temporary space available. If lwork == -1, instead of performing Dgeqrf,
// the optimal work length will be stored into work[0].
//
// tau must have length at least min(m,n), and this function will panic otherwise.
func (impl Implementation) Dgeqrf(m, n int, a []float64, lda int, tau, work
[]float64, lwork int) {
 switch {
 case m < 0:
 panic(mLT0)
 case n < 0:
 panic(nLT0)
 case lda < max(1, n):
 panic(badLdA)
 case lwork < max(1, n) && lwork != -1:
 panic(badLWork)
 case len(work) < max(1, lwork):
 panic(shortWork)
 }

 // Quick return if possible.
 k := min(m, n)
 if k == 0 {
 work[0] = 1
 return
 }

 // nb is the optimal blocksize, i.e. the number of columns transformed at a time.
 nb := impl.Ilaenv(1, "DGEQRF", " ", m, n, -1, -1)
 if lwork == -1 {
 work[0] = float64(n * nb)
 return
 }

```

```

}

if len(a) < (m-1)*lda+n {
 panic(shortA)
}
if len(tau) < k {
 panic(shortTau)
}

nbmin := 2 // Minimal block size.
var nx int // Use unblocked (unless changed in the next for loop)
iws := n
// Only consider blocked if the suggested block size is > 1 and the
// number of rows or columns is sufficiently large.
if 1 < nb && nb < k {
 // nx is the block size at which the code switches from blocked
 // to unblocked.
 nx = max(0, impl.Ilaenv(3, "DGEQRF", " ", m,
n, -1, -1))
 if k > nx {
 iws = n * nb
 if lwork < iws {
 // Not enough workspace to use the optimal block
 // size. Get the minimum block size instead.
 nb = lwork / n
 nbmin = max(2, impl.Ilaenv(2, "DGEQRF", " ", m, n, -1, -1))
 }
 }
}

// Compute QR using a blocked algorithm.
var i int
if nbmin <= nb && nb < k && nx < k {
 ldwork := nb
 for i = 0; i < k-nx; i += nb {
 ib := min(k-i, nb)
 // Compute the QR factorization of the current block.
 impl.Dgeqr2(m-i, ib, a[i*lda+i:], lda, tau[i:], work)
 if i+ib < n {
 // Form the triangular factor of the block reflector and apply H
 // In Dlarft, work becomes the T matrix.
 impl.Dlarft(lapack.Forward, lapack.ColumnWise, m-i, ib,
a[i*lda+i:], lda,
tau[i:],
work, ldwork)
 impl.Dlarfb(blas.Left, blas.Trans, lapack.Forward, lapack.ColumnWise,
m-i, n-i-ib, ib,
a[i*lda+i:], lda,

```

```

 work, ldwork,
 a[i*lda+i+ib:], lda,
 work[ib*ldwork:], ldwork)
}
}
}
// Call unblocked
code on the remaining columns.
if i < k {
 impl.Dgeqr2(m-i, n-i, a[i*lda+i:], lda, tau[i:], work)
}
work[0] = float64(iws)
}
graph{"ge Vertex OptEdge << astx.New >>\\\\\\\\\\\\X[D], X[1], X[2]) >>\\\\\\\\"}
// Code generated by "go generate gonum.org/v1/gonum/unit/constant; DO NOT EDIT.

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package constant

import (
 "fmt"

 "gonum.org/v1/gonum/unit"
)

// ElectricConstant is the electric constant (), the value of the absolute dielectric permittivity of classical vacuum.
// The dimensions of ElectricConstant are A^2 s^4 kg^-1 m^-3. The standard uncertainty of the constant is 1.3e-21
// A^2 s^4 kg^-1 m^-3.
const ElectricConstant = electricConstantUnits(8.854187817620389e-12)

type electricConstantUnits float64

// Unit converts the electricConstantUnits to a *unit.Unit
func (cnst electricConstantUnits) Unit() *unit.Unit {
 return unit.New(float64(cnst), unit.Dimensions{
 unit.CurrentDim: 2,
 unit.TimeDim: 4,
 unit.MassDim: -1,
 unit.LengthDim: -3,
 })
}

func (cnst electricConstantUnits) Format(fs fmt.State, c rune) {
 switch

```

```

c {
case 'v':
if fs.Flag('#') {
fmt.Fprintf(fs, "%T(%v)", cnst, float64(cnst))
return
}
fallthrough
case 'e', 'E', 'f', 'F', 'g', 'G':
p, pOk := fs.Precision()
w, wOk := fs.Width()
switch {
case pOk && wOk:
fmt.Fprintf(fs, "%*.*"+string(c), w, p, cnst.Unit())
case pOk:
fmt.Fprintf(fs, "%.*"+string(c), p, cnst.Unit())
case wOk:
fmt.Fprintf(fs, "%*"+string(c), w, cnst.Unit())
default:
fmt.Fprintf(fs, "%"+string(c), cnst.Unit())
}
default:
fmt.Fprintf(fs, "%%!"+string(c)+"(constant.electricConstantUnits=%v A^2 s^4 kg^-1 m^-3)", float64(cnst))
}
}
graph{{nod{nod}}}
graph{stri5{stri5{stri1{{stri5}}}stri1}}
graph{{SUBGRA_}{SUBGRA_}SUBGRA_}
 DOUBLE PRECISION FUNCTION MYSQRT(A)
 DOUBLE PRECISION A
 MYSQRT = SQRT(A)
 RETURN
 END
// Code generated by "go generate gonum.org/v1/gonum/unit/constant; DO NOT EDIT.

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package constant

import "gonum.org/v1/gonum/unit"

// LightSpeedInVacuum is the c constant, the speed of light in a vacuum.
// The dimensions of LightSpeedInVacuum are m s^-1. The constant is exact.
const LightSpeedInVacuum = unit.Velocity(2.99792458e+08)
// Package mem implements a memory allocator and deallocator.
// It currently uses mmap on unix and VirtualAlloc on windows
// to request pages of memory from the operating system, and

```

```

// munmap and VirtualFree to release pages of memory to the
// operating system. The allocator uses a first-fit algorithm
// on a singly-linked free list of blocks. Blocks are divided
// into sets called arenas, which correspond to the chunk of
// memory mapped from the operating system. When all of the
// blocks in a set are freed, the arena is unmapped.
package mem

import (
 "os"
 "sync"
 "unsafe"
)

var (
 szpage = uint(os.Getpagesize())
 szheader = uint(unsafe.Sizeof(header{}))
 freep = new(header) // head of linked list
 m sync.Mutex
)

type header struct {
 size uint
 allocated bool
 next *header
 arena unsafe.Pointer // arena of which this block is a member
}

// return n rounded up to a multiple of k.
func roundMultiple(n, k uint) uint {
 if mod := n % k; mod != 0 {
 return
 n + (k - mod)
 }
 return n
}

// Alloc allocates size bytes of memory, and returns a pointer to it.
// It is goroutine-safe and attempts to preserve the semantics of
// POSIX libc's malloc. However, Alloc panics if an error occurs when
// requesting more memory from the operating system.
func Alloc(size uint) unsafe.Pointer {
 if size == 0 {
 return nil
 }
 m.Lock()
 defer m.Unlock()
 // Iterate through linked list of headers.

```



```

p := freep
for {
 // block is free
 if !p.allocated {
 // block is large enough (first-fit)
 if p.size >= size {
 ret := uintptr(unsafe.Pointer(p)) + uintptr(szheader)
 // split block if enough space for header
 if gap := p.size - size; gap >= szheader {
 h := (*header)(unsafe.Pointer(ret + uintptr(size)))
 h.size = gap - szheader
 h.allocated = false
 h.next = p.next
 h.arena = p.arena
 p.next = h
 p.size = size
 }
 p.allocated = true
 return unsafe.Pointer(ret)
 }
 }
 // allocate memory
 if p.next
 == nil {
 // Allocated space must be enough to hold header and
 // size bytes. Simplify alignment by rounding up to
 // the next multiple of the header size.
 szalign := roundMultiple(szheader+size, szheader)
 // round bytes to the next multiple of the page size
 szalloc := roundMultiple(szalign, szpage)
 pblock, err := mmap(szalloc)
 if err != nil {
 panic(err)
 }
 h := (*header)(pblock)
 h.size = szalloc - szheader
 h.allocated = false
 h.next = nil
 h.arena = pblock
 p.next = h
 }
 p = p.next
}

// Free deallocates the memory pointed to by p. It is goroutine-safe
// and attempts to preserve the semantics of POSIX libc's free.
// However, Free panics if an error occurs when releasing memory to

```

```

// the operating system.
func Free(p unsafe.Pointer) {
 if p == nil {
 return
 }
 m.Lock()
 defer m.Unlock()
 h := (*header)(unsafe.Pointer(uintptr(p) - uintptr(szheader)))
 arcurr := h.arena
 h.allocated = false
 // Coalesce adjacent free blocks from the
 same arena.
 if next := h.next; next != nil && next.arena == h.arena && !next.allocated {
 h.size += next.size + szheader
 h.next = next.next
 }
 freeArena := true
 var first, prev *header
 for it := freep; ; it = it.next {
 if it.arena == arcurr {
 if it.allocated {
 freeArena = false
 } else if next := it.next; next != nil && next.arena == arcurr && !next.allocated {
 it.size += next.size + szheader
 it.next = next.next
 }
 }
 if first == nil {
 first = it
 }
 }
 if it.next == nil {
 break
 }
 if it.arena != arcurr && it.next.arena == arcurr {
 prev = it
 }
}
if !freeArena {
 return
}
// If there are no allocated blocks in arena, munmap it.
prev.next = first.next
if err := munmap(unsafe.Pointer(first)); err != nil {
 panic(err)
}
}
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```

```
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```

```
package gonum
```

```
import "math"
```

```
// Dlanv2 computes the Schur factorization of a real 22 matrix:
```

```
// [a b] = [cs -sn] * [aa bb] * [cs sn]
```

```
// [c d] [sn cs] [cc dd] * [-sn cs]
```

```
// If cc is zero, aa and dd are real eigenvalues of the matrix. Otherwise it
```

```
// holds that aa = dd and bb*cc < 0, and aa sqrt(bb*cc) are complex conjugate
```

```
// eigenvalues. The real and imaginary parts of the eigenvalues are returned in
```

```
// (rt1r,rt1i) and (rt2r,rt2i).
```

```
func (impl Implementation) Dlanv2(a, b, c, d float64) (aa, bb, cc, dd float64, rt1r, rt1i, rt2r, rt2i float64, cs, sn float64) {
```

```
 switch {
```

```
 case c == 0: // Matrix is already upper triangular.
```

```
 aa = a
```

```
 bb = b
```

```
 cc = 0
```

```
 dd = d
```

```
 cs = 1
```

```
 sn = 0
```

```
 case b == 0: // Matrix is lower triangular, swap rows and columns.
```

```
 aa = d
```

```
 bb = -c
```

```
 cc = 0
```

```
 dd = a
```

```
 cs = 0
```

```
 sn = 1
```

```
 case a ==
```

```
 d && math.Signbit(b) != math.Signbit(c): // Matrix is already in the standard Schur form.
```

```
 aa = a
```

```
 bb = b
```

```
 cc = c
```

```
 dd = d
```

```
 cs = 1
```

```
 sn = 0
```

```
 default:
```

```
 temp := a - d
```

```
 p := temp / 2
```

```
 bcmax := math.Max(math.Abs(b), math.Abs(c))
```

```
 bcmin := math.Min(math.Abs(b), math.Abs(c))
```

```
 if b*c < 0 {
```

```
 bcmin *= -1
```

```
 }
```

```
 scale := math.Max(math.Abs(p), bcmax)
```

```
 z := p/scale*p + bcmax/scale*bcmin
```

```

eps := dlamchP

if z >= 4*eps {
 // Real eigenvalues. Compute aa and dd.
 if p > 0 {
 z = p + math.Sqrt(scale)*math.Sqrt(z)
 } else {
 z = p - math.Sqrt(scale)*math.Sqrt(z)
 }
 aa = d + z
 dd = d - b*cmis/z
 // Compute bb and the rotation matrix.
 tau := impl.Dlapy2(c, z)
 cs = z / tau
 sn = c / tau
 bb = b - c
 cc = 0
} else {
 // Complex eigenvalues, or real (almost) equal eigenvalues.
 // Make diagonal elements equal.
 sigma := b + c
 tau := impl.Dlapy2(sigma, temp)
 cs = math.Sqrt((1 + math.Abs(sigma)/tau) / 2)
 sn = -p / (tau * cs)
 if sigma <
0 {
 sn *= -1
 }
 // Compute [aa bb] = [a b] [cs -sn]
 // [cc dd] [c d] [sn cs]
 aa = a*cs + b*sn
 bb = -a*sn + b*cs
 cc = c*cs + d*sn
 dd = -c*sn + d*cs
 // Compute [a b] = [cs sn] [aa bb]
 // [c d] [-sn cs] [cc dd]
 a = aa*cs + cc*sn
 b = bb*cs + dd*sn
 c = -aa*sn + cc*cs
 d = -bb*sn + dd*cs

 temp = (a + d) / 2
 aa = temp
 bb = b
 cc = c
 dd = temp

 if cc != 0 {

```

```

if bb != 0 {
 if math.Signbit(bb) == math.Signbit(cc) {
 // Real eigenvalues, reduce to
 // upper triangular form.
 sab := math.Sqrt(math.Abs(bb))
 sac := math.Sqrt(math.Abs(cc))
 p = sab * sac
 if cc < 0 {
 p *= -1
 }
 tau = 1 / math.Sqrt(math.Abs(bb+cc))
 aa = temp + p
 bb = bb - cc
 cc = 0
 dd = temp - p
 cs1 := sab * tau
 sn1 := sac * tau
 cs, sn = cs*cs1-sn*sn1, cs*sn1+sn+cs1
 }
 } else {
 bb = -cc
 cc = 0
 cs, sn = -sn, cs
 }
}

//
Store eigenvalues in (rt1r,rt1i) and (rt2r,rt2i).
rt1r = aa
rt2r = dd
if cc != 0 {
 rt1i = math.Sqrt(math.Abs(bb)) * math.Sqrt(math.Abs(cc))
 rt2i = -rt1i
}
return
}
strict digraph{A->B A->B}
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package mat_test

import (
 "fmt"

```

```

"gonum.org/v1/gonum/mat"
)

func ExampleFormatted() {
a := mat.NewDense(3, 3, []float64{1, 2, 3, 0, 4, 5, 0, 0, 6})

// Create a matrix formatting value with a prefix and calculating each column
// width individually...
fa := mat.Formatted(a, mat.Prefix(" "), mat.Squeeze())

// and then print with and without zero value elements.
fmt.Printf("with all values:\na = %v\n\n", fa)
fmt.Printf("with only non-zero values:\na = %v\n\n", fa)

// Modify the matrix...
a.Set(0, 2, 0)

// and print it without zero value elements.
fmt.Printf("after modification with only non-zero values:\na = %v\n\n", fa)

// Modify the matrix again...
a.Set(0, 2, 123.456)

// and print it using scientific notation for large exponents.
fmt.Printf("after modification with scientific notation:\na = %.2g\n\n",
fa)
// See golang.org/pkg/fmt/ floating-point verbs for a comprehensive list.

// Output:
// with all values:
// a = 1 2 3
// 0 4 5
// 0 0 6
//
// with only non-zero values:
// a = 1 2 3
// . 4 5
// . . 6
//
// after modification with only non-zero values:
// a = 1 2 .
// . 4 5
// . . 6
//
// after modification with scientific notation:
// a = 1 2 1.2e+02
// 0 4 5
// 0 0 6

```

```

}

func ExampleExcerpt() {
 // Excerpt allows diagnostic display of very large
 // matrices and vectors.

 // The big matrix is too large to properly print...
 big := mat.NewDense(100, 100, nil)
 for i := 0; i < 100; i++ {
 big.Set(i, i, 1)
 }

 // so only print corner excerpts of the matrix.
 fmt.Printf("excerpt big identity matrix: %v\n\n",
 mat.Formatted(big, mat.Prefix(" "), mat.Excerpt(3)))

 // The long vector is also too large, ...
 long := mat.NewVecDense(100, nil)
 for i := 0; i < 100; i++ {
 long.SetVec(i, float64(i))
 }

 //
 ... so print end excerpts of the vector,
 fmt.Printf("excerpt long column vector: %v\n\n",
 mat.Formatted(long, mat.Prefix(" "), mat.Excerpt(3)))
 // or its transpose.
 fmt.Printf("excerpt long row vector: %v\n",
 mat.Formatted(long.T(), mat.Prefix(" "), mat.Excerpt(3)))

 // Output:
 // excerpt big identity matrix: Dims(100, 100)
 // 1 0 0 0 0 0
 // 0 1 0 0 0 0
 // 0 0 1 0 0 0
 // .
 // .
 // .
 // 0 0 0 1 0 0
 // 0 0 0 0 1 0
 // 0 0 0 0 0 1
 //
 // excerpt long column vector: Dims(100, 1)
 // 0
 // 1
 // 2
 // .
 // .

```

```
// .
// 97
// 98
// 99
//
// excerpt long row vector: Dims(1, 100)
// [0 1 2 97 98 99]

}

graph{SUBh{SUBo}}
Graph{{SubGr4}{SubGr4}{SubGr4}{SubGr4}{SubGr4}{SubGr4}}
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graph{{DiGrapR}DiGrapR}DiGrapR}
graph ER{stu[e=e]{e[l=""]ne ne ne}grae nu[e=d,sty=d,r=y]""""""ne--e--e--""[l="",n=1.00]""--e[l="",n=1.00]e--ne--""[l="",n=1.00]""--stu[l="",n=1.00]stu--grae stu--ne stu--nu stu--""[l="",n=1.00]""--e[l="",n=1.00]l""}
graph{{digraq}{digraq}}{{digraq}}{{digraq}{digraq}{digraq}}{{digraq}}{{digraq}}{{digraq}}
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// Copyright 2016 The Gonum Authors. All rights reserved.
// Use of this source code is governed by a BSD-style
// license that can be found in the LICENSE file.

package distuv

import (
 "math"

 "golang.org/x/exp/rand"

 "gonum.org/v1/gonum/mat"
)

const logPi = 1.1447298858494001741 // http://oeis.org/A053510

// StudentsT implements the three-parameter Student's T distribution, a distribution
// over the real numbers.
//
// The Student's T distribution has density function
// $((1+1/2) / (\sqrt{2})) (1 + 1/2 * ((x-)/^2)^{-(+1)/2}$
//
// The Student's T distribution approaches the normal distribution as .
//
// For more information, see https://en.wikipedia.org/wiki/Student%27s_t-distribution,
// specifically https://en.wikipedia.org/wiki/Student%27s_t-distribution#Non-standardized_Student.27s_t-distribution .
//
// The standard Student's T distribution is with Mu = 0, and Sigma = 1.
type StudentsT struct {
```



```

// Mu is the location parameter of the distribution, and the mean of
the
// distribution
Mu float64

// Sigma is the scale parameter of the distribution. It is related to the
// standard deviation by $\text{std} = \text{Sigma} * \sqrt{\text{Nu}/(\text{Nu}-2)}$
Sigma float64

// Nu is the shape parameter of the distribution, representing the number of
// degrees of the distribution, and one less than the number of observations
// from a Normal distribution.
Nu float64

Src rand.Source
}

// CDF computes the value of the cumulative distribution function at x.
func (s StudentsT) CDF(x float64) float64 {
 // transform to standard normal
 y := (x - s.Mu) / s.Sigma
 if y == 0 {
 return 0.5
 }
 // For $t > 0$
 // $F(y) = 1 - 0.5 * I_t(y)(\text{nu}/2, 1/2)$
 // $t(y) = \text{nu}/(y^2 + \text{nu})$
 // and $1 - F(y)$ for $t < 0$
 t := s.Nu / (y*y + s.Nu)
 if y > 0 {
 return 1 - 0.5*mathext.RegIncBeta(0.5*s.Nu, 0.5, t)
 }
 return 0.5 * mathext.RegIncBeta(s.Nu/2, 0.5, t)
}

// LogProb computes the natural logarithm of the value of the probability
// density function at x.
func (s StudentsT) LogProb(x float64) float64
{
 g1, _ := math.Lgamma((s.Nu + 1) / 2)
 g2, _ := math.Lgamma(s.Nu / 2)
 z := (x - s.Mu) / s.Sigma
 return g1 - g2 - 0.5*math.Log(s.Nu) - 0.5*logPi - math.Log(s.Sigma) - ((s.Nu+1)/2)*math.Log(1+z*z/s.Nu)
}

// Mean returns the mean of the probability distribution.
func (s StudentsT) Mean() float64 {
 return s.Mu
}

```

```

}

// Mode returns the mode of the distribution.
func (s StudentsT) Mode() float64 {
 return s.Mu
}

// NumParameters returns the number of parameters in the distribution.
func (StudentsT) NumParameters() int {
 return 3
}

// Prob computes the value of the probability density function at x.
func (s StudentsT) Prob(x float64) float64 {
 return math.Exp(s.LogProb(x))
}

// Quantile returns the inverse of the cumulative distribution function.
func (s StudentsT) Quantile(p float64) float64 {
 if p < 0 || p > 1 {
 panic(badPercentile)
 }
 // $F(x) = 1 - 0.5 * I_t(x)(\nu/2, 1/2)$
 // $t(x) = \nu/(t^2 + \nu)$
 if p == 0.5 {
 return s.Mu
 }
 var y float64
 if p > 0.5 {
 // Know t >
 0
 t := mathext.InvRegIncBeta(s.Nu/2, 0.5, 2*(1-p))
 y = math.Sqrt(s.Nu * (1 - t) / t)
 } else {
 t := mathext.InvRegIncBeta(s.Nu/2, 0.5, 2*p)
 y = -math.Sqrt(s.Nu * (1 - t) / t)
 }
 // Convert out of standard normal
 return y*s.Sigma + s.Mu
}

// Rand returns a random sample drawn from the distribution.
func (s StudentsT) Rand() float64 {
 // http://www.math.uah.edu/stat/special/Student.html
 n := Normal{0, 1, s.Src}.Rand()
 c := Gamma{s.Nu / 2, 0.5, s.Src}.Rand()
 z := n / math.Sqrt(c/s.Nu)
 return z*s.Sigma + s.Mu
}

```

```

}

// StdDev returns the standard deviation of the probability distribution.
//
// The standard deviation is undefined for ≤ 1 , and this returns math.NaN().
func (s StudentsT) StdDev() float64 {
 return math.Sqrt(s.Variance())
}

// Survival returns the survival function (complementary CDF) at x.
func (s StudentsT) Survival(x float64) float64 {
 // transform to standard normal
 y := (x - s.Mu) / s.Sigma
 if y == 0 {
 return 0.5
 }
 // For $t > 0$
 // $F(y) = 1 - 0.5 * I_t(y)(\nu/2, 1/2)$
 // $t(y) = \nu/(y^2 + \nu)$
 // and $1 - F(y)$ for $t < 0$
 t := s.Nu / (y*y + s.Nu)
 if y > 0 {
 return 0.5 * mathext.RegIncBeta(s.Nu/2, 0.5, t)
 }
 return 1 - 0.5*mathext.RegIncBeta(s.Nu/2, 0.5, t)
}

// Variance returns the variance of the probability distribution.
//
// The variance is undefined for ≤ 1 , and this returns math.NaN().
func (s StudentsT) Variance() float64 {
 if s.Nu < 1 {
 return math.NaN()
 }
 if s.Nu <= 2 {
 return math.Inf(1)
 }
 return s.Sigma * s.Sigma * s.Nu / (s.Nu - 2)
}
graph{{E4}E4}
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// Use of this source code is governed by a BSD-style
// license that can be found in the LICENSE file.

package mat

const (

```

```

// regionOverlap is the panic string used for the general case
// of a matrix region overlap between a source and destination.
regionOverlap = "mat: bad region: overlap"

// regionIdentity is the panic string used for the specific
// case of complete agreement between a source and a destination.
regionIdentity = "mat: bad region: identical"

// mismatchedStrides is the panic string used for overlapping
// data slices with differing strides.
mismatchedStrides = "mat: bad region: different strides"
)

// rectanglesOverlap returns whether the strided rectangles a and b overlap
// when b is offset by off elements after a but has at least one element before
// the end of a. off must be positive. a and b have aCols and bCols respectively.
//
// rectanglesOverlap works by shifting both matrices left such
// that the left
// column of a is at 0. The column indexes are flattened by obtaining the shifted
// relative left and right column positions modulo the common stride. This allows
// direct comparison of the column offsets when the matrix backing data slices
// are known to overlap.
func rectanglesOverlap(off, aCols, bCols, stride int) bool {
 if stride == 1 {
 // Unit stride means overlapping data
 // slices must overlap as matrices.
 return true
 }

 // Flatten the shifted matrix column positions
 // so a starts at 0, modulo the common stride.
 aTo := aCols
 // The mod stride operations here make the from
 // and to indexes comparable between a and b when
 // the data slices of a and b overlap.
 bFrom := off % stride
 bTo := (bFrom + bCols) % stride

 if bTo == 0 || bFrom < bTo {
 // b matrix is not wrapped: compare for
 // simple overlap.
 return bFrom < aTo
 }

 // b strictly wraps and so must overlap with a.
 return true
}

```

```

graph{subg{subgg{subg}subgr}subgr}
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// +build !noasm,!appengine,!safe

package c64

// ApyUnitary is
// for i, v := range x {
// y[i] += alpha * v
// }
func ApyUnitary(alpha complex64, x, y []complex64)

// ApyUnitaryTo is
// for i, v := range x {
// dst[i] = alpha*v + y[i]
// }
func ApyUnitaryTo(dst []complex64, alpha complex64, x, y []complex64)

// ApyInc is
// for i := 0; i < int(n); i++ {
// y[iy] += alpha * x[ix]
// ix += incX
// iy += incY
// }
func ApyInc(alpha complex64, x, y []complex64, n, incX, incY, ix, iy uintptr)

// ApyIncTo is
// for i := 0; i < int(n); i++ {
// dst[idst] = alpha*x[ix] + y[iy]
// ix += incX
// iy += incY
// idst += incDst
// }
func ApyIncTo(dst []complex64, incDst, idst uintptr, alpha complex64, x, y []complex64, n, incX, incY, ix, iy
uintptr)

// DotcUnitary is
// for i, v := range x {
// sum
// += y[i] * conj(v)
// }
// return sum
func DotcUnitary(x, y []complex64) (sum complex64)

// DotcInc is

```

```

// for i := 0; i < int(n); i++ {
// sum += y[iy] * conj(x[ix])
// ix += incX
// iy += incY
// }
// return sum
func DotcInc(x, y []complex64, n, incX, incY, ix, iy uintptr) (sum complex64)

// DotuUnitary is
// for i, v := range x {
// sum += y[i] * v
// }
// return sum
func DotuUnitary(x, y []complex64) (sum complex64)

// DotuInc is
// for i := 0; i < int(n); i++ {
// sum += y[iy] * x[ix]
// ix += incX
// iy += incY
// }
// return sum
func DotuInc(x, y []complex64, n, incX, incY, ix, iy uintptr) (sum complex64)
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// license that can be found in the LICENSE file.

package distuv

import (
 "math"

 "golang.org/x/exp/rand"

 "gonum.org/v1/gonum/matext"
)

// InverseGamma implements the inverse gamma distribution, a two-parameter
// continuous distribution with support over the positive real numbers. The
// inverse gamma distribution is the same as the distribution of the reciprocal
// of a gamma distributed random variable.
//
// The inverse gamma distribution has density function
// $f(x) = \frac{1}{x^{a+1}} e^{-1/x}$
//
// For more information, see https://en.wikipedia.org/wiki/Inverse-gamma_distribution
type InverseGamma struct {
 // Alpha is the shape parameter of the distribution. Alpha must be greater than 0.

```

```

Alpha float64
// Beta is the scale parameter of the distribution. Beta must be greater than 0.
Beta float64

Src rand.Source
}

// CDF computes the value of the cumulative distribution
function at x.
func (g InverseGamma) CDF(x float64) float64 {
 if x < 0 {
 return 0
 }
 // TODO(btracey): Replace this with a direct call to the upper regularized
 // gamma function if mathext gets it.
 //return 1 - mathext.GammaInc(g.Alpha, g.Beta/x)
 return mathext.GammaIncRegComp(g.Alpha, g.Beta/x)
}

// ExKurtosis returns the excess kurtosis of the distribution.
func (g InverseGamma) ExKurtosis() float64 {
 if g.Alpha <= 4 {
 return math.Inf(1)
 }
 return (30*g.Alpha - 66) / (g.Alpha - 3) / (g.Alpha - 4)
}

// LogProb computes the natural logarithm of the value of the probability
// density function at x.
func (g InverseGamma) LogProb(x float64) float64 {
 if x <= 0 {
 return math.Inf(-1)
 }
 a := g.Alpha
 b := g.Beta
 lg, _ := math.Lgamma(a)
 return a*math.Log(b) - lg + (-a-1)*math.Log(x) - b/x
}

// Mean returns the mean of the probability distribution.
func (g InverseGamma) Mean() float64 {
 if g.Alpha <= 1 {
 return math.Inf(1)
 }
 return g.Beta / (g.Alpha - 1)
}

// Mode

```

```

returns the mode of the distribution.
func (g InverseGamma) Mode() float64 {
 return g.Beta / (g.Alpha + 1)
}

// NumParameters returns the number of parameters in the distribution.
func (InverseGamma) NumParameters() int {
 return 2
}

// Prob computes the value of the probability density function at x.
func (g InverseGamma) Prob(x float64) float64 {
 return math.Exp(g.LogProb(x))
}

// Quantile returns the inverse of the cumulative distribution function.
func (g InverseGamma) Quantile(p float64) float64 {
 if p < 0 || 1 < p {
 panic(badPercentile)
 }
 return (1 / (mathext.GammaIncRegCompInv(g.Alpha, p))) * g.Beta
}

// Rand returns a random sample drawn from the distribution.
//
// Rand panics if either alpha or beta is <= 0.
func (g InverseGamma) Rand() float64 {
 // TODO(btracey): See if there is a more direct way to sample.
 return 1 / Gamma(g).Rand()
}

// Survival returns the survival function (complementary CDF) at x.
func (g InverseGamma) Survival(x float64) float64 {
 if x
 < 0 {
 return 1
 }
 return mathext.GammaIncReg(g.Alpha, g.Beta/x)
}

// StdDev returns the standard deviation of the probability distribution.
func (g InverseGamma) StdDev() float64 {
 return math.Sqrt(g.Variance())
}

// Variance returns the variance of the probability distribution.
func (g InverseGamma) Variance() float64 {
 if g.Alpha <= 2 {

```



```

 return math.Inf(1)
}
v := g.Beta / (g.Alpha - 1)
return v * v / (g.Alpha - 2)
}
graph{<<auaua>>}
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graph{Strig}
graph{{{8.}9.}{8.}9.}
graph{St{{St{St{{St}}St}}St{{St}St}St}}
// Copyright 2019 The Gonum Authors. All rights reserved.
// Use of this source code is governed by a BSD-style
// license that can be found in the LICENSE file.

package testblas

import (
 "fmt"
 "testing"

 "golang.org/x/exp/rand"
 "gonum.org/v1/gonum/blas"
)

type Zgemmer interface {
 Zgemm(tA, tB blas.Transpose, m, n, k int, alpha complex128, a []complex128, lda int, b []complex128, ldb int, beta
 complex128, c []complex128, ldc int)
}

func ZgemmTest(t *testing.T, impl Zgemmer) {
 for _, tA := range []blas.Transpose{blas.NoTrans, blas.Trans, blas.ConjTrans} {
 for _, tB := range []blas.Transpose{blas.NoTrans, blas.Trans, blas.ConjTrans} {
 name := transString(tA) + "-" + transString(tB)
 t.Run(name, func(t *testing.T) {
 for _, m := range []int{0, 1, 2, 5, 10} {
 for _, n := range []int{0, 1, 2, 5, 10} {
 for _, k := range []int{0, 1, 2, 7, 11} {
 zgemmTest(t, impl, tA, tB, m, n, k)
 }
 }
 }
 })
 }
 }
}

func zgemmTest(t *testing.T, impl Zgemmer,
```

```

tA, tB blas.Transpose, m, n, k int) {
const tol = 1e-13

rnd := rand.New(rand.NewSource(1))

rowA, colA := m, k
if tA != blas.NoTrans {
 rowA, colA = k, m
}
rowB, colB := k, n
if tB != blas.NoTrans {
 rowB, colB = n, k
}

for _, lda := range []int{max(1, colA), colA + 2} {
 for _, ldb := range []int{max(1, colB), colB + 3} {
 for _, ldc := range []int{max(1, n), n + 4} {
 for _, alpha := range []complex128{0, 1, complex(0.7, -0.9)} {
 for _, beta := range []complex128{0, 1, complex(1.3, -1.1)} {
 // Allocate the matrix A and fill it with random numbers.
 a := make([]complex128, rowA*lda)
 for i := range a {
 a[i] = rndComplex128(rnd)
 }
 // Create a copy of A.
 aCopy := make([]complex128, len(a))
 copy(aCopy, a)

 // Allocate the matrix B and fill it with random numbers.
 b := make([]complex128, rowB*ldb)
 for i := range b {
 b[i] = rndComplex128(rnd)
 }
 // Create a copy of B.
 bCopy :=
make([]complex128, len(b))
 copy(bCopy, b)

 // Allocate the matrix C and fill it with random numbers.
 c := make([]complex128, m*ldc)
 for i := range c {
 c[i] = rndComplex128(rnd)
 }

 // Compute the expected result using an internal Zgemm implementation.
 want := zmm(tA, tB, m, n, k, alpha, a, lda, b, ldb, beta, c, ldc)

 // Compute a result using Zgemm.

```

```

impl.Zgemm(tA, tB, m, n, k, alpha, a, lda, b, ldb, beta, c, ldc)

prefix := fmt.Sprintf("m=%v,n=%v,k=%v,lda=%v,ldb=%v,ldc=%v,alpha=%v,beta=%v", m, n, k, lda, ldb, ldc,
alpha, beta)

if !zsame(a, aCopy) {
 t.Errorf("%v: unexpected modification of A", prefix)
 continue
}
if !zsame(b, bCopy) {
 t.Errorf("%v: unexpected modification of B", prefix)
 continue
}

if !zEqualApprox(c, want, tol) {
 t.Errorf("%v: unexpected result,\nwant=%v\ngot=%v\n", prefix, want, c)
}
}
}
}
}
}
}
}
graph{{SUBGRZ{}}SUBGRR{}}
graph{{stri_{stri_}}{}}
// Code generated by "go generate gonum.org/v1/gonum/unit; DO NOT EDIT.

// Copyright 2014 The Gonum Authors. All rights reserved.
// Use of this source code is governed by a BSD-style
// license that can be found in the LICENSE file.

package unit

import (
 "errors"
 "fmt"
 "math"
 "unicode/utf8"
)

// Inductance represents an electrical inductance in Henry.
type Inductance float64

const Henry Inductance = 1

// Unit converts the Inductance to a *Unit
func (i Inductance) Unit() *Unit {
 return New(float64(i), Dimensions{

```

```

 CurrentDim: -2,
 LengthDim: 2,
 MassDim: 1,
 TimeDim: -2,
})
}

// Inductance allows Inductance to implement a Inductancer interface
func (i Inductance) Inductance() Inductance {
 return i
}

// From converts the unit into the receiver. From returns an
// error if there is a mismatch in dimension
func (i *Inductance) From(u Uniter) error {
 if !DimensionsMatch(u, Henry) {
 *i = Inductance(math.NaN())
 return errors.New("Dimension mismatch")
 }
 *i = Inductance(u.Unit().Value())
 return
 nil
}

func (i Inductance) Format(fs fmt.State, c rune) {
 switch c {
 case 'v':
 if fs.Flag('#') {
 fmt.Fprintf(fs, "%T(%v)", i, float64(i))
 return
 }
 fallthrough
 case 'e', 'E', 'f', 'F', 'g', 'G':
 p, pOk := fs.Precision()
 w, wOk := fs.Width()
 const unit = " H"
 switch {
 case pOk && wOk:
 fmt.Fprintf(fs, "%*.*"+string(c), pos(w-utf8.RuneCount([]byte(unit))), p, float64(i))
 case pOk:
 fmt.Fprintf(fs, "%*.*"+string(c), p, float64(i))
 case wOk:
 fmt.Fprintf(fs, "%*"+string(c), pos(w-utf8.RuneCount([]byte(unit))), float64(i))
 default:
 fmt.Fprintf(fs, "%"+string(c), float64(i))
 }
 fmt.Fprint(fs, unit)
 default:

```

```

 fmt.Fprintf(fs, "%%!%c(%T=%g H)", c, i, float64(i))
}
}
graph{{sq sq}}
graph{"\
""\
\\\\\\\\\\\\"}
Graph{Subgrg{Ed_{Ed_}}}
graph{diG1{{diG8{{}}diG5{{}}}}diG5{{diG5{{diG5{{}}diG8{{}}}}diG5{{diG5{{diG8{{diG5{{diG5{{
}}diG5{{}}diG5""diG5{{diG5{{
digraph{e[l=<<">a<D>b<D>|<D>c>]]}
graph{{{GRU{GRR{{{GRU{GRR}GRU}{GRU}}}GRR}GRU}{GRU}}}
graph{<==>}
// Copyright 2017 The Gonum Authors. All rights reserved.
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// license that can be found in the LICENSE file.

package distuv

import (
 "math"

 "golang.org/x/exp/rand"

 "gonum.org/v1/gonum/mathext"
)

// F implements the F-distribution, a two-parameter continuous distribution
// with support over the positive real numbers.
//
// The F-distribution has density function
// $\text{sqrt}(((d1*x)^{d1}) * d2^{d2} / ((d1*x+d2)^{(d1+d2)})) / (x * B(d1/2, d2/2))$
// where B is the beta function.
//
// For more information, see https://en.wikipedia.org/wiki/F-distribution
type F struct {
 D1 float64 // Degrees of freedom for the numerator
 D2 float64 // Degrees of freedom for the denominator
 Src rand.Source
}

// CDF computes the value of the cumulative density function at x.
func (f F) CDF(x float64) float64 {
 return mathext.RegIncBeta(f.D1/2, f.D2/2, f.D1*x/(f.D1*x+f.D2))
}

// ExKurtosis returns the excess kurtosis of the distribution.
//

```

```

// ExKurtosis
returns NaN if the D2 parameter is less or equal to 8.
func (f F) ExKurtosis() float64 {
 if f.D2 <= 8 {
 return math.NaN()
 }
 return (12 / (f.D2 - 6)) * ((5*f.D2-22)/(f.D2-8) + ((f.D2-4)/f.D1)*((f.D2-2)/(f.D2-8))*((f.D2-2)/(f.D1+f.D2-2)))
}

// LogProb computes the natural logarithm of the value of the probability
// density function at x.
func (f F) LogProb(x float64) float64 {
 return 0.5*(f.D1*math.Log(f.D1*x)+f.D2*math.Log(f.D2)-(f.D1+f.D2)*math.Log(f.D1*x+f.D2)) - math.Log(x) -
 mathext.Lbeta(f.D1/2, f.D2/2)
}

// Mean returns the mean of the probability distribution.
//
// Mean returns NaN if the D2 parameter is less than or equal to 2.
func (f F) Mean() float64 {
 if f.D2 <= 2 {
 return math.NaN()
 }
 return f.D2 / (f.D2 - 2)
}

// Mode returns the mode of the distribution.
//
// Mode returns NaN if the D1 parameter is less than or equal to 2.
func (f F) Mode() float64 {
 if f.D1 <= 2 {
 return math.NaN()
 }
 return ((f.D1 - 2) / f.D1) * (f.D2 / (f.D2 + 2))
}

// NumParameters
returns the number of parameters in the distribution.
func (f F) NumParameters() int {
 return 2
}

// Prob computes the value of the probability density function at x.
func (f F) Prob(x float64) float64 {
 return math.Exp(f.LogProb(x))
}

// Quantile returns the inverse of the cumulative distribution function.

```

```

func (f F) Quantile(p float64) float64 {
 if p < 0 || p > 1 {
 panic(badPercentile)
 }
 y := mathext.InvRegIncBeta(0.5*f.D1, 0.5*f.D2, p)
 return f.D2 * y / (f.D1 * (1 - y))
}

// Rand returns a random sample drawn from the distribution.
func (f F) Rand() float64 {
 u1 := ChiSquared{f.D1, f.Src}.Rand()
 u2 := ChiSquared{f.D2, f.Src}.Rand()
 return (u1 / f.D1) / (u2 / f.D2)
}

// Skewness returns the skewness of the distribution.
//
// Skewness returns NaN if the D2 parameter is less than or equal to 6.
func (f F) Skewness() float64 {
 if f.D2 <= 6 {
 return math.NaN()
 }
 num := (2*f.D1 + f.D2 - 2) * math.Sqrt(8*(f.D2-4))
 den := (f.D2 - 6) * math.Sqrt(f.D1*(f.D1+f.D2-2))
 return
 num / den
}

// StdDev returns the standard deviation of the probability distribution.
//
// StdDev returns NaN if the D2 parameter is less than or equal to 4.
func (f F) StdDev() float64 {
 if f.D2 <= 4 {
 return math.NaN()
 }
 return math.Sqrt(f.Variance())
}

// Survival returns the survival function (complementary CDF) at x.
func (f F) Survival(x float64) float64 {
 return 1 - f.CDF(x)
}

// Variance returns the variance of the probability distribution.
//
// Variance returns NaN if the D2 parameter is less than or equal to 4.
func (f F) Variance() float64 {
 if f.D2 <= 4 {

```

```

return math.NaN()
}
num := 2 * f.D2 * f.D2 * (f.D1 + f.D2 - 2)
den := f.D1 * (f.D2 - 2) * (f.D2 - 2) * (f.D2 - 4)
return num / den
}
/**

```

```

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// Package blas32 provides a simple interface to the float32 BLAS API.
package blas32 // import "gonum.org/v1/gonum/blas/blas32"
graph{{EDGD{EDGD}}}}
/**
 launchpad.net_ubuntu-push@v0.0.0-20170211001545-000000000177
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**//

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package testlapack

import (
 "testing"

 "golang.org/x/exp/rand"

 "gonum.org/v1/gonum/blas/blas64"
)

func TestDlagsy(t *testing.T) {
 const tol = 1e-14
 rnd := rand.New(rand.NewSource(1))
 for _, n := range []int{0, 1, 2, 3, 4, 5, 10, 50} {
 for _, lda := range []int{0, 2*n + 1} {
 if lda == 0 {
 lda = max(1, n)
 }
 // D is the identity matrix I.
 d := make([]float64, n)
 for i := range d {
 d[i] = 1
 }
 // Allocate an nn symmetric matrix A and fill it with NaNs.
 a := nanSlice(n * lda)
 work := make([]float64, 2*n)
 // Compute A = U * D * U where U is a random orthogonal matrix.
 Dlagsy(n, 0, d, a, lda, rnd, work)
 // A should be the identity matrix because
 // A = U * D * U = U * I * U = U * U = I.
 dist := distFromIdentity(n, a, lda)
 if dist > tol {
 t.Errorf("Case n=%v,lda=%v: |A-I|=%v\nis too large", n, lda, dist)
 }
 }
 }
}

func TestDlagge(t *testing.T) {
 rnd := rand.New(rand.NewSource(1))
 for _, n := range []int{0, 1, 2, 3, 4, 5, 10, 50} {

```

```

for _, lda := range []int{0, 2*n + 1} {
 if lda == 0 {
 lda = max(1, n)
 }
 d := make([]float64, n)
 for i := range d {
 d[i] = 1
 }
 a := blas64.General{
 Rows: n,
 Cols: n,
 Stride: lda,
 Data: nanSlice(n * lda),
 }
 work := make([]float64, a.Rows+a.Cols)

 Dlagge(a.Rows, a.Cols, 0, 0, d, a.Data, a.Stride, rnd, work)

 if !isOrthogonal(a) {
 t.Errorf("Case n=%v,lda=%v: unexpected result", n, lda)
 }
}

}

func TestRandomOrthogonal(t *testing.T) {
 rnd := rand.New(rand.NewSource(1))
 for n := 1; n <= 20; n++ {
 q := randomOrthogonal(n, rnd)
 if !isOrthogonal(q) {
 t.Errorf("Case n=%v: Q not orthogonal", n)
 }
 }
}

graph{{{{{{{{st}}st}stI}}st}}st}stI}
Graph{{SubGr4}{SubGr4}}
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package testblas

import (
 "fmt"
 "math"
 "testing"

```

"golang.org/x/exp/rand"

"gonum.org/v1/gonum/floats"

)

```
type Dznrm2er interface {
 Dznrm2(n int, x []complex128, incX int) float64
 Dnrm2er
}
```

```
func Dznrm2Test(t *testing.T, impl Dznrm2er) {
 tol := 1e-12
 for tc, test := range []struct {
 x []complex128
 want float64
 }{
 {
 x: nil,
 want: 0,
 },
 {
 x: []complex128{1 + 2i},
 want: 2.2360679774998,
 },
 {
 x: []complex128{1 + 2i, 3 + 4i},
 want: 5.4772255750517,
 },
 {
 x: []complex128{1 + 2i, 3 + 4i, 5 + 6i},
 want: 9.5393920141695,
 },
 {
 x: []complex128{1 + 2i, 3 + 4i, 5 + 6i, 7 + 8i},
 want: 1.4282856857086e+01,
 },
 {
 x: []complex128{1 + 2i, 3 + 4i, 5 + 6i, 7 + 8i, 9 + 10i},
 want: 1.9621416870349e+01,
 },
 {
 x: []complex128{1 + 2i, 3 + 4i, 5 + 6i, 7
+ 8i, 9 + 10i, 11 + 12i},
 want: 2.5495097567964e+01,
 },
 {
 x: []complex128{1 + 2i, 3 + 4i, 5 + 6i, 7 + 8i, 9 + 10i, 11 + 12i, 13 + 14i},
 want: 3.1859064644148e+01,
 },
 }
```

```

 },
 {
 x: []complex128{1 + 2i, 3 + 4i, 5 + 6i, 7 + 8i, 9 + 10i, 11 + 12i, 13 + 14i, 15 + 16i},
 want: 3.8678159211627e+01,
 },
 {
 x: []complex128{1 + 2i, 3 + 4i, 5 + 6i, 7 + 8i, 9 + 10i, 11 + 12i, 13 + 14i, 15 + 16i, 17 + 18i},
 want: 4.5923850012820e+01,
 },
 {
 x: []complex128{1 + 2i, 3 + 4i, 5 + 6i, 7 + 8i, 9 + 10i, 11 + 12i, 13 + 14i, 15 + 16i, 17 + 18i, 19 + 20i},
 want: 5.3572380943915e+01,
 },
 {
 x: []complex128{1 + 2i, 3 + 4i, 5 + 6i, 7 + 8i, 9 + 10i, 11 + 12i, 13 + 14i, 15 + 16i, 17 + 18i, 19 + 20i, 21 + 22i},
 want: 6.1603571325046e+01,
 },
 {
 x: []complex128{1 + 2i, 3 + 4i, 5 + 6i, 7 + 8i, 9 + 10i, 11 + 12i, 13 + 14i, 15 + 16i, 17 + 18i, 19 + 20i, 21 + 22i, 23
+ 24i},
 want: 70,
 },
} {
 n := len(test.x)
 for _, incX := range []int{-10, -1, 1, 2,
9, 17} {
 x := makeZVector(test.x, incX)
 xCopy := make([]complex128, len(x))
 copy(xCopy, x)

 got := impl.Dznrm2(n, x, incX)

 prefix := fmt.Sprintf("Case %v (n=%v,incX=%v):", tc, n, incX)

 if !zsame(x, xCopy) {
 t.Errorf("%v: unexpected modification of x", prefix)
 }

 if incX < 0 {
 if got != 0 {
 t.Errorf("%v: non-zero result when incX < 0. got %v", prefix, got)
 }
 continue
 }

 if !floats.EqualWithinAbsOrRel(test.want, got, tol, tol) {
 t.Errorf("%v: unexpected result. want %v, got %v", prefix, test.want, got)
 }
 }
}

```

```

}
}

tol = 1e-14

rnd := rand.New(rand.NewSource(1))

for _, n := range []int{10, 50, 100} {
 for _, incX := range []int{1, 2, 10} {
 re := make([]float64, n)
 for i := range re {
 re[i] = rnd.NormFloat64()
 }
 im := make([]float64, n)
 for i := range im {
 im[i] = rnd.NormFloat64()
 }
 want := math.Hypot(impl.Dnrm2(n, re, 1), impl.Dnrm2(n, im, 1))

 x := make([]complex128, (n-1)*incX+1)
 for i := range
x {
 x[i] = znan
 }
 for i := range re {
 x[i*incX] = complex(re[i], im[i])
 }

 got := impl.Dznrm2(n, x, incX)

 if !floats.EqualWithinAbsOrRel(want, got, tol, tol) {
 t.Errorf("Case n=%v,incX=%v: unexpected result using Dnrm2. want %v, got %v", n, incX, want, got)
 }
 }
}
}

graph{"\\\\\\\\\\\\\\\\\\\\\\{sssssssss\\"}
graph{Gra{Gra}}
graph{Digr{Digr{{Digr
}}}}}

*> \brief \b DSCAL

*
* ===== DOCUMENTATION =====
*
* Online html documentation available at
* http://www.netlib.org/lapack/explore-html/
*
* Definition:
* =====
*
```

```

* SUBROUTINE DSCAL(N,DA,DX,INCX)
*
* .. Scalar Arguments ..
* DOUBLE PRECISION DA
* INTEGER INCX,N
* ..
* .. Array Arguments ..
* DOUBLE PRECISION DX(*)
* ..
*
*
*
*> \par Purpose:
* =====
*>
*> \verbatim
*>
*> DSCAL scales a vector by a constant.
*> uses unrolled loops for increment equal to one.
*> \endverbatim
*
* Authors:
* =====
*
*> \author Univ. of Tennessee
*> \author Univ. of California Berkeley
*> \author Univ. of Colorado Denver
*> \author NAG Ltd.
*
*> \date November 2011
*
*> \ingroup double_blas_level1
*
*> \par Further Details:
* =====
*>
*> \verbatim
*>
*> jack dongarra, linpack, 3/11/78.
*> modified 3/93 to return if incx .le. 0.
*> modified 12/3/93, array(1) declarations changed
> to array()
*> \endverbatim
*>
* =====
* SUBROUTINE DSCAL(N,DA,DX,INCX)
*
* -- Reference BLAS level1 routine (version 3.4.0) --
* -- Reference BLAS is a software package provided by Univ. of Tennessee, --

```

```

* -- Univ. of California Berkeley, Univ. of Colorado Denver and NAG Ltd.--
* November 2011
*
* .. Scalar Arguments ..
 DOUBLE PRECISION DA
 INTEGER INCX,N
*
* ..
* .. Array Arguments ..
 DOUBLE PRECISION DX(*)
*
* ..
*
* =====
*
* .. Local Scalars ..
 INTEGER I,M,MP1,NINCX
*
* ..
* .. Intrinsic Functions ..
 INTRINSIC MOD
*
* ..
 IF (N.LE.0 .OR. INCX.LE.0) RETURN
 IF (INCX.EQ.1) THEN
*
* code for increment equal to 1
*
*
*
* clean-up loop
*
 M = MOD(N,5)
 IF (M.NE.0) THEN
 DO I = 1,M
 DX(I) = DA*DX(I)
 END DO

 IF (N.LT.5) RETURN
 END IF
 MP1 = M + 1
 DO I = MP1,N,5
 DX(I) = DA*DX(I)
 DX(I+1) = DA*DX(I+1)
 DX(I+2) = DA*DX(I+2)
 DX(I+3) = DA*DX(I+3)
 DX(I+4) = DA*DX(I+4)
 END DO
 ELSE
*
* code for increment not equal to 1
*
 NINCX = N*INCX

```



```

 DO I = 1,NINCX,INCX
 DX(I) = DA*DX(I)
 END DO
 END IF
 RETURN
END
graph{{{digg}digh{{{digh}}}}}
graph{{SU_}SU_{}SU_{}SU_}
Graph{{subgra_}}
graph{{{di}di}di}
graph{SubgE{{SubgJ{SubgJ{SubgJ{SubgJ}}}}SubgJ}}
/** github.com/Tencent/bk-cmdb@v3.1.0-rc.1.0.20200226072203-90d9a93e8e0c+incompatible **/

{{Types "MIT"}}

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-----  
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6.vis v4.21.0

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```

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package cmplx64

import math "gonum.org/v1/gonum/internal/math32"

// The original C code, the long comment, and the constants
// below are from http://netlib.sandia.gov/cephes/c9x-complex/clog.c.
// The go code is a simplified version of the original C.
//
// Cephes Math Library Release 2.8: June, 2000
// Copyright 1984, 1987, 1989, 1992, 2000 by Stephen L. Moshier
//
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// guarantee.
//
// The two known misprints in the book are repaired here in the
// source listings for the gamma function and the incomplete beta
// integral.
//
// Stephen L. Moshier
// moshier@na-net.ornl.gov

// Complex square root
//
// DESCRIPTION:
//
// If $z = x + iy$, $r = |z|$, then
//
//
$$\text{Re } w = \left[\frac{r + x}{2} \right]^{1/2}$$

//
//
$$\text{Im } w = \left[\frac{r - x}{2} \right]^{1/2}$$

//
// Cancellation error in $r - x$ or $r + x$ is avoided by using the
// identity $2 \text{Re } w \text{Im } w = y$.
//
// Note that $-w$ is also a square root of z . The root chosen
// is always in the right half plane and $\text{Im } w$ has the same sign as y .
//
// ACCURACY:

```

```

//
// Relative error:
// arithmetic domain # trials peak rms
// DEC -10,+10 25000 3.2e-17 9.6e-18
// IEEE -10,+10 1,000,000 2.9e-16 6.1e-17

//
Sqrt returns the square root of x.
// The result r is chosen so that real(r) ≥ 0 and imag(r) has the same sign as imag(x).
func Sqrt(x complex64) complex64 {
 if imag(x) == 0 {
 if real(x) == 0 {
 return complex(0, 0)
 }
 if real(x) < 0 {
 return complex(0, math.Sqrt(-real(x)))
 }
 return complex(math.Sqrt(real(x)), 0)
 }
 if real(x) == 0 {
 if imag(x) < 0 {
 r := math.Sqrt(-0.5 * imag(x))
 return complex(r, -r)
 }
 r := math.Sqrt(0.5 * imag(x))
 return complex(r, r)
 }
 a := real(x)
 b := imag(x)
 var scale float32
 // Rescale to avoid internal overflow or underflow.
 if math.Abs(a) > 4 || math.Abs(b) > 4 {
 a *= 0.25
 b *= 0.25
 scale = 2
 } else {
 a *= 1.8014398509481984e16 // 2**54
 b *= 1.8014398509481984e16
 scale = 7.450580596923828125e-9 // 2**-27
 }
 r := math.Hypot(a, b)
 var t float32
 if a > 0 {
 t = math.Sqrt(0.5*r + 0.5*a)
 r = scale * math.Abs((0.5*b)/t)
 t *= scale
 } else {
 r = math.Sqrt(0.5*r - 0.5*a)
 }
}

```



```

 t = scale * math.Abs((0.5*b)/r)
 r
 *= scale
}
if b < 0 {
 return complex(t, -r)
}
return complex(t, r)
}
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package gonum

import (
 "math"

 "gonum.org/v1/gonum/blas/blas64"
 "gonum.org/v1/gonum/lapack"
)

// Dlasq1 computes the singular values of an nn bidiagonal matrix with diagonal
// d and off-diagonal e. On exit, d contains the singular values in decreasing
// order, and e is overwritten. d must have length at least n, e must have
// length at least n-1, and the input work must have length at least 4*n. Dlasq1
// will panic if these conditions are not met.
//
// Dlasq1 is an internal routine. It is exported for testing purposes.
func (impl Implementation) Dlasq1(n int, d, e, work []float64) (info int) {
 if n < 0 {
 panic(nLT0)
 }

 if n == 0 {
 return info
 }

 switch {
 case len(d) < n:
 panic(shortD)
 case len(e) < n-1:
 panic(shortE)
 case len(work) < 4*n:
 panic(shortWork)
 }

 if n == 1 {

```

```

d[0] = math.Abs(d[0])
return
info
}

if n == 2 {
d[1], d[0] = impl.Dlas2(d[0], e[0], d[1])
return info
}

// Estimate the largest singular value.
var sigmx float64
for i := 0; i < n-1; i++ {
d[i] = math.Abs(d[i])
sigmx = math.Max(sigmx, math.Abs(e[i]))
}
d[n-1] = math.Abs(d[n-1])
// Early return if sigmx is zero (matrix is already diagonal).
if sigmx == 0 {
impl.Dlasrt(lapack.SortDecreasing, n, d)
return info
}

for i := 0; i < n; i++ {
sigmx = math.Max(sigmx, d[i])
}

// Copy D and E into WORK (in the Z format) and scale (squaring the
// input data makes scaling by a power of the radix pointless).

eps := dlamchP
safmin := dlamchS
scale := math.Sqrt(eps / safmin)
bi := blas64.Implementation()
bi.Dcopy(n, d, 1, work, 2)
bi.Dcopy(n-1, e, 1, work[1:], 2)
impl.Dlascl(lapack.General, 0, 0, sigmx, scale, 2*n-1, 1, work, 1)

// Compute the q's and e's.
for i := 0; i < 2*n-1; i++ {
work[i] *= work[i]
}
work[2*n-1] = 0

info = impl.Dlasq2(n, work)
if info == 0 {
for i :=

```

```

0; i < n; i++ {
 d[i] = math.Sqrt(work[i])
}
impl.Dlascl(lapack.General, 0, 0, scale, sigmx, n, 1, d, 1)
} else if info == 2 {
 // Maximum number of iterations exceeded. Move data from work
 // into D and E so the calling subroutine can try to finish.
 for i := 0; i < n; i++ {
 d[i] = math.Sqrt(work[2*i])
 e[i] = math.Sqrt(work[2*i+1])
 }
 impl.Dlascl(lapack.General, 0, 0, scale, sigmx, n, 1, d, 1)
 impl.Dlascl(lapack.General, 0, 0, scale, sigmx, n, 1, e, 1)
}
return info
}
graph{{STR{STR}STR}}
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package path

// A disjoint set is a collection of non-overlapping sets. That is, for any two sets in the
// disjoint set, their intersection is the empty set.
//
// A disjoint set has three principle operations: Make Set, Find, and Union.
//
// Make set creates a new set for an element (presuming it does not already exist in any set in
// the disjoint set), Find finds the set containing that element (if any), and Union merges two
// sets in the disjoint set. In general, algorithms operating on disjoint sets are "union-find"
// algorithms, where two sets are found with Find, and then joined with Union.
//
// A concrete example of a union-find algorithm can be found as discrete.Kruskal -- which unions
// two sets when an edge is created between two vertices, and refuses to make an edge between two
// vertices if they're part of
// the same set.
type disjointSet struct {
 master map[int64]*disjointSetNode
}

type disjointSetNode struct {
 parent *disjointSetNode
 rank int
}

func newDisjointSet() *disjointSet {

```

```

return &disjointSet{master: make(map[int64]*disjointSetNode)}
}

// If the element isn't already somewhere in there, adds it to the master set and its own tiny set.
func (ds *disjointSet) makeSet(e int64) {
 if _, ok := ds.master[e]; ok {
 return
 }
 dsNode := &disjointSetNode{rank: 0}
 dsNode.parent = dsNode
 ds.master[e] = dsNode
}

// Returns the set the element belongs to, or nil if none.
func (ds *disjointSet) find(e int64) *disjointSetNode {
 dsNode, ok := ds.master[e]
 if !ok {
 return nil
 }

 return find(dsNode)
}

func find(dsNode *disjointSetNode) *disjointSetNode {
 if dsNode.parent != dsNode {
 dsNode.parent = find(dsNode.parent)
 }

 return dsNode.parent
}

// Unions two subsets within the disjointSet.
//
// If x or y are not in this disjoint set, the behavior is undefined. If either pointer
// is nil,
// this function will panic.
func (ds *disjointSet) union(x, y *disjointSetNode) {
 if x == nil || y == nil {
 panic("Disjoint Set union on nil sets")
 }
 xRoot := find(x)
 yRoot := find(y)
 if xRoot == nil || yRoot == nil {
 return
 }

 if xRoot == yRoot {
 return
 }

```

```

}

if xRoot.rank < yRoot.rank {
 xRoot.parent = yRoot
} else if yRoot.rank < xRoot.rank {
 yRoot.parent = xRoot
} else {
 yRoot.parent = xRoot
 xRoot.rank++
}
}

graph{{{Subgrap{Subgrap}Subgrap{Subgrap}}}}
graph{<<><><>>}
graph{{{SUBGRAPH{SUBGRAPH{{{SUBGRAPH}}}}}}}
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// license that can be found in the LICENSE file.

// TODO(kortschak): Implement:
// * edge-weighted PageRank and HITS
// * PersonalizedPageRank:
// http://infolab.stanford.edu/~backrub/google.html 2.1.2 Intuitive Justification
// http://ilpubs.stanford.edu:8090/596/1/2003-35.pdf
// http://www.vldb.org/pvldb/vol7/p1023-maehara.pdf
// * other centrality measures

package network
graph{{Su_{Su_{Su_}}{Su_{Su_}}{Su_}}}}
digraph{graphe}
graph{{GRAP}GRAP{{{GRAP}}}{{GRAP}GRAP}{{GRAP}GRAP}{{GRAP}GRAP}{{GRAP}GRAP}}}
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package testblas

import (
 "fmt"
 "testing"

 "golang.org/x/exp/rand"
 "gonum.org/v1/gonum/blas"
)

type Zsymmer interface {
 Zsymm(side blas.Side, uplo blas.Uplo, m, n int, alpha complex128, a []complex128, lda int, b []complex128, ldb int,
 beta complex128, c []complex128, ldc int)
}

```

```

func ZsymmTest(t *testing.T, impl Zsymmer) {
 for _, side := range []blas.Side{blas.Left, blas.Right} {
 for _, uplo := range []blas.Uplo{blas.Lower, blas.Upper} {
 name := sideString(side) + "-" + uploString(uplo)
 t.Run(name, func(t *testing.T) {
 for _, m := range []int{0, 1, 2, 3, 4, 5} {
 for _, n := range []int{0, 1, 2, 3, 4, 5} {
 zsymmTest(t, impl, side, uplo, m, n)
 }
 }
 })
 }
 }
}

func zsymmTest(t *testing.T, impl Zsymmer, side blas.Side, uplo blas.Uplo, m, n int) {
 const tol = 1e-13

 rnd := rand.New(rand.NewSource(1))

 nA
 := m
 if side == blas.Right {
 nA = n
 }
 for _, lda := range []int{max(1, nA), nA + 2} {
 for _, ldb := range []int{max(1, n), n + 3} {
 for _, ldc := range []int{max(1, n), n + 4} {
 for _, alpha := range []complex128{0, 1, complex(0.7, -0.9)} {
 for _, beta := range []complex128{0, 1, complex(1.3, -1.1)} {
 // Allocate the matrix A and fill it with random numbers.
 a := make([]complex128, nA*lda)
 for i := range a {
 a[i] = rndComplex128(rnd)
 }
 // Create a copy of A for checking that
 // Zsymm does not modify its triangle
 // opposite to uplo.
 aCopy := make([]complex128, len(a))
 copy(aCopy, a)
 // Create a copy of A expanded into a
 // full symmetric matrix for computing
 // the expected result using zmm.
 aSym := make([]complex128, len(a))
 copy(aSym, a)
 if uplo == blas.Upper {
 for i := 0; i < nA-1; i++ {

```

```

 for j := i + 1; j < nA; j++ {
 aSym[j*lda+i]
= aSym[i*lda+j]
 }
 }
} else {
 for i := 1; i < nA; i++ {
 for j := 0; j < i; j++ {
 aSym[j*lda+i] = aSym[i*lda+j]
 }
 }
}

// Allocate the matrix B and fill it with random numbers.
b := make([]complex128, m*ldb)
for i := range b {
 b[i] = rndComplex128(rnd)
}
// Create a copy of B for checking that
// Zsymm does not modify B.
bCopy := make([]complex128, len(b))
copy(bCopy, b)

// Allocate the matrix C and fill it with random numbers.
c := make([]complex128, m*ldc)
for i := range c {
 c[i] = rndComplex128(rnd)
}
// Create a copy of C for checking that
// Zsymm does not modify C.
cCopy := make([]complex128, len(c))
copy(cCopy, c)

// Compute the expected result using an internal Zgemm implementation.
var want []complex128
if side == blas.Left {
 want = zmm(blas.NoTrans, blas.NoTrans, m, n, m,
alpha, aSym, lda, b, ldb, beta, c, ldc)
} else {
 want = zmm(blas.NoTrans, blas.NoTrans, m, n, n, alpha, b, ldb, aSym, lda, beta, c, ldc)
}

// Compute the result using Zsymm.
impl.Zsymm(side, uplo, m, n, alpha, a, lda, b, ldb, beta, c, ldc)

prefix := fmt.Sprintf("m=%v,n=%v,lda=%v,ldb=%v,ldc=%v,alpha=%v,beta=%v", m, n, lda, ldb, ldc, alpha, beta)

if !zsame(a, aCopy) {

```

```

t.Errorf("%v: unexpected modification of A", prefix)
continue
}
if !zsame(b, bCopy) {
t.Errorf("%v: unexpected modification of B", prefix)
continue
}

if !zEqualApprox(c, want, tol) {
t.Errorf("%v: unexpected result", prefix)
}
}
}
}
}
}
}
}
}
graph{{DIGG}DIGG{ }DIGG{DIGG}DIGG{ }}
graph{{striN{striN}striN}striN{striN}striN{striN}striN{striN}}
graph{DiGr{{DiGr}{DiGr}DiGr}{DiGr}DiGr}}
digraph{{digrape}{digrape}}
digraph {Er{ }Et->Et Et}
<?xml version="1.0" encoding="UTF-8"?>
<gexf xmlns="http://www.gexf.net/1.2draft"
xmlns:viz="http://www.gexf.net/1.2draft/viz"
xmlns:xsi="http://www.w3.org/2001/XMLSchema-instance"
xsi:schemaLocation="http://www.gexf.net/1.2draft
http://www.gexf.net/1.2draft/gexf.xsd"
version="1.2">
 <meta lastmodifieddate="2009-10-01">
 <creator>Gephi.org</creator>
 <description>A hierarchy file</description>
 </meta>
 <graph mode="static" defaultedgetype="directed">
 <nodes>
 <node id="g" label="frog2" pid="e" />
 <node id="a" label="Kevin Bacon" />
 <node id="c" label="human1" pid="b" />
 <node id="b" label="God" pid="a" />
 <node id="e" label="Me" pid="a" />
 <node id="d" label="human2" pid="b" />
 <node id="f" label="frog1" pid="e" />
 </nodes>
 <edges>
 <edge id="0" source="b" target="e" />
 <edge id="1" source="c" target="d" />
 </edge

```



```

id="2" source="g" target="b" />
 <edge id="3" source="f" target="a" />
</edges>
</graph>
</gexf>
graph{{subGr_}}
graph{__{__}_}
// Code generated by "go generate gonum.org/v1/gonum/unit; DO NOT EDIT.

```

```

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```

```

package unit

```

```

import (
 "errors"
 "fmt"
 "math"
 "unicode/utf8"
)

```

```

// Power represents a power in Watts.
type Power float64

```

```

const Watt Power = 1

```

```

// Unit converts the Power to a *Unit
func (pw Power) Unit() *Unit {
 return New(float64(pw), Dimensions{
 LengthDim: 2,
 MassDim: 1,
 TimeDim: -3,
 })
}

```

```

// Power allows Power to implement a Powerer interface
func (pw Power) Power() Power {
 return pw
}

```

```

// From converts the unit into the receiver. From returns an
// error if there is a mismatch in dimension
func (pw *Power) From(u Uniter) error {
 if !DimensionsMatch(u, Watt) {
 *pw = Power(math.NaN())
 return errors.New("Dimension mismatch")
 }
}

```

[illegible]

```
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```

```
package testblas
```

```
import (
 "fmt"
 "testing"
)
```

```
type Zdscaler interface {
 Zdscal(n int, alpha float64, x []complex128, incX int)
}
```

```
func ZdscalTest(t *testing.T, impl Zdscaler) {
 for tc, test := range []struct {
 alpha float64
 x []complex128
 want []complex128
 }{
 {
 alpha: 3,
 x: nil,
 want: nil,
 },
 {
 alpha: 3,
 x: []complex128{1 + 2i},
 want: []complex128{3 + 6i},
 },
 {
 alpha: 3,
 x: []complex128{1 + 2i, 3 + 4i},
 want: []complex128{3 + 6i, 9 + 12i},
 },
 {
 alpha: 3,
 x: []complex128{1 + 2i, 3 + 4i, 5 + 6i},
 want: []complex128{3 + 6i, 9 + 12i, 15 + 18i},
 },
 {
 alpha: 3,
 x: []complex128{1 + 2i, 3 + 4i, 5 + 6i, 7 + 8i},
 want: []complex128{3 + 6i, 9 + 12i, 15 + 18i, 21 + 24i},
 },
 {
 alpha: 3,

```

```

x: []complex128{1 + 2i, 3 + 4i, 5 + 6i,
7 + 8i, 9 + 10i},
want: []complex128{3 + 6i, 9 + 12i, 15 + 18i, 21 + 24i, 27 + 30i},
},
{
alpha: 3,
x: []complex128{1 + 2i, 3 + 4i, 5 + 6i, 7 + 8i, 9 + 10i, 11 + 12i},
want: []complex128{3 + 6i, 9 + 12i, 15 + 18i, 21 + 24i, 27 + 30i, 33 + 36i},
},
{
alpha: 3,
x: []complex128{1 + 2i, 3 + 4i, 5 + 6i, 7 + 8i, 9 + 10i, 11 + 12i, 13 + 14i},
want: []complex128{3 + 6i, 9 + 12i, 15 + 18i, 21 + 24i, 27 + 30i, 33 + 36i, 39 + 42i},
},
{
alpha: 3,
x: []complex128{1 + 2i, 3 + 4i, 5 + 6i, 7 + 8i, 9 + 10i, 11 + 12i, 13 + 14i, 15 + 16i},
want: []complex128{3 + 6i, 9 + 12i, 15 + 18i, 21 + 24i, 27 + 30i, 33 + 36i, 39 + 42i, 45 + 48i},
},
{
alpha: 3,
x: []complex128{1 + 2i, 3 + 4i, 5 + 6i, 7 + 8i, 9 + 10i, 11 + 12i, 13 + 14i, 15 + 16i, 17 + 18i},
want: []complex128{3 + 6i, 9 + 12i, 15 + 18i, 21 + 24i, 27 + 30i, 33 + 36i, 39 + 42i, 45 + 48i, 51 + 54i},
},
{
alpha: 3,
x: []complex128{1 + 2i, 3 + 4i, 5 + 6i, 7 + 8i,
9 + 10i, 11 + 12i, 13 + 14i, 15 + 16i, 17 + 18i, 19 + 20i},
want: []complex128{3 + 6i, 9 + 12i, 15 + 18i, 21 + 24i, 27 + 30i, 33 + 36i, 39 + 42i, 45 + 48i, 51 + 54i, 57 + 60i},
},
{
alpha: 3,
x: []complex128{1 + 2i, 3 + 4i, 5 + 6i, 7 + 8i, 9 + 10i, 11 + 12i, 13 + 14i, 15 + 16i, 17 + 18i, 19 + 20i, 21 + 22i},
want: []complex128{3 + 6i, 9 + 12i, 15 + 18i, 21 + 24i, 27 + 30i, 33 + 36i, 39 + 42i, 45 + 48i, 51 + 54i, 57 + 60i, 63
+ 66i},
},
{
alpha: 3,
x: []complex128{1 + 2i, 3 + 4i, 5 + 6i, 7 + 8i, 9 + 10i, 11 + 12i, 13 + 14i, 15 + 16i, 17 + 18i, 19 + 20i, 21 + 22i,
23 + 24i},
want: []complex128{3 + 6i, 9 + 12i, 15 + 18i, 21 + 24i, 27 + 30i, 33 + 36i, 39 + 42i, 45 + 48i, 51 + 54i, 57 + 60i, 63
+ 66i, 69 + 72i},
},
{
alpha: 0,
x: []complex128{1 + 2i, 3 + 4i, 5 + 6i, 7 + 8i, 9 + 10i, 11 + 12i, 13 + 14i, 15 + 16i, 17 + 18i, 19 + 20i, 21 + 22i,
23 + 24i},
want: []complex128{0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0},

```

```

 },
} {
 n := len(test.x)
 if
len(test.want) != n {
 panic("bad test")
}
for _, incX := range []int{-3, -1, 1, 2, 4, 7, 10} {
 x := makeZVector(test.x, incX)
 xCopy := make([]complex128, len(x))
 copy(xCopy, x)

 want := makeZVector(test.want, incX)

 impl.Zdscal(n, test.alpha, x, incX)

 prefix := fmt.Sprintf("Case %v (n=%v,incX=%v):", tc, n, incX)

 if incX < 0 {
 if !zsame(x, xCopy) {
 t.Errorf("%v: unexpected modification of x\nwant %v\ngot %v", prefix, want, x)
 }
 continue
 }
 if !zsame(x, want) {
 t.Errorf("%v: unexpected result:\nwant: %v\ngot: %v", prefix, want, x)
 }
}
}
}

```

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package material

```

import (
 "image"

 "gioui.org/f32"
 "gioui.org/layout"
 "gioui.org/op"
 "gioui.org/op/clip"
 "gioui.org/op/paint"
 "gioui.org/unit"
)

```

// Image is a widget that displays an image.

```

type Image struct {
 // Src is the image to display.

```

```

Src paint.ImageOp
// Scale is the ratio of image pixels to
// dps.
Scale float32
}

func (t *Theme) Image(img paint.ImageOp) Image {
return Image{
 Src: img,
 Scale: 160 / 72, // About 72 DPI.
}
}

func (im Image) Layout(gtx *layout.Context) {
size := im.Src.Size()
wf, hf := float32(size.X), float32(size.Y)
w, h := gtx.Px(unit.Dp(wf*im.Scale)), gtx.Px(unit.Dp(hf*im.Scale))
cs := gtx.Constraints
d := image.Point{X: cs.Width.Constrain(w), Y: cs.Height.Constrain(h)}
var s op.StackOp
s.Push(gtx.Ops)
clip.Rect{Rect: f32.Rectangle{Max: toPointF(d)}}.Op(gtx.Ops).Add(gtx.Ops)
im.Src.Add(gtx.Ops)
paint.PaintOp{Rect: f32.Rectangle{Max: f32.Point{X: float32(w), Y: float32(h)}}}.Add(gtx.Ops)
s.Pop()
gtx.Dimensions
= layout.Dimensions{Size: d}
}
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package optimize

import "gonum.org/v1/gonum/floats"

var (
 _ Method = (*GradientDescent)(nil)
 _ localMethod = (*GradientDescent)(nil)
)

// GradientDescent implements the steepest descent optimization method that
// performs successive steps along the direction of the negative gradient.
type GradientDescent struct {
 // Linesearcher selects suitable steps along the descent direction.
 // If Linesearcher is nil, a reasonable default will be chosen.
 Linesearcher Linesearcher
 // StepSizer determines the initial step size along each direction.

```

```

// If StepSizer is nil, a reasonable default will be chosen.
StepSizer StepSizer
// GradStopThreshold sets the threshold for stopping if the gradient norm
// gets too small. If GradStopThreshold is 0 it is defaulted to 1e-12, and
// if it is NaN the setting is not used.
GradStopThreshold
float64

ls *LinesearchMethod

status Status
err error
}

func (g *GradientDescent) Status() (Status, error) {
 return g.status, g.err
}

func (*GradientDescent) Uses(has Available) (uses Available, err error) {
 return has.gradient()
}

func (g *GradientDescent) Init(dim, tasks int) int {
 g.status = NotTerminated
 g.err = nil
 return 1
}

func (g *GradientDescent) Run(operation chan<- Task, result <-chan Task, tasks []Task) {
 g.status, g.err = localOptimizer{}.run(g, g.GradStopThreshold, operation, result, tasks)
 close(operation)
}

func (g *GradientDescent) initLocal(loc *Location) (Operation, error) {
 if g.Linesearcher == nil {
 g.Linesearcher = &Backtracking{}
 }
 if g.StepSizer == nil {
 g.StepSizer = &QuadraticStepSize{}
 }

 if g.ls == nil {
 g.ls = &LinesearchMethod{}
 }
 g.ls.Linesearcher = g.Linesearcher
 g.ls.NextDirectioner = g

 return g.ls.Init(loc)
}

```

```

}

func (g *GradientDescent) iterateLocal(loc *Location) (Operation, error) {
 return g.ls.Iterate(loc)
}

func
(g *GradientDescent) InitDirection(loc *Location, dir []float64) (stepSize float64) {
 copy(dir, loc.Gradient)
 floats.Scale(-1, dir)
 return g.StepSizer.Init(loc, dir)
}

func (g *GradientDescent) NextDirection(loc *Location, dir []float64) (stepSize float64) {
 copy(dir, loc.Gradient)
 floats.Scale(-1, dir)
 return g.StepSizer.StepSize(loc, dir)
}

func (*GradientDescent) needs() struct {
 Gradient bool
 Hessian bool
} {
 return struct {
 Gradient bool
 Hessian bool
 }{true, false}
}
graph{subGrap{{b{subGrap}}}}
Graph{{Graphg}}
graph{{GS}}{GS}}
// Code generated by "go generate gonum.org/v1/gonum/unit; DO NOT EDIT.

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package unit

import (
 "fmt"
 "testing"
)

func TestAreaFormat(t *testing.T) {
 for _, test := range []struct {
 value Area
 format string
 }{

```



```

 want string
 }{
 {1.23456789, "%v", "1.23456789 m^2"},
 {1.23456789, "%.1v", "1 m^2"},
 {1.23456789, "%20.1v", " 1 m^2"},
 {1.23456789, "%20v", " 1.23456789 m^2"},
 {1.23456789, "%1v", "1.23456789 m^2"},
 {1.23456789, "%#v", "unit.Area(1.23456789)"},
 {1.23456789, "%s", "%!s(unit.Area=1.23456789 m^2)"},
 } {
 got := fmt.Sprintf(test.format, test.value)
 if got != test.want {
 t.Errorf("Format %q %v: got: %q want: %q", test.format, float64(test.value), got, test.want)
 }
 }
}
graph{{{DiV{{{DiW}{DiW}}}}}
graph{{d_{d_}d_{d_}{d_}d_}}
graph{_{_}_}
graph{{dig_}{dig_}dig_}
graph{diG8{diG5}
// Code generated by "go generate gonum.org/v1/gonum/unit; DO NOT EDIT.

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package unit

import (
 "fmt"
 "testing"
)

func TestConductanceFormat(t *testing.T) {
 for _, test := range []struct {
 value Conductance
 format string
 want string
 }{
 {1.23456789, "%v", "1.23456789 S"},
 {1.23456789, "%.1v", "1 S"},
 {1.23456789, "%20.1v", " 1 S"},
 {1.23456789, "%20v", " 1.23456789 S"},
 {1.23456789, "%1v", "1.23456789 S"},
 {1.23456789, "%#v", "unit.Conductance(1.23456789)"},
 {1.23456789, "%s", "%!s(unit.Conductance=1.23456789 S)"},
 } {

```

```

got := fmt.Sprintf(test.format, test.value)
if got != test.want {
 t.Errorf("Format %q %v: got: %q want: %q", test.format, float64(test.value), got, test.want)
}
}
}
graph{{{EDG_{{{EDG_}EDG_}}}}}
graph{{Stra-9Stra}Stra-9Stra}
/**
The Unlicense
https://spdx.org/licenses/Unlicense.json
https://unlicense.org/
**//

```

```

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))??

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```

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```

))??

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graph{{DIGRAG}}{DIGRAG}}

Graph{Grap[]Grap[]Grap[]Grap}

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package testlapack

import (

"fmt"

"math"

"testing"

"golang.org/x/exp/rand"

"gonum.org/v1/gonum/blas"

"gonum.org/v1/gonum/blas/blas64"

"gonum.org/v1/gonum/floats"

)

type Dpbtrser interface {

Dpbtrs(uplo blas.Uplo, n, kd, nrhs int, ab []float64, ldab int, b []float64, ldb int)

Dpbtrfer

}

// DpbtrsTest tests Dpbtrs by comparing the computed and known, generated solutions of

// a linear system with a random symmetric positive definite band matrix.

func DpbtrsTest(t \*testing.T, impl Dpbtrser) {

rnd := rand.New(rand.NewSource(1))

for \_, n := range []int{0, 1, 2, 3, 4, 5, 65, 100, 129} {

for \_, kd := range []int{0, (n + 1) / 4, (3\*n - 1) / 4, (5\*n + 1) / 4} {

for \_, nrhs := range []int{0, 1, 2, 5} {

for \_, uplo := range []blas.Uplo{blas.Upper, blas.Lower} {

for \_, ldab := range []int{kd + 1, kd + 1 + 3}

{

for \_, ldb := range []int{max(1, nrhs), nrhs + 4} {

dpbtrsTest(t, impl, rnd, uplo, n, kd, nrhs, ldab, ldb)

}

}

}

}

}

}

}

```

}

func dpbtrsTest(t *testing.T, impl Dpbtrser, rnd *rand.Rand, uplo blas.Uplo, n, kd, nrhs int, ldab, ldb int) {
 const tol = 1e-12

 name := fmt.Sprintf("uplo=%v,n=%v,kd=%v,nrhs=%v,ldab=%v,ldb=%v", string(uplo), n, kd, nrhs, ldab, ldb)

 // Generate a random symmetric positive definite band matrix.
 ab := randSymBand(uplo, n, kd, ldab, rnd)

 // Compute the Cholesky decomposition of A.
 abFac := make([]float64, len(ab))
 copy(abFac, ab)
 ok := impl.Dpbtrf(uplo, n, kd, abFac, ldab)
 if !ok {
 t.Fatalf("%v: bad test matrix, Dpbtrs failed", name)
 }
 abFacCopy := make([]float64, len(abFac))
 copy(abFacCopy, abFac)

 // Generate a random solution.
 xWant := make([]float64, n*ldb)
 for i := range xWant {
 xWant[i] = rnd.NormFloat64()
 }

 // Compute the corresponding right-hand side.
 bi := blas64.Implementation()
 b := make([]float64,
 len(xWant))
 if n > 0 {
 for j := 0; j < nrhs; j++ {
 bi.Dsbmv(uplo, n, kd, 1, ab, ldab, xWant[j:], ldb, 0, b[j:], ldb)
 }
 }

 // Solve $U * U * X = B$ or $L * L * X = B$.
 impl.Dpbtrs(uplo, n, kd, nrhs, abFac, ldab, b, ldb)
 xGot := b

 // Check that the Cholesky factorization matrix has not been modified.
 if !floats.Equal(abFac, abFacCopy) {
 t.Errorf("%v: unexpected modification of ab", name)
 }

 // Compute and check the max-norm difference between the computed and generated solutions.
 var diff float64
 for i := 0; i < n; i++ {

```

```

 for j := 0; j < nrhs; j++ {
 diff = math.Max(diff, math.Abs(xWant[i*ldb+j]-xGot[i*ldb+j]))
 }
}
if diff > tol {
 t.Errorf("%v: unexpected result, diff=%v", name, diff)
}
}
graph{digY{{digD{digD}}}digY}
graph{DiGr{{{DiGr}DiGr}{DiGr}DiGr}}
Graph{{{Subgr}}Subgr}
graph{{{e_}e_}}
graph{{Dig_}Dig_{{Dig_}Dig_}Dig_{Dig_}}
graph{"\
""\
"}
graph{DIGRC}
// Copyright 2016 The Gonum Authors. All rights reserved.
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// license that can be found in the LICENSE file.

package testlapack

import (
 "fmt"
 "math"
 "testing"

 "golang.org/x/exp/rand"
)

type Dlanv2er interface {
 Dlanv2(a, b, c, d float64) (aa, bb, cc, dd float64, rt1r, rt1i, rt2r, rt2i float64, cs, sn float64)
}

func Dlanv2Test(t *testing.T, impl Dlanv2er) {
 rnd := rand.New(rand.NewSource(1))
 t.Run("UpperTriangular", func(t *testing.T) {
 for i := 0; i < 10; i++ {
 a := rnd.NormFloat64()
 b := rnd.NormFloat64()
 d := rnd.NormFloat64()
 dlanv2Test(t, impl, a, b, 0, d)
 }
 })
 t.Run("LowerTriangular", func(t *testing.T) {
 for i := 0; i < 10; i++ {
 a := rnd.NormFloat64()

```

```

 c := rnd.NormFloat64()
 d := rnd.NormFloat64()
 dlanv2Test(t, impl, a, 0, c, d)
}
})
t.Run("StandardSchur", func(t *testing.T) {
 for i := 0; i < 10; i++ {
 a := rnd.NormFloat64()
 b := rnd.NormFloat64()
 c := rnd.NormFloat64()
 if
math.Signbit(b) == math.Signbit(c) {
 c = -c
 }
 dlanv2Test(t, impl, a, b, c, a)
 }
})
t.Run("General", func(t *testing.T) {
 for i := 0; i < 100; i++ {
 a := rnd.NormFloat64()
 b := rnd.NormFloat64()
 c := rnd.NormFloat64()
 d := rnd.NormFloat64()
 dlanv2Test(t, impl, a, b, c, d)
 }
})
}

func dlanv2Test(t *testing.T, impl Dlanv2er, a, b, c, d float64) {
 aa, bb, cc, dd, rt1r, rt1i, rt2r, rt2i, cs, sn := impl.Dlanv2(a, b, c, d)

 mat := fmt.Sprintf("[%v %v; %v %v]", a, b, c, d)
 if cc == 0 {
 // The eigenvalues are real, so check that the imaginary parts
 // are zero.
 if rt1i != 0 || rt2i != 0 {
 t.Errorf("Unexpected complex eigenvalues for %v", mat)
 }
 } else {
 // The eigenvalues are complex, so check that documented
 // conditions hold.
 if aa != dd {
 t.Errorf("Diagonal elements not equal for %v: got [%v %v]", mat, aa, dd)
 }
 if bb*cc >= 0 {
 t.Errorf("Non-diagonal elements have the same sign for %v: got [%v %v]", mat, bb, cc)
 } else

```

```

{
 // Compute the absolute value of the imaginary part.
 im := math.Sqrt(-bb * cc)
 // Check that im is close to one of the returned
 // imaginary parts.
 if math.Abs(rt1i-im) > 1e-14 && math.Abs(rt1i+im) > 1e-14 {
 t.Errorf("Unexpected imaginary part of eigenvalue for %v: got %v, want %v or %v", mat, rt1i, im, -im)
 }
 if math.Abs(rt2i-im) > 1e-14 && math.Abs(rt2i+im) > 1e-14 {
 t.Errorf("Unexpected imaginary part of eigenvalue for %v: got %v, want %v or %v", mat, rt2i, im, -im)
 }
}
}
// Check that the returned real parts are consistent.
if rt1r != aa && rt1r != dd {
 t.Errorf("Unexpected real part of eigenvalue for %v: got %v, want %v or %v", mat, rt1r, aa, dd)
}
if rt2r != aa && rt2r != dd {
 t.Errorf("Unexpected real part of eigenvalue for %v: got %v, want %v or %v", mat, rt2r, aa, dd)
}
// Check that the columns of the orthogonal matrix have unit norm.
if math.Abs(math.Hypot(cs, sn)-1) > 1e-14 {
 t.Errorf("Unexpected unitary matrix for %v: got
cs %v, sn %v", mat, cs, sn)
}

// Re-compute the original matrix [a b; c d] from its factorization.
gota := cs*(aa*cs-bb*sn) - sn*(cc*cs-dd*sn)
gotb := cs*(aa*sn+bb*cs) - sn*(cc*sn+dd*cs)
gotc := sn*(aa*cs-bb*sn) + cs*(cc*cs-dd*sn)
gotd := sn*(aa*sn+bb*cs) + cs*(cc*sn+dd*cs)
if math.Abs(gota-a) > 1e-14 ||
 math.Abs(gotb-b) > 1e-14 ||
 math.Abs(gotc-c) > 1e-14 ||
 math.Abs(gotd-d) > 1e-14 {
 t.Errorf("Unexpected factorization: got [%v %v; %v %v], want [%v %v; %v %v]", gota, gotb, gotc, gotd, a, b, c, d)
}
}

graph{digY{{digD}}digY}
graph{{{digrr}{digrr}{digrr}{digrr}{digrr}{digrr}}}
graph{{stric}stric{stric{stric{stric}}{stric}}}
graph{{subgrap_}{subgrap_}{subgrap_}{subgrap_}}
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graph{{{digrap}}}
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// license that can be found in the LICENSE file.

```

```

package testlapack

import (
 "math"
 "testing"

 "golang.org/x/exp/rand"

 "gonum.org/v1/gonum/blas"
 "gonum.org/v1/gonum/blas/blas64"
 "gonum.org/v1/gonum/floats"
)

type Dlarfger interface {
 Dlarfg(n int, alpha float64, x []float64, incX int) (beta, tau float64)
}

func DlarfgTest(t *testing.T, impl Dlarfger) {
 const tol = 1e-14
 rnd := rand.New(rand.NewSource(1))
 for i, test := range []struct {
 alpha float64
 n int
 x []float64
 }{
 {
 alpha: 4,
 n: 3,
 },
 {
 alpha: -2,
 n: 3,
 },
 {
 alpha: 0,
 n: 3,
 },
 {
 alpha: 1,
 n: 1,
 },
 {
 alpha: 1,
 n: 4,
 x: []float64{4, 5, 6},
 },
 {
 alpha: 1,

```



```

n: 4,
x: []float64{0, 0, 0},
},
{
alpha: dlamchS,
n: 4,
x: []float64{dlamchS, dlamchS, dlamchS},
},
} {
n := test.n
incX
:= 1
var x []float64
if test.x == nil {
x = make([]float64, n-1)
for i := range x {
x[i] = rnd.Float64()
}
} else {
if len(test.x) != n-1 {
panic("bad test")
}
x = make([]float64, n-1)
copy(x, test.x)
}
xcopy := make([]float64, n-1)
copy(xcopy, x)
alpha := test.alpha
beta, tau := impl.Dlarfg(n, alpha, x, incX)

// Verify the returns and the values in v. Construct h and perform
// the explicit multiplication.
h := make([]float64, n*n)
for i := 0; i < n; i++ {
h[i*n+i] = 1
}
hmat := blas64.General{
Rows: n,
Cols: n,
Stride: n,
Data: h,
}
v := make([]float64, n)
copy(v[1:], x)
v[0] = 1
vVec := blas64.Vector{
Inc: 1,
Data: v,

```

```

}
blas64.Ger(-tau, vVec, vVec, hmat)
eye := blas64.General{
 Rows: n,
 Cols: n,
 Stride: n,
 Data: make([]float64, n*n),
}
blas64.Gemm(blas.Trans, blas.NoTrans, 1, hmat, hmat, 0, eye)
dist := distFromIdentity(n, eye.Data, n)
if dist > tol {
 t.Errorf("H
* H is not close to I, dist=%v", dist)
}

xVec := blas64.Vector{
 Inc: 1,
 Data: make([]float64, n),
}
xVec.Data[0] = test.alpha
copy(xVec.Data[1:], xcopy)

ans := make([]float64, n)
ansVec := blas64.Vector{
 Inc: 1,
 Data: ans,
}
blas64.Gemv(blas.NoTrans, 1, hmat, xVec, 0, ansVec)
if math.Abs(ans[0]-beta) > tol {
 t.Errorf("Case %v, beta mismatch. Want %v, got %v", i, ans[0], beta)
}
if floats.Norm(ans[1:n], math.Inf(1)) > tol {
 t.Errorf("Case %v, nonzero answer %v", i, ans[1:n])
}
}
}
}
graph{{{gr_}{gr_}gr_{gr_}gr_}}
// Code generated by "go generate gonum.org/v1/gonum/unit/constant; DO NOT EDIT.

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// license that can be found in the LICENSE file.

package constant

import "gonum.org/v1/gonum/unit"

// FineStructure is the fine structure constant (α), it describes the strength of the electromagnetic interaction between

```



```

func TestAbs(t *testing.T) {
 for _, test := range absTests {
 got := Abs(test.q)
 if math.IsNaN(test.want) {
 if !math.IsNaN(got) {
 t.Errorf("unexpected result for Abs(%v): got:%v want:%v", test.q, got, test.want)
 }
 continue
 }
 if got != test.want {
 t.Errorf("unexpected result for Abs(%v): got:%v want:%v", test.q, got, test.want)
 }
 }
}

graph{{DG{DG}DG{DG}DG{DG}DG}{DG{DG}DG}}
graph{{SUBB}SUBB}SUBB{SUBB}SUBB}
graph{{ED}}ED}

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```

```

package distuv

```

```

import (
 "math"

```

```

 "golang.org/x/exp/rand"
)

```

```

// GumbelRight implements the right-skewed Gumbel distribution, a two-parameter
// continuous distribution with support over the real numbers. The right-skewed
// Gumbel distribution is also sometimes known as the Extreme Value distribution.
//
// The right-skewed Gumbel distribution has density function
// $1/\beta * \exp(-(z + \exp(-z)))$
// $z = (x - \mu)/\beta$
// Beta must be greater than 0.
//
// For more information, see https://en.wikipedia.org/wiki/Gumbel_distribution.

```

```

type GumbelRight struct {
 Mu float64
 Beta float64
 Src rand.Source
}

```

```

func (g GumbelRight) z(x float64) float64 {
 return (x - g.Mu) / g.Beta
}

```

```

}

// CDF computes the value of the cumulative density function at x.
func (g GumbelRight) CDF(x float64) float64 {
 z := g.z(x)
 return math.Exp(-math.Exp(-z))
}

//
Entropy returns the differential entropy of the distribution.
func (g GumbelRight) Entropy() float64 {
 return math.Log(g.Beta) + eulerMascheroni + 1
}

// ExKurtosis returns the excess kurtosis of the distribution.
func (g GumbelRight) ExKurtosis() float64 {
 return 12.0 / 5
}

// LogProb computes the natural logarithm of the value of the probability density function at x.
func (g GumbelRight) LogProb(x float64) float64 {
 z := g.z(x)
 return -math.Log(g.Beta) - z - math.Exp(-z)
}

// Mean returns the mean of the probability distribution.
func (g GumbelRight) Mean() float64 {
 return g.Mu + g.Beta*eulerMascheroni
}

// Median returns the median of the normal distribution.
func (g GumbelRight) Median() float64 {
 return g.Mu - g.Beta*math.Log(math.Ln2)
}

// Mode returns the mode of the normal distribution.
func (g GumbelRight) Mode() float64 {
 return g.Mu
}

// NumParameters returns the number of parameters in the distribution.
func (GumbelRight) NumParameters() int {
 return
 2
}

// Prob computes the value of the probability density function at x.
func (g GumbelRight) Prob(x float64) float64 {

```

```
return math.Exp(g.LogProb(x))
}

// Quantile returns the inverse of the cumulative probability distribution.
func (g GumbelRight) Quantile(p float64) float64 {
 if p < 0 || 1 < p {
 panic(badPercentile)
 }
 return g.Mu - g.Beta*math.Log(-math.Log(p))
}

// Rand returns a random sample drawn from the distribution.
func (g GumbelRight) Rand() float64 {
 var rnd float64
 if g.Src == nil {
 rnd = rand.ExpFloat64()
 } else {
 rnd = rand.New(g.Src).ExpFloat64()
 }
 return g.Mu - g.Beta*math.Log(rnd)
}

// Skewness returns the skewness of the distribution.
func (GumbelRight) Skewness() float64 {
 return 12 * math.Sqrt(6) * apéry / (math.Pi * math.Pi * math.Pi)
}

// StdDev returns the standard deviation of the probability distribution.
func (g GumbelRight) StdDev() float64 {
 return (math.Pi / math.Sqrt(6)) * g.Beta
}

// Survival returns the survival function (complementary CDF) at x.
func (g GumbelRight) Survival(x float64) float64 {
 return 1 - g.CDF(x)
}

// Variance returns the variance of the probability distribution.
func (g GumbelRight) Variance() float64 {
 return math.Pi * math.Pi * g.Beta * g.Beta / 6
}

Graph{subgra4{{subgra4{subgra4}}}}
graph{{{edgN}}}edgJ}}}
graph{{{D_{{D_{D_{D_}}}}D_}}D_{{D_{D_{D_}}}}D_}}}}}
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// license that can be found in the LICENSE file.
```

```

package testlapack

import (
 "testing"

 "golang.org/x/exp/rand"

 "gonum.org/v1/gonum/floats"
 "gonum.org/v1/gonum/lapack"
)

type Dlapller interface {
 Dgesvder
 Dlapll(n int, x []float64, incX int, y []float64, incY int) float64
}

func DlapllTest(t *testing.T, impl Dlapller) {
 rnd := rand.New(rand.NewSource(1))
 for i, m := range []int{5, 6, 9, 300, 400, 600} {
 n := 2
 lda := n
 // Allocate m2 matrix A and fill it with random numbers.
 a := make([]float64, m*lda)
 for i := range a {
 a[i] = rnd.NormFloat64()
 }
 // Store a copy of A for later comparison.
 aCopy := make([]float64, len(a))
 copy(aCopy, a)

 // Compute the smallest singular value of A.
 got := impl.Dlapll(m, a[0:], lda, a[1:], lda)

 // Compute singular values of A independently by Dgesvd.
 s := make([]float64, min(m, n))
 work := make([]float64,
 1)
 impl.Dgesvd(lapack.SVDNone, lapack.SVDNone, m, n, aCopy, lda, s, nil, 1, nil, 1, work, -1)
 work = make([]float64, int(work[0]))
 impl.Dgesvd(lapack.SVDNone, lapack.SVDNone, m, n, aCopy, lda, s, nil, 1, nil, 1, work, len(work))
 // Take the smallest singular value.
 want := s[len(s)-1]

 if !floats.EqualWithinAbsOrRel(got, want, 1e-14, 1e-14) {
 t.Errorf("Case %d: unexpected smallest singular value, got:%f want:%f", i, got, want)
 }
 }
}

```

```

}
*> \brief \b DLAINAN tests input for NaN by comparing two arguments for inequality.
*
* ===== DOCUMENTATION =====
*
* Online html documentation available at
* http://www.netlib.org/lapack/explore-html/
*
*> \htmlonly
*> Download DLAINAN + dependencies
*>
*
*> [TGZ]
*>
*
*> [ZIP]
*>
*> [TXT]
*> \endhtmlonly
*
* Definition:
* =====
*
* LOGICAL FUNCTION DLAINAN(DIN1, DIN2)
*
* .. Scalar Arguments ..
* DOUBLE PRECISION DIN1, DIN2
* ..
*
*> \par Purpose:
* =====
*>
*> \verbatim
*>
*> This routine is not for general use. It exists solely to avoid
*> over-optimization in DISNAN.
*>
*>
DLAINAN checks for NaNs by comparing its two arguments for
*> inequality. NaN is the only floating-point value where NaN != NaN
*> returns .TRUE. To check for NaNs, pass the same variable as both
*> arguments.
*>
*> A compiler must assume that the two arguments are
*> not the same variable, and the test will not be optimized away.
*> Interprocedural or whole-program optimization may delete this
*> test. The ISNAN functions will be replaced by the correct

```



```

*> Fortran 03 intrinsic once the intrinsic is widely available.
*> \endverbatim
*
* Arguments:
* =====
*
*> \param[in] DIN1
*> \verbatim
*> DIN1 is DOUBLE PRECISION
*> \endverbatim
*>
*> \param[in] DIN2
*> \verbatim
*> DIN2 is DOUBLE PRECISION
*> Two numbers to compare for inequality.
*> \endverbatim
*
* Authors:
* =====
*
*> \author Univ. of Tennessee
*> \author Univ. of California Berkeley
*> \author Univ. of Colorado Denver
*> \author NAG Ltd.
*
*> \date September 2012
*
*>
\ingroup auxOTHERauxiliary
*
* =====
LOGICAL FUNCTION DLAISNAN(DIN1, DIN2)
*
* -- LAPACK auxiliary routine (version 3.4.2) --
* -- LAPACK is a software package provided by Univ. of Tennessee, --
* -- Univ. of California Berkeley, Univ. of Colorado Denver and NAG Ltd.--
* September 2012
*
* .. Scalar Arguments ..
DOUBLE PRECISION DIN1, DIN2
*
* ..
*
* =====
*
* .. Executable Statements ..
DLAISNAN = (DIN1.NE.DIN2)
RETURN
END

```

```
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// license that can be found in the LICENSE file.

// Package dot implements a parser for Graphviz DOT files.
package dot // import "gonum.org/v1/gonum/graph/formats/dot"

graph{{{SUBB}SUBB}SUBB{{{SUBB}}}}
Graph{{{subgre{{{subgre}}}subgro}}}}
graph{{{SUBGR{SUBGR}SUBGR}SUBGR{SUBGR{SUBGR}SUBGR}SUBGR{SUBGR{}}}}
graph{"\\"\\"\\\\"\\\\"\\\\"\\\\"\\\\"\\\\""}
Graph{Sun{Sur{Sur}{Sun{Sur{Sur}{Sur}{Sun{Sur}}}}{Sun{{Sun{Sur{Sur}{Sur}{Sun{Sur}}}}Sur}}}}
graph{{{{{graa{{{graa}}}grag}}grai}}}{grai}grag}
graph{Digr}
graph{{"
"#1387778780781445675529539585113525390625
}}
graph{DIGRA}
graph{STRIR{STRIR}STRIR}
// SPDX-License-Identifier: Unlicense OR MIT

package material

import (
 "image/color"

 "gioui.org/layout"
 "gioui.org/op/paint"
 "gioui.org/text"
 "gioui.org/unit"
 "gioui.org/widget"
)

type Label struct {
 // Face defines the text style.
 Font text.Font
 // Color is the text color.
 Color color.RGBA
 // Alignment specify the text alignment.
 Alignment text.Alignment
 // MaxLines limits the number of lines. Zero means no limit.
 MaxLines int
 Text string

 shaper *text.Shaper
}

func (t *Theme) H1(txt string) Label {
 return t.Label(t.TextSize.Scale(96.0/16.0), txt)
```

```

}

func (t *Theme) H2(txt string) Label {
 return t.Label(t.TextSize.Scale(60.0/16.0), txt)
}

func (t *Theme) H3(txt string) Label {
 return t.Label(t.TextSize.Scale(48.0/16.0), txt)
}

func (t *Theme) H4(txt string) Label {
 return t.Label(t.TextSize.Scale(34.0/16.0), txt)
}

func (t *Theme) H5(txt string) Label {
 return t.Label(t.TextSize.Scale(24.0/16.0), txt)
}

func (t *Theme) H6(txt string) Label {
 return t.Label(t.TextSize.Scale(20.0/16.0),
 txt)
}

func (t *Theme) Body1(txt string) Label {
 return t.Label(t.TextSize, txt)
}

func (t *Theme) Body2(txt string) Label {
 return t.Label(t.TextSize.Scale(14.0/16.0), txt)
}

func (t *Theme) Caption(txt string) Label {
 return t.Label(t.TextSize.Scale(12.0/16.0), txt)
}

func (t *Theme) Label(size unit.Value, txt string) Label {
 return Label{
 Text: txt,
 Color: t.Color.Text,
 Font: text.Font{
 Size: size,
 },
 shaper: t.Shaper,
 }
}

func (l Label) Layout(gtx *layout.Context) {
 paint.ColorOp{Color: l.Color}.Add(gtx.Ops)

```

```

 tl := widget.Label{Alignment: l.Alignment, MaxLines: l.MaxLines}
 tl.Layout(gtx, l.shaper, l.Font, l.Text)
}
graph{Subr{Subr}{Subr}}
graph{Gra{}GrA}
graph{"""e""e""n""n""n""n""n""n"}
graph{Graph}
graph sG{{sG}sG{{sG}}}
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```

```

package mathext_test

```

```

import (
 "math"
 "testing"

 "gonum.org/v1/gonum/floats"
 "gonum.org/v1/gonum/mathext"
)

```

```

var betaTests = []struct {
 p, q float64
 want float64
}{
 {
 p: 1,
 q: 2,
 want: 0.5, // obtained from scipy.special.beta(1,2) (version=0.18.0)
 },
 {
 p: 10,
 q: 20,
 want: 4.9925087406346778e-09, // obtained from scipy.special.beta(10,20) (version=0.18.0)
 },
 {
 p: +0,
 q: 10,
 want: math.Inf(+1),
 },
 {
 p: -0,
 q: 10,
 want: math.Inf(+1),
 },
 {
 p: 0,

```

```

q: 0,
want: math.NaN(),
},
{
p: 0,
q: math.Inf(-1),
want: math.NaN(),
},
{
p: 10,
q: math.Inf(-1),
want: math.NaN(),
},
{
p: 0,
q: math.Inf(+1),
want: math.NaN(),
},
{
p: 10,
q: math.Inf(+1),
want: math.NaN(),
},
{
p: math.NaN(),
q: 10,
want: math.NaN(),
},
{
p:
 math.NaN(),
q: 0,
want: math.NaN(),
},
{
p: -1,
q: 0,
want: math.NaN(),
},
{
p: -1,
q: +1,
want: math.NaN(),
},
}

```

```

func TestBeta(t *testing.T) {
 for i, test := range betaTests {

```

```

v := mathext.Beta(test.p, test.q)
testOK := func(x float64) bool {
 return floats.EqualWithinAbsOrRel(x, test.want, 1e-15, 1e-15) || (math.IsNaN(test.want) && math.IsNaN(x))
}
if !testOK(v) {
 t.Errorf("test #%d: Beta(%v, %v)=%v. want=%v\n",
 i, test.p, test.q, v, test.want,
)
}

u := mathext.Beta(test.q, test.p)
if !testOK(u) {
 t.Errorf("test #%[1]d: Beta(%[2]v, %[3]v)=%[4]v != Beta(%[3]v, %[2]v)=%[5]v\n",
 i, test.p, test.q, v, u,
)
}

if math.IsInf(v, +1) || math.IsNaN(v) {
 continue
}

vv := mathext.Beta(test.p, test.q+1)
uu := mathext.Beta(test.p+1, test.q)
if !floats.EqualWithinAbsOrRel(v, vv+uu, 1e-15, 1e-15) {
 t.Errorf(
 "test #%[1]d: Beta(%[2]v, %[3]v)=%[4]v != Beta(%[2]v+1, %[3]v) + Beta(%[2]v,
 %[3]v+1) (= %[5]v + %[6]v = %[7]v)\n",
 i, test.p, test.q, v, uu, vv, uu+vv,
)
}

vbeta2 := beta2(test.p, test.q)
if !floats.EqualWithinAbsOrRel(v, vbeta2, 1e-15, 1e-15) {
 t.Errorf(
 "test #%[1]d: Beta(%[2]v, %[3]v) != (p)(q) / (p+q) (v=%[4]v u=%[5]v)\n",
 i, test.p, test.q, v, vbeta2,
)
}

func beta2(x, y float64) float64 {
 return math.Gamma(x) * math.Gamma(y) / math.Gamma(x+y)
}

func BenchmarkBeta(b *testing.B) {
 for i := 0; i < b.N; i++ {
 _ = mathext.Beta(10, 20)
 }
}

```

```

}
}

func BenchmarkBeta2(b *testing.B) {
 for i := 0; i < b.N; i++ {
 _ = math.Gamma(10) * math.Gamma(20) / math.Gamma(10+20)
 }
}

func TestLbeta(t *testing.T) {
 for i, test := range betaTests {
 want := math.Log(test.want)
 v := mathext.Lbeta(test.p, test.q)

 testOK := func(x float64) bool {
 return floats.EqualWithinAbsOrRel(x, want, 1e-15, 1e-15) || (math.IsNaN(want) && math.IsNaN(x))
 }
 if !testOK(v) {
 t.Errorf("test #%d: Lbeta(%v, %v)=%v. want=%v\n",
 i, test.p,
 test.q, v, want,
)
 }

 u := mathext.Lbeta(test.q, test.p)
 if !testOK(u) {
 t.Errorf("test #%d: Lbeta(%[2]v, %[3]v)=%[4]v != Lbeta(%[3]v, %[2]v)=%[5]v\n",
 i, test.p, test.q, v, u,
)
 }

 if math.IsInf(v, +1) || math.IsNaN(v) {
 continue
 }

 vbeta2 := math.Log(beta2(test.p, test.q))
 if !floats.EqualWithinAbsOrRel(v, vbeta2, 1e-15, 1e-15) {
 t.Errorf(
 "test #%d: Lbeta(%[2]v, %[3]v) != Log((p)(q) / (p+q)) (v=%[4]v u=%[5]v)\n",
 i, test.p, test.q, v, vbeta2,
)
 }
 }
}

graph{strict5}
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```





### What did you expect to happen?

### What actually happened?

### What version of Go and Gonum are you using?

<!--

Paste the output of `go version` and if you are installing Gonum from source, paste the output of `(cd \$(go env GOPATH)/src/gonum.org/v1/gonum && git rev-parse HEAD)`.

If you are using modules, also paste the output of `grep gonum.org/v1/gonum go.sum`, executed in the root of your dependent module.

-->

### Does this issue reproduce with the current master?

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package quat

// Conj returns the quaternion conjugate of q.

```
func Conj(q Number) Number {
 return Number{Real: q.Real, Imag: -q.Imag, Jmag: -q.Jmag, Kmag: -q.Kmag}
}
```

// Inv returns the quaternion inverse of q.

```
func Inv(q Number) Number {
 if IsInf(q) {
 return zero
 }
 a := Abs(q)
 return Scale(1/(a*a), Conj(q))
}
```

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package testblas

import (

```

"fmt"
"math/cmplx"
"testing"

"golang.org/x/exp/rand"
"gonum.org/v1/gonum/blas"
)

type Zhemmer interface {
 Zhemm(side blas.Side, uplo blas.Uplo, m, n int, alpha complex128, a []complex128, lda int, b []complex128, ldb
int, beta complex128, c []complex128, ldc int)
}

func ZhemmTest(t *testing.T, impl Zhemmer) {
 for _, side := range []blas.Side{blas.Left, blas.Right} {
 for _, uplo := range []blas.Uplo{blas.Lower, blas.Upper} {
 name := sideString(side) + "-" + uploString(uplo)
 t.Run(name, func(t *testing.T) {
 for _, m := range []int{0, 1, 2, 3, 4, 5} {
 for _, n := range []int{0, 1, 2, 3, 4, 5} {
 zhemmTest(t, impl, side, uplo, m, n)
 }
 }
 })
 }
 }
}

func zhemmTest(t *testing.T, impl Zhemmer, side blas.Side, uplo blas.Uplo, m, n int) {
 const tol = 1e-13

 rnd :=
 rand.New(rand.NewSource(1))

 nA := m
 if side == blas.Right {
 nA = n
 }
 for _, lda := range []int{max(1, nA), nA + 2} {
 for _, ldb := range []int{max(1, n), n + 3} {
 for _, ldc := range []int{max(1, n), n + 4} {
 for _, alpha := range []complex128{0, 1, complex(0.7, -0.9)} {
 for _, beta := range []complex128{0, 1, complex(1.3, -1.1)} {
 // Allocate the matrix A and fill it with random numbers.
 a := make([]complex128, nA*lda)
 for i := range a {
 a[i] = rndComplex128(rnd)
 }
 }
 }
 }
 }
 }
}

```

```

// Create a copy of A for checking that
// Zhemm does not modify its triangle
// opposite to uplo.
aCopy := make([]complex128, len(a))
copy(aCopy, a)
// Create a copy of A expanded into a
// full hermitian matrix for computing
// the expected result using zmm.
aHem := make([]complex128, len(a))
copy(aHem, a)
if uplo == blas.Upper {
 for i := 0; i < nA; i++ {
 aHem[i*lda+i] = complex(real(aHem[i*lda+i]),
0)
 for j := i + 1; j < nA; j++ {
 aHem[j*lda+i] = cmplx.Conj(aHem[i*lda+j])
 }
 }
} else {
 for i := 0; i < nA; i++ {
 for j := 0; j < i; j++ {
 aHem[j*lda+i] = cmplx.Conj(aHem[i*lda+j])
 }
 aHem[i*lda+i] = complex(real(aHem[i*lda+i]), 0)
 }
}

// Allocate the matrix B and fill it with random numbers.
b := make([]complex128, m*ldb)
for i := range b {
 b[i] = rndComplex128(rnd)
}
// Create a copy of B for checking that
// Zhemm does not modify B.
bCopy := make([]complex128, len(b))
copy(bCopy, b)

// Allocate the matrix C and fill it with random numbers.
c := make([]complex128, m*ldc)
for i := range c {
 c[i] = rndComplex128(rnd)
}
// Create a copy of C for checking that
// Zhemm does not modify C.
cCopy := make([]complex128, len(c))
copy(cCopy, c)

// Compute the expected result using

```

```

var want []complex128
if side == blas.Left {
 want = zmm(blas.NoTrans, blas.NoTrans, m, n, m, alpha, aHem, lda, b, ldb, beta, c, ldc)
} else {
 want = zmm(blas.NoTrans, blas.NoTrans, m, n, n, alpha, b, ldb, aHem, lda, beta, c, ldc)
}

// Compute the result using Zhemm.
impl.Zhemm(side, uplo, m, n, alpha, a, lda, b, ldb, beta, c, ldc)

prefix := fmt.Sprintf("m=%v,n=%v,lda=%v,ldb=%v,ldc=%v,alpha=%v,beta=%v", m, n, lda, ldb, ldc, alpha, beta)

if !zsame(a, aCopy) {
 t.Errorf("%v: unexpected modification of A", prefix)
 continue
}

if !zsame(b, bCopy) {
 t.Errorf("%v: unexpected modification of B", prefix)
 continue
}

if !zEqualApprox(c, want, tol) {
 t.Errorf("%v: unexpected result", prefix)
}
}
}
}
}
}
}
}

/** github.com/tmthrgd/chacha20@v0.0.0-20180315111422-d64f83450a9a **/

```

```

/* Copyright (C) 1995-1998 Eric Young (eay@cryptsoft.com)
 * All rights reserved.
 *
 * This package is an SSL implementation written
 * by Eric Young (eay@cryptsoft.com).
 * The implementation was written so as to conform with Netscapes SSL.
 *
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 * the following conditions are aheared to. The following conditions
 * apply to all code found in this distribution, be it the RC4, RSA,
 * lhash, DES, etc., code; not just the SSL code. The SSL documentation
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```

```

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* [including the GNU Public Licence.]
*/
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```

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package testblas

import (

"math"

"math/cmplx"

"testing"

"golang.org/x/exp/rand"

"gonum.org/v1/gonum/blas"

"gonum.org/v1/gonum/floats"

)

func TestFlattenBanded(t \*testing.T) {

for i, test := range []struct {

dense [][]float64

ku int

kl int

condensed [][]float64

}{

{

dense: [][]float64{{3}},

ku: 0,

kl: 0,

condensed: [][]float64{{3}},

},

{

dense: [][]float64{

{3, 4, 0},

},

ku: 1,

kl: 0,

condensed: [][]float64{

{3, 4},

},

},

{

dense: [][]float64{

{3, 4, 0, 0, 0},

},

ku: 1,

kl: 0,

condensed: [][]float64{

{3, 4},

},

},

```

{
dense: [][]float64{
 {3, 4, 0},
 {0, 5, 8},
 {0, 0, 2},
 {0, 0, 0},
 {0, 0, 0},
},
ku: 1,
kl: 0,
condensed: [][]float64{
 {3, 4},
 {5, 8},
 {2,
math.NaN()}},
 {math.NaN(), math.NaN()}},
 {math.NaN(), math.NaN()}},
},
},
{
dense: [][]float64{
 {3, 4, 6},
 {0, 5, 8},
 {0, 0, 2},
 {0, 0, 0},
 {0, 0, 0},
},
ku: 2,
kl: 0,
condensed: [][]float64{
 {3, 4, 6},
 {5, 8, math.NaN()}},
 {2, math.NaN(), math.NaN()}},
 {math.NaN(), math.NaN(), math.NaN()}},
 {math.NaN(), math.NaN(), math.NaN()}},
},
},
{
dense: [][]float64{
 {3, 4, 6},
 {1, 5, 8},
 {0, 6, 2},
 {0, 0, 7},
 {0, 0, 0},
},
ku: 2,
kl: 1,
condensed: [][]float64{

```

```

{math.NaN(), 3, 4, 6},
{1, 5, 8, math.NaN()},
{6, 2, math.NaN(), math.NaN()},
{7, math.NaN(), math.NaN(), math.NaN()},
{math.NaN(), math.NaN(), math.NaN(), math.NaN()},
},
},
{
dense: [][]float64{
 {1, 2, 0},
 {3, 4, 5},
 {6, 7, 8},
 {0, 9, 10},
 {0, 0, 11},
},
ku: 1,
kl: 2,
condensed: [][]float64{
 {math.NaN(), math.NaN(), 1, 2},
 {math.NaN(), 3, 4, 5},
 {6, 7, 8, math.NaN()},
 {9,
10, math.NaN(), math.NaN()}},
 {11, math.NaN(), math.NaN(), math.NaN()}},
},
},
{
dense: [][]float64{
 {1, 0, 0},
 {3, 4, 0},
 {6, 7, 8},
 {0, 9, 10},
 {0, 0, 11},
},
ku: 0,
kl: 2,
condensed: [][]float64{
 {math.NaN(), math.NaN(), 1},
 {math.NaN(), 3, 4},
 {6, 7, 8},
 {9, 10, math.NaN()}},
 {11, math.NaN(), math.NaN()}},
},
},
{
dense: [][]float64{
 {1, 0, 0, 0, 0},
 {3, 4, 0, 0, 0},

```



```

 {1, 3, 5, 0, 0},
},
ku: 0,
kl: 2,
condensed: [][]float64{
 {math.NaN(), math.NaN(), 1},
 {math.NaN(), 3, 4},
 {1, 3, 5},
},
},
} {
condensed := flattenBanded(test.dense, test.ku, test.kl)
correct := flatten(test.condensed)
if !floats.Same(condensed, correct) {
 t.Errorf("Case %v mismatch. Want %v, got %v.", i, correct, condensed)
}
}
}

```

```

func TestFlattenTriangular(t *testing.T) {
for i, test := range []struct {
 a [][]float64
 ans []float64
 ul blas.Uplo
}{
{
 a: [][]float64{
 {1,
2, 3},
 {0, 4, 5},
 {0, 0, 6},
 },
 ul: blas.Upper,
 ans: []float64{1, 2, 3, 4, 5, 6},
},
{
 a: [][]float64{
 {1, 0, 0},
 {2, 3, 0},
 {4, 5, 6},
 },
 ul: blas.Lower,
 ans: []float64{1, 2, 3, 4, 5, 6},
},
} {
 a := flattenTriangular(test.a, test.ul)
 if !floats.Equal(a, test.ans) {
 t.Errorf("Case %v. Want %v, got %v.", i, test.ans, a)
 }
}
}

```

```

}
}
}

func TestPackUnpackAsHermitian(t *testing.T) {
 rnd := rand.New(rand.NewSource(1))
 for _, uplo := range []blas.Uplo{blas.Upper, blas.Lower} {
 for _, n := range []int{1, 2, 5, 50} {
 for _, lda := range []int{max(1, n), n + 11} {
 a := makeZGeneral(nil, n, n, lda)
 for i := 0; i < n; i++ {
 for j := i; j < n; j++ {
 a[i*lda+j] = complex(rnd.NormFloat64(), rnd.NormFloat64())
 if i != j {
 a[j*lda+i] = cmplx.Conj(a[i*lda+j])
 }
 }
 }
 aCopy := make([]complex128, len(a))
 copy(aCopy, a)

 ap := zPack(uplo, n, a, lda)
 if !zsame(a, aCopy) {
 t.Errorf("Case
uplo=%v,n=%v,lda=%v: zPack modified a", uplo, n, lda)
 }

 apCopy := make([]complex128, len(ap))
 copy(apCopy, ap)

 art := zUnpackAsHermitian(uplo, n, ap)
 if !zsame(ap, apCopy) {
 t.Errorf("Case uplo=%v,n=%v,lda=%v: zUnpackAsHermitian modified ap", uplo, n, lda)
 }

 // Copy the round-tripped A into a matrix with the same stride
 // as the original.
 got := makeZGeneral(nil, n, n, lda)
 for i := 0; i < n; i++ {
 copy(got[i*lda:i*lda+n], art[i*n:i*n+n])
 }
 if !zsame(got, a) {
 t.Errorf("Case uplo=%v,n=%v,lda=%v: zPack and zUnpackAsHermitian do not roundtrip", uplo, n, lda)
 }
 }
 }
 }
}

```

```

graph{{di{di}di}di}
graph{{{{{diGrS}}}diGrS}}
digraph {nod0}
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```

```
// +build cblas
```

```
package mat
```

```

import (
 "gonum.org/v1/gonum/blas/blas64"
 "gonum.org/v1/netlib/blas/netlib"
)

func init() {
 blas64.Use(netlib.Implementation{})
}
graph{no{no{no}{no{no}no{no}}{no}}no}
graph{KSK}
graph{{Dig5}Dig5{{Dig5}Dig5}Dig5}
graph{{{grapJ{grapQ}{grapJ{grapQ}}}}}
graph{GRAPU{GRh{GRAPU{GRAPU}}}}
graph{"\
""\
""\
"}
graph{{ED_}ED_}
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```

```
package dot_test
```

```

import (
 "fmt"

 "gonum.org/v1/gonum/graph"
 "gonum.org/v1/gonum/graph/encoding/dot"
 "gonum.org/v1/gonum/graph/simple"
)

type edgeWithPorts struct {
 simple.Edge
 fromPort, toPort string
}

```

```

func (e edgeWithPorts) ReversedEdge() graph.Edge {
 e.F, e.T = e.T, e.F
 e.fromPort, e.toPort = e.toPort, e.fromPort
 return e
}

func (e edgeWithPorts) FromPort() (string, string) {
 return e.fromPort, ""
}

func (e edgeWithPorts) ToPort() (string, string) {
 return e.toPort, ""
}

func ExamplePorter() {
 g := simple.NewUndirectedGraph()
 g.SetEdge(edgeWithPorts{
 Edge: simple.Edge{F: simple.Node(1), T: simple.Node(0)},
 fromPort: "p1",
 toPort: "p2",
 })

 result, _ := dot.Marshal(g, "", "", " ")
 fmt.Print(string(result))

 // Output:
 // strict graph {
 // // Node definitions.
 // 0;
 // 1;
 //
 //
 // Edge definitions.
 // 0:p2 -- 1:p1;
 // }
 graph{{{EDGD{EDGD}}EDGD{EDGD}}EDGD}}
 graph{{diGr}diGr{diGr}diGr{diGr}{{diGr}diGr{diGr}diGr{diGr}diGr}}
 graph{edgc{edgd}{edgd}}
 Copyright (C) 2013-2014, Alexis Jacomy, http://sigmajs.org

```

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```
graph{{{{Digrap_}Digrap_}{{Digrap_}Digrap_}Digrap_{{Digrap_}{{Digrap_}Digrap_}Digrap_}}
```

```
// Code generated by "go generate gonum.org/v1/gonum/unit; DO NOT EDIT.
```

```
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```

```
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```

```
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```

```
package unit
```

```
import (
 "errors"
 "fmt"
 "math"
 "unicode/utf8"
)
```

```
// Energy represents a quantity of energy in Joules.
```

```
type Energy float64
```

```
const Joule Energy = 1
```

```
// Unit converts the Energy to a *Unit
```

```
func (e Energy) Unit() *Unit {
 return New(float64(e), Dimensions{
 LengthDim: 2,
 MassDim: 1,
 TimeDim: -2,
 })
}
```

```
// Energy allows Energy to implement a Energyer interface
```

```
func (e Energy) Energy() Energy {
 return e
}
```

```
// From converts the unit into the receiver. From returns an
```

```
// error if there is a mismatch in dimension
```

```

func (e *Energy) From(u Uniter) error {
 if !DimensionsMatch(u, Joule) {
 *e = Energy(math.NaN())
 return errors.New("Dimension mismatch")
 }
 *e = Energy(u.Unit().Value())
 return nil
}

func (e Energy) Format(fs fmt.State,
 c rune) {
 switch c {
 case 'v':
 if fs.Flag('#') {
 fmt.Fprintf(fs, "%T(%v)", e, float64(e))
 return
 }
 fallthrough
 case 'e', 'E', 'f', 'F', 'g', 'G':
 p, pOk := fs.Precision()
 w, wOk := fs.Width()
 const unit = " J"
 switch {
 case pOk && wOk:
 fmt.Fprintf(fs, "%*.*"+string(c), pos(w-utf8.RuneCount([]byte(unit))), p, float64(e))
 case pOk:
 fmt.Fprintf(fs, "%.*"+string(c), p, float64(e))
 case wOk:
 fmt.Fprintf(fs, "%*"+string(c), pos(w-utf8.RuneCount([]byte(unit))), float64(e))
 default:
 fmt.Fprintf(fs, "%"+string(c), float64(e))
 }
 fmt.Fprint(fs, unit)
 default:
 fmt.Fprintf(fs, "%%!%c(%T=%g J)", c, e, float64(e))
 }
}

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package f32

import (
 "math"
 "testing"
)

```

```

const (
 msgRes = "%v: unexpected result Got: %v Expected: %v"
 msgVal = "%v: unexpected value at %v Got: %v Expected: %v"
 msgGuard = "%v: guard violated in %s vector %v %v"
 msgReadOnly = "%v: modified read-only %v argument"
 epsilon = 1e-4
)

var (
 nan = float32(math.NaN())
 inf = float32(math.Inf(1))
)

// within tests for nan-aware equality within epsilon.
func within(x, y float32) bool {
 a, b := float64(x), float64(y)
 return same(x, y) || math.Abs(a-b) <= epsilon
}

func same(x, y float32) bool {
 a, b := float64(x), float64(y)
 return a == b || (math.IsNaN(a) && math.IsNaN(b))
}

func same64(a, b float64) bool {
 return a == b || (math.IsNaN(a) && math.IsNaN(b))
}

// sameStrided returns true if the strided vector x contains elements of the
// dense vector
// ref at indices i*inc, false otherwise.
func sameStrided(ref, x []float32, inc int) bool {
 if inc < 0 {
 inc = -inc
 }
 for i, v := range ref {
 if !same(x[i*inc], v) {
 return false
 }
 }
 return true
}

func guardVector(v []float32, g float32, gdLn int) (guarded []float32) {
 guarded = make([]float32, len(v)+gdLn*2)
 copy(guarded[gdLn:], v)
 for i := 0; i < gdLn; i++ {
 guarded[i] = g
 }
}

```

```

 guarded[len(guarded)-1-i] = g
}
return guarded
}

func isValidGuard(v []float32, g float32, gdLn int) bool {
 for i := 0; i < gdLn; i++ {
 if !same(v[i], g) || !same(v[len(v)-1-i], g) {
 return false
 }
 }
 return true
}

func guardIncVector(vec []float32, gdVal float32, inc, gdLen int) (guarded []float32) {
 if inc < 0 {
 inc = -inc
 }
 inrLen := len(vec) * inc
 guarded = make([]float32, inrLen+gdLen*2)
 for i := range guarded {
 guarded[i] = gdVal
 }
 for i, v := range vec {
 guarded[gdLen+i*inc] = v
 }
 return guarded
}

func checkValidIncGuard(t *testing.T, v []float32, g float32, inc,
 gdLn int) {
 srcLn := len(v) - 2*gdLn
 for i := range v {
 switch {
 case same(v[i], g):
 // Correct value
 case i < gdLn:
 t.Error("Front guard violated at", i, v[:gdLn])
 case i > gdLn+srcLn:
 t.Error("Back guard violated at", i-gdLn-srcLn, v[gdLn+srcLn:])
 case (i-gdLn)%inc == 0 && (i-gdLn)/inc < len(v):
 default:
 t.Error("Internal guard violated at", i-gdLn, v[gdLn:gdLn+srcLn])
 }
 }
}

```

var ( // Offset sets for testing alignment handling in Unitary assembly functions.



```

align2 = newIncSet(0, 1, 2, 3)
align3 = newIncToSet(0, 1, 2, 3)
)

type incSet struct {
 x, y int
}

// genInc will generate all (x,y) combinations of the input increment set.
func newIncSet(inc ...int) []incSet {
 n := len(inc)
 is := make([]incSet, n*n)
 for x := range inc {
 for y := range inc {
 is[x*n+y] = incSet{inc[x], inc[y]}
 }
 }
 return is
}

type incToSet struct {
 dst, x, y int
}

// genIncTo will generate all (dst,x,y) combinations of the input increment set.
func newIncToSet(inc
...int) []incToSet {
 n := len(inc)
 is := make([]incToSet, n*n*n)
 for i, dst := range inc {
 for x := range inc {
 for y := range inc {
 is[i*n*n+x*n+y] = incToSet{dst, inc[x], inc[y]}
 }
 }
 }
 return is
}
}
// SPDX-License-Identifier: Unlicense OR MIT

/*
Package paint provides drawing operations for 2D graphics.

```

The PaintOp operation draws the current material into a rectangular area, taking the current clip path and transformation into account.

The material is set by either a ColorOp for a constant color, or ImageOp for an image.

```

*/
package paint
graph{{S}S{S}S}
graph{{{{{{SubGrapN{{{{{{{{SubGrapN}}SubGrapN}}}}SubGrapN}}}}SubGrapN}}SubGrapT}}
graph{{{{{{{{subGn}subGc{{{{{{subGn}subGc}}}}}}}}}}
graph{{Ed}{Ed{Ed}Ed}Ed""Ed}
graph{{{{grapg}grape}{grape{grapg}}}{grape{{grapg}grape}{grape{grapg}}grapg}}}}
graph{Nn{Nn}Na{Nn{Nn}Nn{Nn{Nn}Nn}Nn{Nn}Nn}}
// SPDX-License-Identifier: Unlicense OR MIT

// Package font implements a central font registry.
package font

import (
 "sync"

 "gioui.org/text"
)

var (
 mu sync.Mutex
 initialized bool
 shaper = new(text.Shaper)
)

// Default returns a singleton *text.Shaper that contains
// the registered fonts.
func Default() *text.Shaper {
 mu.Lock()
 defer mu.Unlock()
 initialized = true
 return shaper
}

// Register a face. Register panics if Default has been
// called.
func Register(font text.Font, face text.Face) {
 mu.Lock()
 defer mu.Unlock()
 if initialized {
 panic("Register must be called before Default")
 }
 shaper.Register(font, face)
}
graph{sub{sub}{subr{sub{sub}{sub}}}}
graph{S}
Graph{{SubGr4}{SubGr4}{SubGr4}{SubGr4}{SubGr4}{SubGr4}{SubGr4}{SubGr4}{SubGr4}{SubGr4}}

```

```

 DOUBLE PRECISION FUNCTION MYCOS(A)
 DOUBLE PRECISION A
 MYCOS = DCOS(A)
 RETURN
 END
graph{"\////////////////////////////////"}
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// license that can be found in the LICENSE file.

// Package r3 provides 3D vectors and boxes and operations on them.
package r3 // import "gonum.org/v1/gonum/spatial/r3"
graph{{{Stri}}}}
// Code generated by "go generate gonum.org/v1/gonum/unit; DO NOT EDIT.

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package unit

import (
 "fmt"
 "testing"
)

func TestEnergyFormat(t *testing.T) {
 for _, test := range []struct {
 value Energy
 format string
 want string
 }{
 {1.23456789, "%v", "1.23456789 J"},
 {1.23456789, "%.1v", "1 J"},
 {1.23456789, "%20.1v", "1 J"},
 {1.23456789, "%20v", "1.23456789 J"},
 {1.23456789, "%1v", "1.23456789 J"},
 {1.23456789, "%#v", "unit.Energy(1.23456789)"},
 {1.23456789, "%s", "%!s(unit.Energy=1.23456789 J)"},
 } {
 got := fmt.Sprintf(test.format, test.value)
 if got != test.want {
 t.Errorf("Format %q %v: got: %q want: %q", test.format, float64(test.value), got, test.want)
 }
 }
}

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```

// license that can be found in the LICENSE file.

package testlapack

import (  
"math"  
"testing"

"golang.org/x/exp/rand"  
)

type Dlaev2er interface {  
Dlaev2(a, b, c float64) (rt1, rt2, cs1, sn1 float64)  
}

func Dlaev2Test(t \*testing.T, impl Dlaev2er) {  
rnd := rand.New(rand.NewSource(1))  
for trial := 0; trial < 100; trial++ {  
a := rnd.NormFloat64()  
b := rnd.NormFloat64()  
c := rnd.NormFloat64()  
  
rt1, rt2, cs1, sn1 := impl.Dlaev2(a, b, c)  
tmp := mul2by2([2][2]float64{{cs1, sn1}, {-sn1, cs1}}, [2][2]float64{{a, b}, {b, c}})  
ans := mul2by2(tmp, [2][2]float64{{cs1, -sn1}, {sn1, cs1}})  
if math.Abs(ans[0][0]-rt1) > 1e-14 {  
t.Errorf("Largest eigenvalue mismatch. Returned %v, mul %v", rt1, ans[0][0])  
}  
if math.Abs(ans[1][0]) > 1e-14 || math.Abs(ans[0][1]) > 1e-14 {  
t.Errorf("Non-zero off diagonal. ans[1][0] = %v, ans[0][1] = %v", ans[1][0], ans[0][1])  
}  
if  
math.Abs(ans[1][1]-rt2) > 1e-14 {  
t.Errorf("Smallest eigenvalue mismatch. Returned %v, mul %v", rt2, ans[1][1])  
}  
}  
}

func mul2by2(a, b [2][2]float64) [2][2]float64 {  
var c [2][2]float64  
c[0][0] = a[0][0]\*b[0][0] + a[0][1]\*b[1][0]  
c[0][1] = a[0][0]\*b[0][1] + a[0][1]\*b[1][1]  
c[1][0] = a[1][0]\*b[0][0] + a[1][1]\*b[1][0]  
c[1][1] = a[1][0]\*b[0][1] + a[1][1]\*b[1][1]  
return c  
}  
graph{STRIC{STRIC{STRIC}STRIC}}

```

graph{StriS}
graph{STRICtR}
graph{{SUBGRA_}}
graph{{SUBh{SUBo}}{SUBo}SUBo}{SUBo}}
// Code generated by "go generate gonum.org/v1/gonum/unit/constant; DO NOT EDIT.

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package constant

import "gonum.org/v1/gonum/unit"

// AtomicMass is the atomic mass constant (m), one twelfth of the mass of an unbound atom of carbon-12 at rest and
// in its ground state.
// The dimension of AtomicMass is kg. The standard uncertainty of the constant is 5e-37 kg.
const AtomicMass = unit.Mass(1.6605390666e-27)
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// Package multi provides a suite of multigraph implementations satisfying
// the gonum/graph interfaces.
//
// All types in multi return the graph.Empty value for empty iterators.
package multi // import "gonum.org/v1/gonum/graph/multi"
graph{{DiGraphg}{DiGraphg}}
graph{Str{Str}{Str}}
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package fd

import (
 "math"
 "runtime"
 "sync"
)

// Derivative estimates the derivative of the function f at the given location.
// The finite difference formula, the step size, and other options are
// specified by settings. If settings is nil, the first derivative will be
// estimated using the Forward formula and a default step size.
func Derivative(f func(float64) float64, x float64, settings *Settings) float64 {
 // Default settings.
 formula := Forward

```

```

step := formula.Step
var originValue float64
var originKnown, concurrent bool

// Use user settings if provided.
if settings != nil {
 if !settings.Formula.isZero() {
 formula = settings.Formula
 step = formula.Step
 checkFormula(formula)
 }
 if settings.Step != 0 {
 step = settings.Step
 }
 originKnown = settings.OriginKnown
 originValue = settings.OriginValue
 concurrent
 = settings.Concurrent
}

var deriv float64
if !concurrent || runtime.GOMAXPROCS(0) == 1 {
 for _, pt := range formula.Stencil {
 if originKnown && pt.Loc == 0 {
 deriv += pt.Coeff * originValue
 continue
 }
 deriv += pt.Coeff * f(x+step*pt.Loc)
 }
 return deriv / math.Pow(step, float64(formula.Derivative))
}

wg := &sync.WaitGroup{}
mux := &sync.Mutex{}
for _, pt := range formula.Stencil {
 if originKnown && pt.Loc == 0 {
 mux.Lock()
 deriv += pt.Coeff * originValue
 mux.Unlock()
 continue
 }
 wg.Add(1)
 go func(pt Point) {
 defer wg.Done()
 fofx := f(x + step*pt.Loc)
 mux.Lock()
 defer mux.Unlock()
 deriv += pt.Coeff * fofx
 }(pt)
}

```



```
*a = AbsorbedRadioactiveDose(math.NaN())
return errors.New("Dimension mismatch")
}

*a = AbsorbedRadioactiveDose(u.Unit().Value())
return nil
}

func (a AbsorbedRadioactiveDose) Format(fs fmt.State, c rune) {
switch c {
case 'v':
if fs.Flag('#') {
fmt.Fprintf(fs, "%T(%v)", a, float64(a))
return
}
fallthrough
case 'e', 'E', 'f', 'F', 'g', 'G':
p, pOk := fs.Precision()
w, wOk := fs.Width()
const unit = " Gy"
switch {
case pOk && wOk:
fmt.Fprintf(fs, "%*.%" + string(c), pos(w-utf8.RuneCount([]byte(unit))), p, float64(a))
case pOk:
fmt.Fprintf(fs, "%.%" + string(c), p, float64(a))
case wOk:
fmt.Fprintf(fs, "%" + string(c), pos(w-utf8.RuneCount([]byte(unit))), float64(a))
default:
fmt.Fprintf(fs, "" + string(c), float64(a))
}
fmt.Fprint(fs, unit)
default:
fmt.Fprintf(fs, "%%!%c(%T=%g Gy)", c, a, float64(a))
}
}

graph{{{St_{St_}{St_}St_}{St_}St_{St_}{St_}St_}St_}
graph{.5{.5{.5{.5}.5{.5{.5{.5}.5}.5{.5{.5{.5}.5}.5}}}}
graph{{{Subg}{Subg{Subg}{Subg}}}}}
graph{"\\\\\\\\\\\\\\\\"}
graph{{{Digra{{Digra{}Digra}{Digra{}Digra}}Digra}}
graph{{{{{Subgi{Subgc}}Subgi}Subgi{Subgi{Subgc}}Subgi}Subgi{Subgc}{Subgc}}}}
// Code generated by "go generate gonum.org/v1/gonum/unit; DO NOT EDIT.

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```



```

import (
 "errors"
 "fmt"
 "math"
 "unicode/utf8"
)

// Mass represents a mass in kilograms.
type Mass float64

const (
 Gram Mass = 1e-3

 Kilogram = Kilo * Gram
)

// Unit converts the Mass to a *Unit
func (m Mass) Unit() *Unit {
 return New(float64(m), Dimensions{
 MassDim: 1,
 })
}

// Mass allows Mass to implement a Masser interface
func (m Mass) Mass() Mass {
 return m
}

// From converts the unit into the receiver. From returns an
// error if there is a mismatch in dimension
func (m *Mass) From(u Uniter) error {
 if !DimensionsMatch(u, Gram) {
 *m = Mass(math.NaN())
 return errors.New("Dimension mismatch")
 }
 *m = Mass(u.Unit().Value())
 return nil
}

func (m Mass) Format(fs fmt.State, c rune) {
 switch c {
 case 'v':
 if fs.Flag('#')
 {
 fmt.Fprintf(fs, "%T(%v)", m, float64(m))
 return
 }
 fallthrough

```

```

case 'e', 'E', 'f', 'F', 'g', 'G':
 p, pOk := fs.Precision()
 w, wOk := fs.Width()
 const unit = " kg"
 switch {
 case pOk && wOk:
 fmt.Fprintf(fs, "%*.*"+string(c), pos(w-utf8.RuneCount([]byte(unit))), p, float64(m))
 case pOk:
 fmt.Fprintf(fs, "%.*"+string(c), p, float64(m))
 case wOk:
 fmt.Fprintf(fs, "%*"+string(c), pos(w-utf8.RuneCount([]byte(unit))), float64(m))
 default:
 fmt.Fprintf(fs, "%"+string(c), float64(m))
 }
 fmt.Fprint(fs, unit)
default:
 fmt.Fprint(fs, "%%!%c(%T=%g kg)", c, m, float64(m))
}
}
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```

```

package testlapack

```

```

import (
 "testing"

 "gonum.org/v1/gonum/blas"
 "gonum.org/v1/gonum/floats"
)

```

```

type Dpotf2er interface {
 Dpotf2(ul blas.Uplo, n int, a []float64, lda int) (ok bool)
}

```

```

func Dpotf2Test(t *testing.T, impl Dpotf2er) {
 for _, test := range []struct {
 a [][]float64
 pos bool
 U [][]float64
 }{
 {
 a: [][]float64{
 {23, 37, 34, 32},
 {108, 71, 48, 48},
 {109, 109, 67, 58},
 {106, 107, 106, 63},
 },

```

```

 },
 pos: true,
 U: [][]float64{
 {4.795831523312719, 7.715033320111766, 7.089490077940543, 6.672461249826393},
 {0, 3.387958215439679, -1.976308959006481, -1.026654004678691},
 {0, 0, 3.582364210034111, 2.419258947036024},
 {0, 0, 0, 3.401680257083044},
 },
},
{
 a: [][]float64{
 {8, 2},
 {2, 4},
 },
 pos: true,
 U: [][]float64{
 {2.82842712474619, 0.707106781186547},
 {0,
1.870828693386971},
 },
},
} {
 testDpotf2(t, impl, test.pos, test.a, test.U, len(test.a[0]), blas.Upper)
 testDpotf2(t, impl, test.pos, test.a, test.U, len(test.a[0])+5, blas.Upper)
 aT := transpose(test.a)
 L := transpose(test.U)
 testDpotf2(t, impl, test.pos, aT, L, len(test.a[0]), blas.Lower)
 testDpotf2(t, impl, test.pos, aT, L, len(test.a[0])+5, blas.Lower)
}
}

func testDpotf2(t *testing.T, impl Dpotf2er, testPos bool, a, ans [][]float64, stride int, ul blas.Uplo) {
 aFlat := flattenTri(a, stride, ul)
 ansFlat := flattenTri(ans, stride, ul)
 pos := impl.Dpotf2(ul, len(a[0]), aFlat, stride)
 if pos != testPos {
 t.Errorf("Positive definite mismatch: Want %v, Got %v", testPos, pos)
 return
 }
 if testPos && !floats.EqualApprox(ansFlat, aFlat, 1e-14) {
 t.Errorf("Result mismatch: Want %v, Got %v", ansFlat, aFlat)
 }
}

// flattenTri with a certain stride. stride must be >= dimension. Puts repeatable
// nonce values in non-accessed places
func flattenTri(a

```

```

[][]float64, stride int, ul blas.Uplo) [][]float64 {
 m := len(a)
 n := len(a[0])
 if stride < n {
 panic("bad stride")
 }
 upper := ul == blas.Upper
 v := make([]float64, m*stride)
 count := 1000.0
 for i := 0; i < m; i++ {
 for j := 0; j < stride; j++ {
 if j >= n || (upper && j < i) || (!upper && j > i) {
 // not accessed, so give a unique crazy number
 v[i*stride+j] = count
 count++
 continue
 }
 v[i*stride+j] = a[i][j]
 }
 }
 return v
}

func transpose(a [][]float64) [][]float64 {
 m := len(a)
 n := len(a[0])
 if m != n {
 panic("not square")
 }
 aNew := make([][]float64, m)
 for i := 0; i < m; i++ {
 aNew[i] = make([]float64, n)
 }
 for i := 0; i < m; i++ {
 if len(a[i]) != n {
 panic("bad n size")
 }
 for j := 0; j < n; j++ {
 aNew[j][i] = a[i][j]
 }
 }
 return aNew
}

graph{{sub_}{sub_}{sub_{sub_}}}}
digraph{nod_}
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```

```

package mat

import "testing"

func TestCDenseNewAtSet(t *testing.T) {
 for cas, test := range []struct {
 a []complex128
 rows, cols int
 }{
 {
 a: []complex128{0, 0, 0,
 0, 0, 0,
 0, 0, 0},
 rows: 3,
 cols: 3,
 },
 } {
 aCopy := make([]complex128, len(test.a))
 copy(aCopy, test.a)
 mZero := NewCDense(test.rows, test.cols, nil)
 rows, cols := mZero.Dims()
 if rows != test.rows {
 t.Errorf("unexpected number of rows for test %d: got: %d want: %d", cas, rows, test.rows)
 }
 if cols != test.cols {
 t.Errorf("unexpected number of cols for test %d: got: %d want: %d", cas, cols, test.cols)
 }
 m := NewCDense(test.rows, test.cols, aCopy)
 for i := 0; i < test.rows; i++ {
 for j := 0; j < test.cols; j++ {
 v := m.At(i, j)
 idx := i*test.rows + j
 if v != test.a[idx] {
 t.Errorf("unexpected
get value for test %d at i=%d, j=%d: got: %v, want: %v", cas, i, j, v, test.a[idx])
 }
 add := complex(float64(i+1), float64(j+1))
 m.Set(i, j, v+add)
 if m.At(i, j) != test.a[idx]+add {
 t.Errorf("unexpected set value for test %d at i=%d, j=%d: got: %v, want: %v", cas, i, j, v, test.a[idx]+add)
 }
 }
 }
 }
}

graph{{{diGrS{{{diGrS}}}diGrS{{{diGrS}}}diGrS}}}

```

```

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package gonum

import "gonum.org/v1/gonum/lapack"

// Dorgbr generates one of the matrices Q or P computed by Dgebrd
// computed from the decomposition Dgebrd. See Dgebd2 for the description of
// Q and P.
//
// If vect == lapack.GenerateQ, then a is assumed to have been an mk matrix and
// Q is of order m. If m >= k, then Dorgbr returns the first n columns of Q
// where m >= n >= k. If m < k, then Dorgbr returns Q as an mm matrix.
//
// If vect == lapack.GeneratePT, then A is assumed to have been a kn matrix, and
// P is of order n. If k < n, then Dorgbr returns the first m rows of P,
// where n >= m >= k. If k >= n, then Dorgbr returns P as an nn matrix.
//
// Dorgbr is an internal routine. It is exported for testing purposes.
func (impl Implementation) Dorgbr(vect lapack.GenOrtho, m, n, k int, a []float64, lda int, tau, work
[]float64, lwork int) {
 wantq := vect == lapack.GenerateQ
 mn := min(m, n)
 switch {
 case vect != lapack.GenerateQ && vect != lapack.GeneratePT:
 panic(badGenOrtho)
 case m < 0:
 panic(mLT0)
 case n < 0:
 panic(nLT0)
 case k < 0:
 panic(kLT0)
 case wantq && n > m:
 panic(nGTM)
 case wantq && n < min(m, k):
 panic("lapack: n < min(m,k)")
 case !wantq && m > n:
 panic(mGTN)
 case !wantq && m < min(n, k):
 panic("lapack: m < min(n,k)")
 case lda < max(1, n) && lwork != -1:
 // Normally, we follow the reference and require the leading
 // dimension to be always valid, even in case of workspace
 // queries. However, if a caller provided a placeholder value
 // for lda (and a) when doing a workspace query that didn't
 // fulfill the condition here, it would cause a panic. This is

```

```

// exactly what Dgesvd does.
panic(badLdA)
case lwork < max(1, mn) && lwork != -1:
 panic(badLWork)
case len(work) < max(1, lwork):
 panic(shortWork)
}

// Quick return if possible.
work[0]
= 1
if m == 0 || n == 0 {
 return
}

if wantq {
 if m >= k {
 impl.Dorgqr(m, n, k, a, lda, tau, work, -1)
 } else if m > 1 {
 impl.Dorgqr(m-1, m-1, m-1, a[lda+1:], lda, tau, work, -1)
 }
} else {
 if k < n {
 impl.Dorglq(m, n, k, a, lda, tau, work, -1)
 } else if n > 1 {
 impl.Dorglq(n-1, n-1, n-1, a[lda+1:], lda, tau, work, -1)
 }
}
lworkopt := int(work[0])
lworkopt = max(lworkopt, mn)
if lwork == -1 {
 work[0] = float64(lworkopt)
 return
}

switch {
case len(a) < (m-1)*lda+n:
 panic(shortA)
case wantq && len(tau) < min(m, k):
 panic(shortTau)
case !wantq && len(tau) < min(n, k):
 panic(shortTau)
}

if wantq {
 // Form Q, determined by a call to Dgebrd to reduce an mk matrix.
 if m >= k {
 impl.Dorgqr(m, n, k, a, lda, tau, work, lwork)
 }
}

```

```

} else {
// Shift the vectors which define the elementary reflectors one
// column to the right, and set the first row and column of Q to
// those of the unit matrix.
for j := m - 1; j >= 1; j-- {
 a[j]
= 0
 for i := j + 1; i < m; i++ {
 a[i*lda+j] = a[i*lda+j-1]
 }
}
a[0] = 1
for i := 1; i < m; i++ {
 a[i*lda] = 0
}
if m > 1 {
 // Form Q[1:m-1, 1:m-1]
 impl.Dorgqr(m-1, m-1, m-1, a[lda+1:], lda, tau, work, lwork)
}
} else {
// Form P, determined by a call to Dgebrd to reduce a kn matrix.
if k < n {
 impl.Dorglq(m, n, k, a, lda, tau, work, lwork)
} else {
// Shift the vectors which define the elementary reflectors one
// row downward, and set the first row and column of P to
// those of the unit matrix.
a[0] = 1
for i := 1; i < n; i++ {
 a[i*lda] = 0
}
for j := 1; j < n; j++ {
 for i := j - 1; i >= 1; i-- {
 a[i*lda+j] = a[(i-1)*lda+j]
 }
 a[j] = 0
}
if n > 1 {
 impl.Dorglq(n-1, n-1, n-1, a[lda+1:], lda, tau, work, lwork)
}
}
}
work[0] = float64(lworkopt)
}
graph{diGrap7}
graph{{{subGz}}subGs}}

```



```

 SUBROUTINE ZBINU(ZR, ZI, FNU, KODE, N, CYR, CYI, NZ, RL, FNUL,
 * TOL, ELIM, ALIM)
C***BEGIN PROLOGUE ZBINU
C***REFER TO ZBESH,ZBESI,ZBESJ,ZBESK,ZAIRY,ZBIRY
C
C ZBINU COMPUTES THE I FUNCTION IN THE RIGHT HALF Z PLANE
C
C***ROUTINES CALLED ZABS,ZASYI,ZBUNI,ZMLRI,ZSERI,ZUOIK,ZWRSK
C***END PROLOGUE ZBINU
 DOUBLE PRECISION ALIM, AZ, CWI, CWR, CYI, CYR, DFNU, ELIM, FNU,
 * FNUL, RL, TOL, ZEROI, ZEROR, ZI, ZR, ZABS
 INTEGER I, INW, KODE, N, NLAST, NN, NUI, NW, NZ
 DIMENSION CYR(N), CYI(N), CWR(2), CWI(2)
 DATA ZEROR,ZEROI / 0.0D0, 0.0D0 /
C
 NZ = 0
 AZ = ZABS(CMPLX(ZR,ZI,kind=KIND(1.0D0)))
 NN = N
 DFNU = FNU + DBLE(FLOAT(N-1))
 IF (AZ.LE.2.0D0) GO TO 10
 IF (AZ*AZ*0.25D0.GT.DFNU+1.0D0) GO TO 20
10 CONTINUE
C-----
C POWER SERIES
C-----
 CALL ZSERI(ZR, ZI, FNU, KODE, NN, CYR, CYI,
 NW, TOL, ELIM, ALIM)
 INW = IABS(NW)
 NZ = NZ + INW
 NN = NN - INW
 IF (NN.EQ.0) RETURN
 IF (NW.GE.0) GO TO 120
 DFNU = FNU + DBLE(FLOAT(NN-1))
20 CONTINUE
 IF (AZ.LT.RL) GO TO 40
 IF (DFNU.LE.1.0D0) GO TO 30
 IF (AZ+AZ.LT.DFNU*DFNU) GO TO 50
C-----
C ASYMPTOTIC EXPANSION FOR LARGE Z
C-----
30 CONTINUE
 CALL ZASYI(ZR, ZI, FNU, KODE, NN, CYR, CYI, NW, RL, TOL, ELIM,
 * ALIM)
 IF (NW.LT.0) GO TO 130
 GO TO 120
40 CONTINUE
 IF (DFNU.LE.1.0D0) GO TO 70
50 CONTINUE

```

```

C-----
C OVERFLOW AND UNDERFLOW TEST ON I SEQUENCE FOR MILLER ALGORITHM
C-----
 CALL ZUOIK(ZR, ZI, FNU, KODE, 1, NN, CYR, CYI, NW, TOL, ELIM,
 * ALIM)
 IF (NW.LT.0) GO
TO 130
 NZ = NZ + NW
 NN = NN - NW
 IF (NN.EQ.0) RETURN
 DFNU = FNU+DBLE(FLOAT(NN-1))
 IF (DFNU.GT.FNUL) GO TO 110
 IF (AZ.GT.FNUL) GO TO 110
60 CONTINUE
 IF (AZ.GT.RL) GO TO 80
70 CONTINUE
C-----
C MILLER ALGORITHM NORMALIZED BY THE SERIES
C-----
 CALL ZMLRI(ZR, ZI, FNU, KODE, NN, CYR, CYI, NW, TOL)
 IF(NW.LT.0) GO TO 130
 GO TO 120
80 CONTINUE
C-----
C MILLER ALGORITHM NORMALIZED BY THE WRONSKIAN
C-----
C-----
C OVERFLOW TEST ON K FUNCTIONS USED IN WRONSKIAN
C-----
 CALL ZUOIK(ZR, ZI, FNU, KODE, 2, 2, CWR, CWI, NW, TOL,
ELIM,
 * ALIM)
 IF (NW.GE.0) GO TO 100
 NZ = NN
 DO 90 I=1,NN
 CYR(I) = ZEROR
 CYI(I) = ZEROI
90 CONTINUE
 RETURN
100 CONTINUE
 IF (NW.GT.0) GO TO 130
 CALL ZWRSK(ZR, ZI, FNU, KODE, NN, CYR, CYI, NW, CWR, CWI, TOL,
 * ELIM, ALIM)
 IF (NW.LT.0) GO TO 130
 GO TO 120
110 CONTINUE
C-----
C INCREMENT FNU+NN-1 UP TO FNUL, COMPUTE AND RECUR BACKWARD

```

```

C-----
 NUI = INT(SNGL(FNUL-DFNU)) + 1
 NUI = MAX0(NUI,0)
 CALL ZBUNI(ZR, ZI, FNU, KODE, NN, CYR, CYI, NW, NUI, NLAST, FNUL,
 * TOL, ELIM, ALIM)
 IF (NW.LT.0) GO TO 130
 NZ = NZ + NW
 IF (NLAST.EQ.0) GO TO 120
 NN = NLAST
 GO TO 60
120 CONTINUE
 RETURN
130 CONTINUE
 NZ = -1
 IF(NW.EQ.(-2)) NZ=-2
 RETURN
 END

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// license that can be found in the LICENSE file.

package gonum

import (
 "math"
)

// Beta returns the value of the complete beta function B(a, b). It is defined as
// (a)(b) / (a+b)
// Special cases are:
// B(a,b) returns NaN if a or b is Inf
// B(a,b) returns NaN if a and b are 0
// B(a,b) returns NaN if a or b is NaN
// B(a,b) returns NaN if a or b is < 0
// B(a,b) returns +Inf if a xor b is 0.
//
// See http://mathworld.wolfram.com/BetaFunction.html for more detailed information.
func Beta(a, b float64) float64 {
 return math.Exp(Lbeta(a, b))
}

// Lbeta returns the natural logarithm of the complete beta function B(a,b).
// Lbeta is defined as:
// Ln((a)(b)/(a+b))
// Special cases are:
// Lbeta(a,b) returns NaN if a or b is Inf
// Lbeta(a,b) returns NaN if a and b are 0
// Lbeta(a,b) returns NaN if a or b is NaN

```

```
// Lbeta(a,b) returns NaN if a or b is < 0
//
Lbeta(a,b) returns +Inf if a xor b is 0.
func Lbeta(a, b float64) float64 {
switch {
case math.IsInf(a, +1) || math.IsInf(b, +1):
return math.NaN()
case a == 0 && b == 0:
return math.NaN()
case a < 0 || b < 0:
return math.NaN()
case math.IsNaN(a) || math.IsNaN(b):
return math.NaN()
case a == 0 || b == 0:
return math.Inf(+1)
}
}

la, _ := math.Lgamma(a)
lb, _ := math.Lgamma(b)
lab, _ := math.Lgamma(a + b)
return la + lb - lab
}

graph{{dig7{{{dig0{{{dig0}{dig0}dig0}}dig0}}}}
graph{{ED_}ED_{ED~}}}}}}}}
graph{{{{{str}{str}}}}str{str}}}}str}}}
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graph{{SUBGRA{SUBGRA}}}
digraph{e[l=<<TAE B="0">
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<TD>cfdswr</TD>
</"234230">a</TD>
<TD>cfdswr</TD>
</TR>
</TAE>>l=""n->g[l=""]g->l[l=""]}
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graph{STRI{STRI}
graph{e[e=""l=""e=""h=""t=""r=""r=""]/*/"--""[e=0]""--[e=0]""--[e=0]""--[e=0]""--[e=0]}
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graph{STRICU{STRIC{STRICU{STRICU}}}}
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p}DiGrap}{{{DiGrap}DiGrap}DiGrap}{{{DiGrap}}}DiGrap}DiGrap}
graph{{{g{g}g{g}{g}{g}}}}
/**/graph""{e[e=""l=""e=""h=""t=""r=""r=""][r=""]/* "327890" -- "3298-547" -- "3" -- "-0";
/* .rege ar =aw 89723h */
"" -- "" [we = 3.0];
"" -- "" [we = 3.0];
```

```

 "" -- "" [we = 3.0];
 "" -- "" [we = 3.0];
 "" -- "" [we = 3.0];
}
graph{Digx}
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// +build !noasm,!appengine,!safe

package f32

// ApyUnitary is
// for i, v := range x {
// y[i] += alpha * v
// }
func ApyUnitary(alpha float32, x, y []float32)

// ApyUnitaryTo is
// for i, v := range x {
// dst[i] = alpha*v + y[i]
// }
func ApyUnitaryTo(dst []float32, alpha float32, x, y []float32)

// ApyInc is
// for i := 0; i < int(n); i++ {
// y[iy] += alpha * x[ix]
// ix += incX
// iy += incY
// }
func ApyInc(alpha float32, x, y []float32, n, incX, incY, ix, iy uintptr)

// ApyIncTo is
// for i := 0; i < int(n); i++ {
// dst[idst] = alpha*x[ix] + y[iy]
// ix += incX
// iy += incY
// idst += incDst
// }
func ApyIncTo(dst []float32, incDst, idst uintptr, alpha float32, x, y []float32, n, incX, incY, ix, iy uintptr)

// DdotUnitary is
// for i, v := range x {
// sum += float64(y[i]) *
// float64(v)
// }
// return

```

```

func DdotUnitary(x, y []float32) (sum float64)

// DdotInc is
// for i := 0; i < int(n); i++ {
// sum += float64(y[iy]) * float64(x[ix])
// ix += incX
// iy += incY
// }
// return
func DdotInc(x, y []float32, n, incX, incY, ix, iy uintptr) (sum float64)

// DotUnitary is
// for i, v := range x {
// sum += y[i] * v
// }
// return sum
func DotUnitary(x, y []float32) (sum float32)

// DotInc is
// for i := 0; i < int(n); i++ {
// sum += y[iy] * x[ix]
// ix += incX
// iy += incY
// }
// return sum
func DotInc(x, y []float32, n, incX, incY, ix, iy uintptr) (sum float32)
graph{{SUBGRAPR{{SUBGRAPR}}}}
graph{{ED_}ED_{{ED_}ED_}}
graph{{{{{St}St}}}St}}}
graph{{STR}STR{STR}STR{STR}}

```

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## FITNESS

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package testlapack

import (

"testing"

"golang.org/x/exp/rand"

"gonum.org/v1/gonum/blas"

"gonum.org/v1/gonum/blas/blas64"

"gonum.org/v1/gonum/lapack"

)

type Dggsvp3er interface {

Dlanger

Dggsvp3(jobU, jobV, jobQ lapack.GSVDJob, m, p, n int, a []float64, lda int, b []float64, ldb int, tola, tol float64, u []float64, ldu int, v []float64, ldv int, q []float64, ldq int, iwork []int, tau, work []float64, lwork int) (k, l int)

}

func Dggsvp3Test(t \*testing.T, impl Dggsvp3er) {

rnd := rand.New(rand.NewSource(1))

for cas, test := range []struct {

m, p, n, lda, ldb, ldu, ldv, ldq int

}{

{m: 3, p: 3, n: 5, lda: 0, ldb: 0, ldu: 0, ldv: 0, ldq: 0},

{m: 5, p: 5, n: 5, lda: 0, ldb: 0, ldu: 0, ldv: 0, ldq: 0},

{m: 5, p: 5, n: 5, lda: 0, ldb: 0, ldu: 0, ldv: 0, ldq: 0},

{m: 5, p: 5, n: 10, lda: 0, ldb: 0, ldu: 0, ldv:

0, ldq: 0},

{m: 5, p: 5, n: 10, lda: 0, ldb: 0, ldu: 0, ldv: 0, ldq: 0},

{m: 5, p: 5, n: 10, lda: 0, ldb: 0, ldu: 0, ldv: 0, ldq: 0},

{m: 10, p: 5, n: 5, lda: 0, ldb: 0, ldu: 0, ldv: 0, ldq: 0},

{m: 10, p: 5, n: 5, lda: 0, ldb: 0, ldu: 0, ldv: 0, ldq: 0},

{m: 10, p: 10, n: 10, lda: 0, ldb: 0, ldu: 0, ldv: 0, ldq: 0},

{m: 10, p: 10, n: 10, lda: 0, ldb: 0, ldu: 0, ldv: 0, ldq: 0},

{m: 5, p: 5, n: 5, lda: 10, ldb: 10, ldu: 10, ldv: 10, ldq: 10},

{m: 5, p: 5, n: 5, lda: 10, ldb: 10, ldu: 10, ldv: 10, ldq: 10},

{m: 5, p: 5, n: 10, lda: 20, ldb: 20, ldu: 10, ldv: 10, ldq: 20},

{m: 5, p: 5, n: 10, lda: 20, ldb: 20, ldu: 10, ldv: 10, ldq: 20},

```

{m: 5, p: 5, n: 10, lda: 20, ldb: 20, ldu: 10, ldv: 10, ldq: 20},
{m: 10, p: 5, n: 5, lda: 10, ldb: 10, ldu: 20, ldv: 10, ldq: 10},
{m: 10, p: 5, n: 5, lda: 10, ldb: 10, ldu: 20, ldv: 10, ldq: 10},
{m: 10, p: 10, n: 10, lda: 20, ldb: 20, ldu: 20, ldv: 20, ldq: 20},
{m: 10, p: 10, n: 10, lda: 20, ldb: 20, ldu: 20, ldv: 20,
ldq: 20},
} {
m := test.m
p := test.p
n := test.n
lda := test.lda
if lda == 0 {
lda = n
}
ldb := test.ldb
if ldb == 0 {
ldb = n
}
ldu := test.ldu
if ldu == 0 {
ldu = m
}
ldv := test.ldv
if ldv == 0 {
ldv = p
}
ldq := test.ldq
if ldq == 0 {
ldq = n
}

a := randomGeneral(m, n, lda, rnd)
aCopy := cloneGeneral(a)
b := randomGeneral(p, n, ldb, rnd)
bCopy := cloneGeneral(b)

tola := float64(max(m, n)) * impl.Dlange(lapack.Frobenius, m, n, a.Data, a.Stride, nil) * dlamchE
tolb := float64(max(p, n)) * impl.Dlange(lapack.Frobenius, p, n, b.Data, b.Stride, nil) * dlamchE

u := nanGeneral(m, m, ldu)
v := nanGeneral(p, p, ldv)
q := nanGeneral(n, n, ldq)

iwork := make([]int, n)
tau := make([]float64, n)

work := []float64{0}
impl.Dggsvp3(lapack.GSVDU, lapack.GSVDV, lapack.GSVDQ,

```



```

m, p, n,
a.Data, a.Stride,
b.Data, b.Stride,
tola, tolB,
u.Data, u.Stride,
v.Data, v.Stride,
q.Data, q.Stride,
iwork, tau,
work,
-1)

```

```

lwork := int(work[0])
work = make([]float64, lwork)

```

```

k, l := impl.Dggsvp3(lapack.GSVDU, lapack.GSVDV, lapack.GSVDQ,
m, p, n,
a.Data, a.Stride,
b.Data, b.Stride,
tola, tolB,
u.Data, u.Stride,
v.Data, v.Stride,
q.Data, q.Stride,
iwork, tau,
work, lwork)

```

```

// Check orthogonality of U, V and Q.
if !isOrthogonal(u) {
 t.Errorf("test %d: U is not orthogonal\n%+v", cas, u)
}
if !isOrthogonal(v) {
 t.Errorf("test %d: V is not orthogonal\n%+v", cas, v)
}
if !isOrthogonal(q) {
 t.Errorf("test %d: Q is not orthogonal\n%+v", cas, q)
}

```

```

zeroA, zeroB := constructGSVPResults(n, p, m, k, l, a, b)

```

```

// Check $U^*A^*Q = [0 \text{ RA}]$.
uTmp := nanGeneral(m, n, n)
blas64.Gemm(blas.Trans, blas.NoTrans, 1, u, aCopy, 0, uTmp)
uAns := nanGeneral(m, n, n)
blas64.Gemm(blas.NoTrans, blas.NoTrans, 1, uTmp, q, 0, uAns)

if !equalApproxGeneral(uAns, zeroA, 1e-14) {
 t.Errorf("test %d: $U^*A^*Q \neq [0 \text{ RA}]$ \nU*A*Q:\n%+v\n[0 RA]:\n%+v",
 cas,

```

```

uAns, zeroA)
}

// Check V*B*Q = [0 RB].
vTmp := nanGeneral(p, n, n)
blas64.Gemm(blas.Trans, blas.NoTrans, 1, v, bCopy, 0, vTmp)
vAns := nanGeneral(p, n, n)
blas64.Gemm(blas.NoTrans, blas.NoTrans, 1, vTmp, q, 0, vAns)

if !equalApproxGeneral(vAns, zeroB, 1e-14) {
 t.Errorf("test %d: V*B*Q != [0 RB]\nV*B*Q:\n%+v\n[0 RB]:\n%+v",
 cas, vAns, zeroB)
}
}
}

graph{{SubGra_}{SubGra_}{SubGra_}{SubGra_}}
graph{edg{edd{edg{edg}ed{edg}edg}edg{edg}edg{edg}ed{edg}edg}edg{edg}edg}
graph{{diGrar}{diGrar}diGrar}
graph{ea{{ea{ea""ea}}ea}}
graph{Str5}
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package gonum
digraph{A:e->B:w C:o->D:se E:_->G:n H:e I:s J:w K:nw L:c}
graph{Subr}
graph{{s_}{s_{{{s_}{s_{{{s_}{s_}}}}s_}{s_}}}}
build: off

clone_folder: c:\gopath\src\gonum.org\v1\gonum

cache:
- "%LocalAppData%\go-build"

branches:
only:
- master

environment:
Do not move these lines; they are referred to by README.md.
Versions of go that are explicitly supported by gonum.
matrix:
- GOROOT: 'c:\go112'
 #- GOROOT: 'c:\go113'
GOPATH: c:\gopath
GOTOOLDIR: '%GOROOT%\pkg\tool\windows_amd64'
PATH: '%GOPATH%\bin;%GOROOT%\bin;%PATH%'

```

```

build_script:
- "%GOROOT%\bin\go version"
- "%GOROOT%\bin\go get -v -t ./..."

test_script:
- "%GOROOT%\bin\go test ./..."

graph{GRA_}
graph{{Dl{{Ds{Ds}}Ds{{Dl{{Ds{Ds}}Ds{Ds}}}}Ds}}}}
graph{{Su}{Su}{Su}Su{Su}{Su}}
graph{{Ed}}
graph{{Subg}{Subg}{Subg}}
Graph{{subgr_}subgr_}
graph{SUBGRAV{{SUBGRAU}}SUBGRAV}
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graph{{DiGA}}
graph{bFQWDZTE}
graph{{Stra-9Stra}Str{Stra-9Stra}Stra-9Stra-9Stra}
graph{{subGs{{subGz}}subGs}}
diGraph{
graph{{dn{dn do}do}dn{dn do}}
graph{<<NNNNNN>>}
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// license that can be found in the LICENSE file.

package stat

import (
 "math"

 "gonum.org/v1/gonum/floats"
 "gonum.org/v1/gonum/mat"
)

// CovarianceMatrix calculates the covariance matrix (also known as the
// variance-covariance matrix) calculated from a matrix of data, x, using
// a two-pass algorithm. The result is stored in dst.
//

```

```

// If weights is not nil the weighted covariance of x is calculated. weights
// must have length equal to the number of rows in input data matrix and
// must not contain negative elements.
// The dst matrix must either be empty or have the same number of
// columns as the input data matrix.
func CovarianceMatrix(dst *mat.SymDense, x mat.Matrix, weights []float64) {
 // This is the matrix version of the two-pass algorithm. It doesn't use the
 // additional floating point error correction that the Covariance function uses
 // to reduce the impact
 // of rounding during centering.

 r, c := x.Dims()

 if dst.IsEmpty() {
 *dst = *(dst.GrowSym(c).(*mat.SymDense))
 } else if n := dst.Symmetric(); n != c {
 panic(mat.ErrShape)
 }

 var xt mat.Dense
 xt.CloneFrom(x.T())
 // Subtract the mean of each of the columns.
 for i := 0; i < c; i++ {
 v := xt.RawRowView(i)
 // This will panic with ErrShape if len(weights) != len(v), so
 // we don't have to check the size later.
 mean := Mean(v, weights)
 floats.AddConst(-mean, v)
 }

 if weights == nil {
 // Calculate the normalization factor
 // scaled by the sample size.
 dst.SymOuterK(1/(float64(r)-1), &xt)
 return
 }

 // Multiply by the sqrt of the weights, so that multiplication is symmetric.
 sqrtwts := make([]float64, r)
 for i, w := range weights {
 if w < 0 {
 panic("stat: negative covariance matrix weights")
 }
 sqrtwts[i] = math.Sqrt(w)
 }
 // Weight the rows.
 for i := 0; i < c; i++ {
 v := xt.RawRowView(i)

```

```

 floats.Mul(v, sqrtwts)
}

// Calculate the normalization
factor
// scaled by the weighted sample size.
dst.SymOuterK(1/(floats.Sum(weights)-1), &xt)
}

// CorrelationMatrix returns the correlation matrix calculated from a matrix
// of data, x, using a two-pass algorithm. The result is stored in dst.
//
// If weights is not nil the weighted correlation of x is calculated. weights
// must have length equal to the number of rows in input data matrix and
// must not contain negative elements.
// The dst matrix must either be empty or have the same number of
// columns as the input data matrix.
func CorrelationMatrix(dst *mat.SymDense, x mat.Matrix, weights []float64) {
 // This will panic if the sizes don't match, or if weights is the wrong size.
 CovarianceMatrix(dst, x, weights)
 covToCorr(dst)
}

// covToCorr converts a covariance matrix to a correlation matrix.
func covToCorr(c *mat.SymDense) {
 r := c.Symmetric()

 s := make([]float64, r)
 for i := 0; i < r; i++ {
 s[i] = 1 / math.Sqrt(c.At(i, i))
 }
 for i, sx := range s {
 // Ensure
 // that the diagonal has exactly ones.
 c.SetSym(i, i, 1)
 for j := i + 1; j < r; j++ {
 v := c.At(i, j)
 c.SetSym(i, j, v*sx*s[j])
 }
 }
}

// corrToCov converts a correlation matrix to a covariance matrix.
// The input sigma should be vector of standard deviations corresponding
// to the covariance. It will panic if len(sigma) is not equal to the
// number of rows in the correlation matrix.
func corrToCov(c *mat.SymDense, sigma []float64) {
 r, _ := c.Dims()

```

```

if r != len(sigma) {
 panic(mat.ErrShape)
}

for i, sx := range sigma {
 // Ensure that the diagonal has exactly sigma squared.
 c.SetSym(i, i, sx*sx)
 for j := i + 1; j < r; j++ {
 v := c.At(i, j)
 c.SetSym(i, j, v*sx*sigma[j])
 }
}

// Mahalanobis computes the Mahalanobis distance
// D = sqrt((x-y) * ^-1 * (x-y))
// between the column vectors x and y given the cholesky decomposition of .
// Mahalanobis returns NaN if the linear solve fails.
//
// See https://en.wikipedia.org/wiki/Mahalanobis_distance for
more information.
func Mahalanobis(x, y mat.Vector, chol *mat.Cholesky) float64 {
 var diff mat.VecDense
 diff.SubVec(x, y)
 var tmp mat.VecDense
 err := chol.SolveVecTo(&tmp, &diff)
 if err != nil {
 return math.NaN()
 }
 return math.Sqrt(mat.Dot(&tmp, &diff))
}

graph{{""_3_VO1_1wgYc8kRij8q8_1PyG1YO0_iryntlS5u4T4zbq9VH7G1_ZAB_8tO9W}""_3_VO1_1wgYc8
kRij8q8_1PyG1YO0_iryntlS5u4T4zbq9VH7G1_ZAB_8tO9W}""_3_VO1_1wgYc8kRij8q8_1PyG1YO0_iryntl
S5u4T4zbq9VH7G1_ZAB_8tO9W}""_3_VO1_1wgYc8kRij8q8_1PyG1YO0_iryntlS5u4T4zbq9VH7G1_ZAB_8t
O9W}""_c8kRij8q8_1PyG1YO0_iryntlS5u4T4zbq9VH7G1_ZAB8kRij8q8_1PyG1YO0_iryntlS5u4T4zbq9VH7G
1_ZAB_8tO9W}""_3_VO1_1wgYc8kRij8q8_1PyG1YO0_iryntlS5u4T4zbq9VH7G1_ZAB_8tO9W}""_3_VO
1_1wgYc8kRij8q8_1PyG1YO0_iryntlS5u4T4zbq9VH7G1_ZAB_8tO9W}""_3_VO1_1wgYc8kRij8q8_1PyG1Y
O0_iryntlS5u4T4zbq9VH7G1_ZAB_8tO9W}""_3_VO1_1wgYc8kRij8q8_1PyG1YO0_iryntlS5u4T4zbq9VH7G
1_ZAB_8tyntlS5u4T4zbq9VH7G1_ZAB_8tO9W}""_3_VO1_1wgYc1YO0_iryntlS5u4T4zbq9VH7G1_ZAB_8t
O9W}""_3_VO1_1wgYc8kRij8q8_1PyG1YO0_iryntlS5u4T4zbq9VH7G1_ZAB_8tO9W}""_3_VO1_1wgYc8k
Rij8q8_1PyG1YO0_iryntlS5u4T4zbq9VH7G1_ZAB_8tO9W}""_3_VO1_1wgYc8kRij8q8_1PyG1YO0_iryntl
S5u4T4zbq9VH7G1_ZAB_8tO9W}""_3_VO1_1wgYc8kRij8q8_1PyG1YO0_iryntlS5u4T4zbq9VH7G1_ZAB_8t
O9W}""_3_VO1_1wgYc8kRij8q8_1PyG1YO0_iryntlS5u4T4zbq9VH7G1_ZAB_8tO9W}""_3_VO1_1wgYc8k
Rij8q8_1PyG1YO0_iryntlS5u4T4zbq9VH7G1_ZAB_8tO9W}""_3_VO1_1wgYc8kRij8q8_1PyG1YO0_iryntlS
5u4T4zbq9VH7G1_ZAB8kRij8q8_1PyG1YO0_iryntlS5u4T4zbq9VH7G1_ZAB_8tO9W}""_3_VO1_1wgYc8k
Rij8q8_1PyG1YO0_iryntlS5u4T4zbq9VH7G1_ZAB_8tO9W}""_3_VO1_1wgYc8kRij8q8_1PyG1YO0_iryntlS
5u4T4zbq9VH7G1_ZAB_8tO9W}""_3_VO1_1wgYc8kRij8q8_1PyG1YO0_iryntlS5u4T4zbq9VH7G1_ZAB_8tO
9W}""_3_VO1_1wgYc8kRij8q8_1PyG1YO0_iryntlS5u4T4zbq9VH7G1_ZAB_8tO9W}""_3_VO1_1wgYc8kRi
```

```
j8q8_1PyG1YO0_iryntlS5u4T4zbq9VH7G1_ZAB_8tO9W}}}
```

```
// Code generated by "go generate gonum.org/v1/gonum/blas/gonum; DO NOT EDIT.
```

```
// Copyright 2015 The Gonum Authors. All rights reserved.
```

```
// Use of this source code is governed by a BSD-style
```

```
// license that can be found in the LICENSE file.
```

```
package gonum
```

```
import (
```

```
 "gonum.org/v1/gonum/internal/asm/f32"
```

```
)
```

```
// Sdot computes the dot product of the two vectors
```

```
// \sum_i x[i]*y[i]
```

```
//
```

```
// Float32 implementations are autogenerated and not directly tested.
```

```
func (Implementation) Sdot(n int, x []float32, incX int, y []float32, incY int) float32 {
```

```
 if incX == 0 {
```

```
 panic(zeroIncX)
```

```
 }
```

```
 if incY == 0 {
```

```
 panic(zeroIncY)
```

```
 }
```

```
 if n <= 0 {
```

```
 if n == 0 {
```

```
 return 0
```

```
 }
```

```
 panic(nLT0)
```

```
 }
```

```
 if incX == 1 && incY == 1 {
```

```
 if len(x) < n {
```

```
 panic(shortX)
```

```
 }
```

```
 if len(y) < n {
```

```
 panic(shortY)
```

```
 }
```

```
 return f32.DotUnitary(x[:n], y[:n])
```

```
 }
```

```
 var ix, iy int
```

```
 if incX < 0 {
```

```
 ix = (-n + 1) * incX
```

```
 }
```

```
 if incY < 0 {
```

```
 iy = (-n + 1) * incY
```

```
 }
```

```
 if ix >= len(x) || ix+(n-1)*incX >= len(x) {
```

```
 panic(shortX)
```





```

 {0, 3, 5},
 {0, 0, 6},
},
x: []float64{2, 3, 4},
y: []float64{5, 6, 7},
alpha: 2,
ul: blas.Upper,
ans: [][]float64{
 {47, 56, 72},
 {0, 75, 95},
 {0, 0, 118},
},
},
{
n: 3,
a: [][]float64{
 {7, 0, 0},
 {2, 3, 0},
 {4, 5, 6},
},
x: []float64{2, 3, 4},
y: []float64{5, 6, 7},
alpha:
2,
ul: blas.Lower,
ans: [][]float64{
 {47, 0, 0},
 {56, 75, 0},
 {72, 95, 118},
},
},
} {
incTest := func(incX, incY, extra int) {
aFlat := flattenTriangular(test.a, test.ul)
x := makeIncremented(test.x, incX, extra)
y := makeIncremented(test.y, incY, extra)
blasser.Dspr2(test.ul, test.n, test.alpha, x, incX, y, incY, aFlat)
ansFlat := flattenTriangular(test.ans, test.ul)
if !floats.EqualApprox(aFlat, ansFlat, 1e-14) {
t.Errorf("Case %v, incX = %v, incY = %v. Want %v, got %v.", i, incX, incY, ansFlat, aFlat)
}
}
incTest(1, 1, 0)
incTest(-2, 1, 0)
incTest(-2, 3, 0)
incTest(2, -3, 0)
incTest(3, -2, 0)
incTest(-3, -4, 0)

```

```

}
}
graph{{Digr}Digr}
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// license that can be found in the LICENSE file.

package hyperdual_test

import (
 "fmt"

 "gonum.org/v1/gonum/num/hyperdual"
)

func Example_Number_fike() {
 // Calculate the value and first and second derivatives
 // of the function $e^x/(\sqrt{\sin(x)^3 + \cos(x)^3})$.
 fn := func(x hyperdual.Number) hyperdual.Number {
 return hyperdual.Mul(
 hyperdual.Exp(x),
 hyperdual.Inv(hyperdual.Sqrt(
 hyperdual.Add(
 hyperdual.PowReal(hyperdual.Sin(x), 3),
 hyperdual.PowReal(hyperdual.Cos(x), 3))))
)
 }

 v := fn(hyperdual.Number{Real: 1.5, E1mag: 1, E2mag: 1})
 fmt.Printf("v=%0.4f\n", v)
 fmt.Printf("fn(1.5)=%0.4fnfn'(1.5)=%0.4fnfn''(1.5)=%0.4f\n", v.Real, v.E1mag, v.E1E2mag)

 // Output:
 //
 // v=(4.4978+4.0534+4.0534+9.4631)
 // fn(1.5)=4.4978
 // fn'(1.5)=4.0534
 // fn''(1.5)=9.4631
}
graph{{Dig}}
graph{{digraq}{digraq}{{digraq}{digraq}{digraq}}}{digraq}{{digraq}}
Graph{Sun{Sur}}
graph{{Subg_}}
graph{Subg}
graph{{DiGrapg}{{{{DiGrapg}}}DiGrapg}{{{{DiGrapg}DiGrapg}DiGrapb}{{DiGrapg}DiGrapg}DiGrapb}
{{DiGrapg}DiGrapg}DiGrapb}{{""DiGrapg}}}DiGrapg}DiGrapb}
graph{SUBGRAP0{SUBGRAP0}}
graph{{diGrap}diGrap}

```

```

graph{edgd}
graph{<<<><><><><>>}
graph{{DigV}DigP}
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// license that can be found in the LICENSE file.

package quat

import (
 "math"
 "testing"
)

var nan = math.NaN()

var nanTests = []struct {
 q Number
 want bool
}{
 {q: NaN(), want: true},
 {q: Number{Real: nan, Imag: nan, Jmag: nan, Kmag: nan}, want: true},
 {q: Number{Real: nan, Imag: 0, Jmag: 0, Kmag: 0}, want: true},
 {q: Number{Real: 0, Imag: nan, Jmag: 0, Kmag: 0}, want: true},
 {q: Number{Real: 0, Imag: 0, Jmag: nan, Kmag: 0}, want: true},
 {q: Number{Real: 0, Imag: 0, Jmag: 0, Kmag: nan}, want: true},
 {q: Number{Real: inf, Imag: nan, Jmag: nan, Kmag: nan}, want: false},
 {q: Number{Real: nan, Imag: inf, Jmag: nan, Kmag: nan}, want: false},
 {q: Number{Real: nan, Imag: nan, Jmag: inf, Kmag: nan}, want: false},
 {q: Number{Real: nan, Imag: nan, Jmag: nan, Kmag: inf}, want: false},
 {q: Number{Real: -inf, Imag: nan, Jmag: nan, Kmag: nan}, want: false},
 {q: Number{Real:
nan, Imag: -inf, Jmag: nan, Kmag: nan}, want: false},
 {q: Number{Real: nan, Imag: nan, Jmag: -inf, Kmag: nan}, want: false},
 {q: Number{Real: nan, Imag: nan, Jmag: nan, Kmag: -inf}, want: false},
 {q: Number{}, want: false},
}

func TestIsNaN(t *testing.T) {
 for _, test := range nanTests {
 got := IsNaN(test.q)
 if got != test.want {
 t.Errorf("unexpected result for IsNaN(%v): got:%t want:%t", test.q, got, test.want)
 }
 }
}

graph{{Edgeh{{Edge_}{Edge_}}Edge_}}

```

```

graph{{gr_{gr_{gr_{gr_{}}}
graph{{Dig}{Dig}Dig{Dig}{Dig}{{Dig}{Dig}Dig{Dig}{Dig}Dig}Dig}
graph{Stric5}
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package unit_test

import (
 "fmt"

 "gonum.org/v1/gonum/unit"
)

func ExampleNew() {
 // Create an angular acceleration of 3 rad/s^2
 accel := unit.New(3.0, unit.Dimensions{unit.AngleDim: 1, unit.TimeDim: -2})
 fmt.Println(accel)

 // Output: 3 rad s^-2
}

func ExampleNewDimension() {
 // Create a "trees" dimension
 // Typically, this should be used within an init function
 treeDim := unit.NewDimension("tree")
 countPerArea := unit.New(0.1, unit.Dimensions{treeDim: 1, unit.LengthDim: -2})
 fmt.Println(countPerArea)

 // Output: 0.1 tree m^-2
}

func Example_horsepower() {
 // One mechanical horsepower 33,000 ft-lbf/min.
 foot := unit.Length(0.3048)
 pound := unit.Mass(0.45359237)

 gravity := unit.Acceleration(9.80665)
 poundforce := pound.Unit().Mul(gravity)

 hp := ((33000 * foot).Unit().Mul(poundforce)).Div(unit.Minute)
 fmt.Println("1
 hp =", hp)

 watt := unit.Power(1)
 fmt.Println("W is equivalent to hp?", unit.DimensionsMatch(hp, watt))

```

```
// Output:
//
// 1 hp = 745.6998715822701 kg m^2 s^-3
// W is equivalent to hp? true
}
graph{subGv}
graph{{{{{{{{graa}}}}}}grai}grag}
digraph {{
}}
graph{GRA_{GRA_}}
/** github.com/swill/svgo@v0.0.0-20150715025413-bc384fa1e849 **/
{{Types "CC-BY-3.0"}}
```

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// Code generated by "go generate gonum.org/v1/gonum/blas; DO NOT EDIT.

```
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// license that can be found in the LICENSE file.
```

```
package cblas128
```

```
import "gonum.org/v1/gonum/blas"
```

```
// SymmetricCols represents a matrix using the conventional column-major storage scheme.
type SymmetricCols Symmetric
```

```
// From fills the receiver with elements from a. The receiver
// must have the same dimensions and uplo as a and have adequate
// backing data storage.
```

```
func (t SymmetricCols) From(a Symmetric) {
 if t.N != a.N {
 panic("cblas128: mismatched dimension")
 }
 if t.Uplo != a.Uplo {
 panic("cblas128: mismatched BLAS uplo")
 }
 switch a.Uplo {
 default:
 panic("cblas128: bad BLAS uplo")
 case blas.Upper:
 for i := 0; i < a.N; i++ {
 for j := i; j < a.N; j++ {
 t.Data[i+j*t.Stride] = a.Data[i*a.Stride+j]
```

```

 }
}
case blas.Lower:
 for i := 0; i < a.N; i++ {
 for j := 0; j <= i; j++
 {
 t.Data[i+j*t.Stride] = a.Data[i*a.Stride+j]
 }
 }
}
}
}

// From fills the receiver with elements from a. The receiver
// must have the same dimensions and uplo as a and have adequate
// backing data storage.
func (t Symmetric) From(a SymmetricCols) {
 if t.N != a.N {
 panic("cblas128: mismatched dimension")
 }
 if t.Uplo != a.Uplo {
 panic("cblas128: mismatched BLAS uplo")
 }
 switch a.Uplo {
 default:
 panic("cblas128: bad BLAS uplo")
 case blas.Upper:
 for i := 0; i < a.N; i++ {
 for j := i; j < a.N; j++ {
 t.Data[i*t.Stride+j] = a.Data[i+j*a.Stride]
 }
 }
 case blas.Lower:
 for i := 0; i < a.N; i++ {
 for j := 0; j <= i; j++ {
 t.Data[i*t.Stride+j] = a.Data[i+j*a.Stride]
 }
 }
 }
}
}
}

```

// SymmetricBandCols represents a symmetric matrix using the band column-major storage scheme.  
type SymmetricBandCols SymmetricBand

```

// From fills the receiver with elements from a. The receiver
// must have the same dimensions, bandwidth and uplo as a and
// have adequate
// backing data storage.
func (t SymmetricBandCols) From(a SymmetricBand) {

```

```

if t.N != a.N {
 panic("cblas128: mismatched dimension")
}
if t.K != a.K {
 panic("cblas128: mismatched bandwidth")
}
if a.Stride < a.K+1 {
 panic("cblas128: short stride for source")
}
if t.Stride < t.K+1 {
 panic("cblas128: short stride for destination")
}
if t.Uplo != a.Uplo {
 panic("cblas128: mismatched BLAS uplo")
}
dst := BandCols{
 Rows: t.N, Cols: t.N,
 Stride: t.Stride,
 Data: t.Data,
}
src := Band{
 Rows: a.N, Cols: a.N,
 Stride: a.Stride,
 Data: a.Data,
}
switch a.Uplo {
default:
 panic("cblas128: bad BLAS uplo")
case blas.Upper:
 dst.KU = t.K
 src.KU = a.K
case blas.Lower:
 dst.KL = t.K
 src.KL = a.K
}
dst.From(src)
}

// From fills the receiver with elements from a. The receiver
// must have the same dimensions, bandwidth and uplo as a and
// have adequate backing data storage.
func (t SymmetricBand) From(a SymmetricBandCols) {
 if t.N != a.N {
 panic("cblas128:
mismatched dimension")
 }
 if t.K != a.K {
 panic("cblas128: mismatched bandwidth")
 }

```

```

}
if a.Stride < a.K+1 {
 panic("cblas128: short stride for source")
}
if t.Stride < t.K+1 {
 panic("cblas128: short stride for destination")
}
if t.Uplo != a.Uplo {
 panic("cblas128: mismatched BLAS uplo")
}
dst := Band{
 Rows: t.N, Cols: t.N,
 Stride: t.Stride,
 Data: t.Data,
}
src := BandCols{
 Rows: a.N, Cols: a.N,
 Stride: a.Stride,
 Data: a.Data,
}
switch a.Uplo {
default:
 panic("cblas128: bad BLAS uplo")
case blas.Upper:
 dst.KU = t.K
 src.KU = a.K
case blas.Lower:
 dst.KL = t.K
 src.KL = a.K
}
dst.From(src)
}
graph{{DIGRAP_{{DIGRAP_}}{{DIGRAP_}{DIGRAP_}}DIGRAP_}}DIGRAP_}}
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package gonum

import "math"

// Iparm returns problem and machine dependent parameters useful for Dhseqr and
// related subroutines for eigenvalue problems.
//
// ispec specifies the parameter to return:
// 12: Crossover point between Dlahqr and Dlaqr0. Will be at least 11.
// 13: Deflation window size.
// 14: Nibble crossover point. Determines when to skip a multi-shift QR sweep.

```



```

// 15: Number of simultaneous shifts in a multishift QR iteration.
// 16: Select structured matrix multiply.
// For other values of ispec Iparmq will panic.
//
// name is the name of the calling function. name must be in uppercase but this
// is not checked.
//
// opts is not used and exists for future use.
//
// n is the order of the Hessenberg matrix H.
//
// ilo and ihi specify the block [ilo:ihi+1,ilo:ihi+1] that is being processed.
//
//
lwork is the amount of workspace available.
//
// Except for ispec input parameters are not checked.
//
// Iparmq is an internal routine. It is exported for testing purposes.
func (Implementation) Iparmq(ispec int, name, opts string, n, ilo, ihi, lwork int) int {
 nh := ihi - ilo + 1
 ns := 2
 switch {
 case nh >= 30:
 ns = 4
 case nh >= 60:
 ns = 10
 case nh >= 150:
 ns = max(10, nh/int(math.Log(float64(nh))/math.Ln2))
 case nh >= 590:
 ns = 64
 case nh >= 3000:
 ns = 128
 case nh >= 6000:
 ns = 256
 }
 ns = max(2, ns-(ns%2))

 switch ispec {
 default:
 panic(badIspec)

 case 12:
 // Matrices of order smaller than nmin get sent to Dlahqr, the
 // classic double shift algorithm. This must be at least 11.
 const nmin = 75
 return nmin
 }
}

```

```

case 13:
 const knwswp = 500
 if nh <= knwswp {
 return ns
 }
 return 3 * ns / 2

case 14:
 // Skip a computationally expensive multi-shift QR sweep with
 // Dlaqr5 whenever aggressive early deflation finds at least
 // nibble*(window
size)/100 deflations. The default, small,
 // value reflects the expectation that the cost of looking
 // through the deflation window with Dlaqr3 will be
 // substantially smaller.
 const nibble = 14
 return nibble

case 15:
 return ns

case 16:
 if len(name) != 6 {
 panic(badName)
 }
 const (
 k22min = 14
 kacmin = 14
)
 var acc22 int
 switch {
 case name[1:] == "GGHRD" || name[1:] == "GGHD3":
 acc22 = 1
 if nh >= k22min {
 acc22 = 2
 }
 case name[3:] == "EXC":
 if nh >= kacmin {
 acc22 = 1
 }
 if nh >= k22min {
 acc22 = 2
 }
 case name[1:] == "HSEQR" || name[1:5] == "LAQR":
 if ns >= kacmin {
 acc22 = 1
 }
 if ns >= k22min {

```

```

 acc22 = 2
}
}
return acc22
}
}
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```

```
package testlapack
```

```
import (
 "testing"
```

```

 "golang.org/x/exp/rand"
```

```

 "gonum.org/v1/gonum/blas"
```

```

 "gonum.org/v1/gonum/blas/blas64"
```

```

 "gonum.org/v1/gonum/floats"
```

```
)
```

```
type Dgetf2er interface {
```

```
 Dgetf2(m, n int, a []float64, lda int, ipiv []int) bool
```

```
}
```

```
func Dgetf2Test(t *testing.T, impl Dgetf2er) {
```

```
 rnd := rand.New(rand.NewSource(1))
```

```
 for _, test := range []struct {
```

```
 m, n, lda int
```

```
 }{
```

```
 {10, 10, 0},
```

```
 {10, 5, 0},
```

```
 {10, 5, 0},
```

```

 {10, 10, 20},
```

```
 {5, 10, 20},
```

```
 {10, 5, 20},
```

```
 } {
```

```
 m := test.m
```

```
 n := test.n
```

```
 lda := test.lda
```

```
 if lda == 0 {
```

```
 lda = n
```

```
 }
```

```
 a := make([]float64, m*lda)
```

```
 for i := range a {
```

```
 a[i] = rnd.Float64()
```

```

}
aCopy := make([]float64, len(a))
copy(aCopy, a)

mn := min(m, n)
ipiv := make([]int, mn)
for i := range ipiv {
 ipiv[i] = rnd.Int()
}
ok := impl.Dgetf2(m, n, a, lda, ipiv)
checkPLU(t, ok,
m, n, lda, ipiv, a, aCopy, 1e-14, true)
}

// Test with singular matrices (random matrices are almost surely non-singular).
for _, test := range []struct {
 m, n, lda int
 a []float64
}{
 {
 m: 2,
 n: 2,
 lda: 2,
 a: []float64{
 1, 0,
 0, 0,
 },
 },
 {
 m: 2,
 n: 2,
 lda: 2,
 a: []float64{
 1, 5,
 2, 10,
 },
 },
 {
 m: 3,
 n: 3,
 lda: 3,
 // row 3 = row1 + 2 * row2
 a: []float64{
 1, 5, 7,
 2, 10, -3,
 5, 25, 1,
 },
 },
},

```

```

{
 m: 3,
 n: 4,
 lda: 4,
 // row 3 = row1 + 2 * row2
 a: []float64{
 1, 5, 7, 9,
 2, 10, -3, 11,
 5, 25, 1, 31,
 },
},
} {
 if impl.Dgetf2(test.m, test.n, test.a, test.lda, make([]int, min(test.m, test.n))) {
 t.Log("Returned ok with singular matrix.")
 }
}
}

```

// checkPLU checks that the PLU factorization contained in factorize matches  
// the original matrix contained in original.

```

func checkPLU(t *testing.T, ok bool, m, n, lda int, ipiv []int, factorized,
original []float64, tol float64, print bool) {
 var hasZeroDiagonal bool
 for i := 0; i < min(m, n); i++ {
 if factorized[i*lda+i] == 0 {
 hasZeroDiagonal = true
 break
 }
 }
 if hasZeroDiagonal && ok {
 t.Error("Has a zero diagonal but returned ok")
 }
 if !hasZeroDiagonal && !ok {
 t.Error("Non-zero diagonal but returned !ok")
 }
}

```

// Check that the LU decomposition is correct.

```

mn := min(m, n)
l := make([]float64, m*mn)
ldl := mn
u := make([]float64, mn*n)
ldu := n
for i := 0; i < m; i++ {
 for j := 0; j < n; j++ {
 v := factorized[i*lda+j]
 switch {
 case i == j:
 l[i*ldl+i] = 1

```

```

 u[i*ldu+i] = v
case i > j:
 l[i*ldl+j] = v
case i < j:
 u[i*ldu+j] = v
}
}
}

```

```

LU := blas64.General{
 Rows: m,
 Cols: n,
 Stride: n,
 Data: make([]float64, m*n),
}
U := blas64.General{
 Rows: mn,
 Cols: n,
 Stride: ldu,
 Data: u,
}
L := blas64.General{
 Rows: m,
 Cols: mn,
 Stride: ldl,
 Data: l,
}
blas64.Gemm(blas.NoTrans,
blas.NoTrans, 1, L, U, 0, LU)

```

```

p := make([]float64, m*m)
ldp := m
for i := 0; i < m; i++ {
 p[i*ldp+i] = 1
}
for i := len(ipiv) - 1; i >= 0; i-- {
 v := ipiv[i]
 blas64.Swap(blas64.Vector{N: m, Inc: 1, Data: p[i*ldp:]},
 blas64.Vector{N: m, Inc: 1, Data: p[v*ldp:]})
}
P := blas64.General{
 Rows: m,
 Cols: m,
 Stride: m,
 Data: p,
}
aComp := blas64.General{
 Rows: m,

```

```

Cols: n,
Stride: lda,
Data: make([]float64, m*lda),
}
copy(aComp.Data, factorized)
blas64.Gemm(blas.NoTrans, blas.NoTrans, 1, P, LU, 0, aComp)
if !floats.EqualApprox(aComp.Data, original, tol) {
 if print {
 t.Errorf("PLU multiplication does not match original matrix.\nWant: %v\nGot: %v", original, aComp.Data)
 return
 }
 t.Error("PLU multiplication does not match original matrix.")
}
}
graph{Edge[]{{{Edge[]Edge[]}}}}
graph{Digrap{{{Digrap}Digrap}{Digrap}Digrap}Digrap}
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// license that can be found in the LICENSE file.

package sampleuv

import (
 "sort"

 "golang.org/x/exp/rand"
)

// WithoutReplacement samples len(idxs) integers from [0, n) without replacement.
// That is, upon return the elements of idxs will be unique integers. If source
// is non-nil it will be used to generate random numbers, otherwise the default
// source from the math/rand package will be used.
//
// WithoutReplacement will panic if len(idxs) > n.
func WithoutReplacement(idxs []int, n int, src rand.Source) {
 if len(idxs) == 0 {
 panic("withoutreplacement: zero length input")
 }
 if len(idxs) > n {
 panic("withoutreplacement: impossible size inputs")
 }

 // There are two algorithms. One is to generate a random permutation
 // and take the first len(idxs) elements. The second is to generate
 // individual random numbers for each element and check uniqueness. The first
 //
 // method scales as O(n), and the second scales as O(len(idxs)^2). Choose
 // the algorithm accordingly.

```

[illegible]





```

import (
 "fmt"
 "math"
 "testing"

 "golang.org/x/exp/rand"

 "gonum.org/v1/gonum/blas"
 "gonum.org/v1/gonum/blas/blas64"
)

type Dormhrer interface {
 Dormhr(side blas.Side, trans blas.Transpose, m, n, ilo, ihi int, a []float64, lda int, tau, c []float64, ldc int, work
[]float64, lwork int)

 Dgehrder
}

func DormhrTest(t *testing.T, impl Dormhrer) {
 rnd := rand.New(rand.NewSource(1))

 for _, side := range []blas.Side{blas.Left, blas.Right} {
 for _, trans := range []blas.Transpose{blas.NoTrans, blas.Trans} {
 for _, m := range []int{1, 2, 3, 4, 5, 8, 9, 10, 23} {
 for _, n := range []int{1, 2, 3, 4, 5, 8, 9, 10, 23} {
 for _, extra := range []int{0, 1, 13} {
 for cas := 0; cas < 10; cas++ {
 nq := m
 if side == blas.Right {
 nq = n
 }
 ilo := rnd.Intn(nq)
 ihi
:= rnd.Intn(nq)
 if ilo > ihi {
 ilo, ihi = ihi, ilo
 }
 testDormhr(t, impl, side, trans, m, n, ilo, ihi, extra, true, rnd)
 testDormhr(t, impl, side, trans, m, n, ilo, ihi, extra, false, rnd)
 }
 }
 }
 }
 }
 }

 for _, side := range []blas.Side{blas.Left, blas.Right} {
 for _, trans := range []blas.Transpose{blas.NoTrans, blas.Trans} {

```

```

 testDormhr(t, impl, side, trans, 0, 0, 0, -1, 0, true, rnd)
 testDormhr(t, impl, side, trans, 0, 0, 0, -1, 0, false, rnd)
}
}
}

```

```

func testDormhr(t *testing.T, impl Dormhrer, side blas.Side, trans blas.Transpose, m, n, ilo, ihi, extra int, optwork
bool, rnd *rand.Rand) {
 const tol = 1e-14

 var nq, nw int
 switch side {
 case blas.Left:
 nq = m
 nw = n
 case blas.Right:
 nq = n
 nw = m
 }

 // Compute the elementary reflectors and tau.
 a := randomGeneral(nq, nq, nq+extra, rnd)
 var tau []float64
 if nq > 1 {
 tau = nanSlice(nq - 1)
 }
 work := nanSlice(max(1, nq)) // Minimum work for
 Dgehrd.
 impl.Dgehrd(nq, ilo, ihi, a.Data, a.Stride, tau, work, len(work))

 // Construct Q from the elementary reflectors in a and from tau.
 q := eye(nq, nq)
 qCopy := eye(nq, nq)
 for j := ilo; j < ihi; j++ {
 h := eye(nq, nq)
 v := blas64.Vector{
 Inc: 1,
 Data: make([]float64, nq),
 }
 v.Data[j+1] = 1
 for i := j + 2; i < ihi+1; i++ {
 v.Data[i] = a.Data[i*a.Stride+j]
 }
 blas64.Ger(-tau[j], v, v, h)
 copy(qCopy.Data, q.Data)
 blas64.Gemm(blas.NoTrans, blas.NoTrans, 1, qCopy, h, 0, q)
 }
}

```

```

c := randomGeneral(m, n, n+extra, rnd)

// Compute the product of Q and C explicitly.
qc := randomGeneral(m, n, n+extra, rnd)
if side == blas.Left {
 blas64.Gemm(trans, blas.NoTrans, 1, q, c, 0, qc)
} else {
 blas64.Gemm(blas.NoTrans, trans, 1, c, q, 0, qc)
}

// Compute the product of Q and C using Dormhr.
if optwork {
 work = nanSlice(1)
 impl.Dormhr(side, trans, m, n, ilo, ihi, nil, a.Stride, nil, nil, c.Stride, work, -1)
 work = nanSlice(int(work[0]))
} else {
 work
 = nanSlice(max(1, nw))
}
impl.Dormhr(side, trans, m, n, ilo, ihi, a.Data, a.Stride, tau, c.Data, c.Stride, work, len(work))

// Compare the two answers.
prefix := fmt.Sprintf("Case side=%v, trans=%v, m=%v, n=%v, ilo=%v, ihi=%v, extra=%v, optwork=%v",
 side, trans, m, n, ilo, ihi, extra, optwork)
if !generalOutsideAllNaN(c) {
 t.Errorf("%v: out-of-range write to C\n%v", prefix, c.Data)
}
for i := 0; i < m; i++ {
 for j := 0; j < n; j++ {
 cij := c.Data[i*c.Stride+j]
 qcij := qc.Data[i*qc.Stride+j]
 if math.Abs(cij-qcij) > tol {
 t.Errorf("%v: unexpected value of the QC product at [%v,%v]: want %v, got %v", prefix, i, j, qcij, cij)
 }
 }
}

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package cmplx64

import math "gonum.org/v1/gonum/internal/math32"

```

```
// Abs returns the absolute value (also called the modulus) of x.
func Abs(x complex64) float32 { return math.Hypot(real(x), imag(x)) }
graph{Stm Stm Stm}
graph{{subG}subG}
Graph{{SubGr4}}
/**
gitlab.com/ecp-ci/jacamar-plugins@v0.1.0
gitlab.com/ecp-ci/jacamar-ci@v0.3.2
**//
```

```
{{Types "Apache-2.0 MIT"}}
```

Jacamar

```
((CI || Plugins))
```

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```
((CI || Plugins))
```

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```
graph{{g3{g2{g3}g2}g2{g3{g2{g3}g2}}}
```

```
Graph{Subgrg{{Subgrg}{Subgrg{{Subgrg}{Subgrg}}}}}
```

```
graph{{Gr_}{Gr_{{Gr_}{Gr_}}}}
```

```
graph{{p2w9v0H3v3M6{ }o1h1G1{O1g8k8q8G1O0S5u4T4q9H7G1t9}""Q0p2w9v0H3v3M6{ }o1h1G1{O1g8k8q8G1O0S5u4T4q9H7G1t9}""Q0p2w9v0H3v3M6{ }O1g8k8q8G1O0S5u4T4q9H7G1t9}}}
```

```
graph{{d3{d9{d3{d9{{d3{d9{d3{d9}{d9}}}}}}{d9}{d9}}}}
```

```
graph{diG8{ }diG5{ }diG5}
```

```
graph{{{{digra4}{digra4}digra4{digra4}}}
```

```
digraph{e[l=<<=><D><D><D><"><D><D><D><R><E>>]}
```

```
graph{w:w:w K:w w:w w:w K:w w:w w:w w:w:w K:w w:w w:w K:w w:w w:w w}
```

```
Graph{{{{{{subgra{{subgra}{subgra}}subgra}}subgra}}subgra}}
```

```
Graph{{{{{{subgra}{subgra}}subgra}}}
```

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```
package fd
```

```
import "sync"
```

// Laplacian computes the Laplacian of the multivariate function f at the location

// x. That is, Laplacian returns

```
// f(x) = f(x) = \sum_i ^2 f(x)/x_i^2
```

// The finite difference formula and other options are specified by settings.

// The order of the difference formula must be 2 or Laplacian will panic.

```

func Laplacian(f func(x []float64) float64, x []float64, settings *Settings) float64 {
 n := len(x)
 if n == 0 {
 panic("laplacian: x has zero length")
 }

 // Default settings.
 formula := Central2nd
 step := formula.Step
 var originValue float64
 var originKnown, concurrent bool

 // Use user settings if provided.
 if settings != nil {
 if !settings.Formula.isZero() {
 formula = settings.Formula
 step = formula.Step
 checkFormula(formula)
 if formula.Derivative != 2 {
 panic(badDerivOrder)
 }
 }
 if
settings.Step != 0 {
 if settings.Step < 0 {
 panic(negativeStep)
 }
 step = settings.Step
 }
 originKnown = settings.OriginKnown
 originValue = settings.OriginValue
 concurrent = settings.Concurrent
 }

 evals := n * len(formula.Stencil)
 if usesOrigin(formula.Stencil) {
 evals -= n
 }

 nWorkers := computeWorkers(concurrent, evals)
 if nWorkers == 1 {
 return laplacianSerial(f, x, formula.Stencil, step, originKnown, originValue)
 }
 return laplacianConcurrent(nWorkers, evals, f, x, formula.Stencil, step, originKnown, originValue)
}

func laplacianSerial(f func(x []float64) float64, x []float64, stencil []Point, step float64, originKnown bool,
originValue float64) float64 {

```

```

n := len(x)
xCopy := make([]float64, n)
fo := func() float64 {
 // Copy x in case it is modified during the call.
 copy(xCopy, x)
 return f(x)
}
is2 := 1 / (step * step)
origin := getOrigin(originKnown, originValue, fo, stencil)
var laplacian float64
for i := 0; i <
n; i++ {
 for _, pt := range stencil {
 var v float64
 if pt.Loc == 0 {
 v = origin
 } else {
 // Copying the data anew has two benefits. First, it
 // avoids floating point issues where adding and then
 // subtracting the step don't return to the exact same
 // location. Secondly, it protects against the function
 // modifying the input data.
 copy(xCopy, x)
 xCopy[i] += pt.Loc * step
 v = f(xCopy)
 }
 laplacian += v * pt.Coeff * is2
 }
}
return laplacian
}

func laplacianConcurrent(nWorkers, evals int, f func(x []float64) float64, x []float64, stencil []Point, step float64,
originKnown bool, originValue float64) float64 {
 type run struct {
 i int
 idx int
 result float64
 }
 n := len(x)
 send := make(chan run, evals)
 ans := make(chan run, evals)

 var originWG sync.WaitGroup
 hasOrigin := usesOrigin(stencil)
 if hasOrigin {
 originWG.Add(1)
 // Launch worker to compute the origin.

```

```

go func() {
 defer originWG.Done()
 xCopy
:= make([]float64, len(x))
 copy(xCopy, x)
 originValue = f(xCopy)
}()
}

var workerWG sync.WaitGroup
// Launch workers.
for i := 0; i < nWorkers; i++ {
 workerWG.Add(1)
 go func(send <-chan run, ans chan<- run) {
 defer workerWG.Done()
 xCopy := make([]float64, len(x))
 for r := range send {
 if stencil[r.idx].Loc == 0 {
 originWG.Wait()
 r.result = originValue
 } else {
 // See laplacianSerial for comment on the copy.
 copy(xCopy, x)
 xCopy[r.i] += stencil[r.idx].Loc * step
 r.result = f(xCopy)
 }
 ans <- r
 }
 }(send, ans)
}

// Launch the distributor, which sends all of runs.
go func(send chan<- run) {
 for i := 0; i < n; i++ {
 for idx := range stencil {
 send <- run{
 i: i, idx: idx,
 }
 }
 }
 close(send)
 // Wait for all the workers to quit, then close the ans channel.
 workerWG.Wait()
 close(ans)
}(send)

// Read in the results.
is2 := 1 / (step * step)

```



```

var laplacian float64
for r := range ans
{
 laplacian += r.result * stencil[r.idx].Coeff * is2
}
return laplacian
}
graph{STRh{STRh}}
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package fourier

import "gonum.org/v1/gonum/fourier/internal/fftpack"

// DCT implements Discrete Cosine Transform for real sequences.
type DCT struct {
 work []float64
 ifac [15]int
}

// NewDCT returns a DCT initialized for work on sequences of length n.
// NewDCT will panic is n is not greater than 1.
func NewDCT(n int) *DCT {
 var t DCT
 t.Reset(n)
 return &t
}

// Len returns the length of the acceptable input.
func (t *DCT) Len() int { return len(t.work) / 3 }

// Reset reinitializes the DCT for work on sequences of length n.
// Reset will panic is n is not greater than 1.
func (t *DCT) Reset(n int) {
 if n <= 1 {
 panic("fourier: n less than 2")
 }
 if 3*n <= cap(t.work) {
 t.work = t.work[:3*n]
 } else {
 t.work = make([]float64, 3*n)
 }
 fftpack.Costi(n, t.work, t.ifac[:])
}

// Transform computes the Discrete Fourier

```

```

Cosine Transform of
// the input data, src, placing the result in dst and returning it.
// This transform is unnormalized; a call to Transform followed by
// another call to Transform will multiply the input sequence by 2*(n-1),
// where n is the length of the sequence.
//
// If the length of src is not t.Len(), Transform will panic.
// If dst is nil, a new slice is allocated and returned. If dst is not nil and
// the length of dst does not equal t.Len(), FFT will panic.
// It is safe to use the same slice for dst and src.
func (t *DCT) Transform(dst, src []float64) []float64 {
 if len(src) != t.Len() {
 panic("fourier: sequence length mismatch")
 }
 if dst == nil {
 dst = make([]float64, t.Len())
 } else if len(dst) != t.Len() {
 panic("fourier: destination length mismatch")
 }
 copy(dst, src)
 fftpack.Cost(len(dst), dst, t.work, t.ifac[:])
 return dst
}

// DST implements Discrete Sine Transform for real sequences.
type DST struct {
 work []float64
 ifac [15]int
}

// NewDST returns
// a DST initialized for work on sequences of length n.
func NewDST(n int) *DST {
 var t DST
 t.Reset(n)
 return &t
}

// Len returns the length of the acceptable input.
func (t *DST) Len() int { return (2*len(t.work)+1)/5 - 1 }

// Reset reinitializes the DCT for work on sequences of length n.
func (t *DST) Reset(n int) {
 if 5*(n+1)/2 <= cap(t.work) {
 t.work = t.work[:5*(n+1)/2]
 } else {
 t.work = make([]float64, 5*(n+1)/2)
 }
}

```

```

fftpack.Sinti(n, t.work, t.ifac[:])
}

// Transform computes the Discrete Fourier Sine Transform of the input
// data, src, placing the result in dst and returning it.
// This transform is unnormalized; a call to Transform followed by
// another call to Transform will multiply the input sequence by 2*(n-1),
// where n is the length of the sequence.
//
// If the length of src is not t.Len(), Transform will panic.
// If dst is nil, a new slice is allocated and returned. If dst is not nil and
// the length of dst does not equal t.Len(), FFT will panic.
//
It is safe to use the same slice for dst and src.
func (t *DST) Transform(dst, src []float64) []float64 {
 if len(src) != t.Len() {
 panic("fourier: sequence length mismatch")
 }
 if dst == nil {
 dst = make([]float64, t.Len())
 } else if len(dst) != t.Len() {
 panic("fourier: destination length mismatch")
 }
 copy(dst, src)
 fftpack.Sint(len(dst), dst, t.work, t.ifac[:])
 return dst
}
graph{"\nk\t"}
// Code generated by "go generate gonum.org/v1/gonum/unit; DO NOT EDIT.

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// license that can be found in the LICENSE file.

package unit

import (
 "fmt"
 "testing"
)

func TestInductanceFormat(t *testing.T) {
 for _, test := range []struct {
 value Inductance
 format string
 want string
 }{
 {1.23456789, "%v", "1.23456789 H"},
 }

```

```

{1.23456789, "%.1v", "1 H"},
{1.23456789, "%20.1v", "1 H"},
{1.23456789, "%20v", "1.23456789 H"},
{1.23456789, "%1v", "1.23456789 H"},
{1.23456789, "%#v", "unit.Inductance(1.23456789)"},
{1.23456789, "%s", "%!s(unit.Inductance=1.23456789 H)"},
} {
got := fmt.Sprintf(test.format, test.value)
if got != test.want {
t.Errorf("Format %q %v: got: %q want: %q", test.format, float64(test.value), got, test.want)
}
}
}
graph{
{{{DiGrapr{DiGrapi}}}}
{{{DiGrapiDiGrapn}}
{{{DiGrapi}}
{""}}}
Graph{
{{D}Dr{
{{D}D}
{D}}
D}}
}
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package distuv

import (
"math"

"golang.org/x/exp/rand"

"gonum.org/v1/gonum/mathext"
)

// Poisson implements the Poisson distribution, a discrete probability distribution
// that expresses the probability of a given number of events occurring in a fixed
// interval.
// The poisson distribution has density function:
// $f(k) = \lambda^k / k! e^{-\lambda}$
// For more information, see https://en.wikipedia.org/wiki/Poisson_distribution.
type Poisson struct {
// Lambda is the average number of events in an interval.
// Lambda must be greater than 0.
Lambda float64

Src rand.Source
}

// CDF computes the value of the cumulative distribution function at x.
func (p Poisson) CDF(x float64) float64 {
if x < 0 {
return 0
}
}

```

```

return mathext.GammaIncRegComp(math.Floor(x+1), p.Lambda)
}

// ExKurtosis returns the excess kurtosis of the distribution.
func
(p Poisson) ExKurtosis() float64 {
return 1 / p.Lambda
}

// LogProb computes the natural logarithm of the value of the probability
// density function at x.
func (p Poisson) LogProb(x float64) float64 {
if x < 0 || math.Floor(x) != x {
return math.Inf(-1)
}
lg, _ := math.Lgamma(math.Floor(x) + 1)
return x*math.Log(p.Lambda) - p.Lambda - lg
}

// Mean returns the mean of the probability distribution.
func (p Poisson) Mean() float64 {
return p.Lambda
}

// NumParameters returns the number of parameters in the distribution.
func (Poisson) NumParameters() int {
return 1
}

// Prob computes the value of the probability density function at x.
func (p Poisson) Prob(x float64) float64 {
return math.Exp(p.LogProb(x))
}

// Rand returns a random sample drawn from the distribution.
func (p Poisson) Rand() float64 {
// NUMERICAL RECIPES IN C: THE ART OF SCIENTIFIC COMPUTING (ISBN 0-521-43108-5)
// p. 294
// <http://www.aip.de/groups/soe/local/numres/bookcpdf/c7-3.pdf>

rnd
:= rand.ExpFloat64
var rng *rand.Rand
if p.Src != nil {
rng = rand.New(p.Src)
rnd = rng.ExpFloat64
}

```

```

if p.Lambda < 10.0 {
 // Use direct method.
 var em float64
 t := 0.0
 for {
 t += rnd()
 if t >= p.Lambda {
 break
 }
 em++
 }
 return em
}

// Use rejection method.
rnd = rand.Float64
if rng != nil {
 rnd = rng.Float64
}

sq := math.Sqrt(2.0 * p.Lambda)
alxm := math.Log(p.Lambda)
lg, _ := math.Lgamma(p.Lambda + 1)
g := p.Lambda*alxm - lg
for {
 var em, y float64
 for {
 y = math.Tan(math.Pi * rnd())
 em = sq*y + p.Lambda
 if em >= 0 {
 break
 }
 }
 em = math.Floor(em)
 lg, _ = math.Lgamma(em + 1)
 t := 0.9 * (1.0 + y*y) * math.Exp(em*alxm-lg-g)
 if rnd() <= t {
 return em
 }
}

// Skewness returns the skewness of the distribution.
func (p Poisson) Skewness() float64 {
 return 1 / math.Sqrt(p.Lambda)
}

// StdDev returns the standard deviation of the probability distribution.
func (p Poisson) StdDev() float64 {
 return math.Sqrt(p.Variance())
}

```

```

}

//
Survival returns the survival function (complementary CDF) at x.
func (p Poisson) Survival(x float64) float64 {
 return 1 - p.CDF(x)
}

// Variance returns the variance of the probability distribution.
func (p Poisson) Variance() float64 {
 return p.Lambda
}
graph{{{GRAP_ GRAP_ GRAP_}}GRAP_ GRAP_ GRAP_}}
graph{Edg_{Edg_}}
graph{{edg3{{{{{edg3}}}edg5}}}}}
graph{_{}}
package app

import (
 "gioui.org/app/internal/window"
)

type Handle window.Handle

// PlatformHandle returns the Android platform-specific Handle.
func PlatformHandle() *Handle {
 return (*Handle)(window.PlatformHandle)
}

// androidDriver is an interface that allows the Window's run method
// to call the RegisterFragment method of the Android window driver.
type androidDriver interface {
 RegisterFragment(string)
}

// RegisterFragment constructs a Java instance of the specified class
// and registers it as a Fragment in the Context in which the View was
// created.
func (w *Window) RegisterFragment(del string) {
 go func() {
 w.driverFuncs <- func() {
 d := w.driver.(androidDriver)
 d.RegisterFragment(del)
 }
 }()
}
graph{{NOD}{NOD}}

```

```

graph{{SUU{{SUU{{SUU}SUU}}}}SUU}
graph{{subG{subG{subG{subG{subG}subG}}}}}
graph{{ST6{ST6{ST6}ST6}ST6}}
graph{{{{s{s}s}s}s}
<?xml version="1.0" encoding="UTF-8"?>
<gexf xmlns="http://www.gexf.net/1.2draft" version="1.2">
<graph>
 <nodes>
 <node id="a" label="cheese" />
 <node id="b" label="cherry" />
 <node id="c" label="cake">
 <parents>
 <parent for="a" />
 <parent for="b" />
 </parents>
 </node>
 </nodes>
</graph>
</gexf>
graph{{{{grapr{}}grapr{grapr}}}}
graph{{diGrapl{{diGrapl{{diGrapl{}}diGrapp}}}}{{diGrapl{{diGrapp}diGrapp}}
graph{{{{digr{}}digr{>{{digr{}}digr{digr{digr{digr{digr{}}digr{digr{}}}}}
graph{GRAPHe}
digraph main {
 // Node definitions.
 2 [label=entry];
 9;
 198;
 14;
 197;
 19;
 196;
 24;
 195;
 29;
 194;
 34;
 193;
 39;
 192;
 44;
 191;
 49;
 190;
 54;
 189;
 59;
 188;

```



```
64;
187;
69;
186;
74;
185;
79;
184;
84;
183;
89;
182;
94;
181;
99;
180;
104;
179;
109;
178;
114;
177;
119;
176;
124;
175;
129;
174;
134;
173;
139;
172;
144;
171;
149;
170;
154;
169;
159;
168;
164;
167;

// Edge definitions.
2 -> 9 [label=true];
2 -> 198 [label=false];
9 -> 14 [label=true];
9 -> 197 [label=false];
```

14 -> 19 [label=true];  
14 -> 196 [label=false];  
197 -> 198;  
19 -> 24 [label=true];  
19 -> 195 [label=false];  
196 -> 197;  
24 -> 29 [label=true];  
24 -> 194 [label=false];  
195 -> 196;  
29 -> 34 [label=true];  
29 -> 193 [label=false];  
194 -> 195;  
34 -> 39 [label=true];  
34 -> 192 [label=false];  
193 -> 194;  
39 -> 44 [label=true];  
39 -> 191 [label=false];  
192 -> 193;  
44 -> 49 [label=true];  
44 -> 190 [label=false];  
191 -> 192;  
49 -> 54 [label=true];  
49  
-> 189 [label=false];  
190 -> 191;  
54 -> 59 [label=true];  
54 -> 188 [label=false];  
189 -> 190;  
59 -> 64 [label=true];  
59 -> 187 [label=false];  
188 -> 189;  
64 -> 69 [label=true];  
64 -> 186 [label=false];  
187 -> 188;  
69 -> 74 [label=true];  
69 -> 185 [label=false];  
186 -> 187;  
74 -> 79 [label=true];  
74 -> 184 [label=false];  
185 -> 186;  
79 -> 84 [label=true];  
79 -> 183 [label=false];  
184 -> 185;  
84 -> 89 [label=true];  
84 -> 182 [label=false];  
183 -> 184;  
89 -> 94 [label=true];  
89 -> 181 [label=false];

```
182 -> 183;
94 -> 99 [label=true];
94 -> 180 [label=false];
181 -> 182;
99 -> 104 [label=true];
99 -> 179 [label=false];
180 -> 181;
104 -> 109 [label=true];
104 -> 178 [label=false];
179 -> 180;
109 -> 114 [label=true];
109 -> 177 [label=false];
178 -> 179;
114 -> 119 [label=true];
114 -> 176 [label=false];
177 -> 178;
119 -> 124 [label=true];
119 -> 175 [label=false];
176 -> 177;
124 -> 129 [label=true];
124 -> 174 [label=false];
175 -> 176;
129
-> 134 [label=true];
129 -> 173 [label=false];
174 -> 175;
134 -> 139 [label=true];
134 -> 172 [label=false];
173 -> 174;
139 -> 144 [label=true];
139 -> 171 [label=false];
172 -> 173;
144 -> 149 [label=true];
144 -> 170 [label=false];
171 -> 172;
149 -> 154 [label=true];
149 -> 169 [label=false];
170 -> 171;
154 -> 159 [label=true];
154 -> 168 [label=false];
169 -> 170;
159 -> 164 [label=true];
159 -> 167 [label=false];
168 -> 169;
164 -> 167;
167 -> 168;
}
```

```

graph{SUB_{SUB_{{SUB_{{SUB_}SUB_}SUB_}SUB_}}}
graph{{{SubGrap_}}SubGrap_{{SubGrap_}}SubGrap_{{SubGrap_}}}
graph{{SUU{{SUU}}}SUU}
graph{Stri_}
graph{{v0H9O3A{}}h1P1O{s4T3O1P1O4T9H7G9W}""t3A{}}h1P1O{s4T3O1P1O4T9H7G9W}""t3A{}}{s4T3O1P
1O4T9H7G9W}}}
graph{{{{{st_}{st_}}st_}{st_}}}}
/**
 github.com/wojnosystems/go_reopen@v1.0.0
 github.com/coderconvoy/candlestick@v0.0.0-20161129102306-3081b787cd4a
 github.com/derekstinson/gocunets@v0.0.0-20200507203743-98db5b7a50a1
**//

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||
 Unique Candlestick
 =====

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<span
xmlns:dct="http://purl.org/dc/terms/" href="http://purl.org/dc/dcmitype/Text" property="dct:title"
rel="dct:type">Unique Candlestick by <a xmlns:cc="http://creativecommons.org/ns#"
href="github.com/coderconvoy/candlestick" property="cc:attributionName" rel="cc:attributionURL">Matthew
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))
// SPDX-License-Identifier: Unlicense OR MIT

package material

import (
 "image"
 "image/color"

 "gioui.org/f32"
 "gioui.org/font"

```

```

"gioui.org/layout"
"gioui.org/op/paint"
"gioui.org/text"
"gioui.org/unit"
"golang.org/x/exp/shiny/materialdesign/icons"
)

type Theme struct {
 Shaper *text.Shaper
 Color struct {
 Primary color.RGBA
 Text color.RGBA
 Hint color.RGBA
 InvText color.RGBA
 }
 TextSize unit.Value
 checkBoxCheckedIcon *Icon
 checkBoxUncheckedIcon *Icon
 radioCheckedIcon *Icon
 radioUncheckedIcon *Icon
}

func NewTheme() *Theme {
 t := &Theme{
 Shaper: font.Default(),
 }
 t.Color.Primary = rgb(0x3f51b5)
 t.Color.Text = rgb(0x000000)
 t.Color.Hint = rgb(0xbbbbbb)
 t.Color.InvText = rgb(0xffffffff)
 t.TextSize = unit.Sp(16)

 t.checkBoxCheckedIcon = mustIcon(NewIcon(icons.ToggleCheckBox))
 t.checkBoxUncheckedIcon = mustIcon(NewIcon(icons.ToggleCheckBoxOutlineBlank))
 t.radioCheckedIcon = mustIcon(NewIcon(icons.ToggleRadioButtonChecked))
 t.radioUncheckedIcon
 = mustIcon(NewIcon(icons.ToggleRadioButtonUnchecked))

 return t
}

func mustIcon(ic *Icon, err error) *Icon {
 if err != nil {
 panic(err)
 }
 return ic
}

```

```

func rgb(c uint32) color.RGBA {
 return argb(0xff000000 | c)
}

func argb(c uint32) color.RGBA {
 return color.RGBA{A: uint8(c >> 24), R: uint8(c >> 16), G: uint8(c >> 8), B: uint8(c)}
}

func fill(gtx *layout.Context, col color.RGBA) {
 cs := gtx.Constraints
 d := image.Point{X: cs.Width.Min, Y: cs.Height.Min}
 dr := f32.Rectangle{
 Max: f32.Point{X: float32(d.X), Y: float32(d.Y)},
 }
 paint.ColorOp{Color: col}.Add(gtx.Ops)
 paint.PaintOp{Rect: dr}.Add(gtx.Ops)
 gtx.Dimensions = layout.Dimensions{Size: d}
}

graph{{diGrp{diGrp}}}
graph{{digr_}{digr_{digr_{digr_}{digr_{digr_}}}{digr_}{digr_{digr_}}digr_}
digraph {h[l=""]ge[l=" "]ne_s[l=""]ge_n_e_r[l=" "]_d_s[l=" "]_d_s_e_f_a[l=" iri"]_s[l=" "]ne_S_s[l=""]ge-
>{ge_n_e_r_s ne_S_s ne_s_s}_s->_d_s_d_s->_d_s_e_f_a_d_s_e_f_a->_d_s_d_s->ge_n_e_r[e=d]}
graph{{.658570893}Subgrap}
graph{{{EDv}{{{EDv}}}EDv}{EDv{{{EDv}}}EDv}}}
*> \brief \b LSAME
*
* ===== DOCUMENTATION =====
*
* Online html documentation available at
* http://www.netlib.org/lapack/explore-html/
*
* Definition:
* =====
*
* LOGICAL FUNCTION LSAME(CA, CB)
*
* .. Scalar Arguments ..
* CHARACTER CA, CB
* ..
*
*> \par Purpose:
* =====
*>
*> \verbatim
*>
*> LSAME returns .TRUE. if CA is the same letter as CB regardless of
*> case.

```

```

*> \endverbatim
*
* Arguments:
* =====
*
*> \param[in] CA
*> \verbatim
*> \endverbatim
*>
*> \param[in] CB
*> \verbatim
*> CA and CB specify the single characters to be compared.
*> \endverbatim
*
* Authors:
* =====
*
*> \author Univ. of Tennessee
*> \author Univ. of California Berkeley
*> \author Univ. of Colorado Denver
*> \author NAG Ltd.
*
*> \date November 2011
*
*> \ingroup auxOTHERauxiliary
*
* =====
* LOGICAL FUNCTION LSAME(CA, CB)
*
* -- LAPACK
* auxiliary routine (version 3.4.0) --
* -- LAPACK is a software package provided by Univ. of Tennessee, --
* -- Univ. of California Berkeley, Univ. of Colorado Denver and NAG Ltd.--
* November 2011
*
* .. Scalar Arguments ..
* CHARACTER CA, CB
* ..
*
* =====
*
* .. Intrinsic Functions ..
* INTRINSIC ICHAR
* ..
* .. Local Scalars ..
* INTEGER INTA, INTB, ZCODE
* ..
* .. Executable Statements ..

```

```

*
* Test if the characters are equal
*
LSAME = CA.EQ.CB
IF(LSAME)
$ RETURN
*
* Now test for equivalence if both characters are alphabetic.
*
ZCODE = ICHAR('Z')
*
* Use 'Z' rather than 'A' so that ASCII can be detected on Prime
* machines, on which ICHAR returns a value with bit 8 set.
* ICHAR('A') on Prime machines returns 193 which is the same as
* ICHAR('A') on an EBCDIC machine.
*
INTA = ICHAR(
CA)
INTB = ICHAR(CB)
*
IF(ZCODE.EQ.90 .OR. ZCODE.EQ.122) THEN
*
* ASCII is assumed - ZCODE is the ASCII code of either lower or
* upper case 'Z'.
*
IF(INTA.GE.97 .AND. INTA.LE.122) INTA = INTA - 32
IF(INTB.GE.97 .AND. INTB.LE.122) INTB = INTB - 32
*
ELSE IF(ZCODE.EQ.233 .OR. ZCODE.EQ.169) THEN
*
* EBCDIC is assumed - ZCODE is the EBCDIC code of either lower or
* upper case 'Z'.
*
IF(INTA.GE.129 .AND. INTA.LE.137 .OR.
$ INTA.GE.145 .AND. INTA.LE.153 .OR.
$ INTA.GE.162 .AND. INTA.LE.169) INTA = INTA + 64
IF(INTB.GE.129 .AND. INTB.LE.137 .OR.
$ INTB.GE.145 .AND. INTB.LE.153 .OR.
$ INTB.GE.162 .AND. INTB.LE.169) INTB = INTB + 64
*
ELSE IF(ZCODE.EQ.218 .OR. ZCODE.EQ.250) THEN
*
* ASCII is assumed, on Prime machines - ZCODE is the ASCII code
* plus 128 of either lower or upper case 'Z'.
*
IF(INTA.GE.225 .AND. INTA.LE.250
) INTA = INTA - 32
IF(INTB.GE.225 .AND. INTB.LE.250) INTB = INTB - 32

```



```

 END IF
 LSAME = INTA.EQ.INTB
*
* RETURN
*
* End of LSAME
*

 END
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package gonum

import "gonum.org/v1/gonum/blas"

// Dgeql2 computes the QL factorization of the mn matrix A. That is, Dgeql2
// computes Q and L such that
// A = Q * L
// where Q is an mm orthonormal matrix and L is a lower trapezoidal matrix.
//
// Q is represented as a product of elementary reflectors,
// Q = H_{k-1} * ... * H_1 * H_0
// where k = min(m,n) and each H_i has the form
// H_i = I - tau[i] * v_i * v_i
// Vector v_i has v[m-k+i+1:m] = 0, v[m-k+i] = 1, and v[:m-k+i+1] is stored on
// exit in A[0:m-k+i-1, n-k+i].
//
// tau must have length at least min(m,n), and Dgeql2 will panic otherwise.
//
// work is temporary memory storage and must have length at least n.
//
// Dgeql2 is an internal routine. It is exported for testing purposes.
func (impl Implementation) Dgeql2(m, n int, a []float64, lda int, tau, work []float64)
{
 switch {
 case m < 0:
 panic(mLT0)
 case n < 0:
 panic(nLT0)
 case lda < max(1, n):
 panic(badLdA)
 }

 // Quick return if possible.
 k := min(m, n)
 if k == 0 {
 return
 }

```

```

}

switch {
case len(a) < (m-1)*lda+n:
 panic(shortA)
case len(tau) < k:
 panic(shortTau)
case len(work) < n:
 panic(shortWork)
}

var aii float64
for i := k - 1; i >= 0; i-- {
 // Generate elementary reflector H_i to annihilate A[0:m-k+i-1, n-k+i].
 aii, tau[i] = impl.Dlarfg(m-k+i+1, a[(m-k+i)*lda+n-k+i], a[n-k+i:], lda)

 // Apply H_i to A[0:m-k+i, 0:n-k+i-1] from the left.
 a[(m-k+i)*lda+n-k+i] = 1
 impl.Dlarf(blas.Left, m-k+i+1, n-k+i, a[n-k+i:], lda, tau[i], a, lda, work)
 a[(m-k+i)*lda+n-k+i] = aii
}
}
digraph{e6s}
/** github.com/golang-china/golangdoc.translations@v0.0.0-20180720044904-fe925a2c9524 **/

{{Types "CC-BY-3.0"}}

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graph{{ND{ND}}{ND}ND}{ND}}
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package cephes

import "math"

/*
Additional copyright information:

Code in this package is adapted from the Cephes library (http://www.netlib.org/cephes/).
There is no explicit licence on Netlib, but the author has agreed to a BSD release.
See https://github.com/deepmind/torch-cephes/blob/master/LICENSE.txt and
https://lists.debian.org/debian-legal/2004/12/msg00295.html
*/

var (

```

```

badParamOutOfBounds = "cephes: parameter out of bounds"
badParamFunctionSingularity = "cephes: function singularity"
)

const (
 machEp = 1.0 / (1 << 53)
 maxLog = 1024 * math.Ln2
 minLog = -1075 * math.Ln2
 maxIter = 2000
)
graph{{diGra}diGra}
graph{{DIGRAPO{{DIGRAPO{{DIGRAPO}DIGRAPO}{DIGRAPO}}}}DIGRAPO}}}
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package dual

import (
 "fmt"
 "math"
 "strings"
)

// Number is a float64 precision dual number.
type Number struct {
 Real, Emag float64
}

var zero = Number{}

// Format implements fmt.Formatter.
func (d Number) Format(fs fmt.State, c rune) {
 prec, pOk := fs.Precision()
 if !pOk {
 prec = -1
 }
 width, wOk := fs.Width()
 if !wOk {
 width = -1
 }
 switch c {
 case 'v':
 if fs.Flag('#') {
 fmt.Fprintf(fs, "%T{Real:%#v, Emag:%#v}", d, d.Real, d.Emag)
 return
 }
 if fs.Flag('+') {

```

```

 fmt.Fprintf(fs, "{Real:%+v, Emag:%+v}", d.Real, d.Emag)
 return
}
c = 'g'
prec = -1
fallthrough
case 'e', 'E', 'f', 'F', 'g', 'G':
 fre := fmtString(fs, c, prec, width, false)
 fim := fmtString(fs, c, prec, width, true)
 fmt.Fprintf(fs, fmt.Sprintf("(%s%[2]s)", fre, fim), d.Real, d.Emag)
default:
 fmt.Fprintf(fs, "%%!%c(%T=%[2]v)",
c, d)
 return
}
}

// This is horrible, but it's what we have.
func fmtString(fs fmt.State, c rune, prec, width int, wantPlus bool) string {
 var b strings.Builder
 b.WriteByte('%')
 for _, f := range "0+- " {
 if fs.Flag(int(f)) || (f == '+' && wantPlus) {
 b.WriteByte(byte(f))
 }
 }
 if width >= 0 {
 fmt.Fprint(&b, width)
 }
 if prec >= 0 {
 b.WriteByte('.')
 if prec > 0 {
 fmt.Fprint(&b, prec)
 }
 }
 b.WriteRune(c)
 return b.String()
}

// Add returns the sum of x and y.
func Add(x, y Number) Number {
 return Number{
 Real: x.Real + y.Real,
 Emag: x.Emag + y.Emag,
 }
}

// Sub returns the difference of x and y, x-y.

```

```

func Sub(x, y Number) Number {
 return Number{
 Real: x.Real - y.Real,
 Emag: x.Emag - y.Emag,
 }
}

// Mul returns the dual product of x and y.
func Mul(x, y Number) Number {
 return Number{
 Real: x.Real * y.Real,
 Emag: x.Real*y.Emag + x.Emag*y.Real,
 }
}

// Inv returns the dual inverse of d.
//
// Special cases are:
// Inv(Inf) = 0-0
// Inv(0)
// = Inf-Inf
func Inv(d Number) Number {
 d2 := d.Real * d.Real
 return Number{
 Real: 1 / d.Real,
 Emag: -d.Emag / d2,
 }
}

// Scale returns d scaled by f.
func Scale(f float64, d Number) Number {
 return Number{Real: f * d.Real, Emag: f * d.Emag}
}

// Abs returns the absolute value of d.
func Abs(d Number) Number {
 if !math.Signbit(d.Real) {
 return d
 }
 return Scale(-1, d)
}
graph{{G7{G7}G9}G7{G7}G9}
/** github.com/ovirt/terraform-provider-ovirt **/
/** modified BSD-3 **/

{{Types "BSD-3-Clause"}}

```

Forked from <https://github.com/EMSL-MSC/terraform-provider-ovirt>

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```
graph{"ZZ"}
graph{STs{STs{STe}{STs{STe}STe}STe}STe}
graph{{diGrap}}
graph{{diGrS}}
graph{subd{suba}}
graph{{sub_}{sub_}}
graph{{EDG4{{{{{{{{{{EDG9}}}EDG4}}}}}EDG4}}}
graph{SU{SU}}
graph{{DiGrap}}
/** github.com/tendermint/dex-demo@v0.0.2 **/
```

```
{{Types "Apache-2.0"}}
```

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```

"testing"
)

var xSquared = func(x float64) float64 { return x * x }

type testPoint struct {
 f func(float64) float64
 loc float64
 fofx float64
 ans float64
}

var testsFirst = []testPoint{
 {
 f: xSquared,
 loc: 0,
 fofx: 0,
 ans: 0,
 },
 {
 f: xSquared,
 loc: 5,
 fofx: 25,
 ans: 10,
 },
 {
 f: xSquared,
 loc: 2,
 fofx: 4,
 ans: 4,
 },
 {
 f: xSquared,
 loc: -5,
 fofx: 25,
 ans: -10,
 },
}

var testsSecond = []testPoint{
 {
 f: xSquared,
 loc: 0,
 fofx: 0,
 ans: 2,
 },
 {
 f: xSquared,

```



```

loc: 5,
fofx: 25,
ans: 2,
},
{
f: xSquared,
loc: 2,
fofx: 4,
ans: 2,
},
{
f: xSquared,
loc: -5,
fofx: 25,
ans: 2,
},
}

```

```

func testDerivative(t *testing.T, formula Formula, tol float64, tests []testPoint) {
 for i, test :=
 range tests {

 ans := Derivative(test.f, test.loc, &Settings{
 Formula: formula,
 })
 if math.Abs(test.ans-ans) > tol {
 t.Errorf("Case %v: ans mismatch serial: expected %v, found %v", i, test.ans, ans)
 }

 ans = Derivative(test.f, test.loc, &Settings{
 Formula: formula,
 OriginKnown: true,
 OriginValue: test.fofx,
 })
 if math.Abs(test.ans-ans) > tol {
 t.Errorf("Case %v: ans mismatch serial origin known: expected %v, found %v", i, test.ans, ans)
 }

 ans = Derivative(test.f, test.loc, &Settings{
 Formula: formula,
 Concurrent: true,
 })
 if math.Abs(test.ans-ans) > tol {
 t.Errorf("Case %v: ans mismatch concurrent: expected %v, found %v", i, test.ans, ans)
 }

 ans = Derivative(test.f, test.loc, &Settings{
 Formula: formula,

```

```

OriginKnown: true,
OriginValue: test.fofx,
Concurrent: true,
})
if math.Abs(test.ans-ans) > tol {
 t.Errorf("Case %v: ans mismatch concurrent: expected %v, found %v", i, test.ans, ans)
}
}
}

func TestForward(t
 *testing.T) {
 testDerivative(t, Forward, 2e-4, testsFirst)
}

func TestBackward(t *testing.T) {
 testDerivative(t, Backward, 2e-4, testsFirst)
}

func TestCentral(t *testing.T) {
 testDerivative(t, Central, 1e-6, testsFirst)
}

func TestCentralSecond(t *testing.T) {
 testDerivative(t, Central2nd, 1e-3, testsSecond)
}

// TestDerivativeDefault checks that the derivative works when settings is nil
// or zero value.
func TestDerivativeDefault(t *testing.T) {
 tol := 1e-6
 for i, test := range testsFirst {
 ans := Derivative(test.f, test.loc, nil)
 if math.Abs(test.ans-ans) > tol {
 t.Errorf("Case %v: ans mismatch default: expected %v, found %v", i, test.ans, ans)
 }

 ans = Derivative(test.f, test.loc, &Settings{})
 if math.Abs(test.ans-ans) > tol {
 t.Errorf("Case %v: ans mismatch zero value: expected %v, found %v", i, test.ans, ans)
 }
 }
}

Graph{DIGRl{DIGRp{}DIGRl{DIGRp{}DIGRi}}{DIGRp}}
graph{Edge[]{{{Edge[]Edge[]Edge[]}}}
graph{SUB_}
graph{{{diGE}{diGE{diGE}{diGE}{diGE}}diGE}

```

```

Graph{DIGRa{DIGRp}}
digraph {
 A -> B
}
graph{grapha{{{}}graphe}graphe}}{{grapha{{}graphe}graphe}}{{grapha{{graphe}graphe}graphe}graphe}}
// Copyright 2014 The Gonum Authors. All rights reserved.
// Use of this source code is governed by a BSD-style
// license that can be found in the LICENSE file.

package distuv

import (
 "math"
 "sort"
 "testing"

 "golang.org/x/exp/rand"
 "gonum.org/v1/gonum/floats"
)

func TestLaplaceProb(t *testing.T) {
 pts := []univariateProbPoint{
 {
 loc: 0,
 prob: 0.5,
 cumProb: 0.5,
 logProb: math.Log(0.5),
 },
 {
 loc: -1,
 prob: 1 / (2 * math.E),
 cumProb:
0.18393972058572116079776188508073043372290556551588391725391840084873074787244990167857363717
29598219,
 logProb: math.Log(1 / (2 * math.E)),
 },
 {
 loc: 1,
 prob: 1 / (2 * math.E),
 cumProb:
0.81606027941427883920223811491926956627709443448411608274608159915126925212755009832142636282
70401781,
 logProb: math.Log(1 / (2 * math.E)),
 },
 {
 loc: -7,
 prob: 1 / (2 * math.Pow(math.E, 7)),
 cumProb:

```

```

0.00045594098277725810400156804220464131323686226371802692040806671094473994465515326466313950
32324502210,
 logProb:
math.Log(1 / (2 * math.Pow(math.E, 7))),
},
{
 loc: 7,
 prob: 1 / (2 * math.Pow(math.E, 7)),
 cumProb:
0.99954405901722274189599843195779535868676313773628197307959193328905526005534484673533686049
67675498,
 logProb: math.Log(1 / (2 * math.Pow(math.E, 7))),
},
{
 loc: -20,
 prob: math.Exp(-
20.6931471805599453094172321214581765680755001343602552541206800094933936219696947156058633269
9641869),
 cumProb:
1.03057681121927891398297019007791048818790363779955184648612233081458201189227967663995546395
2790684 * 1e-9,
 logProb: -
20.6931471805599453094172321214581765680755001343602552541206800094933936219696947156058633269
9641869,
},
{
 loc: 20,
 prob: math.Exp(-
20.6931471805599453094172321214581765680755001343602552541206800094933936219696947156058633269
9641869),
 cumProb:
0.99999999896942318878072108601702980992208951181209636220044815351387766918541798810772032336
0044536,
 logProb: -
20.6931471805599453094172321214581765680755001343602552541206800094933936219696947156058633269
9641869,
},
}
testDistributionProbs(t,
Laplace{Mu: 0, Scale: 1}, "Laplace", pts)
}

func TestLaplace(t *testing.T) {
src := rand.New(rand.NewSource(1))
for i, dist := range []Laplace{
{Mu: 0, Scale: 3, Src: src},
{Mu: 1, Scale: 1.5, Src: src},
{Mu: -1, Scale: 0.9, Src: src},

```

```

} {
 testLaplace(t, dist, i)
}
}

func testLaplace(t *testing.T, dist Laplace, i int) {
 const (
 tol = 1e-2
 n = 3e6
 bins = 50
)
 x := make([]float64, n)
 generateSamples(x, dist)
 sort.Float64s(x)

 checkMean(t, i, x, dist, tol)
 checkVarAndStd(t, i, x, dist, tol)
 checkEntropy(t, i, x, dist, tol)
 checkExKurtosis(t, i, x, dist, tol)
 checkSkewness(t, i, x, dist, tol)
 checkMedian(t, i, x, dist, tol)
 checkQuantileCDFSurvival(t, i, x, dist, tol)
 checkProbContinuous(t, i, x, dist, 1e-10)
 checkProbQuantContinuous(t, i, x, dist, tol)
}

func TestLaplaceFit(t *testing.T) {
 cases := []struct {
 samples []float64
 weights []float64
 wantMu float64
 wantScale float64
 }{
 {
 samples: []float64{10, 1, 1},
 weights: nil,
 wantMu: 1,
 wantScale: 3,
 },
 {
 samples: []float64{10, 1, 1},
 weights: []float64{10, 10, 10},
 wantMu: 1,
 wantScale: 3,
 },
 {
 samples: []float64{10, 1, 1},

```

```

 weights: []float64{0, 1, 1},
 wantMu: 1,
 wantScale: 0,
},
}
for i, test := range cases {
 d := Laplace{}
 d.Fit(test.samples, test.weights)
 if !floats.EqualWithinAbsOrRel(d.Mu, test.wantMu, 1e-10, 1e-10) {
 t.Errorf("unexpected location result for test %d: got:%f, want:%f", i, d.Mu, test.wantMu)
 }
 if !floats.EqualWithinAbsOrRel(d.Scale, test.wantScale, 1e-10, 1e-10) {
 t.Errorf("unexpected scale result for test %d: got:%f, want:%f", i, d.Scale, test.wantScale)
 }
}
}

func TestLaplaceFitRandomSamples(t *testing.T) {

 nSamples := 100000
 src := rand.New(rand.NewSource(1))
 l := Laplace{
 Mu: 3,
 Scale: 5,
 Src: src,
 }
 samples := make([]float64,
 nSamples)
 for i := range samples {
 samples[i] = l.Rand()
 }
 le := Laplace{}
 le.Fit(samples, nil)
 if !floats.EqualWithinAbsOrRel(le.Mu, l.Mu, 1e-2, 1e-2) {
 t.Errorf("unexpected location result for random test got:%f, want:%f", le.Mu, l.Mu)
 }
 if !floats.EqualWithinAbsOrRel(le.Scale, l.Scale, 1e-2, 1e-2) {
 t.Errorf("unexpected scale result for random test got:%f, want:%f", le.Scale, l.Scale)
 }
}

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// license that can be found in the LICENSE file.

// +build !amd64 noasm appengine safe

package math32

```

```

import (
 "math"
)

// Sqrt returns the square root of x.
//
// Special cases are:
// Sqrt(+Inf) = +Inf
// Sqrt(0) = 0
// Sqrt(x < 0) = NaN
// Sqrt(NaN) = NaN
func Sqrt(x float32) float32 {
 // FIXME(kortschak): Direct translation of the math package
 // asm code for 386 fails to build. No test hardware is available
 // for arm, so using conversion instead.
 return float32(math.Sqrt(float64(x)))
}
graph{ST}
// SPDX-License-Identifier: Unlicense OR MIT

```

```

package gl

```

```

import (
 "errors"
 "fmt"
 "reflect"
 "strings"
 "unsafe"
)

```

```

func CreateProgram(ctx *Functions, vsSrc, fsSrc string, attribs []string) (Program, error) {
 vs, err := createShader(ctx, VERTEX_SHADER, vsSrc)
 if err != nil {
 return Program{}, err
 }
 defer ctx.DeleteShader(vs)
 fs, err := createShader(ctx, FRAGMENT_SHADER, fsSrc)
 if err != nil {
 return Program{}, err
 }
 defer ctx.DeleteShader(fs)
 prog := ctx.CreateProgram()
 if !prog.Valid() {
 return Program{}, errors.New("glCreateProgram failed")
 }
 ctx.AttachShader(prog, vs)
 ctx.AttachShader(prog, fs)
 for i, a := range attribs {

```

```

 ctx.BindAttribLocation(prog, Attrib(i), a)
}
ctx.LinkProgram(prog)
if ctx.GetProgrami(prog, LINK_STATUS) == 0 {
 log := ctx.GetProgramInfoLog(prog)
 ctx.DeleteProgram(prog)
 return Program{}, fmt.Errorf("program link failed: %s", strings.TrimSpace(log))
}
return prog, nil
}

func GetUniformLocation(ctx *Functions, prog Program, name
string) Uniform {
 loc := ctx.GetUniformLocation(prog, name)
 if !loc.Valid() {
 panic(fmt.Errorf("uniform %s not found", name))
 }
 return loc
}

func createShader(ctx *Functions, typ Enum, src string) (Shader, error) {
 sh := ctx.CreateShader(typ)
 if !sh.Valid() {
 return Shader{}, errors.New("glCreateShader failed")
 }
 ctx.ShaderSource(sh, src)
 ctx.CompileShader(sh)
 if ctx.GetShaderi(sh, COMPILE_STATUS) == 0 {
 log := ctx.GetShaderInfoLog(sh)
 ctx.DeleteShader(sh)
 return Shader{}, fmt.Errorf("shader compilation failed: %s", strings.TrimSpace(log))
 }
 return sh, nil
}

// BytesView returns a byte slice view of a slice.
func BytesView(s interface{}) []byte {
 v := reflect.ValueOf(s)
 first := v.Index(0)
 sz := int(first.Type().Size())
 return *(*[]byte)(unsafe.Pointer(&reflect.SliceHeader{
 Data: uintptr(unsafe.Pointer((*reflect.SliceHeader)(unsafe.Pointer(first.UnsafeAddr())))),
 Len: v.Len() * sz,
 Cap: v.Cap() * sz,
 }))
}

func ParseGLVersion(glVer string) ([2]int,

```



```

error) {
var ver [2]int
if _, err := fmt.Sscanf(glVer, "OpenGL ES %d.%d", &ver[0], &ver[1]); err == nil {
 return ver, nil
} else if _, err := fmt.Sscanf(glVer, "WebGL %d.%d", &ver[0], &ver[1]); err == nil {
 // WebGL major version v corresponds to OpenGL ES version v + 1
 ver[0]++
 return ver, nil
} else if _, err := fmt.Sscanf(glVer, "%d.%d", &ver[0], &ver[1]); err == nil {
 return ver, nil
}
return ver, fmt.Errorf("failed to parse OpenGL ES version (%s)", glVer)
}

```

```

func SliceOf(s uintptr) []byte {
if s == 0 {
 return nil
}
sh := reflect.SliceHeader{
 Data: s,
 Len: 1 << 30,
 Cap: 1 << 30,
}
return *(*[]byte)(unsafe.Pointer(&sh))
}

```

```

// GoString convert a NUL-terminated C string
// to a Go string.
func GoString(s []byte) string {
i := 0
for {
 if s[i] == 0 {
 break
 }
 i++
}
return string(s[:i])
}
graph{{ {subgrapu{subgrapu}}} }
graph{{ {NO{NO}}NO{NO}} }
graph{{ {EI}EI} }
 DOUBLE PRECISION FUNCTION MYLOG(A)
 DOUBLE PRECISION A
 MYLOG = DLOG(A)
 RETURN
 END
graph{{ {Digra_{{Digra_{{Digra_{{Digra_{{Digra_}}}}}}}} }

```

Please take a look.

### Checklist:

- Please make sure your commit message summary line and pull request title match the Go convention; a one-line summary of the change, prefixed by the primary affected package that should complete the sentence, "This change modifies Gonum to \_\_\_\_."

```
graph{GRAPe}
graph{{G{G}G}G{G{G{G}G}G{G}G}G{G{G{G}G}G}G}
graph n1{{{n1}n1}{n1}n1}n1{n1}{n1}n1}
// Copyright 2016 The Gonum Authors. All rights reserved.
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// license that can be found in the LICENSE file.
```

package f64

```
// L1Norm is
// for _, v := range x {
// sum += math.Abs(v)
// }
// return sum

func L1Norm(x []float64) (sum float64) {
 for _, v := range x {
 sum += math.Abs(v)
 }
 return sum
}
```

## Open Source Used In vmoperator elpaso 1738

```

func L1NormInc(x []float64, n, incX int) (sum float64) {
 for i := 0; i < n*incX; i += incX {
 sum += math.Abs(x[i])
 }
 return sum
}

// Add is
// for i, v := range s {
// dst[i] += v
// }
func Add(dst, s []float64) {
 for i, v := range s {
 dst[i] += v
 }
}

// AddConst is
// for i := range x {
// x[i] += alpha
// }
func AddConst(alpha float64, x []float64) {
 for i := range x {
 x[i] += alpha
 }
}

// CumSum is
// if len(s) == 0 {
// return dst
// }
// dst[0]
// = s[0]
// for i, v := range s[1:] {
// dst[i+1] = dst[i] + v
// }
// return dst
func CumSum(dst, s []float64) []float64 {
 if len(s) == 0 {
 return dst
 }
 dst[0] = s[0]
 for i, v := range s[1:] {
 dst[i+1] = dst[i] + v
 }
 return dst
}

```

```

// CumProd is
// if len(s) == 0 {
// return dst
// }
// dst[0] = s[0]
// for i, v := range s[1:] {
// dst[i+1] = dst[i] * v
// }
// return dst
func CumProd(dst, s []float64) []float64 {
 if len(s) == 0 {
 return dst
 }
 dst[0] = s[0]
 for i, v := range s[1:] {
 dst[i+1] = dst[i] * v
 }
 return dst
}

```

```

// Div is
// for i, v := range s {
// dst[i] /= v
// }
func Div(dst, s []float64) {
 for i, v := range s {
 dst[i] /= v
 }
}

```

```

// DivTo is
// for i, v := range s {
// dst[i] = v / t[i]
// }
// return dst
func DivTo(dst, s, t []float64) []float64 {
 for i, v := range s {
 dst[i] = v / t[i]
 }
 return dst
}

```

```

// L1Dist is
// var norm float64
// for i, v := range s {
// norm += math.Abs(t[i] - v)
// }
// return norm

```

```

func L1Dist(s,
t []float64) float64 {
var norm float64
for i, v := range s {
norm += math.Abs(t[i] - v)
}
return norm
}

// LinfDist is
// var norm float64
// if len(s) == 0 {
// return 0
// }
// norm = math.Abs(t[0] - s[0])
// for i, v := range s[1:] {
// absDiff := math.Abs(t[i+1] - v)
// if absDiff > norm || math.IsNaN(norm) {
// norm = absDiff
// }
// }
// return norm
func LinfDist(s, t []float64) float64 {
var norm float64
if len(s) == 0 {
return 0
}
norm = math.Abs(t[0] - s[0])
for i, v := range s[1:] {
absDiff := math.Abs(t[i+1] - v)
if absDiff > norm || math.IsNaN(norm) {
norm = absDiff
}
}
return norm
}

// Sum is
// var sum float64
// for i := range x {
// sum += x[i]
// }
func Sum(x []float64) float64 {
var sum float64
for _, v := range x {
sum += v
}
return sum
}

```

```

}
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// license that can be found in the LICENSE file.

package testblas

import (
 "testing"

 "gonum.org/v1/gonum/blas"
 "gonum.org/v1/gonum/floats"
)

type Dtrmv interface {
 Dtrmv(ul blas.Uplo, tA blas.Transpose, d blas.Diag, n int, a []float64, lda int, x []float64, incX int)
}

func DtrmvTest(t *testing.T, blasser Dtrmv) {
 for i, test := range []struct {
 n int
 a []float64
 x []float64
 d blas.Diag
 ul blas.Uplo
 tA blas.Transpose
 ans []float64
 }{
 {
 n: 1,
 a: []float64{{5}},
 x: []float64{2},
 d: blas.NonUnit,
 ul: blas.Upper,
 tA: blas.NoTrans,
 ans: []float64{10},
 },
 {
 n: 1,
 a: []float64{{5}},
 x: []float64{2},
 d: blas.Unit,
 ul: blas.Upper,
 tA: blas.NoTrans,
 ans: []float64{2},
 },
 {
 n: 3,

```

```

a: [][]float64{
 {5, 6, 7},
 {0, 9, 10},
 {0, 0, 13},
},
x: []float64{3,
4, 5},
d: blas.NonUnit,
ul: blas.Upper,
tA: blas.NoTrans,
ans: []float64{74, 86, 65},
},
{
n: 3,
a: [][]float64{
 {5, 6, 7},
 {0, 9, 10},
 {0, 0, 13},
},
x: []float64{3, 4, 5},
d: blas.Unit,
ul: blas.Upper,
tA: blas.NoTrans,
ans: []float64{62, 54, 5},
},
{
n: 3,
a: [][]float64{
 {5, 0, 0},
 {6, 9, 0},
 {7, 10, 13},
},
x: []float64{3, 4, 5},
d: blas.NonUnit,
ul: blas.Lower,
tA: blas.NoTrans,
ans: []float64{15, 54, 126},
},
{
n: 3,
a: [][]float64{
 {1, 0, 0},
 {6, 1, 0},
 {7, 10, 1},
},
x: []float64{3, 4, 5},
d: blas.Unit,
ul: blas.Lower,

```

```

tA: blas.NoTrans,
ans: []float64{3, 22, 66},
},
{
n: 3,
a: [][]float64{
{5, 6, 7},
{0, 9, 10},
{0, 0, 13},
},
x: []float64{3, 4, 5},
d: blas.NonUnit,
ul: blas.Upper,
tA: blas.Trans,
ans: []float64{15, 54, 126},
},
{
n: 3,
a: [][]float64{
{1, 6, 7},
{0,
1, 10},
{0, 0, 1},
},
x: []float64{3, 4, 5},
d: blas.Unit,
ul: blas.Upper,
tA: blas.Trans,
ans: []float64{3, 22, 66},
},
{
n: 3,
a: [][]float64{
{5, 0, 0},
{6, 9, 0},
{7, 10, 13},
},
x: []float64{3, 4, 5},
d: blas.NonUnit,
ul: blas.Lower,
tA: blas.Trans,
ans: []float64{74, 86, 65},
},
} {
incTest := func(incX, extra int) {
aFlat := flatten(test.a)
x := makeIncremented(test.x, incX, extra)
blasser.Dtrmv(test.ul, test.tA, test.d, test.n, aFlat, test.n, x, incX)

```



```

 ans := makeIncremented(test.ans, incX, extra)
 if !floats.EqualApprox(x, ans, 1e-14) {
 t.Errorf("Case %v, idx %v: Want %v, got %v.", i, incX, ans, x)
 }
}
incTest(1, 3)
incTest(-3, 3)
incTest(4, 3)
}
}
package widget

```

```

import (
 "gioui.org/gesture"
 "gioui.org/layout"
)

```

```

type CheckBox struct {
 click gesture.Click
 checked bool
}

```

```

func (c *CheckBox) SetChecked(value bool) {
 c.checked = value
}

```

```

func (c *CheckBox) Checked(gtx *layout.Context) bool {
 for _, e := range c.click.Events(gtx) {
 switch e.Type {
 case gesture.TypeClick:
 c.checked = !c.checked
 }
 }
 return c.checked
}

```

```

func (c *CheckBox) Layout(gtx *layout.Context) {
 c.click.Add(gtx.Ops)
}
graph{SU}
// Copyright 2015 The Gonum Authors. All rights reserved.
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// license that can be found in the LICENSE file.

```

```

package topo

```

```

import (
 "reflect"

```

```

"sort"
"testing"

"gonum.org/v1/gonum/graph"
"gonum.org/v1/gonum/graph/internal/ordered"
"gonum.org/v1/gonum/graph/simple"
)

```

```

var undirectedCyclesInTests = []struct {
 g []intset
 want [][]int64
}{
 {
 g: []intset{
 0: linksTo(1, 2),
 1: linksTo(2, 4, 5, 9),
 2: linksTo(4, 7, 9),
 3: linksTo(5),
 4: linksTo(8),
 5: linksTo(7, 8),
 6: nil,
 7: nil,
 8: nil,
 9: nil,
 10: linksTo(11, 12),
 11: linksTo(12),
 12: nil,
 },
 want: [][]int64{
 {
 {0, 1, 2, 0},
 {1, 2, 7, 5, 1},
 {1, 2, 9, 1},
 {1, 4, 8, 5, 1},
 {2, 4, 8, 5, 7, 2},
 {10, 11, 12, 10},
 },
 {
 {0, 1, 2, 0},
 {1, 2, 4, 1},
 {1, 2, 7, 5, 1},
 {1, 2, 9, 1},
 {1, 4, 8, 5, 1},
 {10, 11, 12, 10},
 },
 {
 {0, 1, 2, 0},
 {1, 2, 4, 1},
 },
 },
 },
}

```

```

 {1,
2, 9, 1},
 {1, 4, 8, 5, 1},
 {2, 4, 8, 5, 7, 2},
 {10, 11, 12, 10},
},
{
 {0, 1, 2, 0},
 {1, 2, 4, 1},
 {1, 2, 7, 5, 1},
 {1, 2, 9, 1},
 {2, 4, 8, 5, 7, 2},
 {10, 11, 12, 10},
},
},
},
}

```

```

func TestUndirectedCyclesIn(t *testing.T) {
 for i, test := range undirectedCyclesInTests {
 g := simple.NewUndirectedGraph()
 g.AddNode(simple.Node(-10)) // Make sure we test graphs with sparse IDs.
 for u, e := range test.g {
 // Add nodes that are not defined by an edge.
 if g.Node(int64(u)) == nil {
 g.AddNode(simple.Node(u))
 }
 for v := range e {
 g.SetEdge(simple.Edge{F: simple.Node(u), T: simple.Node(v)})
 }
 }
 cycles := UndirectedCyclesIn(g)
 var got [][]int64
 if cycles != nil {
 got = make([][]int64, len(cycles))
 }
 // Canonicalise the cycles.
 for j, c := range cycles {
 ids := make([]int64, len(c))
 for k, n := range canonicalise(c[:len(c)-1]) {
 ids[k] = n.ID()
 }
 ids[len(ids)-1] = ids[0]
 got[j] = ids
 }
 sort.Sort(ordered.BySliceValues(got))
 var

```

```
matched bool
for _, want := range test.want {
 if reflect.DeepEqual(got, want) {
 matched = true
 break
 }
}
if !matched {
 t.Errorf("unexpected paton result for %d:\n\tgot:%#v\n\twant from:%#v", i, got, test.want)
}
}
}
```

```
package gl

type (
 Buffer struct{ V uint }
```

```

Framebuffer struct{ V uint }
Program struct{ V uint }
Renderbuffer struct{ V uint }
Shader struct{ V uint }
Texture struct{ V uint }
Query struct{ V uint }
Uniform struct{ V int }
Object struct{ V uint }
)

```

```

func (u Uniform) Valid() bool {
 return u.V != -1
}

```

```

func (p Program) Valid() bool {
 return p.V != 0
}

```

```

func (s Shader) Valid() bool {
 return s.V != 0
}

```

```

func (t Texture) Valid() bool {
 return t.V != 0
}

```

```

func (t Texture) Equal(t2 Texture) bool {
 return t == t2
}

```

```

graph{{St_}St_}{St_}St_}{St_}St_}
graph{"\////////////////////////////////"}
graph{{SubGrat}SubGrat}
graph{D}
graph{{DIGRAPO}{DIGRAPO}}
graph{<"\">>}
graph{"\#I3"}
graph{{SubgraN}{SubgraN}{{SubgraP}SubgraP}}{{SubgraP}SubgraP}}
graph{Nodd{Nodd{Nodd{Nodd{Nodd}}}}}
graph{{{ {_____}{_____} }_ {_____}{_____} }_ {_____} }_ {_____} }
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graph{DiGraphd{{DiGraphg}{DiGraphg}{DiGraphg}DiGraphg}}
graph{{{{G}G}G}G}}
graph{{{{DI}{DI}DI}{{DI}DI}}DI}}
mem

```

[[GoDoc](https://godoc.org/github.com/smasher164/mem?status.svg)](https://godoc.org/github.com/smasher164/mem)

Package mem implements a memory allocator and deallocator. It currently uses mmap on unix and VirtualAlloc on windows to request pages of memory from the operating system, and munmap and VirtualFree to release pages of memory to the operating system. The allocator uses a first-fit algorithm on a singly-linked free list of blocks. Blocks are divided into sets called arenas, which correspond to the chunk of memory mapped from the operating system. When all of the blocks in a set are freed, the arena is unmapped.

```
...
// Alloc allocates size bytes of memory, and returns a pointer to it.
// It is goroutine-safe and attempts to preserve the semantics of
// POSIX libc's malloc. However, Alloc panics if an error occurs when
// requesting more memory from the operating
// system.
func Alloc(size uint) unsafe.Pointer

// Free deallocates the memory pointed to by p. It is goroutine-safe
// and attempts to preserve the semantics of POSIX libc's free.
// However, Free panics if an error occurs when releasing memory to
// the operating system.
func Free(p unsafe.Pointer)
...
Why?
```

I am working on a rudimentary language interpreter for which I want to implement my own garbage collection algorithm in Go. Also, this is a good opportunity for me to brush up on memory allocation techniques.

### Should I use this?

If you want to? \\_\()\\_/\_ It's passed all the tests I've run so far. But don't hold me liable if your multi-million dollar production workload comes crashing down! Instead, file an issue. :)

### What can I do to help?

Why thank you for offering! I am really interested in exploring more efficient memory allocation techniques, like using a best-fit algorithm, using a doubly-linked list for constant-time cleanup, segregated lists to divide allocations of different size classes, and buddy allocation. I would also like to improve test quality by testing edge cases and platform-specific eccentricities.

```

graph{{{SubGr}{SubGr}}SubGr}
graph{Nodeh}
graph{dir{dir{dir}{dir{dih{di}}dir}}}}
graph{{Dib}Dia}
graph{{edg3{{{edg3}{edg3}{edg3}}}edg5}}}}
graph{{EdO""EdP}EdP{EdO""EdP{EdO""EdP}EdP{EdO""EdP}}}}
graph{""[Grap8=""]}
graph{{Dr{{D{D{D{D}D}}D{D{D}D}}}}
graph{{STRI_}}
graph{E}
digraph{h[r=ed]}
// Copyright 2015 The Gonum Authors. All rights reserved.
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// license that can be found in the LICENSE file.

package gonum

import (
 "gonum.org/v1/gonum/blas"
 "gonum.org/v1/gonum/lapack"
)

// Dorgqr generates an mn matrix Q with orthonormal columns defined by the
// product of elementary reflectors
// $Q = H_0 * H_1 * \dots * H_{k-1}$
// as computed by Dgeqrf.
// Dorgqr is the blocked version of Dorg2r that makes greater use of level-3 BLAS
// routines.
//
// The length of tau must be at least k, and the length of work must be at least n.
// It also must be that $0 \leq k \leq n$ and $0 \leq n \leq m$.
//
// work is temporary storage, and lwork specifies the usable memory length. At
// minimum, lwork $\geq n$, and the amount of blocking is limited by the usable
// length. If lwork == -1, instead of computing Dorgqr the optimal work length
// is stored into work[0].
//
// Dorgqr will panic if the conditions on input values are not met.
//
// Dorgqr is
// an internal routine. It is exported for testing purposes.
func (impl Implementation) Dorgqr(m, n, k int, a []float64, lda int, tau, work []float64, lwork int) {
 switch {
 case m < 0:
 panic(mLT0)
 case n < 0:
 panic(nLT0)
 case n > m:

```

```

panic(nGTM)
case k < 0:
 panic(kLT0)
case k > n:
 panic(kGTN)
case lda < max(1, n) && lwork != -1:
 // Normally, we follow the reference and require the leading
 // dimension to be always valid, even in case of workspace
 // queries. However, if a caller provided a placeholder value
 // for lda (and a) when doing a workspace query that didn't
 // fulfill the condition here, it would cause a panic. This is
 // exactly what Dgesvd does.
 panic(badLdA)
case lwork < max(1, n) && lwork != -1:
 panic(badLWork)
case len(work) < max(1, lwork):
 panic(shortWork)
}

if n == 0 {
 work[0] = 1
 return
}

nb := impl.Ilaenv(1, "DORGQR", " ", m, n, k, -1)
// work is treated as an nnb matrix
if lwork == -1 {
 work[0] = float64(n * nb)
 return
}

switch
{
case len(a) < (m-1)*lda+n:
 panic(shortA)
case len(tau) < k:
 panic(shortTau)
}

nbmin := 2 // Minimum block size
var nx int // Crossover size from blocked to unblocked code
iws := n // Length of work needed
var ldwork int
if 1 < nb && nb < k {
 nx = max(0, impl.Ilaenv(3, "DORGQR", " ", m, n, k, -1))
 if nx < k {
 ldwork = nb
 iws = n * ldwork
 }
}

```



```

if lwork < iws {
 nb = lwork / n
 ldwork = nb
 nbmin = max(2, impl.Llaenv(2, "DORGQR", " ", m, n, k, -1))
}
}
}
var ki, kk int
if nbmin <= nb && nb < k && nx < k {
 // The first kk columns are handled by the blocked method.
 ki = ((k - nx - 1) / nb) * nb
 kk = min(k, ki+nb)
 for i := 0; i < kk; i++ {
 for j := kk; j < n; j++ {
 a[i*lda+j] = 0
 }
 }
}
if kk < n {
 // Perform the operation on columns kk to the end.
 impl.Dorg2r(m-kk, n-kk, k-kk, a[kk*lda+kk:], lda, tau[kk:], work)
}
if kk > 0 {
 // Perform the operation on column-blocks.
 for i := ki; i >= 0; i -= nb {
 ib
 := min(nb, k-i)
 if i+ib < n {
 impl.Dlarft(lapack.Forward, lapack.ColumnWise,
 m-i, ib,
 a[i*lda+i:], lda,
 tau[i:],
 work, ldwork)

 impl.Dlarfb(blas.Left, blas.NoTrans, lapack.Forward, lapack.ColumnWise,
 m-i, n-i-ib, ib,
 a[i*lda+i:], lda,
 work, ldwork,
 a[i*lda+i+ib:], lda,
 work[ib*ldwork:], ldwork)
 }
 impl.Dorg2r(m-i, ib, ib, a[i*lda+i:], lda, tau[i:], work)
 // Set rows 0:i-1 of current block to zero.
 for j := i; j < i+ib; j++ {
 for l := 0; l < i; l++ {
 a[l*lda+j] = 0
 }
 }
 }
}

```

```

 }
 }
 work[0] = float64(iws)
}
graph{{SubGra_}}
// Code generated by "go generate gonum.org/v1/gonum/blas/gonum; DO NOT EDIT.

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// license that can be found in the LICENSE file.

package gonum

import (
 "gonum.org/v1/gonum/internal/asm/f32"
)

// Dsdot computes the dot product of the two vectors
// \sum_i x[i]*y[i]
//
// Float32 implementations are autogenerated and not directly tested.
func (Implementation) Dsdot(n int, x []float32, incX int, y []float32, incY int) float64 {
 if incX == 0 {
 panic(zeroIncX)
 }
 if incY == 0 {
 panic(zeroIncY)
 }
 if n <= 0 {
 if n == 0 {
 return 0
 }
 panic(nLT0)
 }
 if incX == 1 && incY == 1 {
 if len(x) < n {
 panic(shortX)
 }
 if len(y) < n {
 panic(shortY)
 }
 return f32.DdotUnitary(x[:n], y[:n])
 }
 var ix, iy int
 if incX < 0 {
 ix = (-n + 1) * incX
 }
 if incY < 0 {

```

```

 iy = (-n + 1) * incY
}
if ix >= len(x) || ix+(n-1)*incX >= len(x) {
 panic(shortX)
}
if iy >=
len(y) || iy+(n-1)*incY >= len(y) {
 panic(shortY)
}
return f32.DdotInc(x, y, uintptr(n), uintptr(incX), uintptr(incY), uintptr(ix), uintptr(iy))
}
graph{{subGG{{subGG}subGT}subGG}}subGG}
graph{{Gr}Gr}
graph{GRAPp{GRAPp{GRAPe}}}
graph{edg_{edg_}}
graph{DigraG}
Graph{{subr}{subu}}
// Copyright 2019 The Gonum Authors. All rights reserved.
// Use of this source code is governed by a BSD-style
// license that can be found in the LICENSE file.

// +build go1.12

package gonum

import (
 "fmt"
 "runtime/debug"
)

const root = "gonum.org/v1/gonum"

// Version returns the version of Gonum and its checksum. The returned
// values are only valid in binaries built with module support.
//
// If a replace directive exists in the Gonum go.mod, the replace will
// be reported in the version in the following format:
// "version=>[replace-path] [replace-version]"
// and the replace sum will be returned in place of the original sum.
//
// The exact version format returned by Version may change in future.
func Version() (version, sum string) {
 b, ok := debug.ReadBuildInfo()
 if !ok {
 return "", ""
 }
 for _, m := range b.Deps {
 if m.Path == root {

```

```

if m.Replace != nil {
 switch {
 case m.Replace.Version != "" && m.Replace.Path != "":
 return fmt.Sprintf("%s=>%s %s",
m.Version, m.Replace.Path, m.Replace.Version), m.Replace.Sum
 case m.Replace.Version != "":
 return fmt.Sprintf("%s=>%s", m.Version, m.Replace.Version), m.Replace.Sum
 case m.Replace.Path != "":
 return fmt.Sprintf("%s=>%s", m.Version, m.Replace.Path), m.Replace.Sum
 default:
 return m.Version + "*", m.Sum + "*"
 }
}
return m.Version, m.Sum
}
}
return "", ""
}
graph{eD""eD}
graph{SUBGRA0{{{SUBGRA5{SUBGRA0}}{SUBGRA0{{SUBGRA5{SUBGRA0}}}}}}}
graph{NO{{NO}NO}}
graph{{subgrap_}{subgrap_}}
graph {e[e=x]stu[e=e]{e[l=""]ne ne ne}grae nu[e=d,sty=d,r=y]""""""ne--e--e--""[l=""n=1.00]""--e[l=""n=1.00]e--
ne--""[l=""n=1.00]""--stu[l=""n=1.00]stu--grae stu--ne stu--nu stu--""[l=""n=1.00]""--e[l=""n=1.00]l\nO"}
graph{SUBG_{SUBG_}{SUBG_}{SUBG_}}
// SPDX-License-Identifier: Unlicense OR MIT

package fling

import "testing"

func TestDecomposeQR(t *testing.T) {
 A := &matrix{
 rows: 3, cols: 3,
 data: []float32{
 12, 6, -4,
 -51, 167, 24,
 4, -68, -41,
 },
 }
 Q, Rt, ok := decomposeQR(A)
 if !ok {
 t.Fatal("decomposeQR failed")
 }
 R := Rt.transpose()
 QR := Q.mul(R)
 if !A.approxEqual(QR) {
 t.Log("A\n", A)
 }
}

```

```

t.Log("Q\n", Q)
t.Log("R\n", R)
t.Log("QR\n", QR)
t.Fatal("Q*R not approximately equal to A")
}
}

func TestFit(t *testing.T) {
X := []float32{-1, 0, 1}
Y := []float32{2, 0, 2}

got, ok := polyFit(X, Y)
if !ok {
t.Fatal("polyFit failed")
}
want := coefficients{0, 0, 2}
if !got.approxEqual(want) {
t.Fatalf("polyFit: got %v want %v", got, want)
}
}
graph{"\I\0\I#\3\I\3\I#\3\I\3\I#\I\#"}
graph{{{edgg}{edgg}edgg}edgg}edgh{{{edgg}edgg}edgg}edgw}}
// Code generated by "go generate gonum.org/v1/gonum/unit; DO NOT EDIT.

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// license that can be found in the LICENSE file.

package unit

import (
 "fmt"
 "testing"
)

func TestMagneticFluxFormat(t *testing.T) {
for _, test := range []struct {
 value MagneticFlux
 format string
 want string
}{
{1.23456789, "%v", "1.23456789 Wb"},
{1.23456789, "%.1v", "1 Wb"},
{1.23456789, "%20.1v", "1 Wb"},
{1.23456789, "%20v", "1.23456789 Wb"},
{1.23456789, "%1v", "1.23456789 Wb"},
{1.23456789, "%#v", "unit.MagneticFlux(1.23456789)"},
{1.23456789, "%s", "%!s(unit.MagneticFlux=1.23456789 Wb)"},

```

```

} {
 got := fmt.Sprintf(test.format, test.value)
 if got != test.want {
 t.Errorf("Format %q %v: got: %q want: %q", test.format, float64(test.value), got, test.want)
 }
}
}

graph{{{digrr{{digrr}digrr}{digrr}}}{digrr}{digrr{{digrr}{digrr}{digrr}}{}}}{digrr}}{digrr}{digrr{{{}}}
}{digrr}}{digrr}{digrr}}
graph{{{Digw{Digz{{{}}}{Digz}}}{Digz{{{<>}}Digw{Digz}}}{}}}{Digw{Digz}}}{Digz{{{<>}}}Di
gw}}}{}}
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graph s{}
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graph{Digrap_}
graph{{{Stri}}}Stri
// Copyright 2015 The Gonum Authors. All rights reserved.
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// license that can be found in the LICENSE file.

package path

import (
 "math"
 "reflect"
 "sort"
 "testing"

 "gonum.org/v1/gonum/graph"
 "gonum.org/v1/gonum/graph/internal/ordered"
 "gonum.org/v1/gonum/graph/path/internal/testgraphs"
)

func TestJohnsonAllPaths(t *testing.T) {
 for _, test := range testgraphs.ShortestPathTests {
 g := test.Graph()
 for _, e := range test.Edges {
 g.SetWeightedEdge(e)
 }

 pt, ok := JohnsonAllPaths(g.(graph.Graph))
 if test.HasNegativeCycle {
 if ok {
 t.Errorf("%q: expected negative cycle", test.Name)
 }
 continue
 }
 if !ok {

```

```

t.Fatalf("%q: unexpected negative cycle", test.Name)
}

// Check all random paths returned are OK.
for i := 0; i < 10; i++ {
 p, weight, unique := pt.Between(test.Query.From().ID(), test.Query.To().ID())
 if weight != test.Weight {
 t.Errorf("%q: unexpected weight from Between: got:%f want:%f",
 test.Name, weight, test.Weight)
 }
 if weight := pt.Weight(test.Query.From().ID(), test.Query.To().ID()); weight != test.Weight {
 t.Errorf("%q: unexpected weight from Weight: got:%f want:%f",
 test.Name, weight, test.Weight)
 }
 if unique != test.HasUniquePath {
 t.Errorf("%q: unexpected number of paths: got: unique=%t want: unique=%t",
 test.Name, unique, test.HasUniquePath)
 }
}

var got []int64
for _, n := range p {
 got = append(got, n.ID())
}
ok := len(got) == 0 && len(test.WantPaths) == 0
for _, sp := range test.WantPaths {
 if reflect.DeepEqual(got, sp) {
 ok = true
 break
 }
}
if !ok {
 t.Errorf("%q: unexpected shortest path:\ngot: %v\nwant from:%v",
 test.Name, p, test.WantPaths)
}
}

np, weight, unique := pt.Between(test.NoPathFor.From().ID(), test.NoPathFor.To().ID())
if np != nil || !math.IsInf(weight, 1) || unique {
 t.Errorf("%q: unexpected path:\ngot: path=%v weight=%f unique=%t\nwant:path=<nil> weight=+Inf unique=false",
 test.Name, np, weight, unique)
}

paths, weight := pt.AllBetween(test.Query.From().ID(), test.Query.To().ID())
if weight != test.Weight {
 t.Errorf("%q: unexpected weight from Between: got:%f want:%f",
 test.Name, weight, test.Weight)
}

```

```

}

var got [][]int64
if len(paths) != 0 {
 got = make([][]int64, len(paths))
}
for i, p := range paths {
 for _, v := range p {
 got[i] = append(got[i], v.ID())
 }
}
sort.Sort(ordered.BySliceValues(got))
if !reflect.DeepEqual(got, test.WantPaths) {
 t.Errorf("testing %q: unexpected shortest paths:\ngot: %v\nwant: %v",
 test.Name, got, test.WantPaths)
}

nps, weight := pt.AllBetween(test.NoPathFor.From().ID(), test.NoPathFor.To().ID())
if nps != nil || !math.IsInf(weight, 1) {
 t.Errorf("%q: unexpected path:\ngot: paths=%v weight=%f\nwant: path=<nil> weight=+Inf",
 test.Name, nps, weight)
}
}
}

graph{{{GrI}}GrH{GrI}}GrH}}
graph{{STR}STR}
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// Package ordered provides common sort ordering types.
package ordered // import "gonum.org/v1/gonum/graph/internal/ordered"
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// license that can be found in the LICENSE file.

package gonum

import "gonum.org/v1/gonum/blas"

// Dormr2 multiplies a general matrix C by an orthogonal matrix from a RQ factorization
// determined by Dgerqf.
// C = Q * C if side == blas.Left and trans == blas.NoTrans
// C = Q * C if side == blas.Left and trans == blas.Trans
// C = C * Q if side == blas.Right and trans == blas.NoTrans
// C = C * Q if side == blas.Right and trans == blas.Trans
// If side == blas.Left, a is a matrix of size km, and if side == blas.Right
// a is of size kn.

```



```

//
// tau contains the Householder factors and is of length at least k and this function
// will panic otherwise.
//
// work is temporary storage of length at least n if side == blas.Left
// and at least m if side == blas.Right and this function will panic otherwise.
//
// Dormr2 is an internal routine. It is exported for testing
purposes.
func (impl Implementation) Dormr2(side blas.Side, trans blas.Transpose, m, n, k int, a []float64, lda int, tau, c
[]float64, ldc int, work []float64) {
 left := side == blas.Left
 nq := n
 nw := m
 if left {
 nq = m
 nw = n
 }
 switch {
 case !left && side != blas.Right:
 panic(badSide)
 case trans != blas.NoTrans && trans != blas.Trans:
 panic(badTrans)
 case m < 0:
 panic(mLT0)
 case n < 0:
 panic(nLT0)
 case k < 0:
 panic(kLT0)
 case left && k > m:
 panic(kGTM)
 case !left && k > n:
 panic(kGTN)
 case lda < max(1, nq):
 panic(badLdA)
 case ldc < max(1, n):
 panic(badLdC)
 }

 // Quick return if possible.
 if m == 0 || n == 0 || k == 0 {
 return
 }

 switch {
 case len(a) < (k-1)*lda+nq:
 panic(shortA)
 case len(tau) < k:

```

```

panic(shortTau)
case len(c) < (m-1)*ldc+n:
panic(shortC)
case len(work) < nw:
panic(shortWork)
}

if left {
if trans == blas.NoTrans {
for i := k - 1; i >= 0; i-- {
a[i*lda+(m-k+i)]
a[i*lda+(m-k+i)] = 1
impl.Dlarf(side,
m-k+i+1, n, a[i*lda:], 1, tau[i], c, ldc, work)
a[i*lda+(m-k+i)] = aii
}
return
}
for i := 0; i < k; i++ {
a[i*lda+(m-k+i)]
a[i*lda+(m-k+i)] = 1
impl.Dlarf(side, m-k+i+1, n, a[i*lda:], 1, tau[i], c, ldc, work)
a[i*lda+(m-k+i)] = aii
}
return
}
if trans == blas.NoTrans {
for i := 0; i < k; i++ {
a[i*lda+(n-k+i)]
a[i*lda+(n-k+i)] = 1
impl.Dlarf(side, m, n-k+i+1, a[i*lda:], 1, tau[i], c, ldc, work)
a[i*lda+(n-k+i)] = aii
}
return
}
for i := k - 1; i >= 0; i-- {
a[i*lda+(n-k+i)]
a[i*lda+(n-k+i)] = 1
impl.Dlarf(side, m, n-k+i+1, a[i*lda:], 1, tau[i], c, ldc, work)
a[i*lda+(n-k+i)] = aii
}
}
graph{{subGrapc{ }subGrapc{ }}
graph{{ {DiGrapg}DiGrapg}DiGrapb}
graph{DiGraQ{DiGraU} {DiGraU}DiGraD}
// Code generated by "go generate gonum.org/v1/gonum/unit; DO NOT EDIT.

```

```

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```

```
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// license that can be found in the LICENSE file.
```

```
package unit
```

```
import (
 "fmt"
 "testing"
)
```

```
func TestChargeFormat(t *testing.T) {
 for _, test := range []struct {
 value Charge
 format string
 want string
 }{
 {1.23456789, "%v", "1.23456789 C"},
 {1.23456789, "%.1v", "1 C"},
 {1.23456789, "%20.1v", " 1 C"},
 {1.23456789, "%20v", " 1.23456789 C"},
 {1.23456789, "%1v", "1.23456789 C"},
 {1.23456789, "%#v", "unit.Charge(1.23456789)"},
 {1.23456789, "%s", "%!s(unit.Charge=1.23456789 C)"},
 } {
 got := fmt.Sprintf(test.format, test.value)
 if got != test.want {
 t.Errorf("Format %q %v: got: %q want: %q", test.format, float64(test.value), got, test.want)
 }
 }
}

graph{G}
graph{{dig0{{dig0}}}}
graph{{edd{eda{eda{edc}edc}}}}
graph{{STRI8{STRI8}STRI4}STRI4}
graph{{NodeW{}}NodeN}}
```

```
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```

```
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```

```
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```

```
package testlapack
```

```
import (
 "testing"
```

```
"golang.org/x/exp/rand"
```

```
"gonum.org/v1/gonum/floats"
```

```
)
```

```

type Dgelqfer interface {
 Dgelq2er
 Dgelqf(m, n int, a []float64, lda int, tau, work []float64, lwork int)
}

```

```

func DgelqfTest(t *testing.T, impl Dgelqfer) {
 const tol = 1e-12
 rnd := rand.New(rand.NewSource(1))
 for c, test := range []struct {
 m, n, lda int
 }{
 {10, 5, 0},
 {5, 10, 0},
 {10, 10, 0},
 {300, 5, 0},
 {3, 500, 0},
 {200, 200, 0},
 {300, 200, 0},
 {204, 300, 0},
 {1, 3000, 0},
 {3000, 1, 0},
 {10, 5, 30},
 {5, 10, 30},
 {10, 10, 30},
 {300, 5, 500},
 {3, 500, 600},
 {200, 200, 300},
 {300, 200, 300},
 {204, 300, 400},
 {1, 3000, 4000},
 {3000, 1, 4000},
 } {
 m := test.m
 n := test.n
 lda := test.lda
 if lda == 0 {
 lda = n
 }
 // Allocate mn matrix A and fill it with random numbers.
 a
 := make([]float64, m*lda)
 for i := range a {
 a[i] = rnd.NormFloat64()
 }
 // Store a copy of A for later comparison.
 aCopy := make([]float64, len(a))
 copy(aCopy, a)
 }
}

```

```

// Allocate a slice for scalar factors of elementary reflectors
// and fill it with random numbers.
tau := make([]float64, n)
for i := 0; i < n; i++ {
 tau[i] = rnd.NormFloat64()
}

// Compute the expected result using unblocked LQ algorithm and
// store it want.
want := make([]float64, len(a))
copy(want, a)
impl.Dgelq2(m, n, want, lda, tau, make([]float64, m))

for _, wl := range []worklen{minimumWork, mediumWork, optimumWork} {
 copy(a, aCopy)

 var lwork int
 switch wl {
 case minimumWork:
 lwork = m
 case mediumWork:
 work := make([]float64, 1)
 impl.Dgelqf(m, n, a, lda, tau, work, -1)
 lwork = int(work[0]) - 2*m
 case optimumWork:
 work := make([]float64, 1)
 impl.Dgelqf(m, n, a, lda, tau, work, -1)
 lwork = int(work[0])
 }
 work := make([]float64,
lwork)

 // Compute the LQ factorization of A.
 impl.Dgelqf(m, n, a, lda, tau, work, len(work))
 // Compare the result with Dgelq2.
 if !floats.EqualApprox(want, a, tol) {
 t.Errorf("Case %v, workspace type %v, unexpected result", c, wl)
 }
 }
 }
 }
graph{SubGE{SubGZ{SubGE{SubGZ}}}}
graph{DiGr{DiGr{DiGr}}}
Graph{SUBG{SUBG{SUBG{SUBG{SUBG{SUBG{SUBG{SUBG}}}}}}SUBG}}
graph{{{digra}digra{digra}}}
graph{no{no{no{no}no}no}

```

```

Graph{subgrapA{subgrapA{subgrapA}{}}{subgrapA}{}}{subgrapA}{}}{subgrapA}{}}{subgrapA}{}}{subgrapA}{}}
graph{--
[f=4][f=8][f=2][f=2][f=3][f=7][f=2][f=4][f=6][f=6][f=4][f=9][f=4][f=4][f=4][f=4][f=1][f=4][f=6][f=6][f=
4][f=1][f=6][f=1][f=2][f=7][f=8][f=2][f=2][f=3][f=7][f=2][f=4][f=6][f=6][f=4][f=4][f=9][f=4][f=4][f=4][f=4][
f=1][f=4][f=6][f=6][f=4][f=1][f=6][f=1][f=2][f=7][f=1][f=1][f=1][f=1][f=8][f=1][f=1][f=1][f=1][f=8][f=1][f=3
][f=5][f=1][f=1][f=1][f=9]}
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package quad

import (
 "math"
 "testing"

 "gonum.org/v1/gonum/floats"
 "gonum.org/v1/gonum/stat/distuv"
)

func TestFixed(t *testing.T) {
 for i, test := range []struct {
 f func(float64) float64
 min, max float64
 n []int
 tol []float64
 ans float64
 }{
 // Tolerances determined from intuition and a bit of post-hoc tweaking.
 {
 f: func(x float64) float64 { return math.Exp(x) },
 min: -3,
 max: 5,
 n: []int{3, 4, 6, 7, 15, 16, 300, 301},
 tol: []float64{5e-2, 5e-3, 5e-6, 1e-7, 1e-14, 1e-14, 1e-14, 1e-14},
 ans: math.Exp(5) - math.Exp(-3),
 },
 {
 f: distuv.UnitNormal.Prob,
 min: math.Inf(-1),
 max: math.Inf(1),
 n: []int{15, 16, 50, 51, 300, 301},
 tol: []float64{5e-3, 1e-3, 1e-7, 1e-7, 1e-14, 1e-14},
 ans: 1,
 },
 }
 for i, test := range []struct {
 f func(float64) float64 { return

```

```

math.Exp(-x) },
min: 5,
max: math.Inf(1),
n: []int{15, 16, 50, 51, 300, 301},
tol: []float64{5e-3, 1e-3, 1e-7, 1e-7, 1e-14, 1e-14},
ans: math.Exp(-5),
},
{
f: func(x float64) float64 { return math.Exp(x) },
min: math.Inf(-1),
max: -5,
n: []int{15, 16, 50, 51, 300, 301},
tol: []float64{5e-3, 1e-3, 1e-7, 1e-7, 1e-14, 1e-14},
ans: math.Exp(-5),
},
{
f: func(x float64) float64 { return math.Exp(x) },
min: 3,
max: 3,
n: []int{15, 16, 50, 51, 300, 301},
tol: []float64{0, 0, 0, 0, 0, 0},
ans: 0,
},
} {
for j, n := range test.n {
ans := Fixed(test.f, test.min, test.max, n, nil, 0)
if !floats.EqualWithinAbsOrRel(ans, test.ans, test.tol[j], test.tol[j]) {
t.Errorf("Case %d, n = %d: Mismatch. Want %v, got %v", i, n, test.ans, ans)
}
ans2 := Fixed(test.f, test.min, test.max, n, nil, 3)
if !floats.EqualWithinAbsOrRel(ans2, test.ans, test.tol[j], test.tol[j]) {
t.Errorf("Case %d, n = %d: Mismatch concurrent.
Want %v, got %v", i, n, test.ans, ans)
}
}
}
}

// legendreNonSingle wraps Legendre but does not implement FixedLocationSingle.
type legendreNonSingle struct {
Legendre Legendre
}

func (l legendreNonSingle) FixedLocations(x, weight []float64, min, max float64) {
l.Legendre.FixedLocations(x, weight, min, max)
}

func TestFixedNonSingle(t *testing.T) {

```

```

// TODO(btracey): Add tests with infinite bounds when we have native support
// for indefinite integrals.
for i, test := range []struct {
 f func(float64) float64
 min, max float64
 n []int
 tol []float64
 ans float64
}{
 // Tolerances determined from intuition and a bit of post-hoc tweaking.
 {
 f: func(x float64) float64 { return math.Exp(x) },
 min: -3,
 max: 5,
 n: []int{3, 4, 6, 7, 15, 16, 300, 301},
 tol: []float64{5e-2, 5e-3, 5e-6, 1e-7, 1e-14, 1e-14, 1e-14, 1e-14},
 ans: math.Exp(5) - math.Exp(-3),
 },
 {
 f: func(x float64) float64 { return math.Exp(x) },
 min:
3,
 max: 3,
 n: []int{3, 4, 6, 7, 15, 16, 300, 301},
 tol: []float64{0, 0, 0, 0, 0, 0, 0, 0},
 ans: 0,
 },
} {
 for j, n := range test.n {
 ans := Fixed(test.f, test.min, test.max, n, legendreNonSingle{}, 0)
 if !floats.EqualWithinAbsOrRel(ans, test.ans, test.tol[j], test.tol[j]) {
 t.Errorf("Case = %d, n = %d: Mismatch. Want %v, got %v", i, n, test.ans, ans)
 }
 ans2 := Fixed(test.f, test.min, test.max, n, legendreNonSingle{}, 3)
 if !floats.EqualWithinAbsOrRel(ans2, test.ans, test.tol[j], test.tol[j]) {
 t.Errorf("Case = %d, n = %d: Mismatch concurrent. Want %v, got %v", i, n, test.ans, ans)
 }
 }
}
}
graph{subgraph{}subgraphd}

```

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```
graph{"tedEdge Vertex OptEdge << astx.NewEdge(X[D], X[1], X[2]) >>\\\\"}
```

```
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```

```
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```

```
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```

```
package mathext
```

```
import "math"
```

```
const (
```

```
 logPi = 1.14472988584940017414342735135305871164729481 // http://oeis.org/A053510
```

```
)
```

```
// MvLgamma returns the log of the multivariate Gamma function. Dim
```

```
// must be greater than zero, and MvLgamma will return NaN if v < (dim-1)/2.
```

```
//
```

```
// See https://en.wikipedia.org/wiki/Multivariate_gamma_function for more
```

```
// information.
```

```
func MvLgamma(v float64, dim int) float64 {
```

```
 if dim < 1 {
```

```
 panic("mathext: negative dimension")
```

```
 }
```

```
 df := float64(dim)
```

```
 if v < (df-1)*0.5 {
```

```
 return math.NaN()
```

```
 }
```

```
 ans := df * (df - 1) * 0.25 * logPi
```

```
 for i := 1; i <= dim; i++ {
```

```
 lg, _ := math.Lgamma(v + float64(1-i)*0.5)
```

```
 ans += lg
```

```
 }
```

```
 return ans
```

```
}
```

```

graph{<e{\{>}
graph{{{Gra}Gra}}Gra}
graph{grapha{{grapha{{graphe}graphe}graphe}graphe}}
graph{DIGRC{DIGRC}}
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package network

import (
 "fmt"
 "math"
 "sort"
 "testing"

 "gonum.org/v1/gonum/floats"
 "gonum.org/v1/gonum/graph/simple"
)

var hitsTests = []struct {
 g []set
 tol float64

 wantTol float64
 want map[int64]HubAuthority
}{
 {
 // Example graph from http://www.cis.hut.fi/Opinnot/T-61.6020/2008/pagerank_hits.pdf page 8.
 g: []set{
 A: linksTo(B, C, D),
 B: linksTo(C, D),
 C: linksTo(B),
 D: nil,
 },
 tol: 1e-4,

 wantTol: 1e-4,
 want: map[int64]HubAuthority{
 A: {Hub: 0.7887, Authority: 0},
 B: {Hub: 0.5774, Authority: 0.4597},
 C: {Hub: 0.2113, Authority: 0.6280},
 D: {Hub: 0, Authority: 0.6280},
 },
 },
}

func TestHITS(t *testing.T) {

```

```

for i, test := range hitsTests {
 g := simple.NewDirectedGraph()
 for u, e := range test.g {
 // Add nodes that are not defined by an edge.
 if g.Node(int64(u))
 == nil {
 g.AddNode(simple.Node(u))
 }
 for v := range e {
 g.SetEdge(simple.Edge{F: simple.Node(u), T: simple.Node(v)})
 }
 }
 got := HITS(g, test.tol)
 prec := 1 - int(math.Log10(test.wantTol))
 for n := range test.g {
 if !floats.EqualWithinAbsOrRel(got[int64(n)].Hub, test.want[int64(n)].Hub, test.wantTol, test.wantTol) {
 t.Errorf("unexpected HITS result for test %d:\ngot: %v\nwant: %v",
 i, orderedHubAuth(got, prec), orderedHubAuth(test.want, prec))
 break
 }
 if !floats.EqualWithinAbsOrRel(got[int64(n)].Authority, test.want[int64(n)].Authority, test.wantTol, test.wantTol) {
 t.Errorf("unexpected HITS result for test %d:\ngot: %v\nwant: %v",
 i, orderedHubAuth(got, prec), orderedHubAuth(test.want, prec))
 break
 }
 }
}

func orderedHubAuth(w map[int64]HubAuthority, prec int) []keyHubAuthVal {
 o := make(orderedHubAuthMap, 0, len(w))
 for k, v := range w {
 o = append(o, keyHubAuthVal{prec: prec, key: k, val: v})
 }
 sort.Sort(o)
 return
 o
}

type keyHubAuthVal struct {
 prec int
 key int64
 val HubAuthority
}

func (kv keyHubAuthVal) String() string {
 return fmt.Sprintf("%d:{H:%.*f, A:%.*f}",
 kv.key, kv.prec, kv.val.Hub, kv.prec, kv.val.Authority,

```

```
)
}
```

```
type orderedHubAuthMap []keyHubAuthVal
```

```
func (o orderedHubAuthMap) Len() int { return len(o) }
func (o orderedHubAuthMap) Less(i, j int) bool { return o[i].key < o[j].key }
func (o orderedHubAuthMap) Swap(i, j int) { o[i], o[j] = o[j], o[i] }
 SUBROUTINE ZEXP(AR, AI, BR, BI)
C***BEGIN PROLOGUE ZEXP
C***REFER TO ZBESH,ZBESI,ZBESJ,ZBESK,ZBESY,ZAIRY,ZBIRY
C
C DOUBLE PRECISION COMPLEX EXPONENTIAL FUNCTION B=EXP(A)
C
C***ROUTINES CALLED (NONE)
C***END PROLOGUE ZEXP
 DOUBLE PRECISION AR, AI, BR, BI, ZM, CA, CB
 ZM = DEXP(AR)
 CA = ZM*DCOS(AI)
 CB = ZM*DSIN(AI)
 BR = CA
 BI = CB
 RETURN
 END
graph{"\""}
graph{n_{n_}}
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```

```
package mathext
```

```
import (
 "gonum.org/v1/gonum/mathext/internal/cephes"
)
```

```
// GammaIncReg computes the regularized incomplete Gamma integral.
// GammaIncReg(a,x) = (1/ (a)) \int_0^x e^{-t} t^{a-1} dt
// The input argument a must be positive and x must be non-negative or GammaIncReg
// will panic.
//
// See http://mathworld.wolfram.com/IncompleteGammaFunction.html
// or https://en.wikipedia.org/wiki/Incomplete_gamma_function for more detailed
// information.
func GammaIncReg(a, x float64) float64 {
 return cephes.Igam(a, x)
}
```

```

// GammaIncRegComp computes the complemented regularized incomplete Gamma integral.
// GammaIncRegComp(a,x) = 1 - GammaIncReg(a,x)
// = (1/ (a)) \int_0^\infty e^{-t} t^{a-1} dt
// The input argument a must be positive and x must be non-negative or
// GammaIncRegComp will panic.
func GammaIncRegComp(a,
x float64) float64 {
 return cephes.IgamC(a, x)
}

// GammaIncRegInv computes the inverse of the regularized incomplete Gamma integral. That is,
// it returns the x such that:
// GammaIncReg(a, x) = y
// The input argument a must be positive and y must be between 0 and 1
// inclusive or GammaIncRegInv will panic. GammaIncRegInv should return a positive
// number, but can return NaN if there is a failure to converge.
func GammaIncRegInv(a, y float64) float64 {
 return gammaIncRegInv(a, y)
}

// GammaIncRegCompInv computes the inverse of the complemented regularized incomplete Gamma
// integral. That is, it returns the x such that:
// GammaIncRegComp(a, x) = y
// The input argument a must be positive and y must be between 0 and 1
// inclusive or GammaIncRegCompInv will panic. GammaIncRegCompInv should return a
// positive number, but can return 0 even with non-zero y due to underflow.
func GammaIncRegCompInv(a, y float64) float64 {
 return cephes.IgamI(a, y)
}

graph{{GrG{GrG{GrC}GrC}}
graph{{DigV}{DigV}DigP}
graph{{S_{{S_}{S_}S_}{S_}S_}}
digraph{e[l=<<"></></></></>]}
graph{ED{ED{ED}ED}}
graph{N9{{N9{N9{N7{N9{{N9{N9{N7}}N9{N7}}}}}N9{N7}}}}
 SUBROUTINE ZLOG(AR, AI, BR, BI, IERR)
C***BEGIN PROLOGUE ZLOG
C***REFER TO ZBESH,ZBESI,ZBESJ,ZBESK,ZBESY,ZAIRY,ZBIRY
C
C DOUBLE PRECISION COMPLEX LOGARITHM B=CLOG(A)
C IERR=0,NORMAL RETURN IERR=1, Z=CMPLX(0.0,0.0)
C***ROUTINES CALLED ZABS
C***END PROLOGUE ZLOG
 DOUBLE PRECISION AR, AI, BR, BI, ZM, DTHETA, DPI, DHPI
 DOUBLE PRECISION ZABS
 DATA DPI , DHPI / 3.141592653589793238462643383D+0,
1 1.570796326794896619231321696D+0/
C

```



```

// into a. This is the BLAS level 3 version of the algorithm which builds upon
// Dtrti2 to operate on matrix blocks instead of only individual columns.
//
// Dtrtri will not perform the inversion if the matrix is singular, and returns
// a boolean indicating whether the inversion was successful.
func (impl Implementation) Dtrtri(uplo blas.Uplo, diag blas.Diag, n int, a []float64, lda int) (ok bool) {
 switch {
 case uplo != blas.Upper && uplo != blas.Lower:
 panic(badUplo)
 case diag != blas.NonUnit && diag != blas.Unit:
 panic(badDiag)
 case n < 0:
 panic(nLT0)
 case lda < max(1, n):
 panic(badLdA)
 }

 if n == 0 {
 return true
 }

 if len(a) < (n-1)*lda+n
 {
 panic(shortA)
 }

 if diag == blas.NonUnit {
 for i := 0; i < n; i++ {
 if a[i*lda+i] == 0 {
 return false
 }
 }
 }

 bi := blas64.Implementation()

 nb := impl.Ilaenv(1, "DTRTRI", "UD", n, -1, -1, -1)
 if nb <= 1 || nb > n {
 impl.Dtrti2(uplo, diag, n, a, lda)
 return true
 }
 if uplo == blas.Upper {
 for j := 0; j < n; j += nb {
 jb := min(nb, n-j)
 bi.Dtrmm(blas.Left, blas.Upper, blas.NoTrans, diag, j, jb, 1, a, lda, a[j:], lda)
 bi.Dtrsm(blas.Right, blas.Upper, blas.NoTrans, diag, j, jb, -1, a[j*lda+j:], lda, a[j:], lda)
 impl.Dtrti2(blas.Upper, diag, jb, a[j*lda+j:], lda)
 }
 }
}

```

```

 return true
}
nn := ((n - 1) / nb) * nb
for j := nn; j >= 0; j -= nb {
 jb := min(nb, n-j)
 if j+jb <= n-1 {
 bi.Dtrmm(blas.Left, blas.Lower, blas.NoTrans, diag, n-j-jb, jb, 1, a[(j+jb)*lda+j+jb:], lda, a[(j+jb)*lda+j:], lda)
 bi.Dtrsm(blas.Right, blas.Lower, blas.NoTrans, diag, n-j-jb, jb, -1, a[j*lda+j:], lda, a[(j+jb)*lda+j:], lda)
 }
 impl.Dtrti2(blas.Lower, diag,
jb, a[j*lda+j:], lda)
}
return true
}
graph{"\\
\\
ssssss\
\\
sssssss}\\s}\\"}
graph{{DiGrap_}{DiGrap_}}
// Code generated by "go generate gonum.org/v1/gonum/unit; DO NOT EDIT.

```

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// license that can be found in the LICENSE file.

package unit

```

import (
 "errors"
 "fmt"
 "math"
 "unicode/utf8"
)

```

// Torque represents a torque in Newton metres.

type Torque float64

const Newtonmetre Torque = 1

// Unit converts the Torque to a \*Unit

```

func (t Torque) Unit() *Unit {
 return New(float64(t), Dimensions{
 LengthDim: 2,
 MassDim: 1,
 TimeDim: -2,
 })
}

```



```

// Torque allows Torque to implement a Torquer interface
func (t Torque) Torque() Torque {
 return t
}

// From converts the unit into the receiver. From returns an
// error if there is a mismatch in dimension
func (t *Torque) From(u Uniter) error {
 if !DimensionsMatch(u, Newtonmetre) {
 *t = Torque(math.NaN())
 return errors.New("Dimension mismatch")
 }
 *t = Torque(u.Unit().Value())
 return nil
}

func (t Torque) Format(fs fmt.State,
 c rune) {
 switch c {
 case 'v':
 if fs.Flag('#') {
 fmt.Fprintf(fs, "%T(%v)", t, float64(t))
 return
 }
 fallthrough
 case 'e', 'E', 'f', 'F', 'g', 'G':
 p, pOk := fs.Precision()
 w, wOk := fs.Width()
 const unit = " N m"
 switch {
 case pOk && wOk:
 fmt.Fprintf(fs, "%*.*"+string(c), pos(w-utf8.RuneCount([]byte(unit))), p, float64(t))
 case pOk:
 fmt.Fprintf(fs, "%.*"+string(c), p, float64(t))
 case wOk:
 fmt.Fprintf(fs, "%*"+string(c), pos(w-utf8.RuneCount([]byte(unit))), float64(t))
 default:
 fmt.Fprintf(fs, "%"+string(c), float64(t))
 }
 fmt.Fprint(fs, unit)
 default:
 fmt.Fprintf(fs, "%%!%c(%T=%g N m)", c, t, float64(t))
 }
}

graph{ {{ {Digraa} {Digraa} Digrag} }}
graph{ {GG GB GP} }

```

```

graph{{d_{d_}d_{d_}d_{{d_}{d_}}d_{{d_{d_}d_{d_}d_{{d_}{d_}}d_}{d_}}d_}}
graph{{NOD0}NOD0}NOD0}
graph{{diGrag{diGrag}}diGrai{diGrag}{diGrag}diGrai}
digraph{EB}
graph{digra_{digra_{{digra_{digra_{digra_}}}}digra_{digra_{digra_{digra_}}}}digra_}}
graph{{DIGRAPA}{DIGRAPA}DIGRAPA{DIGRAPA}{DIGRAPA}DIGRAPA}}
graph{{SUBGRp{SUBGRp}SUBGRp}}
// Code generated by "go generate gonum.org/v1/gonum/unit; DO NOT EDIT.

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package unit

import (
 "fmt"
 "testing"
)

func TestTorqueFormat(t *testing.T) {
 for _, test := range []struct {
 value Torque
 format string
 want string
 }{
 {1.23456789, "%v", "1.23456789 N m"},
 {1.23456789, "%.1v", "1 N m"},
 {1.23456789, "%20.1v", "1 N m"},
 {1.23456789, "%20v", "1.23456789 N m"},
 {1.23456789, "%1v", "1.23456789 N m"},
 {1.23456789, "%#v", "unit.Torque(1.23456789)"},
 {1.23456789, "%s", "%!s(unit.Torque=1.23456789 N m)"},
 } {
 got := fmt.Sprintf(test.format, test.value)
 if got != test.want {
 t.Errorf("Format %q %v: got: %q want: %q", test.format, float64(test.value), got, test.want)
 }
 }
}

graph{subgrS}
graph{SubGrap}
graph{{GRa{GRi}{GRa{GRi}}}}GRa}
graph{SubGE{SubGZ}}
graph{Digrap{{Digrap}Digrap}{Digrap}{Digrap}Digrap}Digrap}
graph{{DI}DI}}
graph{{""9W}""_3_3VO1_1wgYc8kRij8q8_1PyG1YO0_iryntlS5u4T4zbq9VH7G1_ZAB_8tO9W}""_3_3VO1_1wgYc8kRij8q8_1PyG1YO0_iryntlS5u4T4zbq9VH7G1_ZAB_8tO9W}""_3_3VO1_1wgYc1YO0_iryntlS5u4T4z

```

```

bq9VH7G1_ZAB_8tO9W}""_3_3VO1_1wgYc8kRij8q8_1PyG1YO0_iryntlS5u4T4zbq9VH7G1_ZAB_8tO9W}""
_3_3VO1_1wgYc8kRij8q8_1PyG1YO0_iryntlS5u4T4zbq9VH7G1_ZAB_8tO9W}""""_3_3VO1_1wgYc8kRij8q8
_1PyG1YO0_iryntlS5u4T4zbq9VH7G1_ZAB_8tO9W}""_3_3VO1_1wgYc8kRij8q8_1PyG1YO0_iryntlS5u4T4z
bq9VH7G1_ZAB_8tO9W}""_3_3VO1_1wgYc8kRij8q8_1PyG1YO0_iryntlS5u4T4zbq9VH7G1_ZAB_8tO9W}""
_3_3VO1_1wgYc8kRij8q8_1PyG1YO0_iryntlS5u4T4zbq9VH7G1_ZAB_8tO9W}""_3_3VO1_1wgYc8kRij8q8_1
PyG1YO0_iryntlS5u4T4zbq9VH7G1_ZAB8kRij8q8_1PyG1YO0_iryntlS5u4T4zbq9VH7G1_ZAB_8tO9W}""""_
3_3VO1_1wgYc8kRij8q8_1PyG1YO0_iryntlS5u4T4zbq9VH7G1_ZAB_8tO9W}""_3_3VO1_1wgYc8kRij8q8_1P
yG1YO0_iryntlS5u4T4zbq9VH7G1_ZAB_8tO9W}""_3_3VO1_1wgYc8kRij8q8_1PyG1YO0_iryntlS5u4T4zbq9
VH7G1_ZAB_8tO9W}""_3_3VO1_1wgYc8kRij8q8_1PyG1YO0_iryntlS5u4T4zbq9VH7G1_ZAB_8tO9W}""_3_
3VO1_1wgYc8kRij8q8_1PyG1YO0_iryntlS5u4T4zbq9VH7G1_ZAB_8tO9W}""}}

```

```
graph{STRI{STRI}{STRI{STRI}STRI}STRI}
```

```
graph{{D{D}{D}}}
```

```
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```

```
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```

```
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```

```
package testlapack
```

```
import (
```

```
 "fmt"
```

```
 "testing"
```

```
 "golang.org/x/exp/rand"
```

```
 "gonum.org/v1/gonum/blas"
```

```
)
```

```
type Dlapcyer interface {
```

```
 Dlapcy(uplo blas.Uplo, m, n int, a []float64, lda int, b []float64, ldb int)
```

```
}
```

```
func DlapcyTest(t *testing.T, impl Dlapcyer) {
```

```
 rnd := rand.New(rand.NewSource(1))
```

```
 for _, uplo := range []blas.Uplo{blas.Upper, blas.Lower, blas.All} {
```

```
 for _, test := range []struct {
```

```
 m, n, lda, ldb int
```

```
 }{
```

```
 {3, 5, 0, 0},
```

```
 {5, 5, 0, 0},
```

```
 {7, 5, 0, 0},
```

```
 {3, 5, 10, 12},
```

```
 {5, 5, 10, 12},
```

```
 {7, 5, 10, 12},
```

```
 } {
```

```
 m := test.m
```

```
 n := test.n
```

```
 lda := test.lda
```

```

if lda == 0 {
 lda = n
}
ldb := test.ldb
if ldb == 0 {
 ldb = n
}
a := make([]float64, m*lda)
for i := range a {
 a[i] = rnd.Float64()
}
b := make([]float64, m*ldb)
for i := range b {
 b[i] = rnd.Float64()
}
impl.Dlacy(upto,
m, n, a, lda, b, ldb)
equal := true
switch upto {
case blas.Upper:
 for i := 0; i < m; i++ {
 for j := i; j < n; j++ {
 if b[i*ldb+j] != a[i*lda+j] {
 equal = false
 goto DoneCheck
 }
 }
 }
case blas.Lower:
 for i := 0; i < m; i++ {
 for j := 0; j < min(i, n); j++ {
 if b[i*ldb+j] != a[i*lda+j] {
 equal = false
 goto DoneCheck
 }
 }
 }
case blas.All:
 for i := 0; i < m; i++ {
 for j := 0; j < n; j++ {
 if b[i*ldb+j] != a[i*lda+j] {
 equal = false
 goto DoneCheck
 }
 }
 }
}
DoneCheck:

```

```

 if !equal {
 fmt.Println(blas.Lower)
 t.Errorf("Matrices not equal after copy. Uplo = %d, m = %d, n = %d", uplo, m, n)
 }
}
}
}

graph{DiGi{DiG}{DiG{DiG}DiG}DiG{DiG}{DiG{DiG}DiG}DiG}
graph{No{No}No{No}No{No}N{No{No}No{No}No{No}No{No}No{No}}
graph{Subg_{Subg_}}
graph{strih{strih{strih{strii}}}}
graph{{{s}s{s}s}s}
digraph{h[l]="d"]][l=" iri"]][l=""][l=""e->{->s->a->s->r[e=d]}
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// +build bounds

package barneshut

const checkBounds = true
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package multi_test

import (
 "math"
 "testing"

 "golang.org/x/exp/rand"

 "gonum.org/v1/gonum/graph"
 "gonum.org/v1/gonum/graph/internal/set"
 "gonum.org/v1/gonum/graph/iterator"
 "gonum.org/v1/gonum/graph/multi"
 "gonum.org/v1/gonum/graph/testgraph"
)

func undirectedBuilder(nodes []graph.Node, edges []testgraph.WeightedLine, _ _ float64) (g graph.Graph, n
[]graph.Node, e []testgraph.Edge, s, a float64, ok bool) {
 seen := set.NewNodes()
 ug := multi.NewUndirectedGraph()
 for _, n := range nodes {
 seen.Add(n)
 ug.AddNode(n)
 }
}

```

```

}
for _, edge := range edges {
 f := ug.Node(edge.From().ID())
 if f == nil {
 f = edge.From()
 }
 t := ug.Node(edge.To().ID())
 if t == nil {
 t = edge.To()
 }
 ce := multi.Line{F: f, T: t, UID: edge.ID()}
 seen.Add(ce.F)
 seen.Add(ce.T)
 e = append(e, ce)
 ug.SetLine(ce)
}
if len(seen)
!= 0 {
 n = make([]graph.Node, 0, len(seen))
}
for _, sn := range seen {
 n = append(n, sn)
}
return ug, n, e, math.NaN(), math.NaN(), true
}

func TestUndirected(t *testing.T) {
 t.Run("EdgeExistence", func(t *testing.T) {
 testgraph.EdgeExistence(t, undirectedBuilder)
 })
 t.Run("LineExistence", func(t *testing.T) {
 testgraph.LineExistence(t, directedBuilder, true)
 })
 t.Run("NodeExistence", func(t *testing.T) {
 testgraph.NodeExistence(t, undirectedBuilder)
 })
 t.Run("ReturnAdjacentNodes", func(t *testing.T) {
 testgraph.ReturnAdjacentNodes(t, undirectedBuilder, true)
 })
 t.Run("ReturnAllLines", func(t *testing.T) {
 testgraph.ReturnAllLines(t, undirectedBuilder, true)
 })
 t.Run("ReturnAllNodes", func(t *testing.T) {
 testgraph.ReturnAllNodes(t, undirectedBuilder, true)
 })
 t.Run("ReturnNodeSlice", func(t *testing.T) {
 testgraph.ReturnNodeSlice(t, undirectedBuilder, true)
 })
}

```

```

t.Run("AddNodes", func(t *testing.T) {
 testgraph.AddNodes(t, multi.NewUndirectedGraph(),
 100)
})
t.Run("AddArbitraryNodes", func(t *testing.T) {
 testgraph.AddArbitraryNodes(t,
 multi.NewUndirectedGraph(),
 testgraph.NewRandomNodes(100, 1, func(id int64) graph.Node { return multi.Node(id) }),
)
})
t.Run("RemoveNodes", func(t *testing.T) {
 g := multi.NewUndirectedGraph()
 it := testgraph.NewRandomNodes(100, 1, func(id int64) graph.Node { return multi.Node(id) })
 for it.Next() {
 g.AddNode(it.Node())
 }
 it.Reset()
 rnd := rand.New(rand.NewSource(1))
 for it.Next() {
 u := it.Node()
 d := rnd.Intn(5)
 vit := g.Nodes()
 for d >= 0 && vit.Next() {
 v := vit.Node()
 d--
 g.SetLine(g.NewLine(u, v))
 }
 }
 testgraph.RemoveNodes(t, g)
})
t.Run("AddLines", func(t *testing.T) {
 testgraph.AddLines(t, 100,
 multi.NewUndirectedGraph(),
 func(id int64) graph.Node { return multi.Node(id) },
 true, // Can update nodes.
)
})
t.Run("RemoveLines", func(t *testing.T) {
 g := multi.NewUndirectedGraph()
 it := testgraph.NewRandomNodes(100,
 1, func(id int64) graph.Node { return multi.Node(id) })
 for it.Next() {
 g.AddNode(it.Node())
 }
 it.Reset()
 var lines []graph.Line
 rnd := rand.New(rand.NewSource(1))

```

```

for it.Next() {
 u := it.Node()
 d := rnd.Intn(5)
 vit := g.Nodes()
 for d >= 0 && vit.Next() {
 v := vit.Node()
 d--
 l := g.NewLine(u, v)
 g.SetLine(l)
 lines = append(lines, l)
 }
}
rnd.Shuffle(len(lines), func(i, j int) {
 lines[i], lines[j] = lines[j], lines[i]
})
testgraph.RemoveLines(t, g, iterator.NewOrderedLines(lines))
})
}

```

```

func TestMaxID(t *testing.T) {
 g := multi.NewUndirectedGraph()
 nodes := make(map[graph.Node]struct{})
 for i := multi.Node(0); i < 3; i++ {
 g.AddNode(i)
 nodes[i] = struct{}{}
 }
 g.RemoveNode(int64(0))
 delete(nodes, multi.Node(0))
 g.RemoveNode(int64(2))
 delete(nodes, multi.Node(2))
 n := g.NewNode()
 g.AddNode(n)
 if g.Node(n.ID()) == nil {
 t.Error("added node does not exist in graph")
 }
 if _, exists := nodes[n]; exists {
 t.Errorf("Created already existing node id: %v", n.ID())
 }
}

```

// Test for issue #123 <https://github.com/gonum/graph/issues/123>

```

func TestIssue123UndirectedGraph(t *testing.T) {
 defer func() {
 if r := recover(); r != nil {
 t.Errorf("unexpected panic: %v", r)
 }
 }()
}

```



```

g := multi.NewUndirectedGraph()

n0 := g.NewNode()
g.AddNode(n0)

n1 := g.NewNode()
g.AddNode(n1)

g.RemoveNode(n0.ID())

n2 := g.NewNode()
g.AddNode(n2)
}
graph{digra}
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package gonum

import "gonum.org/v1/gonum/blas"

// Dgelq2 computes the LQ factorization of the mn matrix A.
//
// In an LQ factorization, L is a lower triangular mn matrix, and Q is an nn
// orthonormal matrix.
//
// a is modified to contain the information to construct L and Q.
// The lower triangle of a contains the matrix L. The upper triangular elements
// (not including the diagonal) contain the elementary reflectors. tau is modified
// to contain the reflector scales. tau must have length of at least k = min(m,n)
// and this function will panic otherwise.
//
// See Dgeqr2 for a description of the elementary reflectors and orthonormal
// matrix Q. Q is constructed as a product of these elementary reflectors,
// $Q = H_{k-1} * \dots * H_1 * H_0$.
//
// work is temporary storage of length at least m and this function will panic
// otherwise.
//
// Dgelq2 is an internal routine. It is exported for testing purposes.
func (impl Implementation) Dgelq2(m, n int, a []float64, lda int, tau, work []float64) {
 switch {
 case m < 0:
 panic(mLT0)
 case n < 0:
 panic(nLT0)
 case lda < max(1, n):

```

```

panic(badLdA)
}

// Quick return if possible.
k := min(m, n)
if k == 0 {
 return
}

switch {
case len(a) < (m-1)*lda+n:
 panic(shortA)
case len(tau) < k:
 panic(shortTau)
case len(work) < m:
 panic(shortWork)
}

for i := 0; i < k; i++ {
 a[i*lda+i], tau[i] = impl.Dlarfg(n-i, a[i*lda+i], a[i*lda+min(i+1, n-1):], 1)
 if i < m-1 {
 aii := a[i*lda+i]
 a[i*lda+i] = 1
 impl.Dlarf(blas.Right, m-i-1, n-i,
 a[i*lda+i:], 1,
 tau[i],
 a[(i+1)*lda+i:], lda,
 work)
 a[i*lda+i] = aii
 }
}
}
}
digraph {
 A [style=filled fillcolor=red]
}
graph{SubgE{SubgJ}}
graph{{{Digw{Digz{{{Digw{Digz}}}Digw{Digz}}}}}}
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package testlapack

import (
 "fmt"
 "math"
 "testing"

```

```
"golang.org/x/exp/rand"
```

```
"gonum.org/v1/gonum/floats"
```

```
)
```

```
type Dlassqer interface {
```

```
 Dlassq(n int, x []float64, incx int, scale, ssq float64) (float64, float64)
```

```
}
```

```
func DlassqTest(t *testing.T, impl Dlassqer) {
```

```
 const tol = 1e-14
```

```
 rnd := rand.New(rand.NewSource(1))
```

```
 for _, n := range []int{0, 1, 2, 3, 4, 5, 10} {
```

```
 for _, incx := range []int{1, 3} {
```

```
 name := fmt.Sprintf("n=%v,incx=%v", n, incx)
```

```
 // Allocate a slice of minimum length and fill it with
```

```
 // random numbers.
```

```
 x := make([]float64, max(0, 1+(n-1)*incx))
```

```
 for i := range x {
```

```
 x[i] = rnd.Float64()
```

```
 }
```

```
 // Fill the referenced elements of x and compute the
```

```
 // expected result in a non-sophisticated way.
```

```
 scale := rnd.Float64()
```

```
 ssq := rnd.Float64()
```

```
 want := scale * scale * ssq
```

```
 for i := 0;
```

```
 i < n; i++ {
```

```
 xi := rnd.NormFloat64()
```

```
 x[i*incx] = xi
```

```
 want += xi * xi
```

```
 }
```

```
 xCopy := make([]float64, len(x))
```

```
 copy(xCopy, x)
```

```
 // Update scale and ssq so that
```

```
 // scale_out^2 * ssq_out = x[0]^2 + ... + x[n-1]^2 + scale_in^2*ssq_in
```

```
 scale, ssq = impl.Dlassq(n, x, incx, scale, ssq)
```

```
 if !floats.Equal(x, xCopy) {
```

```
 t.Fatalf("%v: unexpected modification of x", name)
```

```
 }
```

```
 // Check the result.
```

```
 got := scale * scale * ssq
```

```

 if math.Abs(got-want) >= tol {
 t.Errorf("%v: unexpected result; got %v, want %v", name, got, want)
 }
}
}
}
}
graph{{{gr}{gr}{gr}{gr}}gr{{gr}{gr}{gr}{gr}{gr}{gr}{gr}}
graph{{{8.}9.{8.}9.}{8.}9.}
graph{{{<<=>=<=>=<=>=>}<<=>=<=>=<=>=>}}
graph{Digrapd}
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package testblas

import (
 "testing"

 "gonum.org/v1/gonum/blas"
)

type Dgbmver interface {
 Dgbmv(tA blas.Transpose, m, n, kL, kU int, alpha float64, a []float64, lda int, x []float64, incX int, beta float64, y
[]float64, incY int)
}

func DgbmvTest(t *testing.T, blasser Dgbmver) {
 for i, test := range []struct {
 tA blas.Transpose
 m, n int
 kL, kU int
 alpha float64
 a [][]float64
 lda int
 x []float64
 beta float64
 y []float64
 ans []float64
 }{
 {
 tA: blas.NoTrans,
 m: 9,
 n: 6,
 lda: 4,
 kL: 2,
 kU: 1,
 alpha: 3.0,

```

```

beta: 2.0,
a: [][]float64{
 {5, 3, 0, 0, 0, 0},
 {-1, 2, 9, 0, 0, 0},
 {4, 8, 3, 6, 0, 0},
 {0, -1, 8, 2, 1, 0},
 {0, 0, 9, 9, 9, 5},
 {0, 0, 0, 2, -3, 2},
 {0, 0, 0, 0, 1, 5},
 {0, 0, 0, 0, 0, 6},
},
x:
[]float64{1, 2, 3, 4, 5, 6},
y: []float64{-1, -2, -3, -4, -5, -6, -7, -8, -9},
ans: []float64{31, 86, 153, 97, 404, 3, 91, 92, -18},
},
{
 tA: blas.Trans,
 m: 9,
 n: 6,
 lda: 4,
 kL: 2,
 kU: 1,
 alpha: 3.0,
 beta: 2.0,
 a: [][]float64{
 {5, 3, 0, 0, 0, 0},
 {-1, 2, 9, 0, 0, 0},
 {4, 8, 3, 6, 0, 0},
 {0, -1, 8, 2, 1, 0},
 {0, 0, 9, 9, 9, 5},
 {0, 0, 0, 2, -3, 2},
 {0, 0, 0, 0, 1, 5},
 {0, 0, 0, 0, 0, 6},
 },
 x: []float64{1, 2, 3, 4, 5, 6, 7, 8, 9},
 y: []float64{-1, -2, -3, -4, -5, -6},
 ans: []float64{43, 77, 306, 241, 104, 348},
},
{
 tA: blas.NoTrans,
 m: 6,
 n: 3,
 lda: 1,
 kL: 0,
 kU: 0,
 alpha: 2.0,
 beta: 1.0,

```

```

a: [][]float64{
 {1, 0, 0},
 {0, 1, 0},
 {0, 0, 1},
},
x: []float64{1, 2, 3},
y: []float64{-1, -2, -3, -4, -5, -6},
ans: []float64{1, 2, 3, -4, -5, -6},
},
{
 tA: blas.Trans,
 m: 6,
 n: 3,
 lda:
 1,
 kL: 0,
 kU: 0,
 alpha: 2.0,
 beta: 1.0,
 a: [][]float64{
 {1, 0, 0},
 {0, 1, 0},
 {0, 0, 1},
 {0, 0, 0},
 {0, 0, 0},
 {0, 0, 0},
 },
 x: []float64{1, 2, 3, 4, 5, 6},
 y: []float64{-1, -2, -3},
 ans: []float64{1, 2, 3},
},
{
 tA: blas.NoTrans,
 m: 3,
 n: 5,
 lda: 4,
 kL: 1,
 kU: 2,
 alpha: 2.0,
 beta: 1.0,
 a: [][]float64{
 {1, 2, 3, 0, 0},
 {1, 3, 6, 9, 0},
 {0, 1, 1, 1, 1},
 },
 x: []float64{1, 2, 3, 4, 5},
 y: []float64{-1, -2, -3},
 ans: []float64{-1 + 2*(1+4+9), -2 + 2*(1+6+18+36), -3 + 2*(2+3+4+5)},
}

```

```

},
} {
extra := 3
aFlat := flattenBanded(test.a, test.kU, test.kL)
incTest := func(incX, incY, extra int) {
 xnew := makeIncremented(test.x, incX, extra)
 ynew := makeIncremented(test.y, incY, extra)
 ans := makeIncremented(test.ans, incY, extra)
 blasser.Dgbmv(test.tA, test.m, test.n, test.kL, test.kU, test.alpha, aFlat, test.la, xnew, incX, test.beta,
ynew, incY)
 if !dSliceTolEqual(ans, ynew) {
 t.Errorf("Case %v: Want %v, got %v", i, ans, ynew)
 }
}
incTest(1, 1, extra)
incTest(1, 3, extra)
incTest(1, -3, extra)
incTest(2, 3, extra)
incTest(2, -3, extra)
incTest(3, 2, extra)
incTest(-3, 2, extra)
}
}
graph{Su1{{Su1{Su5{{Su{{Su1{Su5{{Su1}}}}Su5{{Su1}}}}}}Su5{{Su1}}}}
graph{{{edg3{{{edg3{edg3}{edg3}{edg3}}edg5}}}}}
graph{{{DIGG}DIGG{}}DIGG{DIGG}}DIGG{DIGG{DIGG{DIGG}}DIGG}
graph{_[f=DiGr_]}
graph{{DI9}}
// Code generated by "go generate gonum.org/v1/gonum/unit; DO NOT EDIT.

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// license that can be found in the LICENSE file.

package unit

import (
 "errors"
 "fmt"
 "math"
 "unicode/utf8"
)

// Frequency represents a frequency in Hertz.
type Frequency float64

const Hertz Frequency = 1

```

```

// Unit converts the Frequency to a *Unit
func (f Frequency) Unit() *Unit {
 return New(float64(f), Dimensions{
 TimeDim: -1,
 })
}

// Frequency allows Frequency to implement a Frequencyer interface
func (f Frequency) Frequency() Frequency {
 return f
}

// From converts the unit into the receiver. From returns an
// error if there is a mismatch in dimension
func (f *Frequency) From(u Uniter) error {
 if !DimensionsMatch(u, Hertz) {
 *f = Frequency(math.NaN())
 return errors.New("Dimension mismatch")
 }
 *f = Frequency(u.Unit().Value())
 return nil
}

func (f Frequency) Format(fs fmt.State,
c rune) {
 switch c {
 case 'v':
 if fs.Flag('#') {
 fmt.Fprintf(fs, "%T(%v)", f, float64(f))
 return
 }
 fallthrough
 case 'e', 'E', 'f', 'F', 'g', 'G':
 p, pOk := fs.Precision()
 w, wOk := fs.Width()
 const unit = " Hz"
 switch {
 case pOk && wOk:
 fmt.Fprintf(fs, "%*.*"+string(c), pos(w-utf8.RuneCount([]byte(unit))), p, float64(f))
 case pOk:
 fmt.Fprintf(fs, "%*.*"+string(c), p, float64(f))
 case wOk:
 fmt.Fprintf(fs, "%*"+string(c), pos(w-utf8.RuneCount([]byte(unit))), float64(f))
 default:
 fmt.Fprintf(fs, "%"+string(c), float64(f))
 }
 fmt.Fprint(fs, unit)
 default:

```



```

 fmt.Fprintf(fs, "%%!%c(%T=%g Hz)", c, f, float64(f))
}
}
graph{{ {ST}ST}ST}
graph{{ {Stra{Stra-9Stra}Stra-9Stra}{Stra-9Stra}Stra-9Stra-9Stra}
// Copyright 2016 The Gonum Authors. All rights reserved.
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// license that can be found in the LICENSE file.

package stat

import (
 "math"
 "sort"
)

// ROC returns paired false positive rate (FPR) and true positive rate
// (TPR) values corresponding to cutoff points on the receiver operator
// characteristic (ROC) curve obtained when y is treated as a binary
// classifier for classes with weights. The cutoff thresholds used to
// calculate the ROC are returned in thresh such that tpr[i] and fpr[i]
// are the true and false positive rates for y >= thresh[i].
//
// The input y and cutoffs must be sorted, and values in y must correspond
// to values in classes and weights. SortWeightedLabeled can be used to
// sort y together with classes and weights.
//
// For a given cutoff value, observations corresponding to entries in y
// greater than the cutoff value are classified as false, while those
// less than or equal to the cutoff value
// are classified as true. These
// assigned class labels are compared with the true values in the classes
// slice and used to calculate the FPR and TPR.
//
// If weights is nil, all weights are treated as 1.
//
// If cutoffs is nil or empty, all possible cutoffs are calculated,
// resulting in fpr and tpr having length one greater than the number of
// unique values in y. Otherwise fpr and tpr will be returned with the
// same length as cutoffs. floats.Span can be used to generate equally
// spaced cutoffs.
//
// More details about ROC curves are available at
// https://en.wikipedia.org/wiki/Receiver_operating_characteristic
func ROC(cutoffs, y []float64, classes []bool, weights []float64) (tpr, fpr, thresh []float64) {
 if len(y) != len(classes) {
 panic("stat: slice length mismatch")
 }
}

```

```

if weights != nil && len(y) != len(weights) {
 panic("stat: slice length mismatch")
}
if !sort.Float64sAreSorted(y) {
 panic("stat: input must be sorted ascending")
}
if !sort.Float64sAreSorted(cutoffs)
{
 panic("stat: cutoff values must be sorted ascending")
}
if len(y) == 0 {
 return nil, nil, nil
}
if len(cutoffs) == 0 {
 if cutoffs == nil || cap(cutoffs) < len(y)+1 {
 cutoffs = make([]float64, len(y)+1)
 } else {
 cutoffs = cutoffs[:len(y)+1]
 }
 cutoffs[0] = math.Inf(-1)
 // Choose all possible cutoffs for unique values in y.
 bin := 1
 cutoffs[bin] = y[0]
 for i, u := range y[1:] {
 if u == y[i] {
 continue
 }
 bin++
 cutoffs[bin] = u
 }
 cutoffs = cutoffs[:bin+1]
} else {
 // Don't mutate the provided cutoffs.
 tmp := cutoffs
 cutoffs = make([]float64, len(cutoffs))
 copy(cutoffs, tmp)
}

tpr = make([]float64, len(cutoffs))
fpr = make([]float64, len(cutoffs))
var bin int
var nPos, nNeg float64
for i, u := range classes {
 // Update the bin until it matches the next y value
 // skipping empty bins.
 for bin < len(cutoffs)-1 && y[i] > cutoffs[bin] {
 bin++
 tpr[bin] = tpr[bin-1]
 }
}

```

```

 fpr[bin] = fpr[bin-1]
}
posWeight,
negWeight := 1.0, 0.0
if weights != nil {
 posWeight = weights[i]
}
if !u {
 posWeight, negWeight = negWeight, posWeight
}
nPos += posWeight
nNeg += negWeight
if y[i] <= cutoffs[bin] {
 tpr[bin] += posWeight
 fpr[bin] += negWeight
}
}

invNeg := 1 / nNeg
invPos := 1 / nPos
for i := range tpr {
 tpr[i] *= invPos
 tpr[i] = 1 - tpr[i]
 fpr[i] *= invNeg
 fpr[i] = 1 - fpr[i]
}
for i, j := 0, len(tpr)-1; i < j; i, j = i+1, j-1 {
 tpr[i], tpr[j] = tpr[j], tpr[i]
 fpr[i], fpr[j] = fpr[j], fpr[i]
}
for i, j := 1, len(cutoffs)-1; i < j; i, j = i+1, j-1 {
 cutoffs[i], cutoffs[j] = cutoffs[j], cutoffs[i]
}
cutoffs[0] = math.Inf(1)

return tpr, fpr, cutoffs
}
graph{{NodeW}NodeW{NodeW{}}NodeN}}
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// license that can be found in the LICENSE file.

package stat_test

import (
 "fmt"
 "math"

```

```

"gonum.org/v1/gonum/floats"
"gonum.org/v1/gonum/integrate"
"gonum.org/v1/gonum/stat"
)

func ExampleROC_weighted() {
y := []float64{0, 3, 5, 6, 7.5, 8}
classes := []bool{false, true, false, true, true, true}
weights := []float64{4, 1, 6, 3, 2, 2}

tpr, fpr, _ := stat.ROC(nil, y, classes, weights)
fmt.Printf("true positive rate: %v\n", tpr)
fmt.Printf("false positive rate: %v\n", fpr)

// Output:
// true positive rate: [0 0.25 0.5 0.875 0.875 1 1]
// false positive rate: [0 0 0 0 0.6 0.6 1]
}

func ExampleROC_unweighted() {
y := []float64{0, 3, 5, 6, 7.5, 8}
classes := []bool{false, true, false, true, true, true}

tpr, fpr, _ := stat.ROC(nil, y, classes, nil)
fmt.Printf("true positive rate: %v\n", tpr)
fmt.Printf("false positive rate: %v\n", fpr)

// Output:
// true
// positive rate: [0 0.25 0.5 0.75 0.75 1 1]
// false positive rate: [0 0 0 0 0.5 0.5 1]
}

func ExampleROC_threshold() {
y := []float64{0.1, 0.4, 0.35, 0.8}
classes := []bool{false, false, true, true}
stat.SortWeightedLabeled(y, classes, nil)

tpr, fpr, thresh := stat.ROC(nil, y, classes, nil)
fmt.Printf("true positive rate: %v\n", tpr)
fmt.Printf("false positive rate: %v\n", fpr)
fmt.Printf("cutoff thresholds: %v\n", thresh)

// Output:
// true positive rate: [0 0.5 0.5 1 1]
// false positive rate: [0 0 0.5 0.5 1]
// cutoff thresholds: [+Inf 0.8 0.4 0.35 0.1]
}

```

```

func ExampleROC_unsorted() {
 y := []float64{8, 7.5, 6, 5, 3, 0}
 classes := []bool{true, true, true, false, true, false}
 weights := []float64{2, 2, 3, 6, 1, 4}

 stat.SortWeightedLabeled(y, classes, weights)

 tpr, fpr, _ := stat.ROC(nil, y, classes, weights)
 fmt.Printf("true positive rate: %v\n", tpr)
 fmt.Printf("false positive rate: %v\n", fpr)

 // Output:
 // true positive rate: [0 0.25 0.5 0.875 0.875
 // 1 1]
 // false positive rate: [0 0 0 0 0.6 0.6 1]
}

func ExampleROC_knownCutoffs() {
 y := []float64{8, 7.5, 6, 5, 3, 0}
 classes := []bool{true, true, true, false, true, false}
 weights := []float64{2, 2, 3, 6, 1, 4}
 cutoffs := []float64{-1, 3, 4}

 stat.SortWeightedLabeled(y, classes, weights)

 tpr, fpr, _ := stat.ROC(cutoffs, y, classes, weights)
 fmt.Printf("true positive rate: %v\n", tpr)
 fmt.Printf("false positive rate: %v\n", fpr)

 // Output:
 // true positive rate: [0.875 0.875 1]
 // false positive rate: [0.6 0.6 1]
}

func ExampleROC_equallySpacedCutoffs() {
 y := []float64{8, 7.5, 6, 5, 3, 0}
 classes := []bool{true, true, true, false, true, true}
 weights := []float64{2, 2, 3, 6, 1, 4}
 n := 9

 stat.SortWeightedLabeled(y, classes, weights)
 cutoffs := make([]float64, n)
 floats.Span(cutoffs, math.Nextafter(y[0], y[0]-1), y[len(y)-1])

 tpr, fpr, _ := stat.ROC(cutoffs, y, classes, weights)
 fmt.Printf("true positive rate: %.3v\n", tpr)
 fmt.Printf("false positive

```

```

rate: %.3v\n", fpr)

// Output:
// true positive rate: [0 0.333 0.333 0.583 0.583 0.583 0.667 0.667 1]
// false positive rate: [0 0 0 0 1 1 1 1 1]
}

func ExampleROC_aUC() {
y := []float64{0.1, 0.35, 0.4, 0.8}
classes := []bool{true, false, true, false}

tpr, fpr, _ := stat.ROC(nil, y, classes, nil)

// Compute Area Under Curve.
auc := integrate.Trapezoidal(fpr, tpr)
fmt.Printf("true positive rate: %v\n", tpr)
fmt.Printf("false positive rate: %v\n", fpr)
fmt.Printf("auc: %v\n", auc)

// Output:
// true positive rate: [0 0 0.5 0.5 1]
// false positive rate: [0 0.5 0.5 1 1]
// auc: 0.25
}
graph{N{N}{N{N}{N}N}}
graph{{DIGR1}{DIGR1}DIGR1}{DIGR1{DIGR1}{DIGR1}}{DIGR1}DIGR1}}
// Code generated by "go generate gonum.org/v1/gonum/unit/constant; DO NOT EDIT.

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// license that can be found in the LICENSE file.

package constant

import (
 "fmt"
 "testing"
)

func TestBoltzmannFormat(t *testing.T) {
 for _, test := range []struct {
 format string
 want string
 }{
 {"%v", "1.380649e-23 kg m^2 K^-1 s^-2"},
 {"%.1v", "1e-23 kg m^2 K^-1 s^-2"},
 {"%50.1v", "1e-23 kg m^2 K^-1 s^-2"},
 {"%50v", "1.380649e-23 kg m^2 K^-1 s^-2"},
 }{

```

```

{"%1v", "1.380649e-23 kg m^2 K^-1 s^-2"},
{"%#v", "constant.boltzmannUnits(1.380649e-23)"},
{"%s", "%!s(constant.boltzmannUnits=1.380649e-23 kg m^2 K^-1 s^-2)"},
} {
got := fmt.Sprintf(test.format, Boltzmann)
if got != test.want {
t.Errorf("Format %q: got: %q want: %q", test.format, got, test.want)
}
}
}
graph{SubGau}
// Code generated by "go generate gonum.org/v1/gonum/unit/constant; DO NOT EDIT.

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package constant

import (
 "fmt"

 "gonum.org/v1/gonum/unit"
)

// Planck is the Planck constant (h), it relates the energy carried by a photon to its frequency.
// The dimensions of Planck are kg m^2 s^-1. The constant is exact.
const Planck = planckUnits(6.62607015e-34)

type planckUnits float64

// Unit converts the planckUnits to a *unit.Unit
func (cnst planckUnits) Unit() *unit.Unit {
 return unit.New(float64(cnst), unit.Dimensions{
 unit.MassDim: 1,
 unit.LengthDim: 2,
 unit.TimeDim: -1,
 })
}

func (cnst planckUnits) Format(fs fmt.State, c rune) {
 switch c {
 case 'v':
 if fs.Flag('#') {
 fmt.Fprintf(fs, "%T(%v)", cnst, float64(cnst))
 return
 }
 }
 fallthrough

```





```

// its children's weights; the children of
// an element i can be found at positions
// $2*(i+1)-1$ and $2*(i+1)$. The root of the
// weight heap is at element 0.
//
// See comments in container/heap for an
// explanation of the layout of a heap.
heap []float64

src rand.Source
}

// NewCategorical
constructs a new categorical distribution where the probability
// that x equals i is proportional to w[i]. All of the weights must be
// nonnegative, and at least one of the weights must be positive.
func NewCategorical(w []float64, src rand.Source) Categorical {
 c := Categorical{
 weights: make([]float64, len(w)),
 heap: make([]float64, len(w)),
 src: src,
 }
 c.ReweightAll(w)
 return c
}

// CDF computes the value of the cumulative density function at x.
func (c Categorical) CDF(x float64) float64 {
 var cdf float64
 for i, w := range c.weights {
 if x < float64(i) {
 break
 }
 cdf += w
 }
 return cdf / c.heap[0]
}

// Entropy returns the entropy of the distribution.
func (c Categorical) Entropy() float64 {
 var ent float64
 for _, w := range c.weights {
 if w == 0 {
 continue
 }
 p := w / c.heap[0]
 ent += p * math.Log(p)
 }
}

```

```

return -ent
}

// Len returns the number of values x could possibly take (the length of the
// initial supplied weight vector).
func (c
Categorical) Len() int {
return len(c.weights)
}

// Mean returns the mean of the probability distribution.
func (c Categorical) Mean() float64 {
var mean float64
for i, v := range c.weights {
mean += float64(i) * v
}
return mean / c.heap[0]
}

// Prob computes the value of the probability density function at x.
func (c Categorical) Prob(x float64) float64 {
xi := int(x)
if float64(xi) != x {
return 0
}
if xi < 0 || xi > len(c.weights)-1 {
return 0
}
return c.weights[xi] / c.heap[0]
}

// LogProb computes the natural logarithm of the value of the probability density function at x.
func (c Categorical) LogProb(x float64) float64 {
return math.Log(c.Prob(x))
}

// Rand returns a random draw from the categorical distribution.
func (c Categorical) Rand() float64 {
var r float64
if c.src == nil {
r = c.heap[0] * rand.Float64()
} else {
r = c.heap[0] * rand.New(c.src).Float64()
}
i := 1
last := -1
left := len(c.weights)
for {

```

```

 if r -= c.weights[i-1]; r <= 0 {
 break
 }
 // Fall within item i-1.
}
i <= 1 // Move to left child.
if d := c.heap[i-1]; r > d {
 r -= d
 // If enough r to pass left child,
 // move to right child state will
 // be caught at break above.
 i++
}
if i == last || left < 0 {
 panic("categorical: bad sample")
}
last = i
left--
}
return float64(i - 1)
}

// Reweight sets the weight of item idx to w. The input weight must be
// non-negative, and after reweighting at least one of the weights must be
// positive.
func (c Categorical) Reweight(idx int, w float64) {
 if w < 0 {
 panic("categorical: negative weight")
 }
 w, c.weights[idx] = c.weights[idx]-w, w
 idx++
 for idx > 0 {
 c.heap[idx-1] -= w
 idx >>= 1
 }
 if c.heap[0] <= 0 {
 panic("categorical: sum of the weights non-positive")
 }
}

// ReweightAll resets the weights of the distribution. ReweightAll panics if
// len(w) != c.Len. All of the weights must be nonnegative, and at least one of
// the weights must be positive.
func (c Categorical)
 ReweightAll(w []float64) {
 if len(w) != c.Len() {
 panic("categorical: length of the slices do not match")
 }
 for _, v := range w {

```

```

 if v < 0 {
 panic("categorical: negative weight")
 }
}
copy(c.weights, w)
c.reset()
}

func (c Categorical) reset() {
 copy(c.heap, c.weights)
 for i := len(c.heap) - 1; i > 0; i-- {
 // Sometimes 1-based counting makes sense.
 c.heap[(((i+1)>>1)-1)] += c.heap[i]
 }
 // TODO(btracey): Renormalization for weird weights?
 if c.heap[0] <= 0 {
 panic("categorical: sum of the weights non-positive")
 }
}
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package topo

import (
 "testing"

 "gonum.org/v1/gonum/graph"
 "gonum.org/v1/gonum/graph/graphs/gen"
 "gonum.org/v1/gonum/graph/simple"
)

var (
 gnpDirected_10_tenth = gnpDirected(10, 0.1)
 gnpDirected_100_tenth = gnpDirected(100, 0.1)
 gnpDirected_1000_tenth = gnpDirected(1000, 0.1)
 gnpDirected_10_half = gnpDirected(10, 0.5)
 gnpDirected_100_half = gnpDirected(100, 0.5)
 gnpDirected_1000_half = gnpDirected(1000, 0.5)
)

func gnpDirected(n int, p float64) graph.Directed {
 g := simple.NewDirectedGraph()
 gen.Gnp(g, n, p, nil)
 return g
}

```

```

func benchmarkTarjanSCC(b *testing.B, g graph.Directed) {
 var sccs [][]graph.Node
 for i := 0; i < b.N; i++ {
 sccs = TarjanSCC(g)
 }
 if len(sccs) == 0 {
 b.Fatal("unexpected number zero-sized SCC set")
 }
}

func BenchmarkTarjanSCCGnp_10_tenth(b *testing.B) {
 benchmarkTarjanSCC(b,
 gnpDirected_10_tenth)
}
func BenchmarkTarjanSCCGnp_100_tenth(b *testing.B) {
 benchmarkTarjanSCC(b, gnpDirected_100_tenth)
}
func BenchmarkTarjanSCCGnp_1000_tenth(b *testing.B) {
 benchmarkTarjanSCC(b, gnpDirected_1000_tenth)
}
func BenchmarkTarjanSCCGnp_10_half(b *testing.B) {
 benchmarkTarjanSCC(b, gnpDirected_10_half)
}
func BenchmarkTarjanSCCGnp_100_half(b *testing.B) {
 benchmarkTarjanSCC(b, gnpDirected_100_half)
}
func BenchmarkTarjanSCCGnp_1000_half(b *testing.B) {
 benchmarkTarjanSCC(b, gnpDirected_1000_half)
}
graph{Nn{Nn}Na{Nn{Nn}Nn{Nn{Nn}Nn}Nn{Nn}Na{Nn{Nn}Nn{Nn{Nn}Nn}Nn}}
graph{"\
\
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\\\"}
mathext
[![GoDoc](https://godoc.org/gonum.org/v1/gonum/mathext?status.svg)](https://godoc.org/gonum.org/v1/gonum/mat
hex)

```

Package mathext implements basic elementary functions not included in the Go standard library.

```

graph{{ST_{{{ST_{{{ST_}ST_}ST_}ST_}ST_}}}ST_}
graph{{{GRAP}GRAP}GRAP}

```

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```
package f64
```

```
import (
 "fmt"
 "testing"
)
```

```
const (
 testLen = 1e5
)
```

```
var (
 a = 2.0
 x = make([]float64, testLen)
 y = make([]float64, testLen)
 z = make([]float64, testLen)
)
```

```
func init() {
 for n := range x {
 x[n] = float64(n)
 y[n] = float64(n)
 }
}
```

```
func BenchmarkAxyUnitary(t *testing.B) {
 naiveaxpyu := func(a float64, x, y []float64) {
 for i, v := range x {
 y[i] += a * v
 }
 }
 tests := []struct {
 name string
 f func(a float64, x, y []float64)
 }{
 {"AxyUnitary", AxyUnitary},
 {"NaiveAxyUnitary", naiveaxpyu},
 }
 for _, test := range tests {
 for _, ln := range []uintptr{1, 3, 10, 30, 1e2, 3e2, 1e3, 3e3, 1e4, 3e4, 1e5} {
 t.Run(fmt.Sprintf("%s-%d", test.name, ln), func(b *testing.B) {
 b.SetBytes(int64(64 * ln))
 x, y := x[:ln], y[:ln]
 b.ResetTimer()
 })
 }
 }
}
```

```

 for i := 0; i < b.N; i++ {
 test.f(a,
 x, y)
 }
})
}
}
}

func BenchmarkAxyUnitaryTo(t *testing.B) {
 naiveaxyut := func(d []float64, a float64, x, y []float64) {
 for i, v := range x {
 d[i] = y[i] + a*v
 }
 }
 tests := []struct {
 name string
 f func(z []float64, a float64, x, y []float64)
 }{
 {"AxyUnitaryTo", AxyUnitaryTo},
 {"NaiveAxyUnitaryTo", naiveaxyut},
 }
 for _, test := range tests {
 for _, ln := range []uintptr{1, 3, 10, 30, 1e2, 3e2, 1e3, 3e3, 1e4, 3e4, 1e5} {
 t.Run(fmt.Sprintf("%s-%d", test.name, ln), func(b *testing.B) {
 b.SetBytes(int64(64 * ln))
 x, y, z := x[:ln], y[:ln], z[:ln]
 b.ResetTimer()
 for i := 0; i < b.N; i++ {
 test.f(z, a, x, y)
 }
 })
 }
 }
}

var incsAxy = []struct {
 len uintptr
 inc []int
}{
 {1, []int{1}},
 {2, []int{1, 2, 4, 10}},
 {3, []int{1, 2, 4, 10}},
 {4, []int{1, 2, 4, 10}},
 {5, []int{1, 2, 4, 10}},
 {10, []int{1, 2, 4, 10}},
 {500, []int{1, 2, 4, 10}},
 {1e3, []int{1, 2, 4, 10}},
}

```

```
{1e4, []int{1, 2, 4, 10, -1, -2, -4,
-10}},
}
```

```
func BenchmarkAxyInc(t *testing.B) {
 naiveaxyinc := func(alpha float64, x, y []float64, n, incX, incY, ix, iy uintptr) {
 for i := 0; i < int(n); i++ {
 y[iy] += alpha * x[ix]
 ix += incX
 iy += incY
 }
 }
 tests := []struct {
 name string
 f func(alpha float64, x, y []float64, n, incX, incY, ix, iy uintptr)
 }{
 {"AxyInc", AxyInc},
 {"NaiveAxyInc", naiveaxyinc},
 }
 for _, test := range tests {
 for _, tt := range incsAxy {
 for _, inc := range tt.inc {
 t.Run(fmt.Sprintf("%s-%d-inc(%d)", test.name, tt.len, inc), func(b *testing.B) {
 b.SetBytes(int64(64 * tt.len))
 var idx, tstInc uintptr = 0, uintptr(inc)
 if inc < 0 {
 idx = uintptr((-int(tt.len) + 1) * inc)
 }
 for i := 0; i < b.N; i++ {
 test.f(a, x, y, uintptr(tt.len), tstInc, tstInc, idx, idx)
 }
 })
 }
 }
 }
}
```

```
func BenchmarkAxyIncTo(t *testing.B) {
 naiveaxyincto := func(dst []float64, incDst, idst uintptr, alpha float64, x, y []float64, n, incX,
 incY, ix, iy uintptr) {
 for i := 0; i < int(n); i++ {
 dst[idst] = alpha*x[ix] + y[iy]
 ix += incX
 iy += incY
 idst += incDst
 }
 }
 tests := []struct {
```



```

name string
f func(dst []float64, incDst, idst uintptr, alpha float64, x, y []float64, n, incX, incY, ix, iy uintptr)
){
{"AxyIncTo", AxyIncTo},
{"NaiveAxyIncTo", naiveaxyincto},
}
for _, test := range tests {
for _, tt := range incsAxy {
for _, inc := range tt.inc {
t.Run(fmt.Sprintf("%s-%d-inc(%d)", test.name, tt.len, inc), func(b *testing.B) {
b.SetBytes(int64(64 * tt.len))
var idx, tstInc uintptr = 0, uintptr(inc)
if inc < 0 {
idx = uintptr((-int(tt.len) + 1) * inc)
}
for i := 0; i < b.N; i++ {
test.f(z, tstInc, idx, a, x, y, uintptr(tt.len),
tstInc, tstInc, idx, idx)
}
})
}
}
}
}
graph{DiGra{{{DiGra}DiGra}DiGra}}
graph{ED{ED{ED}ED}ED{ED}}
graph{{{digraa}digraa{{{digraa}digrag}}}digrag}digrag}
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```

```
package ordered
```

```
import "gonum.org/v1/gonum/graph"
```

```
// ByID implements the sort.Interface sorting a slice of graph.Node
```

```
// by ID.
```

```
type ByID []graph.Node
```

```
func (n ByID) Len() int { return len(n) }
```

```
func (n ByID) Less(i, j int) bool { return n[i].ID() < n[j].ID() }
```

```
func (n ByID) Swap(i, j int) { n[i], n[j] = n[j], n[i] }
```

```
// BySliceValues implements the sort.Interface sorting a slice of
```

```
// []int64 lexically by the values of the []int64.
```

```
type BySliceValues [][]int64
```

```
func (c BySliceValues) Len() int { return len(c) }
```

```

func (c BySliceValues) Less(i, j int) bool {
 a, b := c[i], c[j]
 l := len(a)
 if len(b) < l {
 l = len(b)
 }
 for k, v := range a[:l] {
 if v < b[k] {
 return true
 }
 if v > b[k] {
 return false
 }
 }
 return len(a) < len(b)
}
func (c BySliceValues) Swap(i, j int) { c[i], c[j] = c[j], c[i] }

```

```

//
// BySliceIDs implements the sort.Interface sorting a slice of
// []graph.Node lexically by the IDs of the []graph.Node.
type BySliceIDs [][]graph.Node

```

```

func (c BySliceIDs) Len() int { return len(c) }
func (c BySliceIDs) Less(i, j int) bool {
 a, b := c[i], c[j]
 l := len(a)
 if len(b) < l {
 l = len(b)
 }
 for k, v := range a[:l] {
 if v.ID() < b[k].ID() {
 return true
 }
 if v.ID() > b[k].ID() {
 return false
 }
 }
 return len(a) < len(b)
}
func (c BySliceIDs) Swap(i, j int) { c[i], c[j] = c[j], c[i] }

```

```

// Int64s implements the sort.Interface sorting a slice of
// int64.
type Int64s []int64

```

```

func (s Int64s) Len() int { return len(s) }
func (s Int64s) Less(i, j int) bool { return s[i] < s[j] }

```

```
func (s Int64s) Swap(i, j int) { s[i], s[j] = s[j], s[i] }

// Reverse reverses the order of nodes.
func Reverse(nodes []graph.Node) {
 for i, j := 0, len(nodes)-1; i < j; i, j = i+1, j-1 {
 nodes[i], nodes[j] = nodes[j], nodes[i]
 }
}

// LinesByIDs implements the sort.Interface
sorting a slice of graph.LinesByIDs
// lexically by the From IDs, then by the To IDs, finally by the Line IDs.
type LinesByIDs []graph.Line

func (n LinesByIDs) Len() int { return len(n) }
func (n LinesByIDs) Less(i, j int) bool {
 a, b := n[i], n[j]
 if a.From().ID() != b.From().ID() {
 return a.From().ID() < b.From().ID()
 }
 if a.To().ID() != b.To().ID() {
 return a.To().ID() < b.To().ID()
 }
 return n[i].ID() < n[j].ID()
}
func (n LinesByIDs) Swap(i, j int) { n[i], n[j] = n[j], n[i] }
graph{{DIGR{DIGR}DIGR{DIGR}}}
graph{g_{g_{g_}g_{g_{g_}g_{g_}g_}}
Graph{{{EDGG}{EDGG}{EDGG}{EDGG}}}
digraph{e[l=<<"> <R> <">a<D> <D>r<D> <D>r</> </> <">a</> <D>r</> </> </>>l=""']n->g[l=""']g->l[l=""']}
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// license that can be found in the LICENSE file.

package fd

import (
 "math"
 "runtime"
)

// A Point is a stencil location in a finite difference formula.
type Point struct {
 Loc float64
 Coeff float64
}

// Formula represents a finite difference formula on a regularly spaced grid
```

```

// that approximates the derivative of order k of a function f at x as
// $d^k f(x) (1 / \text{Step}^k) * \sum_i \text{Coeff}_i * f(x + \text{Step} * \text{Loc}_i)$.
// Step must be positive, or the finite difference formula will panic.
type Formula struct {
 // Stencil is the set of sampling Points which are used to estimate the
 // derivative. The locations will be scaled by Step and are relative to x.
 Stencil []Point
 Derivative int // The order of the approximated derivative.
 Step float64 // Default step size for the formula.
}

func (f Formula) isZero() bool {
 return f.Stencil == nil && f.Derivative
 == 0 && f.Step == 0
}

// Settings is the settings structure for computing finite differences.
type Settings struct {
 // Formula is the finite difference formula used
 // for approximating the derivative.
 // Zero value indicates a default formula.
 Formula Formula
 // Step is the distance between points of the stencil.
 // If equal to 0, formula's default step will be used.
 Step float64

 OriginKnown bool // Flag that the value at the origin x is known.
 OriginValue float64 // Value at the origin (only used if OriginKnown is true).

 Concurrent bool // Should the function calls be executed concurrently.
}

// Forward represents a first-order accurate forward approximation
// to the first derivative.
var Forward = Formula{
 Stencil: []Point{{Loc: 0, Coeff: -1}, {Loc: 1, Coeff: 1}},
 Derivative: 1,
 Step: 2e-8,
}

// Forward2nd represents a first-order accurate forward approximation
// to the second derivative.
var Forward2nd = Formula{
 Stencil: []Point{{Loc: 0, Coeff:
 1}, {Loc: 1, Coeff: -2}, {Loc: 2, Coeff: 1}},
 Derivative: 2,
 Step: 1e-4,
}

```

```

// Backward represents a first-order accurate backward approximation
// to the first derivative.
var Backward = Formula{
 Stencil: []Point{{Loc: -1, Coeff: -1}, {Loc: 0, Coeff: 1}},
 Derivative: 1,
 Step: 2e-8,
}

// Backward2nd represents a first-order accurate forward approximation
// to the second derivative.
var Backward2nd = Formula{
 Stencil: []Point{{Loc: 0, Coeff: 1}, {Loc: -1, Coeff: -2}, {Loc: -2, Coeff: 1}},
 Derivative: 2,
 Step: 1e-4,
}

// Central represents a second-order accurate centered approximation
// to the first derivative.
var Central = Formula{
 Stencil: []Point{{Loc: -1, Coeff: -0.5}, {Loc: 1, Coeff: 0.5}},
 Derivative: 1,
 Step: 6e-6,
}

// Central2nd represents a second-order accurate centered approximation
// to the second derivative.
var Central2nd = Formula{
 Stencil: []Point{{Loc: -1, Coeff: 1}, {Loc: 0, Coeff: -2}, {Loc: 1, Coeff: 1}},
 Derivative:
 2,
 Step: 1e-4,
}

var negativeStep = "fd: negative step"

// checkFormula checks if the formula is valid, and panics otherwise.
func checkFormula(formula Formula) {
 if formula.Derivative == 0 || formula.Stencil == nil || formula.Step <= 0 {
 panic("fd: bad formula")
 }
}

// computeWorkers returns the desired number of workers given the concurrency
// level and number of evaluations.
func computeWorkers(concurrent bool, evals int) int {
 if !concurrent {
 return 1
 }
}

```

```

}
nWorkers := runtime.GOMAXPROCS(0)
if nWorkers > evals {
 nWorkers = evals
}
return nWorkers
}

// usesOrigin returns whether the stencil uses the origin, which is true iff
// one of the locations in the stencil equals 0.
func usesOrigin(stencil []Point) bool {
 for _, pt := range stencil {
 if pt.Loc == 0 {
 return true
 }
 }
 return false
}

// getOrigin returns the value at the origin. It returns originValue if originKnown
// is true. It returns the value returned by f if stencil contains a point
// with
// zero location, and NaN otherwise.
func getOrigin(originKnown bool, originValue float64, f func() float64, stencil []Point) float64 {
 if originKnown {
 return originValue
 }
 for _, pt := range stencil {
 if pt.Loc == 0 {
 return f()
 }
 }
 return math.NaN()
}

const (
 badDerivOrder = "fd: invalid derivative order"
)
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package gen

import (
 "errors"
 "fmt"

```

"golang.org/x/exp/rand"

"gonum.org/v1/gonum/graph"

"gonum.org/v1/gonum/graph/simple"

"gonum.org/v1/gonum/stat/sampleuv"

)

// TunableClusteringScaleFree constructs a subgraph in the destination, dst, of order n.

// The graph is constructed successively starting from an m order graph with one node

// having degree m-1. At each iteration of graph addition, one node is added with m

// additional edges joining existing nodes with probability proportional to the nodes'

// degrees. The edges are formed as a triad with probability, p.

// If src is not nil it is used as the random source, otherwise rand.Float64 and

// rand.Intn are used for the random number generators.

//

// The algorithm is essentially as described in <http://arxiv.org/abs/cond-mat/0110452>.

```
func TunableClusteringScaleFree(dst
graph.UndirectedBuilder, n, m int, p float64, src rand.Source) error {
 if p < 0 || p > 1 {
 return fmt.Errorf("gen: bad probability: p=%v", p)
 }
 if n <= m {
 return fmt.Errorf("gen: n <= m: n=%v m=%d", n, m)
 }
}
```

```
var (
 rnd func() float64
 rndN func(int) int
)
if src == nil {
 rnd = rand.Float64
 rndN = rand.Intn
} else {
 r := rand.New(src)
 rnd = r.Float64
 rndN = r.Intn
}
```

// Initial condition.

wt := make([]float64, n)

id := make([]int64, n)

for u := 0; u < m; u++ {

un := dst.NewNode()

dst.AddNode(un)

id[u] = un.ID()

// We need to give equal probability for

// adding the first generation of edges.

wt[u] = 1

```

}
ws := sampleuv.NewWeighted(wt, src)
for i := range wt {
 // These weights will organically grow
 // after the first growth iteration.
 wt[i] = 0
}

// Growth.
for v := m; v < n; v++ {
 vn := dst.NewNode()
 dst.AddNode(vn)
 id[v] = vn.ID()
 var u int
pa:
 for i := 0; i < m; i++ {
 // Triad formation.
 if i != 0 && rnd() < p
 {
 // TODO(kortschak): Decide whether the node
 // order in this input to permute should be
 // sorted first to allow repeatable runs.
 for _, w := range permute(graph.NodesOf(dst.From(id[u])), rndN) {
 wid := w.ID()
 if wid == id[v] || dst.HasEdgeBetween(wid, id[v]) {
 continue
 }

 dst.SetEdge(dst.NewEdge(w, vn))
 wt[wid]++
 wt[v]++
 continue pa
 }
 }

 // Preferential attachment.
 for {
 var ok bool
 u, ok = ws.Take()
 if !ok {
 return errors.New("gen: depleted distribution")
 }
 if u == v || dst.HasEdgeBetween(id[u], id[v]) {
 continue
 }
 dst.SetEdge(dst.NewEdge(dst.Node(id[u]), vn))
 wt[u]++
 wt[v]++
 }
}

```



```

 break
}
}

ws.ReweightAll(wt)
}

return nil
}

func permute(n []graph.Node, rnd func(int) int) []graph.Node {
 for i := range n[:len(n)-1] {
 j := rnd(len(n)-i) + i
 n[i], n[j] = n[j], n[i]
 }
 return n
}

// PreferentialAttachment constructs a graph in the destination, dst, of order
// n.
// The graph is constructed successively starting from an m order graph with one
// node having degree m-1. At each iteration of graph addition, one node is added
// with m additional edges joining existing nodes with probability proportional
// to the nodes' degrees. If src is not nil it is used as the random source,
// otherwise rand.Float64 is used for the random number generator.
//
// The algorithm is essentially as described in http://arxiv.org/abs/cond-mat/0110452
// after 10.1126/science.286.5439.509.
func PreferentialAttachment(dst graph.UndirectedBuilder, n, m int, src rand.Source) error {
 if n <= m {
 return fmt.Errorf("gen: n <= m: n=%v m=%d", n, m)
 }

 // Initial condition.
 wt := make([]float64, n)
 for u := 0; u < m; u++ {
 if dst.Node(int64(u)) == nil {
 dst.AddNode(simple.Node(u))
 }
 // We need to give equal probability for
 // adding the first generation of edges.
 wt[u] = 1
 }
 ws := sampleuv.NewWeighted(wt, src)
 for i := range wt {
 // These weights
 // will organically grow
 // after the first growth iteration.

```

```

wt[i] = 0
}

// Growth.
for v := m; v < n; v++ {
 for i := 0; i < m; i++ {
 // Preferential attachment.
 u, ok := ws.Take()
 if !ok {
 return errors.New("gen: depleted distribution")
 }
 dst.SetEdge(simple.Edge{F: simple.Node(u), T: simple.Node(v)})
 wt[u]++
 wt[v]++
 }
 ws.ReweightAll(wt)
}

```

```

return nil
}
digraph{e[l=<<TAE B="0">
<TR>
 <TD HGErg="9023" w="234230">a</TD>
 <TD>cfdswr</TD>
</TR>
</TAE>>l=""n->g[l=""g->l=""}]

```

```

graph{NOA{NOA{NOA{NOA}}NOA}}
graph{St{St{St}}St}

```

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```

graph{Di{Di}{Di}}
graph{{striI}}
graph{St_}
graph{{{{DI_}}}DI_}
graph{{Su}{Su}{Su}Su{Su}}
graph{Digraph}
graph{{grap}{grap}{grap}}grap}
graph{SubGp{SubGp{SubGp}}SubGh{SubGp}}
graph{{ea""ea}}
graph{{SUB7{SUB7}{SUB7}SUB7{SUB7}SUB2}}
graph{{DIG_{DIG_{DIG_{DIG_}DIG_{DIG_}DIG_}}DIG_{DIG_}DIG_}}
graph{diGr_[diGr_=""diGr_=diGr_]
graph{{E_{E_}}E_{E_{E_}}E_{E_}E_{E_}}E_{E_{E_}}E_{E_}E_{E_}}
graph{{s{s}s}s{s}s{s{s}s}s{s}s}}
graph{subd{{subd{suba}{subd{suba}}}suba}}

```

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package c64

```
import (
 "math/cmplx"
 "testing"
)
```

```
func same(x, y complex64) bool {
 return x == y || (cmplx.IsNaN(complex128(x)) && cmplx.IsNaN(complex128(y)))
}
```

```
func guardVector(vec []complex64, gdVal complex64, gdLen int) (guarded []complex64) {
 guarded = make([]complex64, len(vec)+gdLen*2)
 copy(guarded[gdLen:], vec)
 for i := 0; i < gdLen; i++ {
 guarded[i] = gdVal
 guarded[len(guarded)-1-i] = gdVal
 }
 return guarded
}
```

```
func isValidGuard(vec []complex64, gdVal complex64, gdLen int) bool {
 for i := 0; i < gdLen; i++ {
 if !same(vec[i], gdVal) || !same(vec[len(vec)-1-i], gdVal) {
 return false
 }
 }
 return true
}
```

```
func guardIncVector(vec []complex64, gdVal complex64, inc, gdLen int) (guarded []complex64) {
 if inc < 0 {
 inc = -inc
 }
 inrLen := len(vec) * inc
 guarded = make([]complex64, inrLen+gdLen*2)
 for i :=
 range guarded {
 guarded[i] = gdVal
 }
 for i, v := range vec {
 guarded[gdLen+i*inc] = v
 }
 return guarded
}
```

```

}

func checkValidIncGuard(t *testing.T, vec []complex64, gdVal complex64, inc, gdLen int) {
 srcLen := len(vec) - 2*gdLen
 if inc < 0 {
 srcLen = len(vec) * -inc
 }

 for i := range vec {
 switch {
 case same(vec[i], gdVal):
 // Correct value
 case (i-gdLen)%inc == 0 && (i-gdLen)/inc < len(vec):
 // Ignore input values
 case i < gdLen:
 t.Errorf("Front guard violated at %d %v", i, vec[:gdLen])
 case i > gdLen+srcLen:
 t.Errorf("Back guard violated at %d %v", i-gdLen-srcLen, vec[gdLen+srcLen:])
 default:
 t.Errorf("Internal guard violated at %d %v", i-gdLen, vec[gdLen:gdLen+srcLen])
 }
 }
}

var (// Offset sets for testing alignment handling in Unitary assembly functions.
 align1 = []int{0, 1}
 align2 = newIncSet(0, 1)
 align3 = newIncToSet(0, 1)
)

type incSet struct {
 x, y int
}

// genInc will generate all (x,y) combinations of the input increment set.
func
 newIncSet(inc ...int) []incSet {
 n := len(inc)
 is := make([]incSet, n*n)
 for x := range inc {
 for y := range inc {
 is[x*n+y] = incSet{inc[x], inc[y]}
 }
 }
 return is
}

type incToSet struct {

```

```

dst, x, y int
}

// genIncTo will generate all (dst,x,y) combinations of the input increment set.
func newIncToSet(inc ...int) []incToSet {
 n := len(inc)
 is := make([]incToSet, n*n*n)
 for i, dst := range inc {
 for x := range inc {
 for y := range inc {
 is[i*n*n+x*n+y] = incToSet{dst, inc[x], inc[y]}
 }
 }
 }
 return is
}

graph{SubGp{SubGp}{SubGp{SubGp}}SubGh{SubGp}{SubGp<>SubGp<>SubGp}{SubGp}{}}
graph{{subGr_{subGr_}subGr_}}
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// license that can be found in the LICENSE file.

package testlapack

import (
 "math"
 "testing"

 "golang.org/x/exp/rand"

 "gonum.org/v1/gonum/floats"
)

type Dlaqr1er interface {
 Dlaqr1(n int, h []float64, ldh int, sr1, si1, sr2, si2 float64, v []float64)
}

func Dlaqr1Test(t *testing.T, impl Dlaqr1er) {
 rnd := rand.New(rand.NewSource(1))

 for _, n := range []int{2, 3} {
 for _, ldh := range []int{n, n + 1, n + 10} {
 for _, cas := range []int{1, 2} {
 for k := 0; k < 100; k++ {
 v := make([]float64, n)
 for i := range v {
 v[i] = math.NaN()
 }
 }
 }
 }
 }
}

```

```

h := make([]float64, n*(n-1)*ldh)
for i := range h {
 h[i] = math.NaN()
}
for i := 0; i < n; i++ {
 for j := 0; j < n; j++ {
 h[i*ldh+j] = rnd.NormFloat64()
 }
}
var sr1, sr2, si1, si2 float64
if cas == 1 {
 sr1 = rnd.NormFloat64()
 sr2 = sr1
 si1
= rnd.NormFloat64()
 si2 = -si1
} else {
 sr1 = rnd.NormFloat64()
 sr2 = rnd.NormFloat64()
 si1 = 0
 si2 = 0
}
impl.Dlaqr1(n, h, ldh, sr1, si1, sr2, si2, v)

```

// Matrix H - s1\*I.

```

h1 := make([]complex128, n*n)
for i := 0; i < n; i++ {
 for j := 0; j < n; j++ {
 h1[i*n+j] = complex(h[i*ldh+j], 0)
 if i == j {
 h1[i*n+j] -= complex(sr1, si1)
 }
 }
}

```

// First column of H - s2\*I.

```

h2 := make([]complex128, n)
for i := 0; i < n; i++ {
 h2[i] = complex(h[i*ldh], 0)
}
h2[0] -= complex(sr2, si2)

```

wantv := make([]float64, n)

// Multiply (H-s1\*I)\*(H-s2\*I) to get a tentative

// wantv.

```

for i := 0; i < n; i++ {
 for j := 0; j < n; j++ {
 wantv[i] += real(h1[i*n+j] * h2[j])
 }
}

```

```

 }
 // Get the unknown scale.
 scale := v[0] / wantv[0]
 // Compute the actual wantv.
 floats.Scale(scale, wantv)

 // The scale must be
 the same for all elements.
 if floats.Distance(wantv, v, math.Inf(1)) > 1e-13 {
 t.Errorf("n = %v, ldh = %v, case = %v: Unexpected value of v: got %v, want %v", n, ldh, cas, v, wantv)
 }
 }
 }
 }
 }
 }
 }
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 // license that can be found in the LICENSE file.

package distuv

import (
 "math"
 "sort"
 "testing"

 "gonum.org/v1/gonum/floats"

 "golang.org/x/exp/rand"
)

func TestGumbelRightProbCDF(t *testing.T) {
 for _, test := range []struct {
 x, mu, beta, wantProb, wantCDF float64
 }{
 // Values calculated with scipy.stats.gumbel_r .
 {-2, 0, 1, 0.0045662814201279153, 0.00061797898933109343},
 {0.01, 0, 1, 0.36786110881643569, 0.37155817442380817},
 {6, 0, 1, 0.0024726155730149077, 0.99752431739275249},

 // Values calculated with Wolfram Alpha's ExtremeValueDistribution.
 {0.1, 2, 5, 0.06776411497087929, 0.231706315790068},
 {0.1, -2, 5, 0.06811997894673336, 0.5183799456323944},
 {-2.1, -2, 0.1, 1.793740787340169, 0.06598803584531238},
 } {
 g := GumbelRight{Mu: test.mu, Beta: test.beta}
 pdf := g.Prob(test.x)
 }
}

```

```

 if !floats.EqualWithinAbsOrRel(pdf, test.wantProb, 1e-12,
1e-12) {
 t.Errorf("Prob mismatch, x = %v, mu = %v, beta = %v. Got %v, want %v", test.x, test.mu, test.beta, pdf,
test.wantProb)
 }
 cdf := g.CDF(test.x)
 if !floats.EqualWithinAbsOrRel(cdf, test.wantCDF, 1e-12, 1e-12) {
 t.Errorf("CDF mismatch, x = %v, mu = %v, beta = %v. Got %v, want %v", test.x, test.mu, test.beta, cdf,
test.wantCDF)
 }
}
}
}

```

```

func TestGumbelRight(t *testing.T) {
 src := rand.New(rand.NewSource(1))
 for i, b := range []GumbelRight{
 {0, 1, src},
 {-5, 6, src},
 {3, 0.1, src},
 } {
 testGumbelRight(t, b, i)
 }
}

```

```

func testGumbelRight(t *testing.T, g GumbelRight, i int) {
 const (
 tol = 1e-2
 n = 5e5
 bins = 50
)
 x := make([]float64, n)
 generateSamples(x, g)
 sort.Float64s(x)

```

```

 min := math.Inf(-1)
 testRandLogProbContinuous(t, i, min, x, g, tol, bins)
 checkProbContinuous(t, i, x, g, 1e-3)
 checkMean(t, i, x, g, tol)
 checkVarAndStd(t, i, x, g, tol)
 checkExKurtosis(t, i, x, g, 1e-1)
 checkSkewness(t, i, x, g, 5e-2)
 checkQuantileCDFSurvival(t,
i, x, g, 5e-3)
}

```

// Code generated by "go generate gonum.org/v1/gonum/unit/constant; DO NOT EDIT.

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```

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package constant

import (
 "fmt"

 "gonum.org/v1/gonum/unit"
)

// MagneticConstant is the magnetic constant (μ_0), the magnetic permeability in a classical vacuum.
// The dimensions of MagneticConstant are $A^2 s^4 kg^{-1} m^{-3}$. The standard uncertainty of the constant is $1.9e-16 A^2 s^4 kg^{-1} m^{-3}$.
const MagneticConstant = magneticConstantUnits(1.2566370621238374e-06)

type magneticConstantUnits float64

// Unit converts the magneticConstantUnits to a *unit.Unit
func (cnst magneticConstantUnits) Unit() *unit.Unit {
 return unit.New(float64(cnst), unit.Dimensions{
 unit.CurrentDim: 2,
 unit.TimeDim: 4,
 unit.MassDim: -1,
 unit.LengthDim: -3,
 })
}

func (cnst magneticConstantUnits) Format(fs fmt.State, c rune) {
 switch c {
 case 'v':
 if
 fs.Flag('#') {
 fmt.Fprintf(fs, "%T(%v)", cnst, float64(cnst))
 return
 }
 fallthrough
 case 'e', 'E', 'f', 'F', 'g', 'G':
 p, pOk := fs.Precision()
 w, wOk := fs.Width()
 switch {
 case pOk && wOk:
 fmt.Fprintf(fs, "%*.*"+string(c), w, p, cnst.Unit())
 case pOk:
 fmt.Fprintf(fs, "%. "+string(c), p, cnst.Unit())
 case wOk:
 fmt.Fprintf(fs, "%*"+string(c), w, cnst.Unit())
 default:
 fmt.Fprintf(fs, "%"+string(c), cnst.Unit())
 }
 }
}

```

```

 }
 default:
 fmt.Fprintf(fs, "%%!"+string(c)+"(constant.magneticConstantUnits=%v A^2 s^4 kg^-1 m^-3)", float64(cnst))
 }
}

graph{{dig_}}
<?xml version="1.0" encoding="UTF-8"?>
<gexf xmlns="http://www.gexf.net/1.2draft" version="1.2">
 <graph mode="static" defaultedgetype="directed">
 <nodes>
 <node id="0" label="Hello" />
 <node id="1" label="Word" />
 </nodes>
 <edges>
 <edge id="0" source="0" target="1" />
 </edges>
 </graph>
</gexf>
graph{DiGr{{{DiGr}DiGr}DiGr}}
graph{{ED}ED}
// Copyright 2016 The Gonum Authors. All rights reserved.
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package testlapack

import (
 "math"
 "sort"
 "testing"

 "golang.org/x/exp/rand"

 "gonum.org/v1/gonum/floats"
)

type Dsterfer interface {
 Dgetrfer
 Dsterf(n int, d, e []float64) (ok bool)
}

func DsterfTest(t *testing.T, impl Dsterfer) {
 // Hand coded tests.
 for cas, test := range []struct {
 d []float64
 e []float64
 n int
 }{

```

```

ans []float64
}{
// Computed from Fortran code.
{
d: []float64{1, 3, 4, 6},
e: []float64{2, 4, 5},
n: 4,
ans: []float64{11.046227528488854, 4.795922173417400, -2.546379458290125, 0.704229756383872},
},
} {
n := test.n
d := make([]float64, len(test.d))
copy(d, test.d)
e := make([]float64, len(test.e))
copy(e, test.e)
ok := impl.Dsterf(n, d, e)
if !ok {
t.Errorf("Case %d, Eigenvalue decomposition failed", cas)
continue
}
ans := make([]float64, len(test.ans))
copy(ans,
test.ans)
sort.Float64s(ans)
if !floats.EqualApprox(ans, d, 1e-10) {
t.Errorf("eigenvalue mismatch")
}
}

rnd := rand.New(rand.NewSource(1))
// Probabilistic tests.
for _, n := range []int{4, 6, 10} {
for cas := 0; cas < 10; cas++ {
d := make([]float64, n)
for i := range d {
d[i] = rnd.NormFloat64()
}
dCopy := make([]float64, len(d))
copy(dCopy, d)
e := make([]float64, n-1)
for i := range e {
e[i] = rnd.NormFloat64()
}
eCopy := make([]float64, len(e))
copy(eCopy, e)

ok := impl.Dsterf(n, d, e)
if !ok {

```

```

t.Errorf("Eigenvalue decomposition failed")
continue
}

// Test that the eigenvalues are sorted.
if !sort.Float64sAreSorted(d) {
t.Errorf("Values are not sorted")
}

// Construct original tridagonal matrix.
lda := n
a := make([]float64, n*lda)
for i := 0; i < n; i++ {
a[i*lda+i] = dCopy[i]
if i != n-1 {
a[i*lda+i+1] = eCopy[i]
a[(i+1)*lda+i] = eCopy[i]
}
}

asub
:= make([]float64, len(a))
ipiv := make([]int, n)

// Test that they are actually eigenvalues by computing the
// determinant of A - I.
// TODO(btracey): Replace this test with a more numerically stable
// test.
for _, lambda := range d {
copy(asub, a)
for i := 0; i < n; i++ {
asub[i*lda+i] -= lambda
}

// Compute LU.
ok := impl.Dgetrf(n, n, asub, lda, ipiv)
if !ok {
// Definitely singular.
continue
}

// Compute determinant.
var logdet float64
for i := 0; i < n; i++ {
v := asub[i*lda+i]
logdet += math.Log(math.Abs(v))
}
if math.Exp(logdet) > 2 {
t.Errorf("Incorrect singular value. n = %d, cas = %d, det = %v", n, cas, math.Exp(logdet))
}
}

```

```

 }
 }
 }
 }
graph{STRIR{STRIR}STRIR{STRIR}{STRIR}STRIR}
graph{subgb{{{subgb{{subgb{{subgb{subgf}}}}}subgb}}}subgb}
graph{{{strictG}}}}
graph{{Sub1}{Sub1}Sub5}
graph{{{{{{{{str{str}}}}str{str}}}}str}}
graph{SUBo}
graph{DiG{DiG}DiG}
graph{{Subg{Subg}{Subg}{Subg}}
graph{<<TT><TT>}
graph{{{{grapQ}{grapJ{grapQ}{grapJ{grapQ}}}}}
graph{Stu}
graph{SubP{SubW}}
graph{{{{Digrap_}Digrap_}Digrap_}
graph{{Di_}{Di_}Di_}
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package layout

import (
 "gonum.org/v1/gonum/graph"
 "gonum.org/v1/gonum/spatial/r2"
)

// LayoutR2 implements graph layout updates and representations.
type LayoutR2 interface {
 // IsInitialized returns whether the Layout is initialized.
 IsInitialized() bool

 // SetCoord2 sets the coordinates of the node with the given
 // id to coords.
 SetCoord2(id int64, coords r2.Vector)

 // Coord2 returns the coordinates of the node with the given
 // id in the graph layout.
 Coord2(id int64) r2.Vector
}

// NewOptimizerR2 returns a new layout optimizer. If g implements LayoutR2 the layout
// will be updated into g, otherwise the OptimizerR2 will hold the graph layout. A nil
// value for update is a valid no-op layout update function.
func NewOptimizerR2(g graph.Graph, update func(graph.Graph, LayoutR2) bool) OptimizerR2 {

```

```

l, ok := g.(LayoutR2)
if
!ok {
 l = make(coordinatesR2)
}
return OptimizerR2{
 g: g,
 layout: l,
 Updater: update,
}
}

// coordinatesR2 is the default layout store for R2.
type coordinatesR2 map[int64]r2.Vec

func (c coordinatesR2) IsInitialized() bool { return len(c) != 0 }
func (c coordinatesR2) SetCoord2(id int64, pos r2.Vec) { c[id] = pos }
func (c coordinatesR2) Coord2(id int64) r2.Vec { return c[id] }

// OptimizerR2 is a helper type that holds a graph and layout
// optimization state.
type OptimizerR2 struct {
 g graph.Graph
 layout LayoutR2

 // Updater is the function called for each call to Update.
 // It updates the OptimizerR2's spatial distribution of the
 // nodes in the backing graph.
 Updater func(graph.Graph, LayoutR2) bool
}

// Coord2 returns the location of the node with the given
// ID. The returned value is only valid if the node exists
// in the graph.
func (g OptimizerR2) Coord2(id int64) r2.Vec {
 return g.layout.Coord2(id)
}

// Update
// updates the locations of the nodes in the graph
// according to the provided update function. It returns whether
// the update function is able to further refine the graph's
// node locations.
func (g OptimizerR2) Update() bool {
 if g.Updater == nil {
 return false
 }
 return g.Updater(g.g, g.layout)
}

```

```

}

// LayoutNodeR2 implements the GraphR2 interface.
func (g OptimizerR2) LayoutNodeR2(id int64) NodeR2 {
 n := g.g.Node(id)
 if n == nil {
 return NodeR2{}
 }
 return NodeR2{Node: n, Coord2: g.Coord2(id)}
}

// Node returns the node with the given ID if it exists
// in the graph, and nil otherwise.
func (g OptimizerR2) Node(id int64) graph.Node { return g.g.Node(id) }

// Nodes returns all the nodes in the graph.
func (g OptimizerR2) Nodes() graph.Nodes { return g.g.Nodes() }

// From returns all nodes that can be reached directly
// from the node with the given ID.
func (g OptimizerR2) From(id int64) graph.Nodes { return g.g.From(id) }

// HasEdgeBetween returns whether an edge exists
// between
// nodes with IDs xid and yid without considering direction.
func (g OptimizerR2) HasEdgeBetween(xid, yid int64) bool { return g.g.HasEdgeBetween(xid, yid) }

// Edge returns the edge from u to v, with IDs uid and vid,
// if such an edge exists and nil otherwise. The node v
// must be directly reachable from u as defined by the
// From method.
func (g OptimizerR2) Edge(uid, vid int64) graph.Edge { return g.g.Edge(uid, vid) }
<!--
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-->

{{define "robots"}}
<meta name="robots" content="noindex">
{{end}}

{{define "main-styles"}}
<link href="/static/frontend/unit/licenses/licenses.min.css?version={{.AppVersionLabel}}" rel="stylesheet">
{{end}}

{{define "main-header"}}
{{template "unit-header" .}}

```

```

{{end}}

{{define "main-content"}}
{{block "licenses" .Details}}{{end}}
{{end}}

{{define "licenses"}}
{{range .Licenses}}
<section class="License" id="{{.Anchor}}">
<h2 class="go-textTitle">
<div id="#{{.Anchor}}">{{range $i, $e := .Types}}{{if $i}}, {{end}}{{$e}}{{end}}</div>
</h2>
<p>This is not legal advice. Read disclaimer.</p>
<pre class="License-contents">{{printf "%s" .Contents}}</pre>
</section>
<div class="License-source go-textSubtle">Source: {{.Source}}</div>
{{end}}
{{end}}
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// Package quat provides the quaternion numeric type and functions.
//
// For a good treatment of uses and behaviors of quaternions, see
// the interactive videos by Ben Eater and Grant Sanderson here
// https://eater.net/quaternions.
package quat // imports "gonum.org/v1/gonum/num/quat"
graph{{SUBGR{SUBGR}SUBGR}SUBGR{SUBGR{SUBGR}}}
graph{{AAA}AAAAAAA}
graph{{g3{g2}}
graph{</></><->}
graph{{diGH}}
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package gonum

import (
 "math"

 "gonum.org/v1/gonum/blas"
 "gonum.org/v1/gonum/blas/blas64"
)

// Dlaqp2 computes a QR factorization with column pivoting of the block A[offset:m, 0:n]
// of the mn matrix A. The block A[0:offset, 0:n] is accordingly pivoted, but not factorized.

```



```

//
// On exit, the upper triangle of block A[offset:m, 0:n] is the triangular factor obtained.
// The elements in block A[offset:m, 0:n] below the diagonal, together with tau, represent
// the orthogonal matrix Q as a product of elementary reflectors.
//
// offset is number of rows of the matrix A that must be pivoted but not factorized.
// offset must not be negative otherwise Dlaqp2 will panic.
//
// On exit, jpvt holds the permutation that was applied; the jth column of A*P was the
// jpvt[j] column of A. jpvt must have length n, otherwise Dlaqp2 will
panic.
//
// On exit tau holds the scalar factors of the elementary reflectors. It must have length
// at least min(m-offset, n) otherwise Dlaqp2 will panic.
//
// vn1 and vn2 hold the partial and complete column norms respectively. They must have length n,
// otherwise Dlaqp2 will panic.
//
// work must have length n, otherwise Dlaqp2 will panic.
//
// Dlaqp2 is an internal routine. It is exported for testing purposes.
func (impl Implementation) Dlaqp2(m, n, offset int, a []float64, lda int, jpvt []int, tau, vn1, vn2, work []float64) {
 switch {
 case m < 0:
 panic(mLT0)
 case n < 0:
 panic(nLT0)
 case offset < 0:
 panic(offsetLT0)
 case offset > m:
 panic(offsetGTM)
 case lda < max(1, n):
 panic(badLdA)
 }

 // Quick return if possible.
 if m == 0 || n == 0 {
 return
 }

 mn := min(m-offset, n)
 switch {
 case len(a) < (m-1)*lda+n:
 panic(shortA)
 case len(jpvt) != n:
 panic(badLenJpvt)
 case len(tau) < mn:
 panic(shortTau)
 }
}

```

```

case len(vn1) < n:
 panic(shortVn1)
case len(vn2)
< n:
 panic(shortVn2)
case len(work) < n:
 panic(shortWork)
}

tol3z := math.Sqrt(dlamchE)

bi := blas64.Implementation()

// Compute factorization.
for i := 0; i < mn; i++ {
 offpi := offset + i

 // Determine ith pivot column and swap if necessary.
 p := i + bi.Idamax(n-i, vn1[i:], 1)
 if p != i {
 bi.Dswap(m, a[p:], lda, a[i:], lda)
 jpv[t[p], jpv[i]] = jpv[i], jpv[p]
 vn1[p] = vn1[i]
 vn2[p] = vn2[i]
 }

 // Generate elementary reflector H_i.
 if offpi < m-1 {
 a[offpi*lda+i], tau[i] = impl.Dlarfg(m-offpi, a[offpi*lda+i], a[(offpi+1)*lda+i:], lda)
 } else {
 tau[i] = 0
 }

 if i < n-1 {
 // Apply H_i to A[offset+i:m, i:n] from the left.
 aii := a[offpi*lda+i]
 a[offpi*lda+i] = 1
 impl.Dlarf(blas.Left, m-offpi, n-i-1, a[offpi*lda+i:], lda, tau[i], a[offpi*lda+i+1:], lda, work)
 a[offpi*lda+i] = aii
 }

 // Update partial column norms.
 for j := i + 1; j < n; j++ {
 if vn1[j] == 0 {
 continue
 }

 // The following marked lines

```

follow from the

```
// analysis in Lapack Working Note 176.
```

```
r := math.Abs(a[offpi*lda+j]) / vn1[j] // *
```

```
temp := math.Max(0, 1-r*r) // *
```

```
r = vn1[j] / vn2[j] // *
```

```
temp2 := temp * r * r // *
```

```
if temp2 < tol3z {
```

```
 var v float64
```

```
 if offpi < m-1 {
```

```
 v = bi.Dnrm2(m-offpi-1, a[(offpi+1)*lda+j:], lda)
```

```
 }
```

```
 vn1[j] = v
```

```
 vn2[j] = v
```

```
 } else {
```

```
 vn1[j] *= math.Sqrt(temp) // *
```

```
 }
```

```
 }
```

```
 }
```

```
 }
```

```
graph{{{S}S}S{S}}
```

```
graph{{SUBGS{SUBGS{SUB{SUBGS{SUBGS{SUBGV}}}}SUBGS{SUBGS{SUBGV}}}}SUBGV}}
```

```
graph{{DIE}{DIE}{DIE}{DIE}{DIE}{DIE}{DIE}{DIE}{DIE}{DIE}}
```

```
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```

```
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```

```
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```

```
package distmv
```

```
import (
```

```
 "math"
```

```
 "testing"
```

```
 "golang.org/x/exp/rand"
```

```
 "gonum.org/v1/gonum/mat"
```

```
)
```

```
func TestDirichlet(t *testing.T) {
```

```
 // Data from Scipy.
```

```
 for cas, test := range []struct {
```

```
 Dir *Dirichlet
```

```
 x []float64
```

```
 prob float64
```

```
 }{
```

```
 {
```

```
 NewDirichlet([]float64{1, 1, 1}, nil),
```

```
 []float64{0.2, 0.3, 0.5},
```

```
 2.0,
```

```

},
{
 NewDirichlet([]float64{0.6, 10, 8.7}, nil),
 []float64{0.2, 0.3, 0.5},
 0.24079612737071665,
},
} {
 p := test.Dir.Prob(test.x)
 if math.Abs(p-test.prob) > 1e-14 {
 t.Errorf("Probablility mismatch. Case %v. Got %v, want %v", cas, p, test.prob)
 }
}

rnd := rand.New(rand.NewSource(1))
for cas, test := range []struct {
 Dir *Dirichlet
}{
 {
 NewDirichlet([]float64{1, 1, 1}, rnd),
 },
 {
 NewDirichlet([]float64{2, 3}, rnd),
 },
 {
 NewDirichlet([]float64{0.2, 0.3}, rnd),
 },
 {
 NewDirichlet([]float64{0.2,
4}, rnd),
 },
 {
 NewDirichlet([]float64{0.1, 4, 20}, rnd),
 },
} {
 const n = 1e5
 d := test.Dir
 dim := d.Dim()
 x := mat.NewDense(n, dim, nil)
 generateSamples(x, d)
 checkMean(t, cas, x, d, 1e-2)
 checkCov(t, cas, x, d, 1e-2)
}
}
graph{GRAPU}
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```

```

package fd

import (
 "testing"

 "gonum.org/v1/gonum/floats"
 "gonum.org/v1/gonum/mat"
)

type CrossLaplacianTester interface {
 Func(x, y []float64) float64
 CrossLaplacian(x, y []float64) float64
}

type WrapperCL struct {
 Tester HessianTester
}

func (WrapperCL) constructZ(x, y []float64) []float64 {
 z := make([]float64, len(x)+len(y))
 copy(z, x)
 copy(z[len(x):], y)
 return z
}

func (w WrapperCL) Func(x, y []float64) float64 {
 z := w.constructZ(x, y)
 return w.Tester.Func(z)
}

func (w WrapperCL) CrossLaplacian(x, y []float64) float64 {
 z := w.constructZ(x, y)
 hess := mat.NewSymDense(len(z), nil)
 w.Tester.Hess(hess, z)
 // The CrossLaplacian is the trace of the off-diagonal block of the Hessian.
 var l float64
 for i := 0; i < len(x); i++ {
 l += hess.At(i, i+len(x))
 }
 return l
}

func TestCrossLaplacian(t *testing.T)
{
 for cas, test := range []struct {
 l CrossLaplacianTester
 x, y []float64
 settings *Settings
 }

```

```

 tol float64
){
 {
 l: WrapperCL{Watson{}},
 x: []float64{0.2, 0.3},
 y: []float64{0.1, 0.4},
 tol: 1e-3,
 },
 {
 l: WrapperCL{Watson{}},
 x: []float64{2, 3, 1},
 y: []float64{1, 4, 1},
 tol: 1e-3,
 },
 {
 l: WrapperCL{ConstFunc(6)},
 x: []float64{2, -3, 1},
 y: []float64{1, 4, -5},
 tol: 1e-6,
 },
 {
 l: WrapperCL{LinearFunc{w: []float64{10, 6, -1, 5}, c: 5}},
 x: []float64{3, 1},
 y: []float64{8, 6},
 tol: 1e-6,
 },
 {
 l: WrapperCL{QuadFunc{
 a: mat.NewSymDense(4, []float64{
 10, 2, 1, 9,
 2, 5, -3, 4,
 1, -3, 6, 2,
 9, 4, 2, -14,
 }),
 b: mat.NewVecDense(4, []float64{3, -2, -1, 4}),
 c: 5,
 }},
 x: []float64{-1.6, -3},
 y: []float64{1.8, 3.4},
 tol: 1e-6,
 },
 } {
 got := CrossLaplacian(test.l.Func, test.x, test.y, test.settings)
 want := test.l.CrossLaplacian(test.x,
test.y)
 if !floats.EqualWithinAbsOrRel(got, want, test.tol, test.tol) {
 t.Errorf("Cas %d: CrossLaplacian mismatch serial. got %v, want %v", cas, got, want)
 }
 }

```

```

// Test that concurrency works.
settings := test.settings
if settings == nil {
 settings = &Settings{}
}
settings.Concurrent = true
got2 := CrossLaplacian(test.l.Func, test.x, test.y, settings)
if !floats.EqualWithinAbsOrRel(got, got2, 1e-6, 1e-6) {
 t.Errorf("Cas %d: Laplacian mismatch. got %v, want %v", cas, got2, got)
}
}
}

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package path_test

import (
 "fmt"
 "math"

 "gonum.org/v1/gonum/graph/path"
 "gonum.org/v1/gonum/graph/simple"
)

func ExampleBellmanFordFrom_negativecycles() {
 // BellmanFordFrom can be used to find a non-exhaustive
 // set of negative cycles in a graph.

 // Construct a graph with a negative cycle.
 edges := []simple.WeightedEdge{
 {F: simple.Node('a'), T: simple.Node('b'), W: -2},
 {F: simple.Node('a'), T: simple.Node('f'), W: 2},
 {F: simple.Node('b'), T: simple.Node('c'), W: 6},
 {F: simple.Node('c'), T: simple.Node('a'), W: -5},
 {F: simple.Node('d'), T: simple.Node('c'), W: -3},
 {F: simple.Node('d'), T: simple.Node('e'), W: 8},
 {F: simple.Node('e'), T: simple.Node('b'), W: 9},
 {F: simple.Node('e'), T: simple.Node('c'), W: 2},
 }
 g := simple.NewWeightedDirectedGraph(0, math.Inf(1))
 for _, e := range edges
 {
 g.SetWeightedEdge(e)
 }
}

```

```

// Add a zero-cost path to all nodes from a new node Q.
nodes := g.Nodes()
for nodes.Next() {
 g.SetWeightedEdge(simple.WeightedEdge{F: simple.Node('Q'), T: nodes.Node()})
}

// Find the shortest path to each node from Q.
pt, ok := path.BellmanFordFrom(simple.Node('Q'), g)
if ok {
 fmt.Println("no negative cycle present")
 return
}
for _, id := range []int64{'a', 'b', 'c', 'd', 'e', 'f'} {
 p, w := pt.To(id)
 if math.IsInf(w, -1) {
 fmt.Printf("negative cycle in path to %c path:%c\n", id, p)
 }
}

// Output:
// negative cycle in path to a path:[a b c a]
// negative cycle in path to b path:[b c a b]
// negative cycle in path to c path:[c a b c]
// negative cycle in path to f path:[a b c a f]
}

func ExampleFloydWarshall_negativecycles() {
 // FloydWarshall can be used to find an exhaustive
 // set of nodes in negative cycles in a graph.

 // Construct a graph with a negative cycle.
 edges := []simple.WeightedEdge{
 {F: simple.Node('a'),
 T: simple.Node('f'), W: -1},
 {F: simple.Node('b'), T: simple.Node('a'), W: 1},
 {F: simple.Node('b'), T: simple.Node('c'), W: -1},
 {F: simple.Node('b'), T: simple.Node('d'), W: 1},
 {F: simple.Node('c'), T: simple.Node('b'), W: 0},
 {F: simple.Node('e'), T: simple.Node('a'), W: 1},
 {F: simple.Node('f'), T: simple.Node('e'), W: -1},
 }
 g := simple.NewWeightedDirectedGraph(0, math.Inf(1))
 for _, e := range edges {
 g.SetWeightedEdge(e)
 }

 // Find the shortest path to each node from Q.
 pt, ok := path.FloydWarshall(g)

```



```

if ok {
 fmt.Println("no negative cycle present")
 return
}

ids := []int64{'a', 'b', 'c', 'd', 'e', 'f'}

for _, id := range ids {
 if math.IsInf(pt.Weight(id, id), -1) {
 fmt.Printf("%c is in a negative cycle\n", id)
 }
}

for _, uid := range ids {
 for _, vid := range ids {
 _, w, unique := pt.Between(uid, vid)
 if math.IsInf(w, -1) {
 fmt.Printf("negative cycle in path from %c to %c unique=%t\n", uid, vid, unique)
 }
 }
}

// Output:
//
a is in a negative cycle
// b is in a negative cycle
// c is in a negative cycle
// e is in a negative cycle
// f is in a negative cycle
// negative cycle in path from a to a unique=false
// negative cycle in path from a to e unique=false
// negative cycle in path from a to f unique=false
// negative cycle in path from b to a unique=false
// negative cycle in path from b to b unique=false
// negative cycle in path from b to c unique=false
// negative cycle in path from b to d unique=false
// negative cycle in path from b to e unique=false
// negative cycle in path from b to f unique=false
// negative cycle in path from c to a unique=false
// negative cycle in path from c to b unique=false
// negative cycle in path from c to c unique=false
// negative cycle in path from c to d unique=false
// negative cycle in path from c to e unique=false
// negative cycle in path from c to f unique=false
// negative cycle in path from e to a unique=false
// negative cycle
in path from e to e unique=false
// negative cycle in path from e to f unique=false

```

```

// negative cycle in path from f to a unique=false
// negative cycle in path from f to e unique=false
// negative cycle in path from f to f unique=false
}
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package testlapack

import (
 "testing"

 "golang.org/x/exp/rand"

 "gonum.org/v1/gonum/blas"
 "gonum.org/v1/gonum/blas/blas64"
 "gonum.org/v1/gonum/floats"
)

type Dlarfer interface {
 Dlarf(side blas.Side, m, n int, v []float64, incv int, tau float64, c []float64, ldc int, work []float64)
}

func DlarfTest(t *testing.T, impl Dlarfer) {
 rnd := rand.New(rand.NewSource(1))
 for i, test := range []struct {
 m, n, ldc int
 incv, lastv int
 lastr, lastc int
 tau float64
 }{
 {
 m: 3,
 n: 2,
 ldc: 2,

 incv: 4,
 lastv: 1,

 lastr: 2,
 lastc: 1,

 tau: 2,
 },
 {
 m: 2,
 n: 3,

```

ldc: 3,

incv: 4,

lastv: 1,

lastr: 1,

lastc: 2,

tau: 2,

},

{

m: 2,

n: 3,

ldc: 3,

incv: 4,

lastv: 1,

lastr: 0,

lastc: 1,

tau: 2,

},

{

m: 2,

n:

3,

ldc: 3,

incv: 4,

lastv: 0,

lastr: 0,

lastc: 1,

tau: 2,

},

{

m: 10,

n: 10,

ldc: 10,

incv: 4,

lastv: 6,

lastr: 9,

lastc: 8,

```

 tau: 2,
 },
} {
 // Construct a random matrix.
 c := make([]float64, test ldc*test.m)
 for i := 0; i <= test.lastr; i++ {
 for j := 0; j <= test.lastc; j++ {
 c[i*test.ldc+j] = rnd.Float64()
 }
 }
 cCopy := make([]float64, len(c))
 copy(cCopy, c)
 cCopy2 := make([]float64, len(c))
 copy(cCopy2, c)

 // Test with side right.
 sz := max(test.m, test.n) // so v works for both right and left side.
 v := make([]float64, test.incv*sz+1)
 // Fill with nonzero entries up until lastv.
 for i := 0; i <= test.lastv; i++ {
 v[i*test.incv] = rnd.Float64()
 }
 // Construct h explicitly to compare.
 h := make([]float64, test.n*test.n)
 for i := 0; i < test.n; i++ {
 h[i*test.n+i] = 1
 }
 hMat := blas64.General{
 Rows: test.n,
 Cols: test.n,
 Stride: test.n,
 Data: h,
 }
 vVec
:= blas64.Vector{
 Inc: test.incv,
 Data: v,
 }
 blas64.Ger(-test.tau, vVec, vVec, hMat)

 // Apply multiplication (2nd copy is to avoid aliasing).
 cMat := blas64.General{
 Rows: test.m,
 Cols: test.n,
 Stride: test.ldc,
 Data: cCopy,
 }
 cMat2 := blas64.General{

```

```

Rows: test.m,
Cols: test.n,
Stride: test ldc,
Data: cCopy2,
}
blas64.Gemm(blas.NoTrans, blas.NoTrans, 1, cMat2, hMat, 0, cMat)

// cMat now stores the true answer. Compare with the function call.
work := make([]float64, sz)
impl.Dlarf(blas.Right, test.m, test.n, v, test.incv, test.tau, c, test ldc, work)
if !floats.EqualApprox(c, cMat.Data, 1e-14) {
 t.Errorf("Dlarf mismatch right, case %v. Want %v, got %v", i, cMat.Data, c)
}

// Test on the left side.
copy(c, cCopy2)
copy(cCopy, c)
// Construct h.
h = make([]float64, test.m*test.m)
for i := 0; i < test.m; i++ {
 h[i*test.m+i] = 1
}
hMat = blas64.General{
 Rows: test.m,
 Cols: test.m,
 Stride:
test.m,
 Data: h,
}
blas64.Ger(-test.tau, vVec, vVec, hMat)
blas64.Gemm(blas.NoTrans, blas.NoTrans, 1, hMat, cMat2, 0, cMat)
impl.Dlarf(blas.Left, test.m, test.n, v, test.incv, test.tau, c, test ldc, work)
if !floats.EqualApprox(c, cMat.Data, 1e-14) {
 t.Errorf("Dlarf mismatch left, case %v. Want %v, got %v", i, cMat.Data, c)
}
}
}

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// Package community provides graph community detection functions.
package community // import "gonum.org/v1/gonum/graph/community"
graph{Edge[]{{Edge[]{{Edge[]{{Edge[]Edge[]Edge[]}}}}}}
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```

```

package testblas

import (
 "fmt"
 "testing"

 "golang.org/x/exp/rand"
)

type Zswaper interface {
 Zswap(n int, x []complex128, incX int, y []complex128, incY int)
}

func ZswapTest(t *testing.T, impl Zswaper) {
 rnd := rand.New(rand.NewSource(1))
 for n := 0; n < 20; n++ {
 for _, inc := range allPairs([]int{-5, -1, 1, 2, 5, 10}, []int{-3, -1, 1, 3, 7, 12}) {
 incX := inc[0]
 incY := inc[1]
 aincX := abs(incX)
 aincY := abs(incY)

 var x, y []complex128
 if n > 0 {
 x = make([]complex128, (n-1)*aincX+1)
 y = make([]complex128, (n-1)*aincY+1)
 }
 for i := range x {
 x[i] = znan
 }
 for i := range y {
 y[i] = znan
 }
 for i := 0; i < n; i++ {
 x[i*aincX] = complex(rnd.NormFloat64(), rnd.NormFloat64())
 y[i*aincY] = complex(rnd.NormFloat64(), rnd.NormFloat64())
 }

 xWant := make([]complex128,
len(x))
 for i := range xWant {
 xWant[i] = znan
 }
 yWant := make([]complex128, len(y))
 for i := range yWant {
 yWant[i] = znan
 }
 if incX*incY > 0 {

```

```

 for i := 0; i < n; i++ {
 xWant[i*aincX] = y[i*aincY]
 yWant[i*aincY] = x[i*aincX]
 }
} else {
 for i := 0; i < n; i++ {
 xWant[(n-i-1)*aincX] = y[i*aincY]
 yWant[(n-i-1)*aincY] = x[i*aincX]
 }
}

impl.Zswap(n, x, incX, y, incY)

prefix := fmt.Sprintf("Case n=%v,incX=%v,incY=%v:", n, incX, incY)
if !zsame(x, xWant) {
 t.Errorf("%v: unexpected x:\nwant %v\ngot %v", prefix, xWant, x)
}
if !zsame(y, yWant) {
 t.Errorf("%v: unexpected y:\nwant %v\ngot %v", prefix, yWant, y)
}
}
}
}

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// +build appengine safe

package mat

import "reflect"

var sizeOfFloat64 = int(reflect.TypeOf(float64(0)).Size())

// offset returns the number of float64 values b[0] is after a[0].
func offset(a, b []float64) int {
 va0 := reflect.ValueOf(a).Index(0)
 vb0 := reflect.ValueOf(b).Index(0)
 if va0.Addr() == vb0.Addr() {
 return 0
 }
 // This expression must be atomic with respect to GC moves.
 // At this stage this is true, because the GC does not
 // move. See https://golang.org/issue/12445.
 return int(vb0.UnsafeAddr()-va0.UnsafeAddr()) / sizeOfFloat64
}

```

```

var sizeofComplex128 = int(reflect.TypeOf(complex128(0)).Size())

// offsetComplex returns the number of complex128 values b[0] is after a[0].
func offsetComplex(a, b []complex128) int {
 va0 := reflect.ValueOf(a).Index(0)
 vb0 := reflect.ValueOf(b).Index(0)
 if va0.Addr()
 == vb0.Addr() {
 return 0
 }
 // This expression must be atomic with respect to GC moves.
 // At this stage this is true, because the GC does not
 // move. See https://golang.org/issue/12445.
 return int(vb0.UnsafeAddr()-va0.UnsafeAddr()) / sizeofComplex128
}
graph{{{grax{grar}grar}}}
graph{<"\}\}\}\}\}\}\}\}\}\}\>}
graph{{GRA}}
graph{{{<<{{{DigwDigwDigwrr__J__w_FgVieT_O_T_AbhplTNn_EOI_Nz__Lhs_dA}}Digw{Digz}}}>>}}}
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// Package lp implements routines to solve linear programming problems.
package lp // import "gonum.org/v1/gonum/optimize/convex/lp"
graph{gz{gv}}
graph{{stric}}
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// +build !amd64 noasm appengine safe

package f64

// ScalUnitary is
// for i := range x {
// x[i] *= alpha
// }
func ScalUnitary(alpha float64, x []float64) {
 for i := range x {
 x[i] *= alpha
 }
}

// ScalUnitaryTo is
// for i, v := range x {
// dst[i] = alpha * v

```



```

// }
func ScalUnitaryTo(dst []float64, alpha float64, x []float64) {
 for i, v := range x {
 dst[i] = alpha * v
 }
}

// ScalInc is
// var ix uintptr
// for i := 0; i < int(n); i++ {
// x[ix] *= alpha
// ix += incX
// }
func ScalInc(alpha float64, x []float64, n, incX uintptr) {
 var ix uintptr
 for i := 0; i < int(n); i++ {
 x[ix] *= alpha
 ix += incX
 }
}

// ScalIncTo is
// var idst, ix uintptr
// for i := 0; i < int(n); i++ {
// dst[idst] = alpha * x[ix]
// ix += incX
// idst += incDst
// }
func ScalIncTo(dst []float64, incDst uintptr,
 alpha float64, x []float64, n, incX uintptr) {
 var idst, ix uintptr
 for i := 0; i < int(n); i++ {
 dst[idst] = alpha * x[ix]
 ix += incX
 idst += incDst
 }
}
}
digraph {
 A -> B
 C
}
graph{strh{{{strh{{{strd}}}}}}}}
graph{{digrap4}{digrap4}}
graph{"\="""t"}
graph{w:w K:w w:w w:w K:w w:w w:w w:w K:w w:w K:w w:w w:w K:w w:w w:w w:w K}
graph{{{I}{{DIGRAPc{{DIGRAPy}}DIGRAPy}}DIGRAPy}}}}
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```

```

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package dualquat

import (
 "fmt"
 "strings"

 "gonum.org/v1/gonum/num/dual"
 "gonum.org/v1/gonum/num/quat"
)

// Number is a float64 precision dual quaternion. A dual quaternion
// is a hypercomplex number composed of two quaternions, $q + q$,
// where $\epsilon = 0$, but $\epsilon \neq 0$. Here, q is termed the real and q the dual.
type Number struct {
 Real, Dual quat.Number
}

var (
 zero Number
 zeroQuat quat.Number
)

// Format implements fmt.Formatter.
func (d Number) Format(fs fmt.State, c rune) {
 prec, pOk := fs.Precision()
 if !pOk {
 prec = -1
 }
 width, wOk := fs.Width()
 if !wOk {
 width = -1
 }
 switch c {
 case 'v':
 if fs.Flag('#') {
 fmt.Fprintf(fs, "%T{Real:%#v, Dual:%#v}", d, d.Real, d.Dual)
 return
 }
 if fs.Flag('+') {
 fmt.Fprintf(fs, "{Real:%+v, Dual:%+v}", d.Real, d.Dual)
 return
 }
 case 'g':
 prec = -1
 fallthrough
 case '':

```

```

'e', 'E', 'f', 'F', 'g', 'G':
 fre := fmtString(fs, c, prec, width, false)
 fim := fmtString(fs, c, prec, width, true)
 fmt.Fprintf(fs, fmt.Sprintf("(%s+%[2]s)", fre, fim), d.Real, d.Dual)
default:
 fmt.Fprintf(fs, "%%!%c(%T=%[2]v)", c, d)
 return
}
}

// This is horrible, but it's what we have.
func fmtString(fs fmt.State, c rune, prec, width int, wantPlus bool) string {
 var b strings.Builder
 b.WriteByte('%')
 for _, f := range "0+- " {
 if fs.Flag(int(f)) || (f == '+' && wantPlus) {
 b.WriteByte(byte(f))
 }
 }
 if width >= 0 {
 fmt.Fprint(&b, width)
 }
 if prec >= 0 {
 b.WriteByte('.')
 if prec > 0 {
 fmt.Fprint(&b, prec)
 }
 }
 b.WriteRune(c)
 return b.String()
}

// Add returns the sum of x and y.
func Add(x, y Number) Number {
 return Number{
 Real: quat.Add(x.Real, y.Real),
 Dual: quat.Add(x.Dual, y.Dual),
 }
}

// Sub returns the difference of x and y, x-y.
func Sub(x, y Number) Number {
 return Number{
 Real: quat.Sub(x.Real, y.Real),
 Dual: quat.Sub(x.Dual,
y.Dual),
 }
}

```

```

// Mul returns the dual product of x and y.
func Mul(x, y Number) Number {
 return Number{
 Real: quat.Mul(x.Real, y.Real),
 Dual: quat.Add(quat.Mul(x.Real, y.Dual), quat.Mul(x.Dual, y.Real)),
 }
}

// Inv returns the dual inverse of d.
func Inv(d Number) Number {
 return Number{
 Real: quat.Inv(d.Real),
 Dual: quat.Scale(-1, quat.Mul(d.Dual, quat.Inv(quat.Mul(d.Real, d.Real)))),
 }
}

// Conj returns the dual quaternion conjugate of d+d, d-d.
func Conj(d Number) Number {
 return Number{
 Real: quat.Conj(d.Real),
 Dual: quat.Scale(-1, quat.Conj(d.Dual)),
 }
}

// ConjDual returns the dual conjugate of d+d, d-d.
func ConjDual(d Number) Number {
 return Number{
 Real: d.Real,
 Dual: quat.Scale(-1, d.Dual),
 }
}

// ConjQuat returns the quaternion conjugate of d+d, d+d.
func ConjQuat(d Number) Number {
 return Number{
 Real: quat.Conj(d.Real),
 Dual: quat.Conj(d.Dual),
 }
}

// Scale returns d scaled by f.
func Scale(f float64, d Number) Number {
 return
 Number{Real: quat.Scale(f, d.Real), Dual: quat.Scale(f, d.Dual)}
}

// Abs returns the absolute value of d.

```

```

func Abs(d Number) dual.Number {
 return dual.Number{
 Real: quat.Abs(d.Real),
 Emag: quat.Abs(d.Dual),
 }
}

func addRealQuat(r float64, q quat.Number) quat.Number {
 q.Real += r
 return q
}

func addQuatReal(q quat.Number, r float64) quat.Number {
 q.Real += r
 return q
}

func subRealQuat(r float64, q quat.Number) quat.Number {
 q.Real = r - q.Real
 return q
}

func subQuatReal(q quat.Number, r float64) quat.Number {
 q.Real -= r
 return q
}

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package testlapack

import (
 "math"
 "testing"

 "golang.org/x/exp/rand"

 "gonum.org/v1/gonum/blas"
 "gonum.org/v1/gonum/blas/blas64"
)

type Dsytd2er interface {
 Dsytd2(uplo blas.Uplo, n int, a []float64, lda int, d, e, tau []float64)
}

func Dsytd2Test(t *testing.T, impl Dsytd2er) {
 rnd := rand.New(rand.NewSource(1))

```

```

for _, uplo := range []blas.Uplo{blas.Upper, blas.Lower} {
 for _, test := range []struct {
 n, lda int
 }{
 {3, 0},
 {4, 0},
 {5, 0},

 {3, 10},
 {4, 10},
 {5, 10},
 } {
 n := test.n
 lda := test.lda
 if lda == 0 {
 lda = n
 }
 a := make([]float64, n*lda)
 for i := range a {
 a[i] = rnd.NormFloat64()
 }
 aCopy := make([]float64, len(a))
 copy(aCopy, a)

 d := make([]float64, n)
 for i := range d {
 d[i] = math.NaN()
 }
 e := make([]float64, n-1)
 for i
:= range e {
 e[i] = math.NaN()
 }
 tau := make([]float64, n-1)
 for i := range tau {
 tau[i] = math.NaN()
 }

 impl.Dsytd2(uplo, n, a, lda, d, e, tau)

 // Construct Q
 qMat := blas64.General{
 Rows: n,
 Cols: n,
 Stride: n,
 Data: make([]float64, n*n),
 }
 qCopy := blas64.General{

```

```

Rows: n,
Cols: n,
Stride: n,
Data: make([]float64, len(qMat.Data)),
}
// Set Q to I.
for i := 0; i < n; i++ {
 qMat.Data[i*qMat.Stride+i] = 1
}
for i := 0; i < n-1; i++ {
 hMat := blas64.General{
 Rows: n,
 Cols: n,
 Stride: n,
 Data: make([]float64, n*n),
 }
 // Set H to I.
 for i := 0; i < n; i++ {
 hMat.Data[i*hMat.Stride+i] = 1
 }
 var vi blas64.Vector
 if uplo == blas.Upper {
 vi = blas64.Vector{
 Inc: 1,
 Data: make([]float64, n),
 }
 for j := 0; j < i; j++ {
 vi.Data[j] = a[j*lda+i+1]
 }
 vi.Data[i] = 1
 } else {
 vi = blas64.Vector{
 Inc:
1,
 Data: make([]float64, n),
 }
 vi.Data[i+1] = 1
 for j := i + 2; j < n; j++ {
 vi.Data[j] = a[j*lda+i]
 }
 }
 blas64.Ger(-tau[i], vi, vi, hMat)
 copy(qCopy.Data, qMat.Data)

 // Multiply q by the new h.
 if uplo == blas.Upper {
 blas64.Gemm(blas.NoTrans, blas.NoTrans, 1, hMat, qCopy, 0, qMat)
 } else {

```

```

blas64.Gemm(blas.NoTrans, blas.NoTrans, 1, qCopy, hMat, 0, qMat)
}
}

if !isOrthogonal(qMat) {
 t.Errorf("Q not orthogonal")
}

// Compute Q * A * Q.
aMat := blas64.General{
 Rows: n,
 Cols: n,
 Stride: n,
 Data: make([]float64, len(a)),
}

for i := 0; i < n; i++ {
 for j := i; j < n; j++ {
 v := aCopy[i*lda+j]
 if uplo == blas.Lower {
 v = aCopy[j*lda+i]
 }
 aMat.Data[i*aMat.Stride+j] = v
 aMat.Data[j*aMat.Stride+i] = v
 }
}

tmp := blas64.General{
 Rows: n,
 Cols: n,
 Stride: n,
 Data: make([]float64, n*n),
}

ans
:= blas64.General{
 Rows: n,
 Cols: n,
 Stride: n,
 Data: make([]float64, n*n),
}

blas64.Gemm(blas.Trans, blas.NoTrans, 1, qMat, aMat, 0, tmp)
blas64.Gemm(blas.NoTrans, blas.NoTrans, 1, tmp, qMat, 0, ans)

// Compare with T.
tMat := blas64.General{
 Rows: n,

```



```

Cols: n,
Stride: n,
Data: make([]float64, n*n),
}
for i := 0; i < n-1; i++ {
 tMat.Data[i*tMat.Stride+i] = d[i]
 tMat.Data[i*tMat.Stride+i+1] = e[i]
 tMat.Data[(i+1)*tMat.Stride+i] = e[i]
}
tMat.Data[(n-1)*tMat.Stride+n-1] = d[n-1]

same := true
for i := 0; i < n; i++ {
 for j := 0; j < n; j++ {
 if math.Abs(ans.Data[i*ans.Stride+j]-tMat.Data[i*tMat.Stride+j]) > 1e-10 {
 same = false
 }
 }
}
if !same {
 t.Errorf("Matrix answer mismatch")
}
}
}
graph{{{EB{EB}EB}}EB{{EB}EB{{EB}}EB{EB}}}
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// license that can be found in the LICENSE file.

// Package mds provides multidimensional scaling functions.
package mds // import "gonum.org/v1/gonum/stat/mds"
graph{{{Ed3{{Ed2}}Ed3{{Ed2}}}}}
Graph{{{Edg}{Edg{Edg}Edg}Edg{Edg}{Edg{Edg}Edg}}}
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// license that can be found in the LICENSE file.

package fd

import "gonum.org/v1/gonum/floats"

// Gradient estimates the gradient of the multivariate function f at the
// location x. If dst is not nil, the result will be stored in-place into dst
// and returned, otherwise a new slice will be allocated first. Finite
// difference formula and other options are specified by settings. If settings is
// nil, the gradient will be estimated using the Forward formula and a default
// step size.

```

```

//
// Gradient panics if the length of dst and x is not equal, or if the derivative
// order of the formula is not 1.
func Gradient(dst []float64, f func([]float64) float64, x []float64, settings *Settings) []float64 {
 if dst == nil {
 dst = make([]float64, len(x))
 }
 if len(dst) != len(x) {
 panic("fd: slice length mismatch")
 }

 // Default settings.
 formula := Forward
 step := formula.Step
 var
 originValue float64
 var originKnown, concurrent bool

 // Use user settings if provided.
 if settings != nil {
 if !settings.Formula.isZero() {
 formula = settings.Formula
 step = formula.Step
 checkFormula(formula)
 if formula.Derivative != 1 {
 panic(badDerivOrder)
 }
 }
 if settings.Step != 0 {
 step = settings.Step
 }
 originKnown = settings.OriginKnown
 originValue = settings.OriginValue
 concurrent = settings.Concurrent
 }

 evals := len(formula.Stencil) * len(x)
 nWorkers := computeWorkers(concurrent, evals)

 hasOrigin := usesOrigin(formula.Stencil)
 // Copy x in case it is modified during the call.
 xcopy := make([]float64, len(x))
 if hasOrigin && !originKnown {
 copy(xcopy, x)
 originValue = f(xcopy)
 }

 if nWorkers == 1 {

```

```

for i := range xcopy {
 var deriv float64
 for _, pt := range formula.Stencil {
 if pt.Loc == 0 {
 deriv += pt.Coeff * originValue
 continue
 }
 // Copying the data anew has two benefits. First,
it
 // avoids floating point issues where adding and then
 // subtracting the step don't return to the exact same
 // location. Secondly, it protects against the function
 // modifying the input data.
 copy(xcopy, x)
 xcopy[i] += pt.Loc * step
 deriv += pt.Coeff * f(xcopy)
 }
 dst[i] = deriv / step
}
return dst
}

sendChan := make(chan fdrun, evals)
ansChan := make(chan fdrun, evals)
quit := make(chan struct{})
defer close(quit)

// Launch workers. Workers receive an index and a step, and compute the answer.
for i := 0; i < nWorkers; i++ {
 go func(sendChan <-chan fdrun, ansChan chan<- fdrun, quit <-chan struct{}) {
 xcopy := make([]float64, len(x))
 for {
 select {
 case <-quit:
 return
 case run := <-sendChan:
 // See above comment on the copy.
 copy(xcopy, x)
 xcopy[run.idx] += run.pt.Loc * step
 run.result = f(xcopy)
 ansChan <- run
 }
 }
 }(sendChan, ansChan, quit)
}

// Launch the distributor. Distributor

```

```

sends the cases to be computed.
go func(sendChan chan<- fdrun, ansChan chan<- fdrun) {
 for i := range x {
 for _, pt := range formula.Stencil {
 if pt.Loc == 0 {
 // Answer already known. Send the answer on the answer channel.
 ansChan <- fdrun{
 idx: i,
 pt: pt,
 result: originValue,
 }
 continue
 }
 // Answer not known, send the answer to be computed.
 sendChan <- fdrun{
 idx: i,
 pt: pt,
 }
 }
 }
}(sendChan, ansChan)

for i := range dst {
 dst[i] = 0
}
// Read in all of the results.
for i := 0; i < evals; i++ {
 run := <-ansChan
 dst[run.idx] += run.pt.Coeff * run.result
}
floats.Scale(1/step, dst)
return dst
}

type fdrun struct {
 idx int
 pt Point
 result float64
}

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// Package fd provides functions to approximate derivatives using finite differences.
package fd // import "gonum.org/v1/gonum/diff/fd"
graph{{Stric{Stric}Stric}{Stric{Stric}Stric}}
graph{{{NODd}NODd{NODd}{NODd}NODd}NODd{NODd}{NODd}NODd}

```

```

graph{{{edge8{{{edge5}}{{edge5}}{{edge5}{edge5}}}}}edge5edge5edge5{edge5}}}}
graph{{digr_}{digr_}{digr_}digr_}
graph{"\\\\\\\\\\\\"}
graph{diG{diG{{{diG}}}diG{diG}{diG{diG}{diG{diG}{diG}}}}diG{diG}{diG{diG}{diG}{diG}}diG}
Graph{Graph[]Graph[]}
graph{{{digr4}digr2{{{digr4}}digr7}{digr2}digr7}{digr2{{{digr4}}digr2}
graph{Gs{Gy}Gs{Gs{Gy}Gs{Gt}Gs{Gt}Gs{Gy}}Gs{Gt}Gs{Gy}Gs{Gt}}
graph{"G{{{i}}}"
graph{N9{{{N9{N9{N7{N9{N9{N7{N9{N9{N7}}}N9{N7}}}}}N9{N7{{{N9{N9{N7}}}N9{N7}}}}}N9{
N7}}}
graph{Stri8}
Graph{{{SubGr4}{SubGr4}{SubGr4}{SubGr4}{SubGr4}}
graph{{d_{d_}d_{d_}d_{{d_}{d_}}d_{{d_}{d_}}d_}}
graph{{INVANVINVALID}}
graph{EDGEg{{{EDGEg}EDGEg{EDGEg}{EDGEg}}}}
graph{"Zd"{"Z{""}ZdZ{"}
graph{{{Gra}}Grar}}
graph{GraA{{{GraA{{GraB}GraB}}}GraB}}
graph{{i=""l=""e=gra_}}
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package floats

import (
 "fmt"
)

// Set of examples for all the functions

func ExampleAdd_simple() {
 // Adding three slices together. Note that
 // the result is stored in the first slice
 s1 := []float64{1, 2, 3, 4}
 s2 := []float64{5, 6, 7, 8}
 s3 := []float64{1, 1, 1, 1}
 Add(s1, s2)
 Add(s1, s3)

 fmt.Println("s1 =", s1)
 fmt.Println("s2 =", s2)
 fmt.Println("s3 =", s3)
 // Output:
 // s1 = [7 9 11 13]
 // s2 = [5 6 7 8]
 // s3 = [1 1 1 1]
}

```

```

func ExampleAdd_newslice() {
 // If one wants to store the result in a
 // new container, just make a new slice
 s1 := []float64{1, 2, 3, 4}
 s2 := []float64{5, 6, 7, 8}
 s3 := []float64{1, 1, 1, 1}
 dst := make([]float64, len(s1))

 AddTo(dst, s1, s2)
 Add(dst, s3)

 fmt.Println("dst =", dst)
 fmt.Println("s1 =", s1)
 fmt.Println("s2 =", s2)
 fmt.Println("s3 =", s3)
 // Output:
 // dst =
 // [7 9 11 13]
 // s1 = [1 2 3 4]
 // s2 = [5 6 7 8]
 // s3 = [1 1 1 1]
}

func ExampleAdd_unequallengths() {
 // If the lengths of the slices are unknown,
 // use Eqlen to check
 s1 := []float64{1, 2, 3}
 s2 := []float64{5, 6, 7, 8}

 eq := EqualLengths(s1, s2)
 if eq {
 Add(s1, s2)
 } else {
 fmt.Println("Unequal lengths")
 }
 // Output:
 // Unequal lengths
}

func ExampleAddConst() {
 s := []float64{1, -2, 3, -4}
 c := 5.0

 AddConst(c, s)

 fmt.Println("s =", s)
 // Output:

```

```

// s = [6 3 8 1]
}

func ExampleCumProd() {
 s := []float64{1, -2, 3, -4}
 dst := make([]float64, len(s))

 CumProd(dst, s)

 fmt.Println("dst =", dst)
 fmt.Println("s =", s)
 // Output:
 // dst = [1 -2 -6 24]
 // s = [1 -2 3 -4]
}

func ExampleCumSum() {
 s := []float64{1, -2, 3, -4}
 dst := make([]float64, len(s))

 CumSum(dst, s)

 fmt.Println("dst =", dst)
 fmt.Println("s =", s)
 // Output:
 // dst = [1 -1 2 -2]
 // s = [1 -2 3 -4]
}
strict digraph {
 A -> B
 A -> B
}
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package topo

import (
 "sort"

 "gonum.org/v1/gonum/graph"
 "gonum.org/v1/gonum/graph/internal/ordered"
 "gonum.org/v1/gonum/graph/internal/set"
)

// Builder is a pure topological graph construction type.
type Builder interface {

```

```

AddNode(graph.Node)
SetEdge(graph.Edge)
}

// CliqueGraph builds the clique graph of g in dst using Clique and CliqueGraphEdge
// nodes and edges. The nodes returned by calls to Nodes on the nodes and edges of
// the constructed graph are the cliques and the common nodes between cliques
// respectively. The dst graph is not cleared.
func CliqueGraph(dst Builder, g graph.Undirected) {
 cliques := BronKerbosch(g)

 // Construct a consistent view of cliques in g. Sorting costs
 // us a little, but not as much as the cliques themselves.
 for _, c := range cliques {
 sort.Sort(ordered.ByID(c))
 }
 sort.Sort(ordered.BySliceIDs(cliques))

 cliqueNodes
:= make(cliqueNodeSets, len(cliques))
 for id, c := range cliques {
 s := set.NewNodesSize(len(c))
 for _, n := range c {
 s.Add(n)
 }
 ns := &nodeSet{Clique: Clique{id: int64(id), nodes: c}, nodes: s}
 dst.AddNode(ns.Clique)
 for _, n := range c {
 nid := n.ID()
 cliqueNodes[nid] = append(cliqueNodes[nid], ns)
 }
 }

 for _, cliques := range cliqueNodes {
 for i, uc := range cliques {
 for _, vc := range cliques[i+1:] {
 // Retain the nodes that contribute to the
 // edge between the cliques.
 var edgeNodes []graph.Node
 switch 1 {
 case len(uc.Clique.nodes):
 edgeNodes = []graph.Node{uc.Clique.nodes[0]}
 case len(vc.Clique.nodes):
 edgeNodes = []graph.Node{vc.Clique.nodes[0]}
 default:
 for _, n := range set.IntersectionOfNodes(uc.nodes, vc.nodes) {
 edgeNodes = append(edgeNodes, n)
 }
 }
 }
 }
 }
}

```



```

 sort.Sort(ordered.ByID(edgeNodes))
}

 dst.SetEdge(CliqueGraphEdge{from: uc.Clique,
to: vc.Clique, nodes: edgeNodes})
}
}
}
}

type cliqueNodeSets map[int64][]*nodeSet

type nodeSet struct {
 Clique
 nodes set.Nodes
}

// Clique is a node in a clique graph.
type Clique struct {
 id int64
 nodes []graph.Node
}

// ID returns the node ID.
func (n Clique) ID() int64 { return n.id }

// Nodes returns the nodes in the clique.
func (n Clique) Nodes() []graph.Node { return n.nodes }

// CliqueGraphEdge is an edge in a clique graph.
type CliqueGraphEdge struct {
 from, to Clique
 nodes []graph.Node
}

// From returns the from node of the edge.
func (e CliqueGraphEdge) From() graph.Node { return e.from }

// To returns the to node of the edge.
func (e CliqueGraphEdge) To() graph.Node { return e.to }

// ReversedEdge returns a new CliqueGraphEdge with
// the edge end points swapped. The nodes of the
// new edge are shared with the receiver.
func (e CliqueGraphEdge) ReversedEdge() graph.Edge { e.from, e.to = e.to, e.from; return e }

// Nodes returns the common nodes

```

```

in the cliques of the underlying graph
// corresponding to the from and to nodes in the clique graph.
func (e CliqueGraphEdge) Nodes() []graph.Node { return e.nodes }
graph{ {{{{No_}{No_}No_}No_}{No_}{No_}No_}No_}
graph{edg_{{edg_}{edg_}}edg_}
Graph{{{diGrap}{diGrap}{diGrap}diGrap}{diGrap}{diGrap}{diGrap}diGrap}
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```

```

package gonum

```

```

import "math"

```

```

// Dlapy2 is the LAPACK version of math.Hypot.
//
// Dlapy2 is an internal routine. It is exported for testing purposes.
func (Implementation) Dlapy2(x, y float64) float64 {
 return math.Hypot(x, y)
}
graph{{{DIE}{DIE}{DIE}{DIE}{DIE}{DIE}{DIE}{DIE}}
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```

```

package gonum

```

```

import (
 "gonum.org/v1/gonum/blas"
 "gonum.org/v1/gonum/blas/blas64"
)

```

```

// Dsytd2 reduces a symmetric nn matrix A to symmetric tridiagonal form T by
// an orthogonal similarity transformation
// $Q * A * Q = T$
// On entry, the matrix is contained in the specified triangle of a. On exit,
// if uplo == blas.Upper, the diagonal and first super-diagonal of a are
// overwritten with the elements of T. The elements above the first super-diagonal
// are overwritten with the elementary reflectors that are used with
// the elements written to tau in order to construct Q. If uplo == blas.Lower,
// the elements are written in the lower triangular region.
//
// d must have length at least n. e and tau must have length at least n-1. Dsytd2
// will panic if these sizes are not met.
//
// Q is represented as a product of elementary
// reflectors.
// If uplo == blas.Upper

```

```

// Q = H_{n-2} * ... * H_1 * H_0
// and if uplo == blas.Lower
// Q = H_0 * H_1 * ... * H_{n-2}
// where
// H_i = I - tau * v * v
// where tau is stored in tau[i], and v is stored in a.
//
// If uplo == blas.Upper, v[0:i-1] is stored in A[0:i-1,i+1], v[i] = 1, and
// v[i+1:] = 0. The elements of a are
// [d e v2 v3 v4]
// [d e v3 v4]
// [d e v4]
// [d e]
// [d]
// If uplo == blas.Lower, v[0:i+1] = 0, v[i+1] = 1, and v[i+2:] is stored in
// A[i+2:n,i].
// The elements of a are
// [d]
// [e d]
// [v1 e d]
// [v1 v2 e d]
// [v1 v2 v3 e d]
//
// Dsytd2 is an internal routine. It is exported for testing purposes.
func (impl Implementation) Dsytd2(uplo blas.Uplo, n int, a []float64, lda int, d, e, tau []float64) {
 switch {
 case uplo != blas.Upper && uplo != blas.Lower:
 panic(badUplo)
 case n < 0:
 panic(nLT0)
 case
 lda < max(1, n):
 panic(badLdA)
 }

 // Quick return if possible.
 if n == 0 {
 return
 }

 switch {
 case len(a) < (n-1)*lda+n:
 panic(shortA)
 case len(d) < n:
 panic(shortD)
 case len(e) < n-1:
 panic(shortE)
 case len(tau) < n-1:

```

```

panic(shortTau)
}

bi := blas64.Implementation()

if uplo == blas.Upper {
 // Reduce the upper triangle of A.
 for i := n - 2; i >= 0; i-- {
 // Generate elementary reflector H_i = I - tau * v * v to
 // annihilate A[i:i-1, i+1].
 var taui float64
 a[i*lda+i+1], taui = impl.Dlarfg(i+1, a[i*lda+i+1], a[i+1:], lda)
 e[i] = a[i*lda+i+1]
 if taui != 0 {
 // Apply H_i from both sides to A[0:i,0:i].
 a[i*lda+i+1] = 1

 // Compute x := tau * A * v storing x in tau[0:i].
 bi.Dsymv(uplo, i+1, taui, a, lda, a[i+1:], lda, 0, tau, 1)

 // Compute w := x - 1/2 * tau * (x * v) * v.
 alpha := -0.5 * taui * bi.Ddot(i+1, tau, 1, a[i+1:], lda)
 bi.Daxpy(i+1, alpha, a[i+1:], lda, tau, 1)

 // Apply the transformation as a rank-2
 update
 // A = A - v * w - w * v.
 bi.Dsyr2(uplo, i+1, -1, a[i+1:], lda, tau, 1, a, lda)
 a[i*lda+i+1] = e[i]
 }
 d[i+1] = a[(i+1)*lda+i+1]
 tau[i] = taui
 }
 d[0] = a[0]
 return
}

// Reduce the lower triangle of A.
for i := 0; i < n-1; i++ {
 // Generate elementary reflector H_i = I - tau * v * v to
 // annihilate A[i+2:n, i].
 var taui float64
 a[(i+1)*lda+i], taui = impl.Dlarfg(n-i-1, a[(i+1)*lda+i], a[min(i+2, n-1)*lda+i:], lda)
 e[i] = a[(i+1)*lda+i]
 if taui != 0 {
 // Apply H_i from both sides to A[i+1:n, i+1:n].
 a[(i+1)*lda+i] = 1

 // Compute x := tau * A * v, storing y in tau[i:n-1].

```

```

bi.Dsymv(uplo, n-i-1, tau, a[(i+1)*lda+i+1:], lda, a[(i+1)*lda+i:], lda, 0, tau[i:], 1)

// Compute w := x - 1/2 * tau * (x * v) * v.
alpha := -0.5 * tau * bi.Ddot(n-i-1, tau[i:], 1, a[(i+1)*lda+i:], lda)
bi.Daxpy(n-i-1, alpha, a[(i+1)*lda+i:], lda, tau[i:], 1)

// Apply the transformation as a rank-2 update
// A = A - v * w - w * v.
bi.Dsyr2(uplo,
n-i-1, -1, a[(i+1)*lda+i:], lda, tau[i:], 1, a[(i+1)*lda+i+1:], lda)
a[(i+1)*lda+i] = e[i]
}
d[i] = a[i*lda+i]
tau[i] = tau
}
d[n-1] = a[(n-1)*lda+n-1]
}
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package distuv

import (
 "sort"
 "testing"

 "golang.org/x/exp/rand"

 "gonum.org/v1/gonum/floats"
)

func TestChiSquaredProb(t *testing.T) {
 for _, test := range []struct {
 x, k, want float64
 }{
 {10, 3, 0.0085003666025203432},
 {2.3, 3, 0.19157345407042367},
 {0.8, 0.2, 0.080363259903912673},
 } {
 pdf := ChiSquared{test.k, nil}.Prob(test.x)
 if !floats.EqualWithinAbsOrRel(pdf, test.want, 1e-10, 1e-10) {
 t.Errorf("Pdf mismatch, x = %v, K = %v. Got %v, want %v", test.x, test.k, pdf, test.want)
 }
 }
}

func TestChiSquaredCDF(t *testing.T) {

```

```

for _, test := range []struct {
 x, k, want float64
}{
 // Values calculated with scipy.stats.chi2.cdf
 {0, 1, 0},
 {0.01, 5, 5.3002700426865167e-07},
 {0.05, 3, 0.002929332764619924},
 {0.5, 2, 0.22119921692859512},
 {0.95, 3, 0.1866520918701263},
 {0.99, 5, 0.036631697220869196},
 {1,
1, 0.68268949213708596},
 {1.5, 4, 0.17335853270322427},
 {10, 10, 0.55950671493478743},
 {25, 15, 0.95005656637357172},
} {
 cdf := ChiSquared{test.k, nil}.CDF(test.x)
 if !floats.EqualWithinAbsOrRel(cdf, test.want, 1e-10, 1e-10) {
 t.Errorf("CDF mismatch, x = %v, K = %v. Got %v, want %v", test.x, test.k, cdf, test.want)
 }
}
}

```

```

func TestChiSquared(t *testing.T) {
 src := rand.New(rand.NewSource(1))
 for i, b := range []ChiSquared{
 {3, src},
 {1.5, src},
 {0.9, src},
 } {
 testChiSquared(t, b, i)
 }
}

```

```

func testChiSquared(t *testing.T, c ChiSquared, i int) {
 const (
 tol = 1e-2
 n = 1e6
 bins = 50
)
 x := make([]float64, n)
 generateSamples(x, c)
 sort.Float64s(x)

 testRandLogProbContinuous(t, i, 0, x, c, tol, bins)
 checkMean(t, i, x, c, tol)
 checkVarAndStd(t, i, x, c, tol)
 checkExKurtosis(t, i, x, c, 7e-2)
}

```

```

checkProbContinuous(t, i, x, c, 1e-3)
checkQuantileCDFSurvival(t, i, x, c, 1e-2)
}
graph{Di{Di}{Di{Di{Di}{Di{Di}Di}}}}
graph{{SUBGRAPHE}{SUBGRAPHP}}
digraph{z[I=e]}
graph{{Digrh}Digrh{{Digrh}Digrr}}
graph{{{stria{{{stria}stria{stria}}}stria{stria{stria}}}stria{stria}}}
// This file is dual licensed under CC0 and The gonum license.
//
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//
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// Universal Public Domain Dedication.

//go:generate ./makeinternal.bash

package dot

import (
 "fmt"
 "io"
 "io/ioutil"

 "gonum.org/v1/gonum/graph/formats/dot/ast"
 "gonum.org/v1/gonum/graph/formats/dot/internal/lexer"
 "gonum.org/v1/gonum/graph/formats/dot/internal/parser"
)

// ParseFile parses the given Graphviz DOT file into an AST.
func ParseFile(path string) (*ast.File, error) {
 buf, err := ioutil.ReadFile(path)
 if err != nil {
 return nil, err
 }
 return ParseBytes(buf)
}

// Parse parses the given Graphviz DOT file into an AST, reading from r.
func Parse(r io.Reader) (*ast.File, error) {
 buf, err := ioutil.ReadAll(r)
 if err != nil {
 return nil, err
 }
 return

```

```

ParseBytes(buf)
}

// ParseBytes parses the given Graphviz DOT file into an AST, reading from b.
func ParseBytes(b []byte) (*ast.File, error) {
 l := lexer.NewLexer(b)
 p := parser.NewParser()
 file, err := p.Parse(l)
 if err != nil {
 return nil, err
 }
 f, ok := file.(*ast.File)
 if !ok {
 return nil, fmt.Errorf("invalid file type; expected *ast.File, got %T", file)
 }
 if err := check(f); err != nil {
 return nil, err
 }
 return f, nil
}

// ParseString parses the given Graphviz DOT file into an AST, reading from s.
func ParseString(s string) (*ast.File, error) {
 return ParseBytes([]byte(s))
}

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// license that can be found in the LICENSE file.

// Package distmv provides multivariate random distribution types.
package distmv // import "gonum.org/v1/gonum/stat/distmv"
Graph{{SubD{SubD{SubF}}}}
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// license that can be found in the LICENSE file.

package blas64

import "gonum.org/v1/gonum/blas"

// SymmetricCols represents a matrix using the conventional column-major storage scheme.
type SymmetricCols Symmetric

// From fills the receiver with elements from a. The receiver
// must have the same dimensions and uplo as a and have adequate
// backing data storage.
func (t SymmetricCols) From(a Symmetric) {
 if t.N != a.N {

```



```

panic("blas64: mismatched dimension")
}
if t.Uplo != a.Uplo {
 panic("blas64: mismatched BLAS uplo")
}
switch a.Uplo {
default:
 panic("blas64: bad BLAS uplo")
case blas.Upper:
 for i := 0; i < a.N; i++ {
 for j := i; j < a.N; j++ {
 t.Data[i+j*t.Stride] = a.Data[i*a.Stride+j]
 }
 }
case blas.Lower:
 for i := 0; i < a.N; i++ {
 for j := 0; j <= i; j++ {
 t.Data[i+j*t.Stride] = a.Data[i*a.Stride+j]
 }
 }
}
}

// From fills the
// receiver with elements from a. The receiver
// must have the same dimensions and uplo as a and have adequate
// backing data storage.
func (t Symmetric) From(a SymmetricCols) {
 if t.N != a.N {
 panic("blas64: mismatched dimension")
 }
 if t.Uplo != a.Uplo {
 panic("blas64: mismatched BLAS uplo")
 }
 switch a.Uplo {
 default:
 panic("blas64: bad BLAS uplo")
 case blas.Upper:
 for i := 0; i < a.N; i++ {
 for j := i; j < a.N; j++ {
 t.Data[i*t.Stride+j] = a.Data[i+j*a.Stride]
 }
 }
 case blas.Lower:
 for i := 0; i < a.N; i++ {
 for j := 0; j <= i; j++ {
 t.Data[i*t.Stride+j] = a.Data[i+j*a.Stride]
 }
 }
 }
}

```

```

 }
 }
}

// SymmetricBandCols represents a symmetric matrix using the band column-major storage scheme.
type SymmetricBandCols SymmetricBand

// From fills the receiver with elements from a. The receiver
// must have the same dimensions, bandwidth and uplo as a and
// have adequate backing data storage.
func (t SymmetricBandCols) From(a SymmetricBand) {
 if t.N != a.N {
 panic("blas64: mismatched dimension")
 }
 if t.K != a.K {
 panic("blas64: mismatched bandwidth")
 }
 if a.Stride < a.K+1 {
 panic("blas64: short stride for source")
 }
 if t.Stride < t.K+1 {
 panic("blas64: short stride for destination")
 }
 if t.Uplo != a.Uplo {
 panic("blas64: mismatched BLAS uplo")
 }
 dst := BandCols{
 Rows: t.N, Cols: t.N,
 Stride: t.Stride,
 Data: t.Data,
 }
 src := Band{
 Rows: a.N, Cols: a.N,
 Stride: a.Stride,
 Data: a.Data,
 }
 switch a.Uplo {
 default:
 panic("blas64: bad BLAS uplo")
 case blas.Upper:
 dst.KU = t.K
 src.KU = a.K
 case blas.Lower:
 dst.KL = t.K
 src.KL = a.K
 }
 dst.From(src)
}

```

```

}

// From fills the receiver with elements from a. The receiver
// must have the same dimensions, bandwidth and uplo as a and
// have adequate backing data storage.
func (t SymmetricBand) From(a SymmetricBandCols) {
 if t.N != a.N {
 panic("blas64: mismatched dimension")
 }
 if t.K != a.K {
 panic("blas64: mismatched bandwidth")
 }
 if a.Stride
 < a.K+1 {
 panic("blas64: short stride for source")
 }
 if t.Stride < t.K+1 {
 panic("blas64: short stride for destination")
 }
 if t.Uplo != a.Uplo {
 panic("blas64: mismatched BLAS uplo")
 }
 dst := Band{
 Rows: t.N, Cols: t.N,
 Stride: t.Stride,
 Data: t.Data,
 }
 src := BandCols{
 Rows: a.N, Cols: a.N,
 Stride: a.Stride,
 Data: a.Data,
 }
 switch a.Uplo {
 default:
 panic("blas64: bad BLAS uplo")
 case blas.Upper:
 dst.KU = t.K
 src.KU = a.K
 case blas.Lower:
 dst.KL = t.K
 src.KL = a.K
 }
 dst.From(src)
}

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```

```

package mat

import (
 "testing"

 "golang.org/x/exp/rand"

 "gonum.org/v1/gonum/floats"
)

func TestGSVD(t *testing.T) {
 const tol = 1e-10
 rnd := rand.New(rand.NewSource(1))
 for _, test := range []struct {
 m, p, n int
 }{
 {5, 3, 5},
 {5, 3, 3},
 {3, 3, 5},
 {5, 5, 5},
 {5, 5, 3},
 {3, 5, 5},
 {150, 150, 150},
 {200, 150, 150},
 {150, 150, 200},
 {150, 200, 150},
 {200, 200, 150},
 {150, 200, 200},
 } {
 m := test.m
 p := test.p
 n := test.n
 for trial := 0; trial < 10; trial++ {
 a := NewDense(m, n, nil)
 for i := range a.mat.Data {
 a.mat.Data[i] = rnd.NormFloat64()
 }
 aCopy := DenseCopyOf(a)

 b := NewDense(p, n, nil)
 for i := range b.mat.Data {
 b.mat.Data[i] = rnd.NormFloat64()
 }
 bCopy := DenseCopyOf(b)

 // Test Full decomposition.
 var gsvd GSVD
 ok := gsvd.Factorize(a,

```

```

b, GSVDU|GSVDV|GSVDQ)
if !ok {
 t.Errorf("GSVD factorization failed")
}
if !Equal(a, aCopy) {
 t.Errorf("A changed during call to GSVD.Factorize with GSVDU|GSVDV|GSVDQ")
}
if !Equal(b, bCopy) {
 t.Errorf("B changed during call to GSVD.Factorize with GSVDU|GSVDV|GSVDQ")
}
c, s, sigma1, sigma2, zeroR, u, v, q := extractGSVD(&gsvd)
var ansU, ansV, d1R, d2R Dense
ansU.Product(u.T(), a, q)
ansV.Product(v.T(), b, q)
d1R.Mul(sigma1, zeroR)
d2R.Mul(sigma2, zeroR)
if !EqualApprox(&ansU, &d1R, tol) {
 t.Errorf("Answer mismatch with GSVDU|GSVDV|GSVDQ\nU * A * Q:\n% 0.2f\n * [0 R]:\n% 0.2f",
 Formatted(&ansU), Formatted(&d1R))
}
if !EqualApprox(&ansV, &d2R, tol) {
 t.Errorf("Answer mismatch with GSVDU|GSVDV|GSVDQ\nV * B * Q:\n% 0.2f\n * [0 R]:\n% 0.2f",
 Formatted(&d2R), Formatted(&ansV))
}

// Check C^2 + S^2 = I.
for i := range c {
 d := c[i]*c[i] + s[i]*s[i]
 if !floats.EqualWithinAbsOrRel(d, 1, 1e-14, 1e-14)
{
 t.Errorf("c_%d^2 + s_%d^2 != 1: got: %v", i, i, d)
 }
}

// Test None decomposition.
ok = gsvd.Factorize(a, b, GSVDNone)
if !ok {
 t.Errorf("GSVD factorization failed")
}
if !Equal(a, aCopy) {
 t.Errorf("A changed during call to GSVD with GSVDNone")
}
if !Equal(b, bCopy) {
 t.Errorf("B changed during call to GSVD with GSVDNone")
}
cNone := gsvd.ValuesA(nil)
if !floats.EqualApprox(c, cNone, tol) {
 t.Errorf("Singular value mismatch between GSVDU|GSVDV|GSVDQ and GSVDNone decomposition")
}

```

```

 }
 sNone := gsvd.ValuesB(nil)
 if !floats.EqualApprox(s, sNone, tol) {
 t.Errorf("Singular value mismatch between GSVDU|GSVDV|GSVDQ and GSVDNone decomposition")
 }
}
}
}
}

```

```

func extractGSVD(gsvd *GSVD) (c, s []float64, s1, s2, zR, u, v, q *Dense) {
 s1 = &Dense{}
 s2 = &Dense{}
 zR = &Dense{}
 u = &Dense{}
 v = &Dense{}
 q = &Dense{}
 gsvd.SigmaATo(s1)
 gsvd.SigmaBTo(s2)
 gsvd.ZeroRTo(zR)
 gsvd.UTo(u)
 gsvd.VTo(v)
 gsvd.QTo(q)
 c = gsvd.ValuesA(nil)
 s
 = gsvd.ValuesB(nil)
 return c, s, s1, s2, zR, u, v, q
}

```

```

graph{{Edg_}Edg_{Edg_{Edg_}}}
graph{""[diA=""diA=""diA=""diA=""]}

```

```

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```

```

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```

```

package quat

```

```

import "math"

```

```

// Abs returns the absolute value (also called the modulus) of q.
func Abs(q Number) float64 {
 // Special cases.
 switch {
 case IsInf(q):
 return math.Inf(1)
 case IsNaN(q):

```



```

"io"
"sort"
"text/tabwriter"

"gonum.org/v1/gonum/graph/path/internal/testgraphs"
"gonum.org/v1/gonum/graph/simple"
)

// dumper implements a grid D* Lite statistics dump.
type dumper struct {
 step int

 dStarLite *DStarLite
 grid *testgraphs.LimitedVisionGrid

 w io.Writer
}

// dump writes a single step of a D* Lite path search to the dumper's io.Writer.
func (d *dumper) dump(withpath bool) {
 if d == nil {
 return
 }
 var pathStep map[int64]int
 if withpath {
 pathStep = make(map[int64]int)
 path, _ := d.dStarLite.Path()
 for i, n := range path {
 pathStep[n.ID()] = i
 }
 }
 fmt.Fprintf(d.w, "Step:%d k=%v\n", d.step, d.dStarLite.keyModifier)
 d.step++
 w := tabwriter.NewWriter(d.w, 0, 0, 0, ' ', tabwriter.Debug)
 rows, cols := d.grid.Grid.Dims()
 for r := 0; r < rows;
 r++ {
 if r == 0 {
 for c := 0; c < cols; c++ {
 if c != 0 {
 fmt.Fprint(w, "\t")
 }
 fmt.Fprint(w, "-----")
 }
 fmt.Fprintln(w)
 }
 for ln := 0; ln < 6; ln++ {
 for c := 0; c < cols; c++ {

```



```

if c != 0 {
 fmt.Fprint(w, "\t")
}
n := d.dStarLite.model.Node(d.grid.NodeAt(r, c).ID()).(*dStarLiteNode)
switch ln {
case 0:
 if n.ID() == d.grid.Location.ID() {
 if d.grid.Grid.HasOpen(n.ID()) {
 fmt.Fprintf(w, "id:%2d >@<", n.ID())
 } else {
 // Mark location as illegal.
 fmt.Fprintf(w, "id:%2d >!<", n.ID())
 }
 } else if n.ID() == d.dStarLite.t.ID() {
 fmt.Fprintf(w, "id:%2d G", n.ID())
 // Mark goal cell as illegal.
 if !d.grid.Grid.HasOpen(n.ID()) {
 fmt.Fprint(w, "!")
 }
 } else if pathStep[n.ID()] > 0 {
 fmt.Fprintf(w, "id:%2d %2d", n.ID(), pathStep[n.ID()])
 // Mark path cells with an obstruction.
 if !d.grid.Grid.HasOpen(n.ID()) {
 fmt.Fprint(w,
"!")
 }
 } else {
 fmt.Fprintf(w, "id:%2d", n.ID())
 // Mark cells with an obstruction.
 if !d.grid.Grid.HasOpen(n.ID()) {
 fmt.Fprint(w, " *")
 }
 }
case 1:
 fmt.Fprintf(w, "h: %.4v", d.dStarLite.heuristic(n, d.dStarLite.Here()))
case 2:
 fmt.Fprintf(w, "g: %.4v", n.g)
case 3:
 fmt.Fprintf(w, "rhs:%.4v", n.rhs)
case 4:
 if n.g != n.rhs {
 fmt.Fprintf(w, "key:%.3f", n.key)
 }
 if !n.key.isBadKey() {
 // Mark keys for nodes in the priority queue.
 // We use NaN inequality for this check since all
 // keys not in the queue must have their key set
 // to badKey.

```

```

//
// This should always mark cells where key is
// printed.
fmt.Fprint(w, "**")
}
if n.g > n.rhs {
 fmt.Fprint(w, "^")
}
if n.g < n.rhs {
 fmt.Fprint(w, "v")
}
default:
 fmt.Fprint(w, "-----")
}
}
fmt.Fprintln(w)
}
}
w.Flush()
fmt.Fprintln(d.w)
}

//
printEdges pretty prints the given edges to the dumper's io.Writer using the provided
// format string. The edges are first formatted to a string, so the format string must use
// the %s verb to indicate where the edges are to be printed.
func (d *dumper) printEdges(format string, edges []simple.WeightedEdge) {
 if d == nil {
 return
 }
 var buf bytes.Buffer
 sort.Sort(lexically(edges))
 for i, e := range edges {
 if i != 0 {
 fmt.Fprint(&buf, ", ")
 }
 fmt.Fprintf(&buf, "%d->%d:%.4v", e.From().ID(), e.To().ID(), e.Weight())
 }
 if len(edges) == 0 {
 fmt.Fprint(&buf, "none")
 }
 fmt.Fprintf(d.w, format, buf.Bytes())
}

type lexically []simple.WeightedEdge

func (l lexically) Len() int { return len(l) }
func (l lexically) Less(i, j int) bool {

```

```

return l[i].From().ID() < l[j].From().ID() || (l[i].From().ID() == l[j].From().ID() && l[i].To().ID() < l[j].To().ID())
}
func (l lexically) Swap(i, j int) { l[i], l[j] = l[j], l[i] }
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package gen

import (
 "fmt"
 "math"
 "sort"

 "golang.org/x/exp/rand"

 "gonum.org/v1/gonum/graph"
 "gonum.org/v1/gonum/graph/internal/ordered"
)

// UndirectedMutator is an undirected graph builder that can remove edges.
type UndirectedMutator interface {
 graph.UndirectedBuilder
 graph.EdgeRemover
}

// Duplication constructs a graph in the destination, dst, of order n. New nodes
// are created by duplicating an existing node and all its edges. Each new edge is
// deleted with probability delta. Additional edges are added between the new node
// and existing nodes with probability alpha/|V|. An exception to this addition
// rule is made for the parent node when sigma is not NaN; in this case an edge is
// created with probability sigma. With the exception of the sigma parameter, this
// corresponds to the completely correlated
// case in doi:10.1016/S0022-5193(03)00028-6.
// If src is not nil it is used as the random source, otherwise rand.Float64 is used.
func Duplication(dst UndirectedMutator, n int, delta, alpha, sigma float64, src rand.Source) error {
 // As described in doi:10.1016/S0022-5193(03)00028-6 but
 // also clarified in doi:10.1186/gb-2007-8-4-r51.

 if delta < 0 || delta > 1 {
 return fmt.Errorf("gen: bad delta: delta=%v", delta)
 }
 if alpha <= 0 || alpha > 1 {
 return fmt.Errorf("gen: bad alpha: alpha=%v", alpha)
 }
 if sigma < 0 || sigma > 1 {
 return fmt.Errorf("gen: bad sigma: sigma=%v", sigma)
 }
}

```

```

var (
 rnd func() float64
 rndN func(int) int
)
if src == nil {
 rnd = rand.Float64
 rndN = rand.Intn
} else {
 r := rand.New(src)
 rnd = r.Float64
 rndN = r.Intn
}

nodes := graph.NodesOf(dst.Nodes())
sort.Sort(ordered.ByID(nodes))
if len(nodes) == 0 {
 n--
 u := dst.NewNode()
 dst.AddNode(u)
 nodes = append(nodes, u)
}
for i := 0; i < n; i++ {
 u := nodes[rndN(len(nodes))]
 d
:= dst.NewNode()
 did := d.ID()

 // Add the duplicate node.
 dst.AddNode(d)

 // Loop until we have connectivity
 // into the rest of the graph.
 for {
 // Add edges to parent's neighbours.
 to := graph.NodesOf(dst.From(u.ID()))
 sort.Sort(ordered.ByID(to))
 for _, v := range to {
 vid := v.ID()
 if rnd() < delta || dst.HasEdgeBetween(vid, did) {
 continue
 }
 if vid < did {
 dst.SetEdge(dst.NewEdge(v, d))
 } else {
 dst.SetEdge(dst.NewEdge(d, v))
 }
 }
 }
}

```

```

// Add edges to old nodes.
scaledAlpha := alpha / float64(len(nodes))
for _, v := range nodes {
 uid := u.ID()
 vid := v.ID()
 switch vid {
 case uid:
 if !math.IsNaN(sigma) {
 if i == 0 || rnd() < sigma {
 if vid < did {
 dst.SetEdge(dst.NewEdge(v, d))
 } else {
 dst.SetEdge(dst.NewEdge(d, v))
 }
 }
 }
 continue
 }
 fallthrough
 default:
 if rnd() < scaledAlpha && !dst.HasEdgeBetween(vid, did)
 {
 if vid < did {
 dst.SetEdge(dst.NewEdge(v, d))
 } else {
 dst.SetEdge(dst.NewEdge(d, v))
 }
 }
}

if dst.From(did).Len() != 0 {
 break
}

nodes = append(nodes, d)
}

return nil
}
graph{{digrap{digrap}}}
graph{{G7{G7}G9}G7{G7{G7}G9}G7{G7}G}G9}
graph{8.185582076609134620766091346740222656257910156274077265625791015625}
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```

```
// Package quad provides numerical evaluation of definite integrals of single-variable functions.
//
package quad // import "gonum.org/v1/gonum/integrate/quad"
graph{{SUBGG{SUBGH}}}
graph{SUB{{{SUB{{SUB}SUB}}SUB}SUB}}
graph{{StricW}StricP}
graph{{{st}}st}}
Graph{{subgra4}}
graph{GR{GR{{GR{{GR}GR}}}{{GR}GR}}}}
graph{ED{ED{ED}}}
graph{di_{di_{di_{di_}}}{di_{di_{di_}}}{di_{di_}}}{di_}}
graph{{no9}{no6}}
digraph {
 graph [bgcolor=transparent]
 node [style=filled fillcolor=white]
 edge [minlen=2]
 A -> B
}
graph{{no9{{no9}{no6}}no6{{no9{{no9}{no6}}no6}}}}
/** github.com/SPIEGELTechLab/skipper@v0.10.69 **/

{{Types "Apache-2.0 MIT"}}
```

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Notice file for pathmux/

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MODIFICATIONS TO pathmux/tree.go and pathmux/tree\_test.go:

02.09.2015

- Exposed the internal tree implementation of <http://godoc.org/github.com/dimfeld/httpreemux> so that it can be used to look up arbitrary objects in a Patricia tree.

21.04.2016 - Enabled backtracking in the tree lookup.

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package layout

```
import (
 "image"
```

```
 "gioui.org/op"
)
```

```
// Stack lays out child elements on top of each other,
// according to an alignment direction.
```

```
type Stack struct {
 // Alignment is the direction to align children
 // smaller than the available space.
 Alignment Direction
}
```

```
// StackChild represents a child for a Stack layout.
```

```
type StackChild struct {
 expanded bool
 widget Widget
```

```
// Scratch space.
```

```
macro op.MacroOp
```

```

dims Dimensions
}

// Stacked returns a Stack child that laid out with the same maximum
// constraints as the Stack.
func Stacked(w Widget) StackChild {
return StackChild{
 widget: w,
}
}

// Expanded returns a Stack child that is forced to take up at least
// the the space as the largest Stacked.
func Expanded(w Widget) StackChild {
return StackChild{
 expanded: true,
 widget: w,
}
}

// Layout a stack of children. The position of the children are
// determined by the specified order, but Stacked children are
// laid out
// before Expanded children.
func (s Stack) Layout(gtx *Context, children ...StackChild) {
 var maxSZ image.Point
 // First lay out Stacked children.
 for i, w := range children {
 if w.expanded {
 continue
 }
 cs := gtx.Constraints
 cs.Width.Min = 0
 cs.Height.Min = 0
 var m op.MacroOp
 m.Record(gtx.Ops)
 dims := ctxLayout(gtx, cs, w.widget)
 m.Stop()
 if w := dims.Size.X; w > maxSZ.X {
 maxSZ.X = w
 }
 if h := dims.Size.Y; h > maxSZ.Y {
 maxSZ.Y = h
 }
 children[i].macro = m
 children[i].dims = dims
 }
 maxSZ = gtx.Constraints.Constrain(maxSZ)

```



```

// Then lay out Expanded children.
for i, w := range children {
 if !w.expanded {
 continue
 }
 var m op.MacroOp
 m.Record(gtx.Ops)
 cs := Constraints{
 Width: Constraint{Min: maxSZ.X, Max: gtx.Constraints.Width.Max},
 Height: Constraint{Min: maxSZ.Y, Max: gtx.Constraints.Height.Max},
 }
 dims := ctxLayout(gtx, cs, w.widget)
 m.Stop()
 children[i].macro = m
 children[i].dims = dims
}

var baseline
int
for _, ch := range children {
 sz := ch.dims.Size
 var p image.Point
 switch s.Alignment {
 case N, S, Center:
 p.X = (maxSZ.X - sz.X) / 2
 case NE, SE, E:
 p.X = maxSZ.X - sz.X
 }
 switch s.Alignment {
 case W, Center, E:
 p.Y = (maxSZ.Y - sz.Y) / 2
 case SW, S, SE:
 p.Y = maxSZ.Y - sz.Y
 }
 var stack op.StackOp
 stack.Push(gtx.Ops)
 op.TransformOp{ }.Offset(toPointF(p)).Add(gtx.Ops)
 ch.macro.Add()
 stack.Pop()
 if baseline == 0 {
 if b := ch.dims.Baseline; b != 0 {
 baseline = b + maxSZ.Y - sz.Y - p.Y
 }
 }
}
gtx.Dimensions = Dimensions{
 Size: maxSZ,
 Baseline: baseline,
}

```

```

}
}
graph{{{die}die}}
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// +build gofuzz

package fuzz

import (
 "bytes"
 "os/exec"

 "gonum.org/v1/gonum/graph/formats/dot"
)

// Fuzz implements the fuzzing function required for go-fuzz.
//
// See documentation at https://github.com/dvyukov/go-fuzz.
func Fuzz(data []byte) int {
 // We don't accept empty data; the dot command does.
 if len(data) == 0 || bytes.Equal(data, []byte{}) {
 return -1
 }

 // Check that dot accepts the input without complaint.
 cmd := exec.Command("dot")
 cmd.Stdin = bytes.NewReader(data)
 err := cmd.Run()
 if err != nil {
 return 0
 }

 // Try to parse the data.
 _, err = dot.Parse(bytes.NewReader(data))
 if err != nil {
 panic("could not parse good dot")
 }
 return 1
}

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// Package cblas64 provides a simple interface to the complex64 BLAS API.
package cblas64 // import "gonum.org/v1/gonum/blas/cblas64"

```

```
graph{{{{{ {{{{{{{{{{Digra_{Digra_}}Digra_{Digra_{Digra_{Digra_}}Digr}}Digra_}}Digra_{Digra_{Digra_}}{Di
gra_}}Digra_{Digra_{Digra_{Digra_}}Digr}}Digra_}}Digra_{Digra_{Digra_}}}}}}}
graph{stric9{stric4}stric9{stric4}}
/**/graph{/**/}
graph{{sur{{sur{{sur{{sur{{sur{{sur{{sur}}sur}}sur}}sur}}sur}}sur}}}}
graph{DIG_{DIG_}}
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package gonum

import "gonum.org/v1/gonum/blas"

// Dorml2 multiplies a general matrix C by an orthogonal matrix from an LQ factorization
// determined by Dgelqf.
// C = Q * C if side == blas.Left and trans == blas.NoTrans
// C = Q * C if side == blas.Left and trans == blas.Trans
// C = C * Q if side == blas.Right and trans == blas.NoTrans
// C = C * Q if side == blas.Right and trans == blas.Trans
// If side == blas.Left, a is a matrix of side km, and if side == blas.Right
// a is of size kn.
//
// tau contains the Householder factors and is of length at least k and this function will
// panic otherwise.
//
// work is temporary storage of length at least n if side == blas.Left
// and at least m if side == blas.Right and this function will panic otherwise.
//
// Dorml2 is an internal routine. It is exported for testing
purposes.
func (impl Implementation) Dorml2(side blas.Side, trans blas.Transpose, m, n, k int, a []float64, lda int, tau, c
[]float64, ldc int, work []float64) {
 left := side == blas.Left
 switch {
 case !left && side != blas.Right:
 panic(badSide)
 case trans != blas.Trans && trans != blas.NoTrans:
 panic(badTrans)
 case m < 0:
 panic(mLT0)
 case n < 0:
 panic(nLT0)
 case k < 0:
 panic(kLT0)
 case left && k > m:
 panic(kGTM)
 case !left && k > n:
```

```

panic(kGTN)
case left && lda < max(1, m):
 panic(badLdA)
case !left && lda < max(1, n):
 panic(badLdA)
}

// Quick return if possible.
if m == 0 || n == 0 || k == 0 {
 return
}

switch {
case left && len(a) < (k-1)*lda+m:
 panic(shortA)
case !left && len(a) < (k-1)*lda+n:
 panic(shortA)
case len(tau) < k:
 panic(shortTau)
case len(c) < (m-1)*ldc+n:
 panic(shortC)
case left && len(work) < n:
 panic(shortWork)
case !left && len(work) < m:
 panic(shortWork)
}

notrans := trans == blas.NoTrans
switch {
case left
&& notrans:
 for i := 0; i < k; i++ {
 aii := a[i*lda+i]
 a[i*lda+i] = 1
 impl.Dlarf(side, m-i, n, a[i*lda+i:], 1, tau[i], c[i*ldc:], ldc, work)
 a[i*lda+i] = aii
 }

case left && !notrans:
 for i := k - 1; i >= 0; i-- {
 aii := a[i*lda+i]
 a[i*lda+i] = 1
 impl.Dlarf(side, m-i, n, a[i*lda+i:], 1, tau[i], c[i*ldc:], ldc, work)
 a[i*lda+i] = aii
 }

case !left && notrans:
 for i := k - 1; i >= 0; i-- {

```

```

a[i*lda+i]
a[i*lda+i] = 1
impl.Dlarf(side, m, n-i, a[i*lda+i:], 1, tau[i], c[i:], ldc, work)
a[i*lda+i] = aii
}

case !left && !notrans:
for i := 0; i < k; i++ {
a[i*lda+i]
a[i*lda+i] = 1
impl.Dlarf(side, m, n-i, a[i*lda+i:], 1, tau[i], c[i:], ldc, work)
a[i*lda+i] = aii
}
}
}

/**/graph""{e[e=""l=""e=""h=""t=""r=""][r=""]/* "327890" -- "3298-547" -- "3" -- "-0";
/* .rege ar =aw 89723h */
"-0" -- "5" [e = 3.0];
"4" -- "9" [e = 3.0];
"6" -- "327890" [e = 3.0];
"8" -- "3" [e = 3.0];
"3298-547" -- "3" [e = 3.0];
}
graph{diG8{}diG5{}diG5{}diG5}
graph{<NNNNNNNNNN>}
graph{{ed_}}
graph{{{STN}STN}STH}STN}STN}STH}
Graph{{{diGrapc}diGrapc}}
/** https://raw.githubusercontent.com/Workiva/sslabs-go/v0.1.4/LICENSE **/

{{Types "Apache-2.0"}}

```

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```
graph{{gra_{}gra_{}gra_}gra_}
```

```
graph{{GRA}{GRA}GRAa{{GRA}{GRA}GRA}}
```

```
graph{{nN{nN}}}
```

```
Gonum stat
```

```
[![GoDoc](https://godoc.org/gonum.org/v1/gonum/stat?status.svg)](https://godoc.org/gonum.org/v1/gonum/stat)
```

Package stat is a statistics package for the Go language.

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```
package gonum
```

```
import (
```

```
 "math"
```

```
 "gonum.org/v1/gonum/blas/blas64"
```

```
)
```

```
// Drscl multiplies the vector x by 1/a being careful to avoid overflow or
```

```
// underflow where possible.
```

```
//
```

```
// Drscl is an internal routine. It is exported for testing purposes.
```

```
func (impl Implementation) Drscl(n int, a float64, x []float64, incX int) {
```

```
 switch {
```

```
 case n < 0:
```

```
 panic(nLT0)
```

```
 case incX <= 0:
```

```
 panic(badIncX)
```

```
 }
```

```
// Quick return if possible.
```

```
if n == 0 {
```

```
 return
```

```
}
```

```
if len(x) < 1+(n-1)*incX {
```

```
 panic(shortX)
```

```
}
```

```
bi := blas64.Implementation()
```

```
cden := a
```

```
cnum := 1.0
```

```

smlnum := dlamchS
bignum := 1 / smlnum
for {
 cden1 := cden * smlnum
 cnum1 := cnum / bignum
 var mul float64
 var done bool
 switch {
 case cnum != 0 && math.Abs(cden1) > math.Abs(cnum):
 mul = smlnum
 done = false
 cden = cden1
 case math.Abs(cnum1) > math.Abs(cden):
 mul
 = bignum
 done = false
 cnum = cnum1
 default:
 mul = cnum / cden
 done = true
 }
 bi.Dscal(n, mul, x, incX)
 if done {
 break
 }
}
graph{{{grN}{grN}{grN}}grO}}
graph{DIGRAP}
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```

```
package optimize
```

```

import (
 "testing"

 "gonum.org/v1/gonum/mat"
 "gonum.org/v1/gonum/optimize/functions"
 "gonum.org/v1/gonum/stat/distmv"
)

func TestGuessAndCheck(t *testing.T) {
 dim := 30
 problem := Problem{
 Func: functions.ExtendedRosenbrock{}.Func,
 }
}

```

```

mu := make([]float64, dim)
sigma := mat.NewSymDense(dim, nil)
for i := 0; i < dim; i++ {
 sigma.SetSym(i, i, 1)
}
d, ok := distmv.NewNormal(mu, sigma, nil)
if !ok {
 panic("bad test")
}
initX := make([]float64, dim)
Minimize(problem, initX, nil, &GuessAndCheck{Rander: d})

settings := &Settings{}
settings.Concurrent = 5
settings.MajorIterations = 15
Minimize(problem, initX, settings, &GuessAndCheck{Rander: d})
}
graph{Di{{{Di}Di}}Di}}
graph{{Gr}{Gr{{Gr}{Gr{{Gr}{Gr}{Gr}}Gr}}Gr}}{Gr}{Gr{{Gr}{Gr}}Gr}}}}
graph{{stricu}stricu}{stricu}{stricu}}
graph{{{EDGD}{EDGD}}EDGD}EDGD{EDGD}}EDGD}}
graph{{D_{{D_}}}}
graph{{DY{DN}DY}DY{DN}{DY{DN}DY}DY{DN}{DY{DN}DY}DY{DN}DY}DY{DN}DY}
graph{ed""ed{ed""ed}}
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// license that can be found in the LICENSE file.

package gonum

import (
 "math"

 "gonum.org/v1/gonum/blas/blas64"
)

// Dgetf2 computes the LU decomposition of the mn matrix A.
// The LU decomposition is a factorization of a into
// A = P * L * U
// where P is a permutation matrix, L is a unit lower triangular matrix, and
// U is a (usually) non-unit upper triangular matrix. On exit, L and U are stored
// in place into a.
//
// ipiv is a permutation vector. It indicates that row i of the matrix was
// changed with ipiv[i]. ipiv must have length at least min(m,n), and will panic
// otherwise. ipiv is zero-indexed.
//
// Dgetf2 returns whether the matrix A is singular. The LU decomposition will

```



```

// be computed regardless of the singularity of A, but division by zero
// will occur if the false is returned and the result is used to solve a
// system of equations.
//
// Dgetf2
is an internal routine. It is exported for testing purposes.
func (Implementation) Dgetf2(m, n int, a []float64, lda int, ipiv []int) (ok bool) {
 mn := min(m, n)
 switch {
 case m < 0:
 panic(mLT0)
 case n < 0:
 panic(nLT0)
 case lda < max(1, n):
 panic(badLdA)
 }

 // Quick return if possible.
 if mn == 0 {
 return true
 }

 switch {
 case len(a) < (m-1)*lda+n:
 panic(shortA)
 case len(ipiv) != mn:
 panic(badLenIpiv)
 }

 bi := blas64.Implementation()

 sfmin := dlamchS
 ok = true
 for j := 0; j < mn; j++ {
 // Find a pivot and test for singularity.
 jp := j + bi.Idamax(m-j, a[j*lda+j:], lda)
 ipiv[j] = jp
 if a[jp*lda+j] == 0 {
 ok = false
 } else {
 // Swap the rows if necessary.
 if jp != j {
 bi.Dswap(n, a[j*lda:], 1, a[jp*lda:], 1)
 }
 if j < m-1 {
 aj := a[j*lda+j]
 if math.Abs(aj) >= sfmin {
 bi.Dscal(m-j-1, 1/aj, a[(j+1)*lda+j:], lda)
 }
 }
 }
 }
}

```

```

 } else {
 for i := 0; i < m-j-1; i++ {
 a[(j+1)*lda+j] = a[(j+1)*lda+j] / a[lda*j+j]
 }
 }
}
}
if
j < mn-1 {
 bi.Dger(m-j-1, n-j-1, -1, a[(j+1)*lda+j:], lda, a[j*lda+j+1:], 1, a[(j+1)*lda+j+1:], lda)
}
}
return ok
}
graph{No0}
graph{su_{su_}{su_}}
graph{diGra{diGra}}
graph{{{StriG}{StriG}{StriG}{StriG}{StriG}}StriC}
Graph{SubgrK{{{SubgrN}}}}
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package path

import (
 "testing"
)

func TestDisjointSetMakeSet(t *testing.T) {
 ds := newDisjointSet()
 if ds.master == nil {
 t.Fatal("Internal disjoint set map erroneously nil")
 } else if len(ds.master) != 0 {
 t.Error("Disjoint set master map of wrong size")
 }

 ds.makeSet(3)
 if len(ds.master) != 1 {
 t.Error("Disjoint set master map of wrong size")
 }

 if node, ok := ds.master[3]; !ok {
 t.Error("Make set did not successfully add element")
 } else {
 if node == nil {
 t.Fatal("Disjoint set node from makeSet is nil")
 }
 }
}

```

```

 if node.rank != 0 {
 t.Error("Node rank set incorrectly")
 }

 if node.parent != node {
 t.Error("Node parent set incorrectly")
 }
}

func TestDisjointSetFind(t *testing.T) {
 ds := newDisjointSet()

 ds.makeSet(3)
 ds.makeSet(5)

 if ds.find(3) == ds.find(5) {
 t.Error("Disjoint
sets incorrectly found to be the same")
 }
}

func TestUnion(t *testing.T) {
 ds := newDisjointSet()

 ds.makeSet(3)
 ds.makeSet(5)

 ds.union(ds.find(3), ds.find(5))

 if ds.find(3) != ds.find(5) {
 t.Error("Sets found to be disjoint after union")
 }
}

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// +build !go1.14

// Work around golang.org/issue/33384, fixed in CL 191785,
// to be released in Go 1.14.

package app

import (
 "os"
 "os/signal"
 "syscall"

```

```

func init() {
signal.Notify(make(chan os.Signal), syscall.SIGPIPE)
}
graph{SubG}
graph{{{Gr4{Gr4{Gr4{{{Gr4}}}Gr8}}}Gr8}}}
Graph{{subgra_}{subgra_}{subgra_}{{{subgra_}}}subgra_{subgra_}{{{subgra_}}}{subgra_}{{{subgra_}}}}
graph{{{S}S}
graph{{{gra_}{gra_{gra_}gra_}gra_}
*> \brief \b DLAQR5 performs a single small-bulge multi-shift QR sweep.
*
* ===== DOCUMENTATION =====
*
* Online html documentation available at
* http://www.netlib.org/lapack/explore-html/
*
*> \htmlonly
*> Download DLAQR5 + dependencies
*>
*> [TGZ]
*>
*> [ZIP]
*>
*> [TXT]
*> \endhtmlonly
*
* Definition:
* =====
*
* SUBROUTINE DLAQR5(WANTT, WANTZ, KACC22, N, KTOP, KBOT, NSHFTS,
* SR, SI, H, LDH, ILOZ, IHIZ, Z, LDZ, V, LDV, U,
* LDU, NV, WV, LDWV, NH, WH, LDWH)
*
* .. Scalar Arguments ..
* INTEGER IHIZ, ILOZ, KACC22, KBOT, KTOP, LDH,
* LDU, LDV,
* $ LDWH, LDWV, LDZ, N, NH, NSHFTS, NV
* LOGICAL WANTT, WANTZ
*
* ..
* .. Array Arguments ..
* DOUBLE PRECISION H(LDH, *), SI(*), SR(*), U(LDU, *),
* $ V(LDV, *), WH(LDWH, *), WV(LDWV, *),
* $ Z(LDZ, *)
*
* ..
*
*

```

```

*> \par Purpose:
* =====
*>
*> \verbatim
*>
*> DLAQR5, called by DLAQR0, performs a
*> single small-bulge multi-shift QR sweep.
*> \endverbatim
*
* Arguments:
* =====
*
*> \param[in] WANTT
*> \verbatim
*> WANTT is logical scalar
*> WANTT = .true. if the quasi-triangular Schur factor
*> is being computed. WANTT is set to .false. otherwise.
*> \endverbatim
*>
*> \param[in] WANTZ
*> \verbatim
*> WANTZ is logical scalar
*> WANTZ = .true. if the orthogonal Schur factor is being
*> computed. WANTZ is set to .false. otherwise.
*> \endverbatim
*>
*> \param[in]
KACC22
*> \verbatim
*> KACC22 is integer with value 0, 1, or 2.
*> Specifies the computation mode of far-from-diagonal
*> orthogonal updates.
*> = 0: DLAQR5 does not accumulate reflections and does not
*> use matrix-matrix multiply to update far-from-diagonal
*> matrix entries.
*> = 1: DLAQR5 accumulates reflections and uses matrix-matrix
*> multiply to update the far-from-diagonal matrix entries.
*> = 2: DLAQR5 accumulates reflections, uses matrix-matrix
*> multiply to update the far-from-diagonal matrix entries,
*> and takes advantage of 2-by-2 block structure during
*> matrix multiplies.
*> \endverbatim
*>
*> \param[in] N
*> \verbatim
*> N is integer scalar
*> N is the order of the Hessenberg matrix H upon which this
*> subroutine operates.

```

```

*> \endverbatim
*>
*> \param[in] KTOP
*> \verbatim
*> KTOP is integer scalar
*>
\endverbatim
*>
*> \param[in] KBOT
*> \verbatim
*> KBOT is integer scalar
*> These are the first and last rows and columns of an
*> isolated diagonal block upon which the QR sweep is to be
*> applied. It is assumed without a check that
*> either $KTOP = 1$ or $H(KTOP, KTOP-1) = 0$
*> and
*> either $KBOT = N$ or $H(KBOT+1, KBOT) = 0$.
*> \endverbatim
*>
*> \param[in] NSHFTS
*> \verbatim
*> NSHFTS is integer scalar
*> NSHFTS gives the number of simultaneous shifts. NSHFTS
*> must be positive and even.
*> \endverbatim
*>
*> \param[in,out] SR
*> \verbatim
*> SR is DOUBLE PRECISION array of size (NSHFTS)
*> \endverbatim
*>
*> \param[in,out] SI
*> \verbatim
*> SI is DOUBLE PRECISION array of size (NSHFTS)
*> SR contains the real parts and SI contains the imaginary
*> parts of the NSHFTS shifts of origin that define the
*>
*> multi-shift QR sweep. On output SR and SI may be
*> reordered.
*> \endverbatim
*>
*> \param[in,out] H
*> \verbatim
*> H is DOUBLE PRECISION array of size (LDH,N)
*> On input H contains a Hessenberg matrix. On output a
*> multi-shift QR sweep with shifts $SR(J)+i*SI(J)$ is applied
*> to the isolated diagonal block in rows and columns KTOP
*> through KBOT.

```

```

*> \endverbatim
*>
*> \param[in] LDH
*> \verbatim
*> LDH is integer scalar
*> LDH is the leading dimension of H just as declared in the
*> calling procedure. LDH.GE.MAX(1,N).
*> \endverbatim
*>
*> \param[in] ILOZ
*> \verbatim
*> ILOZ is INTEGER
*> \endverbatim
*>
*> \param[in] IHIZ
*> \verbatim
*> IHIZ is INTEGER
*> Specify the rows of Z to which transformations must be
*> applied if WANTZ is .TRUE.. 1 .LE. ILOZ .LE. IHIZ .LE. N
*> \endverbatim
*>
*> \param[in,out] Z
*> \verbatim
*>
*> Z is DOUBLE PRECISION array of size (LDZ,IH)
*> If WANTZ = .TRUE., then the QR Sweep orthogonal
*> similarity transformation is accumulated into
*> Z(ILOZ:IHIZ,ILO:IHI) from the right.
*> If WANTZ = .FALSE., then Z is unreferenced.
*> \endverbatim
*>
*> \param[in] LDZ
*> \verbatim
*> LDZ is integer scalar
*> LDA is the leading dimension of Z just as declared in
*> the calling procedure. LDZ.GE.N.
*> \endverbatim
*>
*> \param[out] V
*> \verbatim
*> V is DOUBLE PRECISION array of size (LDV,NSHFTS/2)
*> \endverbatim
*>
*> \param[in] LDV
*> \verbatim
*> LDV is integer scalar
*> LDV is the leading dimension of V as declared in the
*> calling procedure. LDV.GE.3.

```

```

*> \endverbatim
*>
*> \param[out] U
*> \verbatim
*> U is DOUBLE PRECISION array of size
*> (LDU,3*NSHFTS-3)
*> \endverbatim
*>
*> \param[in] LDU
*> \verbatim
*> LDU
is integer scalar
*> LDU is the leading dimension of U just as declared in the
*> in the calling subroutine. LDU.GE.3*NSHFTS-3.
*> \endverbatim
*>
*> \param[in] NH
*> \verbatim
*> NH is integer scalar
*> NH is the number of columns in array WH available for
*> workspace. NH.GE.1.
*> \endverbatim
*>
*> \param[out] WH
*> \verbatim
*> WH is DOUBLE PRECISION array of size (LDWH,NH)
*> \endverbatim
*>
*> \param[in] LDWH
*> \verbatim
*> LDWH is integer scalar
*> Leading dimension of WH just as declared in the
*> calling procedure. LDWH.GE.3*NSHFTS-3.
*> \endverbatim
*>
*> \param[in] NV
*> \verbatim
*> NV is integer scalar
*> NV is the number of rows in WV available for workspace.
*> NV.GE.1.
*> \endverbatim
*>
*> \param[out] WV
*> \verbatim
*> WV is DOUBLE PRECISION array of size
*> (LDWV,3*NSHFTS-3)
*> \endverbatim
*>

```



```

*> \param[in] LDWV
*>
\verbatim
*> LDWV is integer scalar
*> LDWV is the leading dimension of WV as declared in the
*> in the calling subroutine. LDWV.GE.NV.
*> \endverbatim
*
* Authors:
* =====
*
*> \author Univ. of Tennessee
*> \author Univ. of California Berkeley
*> \author Univ. of Colorado Denver
*> \author NAG Ltd.
*
*> \date September 2012
*
*> \ingroup doubleOTHERauxiliary
*
*> \par Contributors:
* =====
*>
*> Karen Braman and Ralph Byers, Department of Mathematics,
*> University of Kansas, USA
*
*> \par References:
* =====
*>
*> K. Braman, R. Byers and R. Mathias, The Multi-Shift QR
*> Algorithm Part I: Maintaining Well Focused Shifts, and Level 3
*> Performance, SIAM Journal of Matrix Analysis, volume 23, pages
*> 929--947, 2002.
*>
* =====
SUBROUTINE DLAQR5(WANTT, WANTZ, KACC22, N, KTOP, KBOT, NSHFTS,
$
$ SR, SI, H, LDH, ILOZ, IHIZ, Z, LDZ, V, LDV, U,
$ LDU, NV, WV, LDWV, NH, WH, LDWH)
*
* -- LAPACK auxiliary routine (version 3.4.2) --
* -- LAPACK is a software package provided by Univ. of Tennessee, --
* -- Univ. of California Berkeley, Univ. of Colorado Denver and NAG Ltd.--
* September 2012
*
* .. Scalar Arguments ..
INTEGER IHIZ, ILOZ, KACC22, KBOT, KTOP, LDH, LDU, LDV,
$ LDWH, LDWV, LDZ, N, NH, NSHFTS, NV

```

```

LOGICAL WANTT, WANTZ
*
* ..
* .. Array Arguments ..
DOUBLE PRECISION H(LDH, *), SI(*), SR(*), U(LDU, *),
$ V(LDV, *), WH(LDWH, *), WV(LDWV, *),
$ Z(LDZ, *)
*
* ..
*
* =====
* .. Parameters ..
DOUBLE PRECISION ZERO, ONE
PARAMETER (ZERO = 0.0d0, ONE = 1.0d0)
*
* ..
* .. Local Scalars ..
DOUBLE PRECISION ALPHA,
BETA, H11, H12, H21, H22, REFSUM,
$ SAFMAX, SAFMIN, SCL, SMLNUM, SWAP, TST1, TST2,
$ ULP
INTEGER I, I2, I4, INCOL, J, J2, J4, JBOT, JCOL, JLEN,
$ JROW, JTOP, K, K1, KDU, KMS, KNZ, KRCOL, KZS,
$ M, M22, MBOT, MEND, MSTART, MTOP, NBMPS, NDCOL,
$ NS, NU
LOGICAL ACCUM, BLK22, BMP22
*
* ..
* .. External Functions ..
DOUBLE PRECISION DLAMCH
EXTERNAL DLAMCH
*
* ..
* .. Intrinsic Functions ..
*
INTRINSIC ABS, DBLE, MAX, MIN, MOD
*
* ..
* .. Local Arrays ..
DOUBLE PRECISION VT(3)
*
* ..
* .. External Subroutines ..
EXTERNAL DGEMM, DLABAD, DLACPY, DLAQR1, DLARFG, DLASET,
$ DTRMM
*
* ..
* .. Executable Statements ..
*
* ==== If there are no shifts, then there is nothing to do. ====
*
IF(NSHFTS.LT.2)
$ RETURN
*
*

```

```

==== If the active block is empty or 1-by-1, then there
* . is nothing to do. ====
*
 IF(KTOP.GE.KBOT)
 $ RETURN
*
* ==== Shuffle shifts into pairs of real shifts and pairs
* . of complex conjugate shifts assuming complex
* . conjugate shifts are already adjacent to one
* . another. ====
*
 DO 10 I = 1, NSHFTS - 2, 2
 IF(SI(I).NE.-SI(I+1)) THEN
*
 SWAP = SR(I)
 SR(I) = SR(I+1)
 SR(I+1) = SR(I+2)
 SR(I+2) = SWAP
*
 SWAP = SI(I)
 SI(I) = SI(I+1)
 SI(I+1) = SI(I+2)
 SI(I+2) = SWAP
 END IF
 10 CONTINUE
*
* ==== NSHFTS is supposed to be even, but if it is odd,
* . then simply reduce it by one. The shuffle above
* . ensures that the dropped shift is real and that
* . the remaining shifts are paired. ====
*
 NS = NSHFTS - MOD(NSHFTS, 2)
*
* ==== Machine constants for
deflation ====
*
 SAFMIN = DLAMCH('SAFE MINIMUM')
 SAFMAX = ONE / SAFMIN
 CALL DLABAD(SAFMIN, SAFMAX)
 ULP = DLAMCH('PRECISION')
 SMLNUM = SAFMIN*(DBLE(N) / ULP)
*
* ==== Use accumulated reflections to update far-from-diagonal
* . entries ? ====
*
 ACCUM = (KACC22.EQ.1) .OR. (KACC22.EQ.2)
*
* ==== If so, exploit the 2-by-2 block structure? ====

```

```

*
BLK22 = (NS.GT.2) .AND. (KACC22.EQ.2)
*
* ==== clear trash ====
*
IF(KTOP+2.LE.KBOT)
$ H(KTOP+2, KTOP) = ZERO
*
* ==== NBMPS = number of 2-shift bulges in the chain ====
*
NBMPS = NS / 2
*
* ==== KDU = width of slab ====
*
KDU = 6*NBMPS - 3
*
* ==== Create and chase chains of NBMPS bulges ====
*
DO 220 INCOL = 3*(1-NBMPS) + KTOP - 1, KBOT - 2, 3*NBMPS - 2
 NDCOL = INCOL + KDU
 IF(ACCUM)
 $ CALL DLASET('ALL', KDU, KDU, ZERO, ONE, U, LDU)
*
* ==== Near-the-diagonal bulge chase. The following
loop
* . performs the near-the-diagonal part of a small bulge
* . multi-shift QR sweep. Each 6*NBMPS-2 column diagonal
* . chunk extends from column INCOL to column NDCOL
* . (including both column INCOL and column NDCOL). The
* . following loop chases a 3*NBMPS column long chain of
* . NBMPS bulges 3*NBMPS-2 columns to the right. (INCOL
* . may be less than KTOP and and NDCOL may be greater than
* . KBOT indicating phantom columns from which to chase
* . bulges before they are actually introduced or to which
* . to chase bulges beyond column KBOT.) ====
*
DO 150 KRCOL = INCOL, MIN(INCOL+3*NBMPS-3, KBOT-2)
*
* ==== Bulges number MTOP to MBOT are active double implicit
* . shift bulges. There may or may not also be small
* . 2-by-2 bulge, if there is room. The inactive bulges
* . (if any) must wait until the active bulges
have moved
* . down the diagonal to make room. The phantom matrix
* . paradigm described above helps keep track. ====
*
MTOP = MAX(1, ((KTOP-1)-KRCOL+2) / 3+1)
MBOT = MIN(NBMPS, (KBOT-KRCOL) / 3)

```

```

M22 = MBOT + 1
BMP22 = (MBOT.LT.NBMPS) .AND. (KRCOL+3*(M22-1)).EQ.
$ (KBOT-2)
*
* ==== Generate reflections to chase the chain right
* . one column. (The minimum value of K is KTOP-1.) ====
*
DO 20 M = MTOP, MBOT
 K = KRCOL + 3*(M-1)
 IF(K.EQ.KTOP-1) THEN
 CALL DLAQR1(3, H(KTOP, KTOP), LDH, SR(2*M-1),
$ SI(2*M-1), SR(2*M), SI(2*M),
$ V(1, M))
 ALPHA = V(1, M)
 CALL DLARFG(3, ALPHA, V(2, M), 1, V(1, M))
 ELSE
 BETA = H(K+1, K)
 V(2, M)
= H(K+2, K)
 V(3, M) = H(K+3, K)
 CALL DLARFG(3, BETA, V(2, M), 1, V(1, M))
*
* ==== A Bulge may collapse because of vigilant
* . deflation or destructive underflow. In the
* . underflow case, try the two-small-subdiagonals
* . trick to try to reinflate the bulge. ====
*
 IF(H(K+3, K).NE.ZERO .OR. H(K+3, K+1).NE.
$ ZERO .OR. H(K+3, K+2).EQ.ZERO) THEN
*
* ==== Typical case: not collapsed (yet). ====
*
 H(K+1, K) = BETA
 H(K+2, K) = ZERO
 H(K+3, K) = ZERO
 ELSE
*
* ==== Atypical case: collapsed. Attempt to
* . reintroduce ignoring H(K+1,K) and H(K+2,K).
* . If the fill resulting from the new
* . reflector is too large, then abandon it.
*
 . Otherwise, use the new one. ====
*
 CALL DLAQR1(3, H(K+1, K+1), LDH, SR(2*M-1),
$ SI(2*M-1), SR(2*M), SI(2*M),
$ VT)
 ALPHA = VT(1)

```

```

CALL DLARFG(3, ALPHA, VT(2), 1, VT(1))
REFSUM = VT(1)*(H(K+1, K)+VT(2)*
$ H(K+2, K))
*
IF(ABS(H(K+2, K)-REFSUM*VT(2))+
$ ABS(REFSUM*VT(3)).GT.ULP*
$ (ABS(H(K, K))+ABS(H(K+1,
$ K+1))+ABS(H(K+2, K+2)))) THEN
*
* ===== Starting a new bulge here would
* . create non-negligible fill. Use
* . the old one with trepidation. =====
*
H(K+1, K) = BETA
H(K+2, K) = ZERO
H(K+3, K) = ZERO
ELSE
*
* ===== Stating a new bulge here would
* . create only negligible fill.
* . Replace the old reflector with
* . the new one. =====
*
H(K+1, K) = H(K+1, K) - REFSUM
H(K+2, K) = ZERO
H(K+3, K) = ZERO
V(1, M) = VT(1)
V(2, M) = VT(2)
V(3, M) = VT(3)
END IF
END IF
END IF
20 CONTINUE
*
* ===== Generate a 2-by-2 reflection, if needed. =====
*
K = KRCOL + 3*(M22-1)
IF(BMP22) THEN
IF(K.EQ.KTOP-1) THEN
CALL DLAQR1(2, H(K+1, K+1), LDH, SR(2*M22-1),
$ SI(2*M22-1), SR(2*M22), SI(2*M22),
$ V(1, M22))

BETA = V(1, M22)
CALL DLARFG(2, BETA, V(2, M22), 1, V(1, M22))
ELSE
BETA = H(K+1, K)
V(2, M22) = H(K+2, K)

```

```

 CALL DLARFG(2, BETA, V(2, M22), 1, V(1, M22))
 H(K+1, K) = BETA
 H(K+2, K) = ZERO
 END IF
END IF

*
* ===== Multiply H by reflections from the left =====
*

IF(ACCUM) THEN
 JBOT = MIN(NDCOL, KBOT)
ELSE IF(WANTT) THEN
 JBOT = N
ELSE
 JBOT = KBOT
END IF
DO 40 J = MAX(KTOP, KRCOL), JBOT
 MEND = MIN(MBOT, (J-KRCOL+2) / 3)
 DO 30 M = MTOP, MEND
 K = KRCOL + 3*(M-1)
 REFSUM = V(1, M)*(H(K+1, J)+V(2, M)*
$ H(K+2, J)+V(3, M)*H(K+3, J))
 H(K+1, J) = H(K+1, J) - REFSUM

 H(K+2, J) = H(K+2, J) - REFSUM*V(2, M)
 H(K+3, J) = H(K+3, J) - REFSUM*V(3, M)
30 CONTINUE
40 CONTINUE
 IF(BMP22) THEN
 K = KRCOL + 3*(M22-1)
 DO 50 J = MAX(K+1, KTOP), JBOT
 REFSUM = V(1, M22)*(H(K+1, J)+V(2, M22)*
$ H(K+2, J))
 H(K+1, J) = H(K+1, J) - REFSUM
 H(K+2, J) = H(K+2, J) - REFSUM*V(2, M22)
50 CONTINUE
 END IF

*
* ===== Multiply H by reflections from the right.
* . Delay filling in the last row until the
* . vigilant deflation check is complete. =====
*

IF(ACCUM) THEN
 JTOP = MAX(KTOP, INCOL)
ELSE IF(WANTT) THEN
 JTOP = 1
ELSE
 JTOP = KTOP
END IF

```

```

DO 90 M = MTOP, MBOT
 IF(V(1, M).NE.ZERO) THEN

 K = KRCOL + 3*(M-1)
 DO 60 J = JTOP, MIN(KBOT, K+3)
 REFSUM = V(1, M)*(H(J, K+1)+V(2, M)*
$ H(J, K+2)+V(3, M)*H(J, K+3))
 H(J, K+1) = H(J, K+1) - REFSUM
 H(J, K+2) = H(J, K+2) - REFSUM*V(2, M)
 H(J, K+3) = H(J, K+3) - REFSUM*V(3, M)
60 CONTINUE
*
 IF(ACCUM) THEN
*
* ===== Accumulate U. (If necessary, update Z later
* . with with an efficient matrix-matrix
* . multiply.) =====
*
 KMS = K - INCOL
 DO 70 J = MAX(1, KTOP-INCOL), KDU
 REFSUM = V(1, M)*(U(J, KMS+1)+V(2, M)*
$ U(J, KMS+2)+V(3, M)*U(J, KMS+3))
 U(J, KMS+1) = U(J, KMS+1) - REFSUM
 U(J, KMS+2) = U(J, KMS+2) -
REFSUM*V(2, M)
 U(J, KMS+3) = U(J, KMS+3) - REFSUM*V(3, M)
70 CONTINUE
 ELSE IF(WANTZ) THEN
*
* ===== U is not accumulated, so update Z
* . now by multiplying by reflections
* . from the right. =====
*
 DO 80 J = ILOZ, IHIZ
 REFSUM = V(1, M)*(Z(J, K+1)+V(2, M)*
$ Z(J, K+2)+V(3, M)*Z(J, K+3))
 Z(J, K+1) = Z(J, K+1) - REFSUM
 Z(J, K+2) = Z(J, K+2) - REFSUM*V(2, M)
 Z(J, K+3) = Z(J, K+3) - REFSUM*V(3, M)
80 CONTINUE
 END IF
 END IF
90 CONTINUE
*
* ===== Special case: 2-by-2 reflection (if needed) =====
*
 K = KRCOL + 3*(M22-1)
 IF(BMP22) THEN

```



```

 IF (V(1, M22).NE.ZERO) THEN

 DO 100 J = JTOP, MIN(KBOT, K+3)
 REFSUM = V(1, M22)*(H(J, K+1)+V(2, M22)*
$ H(J, K+2))
 H(J, K+1) = H(J, K+1) - REFSUM
 H(J, K+2) = H(J, K+2) - REFSUM*V(2, M22)
100 CONTINUE
*
 IF(ACCUM) THEN
 KMS = K - INCOL
 DO 110 J = MAX(1, KTOP-INCOL), KDU
 REFSUM = V(1, M22)*(U(J, KMS+1)+
$ V(2, M22)*U(J, KMS+2))
 U(J, KMS+1) = U(J, KMS+1) - REFSUM
 U(J, KMS+2) = U(J, KMS+2) -
$ REFSUM*V(2, M22)
110 CONTINUE
 ELSE IF(WANTZ) THEN
 DO 120 J = ILOZ, IHIZ
 REFSUM = V(1, M22)*(Z(J, K+1)+V(2, M22)*
$ Z(J, K+2))
 Z(J, K+1)
= Z(J, K+1) - REFSUM
 Z(J, K+2) = Z(J, K+2) - REFSUM*V(2, M22)
120 CONTINUE
 END IF
 END IF
 END IF

*
* ==== Vigilant deflation check ====
*
 MSTART = MTOP
 IF(KRCOL+3*(MSTART-1).LT.KTOP)
$ MSTART = MSTART + 1
 MEND = MBOT
 IF(BMP22)
$ MEND = MEND + 1
 IF(KRCOL.EQ.KBOT-2)
$ MEND = MEND + 1
 DO 130 M = MSTART, MEND
 K = MIN(KBOT-1, KRCOL+3*(M-1))
*
* ==== The following convergence test requires that
* . the tradition small-compared-to-nearby-diagonals
* . criterion and the Ahues & Tisseur (LAWN 122, 1997)
* . criteria both be satisfied. The latter improves
* . accuracy in some examples. Falling back on an

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```

* . alternate convergence criterion when TST1 or TST2
*
* . is zero (as done here) is traditional but probably
* . unnecessary. ====
*
 IF(H(K+1, K).NE.ZERO) THEN
 TST1 = ABS(H(K, K)) + ABS(H(K+1, K+1))
 IF(TST1.EQ.ZERO) THEN
 IF(K.GE.KTOP+1)
$ TST1 = TST1 + ABS(H(K, K-1))
 IF(K.GE.KTOP+2)
$ TST1 = TST1 + ABS(H(K, K-2))
 IF(K.GE.KTOP+3)
$ TST1 = TST1 + ABS(H(K, K-3))
 IF(K.LE.KBOT-2)
$ TST1 = TST1 + ABS(H(K+2, K+1))
 IF(K.LE.KBOT-3)
$ TST1 = TST1 + ABS(H(K+3, K+1))
 IF(K.LE.KBOT-4)
$ TST1 = TST1 + ABS(H(K+4, K+1))
 END IF
 IF(ABS(H(K+1, K)).LE.MAX(SMLNUM, ULP*TST1))
$ THEN
 H12 = MAX(ABS(H(
K+1, K)), ABS(H(K, K+1)))
 H21 = MIN(ABS(H(K+1, K)), ABS(H(K, K+1)))
 H11 = MAX(ABS(H(K+1, K+1)),
$ ABS(H(K, K)-H(K+1, K+1)))
 H22 = MIN(ABS(H(K+1, K+1)),
$ ABS(H(K, K)-H(K+1, K+1)))
 SCL = H11 + H12
 TST2 = H22*(H11 / SCL)
*
 IF(TST2.EQ.ZERO .OR. H21*(H12 / SCL).LE.
$ MAX(SMLNUM, ULP*TST2))H(K+1, K) = ZERO
 END IF
 END IF
130 CONTINUE
*
* ==== Fill in the last row of each bulge. ====
*
 MEND = MIN(NBMPS, (KBOT-KRCOL-1) / 3)
 DO 140 M = MTOP, MEND
 K = KRCOL + 3*(M-1)
 REFSUM = V(1, M)*V(3, M)*H(K+4, K+3)
 H(K+4, K+1) = -REFSUM
 H(K+4, K+2) = -REFSUM*V(2, M)
 H(K+4, K+3) = H(K+4, K+3)

```

```

- REFSUM*V(3, M)
140 CONTINUE
*
* ==== End of near-the-diagonal bulge chase. ====
*
150 CONTINUE
*
* ==== Use U (if accumulated) to update far-from-diagonal
* . entries in H. If required, use U to update Z as
* . well. ====
*
 IF(ACCUM) THEN
 IF(WANTT) THEN
 JTOP = 1
 JBOT = N
 ELSE
 JTOP = KTOP
 JBOT = KBOT
 END IF
 IF((.NOT.BLK22) .OR. (INCOL.LT.KTOP) .OR.
$ (NDCOL.GT.KBOT) .OR. (NS.LE.2)) THEN
*
* ==== Updates not exploiting the 2-by-2 block
* . structure of U. K1 and NU keep track of
* . the location and size of U in the special
* . cases of introducing bulges and chasing
* . bulges off the bottom. In these special
* . cases and in case the number of shifts
* . is NS = 2, there is no 2-by-2
block
* . structure to exploit. ====
*
 K1 = MAX(1, KTOP-INCOL)
 NU = (KDU-MAX(0, NDCOL-KBOT)) - K1 + 1
*
* ==== Horizontal Multiply ====
*
 DO 160 JCOL = MIN(NDCOL, KBOT) + 1, JBOT, NH
 JLEN = MIN(NH, JBOT-JCOL+1)
 CALL DGEMM('C', 'N', NU, JLEN, NU, ONE, U(K1, K1),
$ LDU, H(INCOL+K1, JCOL), LDH, ZERO, WH,
$ LDWH)
 CALL DLACPY('ALL', NU, JLEN, WH, LDWH,
$ H(INCOL+K1, JCOL), LDH)
160 CONTINUE
*
* ==== Vertical multiply ====
*

```

```

DO 170 JROW = JTOP, MAX(KTOP, INCOL) - 1, NV
 JLEN = MIN(NV, MAX(KTOP, INCOL)-JROW)
 CALL DGEMM('N', 'N', JLEN, NU, NU, ONE,
$ H(JROW, INCOL+K1), LDH, U(K1, K1),
$ LDU, ZERO, WV, LDWV)

 CALL DLACPY('ALL', JLEN, NU, WV, LDWV,
$ H(JROW, INCOL+K1), LDH)
170 CONTINUE
*
* ==== Z multiply (also vertical) ====
*
 IF(WANTZ) THEN
 DO 180 JROW = ILOZ, IHIZ, NV
 JLEN = MIN(NV, IHIZ-JROW+1)
 CALL DGEMM('N', 'N', JLEN, NU, NU, ONE,
$ Z(JROW, INCOL+K1), LDZ, U(K1, K1),
$ LDU, ZERO, WV, LDWV)
 CALL DLACPY('ALL', JLEN, NU, WV, LDWV,
$ Z(JROW, INCOL+K1), LDZ)
180 CONTINUE
 END IF
 ELSE
*
* ==== Updates exploiting U's 2-by-2 block structure.
* . (I2, I4, J2, J4 are the last rows and columns
* . of the blocks.) ====
*
 I2 = (KDU+1) / 2
 I4 = KDU
 J2 = I4 - I2
 J4 = KDU
*
* ====
*
 KZS and KNZ deal with the band of zeros
* . along the diagonal of one of the triangular
* . blocks. ====
*
 KZS = (J4-J2) - (NS+1)
 KNZ = NS + 1
*
* ==== Horizontal multiply ====
*
 DO 190 JCOL = MIN(NDCOL, KBOT) + 1, JBOT, NH
 JLEN = MIN(NH, JBOT-JCOL+1)
*
* ==== Copy bottom of H to top+KZS of scratch ====
* (The first KZS rows get multiplied by zero.) ====

```

```

*
CALL DLACPY('ALL', KNZ, JLEN, H(INCOL+1+J2, JCOL),
$ LDH, WH(KZS+1, 1), LDWH)
*
* ==== Multiply by U21**T ====
*
CALL DLASET('ALL', KZS, JLEN, ZERO, ZERO, WH, LDWH)
CALL DTRMM('L', 'U', 'C', 'N', KNZ, JLEN, ONE,
$ U(J2+1, 1+KZS), LDU, WH(KZS+1, 1),
$ LDWH)
*
* ==== Multiply top of H by U11**T ====
*
*
CALL DGEMM('C', 'N', I2, JLEN, J2, ONE, U, LDU,
$ H(INCOL+1, JCOL), LDH, ONE, WH, LDWH)
*
* ==== Copy top of H to bottom of WH ====
*
CALL DLACPY('ALL', J2, JLEN, H(INCOL+1, JCOL), LDH,
$ WH(I2+1, 1), LDWH)
*
* ==== Multiply by U21**T ====
*
CALL DTRMM('L', 'L', 'C', 'N', J2, JLEN, ONE,
$ U(1, I2+1), LDU, WH(I2+1, 1), LDWH)
*
* ==== Multiply by U22 ====
*
CALL DGEMM('C', 'N', I4-I2, JLEN, J4-J2, ONE,
$ U(J2+1, I2+1), LDU,
$ H(INCOL+1+J2, JCOL), LDH, ONE,
$ WH(I2+1, 1), LDWH)
*
* ==== Copy it back ====
*
CALL DLACPY('ALL', KDU, JLEN, WH, LDWH,
$ H(INCOL+1, JCOL), LDH)
190 CONTINUE
*
* ==== Vertical
multiply ====
*
DO 200 JROW = JTOP, MAX(INCOL, KTOP) - 1, NV
 JLEN = MIN(NV, MAX(INCOL, KTOP)-JROW)
*
* ==== Copy right of H to scratch (the first KZS
* . columns get multiplied by zero) ====

```

```

*
 CALL DLACPY('ALL', JLEN, KNZ, H(JROW, INCOL+1+J2),
$ LDH, WV(1, 1+KZS), LDWV)
*
* ==== Multiply by U21 ====
*
 CALL DLASET('ALL', JLEN, KZS, ZERO, ZERO, WV, LDWV)
 CALL DTRMM('R', 'U', 'N', 'N', JLEN, KNZ, ONE,
$ U(J2+1, 1+KZS), LDU, WV(1, 1+KZS),
$ LDWV)
*
* ==== Multiply by U11 ====
*
 CALL DGEMM('N', 'N', JLEN, I2, J2, ONE,
$ H(JROW, INCOL+1), LDH, U, LDU, ONE, WV,
$ LDWV)
*
* ==== Copy left of H to right of scratch ====
*
 CALL DLACPY(
'ALL', JLEN, J2, H(JROW, INCOL+1), LDH,
$ WV(1, 1+I2), LDWV)
*
* ==== Multiply by U21 ====
*
 CALL DTRMM('R', 'L', 'N', 'N', JLEN, I4-I2, ONE,
$ U(1, I2+1), LDU, WV(1, 1+I2), LDWV)
*
* ==== Multiply by U22 ====
*
 CALL DGEMM('N', 'N', JLEN, I4-I2, J4-J2, ONE,
$ H(JROW, INCOL+1+J2), LDH,
$ U(J2+1, I2+1), LDU, ONE, WV(1, 1+I2),
$ LDWV)
*
* ==== Copy it back ====
*
 CALL DLACPY('ALL', JLEN, KDU, WV, LDWV,
$ H(JROW, INCOL+1), LDH)
200 CONTINUE
*
* ==== Multiply Z (also vertical) ====
*
 IF(WANTZ) THEN
 DO 210 JROW = ILOZ, IHIZ, NV
 JLEN = MIN(NV, IHIZ-JROW+1)
*
* ==== Copy right of Z to left of scratch

```

```

(first
* . KZS columns get multiplied by zero) =====
*
 CALL DLACPY('ALL', JLEN, KNZ,
$ Z(JROW, INCOL+1+J2), LDZ,
$ WV(1, 1+KZS), LDWV)
*
* ===== Multiply by U12 =====
*
 CALL DLASET('ALL', JLEN, KZS, ZERO, ZERO, WV,
$ LDWV)
 CALL DTRMM('R', 'U', 'N', 'N', JLEN, KNZ, ONE,
$ U(J2+1, 1+KZS), LDU, WV(1, 1+KZS),
$ LDWV)
*
* ===== Multiply by U11 =====
*
 CALL DGEMM('N', 'N', JLEN, I2, J2, ONE,
$ Z(JROW, INCOL+1), LDZ, U, LDU, ONE,
$ WV, LDWV)
*
* ===== Copy left of Z to right of scratch =====
*
 CALL DLACPY('ALL', JLEN, J2, Z(JROW, INCOL+1),
$ LDZ,
WV(1, 1+I2), LDWV)
*
* ===== Multiply by U21 =====
*
 CALL DTRMM('R', 'L', 'N', 'N', JLEN, I4-I2, ONE,
$ U(1, I2+1), LDU, WV(1, 1+I2),
$ LDWV)
*
* ===== Multiply by U22 =====
*
 CALL DGEMM('N', 'N', JLEN, I4-I2, J4-J2, ONE,
$ Z(JROW, INCOL+1+J2), LDZ,
$ U(J2+1, I2+1), LDU, ONE,
$ WV(1, 1+I2), LDWV)
*
* ===== Copy the result back to Z =====
*
 CALL DLACPY('ALL', JLEN, KDU, WV, LDWV,
$ Z(JROW, INCOL+1), LDZ)
210 CONTINUE
 END IF
 END IF
 END IF

```

220 CONTINUE

\*

\* ==== End of DLAQR5 ====

\*

END

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```
digraph {st9->st9[l=""]st9->st0[l=""]st8->st8[l=""]st8->st0[l=""]st7->st8[l=""]st7->st7[l=""]st6->st6[l=""]st6->st0[l=""]st5->st6[l=""]st5->st5[l=""]st4->st4[l=""]st4->st0[l=""]st3->st4[l=""]st3->st3[l=""]st2->st9[l=""]st2->st7[l=""]st2->st2[l=""]st0->st0[l=""]st0->st0[l=""]st1->st5[l=""]st1->st3[l=""]st1->st1[l=""]st0->st2[l=""]st0->st1[l=""]st0->st0[l=""]}
```

```
graph{{DIGRAG{{DIGRAG}}{DIGRAG}}}
```

```
graph{SubGrap1}
```

```
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```

```
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```

```
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```

```
package testlapack
```

```
import (
```

```
"testing"
```

```
"golang.org/x/exp/rand"
```

```
"gonum.org/v1/gonum/blas"
```

```
"gonum.org/v1/gonum/blas/blas64"
```

```
"gonum.org/v1/gonum/floats"
```

```
)
```

```
type Dgelq2er interface {
```

```
Dgelq2(m, n int, a []float64, lda int, tau, work []float64)
```

```
}
```

```
func Dgelq2Test(t *testing.T, impl Dgelq2er) {
```

```
rnd := rand.New(rand.NewSource(1))
```

```
for c, test := range []struct {
```

```
m, n, lda int
```



```

}{
{1, 1, 0},
{2, 2, 0},
{3, 2, 0},
{2, 3, 0},
{1, 12, 0},
{2, 6, 0},
{3, 4, 0},
{4, 3, 0},
{6, 2, 0},
{1, 12, 0},
{1, 1, 20},
{2, 2, 20},
{3, 2, 20},
{2, 3, 20},
{1, 12, 20},
{2, 6, 20},
{3, 4, 20},
{4, 3, 20},
{6, 2, 20},
{1, 12, 20},
} {
n := test.n
m := test.m
lda := test.lda
if lda == 0 {
lda = test.n
}
k := min(m, n)
tau := make([]float64, k)
for i := range tau {
tau[i] = rnd.Float64()
}
work
:= make([]float64, m)
for i := range work {
work[i] = rnd.Float64()
}
a := make([]float64, m*lda)
for i := 0; i < m*lda; i++ {
a[i] = rnd.Float64()
}
aCopy := make([]float64, len(a))
copy(aCopy, a)
impl.Dgelq2(m, n, a, lda, tau, work)

Q := constructQ("LQ", m, n, a, lda, tau)

```

```

// Check that Q is orthogonal.
if !isOrthogonal(Q) {
 t.Errorf("Case %v: Q not orthogonal", c)
}

L := blas64.General{
 Rows: m,
 Cols: n,
 Stride: n,
 Data: make([]float64, m*n),
}
for i := 0; i < m; i++ {
 for j := 0; j <= min(i, n-1); j++ {
 L.Data[i*L.Stride+j] = a[i*lda+j]
 }
}

ans := blas64.General{
 Rows: m,
 Cols: n,
 Stride: lda,
 Data: make([]float64, m*lda),
}
copy(ans.Data, aCopy)
blas64.Gemm(blas.NoTrans, blas.NoTrans, 1, L, Q, 0, ans)
if !floats.EqualApprox(aCopy, ans.Data, 1e-14) {
 t.Errorf("Case %v, LQ mismatch. Want %v, got %v.", c, aCopy, ans.Data)
}
}
}

```

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```
package testblas
```

```
import (
```

```
 "testing"
```

```
 "golang.org/x/exp/rand"
```

```
 "gonum.org/v1/gonum/blas"
```

```
)
```

```
func DtrmvBenchmark(b *testing.B, dtrmv Dtrmv, n, lda, incX int, ul blas.Uplo, tA blas.Transpose, d blas.Diag) {
```

```
 rnd := rand.New(rand.NewSource(0))
```

```
 a := make([]float64, n*lda)
```

```
 for i := range a {
```

```
 a[i] = rnd.Float64()
```

```
 }
```

```
 x := make([]float64, n*incX)
```

```
 for i := range x {
```

```
 x[i] = rnd.Float64()
```

```
 }
```

```
 b.ResetTimer()
```

```
 for i := 0; i < b.N; i++ {
```

```
 dtrmv.Dtrmv(ul, tA, d, n, a, lda, x, incX)
```

```
 }
```

```
}
```

```
Graph{DIGRAP}
```

```
graph{Gr{{Gr{Gr}Gr{Gr}}Gr}}
```

```
/** github.com/twitchyliquid64/golang-asm@v0.15.0 **/
```

```
{{Types "MIT Apache-2.0"}}
```

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MIT: <https://www.opensource.org/licenses/mit>

```

graph{subgra}
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package testlapack

import (
 "fmt"
 "testing"

 "golang.org/x/exp/rand"

 "gonum.org/v1/gonum/blas"
 "gonum.org/v1/gonum/blas/blas64"
)

type Dorgqler interface {
 Dorgql(m, n, k int, a []float64, lda int, tau, work []float64, lwork int)

 Dlarfger
}

func DorgqlTest(t *testing.T, impl Dorgqler) {
 const tol = 1e-14

 type Dorg2ler interface {
 Dorg2l(m, n, k int, a []float64, lda int, tau, work []float64)
 }
 dorg2ler, hasDorg2l := impl.(Dorg2ler)

 rnd := rand.New(rand.NewSource(1))
 for _, m := range []int{0, 1, 2, 3, 4, 5, 7, 10, 15, 30, 50, 150} {
 for _, extra := range []int{0, 11} {
 for _, wl := range []worklen{minimumWork, mediumWork, optimumWork} {
 var k int
 if m >= 129 {
 // For large matrices make sure that k
 // is large enough to trigger blocked
 // path.
 k = 129 + rnd.Intn(m-129+1)
 }
 else {
 k = rnd.Intn(m + 1)
 }
 n := k + rnd.Intn(m-k+1)
 if m == 0 || n == 0 {
 m = 0

```

```

n = 0
k = 0
}

// Generate k elementary reflectors in the last
// k columns of A.
a := nanGeneral(m, n, n+extra)
tau := make([]float64, k)
for l := 0; l < k; l++ {
 jj := m - k + l
 v := randomSlice(jj, rnd)
 _, tau[l] = impl.Dlarfg(len(v)+1, rnd.NormFloat64(), v, 1)
 j := n - k + l
 for i := 0; i < jj; i++ {
 a.Data[i*a.Stride+j] = v[i]
 }
}
aCopy := cloneGeneral(a)

// Compute the full matrix Q by forming the
// Householder reflectors explicitly.
q := eye(m, m)
qCopy := eye(m, m)
for l := 0; l < k; l++ {
 h := eye(m, m)
 jj := m - k + l
 j := n - k + l
 v := blas64.Vector{Data: make([]float64, m), Inc: 1}
 for i := 0; i < jj; i++ {
 v.Data[i] = a.Data[i*a.Stride+j]
 }
 v.Data[jj] = 1
 blas64.Ger(-tau[l], v, v, h)
 copy(qCopy.Data, q.Data)
 blas64.Gemm(blas.NoTrans,
blas.NoTrans, 1, h, qCopy, 0, q)
}
// View the last n columns of Q as 'want'.
want := blas64.General{
 Rows: m,
 Cols: n,
 Stride: q.Stride,
 Data: q.Data[m-n:],
}

var lwork int
switch wl {
case minimumWork:

```

```

lwork = max(1, n)
case mediumWork:
 work := make([]float64, 1)
 impl.Dorgql(m, n, k, a.Data, a.Stride, tau, work, -1)
 lwork = (int(work[0]) + n) / 2
 lwork = max(1, lwork)
case optimumWork:
 work := make([]float64, 1)
 impl.Dorgql(m, n, k, a.Data, a.Stride, tau, work, -1)
 lwork = int(work[0])
}
work := make([]float64, lwork)

// Compute the last n columns of Q by a call to
// Dorgql.
impl.Dorgql(m, n, k, a.Data, a.Stride, tau, work, len(work))

prefix := fmt.Sprintf("Case m=%v,n=%v,k=%v,wl=%v", m, n, k, wl)
if !generalOutsideAllNaN(a) {
 t.Errorf("%v: out-of-range write to A", prefix)
}
if !equalApproxGeneral(want, a, tol) {
 t.Errorf("%v:
unexpected Q", prefix)
}

// Compute the last n columns of Q by a call to
// Dorg2l and check that we get the same result.
if !hasDorg2l {
 continue
}
dorg2ler.Dorg2l(m, n, k, aCopy.Data, aCopy.Stride, tau, work)
if !equalApproxGeneral(aCopy, a, tol) {
 t.Errorf("%v: mismatch between Dorgql and Dorg2l", prefix)
}
}
}
}
}
digraph{{S8 S4 S1 S5 S0}}{{S8-9S4-7S4-5S1-0S1-2S5-6S5-3S0-1S0-3-2->1->1-6->4-3-6-7->1-8-1-4->1-3-2->1-2-
>0-4-4-4-4S8 S2-5-9-9-4-5-9-1-8-0-9-9-8-0-9-3-9-5-9-4-9-5-1-0-8-6->5-3-2-5->9->7->1->3->5S4->0->8->4->1}
graph{{G_ G_}}
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```

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```

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package math32

import (
 "math"
)

const (
 unan = 0x7fc00000
 uinf = 0x7f800000
 uneginf = 0xff800000
 mask = 0x7f8 >> 3
 shift = 32 - 8 - 1
 bias = 127
)

// Abs returns the absolute value of x.
//
// Special cases are:
// Abs(Inf) = +Inf
// Abs(NaN) = NaN
func Abs(x float32) float32 {
 switch {
 case x < 0:
 return -x
 case x == 0:
 return 0 // return correctly abs(-0)
 }
 return x
}

// Copysign returns a value with the magnitude
// of x and the sign of y.
func Copysign(x, y float32) float32 {
 const sign = 1 << 31
 return math.Float32frombits(math.Float32bits(x)&^sign | math.Float32bits(y)&sign)
}

// Hypot returns Sqrt(p*p + q*q), taking care to avoid
//

```

```

unnecessary overflow and underflow.
//
// Special cases are:
// Hypot(Inf, q) = +Inf
// Hypot(p, Inf) = +Inf
// Hypot(NaN, q) = NaN
// Hypot(p, NaN) = NaN
func Hypot(p, q float32) float32 {
 // special cases
 switch {
 case IsInf(p, 0) || IsInf(q, 0):
 return Inf(1)
 case IsNaN(p) || IsNaN(q):
 return NaN()
 }
 if p < 0 {
 p = -p
 }
 if q < 0 {
 q = -q
 }
 if p < q {
 p, q = q, p
 }
 if p == 0 {
 return 0
 }
 q = q / p
 return p * Sqrt(1+q*q)
}

// Inf returns positive infinity if sign >= 0, negative infinity if sign < 0.
func Inf(sign int) float32 {
 var v uint32
 if sign >= 0 {
 v = uinf
 } else {
 v = uneginf
 }
 return math.Float32frombits(v)
}

// IsInf reports whether f is an infinity, according to sign.
// If sign > 0, IsInf reports whether f is positive infinity.
// If sign < 0, IsInf reports whether f is negative infinity.
// If sign == 0, IsInf reports whether f is either infinity.
func IsInf(f float32, sign int) bool {
 // Test for infinity by comparing against

```



```

maximum float.
// To avoid the floating-point hardware, could use:
// x := math.Float32bits(f);
// return sign >= 0 && x == uinf || sign <= 0 && x == uneginf;
return sign >= 0 && f > math.MaxFloat32 || sign <= 0 && f < -math.MaxFloat32
}

// IsNaN reports whether f is an IEEE 754 ``not-a-number" value.
func IsNaN(f float32) (is bool) {
 // IEEE 754 says that only NaNs satisfy f != f.
 // To avoid the floating-point hardware, could use:
 // x := math.Float32bits(f);
 // return uint32(x>>shift)&mask == mask && x != uinf && x != uneginf
 return f != f
}

// NaN returns an IEEE 754 ``not-a-number" value.
func NaN() float32 { return math.Float32frombits(unan) }
graph{<<====>>}
graph{{nod{{nod{nod}}}}nod{nod}}
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package path

import (
 "container/heap"

 "gonum.org/v1/gonum/graph"
 "gonum.org/v1/gonum/graph/internal/set"
 "gonum.org/v1/gonum/graph/traverse"
)

// AStar finds the A*-shortest path from s to t in g using the heuristic h. The path and
// its cost are returned in a Shortest along with paths and costs to all nodes explored
// during the search. The number of expanded nodes is also returned. This value may help
// with heuristic tuning.
//
// The path will be the shortest path if the heuristic is admissible. A heuristic is
// admissible if for any node, n, in the graph, the heuristic estimate of the cost of
// the path from n to t is less than or equal to the true cost of that path.
//
// If h is nil, AStar will use the g.HeuristicCost method if g implements HeuristicCoster,
// falling back to NullHeuristic otherwise. If the
// graph does not implement Weighted,
// UniformCost is used. AStar will panic if g has an A*-reachable negative edge weight.
func AStar(s, t graph.Node, g traverse.Graph, h Heuristic) (path Shortest, expanded int) {

```

```

if g, ok := g.(graph.Graph); ok {
 if g.Node(s.ID()) == nil || g.Node(t.ID()) == nil {
 return Shortest{from: s}, 0
 }
}

var weight Weighting
if wg, ok := g.(Weighted); ok {
 weight = wg.Weight
} else {
 weight = UniformCost(g)
}

if h == nil {
 if g, ok := g.(HeuristicCoster); ok {
 h = g.HeuristicCost
 } else {
 h = NullHeuristic
 }
}

path = newShortestFrom(s, []graph.Node{s, t})
tid := t.ID()

visited := make(set.Int64s)
open := &aStarQueue{indexOf: make(map[int64]int)}
heap.Push(open, aStarNode{node: s, gscore: 0, fscore: h(s, t)})

for open.Len() != 0 {
 u := heap.Pop(open).(aStarNode)
 uid := u.node.ID()
 i := path.indexOf[uid]
 expanded++

 if uid == tid {
 break
 }

 visited.Add(uid)
 for _, v := range graph.NodesOf(g.From(u.node.ID()))
 {
 vid := v.ID()
 if visited.Has(vid) {
 continue
 }
 j, ok := path.indexOf[vid]
 if !ok {
 j = path.add(v)
 }
 }
}

```

```

w, ok := weight(u.node.ID(), vid)
if !ok {
 panic("path: A* unexpected invalid weight")
}
if w < 0 {
 panic("path: A* negative edge weight")
}
g := u.gscore + w
if n, ok := open.node(vid); !ok {
 path.set(j, g, i)
 heap.Push(open, aStarNode{node: v, gscore: g, fscore: g + h(v, t)})
} else if g < n.gscore {
 path.set(j, g, i)
 open.update(vid, g, g+h(v, t))
}
}
}

return path, expanded
}

// NullHeuristic is an admissible, consistent heuristic that will not speed up computation.
func NullHeuristic(_, _ graph.Node) float64 {
 return 0
}

// aStarNode adds A* accounting to a graph.Node.
type aStarNode struct {
 node graph.Node
 gscore float64
 fscore float64
}

// aStarQueue is an A* priority queue.
type aStarQueue struct {
 indexOf map[int64]int
 nodes []aStarNode
}

func (q *aStarQueue) Less(i, j int)
bool {
 return q.nodes[i].fscore < q.nodes[j].fscore
}

func (q *aStarQueue) Swap(i, j int) {
 q.indexOf[q.nodes[i].node.ID()] = j
 q.indexOf[q.nodes[j].node.ID()] = i
 q.nodes[i], q.nodes[j] = q.nodes[j], q.nodes[i]
}

```

```

}

func (q *aStarQueue) Len() int {
 return len(q.nodes)
}

func (q *aStarQueue) Push(x interface{}) {
 n := x.(aStarNode)
 q.indexOf[n.node.ID()] = len(q.nodes)
 q.nodes = append(q.nodes, n)
}

func (q *aStarQueue) Pop() interface{} {
 n := q.nodes[len(q.nodes)-1]
 q.nodes = q.nodes[:len(q.nodes)-1]
 delete(q.indexOf, n.node.ID())
 return n
}

func (q *aStarQueue) update(id int64, g, f float64) {
 i, ok := q.indexOf[id]
 if !ok {
 return
 }
 q.nodes[i].gscore = g
 q.nodes[i].fscore = f
 heap.Fix(q, i)
}

func (q *aStarQueue) node(id int64) (aStarNode, bool) {
 loc, ok := q.indexOf[id]
 if ok {
 return q.nodes[loc], true
 }
 return aStarNode{}, false
}

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package quat

func lift(v float64) Number {
 return Number{Real: v}
}

```

```

}

func split(q Number) (float64, Number) {
 return q.Real, Number{Imag: q.Imag, Jmag: q.Jmag, Kmag: q.Kmag}
}

func join(w float64, uv Number) Number {
 uv.Real = w
 return uv
}

func unit(q Number) Number {
 return Scale(1/Abs(q), q)
}
graph{{{{{SubGrapN}}SubGrapN}}SubGrapT}}
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// Package dot implements GraphViz DOT marshaling and unmarshaling of graphs.
//
// See the GraphViz DOT Guide and the DOT grammar for more information
// on using specific aspects of the DOT language:
//
// DOT Guide: https://www.graphviz.org/pdf/dotguide.pdf
//
// DOT grammar: http://www.graphviz.org/doc/info/lang.html
//
// Attribute quoting
//
// Attributes and IDs are quoted if needed during marshalling, to conform with
// valid DOT syntax. Quoted IDs and attributes are unquoted during unmarshaling,
// so the data is kept in raw form. As an exception, quoted text with a leading
// `"` and a trailing `>` is not unquoted to ensure preservation of the string
// during a round-trip.
package dot // import "gonum.org/v1/gonum/graph/encoding/dot"
graph{{striN}{striN}striN{striN}}
graph{Subg_{Subg_{Subg_}}}
graph{{{{{DI_}{DI_}{DI_}{DI_}}}}}
graph{{diGra}{diGra}{diGra}diGra{{diGra}}{diGra}}{diGra}{diGra}{diGra}}
// SPDX-License-Identifier: Unlicense OR MIT

package gpu

import (
 "image"
)

```

```

// packer packs a set of many smaller rectangles into
// much fewer larger atlases.
type packer struct {
 maxDim int
 spaces []image.Rectangle

 sizes []image.Point
 pos image.Point
}

type placement struct {
 Idx int
 Pos image.Point
}

// add adds the given rectangle to the atlases and
// return the allocated position.
func (p *packer) add(s image.Point) (placement, bool) {
 if place, ok := p.tryAdd(s); ok {
 return place, true
 }
 p.newPage()
 return p.tryAdd(s)
}

func (p *packer) clear() {
 p.sizes = p.sizes[:0]
 p.spaces = p.spaces[:0]
}

func (p *packer) newPage() {
 p.pos = image.Point{}
 p.sizes = append(p.sizes, image.Point{})
 p.spaces = p.spaces[:0]
 p.spaces = append(p.spaces, image.Rectangle{
 Max: image.Point{X: p.maxDim, Y: p.maxDim},
 })
}

func (p *packer) tryAdd(s image.Point) (placement, bool) {
 // Go backwards to prioritize smaller spaces first.
 for i := len(p.spaces) - 1; i >= 0; i-- {
 space := p.spaces[i]
 rightSpace := space.Dx() - s.X
 bottomSpace := space.Dy() - s.Y
 if rightSpace >= 0 && bottomSpace >= 0 {
 // Remove space.

```

```

p.spaces[i] = p.spaces[len(p.spaces)-1]
p.spaces = p.spaces[:len(p.spaces)-1]
// Put s in the top left corner and add the (at most)
// two smaller spaces.
pos := space.Min
if bottomSpace > 0 {
 p.spaces = append(p.spaces, image.Rectangle{
 Min: image.Point{X: pos.X, Y: pos.Y + s.Y},
 Max: image.Point{X: space.Max.X, Y: space.Max.Y},
 })
}
if rightSpace > 0 {
 p.spaces = append(p.spaces, image.Rectangle{
 Min: image.Point{X: pos.X + s.X, Y: pos.Y},
 Max: image.Point{X: space.Max.X, Y: pos.Y + s.Y},
 })
}
idx := len(p.sizes) - 1
size := &p.sizes[idx]
if x := pos.X + s.X; x > size.X {
 size.X = x
}
if y := pos.Y + s.Y; y > size.Y {
 size.Y = y
}
return placement{Idx: idx, Pos: pos}, true
}
}
return placement{}, false
}
graph{b5_tF3_mZ7_8QQ6_1Z9JF3SU}
graph{DiG}
graph{<"\}\>}
graph{edg{edg{edg}ed{edg}edg}edg{edg}edg}
graph{{{digh}{digg}digd{{{digh}}}}}
graph{Subgrag{Subgrag{{Subgraf{{Subgraf}}{{Subgraf}}}}}}{Subgraf}}}
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```

```
package gonum
```

```
import (
 "testing"
```

```
 "gonum.org/v1/gonum/blas/testblas"
)
```

```
func BenchmarkDgerSmSmInc1(b *testing.B) {
 testblas.DgerBenchmark(b, impl, Sm, Sm, 1, 1)
}
```

```
func BenchmarkDgerSmSmIncN(b *testing.B) {
 testblas.DgerBenchmark(b, impl, Sm, Sm, 2, 3)
}
```

```
func BenchmarkDgerMedMedInc1(b *testing.B) {
 testblas.DgerBenchmark(b, impl, Med, Med, 1, 1)
}
```

```
func BenchmarkDgerMedMedIncN(b *testing.B) {
 testblas.DgerBenchmark(b, impl, Med, Med, 2, 3)
}
```

```
func BenchmarkDgerLgLgInc1(b *testing.B) {
 testblas.DgerBenchmark(b, impl, Lg, Lg, 1, 1)
}
```

```
func BenchmarkDgerLgLgIncN(b *testing.B) {
 testblas.DgerBenchmark(b, impl, Lg, Lg, 2, 3)
}
```

```
func BenchmarkDgerLgSmInc1(b *testing.B) {
 testblas.DgerBenchmark(b, impl, Lg, Sm, 1, 1)
}
```

```
func BenchmarkDgerLgSmIncN(b *testing.B) {
 testblas.DgerBenchmark(b, impl, Lg, Sm, 2, 3)
}
```

```
func BenchmarkDgerSmLgInc1(b
```



```

*testing.B) {
testblas.DgerBenchmark(b, impl, Sm, Lg, 1, 1)
}

func BenchmarkDgerSmLgIncN(b *testing.B) {
testblas.DgerBenchmark(b, impl, Sm, Lg, 2, 3)
}

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// Derived from code by Jeffrey A. Fike at http://adl.stanford.edu/hyperdual/

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package dualquat

import (
 "math"

 "gonum.org/v1/gonum/num/quat"
)

// PowReal returns d^{**p} , the base-d exponential of p.
//
// Special cases are (in order):
// PowReal(NaN+x, 0) = 1+NaN for any x

```

```

// PowReal(x, 0) = 1 for any x
// PowReal(1+x, y) = 1+xy for any y
// PowReal(x, 1) = x for any x
// PowReal(NaN+x, y) = NaN+NaN
// PowReal(x, NaN) = NaN+NaN
// PowReal(0, y) = Inf for y an odd integer < 0
// PowReal(0, -Inf) = +Inf
// PowReal(0, +Inf) = +0
// PowReal(0, y) = +Inf for finite y < 0 and not an odd integer
// PowReal(0, y) = 0 for y an odd integer > 0
// PowReal(0, y) = +0 for finite y > 0 and not an
odd integer
// PowReal(-1, Inf) = 1
// PowReal(x+0, +Inf) = +Inf+NaN for |x| > 1
// PowReal(x+y, +Inf) = +Inf for |x| > 1
// PowReal(x, -Inf) = +0+NaN for |x| > 1
// PowReal(x, +Inf) = +0+NaN for |x| < 1
// PowReal(x+0, -Inf) = +Inf+NaN for |x| < 1
// PowReal(x, -Inf) = +Inf-Inf for |x| < 1
// PowReal(+Inf, y) = +Inf for y > 0
// PowReal(+Inf, y) = +0 for y < 0
// PowReal(-Inf, y) = Pow(-0, -y)
func PowReal(d Number, p float64) Number {
switch {
case p == 0:
switch {
case quat.IsNaN(d.Real):
return Number{Real: quat.Number{Real: 1}, Dual: quat.NaN()}
case d.Real == zeroQuat, quat.IsInf(d.Real):
return Number{Real: quat.Number{Real: 1}}
}
case p == 1:
return d
case math.IsInf(p, 1):
if Abs(d).Real > 1 {
if d.Dual == zeroQuat {
return Number{Real: quat.Inf(), Dual: quat.NaN()}
}
return Number{Real: quat.Inf(), Dual: quat.Inf()}
}
return Number{Real: zeroQuat, Dual: quat.NaN()}
case math.IsInf(p, -1):
if Abs(d).Real > 1 {
return Number{Real: zeroQuat,
Dual: quat.NaN()}
}
if d.Dual == zeroQuat {
return Number{Real: quat.Inf(), Dual: quat.NaN()}
}
}

```

```

 }
 return Number{Real: quat.Inf(), Dual: quat.Inf()}
}
deriv := quat.Mul(quat.Number{Real: p}, quat.Pow(d.Real, quat.Number{Real: p - 1}))
return Number{
 Real: quat.Pow(d.Real, quat.Number{Real: p}),
 Dual: quat.Mul(d.Dual, deriv),
}
}

// Pow return d**p, the base-d exponential of p.
func Pow(d, p Number) Number {
 return Exp(Mul(p, Log(d)))
}

// Sqrt returns the square root of d
//
// Special cases are:
// Sqrt(+Inf) = +Inf
// Sqrt(0) = (0+Inf)
// Sqrt(x < 0) = NaN
// Sqrt(NaN) = NaN
func Sqrt(d Number) Number {
 return PowReal(d, 0.5)
}

// Exp returns e**d, the base-e exponential of d.
//
// Special cases are:
// Exp(+Inf) = +Inf
// Exp(NaN) = NaN
// Very large values overflow to 0 or +Inf.
// Very small values underflow to 1.
func Exp(d Number) Number {
 fnDeriv := quat.Exp(d.Real)
 return Number{
 Real: fnDeriv,
 Dual: quat.Mul(fnDeriv, d.Dual),
 }
}

// Log returns
// the natural logarithm of d.
//
// Special cases are:
// Log(+Inf) = (+Inf+0)
// Log(0) = (-InfInf)
// Log(x < 0) = NaN

```

```

// Log(NaN) = NaN
func Log(d Number) Number {
 switch {
 case d.Real == zeroQuat:
 return Number{
 Real: quat.Log(d.Real),
 Dual: quat.Inf(),
 }
 case quat.IsInf(d.Real):
 return Number{
 Real: quat.Log(d.Real),
 Dual: zeroQuat,
 }
 }
 return Number{
 Real: quat.Log(d.Real),
 Dual: quat.Mul(d.Dual, quat.Inv(d.Real)),
 }
}

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// license that can be found in the LICENSE file.

package testblas

import (
 "fmt"
 "testing"

 "golang.org/x/exp/rand"

 "gonum.org/v1/gonum/blas"
)

type Ztrsmer interface {
 Ztrsm(side blas.Side, uplo blas.Uplo, transA blas.Transpose, diag blas.Diag, m, n int, alpha complex128, a
[]complex128, lda int, b []complex128, ldb int)
}

func ZtrsmTest(t *testing.T, impl Ztrsmer) {
 for _, side := range []blas.Side{blas.Left, blas.Right} {
 for _, uplo := range []blas.Uplo{blas.Lower, blas.Upper} {
 for _, trans := range []blas.Transpose{blas.NoTrans, blas.Trans, blas.ConjTrans} {
 for _, diag := range []blas.Diag{blas.Unit, blas.NonUnit} {

```

```

name := sideString(side) + "-" + uploString(uplo) + "-" + transString(trans) + "-" + diagString(diag)
t.Run(name, func(t *testing.T) {
 for _, m := range []int{0, 1, 2, 3, 4, 5} {
 for _, n := range []int{0, 1, 2, 3,
4, 5} {
 ztrsmTest(t, impl, side, uplo, trans, diag, m, n)
 }
 }
})
}
}
}
}
}
}

func ztrsmTest(t *testing.T, impl Ztrsmer, side blas.Side, uplo blas.Uplo, trans blas.Transpose, diag blas.Diag, m, n
int) {
 const tol = 1e-13

 rnd := rand.New(rand.NewSource(1))

 nA := m
 if side == blas.Right {
 nA = n
 }
 for _, lda := range []int{max(1, nA), nA + 2} {
 for _, ldb := range []int{max(1, n), n + 3} {
 for _, alpha := range []complex128{0, 1, complex(0.7, -0.9)} {
 // Allocate the matrix A and fill it with random numbers.
 a := make([]complex128, nA*lda)
 for i := range a {
 a[i] = rndComplex128(rnd)
 }
 // Set some elements of A to 0 and 1 to cover special cases in Ztrsm.
 if nA > 2 {
 if uplo == blas.Upper {
 a[nA-2] = 1
 a[nA-1] = 0
 } else {
 a[(nA-2)*lda] = 1
 a[(nA-1)*lda] = 0
 }
 }
 // Create a copy of A for checking that Ztrsm
 // does not modify its triangle opposite to uplo.
 aCopy
 := make([]complex128, len(a))
 copy(aCopy, a)

```

```

// Create a dense representation of A for
// computing the right-hand side matrix using zmm.
aTri := make([]complex128, len(a))
copy(aTri, a)
if uplo == blas.Upper {
 for i := 0; i < nA; i++ {
 // Zero out the lower triangle.
 for j := 0; j < i; j++ {
 aTri[i*lda+j] = 0
 }
 if diag == blas.Unit {
 aTri[i*lda+i] = 1
 }
 }
} else {
 for i := 0; i < nA; i++ {
 if diag == blas.Unit {
 aTri[i*lda+i] = 1
 }
 // Zero out the upper triangle.
 for j := i + 1; j < nA; j++ {
 aTri[i*lda+j] = 0
 }
 }
}

// Allocate the right-hand side matrix B and fill it with random numbers.
b := make([]complex128, m*ldb)
for i := range b {
 b[i] = rndComplex128(rnd)
}
// Set some elements of B to 0 to cover special cases in Ztrsm.
if m > 1 && n > 1 {
 b[0] = 0
 b[(m-1)*ldb+n-1] = 0
}
bCopy := make([]complex128,
len(b))
copy(bCopy, b)

// Compute the solution matrix X using Ztrsm.
// X is overwritten on B.
impl.Ztrsm(side, uplo, trans, diag, m, n, alpha, a, lda, b, ldb)
x := b

prefix := fmt.Sprintf("m=%v,n=%v,lda=%v,ldb=%v,alpha=%v", m, n, lda, ldb, alpha)

if !zsame(a, aCopy) {

```

```
t.Errorf("%v: unexpected modification of A", prefix)
continue
}

// Compute the left-hand side matrix of op(A)*X=alpha*B or X*op(A)=alpha*B
// using an internal Zgemm implementation.
var lhs []complex128
if side == blas.Left {
 lhs = zmm(trans, blas.NoTrans, m, n, m, 1, aTri, lda, x, ldb, 0, b, ldb)
} else {
 lhs = zmm(blas.NoTrans, trans, m, n, n, 1, x, ldb, aTri, lda, 0, b, ldb)
}

// Compute the right-hand side matrix alpha*B.
rhs := bCopy
for i := 0; i < m; i++ {
 for j := 0; j < n; j++ {
 rhs[i*ldb+j] *= alpha
 }
}

if !zEqualApprox(lhs, rhs, tol) {
 t.Errorf("%v: unexpected result", prefix)
}
}
}
}
}

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/**/digraph{}
graph{dih{dii}}
digraph {nodep.5[e=d,h=.1,t=.1]node0[l=<f |f |f |f |f | ",t=0][h=5]node1[l="{n n | |p }"]node2[l="{n a | |p }"]node3[l="{n i | |p }"]node4[l="{n e | |p }"]node5[l="{n t | |p }"]node6[l="{n o | |p }"]node7[l="{n s | |p }"]node0:f0->node1:n node0:f1->node2:n node0:f2->node3:n node0:f5->node4:n node0:f6->node5:n node2->node6:n node4->node7:n}
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package integrate

import "sort"

// Simpsons returns an approximate value of the integral
// \int_a^b f(x)dx
// computed using the Simpson's method. The function f is given as a slice of
// samples evaluated at locations in x, that is,
```

```

// f[i] = f(x[i]), x[0] = a, x[len(x)-1] = b
// The slice x must be sorted in strictly increasing order. x and f must be of
// equal length and the length must be at least 3.
//
// See https://en.wikipedia.org/wiki/Simpson%27s_rule#Composite_Simpson's_rule_for_irregularly_spaced_data
// for more information.
func Simpsons(x, f []float64) float64 {
 n := len(x)
 switch {
 case len(f) != n:
 panic("integrate: slice length mismatch")
 case n < 3:
 panic("integrate: input data too small")
 case !sort.Float64sAreSorted(x):
 panic("integrate: must be sorted")
 }

 // Simpson's method approximates
 // the integral of a function f by subdividing
 // the interval of integration into segments and applying a method that fits
 // a polynomial to each subinterval.
 //
 // This implementation makes use of the following composite Simpson's method
 // to estimate $\int_a^b f(x) dx$ where a, b are x at x[0] and x[len(x)-1]
 // respectively:
 //
$$\sum_{i=1}^N \{a_0\}_i * f_{i-1} + \{a_1\}_i * f_i + \{a_2\}_i * f_{i+1}$$

 // where N is the count of subintervals and $\{a_0\}_i$, $\{a_1\}_i$, and $\{a_2\}_i$
 // are constants at index i given by:
 //
$$\begin{aligned} \{a_0\}_i &= 2 * h^3_i - h^3_{i+1} + 3 * h_{i+1} * h^2_i / 6 * h_i * (h_i + h_{i+1}) \\ \{a_1\}_i &= h^3_i + h^3_{i+1} + 3 * h_i * h_{i+1} * (h_i + h_{i+1}) / 6 * h_i * h_{i+1} \\ \{a_2\}_i &= -h^3_i + 2 * h^3_{i+1} + 3 * h_i * h^2_{i+1} / 6 * h_{i+1} * (h_i + h_{i+1}) \end{aligned}$$

 // where h_k is the difference $x[k] - x[k-1]$.
 //
 // The formula above approximates the integral of f when N is even. If the
 // number of subintervals is odd, the subintervals $i=0, \dots, n-2$ are given by
 //
 // the above formula and the approximation over the remaining subintervals
 // is given by:
 //
$$\{a_0\}_i * f_{N-2} + \{a_1\}_i * f_{N-1} + \{a_2\}_i * f_N$$

 // where the coefficients are:
 //
$$\begin{aligned} \{a_0\}_i &= -1 * h^3_{N-1} / 6 * h_{N-2} * (h_{N-2} + h_{N-1}) \\ \{a_1\}_i &= h^2_{N-1} + 3 * h^3_{N-1} * h_{N-2} / 6 * h_{N-2} \\ \{a_2\}_i &= 2 * h^2_{N-1} + 3 * h^2_{N-1} * h_{N-2} / 6 * (h_{N-2} + h_{N-1}) \end{aligned}$$

 var integral float64
 for i := 1; i < n-1; i += 2 {
 h0 := x[i] - x[i-1]
 h1 := x[i+1] - x[i]

```



```

if h0 == 0 || h1 == 0 {
 panic("integrate: repeated abscissa")
}
h0p2 := h0 * h0
h0p3 := h0 * h0 * h0
h1p2 := h1 * h1
h1p3 := h1 * h1 * h1
hph := h0 + h1
a0 := (2*h0p3 - h1p3 + 3*h1*h0p2) / (6 * h0 * hph)
a1 := (h0p3 + h1p3 + 3*h0*h1*hph) / (6 * h0 * h1)
a2 := (-h0p3 + 2*h1p3 + 3*h0*h1p2) / (6 * h1 * hph)
integral += a0 * f[i-1]
integral += a1 * f[i]
integral += a2 * f[i+1]
}

if n%2 == 0 {
 h0 := x[n-2] - x[n-3]
 h1 := x[n-1] - x[n-2]
 if h0 == 0 || h1 == 0 {
 panic("integrate:
repeated abscissa")
 }
 h1p2 := h1 * h1
 h1p3 := h1 * h1 * h1
 hph := h0 + h1
 a0 := -1 * h1p3 / (6 * h0 * hph)
 a1 := (h1p2 + 3*h0*h1) / (6 * h0)
 a2 := (2*h1p2 + 3*h0*h1) / (6 * hph)
 integral += a0 * f[n-3]
 integral += a1 * f[n-2]
 integral += a2 * f[n-1]
}

return integral
}
graph{Subgrag{Subgrag{{Subgraf}}{{Subgraf}}}}
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package testlapack

import (
 "math"
 "testing"

```

"golang.org/x/exp/rand"

"gonum.org/v1/gonum/blas"

"gonum.org/v1/gonum/blas/blas64"

"gonum.org/v1/gonum/floats"

"gonum.org/v1/gonum/lapack"

)

type Dlasr interface {

Dlasr(side blas.Side, pivot lapack.Pivot, direct lapack.Direct, m, n int, c, s, a []float64, lda int)

}

func DlasrTest(t \*testing.T, impl Dlasr) {

rnd := rand.New(rand.NewSource(1))

for \_, side := range []blas.Side{blas.Left, blas.Right} {

for \_, pivot := range []lapack.Pivot{lapack.Variable, lapack.Top, lapack.Bottom} {

for \_, direct := range []lapack.Direct{lapack.Forward, lapack.Backward} {

for \_, test := range []struct {

m, n, lda int

}{

{5, 5, 0},

{5, 10, 0},

{10, 5, 0},

{5, 5, 20},

{5, 10, 20},

{10, 5, 20},

} {

m := test.m

n := test.n

lda

:= test.lda

if lda == 0 {

lda = n

}

// Allocate nn matrix A and fill it with random numbers.

a := make([]float64, m\*lda)

for i := range a {

a[i] = rnd.Float64()

}

// Allocate slices for implicitly

// represented rotation matrices.

var s, c []float64

if side == blas.Left {

s = make([]float64, m-1)

c = make([]float64, m-1)

} else {

```

s = make([]float64, n-1)
c = make([]float64, n-1)
}
for k := range s {
 // Generate a random number in [0,2*pi).
 theta := rnd.Float64() * 2 * math.Pi
 s[k] = math.Sin(theta)
 c[k] = math.Cos(theta)
}
aCopy := make([]float64, len(a))
copy(a, aCopy)

// Apply plane a sequence of plane
// rotation in s and c to the matrix A.
impl.Dlasr(side, pivot, direct, m, n, c, s, a, lda)

// Compute a reference solution by multiplying A
// by explicitly formed rotation matrix P.
pSize := m
if side
== blas.Right {
 pSize = n
}
// Allocate matrix P.
p := blas64.General{
 Rows: pSize,
 Cols: pSize,
 Stride: pSize,
 Data: make([]float64, pSize*pSize),
}
// Allocate matrix P_k.
pk := blas64.General{
 Rows: pSize,
 Cols: pSize,
 Stride: pSize,
 Data: make([]float64, pSize*pSize),
}
ptmp := blas64.General{
 Rows: pSize,
 Cols: pSize,
 Stride: pSize,
 Data: make([]float64, pSize*pSize),
}
// Initialize P to the identity matrix.
for i := 0; i < pSize; i++ {
 p.Data[i*p.Stride+i] = 1
 ptmp.Data[i*p.Stride+i] = 1
}

```

```

// Iterate over the sequence of plane rotations.
for k := range s {
 // Set P_k to the identity matrix.
 for i := range p.Data {
 pk.Data[i] = 0
 }
 for i := 0; i < pSize; i++ {
 pk.Data[i*p.Stride+i] = 1
 }
 // Set the corresponding elements of P_k.
 switch pivot {
 case
lapack.Variable:
 pk.Data[k*p.Stride+k] = c[k]
 pk.Data[k*p.Stride+k+1] = s[k]
 pk.Data[(k+1)*p.Stride+k] = -s[k]
 pk.Data[(k+1)*p.Stride+k+1] = c[k]
 case lapack.Top:
 pk.Data[0] = c[k]
 pk.Data[k+1] = s[k]
 pk.Data[(k+1)*p.Stride] = -s[k]
 pk.Data[(k+1)*p.Stride+k+1] = c[k]
 case lapack.Bottom:
 pk.Data[(pSize-1-k)*p.Stride+pSize-k-1] = c[k]
 pk.Data[(pSize-1-k)*p.Stride+pSize-1] = s[k]
 pk.Data[(pSize-1)*p.Stride+pSize-1-k] = -s[k]
 pk.Data[(pSize-1)*p.Stride+pSize-1] = c[k]
 }
 // Compute P <- P_k * P or P <- P * P_k.
 if direct == lapack.Forward {
 blas64.Gemm(blas.NoTrans, blas.NoTrans, 1, pk, ptmp, 0, p)
 } else {
 blas64.Gemm(blas.NoTrans, blas.NoTrans, 1, ptmp, pk, 0, p)
 }
 copy(ptmp.Data, p.Data)
}

aMat := blas64.General{
 Rows: m,
 Cols: n,
 Stride: lda,
 Data: make([]float64, m*lda),
}
copy(a, aCopy)
newA
:= blas64.General{
 Rows: m,
 Cols: n,

```

```

 Stride: lda,
 Data: make([]float64, m*lda),
}
// Compute P * A or A * P.
if side == blas.Left {
 blas64.Gemm(blas.NoTrans, blas.NoTrans, 1, p, aMat, 0, newA)
} else {
 blas64.Gemm(blas.NoTrans, blas.NoTrans, 1, aMat, p, 0, newA)
}
// Compare the result from Dlasr with the reference solution.
if !floats.EqualApprox(newA.Data, a, 1e-12) {
 t.Errorf("A update mismatch")
}
}
}
}
}
}
graph{"\\\\"}
graph{dS{dG}}
graph{{{g}{g}g}}
graph{DiGraphd{DiGraphg}{DiGraphg}}
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```

```
package distuv
```

```
import (
 "math"
 "sort"
 "testing"
```

```
 "golang.org/x/exp/rand"
)
```

```
func TestExponentialProb(t *testing.T) {
 pts := []univariateProbPoint{
 {
 loc: 0,
 prob: 1,
 cumProb: 0,
 logProb: 0,
 },
 {
 loc: -1,
 prob: 0,
 cumProb: 0,

```

```

 logProb: math.Inf(-1),
 },
 {
 loc: 1,
 prob: 1 / (math.E),
 cumProb:
0.63212055882855767840447622983853913255418886896823216549216319830253850425510019664285272565
40803563,
 logProb: -1,
 },
 {
 loc: 20,
 prob: math.Exp(-20),
 cumProb:
0.99999999793884637756144217203405961984417902362419272440089630702775533837083597621544064672
0089072,
 logProb: -20,
 },
}
testDistributionProbs(t, Exponential{Rate: 1}, "Exponential", pts)
}

func TestExponentialFitPrior(t *testing.T) {
 testConjugateUpdate(t, func() ConjugateUpdater {
 return &Exponential{Rate: 13.7} })
}

func TestExponential(t *testing.T) {
 src := rand.New(rand.NewSource(1))
 for i, dist := range []Exponential{
 {Rate: 3, Src: src},
 {Rate: 1.5, Src: src},
 {Rate: 0.9, Src: src},
 } {
 testExponential(t, dist, i)
 }
}

func testExponential(t *testing.T, dist Exponential, i int) {
 const (
 tol = 1e-2
 n = 3e6
 bins = 50
)
 x := make([]float64, n)
 generateSamples(x, dist)
 sort.Float64s(x)
}

```

```

checkMean(t, i, x, dist, tol)
checkVarAndStd(t, i, x, dist, tol)
checkEntropy(t, i, x, dist, tol)
checkExKurtosis(t, i, x, dist, tol)
checkSkewness(t, i, x, dist, tol)
checkMedian(t, i, x, dist, tol)
checkQuantileCDFSurvival(t, i, x, dist, tol)
checkProbContinuous(t, i, x, dist, 1e-10)
checkProbQuantContinuous(t, i, x, dist, tol)
}

func TestExponentialScore(t *testing.T) {
for _, test := range []*Exponential{
{
Rate: 1,
},
{
Rate: 0.35,
},
{
Rate: 4.6,
},
} {
testDerivParam(t, test)
}
}

func TestExponentialFitPanic(t
*testing.T) {
e := Exponential{Rate: 2}
defer func() {
r := recover()
if r != nil {
t.Errorf("unexpected panic for Fit call: %v", r)
}
}()
e.Fit(make([]float64, 10), nil)
}
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package gonum

import (
"testing"

"gonum.org/v1/gonum/blas/testblas"

```

)

var impl Implementation

```
func TestDasum(t *testing.T) {
 testblas.DasumTest(t, impl)
}
```

```
func TestDaxpy(t *testing.T) {
 testblas.DaxpyTest(t, impl)
}
```

```
func TestDdot(t *testing.T) {
 testblas.DdotTest(t, impl)
}
```

```
func TestDnrm2(t *testing.T) {
 testblas.Dnrm2Test(t, impl)
}
```

```
func TestIdamax(t *testing.T) {
 testblas.IdamaxTest(t, impl)
}
```

```
func TestDswap(t *testing.T) {
 testblas.DswapTest(t, impl)
}
```

```
func TestDcopy(t *testing.T) {
 testblas.DcopyTest(t, impl)
}
```

```
func TestDrotg(t *testing.T) {
 testblas.DrotgTest(t, impl)
}
```

```
func TestDrotmg(t *testing.T) {
 testblas.DrotmgTest(t, impl)
}
```

```
func TestDrot(t *testing.T) {
 testblas.DrotTest(t, impl)
}
```

```
func TestDrotm(t *testing.T) {
 testblas.DrotmTest(t, impl)
}
```



```

func TestDscal(t *testing.T) {
 testblas.DscalTest(t,
 impl)
}
graph{{{_____}{_____}}_{{_____}{_____}}_{{_____}}_{{_____}}
}}}
graph{SubGrag}
graph{{DIGRAPc{{DIGRAPy}{DIGRAPy}}}}
graph{{{Digw{Digz}}}}
graph{Subr{Subh{Subr{Subr}{Subr}}Subr}{{Subr{Subr}}Subr}}
graph{{{Digp{Digp}}Digg}}
graph{{{DiGu}{DiGu}DiGv}}
graph{{g}}
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//go:generate ./single_precision.bash

package gonum

import (
 "math"

 "gonum.org/v1/gonum/internal/math32"
)

type Implementation struct{}

// [SD]gemm behavior constants. These are kept here to keep them out of the
// way during single precision code genration.
const (
 blockSize = 64 // b x b matrix
 minParBlock = 4 // minimum number of blocks needed to go parallel
 buffMul = 4 // how big is the buffer relative to the number of workers
)

// subMul is a common type shared by [SD]gemm.
type subMul struct {
 i, j int // index of block
}

func max(a, b int) int {
 if a > b {
 return a
 }
 return b
}

```

```

func min(a, b int) int {
 if a > b {
 return b
 }
 return a
}

// blocks returns the number of divisions of the dimension length with the given
// block size.
func blocks(dim, bsize int) int {
 return (dim + bsize - 1)
 / bsize
}

// dcabs1 returns |real(z)|+|imag(z)|.
func dcabs1(z complex128) float64 {
 return math.Abs(real(z)) + math.Abs(imag(z))
}

// scabs1 returns |real(z)|+|imag(z)|.
func scabs1(z complex64) float32 {
 return math32.Abs(real(z)) + math32.Abs(imag(z))
}
graph{subgre}
graph{{{grax{}}grar{}}}
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package graphql

import (
 "bytes"
 "encoding/json"
 "errors"
 "fmt"

 "gonum.org/v1/gonum/graph"
 "gonum.org/v1/gonum/graph/encoding"
)

// Unmarshal parses the JSON-encoded data and stores the result in dst.
// Node IDs are obtained from the JSON fields identified by the uid parameter.
// UIDs obtained from the JSON encoding must map to unique node ID values
// consistently across the JSON-encoded spanning tree.
func Unmarshal(data []byte, uid string, dst encoding.Builder) error {
 if uid == "" {

```

```

 return errors.New("graphql: invalid UID field name")
}
var src json.RawMessage
err := json.Unmarshal(data, &src)
if err != nil {
 return err
}
gen := generator{dst: dst, uidName: uid, nodes: make(map[string]graph.Node)}
return gen.walk(src, nil, "")
}

// StringIDSetter is a graph node that can set its ID based on the given
// uid string.
type StringIDSetter interface {
 SetIDFromString(uid string) error
}

// LabelSetter is a graph edge that can set its label.
type LabelSetter interface {
 SetLabel(string)
}

type generator struct {
 dst encoding.Builder

 // uidName is the name of the UID field in the source JSON.
 uidName string
 // nodes maps from GraphQL UID string to graph.Node.
 nodes map[string]graph.Node
}

func (g *generator) walk(src json.RawMessage, node graph.Node, attr string) error {
 switch src[0] {
 case '{':
 var val map[string]json.RawMessage
 err := json.Unmarshal(src, &val)
 if err != nil {
 return err
 }
 if next, ok := val[g.uidName]; !ok {
 if node != nil {
 var buf bytes.Buffer
 err := json.Compact(&buf, src)
 if err != nil {
 panic(err)
 }
 return fmt.Errorf("graphql: no UID for node: `%s`", &buf)
 }
 }
 }
}

```

```

} else {
 var v interface{}
 err = json.Unmarshal(next, &v)
 if err != nil {
 return err
 }
 value := fmt.Sprint(v)
 child, ok := g.nodes[value]
 if
!ok {
 child = g.dst.NewNode()
 s, ok := child.(StringIDSetter)
 if !ok {
 return errors.New("graphql: cannot set UID")
 }
 err = s.SetIDFromString(value)
 if err != nil {
 return err
 }
 g.nodes[value] = child
 g.dst.AddNode(child)
 }
 if node != nil {
 e := g.dst.NewEdge(node, child)
 if s, ok := e.(LabelSetter); ok {
 s.SetLabel(attr)
 }
 g.dst.SetEdge(e)
 }
 node = child
}
for attr, src := range val {
 if attr == g.uidName {
 continue
 }
 err = g.walk(src, node, attr)
 if err != nil {
 return err
 }
}

case '[':
 var val []json.RawMessage
 err := json.Unmarshal(src, &val)
 if err != nil {
 return err
 }
 for _, src := range val {

```

```

err = g.walk(src, node, attr)
if err != nil {
 return err
}
}

default:
var v interface{}
err := json.Unmarshal(src, &v)
if err != nil {
 return err
}
if attr == g.uidName {
 value := fmt.Sprint(v)
 if s, ok := node.(StringIDSetter);
ok {
 if _, ok := g.nodes[value]; !ok {
 err = s.SetIDFromString(value)
 if err != nil {
 return err
 }
 g.nodes[value] = node
 }
} else {
 return errors.New("graphql: cannot set ID")
}
} else if s, ok := node.(encoding.AttributeSetter); ok {
 var value string
 if _, ok := v.(float64); ok {
 value = string(src)
 } else {
 value = fmt.Sprint(v)
 }
 err = s.SetAttribute(encoding.Attribute{Key: attr, Value: value})
 if err != nil {
 return err
 }
}
}

return nil
}
digraph{no_ -> no_}
graph{{subGs{{subGz}}subGs{{{subGz}}subGz}}subGs}}
graph{N{{N{N}}N}}
graph{nodb nodb}
graph{{DIGRAPA}{DIGRAPA}}

```

```

graph{{digu}}digz}
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package gonum

import "gonum.org/v1/gonum/blas"

// Dlaset sets the off-diagonal elements of A to alpha, and the diagonal
// elements to beta. If uplo == blas.Upper, only the elements in the upper
// triangular part are set. If uplo == blas.Lower, only the elements in the
// lower triangular part are set. If uplo is otherwise, all of the elements of A
// are set.
//
// Dlaset is an internal routine. It is exported for testing purposes.
func (impl Implementation) Dlaset(uplo blas.Uplo, m, n int, alpha, beta float64, a []float64, lda int) {
 switch {
 case m < 0:
 panic(mLT0)
 case n < 0:
 panic(nLT0)
 case lda < max(1, n):
 panic(badLdA)
 }

 minmn := min(m, n)
 if minmn == 0 {
 return
 }

 if len(a) < (m-1)*lda+n {
 panic(shortA)
 }

 if uplo == blas.Upper {
 for i := 0; i < m; i++ {
 for j := i + 1; j < n; j++ {
 a[i*lda+j]
 }
 }
 } else if uplo == blas.Lower {
 for i := 0; i < m; i++ {
 for j := 0; j < min(i+1, n); j++ {
 a[i*lda+j] = alpha
 }
 }
 }
}

```

```

} else {
 for i := 0; i < m; i++ {
 for j := 0; j < n; j++ {
 a[i*lda+j] = alpha
 }
 }
}
for i := 0; i < minmn; i++ {
 a[i*lda+i] = beta
}
}
graph{{EDX}EDI}
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```

```
package c64
```

```

import (
 "fmt"
 "testing"
)

```

```
var benchSink complex64
```

```

func BenchmarkDotUnitary(t *testing.B) {
 for _, tst := range []struct {
 name string
 f func(x, y []complex64) complex64
 }{
 {"DotcUnitary", DotcUnitary},
 {"DotuUnitary", DotuUnitary},
 } {
 for _, v := range []int64{1, 2, 3, 4, 5, 10, 100, 1e3, 5e3, 1e4, 5e4} {
 t.Run(fmt.Sprintf("%s-%d", tst.name, v), func(b *testing.B) {
 x, y := x[:v], y[:v]
 b.SetBytes(128 * v)
 for i := 0; i < b.N; i++ {
 benchSink = tst.f(x, y)
 }
 })
 }
 }
}

```

```

func BenchmarkDotInc(t *testing.B) {
 for _, tst := range []struct {
 name string
 }{

```

```
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```

```
for _, diag := range []blas.Diag{blas.NonUnit, blas.Unit} {
```



```

for _, n := range []int{1, 2, 3, 5} {
 for k := 0; k < n; k++ {
 for _, ldab := range []int{k + 1, k + 1 + 10} {
 for _, incX := range []int{-4, 1, 5} {
 testZtbmv(t, impl, rnd, uplo, trans, diag, n, k, ldab, incX)
 }
 }
 }
}

//
testZtbmv tests Ztbmv by comparing its output to that of Ztrmv.
func testZtbmv(t *testing.T, impl Ztbmver, rnd *rand.Rand, uplo blas.Uplo, trans blas.Transpose, diag blas.Diag, n,
k, ldab, incX int) {
 const tol = 1e-13

 // Allocate a dense-storage triangular band matrix filled with NaNs that
 // will be used as the reference matrix for Ztrmv.
 lda := max(1, n)
 a := makeZGeneral(nil, n, n, lda)
 // Fill the referenced triangle with random data within the band and
 // with zeros outside.
 if uplo == blas.Upper {
 for i := 0; i < n; i++ {
 for j := i; j < min(n, i+k+1); j++ {
 re := rnd.NormFloat64()
 im := rnd.NormFloat64()
 a[i*lda+j] = complex(re, im)
 }
 for j := i + k + 1; j < n; j++ {
 a[i*lda+j] = 0
 }
 }
 } else {
 for i := 0; i < n; i++ {
 for j := 0; j < i-k; j++ {
 a[i*lda+j] = 0
 }
 for j := max(0, i-k); j <= i; j++ {
 re := rnd.NormFloat64()
 im := rnd.NormFloat64()
 a[i*lda+j] = complex(re, im)
 }
 }
 }
}

```

```

}
if diag == blas.Unit
{
 // The diagonal should not be referenced by Ztbmv and Ztrmv, so
 // invalidate it with NaNs.
 for i := 0; i < n; i++ {
 a[i*lda+i] = znan
 }
}
// Create the triangular band matrix.
ab := zPackTriBand(k, ldab, uplo, n, a, lda)
abCopy := make([]complex128, len(ab))
copy(abCopy, ab)

// Generate a random complex vector x.
xtest := make([]complex128, n)
for i := range xtest {
 re := rnd.NormFloat64()
 im := rnd.NormFloat64()
 xtest[i] = complex(re, im)
}
x := makeZVector(xtest, incX)
xCopy := make([]complex128, len(x))
copy(xCopy, x)

want := make([]complex128, len(x))
copy(want, x)

// Compute the reference result of op(A)*x, storing it into want.
impl.Ztrmv(uplo, trans, diag, n, a, lda, want, incX)
// Compute op(A)*x, storing the result in-place into x.
impl.Ztbmv(uplo, trans, diag, n, k, ab, ldab, x, incX)

name := fmt.Sprintf("uplo=%v,trans=%v,diag=%v,n=%v,k=%v,ldab=%v,incX=%v", uplo, trans, diag, n, k, ldab,
incX)
if !zsame(ab, abCopy) {
 t.Errorf("%v:
unexpected modification of ab", name)
}
if !zSameAtNonstrided(x, want, incX) {
 t.Errorf("%v: unexpected modification of x", name)
}
if !zEqualApproxAtStrided(x, want, incX, tol) {
 t.Errorf("%v: unexpected result\nwant %v\ngot %v", name, want, x)
}
}
graph{{S}S{S}}

```

```

graph{w:w:w w w:w w:w:w w:w w:w w:w:w w}
graph{<>{<>}}
digraph{{D:_->G:_->G:_}D:_->G:_}
graph{t<=>=>gra}
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package testlapack

import (
 "fmt"
 "math"
 "testing"

 "golang.org/x/exp/rand"

 "gonum.org/v1/gonum/lapack"
)

type Dlascler interface {
 Dlascl(kind lapack.MatrixType, kl, ku int, cfrom, cto float64, m, n int, a []float64, lda int)
}

func DlasclTest(t *testing.T, impl Dlascler) {
 const tol = 1e-16

 rnd := rand.New(rand.NewSource(1))
 for ti, test := range []struct {
 m, n int
 }{
 {0, 0},
 {1, 1},
 {1, 10},
 {10, 1},
 {2, 2},
 {2, 11},
 {11, 2},
 {3, 3},
 {3, 11},
 {11, 3},
 {11, 11},
 {11, 100},
 {100, 11},
 } {
 m := test.m
 n := test.n
 for _, extra := range []int{0, 11} {

```

```

for _, kind := range []lapack.MatrixType{lapack.General, lapack.UpperTri, lapack.LowerTri} {
 a := randomGeneral(m, n, n+extra, rnd)
 aCopy := cloneGeneral(a)
 cfrom := rnd.NormFloat64()
 cto := rnd.NormFloat64()
 scale
:= cto / cfrom

 impl.Dlascl(kind, -1, -1, cfrom, cto, m, n, a.Data, a.Stride)

 prefix := fmt.Sprintf("Case #%v: kind=%v,m=%v,n=%v,extra=%v", ti, kind, m, n, extra)
 if !generalOutsideAllNaN(a) {
 t.Errorf("%v: out-of-range write to A", prefix)
 }
 switch kind {
 case lapack.General:
 for i := 0; i < m; i++ {
 for j := 0; j < n; j++ {
 want := scale * aCopy.Data[i*aCopy.Stride+j]
 got := a.Data[i*a.Stride+j]
 if math.Abs(want-got) > tol {
 t.Errorf("%v: unexpected A[%v,%v]=%v, want %v", prefix, i, j, got, want)
 }
 }
 }
 case lapack.UpperTri:
 for i := 0; i < m; i++ {
 for j := i; j < n; j++ {
 want := scale * aCopy.Data[i*aCopy.Stride+j]
 got := a.Data[i*a.Stride+j]
 if math.Abs(want-got) > tol {
 t.Errorf("%v: unexpected A[%v,%v]=%v, want %v", prefix, i, j, got, want)
 }
 }
 }
 for i := 0; i < m; i++ {
 for j := 0; j < min(i, n); j++ {
 if
a.Data[i*a.Stride+j] != aCopy.Data[i*aCopy.Stride+j] {
 t.Errorf("%v: unexpected modification in lower triangle of A", prefix)
 }
 }
 }
 case lapack.LowerTri:
 for i := 0; i < m; i++ {
 for j := 0; j <= min(i, n-1); j++ {
 want := scale * aCopy.Data[i*aCopy.Stride+j]
 got := a.Data[i*a.Stride+j]

```

```

 if math.Abs(want-got) > tol {
 t.Errorf("%v: unexpected A[%v,%v]=%v, want %v", prefix, i, j, got, want)
 }
}
}
for i := 0; i < m; i++ {
 for j := i + 1; j < n; j++ {
 if a.Data[i*a.Stride+j] != aCopy.Data[i*aCopy.Stride+j] {
 t.Errorf("%v: unexpected modification in upper triangle of A", prefix)
 }
 }
}
}
}
}
}
}
}
}
graph n1{{n1}n1{{n1}n1}n1}
graph{{NOD{NOR{{NOD{NOR}}}}}
graph{Stt{Stt}Stt{Stt{Stt}{Stt}}}
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```

```
package optimize
```

```
import (
 "math"
)
```

```

// Converger returns the convergence of the optimization based on
// locations found during optimization. Converger must not modify the value of
// the provided Location in any of the methods.

```

```

type Converger interface {
 Init(dim int)
 Converged(loc *Location) Status
}

```

```

// NeverTerminate implements Converger, always reporting NotTerminated.
type NeverTerminate struct{}

```

```
func (NeverTerminate) Init(dim int) {}
```

```

func (NeverTerminate) Converged(loc *Location) Status {
 return NotTerminated
}

```

```
// FunctionConverge tests for insufficient improvement in the optimum value
```

```

// over the last iterations. A FunctionConvergence status is returned if
// there is no significant decrease for FunctionConverge.Iterations. A
// significant decrease is considered if
// f < f_best
// and
// f_best - f > FunctionConverge.Relative
// * maxabs(f, f_best) + FunctionConverge.Absolute
// If the decrease is significant, then the iteration counter is reset and
// f_best is updated.
//
// If FunctionConverge.Iterations == 0, it has no effect.
type FunctionConverge struct {
 Absolute float64
 Relative float64
 Iterations int

 first bool
 best float64
 iter int
}

func (fc *FunctionConverge) Init(dim int) {
 fc.first = true
 fc.best = 0
 fc.iter = 0
}

func (fc *FunctionConverge) Converged(l *Location) Status {
 f := l.F
 if fc.first {
 fc.best = f
 fc.first = false
 return NotTerminated
 }
 if fc.Iterations == 0 {
 return NotTerminated
 }
 maxAbs := math.Max(math.Abs(f), math.Abs(fc.best))
 if f < fc.best && fc.best-f > fc.Relative*maxAbs+fc.Absolute {
 fc.best = f
 fc.iter = 0
 return NotTerminated
 }
 fc.iter++
 if fc.iter < fc.Iterations {
 return NotTerminated
 }
 return FunctionConvergence
}

```

[illegible]

```

got := fmt.Sprintf(test.format, test.value)
if got != test.want {
 t.Errorf("Format %q %v: got: %q want: %q", test.format, float64(test.value), got, test.want)
}
}
}
graph{di_{di_}}
/**/graph{"3298-547"--"3"--"0"/**/"0"--"5"[e=0]"4"--"9"[e=0]"6"--"327890"[e=0]"8"--"3"[e=0]"3298-547"--
"3"[e=0]}
graph{{"\{\L"}"\{\L"}
{
 "nodes": [
 { "data": { "id": "compound-1" } },
 { "data": { "id": "compound-2" } },
 { "data": { "id": "compound-3" } },
 { "data": { "id": "b", "parent": "compound-1" } },
 { "data": { "id": "c", "parent": "compound-1" } },
 { "data": { "id": "a", "parent": "compound-2" } },
 { "data": { "id": "d", "parent": "compound-3" } },
 { "data": { "id": "e", "parent": "compound-3" } },
 { "data": { "id": "f" } }
],
 "edges": [
 { "data": { "id": "ab", "source": "a", "target": "b" } },
 { "data": { "id": "bc", "source": "b", "target": "c" } },
 { "data": { "id": "ac", "source": "a", "target": "c" } },
 { "data": { "id": "cd", "source": "c", "target": "d" } },
 { "data": { "id": "de", "source": "d", "target": "e" } },
 { "data": { "id": "df", "source": "d", "target": "f" } },
 { "data": { "id": "af", "source": "a", "target": "f" } }
]
}
graph{{rr}rrrr}
graph{{Su5{{Su1}}}}
graph{dir{dir}}
graph{{GRAPA{GRAPA GRAPG{GRAPA{GRAPA GRAPG}GRAPG}GRAPG}GRAPG}GRAPG}
// Code generated by "go generate gonum.org/v1/gonum/unit; DO NOT EDIT.

```

```

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// license that can be found in the LICENSE file.

```

```

package unit

```

```

import (
 "errors"
 "fmt"
 "math"

```



```

"unicode/utf8"
)

// Candela represents a luminous intensity in candela.
type LuminousIntensity float64

const Candela LuminousIntensity = 1

// Unit converts the LuminousIntensity to a *Unit
func (j LuminousIntensity) Unit() *Unit {
 return New(float64(j), Dimensions{
 LuminousIntensityDim: 1,
 })
}

// LuminousIntensity allows LuminousIntensity to implement a LuminousIntensityer interface
func (j LuminousIntensity) LuminousIntensity() LuminousIntensity {
 return j
}

// From converts the unit into the receiver. From returns an
// error if there is a mismatch in dimension
func (j *LuminousIntensity) From(u Uniter) error {
 if !DimensionsMatch(u, Candela) {
 *j = LuminousIntensity(math.NaN())
 return errors.New("Dimension
mismatch")
 }
 *j = LuminousIntensity(u.Unit().Value())
 return nil
}

func (j LuminousIntensity) Format(fs fmt.State, c rune) {
 switch c {
 case 'v':
 if fs.Flag('#') {
 fmt.Fprintf(fs, "%T(%v)", j, float64(j))
 return
 }
 fallthrough
 case 'e', 'E', 'f', 'F', 'g', 'G':
 p, pOk := fs.Precision()
 w, wOk := fs.Width()
 const unit = " cd"
 switch {
 case pOk && wOk:
 fmt.Fprintf(fs, "%*.*"+string(c), pos(w-utf8.RuneCount([]byte(unit))), p, float64(j))
 case pOk:

```

```

 fmt.Fprintf(fs, "%. "+string(c), p, float64(j))
case wOk:
 fmt.Fprintf(fs, "%. "+string(c), pos(w-utf8.RuneCount([]byte(unit))), float64(j))
default:
 fmt.Fprintf(fs, "%. "+string(c), float64(j))
}
fmt.Fprint(fs, unit)
default:
 fmt.Fprintf(fs, "%%!%c(%T=%g cd)", c, j, float64(j))
}
}
graph{{ {GRA8}GRA8}GRA9}
graph{{ Digr_{ }Digr_{ } {Digr_{ }Digr_{ } {Digr_{ }Digr_{ }Digr_{ }}}}
graph{{ { {Stricy} }Stricy} }
*> \brief \b DISNAN tests input for NaN.
*
* ===== DOCUMENTATION =====
*
* Online html documentation available at
* http://www.netlib.org/lapack/explore-html/
*
*> \htmlonly
*> Download DISNAN + dependencies
*>
*> [TGZ]
*>
*> [ZIP]
*>
*> [TXT]
*> \endhtmlonly
*
* Definition:
* =====
*
* LOGICAL FUNCTION DISNAN(DIN)
*
* .. Scalar Arguments ..
* DOUBLE PRECISION DIN
* ..
*
*> \par Purpose:
* =====
*>
*> \verbatim
*>
*> DISNAN returns .TRUE. if its argument is NaN, and .FALSE.
*> otherwise. To be replaced by the Fortran 2003 intrinsic in the

```

```

*> future.
*> \endverbatim
*
* Arguments:
*
* =====
*
*> \param[in] DIN
*> \verbatim
*> DIN is DOUBLE PRECISION
*> Input to test for NaN.
*> \endverbatim
*
* Authors:
* =====
*
*> \author Univ. of Tennessee
*> \author Univ. of California Berkeley
*> \author Univ. of Colorado Denver
*> \author NAG Ltd.
*
*> \date September 2012
*
*> \ingroup auxOTHERauxiliary
*
* =====
* LOGICAL FUNCTION DISNAN(DIN)
*
* -- LAPACK auxiliary routine (version 3.4.2) --
* -- LAPACK is a software package provided by Univ. of Tennessee, --
* -- Univ. of California Berkeley, Univ. of Colorado Denver and NAG Ltd.--
* September 2012
*
* .. Scalar Arguments ..
* DOUBLE PRECISION DIN
* ..
*
* =====
*
* .. External Functions ..
* LOGICAL DLAISNAN
* EXTERNAL DLAISNAN
* ..
* .. Executable Statements ..
* DISNAN = DLAISNAN(DIN,DIN)
* RETURN
* END

```

```

graph{{EDG{EDG}}}
graph{{SUBGR}SUBGR{SUBGR{SUBGR}}}
// Copyright 2015 The Gonum Authors. All rights reserved.
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// license that can be found in the LICENSE file.

package gonum

import "math"

// Dlasv2 computes the singular value decomposition of a 22 matrix.
// [csl snl] [f g] [csr -snr] = [ssmax 0]
// [-snl csl] [0 h] [snr csr] = [0 ssmin]
// ssmax is the larger absolute singular value, and ssmin is the smaller absolute
// singular value. [cls, snl] and [csr, snr] are the left and right singular vectors.
//
// Dlasv2 is an internal routine. It is exported for testing purposes.
func (impl Implementation) Dlasv2(f, g, h float64) (ssmin, ssmax, snr, csr, snl, csl float64) {
 ft := f
 fa := math.Abs(ft)
 ht := h
 ha := math.Abs(h)
 // pmax points to the largest element of the matrix in terms of absolute value.
 // 1 if F, 2 if G, 3 if H.
 pmax := 1
 swap := ha > fa
 if swap {
 pmax = 3
 ft, ht = ht, ft
 fa, ha = ha, fa
 }
 gt := g
 ga := math.Abs(gt)
 var clt, crt, slt, srt
 float64
 if ga == 0 {
 ssmin = ha
 ssmax = fa
 clt = 1
 crt = 1
 slt = 0
 srt = 0
 } else {
 gasmall := true
 if ga > fa {
 pmax = 2
 if (fa / ga) < dlamchE {
 gasmall = false
 }
 }
 }
}

```

```

ssmax = ga
if ha > 1 {
 ssmin = fa / (ga / ha)
} else {
 ssmin = (fa / ga) * ha
}
clt = 1
slt = ht / gt
srt = 1
crt = ft / gt
}
}
if gasmall {
 d := fa - ha
 l := d / fa
 if d == fa { // deal with inf
 l = 1
 }
 m := gt / ft
 t := 2 - l
 s := math.Hypot(t, m)
 var r float64
 if l == 0 {
 r = math.Abs(m)
 } else {
 r = math.Hypot(l, m)
 }
 a := 0.5 * (s + r)
 ssmin = ha / a
 ssmax = fa * a
 if m == 0 {
 if l == 0 {
 t = math.Copysign(2, ft) * math.Copysign(1, gt)
 } else {
 t = gt/math.Copysign(d, ft) + m/t
 }
 } else {
 t = (m/(s+t) + m/(r+l)) * (1 + a)
 }
 l = math.Hypot(t, 2)
 crt = 2 / l
 srt = t / l
 clt = (crt + srt*m) / a
 slt = (ht / ft) * srt / a
}
}
if swap {
 csl

```

```

= srt
snl = crt
csr = slt
snr = clt
} else {
csl = clt
snl = slt
csr = crt
snr = srt
}
var tsign float64
switch pmax {
case 1:
tsign = math.Copysign(1, csr) * math.Copysign(1, csl) * math.Copysign(1, f)
case 2:
tsign = math.Copysign(1, snr) * math.Copysign(1, csl) * math.Copysign(1, g)
case 3:
tsign = math.Copysign(1, snr) * math.Copysign(1, snl) * math.Copysign(1, h)
}
ssmax = math.Copysign(ssmax, tsign)
ssmin = math.Copysign(ssmin, tsign*math.Copysign(1, f)*math.Copysign(1, h))
return ssmin, ssmax, snr, csr, snl, csl
}
graph{{DI{DI}}}
graph{{STRI8}STRI4}
// SPDX-License-Identifier: Unlicense OR MIT

// +build darwin,ios

package window

import "C"

//export gio_runMain
func gio_runMain() {
runMain()
}
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// license that can be found in the LICENSE file.

// Package distuv provides univariate random distribution types.
package distuv // import "gonum.org/v1/gonum/stat/distuv"
graph{{SUBGRAv}SUBGRAh{{SUBGRAv}}SUBGRAh{{SUBGRAv}SUBGRAa}}
graph{SUBGR9{{SUBGR5}}SUBGR5}SUBGR9{{SUBGR5}}SUBGR5}}}
graph{{No{{No}}No}}}
graph{"\""}

```

[illegible]

```

corner with the axes extending right and down.
*/
package f32

// A Point is a two dimensional point.
type Point struct {
 X, Y float32
}

// A Rectangle contains the points (X, Y) where Min.X <= X < Max.X,
// Min.Y <= Y < Max.Y.
type Rectangle struct {
 Min, Max Point
}

// Add return the point p+p2.
func (p Point) Add(p2 Point) Point {
 return Point{X: p.X + p2.X, Y: p.Y + p2.Y}
}

// Sub returns the vector p-p2.
func (p Point) Sub(p2 Point) Point {
 return Point{X: p.X - p2.X, Y: p.Y - p2.Y}
}

// Mul returns p scaled by s.
func (p Point) Mul(s float32) Point {
 return Point{X: p.X * s, Y: p.Y * s}
}

// Size returns r's width and height.
func (r Rectangle) Size() Point {
 return Point{X: r.Dx(), Y: r.Dy()}
}

// Dx returns r's width.
func (r Rectangle) Dx() float32 {
 return r.Max.X - r.Min.X
}

// Dy returns
// r's Height.
func (r Rectangle) Dy() float32 {
 return r.Max.Y - r.Min.Y
}

// Intersect returns the intersection of r and s.
func (r Rectangle) Intersect(s Rectangle) Rectangle {

```



```

if r.Min.X < s.Min.X {
 r.Min.X = s.Min.X
}
if r.Min.Y < s.Min.Y {
 r.Min.Y = s.Min.Y
}
if r.Max.X > s.Max.X {
 r.Max.X = s.Max.X
}
if r.Max.Y > s.Max.Y {
 r.Max.Y = s.Max.Y
}
return r
}

// Union returns the union of r and s.
func (r Rectangle) Union(s Rectangle) Rectangle {
 if r.Min.X > s.Min.X {
 r.Min.X = s.Min.X
 }
 if r.Min.Y > s.Min.Y {
 r.Min.Y = s.Min.Y
 }
 if r.Max.X < s.Max.X {
 r.Max.X = s.Max.X
 }
 if r.Max.Y < s.Max.Y {
 r.Max.Y = s.Max.Y
 }
 return r
}

// Canon returns the canonical version of r, where Min is to
// the upper left of Max.
func (r Rectangle) Canon() Rectangle {
 if r.Max.X < r.Min.X {
 r.Min.X, r.Max.X = r.Max.X, r.Min.X
 }
 if r.Max.Y < r.Min.Y {
 r.Min.Y, r.Max.Y = r.Max.Y, r.Min.Y
 }
 return r
}

// Empty reports whether r represents the empty area.
func
(r Rectangle) Empty() bool {
 return r.Min.X >= r.Max.X || r.Min.Y >= r.Max.Y
}

```

[illegible]

```

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// Package graphql implements JSON marshaling and unmarshaling of graph as
// used by GraphQL
package graphql // import "gonum.org/v1/gonum/graph/encoding/graphql"
graph{Str_}

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// license that can be found in the LICENSE file.

// Package layout defines functions for performing graph layout.
package layout // import "gonum.org/v1/gonum/graph/layout"
graph{{diGrapl}{diGrapp}}
graph{{DIE}}
graph{Np{Np{{Np{Np}}Np}}}

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// license that can be found in the LICENSE file.

package testlapack

import (
 "testing"

 "golang.org/x/exp/rand"
)

type Dgetrf interface {
 Dgetrf(m, n int, a []float64, lda int, ipiv []int) bool
}

func DgetrfTest(t *testing.T, impl Dgetrf) {
 rnd := rand.New(rand.NewSource(1))
 for _, test := range []struct {
 m, n, lda int
 }{
 {10, 5, 0},
 {5, 10, 0},
 {10, 10, 0},
 {300, 5, 0},
 {3, 500, 0},
 {4, 5, 0},
 {300, 200, 0},
 {204, 300, 0},
 {1, 3000, 0},
 {3000, 1, 0},
 }

```

```

{10, 5, 20},
{5, 10, 20},
{10, 10, 20},
{300, 5, 400},
{3, 500, 600},
{200, 200, 300},
{300, 200, 300},
{204, 300, 400},
{1, 3000, 4000},
{3000, 1, 4000},
} {
m := test.m
n := test.n
lda := test.lda
if lda == 0 {
 lda = n
}
a := make([]float64, m*lda)
for i := range a {
 a[i] = rnd.Float64()
}
mn := min(m, n)
ipiv := make([]int, mn)
for i := range
ipiv {
 ipiv[i] = rnd.Int()
}

// Cannot compare the outputs of Dgetrf and Dgetf2 because the pivoting may
// happen differently. Instead check that the LPQ factorization is correct.
aCopy := make([]float64, len(a))
copy(aCopy, a)
ok := impl.Dgetrf(m, n, a, lda, ipiv)
checkPLU(t, ok, m, n, lda, ipiv, a, aCopy, 1e-10, false)
}
}
graph{G_}
graph{{ {Dig5}Dig5}Dig5{{ {Dig5}Dig5}Dig5}
Graph{{ {Subgz}Subgt{Subgz{Subgz}}}}
graph{"\////////////////////////////////"}
// Copyright 2015 The Gonum Authors. All rights reserved.
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package gonum

import (
 "gonum.org/v1/gonum/blas"

```

```

"gonum.org/v1/gonum/blas/blas64"
)

// Dorgl2 generates an mn matrix Q with orthonormal rows defined by the
// first m rows product of elementary reflectors as computed by Dgelqf.
// $Q = H_0 * H_1 * \dots * H_{k-1}$
// $\text{len}(\text{tau}) \geq k, 0 \leq k \leq m, 0 \leq m \leq n, \text{len}(\text{work}) \geq m.$
// Dorgl2 will panic if these conditions are not met.
//
// Dorgl2 is an internal routine. It is exported for testing purposes.
func (impl Implementation) Dorgl2(m, n, k int, a []float64, lda int, tau, work []float64) {
 switch {
 case m < 0:
 panic(mLT0)
 case n < m:
 panic(nLTM)
 case k < 0:
 panic(kLT0)
 case k > m:
 panic(kGTM)
 case lda < max(1, m):
 panic(badLdA)
 }

 if m == 0 {
 return
 }

 switch {
 case len(a) < (m-1)*lda+n:
 panic(shortA)
 case len(tau) < k:
 panic(shortTau)
 case len(work)
 < m:
 panic(shortWork)
 }

 bi := blas64.Implementation()

 if k < m {
 for i := k; i < m; i++ {
 for j := 0; j < n; j++ {
 a[i*lda+j] = 0
 }
 }
 for j := k; j < m; j++ {
 a[j*lda+j] = 1
 }
 }
}

```

```

}
}
for i := k - 1; i >= 0; i-- {
 if i < n-1 {
 if i < m-1 {
 a[i*lda+i] = 1
 impl.Dlarf(blas.Right, m-i-1, n-i, a[i*lda+i:], 1, tau[i], a[(i+1)*lda+i:], lda, work)
 }
 bi.Dscal(n-i-1, -tau[i], a[i*lda+i+1:], 1)
 }
 a[i*lda+i] = 1 - tau[i]
 for l := 0; l < i; l++ {
 a[i*lda+l] = 0
 }
}
}
}

digraph {e""[e=d]Dc[l=""]Noe[l=""]Df[l=""]Da[l=""][l=""]Da[l=""][l=""][l=""]e->l->e->e
Da->Da
Da->Df
Da->Df
Da->Noe
Df->Noe
Df->Df->l->Noe->Df->l->
De->n->Df
Noe->De -> W ;
W -> EE ;
ee -> W ;
}

graph{GRA{GRA}GRA{GRA}GRA}
graph{<><><>}
graph{"""\\
\\
sssss\\
\\
sssss\\s}\\
graph{SubGra}
graph{{diGr}diGr{diGr}diGr{diGr}
graph{{{subGr}}subGr}}
graph{{nodU{nodU}}}
graph{{{digrap{digrap}}digrap{digrap}digrap{digrap}digrap{digrap}digrap}
graph{{diGr}diGr{diGr}
graph{{GR}}
Graph{GraphG{GraphG}GraphG}
graph{{{{{subGn}}subGn}subGc{{{subGn}subGc}}}}subGn}}}}
graph{{ST6}{ST6}{ST6{ST6{ST6}ST6{ST6{ST6}ST6}{ST6{ST6}ST6}ST6}{ST6{ST6}ST6}ST6}}
digraph{gs->gt[r=n]n->s[r=e]n->gt[r=n]n->s[r=e]n->s->s[r=n]n->c[r=n]gt[r=n]n->r[r=e]n->s[r=n]a:gs-
>c[r=e]a:gs[r=n]s->t[r=n]s->t[r=n]s->c[r=n]t->e[r=e]t->c[r=n]t->c[r=n]t->r[r=e]t->e[r=n]c->c[r=n]c->r[r=e]r-
>t[r=e]r->f[r=e]r->r[r=e]e->s[r=d]e->f[r=d]e->d[r=n]s->e[r=n]s->n[r=n]s->t[r=n]s->e[r=e]}

```

```

graph{{stricu}{stricu}}
graph{{{Gra}Gra{Gra}Gra{{Gra}Gra{Gra}Gra}}Gra}}
// Copyright 2017 The Gonum Authors. All rights reserved.
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// license that can be found in the LICENSE file.

// Package astx implements utility functions for generating abstract syntax
// trees of Graphviz DOT graphs.
package astx // import "gonum.org/v1/gonum/graph/formats/dot/internal/astx"
graph{{Subg1{Subg1}Subg1}Subg1}{Subg1}}
graph{GRAPA}
Graph{{Grap5[]Grap5[]Grap5[]Grap5[]Grap5[]Grap5}Grap5}
graph{edg{edg{edg}edg}edg}
// Copyright 2019 The Gonum Authors. All rights reserved.
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// license that can be found in the LICENSE file.

package testlapack

import (
 "fmt"
 "math"
 "testing"

 "golang.org/x/exp/rand"

 "gonum.org/v1/gonum/blas"
 "gonum.org/v1/gonum/floats"
 "gonum.org/v1/gonum/lapack"
)

type Dlansber interface {
 Dlansb(norm lapack.MatrixNorm, uplo blas.Uplo, n, kd int, ab []float64, ldab int, work []float64) float64
}

func DlansbTest(t *testing.T, impl Dlansber) {
 rnd := rand.New(rand.NewSource(1))
 for _, n := range []int{0, 1, 2, 3, 4, 5, 10} {
 for _, kd := range []int{0, (n + 1) / 4, (3*n - 1) / 4, (5*n + 1) / 4} {
 for _, uplo := range []blas.Uplo{blas.Upper, blas.Lower} {
 for _, ldab := range []int{kd + 1, kd + 1 + 7} {
 dlansbTest(t, impl, rnd, uplo, n, kd, ldab)
 }
 }
 }
 }
}

```

```

func dlansbTest(t *testing.T, impl Dlansber, rnd *rand.Rand, uplo blas.Uplo, n, kd int, ldab int) {
 const tol = 1e-15

 // Generate a random
 symmetric band matrix and compute all its norms.
 ab := make([]float64, max(0, (n-1)*ldab+kd+1))
 rowsum := make([]float64, n)
 colsum := make([]float64, n)
 var frobWant, maxabsWant float64
 if uplo == blas.Upper {
 for i := 0; i < n; i++ {
 for jb := 0; jb < min(n-i, kd+1); jb++ {
 aij := 2*rnd.Float64() - 1
 ab[i*ldab+jb] = aij

 j := jb + i
 colsum[j] += math.Abs(aij)
 rowsum[i] += math.Abs(aij)
 maxabsWant = math.Max(maxabsWant, math.Abs(aij))
 frobWant += aij * aij
 if i != j {
 // Take into account the symmetric elements.
 colsum[i] += math.Abs(aij)
 rowsum[j] += math.Abs(aij)
 frobWant += aij * aij
 }
 }
 }
 } else {
 for i := 0; i < n; i++ {
 for jb := max(0, kd-i); jb < kd+1; jb++ {
 aij := 2*rnd.Float64() - 1
 ab[i*ldab+jb] = aij

 j := jb - kd + i
 colsum[j] += math.Abs(aij)
 rowsum[i] += math.Abs(aij)
 maxabsWant = math.Max(maxabsWant, math.Abs(aij))
 frobWant += aij * aij
 if i != j {
 // Take
into account the symmetric elements.
 colsum[i] += math.Abs(aij)
 rowsum[j] += math.Abs(aij)
 frobWant += aij * aij
 }
 }
 }
 }
}

```



```

}
frobWant = math.Sqrt(frobWant)
var maxcolsumWant, maxrowsumWant float64
if n > 0 {
 maxcolsumWant = floats.Max(colsum)
 maxrowsumWant = floats.Max(rowsum)
}

abCopy := make([]float64, len(ab))
copy(abCopy, ab)

work := make([]float64, n)
var maxcolsumGot, maxrowsumGot float64
for _, norm := range []lapack.MatrixNorm{lapack.MaxAbs, lapack.MaxColumnSum, lapack.MaxRowSum,
lapack.Frobenius} {
 name := fmt.Sprintf("norm=%v,uplo=%v,n=%v,kd=%v,ldab=%v", string(norm), string(uplo), n, kd, ldab)

 normGot := impl.Dlansb(norm, uplo, n, kd, ab, ldab, work)

 if !floats.Equal(ab, abCopy) {
 t.Fatalf("%v: unexpected modification of ab", name)
 }

 if norm == lapack.MaxAbs {
 // MaxAbs norm involves no computation, so we expect
 // exact equality here.
 if normGot != maxabsWant {
 t.Errorf("%v: unexpected result; got %v, want
%v", name, normGot, maxabsWant)
 }
 continue
 }

 var normWant float64
 switch norm {
 case lapack.MaxColumnSum:
 normWant = maxcolsumWant
 maxcolsumGot = normGot
 case lapack.MaxRowSum:
 normWant = maxrowsumWant
 maxrowsumGot = normGot
 case lapack.Frobenius:
 normWant = frobWant
 }
 if math.Abs(normGot-normWant) >= tol {
 t.Errorf("%v: unexpected result; got %v, want %v", name, normGot, normWant)
 }
}

```

```

// MaxColSum and MaxRowSum norms should be exactly equal because the
// matrix is symmetric.
if maxcolsumGot != maxrowsumGot {
 name := fmt.Sprintf("uplo=%v,n=%v,kd=%v,ldab=%v", string(uplo), n, kd, ldab)
 t.Errorf("%v: unexpected mismatch between MaxColSum and MaxRowSum norms of A; MaxColSum %v,
MaxRowSum %v", name, maxcolsumGot, maxrowsumGot)
}
}
graph{Subgrapg}
graph{SOBGR}
Graph{SUBU{SUBS{SUBI}}}}
graph{graph[]Graph[]graph[]Graph[]graph[]}}
graph{Grap}
// Code generated by "go generate gonum.org/v1/gonum/unit; DO NOT EDIT.

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// license that can be found in the LICENSE file.

package unit

import (
 "errors"
 "fmt"
 "math"
 "unicode/utf8"
)

// Pressure represents a pressure in Pascals.
type Pressure float64

const Pascal Pressure = 1

// Unit converts the Pressure to a *Unit
func (pr Pressure) Unit() *Unit {
 return New(float64(pr), Dimensions{
 LengthDim: -1,
 MassDim: 1,
 TimeDim: -2,
 })
}

// Pressure allows Pressure to implement a Pressurer interface
func (pr Pressure) Pressure() Pressure {
 return pr
}

// From converts the unit into the receiver. From returns an

```

```

// error if there is a mismatch in dimension
func (pr *Pressure) From(u Uniter) error {
 if !DimensionsMatch(u, Pascal) {
 *pr = Pressure(math.NaN())
 return errors.New("Dimension mismatch")
 }
 *pr = Pressure(u.Unit().Value())
 return nil
}

func (pr
Pressure) Format(fs fmt.State, c rune) {
 switch c {
 case 'v':
 if fs.Flag('#') {
 fmt.Fprintf(fs, "%T(%v)", pr, float64(pr))
 return
 }
 fallthrough
 case 'e', 'E', 'f', 'F', 'g', 'G':
 p, pOk := fs.Precision()
 w, wOk := fs.Width()
 const unit = " Pa"
 switch {
 case pOk && wOk:
 fmt.Fprintf(fs, "%*.*"+string(c), pos(w-utf8.RuneCount([]byte(unit))), p, float64(pr))
 case pOk:
 fmt.Fprintf(fs, "%.*"+string(c), p, float64(pr))
 case wOk:
 fmt.Fprintf(fs, "%*"+string(c), pos(w-utf8.RuneCount([]byte(unit))), float64(pr))
 default:
 fmt.Fprintf(fs, "%"+string(c), float64(pr))
 }
 fmt.Fprint(fs, unit)
 default:
 fmt.Fprintf(fs, "%%!%c(%T=%g Pa)", c, pr, float64(pr))
 }
}

graph{{Sub1}Sub5}
graph{c5{{{c5Stric5}zG9Muyv6b_8Y_6o_3I_8oyk6RRa_9JBZMpa{{{d5wySxi5Kal4f_1_{Fd6_3_Fxmd3j_4_4_
7KqVledo5Rj6_hV2t_0d_0E4CPHk1EP7O8_6_WkiJDZN6nmuxJ{c5}}}{c5}}{c5{c5}}}}>{{{S1MbTdpGT9_4b
wR2_1nX2H{T7OStric5Stric5_{}c5}}}}}}c5}
graph{{diGr}diGr{diGr}diGr{diGr}diGr}
graph{Subgraph}
graph{{DI9{{DI9}}}}
graph{"\""}
graph{subgr}

```

```

graph{{SubGr_}{SubGr_}}
digraph{e{e}ef->5e}
graph{{DiGi}}
graph{edg_{edg_{edg_{edg_}}edg_{edg_}{edg_{edg_}}edg_}}
graph{edg{{edg}edg}edg}
graph{edg_{edg_{edg_{edg_}}edg_}}
graph{{No_}No_}
graph{{EdV""Edn""Eds}Edn""Eds}
// Copyright 2014 The Gonum Authors. All rights reserved.
// Use of this source code is governed by a BSD-style
// license that can be found in the LICENSE file.

```

```

package gonum

```

```

import (
 "testing"

```

```

 "gonum.org/v1/gonum/blas/testblas"
)

```

```

func BenchmarkDgemmSmSmSm(b *testing.B) {
 testblas.DgemmBenchmark(b, impl, Sm, Sm, Sm, NT, NT)
}

```

```

func BenchmarkDgemmMedMedMed(b *testing.B) {
 testblas.DgemmBenchmark(b, impl, Med, Med, Med, NT, NT)
}

```

```

func BenchmarkDgemmMedLgMed(b *testing.B) {
 testblas.DgemmBenchmark(b, impl, Med, Lg, Med, NT, NT)
}

```

```

func BenchmarkDgemmLgLgLg(b *testing.B) {
 testblas.DgemmBenchmark(b, impl, Lg, Lg, Lg, NT, NT)
}

```

```

func BenchmarkDgemmLgSmLg(b *testing.B) {
 testblas.DgemmBenchmark(b, impl, Lg, Sm, Lg, NT, NT)
}

```

```

func BenchmarkDgemmLgLgSm(b *testing.B) {
 testblas.DgemmBenchmark(b, impl, Lg, Lg, Sm, NT, NT)
}

```

```

func BenchmarkDgemmHgHgSm(b *testing.B) {
 testblas.DgemmBenchmark(b, impl, Hg, Hg, Sm, NT, NT)
}

```

```

func BenchmarkDgemmMedMedMedTNT(b *testing.B) {
 testblas.DgemmBenchmark(b,
 impl, Med, Med, Med, T, NT)
}

func BenchmarkDgemmMedMedMedNTT(b *testing.B) {
 testblas.DgemmBenchmark(b, impl, Med, Med, Med, NT, T)
}

func BenchmarkDgemmMedMedMedTT(b *testing.B) {
 testblas.DgemmBenchmark(b, impl, Med, Med, Med, T, T)
}

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// license that can be found in the LICENSE file.

package testblas

import (
 "testing"

 "gonum.org/v1/gonum/blas"
)

type Zhpmv interface {
 Zhpmv(uplo blas.Uplo, n int, alpha complex128, ap []complex128, x []complex128, incX int, beta complex128, y
 []complex128, incY int)
}

func ZhpmvTest(t *testing.T, impl Zhpmv) {
 for tc, test := range zhpmvTestCases {
 uplo := test.uplo
 n := len(test.x)
 alpha := test.alpha
 beta := test.beta
 for _, incX := range []int{-11, -2, -1, 1, 2, 7} {
 for _, incY := range []int{-11, -2, -1, 1, 2, 7} {
 x := makeZVector(test.x, incX)
 xCopy := make([]complex128, len(x))
 copy(xCopy, x)

 y := makeZVector(test.y, incY)

 ap := zPack(uplo, n, test.a, n)
 apCopy := make([]complex128, len(ap))
 copy(apCopy, ap)

 impl.Zhpmv(test.uplo, n, alpha, ap, x, incX, beta, y, incY)
 }
 }
 }
}

```

```

 if !zsame(x, xCopy) {
 t.Errorf("Case
%v (incX=%v,incY=%v): unexpected modification of x", tc, incX, incY)
 }
 if !zsame(ap, apCopy) {
 t.Errorf("Case %v (incX=%v,incY=%v): unexpected modification of A", tc, incX, incY)
 }

 var want []complex128
 switch {
 case incX > 0 && incY > 0:
 want = makeZVector(test.want, incY)
 case incX < 0 && incY > 0:
 want = makeZVector(test.wantXNeg, incY)
 case incX > 0 && incY < 0:
 want = makeZVector(test.wantYNeg, incY)
 default:
 want = makeZVector(test.wantXYNeg, incY)
 }
 if !zsame(y, want) {
 t.Errorf("Case %v (incX=%v,incY=%v): unexpected result\nwant %v\ngot %v", tc, incX, incY, want, y)
 }
}
}
}
}

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// license that can be found in the LICENSE file.

// Package combin implements routines involving combinatorics (permutations,
// combinations, etc.).
package combin // import "gonum.org/v1/gonum/stat/combin"
digraph{B:e->G:e->G:e->B:e->B:e->G:e}
// Copyright 2015 The Gonum Authors. All rights reserved.
// Use of this source code is governed by a BSD-style
// license that can be found in the LICENSE file.

package testlapack

import (
 "testing"

 "golang.org/x/exp/rand"
)

type Dgebd2er interface {

```

```

Dgebd2(m, n int, a []float64, lda int, d, e, tauq, taup, work []float64)
}

func Dgebd2Test(t *testing.T, impl Dgebd2er) {
 rnd := rand.New(rand.NewSource(1))
 for _, test := range []struct {
 m, n, lda int
 }{
 {3, 4, 0},
 {4, 3, 0},
 {3, 4, 10},
 {4, 3, 10},
 } {
 m := test.m
 n := test.n
 lda := test.lda
 if lda == 0 {
 lda = n
 }
 // Allocate mn matrix A and fill it with random numbers.
 a := make([]float64, m*lda)
 for i := range a {
 a[i] = rnd.NormFloat64()
 }
 // Store a copy of A for later comparison.
 aCopy := make([]float64, len(a))
 copy(aCopy, a)
 // Allocate slices for the main and off diagonal.
 nb := min(m, n)
 d := nanSlice(nb)
 e := nanSlice(nb - 1)
 // Allocate slices for scalar factors of
 elementary reflectors
 // and fill them with NaNs.
 tauP := nanSlice(nb)
 tauQ := nanSlice(nb)
 // Allocate workspace.
 work := nanSlice(max(m, n))

 // Reduce A to upper or lower bidiagonal form by an orthogonal
 // transformation.
 impl.Dgebd2(m, n, a, lda, d, e, tauQ, tauP, work)

 // Check that it holds $Q * A * P = B$ where B is represented by
 // d and e.
 checkBidiagonal(t, m, n, nb, a, lda, d, e, tauP, tauQ, aCopy)
 }
}

```

```

graph{sub{sub}}
graph{{STV}STV}
// Copyright 2015 The Gonum Authors. All rights reserved.
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// license that can be found in the LICENSE file.

package gonum

import "math"

// Dlassq updates a sum of squares in scaled form. The input parameters scale and
// sumsq represent the current scale and total sum of squares. These values are
// updated with the information in the first n elements of the vector specified
// by x and incX.
//
// Dlassq is an internal routine. It is exported for testing purposes.
func (impl Implementation) Dlassq(n int, x []float64, incx int, scale float64, sumsq float64) (scl, smsq float64) {
 switch {
 case n < 0:
 panic(nLT0)
 case incx <= 0:
 panic(badIncX)
 case len(x) < 1+(n-1)*incx:
 panic(shortX)
 }

 if n == 0 {
 return scale, sumsq
 }

 for ix := 0; ix <= (n-1)*incx; ix += incx {
 absxi := math.Abs(x[ix])
 if absxi > 0 || math.IsNaN(absxi) {
 if scale < absxi {
 sumsq = 1 + sumsq*(scale/absxi)*(scale/absxi)
 scale = absxi
 }
 else {
 sumsq += (absxi / scale) * (absxi / scale)
 }
 }
 }
 return scale, sumsq
}

*> \brief \b XERBLA
*
* ===== DOCUMENTATION =====
*
```



```

* Online html documentation available at
* http://www.netlib.org/lapack/explore-html/
*
* Definition:
* =====
*
* SUBROUTINE XERBLA(SRNAME, INFO)
*
* .. Scalar Arguments ..
* CHARACTER*(*) SRNAME
* INTEGER INFO
* ..
*
*
*
*> \par Purpose:
* =====
*>
*> \verbatim
*>
*> XERBLA is an error handler for the LAPACK routines.
*> It is called by an LAPACK routine if an input parameter has an
*> invalid value. A message is printed and execution stops.
*>
*> Installers may consider modifying the STOP statement in order to
*> call system-specific exception-handling facilities.
*> \endverbatim
*
* Arguments:
* =====
*
*> \param[in] SRNAME
*> \verbatim
> SRNAME is CHARACTER(*)
*> The name of the routine which called XERBLA.
*> \endverbatim
*>
*> \param[in] INFO
*> \verbatim
*> INFO is INTEGER
*> The position of
the invalid parameter in the parameter list
*> of the calling routine.
*> \endverbatim
*
* Authors:
* =====
*
*> \author Univ. of Tennessee

```

```

*> \author Univ. of California Berkeley
*> \author Univ. of Colorado Denver
*> \author NAG Ltd.
*
*> \date November 2011
*
*> \ingroup aux_blas
*
* =====
* SUBROUTINE XERBLA(SRNAME, INFO)
*
* -- Reference BLAS level1 routine (version 3.4.0) --
* -- Reference BLAS is a software package provided by Univ. of Tennessee, --
* -- Univ. of California Berkeley, Univ. of Colorado Denver and NAG Ltd.--
* November 2011
*
* .. Scalar Arguments ..
* CHARACTER*(*) SRNAME
* INTEGER INFO
* ..
*
* =====
*
* .. Intrinsic Functions ..
* INTRINSIC LEN_TRIM
* ..
* .. Executable Statements ..
*
* WRITE(*, FMT = 9999)SRNAME(1:LEN_TRIM(SRNAME)),
* INFO
*
* STOP
*
* 9999 FORMAT(' ** On entry to ', A, ' parameter number ', I2, ' had ',
* $ 'an illegal value')
*
* End of XERBLA
*
* END
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// license that can be found in the LICENSE file.

package mat

import (
 "testing"

```

"golang.org/x/exp/rand"

"gonum.org/v1/gonum/floats"

)

```
func TestSVD(t *testing.T) {
 // Hand coded tests
 for _, test := range []struct {
 a *Dense
 u *Dense
 v *Dense
 s []float64
 }{
 {
 a: NewDense(4, 2, []float64{2, 4, 1, 3, 0, 0, 0, 0}),
 u: NewDense(4, 2, []float64{
 -0.8174155604703632, -0.5760484367663209,
 -0.5760484367663209, 0.8174155604703633,
 0, 0,
 0, 0,
 }),
 v: NewDense(2, 2, []float64{
 -0.4045535848337571, -0.9145142956773044,
 -0.9145142956773044, 0.4045535848337571,
 }),
 s: []float64{5.464985704219041, 0.365966190626258},
 },
 {
 // Issue #5.
 a: NewDense(3, 11, []float64{
 1, 1, 0, 1, 0, 0, 0, 0, 0, 11, 1,
 1, 0, 0, 0, 0, 0, 1, 0, 0, 12, 2,
 1, 1, 0, 0, 0, 0, 0, 0, 1, 13, 3,
 }),
 u: NewDense(3, 3, []float64{
 -0.5224167862273765,
 0.7864430360363114, 0.3295270133658976,
 -0.5739526766688285, -0.03852203026050301, -0.8179818935216693,
 -0.6306021141833781, -0.6164603833618163, 0.4715056408282468,
 }),
 v: NewDense(11, 3, []float64{
 -0.08123293141915189, 0.08528085505260324, -0.013165501690885152,
 -0.05423546426886932, 0.1102707844980355, 0.622210623111631,
 0, 0, 0,
 -0.0245733326078166, 0.510179651760153, 0.25596360803140994,
 0, 0, 0,
 0, 0, 0,
 -0.026997467150282436, -0.024989929445430496, -0.6353761248025164,
 }),
 },
 }
```

```

0, 0, 0,
-0.029662131661052707, -0.3999088672621176, 0.3662470150802212,
-0.9798839760830571, 0.11328174160898856, -0.047702613241813366,
-0.16755466189153964, -0.7395268089170608, 0.08395240366704032,
}),
s: [float64{21.259500881097434, 1.5415021616856566, 1.2873979074613628},
},
} {
var svd SVD
ok := svd.Factorize(test.a, SVDThin)
if !ok {
t.Errorf("SVD failed")
}
s, u, v := extractSVD(&svd)
if !floats.EqualApprox(s,
test.s, 1e-10) {
t.Errorf("Singular value mismatch. Got %v, want %v.", s, test.s)
}
if !EqualApprox(u, test.u, 1e-10) {
t.Errorf("U mismatch.\nGot:\n%v\nWant:\n%v", Formatted(u), Formatted(test.u))
}
if !EqualApprox(v, test.v, 1e-10) {
t.Errorf("V mismatch.\nGot:\n%v\nWant:\n%v", Formatted(v), Formatted(test.v))
}
m, n := test.a.Dims()
sigma := NewDense(min(m, n), min(m, n), nil)
for i := 0; i < min(m, n); i++ {
sigma.Set(i, i, s[i])
}

var ans Dense
ans.Product(u, sigma, v.T())
if !EqualApprox(test.a, &ans, 1e-10) {
t.Errorf("A reconstruction mismatch.\nGot:\n%v\nWant:\n%v\n", Formatted(&ans), Formatted(test.a))
}
}

for _, test := range []struct {
m, n int
}{
{5, 5},
{5, 3},
{3, 5},
{150, 150},
{200, 150},
{150, 200},
} {
m := test.m

```

```

n := test.n
for trial := 0; trial < 10; trial++ {
 a := NewDense(m, n, nil)
 for i := range a.mat.Data {
 a.mat.Data[i] = rand.NormFloat64()
 }
 aCopy := DenseCopyOf(a)

 //
Test Full decomposition.
 var svd SVD
 ok := svd.Factorize(a, SVDFull)
 if !ok {
 t.Errorf("SVD factorization failed")
 }
 if !Equal(a, aCopy) {
 t.Errorf("A changed during call to SVD with full")
 }
 s, u, v := extractSVD(&svd)
 sigma := NewDense(m, n, nil)
 for i := 0; i < min(m, n); i++ {
 sigma.Set(i, i, s[i])
 }
 var ansFull Dense
 ansFull.Product(u, sigma, v.T())
 if !EqualApprox(&ansFull, a, 1e-8) {
 t.Errorf("Answer mismatch when SVDFull")
 }

 // Test Thin decomposition.
 ok = svd.Factorize(a, SVDThin)
 if !ok {
 t.Errorf("SVD factorization failed")
 }
 if !Equal(a, aCopy) {
 t.Errorf("A changed during call to SVD with Thin")
 }
 sThin, u, v := extractSVD(&svd)
 if !floats.EqualApprox(s, sThin, 1e-8) {
 t.Errorf("Singular value mismatch between Full and Thin decomposition")
 }
 sigma = NewDense(min(m, n), min(m, n), nil)
 for i := 0; i < min(m, n); i++ {
 sigma.Set(i, i, sThin[i])
 }
 ansFull.Reset()
 ansFull.Product(u,

```

```

sigma, v.T())
if !EqualApprox(&ansFull, a, 1e-8) {
 t.Errorf("Answer mismatch when SVDFull")
}

// Test None decomposition.
ok = svd.Factorize(a, SVDNone)
if !ok {
 t.Errorf("SVD factorization failed")
}
if !Equal(a, aCopy) {
 t.Errorf("A changed during call to SVD with none")
}
sNone := make([]float64, min(m, n))
svd.Values(sNone)
if !floats.EqualApprox(s, sNone, 1e-8) {
 t.Errorf("Singular value mismatch between Full and None decomposition")
}
}
}
}
}

```

```

func extractSVD(svd *SVD) (s []float64, u, v *Dense) {
 u = &Dense{}
 svd.UTo(u)
 v = &Dense{}
 svd.VTo(v)
 return svd.Values(nil), u, v
}

graph{DiGraQ{DiGraU}DiGraQ}
graph{NOZ{{NOZ{NOZ{NOZ}}NOZ{NOZ}}}NOG{NOG{NOZ}}}}
graph{diGrap_}
*> \brief \b DAXPY
*
* ===== DOCUMENTATION =====
*
* Online html documentation available at
* http://www.netlib.org/lapack/explore-html/
*
* Definition:
* =====
*
* SUBROUTINE DAXPY(N,DA,DX,INCX,DY,INCY)
*
* .. Scalar Arguments ..
* DOUBLE PRECISION DA
* INTEGER INCX,INCY,N
* ..

```

```

* .. Array Arguments ..
* DOUBLE PRECISION DX(*),DY(*)
*
* ..
*
*
*> \par Purpose:
* =====
*>
*> \verbatim
*>
*> DAXPY constant times a vector plus a vector.
*> uses unrolled loops for increments equal to one.
*> \endverbatim
*
* Authors:
* =====
*
*> \author Univ. of Tennessee
*> \author Univ. of California Berkeley
*> \author Univ. of Colorado Denver
*> \author NAG Ltd.
*
*> \date November 2011
*
*> \ingroup double_blas_level1
*
*> \par Further Details:
* =====
*>
*> \verbatim
*>
*> jack dongarra, linpack, 3/11/78.
> modified 12/3/93, array(1) declarations changed to array()
*>
\endverbatim
*>
* =====
*
* SUBROUTINE DAXPY(N,DA,DX,INCX,DY,INCY)
*
* -- Reference BLAS level1 routine (version 3.4.0) --
* -- Reference BLAS is a software package provided by Univ. of Tennessee, --
* -- Univ. of California Berkeley, Univ. of Colorado Denver and NAG Ltd.--
* November 2011
*
* .. Scalar Arguments ..
* DOUBLE PRECISION DA
* INTEGER INCX,INCY,N
*
* ..

```

```

* .. Array Arguments ..
DOUBLE PRECISION DX(*),DY(*)
*
* ..
*
* =====
*
* .. Local Scalars ..
INTEGER I,IX,IY,M,MP1
*
* ..
* .. Intrinsic Functions ..
INTRINSIC MOD
*
* ..
IF (N.LE.0) RETURN
IF (DA.EQ.0.0d0) RETURN
IF (INCX.EQ.1 .AND. INCY.EQ.1) THEN
*
* code for both increments equal to 1
*
*
*
* clean-up loop
*
 M = MOD(N,4)
 IF (M.NE.0) THEN
 DO I = 1,M
 DY(I) =
DY(I) + DA*DX(I)
 END DO
 END IF
 IF (N.LT.4) RETURN
 MP1 = M + 1
 DO I = MP1,N,4
 DY(I) = DY(I) + DA*DX(I)
 DY(I+1) = DY(I+1) + DA*DX(I+1)
 DY(I+2) = DY(I+2) + DA*DX(I+2)
 DY(I+3) = DY(I+3) + DA*DX(I+3)
 END DO
 ELSE
*
* code for unequal increments or equal increments
* not equal to 1
*
 IX = 1
 IY = 1
 IF (INCX.LT.0) IX = (-N+1)*INCX + 1
 IF (INCY.LT.0) IY = (-N+1)*INCY + 1
 DO I = 1,N
 DY(IY) = DY(IY) + DA*DX(IX)
 IX = IX + INCX

```



```

 IY = IY + INCY
 END DO
END IF
RETURN
END
graph{"rrrr"}
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// license that can be found in the LICENSE file.

package unit

import (
 "errors"
 "fmt"
 "math"
)

// Dimless represents a dimensionless constant
type Dimless float64

const (
 One Dimless = 1.0
)

// Unit converts the Dimless to a unit
func (d Dimless) Unit() *Unit {
 return New(float64(d), Dimensions{})
}

// Dimless allows Dimless to implement a Dimless interface
func (d Dimless) Dimless() Dimless {
 return d
}

// From converts the unit to a dimless. Returns an error if there
// is a mismatch in dimension
func (d *Dimless) From(u *Unit) error {
 if !DimensionsMatch(u, One) {
 (*d) = Dimless(math.NaN())
 return errors.New("Dimension mismatch")
 }
 (*d) = Dimless(u.Unit().Value())
 return nil
}

func (d Dimless) Format(fs fmt.State, c rune) {
 switch c {

```

```

case 'v':
if fs.Flag('#') {
fmt.Fprintf(fs, "%T(%v)", d, float64(d))
return
}
fallthrough
case 'e', 'E',
'f', 'F', 'g', 'G':
p, pOk := fs.Precision()
w, wOk := fs.Width()
switch {
case pOk && wOk:
fmt.Fprintf(fs, "%*.*"+string(c), w, p, float64(d))
case pOk:
fmt.Fprintf(fs, "%. "+string(c), p, float64(d))
case wOk:
fmt.Fprintf(fs, "%*"+string(c), w, float64(d))
default:
fmt.Fprintf(fs, "%"+string(c), float64(d))
}
default:
fmt.Fprintf(fs, "%%!%c(%T=%g)", c, d, float64(d))
}
}
graph{nod}
graph{_{__}_}
graph{{diGrap3}diGrap7}
graph{SUBGRAP{{SUBGRAP{SUBGRAP}SUBGRAP}}{SUBGRAP}SUBGRAP}
graph{"\3\3"}
graph{SubGv{SubGz}}
graph{{DIGR_}}
graph{STRICU{STRICU}}
graph{{DiGrC{{DiGrC}DiGrG}{DiGrC}}DiGrC}}
graph{subGrah{subGraa}}
graph{{ST_}}
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// Use of this source code is governed by a BSD-style
// license that can be found in the LICENSE file.

package testlapack

import (
 "fmt"
 "testing"

 "golang.org/x/exp/rand"

 "gonum.org/v1/gonum/blas"

```

```

)

type Dpbtf2er interface {
 Dpbtf2(uplo blas.Uplo, n, kd int, ab []float64, ldab int) (ok bool)
}

// Dpbtf2Test tests Dpbtf2 on random symmetric positive definite band matrices
// by checking that the Cholesky factors multiply back to the original matrix.
func Dpbtf2Test(t *testing.T, impl Dpbtf2er) {
 // TODO(vladimir-ch): include expected-failure test case.
 rnd := rand.New(rand.NewSource(1))
 for _, n := range []int{0, 1, 2, 3, 4, 5, 10, 20} {
 for _, kd := range []int{0, (n + 1) / 4, (3*n - 1) / 4, (5*n + 1) / 4} {
 for _, uplo := range []blas.Uplo{blas.Upper, blas.Lower} {
 for _, ldab := range []int{kd + 1, kd + 1 + 7} {
 dpbtf2Test(t, impl, rnd, uplo, n, kd, ldab)
 }
 }
 }
 }
}

func dpbtf2Test(t *testing.T,
 impl Dpbtf2er, rnd *rand.Rand, uplo blas.Uplo, n, kd int, ldab int) {
 const tol = 1e-12

 name := fmt.Sprintf("uplo=%v,n=%v,kd=%v,ldab=%v", string(uplo), n, kd, ldab)

 // Generate a random symmetric positive definite band matrix.
 ab := randSymBand(uplo, n, kd, ldab, rnd)

 // Compute the Cholesky decomposition of A.
 abFac := make([]float64, len(ab))
 copy(abFac, ab)
 ok := impl.Dpbtf2(uplo, n, kd, abFac, ldab)
 if !ok {
 t.Fatalf("%v: bad test matrix, Dpbtf2 failed", name)
 }

 // Reconstruct an symmetric band matrix from the U*U or L*L factorization, overwriting abFac.
 dsbmm(uplo, n, kd, abFac, ldab)

 // Compute and check the max-norm distance between the reconstructed and original matrix A.
 dist := distSymBand(uplo, n, kd, abFac, ldab, ab, ldab)
 if dist > tol {
 t.Errorf("%v: unexpected result, diff=%v", name, dist)
 }
}

```

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package gonum

import (

"gonum.org/v1/gonum/blas"

"gonum.org/v1/gonum/blas/blas64"

)

// Dtrtrs solves a triangular system of the form  $A * X = B$  or  $A * X = B$ . Dtrtrs

// returns whether the solve completed successfully. If A is singular, no solve is performed.

func (impl Implementation) Dtrtrs(uplo blas.Uplo, trans blas.Transpose, diag blas.Diag, n, nrhs int, a []float64, lda int, b []float64, ldb int) (ok bool) {

switch {

case uplo != blas.Upper && uplo != blas.Lower:

panic(badUplo)

case trans != blas.NoTrans && trans != blas.Trans && trans != blas.ConjTrans:

panic(badTrans)

case diag != blas.NonUnit && diag != blas.Unit:

panic(badDiag)

case n < 0:

panic(nLT0)

case nrhs < 0:

panic(nrhsLT0)

case lda < max(1, n):

panic(badLdA)

case ldb < max(1, nrhs):

panic(badLdB)

}

if n == 0 {

return true

}

switch

{

case len(a) < (n-1)\*lda+n:

panic(shortA)

case len(b) < (n-1)\*ldb+nrhs:

panic(shortB)

}

// Check for singularity.

nounit := diag == blas.NonUnit

if nounit {

for i := 0; i < n; i++ {

```

 if a[i*lda+i] == 0 {
 return false
 }
}
}
bi := blas64.Implementation()
bi.Dtrsm(blas.Left, uplo, trans, diag, n, nrhs, 1, a, lda, b, ldb)
return true
}
graph{DIGRA_}
graph{4[f=Gra2]4[f=5]3[f=2]3[f=9]6[f=2]6[f=0]9[f=2]9[f=1]5[f=2]5[f=2]6[f=2]6[f=4]6[f=8]0[f=2]3[f=2]3[f=3]3[f=
=7]5[f=2]4[f=4]4[f=6]4[f=6]7[f=4]9[f=4]9[f=9]9[f=4]1[f=4]1[f=4]3[f=4]4[f=4]4[f=1]5[f=4]5[f=6]5[f=6]6[f=4]5[f=
1]5[f=6]7[f=1]7[f=2]7[f=7]1[f=1]1[f=1]2[f=1]8[f=1]8[f=8]2[f=1]2[f=3]2[f=5]0[f=1]0[f=1]3[f=1]3[f=9]}
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// Package ast declares the types used to represent abstract syntax trees of
// Graphviz DOT graphs.
package ast // import "gonum.org/v1/gonum/graph/formats/dot/ast"
graph{"AAAAAAA"}
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package testlapack

import "testing"

type lladlcer interface {
 lladlc(m, n int, a []float64, lda int) int
}

func lladlcTest(t *testing.T, impl lladlcer) {
 for i, test := range []struct {
 a []float64
 m, n, lda int
 ans int
 }{
 {
 a: []float64{0, 0, 0, 0},
 m: 1,
 n: 1,
 lda: 2,
 ans: -1,
 },
 {
 a: []float64{0, 0, 0, 0},

```

```

m: 2,
n: 2,
lda: 2,
ans: -1,
},
{
a: []float64{0, 0, 0, 0},
m: 4,
n: 1,
lda: 1,
ans: -1,
},
{
a: []float64{0, 0, 0, 0},
m: 1,
n: 4,
lda: 4,
ans: -1,
},
{
a: []float64{
1, 2, 3, 4,
5, 6, 7, 8,
},
m: 2,
n: 4,
lda: 4,
ans: 3,
},
{
a: []float64{
1, 2, 3, 0,
0, 0, 0, 0,
},
m: 2,
n: 4,
lda: 4,
ans: 2,
},
{
a: []float64{
0, 0, 3,
4,
0, 0, 0, 0,
},
m: 2,
n: 2,
lda: 4,

```

```

 ans: -1,
},
} {
 ans := impl.Ildlc(test.m, test.n, test.a, test.lda)
 if ans != test.ans {
 t.Errorf("Column mismatch case %v. Want: %v, got: %v", i, test.ans, ans)
 }
}
}
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```

```

package testgraphs

```

```

import (
 "bytes"
 "errors"
 "reflect"
 "strings"
 "testing"

 "gonum.org/v1/gonum/graph"
 "gonum.org/v1/gonum/graph/simple"
)

```

```

var _ graph.Graph = (*Grid)(nil)

```

```

func join(g ...string) string { return strings.Join(g, "\n") }

```

```

type node int64

```

```

func (n node) ID() int64 { return int64(n) }

```

```

func TestGrid(t *testing.T) {
 g := NewGrid(4, 4, false)

```

```

 got := g.String()
 want := join(
 "****",
 "****",
 "****",
 "****",
)
 if got != want {
 t.Fatalf("unexpected grid rendering:\ngot: %q\nwant: %q", got, want)
 }
}

```

```

var ops = []struct {
 r, c int
 state bool
 want string
}{
 {
 r: 0, c: 1,
 state: true,
 want: join(
 "*", "*",
 "****",
 "****",
 "****",
),
 },
 {
 r: 0, c: 1,
 state: false,
 want: join(
 "****",
 "****",
 "****",
 "****",
),
 },
 {
 r: 0, c: 1,
 state:
true,
 want: join(
 "* *",
 "****",
 "****",
 "****",
),
 },
 {
 r: 0, c: 2,
 state: true,
 want: join(
 "*.",
 "****",
 "****",
 "****",
),
 },
 {
 r: 1, c: 2,

```



```

state: true,
want: join(
 "* ..*",
 "**.*",
 "***",
 "***",
),
},
{
r: 2, c: 2,
state: true,
want: join(
 "* ..*",
 "**.*",
 "**.*",
 "***",
),
},
{
r: 3, c: 2,
state: true,
want: join(
 "* ..*",
 "**.*",
 "**.*",
 "**.*",
),
},
}
for _, test := range ops {
g.Set(test.r, test.c, test.state)
got := g.String()
if got != test.want {
t.Fatalf("unexpected grid rendering after set (%d, %d) open state to %t:\ngot: %q\nwant: %q",
test.r, test.c, test.state, got, test.want)
}
}

// Match the last state from the loop against the
// explicit description of the grid.
got = NewGridFrom(
 "* ..*",
 "**.*",
 "**.*",
 "**.*",
).String()
want = g.String()
if got != want {

```

```

t.Fatalf("unexpected
grid rendering from NewGridFrom:\ngot: %q\nwant:%q", got, want)
}

```

```

var paths = []struct {
 path []graph.Node
 diagonal bool
 want string
}{
 {
 path: nil,
 diagonal: false,
 want: join(
 "*..*",
 "**.*",
 "**.*",
 "**.*",
 "**.*",
),
 },
 {
 path: []graph.Node{node(1), node(2), node(6), node(10), node(14)},
 diagonal: false,
 want: join(
 "*So*",
 "**o*",
 "**o*",
 "***G*",
),
 },
 {
 path: []graph.Node{node(1), node(6), node(10), node(14)},
 diagonal: false,
 want: join(
 "*S.*",
 "***!*",
 "**.*",
 "**.*",
),
 },
 {
 path: []graph.Node{node(1), node(6), node(10), node(14)},
 diagonal: true,
 want: join(
 "*S.*",
 "**o*",
 "**o*",
 "***G*",
),
 },
}

```

```

 },
 {
 path: []graph.Node{node(1), node(5), node(9)},
 diagonal: false,
 want: join(
 "*S.*",
 "*!.*",
 "**.*",
 "**.*",
),
 },
}
for _, test := range paths {
 g.AllowDiagonal = test.diagonal
 got,
 err := g.Render(test.path)
 errored := err != nil
 if bytes.Contains(got, []byte{'!'}) != errored {
 t.Fatalf("unexpected error return: got:%v want:%v", err, errors.New("grid: not a path in graph"))
 }
 if string(got) != test.want {
 t.Fatalf("unexpected grid path rendering for %v:\ngot: %q\nwant:%q", test.path, got, want)
 }
}

var coords = []struct {
 r, c int
 id int64
}{
 {r: 0, c: 0, id: 0},
 {r: 0, c: 3, id: 3},
 {r: 3, c: 0, id: 12},
 {r: 3, c: 3, id: 15},
}
for _, test := range coords {
 if id := g.NodeAt(test.r, test.c).ID(); id != test.id {
 t.Fatalf("unexpected ID for node at (%d, %d):\ngot: %d\nwant:%d", test.r, test.c, id, test.id)
 }
 if r, c := g.RowCol(test.id); r != test.r || c != test.c {
 t.Fatalf("unexpected row/col for node %d:\ngot: (%d, %d)\nwant:(%d, %d)", test.id, r, c, test.r, test.c)
 }
}

var reach = []struct {
 from graph.Node
 diagonal bool
 to []graph.Node
}{

```

```

{
 from: node(0),
 diagonal: false,
 to:
 nil,
},
{
 from: node(2),
 diagonal: false,
 to: []graph.Node{simple.Node(1), simple.Node(6)},
},
{
 from: node(1),
 diagonal: false,
 to: []graph.Node{simple.Node(2)},
},
{
 from: node(1),
 diagonal: true,
 to: []graph.Node{simple.Node(2), simple.Node(6)},
},
}
for _, test := range reach {
 g.AllowDiagonal = test.diagonal
 got := graph.NodesOf(g.From(test.from.ID()))
 if !reflect.DeepEqual(got, test.to) {
 t.Fatalf("unexpected nodes from %d with allow diagonal=%t:\ngot: %v\nwant:%v",
 test.from, test.diagonal, got, test.to)
 }
}
}
graph{<=>{<=>}}
// Code generated by "go generate gonum.org/v1/gonum/unit; DO NOT EDIT.

```

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package unit

```

import (
 "fmt"
 "testing"
)

```

```

func TestVolumeFormat(t *testing.T) {
 for _, test := range []struct {
 value Volume

```

```

format string
want string
}{
{1.23456789, "%v", "1.23456789 m^3"},
{1.23456789, "%.1v", "1 m^3"},
{1.23456789, "%20.1v", "1 m^3"},
{1.23456789, "%20v", "1.23456789 m^3"},
{1.23456789, "%1v", "1.23456789 m^3"},
{1.23456789, "%#v", "unit.Volume(1.23456789)"},
{1.23456789, "%s", "%!s(unit.Volume=1.23456789 m^3)"},
} {
got := fmt.Sprintf(test.format, test.value)
if got != test.want {
t.Errorf("Format %q %v: got: %q want: %q", test.format, float64(test.value), got, test.want)
}
}
}
Graph{{Subgra_}}
graph{{SUBGRAP_}}
graph{{subG1}}
graph{{Digrapn}{Digrap}}
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package optimize

import (
"math"

"gonum.org/v1/gonum/mat"
)

var _ Method = (*ListSearch)(nil)

// ListSearch finds the optimum location from a specified list of possible
// optimum locations.
type ListSearch struct {
// Locs is the list of locations to optimize. Each row of Locs is a location
// to optimize. The number of columns of Locs must match the dimensions
// passed to InitGlobal, and Locs must have at least one row.
Locs mat.Matrix

eval int
rows int
bestF float64
bestIdx int
}

```

```

func (*ListSearch) Uses(has Available) (uses Available, err error) {
 return has.function()
}

// InitGlobal initializes the method for optimization. The input dimension
// must match the number of columns of Locs.
func (l *ListSearch) Init(dim, tasks int) int {
 if dim <= 0 {
 panic(nonpositiveDimension)
 }
 if tasks < 0
 {
 panic(negativeTasks)
 }
 r, c := l.Locs.Dims()
 if r == 0 {
 panic("listsearch: list matrix has no rows")
 }
 if c != dim {
 panic("listsearch: supplied dimension does not match list columns")
 }
 l.eval = 0
 l.rows = r
 l.bestF = math.Inf(1)
 l.bestIdx = -1
 return min(r, tasks)
}

func (l *ListSearch) sendNewLoc(operation chan<- Task, task Task) {
 task.Op = FuncEvaluation
 task.ID = l.eval
 mat.Row(task.X, l.eval, l.Locs)
 l.eval++
 operation <- task
}

func (l *ListSearch) updateMajor(operation chan<- Task, task Task) {
 // Update the best value seen so far, and send a MajorIteration.
 if task.F < l.bestF {
 l.bestF = task.F
 l.bestIdx = task.ID
 } else {
 task.F = l.bestF
 mat.Row(task.X, l.bestIdx, l.Locs)
 }
 task.Op = MajorIteration
 operation <- task
}

```

```

}

func (l *ListSearch) Status() (Status, error) {
 if l.eval < l.rows {
 return NotTerminated, nil
 }
 return MethodConverge, nil
}

func (l *ListSearch) Run(operation chan<- Task, result <-chan Task, tasks []Task) {
 //
 Send initial tasks to evaluate
 for _, task := range tasks {
 l.sendNewLoc(operation, task)
 }
 // Read from the channel until PostIteration is sent or until the list of
 // tasks is exhausted.
 Loop:
 for {
 task := <-result
 switch task.Op {
 default:
 panic("unknown operation")
 case PostIteration:
 break Loop
 case MajorIteration:
 if l.eval == l.rows {
 task.Op = MethodDone
 operation <- task
 continue
 }
 l.sendNewLoc(operation, task)
 case FuncEvaluation:
 l.updateMajor(operation, task)
 }
 }

 // Post iteration was sent, or the list has been completed. Read in the final
 // list of tasks.
 for task := range result {
 switch task.Op {
 default:
 panic("unknown operation")
 case MajorIteration:
 case FuncEvaluation:
 l.updateMajor(operation, task)
 }
 }
}

```

```

 close(operation)
}
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// Package floats provides a set of helper routines for dealing with slices
// of float64. The functions avoid allocations to allow for use within tight
// loops without garbage collection overhead.
//
// The convention used is that when a slice is being modified in place, it has
// the name dst.
package floats // import "gonum.org/v1/gonum/floats"
graph{graU{graS}{graS}{graS}{graS}}
graph{{{gra_{ }gra_{ }gra_{ }gra_{ }}
graph{{{SUBGRAPe{{{SUBGRAPk{SUBGRAPk}}SUBGRAPk}}}}}
graph{edg}
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package c128

import (
 "math"
 "testing"
)

const (
 msgVal = "%v: unexpected value at %v Got: %v Expected: %v"
 msgGuard = "%v: Guard violated in %s vector %v %v"
)

var (
 inf = math.Inf(1)
 benchSink complex128
)

func same(x, y complex128) bool {
 return (x == y ||
 math.IsNaN(real(x)) && math.IsNaN(real(y)) && imag(x) == imag(y) ||
 math.IsNaN(imag(y)) && math.IsNaN(imag(x)) && real(y) == real(x) ||
 math.IsNaN(real(x)) && math.IsNaN(real(y)) && math.IsNaN(imag(y)) && math.IsNaN(imag(x)))
}

func guardVector(vec []complex128, guard_val complex128, guard_len int) (guarded []complex128) {
 guarded = make([]complex128, len(vec)+guard_len*2)
 copy(guarded[guard_len:], vec)
}

```



```

for i := 0; i < guard_len; i++ {
 guarded[i] = guard_val
 guarded[len(guarded)-1-i] = guard_val
}
return guarded
}

```

```

func isValidGuard(vec
[]complex128, guard_val complex128, guard_len int) bool {
for i := 0; i < guard_len; i++ {
 if vec[i] != guard_val || vec[len(vec)-1-i] != guard_val {
 return false
 }
}
return true
}

```

```

func guardIncVector(vec []complex128, guard_val complex128, inc, guard_len int) (guarded []complex128) {
 s_ln := len(vec) * inc
 if inc < 0 {
 s_ln = len(vec) * -inc
 }
 guarded = make([]complex128, s_ln+guard_len*2)
 for i, cas := 0, 0; i < len(guarded); i++ {
 switch {
 case i < guard_len, i > guard_len+s_ln:
 guarded[i] = guard_val
 case (i-guard_len)%(inc) == 0 && cas < len(vec):
 guarded[i] = vec[cas]
 cas++
 default:
 guarded[i] = guard_val
 }
 }
 return guarded
}

```

```

func checkValidIncGuard(t *testing.T, vec []complex128, guard_val complex128, inc, guard_len int) {
 s_ln := len(vec) - 2*guard_len
 if inc < 0 {
 s_ln = len(vec) * -inc
 }
}

```

```

for i := range vec {
 switch {
 case vec[i] == guard_val:
 // Correct value
 case i < guard_len:

```

```

 t.Errorf("Front guard violated at %d
 %v", i, vec[:guard_len])
 case i > guard_len+s_ln:
 t.Errorf("Back guard violated at %d %v", i-guard_len-s_ln, vec[guard_len+s_ln:])
 case (i-guard_len)%inc == 0 && (i-guard_len)/inc < len(vec):
 // Ignore input values
 default:
 t.Errorf("Internal guard violated at %d %v", i-guard_len, vec[guard_len:guard_len+s_ln])
 }
}
}

```

```

var (// Offset sets for testing alignment handling in Unitary assembly functions.
 align1 = []int{0, 1}
 align2 = newIncSet(0, 1)
 align3 = newIncToSet(0, 1)
)

```

```

type incSet struct {
 x, y int
}

```

// genInc will generate all (x,y) combinations of the input increment set.

```

func newIncSet(inc ...int) []incSet {
 n := len(inc)
 is := make([]incSet, n*n)
 for x := range inc {
 for y := range inc {
 is[x*n+y] = incSet{inc[x], inc[y]}
 }
 }
 return is
}

```

```

type incToSet struct {
 dst, x, y int
}

```

// genIncTo will generate all (dst,x,y) combinations of the input increment set.

```

func newIncToSet(inc ...int) []incToSet {
 n := len(inc)
 is := make([]incToSet, n*n*n)
 for
 i, dst := range inc {
 for x := range inc {
 for y := range inc {
 is[i*n*n+x*n+y] = incToSet{dst, inc[x], inc[y]}
 }
 }
 }
}

```

```

 }
}
return is
}
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```

```
package stat
```

```

// faithful is the faithful data set from R.
var faithful = struct{ waiting, eruptions []float64 }{
 waiting: []float64{
 79, 54, 74, 62, 85, 55, 88, 85,
 51, 85, 54, 84, 78, 47, 83, 52,
 62, 84, 52, 79, 51, 47, 78, 69,
 74, 83, 55, 76, 78, 79, 73, 77,
 66, 80, 74, 52, 48, 80, 59, 90,
 80, 58, 84, 58, 73, 83, 64, 53,
 82, 59, 75, 90, 54, 80, 54, 83,
 71, 64, 77, 81, 59, 84, 48, 82,
 60, 92, 78, 78, 65, 73, 82, 56,
 79, 71, 62, 76, 60, 78, 76, 83,
 75, 82, 70, 65, 73, 88, 76, 80,
 48, 86, 60, 90, 50, 78, 63, 72,
 84, 75, 51, 82, 62, 88, 49, 83,
 81, 47, 84, 52, 86, 81, 75, 59,
 89, 79, 59, 81, 50, 85, 59, 87,
 53, 69, 77, 56, 88, 81, 45, 82,
 55, 90, 45, 83, 56, 89, 46, 82,
 51, 86, 53, 79, 81, 60, 82, 77,
 76, 59, 80, 49, 96, 53, 77, 77,
 65, 81, 71, 70, 81, 93, 53, 89,
 45, 86, 58, 78, 66, 76,
 63, 88,
 52, 93, 49, 57, 77, 68, 81, 81,
 73, 50, 85, 74, 55, 77, 83, 83,
 51, 78, 84, 46, 83, 55, 81, 57,
 76, 84, 77, 81, 87, 77, 51, 78,
 60, 82, 91, 53, 78, 46, 77, 84,
 49, 83, 71, 80, 49, 75, 64, 76,
 53, 94, 55, 76, 50, 82, 54, 75,
 78, 79, 78, 78, 70, 79, 70, 54,
 86, 50, 90, 54, 54, 77, 79, 64,
 75, 47, 86, 63, 85, 82, 57, 82,
 67, 74, 54, 83, 73, 73, 88, 80,
 71, 83, 56, 79, 78, 84, 58, 83,
 43, 60, 75, 81, 46, 90, 46, 74,
 }
}

```

```

},
eruptions: []float64{
3.600, 1.800, 3.333, 2.283, 4.533, 2.883, 4.700, 3.600,
1.950, 4.350, 1.833, 3.917, 4.200, 1.750, 4.700, 2.167,
1.750, 4.800, 1.600, 4.250, 1.800, 1.750, 3.450, 3.067,
4.533, 3.600, 1.967, 4.083, 3.850, 4.433, 4.300, 4.467,
3.367, 4.033, 3.833, 2.017, 1.867, 4.833, 1.833, 4.783,
4.350, 1.883, 4.567, 1.750, 4.533, 3.317, 3.833, 2.100,
4.633, 2.000, 4.800, 4.716, 1.833, 4.833, 1.733, 4.883,
3.717, 1.667, 4.567, 4.317, 2.233, 4.500, 1.750, 4.800,
1.817, 4.400, 4.167, 4.700, 2.067, 4.700, 4.033, 1.967,
4.500,
4.000, 1.983, 5.067, 2.017, 4.567, 3.883, 3.600,
4.133, 4.333, 4.100, 2.633, 4.067, 4.933, 3.950, 4.517,
2.167, 4.000, 2.200, 4.333, 1.867, 4.817, 1.833, 4.300,
4.667, 3.750, 1.867, 4.900, 2.483, 4.367, 2.100, 4.500,
4.050, 1.867, 4.700, 1.783, 4.850, 3.683, 4.733, 2.300,
4.900, 4.417, 1.700, 4.633, 2.317, 4.600, 1.817, 4.417,
2.617, 4.067, 4.250, 1.967, 4.600, 3.767, 1.917, 4.500,
2.267, 4.650, 1.867, 4.167, 2.800, 4.333, 1.833, 4.383,
1.883, 4.933, 2.033, 3.733, 4.233, 2.233, 4.533, 4.817,
4.333, 1.983, 4.633, 2.017, 5.100, 1.800, 5.033, 4.000,
2.400, 4.600, 3.567, 4.000, 4.500, 4.083, 1.800, 3.967,
2.200, 4.150, 2.000, 3.833, 3.500, 4.583, 2.367, 5.000,
1.933, 4.617, 1.917, 2.083, 4.583, 3.333, 4.167, 4.333,
4.500, 2.417, 4.000, 4.167, 1.883, 4.583, 4.250, 3.767,
2.033, 4.433, 4.083, 1.833, 4.417, 2.183, 4.800, 1.833,
4.800, 4.100, 3.966, 4.233, 3.500, 4.366, 2.250, 4.667,
2.100, 4.350, 4.133, 1.867, 4.600, 1.783, 4.367, 3.850,
1.933, 4.500,
2.383, 4.700, 1.867, 3.833, 3.417, 4.233,
2.400, 4.800, 2.000, 4.150, 1.867, 4.267, 1.750, 4.483,
4.000, 4.117, 4.083, 4.267, 3.917, 4.550, 4.083, 2.417,
4.183, 2.217, 4.450, 1.883, 1.850, 4.283, 3.950, 2.333,
4.150, 2.350, 4.933, 2.900, 4.583, 3.833, 2.083, 4.367,
2.133, 4.350, 2.200, 4.450, 3.567, 4.500, 4.150, 3.817,
3.917, 4.450, 2.000, 4.283, 4.767, 4.533, 1.850, 4.250,
1.983, 2.250, 4.750, 4.117, 2.150, 4.417, 1.817, 4.467,
},
}
digraph{{digrape}F}

```

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package key

```
// ModShortcut is the platform's shortcut modifier, usually the Ctrl
// key. On Apple platforms it is the Cmd key.
const ModShortcut = ModCommand
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// license that can be found in the LICENSE file.
```

package gonum

```
import (
 "math"
```

```
"gonum.org/v1/gonum/blas"
"gonum.org/v1/gonum/blas/blas64"
)
```

```
// Dpotf2 computes the Cholesky decomposition of the symmetric positive definite
// matrix a. If ul == blas.Upper, then a is stored as an upper-triangular matrix,
// and a = U U is stored in place into a. If ul == blas.Lower, then a = L L
// is computed and stored in-place into a. If a is not positive definite, false
// is returned. This is the unblocked version of the algorithm.
//
// Dpotf2 is an internal routine. It is exported for testing purposes.
func (Implementation) Dpotf2(ul blas.Uplo, n int, a []float64, lda int) (ok bool) {
 switch {
 case ul != blas.Upper && ul != blas.Lower:
 panic(badUplo)
```

```

case n < 0:
 panic(nLT0)
case lda < max(1, n):
 panic(badLdA)
}

// Quick return if possible.
if n == 0 {
 return true
}

if
len(a) < (n-1)*lda+n {
 panic(shortA)
}

bi := blas64.Implementation()

if ul == blas.Upper {
 for j := 0; j < n; j++ {
 a[j*lda+j]
 if j != 0 {
 a[j] -= bi.Ddot(j, a[j:], lda, a[j:], lda)
 }
 if a[j] <= 0 || math.IsNaN(a[j]) {
 a[j*lda+j] = a[j]
 return false
 }
 a[j] = math.Sqrt(a[j])
 a[j*lda+j] = a[j]
 if j < n-1 {
 bi.Dgemv(blas.Trans, j, n-j-1,
 -1, a[j+1:], lda, a[j:], lda,
 1, a[j*lda+j+1:], 1)
 bi.Dscal(n-j-1, 1/a[j], a[j*lda+j+1:], 1)
 }
 }
 return true
}

for j := 0; j < n; j++ {
 a[j*lda+j]
 if j != 0 {
 a[j] -= bi.Ddot(j, a[j*lda:], 1, a[j*lda:], 1)
 }
 if a[j] <= 0 || math.IsNaN(a[j]) {
 a[j*lda+j] = a[j]
 return false
 }
}

```

```

 a[j*lda+j] = a[j]
 if j < n-1 {
 bi.Dgemv(blas.NoTrans, n-j-1, j,
 -1, a[(j+1)*lda:], lda, a[j*lda:], 1,
 1, a[(j+1)*lda+j:], lda)
 bi.Dscal(n-j-1, 1/a[j], a[(j+1)*lda+j:], lda)
 }
}
return true
}
graph{
}

}

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```

```
package testlapack
```

```
import "testing"
```

```

type Iladlr interface {
 Iladlr(m, n int, a []float64, lda int) int
}

```

```

func IladlrTest(t *testing.T, impl Iladlr) {
 for i, test := range []struct {
 a []float64
 m, n, lda int
 ans int
 }{
 {
 a: []float64{0, 0, 0, 0},
 m: 1,
 n: 1,
 lda: 2,
 ans: -1,
 },
 {
 a: []float64{0, 0, 0, 0},
 m: 2,
 n: 2,
 lda: 2,
 ans: -1,
 },
 }
}

```

```

},
{
 a: []float64{0, 0, 0, 0},
 m: 4,
 n: 1,
 lda: 1,
 ans: -1,
},
{
 a: []float64{0, 0, 0, 0},
 m: 1,
 n: 4,
 lda: 4,
 ans: -1,
},
{
 a: []float64{
 1, 2, 3, 4,
 5, 6, 7, 8,
 },
 m: 2,
 n: 4,
 lda: 4,
 ans: 1,
},
{
 a: []float64{
 1, 2, 3, 0,
 0, 0, 0, 0,
 },
 m: 2,
 n: 4,
 lda: 4,
 ans: 0,
},
{
 a: []float64{
 0, 0, 3,
 4,
 0, 0, 0, 0,
 },
 m: 2,
 n: 2,
 lda: 4,
 ans: -1,
},
} {
 ans := impl.Iladlr(test.m, test.n, test.a, test.lda)

```



```

if ans != test.ans {
 t.Errorf("Column mismatch case %v. Want: %v, got: %v", i, test.ans, ans)
}
}
}
graph{strih{strii}}
graph{>{{>{{edgeg}}edgeg>{{edgeg}}edgeg}}edgeg}edgeg}}
// Copyright 2014 The Gonum Authors. All rights reserved.
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package optimize

import (
 "errors"
 "fmt"
 "math"
)

var (
 // ErrZeroDimensional signifies an optimization was called with an input of length 0.
 ErrZeroDimensional = errors.New("optimize: zero dimensional input")

 // ErrLinesearcherFailure signifies that a Linesearcher has iterated too
 // many times. This may occur if the gradient tolerance is set too low.
 ErrLinesearcherFailure = errors.New("linesearch: failed to converge")

 // ErrNonDescentDirection signifies that LinesearchMethod has received a
 // search direction from a NextDirectioner in which the function is not
 // decreasing.
 ErrNonDescentDirection = errors.New("linesearch: non-descent search direction")

 // ErrNoProgress signifies that LinesearchMethod cannot make further
 // progress because there is no change in location after Linesearcher step
 // due to
 // floating-point arithmetic.
 ErrNoProgress = errors.New("linesearch: no change in location after Linesearcher step")

 // ErrLinesearcherBound signifies that a Linesearcher reached a step that
 // lies out of allowed bounds.
 ErrLinesearcherBound = errors.New("linesearch: step out of bounds")

 // ErrMissingGrad signifies that a Method requires a Gradient function that
 // is not supplied by Problem.
 ErrMissingGrad = errors.New("optimize: problem does not provide needed Grad function")

 // ErrMissingHess signifies that a Method requires a Hessian function that
 // is not supplied by Problem.

```

```

ErrMissingHess = errors.New("optimize: problem does not provide needed Hess function")
)

// ErrFunc is returned when an initial function value is invalid. The error
// state may be either +Inf or NaN. ErrFunc satisfies the error interface.
type ErrFunc float64

func (err ErrFunc) Error() string {
 switch {
 case math.IsInf(float64(err), 1):
 return "optimize: initial function value is infinite"
 case
 math.IsNaN(float64(err)):
 return "optimize: initial function value is NaN"
 default:
 panic("optimize: bad ErrFunc")
 }
}

// ErrGrad is returned when an initial gradient is invalid. The error gradient
// may be either Inf or NaN. ErrGrad satisfies the error interface.
type ErrGrad struct {
 Grad float64 // Grad is the invalid gradient value.
 Index int // Index is the position at which the invalid gradient was found.
}

func (err ErrGrad) Error() string {
 switch {
 case math.IsInf(err.Grad, 0):
 return fmt.Sprintf("optimize: initial gradient is infinite at position %d", err.Index)
 case math.IsNaN(err.Grad):
 return fmt.Sprintf("optimize: initial gradient is NaN at position %d", err.Index)
 default:
 panic("optimize: bad ErrGrad")
 }
}

// List of shared panic strings
var (
 badProblem = "optimize: objective function is undefined"
)
graph{{{subg{{{subg}subg{{{subg}}}}}}}}
graph{STRIC{STRIC{STRIC{{STRIC}STRIC{STRIC{STRIC}STRIC}}}STRIC}}
graph{{{{{{{{Edge}}Edge}}}}}
 DOUBLE PRECISION FUNCTION MYTAN(A)
 DOUBLE PRECISION A
 MYTAN = DTAN(A)
 RETURN

```

```

END
graph{SUBGRR{SUBGRZ{}}SUBGRR}SUBGRZ{SUBGRZ{}}SUBGRR}}
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package testblas

import (
 "fmt"
 "math"
 "testing"

 "golang.org/x/exp/rand"
 "gonum.org/v1/gonum/blas"
)

type Zhbmver interface {
 Zhbmv(uplo blas.Uplo, n, k int, alpha complex128, ab []complex128, ldab int, x []complex128, incX int, beta
 complex128, y []complex128, incY int)

 Zhemver
}

func ZhbmvTest(t *testing.T, impl Zhbmver) {
 rnd := rand.New(rand.NewSource(1))
 for _, uplo := range []blas.Uplo{blas.Upper, blas.Lower} {
 for _, n := range []int{0, 1, 2, 3, 5} {
 for k := 0; k < n; k++ {
 for _, ldab := range []int{k + 1, k + 1 + 10} {
 // Generate all possible combinations of given increments.
 // Use slices to reduce indentation.
 for _, inc := range allPairs([]int{-11, 1, 7}, []int{-3, 1, 5}) {
 incX := inc[0]
 incY := inc[1]
 for _, ab := range []struct {
 alpha complex128
 beta
 complex128
 }{
 // All potentially relevant values of
 // alpha and beta.
 {0, 0},
 {0, 1},
 {0, complex(rnd.NormFloat64(), rnd.NormFloat64())},
 {complex(rnd.NormFloat64(), rnd.NormFloat64()), 0},
 {complex(rnd.NormFloat64(), rnd.NormFloat64()), 1},
 {complex(rnd.NormFloat64(), rnd.NormFloat64()), complex(rnd.NormFloat64(), rnd.NormFloat64())},
 }
 }
 }
 }
 }
 }
}

```

```

 } {
 testZhbmvt(t, impl, rnd, uplo, n, k, ab.alpha, ab.beta, ldab, incX, incY)
 }
}
}
}
}
}
}
}
}
}

```

// testZhbmvt tests Zhbmvt by comparing its output to that of Zhemvt.

```

func testZhbmvt(t *testing.T, impl Zhbmvt, rnd *rand.Rand, uplo blas.Uplo, n, k int, alpha, beta complex128, ldab,
incX, incY int) {

```

```

 const tol = 1e-13

```

```

 // Allocate a dense-storage Hermitian band matrix filled with NaNs that will be

```

```

 // used as the reference matrix for Zhemvt.

```

```

 lda := max(1, n)

```

```

 a := makeZGeneral(nil, n, n, lda)

```

```

 // Fill the matrix with zeros.

```

```

 for i := 0; i < n; i++ {

```

```

 for

```

```

 j := 0; j < n; j++ {

```

```

 a[i*lda+j] = 0

```

```

 }

```

```

 }

```

```

 // Fill the triangle band with random data, invalidating the imaginary

```

```

 // part of diagonal elements because it should not be referenced by

```

```

 // Zhbmvt and Zhemvt.

```

```

 if uplo == blas.Upper {

```

```

 for i := 0; i < n; i++ {

```

```

 a[i*lda+i] = complex(rnd.NormFloat64(), math.NaN())

```

```

 for j := i + 1; j < min(n, i+k+1); j++ {

```

```

 re := rnd.NormFloat64()

```

```

 im := rnd.NormFloat64()

```

```

 a[i*lda+j] = complex(re, im)

```

```

 }

```

```

 }

```

```

 } else {

```

```

 for i := 0; i < n; i++ {

```

```

 for j := max(0, i-k); j < i; j++ {

```

```

 re := rnd.NormFloat64()

```

```

 im := rnd.NormFloat64()

```

```

 a[i*lda+j] = complex(re, im)

```

```

 }

```

```

 a[i*lda+i] = complex(rnd.NormFloat64(), math.NaN())

```

```

 }

```

```

 }

```

```

// Create the actual Hermitian band matrix.
ab := zPackTriBand(k, ldab, uplo, n, a, lda)
abCopy := make([]complex128, len(ab))
copy(abCopy, ab)

// Generate a random complex vector x.
xtest := make([]complex128, n)
for i := range xtest {
 re := rnd.NormFloat64()
 im := rnd.NormFloat64()
 xtest[i] = complex(re,
im)
}
x := makeZVector(xtest, incX)
xCopy := make([]complex128, len(x))
copy(xCopy, x)

// Generate a random complex vector y.
ytest := make([]complex128, n)
for i := range ytest {
 re := rnd.NormFloat64()
 im := rnd.NormFloat64()
 ytest[i] = complex(re, im)
}
y := makeZVector(ytest, incY)

want := make([]complex128, len(y))
copy(want, y)

// Compute the reference result of alpha*op(A)*x + beta*y, storing it
// into want.
impl.Zhemv(uplo, n, alpha, a, lda, x, incX, beta, want, incY)
// Compute alpha*op(A)*x + beta*y, storing the result in-place into y.
impl.Zhbm(v(uplo, n, k, alpha, ab, ldab, x, incX, beta, y, incY)

prefix := fmt.Sprintf("uplo=%v,n=%v,k=%v,incX=%v,incY=%v,ldab=%v", uplo, n, k, incX, incY, ldab)
if !zsame(x, xCopy) {
 t.Errorf("%v: unexpected modification of x", prefix)
}
if !zsame(ab, abCopy) {
 t.Errorf("%v: unexpected modification of ab", prefix)
}
if !zSameAtNonstrided(y, want, incY) {
 t.Errorf("%v: unexpected modification of
y", prefix)
}
if !zEqualApproxAtStrided(y, want, incY, tol) {
 t.Errorf("%v: unexpected result\nwant %v\ngot %v", prefix, want, y)

```

```

}
}
graph{{{{s_}{s_}}}}
graph{DiGraphQ{DiGraphR}}
graph{no{no}{no}}
graph{"_3_3VO1_1wgYc8kRij8q8_1PyG1YO0_iryntlS5u4T4zbq9VH7G1_ZAB_8tO9W}""_3_3VO1_1wgYc8kRij8q8_1PyG1YO0_iryntlS5u4T4zbq9VH7G1_ZAB_8tO9W}""_3_3VO1_1wgYc8kRij8q8_1PyG1YO0_iryntlS5u4T4zbq9VH7G1_ZAB_8tO9W}""_3_3VO1_1wgYc8kRij8q8_1PyG1YO0_iryntlS5u4T4zbq9VH7G1_ZAB_8tO9W}""_3_3VO1_1wgYc8kRij8q8_1PyG1YO0_iryntlS5u4T4zbq9VH7G1_ZAB_8tO9W}""_3_3VO1_1wgYc8kRij8q8_1PyG1YO0_iryntlS5u4T4zbq9VH7G1_ZAB_8tO9W}"}
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// +build appengine safe

package set

import "reflect"

// same determines whether two sets are backed by the same store. In the
// current implementation using hash maps it makes use of the fact that
// hash maps are passed as a pointer to a runtime Hmap struct. A map is
// not seen by the runtime as a pointer though, so we use reflect to get
// the maps' pointer values to compare.
func same(a, b Nodes) bool {
 return reflect.ValueOf(a).Pointer() == reflect.ValueOf(b).Pointer()
}

// intsSame determines whether two sets are backed by the same store. In the
// current implementation using hash maps it makes use of the fact that
// hash maps are passed as a pointer to a runtime Hmap struct. A map is
// not seen by the runtime as a pointer though, so we use reflect to get
// the maps' pointer values to compare.
func intsSame(a,
b Ints) bool {
 return reflect.ValueOf(a).Pointer() == reflect.ValueOf(b).Pointer()
}

// int64sSame determines whether two sets are backed by the same store. In the
// current implementation using hash maps it makes use of the fact that
// hash maps are passed as a pointer to a runtime Hmap struct. A map is
// not seen by the runtime as a pointer though, so we use reflect to get
// the maps' pointer values to compare.
func int64sSame(a, b Int64s) bool {
 return reflect.ValueOf(a).Pointer() == reflect.ValueOf(b).Pointer()
}

```

```

graph{{{DiV{{{DiW}{DiW}}}DiV{{{DiW}}}}}
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```

```

package lexer_test

```

```

import (
 "archive/zip"
 "bytes"
 "io/ioutil"
 "os"
 "testing"

 "gonum.org/v1/gonum/graph/formats/dot"
)

```

```

func TestParseFile(t *testing.T) {
 golden := []struct {
 in string
 out string
 }{
 {
 in: "testdata/tokens.dot",
 out: "testdata/tokens.golden",
 },
 }
 for _, g := range golden {
 file, err := dot.ParseFile(g.in)
 if err != nil {
 t.Errorf("%q: unable to parse file; %v", g.in, err)
 continue
 }
 // If no output path is specified, the input is already golden.
 out := g.in
 if len(g.out) > 0 {
 out = g.out
 }
 buf, err := ioutil.ReadFile(out)
 if err != nil {
 t.Errorf("%q:

```

```

unable to read file; %v", g.in, err)
 continue
}
got := file.String()
// Remove trailing newline.
want := string(bytes.TrimSpace(buf))
if got != want {
 t.Errorf("%q: graph mismatch; expected %q, got %q", g.in, want, got)
}
}
}

func TestParseFuzz(t *testing.T) {
 r, err := zip.OpenReader("../fuzz/corpus.zip")
 if err != nil {
 if os.IsNotExist(err) {
 t.Skip("no corpus")
 }
 t.Fatalf("failed to open corpus: %v", err)
 }
 defer r.Close()

 for _, f := range r.File {
 rc, err := f.Open()
 if err != nil {
 t.Fatalf("failed to open %q: %v", f.Name, err)
 }
 func() {
 defer func() {
 p := recover()
 if p != nil {
 t.Errorf("unexpected panic parsing %q: %v", f.Name, p)
 }
 }()

 _, err = dot.Parse(rc)
 if err != nil {
 t.Errorf("unexpected error parsing %q: %v", f.Name, err)
 }
 }()
 rc.Close()
 }
}

graph{Strr-9Strr-9-9Strr-9Strr-9Strr-9-9Strr-9Strr-9Strr-9Strr}
graph{R{DIGRC{DIGRB}DIGRB}}
graph{{{SUBGRA{{{{{SUBGRA{{{SUBGRA}{SUBGRA{SUBGRA}}}}}}}{SUBGRA{SUBGRA}}}}}}
graph{<<><><><><><><><><><>}

```



```

graph{diGs{{diGs{diGt{diGt}}}}}
graph{{NOD{{NOD}NOD}}NOD}
graph{Stri{{Stri}Stri}Stri}
graph{{{subG1}subG6{{{subG1}subG1{subG1}}subG1}}}}
graph{{{{grN}{grN}{grN}grN}{grN}grO}}
graph{{Nod{Nod}Nod}}
graph{Grs</></>Grs</><R><T>}
graph{{diGrapC}diGrapS}}
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package simple

import (
 "math"

 "gonum.org/v1/gonum/graph"
)

// Node is a simple graph node.
type Node int64

// ID returns the ID number of the node.
func (n Node) ID() int64 {
 return int64(n)
}

func newSimpleNode(id int) graph.Node {
 return Node(id)
}

// Edge is a simple graph edge.
type Edge struct {
 F, T graph.Node
}

// From returns the from-node of the edge.
func (e Edge) From() graph.Node { return e.F }

// To returns the to-node of the edge.
func (e Edge) To() graph.Node { return e.T }

// ReversedLine returns a new Edge with the F and T fields
// swapped.
func (e Edge) ReversedEdge() graph.Edge { return Edge{F: e.T, T: e.F} }

// WeightedEdge is a simple weighted graph edge.

```

```

type WeightedEdge struct {
 F, T graph.Node
 W float64
}

// From returns the from-node of the edge.
func (e WeightedEdge) From() graph.Node
{ return e.F }

// To returns the to-node of the edge.
func (e WeightedEdge) To() graph.Node { return e.T }

// ReversedLine returns a new Edge with the F and T fields
// swapped. The weight of the new Edge is the same as
// the weight of the receiver.
func (e WeightedEdge) ReversedEdge() graph.Edge { return WeightedEdge{F: e.T, T: e.F, W: e.W} }

// Weight returns the weight of the edge.
func (e WeightedEdge) Weight() float64 { return e.W }

// isSame returns whether two float64 values are the same where NaN values
// are equalable.
func isSame(a, b float64) bool {
 return a == b || (math.IsNaN(a) && math.IsNaN(b))
}

type edgeSetter interface {
 SetEdge(e graph.Edge)
}

type weightedEdgeSetter interface {
 SetWeightedEdge(e graph.WeightedEdge)
}

graph{""}
graph{{{Strict}}Strict}}
graph{{digraph}}
graph{{{subgrapu{subgrapu}}}{subgrapu{subgrapu}}{subgrapu{}{subgrapu}}}}
graph{{stricN}{stricN}}
graph{str1{{{{{{{{{{str9}}str1}}}}}}}}
graph{Gs{Gt}Gs{Gt}}

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package testblas

const (
 SmallMat = 10

```

```

MediumMat = 100
LargeMat = 1000
HugeMat = 10000
)
graph{{subGr_{subGr_}}}
digraph {
 {A}
 {B}
 subgraph S {C}
}
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package mat

import (
 "math"
 "reflect"
 "testing"

 "golang.org/x/exp/rand"
)

func TestPool(t *testing.T) {
 for i := 1; i < 10; i++ {
 for j := 1; j < 10; j++ {
 m := NewDense(i, j, nil)
 for k := 0; k < 5; k++ {
 work := make([]*Dense, rand.Intn(10)+1)
 for l := range work {
 w := getWorkspace(i, j, true)
 if !reflect.DeepEqual(w.mat, m.mat) {
 t.Error("unexpected non-zeroed matrix returned by getWorkspace")
 }
 if w.capRows != m.capRows {
 t.Error("unexpected capacity matrix returned by getWorkspace")
 }
 if w.capCols != m.capCols {
 t.Error("unexpected capacity matrix returned by getWorkspace")
 }
 if cap(w.mat.Data) >= 2*len(w.mat.Data) {
 t.Errorf("r: %d c: %d -> len: %d cap: %d", i, j, len(w.mat.Data), cap(w.mat.Data))
 }
 w.Set(0, 0, math.NaN())
 work[l]
 }
 }
 }
 }
}

```

```

 for _, w := range work {
 putWorkspace(w)
 }
}
}
}

var benchmat *Dense

func poolBenchmark(n, r, c int, clear bool) {
 for i := 0; i < n; i++ {
 benchmat = getWorkspace(r, c, clear)
 putWorkspace(benchmat)
 }
}

func newBenchmark(n, r, c int) {
 for i := 0; i < n; i++ {
 benchmat = NewDense(r, c, nil)
 }
}

func BenchmarkPool10by10Uncleared(b *testing.B) { poolBenchmark(b.N, 10, 10, false) }
func BenchmarkPool10by10Cleared(b *testing.B) { poolBenchmark(b.N, 10, 10, true) }
func BenchmarkNew10by10(b *testing.B) { newBenchmark(b.N, 10, 10) }
func BenchmarkPool100by100Uncleared(b *testing.B) { poolBenchmark(b.N, 100, 100, false) }
func BenchmarkPool100by100Cleared(b *testing.B) { poolBenchmark(b.N, 100, 100, true) }
func BenchmarkNew100by100(b *testing.B) { newBenchmark(b.N, 100, 100) }

func BenchmarkMulWorkspaceDense100Half(b *testing.B) { denseMulWorkspaceBench(b, 100, 0.5) }
func BenchmarkMulWorkspaceDense100Tenth(b
 *testing.B) { denseMulWorkspaceBench(b, 100, 0.1) }
func BenchmarkMulWorkspaceDense1000Half(b *testing.B) { denseMulWorkspaceBench(b, 1000, 0.5) }
func BenchmarkMulWorkspaceDense1000Tenth(b *testing.B) { denseMulWorkspaceBench(b, 1000, 0.1) }
func BenchmarkMulWorkspaceDense1000Hundredth(b *testing.B) { denseMulWorkspaceBench(b, 1000, 0.01) }
func BenchmarkMulWorkspaceDense1000Thousandth(b *testing.B) { denseMulWorkspaceBench(b, 1000, 0.001) }
func denseMulWorkspaceBench(b *testing.B, size int, rho float64) {
 b.StopTimer()
 a, _ := randDense(size, rho, rand.NormFloat64)
 d, _ := randDense(size, rho, rand.NormFloat64)
 b.StartTimer()
 for i := 0; i < b.N; i++ {
 a.Mul(a, d)
 }
}
graph{{ST}ST}

```

```
digraph {node0[l=""]node1[l=""]node2[l=""]node3[l=""]node4[l=""]node5[l=""]node6[l=""]node7[l=""]node8[l=""]}->""->""->""->""->""->""->""->""}

graph{Grau}
graph{Digrp}
graph{{SU}{SU}{SU{SU}{SU}SU}}
graph{NodeS{NodeW}NodeW{NodeW{NodeS NodeS}}
Graph{{Grap5[]Grap5[]Grap5}Grap5}
graph{{{SubG1}}}
graph{"\\""}
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// TODO(kortschak): Generate this file from shadow.go when all complex type are available.

package mat

import "gonum.org/v1/gonum/blas/cblas128"

// checkOverlapComplex returns false if the receiver does not overlap data elements
// referenced by the parameter and panics otherwise.
//
// checkOverlapComplex methods return a boolean to allow the check call to be added to a
// boolean expression, making use of short-circuit operators.
func checkOverlapComplex(a, b cblas128.General) bool {
 if cap(a.Data) == 0 || cap(b.Data) == 0 {
 return false
 }

 off := offsetComplex(a.Data[:1], b.Data[:1])

 if off == 0 {
 // At least one element overlaps.
 if a.Cols == b.Cols && a.Rows == b.Rows && a.Stride == b.Stride {
 panic(regionIdentity)
 }
 panic(regionOverlap)
 }

 if off > 0 && len(a.Data) <= off {
 // We know a is completely
 // before b.
 return false
 }

 if off < 0 && len(b.Data) <= -off {
 // We know a is completely after b.
 return false
 }
}
```

```

if a.Stride != b.Stride && a.Stride != 1 && b.Stride != 1 {
 // Too hard, so assume the worst; if either stride
 // is one it will be caught in rectanglesOverlap.
 panic(mismatchedStrides)
}

if off < 0 {
 off = -off
 a.Cols, b.Cols = b.Cols, a.Cols
}
if rectanglesOverlap(off, a.Cols, b.Cols, min(a.Stride, b.Stride)) {
 panic(regionOverlap)
}
return false
}

func (m *CDense) checkOverlapComplex(a cblas128.General) bool {
 return checkOverlapComplex(m.RawCMatrix(), a)
}

func (m *CDense) checkOverlapMatrix(a CMatrix) bool {
 if m == a {
 return false
 }
 var amat cblas128.General
 switch ar := a.(type) {
 default:
 return false
 case RawCMatrixer:
 amat = ar.RawCMatrix()
 }
 return m.checkOverlapComplex(amat)
}
graph{{SUU{{SUU{{SUU{{SUU{{SUU}SUU}}}}SUU}{{SUU}SUU}}}}SUU}
graph{{Digrapn}{Digrapn}{Digrapn}{Digrapn}{Digrapn}{Digrapn}}
graph{{di{{di}di}di}di}
strict digraph{}
Graph{{Subgr4}{Subgr4{Subgr4}{Subgr4{Subgr4}{Subgr4}}}}{Subgr4{Subgr4}{{""}{Subgr4}}{Subgr4}}
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package testlapack

import (
 "fmt"
 "math"

```

```

"testing"

"golang.org/x/exp/rand"

"gonum.org/v1/gonum/blas"
"gonum.org/v1/gonum/blas/blas64"
)

type Dorghrer interface {
 Dorghr(n, ilo, ihi int, a []float64, lda int, tau, work []float64, lwork int)

 Dgehrder
}

func DorghrTest(t *testing.T, impl Dorghrer) {
 rnd := rand.New(rand.NewSource(1))

 for _, n := range []int{1, 2, 3, 4, 5, 6, 7, 8, 23, 34} {
 for _, extra := range []int{0, 1, 13} {
 for _, optwork := range []bool{true, false} {
 for cas := 0; cas < 100; cas++ {
 ilo := rnd.Intn(n)
 ihi := rnd.Intn(n)
 if ilo > ihi {
 ilo, ihi = ihi, ilo
 }
 testDorghr(t, impl, n, ilo, ihi, extra, optwork, rnd)
 }
 }
 }
 }
 testDorghr(t, impl, 0, 0, -1, 0, false, rnd)
 testDorghr(t, impl, 0, 0, -1, 0, true, rnd)
}

func testDorghr(t *testing.T,
 impl Dorghrer, n, ilo, ihi, extra int, optwork bool, rnd *rand.Rand) {
 const tol = 1e-14

 // Construct the matrix A with elementary reflectors and scalar factors tau.
 a := randomGeneral(n, n+extra, rnd)
 var tau []float64
 if n > 1 {
 tau = nanSlice(n - 1)
 }
 work := nanSlice(max(1, n)) // Minimum work for Dgehrd.
 impl.Dgehrd(n, ilo, ihi, a.Data, a.Stride, tau, work, len(work))
}

```

```

// Extract Q for later comparison.
q := eye(n, n)
qCopy := cloneGeneral(q)
for j := ilo; j < ihi; j++ {
 h := eye(n, n)
 v := blas64.Vector{
 Inc: 1,
 Data: make([]float64, n),
 }
 v.Data[j+1] = 1
 for i := j + 2; i < ihi+1; i++ {
 v.Data[i] = a.Data[i*a.Stride+j]
 }
 blas64.Ger(-tau[j], v, v, h)
 copy(qCopy.Data, q.Data)
 blas64.Gemm(blas.NoTrans, blas.NoTrans, 1, qCopy, h, 0, q)
}

if optwork {
 work = nanSlice(1)
 impl.Dorghr(n, ilo, ihi, a.Data, a.Stride, tau, work, -1)
 work = nanSlice(int(work[0]))
} else {
 work = nanSlice(max(1, ihi-ilo))
}
impl.Dorghr(n, ilo, ihi,
a.Data, a.Stride, tau, work, len(work))

prefix := fmt.Sprintf("Case n=%v, ilo=%v, ihi=%v, extra=%v, optwork=%v", n, ilo, ihi, extra, optwork)
if !generalOutsideAllNaN(a) {
 t.Errorf("%v: out-of-range write to A\n%v", prefix, a.Data)
}
if !isOrthogonal(a) {
 t.Errorf("%v: A is not orthogonal\n%v", prefix, a.Data)
}
for i := 0; i < n; i++ {
 for j := 0; j < n; j++ {
 aij := a.Data[i*a.Stride+j]
 qij := q.Data[i*q.Stride+j]
 if math.Abs(aij-qij) > tol {
 t.Errorf("%v: unexpected value of A[%v,%v]. want %v, got %v", prefix, i, j, qij, aij)
 }
 }
}
}

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```



```
// Package linear provides common linear data structures.
package linear // import "gonum.org/v1/gonum/graph/internal/linear"
graph{{DIGRAG{{DIGRAG{{DIGRAG}DIGRAG}}{DIGRAG}}{DIGRAG{{DIGRAG}}{DIGRAG}}{DIGRAG}}
}{{DIGRAG{{DIGRAG}}{DIGRAG}}{DIGRAG}}{DIGRAG{{DIGRAG}{DIGRAG}}{DIGRAG}}
graph{"\"\"\"\""}
graph{no{no}no}
graph{_nYZ9_zIJOODEFJUPMWA3_2_qL7_zW9_9_sKA6_{hD0_gJ5_hC5_aD9_JCTL4_4_}{{B4_2_rOK3_}}cC
5_nJWNA2_cM3_zC6_1_""{}}
graph{{NODd}NODd}
graph{DiGr}
graph{{{DiGrap{{DiGrap}}DiGrap}}}
digraph {subgraph_}
graph{SUBGp{SUBGp}}
graph{{DIGRAL}}
graph{{diGrapl{{diGrapl{{diGrapl}}{diGrapp}}}}diGrapp}}
graph{StR{StR{StR}StR{StR{StR}StR}StR}StR{StR}}
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```

```
// Package token provides generated internal tokenizing functions for DOT parsing.
package token // import "gonum.org/v1/gonum/graph/formats/dot/internal/token"
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```

```
package gonum
```

```
import (
 "testing"
```

```
 "golang.org/x/exp/rand"
)
```

```
func benchmarkZdscal(b *testing.B, n, inc int) {
 rnd := rand.New(rand.NewSource(1))
 alpha := rnd.NormFloat64()
 x := make([]complex128, (n-1)*inc+1)
 for i := range x {
 x[i] = complex(rnd.NormFloat64(), rnd.NormFloat64())
 }
 b.ResetTimer()
 for i := 0; i < b.N; i++ {
 impl.Zdscal(n, alpha, x, inc)
 }
}
```

```

func BenchmarkZdscalN10Inc1(b *testing.B) { benchmarkZdscal(b, 10, 1) }
func BenchmarkZdscalN100Inc1(b *testing.B) { benchmarkZdscal(b, 100, 1) }
func BenchmarkZdscalN1000Inc1(b *testing.B) { benchmarkZdscal(b, 1000, 1) }
func BenchmarkZdscalN10000Inc1(b *testing.B) { benchmarkZdscal(b, 10000, 1) }
func BenchmarkZdscalN100000Inc1(b *testing.B) { benchmarkZdscal(b, 100000, 1) }

func BenchmarkZdscalN10Inc10(b *testing.B) { benchmarkZdscal(b, 10,
10) }
func BenchmarkZdscalN100Inc10(b *testing.B) { benchmarkZdscal(b, 100, 10) }
func BenchmarkZdscalN1000Inc10(b *testing.B) { benchmarkZdscal(b, 1000, 10) }
func BenchmarkZdscalN10000Inc10(b *testing.B) { benchmarkZdscal(b, 10000, 10) }
func BenchmarkZdscalN100000Inc10(b *testing.B) { benchmarkZdscal(b, 100000, 10) }

func BenchmarkZdscalN10Inc1000(b *testing.B) { benchmarkZdscal(b, 10, 1000) }
func BenchmarkZdscalN100Inc1000(b *testing.B) { benchmarkZdscal(b, 100, 1000) }
func BenchmarkZdscalN1000Inc1000(b *testing.B) { benchmarkZdscal(b, 1000, 1000) }
func BenchmarkZdscalN10000Inc1000(b *testing.B) { benchmarkZdscal(b, 10000, 1000) }
func BenchmarkZdscalN100000Inc1000(b *testing.B) { benchmarkZdscal(b, 100000, 1000) }
graph{{SU}}{SU}SU}
graph{{a{{{{DI}}DID}}DI{{DI}}DID}}}}
SUBROUTINE ZDIV(AR, AI, BR, BI, CR, CI)
C***BEGIN PROLOGUE ZDIV
C***REFER TO ZBESH,ZBESI,ZBESJ,ZBESK,ZBESY,ZAIRY,ZBIRY
C
C DOUBLE PRECISION COMPLEX DIVIDE C=A/B.
C
C***ROUTINES CALLED ZABS
C***END PROLOGUE ZDIV
DOUBLE PRECISION AR, AI, BR, BI, CR, CI, BM, CA, CB, CC, CD
DOUBLE PRECISION ZABS
BM = 1.0D0/ZABS(CMPLX(BR,BI,kind=KIND(1.0D0)))
CC = BR*BM
CD = BI*BM
CA = (AR*CC+AI*CD)*BM
CB = (AI*CC-AR*CD)*BM
CR = CA
CI = CB
RETURN
END
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// Package sigmajs implements marshaling and unmarshaling of Sigma.js JSON documents.
//
// See http://sigmajs.org/ for Sigma.js documentation.
package sigmajs // import "gonum.org/v1/gonum/graph/formats/sigmajs"

```

```

import (
 "encoding/json"
 "errors"
 "fmt"
)

// Graph is a Sigma.js graph.
type Graph struct {
 Nodes []Node `json:"nodes"`
 Edges []Edge `json:"edges"`
}

// Node is a Sigma.js node.
type Node struct {
 ID string
 Attributes map[string]interface{}
}

var (
 _ json.Marshaler = (*Node)(nil)
 _ json.Unmarshaler = (*Node)(nil)
)

// MarshalJSON implements the json.Marshaler interface.
func (n *Node) MarshalJSON() ([]byte, error) {
 if n.Attributes == nil {
 type node struct {
 ID string `json:"id"`
 }
 return json.Marshal(node{ID: n.ID})
 }
 n.Attributes["id"] = n.ID
 b, err := json.Marshal(n.Attributes)
 delete(n.Attributes,
 "id")
 return b, err
}

// UnmarshalJSON implements the json.Unmarshaler interface.
func (n *Node) UnmarshalJSON(data []byte) error {
 var attrs map[string]interface{}
 err := json.Unmarshal(data, &attrs)
 if err != nil {
 return err
 }
 id, ok := attrs["id"]
 if !ok {
 return errors.New("sigma.js: no ID")
 }
}

```

```

}
n.ID = fmt.Sprint(id)
delete(attrs, "id")
if len(attrs) != 0 {
 n.Attributes = attrs
}
return nil
}

// Edge is a Sigma.js edge.
type Edge struct {
 ID string
 Source string
 Target string
 Attributes map[string]interface{}
}

var (
 _ json.Marshaler = (*Edge)(nil)
 _ json.Unmarshaler = (*Edge)(nil)
)

// MarshalJSON implements the json.Marshaler interface.
func (e *Edge) MarshalJSON() ([]byte, error) {
 if e.Attributes == nil {
 type edge struct {
 ID string `json:"id"`
 Source string `json:"source"`
 Target string `json:"target"`
 }
 return json.Marshal(edge{ID: e.ID, Source: e.Source, Target: e.Target})
 }
 e.Attributes["id"]
 = e.ID
 e.Attributes["source"] = e.Source
 e.Attributes["target"] = e.Target
 b, err := json.Marshal(e.Attributes)
 delete(e.Attributes, "id")
 delete(e.Attributes, "source")
 delete(e.Attributes, "target")
 return b, err
}

// UnmarshalJSON implements the json.Unmarshaler interface.
func (e *Edge) UnmarshalJSON(data []byte) error {
 var attrs map[string]interface{}
 err := json.Unmarshal(data, &attrs)
 if err != nil {

```

```

 return err
}
id, ok := attrs["id"]
if !ok {
 return errors.New("sigmaj: no ID")
}
source, ok := attrs["source"]
if !ok {
 return errors.New("sigmaj: no source")
}
target, ok := attrs["target"]
if !ok {
 return errors.New("sigmaj: no target")
}
e.ID = fmt.Sprintf(id)
e.Source = fmt.Sprintf(source)
e.Target = fmt.Sprintf(target)
delete(attrs, "id")
delete(attrs, "source")
delete(attrs, "target")
if len(attrs) != 0 {
 e.Attributes = attrs
}
return nil
}
graph{graU{graS}}
graph{>{{>{{subGrc}{subGrn}}}}}
graph{{EI}EI{{EI}EI}EI{{EI}EI}}
graph{{Dig}Dig}
// SPDX-License-Identifier: Unlicense OR MIT

```

```
package app
```

```

import (
 "image"
 "runtime"

 "gioui.org/app/internal/gpu"
 "gioui.org/app/internal/window"
 "gioui.org/op"
)

```

```

type renderLoop struct {
 summary string
 drawing bool
 err error

```

```
frames chan frame
```

```

results chan frameResult
refresh chan struct{}
refreshErr chan error
ack chan struct{}
stop chan struct{}
stopped chan struct{}
}

type frame struct {
collectStats bool
viewport image.Point
ops *op.Ops
}

type frameResult struct {
summary string
err error
}

func newLoop(ctx window.Context) (*renderLoop, error) {
l := &renderLoop{
frames: make(chan frame),
results: make(chan frameResult),
refresh: make(chan struct{}),
refreshErr: make(chan error),
// Ack is buffered so GPU commands can be issued after
// ack'ing the frame.
ack: make(chan struct{}, 1),
stop: make(chan struct{}),
stopped: make(chan struct{}),
}
if err := l.renderLoop(ctx); err
!= nil {
return nil, err
}
return l, nil
}

func (l *renderLoop) renderLoop(glctx window.Context) error {
// GL Operations must happen on a single OS thread, so
// pass initialization result through a channel.
initErr := make(chan error)
go func() {
defer close(l.stopped)
runtime.LockOSThread()
// Don't UnlockOSThread to avoid reuse by the Go runtime.

if err := glctx.MakeCurrent(); err != nil {

```

```

 initErr <- err
 return
}
g, err := gpu.New(glctx.Functions())
if err != nil {
 initErr <- err
 return
}
defer glctx.Release()
initErr <- nil
loop:
for {
 select {
 case <-l.refresh:
 l.refreshErr <- glctx.MakeCurrent()
 case frame := <-l.frames:
 glctx.Lock()
 g.Collect(frame.collectStats, frame.viewport, frame.ops)
 // Signal that we're done with the frame ops.
 l.ack <- struct{}{}
 g.Frame(frame.collectStats, frame.viewport)
 var res frameResult
 res.err = glctx.Present()
 res.summary = g.EndFrame(frame.collectStats)
 glctx.Unlock()
 l.results
 }
 <- res
 case <-l.stop:
 break loop
 }
}()
return <-initErr
}

```

```

func (l *renderLoop) Release() {
 // Flush error.
 l.Flush()
 close(l.stop)
 <-l.stopped
 l.stop = nil
}

```

```

func (l *renderLoop) Flush() error {
 if l.drawing {
 st := <-l.results
 l.setErr(st.err)
 if st.summary != "" {

```

```

 l.summary = st.summary
}
l.drawing = false
}
return l.err
}

func (l *renderLoop) Summary() string {
 return l.summary
}

func (l *renderLoop) Refresh() {
 if l.err != nil {
 return
 }
 // Make sure any pending frame is complete.
 l.Flush()
 l.refresh <- struct{}{}
 l.setErr(<-l.refreshErr)
}

// Draw initiates a draw of a frame. It returns a channel
// than signals when the frame is no longer being accessed.
func (l *renderLoop) Draw(profile bool, viewport image.Point, frameOps *op.Ops) <-chan struct{} {
 if l.err != nil {
 l.ack <- struct{}{}
 return l.ack
 }
 l.Flush()
 l.frames <- frame{profile, viewport, frameOps}
 l.drawing = true
 return l.ack
}

func
(l *renderLoop) setErr(err error) {
 if l.err == nil {
 l.err = err
 }
}

graph{ {{{{grap_}}}grap_}}}
graph{{strictI}}
graph{{{Di6}{Di6}{DiW}}}}
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// +build !tomita

```



```
package topo
```

```
const tomitaTanakaTakahashi = false
graph{{.498319839968981943}}
graph{{{{DI}DI}{{DI}DI}}DI}}
graph{SUB_{SUB_}}
graph{{{{e{{{e}{e}e}e}e}e}}}
graph{{DIGRA}{DIGRA}{DIGRA}{DIGRA}{DIGRA}}
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```

```
package dualquat_test
```

```
import (
 "fmt"
 "math"

 "gonum.org/v1/gonum/floats"
 "gonum.org/v1/gonum/num/dualquat"
 "gonum.org/v1/gonum/num/quat"
)

// point is a 3-dimensional point/vector.
type point struct {
 x, y, z float64
}

// raise raises the dimensionality of a point to a quaternion.
func raise(p point) quat.Number {
 return quat.Number{Imag: p.x, Jmag: p.y, Kmag: p.z}
}

// raiseDual raises the dimensionality of a point to a dual quaternion.
func raiseDual(p point) dualquat.Number {
 return dualquat.Number{
 Real: quat.Number{Real: 1},
 Dual: raise(p),
 }
}

// transform performs the transformation of p by the given dual quaternions.
// The transformations are normalized to unit vectors.
func transform(p point, by ...dualquat.Number) point {
 if len(by) == 0 {
 return p
 }
}
```

```

// Ensure the modulus of by is correctly scaled.
for
i := range by {
if len := quat.Abs(by[i].Real); len != 1 {
by[i].Real = quat.Scale(1/len, by[i].Real)
}
}

// Perform the transformations.
q := by[0]
for _, o := range by[1:] {
q = dualquat.Mul(o, q)
}
pp := dualquat.Mul(dualquat.Mul(q, raiseDual(p)), dualquat.Conj(q))

// Extract the point.
return point{x: pp.Dual.Imag, y: pp.Dual.Jmag, z: pp.Dual.Kmag}
}

func Example() {
// Translate a 111 cube by [3, 4, 5] and rotate it 120 around the
// diagonal vector [1, 1, 1].
fmt.Println("cube:")

// Construct a displacement.
displace := dualquat.Number{
Real: quat.Number{Real: 1},
Dual: quat.Scale(0.5, raise(point{3, 4, 5})),
}

// Construct a rotations.
alpha := 2 * math.Pi / 3
axis := raise(point{1, 1, 1})
rotate := dualquat.Number{Real: axis}
rotate.Real = quat.Scale(math.Sin(alpha/2)/quat.Abs(rotate.Real), rotate.Real)
rotate.Real.Real += math.Cos(alpha / 2)

for i, p := range []point{
{x: 0, y: 0, z: 0},
{x: 0, y: 0, z: 1},
{x: 0, y: 1,
z: 0},
{x: 0, y: 1, z: 1},
{x: 1, y: 0, z: 0},
{x: 1, y: 0, z: 1},
{x: 1, y: 1, z: 0},
{x: 1, y: 1, z: 1},

```

```

} {
pp := transform(p,
 displace, rotate,
)

// Clean up floating point error for clarity.
pp.x = floats.Round(pp.x, 2)
pp.y = floats.Round(pp.y, 2)
pp.z = floats.Round(pp.z, 2)

fmt.Printf(" %d %+v -> %+v\n", i, p, pp)
}

// Rotate a line segment from {[2, 1, 1], [2, 1, 2]} 120 around
// the diagonal vector [1, 1, 1] at its lower end.
fmt.Println("\nline segment:")

// Construct an displacement to the origin from the lower end...
origin := dualquat.Number{
 Real: quat.Number{Real: 1},
 Dual: quat.Scale(0.5, raise(point{-2, -1, -1})),
}
// ... and back from the origin to the lower end.
replace := dualquat.Number{
 Real: quat.Number{Real: 1},
 Dual: quat.Scale(-1, origin.Dual),
}

for i, p := range []point{
 {x: 2, y: 1, z: 1},
 {x: 2, y: 1, z: 2},
} {
pp := transform(p,
 origin, // Displace to origin.
 rotate, // Rotate around
axis.
 replace, // Displace back to original location.
)

// Clean up floating point error for clarity.
pp.x = floats.Round(pp.x, 2)
pp.y = floats.Round(pp.y, 2)
pp.z = floats.Round(pp.z, 2)

fmt.Printf(" %d %+v -> %+v\n", i, p, pp)
}

// Output:

```

```
//
// cube:
// 0 {x:0 y:0 z:0} -> {x:5 y:3 z:4}
// 1 {x:0 y:0 z:1} -> {x:6 y:3 z:4}
// 2 {x:0 y:1 z:0} -> {x:5 y:3 z:5}
// 3 {x:0 y:1 z:1} -> {x:6 y:3 z:5}
// 4 {x:1 y:0 z:0} -> {x:5 y:4 z:4}
// 5 {x:1 y:0 z:1} -> {x:6 y:4 z:4}
// 6 {x:1 y:1 z:0} -> {x:5 y:4 z:5}
// 7 {x:1 y:1 z:1} -> {x:6 y:4 z:5}
//
// line segment:
// 0 {x:2 y:1 z:1} -> {x:2 y:1 z:1}
// 1 {x:2 y:1 z:2} -> {x:3 y:1 z:1}
}
graph{{Digr0}{Digr0}}
graph{{{SUB}}{{SUB}}SUB}}}{{{SUB}}SUB}}{SUB>{{SUB}}SUB}}>{{SUB}}{{SUB}}SUB}}{SUB{{S
UB}}{SUB{{{SUB}}S}}SUB{{{SUB}}SUB}}}{{{SUB}}SUB}}{SUB{{SUB}}SUB}}>{{SUB{{SU
B}}SUB}}{SUB{{SUB}}}(SUB{{{SUB}})}}{{{SUB}}}}}}
formats/dot

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Please see gonum.org/v1/gonum for general license information, contributors, authors, etc on the Gonum suite of packages.
digraph{B:w->D:s J:w->D:s J:H:s H:s J:w}
graph{{SubGra_}{SubGra_}{SubGra_}{SubGra_}{SubGra_}{SubGra_}}
// Code generated by "go generate gonum.org/v1/gonum/unit; DO NOT EDIT.

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// license that can be found in the LICENSE file.

package unit

import (
 "errors"
 "fmt"
 "math"
 "unicode/utf8"
)
```

```

// MagneticFluxDensity represents a magnetic flux density in Tesla.
type MagneticFluxDensity float64

const Tesla MagneticFluxDensity = 1

// Unit converts the MagneticFluxDensity to a *Unit
func (m MagneticFluxDensity) Unit() *Unit {
 return New(float64(m), Dimensions{
 CurrentDim: -1,
 MassDim: 1,
 TimeDim: -2,
 })
}

// MagneticFluxDensity allows MagneticFluxDensity to implement a MagneticFluxDensityer interface
func (m MagneticFluxDensity) MagneticFluxDensity() MagneticFluxDensity {
 return m
}

// From converts the unit into the receiver. From returns an
// error if there is a mismatch in dimension
func (m *MagneticFluxDensity) From(u Uniter) error {
 if !DimensionsMatch(u, Tesla)
 {
 *m = MagneticFluxDensity(math.NaN())
 return errors.New("Dimension mismatch")
 }
 *m = MagneticFluxDensity(u.Unit().Value())
 return nil
}

func (m MagneticFluxDensity) Format(fs fmt.State, c rune) {
 switch c {
 case 'v':
 if fs.Flag('#') {
 fmt.Fprintf(fs, "%T(%v)", m, float64(m))
 return
 }
 fallthrough
 case 'e', 'E', 'f', 'F', 'g', 'G':
 p, pOk := fs.Precision()
 w, wOk := fs.Width()
 const unit = " T"
 switch {
 case pOk && wOk:
 fmt.Fprintf(fs, "%*.*"+string(c), pos(w-utf8.RuneCount([]byte(unit))), p, float64(m))
 case pOk:
 fmt.Fprintf(fs, "%.*"+string(c), p, float64(m))
 }
}

```

```

case wOk:
 fmt.Fprintf(fs, "%*" + string(c), pos(w-utf8.RuneCount([]byte(unit))), float64(m))
default:
 fmt.Fprintf(fs, "%" + string(c), float64(m))
}
fmt.Fprint(fs, unit)
default:
 fmt.Fprintf(fs, "%%!%c(%T=%g T)", c, m, float64(m))
}
}
graph{{EDGv{{EDGv{{EDGv{{EDGv{{EDGv{{EDGv{{EDGy}}}}}}}}}}}
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```

```

package testlapack

```

```

import (
 "testing"

 "golang.org/x/exp/rand"

 "gonum.org/v1/gonum/floats"
)

```

```

type Dlasv2er interface {
 Dlasv2(f, g, h float64) (ssmin, ssmax, snr, csr, snl, csl float64)
}

```

```

func Dlasv2Test(t *testing.T, impl Dlasv2er) {
 rnd := rand.New(rand.NewSource(1))
 for i := 0; i < 100; i++ {
 f := rnd.NormFloat64()
 g := rnd.NormFloat64()
 h := rnd.NormFloat64()

 ssmin, ssmax, snr, csr, snl, csl := impl.Dlasv2(f, g, h)

 // tmp =
 // [csl snl] [f g]
 // [-snl csl] [0 h]
 tmp11 := csl * f
 tmp12 := csl*g + snl*h
 tmp21 := -snl * f
 tmp22 := -snl*g + csl*h
 // lhs =
 // [tmp11 tmp12] [csr -snr]
 // [tmp21 tmp22] [snr csr]
 }
}

```

```

ans11 := tmp11*csr + tmp12*snr
ans12 := tmp11*-snr + tmp12*csr
ans21 := tmp21*csr + tmp22*snr
ans22 := tmp21*-snr + tmp22*csr

lhs := []float64{ans11, ans12, ans21, ans22}
rhs
:= []float64{ssmax, 0, 0, ssmin}
if !floats.EqualApprox(rhs, lhs, 1e-12) {
 t.Errorf("SVD mismatch. f = %v, g = %v, h = %v.\nLHS: %v\nRHS: %v", f, g, h, lhs, rhs)
}
}
}
graph{"G{{{}}}"
graph{{{DiG2{DiG2}}}}
graph{{Stric_}Stric_}
graph{"\Zd{"\Z{"}\Zd\Z{\Zd\Z{"}
graph{{{{{SubGrapN{{{SubGrapN}}SubGrapN}}}}SubGrapN}}SubGrapT}}
digraph{B}
digraph{D}
graph{{DIGR}DIGR{{DIGR}DIGR}DIGR{{DIGR}DIGR{DIGR}{DIGR}}}
// Code generated by "go generate gonum.org/v1/gonum/unit; DO NOT EDIT.

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// license that can be found in the LICENSE file.

package unit

import (
 "errors"
 "fmt"
 "math"
 "unicode/utf8"
)

// Volume represents a volume in cubic metres.
type Volume float64

const Litre Volume = 1e-3

// Unit converts the Volume to a *Unit
func (v Volume) Unit() *Unit {
 return New(float64(v), Dimensions{
 LengthDim: 3,
 })
}

```

```

// Volume allows Volume to implement a Volumeer interface
func (v Volume) Volume() Volume {
 return v
}

// From converts the unit into the receiver. From returns an
// error if there is a mismatch in dimension
func (v *Volume) From(u Uniter) error {
 if !DimensionsMatch(u, Litre) {
 *v = Volume(math.NaN())
 return errors.New("Dimension mismatch")
 }
 *v = Volume(u.Unit().Value())
 return nil
}

func (v Volume) Format(fs fmt.State, c rune) {
 switch c {
 case 'v':
 if
 fs.Flag('#') {
 fmt.Fprintf(fs, "%T(%v)", v, float64(v))
 return
 }
 fallthrough
 case 'e', 'E', 'f', 'F', 'g', 'G':
 p, pOk := fs.Precision()
 w, wOk := fs.Width()
 const unit = " m^3"
 switch {
 case pOk && wOk:
 fmt.Fprintf(fs, "%*.*"+string(c), pos(w-utf8.RuneCount([]byte(unit))), p, float64(v))
 case pOk:
 fmt.Fprintf(fs, "%.*"+string(c), p, float64(v))
 case wOk:
 fmt.Fprintf(fs, "%*"+string(c), pos(w-utf8.RuneCount([]byte(unit))), float64(v))
 default:
 fmt.Fprintf(fs, "%"+string(c), float64(v))
 }
 fmt.Fprint(fs, unit)
 default:
 fmt.Fprintf(fs, "%%!%c(%T=%g m^3)", c, v, float64(v))
 }
}

graph{SubgE{SubgJ{SubgJ{SubgJ}}SubgJ}}
graph{{STV}STV{STV}{STV}STV{STV}STV}
graph{}graph{a}

```



```

graph{{{{edgh{{{edgeg}}edgeg}}}}edgeg}}
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package testblas

import (
 "fmt"
 "testing"

 "golang.org/x/exp/rand"

 "gonum.org/v1/gonum/blas"
)

type Zsyrker interface {
 Zsyrk(uplo blas.Uplo, trans blas.Transpose, n, k int, alpha complex128, a []complex128, lda int, beta complex128, c
 []complex128, ldc int)
}

func ZsyrkTest(t *testing.T, impl Zsyrker) {
 for _, uplo := range []blas.Uplo{blas.Upper, blas.Lower} {
 for _, trans := range []blas.Transpose{blas.NoTrans, blas.Trans} {
 name := uploString(uplo) + "-" + transString(trans)
 t.Run(name, func(t *testing.T) {
 for _, n := range []int{0, 1, 2, 3, 4, 5} {
 for _, k := range []int{0, 1, 2, 3, 4, 5, 7} {
 zsyrkTest(t, impl, uplo, trans, n, k)
 }
 }
 })
 }
 }
}

func zsyrkTest(t *testing.T, impl Zsyrker, uplo blas.Uplo, trans blas.Transpose, n, k int) {
 const tol = 1e-13

 rnd := rand.New(rand.NewSource(1))

 rowA,
 colA := n, k
 if trans == blas.Trans {
 rowA, colA = k, n
 }
 for _, lda := range []int{max(1, colA), colA + 2} {
 for _, ldc := range []int{max(1, n), n + 4} {

```

```

for _, alpha := range []complex128{0, 1, complex(0.7, -0.9)} {
for _, beta := range []complex128{0, 1, complex(1.3, -1.1)} {
 // Allocate the matrix A and fill it with random numbers.
 a := make([]complex128, rowA*lda)
 for i := range a {
 a[i] = rndComplex128(rnd)
 }
 // Create a copy of A for checking that
 // Zsyrk does not modify A.
 aCopy := make([]complex128, len(a))
 copy(aCopy, a)

 // Allocate the matrix C and fill it with random numbers.
 c := make([]complex128, n*ldc)
 for i := range c {
 c[i] = rndComplex128(rnd)
 }
 // Create a copy of C for checking that
 // Zsyrk does not modify its triangle
 // opposite to uplo.
 cCopy := make([]complex128, len(c))
 copy(cCopy, c)
 // Create a copy of C expanded
into a
 // full symmetric matrix for computing
 // the expected result using zmm.
 cSym := make([]complex128, len(c))
 copy(cSym, c)
 if uplo == blas.Upper {
 for i := 0; i < n-1; i++ {
 for j := i + 1; j < n; j++ {
 cSym[j*ldc+i] = cSym[i*ldc+j]
 }
 }
 } else {
 for i := 1; i < n; i++ {
 for j := 0; j < i; j++ {
 cSym[j*ldc+i] = cSym[i*ldc+j]
 }
 }
 }

 // Compute the expected result using an internal Zgemm implementation.
 var want []complex128
 if trans == blas.NoTrans {
 want = zmm(blas.NoTrans, blas.Trans, n, n, k, alpha, a, lda, a, lda, beta, cSym, ldc)
 } else {
 want = zmm(blas.Trans, blas.NoTrans, n, n, k, alpha, a, lda, a, lda, beta, cSym, ldc)
 }
}
}

```

```

}

// Compute the result using Zsyrk.
impl.Zsyrk(uplo, trans, n, k, alpha, a, lda, beta, c, ldc)

prefix := fmt.Sprintf("n=%v,k=%v,lda=%v,ldc=%v,alpha=%v,beta=%v", n, k, lda, ldc, alpha, beta)

if !zsame(a,
aCopy) {
 t.Errorf("%v: unexpected modification of A", prefix)
 continue
}
if uplo == blas.Upper && !zSameLowerTri(n, c, ldc, cCopy, ldc) {
 t.Errorf("%v: unexpected modification in lower triangle of C", prefix)
 continue
}
if uplo == blas.Lower && !zSameUpperTri(n, c, ldc, cCopy, ldc) {
 t.Errorf("%v: unexpected modification in upper triangle of C", prefix)
 continue
}

// Expand C into a full symmetric matrix
// for comparison with the result from zmm.
if uplo == blas.Upper {
 for i := 0; i < n-1; i++ {
 for j := i + 1; j < n; j++ {
 c[j*ldc+i] = c[i*ldc+j]
 }
 }
} else {
 for i := 1; i < n; i++ {
 for j := 0; j < i; j++ {
 c[j*ldc+i] = c[i*ldc+j]
 }
 }
}
if !zEqualApprox(c, want, tol) {
 t.Errorf("%v: unexpected result", prefix)
}
}
}
}
}
digraph{e[l=<<D><D><D><D><R><E>>]}
graph{{Digp{Digp{Digp}}Digp}}
graph{{SubGrt}{SubGrt}}

```

```

graph{{DiGrap}{{{{{DiGrap}}}}DiGrap}{{{{{DiGrap}DiGrap}DiGrap}{{{DiGrap}DiGrap}DiGrap}{{{DiGrap}
p}DiGrap}{{{DiGrap}DiGrap}DiGrap}{{""DiGrap}}}DiGrap}DiGrap}
graph{SubgE{SubgJ}{SubgJ}}
graph{{SubG}{SubG}{SubG}{SubG}SubG}{SubG{{SubG}{SubG}SubG}{{}}}
graph{<NNNN>}

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// license that can be found in the LICENSE file.

package testlapack

import (
 "fmt"
 "math"
 "testing"
)

type Dlae2er interface {
 Dlae2(a, b, c float64) (rt1, rt2 float64)
}

func Dlae2Test(t *testing.T, impl Dlae2er) {
 for _, test := range []struct {
 a, b, c float64
 }{
 {-10, 5, 3},
 {3, 5, -10},
 {0, 3, 0},
 {1, 3, 1},
 {1, -3, 1},
 {5, 0, 3},
 {3, 0, -5},
 {1, 3, 1.02},
 {1.02, 3, 1},
 {1, -3, -9},
 } {
 a := test.a
 b := test.b
 c := test.c
 rt1, rt2 := impl.Dlae2(a, b, c)

 errStr := fmt.Sprintf("a = %v, b = %v, c = %v", a, b, c)
 // Check if rt1 and rt2 are eigenvalues by checking if det(a - I) = 0
 a1 := a - rt1
 c1 := c - rt1
 det := a1*c1 - b*b
 if math.Abs(det) > 1e-10 {
 t.Errorf("First eigenvalue mismatch. %s. Det = %v", errStr, det)
 }
 }
}

```

```

}

a2 := a - rt2
c2 := c - rt2
det = a2*c2 - b*b
if math.Abs(det) > 1e-10 {
 t.Errorf("Second
eigenvalue mismatch. %s. Det = %v", errStr, det)
}
}
}

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package hyperdual

import "math"

// Sinh returns the hyperbolic sine of d.
//
// Special cases are:
// Sinh(0) = (0+N+N0)
// Sinh(Inf) = Inf
// Sinh(NaN) = NaN
func Sinh(d Number) Number {
 if d.Real == 0 {
 return Number{
 Real: d.Real,
 E1mag: d.E1mag,
 E2mag: d.E1mag,
 E1E2mag: d.Real,
 }
 }
 if math.IsInf(d.Real, 0) {
 return Number{
 Real: d.Real,
 E1mag: math.Inf(1),
 E2mag: math.Inf(1),
 E1E2mag: d.Real,
 }
 }
 fn := math.Sinh(d.Real)
 deriv := math.Cosh(d.Real)
 return Number{
 Real: fn,
 E1mag: deriv * d.E1mag,
 E2mag: deriv * d.E2mag,
 }
}

```

```

 E1E2mag: deriv*d.E1E2mag + fn*d.E1mag*d.E2mag,
 }
}

// Cosh returns the hyperbolic cosine of d.
//
// Special cases are:
// Cosh(0) = 1
// Cosh(Inf) = +Inf
// Cosh(NaN) = NaN
func Cosh(d Number) Number {
 if math.IsInf(d.Real, 0) {
 return
 Number{
 Real: math.Inf(1),
 E1mag: d.Real,
 E2mag: d.Real,
 E1E2mag: math.Inf(1),
 }
 }
 fn := math.Cosh(d.Real)
 deriv := math.Sinh(d.Real)
 return Number{
 Real: fn,
 E1mag: deriv * d.E1mag,
 E2mag: deriv * d.E2mag,
 E1E2mag: deriv*d.E1E2mag + fn*d.E1mag*d.E2mag,
 }
}

```

```

// Tanh returns the hyperbolic tangent of d.
//
// Special cases are:
// Tanh(0) = (0+N+N0)
// Tanh(Inf) = (1+0+00)
// Tanh(NaN) = NaN
func Tanh(d Number) Number {
 switch d.Real {
 case 0:
 return Number{
 Real: d.Real,
 E1mag: d.E1mag,
 E2mag: d.E2mag,
 E1E2mag: -d.Real,
 }
 case math.Inf(1):
 return Number{
 Real: 1,

```

```

 E1mag: 0,
 E2mag: 0,
 E1E2mag: negZero,
 }
case math.Inf(-1):
return Number{
 Real: -1,
 E1mag: 0,
 E2mag: 0,
 E1E2mag: 0,
}
}
fn := math.Tanh(d.Real)
deriv := 1 - fn*fn
return Number{
 Real: fn,
 E1mag: deriv * d.E1mag,
 E2mag: deriv * d.E2mag,
 E1E2mag: deriv*d.E1E2mag - d.E1mag*d.E2mag*(2*fn*deriv),
}
}

//
Asinh returns the inverse hyperbolic sine of d.
//
// Special cases are:
// Asinh(0) = (0+N+N0)
// Asinh(Inf) = Inf
// Asinh(NaN) = NaN
func Asinh(d Number) Number {
if d.Real == 0 {
 return Number{
 Real: d.Real,
 E1mag: d.E1mag,
 E2mag: d.E2mag,
 E1E2mag: -d.Real,
 }
}
fn := math.Asinh(d.Real)
deriv1 := d.Real*d.Real + 1
deriv := 1 / math.Sqrt(deriv1)
return Number{
 Real: fn,
 E1mag: deriv * d.E1mag,
 E2mag: deriv * d.E2mag,
 E1E2mag: deriv*d.E1E2mag + d.E1mag*d.E2mag*(-d.Real*(deriv/deriv1)),
}
}

```

```

// Acosh returns the inverse hyperbolic cosine of d.
//
// Special cases are:
// Acosh(+Inf) = +Inf
// Acosh(1) = (0+Inf+Inf-Inf)
// Acosh(x) = NaN if x < 1
// Acosh(NaN) = NaN
func Acosh(d Number) Number {
 if d.Real <= 1 {
 if d.Real == 1 {
 return Number{
 Real: 0,
 E1mag: math.Inf(1),
 E2mag: math.Inf(1),
 E1E2mag: math.Inf(-1),
 }
 }
 return Number{
 Real: math.NaN(),
 E1mag: math.NaN(),
 E2mag: math.NaN(),
 E1E2mag:
 math.NaN(),
 }
 }
 fn := math.Acosh(d.Real)
 deriv1 := d.Real*d.Real - 1
 deriv := 1 / math.Sqrt(deriv1)
 return Number{
 Real: fn,
 E1mag: deriv * d.E1mag,
 E2mag: deriv * d.E2mag,
 E1E2mag: deriv*d.E1E2mag + d.E1mag*d.E2mag*(-d.Real*(deriv/deriv1)),
 }
}

```

```

// Atanh returns the inverse hyperbolic tangent of d.
//
// Special cases are:
// Atanh(1) = +Inf
// Atanh(0) = (0+N+N0)
// Atanh(-1) = -Inf
// Atanh(x) = NaN if x < -1 or x > 1
// Atanh(NaN) = NaN
func Atanh(d Number) Number {
 if d.Real == 0 {
 return Number{

```



```

Real: d.Real,
E1mag: d.E1mag,
E2mag: d.E2mag,
E1E2mag: d.Real,
}
}
if math.Abs(d.Real) == 1 {
return Number{
Real: math.Inf(int(d.Real)),
E1mag: math.NaN(),
E2mag: math.NaN(),
E1E2mag: math.Inf(int(d.Real)),
}
}
fn := math.Atanh(d.Real)
deriv1 := 1 - d.Real*d.Real
deriv := 1 / deriv1
return Number{
Real: fn,
E1mag: deriv * d.E1mag,
E2mag: deriv * d.E2mag,
E1E2mag: deriv*d.E1E2mag +
d.E1mag*d.E2mag*(2*d.Real/(deriv1*deriv1)),
}
}

DOUBLE PRECISION FUNCTION MYMIN(A, B)
DOUBLE PRECISION A, B
MYMIN = DMIN1(A,B)
RETURN
END

graph{{{g{l{f{f}}}}{f}}{g{f{f}}}{f}}{g{{r{x{i}{r}{8u{i}}r}}}{r}{5}}{r{r{r{r}}}}}
}}{p{p}}p}}
graph{{{dig{dig}}dig{dig}}}}}
The MIT License (MIT)

```

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```
graph{{SUBGRA}}
```

```
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```

```
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```

```
// license that can be found in the LICENSE file.
```

```
package vptree_test
```

```
import (
```

```
 "fmt"
```

```
 "log"
```

```
 "math"
```

```
 "gonum.org/v1/gonum/spatial/vptree"
```

```
)
```

```
func Example_accessiblePublicTransport() {
```

```
 // Construct a vp tree of train station locations
```

```
 // to identify accessible public transport for the
```

```
 // elderly.
```

```
 t, err := vptree.New(stations, 5, nil)
```

```
 if err != nil {
```

```
 log.Fatal(err)
```

```
 }
```

```
 // Residence.
```

```
 q := place{lat: 51.501476, lon: -0.140634}
```

```
 var keep vptree.Keeper
```

```
 // Find all stations within 0.75 of the residence.
```

```
 keep = vptree.NewDistKeeper(0.75)
```

```
 t.NearestSet(keep, q)
```

```
 fmt.Println(`Stations within 750 m of 51.501476N 0.140634W.`)
```

```
 for _, c := range keep.(*vptree.DistKeeper).Heap {
```

```
 p := c.Comparable.(place)
```

```
 fmt.Printf("%s: %0.3f km\n", p.name, p.Distance(q))
```

```
 }
```

```
 fmt.Println()
```

```
 // Find the five closest stations to the residence.
```

```

keep = vptree.NewNKeeper(5)
t.NearestSet(keep,
q)

fmt.Println(`5 closest stations to 51.501476N 0.140634W.`)
for _, c := range keep.(*vptree.NKeeper).Heap {
 p := c.Comparable.(place)
 fmt.Printf("%s: %0.3f km\n", p.name, p.Distance(q))
}

// Output:
//
// Stations within 750 m of 51.501476N 0.140634W.
// St. James's Park: 0.545 km
// Green Park: 0.600 km
// Victoria: 0.621 km
//
// 5 closest stations to 51.501476N 0.140634W.
// St. James's Park: 0.545 km
// Green Park: 0.600 km
// Victoria: 0.621 km
// Hyde Park Corner: 0.846 km
// Picadilly Circus: 1.027 km
}

// stations is a list of railways stations.
var stations = []vptree.Comparable{
 place{name: "Bond Street", lat: 51.5142, lon: -0.1494},
 place{name: "Charing Cross", lat: 51.508, lon: -0.1247},
 place{name: "Covent Garden", lat: 51.5129, lon: -0.1243},
 place{name: "Embankment", lat: 51.5074, lon: -0.1223},
 place{name: "Green Park", lat: 51.5067, lon: -0.1428},
 place{name: "Hyde Park Corner", lat: 51.5027, lon: -0.1527},
 place{name: "Leicester Square",
lat: 51.5113, lon: -0.1281},
 place{name: "Marble Arch", lat: 51.5136, lon: -0.1586},
 place{name: "Oxford Circus", lat: 51.515, lon: -0.1415},
 place{name: "Picadilly Circus", lat: 51.5098, lon: -0.1342},
 place{name: "Pimlico", lat: 51.4893, lon: -0.1334},
 place{name: "Sloane Square", lat: 51.4924, lon: -0.1565},
 place{name: "South Kensington", lat: 51.4941, lon: -0.1738},
 place{name: "St. James's Park", lat: 51.4994, lon: -0.1335},
 place{name: "Temple", lat: 51.5111, lon: -0.1141},
 place{name: "Tottenham Court Road", lat: 51.5165, lon: -0.131},
 place{name: "Vauxhall", lat: 51.4861, lon: -0.1253},
 place{name: "Victoria", lat: 51.4965, lon: -0.1447},
 place{name: "Waterloo", lat: 51.5036, lon: -0.1143},
 place{name: "Westminster", lat: 51.501, lon: -0.1254},

```

```

}

// place is a vptree.Comparable implementations.
type place struct {
 name string
 lat, lon float64
}

// Distance returns the distance between the receiver and c.
func (p place) Distance(c vptree.Comparable)
float64 {
 q := c.(place)
 return haversine(p.lat, p.lon, q.lat, q.lon)
}

// haversine returns the distance between two geographic coordinates.
func haversine(lat1, lon1, lat2, lon2 float64) float64 {
 const r = 6371 // km
 sdLat := math.Sin(radians(lat2-lat1) / 2)
 sdLon := math.Sin(radians(lon2-lon1) / 2)
 a := sdLat*sdLat + math.Cos(radians(lat1))*math.Cos(radians(lat2))*sdLon*sdLon
 d := 2 * r * math.Asin(math.Sqrt(a))
 return d // km
}

func radians(d float64) float64 {
 return d * math.Pi / 180
}
graph{GRAP0{GRAP1}}
graph{Edg{Edg}}
graph{{s_}{s_}{s_}{s_}{s_}{s_}{s_}{s_}{s_}{s_}}
graph{{grap5}grap5{grap5}grap5}
graph{{{ed8}ed8}ed0}{ed0}{ed8}ed0}
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package testlapack

import (
 "math"
 "testing"

 "golang.org/x/exp/rand"

 "gonum.org/v1/gonum/floats"
)

```

```

type Dgebrdr interface {
 Dgebrd(m, n int, a []float64, lda int, d, e, tauQ, tauP, work []float64, lwork int)
 Dgebd2er
}

```

```

func DgebrdTest(t *testing.T, impl Dgebrdr) {

```

```

 rnd := rand.New(rand.NewSource(1))

```

```

 for _, test := range []struct {

```

```

 m, n, lda int

```

```

 }{

```

```

 {100, 100, 0},

```

```

 {100, 150, 0},

```

```

 {150, 100, 0},

```

```

 {100, 100, 200},

```

```

 {100, 150, 200},

```

```

 {150, 100, 200},

```

```

 {300, 300, 0},

```

```

 {300, 400, 0},

```

```

 {400, 300, 0},

```

```

 {300, 300, 500},

```

```

 {300, 400, 500},

```

```

 {300, 400, 500},

```

```

 } {

```

```

 m := test.m

```

```

 n := test.n

```

```

 lda := test.lda

```

```

 if lda == 0 {

```

```

 lda = n

```

```

 }

```

```

 minmn := min(m, n)

```

```

 a := make([]float64, m*lda)

```

```

 for i := range a {

```

```

 a[i] = rnd.NormFloat64()

```

```

 }

```

```

 d := make([]float64, minmn)

```

```

 e := make([]float64, minmn-1)

```

```

 tauP

```

```

:= make([]float64, minmn)

```

```

 tauQ := make([]float64, minmn)

```

```

 work := make([]float64, max(m, n))

```

```

 for i := range work {

```

```

 work[i] = math.NaN()

```

```

 }

```

```

 // Store a.

```

```

 aCopy := make([]float64, len(a))

```

```

copy(aCopy, a)

// Compute the true answer with the unblocked algorithm.
impl.Dgebd2(m, n, a, lda, d, e, tauQ, tauP, work)
aAns := make([]float64, len(a))
copy(aAns, a)
dAns := make([]float64, len(d))
copy(dAns, d)
eAns := make([]float64, len(e))
copy(eAns, e)
tauQAns := make([]float64, len(tauQ))
copy(tauQAns, tauQ)
tauPAns := make([]float64, len(tauP))
copy(tauPAns, tauP)

// Test with optimal work.
lwork := -1
copy(a, aCopy)
impl.Dgebrd(m, n, a, lda, d, e, tauQ, tauP, work, lwork)
work = make([]float64, int(work[0]))
lwork = len(work)
for i := range work {
 work[i] = math.NaN()
}
for i := range d {
 d[i] = math.NaN()
}
for i := range e {
 e[i] = math.NaN()
}
for i := range tauQ {
 tauQ[i] = math.NaN()
}
for i := range tauP {
 tauP[i] = math.NaN()
}
impl.Dgebrd(m, n, a, lda, d, e, tauQ, tauP, work, lwork)

// Test answers
if !floats.EqualApprox(a, aAns, 1e-10) {
 t.Errorf("a mismatch")
}
if !floats.EqualApprox(d, dAns, 1e-10) {
 t.Errorf("d mismatch")
}
if !floats.EqualApprox(e, eAns, 1e-10) {
 t.Errorf("e mismatch")
}

```



```
digraph {
 A []
}

graph{Subgrapu}

graph{Str{}Str{Str}{Str{}Str{Str}}}

graph{{{suG}}suG}suG

graph{DigraG{{DigraG{DigraG}DigraG{DigraG}}}}

digraph{h[l!="=d"]}["l=" iri"]["l=" iri"]["l=" iri"]["l=" iri"]e->{}->s->a->s->r[e=d]}

graph{STRI{STRI}STRI}

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```



```

as := 1 + fhmin/fhmax
at := (fhmax - fhmin) / fhmax
c := 1 / (math.Sqrt(1+(as*au)*(as*au)) + math.Sqrt(1+(at*au)*(at*au)))
return 2 * (fhmin * c) * au, ga / (c + c)
}
graph{{Di_}{Di_}Di_{Di_}Di_}
Graph{{{{{{{{{{subgrT}}}}}}subgrK}}}}
graph{{noe not not}noe not}
// Copyright 2017 The Gonum Authors. All rights reserved.
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// Package functions provides objective functions for testing optimization
// algorithms.
//
// We encourage outside contributions of additional test functions that exhibit
// properties not already covered in the testing suite or that have
// significance due to prior use as benchmark cases.
package functions // import "gonum.org/v1/gonum/optimize/functions"

const (
 badInputDim = "functions: wrong input dimension"
)
Graph{Grap[]Grap[]Grap[]Grap[]Grap}
graph{{nod_}nod_{ }nod_{ }nod_{nod_}}
graph{{<<=>=<=>=>}<=>=>}
graph{{{{DI}}DI{DI}DI}DI{DI}}
graph{g{{g}g}}
graph{{{{Strictc}}Strictc}{Strictc}Strictc{ }Strictc{Strictc}}
graph{{{{GRAPHe}GRAPHe{GRAPHe}}GRAPHe{GRAPHe}}
graph{EDA{EDA{EDA}EDA}{EDA{EDA}EDA}}
graph{{{{Digrap}Digrap}Digrap}
graph{STRIC}
graph{STRICU{STRIC{STRICU}{STRICU{STRICU}}}}
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package testlapack

import (
 "fmt"
 "testing"

 "gonum.org/v1/gonum/blas"
 "gonum.org/v1/gonum/blas/blas64"
)

```

```

type Dlaqpser interface {
 Dlapmter
 Dlaqps(m, n, offset, nb int, a []float64, lda int, jpvt []int, tau, vn1, vn2, auxv, f []float64, ldf int) (kb int)
}

```

```

func DlaqpsTest(t *testing.T, impl Dlaqpser) {
 for ti, test := range []struct {
 m, n, nb, offset int
 }{
 {m: 4, n: 3, nb: 2, offset: 0},
 {m: 4, n: 3, nb: 1, offset: 2},
 {m: 3, n: 4, nb: 2, offset: 0},
 {m: 3, n: 4, nb: 1, offset: 2},
 {m: 8, n: 3, nb: 2, offset: 0},
 {m: 8, n: 3, nb: 1, offset: 4},
 {m: 3, n: 8, nb: 2, offset: 0},
 {m: 3, n: 8, nb: 1, offset: 1},
 {m: 10, n: 10, nb: 3, offset: 0},
 {m: 10, n: 10, nb: 2, offset: 5},
 } {
 m := test.m
 n := test.n
 jpiv := make([]int, n)

 for _, extra := range []int{0, 11} {
 a := zeros(m, n, n+extra)
 c
 := 1
 for i := 0; i < m; i++ {
 for j := 0; j < n; j++ {
 a.Data[i*a.Stride+j] = float64(c)
 c++
 }
 }
 aCopy := cloneGeneral(a)
 for j := range jpiv {
 jpiv[j] = j
 }

 tau := make([]float64, n)
 vn1 := columnNorms(m, n, a.Data, a.Stride)
 vn2 := columnNorms(m, n, a.Data, a.Stride)
 auxv := make([]float64, test.nb)
 f := zeros(test.n, test.nb, n)

 kb := impl.Dlaqps(m, n, test.offset, test.nb, a.Data, a.Stride, jpiv, tau, vn1, vn2, auxv, f.Data, f.Stride)

 prefix := fmt.Sprintf("Case %v (offset=%d,m=%v,n=%v,extra=%v)", ti, test.offset, m, n, extra)

```

```

if !generalOutsideAllNaN(a) {
 t.Errorf("%v: out-of-range write to A", prefix)
}

if test.offset == m {
 continue
}

mo := m - test.offset
q := constructQ("QR", mo, kb, a.Data[test.offset*a.Stride:], a.Stride, tau)

// Check that Q is orthogonal.
if !isOrthogonal(q) {
 t.Errorf("Case %v, Q not orthogonal", ti)
}

// Check that A * P = Q * R
r :=
blas64.General{
 Rows: mo,
 Cols: kb,
 Stride: kb,
 Data: make([]float64, mo*kb),
}
for i := 0; i < mo; i++ {
 for j := 0; j < kb; j++ {
 r.Data[i*kb+j] = a.Data[(test.offset+i)*a.Stride+j]
 }
}
got := nanGeneral(mo, kb, kb)
blas64.Gemm(blas.NoTrans, blas.NoTrans, 1, q, r, 0, got)

want := aCopy
impl.Dlapmt(true, want.Rows, want.Cols, want.Data, want.Stride, jpiv)
want.Rows = mo
want.Cols = kb
want.Data = want.Data[test.offset*want.Stride:]
if !equalApproxGeneral(got, want, 1e-12) {
 t.Errorf("Case %v, Q*R != A*P\nQ*R=%v\nA*P=%v", ti, got, want)
}
}
}
}
}
*DECK D1MACH
 DOUBLE PRECISION FUNCTION D1MACH(I)
C***BEGIN PROLOGUE D1MACH
C***DATE WRITTEN 750101 (YYMMDD)
C***REVISION DATE 890213 (YYMMDD)

```

C\*\*\*CATEGORY NO. R1

C\*\*\*KEYWORDS LIBRARY=SLATEC,TYPE=DOUBLE PRECISION(R1MACH-S D1MACH-D),

C MACHINE CONSTANTS

C\*\*\*AUTHOR FOX, P. A., (BELL LABS)

C HALL, A. D., (BELL LABS)

C SCHRYER, N. L., (BELL LABS)

C\*\*\*PURPOSE Returns double precision machine dependent constants

C\*\*\*DESCRIPTION

C

C D1MACH can be used to obtain machine-dependent parameters

C for the local machine environment. It is a function

C subprogram with one (input) argument, and can be called

C as follows, for example

C

C D = D1MACH(I)

C

C where I=1,...,5. The (output) value of D above is

C determined by the (input) value of I. The results for

C various values of I are discussed below.

C

C D1MACH( 1) = B\*\*(EMIN-1), the smallest positive magnitude.

C D1MACH( 2) = B\*\*EMAX\*(1 - B\*\*(-T)), the largest magnitude.

C

C D1MACH( 3) = B\*\*(-T), the smallest relative spacing.

C D1MACH( 4) = B\*\*(1-T), the largest relative spacing.

C D1MACH( 5) = LOG10(B)

C

C Assume double precision numbers are represented in the T-digit,

C base-B form

C

C  $\text{sign}(B^{**E}) * ( (X(1)/B) + \dots + (X(T)/B^{**T}) )$

C

C where 0 .LE. X(I) .LT. B for I=1,...,T, 0 .LT. X(1), and

C EMIN .LE. E .LE. EMAX.

C

C The values of B, T, EMIN and EMAX are provided in I1MACH as

C follows:

C I1MACH(10) = B, the base.

C I1MACH(14) = T, the number of base-B digits.

C I1MACH(15) = EMIN, the smallest exponent E.

C I1MACH(16) = EMAX, the largest exponent E.

C

C To alter this function for a particular environment,

C the desired set of DATA statements should be activated by

C removing the C from column 1. Also, the values of

C D1MACH(1) - D1MACH(4) should be checked for consistency

C with the local operating system.

C

```

C***REFERENCES FOX P.A., HALL A.D., SCHRYER N.L.,*FRAMEWORK FOR A
C PORTABLE LIBRARY*,
ACM TRANSACTIONS ON MATHEMATICAL
C SOFTWARE, VOL. 4, NO. 2, JUNE 1978, PP. 177-188.
C***ROUTINES CALLED XERROR
C***END PROLOGUE D1MACH
C
C INTEGER SMALL(4)
C INTEGER LARGE(4)
C INTEGER RIGHT(4)
C INTEGER DIVER(4)
C INTEGER LOG10(4)
C
C DOUBLE PRECISION DMACH(5)
C SAVE DMACH
C
C EQUIVALENCE (DMACH(1),SMALL(1))
C EQUIVALENCE (DMACH(2),LARGE(1))
C EQUIVALENCE (DMACH(3),RIGHT(1))
C EQUIVALENCE (DMACH(4),DIVER(1))
C EQUIVALENCE (DMACH(5),LOG10(1))
C
C MACHINE CONSTANTS FOR THE IBM PC
C ASSUMES THAT ALL ARITHMETIC IS DONE IN DOUBLE PRECISION
C ON 8088, I.E., NOT IN 80 BIT FORM FOR THE 8087.
C
C DATA DMACH(1) / 2.23D-308 /
C DATA SMALL(1),SMALL(2) / 2002288515, 1050897 /
C DATA DMACH(2) / 1.79D-308 /
C DATA LARGE(1),LARGE(2) / 1487780761, 2146426097 /
C DATA DMACH(3) / 1.11D-16 /
C DATA RIGHT(1),RIGHT(2) / -1209488034, 1017118298 /
C DATA DMACH(4) / 2.22D-16 /
C DATA
C DIVER(1),DIVER(2) / -1209488034, 1018166874 /
C DATA DMACH(5) / 0.3010299956639812 /
C DATA LOG10(1),LOG10(2) / 1352628735, 1070810131 /
C
C
C***FIRST EXECUTABLE STATEMENT D1MACH
C IF (I.LT. 1 .OR. I.GT. 5)
C 1 CALL XERROR ('D1MACH -- I OUT OF BOUNDS', 25, 1, 2)
C
C D1MACH = DMACH(I)
C RETURN
C
C END

```

```

graph{Edv{Edv""Edn""Eds}Edn{Edv""Edn""Eds}Edn""Eds}
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package gonum

import (
 "math"

 "gonum.org/v1/gonum/blas"
 "gonum.org/v1/gonum/blas/blas64"
)

// Dpocon estimates the reciprocal of the condition number of a positive-definite
// matrix A given the Cholesky decomposition of A. The condition number computed
// is based on the 1-norm and the -norm.
//
// anorm is the 1-norm and the -norm of the original matrix A.
//
// work is a temporary data slice of length at least 3*n and Dpocon will panic otherwise.
//
// iwork is a temporary data slice of length at least n and Dpocon will panic otherwise.
func (impl Implementation) Dpocon(uplo blas.Uplo, n int, a []float64, lda int, anorm float64, work []float64, iwork
[int]) float64 {
 switch {
 case uplo != blas.Upper && uplo != blas.Lower:
 panic(badUplo)
 case n < 0:
 panic(nLT0)
 case lda < max(1, n):
 panic(badLdA)
 case anorm
 < 0:
 panic(negANorm)
 }

 // Quick return if possible.
 if n == 0 {
 return 1
 }

 switch {
 case len(a) < (n-1)*lda+n:
 panic(shortA)
 case len(work) < 3*n:
 panic(shortWork)
 case len(iwork) < n:

```

```

panic(shortIWork)
}

if anorm == 0 {
 return 0
}

bi := blas64.Implementation()

var (
 smlnum = dlamchS
 rcond float64
 sl, su float64
 normin bool
 ainvm float64
 kase int
 isave [3]int
)
for {
 ainvm, kase = impl.Dlacn2(n, work[n:], work, iwork, ainvm, kase, &isave)
 if kase == 0 {
 if ainvm != 0 {
 rcond = (1 / ainvm) / anorm
 }
 return rcond
 }
 if uplo == blas.Upper {
 sl = impl.Dlatrs(blas.Upper, blas.Trans, blas.NonUnit, normin, n, a, lda, work, work[2*n:])
 normin = true
 su = impl.Dlatrs(blas.Upper, blas.NoTrans, blas.NonUnit, normin, n, a, lda, work, work[2*n:])
 } else {
 sl = impl.Dlatrs(blas.Lower, blas.NoTrans, blas.NonUnit, normin, n, a, lda, work, work[2*n:])
 normin = true
 su = impl.Dlatrs(blas.Lower, blas.Trans, blas.NonUnit,
normin, n, a, lda, work, work[2*n:])
 }
 scale := sl * su
 if scale != 1 {
 ix := bi.Idamax(n, work, 1)
 if scale == 0 || scale < math.Abs(work[ix])*smlnum {
 return rcond
 }
 impl.Drscl(n, scale, work, 1)
 }
}
}
graph{STRU{STRW{STRW}STRW{STRW}STRW}}

```

```

graph{{d}}
graph{strh{{{strd}}}}
// Copyright 2017 The Gonum Authors. All rights reserved.
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// license that can be found in the LICENSE file.

package distuv_test

import (
 "fmt"

 "gonum.org/v1/gonum/stat"
 "gonum.org/v1/gonum/stat/distuv"
)

func ExampleNormal() {
 // Create a normal distribution
 dist := distuv.Normal{
 Mu: 2,
 Sigma: 5,
 }

 data := make([]float64, 1e5)

 // Draw some random values from the standard normal distribution
 for i := range data {
 data[i] = dist.Rand()
 }

 mean, std := stat.MeanStdDev(data, nil)
 meanErr := stat.StdErr(std, float64(len(data)))

 fmt.Printf("mean= %1.1f %0.1v\n", mean, meanErr)

 // Output:
 // mean= 2.0 0.02
}
// Copyright 2019 The Gonum Authors. All rights reserved.
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// +build noasm appengine safe

package layout

// Change the testdata path for calculations done without assembly kernels.
func init() {
 tag = "_noasm"
}

```



```

}
graph edl{{edn}edh{edn}edl}
graph{StR{StR}}
graph{N9{N9{N7}}}}
graph{{{{{n}}n{{{n}}n}}}}n}
digraph main {
// Node definitions.
2 [label=entry];
9;
102;
14;
101;
19;
100;
24;
99;
29;
98;
34;
97;
39;
96;
44;
95;
49;
94;
54;
93;
59;
92;
64;
91;
69;
90;
74;
89;
79;
88;
84;
87;

// Edge definitions.
2 -> 9 [label=true];
2 -> 102 [label=false];
9 -> 14 [label=true];
9 -> 101 [label=false];
14 -> 19 [label=true];
14 -> 100 [label=false];

```

```

101 -> 102;
19 -> 24 [label=true];
19 -> 99 [label=false];
100 -> 101;
24 -> 29 [label=true];
24 -> 98 [label=false];
99 -> 100;
29 -> 34 [label=true];
29 -> 97 [label=false];
98 -> 99;
34 -> 39 [label=true];
34 -> 96 [label=false];
97 -> 98;
39 -> 44 [label=true];
39 -> 95 [label=false];
96 -> 97;
44 -> 49 [label=true];
44 -> 94 [label=false];
95 -> 96;
49 -> 54 [label=true];
49 -> 93 [label=false];
94 -> 95;
54 -> 59 [label=true];
54 -> 92 [label=false];
93 -> 94;
59 -> 64 [label=true];
59 -> 91 [label=false];
92 -> 93;
64 -> 69 [label=true];
64 -> 90 [label=false];
91 -> 92;
69
-> 74 [label=true];
69 -> 89 [label=false];
90 -> 91;
74 -> 79 [label=true];
74 -> 88 [label=false];
89 -> 90;
79 -> 84 [label=true];
79 -> 87 [label=false];
88 -> 89;
84 -> 87;
87 -> 88;
}
graph{GRAP0}
graph{{diGrap}}
This source code was written by the Go contributors.
The master list of contributors is in the main Go distribution,

```

```
visible at http://tip.golang.org/CONTRIBUTORS.
graph{{EDG}}
/** github.com/losinggeneration/geojson@v0.0.0-20160627001320-09bc167a825e **/

{{Types "CC-BY-SA-4.0"}}
```

Unit test JSON examples:

Most unit test examples are taken from the GeoJSON spec Rev 1.0 at

<http://geojson.org/geojson-spec.html>

Authors Howard Butler (Hobu Inc.), Martin Daly (Cadcorp), Allan Doyle (MIT), Sean Gillies (UNC-Chapel Hill), Tim Schaub (OpenGeo), Christopher Schmidt (MetaCarta)

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Unit test JSON examples are thus licensed under a

Creative Commons Attribution 3.0 United States License

<http://creativecommons.org/licenses/by/3.0/us/>

```
graph{eD""eD""eD""eD""eN}
Graph{{Ed_{Ed_{Ed_{Ed_}}}}}
graph{e[l=<V5>]}
graph{{{diGE{diGE}{diGE}{diGE}}}diGE}
graph{GRAPU{GRAPU}}
Contributing to Go
```

Go is an open source project.

It is the work of hundreds of contributors. We appreciate your help!

## Filing issues

When [filing an issue](<https://golang.org/issue/new>), make sure to answer these five questions:

1. What version of Go are you using (`go version`)?
2. What operating system and processor architecture are you using?
3. What did you do?
4. What did you expect to see?
5. What did you see instead?

General questions should go to the [golang-nuts mailing list](<https://groups.google.com/group/golang-nuts>) instead of the issue tracker.

The gophers there will answer or ask you to file an issue if you've tripped over a bug.

## Contributing code

Please read the [Contribution Guidelines](<https://golang.org/doc/contribute.html>) before sending patches.

Unless otherwise noted, the Go source files are distributed under the BSD-style license found in the LICENSE file.

```
graph{{NO{NO}}
graph{{{subgr}subgr}subgr}subgr}
/** github.com/ipld/go-ipld-adl-hamt@v0.0.0-20201125163904-25abfe77c0bc **/

{{Types "Apache-2.0 MIT"}}
```

This library is dual-licensed under either of Apache 2.0 or MIT terms:

- Apache-2.0 Software License: <https://www.apache.org/licenses/LICENSE-2.0>
- MIT Software License: <https://opensource.org/licenses/MIT>

Unless required by applicable law or agreed to in writing, software distributed under the terms listed in this notice is distributed on an "AS IS" BASIS, WITHOUT WARRANTIES OR CONDITIONS OF ANY KIND, either express or implied. See each License for the specific language governing permissions and limitations under that License.

```
<!-- SPDX-License-Identifier: Apache-2.0 OR MIT -->
`SPDX-License-Identifier: Apache-2.0 OR MIT`
graph{{{subgz{{subgu{subgu}}}}subgz{{subgu{subgu}}}}}
graph{{SUBGRAv}SUBGRAh{{SUBGRAv}SUBGRAa}}
package mem_test
```

```
import (
 "bytes"
 "fmt"
 "math/rand"
 "os"
 "sync"
 "testing"
 "unsafe"

 "github.com/smasher164/mem"
)
```

```
var szpage = os.Getpagesize()
```

```
type slice struct {
 addr unsafe.Pointer
 len int
 cap int
}
```

```
func errpanic(f func()) (err error) {
 defer func() {
 if r := recover(); r != nil {
 err = fmt.Errorf("%v", r)
 }
 }()
```

```

 }
}()
f()
return
}

```

```

func TestZero(t *testing.T) {
 p := mem.Alloc(0)
 if p != nil {
 t.Error("mem.Alloc(0) must return nil")
 }
 err := errpanic(func() { mem.Free(p) })
 if err != nil {
 t.Errorf("mem.Free(mem.Alloc(0)) panics: %v", err)
 }
}

```

```

func allocTester(t *testing.T) unsafe.Pointer {
 size := rand.Intn(szpage * (1 + rand.Intn(8)))
 p := mem.Alloc(uint(size))
 b1 := *(*[]byte)(unsafe.Pointer(&slice{p, size, size}))
 b2 := make([]byte, size)
 rand.Read(b2)
 if n := copy(b1, b2); n != size {
 t.Errorf("incorrect number of copied. want: %v, got: %v", size, n)
 }
 if bytes.Compare(b1, b2) != 0 {
 t.Errorf("original does not match allocated slice. want: %x, got: %x", b2, b1)
 }
 return p
}

```

```

func TestConsecutive(t *testing.T) {
 var allocs []unsafe.Pointer
 for i := 0; i < 50; i++ {
 allocs = append(allocs, allocTester(t))
 }
 for _, p := range allocs {
 p := p
 if err := errpanic(func() { mem.Free(p) }); err != nil {
 t.Errorf("mem.Free(%p) panics: %v", p, err)
 }
 }
}

```

```

func TestMixed(t *testing.T) {
 var allocs []unsafe.Pointer

```

```

for i := 0; i < 30; i++ {
 allocs = append(allocs, allocTester(t))
}
rand.Shuffle(len(allocs), func(i, j int) {
 allocs[i], allocs[j] = allocs[j], allocs[i]
})
for i := 30 - 1; i >= 10; i-- {
 p := allocs[i]
 if err := errpanic(func() { mem.Free(p) }); err != nil {
 t.Errorf("mem.Free(%p) panics: %v", p, err)
 }
 allocs = allocs[:i]
}
for i := 0; i < 20; i++ {
 allocs = append(allocs, allocTester(t))
}
for _, p := range allocs {
 p := p
 if err := errpanic(func() { mem.Free(p) }); err != nil {
 t.Errorf("mem.Free(%p) panics: %v", p, err)
 }
}
}

```

```

func TestConsecutiveConcurrent(t
*testing.T) {
 var wg sync.WaitGroup
 var allocs []unsafe.Pointer
 var m sync.Mutex
 for i := 0; i < 50; i++ {
 wg.Add(1)
 go func() {
 defer wg.Done()
 p := allocTester(t)
 m.Lock()
 allocs = append(allocs, p)
 m.Unlock()
 }()
 }
 wg.Wait()
 for _, p := range allocs {
 p := p
 wg.Add(1)
 go func() {
 defer wg.Done()
 if err := errpanic(func() { mem.Free(p) }); err != nil {
 t.Errorf("mem.Free(%p) panics: %v", p, err)
 }
 }
 }
}

```

```

 }()
}
wg.Wait()
}

```

```

func BenchmarkConsecutiveAlloc(b *testing.B) {
 b.ReportAllocs()
 b.StopTimer()
 allocs := make([]unsafe.Pointer, b.N)
 for i := 0; i < b.N; i++ {
 size := uint(rand.Intn(szpage * (1 + rand.Intn(8))))
 b.StartTimer()
 allocs[i] = mem.Alloc(size)
 b.StopTimer()
 }
 for _, p := range allocs {
 mem.Free(p)
 }
}

```

```

func BenchmarkConsecutiveFree(b *testing.B) {
 b.ReportAllocs()
 b.StopTimer()
 allocs := make([]unsafe.Pointer, b.N)
 for i := 0; i < b.N; i++ {
 size := uint(rand.Intn(szpage * (1 + rand.Intn(8))))
 allocs[i]
 = mem.Alloc(size)
 }
 b.StartTimer()
 for i := 0; i < b.N; i++ {
 mem.Free(allocs[i])
 }
}

graph{{{SubGra}}}SubGra}
#
graph{"
"#
}}
graph{DIR}{DIR}{DIR}
graph{{{DiGr2}{DiGr2}{DiGr2}{DiGr2}DiGr1}DiGr1}DiGr1}DiGr1}DiGr1}DiGr1}
graph{rr}rr}
graph{GRAPp{GRAPp{GRAPe}{GRAPp{GRAPe}}}}
graph{DiGrC{{DiGrC{{DiGrC}DiGrG}{DiGrC}}DiGrC}}
graph{NU{{NU}{NU{{NU}NU}}NU}{NU{{NU}NU}}}
graph{diGra{diGrap}diGrap}
graph{diG{diG{diG{di9}diG}}}

```





```

t := s1 - s2*s2 - 1
sum += t * t
}
t := x[1] - x[0]*x[0] - 1
sum += x[0]*x[0] + t*t
return sum
}

func (Watson) Grad(grad, x []float64) {
if len(x) != len(grad) {
panic("incorrect size of the gradient")
}

for i := range grad {
grad[i] = 0
}
for i := 1; i <= 29; i++ {
d1 := float64(i) / 29

d2 := 1.0
var s1 float64
for j := 1; j < len(x); j++ {
s1 += float64(j) * d2 * x[j]
d2 *= d1
}

d2 = 1.0
var s2 float64
for _, v := range x {
s2 += d2 * v
d2 *= d1
}

t := s1 - s2*s2 - 1
s3 := 2 * d1 * s2
d2 = 2 / d1
for j := range x {
grad[j] += d2 * (float64(j) - s3) * t
d2 *= d1
}
}
t := x[1] - x[0]*x[0] - 1
grad[0] += x[0] * (2 - 4*t)
grad[1] += 2 * t
}

func (Watson) Hess(hess mat.MutableSymmetric, x []float64) {
dim := len(x)

```

```

if dim != hess.Symmetric() {
 panic("incorrect size of the Hessian")
}

for j := 0; j < dim; j++ {
 for k
:= j; k < dim; k++ {
 hess.SetSym(j, k, 0)
 }
}
for i := 1; i <= 29; i++ {
 d1 := float64(i) / 29
 d2 := 1.0
 var s1 float64
 for j := 1; j < dim; j++ {
 s1 += float64(j) * d2 * x[j]
 d2 *= d1
 }

 d2 = 1.0
 var s2 float64
 for _, v := range x {
 s2 += d2 * v
 d2 *= d1
 }

 t := s1 - s2*s2 - 1
 s3 := 2 * d1 * s2
 d2 = 2 / d1
 th := 2 * d1 * d1 * t
 for j := 0; j < dim; j++ {
 v := float64(j) - s3
 d3 := 1 / d1
 for k := 0; k <= j; k++ {
 hess.SetSym(k, j, hess.At(k, j)+d2*d3*(v*(float64(k)-s3)-th))
 d3 *= d1
 }
 d2 *= d1
 }
}
t1 := x[1] - x[0]*x[0] - 1
hess.SetSym(0, 0, hess.At(0, 0)+8*x[0]*x[0]+2-4*t1)
hess.SetSym(0, 1, hess.At(0, 1)-4*x[0])
hess.SetSym(1, 1, hess.At(1, 1)+2)
}
graph{{SUBGRp}SUBGRp{SUBGRp}SUBGRp}}
graph{{subgrap_}{subgrap_}{subgrap_}{subgrap_}{subgrap_}{subgrap_}{subgrap_}}

```

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// license that can be found in the LICENSE file.

```
package iterator_test
```

```
import (
```

```
 "reflect"
```

```
 "testing"
```

```
 "gonum.org/v1/gonum/graph"
```

```
 "gonum.org/v1/gonum/graph/iterator"
```

```
 "gonum.org/v1/gonum/graph/simple"
```

```
)
```

```
type edge struct{ f, t int }
```

```
func (e edge) From() graph.Node { return simple.Node(e.f) }
```

```
func (e edge) To() graph.Node { return simple.Node(e.t) }
```

```
func (e edge) ReversedEdge() graph.Edge { return edge{f: e.t, t: e.f} }
```

```
var orderedEdgesTests = []struct {
```

```
 edges []graph.Edge
```

```
}{
```

```
 {edges: nil},
```

```
 {edges: []graph.Edge{edge{f: 1, t: 2}}},
```

```
 {edges: []graph.Edge{edge{f: 1, t: 2}, edge{f: 2, t: 3}, edge{f: 3, t: 4}, edge{f: 4, t: 5}}},
```

```
 {edges: []graph.Edge{edge{f: 5, t: 4}, edge{f: 4, t: 3}, edge{f: 3, t: 2}, edge{f: 2, t: 1}}},
```

```
}
```

```
func TestOrderedEdgesIterate(t *testing.T) {
```

```
 for _, test := range orderedEdgesTests {
```

```
 it := iterator.NewOrderedEdges(test.edges)
```

```
 for
```

```
 i := 0; i < 2; i++ {
```

```
 if it.Len() != len(test.edges) {
```

```
 t.Errorf("unexpected iterator length for round %d: got:%d want:%d", i, it.Len(), len(test.edges))
```

```
 }
```

```
 var got []graph.Edge
```

```
 for it.Next() {
```

```
 got = append(got, it.Edge())
```

```
 }
```

```
 want := test.edges
```

```
 if !reflect.DeepEqual(got, want) {
```

```
 t.Errorf("unexpected iterator output for round %d: got:%#v want:%#v", i, got, want)
```

```
 }
```

```
 it.Reset()
```

```
 }
```

```

}
}

func TestOrderedEdgesSlice(t *testing.T) {
 for _, test := range orderedEdgesTests {
 it := iterator.NewOrderedEdges(test.edges)
 for i := 0; i < 2; i++ {
 got := it.EdgeSlice()
 want := test.edges
 if !reflect.DeepEqual(got, want) {
 t.Errorf("unexpected iterator output for round %d: got:%#v want:%#v", i, got, want)
 }
 it.Reset()
 }
 }
}

type weightedEdge struct {
 f, t int
 w float64
}

func (e weightedEdge) From() graph.Node { return simple.Node(e.f) }
func (e weightedEdge) To() graph.Node { return simple.Node(e.t) }
func (e
 weightedEdge) ReversedEdge() graph.Edge { e.f, e.t = e.t, e.f; return e }
func (e weightedEdge) Weight() float64 { return e.w }

var orderedWeightedEdgesTests = []struct {
 edges []graph.WeightedEdge
}{
 {edges: nil},
 {edges: []graph.WeightedEdge{weightedEdge{f: 1, t: 2, w: 1}}},
 {edges: []graph.WeightedEdge{weightedEdge{f: 1, t: 2, w: 1}, weightedEdge{f: 2, t: 3, w: 2}, weightedEdge{f: 3, t:
4, w: 3}, weightedEdge{f: 4, t: 5, w: 4}}},
 {edges: []graph.WeightedEdge{weightedEdge{f: 5, t: 4, w: 4}, weightedEdge{f: 4, t: 3, w: 3}, weightedEdge{f: 3, t:
2, w: 2}, weightedEdge{f: 2, t: 1, w: 1}}},
}

func TestOrderedWeightedEdgesIterate(t *testing.T) {
 for _, test := range orderedWeightedEdgesTests {
 it := iterator.NewOrderedWeightedEdges(test.edges)
 for i := 0; i < 2; i++ {
 if it.Len() != len(test.edges) {
 t.Errorf("unexpected iterator length for round %d: got:%d want:%d", i, it.Len(), len(test.edges))
 }
 var got []graph.WeightedEdge
 for it.Next() {

```

```

 got
 = append(got, it.WeightedEdge())
 }
 want := test.edges
 if !reflect.DeepEqual(got, want) {
 t.Errorf("unexpected iterator output for round %d: got:%#v want:%#v", i, got, want)
 }
 it.Reset()
 }
 }
}

func TestOrderedWeightedEdgesSlice(t *testing.T) {
 for _, test := range orderedWeightedEdgesTests {
 it := iterator.NewOrderedWeightedEdges(test.edges)
 for i := 0; i < 2; i++ {
 got := it.WeightedEdgeSlice()
 want := test.edges
 if !reflect.DeepEqual(got, want) {
 t.Errorf("unexpected iterator output for round %d: got:%#v want:%#v", i, got, want)
 }
 it.Reset()
 }
 }
}

graph{{SUBG0{SUBG9}}}}
graph{{digraq}{digraq}{digraq}{digraq}}{digraq}}
graph{{GRAC}{GRAC}{GRAB}{GRAB}{GRAB}{GRAB}}}}
graph{{Nod{NOr{{NOr{Nod{NOr}}}}}}}
graph{{DiGraphg}}
graph{{SubG1}{SubG1}{SubG1}{SubG1}}
graph{<<><><><><><><><>}
graph{subGraA{subGraB}}
graph{GR}

Gonom [![Build Status](https://www.travis-ci.org/gonom/gonom.svg?branch=master)](https://www.travis-ci.org/gonom/gonom/branches) [![Build status](https://ci.appveyor.com/api/projects/status/vals1kp8sr50eepn/branch/master?svg=true)](https://ci.appveyor.com/project/Gonom/gonom/branch/master) [![codecov.io](https://codecov.io/gh/gonom/gonom/branch/master/graph/badge.svg)](https://codecov.io/gh/gonom/gonom) [![coveralls.io](https://coveralls.io/repos/gonom/gonom/badge.svg?branch=master&service=github)](https://coveralls.io/github/gonom/gonom?branch=master) [![GoDoc](https://godoc.org/gonom.org/v1/gonom?status.svg)](https://godoc.org/gonom.org/v1/gonom) [![Go Report Card](https://goreportcard.com/badge/github.com/gonom/gonom)](https://goreportcard.com/report/github.com/gonom/gonom) [![stability-unstable](https://img.shields.io/badge/stability-unstable-yellow.svg)](https://github.com/emersion/stability-badges#unstable)

```

## ## Installation

The core packages of the Gonum suite are written in pure Go with some assembly.

Installation is done using `go get``.

...

`go get -u gonum.org/v1/gonum/...`

...

## ## Supported Go versions

Gonum supports and tests on the [two most recent Go releases](<https://github.com/gonum/gonum/blob/master/.travis.yml#L6-L10>) on Linux, macOS and Windows.

## ## Release schedule

The Gonum modules are released on a six-month release schedule, aligned with the Go releases.

\_i.e.:\_ when `Go-1.x`` is released, `Gonum-v0.n.0`` is released around the same time.

Six months after, `Go-1.x+1`` is released, and `Gonum-v0.n+1.0`` as well.

The release schedule, based on the current Go release schedule is thus:

- `Gonum-v0.n.0``: February
- `Gonum-v0.n+1.0``: August

## ## Build tags

The Gonum packages use a variety of build tags to set non-standard build conditions.

Building Gonum applications will work without knowing how to use these tags, but they can be used during testing and to control the use of assembly and CGO code.

The current list of non-internal tags is as follows:

-

- `appengine`` do not use assembly or unsafe
- `safe`` synonym for `appengine``
- `bounds`` use bounds checks even in internal calls
- `cblas`` use CGO `gonum.org/v1/netlib/blas/netlib` BLAS implementation in tests (only in [mat package](<https://godoc.org/gonum.org/v1/gonum/mat>))
- `noasm`` do not use assembly implementations
- `tomita`` use [Tomita, Tanaka, Takahashi pivot choice](<https://doi.org/10.1016%2Fj.tcs.2006.06.015>) for maximal clique calculation, otherwise use random pivot (only in [topo package](<https://godoc.org/gonum.org/v1/gonum/graph/topo>))

## ## Issues

If you find any bugs, feel free to file an issue on the github issue tracker. Discussions on API changes, added

features, code review, or similar requests are preferred on the gonum-dev Google Group.

<https://groups.google.com/forum/#!forum/gonum-dev>

## ## License

Original code is licensed under the Gonum License found in the LICENSE file. Portions of the code are subject to the additional licenses found in THIRD\_PARTY\_LICENSES. All third party code is licensed either under a BSD or MIT license.

Code in graph/formats/dot is dual licensed [Public Domain Dedication](<https://creativecommons.org/publicdomain/zero/1.0/>) and Gonum License, and users are free to choose the license which suits their needs for this code.

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// license that can be found in the LICENSE file.

```
package r3
```

```
// Vec is a 3D vector.
```

```
type Vec struct {
 X, Y, Z float64
}
```

```
// Add returns the vector sum of p and q.
```

```
func (p Vec) Add(q Vec) Vec {
 p.X += q.X
 p.Y += q.Y
 p.Z += q.Z
 return p
}
```

```
// Sub returns the vector sum of p and -q.
```

```
func (p Vec) Sub(q Vec) Vec {
 p.X -= q.X
 p.Y -= q.Y
 p.Z -= q.Z
 return p
}
```

```
// Scale returns the vector p scaled by f.
```

```
func (p Vec) Scale(f float64) Vec {
 p.X *= f
 p.Y *= f
 p.Z *= f
 return p
}
```

```

// Box is a 3D bounding box.
type Box struct {
 Min, Max Vec
}
graph{Di{Di}{Di{Di{Di}{Di{Di}Di{Di}}Di}Di{Di}{Di{Di}Di}Di}
// Copyright 2015 The Gonum Authors. All rights reserved.
// Use of this source code is governed by a BSD-style
// license that can be found in the LICENSE file.

package gonum

// Iladlc scans a matrix for its last non-zero column. Returns -1 if the matrix
// is all zeros.
//
// Iladlc is an internal routine. It is exported for testing purposes.
func (Implementation) Iladlc(m, n int, a []float64, lda int) int {
 switch {
 case m < 0:
 panic(mLT0)
 case n < 0:
 panic(nLT0)
 case lda < max(1, n):
 panic(badLdA)
 }

 if n == 0 || m == 0 {
 return -1
 }

 if len(a) < (m-1)*lda+n {
 panic(shortA)
 }

 // Test common case where corner is non-zero.
 if a[n-1] != 0 || a[(m-1)*lda+(n-1)] != 0 {
 return n - 1
 }

 // Scan each row tracking the highest column seen.
 highest := -1
 for i := 0; i < m; i++ {
 for j := n - 1; j >= 0; j-- {
 if a[i*lda+j] != 0 {
 highest = max(highest, j)
 break
 }
 }
 }
}

```



```

return highest
}
graph{diGrapu}
graph{""[diGra_=""]}
graph{{DIGRA}{DIGRA}{DIGRA}{DIGRA}{DIGRA}{DIGRA}{DIGRA}{DIGRA}}
// SPDX-License-Identifier: Unlicense OR MIT

// Package widget implements state tracking and event handling of
// common user interface controls. To draw widgets, use a theme
// packages such as package gioui.org/widget/material.
package widget
// Copyright 2015 The Gonum Authors. All rights reserved.
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// license that can be found in the LICENSE file.

package graph_test

import (
 "math"
 "testing"

 "gonum.org/v1/gonum/graph"
 "gonum.org/v1/gonum/graph/simple"
 "gonum.org/v1/gonum/mat"
)

type weightedDirectedBuilder interface {
 graph.WeightedBuilder
 graph.WeightedDirected
}

var weightedDirectedGraphs = []struct {
 skipUnweighted bool

 g func() weightedDirectedBuilder
 edges []simple.WeightedEdge
 absent float64
 merge func(x, y float64, xe, ye graph.Edge) float64

 want mat.Matrix
}{
{
 g: func() weightedDirectedBuilder { return simple.NewWeightedDirectedGraph(0, 0) },
 edges: []simple.WeightedEdge{
 {F: simple.Node(0), T: simple.Node(1), W: 2},
 {F: simple.Node(1), T: simple.Node(0), W: 1},
 {F: simple.Node(1), T: simple.Node(2), W: 1},
 },
},

```

```

want: mat.NewSymDense(3, []float64{
 0, (1. + 2.) / 2., 0,
 (1. + 2.) / 2., 0, 1. / 2.,
 0, 1. / 2., 0,
}),
},
{
 g:
func() weightedDirectedBuilder { return simple.NewWeightedDirectedGraph(0, 0) },
edges: []simple.WeightedEdge{
 {F: simple.Node(0), T: simple.Node(1), W: 2},
 {F: simple.Node(1), T: simple.Node(0), W: 1},
 {F: simple.Node(1), T: simple.Node(2), W: 1},
},
absent: 1,
merge: func(x, y float64, _, _ graph.Edge) float64 { return math.Sqrt(x * y) },
want: mat.NewSymDense(3, []float64{
 0, math.Sqrt(1 * 2), 0,
 math.Sqrt(1 * 2), 0, math.Sqrt(1 * 1),
 0, math.Sqrt(1 * 1), 0,
}),
},
{
 skipUnweighted: true, // The min merge function cannot be used in the unweighted case.

 g: func() weightedDirectedBuilder { return simple.NewWeightedDirectedGraph(0, 0) },
edges: []simple.WeightedEdge{
 {F: simple.Node(0), T: simple.Node(1), W: 2},
 {F: simple.Node(1), T: simple.Node(0), W: 1},
 {F: simple.Node(1), T: simple.Node(2), W: 1},
},
merge: func(x, y float64, _, _ graph.Edge) float64 { return math.Min(x, y) },
want: mat.NewSymDense(3, []float64{
 0,
 math.Min(1, 2), 0,
 math.Min(1, 2), 0, math.Min(1, 0),
 0, math.Min(1, 0), 0,
}),
},
{
 g: func() weightedDirectedBuilder { return simple.NewWeightedDirectedGraph(0, 0) },
edges: []simple.WeightedEdge{
 {F: simple.Node(0), T: simple.Node(1), W: 2},
 {F: simple.Node(1), T: simple.Node(0), W: 1},
 {F: simple.Node(1), T: simple.Node(2), W: 1},
},
merge: func(x, y float64, xe, ye graph.Edge) float64 {
 if xe == nil {

```

```

 return y
}
if ye == nil {
 return x
}
return math.Min(x, y)
},
want: mat.NewSymDense(3, []float64{
 0, math.Min(1, 2), 0,
 math.Min(1, 2), 0, 1,
 0, 1, 0,
}),
},
{
g: func() weightedDirectedBuilder { return simple.NewWeightedDirectedGraph(0, 0) },
edges: []simple.WeightedEdge{
 {F: simple.Node(0), T: simple.Node(1), W: 2},
 {F: simple.Node(1), T: simple.Node(0), W: 1},
 {F: simple.Node(1), T: simple.Node(2), W: 1},
},
merge: func(x, y float64, _, _ graph.Edge) float64 { return math.Max(x, y) },
want:
mat.NewSymDense(3, []float64{
 0, math.Max(1, 2), 0,
 math.Max(1, 2), 0, math.Max(1, 0),
 0, math.Max(1, 0), 0,
}),
},
}

func TestUndirect(t *testing.T) {
for i, test := range weightedDirectedGraphs {
if test.skipUnweighted {
continue
}
g := test.g()
for _, e := range test.edges {
g.SetWeightedEdge(e)
}

src := graph.Undirect{G: g}
nodes := graph.NodesOf(src.Nodes())
dst := simple.NewUndirectedMatrixFrom(nodes, 0, 0, 0)
for _, u := range nodes {
for _, v := range graph.NodesOf(src.From(u.ID())) {
dst.SetEdge(src.Edge(u.ID(), v.ID()))
}
}
}
}

```

```

want := unit{test.want}
if !mat.Equal(dst.Matrix(), want) {
 t.Errorf("unexpected result for case %d:\ngot:\n%.4v\nwant:\n%.4v", i,
 mat.Formatted(dst.Matrix()),
 mat.Formatted(want),
)
}
}
}

```

```

func TestUndirectWeighted(t *testing.T) {
 for i, test := range weightedDirectedGraphs {
 g := test.g()
 for _, e := range test.edges {
 g.SetWeightedEdge(e)
 }
 }
}

```

```

src := graph.UndirectWeighted{G:
g, Absent: test.absent, Merge: test.merge}
nodes := graph.NodesOf(src.Nodes())
dst := simple.NewUndirectedMatrixFrom(nodes, 0, 0, 0)
for _, u := range nodes {
 for _, v := range graph.NodesOf(src.From(u.ID())) {
 dst.SetWeightedEdge(src.WeightedEdge(u.ID(), v.ID()))
 }
}
}

```

```

if !mat.Equal(dst.Matrix(), test.want) {
 t.Errorf("unexpected result for case %d:\ngot:\n%.4v\nwant:\n%.4v", i,
 mat.Formatted(dst.Matrix()),
 mat.Formatted(test.want),
)
}
}
}
}

```

```

type unit struct {
 mat.Matrix
}

```

```

func (m unit) At(i, j int) float64 {
 v := m.Matrix.At(i, j)
 if v == 0 {
 return 0
 }
 return 1
}

```

```

graph{{{Strictc}{Strictc}}}
graph{SubGra{{{SubGra}}}SubGra}
// SPDX-License-Identifier: Unlicense OR MIT

// Package window implements platform specific windows
// and GPU contexts.
package window

import (
 "errors"
 "math"
 "time"

 "gioui.org/app/internal/gl"
 "gioui.org/io/event"
 "gioui.org/io/system"
 "gioui.org/unit"
)

type Options struct {
 Width, Height unit.Value
 Title string
}

type FrameEvent struct {
 system.FrameEvent

 Sync bool
}

type Callbacks interface {
 SetDriver(d Driver)
 Event(e event.Event)
}

type Context interface {
 Functions() *gl.Functions
 Present() error
 MakeCurrent() error
 Release()
 Lock()
 Unlock()
}

// Driver is the interface for the platform implementation
// of a window.
type Driver interface {
 // SetAnimating sets the animation flag. When the window is animating,

```

```

// FrameEvents are delivered as fast as the display can handle them.
SetAnimating(anim bool)
// ShowTextInput updates the virtual keyboard state.
ShowTextInput(show bool)
NewContext() (Context, error)
}

```

```

type windowRendezvous struct
{
in chan windowAndOptions
out chan windowAndOptions
errs chan error
}

```

```

type windowAndOptions struct {
window Callbacks
opts *Options
}

```

```

// config implements the system.Config interface.
type config struct {
// Device pixels per dp.
pxPerDp float32
// Device pixels per sp.
pxPerSp float32
now time.Time
}

```

```

func (c *config) Now() time.Time {
return c.now
}

```

```

func (c *config) Px(v unit.Value) int {
var r float32
switch v.U {
case unit.UnitPx:
r = v.V
case unit.UnitDp:
r = c.pxPerDp * v.V
case unit.UnitSp:
r = c.pxPerSp * v.V
default:
panic("unknown unit")
}
return int(math.Round(float64(r)))
}

```

```

func newWindowRendezvous() *windowRendezvous {

```



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In 2018 it was forked from [github.com/hootsuite/atlantis](https://github.com/hootsuite/atlantis) to [github.com/runatlantis/atlantis](https://github.com/runatlantis/atlantis). The contents of files created before the fork are obviously still under the Hootsuite copyright and contain a header to that effect in addition to a disclaimer that they have subsequently been modified by contributors to [github.com/runatlantis/atlantis](https://github.com/runatlantis/atlantis). Modifications and new files hereafter are still under the Apache 2.0 license, but are not under copyright of Hootsuite Media Inc.

```
graph{{{STRlr}}STRlr}}
graph{<<=====>>}
graph{{{e{e}e}e}e}}
graph{{{{{SubGrap{{SubGrap{{SubGrap}}}}}SubGrap{{SubGrap{{SubGrap}}}}{{SubGrap}}}}}}
graph{{subgrap_}{subgrap_}{subgrap_}{subgrap_}{subgrap_}}
graph{Grac{{{Grab}}}}
// Code generated by "go generate gonum.org/v1/gonum/unit; DO NOT EDIT.
```

```
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// Use of this source code is governed by a BSD-style
// license that can be found in the LICENSE file.
```

```
package unit
```

```
import (
 "errors"
 "fmt"
 "math"
 "unicode/utf8"
)
```

```
// Time represents a duration in seconds.
type Time float64
```

```
const (
 Second Time = 1

 Minute = 60 * Second
 Hour = 60 * Minute
)
```

```
// Unit converts the Time to a *Unit
func (t Time) Unit() *Unit {
```



```

return New(float64(t), Dimensions{
 TimeDim: 1,
})
}

// Time allows Time to implement a Timer interface
func (t Time) Time() Time {
 return t
}

// From converts the unit into the receiver. From returns an
// error if there is a mismatch in dimension
func (t *Time) From(u Uniter) error {
 if !DimensionsMatch(u, Second) {
 *t = Time(math.NaN())
 return errors.New("Dimension mismatch")
 }
 *t = Time(u.Unit().Value())
 return nil
}

func (t Time) Format(fs fmt.State, c rune) {
 switch c {
 case
 'v':
 if fs.Flag('#') {
 fmt.Fprintf(fs, "%T(%v)", t, float64(t))
 return
 }
 fallthrough
 case 'e', 'E', 'f', 'F', 'g', 'G':
 p, pOk := fs.Precision()
 w, wOk := fs.Width()
 const unit = " s"
 switch {
 case pOk && wOk:
 fmt.Fprintf(fs, "%*.*"+string(c), pos(w-utf8.RuneCount([]byte(unit))), p, float64(t))
 case pOk:
 fmt.Fprintf(fs, "%*.*"+string(c), p, float64(t))
 case wOk:
 fmt.Fprintf(fs, "%*"+string(c), pos(w-utf8.RuneCount([]byte(unit))), float64(t))
 default:
 fmt.Fprintf(fs, "%"+string(c), float64(t))
 }
 fmt.Fprint(fs, unit)
 default:
 fmt.Fprintf(fs, "%%!c(%T=%g s)", c, t, float64(t))
 }
}

```

```

}
graph{-.5{-.5{-.5}-.5}}
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// license that can be found in the LICENSE file.

package testblas

import (
 "testing"

 "gonum.org/v1/gonum/blas"
 "gonum.org/v1/gonum/floats"
)

type Dtrsver interface {
 Dtrsv(ul blas.Uplo, tA blas.Transpose, d blas.Diag, n int, a []float64, lda int, x []float64, incX int)
}

func DtrsTest(t *testing.T, blasser Dtrsver) {
 for i, test := range []struct {
 n int
 a []float64
 ul blas.Uplo
 tA blas.Transpose
 d blas.Diag
 x []float64
 ans []float64
 }{
 {
 n: 3,
 a: []float64{
 {1, 2, 3},
 {0, 8, 15},
 {0, 0, 8},
 },
 ul: blas.Upper,
 tA: blas.NoTrans,
 d: blas.NonUnit,
 x: []float64{5, 6, 7},
 ans: []float64{4.15625, -0.890625, 0.875},
 },
 {
 n: 3,
 a: []float64{
 {1, 2, 3},
 {0, 1, 15},
 {0, 0, 1},
 },

```

```

},
ul: blas.Upper,
tA: blas.NoTrans,
d: blas.Unit,
x: []float64{5, 6, 7},
ans: []float64{182,
-99, 7},
},
{
n: 3,
a: [][]float64{
{1, 0, 0},
{2, 8, 0},
{3, 15, 8},
},
ul: blas.Lower,
tA: blas.NoTrans,
d: blas.NonUnit,
x: []float64{5, 6, 7},
ans: []float64{5, -0.5, -0.0625},
},
{
n: 3,
a: [][]float64{
{1, 0, 0},
{2, 8, 0},
{3, 15, 8},
},
ul: blas.Lower,
tA: blas.NoTrans,
d: blas.Unit,
x: []float64{5, 6, 7},
ans: []float64{5, -4, 52},
},
{
n: 3,
a: [][]float64{
{1, 2, 3},
{0, 8, 15},
{0, 0, 8},
},
ul: blas.Upper,
tA: blas.Trans,
d: blas.NonUnit,
x: []float64{5, 6, 7},
ans: []float64{5, -0.5, -0.0625},
},
{

```

```

n: 3,
a: [][]float64{
 {1, 2, 3},
 {0, 8, 15},
 {0, 0, 8},
},
ul: blas.Upper,
tA: blas.Trans,
d: blas.Unit,
x: []float64{5, 6, 7},
ans: []float64{5, -4, 52},
},
{
n: 3,
a: [][]float64{
 {1, 0, 0},
 {2, 8, 0},
 {3, 15, 8},
},
ul: blas.Lower,
tA: blas.Trans,
d:
blas.NonUnit,
x: []float64{5, 6, 7},
ans: []float64{4.15625, -0.890625, 0.875},
},
{
n: 3,
a: [][]float64{
 {1, 0, 0},
 {2, 1, 0},
 {3, 15, 1},
},
ul: blas.Lower,
tA: blas.Trans,
d: blas.Unit,
x: []float64{5, 6, 7},
ans: []float64{182, -99, 7},
},
} {
incTest := func(incX, extra int) {
 aFlat := flatten(test.a)
 x := makeIncremented(test.x, incX, extra)
 blasser.Dtrsv(test.ul, test.tA, test.d, test.n, aFlat, test.n, x, incX)
 ans := makeIncremented(test.ans, incX, extra)
 if !floats.EqualApprox(x, ans, 1e-14) {
 t.Errorf("Case %v, incX = %v: Want %v, got %v.", i, incX, ans, x)
 }
}

```

```

 }
 incTest(1, 0)
 incTest(-2, 0)
 incTest(3, 0)
 incTest(-3, 8)
 incTest(4, 2)
 }
}

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package testblas

import (
 "testing"

 "gonum.org/v1/gonum/blas"
)

type Dsprer interface {
 Dspr(ul blas.Uplo, n int, alpha float64, x []float64, incX int, a []float64)
}

func DsprTest(t *testing.T, blasser Dsprer) {
 for i, test := range []struct {
 ul blas.Uplo
 n int
 a [][]float64
 x []float64
 alpha float64
 ans [][]float64
 }{
 {
 ul: blas.Upper,
 n: 4,
 a: [][]float64{
 {10, 2, 0, 1},
 {0, 1, 2, 3},
 {0, 0, 9, 15},
 {0, 0, 0, -6},
 },
 x: []float64{1, 2, 0, 5},
 alpha: 8,
 ans: [][]float64{
 {18, 18, 0, 41},
 {0, 33, 2, 83},
 {0, 0, 9, 15},
 },
 },
 }

```

```

 {0, 0, 0, 194},
 },
},
{
 ul: blas.Lower,
 n: 3,
 a: [][]float64{
 {10, 2, 0},
 {4, 1, 2},
 {2, 7, 9},
 },
 x: []float64{3, 0, 5},
 alpha: 8,
 ans: [][]float64{
 {82, 2, 0},
 {4,
1, 2},
 {122, 7, 209},
 },
},
} {
 incTest := func(incX, extra int) {
 xnew := makeIncremented(test.x, incX, extra)
 aFlat := flattenTriangular(test.a, test.ul)
 ans := flattenTriangular(test.ans, test.ul)
 blasser.Dspr(test.ul, test.n, test.alpha, xnew, incX, aFlat)
 if !dSliceToIEqual(aFlat, ans) {
 t.Errorf("Case %v, idx %v: Want %v, got %v.", i, incX, ans, aFlat)
 }
 }
 incTest(1, 3)
 incTest(1, 0)
 incTest(3, 2)
 incTest(-2, 2)
}
}
graph{Subgrap}
graph{<=====>}
Graph{{Subgt{Subgz}}}
Graph{{{subgrax}subgrax{subgrax}subgrax}{{subgrax{}}subgrax}}
graph{subgrap}
graph{node}
graph{subGraph{{subGraph{subGrap}}}}
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package testblas

```

```

import (
 "testing"

 "golang.org/x/exp/rand"

 "gonum.org/v1/gonum/floats"
)

type Dzasumer interface {
 Dzasum(n int, x []complex128, incX int) float64
}

func DzasumTest(t *testing.T, impl Dzasumer) {
 const tol = 1e-14
 rnd := rand.New(rand.NewSource(1))
 for _, n := range []int{0, 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 50, 100} {
 for _, incX := range []int{-5, 1, 2, 10} {
 aincX := abs(incX)
 var x []complex128
 if n > 0 {
 x = make([]complex128, (n-1)*aincX+1)
 }
 for i := range x {
 x[i] = znan
 }
 for i := 0; i < n; i++ {
 re := float64(2*i + 1)
 if rnd.Intn(2) == 0 {
 re *= -1
 }
 im := float64(2 * (i + 1))
 if rnd.Intn(2) == 0 {
 im *= -1
 }
 x[i*aincX] = complex(re, im)
 }

 want := float64(n * (2*n + 1))
 got := impl.Dzasum(n, x, incX)

 if
incX < 0 {
 if got != 0 {
 t.Errorf("Case n=%v,incX=%v: non-zero result when incX < 0. got %v", n, incX, got)
 }
 continue
 }

```

```

 if !floats.EqualWithinAbsOrRel(got, want, tol, tol) {
 t.Errorf("Case n=%v,incX=%v: unexpected result. want %v, got %v", n, incX, want, got)
 }
}
}
}
}

```

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```

graph{STRI{STRI}{STRI}STRI}
graph{{S}S{S}S{S{S}}}
graph{GRAC{{GRAB}}}
digraph sta{node[e=ee]ey[]stn[l=""][l=""][l=""]ey->l[l=""]ey->stn[l=""t=8]stn->l[l=""]stn->g[l=""]g->l[l=""]}
graph{ {{{ {{{ {subgJ{subgO}} }}} }}}
graph{ {{{ {EDGD}{EDGD}{}} }} {EDGD""} {{{ {EDGD{EDGD}}EDGD} {{{ {EDGD}{EDGD}n} {{{ {EDGD{EDGD}}EDGD{EDGD}}EDGD{EDGD}} {{{ {EDGD{EDGD}}EDGD}} <>EDGD} }

```

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// Package cephes implements functions originally in the Netlib code by Stephen Moshier.

package cephes // import "gonum.org/v1/gonum/mathext/internal/cephes"

// Code generated by "go generate gonum.org/v1/gonum/unit; DO NOT EDIT.

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```

package unit

import (
 "errors"
 "fmt"
 "math"
 "unicode/utf8"
)

// Current represents a current in Amperes.
type Current float64

const Ampere Current = 1

// Unit converts the Current to a *Unit
func (i Current) Unit() *Unit {
 return New(float64(i), Dimensions{
 CurrentDim: 1,
 })
}

// Current allows Current to implement a Currenter interface
func (i Current) Current() Current {
 return i
}

// From converts the unit into the receiver. From returns an
// error if there is a mismatch in dimension
func (i *Current) From(u Uniter) error {
 if !DimensionsMatch(u, Ampere) {
 *i = Current(math.NaN())
 return errors.New("Dimension mismatch")
 }
 *i = Current(u.Unit().Value())
 return nil
}

func (i Current) Format(fs fmt.State, c rune) {
 switch c {
 case
 'v':
 if fs.Flag('#') {
 fmt.Fprintf(fs, "%T(%v)", i, float64(i))
 return
 }
 fallthrough
 case 'e', 'E', 'f', 'F', 'g', 'G':
 p, pOk := fs.Precision()

```

```

w, wOk := fs.Width()
const unit = " A"
switch {
case pOk && wOk:
 fmt.Fprintf(fs, "%*.*"+string(c), pos(w-utf8.RuneCount([]byte(unit))), p, float64(i))
case pOk:
 fmt.Fprintf(fs, "%.*"+string(c), p, float64(i))
case wOk:
 fmt.Fprintf(fs, "%*"+string(c), pos(w-utf8.RuneCount([]byte(unit))), float64(i))
default:
 fmt.Fprintf(fs, "%"+string(c), float64(i))
}
fmt.Fprint(fs, unit)
default:
 fmt.Fprintf(fs, "%%!%c(%T=%g A)", c, i, float64(i))
}
}
graph{{diGrar}diGrar}
graph{{st}st{st}{{st}st{st}st}}
graph{Nodd{Nodd{Nodd}}}
Graph{Subgrg{{Subgrg}{Subgrg{{Subgrg}{Subgrg}}}}Subgrg}}}
graph{{Ed}Edd""Ed}
graph{STRICU{{STRICU{STRICU}STRICU{STRICU{STRICU}}}}}
Graph{{{{{subgre{{subgre}}subgro}subgre}}subgro}subgre}}
graph{{"\{\{\L"\}\{\L"}
digraph{{D:_->G:_->G:_->G:_}D:_->G:_}
graph{{{{digraV}digraM}digraU}}
graph{{{{grap5}grap5}grap5{grap5}grap5}}
graph{subGrH{subGrT}}
graph{{DigV}{DigV}{DigV}{DigV}DigP}
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// license that can be found in the LICENSE file.

package testlapack

import (
 "testing"

 "golang.org/x/exp/rand"

 "gonum.org/v1/gonum/blas"
 "gonum.org/v1/gonum/blas/blas64"
 "gonum.org/v1/gonum/floats"
 "gonum.org/v1/gonum/lapack"
)

type Dormbrer interface {

```

```

Dormbr(vect lapack.ApplyOrtho, side blas.Side, trans blas.Transpose, m, n, k int, a []float64, lda int, tau, c []float64,
ldc int, work []float64, lwork int)
Dgebrder
}

```

```

func DormbrTest(t *testing.T, impl Dormbrer) {
 rnd := rand.New(rand.NewSource(1))
 bi := blas64.Implementation()
 for _, vect := range []lapack.ApplyOrtho{lapack.ApplyQ, lapack.ApplyP} {
 for _, side := range []blas.Side{blas.Left, blas.Right} {
 for _, trans := range []blas.Transpose{blas.NoTrans, blas.Trans} {
 for _, wl := range []worklen{minimumWork, mediumWork, optimumWork} {
 for _, test := range []struct {
 m, n, k, lda, ldc
 int
 }{
 {3, 4, 5, 0, 0},
 {3, 5, 4, 0, 0},
 {4, 3, 5, 0, 0},
 {4, 5, 3, 0, 0},
 {5, 3, 4, 0, 0},
 {5, 4, 3, 0, 0},

 {3, 4, 5, 10, 12},
 {3, 5, 4, 10, 12},
 {4, 3, 5, 10, 12},
 {4, 5, 3, 10, 12},
 {5, 3, 4, 10, 12},
 {5, 4, 3, 10, 12},

 {150, 140, 130, 0, 0},
 } {
 m := test.m
 n := test.n
 k := test.k
 ldc := test.ldc
 if ldc == 0 {
 ldc = n
 }
 nq := n
 nw := m
 if side == blas.Left {
 nq = m
 nw = n
 }

 // Compute a decomposition.
 var ma, na int

```

```

var a []float64
if vect == lapack.ApplyQ {
 ma = nq
 na = k
} else {
 ma = k
 na = nq
}
lda := test.lda
if lda == 0 {
 lda = na
}
a = make([]float64, ma*lda)
for i := range a {
 a[i] = rnd.NormFloat64()
}
nTau := min(nq, k)
tauP := make([]float64, nTau)
tauQ := make([]float64,
nTau)
d := make([]float64, nTau)
e := make([]float64, nTau)

work := make([]float64, 1)
impl.Dgebrd(ma, na, a, lda, d, e, tauQ, tauP, work, -1)
work = make([]float64, int(work[0]))
impl.Dgebrd(ma, na, a, lda, d, e, tauQ, tauP, work, len(work))

// Apply and compare update.
c := make([]float64, m*ldc)
for i := range c {
 c[i] = rnd.NormFloat64()
}
cCopy := make([]float64, len(c))
copy(cCopy, c)

var lwork int
switch wl {
case minimumWork:
 lwork = nw
case optimumWork:
 impl.Dormbr(vect, side, trans, m, n, k, a, lda, tauQ, c, ldc, work, -1)
 lwork = int(work[0])
case mediumWork:
 work := make([]float64, 1)
 impl.Dormbr(vect, side, trans, m, n, k, a, lda, tauQ, c, ldc, work, -1)
 lwork = (int(work[0]) + nw) / 2
}

```

```

lwork = max(1, lwork)
work = make([]float64, lwork)

if vect == lapack.ApplyQ {
 impl.Dormbr(vect, side,
trans, m, n, k, a, lda, tauQ, c, ldc, work, lwork)
} else {
 impl.Dormbr(vect, side, trans, m, n, k, a, lda, tauP, c, ldc, work, lwork)
}

// Check that the multiplication was correct.
cOrig := blas64.General{
 Rows: m,
 Cols: n,
 Stride: ldc,
 Data: make([]float64, len(cCopy)),
}
copy(cOrig.Data, cCopy)
cAns := blas64.General{
 Rows: m,
 Cols: n,
 Stride: ldc,
 Data: make([]float64, len(cCopy)),
}
copy(cAns.Data, cCopy)
nb := min(ma, na)
var mulMat blas64.General
if vect == lapack.ApplyQ {
 mulMat = constructQPBidiagonal(lapack.ApplyQ, ma, na, nb, a, lda, tauQ)
} else {
 mulMat = constructQPBidiagonal(lapack.ApplyP, ma, na, nb, a, lda, tauP)
}

mulTrans := trans

if side == blas.Left {
 bi.Dgemm(mulTrans, blas.NoTrans, m, n, m, 1, mulMat.Data, mulMat.Stride, cOrig.Data, cOrig.Stride, 0,
cAns.Data, cAns.Stride)
}
else {
 bi.Dgemm(blas.NoTrans, mulTrans, m, n, n, 1, cOrig.Data, cOrig.Stride, mulMat.Data, mulMat.Stride, 0,
cAns.Data, cAns.Stride)
}

if !floats.EqualApprox(cAns.Data, c, 1e-13) {
 isApplyQ := vect == lapack.ApplyQ
 isLeft := side == blas.Left
 isTrans := trans == blas.Trans

```

```

t.Errorf("C mismatch. isApplyQ: %v, isLeft: %v, isTrans: %v, m = %v, n = %v, k = %v, lda = %v, ldc = %v",
isApplyQ, isLeft, isTrans, m, n, k, lda, ldc)
}
}
}
}
}
}
}
graph{{DIG_{DIG_}DIG_{DIG_}DIG_}}
graph{<<==>>}
graph{stric{stric}}
graph{{GRAP_ GRAP_}}
Graph{{subgra_}{subgra_{{subgra_}{subgra_}}subgra_}}
graph{"\I#"}
// Copyright 2016 The Gonum Authors. All rights reserved.
// Use of this source code is governed by a BSD-style
// license that can be found in the LICENSE file.

package testlapack

import (
 "fmt"
 "math"
 "math/cmplx"
 "testing"

 "golang.org/x/exp/rand"
)

type Dlaln2er interface {
 Dlaln2(trans bool, na, nw int, smin, ca float64, a []float64, lda int, d1, d2 float64, b []float64, ldb int, wr, wi float64,
 x []float64, ldx int) (scale, xnorm float64, ok bool)
}

func Dlaln2Test(t *testing.T, impl Dlaln2er) {
 rnd := rand.New(rand.NewSource(1))
 for _, trans := range []bool{true, false} {
 for _, na := range []int{1, 2} {
 for _, nw := range []int{1, 2} {
 for _, extra := range []int{0, 1, 2, 13} {
 for cas := 0; cas < 1000; cas++ {
 testDlaln2(t, impl, trans, na, nw, extra, rnd)
 }
 }
 }
 }
 }
}

```

```

}
}

func testDlaln2(t *testing.T, impl Dlaln2er, trans bool, na, nw, extra int, rnd *rand.Rand) {
 const tol = 1e-12

 // Generate random input scalars.
 ca := rnd.NormFloat64()
 d1
 := rnd.NormFloat64()
 d2 := rnd.NormFloat64()

 var w complex128
 if nw == 1 {
 w = complex(rnd.NormFloat64(), 0)
 } else {
 w = complex(rnd.NormFloat64(), rnd.NormFloat64())
 }
 smin := dlamchP * (math.Abs(real(w)) + math.Abs(imag(w)))

 // Generate random input matrices.
 a := randomGeneral(na, na, na+extra, rnd)
 b := randomGeneral(na, nw, nw+extra, rnd)
 x := randomGeneral(na, nw, nw+extra, rnd)

 scale, xnormGot, ok := impl.Dlaln2(trans, na, nw, smin, ca, a.Data, a.Stride, d1, d2, b.Data, b.Stride, real(w),
 imag(w), x.Data, x.Stride)

 prefix := fmt.Sprintf("Case trans=%v, na=%v, nw=%v, extra=%v", trans, na, nw, extra)

 if !generalOutsideAllNaN(a) {
 t.Errorf("%v: out-of-range write to A\n%v", prefix, a.Data)
 }
 if !generalOutsideAllNaN(b) {
 t.Errorf("%v: out-of-range write to B\n%v", prefix, b.Data)
 }
 if !generalOutsideAllNaN(x) {
 t.Errorf("%v: out-of-range write to X\n%v", prefix, x.Data)
 }

 // Scale is documented to be <= 1.
 if scale <= 0 || 1 < scale
 {
 t.Errorf("%v: invalid value of scale=%v", prefix, scale)
 }

 // Calculate the infinity norm of X explicitly.
 var xnormWant float64

```

```

for i := 0; i < na; i++ {
 var rowsum float64
 for j := 0; j < nw; j++ {
 rowsum += math.Abs(x.Data[i*x.Stride+j])
 }
 if rowsum > xnormWant {
 xnormWant = rowsum
 }
}
if xnormWant != xnormGot {
 t.Errorf("Case %v: unexpected xnorm with scale=%v. Want %v, got %v", prefix, scale, xnormWant, xnormGot)
}

if !ok {
 // If ok is false, the matrix has been perturbed but we don't
 // know how. Return without comparing both sides of the
 // equation.
 return
}

// Compute a complex matrix
// M := ca * A - w * D
// or
// M := ca * A - w * D.
m := make([]complex128, na*na)
if trans {
 // M = ca * A
 for i := 0; i < na; i++ {
 for j := 0; j < na; j++ {
 m[i*na+j] = complex(ca*a.Data[j*a.Stride+i], 0)
 }
 }
} else {
 // M = ca * A
 for i := 0; i < na; i++ {
 for j := 0; j < na; j++ {
 m[i*na+j] = complex(ca*a.Data[i*a.Stride+j],
0)
 }
 }
}
// Subtract the diagonal matrix w * D.
m[0] -= w * complex(d1, 0)
if na == 2 {
 m[3] -= w * complex(d2, 0)
}

// Convert real na2 matrices X and scale*B into complex na-vectors.

```



```

cx := make([]complex128, na)
cb := make([]complex128, na)
switch nw {
case 1:
 for i := 0; i < na; i++ {
 cx[i] = complex(x.Data[i*x.Stride], 0)
 cb[i] = complex(scale*b.Data[i*x.Stride], 0)
 }
case 2:
 for i := 0; i < na; i++ {
 cx[i] = complex(x.Data[i*x.Stride], x.Data[i*x.Stride+1])
 cb[i] = complex(scale*b.Data[i*b.Stride], scale*b.Data[i*b.Stride+1])
 }
}

// Compute M * X.
mx := make([]complex128, na)
for i := 0; i < na; i++ {
 for j := 0; j < na; j++ {
 mx[i] += m[i*na+j] * cx[j]
 }
}

// Check whether |M * X - scale * B|_max <= tol.
for i := 0; i < na; i++ {
 if cmplx.Abs(mx[i]-cb[i]) > tol {
 t.Errorf("Case %v: unexpected value of left-hand side at row %v with scale=%v. Want %v, got %v", prefix, i, scale,
cb[i], mx[i])
 }
}
}
graph{{diGrap3}{diGrap3}{diGrap3}diGrap3}{diGrap3}{diGrap3}diGrap7}
graph{no{no}}
package mem

import (
 "unsafe"

 "golang.org/x/sys/windows"
)

func mmap(size uint) (unsafe.Pointer, error) {
 p, err := windows.VirtualAlloc(0, uintptr(size), windows.MEM_COMMIT|windows.MEM_RESERVE,
windows.PAGE_READWRITE)
 if err != nil {
 return nil, err
 }
 return unsafe.Pointer(p), nil
}

```

```

func munmap(p unsafe.Pointer) error {
 return windows.VirtualFree(uintptr(p), 0, windows.MEM_RELEASE)
}
graph{{EdO""EdP}EdP{EdO""EdP}}
graph{SUB_{SUB_{SUB_{SUB_}}}}
graph{{{DiGu}{DiGu}{DiGu}{DiGu}DiGv}DiGu{DiGu}{DiGu}{DiGu}}
graph{{DiGrapR}}
graph{Sub_{{{Sub_{{Sub_{{Sub_}}Sub_}}}}Sub_}}
graph{{{Gra}Gra}{Gra}}Gra}
graph {
 A -- B
}
// Copyright 2017 The Gonum Authors. All rights reserved.
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// license that can be found in the LICENSE file.

// +build !amd64 noasm appengine safe

package f64

// Ger performs the rank-one operation
// A += alpha * x * y
// where A is an mn dense matrix, x and y are vectors, and alpha is a scalar.
func Ger(m, n uintptr, alpha float64, x []float64, incX uintptr, y []float64, incY uintptr, a []float64, lda uintptr) {
 if incX == 1 && incY == 1 {
 x = x[:m]
 y = y[:n]
 for i, xv := range x {
 AxpyUnitary(alpha*xv, y, a[uintptr(i)*lda:uintptr(i)*lda+n])
 }
 return
 }

 var ky, kx uintptr
 if int(incY) < 0 {
 ky = uintptr(-int(n-1) * int(incY))
 }
 if int(incX) < 0 {
 kx = uintptr(-int(m-1) * int(incX))
 }

 ix := kx
 for i := 0; i < int(m); i++ {
 AxpyInc(alpha*x[ix], y, a[uintptr(i)*lda:uintptr(i)*lda+n], n, incY, 1, ky, 0)
 ix += incX
 }
}

```

```

// GemvN computes
// y = alpha * A * x + beta * y
// where A is an mn dense matrix,
// x and y are vectors, and alpha and beta are scalars.
func GemvN(m, n uintptr, alpha float64, a []float64, lda uintptr, x []float64, incX uintptr, beta float64, y []float64,
incY uintptr) {
 var kx, ky, i uintptr
 if int(incX) < 0 {
 kx = uintptr(-int(n-1) * int(incX))
 }
 if int(incY) < 0 {
 ky = uintptr(-int(m-1) * int(incY))
 }

 if incX == 1 && incY == 1 {
 if beta == 0 {
 for i = 0; i < m; i++ {
 y[i] = alpha * DotUnitary(a[lda*i:lda*i+n], x)
 }
 return
 }
 for i = 0; i < m; i++ {
 y[i] = y[i]*beta + alpha*DotUnitary(a[lda*i:lda*i+n], x)
 }
 return
 }
 iy := ky
 if beta == 0 {
 for i = 0; i < m; i++ {
 y[iy] = alpha * DotInc(x, a[lda*i:lda*i+n], n, incX, 1, kx, 0)
 iy += incY
 }
 return
 }
 for i = 0; i < m; i++ {
 y[iy] = y[iy]*beta + alpha*DotInc(x, a[lda*i:lda*i+n], n, incX, 1, kx, 0)
 iy += incY
 }
}

// GemvT computes
// y = alpha * A * x + beta * y
// where A is an mn dense matrix, x and y are vectors, and alpha and beta are scalars.
func GemvT(m,
n uintptr, alpha float64, a []float64, lda uintptr, x []float64, incX uintptr, beta float64, y []float64, incY uintptr) {
 var kx, ky, i uintptr
 if int(incX) < 0 {

```

```

 kx = uintptr(-int(m-1) * int(incX))
}
if int(incY) < 0 {
 ky = uintptr(-int(n-1) * int(incY))
}
switch {
case beta == 0: // beta == 0 is special-cased to memclear
 if incY == 1 {
 for i := range y {
 y[i] = 0
 }
 } else {
 iy := ky
 for i := 0; i < int(n); i++ {
 y[iy] = 0
 iy += incY
 }
 }
case int(incY) < 0:
 ScalInc(beta, y, n, uintptr(int(-incY)))
case incY == 1:
 ScalUnitary(beta, y[:n])
default:
 ScalInc(beta, y, n, incY)
}

if incX == 1 && incY == 1 {
 for i = 0; i < m; i++ {
 ApxyUnitaryTo(y, alpha*x[i], a[lda*i:lda*i+n], y)
 }
 return
}
ix := kx
for i = 0; i < m; i++ {
 ApxyInc(alpha*x[ix], a[lda*i:lda*i+n], y, n, 1, incY, 0, ky)
 ix += incX
}
}
graph{subgrau}
graph{diGrapS{{{diGrapC}diGrapS}}{{{diGrapC}diGrapS}}{{{diGrapC}diGrapS}}diGrapS}diGrapS}}
// Copyright 2014 The Gonum Authors. All rights reserved.
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// license that can be found in the LICENSE file.

package fd

import (
 "math"

```

"testing"

"golang.org/x/exp/rand"

"gonum.org/v1/gonum/floats"

)

```
type Rosenbrock struct {
 nDim int
}
```

```
func (r Rosenbrock) F(x []float64) (sum float64) {
 deriv := make([]float64, len(x))
 return r.FDf(x, deriv)
}
```

```
func (r Rosenbrock) FDf(x []float64, deriv []float64) (sum float64) {
 for i := range deriv {
 deriv[i] = 0
 }
```

```
 for i := 0; i < len(x)-1; i++ {
 sum += math.Pow(1-x[i], 2) + 100*math.Pow(x[i+1]-math.Pow(x[i], 2), 2)
 }
```

```
 for i := 0; i < len(x)-1; i++ {
 deriv[i] += -1 * 2 * (1 - x[i])
 deriv[i] += 2 * 100 * (x[i+1] - math.Pow(x[i], 2)) * (-2 * x[i])
 }
```

```
 for i := 1; i < len(x); i++ {
 deriv[i] += 2 * 100 * (x[i] - math.Pow(x[i-1], 2))
 }
```

```
 return sum
}
```

```
func TestGradient(t *testing.T) {
 rand.Seed(1)
 for i, test := range []struct {
 nDim int
 tol float64
 formula Formula
 }{
 {
 nDim:
 2,
 tol: 2e-4,
 formula: Forward,
 },
```

```

{
 nDim: 2,
 tol: 1e-6,
 formula: Central,
},
{
 nDim: 40,
 tol: 2e-4,
 formula: Forward,
},
{
 nDim: 40,
 tol: 1e-5,
 formula: Central,
},
} {
 x := make([]float64, test.nDim)
 for i := range x {
 x[i] = rand.Float64()
 }
 xcopy := make([]float64, len(x))
 copy(xcopy, x)

 r := Rosenbrock{len(x)}
 trueGradient := make([]float64, len(x))
 r.FDf(x, trueGradient)

 // Try with gradient nil.
 gradient := Gradient(nil, r.F, x, &Settings{
 Formula: test.formula,
 })
 if !floats.EqualApprox(gradient, trueGradient, test.tol) {
 t.Errorf("Case %v: gradient mismatch in serial with nil. Want: %v, Got: %v.", i, trueGradient, gradient)
 }
 if !floats.Equal(x, xcopy) {
 t.Errorf("Case %v: x modified during call to gradient in serial with nil.", i)
 }

 // Try with provided gradient.
 for i := range gradient {
 gradient[i] = rand.Float64()
 }
 Gradient(gradient,
r.F, x, &Settings{
 Formula: test.formula,
})
 if !floats.EqualApprox(gradient, trueGradient, test.tol) {
 t.Errorf("Case %v: gradient mismatch in serial. Want: %v, Got: %v.", i, trueGradient, gradient)
 }

```

```

}
if !floats.Equal(x, xcopy) {
 t.Errorf("Case %v: x modified during call to gradient in serial with non-nil.", i)
}

// Try with known value.
for i := range gradient {
 gradient[i] = rand.Float64()
}
Gradient(gradient, r.F, x, &Settings{
 Formula: test.formula,
 OriginKnown: true,
 OriginValue: r.F(x),
})
if !floats.EqualApprox(gradient, trueGradient, test.tol) {
 t.Errorf("Case %v: gradient mismatch with known origin in serial. Want: %v, Got: %v.", i, trueGradient, gradient)
}

// Try with concurrent evaluation.
for i := range gradient {
 gradient[i] = rand.Float64()
}
Gradient(gradient, r.F, x, &Settings{
 Formula: test.formula,
 Concurrent: true,
})
if !floats.EqualApprox(gradient, trueGradient, test.tol) {
 t.Errorf("Case
%v: gradient mismatch with unknown origin in parallel. Want: %v, Got: %v.", i, trueGradient, gradient)
}
if !floats.Equal(x, xcopy) {
 t.Errorf("Case %v: x modified during call to gradient in parallel", i)
}

// Try with concurrent evaluation with origin known.
for i := range gradient {
 gradient[i] = rand.Float64()
}
Gradient(gradient, r.F, x, &Settings{
 Formula: test.formula,
 Concurrent: true,
 OriginKnown: true,
 OriginValue: r.F(x),
})
if !floats.EqualApprox(gradient, trueGradient, test.tol) {
 t.Errorf("Case %v: gradient mismatch with known origin in parallel. Want: %v, Got: %v.", i, trueGradient, gradient)
}

```

```

// Try with nil settings.
for i := range gradient {
 gradient[i] = rand.Float64()
}
Gradient(gradient, r.F, x, nil)
if !floats.EqualApprox(gradient, trueGradient, test.tol) {
 t.Errorf("Case %v: gradient mismatch with default settings. Want: %v, Got: %v.", i, trueGradient, gradient)
}

// Try with
zero-valued settings.
for i := range gradient {
 gradient[i] = rand.Float64()
}
Gradient(gradient, r.F, x, &Settings{})
if !floats.EqualApprox(gradient, trueGradient, test.tol) {
 t.Errorf("Case %v: gradient mismatch with zero settings. Want: %v, Got: %v.", i, trueGradient, gradient)
}
}
}

func Panics(fun func()) (b bool) {
 defer func() {
 err := recover()
 if err != nil {
 b = true
 }
 }()
 fun()
 return
}

func TestGradientPanics(t *testing.T) {
 // Test that it panics
 if !Panics(func() {
 Gradient([]float64{0.0}, func(x []float64) float64 { return x[0] * x[0] }, []float64{0.0, 0.0}, nil)
 }) {
 t.Errorf("Gradient did not panic with length mismatch")
 }
}

graph{{St_{St_{St_{St_{St_}}
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// Use of this source code is governed by a BSD-style
// license that can be found in the LICENSE file.

package dualcmplx_test

import (

```



```
"fmt"
"math"
```

```
"gonum.org/v1/gonum/num/dualcmplx"
)
```

```
// Example point, displacement and rotation from Euclidean Space Dual Complex Number page:
// http://www.euclideanspace.com/maths/algebra/realNormedAlgebra/other/dualComplex/index.htm
```

```
func Example_displace() {
 // Displace a point [3, 4] by [4, 3].

 // Point to be transformed in the dual imaginary vector.
 p := dualcmplx.Number{Real: 1, Dual: 3 + 4i}

 // Displacement vector, half [4, 3], in the dual imaginary vector.
 d := dualcmplx.Number{Real: 1, Dual: 2 + 1.5i}

 fmt.Printf("%.0f\n", dualcmplx.Mul(dualcmplx.Mul(d, p), dualcmplx.Conj(d)).Dual)

 // Output:
 //
 // (7+7i)
}
```

```
func Example_rotate() {
 // Rotate a point [3, 4] by 90 around the origin.

 // Point to be transformed in the dual imaginary vector.
 p := dualcmplx.Number{Real: 1,
 Dual: 3 + 4i}

 // Half the rotation in the real complex number.
 r := dualcmplx.Number{Real: complex(math.Cos(math.Pi/4), math.Sin(math.Pi/4))}

 fmt.Printf("%.0f\n", dualcmplx.Mul(dualcmplx.Mul(r, p), dualcmplx.Conj(r)).Dual)

 // Output:
 //
 // (-4+3i)
}
```

```
func Example_displaceAndRotate() {
 // Displace a point [3, 4] by [4, 3] and then rotate
 // by 90 around the origin.

 // Point to be transformed in the dual imaginary vector.
 p := dualcmplx.Number{Real: 1, Dual: 3 + 4i}
```

```

// Displacement vector, half [4, 3], in the dual imaginary vector.
d := dualcmplx.Number{Real: 1, Dual: 2 + 1.5i}

// Rotation in the real complex number.
r := dualcmplx.Number{Real: complex(math.Cos(math.Pi/4), math.Sin(math.Pi/4))}

// Combine the rotation and displacement so
// the displacement is performed first.
q := dualcmplx.Mul(r, d)

fmt.Printf("%.0f\n", dualcmplx.Mul(dualcmplx.Mul(q, p), dualcmplx.Conj(q)).Dual)

// Output:
//
// (-7+7i)
}

func Example_rotateAndDisplace() {
 // Rotate a
 point [3, 4] by 90 around the origin and then
 // displace by [4, 3].

 // Point to be transformed in the dual imaginary vector.
 p := dualcmplx.Number{Real: 1, Dual: 3 + 4i}

 // Displacement vector, half [4, 3], in the dual imaginary vector.
 d := dualcmplx.Number{Real: 1, Dual: 2 + 1.5i}

 // Rotation in the real complex number.
 r := dualcmplx.Number{Real: complex(math.Cos(math.Pi/4), math.Sin(math.Pi/4))}

 // Combine the rotation and displacement so
 // the displacement is performed first.
 q := dualcmplx.Mul(d, r)

 fmt.Printf("%.0f\n", dualcmplx.Mul(dualcmplx.Mul(q, p), dualcmplx.Conj(q)).Dual)

 // Output:
 //
 // (0+6i)
}
graph{{Digr0}}
graph{{Edd}Edd}
graph{{sub1{sub8{sub1{sub8}sub8}}}
graph{{Edv""Edn""Eds}Edn""Eds}
graph{{Su1{{Su1{Su5{{Su1}}}Su5{{Su1}}}}}

```

```

graph{Su{{Su}}}
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// license that can be found in the LICENSE file.

package testlapack

import (
 "testing"

 "golang.org/x/exp/rand"

 "gonum.org/v1/gonum/blas/blas64"
 "gonum.org/v1/gonum/lapack"
)

var resultGeneral blas64.General

func DgeevBenchmark(b *testing.B, impl Dgeever) {
 rnd := rand.New(rand.NewSource(1))
 benchmarks := []struct {
 name string
 a blas64.General
 }{
 {"AntisymRandom3", NewAntisymRandom(3, rnd).Matrix()},
 {"AntisymRandom4", NewAntisymRandom(4, rnd).Matrix()},
 {"AntisymRandom5", NewAntisymRandom(5, rnd).Matrix()},
 {"AntisymRandom10", NewAntisymRandom(10, rnd).Matrix()},
 {"AntisymRandom50", NewAntisymRandom(50, rnd).Matrix()},
 {"AntisymRandom100", NewAntisymRandom(100, rnd).Matrix()},
 {"AntisymRandom200", NewAntisymRandom(200, rnd).Matrix()},
 {"AntisymRandom500", NewAntisymRandom(500, rnd).Matrix()},
 {"Circulant3", Circulant(3).Matrix()},
 {"Circulant4",
Circulant(4).Matrix()},
 {"Circulant5", Circulant(5).Matrix()},
 {"Circulant10", Circulant(10).Matrix()},
 {"Circulant50", Circulant(50).Matrix()},
 {"Circulant100", Circulant(100).Matrix()},
 {"Circulant200", Circulant(200).Matrix()},
 {"Circulant500", Circulant(500).Matrix()},
 }
 for _, bm := range benchmarks {
 n := bm.a.Rows
 a := zeros(n, n, n)
 vl := zeros(n, n, n)
 vr := zeros(n, n, n)
 wr := make([]float64, n)
 }
}

```

```

wi := make([]float64, n)
work := make([]float64, 1)
impl.Dgeev(lapack.LeftEVCompute, lapack.RightEVCompute, n, a.Data, a.Stride, wr, wi, vl.Data, vl.Stride,
vr.Data, vr.Stride, work, -1)
work = make([]float64, int(work[0]))
b.Run(bm.name, func(b *testing.B) {
 for i := 0; i < b.N; i++ {
 b.StopTimer()
 copyGeneral(a, bm.a)
 b.StartTimer()
 impl.Dgeev(lapack.LeftEVCompute, lapack.RightEVCompute, n, a.Data, a.Stride, wr, wi,
 vl.Data, vl.Stride, vr.Data, vr.Stride, work, len(work))
 }
 resultGeneral = a
})
}
}
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```

```

// +build !appengine,!safe

```

```

package set

```

```

import "unsafe"

```

```

// same determines whether two sets are backed by the same store. In the
// current implementation using hash maps it makes use of the fact that
// hash maps are passed as a pointer to a runtime Hmap struct. A map is
// not seen by the runtime as a pointer though, so we use unsafe to get
// the maps' pointer values to compare.
func same(a, b Nodes) bool {
 return *(*uintptr)(unsafe.Pointer(&a)) == *(*uintptr)(unsafe.Pointer(&b))
}

```

```

// intsSame determines whether two sets are backed by the same store. In the
// current implementation using hash maps it makes use of the fact that
// hash maps are passed as a pointer to a runtime Hmap struct. A map is
// not seen by the runtime as a pointer though, so we use unsafe to get
// the maps' pointer values to compare.
func intsSame(a,
 b Ints) bool {
 return *(*uintptr)(unsafe.Pointer(&a)) == *(*uintptr)(unsafe.Pointer(&b))
}

```

```

// int64sSame determines whether two sets are backed by the same store. In the
// current implementation using hash maps it makes use of the fact that

```

```
// hash maps are passed as a pointer to a runtime Hmap struct. A map is
// not seen by the runtime as a pointer though, so we use unsafe to get
// the maps' pointer values to compare.
func int64sSame(a, b Int64s) bool {
 return *(*uintptr)(unsafe.Pointer(&a)) == *(*uintptr)(unsafe.Pointer(&b))
}
graph{{diGrap3}{diGrap3}{diGrap3}diGrap7}
graph{{ed_{ed_{ed_}}ed_{ed_}}ed_}
Graph{{Subgr{Subgr}{Subgr}{Subgr}}Subgr}
// Copyright 2018 The Gonum Authors. All rights reserved.
// Use of this source code is governed by a BSD-style
// license that can be found in the LICENSE file.
```

```
package distuv
```

```
import (
 "sort"
 "testing"
```

```
"golang.org/x/exp/rand"
```

```
"gonum.org/v1/gonum/floats"
```

```
)
```

```
func TestInverseGamma(t *testing.T) {
 // Values extracted from a comparison with scipy
 for _, test := range []struct {
 x, alpha, want float64
 }{
 {0.9, 4.5, 0.050521067785046482},
 {0.04, 45, 0.10550644842525572},
 {20, 0.4, 0.0064691988681571536},
 } {
 pdf := InverseGamma{Alpha: test.alpha, Beta: 1}.Prob(test.x)
 if !floats.EqualWithinAbsOrRel(pdf, test.want, 1e-10, 1e-10) {
 t.Errorf("Pdf mismatch. Got %v, want %v", pdf, test.want)
 }
 }
 src := rand.NewSource(1)
 for i, g := range []InverseGamma{
 {Alpha: 5.6, Beta: 0.5, Src: src},
 {Alpha: 30, Beta: 1.7, Src: src},
 {Alpha: 30.2, Beta: 1.7, Src: src},
 } {
 testInverseGamma(t, g, i)
 }
}
```

```

func testInverseGamma(t *testing.T, f InverseGamma, i int) {
 const
 (
 tol = 1e-2
 n = 1e6
 bins = 50
)
 x := make([]float64, n)
 generateSamples(x, f)
 sort.Float64s(x)

 testRandLogProbContinuous(t, i, 0, x, f, tol, bins)
 checkMean(t, i, x, f, tol)
 checkVarAndStd(t, i, x, f, 2e-2)
 checkExKurtosis(t, i, x, f, 2e-1)
 checkProbContinuous(t, i, x, f, 1e-3)
 checkQuantileCDFSurvival(t, i, x, f, 5e-2)
}
graph{""[diGrai=""]}
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package kdtree

import (
 "sort"
 "testing"

 "golang.org/x/exp/rand"
)

type ints []int

func (a ints) Len() int { return len(a) }
func (a ints) Less(i, j int) bool { return a[i] < a[j] }
func (a ints) Slice(s, e int) SortSlicer { return a[s:e] }
func (a ints) Swap(i, j int) { a[i], a[j] = a[j], a[i] }

func TestPartition(t *testing.T) {
 rnd := rand.New(rand.NewSource(1))

 for p := 0; p < 100; p++ {
 list := make(ints, 1e5)
 for i := range list {
 list[i] = rnd.Int()
 }
 pi := Partition(list, rnd.Intn(list.Len()))
 }
}

```

```

for i := 0; i < pi; i++ {
 if list[i] > list[pi] {
 t.Errorf("unexpected partition sort order p[%d] > p[%d]: %d > %d", i, pi, list[i], list[pi])
 }
}
for i := pi + 1; i < len(list); i++ {
 if list[i] <= list[pi] {
 t.Errorf("unexpected partition sort order
p[%d] <= p[%d]: %d <= %d", i, pi, list[i], list[pi])
 }
}
}
}

func TestPartitionCollision(t *testing.T) {
 rnd := rand.New(rand.NewSource(1))

 for p := 0; p < 10; p++ {
 list := make(ints, 10)
 for i := range list {
 list[i] = rnd.Intn(5)
 }
 pi := Partition(list, p)
 for i := 0; i < pi; i++ {
 if list[i] > list[pi] {
 t.Errorf("unexpected partition sort order p[%d] > p[%d]: %d > %d", i, pi, list[i], list[pi])
 }
 }
 for i := pi + 1; i < len(list); i++ {
 if list[i] <= list[pi] {
 t.Errorf("unexpected partition sort order p[%d] <= p[%d]: %d <= %d", i, pi, list[i], list[pi])
 }
 }
 }
}

func sortSelection(list ints, k int) int {
 sort.Sort(list)
 return list[k]
}

func TestSelect(t *testing.T) {
 rnd := rand.New(rand.NewSource(1))

 for k := 0; k < 2121; k++ {
 list := make(ints, 2121)
 for i := range list {
 list[i] = rnd.Intn(1000)
 }
 }
}

```

```

 }
 Select(list, k)
 sorted := append(ints(nil), list...)
 want := sortSelection(sorted, k)
 if list[k] != want {
 t.Errorf("unexpected
result from Select(..., %d): got:%v want:%d", k, list[k], want)
 }
}
}
}

```

```

func TestMedianOfMedians(t *testing.T) {
 rnd := rand.New(rand.NewSource(1))

 list := make(ints, 1e4)
 for i := range list {
 list[i] = rnd.Int()
 }
 p := MedianOfMedians(list)
 med := list[p]
 sort.Sort(list)
 var found bool
 for _, v := range list[len(list)*3/10 : len(list)*7/10+1] {
 if v == med {
 found = true
 break
 }
 }
 if !found {
 t.Error("failed to find median")
 }
}

```

```

func TestMedianOfRandoms(t *testing.T) {
 rnd := rand.New(rand.NewSource(1))

 list := make(ints, 1e4)
 for i := range list {
 list[i] = rnd.Int()
 }
 p := MedianOfRandoms(list, randoms)
 med := list[p]
 sort.Sort(list)
 var found bool
 for _, v := range list[len(list)*3/10 : len(list)*7/10+1] {
 if v == med {
 found = true
 break
 }
 }
}

```



```

 }
}
if !found {
 t.Error("failed to find median")
}
}

var benchSink int

func BenchmarkMedianOfMedians(b *testing.B) {
 rnd := rand.New(rand.NewSource(1))

 for i :=
0; i < b.N; i++ {
 b.StopTimer()
 list := make(ints, 1e4)
 for i := range list {
 list[i] = rnd.Int()
 }
 b.StartTimer()
 benchSink = MedianOfMedians(list)
 }
}

func BenchmarkPartitionMedianOfMedians(b *testing.B) {
 rnd := rand.New(rand.NewSource(1))

 for i := 0; i < b.N; i++ {
 b.StopTimer()
 list := make(ints, 1e4)
 for i := range list {
 list[i] = rnd.Int()
 }
 b.StartTimer()
 benchSink = Partition(list, MedianOfMedians(list))
 }
}

func BenchmarkMedianOfRandoms(b *testing.B) {
 rnd := rand.New(rand.NewSource(1))

 b.StopTimer()
 list := make(ints, 1e4)
 for i := range list {
 list[i] = rnd.Int()
 }
 b.StartTimer()
 for i := 0; i < b.N; i++ {

```

```

 benchSink = MedianOfRandoms(list, list.Len()/1e3)
}
}

func BenchmarkPartitionMedianOfRandoms(b *testing.B) {
 rnd := rand.New(rand.NewSource(1))

 b.StopTimer()
 list := make(ints, 1e4)
 for i := range list {
 list[i] = rnd.Int()
 }
 b.StartTimer()
 for i := 0; i < b.N; i++ {
 benchSink = Partition(list, MedianOfRandoms(list,
list.Len()/1e3))
 }
}
graph{{Dig}Di{Dig}Dig}
graph{{{{d{{d}}}d}}
/** https://github.com/ThePiachu/Golang-Koblitz-elliptic-curve-DSA-library **/

{{Types "BSD-3-Clause"}}

```

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```
graph{<R><T><T><R><T><R><R><T><T><R>}
digraph{{D:_->G:_}D:_->G:_}
graph{{Digraz{Digraz{}}Digrar}Digrax}Digrax}
graph{SUBGRp}
graph{{GRR}GRR}
graph{{{{DI}DI}DI}}
graph{Subgrau}
graph{{{subJ subJ{{{{}}subgO}}>{{{{subgJ}}}}subgO}}_{{{{subgJ}}subgO}}subgJ{{subgO}}
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```

```
package quad
```

```
import (
 "math"
 "testing"

 "gonum.org/v1/gonum/floats"
)
```

```
func TestLegendre(t *testing.T) {
 for i, test := range []struct {
 f func(float64) float64
 min, max float64
 n []int
 tol []float64
 ans float64
 }{
 // Tolerances determined from intuition and a bit of post-hoc tweaking.
 {
 f: func(x float64) float64 { return math.Exp(x) },
 min: -3,
 max: 5,
 n: []int{3, 4, 6, 7, 15, 16, 300, 301},
 tol: []float64{5e-2, 5e-3, 5e-6, 1e-7, 1e-14, 1e-14, 1e-14, 1e-14},
 ans: math.Exp(5) - math.Exp(-3),
 },
 } {
 for j, n := range test.n {
```

```

ans := Fixed(test.f, test.min, test.max, n, Legendre{ }, 0)
if !floats.EqualWithinAbsOrRel(ans, test.ans, test.tol[j], test.tol[j]) {
 t.Errorf("Mismatch. Case = %d, n = %d. Want %v, got %v", i, n, test.ans, ans)
}
ans2 :=
Fixed(test.f, test.min, test.max, n, Legendre{ }, 3)
if !floats.EqualWithinAbsOrRel(ans2, test.ans, test.tol[j], test.tol[j]) {
 t.Errorf("Mismatch concurrent. Case = %d, n = %d. Want %v, got %v", i, n, test.ans, ans)
}
}
}
}
}

```

```

func TestLegendreSingle(t *testing.T) {
for c, test := range []struct {
 n int
 min, max float64
}{
 {
 n: 100,
 min: -1,
 max: 1,
 },
 {
 n: 50,
 min: -3,
 max: -1,
 },
 {
 n: 1000,
 min: 2,
 max: 7,
 },
} {
 l := Legendre{ }
 n := test.n
 xs := make([]float64, n)
 weights := make([]float64, n)
 l.FixedLocations(xs, weights, test.min, test.max)

 xsSingle := make([]float64, n)
 weightsSingle := make([]float64, n)
 for i := range xsSingle {
 xsSingle[i], weightsSingle[i] = l.FixedLocationSingle(n, i, test.min, test.max)
 }
 if !floats.Equal(xs, xsSingle) {
 t.Errorf("Case %d: xs mismatch batch and single", c)
 }
}
}

```

```

if !floats.Equal(weights, weightsSingle) {
 t.Errorf("Case %d: weights mismatch
batch and single", c)
}
}
}
graph{Edg{Edg}{Edg}Edg{Edg}}
graph{N{N{N}{N{N}}N}}
graph{<<gggggg>>}
graph{{stric}{stric}}
graph{{Grapg}Grapg}
graph{{Ea}{Ea}{Ea}{Ea}}
graph{{{Edg2}}Edg2}}
graph{>{{{grap_}}}grap_{{grap_}}}grap_}}}
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// Package stat provides generalized statistical functions.
package stat // import "gonum.org/v1/gonum/stat"
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Modifications and new files
hereafter are still under the Apache 2.0 license, but are not under copyright of
Hootsuite Media Inc.
digraph {SubgraphY}
Gonum LAPACK
[![GoDoc](https://godoc.org/gonum.org/v1/gonum/lapack?status.svg)](https://godoc.org/gonum.org/v1/gonum/lapack)
k)

```

=====

A collection of packages to provide LAPACK functionality for the Go programming language (<http://golang.org>). This provides a partial implementation in native go and a wrapper using cgo to a c-based implementation.

## Installation

...

```
go get gonum.org/v1/gonum/lapack/...
```

...

## Packages

### lapack

Defines the LAPACK API based on <http://www.netlib.org/lapack/lapacke.html>

### lapack/gonum

Go implementation of the LAPACK API (incomplete, implements the `float64` API).

### lapack/lapack64

Wrappers for an implementation of the double (i.e., `float64`) precision real parts of the LAPACK API.

```
graph{no{{no{{no{{no{{no}}no}}no}}no}}
```

```
graph{"\L"\L"
```

```
graph{{noU{noU}{noU}noU}noO{noU{noU}}noO{noU{noU}}}
```

```
graph{{GS{{GS}}GS}}
```

```
graph{"Z\Z"\Z"\Z\Z"
```

```
graph{{{stri1{{stri5}}stri1}}
```

```
graph{{{{DI}}DI{DI}DII}}
```

```
graph{{{STN}STN}STH}
```

```
! $CLASSHG/codes/lapack/random/randomsys1.f90
```

```
program randomsys1
```

```
implicit none
```

```
integer, parameter :: nmax=1000
```

```
real(kind=8), dimension(nmax) :: b, x
```

```
real(kind=8), dimension(nmax,nmax) :: a
```

```
real(kind=8) :: err
```

```
integer :: i, info, lda, ldb, nrhs, n,iter
```

```
integer, dimension(nmax) :: ipiv
```

```
real(kind=8), dimension(84) :: z
```

```
z(1:84) = (/2.3962280929192509D-01, &
```

6.4346010490580374D-01, &  
5.4886677265274941D-01, &  
1.8435046456575191D-01, &  
4.2690013698472401D-01, &  
6.2760930131666248D-01, &  
8.7243363936287288D-02, &  
5.3710399529030350D-01, &  
8.4474604576675638D-01, &  
4.0947669295022632D-01, &  
2.0315141244999760D-01, &  
8.2714283129979482D-01, &  
9.6582843029739029D-01, &  
3.7773539690481128D-01, &  
6.4713340225873406D-01, &  
6.7774351756798612D-01, &  
4.4568905572928591D-01, &  
1.7208265726837521D-01, &  
3.5202074329011412D-01, &  
3.2913965083413110D-01, &  
7.4682622623737438D-01, &  
2.7151044969605542D-01, &  
5.6129178633962351D-01, &  
1.3244294692867761D-01, &  
7.9837660640147112D-01, &  
2.0595995860196409D-01,  
&  
2.6555102564257749D-02, &  
1.9623902644848701D-01, &  
7.8452468963715605D-03, &  
8.2177375597112101D-01, &  
9.4444982187044924D-01, &  
4.6799576958310329D-01, &  
1.1359180530395520D-01, &  
1.6049482525711320D-01, &  
8.4523811016138373D-01, &  
8.5370708147160490D-01, &  
3.0139325968162661D-01, &  
2.5117154067021252D-01, &  
2.0086476380364379D-01, &  
2.6078975734443288D-01, &  
2.5710509100784901D-01, &  
6.2861740244633146D-01, &  
4.7397018497236110D-01, &  
8.6989475348440182D-01, &  
6.4860795895959611D-01, &  
8.8943219043019872D-01, &  
7.9524758401855578D-01, &  
8.8016617212154102D-01, &

```

2.1472721943810300D-01, &
9.5183566464760194D-01, &
7.1911522894148772D-01, &
1.1065249711733080D-01, &
9.5745872307341484D-01, &
6.4694742306793951D-01, &
5.8182607574435841D-01, &
1.2922028370755401D-02, &
2.7617229134380777D-01, &
8.0045359255855852D-01, &
3.2789738555900377D-01, &
5.7940374386642890D-01, &
2.3961554431041750D-02, &
6.6990484757537938D-01, &
1.8144929371280860D-01, &
2.8661849362222419D-01, &
6.5845572125062690D-01,
&
5.8896512277754309D-01, &
6.3697665190607378D-02, &
1.3281935295985961D-01, &
7.4166314172628711D-01, &
5.0033182787066932D-01, &
3.1440772963953763D-02, &
9.9073931564031925D-01, &
3.4236965949145941D-03, &
6.9929220728508257D-01, &
7.5905196170645428D-01, &
2.5421825141163590D-01, &
3.3146571845550887D-01, &
5.7286596840196446D-01, &
9.9158547964144228D-01, &
4.8967497301052382D-01, &
5.6113697207961410D-01, &
6.0641422150435165D-01, &
8.5675901647669139D-02, &
2.5817319326781851D-01/)
n = 21
info = 0

```

```

open(unit = 2,STATUS='REPLACE', file = "gen2tests.txt")
open(unit = 4, STATUS='REPLACE', file = "gen4tests.txt")
open(unit = 3,STATUS='REPLACE', file = "gen3tests.txt")
open(unit = 5,STATUS='REPLACE', file = "gen5tests.txt")

write(2,*) "{"
write(2,'(9999(g0))',advance="no") "z: []float64{"
do i = 1, 4*n

```



```

write (2,'(99999(e24.16,a))',advance="no") z(i), ","
end do
write (2,*) "},"
write(2,*) "n: " ,n","

call dlasq2(n, z, info)

write(2,'(9999(g0))', advance="no")
"zOut: []float64{"
do i = 1, 4*n
write (2,'(99999(e24.16,a))', advance="no") z(i), ","
end do
write (2,*) "},"
write(2,*) "info:", info, ","
write(2,*) "},"

print *, "Done fixed dlasq2"

close(5)
close(3)
close(4)
close(2)

! For random tests
n = 21

open(unit = 2, STATUS='REPLACE', file = "gen2tests.txt")
open(unit = 4, STATUS='REPLACE', file = "gen4tests.txt")
open(unit = 3, STATUS='REPLACE', file = "gen3tests.txt")
open(unit = 5, STATUS='REPLACE', file = "gen5tests.txt")

do iter = 1, 2

call random_number(z(1:4*n))

write(2,*) "{"
write(2,'(9999(g0))', advance="no") "z: []float64{"
do i = 1, 4*n
write (2,'(99999(e24.16,a))', advance="no") z(i), ","
end do
write (2,*) "},"
write(2,*) "n: " ,n","

call dlasq2(n, z, info)

write(2,'(9999(g0))', advance="no") "zOut: []float64{"
do i = 1, 4*n

```

```

 write (2,'(99999(e24.16,a))', advance="no") z(i), ", "
end do
write (2,*) "},"
write(2,*) "info:", info, ", "
write(2,*) "},"

print *, "Done with dlasq2"

end do

close(5)
close(3)
close(4)
close(2)

end
program randomsys1
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// license that can be found in the LICENSE file.

package testblas

import (
 "testing"

 "gonum.org/v1/gonum/blas"
 "gonum.org/v1/gonum/floats"
)

type Dsymver interface {
 Dsymv(ul blas.Uplo, n int, alpha float64, a []float64, lda int, x []float64, incX int, beta float64, y []float64, incY int)
}

func DsymvTest(t *testing.T, blasser Dsymver) {
 for i, test := range []struct {
 ul blas.Uplo
 n int
 a []float64
 x []float64
 y []float64
 alpha float64
 beta float64
 ans []float64
 }{
 {
 ul: blas.Upper,
 n: 3,

```

```

a: [][]float64{
 {5, 6, 7},
 {0, 8, 10},
 {0, 0, 13},
},
x: []float64{3, 4, 5},
y: []float64{6, 7, 8},
alpha: 2.1,
beta: -3,
ans: []float64{137.4, 189, 240.6},
},
{
 ul: blas.Lower,
 n: 3,
 a: [][]float64{
 {5, 0, 0},
 {6, 8, 0},
 {7, 10, 13},
 },
 x: []float64{3,
4, 5},
 y: []float64{6, 7, 8},
 alpha: 2.1,
 beta: -3,
 ans: []float64{137.4, 189, 240.6},
},
} {
 incTest := func(incX, incY, extra int) {
 x := makeIncremented(test.x, incX, extra)
 y := makeIncremented(test.y, incY, extra)
 aFlat := flatten(test.a)
 ans := makeIncremented(test.ans, incY, extra)

 blasser.Dsymv(test.ul, test.n, test.alpha, aFlat, test.n, x, incX, test.beta, y, incY)
 if !floats.EqualApprox(ans, y, 1e-14) {
 t.Errorf("Case %v, incX=%v, incY=%v: Want %v, got %v.", i, incX, incY, ans, y)
 }
 }
 incTest(1, 1, 0)
 incTest(2, 3, 0)
 incTest(3, 2, 0)
 incTest(-3, 2, 0)
 incTest(-2, 4, 0)
 incTest(2, -1, 0)
 incTest(-3, -4, 3)
}
}

```

```

graph{{StricW{StricW}StricW{StricW}}StricP}
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package testlapack

import (
 "math"
 "testing"

 "golang.org/x/exp/rand"

 "gonum.org/v1/gonum/floats"
)

type Dorglqer interface {
 Dorgl2er
 Dorglq(m, n, k int, a []float64, lda int, tau, work []float64, lwork int)
}

func DorglqTest(t *testing.T, impl Dorglqer) {
 rnd := rand.New(rand.NewSource(1))
 // TODO(btracey): Base tests off of nb and nx.
 for _, test := range []struct{ m, n, k, lda int }{
 {10, 10, 10, 0},
 {10, 10, 10, 20},
 {10, 30, 10, 0},
 {20, 30, 10, 0},

 {100, 100, 100, 0},
 {100, 100, 50, 0},
 {100, 130, 100, 0},
 {100, 130, 50, 0},
 {100, 100, 100, 150},
 {100, 100, 50, 150},
 {100, 130, 100, 150},
 {100, 130, 50, 150},

 {200, 200, 200, 0},
 {200, 200, 150, 0},
 {200, 230, 200, 0},
 {200, 230, 150, 0},
 {200, 200, 200, 250},
 {200, 200, 150, 250},
 {200, 230, 200, 250},
 {200, 230, 150,

```

```

250},
} {
m := test.m
n := test.n
k := test.k
lda := test.lda
if lda == 0 {
lda = n
}
a := make([]float64, m*lda)
for i := range a {
a[i] = rnd.Float64()
}
work := make([]float64, 1)
tau := make([]float64, m)
for i := range tau {
tau[i] = math.NaN()
}
// Compute LQ factorization.
impl.Dgelqf(m, n, a, lda, tau, work, -1)
work = make([]float64, int(work[0]))
impl.Dgelqf(m, n, a, lda, tau, work, len(work))

aUnblocked := make([]float64, len(a))
copy(aUnblocked, a)
for i := range work {
work[i] = math.NaN()
}
impl.Dorgl2(m, n, k, aUnblocked, lda, tau, work)
// make sure work isn't used before initialized
for i := range work {
work[i] = math.NaN()
}
impl.Dorglq(m, n, k, a, lda, tau, work, len(work))
if !floats.EqualApprox(a, aUnblocked, 1e-10) {
t.Errorf("Q Mismatch. m = %d, n = %d, k = %d, lda = %d", m, n, k, lda)
}
}
}
}
graph{{GrG{}GrC{}}
graph{{{{{{Gra_}Gra_}Gra_}Gra_}Gra_}
graph{{Dig5{}Dig5}
graph{{{{{{digra4}{{digra4}digra4{digra4}{{digra4}}}}}
graph{{NOZ{NOZ{NOZ}}}
graph{{{{EDX}EDI{EDX}EDI}{{EDX}EDI}
// SPDX-License-Identifier: Unlicense OR MIT

// Package material implements the Material design.

```

```

//
// To maximize reusability and visual flexibility, user interface controls are
// split into two parts: the stateful widget and the stateless drawing of it.
//
// For example, widget.Button encapsulates the state and event
// handling of all buttons, while the Theme can draw a single Button
// in various styles.
//
// This snippet defines a button that prints a message when clicked:
//
// var gtx *layout.Context
// button := new(widget.Button)
//
// for button.Clicked(gtx) {
// fmt.Println("Clicked!")
// }
//
// Use a Theme to draw the button:
//
// theme := material.NewTheme(...)
//
// th.Button("Click me!").Layout(gtx, button)
//
// Customization
//
// Quite often, a program needs to customize the theme provided defaults. Several
// options are available, depending on the nature of the change:
//
// Mandatory parameters: Some parameters are not part of the
// widget state but
// have no obvious default. In the program above, the button text is a
// parameter to the Theme.Button method.
//
// Theme-global parameters: For changing the look of all widgets drawn with a
// particular theme, adjust the `Theme` fields:
//
// theme.Color.Primary = color.RGBA{...}
//
// Widget-local parameters: For changing the look of a particular widget,
// adjust the widget specific theme object:
//
// btn := th.Button("Click me!")
// btn.Font.Style = text.Italic
// btn.Layout(gtx)
//
// Widget variants: A widget can have several distinct representations even
// though the underlying state is the same. A widget.Button can be drawn as a
// round icon button:

```

```

//
// icon := material.NewIcon(...)
//
// th.IconButton(icon).Layout(gtx, button)
//
// Specialized widgets: Theme both define a generic Label method
// that takes a text size, and specialized methods for standard text
// sizes such as Theme.H1 and Theme.Body2.
package material
Graph{SubgrK{{{SubgrN}SubgrN}{SubgrN}}}}
graph{{STRI8{STRI8}STRI4}STRI8{STRI8}STRI4}
graph{{{grapJ{grapQ}{grapJ{grapJ{grapQ}}}}}}
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package functions

import (
 "math"
 "testing"

 "gonum.org/v1/gonum/diff/fd"
 "gonum.org/v1/gonum/floats"
)

// function represents an objective function.
type function interface {
 Func(x []float64) float64
}

type gradient interface {
 Grad(grad, x []float64) []float64
}

// minimumer is an objective function that can also provide information about
// its minima.
type minimumer interface {
 function

 // Minima returns _known_ minima of the function.
 Minima() []Minimum
}

// Minimum represents information about an optimal location of a function.
type Minimum struct {
 // X is the location of the minimum. X may not be nil.
 X []float64

```

```

// F is the value of the objective function at X.
F float64
// Global indicates if the location is a global minimum.
Global bool
}

type funcTest struct {
 X []float64

 // F is the expected
 function value at X.
 F float64
 // Gradient is the expected gradient at X. If nil, it is not evaluated.
 Gradient []float64
}

// TODO(vladimir-ch): Decide and implement an exported testing function:
// func Test(f Function, ???) ??? {
// }

const (
 defaultTol = 1e-12
 defaultGradTol = 1e-9
 defaultFDGradTol = 1e-5
)

// testFunction checks that the function can evaluate itself (and its gradient)
// correctly.
func testFunction(f function, ftests []funcTest, t *testing.T) {
 // Make a copy of tests because we may append to the slice.
 tests := make([]funcTest, len(ftests))
 copy(tests, ftests)

 // Get information about the function.
 fMinima, isMinimizer := f.(minimizer)
 fGradient, isGradient := f.(gradient)

 // If the function is a Minimizer, append its minima to the tests.
 if isMinimizer {
 for _, minimum := range fMinima.Minima() {
 // Allocate gradient only if the function can evaluate it.
 var grad []float64
 if isGradient {
 grad = make([]float64, len(minimum.X))
 }
 tests
 }
 }
 = append(tests, funcTest{
 X: minimum.X,

```



```

 F: minimum.F,
 Gradient: grad,
 })
}
}

for i, test := range tests {
 F := f.Func(test.X)

 // Check that the function value is as expected.
 if math.Abs(F-test.F) > defaultTol {
 t.Errorf("Test #%d: function value given by Func is incorrect. Want: %v, Got: %v",
 i, test.F, F)
 }

 if test.Gradient == nil {
 continue
 }

 // Evaluate the finite difference gradient.
 fdGrad := fd.Gradient(nil, f.Func, test.X, &fd.Settings{
 Formula: fd.Central,
 Step: 1e-6,
 })

 // Check that the finite difference and expected gradients match.
 if !floats.EqualApprox(fdGrad, test.Gradient, defaultFDGradTol) {
 dist := floats.Distance(fdGrad, test.Gradient, math.Inf(1))
 t.Errorf("Test #%d: numerical and expected gradients do not match. |fdGrad - WantGrad|_ = %v",
 i, dist)
 }

 // If the function is a Gradient, check that it computes the gradient correctly.
 if isGradient
 {
 grad := make([]float64, len(test.Gradient))
 fGradient.Grad(grad, test.X)

 if !floats.EqualApprox(grad, test.Gradient, defaultGradTol) {
 dist := floats.Distance(grad, test.Gradient, math.Inf(1))
 t.Errorf("Test #%d: gradient given by Grad is incorrect. |grad - WantGrad|_ = %v",
 i, dist)
 }
 }
}
graph{STR{STR{STR}STR}}

```

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```
package mat_test
```

```
import (
```

```
 "fmt"
```

```
 "log"
```

```
 "gonum.org/v1/gonum/mat"
```

```
)
```

```
func ExampleEigenSym() {
```

```
 a := mat.NewSymDense(2, []float64{
```

```
 7, 0.5,
```

```
 0.5, 1,
```

```
 })
```

```
 fmt.Printf("A = %v\n\n", mat.Formatted(a, mat.Prefix(" ")))
```

```
 var eigsym mat.EigenSym
```

```
 ok := eigsym.Factorize(a, true)
```

```
 if !ok {
```

```
 log.Fatal("Symmetric eigendecomposition failed")
```

```
 }
```

```
 fmt.Printf("Eigenvalues of A:\n%1.3f\n\n", eigsym.Values(nil))
```

```
 var ev mat.Dense
```

```
 eigsym.VectorsTo(&ev)
```

```
 fmt.Printf("Eigenvectors of A:\n%1.3f\n\n", mat.Formatted(&ev))
```

```
// Output:
```

```
// A = 7 0.5
```

```
// 0.5 1
```

```
//
```

```
// Eigenvalues of A:
```

```
// [0.959 7.041]
```

```
//
```

```
// Eigenvectors of A:
```

```
// 0.082 -0.997
```

```
// -0.997 -0.082
```

```
//
```

```
}
```

```
func ExampleEigen() {
```

```
 a := mat.NewDense(2, 2, []float64{
```

```
 1, -1,
```

```
 1, 1,
```

```

})
fmt.Printf("A = %v\n\n", mat.Formatted(a, mat.Prefix(" ")))

var eig mat.Eigen
ok
:= eig.Factorize(a, mat.EigenLeft)
if !ok {
 log.Fatal("Eigendecomposition failed")
}
fmt.Printf("Eigenvalues of A:\n%v\n", eig.Values(nil))

// Output:
// A = 1 -1
// 1 1
//
// Eigenvalues of A:
// [(1+1i) (1-1i)]
}
graph{{digrP{{digrA}digrP}digrA}digrP{digrA{digrA}}}}
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package mat

import (
 "gonum.org/v1/gonum/blas"
 "gonum.org/v1/gonum/blas/blas64"
 "gonum.org/v1/gonum/internal/asm/f64"
)

// Inner computes the generalized inner product
// x A y
// between the vectors x and y with matrix A, where x and y are treated as
// column vectors.
//
// This is only a true inner product if A is symmetric positive definite, though
// the operation works for any matrix A.
//
// Inner panics if x.Len() != m or y.Len() != n when A is an m x n matrix.
func Inner(x Vector, a Matrix, y Vector) float64 {
 m, n := a.Dims()
 if x.Len() != m {
 panic(ErrShape)
 }
 if y.Len() != n {
 panic(ErrShape)
 }
}

```

```

if m == 0 || n == 0 {
 return 0
}

var sum float64

switch a := a.(type) {
case RawSymmetrizer:
 amat := a.RawSymmetric()
 if amat.Uplo != blas.Upper {
 // Panic as a string not a mat.Error.
 panic(badSymTriangle)
 }
 var
 xmat, ymat blas64.Vector
 if xrv, ok := x.(RawVectorer); ok {
 xmat = xrv.RawVector()
 } else {
 break
 }
 if yrv, ok := y.(RawVectorer); ok {
 ymat = yrv.RawVector()
 } else {
 break
 }
 for i := 0; i < x.Len(); i++ {
 xi := x.AtVec(i)
 if xi != 0 {
 if ymat.Inc == 1 {
 sum += xi * f64.DotUnitary(
 amat.Data[i*amat.Stride+i:amat.Stride+n],
 ymat.Data[i:],
)
 } else {
 sum += xi * f64.DotInc(
 amat.Data[i*amat.Stride+i:amat.Stride+n],
 ymat.Data[i*ymat.Inc:], uintptr(n-i),
 1, uintptr(ymat.Inc),
 0, 0,
)
 }
 }
 yi := y.AtVec(i)
 if i != n-1 && yi != 0 {
 if xmat.Inc == 1 {
 sum += yi * f64.DotUnitary(
 amat.Data[i*amat.Stride+i+1:amat.Stride+n],
 xmat.Data[i+1:],

```

```

)
 } else {
 sum += yi * f64.DotInc(
 amat.Data[i*amat.Stride+i+1:i*amat.Stride+n],
 xmat.Data[(i+1)*xmat.Inc:], uintptr(n-i-1),
 1, uintptr(xmat.Inc),
 0, 0,
)
 }
}
}
return
sum
case RawMatrixer:
 amat := a.RawMatrix()
 var ymat blas64.Vector
 if yrv, ok := y.(RawVectorer); ok {
 ymat = yrv.RawVector()
 } else {
 break
 }
 for i := 0; i < x.Len(); i++ {
 xi := x.AtVec(i)
 if xi != 0 {
 if ymat.Inc == 1 {
 sum += xi * f64.DotUnitary(
 amat.Data[i*amat.Stride:i*amat.Stride+n],
 ymat.Data,
)
 } else {
 sum += xi * f64.DotInc(
 amat.Data[i*amat.Stride:i*amat.Stride+n],
 ymat.Data, uintptr(n),
 1, uintptr(ymat.Inc),
 0, 0,
)
 }
 }
 }
 return sum
}
for i := 0; i < x.Len(); i++ {
 xi := x.AtVec(i)
 for j := 0; j < y.Len(); j++ {
 sum += xi * a.At(i, j) * y.AtVec(j)
 }
}
return sum

```

```

}
graph{diV{{diY}}diV}
graph{{Dig}{Dig}Dig{Dig}{Dig}{{}}Dig{Dig}{Dig}{{Dig}{Dig}Dig}{Dig}Dig{Dig}{Dig}Dig}
graph{STRU{STRW{STRW}{STRW}STRW}}
graph{{SubGrag}SubGrag}
graph{SubGE{{SubGE{SubGZ}SubGE{SubGZ}}}}
graph{{{Stricy{Stricy{{Stricy}}Stricy}{Stricy}}Stricy}}
graph{{ST_{{ST_}}}}
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// Package distmat provides probability distributions over matrices.
package distmat // import "gonum.org/v1/gonum/stat/distmat"
graph{{DIGR}}
graph{{DIGRAe}{DIGRAe{{DIGRAe{DIGRAe}}DIGRAe}}DIGRAe}
graph{"\3\3\3"}
graph{{DigrapC}DigrapC}
graph{{{EDGD{EDGD}}EDGD{EDGD}}}}
graph{{{g{g}{g}}}}
graph{{{STRIr{STRIr{{STRIr{STRIr}}STRIr}}}}STRIr}}
graph{diV{{{{{{diY}{diY}}}{diY}}{diY}}{diY}}diV}}diY}}diV}
graph{Eh{Eh}}
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package testlapack

import (
 "math"
 "testing"

 "golang.org/x/exp/rand"

 "gonum.org/v1/gonum/floats"
)

type Dlargtger interface {
 Dlargt(f, g float64) (cs, sn, r float64)
}

func DlargtgerTest(t *testing.T, impl Dlargtger) {
 const tol = 1e-14
 // safmn2 and safmx2 are copied from native.Dlargtger.
 // safmn2 ~ 2*10^{-146}
 safmn2 := math.Pow(dlamchB, math.Trunc(math.Log(dlamchS/dlamchE)/math.Log(dlamchB)/2))
 // safmx2 ~ 5*10^{145}

```

```

safmx2 := 1 / safmn2
rnd := rand.New(rand.NewSource(1))
for i := 0; i < 1000; i++ {
 // Generate randomly huge, tiny, and "normal" input arguments to Dlartg.
 var f float64
 var fHuge bool
 switch rnd.Intn(3) {
 case 0:
 // Huge f.
 fHuge = true
 // scale is in the range (10^{-10}, 10^{10}].
 scale := math.Pow(10, 10-20*rnd.Float64())
 // f is in the range (5*10^{135}, 5*10^{155}].
 f = scale
 * safmx2
 case 1:
 // Tiny f.
 // f is in the range (2*10^{-156}, 2*10^{-136}].
 f = math.Pow(10, 10-20*rnd.Float64()) * safmn2
 default:
 f = rnd.NormFloat64()
 }
 if rnd.Intn(2) == 0 {
 // Sometimes change the sign of f.
 f *= -1
 }

 var g float64
 var gHuge bool
 switch rnd.Intn(3) {
 case 0:
 // Huge g.
 gHuge = true
 g = math.Pow(10, 10-20*rnd.Float64()) * safmx2
 case 1:
 // Tiny g.
 g = math.Pow(10, 10-20*rnd.Float64()) * safmn2
 default:
 g = rnd.NormFloat64()
 }
 if rnd.Intn(2) == 0 {
 g *= -1
 }

 // Generate a plane rotation so that
 // [cs sn] * [f] = [r]
 // [-sn cs] [g] = [0]
 cs, sn, r := impl.Dlartg(f, g)

```

```

// Check that the first equation holds.
rWant := cs*f + sn*g
if !floats.EqualWithinAbsOrRel(math.Abs(rWant), math.Abs(r), tol, tol) {
 t.Errorf("Case f=%v,g=%v: unexpected r. Want %v, got %v", f, g, rWant, r)
}
// Check that cs and sn define a plane rotation. The 22 matrix
// has orthogonal columns by
construction, so only check that
// the columns/rows have unit norm.
oneTest := cs*cs + sn*sn
if math.Abs(oneTest-1) > tol {
 t.Errorf("Case f=%v,g=%v: expected cs^2+sn^2==1, got %v", f, g, oneTest)
}
if !fHuge && !gHuge {
 // Check that the second equation holds.
 // If both numbers are huge, cancellation errors make
 // this test unreliable.
 zeroTest := -sn*f + cs*g
 if math.Abs(zeroTest) > tol {
 t.Errorf("Case f=%v,g=%v: expected zero, got %v", f, g, zeroTest)
 }
}
// Check that cs is positive as documented.
if math.Abs(f) > math.Abs(g) && cs < 0 {
 t.Errorf("Case f=%v,g=%v: unexpected negative cs %v", f, g, cs)
}
}
// Check other documented special cases.
for i := 0; i < 100; i++ {
 cs, sn, _ := impl.Dlartg(rnd.NormFloat64(), 0)
 if cs != 1 {
 t.Errorf("Unexpected cs for g=0. Want 1, got %v", cs)
 }
 if sn != 0 {
 t.Errorf("Unexpected sn for g=0. Want 0, got %v", sn)
 }
}
for i := 0; i < 100; i++ {
 cs, sn, _ := impl.Dlartg(0,
 rnd.NormFloat64())
 if cs != 0 {
 t.Errorf("Unexpected cs for f=0. Want 0, got %v", cs)
 }
 if sn != 1 {
 t.Errorf("Unexpected sn for f=0. Want 1, got %v", sn)
 }
}
}

```



```
}
graph{ _3_2_7_9_9_6{_5_5_9_4_4}{ {_2_3_4_2_3_4_2_3_4_2_3_4_2_3_4_2_3_4}_1"" }{} }}

/** github.com/gyuho/learn@v0.0.0-20170111014222-d7ea19cb9a88 **/

{ {Types "CC-BY-4.0"} }
```

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International License</a>.

```
Graph{{{SubgrN}{SubgrN}SubgrN}{SubgrN}SubgrK{{ {{SubgrN}{SubgrN}SubgrN}{SubgrN}}}
graph{{STRIr}}
graph{{nodU{nodU}{nodU}{nodU}}}
graph{SubGrB}
graph{{ {{{{edgN{{edgN}}edgJ}}edgJ}}}
graph{{DiGra{{DiGra{DiGra}}DiGra{DiGra}}DiGra}}
graph{Stric_
graph{NO3{NO5{NO3{NO5{NO5}}NO5}}}
graph{g{{g{{g}}g}}g}
graph{St5{St5{St1}St1}}
```

// Code generated by "go generate gonum.org/v1/gonum/unit/constant; DO NOT EDIT.

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// license that can be found in the LICENSE file.

```
package constant
```

```
import (
 "fmt"
```

```
"gonum.org/v1/gonum/unit"
```

)  
  
// Boltzmann is the Boltzmann constant (k), it relates the average relative kinetic energy of particles in a gas with the temperature of the gas.  
// The dimensions of Boltzmann are kg m^2 K^-1 s^-2. The constant is exact.  
const Boltzmann = boltzmannUnits(1.380649e-23)

```
type boltzmannUnits float64
```

```
// Unit converts the boltzmannUnits to a *unit.Unit
func (cnst boltzmannUnits) Unit() *unit.Unit {
return unit.New(float64(cnst), unit.Dimensions{
 unit.MassDim: 1,
 unit.LengthDim: 2,
 unit.TimeDim: -2,
 unit.TemperatureDim:-1,
```

```

}))
}

func (cnst boltzmannUnits) Format(fs fmt.State, c rune) {
 switch c {
 case 'v':
 if fs.Flag('#') {
 fmt.Fprintf(fs, "%T(%v)", cnst,
float64(cnst))
 return
 }
 fallthrough
 case 'e', 'E', 'f', 'F', 'g', 'G':
 p, pOk := fs.Precision()
 w, wOk := fs.Width()
 switch {
 case pOk && wOk:
 fmt.Fprintf(fs, "%*.*"+string(c), w, p, cnst.Unit())
 case pOk:
 fmt.Fprintf(fs, "%.*"+string(c), p, cnst.Unit())
 case wOk:
 fmt.Fprintf(fs, "%*"+string(c), w, cnst.Unit())
 default:
 fmt.Fprintf(fs, "%"+string(c), cnst.Unit())
 }
 default:
 fmt.Fprintf(fs, "%%!"+string(c)+"(constant.boltzmannUnits=%v kg m^2 K^-1 s^-2)", float64(cnst))
 }
}

graph{{Se}}
graph{{SubG1}{SubG1}{SubG1}{SubG1}SubG1}{SubG1}}
graph{nod-9nod}
Graph{Grap[]Grap[]Grap[]Grap[]Grap[]Grap[]Grap}
// Code generated by gocc; DO NOT EDIT.

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//
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// Universal Public Domain Dedication.

package util

import (

```

```

"fmt"
"strconv"
"unicode"
"unicode/utf8"
)

/* Interface */

/*
Convert the literal value of a scanned token to rune
*/
func RuneValue(lit []byte) rune {
 if lit[1] == '\\' {
 return escapeCharVal(lit)
 }
 r, size := utf8.DecodeRune(lit[1:])
 if size != len(lit)-2 {
 panic(fmt.Sprintf("Error decoding rune. Lit: %s, rune: %d, size%d\n", lit, r, size))
 }
 return r
}

/*
Convert the literal value of a scanned token to int64
*/
func IntValue(lit []byte) (int64, error) {
 return strconv.ParseInt(string(lit), 10, 64)
}

/*
Convert the literal value of a scanned token
to uint64
*/
func UintValue(lit []byte) (uint64, error) {
 return strconv.ParseUint(string(lit), 10, 64)
}

/* Util */

func escapeCharVal(lit []byte) rune {
 var i, base, max uint32
 offset := 2
 switch lit[offset] {
 case 'a':
 return '\a'
 case 'b':
 return '\b'
 case 'f':

```

```

 return '\f'
case 'n':
 return '\n'
case 'r':
 return '\r'
case 't':
 return '\t'
case 'v':
 return '\v'
case '\\':
 return '\\'
case '\"':
 return '\"'
case '0', '1', '2', '3', '4', '5', '6', '7':
 i, base, max = 3, 8, 255
case 'x':
 i, base, max = 2, 16, 255
 offset++
case 'u':
 i, base, max = 4, 16, unicode.MaxRune
 offset++
case 'U':
 i, base, max = 8, 16, unicode.MaxRune
 offset++
default:
 panic(fmt.Sprintf("Error decoding character literal: %s\n", lit))
}

var x uint32
for ; i > 0 && offset < len(lit)-1; i-- {
 ch, size := utf8.DecodeRune(lit[offset:])
 offset += size
 d := uint32(digitVal(ch))
 if d >= base {
 panic(fmt.Sprintf("charVal(%s): illegal character (%c)
in escape sequence. size=%d, offset=%d", lit, ch, size, offset))
 }
 x = x*base + d
}
if x > max || 0xD800 <= x && x < 0xE000 {
 panic(fmt.Sprintf("Error decoding escape char value. Lit:%s, offset:%d, escape sequence is invalid Unicode code
point\n", lit, offset))
}

return rune(x)
}

func digitVal(ch rune) int {

```

```

switch {
case '0' <= ch && ch <= '9':
 return int(ch) - '0'
case 'a' <= ch && ch <= 'f':
 return int(ch) - 'a' + 10
case 'A' <= ch && ch <= 'F':
 return int(ch) - 'A' + 10
}
return 16 // larger than any legal digit val
}
graph{STR_}
// Code generated by "go generate gonum.org/v1/gonum/unit; DO NOT EDIT.

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// Use of this source code is governed by a BSD-style
// license that can be found in the LICENSE file.

package unit

import (
 "errors"
 "fmt"
 "math"
 "unicode/utf8"
)

// Acceleration represents an acceleration in metres per second squared.
type Acceleration float64

// Unit converts the Acceleration to a *Unit
func (a Acceleration) Unit() *Unit {
 return New(float64(a), Dimensions{
 LengthDim: 1,
 TimeDim: -2,
 })
}

// Acceleration allows Acceleration to implement a Accelerationer interface
func (a Acceleration) Acceleration() Acceleration {
 return a
}

// From converts the unit into the receiver. From returns an
// error if there is a mismatch in dimension
func (a *Acceleration) From(u Uniter) error {
 if !DimensionsMatch(u, Acceleration(0)) {
 *a = Acceleration(math.NaN())
 return errors.New("Dimension mismatch")
 }
}

```

```

}
*a = Acceleration(u.Unit().Value())
return
nil
}

func (a Acceleration) Format(fs fmt.State, c rune) {
switch c {
case 'v':
if fs.Flag('#') {
fmt.Fprintf(fs, "%T(%v)", a, float64(a))
return
}
fallthrough
case 'e', 'E', 'f', 'F', 'g', 'G':
p, pOk := fs.Precision()
w, wOk := fs.Width()
const unit = " m s^-2"
switch {
case pOk && wOk:
fmt.Fprintf(fs, "%*.*"+string(c), pos(w-utf8.RuneCount([]byte(unit))), p, float64(a))
case pOk:
fmt.Fprintf(fs, "%.*"+string(c), p, float64(a))
case wOk:
fmt.Fprintf(fs, "%*"+string(c), pos(w-utf8.RuneCount([]byte(unit))), float64(a))
default:
fmt.Fprintf(fs, "%"+string(c), float64(a))
}
fmt.Fprint(fs, unit)
default:
fmt.Fprintf(fs, "%%!%c(%T=%g m s^-2)", c, a, float64(a))
}
}
graph{{SUBG_}SUBG_{SUBG_}{SUBG_}{SUBG_}{SUBG_}}
graph{{nod_}nod_}
// Code generated by "go generate gonum.org/v1/gonum/unit/constant; DO NOT EDIT.

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package constant

import (
 "fmt"
 "testing"
)

```

```

func TestAvogadroFormat(t *testing.T) {
 for _, test := range []struct {
 format string
 want string
 }{
 {"%v", "6.02214076e+23 mol^-1"},
 {"%.1v", "6e+23 mol^-1"},
 {"%50.1v", "6.02214076e+23 mol^-1"},
 {"%50v", "6.02214076e+23 mol^-1"},
 {"%1v", "6.02214076e+23 mol^-1"},
 {"%#v", "constant.avogadroUnits(6.02214076e+23)"},
 {"%s", "%!s(constant.avogadroUnits=6.02214076e+23 mol^-1)"},
 } {
 got := fmt.Sprintf(test.format, Avogadro)
 if got != test.want {
 t.Errorf("Format %q: got: %q want: %q", test.format, got, test.want)
 }
 }
}

graph{{EdgU}{EdgW}{EdgW}}
graph{GrapA{GrapA}}
graph{"\n"}
graph{{{digra}}digY{{{digra}}}}
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package distuv

import (
 "math"

 "golang.org/x/exp/rand"
)

// Bernoulli represents a random variable whose value is 1 with probability p and
// value of zero with probability 1-P. The value of P must be between 0 and 1.
// More information at https://en.wikipedia.org/wiki/Bernoulli_distribution.
type Bernoulli struct {
 P float64
 Src rand.Source
}

// CDF computes the value of the cumulative density function at x.
func (b Bernoulli) CDF(x float64) float64 {
 if x < 0 {
 return 0
 }
}

```

```

if x < 1 {
 return 1 - b.P
}
return 1
}

// Entropy returns the entropy of the distribution.
func (b Bernoulli) Entropy() float64 {
 if b.P == 0 {
 return 0
 }
 if b.P == 1 {
 return 1
 }
 q := 1 - b.P
 return -b.P*math.Log(b.P) - q*math.Log(q)
}

// ExKurtosis returns the excess kurtosis of the distribution.
func (b Bernoulli) ExKurtosis()
float64 {
 pq := b.P * (1 - b.P)
 return (1 - 6*pq) / pq
}

// LogProb computes the natural logarithm of the value of the probability density function at x.
func (b Bernoulli) LogProb(x float64) float64 {
 if x == 0 {
 return math.Log(1 - b.P)
 }
 if x == 1 {
 return math.Log(b.P)
 }
 return math.Inf(-1)
}

// Mean returns the mean of the probability distribution.
func (b Bernoulli) Mean() float64 {
 return b.P
}

// Median returns the median of the probability distribution.
func (b Bernoulli) Median() float64 {
 p := b.P
 switch {
 case p < 0.5:
 return 0
 case p > 0.5:

```



```

 return 1
default:
 return 0.5
}
}

// NumParameters returns the number of parameters in the distribution.
func (Bernoulli) NumParameters() int {
 return 1
}

// Prob computes the value of the probability distribution at x.
func (b Bernoulli) Prob(x float64) float64 {
 return math.Exp(b.LogProb(x))
}

// Quantile returns the inverse of the cumulative probability distribution.
func (b Bernoulli) Quantile(p float64)
float64 {
 if p < 0 || 1 < p {
 panic(badPercentile)
 }
 if p < 1-b.P {
 return 0
 }
 return 1
}

// Rand returns a random sample drawn from the distribution.
func (b Bernoulli) Rand() float64 {
 var rnd float64
 if b.Src == nil {
 rnd = rand.Float64()
 } else {
 rnd = rand.New(b.Src).Float64()
 }
 if rnd < b.P {
 return 1
 }
 return 0
}

// Skewness returns the skewness of the distribution.
func (b Bernoulli) Skewness() float64 {
 return (1 - 2*b.P) / math.Sqrt(b.P*(1-b.P))
}

// StdDev returns the standard deviation of the probability distribution.

```

```

func (b Bernoulli) StdDev() float64 {
 return math.Sqrt(b.Variance())
}

// Survival returns the survival function (complementary CDF) at x.
func (b Bernoulli) Survival(x float64) float64 {
 return 1 - b.CDF(x)
}

// Variance returns the variance of the probability distribution.
func (b Bernoulli) Variance() float64 {
 return b.P * (1 - b.P)
}
graph{eD{eD""eD""eD""eD""eN}eD""eD""eD""eD""eN}
graph{{DIGG}DIGG{ }DIGG{DIGG} }DIGG{ }DIGG{DIGG} }
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// license that can be found in the LICENSE file.

package testlapack

import (
 "testing"

 "golang.org/x/exp/rand"

 "gonum.org/v1/gonum/blas"
 "gonum.org/v1/gonum/blas/blas64"
 "gonum.org/v1/gonum/floats"
)

type Dorml2er interface {
 Dgelqfer
 Dorml2(side blas.Side, trans blas.Transpose, m, n, k int, a []float64, lda int, tau, c []float64, ldc int, work []float64)
}

func Dorml2Test(t *testing.T, impl Dorml2er) {
 rnd := rand.New(rand.NewSource(1))
 // TODO(btracey): This test is not complete, because it
 // doesn't test individual values of m, n, and k, instead only testing
 // a specific subset of possible k values.
 for _, side := range []blas.Side{blas.Left, blas.Right} {
 for _, trans := range []blas.Transpose{blas.NoTrans, blas.Trans} {
 for _, test := range []struct {
 common, adim, cdim, lda, ldc int
 }{
 {3, 4, 5, 0, 0},
 {3, 5, 4, 0, 0},
 } {

```

```

 {4, 3,
5, 0, 0},
 {4, 5, 3, 0, 0},
 {5, 3, 4, 0, 0},
 {5, 4, 3, 0, 0},

 {3, 4, 5, 6, 20},
 {3, 5, 4, 6, 20},
 {4, 3, 5, 6, 20},
 {4, 5, 3, 6, 20},
 {5, 3, 4, 6, 20},
 {5, 4, 3, 6, 20},
 {3, 4, 5, 20, 6},
 {3, 5, 4, 20, 6},
 {4, 3, 5, 20, 6},
 {4, 5, 3, 20, 6},
 {5, 3, 4, 20, 6},
 {5, 4, 3, 20, 6},
} {
var ma, na, mc, nc int
if side == blas.Left {
 ma = test.adim
 na = test.common
 mc = test.common
 nc = test.cdim
} else {
 ma = test.adim
 na = test.common
 mc = test.cdim
 nc = test.common
}
// Generate a random matrix
lda := test.lda
if lda == 0 {
 lda = na
}
a := make([]float64, ma*lda)
for i := range a {
 a[i] = rnd.Float64()
}
ldc := test.ldc
if ldc == 0 {
 ldc = nc
}
// Compute random C matrix
c := make([]float64, mc*ldc)
for i := range c {
 c[i] = rnd.Float64()
}

```

```

}

// Compute LQ
k := min(ma, na)
tau := make([]float64,
k)
work := make([]float64, 1)
impl.Dgelqf(ma, na, a, lda, tau, work, -1)
work = make([]float64, int(work[0]))
impl.Dgelqf(ma, na, a, lda, tau, work, len(work))

// Build Q from result
q := constructQ("LQ", ma, na, a, lda, tau)

cMat := blas64.General{
 Rows: mc,
 Cols: nc,
 Stride: ldc,
 Data: make([]float64, len(c)),
}
copy(cMat.Data, c)
cMatCopy := blas64.General{
 Rows: cMat.Rows,
 Cols: cMat.Cols,
 Stride: cMat.Stride,
 Data: make([]float64, len(cMat.Data)),
}
copy(cMatCopy.Data, cMat.Data)
switch {
default:
 panic("bad test")
case side == blas.Left && trans == blas.NoTrans:
 blas64.Gemm(blas.NoTrans, blas.NoTrans, 1, q, cMatCopy, 0, cMat)
case side == blas.Left && trans == blas.Trans:
 blas64.Gemm(blas.Trans, blas.NoTrans, 1, q, cMatCopy, 0, cMat)
case side == blas.Right && trans == blas.NoTrans:
 blas64.Gemm(blas.NoTrans, blas.NoTrans, 1, cMatCopy,
q, 0, cMat)
case side == blas.Right && trans == blas.Trans:
 blas64.Gemm(blas.NoTrans, blas.Trans, 1, cMatCopy, q, 0, cMat)
}
// Do Dorm2r ard compare
if side == blas.Left {
 work = make([]float64, nc)
} else {
 work = make([]float64, mc)
}
aCopy := make([]float64, len(a))

```

```

copy(aCopy, a)
tauCopy := make([]float64, len(tau))
copy(tauCopy, tau)
impl.Dorml2(side, trans, mc, nc, k, a, lda, tau, c, ldc, work)
if !floats.Equal(a, aCopy) {
 t.Errorf("a changed in call")
}
if !floats.Equal(tau, tauCopy) {
 t.Errorf("tau changed in call")
}
if !floats.EqualApprox(cMat.Data, c, 1e-14) {
 isLeft := side == blas.Left
 isTrans := trans == blas.Trans
 t.Errorf("Multiplication mismatch. IsLeft = %v. IsTrans = %v", isLeft, isTrans)
}
}
}
}
}
digraph {z[l="",r="",e=4,e="",e=d,]grn[r=gre,]grn grw gre}
graph{DIGRAPp}
graph{SubGrapI}
graph{{{subgb{{subgb{{subgb{subgf}}}}}}subgb}}
graph{{{S}S}S}S{S}}
graph{Strica-9Stric}
Graph{Edg{Edg}{Edg}Edg{Edg{Edg}}}
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package dualcmplx_test

import (
 "fmt"
 "math"

 "gonum.org/v1/gonum/floats"
 "gonum.org/v1/gonum/num/dualcmplx"
)

// point is a 2-dimensional point/vector.
type point struct {
 x, y float64
}

// raise raises the dimensionality of a point to a complex.
func raise(p point) complex128 {
 return complex(p.x, p.y)
}

```

```

}

// raiseDual raises the dimensionality of a point to a dual complex number.
func raiseDual(p point) dualcmplx.Number {
 return dualcmplx.Number{
 Real: 1,
 Dual: complex(p.x, p.y),
 }
}

// transform performs the transformation of p by the given dual complex numbers.
// The transformations are normalized to unit vectors.
func transform(p point, by ...dualcmplx.Number) point {
 if len(by) == 0 {
 return p
 }

 // Ensure the modulus of by is correctly scaled.
 for i := range by {
 if len := dualcmplx.Abs(by[i]);
 len != 1 {
 by[i].Real *= complex(1/len, 0)
 }
 }

 // Perform the transformations.
 z := by[0]
 for _, o := range by[1:] {
 z = dualcmplx.Mul(o, z)
 }
 pp := dualcmplx.Mul(dualcmplx.Mul(z, raiseDual(p)), dualcmplx.Conj(z))

 // Extract the point.
 return point{x: real(pp.Dual), y: imag(pp.Dual)}
}

func Example() {
 // Translate a 11 square by [3, 4] and rotate it 90 around the
 // origin.
 fmt.Println("square:")

 // Construct a displacement.
 displace := dualcmplx.Number{
 Real: 1,
 Dual: 0.5 * raise(point{3, 4}),
 }

 // Construct a rotation.

```

```

alpha := math.Pi / 2
rotate := dualcmplx.Number{Real: complex(math.Cos(alpha/2), math.Sin(alpha/2))}

for i, p := range []point{
 {x: 0, y: 0},
 {x: 0, y: 1},
 {x: 1, y: 0},
 {x: 1, y: 1},
} {
 pp := transform(p,
 displace, rotate,
)

 // Clean up floating point error for clarity.
 pp.x = floats.Round(pp.x, 2)
 pp.y = floats.Round(pp.y, 2)

 fmt.Printf(" %d %+v -> %+v\n", i, p, pp)
}

// Rotate a line segment 90 around
// its lower end [2, 2].
fmt.Println("\nline segment:")

// Construct a displacement to the origin from the lower end...
origin := dualcmplx.Number{
 Real: 1,
 Dual: 0.5 * raise(point{-2, -2}),
}
// ... and back from the origin to the lower end.
replace := dualcmplx.Number{
 Real: 1,
 Dual: -origin.Dual,
}

for i, p := range []point{
 {x: 2, y: 2},
 {x: 2, y: 3},
} {
 pp := transform(p,
 origin, // Displace to origin.
 rotate, // Rotate around axis.
 replace, // Displace back to original location.
)

 // Clean up floating point error for clarity.
 pp.x = floats.Round(pp.x, 2)
 pp.y = floats.Round(pp.y, 2)
}

```





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package distuv

import (

"sort"

"testing"

"golang.org/x/exp/rand"

"gonum.org/v1/gonum/floats"

)

func TestBinomialProb(t \*testing.T) {

const tol = 1e-10

for i, tt := range []struct {

k float64

n float64

p float64

want float64

}{

// Probabilities computed with Wolfram|Alpha (<http://www.wolframalpha.com>)

{0, 10, 0.5, 0.0009765625},

{1, 10, 0.5, 0.009765625},

{2, 10, 0.5, 0.0439453125},

{3, 10, 0.5, 0.1171875},

{4, 10, 0.5, 0.205078125},

{5, 10, 0.75, 5.839920043945313e-02},

{6, 10, 0.75, 0.1459980010986328},

{7, 10, 0.75, 0.2502822875976563},

{8, 10, 0.75, 0.2815675735473633},

{9, 10, 0.75, 0.1877117156982422},

{10, 10, 0.75, 5.6313514709472656e-02},

{0, 25, 0.25, 7.525434581650003e-04},

{2, 25, 0.25, 2.508478193883334e-02},

{5, 25, 0.25, 0.1645375881987921},

{7, 25, 0.25,

0.1654081574485211},

{10, 25, 0.25, 4.165835076481272e-02},

{12, 25, 0.01, 4.563372575901533e-18},

{15, 25, 0.01, 2.956207951505780e-24},

{17, 25, 0.01, 9.980175928758777e-29},

{20, 25, 0.99, 4.345539559454088e-06},

{22, 25, 0.99, 1.843750355939806e-03},

{25, 25, 0.99, 0.7778213593991468},

```

{0.5, 25, 0.5, 0},
{1.5, 25, 0.5, 0},
{2.5, 25, 0.5, 0},
{3.5, 25, 0.5, 0},
{4.5, 25, 0.5, 0},
{5.5, 25, 0.5, 0},
{6.5, 25, 0.5, 0},
{7.5, 25, 0.5, 0},
{8.5, 25, 0.5, 0},
{9.5, 25, 0.5, 0},
} {
b := Binomial{N: tt.n, P: tt.p}
got := b.Prob(tt.k)
if !floats.EqualWithinRel(got, tt.want, tol) {
t.Errorf("test-%d: got=%e. want=%e\n", i, got, tt.want)
}
}
}

```

```

func TestBinomialCDF(t *testing.T) {
const tol = 1e-10
for i, tt := range []struct {
k float64
n float64
p float64
want float64
}{
// Cumulative probabilities computed with SciPy
{0, 10, 0.5, 9.765625e-04},
{1, 10, 0.5, 1.0742187499999998e-02},
{2, 10, 0.5, 5.468749999999999e-02},
{3,
10, 0.5, 1.7187499999999994e-01},
{4, 10, 0.5, 3.769531249999999e-01},
{5, 10, 0.25, 9.802722930908203e-01},
{6, 10, 0.25, 9.964942932128906e-01},
{7, 10, 0.25, 9.995841979980469e-01},
{8, 10, 0.25, 9.999704360961914e-01},
{9, 10, 0.25, 9.999990463256836e-01},
{10, 10, 0.25, 1.0},

{0, 25, 0.75, 8.881784197001252e-16},
{2.5, 25, 0.75, 2.4655832930875472e-12},
{5, 25, 0.75, 1.243460090449844e-08},
{7.5, 25, 0.75, 1.060837565347583e-06},
{10, 25, 0.75, 2.1451240486669576e-04},
{12.5, 25, 0.01, 9.999999999999999e-01},

```

```

{15, 25, 0.01, 9.999999999999999e-01},
{17.5, 25, 0.01, 9.999999999999999e-01},
{20, 25, 0.99, 4.495958469027147e-06},
{22.5, 25, 0.99, 1.9506768897388268e-03},
{25, 25, 0.99, 1.0},
} {
b := Binomial{N: tt.n, P: tt.p}
got := b.CDF(tt.k)
if !floats.EqualWithinRel(got, tt.want, tol) {
t.Errorf("test-%d: got=%e. want=%e\n", i, got, tt.want)
}
}
}

func TestBinomial(t *testing.T) {
src := rand.New(rand.NewSource(1))
for
i, b := range []Binomial{
{100, 0.5, src},
{15, 0.25, src},
{10, 0.75, src},
{9000, 0.102, src},
{1e6, 0.001, src},
{25, 0.02, src},
{3, 0.8, src},
} {
testBinomial(t, b, i)
}
}

func testBinomial(t *testing.T, b Binomial, i int) {
const (
tol = 1e-2
n = 1e6
)
x := make([]float64, n)
generateSamples(x, b)
sort.Float64s(x)

checkMean(t, i, x, b, tol)
checkVarAndStd(t, i, x, b, tol)
checkExKurtosis(t, i, x, b, 7e-2)
}
graph{
{{{
{{{
{{{
{{{
Digra_{{Digra_}}
Digra_{{Digra_{{Digra_{{Digra_}}
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}}}
}}}
}}}
}}}
}}}
// Code generated by gocc; DO NOT EDIT.

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//

```

```
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//
// Copyright 2017 Robin Eklind.
// This file is made available under a Creative Commons CC0 1.0
// Universal Public Domain Dedication.
```

```
package parser
```

```
import (
 "fmt"
)
```

```
type action interface {
 act()
 String() string
}
```

```
type (
 accept bool
 shift int // value is next state index
 reduce int // value is production index
)
```

```
func (this accept) act() {}
func (this shift) act() {}
func (this reduce) act() {}
```

```
func (this accept) Equal(that action) bool {
 if _, ok := that.(accept); ok {
 return true
 }
 return false
}
```

```
func (this reduce) Equal(that action) bool {
 that1, ok := that.(reduce)
 if !ok {
 return false
 }
 return this == that1
}
```

```
func (this shift) Equal(that action) bool {
 that1, ok := that.(shift)
 if !ok
```

```

{
 return false
}
return this == that1
}

func (this accept) String() string { return "accept(0)" }
func (this shift) String() string { return fmt.Sprintf("shift:%d", this) }
func (this reduce) String() string {
 return fmt.Sprintf("reduce:%d(%s)", this, productionsTable[this].String)
}
// Code generated by "go generate gonum.org/v1/gonum/unit; DO NOT EDIT.

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package unit

import (
 "fmt"
 "testing"
)

func TestTimeFormat(t *testing.T) {
 for _, test := range []struct {
 value Time
 format string
 want string
 }{
 {1.23456789, "%v", "1.23456789 s"},
 {1.23456789, "%.1v", "1 s"},
 {1.23456789, "%20.1v", "1 s"},
 {1.23456789, "%20v", "1.23456789 s"},
 {1.23456789, "%1v", "1.23456789 s"},
 {1.23456789, "%#v", "unit.Time(1.23456789)"},
 {1.23456789, "%s", "%!s(unit.Time=1.23456789 s)"},
 } {
 got := fmt.Sprintf(test.format, test.value)
 if got != test.want {
 t.Errorf("Format %q %v: got: %q want: %q", test.format, float64(test.value), got, test.want)
 }
 }
}

Graph{SUBU{SUBS{{SUBU{SUBS{SUBI}{SUBI}}}}}
graph{Ed{Ed}Ed}
graph{{"t3AdM6_esq_5_0wvni{W}o1h1PyG1YOedae{s4TupuTsd_3_3VO1_Attr : ID
""Yc8kRij8q8_1PyG1YO0_iryntlS5u4T4i/o timeoutzbq9VH7G1_ZAB_8tO9W}"}}

```

```
// Code generated by "go generate gonum.org/v1/gonum/unit; DO NOT EDIT.
```

```
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```

```
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```

```
// license that can be found in the LICENSE file.
```

```
package unit
```

```
import (
 "errors"
 "fmt"
 "math"
 "unicode/utf8"
)
```

```
// Capacitance represents an electrical capacitance in Farads.
```

```
type Capacitance float64
```

```
const Farad Capacitance = 1
```

```
// Unit converts the Capacitance to a *Unit
```

```
func (cp Capacitance) Unit() *Unit {
 return New(float64(cp), Dimensions{
 CurrentDim: 2,
 LengthDim: -2,
 MassDim: -1,
 TimeDim: 4,
 })
}
```

```
// Capacitance allows Capacitance to implement a Capacitancer interface
```

```
func (cp Capacitance) Capacitance() Capacitance {
 return cp
}
```

```
// From converts the unit into the receiver. From returns an
```

```
// error if there is a mismatch in dimension
```

```
func (cp *Capacitance) From(u Uniter) error {
 if !DimensionsMatch(u, Farad) {
 *cp = Capacitance(math.NaN())
 return errors.New("Dimension mismatch")
 }
 *cp
 = Capacitance(u.Unit().Value())
 return nil
}
```

```
func (cp Capacitance) Format(fs fmt.State, c rune) {
```

```

switch c {
case 'v':
if fs.Flag('#') {
fmt.Fprintf(fs, "%T(%v)", cp, float64(cp))
return
}
fallthrough
case 'e', 'E', 'f', 'F', 'g', 'G':
p, pOk := fs.Precision()
w, wOk := fs.Width()
const unit = " F"
switch {
case pOk && wOk:
fmt.Fprintf(fs, "%*.*"+string(c), pos(w-utf8.RuneCount([]byte(unit))), p, float64(cp))
case pOk:
fmt.Fprintf(fs, "%.*"+string(c), p, float64(cp))
case wOk:
fmt.Fprintf(fs, "%*"+string(c), pos(w-utf8.RuneCount([]byte(unit))), float64(cp))
default:
fmt.Fprintf(fs, "%"+string(c), float64(cp))
}
fmt.Fprint(fs, unit)
default:
fmt.Fprintf(fs, "%%!%c(%T=%g F)", c, cp, float64(cp))
}
}

```

```
graph{dS{dG}{dS{dG}}}
```

```
graph{{Ed}{Ed}Ed""Ed}
```

```
graph{{diGrag}{diGrag}diGrai}
```

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```
package unit
```

```

const (
Yotta = 1e24
Zetta = 1e21
Exa = 1e18
Peta = 1e15
Tera = 1e12
Giga = 1e9
Mega = 1e6
Kilo = 1e3
Hecto = 1e2
Deca = 1e1

Deci = 1e-1

```

```

Centi = 1e-2
Milli = 1e-3
Micro = 1e-6
Nano = 1e-9
Pico = 1e-12
Femto = 1e-15
Atto = 1e-18
Zepto = 1e-21
Yocto = 1e-24
)
graph{{e4{{e4}}}}
Graph{{subgrapA}subgrapA}}
graph{{Graph}}
graph{{DiGrC}DiGrG}}
module github.com/smasher164/mem

go 1.13

require golang.org/x/sys v0.0.0-20191113165036-4c7a9d0fe056
Graph{Sun{Sur{Sur}{Sun{Sur}}}}
graph{{{{Di}}Di}}
graph{"#\I\3#\I\3#\I\3#\I\3"}
graph{{stricu}stricu}{stricu}{stricu}{stricu}{stricu}
digraph{r[e=r e=d r=3][l=""]e=w e=d r=3]Gl Gl[l=""]e=l e=d e=""]e=l l="r=k e=d][e=l e=d
e=5][l=""]l=""]l=""]Gl[l=""]{r[e=Gb r=3]a->Gl[d=e]Gl->S[d=e]S->I[d=e]I->d[d=e]d->3[d=e]3->E[d=e]E-
>y[d=e]Gl->Gl Gl->S->n->n->d[d=e]G->n[d=e]3->n->n->E->n->t}
graph{{d_{{d_}{d_}}d_}}
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package gonum

// Panic strings used during parameter checks.
// This list is duplicated in netlib/blas/netlib. Keep in sync.
const (
 zeroIncX = "blas: zero x index increment"
 zeroIncY = "blas: zero y index increment"

 mLT0 = "blas: m < 0"
 nLT0 = "blas: n < 0"
 kLT0 = "blas: k < 0"
 kLLT0 = "blas: kL < 0"
 kULT0 = "blas: kU < 0"

 badUplo = "blas: illegal triangle"
 badTranspose = "blas: illegal transpose"
 badDiag = "blas: illegal diagonal"

```



```

badSide = "blas: illegal side"
badFlag = "blas: illegal rotm flag"

badLdA = "blas: bad leading dimension of A"
badLdB = "blas: bad leading dimension of B"
badLdC = "blas: bad leading dimension of C"

shortX = "blas: insufficient length of x"
shortY = "blas: insufficient length of y"
shortAP = "blas: insufficient length of ap"
shortA = "blas: insufficient
length of a"
shortB = "blas: insufficient length of b"
shortC = "blas: insufficient length of c"
)
digraph{i{{{digrapn}digrapn}}}
graph{{{DG}{DG}}}}
graph{{{{{DiGu}{DiGu}{DiGu}DiGv}}}}
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package gonum

import (
 "gonum.org/v1/gonum/blas"
 "gonum.org/v1/gonum/blas/blas64"
)

// Dlarf applies an elementary reflector to a general rectangular matrix c.
// This computes
// c = h * c if side == Left
// c = c * h if side == right
// where
// h = 1 - tau * v * v
// and c is an m * n matrix.
//
// work is temporary storage of length at least m if side == Left and at least
// n if side == Right. This function will panic if this length requirement is not met.
//
// Dlarf is an internal routine. It is exported for testing purposes.
func (impl Implementation) Dlarf(side blas.Side, m, n int, v []float64, incv int, tau float64, c []float64, ldc int, work
[]float64) {
 switch {
 case side != blas.Left && side != blas.Right:
 panic(badSide)
 case m < 0:
 panic(mLT0)
 }
}

```

```

case n < 0:
 panic(nLT0)
case incv == 0:
 panic(zeroIncV)
case
 ldc < max(1, n):
 panic(badLdC)
}

if m == 0 || n == 0 {
 return
}

applyleft := side == blas.Left
lenV := n
if applyleft {
 lenV = m
}

switch {
case len(v) < 1+(lenV-1)*abs(incv):
 panic(shortV)
case len(c) < (m-1)*ldc+n:
 panic(shortC)
case (applyleft && len(work) < n) || (!applyleft && len(work) < m):
 panic(shortWork)
}

lastv := 0 // last non-zero element of v
lastc := 0 // last non-zero row/column of c
if tau != 0 {
 var i int
 if applyleft {
 lastv = m - 1
 } else {
 lastv = n - 1
 }
 if incv > 0 {
 i = lastv * incv
 }

 // Look for the last non-zero row in v.
 for lastv >= 0 && v[i] == 0 {
 lastv--
 i -= incv
 }
 if applyleft {
 // Scan for the last non-zero column in C[0:lastv, :]

```

```

 lastc = impl.Iladlc(lastv+1, n, c, ldc)
} else {
 // Scan for the last non-zero row in C[:, 0:lastv]
 lastc = impl.Iladlr(m, lastv+1, c, ldc)
}
}
if lastv == -1 || lastc == -1 {
 return
}
// Sometimes 1-indexing is nicer ...
bi
:= blas64.Implementation()
if applyleft {
 // Form H * C
 // w[0:lastc+1] = c[1:lastv+1, 1:lastc+1] * v[1:lastv+1,1]
 bi.Dgemv(blas.Trans, lastv+1, lastc+1, 1, c, ldc, v, incv, 0, work, 1)
 // c[0: lastv, 0: lastc] = c[...] - w[0:lastv, 1] * v[1:lastc, 1]
 bi.Dger(lastv+1, lastc+1, -tau, v, incv, work, 1, c, ldc)
 return
}
// Form C*H
// w[0:lastc+1,1] := c[0:lastc+1,0:lastv+1] * v[0:lastv+1,1]
bi.Dgemv(blas.NoTrans, lastc+1, lastv+1, 1, c, ldc, v, incv, 0, work, 1)
// c[0:lastc+1,0:lastv+1] = c[...] - w[0:lastc+1,0] * v[0:lastv+1,0]
bi.Dger(lastc+1, lastv+1, -tau, work, 1, v, incv, c, ldc)
}
/*
ragnishtszcvxbz

:

xvxc - sd -dfsSTRHrg R = sfsdfsd]]]] a

*/digraph sta{""[e=e][l=""]stn[l=""][l=""][l=""]y->l[l=""]y->stn[l=""]t=8]stn->l[l=""]stn->g[l=""]g->l[l=""]}
graph{"\\\\"}
graph{<=>}
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package testlapack

import (
 "testing"

 "golang.org/x/exp/rand"

 "gonum.org/v1/gonum/blas"

```

```

"gonum.org/v1/gonum/blas/blas64"
"gonum.org/v1/gonum/floats"
"gonum.org/v1/gonum/lapack"
)

type Dsyever interface {
 Dsyev(jobz lapack.EVJob, uplo blas.Uplo, n int, a []float64, lda int, w, work []float64, lwork int) (ok bool)
}

func DsyevTest(t *testing.T, impl Dsyever) {
 rnd := rand.New(rand.NewSource(1))
 for _, uplo := range []blas.Uplo{blas.Lower, blas.Upper} {
 for _, test := range []struct {
 n, lda int
 }{
 {1, 0},
 {2, 0},
 {5, 0},
 {10, 0},
 {100, 0},

 {1, 5},
 {2, 5},
 {5, 10},
 {10, 20},
 {100, 110},
 } {
 for cas := 0; cas < 10; cas++ {
 n := test.n
 lda := test.lda
 if lda == 0 {
 lda = n
 }
 a := make([]float64, n*lda)
 for i := range a {
 a[i] = rnd.NormFloat64()
 }
 aCopy := make([]float64, len(a))
 copy(aCopy, a)
 w := make([]float64, n)
 for i := range w {
 w[i] = rnd.NormFloat64()
 }

 work := make([]float64, 1)
 impl.Dsyev(lapack.EVCompute, uplo, n, a, lda, w, work, -1)
 work = make([]float64, int(work[0]))
 }
 }
 }
}

```

```

impl.Dsyev(lapack.EVCompute, uplo, n, a, lda, w, work, len(work))

// Check that the decomposition is correct
orig := blas64.General{
 Rows: n,
 Cols: n,
 Stride: n,
 Data: make([]float64, n*n),
}
if uplo == blas.Upper {
 for i := 0; i < n; i++ {
 for j := i; j < n; j++ {
 v := aCopy[i*lda+j]
 orig.Data[i*orig.Stride+j] = v
 orig.Data[j*orig.Stride+i] = v
 }
 }
} else {
 for i := 0; i < n; i++ {
 for j := 0; j <= i; j++ {
 v := aCopy[i*lda+j]
 orig.Data[i*orig.Stride+j] = v
 orig.Data[j*orig.Stride+i] = v
 }
 }
}

V := blas64.General{
 Rows: n,
 Cols: n,
 Stride:
lda,
 Data: a,
}

if !eigenDecompCorrect(w, orig, V) {
 t.Errorf("Decomposition mismatch")
}

// Check that the decomposition is correct when the eigenvectors
// are not computed.
wAns := make([]float64, len(w))
copy(wAns, w)
copy(a, aCopy)
for i := range w {
 w[i] = rnd.Float64()
}
for i := range work {

```

```

work[i] = rnd.Float64()
}
impl.Dsyev(lapack.EVNone, uplo, n, a, lda, w, work, len(work))
if !floats.EqualApprox(w, wAns, 1e-8) {
 t.Errorf("Eigenvalue mismatch when vectors not computed")
}
}
}
}
}
}
}
}

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// Package gonum contains functions implemented by the gonum team.
// It is here to avoid circular imports and/or double coding of functions.
package gonum // import "gonum.org/v1/gonum/mathext/internal/gonum"

graph{{Digraz{Digraz}Digra}Digrax}
graph{{-2-1-0-4-4-4-0}-9-7-5-0-2-1-0-3-2-1-1-4-7-1-1-4-1-2-1-0-4-4-4-5-9-9-4-5-9-1-8-0-9-9-8-0-9-3-9-5-9-4-9-5-1-0-8-6-5-2-5-9-7-1-3-5-0-8-4-1}
graph{no{no{no}no}no}
graph{{{stR}stI}}stI}{stR}stI}}stI}
graph{digrap_}
graph{4[ff=2][f=9][f=2][f=0][f=2][f=1][f=2][f=2]integerverflownoken[f=2][f=4][f=8][f=2][f=2][f=3][f=7][f=2][f=4][f=6][f=6][f=4][f=4][f=9][f=4][f=4][f=4][f=4][f=4][f=1][f=4][f=6][f=6][f=4][f=1][f=6][f=1][f=2][f=7][f=1][f=1][f=1][f=1][f=8][f=1][f=3][f=5][f=1][f=1][f=1][f=9]}
module gioui.org

go 1.13

require (
 golang.org/x/exp v0.0.0-20191002040644-a1355ae1e2c3
 golang.org/x/image v0.0.0-20190802002840-cff245a6509b
 golang.org/x/sys v0.0.0-20190813064441-fde4db37ae7a
)

DOUBLE PRECISION FUNCTION MYMAX(A, B)
DOUBLE PRECISION A, B
MYMAX = DMAX1(A,B)
RETURN
END

graph{{S_}{S_}}

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package gonum

import (

```

"math"

"gonum.org/v1/gonum/blas"

"gonum.org/v1/gonum/lapack"

)

// Dlansy returns the value of the specified norm of an nn symmetric matrix. If

// norm == lapack.MaxColumnSum or norm == lapack.MaxRowSum, work must have length

// at least n, otherwise work is unused.

func (impl Implementation) Dlansy(norm lapack.MatrixNorm, uplo blas.Uplo, n int, a []float64, lda int, work

[]float64) float64 {

switch {

case norm != lapack.MaxRowSum && norm != lapack.MaxColumnSum && norm != lapack.Frobenius && norm  
!= lapack.MaxAbs:

panic(badNorm)

case uplo != blas.Upper && uplo != blas.Lower:

panic(badUplo)

case n < 0:

panic(nLT0)

case lda < max(1, n):

panic(badLdA)

}

// Quick return if possible.

if n == 0 {

return 0

}

switch {

case len(a) < (n-1)\*lda+n:

panic(shortA)

case (norm == lapack.MaxColumnSum

|| norm == lapack.MaxRowSum) && len(work) < n:

panic(shortWork)

}

switch norm {

case lapack.MaxAbs:

if uplo == blas.Upper {

var max float64

for i := 0; i < n; i++ {

for j := i; j < n; j++ {

v := math.Abs(a[i\*lda+j])

if math.IsNaN(v) {

return math.NaN()

}

if v > max {

max = v

```

 }
 }
 }
 return max
}
var max float64
for i := 0; i < n; i++ {
 for j := 0; j <= i; j++ {
 v := math.Abs(a[i*lda+j])
 if math.IsNaN(v) {
 return math.NaN()
 }
 if v > max {
 max = v
 }
 }
}
return max
case lapack.MaxRowSum, lapack.MaxColumnSum:
 // A symmetric matrix has the same 1-norm and -norm.
 for i := 0; i < n; i++ {
 work[i] = 0
 }
 if uplo == blas.Upper {
 for i := 0; i < n; i++ {
 work[i] += math.Abs(a[i*lda+i])
 for j := i + 1; j < n; j++ {
 v := math.Abs(a[i*lda+j])
 work[i] += v
 work[j] += v
 }
 }
 } else {
 for i := 0; i < n; i++ {
 for j := 0; j < i; j++
 {
 v := math.Abs(a[i*lda+j])
 work[i] += v
 work[j] += v
 }
 work[i] += math.Abs(a[i*lda+i])
 }
}
var max float64
for i := 0; i < n; i++ {
 v := work[i]
 if math.IsNaN(v) {
 return math.NaN()
 }
}

```



```

 }
 if v > max {
 max = v
 }
}

return max
default:
// lapack.Frobenius:
scale := 0.0
ssq := 1.0
// Sum off-diagonals.
if uplo == blas.Upper {
 for i := 0; i < n-1; i++ {
 rowscale, rowssq := impl.Dlassq(n-i-1, a[i*lda+i+1:], 1, 0, 1)
 scale, ssq = impl.Dcombssq(scale, ssq, rowscale, rowssq)
 }
} else {
 for i := 1; i < n; i++ {
 rowscale, rowssq := impl.Dlassq(i, a[i*lda:], 1, 0, 1)
 scale, ssq = impl.Dcombssq(scale, ssq, rowscale, rowssq)
 }
}
ssq *= 2
// Sum diagonal.
dscale, dssq := impl.Dlassq(n, a, lda+1, 0, 1)
scale, ssq = impl.Dcombssq(scale, ssq, dscale, dssq)
return scale * math.Sqrt(ssq)
}
}
Graph{DIGRl{DIGRp}{DIGRp}}
// SPDX-License-Identifier: Unlicense OR MIT

// +build !android,!go1.13

package app

import "os"

func dataDir() (string, error) {
// Use a quick workaround until we can require go 1.13.
return os.UserHomeDir()
}

graph{stri5{stri5{stri5{stri5{stri1{{stri5}}}stri1}}{{stri5}}}stri1}}
graph{Grs</></><R><T>}
graph edgec{{edgec{edgd}}edgc{{edgec{edgd}}edgd}}edgd{{}}edgd}}
graph{{{gra{{gra{{gra{{gra{gra{{gra{{gra}}}}}gra}}{gra{gra{{gra}}gra}}{gra{gra{{gra}}gra}}{gra}}}}}
graph{{{SUB{SUB}}}}

```

```

graph{digrap}
graph{Strica{Strica-9Strica-9Strica-9Strica-9Stric}}
graph{{ {EDX}EDI}{EDX}EDI}
graph{{No}}
graph{graphB}
graph{nod{nod}nod{nod}}
Graph{Subgra_{Subgra_}}
// Code generated by "go generate gonum.org/v1/gonum/blas; DO NOT EDIT.

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package cblas128

import "gonum.org/v1/gonum/blas"

// HermitianCols represents a matrix using the conventional column-major storage scheme.
type HermitianCols Hermitian

// From fills the receiver with elements from a. The receiver
// must have the same dimensions and uplo as a and have adequate
// backing data storage.
func (t HermitianCols) From(a Hermitian) {
 if t.N != a.N {
 panic("cblas128: mismatched dimension")
 }
 if t.Uplo != a.Uplo {
 panic("cblas128: mismatched BLAS uplo")
 }
 switch a.Uplo {
 default:
 panic("cblas128: bad BLAS uplo")
 case blas.Upper:
 for i := 0; i < a.N; i++ {
 for j := i; j < a.N; j++ {
 t.Data[i+j*t.Stride] = a.Data[i*a.Stride+j]
 }
 }
 case blas.Lower:
 for i := 0; i < a.N; i++ {
 for j := 0; j <= i; j++ {
 t.Data[i+j*t.Stride] = a.Data[i*a.Stride+j]
 }
 }
 }
}

```

```

// From fills the receiver with elements from a. The receiver
// must have the same dimensions and uplo as a and have adequate
// backing data storage.
func (t Hermitian) From(a HermitianCols) {
 if t.N != a.N {
 panic("cblas128: mismatched dimension")
 }
 if t.Uplo != a.Uplo {
 panic("cblas128: mismatched BLAS uplo")
 }
 switch a.Uplo {
 default:
 panic("cblas128: bad BLAS uplo")
 case blas.Upper:
 for i := 0; i < a.N; i++ {
 for j := i; j < a.N; j++ {
 t.Data[i*t.Stride+j] = a.Data[i+j*a.Stride]
 }
 }
 case blas.Lower:
 for i := 0; i < a.N; i++ {
 for j := 0; j <= i; j++ {
 t.Data[i*t.Stride+j] = a.Data[i+j*a.Stride]
 }
 }
 }
}

// HermitianBandCols represents an Hermitian matrix using the band column-major storage scheme.
type HermitianBandCols HermitianBand

// From fills the receiver with elements from a. The receiver
// must have the same dimensions, bandwidth and uplo as a and
// have adequate
// backing data storage.
func (t HermitianBandCols) From(a HermitianBand) {
 if t.N != a.N {
 panic("cblas128: mismatched dimension")
 }
 if t.K != a.K {
 panic("cblas128: mismatched bandwidth")
 }
 if a.Stride < a.K+1 {
 panic("cblas128: short stride for source")
 }
 if t.Stride < t.K+1 {
 panic("cblas128: short stride for destination")
 }
}

```

```

}
if t.Uplo != a.Uplo {
 panic("cblas128: mismatched BLAS uplo")
}
dst := BandCols{
 Rows: t.N, Cols: t.N,
 Stride: t.Stride,
 Data: t.Data,
}
src := Band{
 Rows: a.N, Cols: a.N,
 Stride: a.Stride,
 Data: a.Data,
}
switch a.Uplo {
default:
 panic("cblas128: bad BLAS uplo")
case blas.Upper:
 dst.KU = t.K
 src.KU = a.K
case blas.Lower:
 dst.KL = t.K
 src.KL = a.K
}
dst.From(src)
}

// From fills the receiver with elements from a. The receiver
// must have the same dimensions, bandwidth and uplo as a and
// have adequate backing data storage.
func (t HermitianBand) From(a HermitianBandCols) {
 if t.N != a.N {
 panic("cblas128:
mismatched dimension")
 }
 if t.K != a.K {
 panic("cblas128: mismatched bandwidth")
 }
 if a.Stride < a.K+1 {
 panic("cblas128: short stride for source")
 }
 if t.Stride < t.K+1 {
 panic("cblas128: short stride for destination")
 }
 if t.Uplo != a.Uplo {
 panic("cblas128: mismatched BLAS uplo")
 }
 dst := Band{

```

```

 Rows: t.N, Cols: t.N,
 Stride: t.Stride,
 Data: t.Data,
}
src := BandCols{
 Rows: a.N, Cols: a.N,
 Stride: a.Stride,
 Data: a.Data,
}
switch a.Uplo {
default:
 panic("cblas128: bad BLAS uplo")
case blas.Upper:
 dst.KU = t.K
 src.KU = a.K
case blas.Lower:
 dst.KL = t.K
 src.KL = a.K
}
dst.From(src)
}
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```

```
package optimize
```

```

import (
 "fmt"
 "io"
 "math"
 "os"
 "time"

 "gonum.org/v1/gonum/floats"
)

var printerHeadings = [...]string{
 "Iter",
 "Runtime",
 "FuncEvals",
 "Func",
 "GradEvals",
 "|Gradient|",
 "HessEvals",
}

const (

```

```

printerBaseTpl = "%9v %16v %9v %22v" // Base template for headings and values that are always printed.
printerGradTpl = " %9v %22v" // Appended to base template when loc.Gradient != nil.
printerHessTpl = " %9v" // Appended to base template when loc.Hessian != nil.
)

```

```

// Printer writes column-format output to the specified writer as the optimization
// progresses. By default, it writes to os.Stdout.

```

```

type Printer struct {
 Writer io.Writer
 HeadingInterval int
 ValueInterval time.Duration

```

```

 lastHeading int
 lastValue time.Time
}

```

```

func NewPrinter() *Printer
{
 return &Printer{
 Writer: os.Stdout,
 HeadingInterval: 30,
 ValueInterval: 500 * time.Millisecond,
 }
}

```

```

func (p *Printer) Init() error {
 p.lastHeading = p.HeadingInterval // So the headings are printed the first time.
 p.lastValue = time.Now().Add(-p.ValueInterval) // So the values are printed the first time.
 return nil
}

```

```

func (p *Printer) Record(loc *Location, op Operation, stats *Stats) error {
 if op != MajorIteration && op != InitIteration && op != PostIteration {
 return nil
 }
}

```

```

// Print values always on PostIteration or when ValueInterval has elapsed.
printValues := time.Since(p.lastValue) > p.ValueInterval || op == PostIteration
if !printValues {
 // Return early if not printing anything.
 return nil
}

```

```

// Print heading when HeadingInterval lines have been printed, but never on PostIteration.
printHeading := p.lastHeading >= p.HeadingInterval && op != PostIteration
if printHeading {
 p.lastHeading = 1
} else {

```

```

 p.lastHeading++
}

if
printHeading {
 headings := "" + fmt.Sprintf(printerBaseTmpl, printerHeadings[0], printerHeadings[1], printerHeadings[2],
printerHeadings[3])
 if loc.Gradient != nil {
 headings += fmt.Sprintf(printerGradTmpl, printerHeadings[4], printerHeadings[5])
 }
 if loc.Hessian != nil {
 headings += fmt.Sprintf(printerHessTmpl, printerHeadings[6])
 }
 _, err := fmt.Fprintln(p.Writer, headings)
 if err != nil {
 return err
 }
}

values := fmt.Sprintf(printerBaseTmpl, stats.MajorIterations, stats.Runtime, stats.FuncEvaluations, loc.F)
if loc.Gradient != nil {
 values += fmt.Sprintf(printerGradTmpl, stats.GradEvaluations, floats.Norm(loc.Gradient, math.Inf(1)))
}
if loc.Hessian != nil {
 values += fmt.Sprintf(printerHessTmpl, stats.HessEvaluations)
}
_, err := fmt.Fprintln(p.Writer, values)
if err != nil {
 return err
}

p.lastValue = time.Now()
return nil
}
graph{SW{SW}}
digraph stru{stru[e=d,]stru[e=d,]stru[e=d,]stru->stru stru->stru}
graph{Nodr{{Nodr}{Nodr}Nodr}Nodr{{Nodr}{Nodr}""{Nodr}{Nodr}}
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```

```

package errors

import (
 "fmt"
 "strings"

 "gonum.org/v1/gonum/graph/formats/dot/internal/token"
)

type ErrorSymbol interface {
}

type Error struct {
 Err error
 ErrorToken *token.Token
 ErrorSymbols []ErrorSymbol
 ExpectedTokens []string
 StackTop int
}

func (e *Error) String() string {
 w := new(strings.Builder)
 fmt.Fprintf(w, "Error")
 if e.Err != nil {
 fmt.Fprintf(w, " %s\n", e.Err)
 } else {
 fmt.Fprintf(w, "\n")
 }
 fmt.Fprintf(w, "Token: type=%d, lit=%s\n", e.ErrorToken.Type, e.ErrorToken.Lit)
 fmt.Fprintf(w, "Pos: offset=%d, line=%d, column=%d\n",
 e.ErrorToken.Pos.Offset, e.ErrorToken.Pos.Line, e.ErrorToken.Pos.Column)
 fmt.Fprintf(w, "Expected one of: ")
 for _, sym := range e.ExpectedTokens {
 fmt.Fprintf(w, "%s ", sym)
 }
 fmt.Fprintf(w, "ErrorSymbol:\n")
 for _, sym := range e.ErrorSymbols {
 fmt.Fprintf(w, "%v\n", sym)
 }
 return w.String()
}

func (e *Error) Error() string {
 w := new(strings.Builder)
 fmt.Fprintf(w, "Error in S%d: %s, %s", e.StackTop, token.TokMap.TokenString(e.ErrorToken),
 e.ErrorToken.Pos.String())
 if e.Err != nil {

```



```

 fmt.Fprintf(w, ": %+v", e.Err)
} else {
 fmt.Fprintf(w, ", expected one of: ")
 for _, expected := range e.ExpectedTokens {
 fmt.Fprintf(w, "%s ", expected)
 }
}
return w.String()
}
graph{{SUBGRAPH8}}{SUBGRAPH8}{SUBGRAPH8}}
graph{D5{{D5}D5{{D5}}D5{{D7{D5}}D5}{D7{D5}}D5{{D5}}D5{{D7{D5}}D5}}{D5}}{D5}}
Graph{{SubD{SubD}SubD{{SubF}}SubD{SubF}}}
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package dual_test

import (
 "fmt"

 "gonum.org/v1/gonum/num/dual"
)

func Example_Number_fike() {
 // Calculate the value and derivative of the function
 // $e^x / (\sqrt{\sin(x)^3 + \cos(x)^3})$.
 fn := func(x dual.Number) dual.Number {
 return dual.Mul(
 dual.Exp(x),
 dual.Inv(dual.Sqrt(
 dual.Add(
 dual.PowReal(dual.Sin(x), 3),
 dual.PowReal(dual.Cos(x), 3))))
)
 }

 v := fn(dual.Number{Real: 1.5, Emag: 1})
 fmt.Printf("v=%0.4f\n", v)
 fmt.Printf("fn(1.5)=%0.4f\nfn'(1.5)=%0.4f\n", v.Real, v.Emag)

 // Output:
 //
 // v=(4.4978+4.0534i)
 // fn(1.5)=4.4978
 // fn'(1.5)=4.0534
}
{{Types "Apache-2.0"}}

```

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spf13/pflag v1.0.5

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<https://github.com/spf13/pflag>

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Goautoneg v0.0.0-20120707110453-a547fc61f48d  
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```
digraph{e[l=<<TAEB=TDHh{Subgl=e=h=t=r=rGErg=w==></TD><TD></TD><"></TD><TD></TD></TR></T
AE>>l="""]n->g[l="""]g->l[l="""]}
```

```
graph{{{ed8}ed8}ed0}{ed8}ed0}
```

```
digraph {100->140->120->130->11->18->17->16->31->46->4->4->53->197->19->23->35->67->397->417->407-
>389->209->289->212->298->291->298->299->300->310->331->321->222->232->23->73->24->84->254->275-
>435->36->94->159->150->153->343->403->385->26->420->15->13->11->1->15->1->18->46->42->40->196-
>194->293->307->24}
```

```
Graph{DIGRAP{DIGRAP{DIGRAP}}}
```

```
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```

```
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```
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```

```
// Package testgraphs provides a number of graphs used for testing
```

```
// routines in the path and path/dynamic packages.
```

```
package testgraphs // import "gonum.org/v1/gonum/graph/path/internal/testgraphs"
```

```
graph{nod{nod}nod{{nod}nod}}
```

```
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```
package gonum
```

```
import "gonum.org/v1/gonum/blas"
```

```
// Dgehd2 reduces a block of a general nn matrix A to upper Hessenberg form H
```

```
// by an orthogonal similarity transformation Q * A * Q = H.
```

```
//
```

```
// The matrix Q is represented as a product of (ihi-ilo) elementary
```

```
// reflectors
```

```
// Q = H_{ilo} H_{ilo+1} ... H_{ihi-1}.
```

```
// Each H_i has the form
```

```
// H_i = I - tau[i] * v * v
```

```
// where v is a real vector with v[0:i+1] = 0, v[i+1] = 1 and v[ihi+1:n] = 0.
```

```
// v[i+2:ihi+1] is stored on exit in A[i+2:ihi+1,i].
```

```
//
```

```
// On entry, a contains the nn general matrix to be reduced. On return, the
```

```
// upper triangle and the first subdiagonal of A are overwritten with the upper
```

```
// Hessenberg matrix H, and the elements below the first subdiagonal, with the
```

```
// slice tau, represent the orthogonal matrix Q as a product of elementary
```

```
// reflectors.
```

```

//
// The contents
// of A are illustrated by the following example, with n = 7, ilo =
// 1 and ihi = 5.
// On entry,
// [a a a a a a a]
// [a a a a a a a]
// [a a a a a a a]
// [a a a a a a a]
// [a a a a a a a]
// [a a a a a a a]
// [a]
// on return,
// [a a h h h h a]
// [a h h h h a]
// [h h h h h h]
// [v1 h h h h h]
// [v1 v2 h h h h]
// [v1 v2 v3 h h h]
// [a]
// where a denotes an element of the original matrix A, h denotes a
// modified element of the upper Hessenberg matrix H, and vi denotes an
// element of the vector defining H_i.
//
// ilo and ihi determine the block of A that will be reduced to upper Hessenberg
// form. It must hold that 0 <= ilo <= ihi <= max(0, n-1), otherwise Dgehd2 will
// panic.
//
// On return, tau will contain the scalar factors
// of the elementary reflectors.
// It must have length equal to n-1, otherwise Dgehd2 will panic.
//
// work must have length at least n, otherwise Dgehd2 will panic.
//
// Dgehd2 is an internal routine. It is exported for testing purposes.
func (impl Implementation) Dgehd2(n, ilo, ihi int, a []float64, lda int, tau, work []float64) {
 switch {
 case n < 0:
 panic(nLT0)
 case ilo < 0 || max(0, n-1) < ilo:
 panic(badIlo)
 case ihi < min(ilo, n-1) || n <= ihi:
 panic(badIhi)
 case lda < max(1, n):
 panic(badLdA)
 }

 // Quick return if possible.

```

```

if n == 0 {
 return
}

switch {
case len(a) < (n-1)*lda+n:
 panic(shortA)
case len(tau) != n-1:
 panic(badLenTau)
case len(work) < n:
 panic(shortWork)
}

for i := ilo; i < ihi; i++ {
 // Compute elementary reflector H_i to annihilate A[i+2:ihi+1,i].
 var aii float64
 aii, tau[i] = impl.Dlarfg(ihi-i, a[(i+1)*lda+i], a[min(i+2, n-1)*lda+i:], lda)
 a[(i+1)*lda+i] = 1

 // Apply H_i to A[0:ihi+1,i+1:ihi+1] from the right.
 impl.Dlarf(blas.Right,
 ihi+1, ihi-i, a[(i+1)*lda+i:], lda, tau[i], a[i+1:], lda, work)

 // Apply H_i to A[i+1:ihi+1,i+1:n] from the left.
 impl.Dlarf(blas.Left, ihi-i, n-i-1, a[(i+1)*lda+i:], lda, tau[i], a[(i+1)*lda+i+1:], lda, work)
 a[(i+1)*lda+i] = aii
}
}

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package testblas

import (
 "fmt"
 "testing"

 "golang.org/x/exp/rand"
 "gonum.org/v1/gonum/blas"
)

type Ztpsver interface {
 Ztpsv(uplo blas.Uplo, trans blas.Transpose, diag blas.Diag, n int, ap []complex128, x []complex128, incX int)

 Ztpmver
}

```

```

func ZtpsvTest(t *testing.T, impl Ztpsver) {
 rnd := rand.New(rand.NewSource(1))
 for _, uplo := range []blas.Uplo{blas.Upper, blas.Lower} {
 for _, trans := range []blas.Transpose{blas.NoTrans, blas.Trans, blas.ConjTrans} {
 for _, diag := range []blas.Diag{blas.NonUnit, blas.Unit} {
 for _, n := range []int{0, 1, 2, 3, 4, 10} {
 for _, incX := range []int{-11, -3, -2, -1, 1, 2, 3, 7} {
 ztpsvTest(t, impl, uplo, trans, diag, n, incX, rnd)
 }
 }
 }
 }
 }
}

// ztpsvTest tests Ztpsv by checking whether Ztpmv followed by Ztpsv
// round-trip.
func ztpsvTest(t
 *testing.T, impl Ztpsver, uplo blas.Uplo, trans blas.Transpose, diag blas.Diag, n, incX int, rnd *rand.Rand) {
 const tol = 1e-10

 // Allocate a dense-storage triangular matrix filled with NaNs that
 // will be used as a for creating the actual triangular matrix in packed
 // storage.
 lda := n
 a := makeZGeneral(nil, n, n, max(1, lda))
 // Fill the referenced triangle of A with random data.
 if uplo == blas.Upper {
 for i := 0; i < n; i++ {
 for j := i; j < n; j++ {
 re := rnd.NormFloat64()
 im := rnd.NormFloat64()
 a[i*lda+j] = complex(re, im)
 }
 }
 } else {
 for i := 0; i < n; i++ {
 for j := 0; j <= i; j++ {
 re := rnd.NormFloat64()
 im := rnd.NormFloat64()
 a[i*lda+j] = complex(re, im)
 }
 }
 }
 if diag == blas.Unit {
 // The diagonal should not be referenced by Ztpmv and Ztpsv, so
 // invalidate it with NaNs.
 for i := 0; i < n; i++ {

```

```

 a[i*lda+i] = znan
}
}
// Create the triangular matrix in packed storage.
ap := zPack(uplo, n, a, n)
apCopy
:= make([]complex128, len(ap))
copy(apCopy, ap)

// Generate a random complex vector x.
xtest := make([]complex128, n)
for i := range xtest {
 re := rnd.NormFloat64()
 im := rnd.NormFloat64()
 xtest[i] = complex(re, im)
}
x := makeZVector(xtest, incX)

// Store a copy of x as the correct result that we want.
want := make([]complex128, len(x))
copy(want, x)

// Compute A*x, denoting the result by b and storing it in x.
impl.Ztpmv(uplo, trans, diag, n, ap, x, incX)
// Solve A*x = b, that is, $x = A^{-1} * b = A^{-1} * A * x$.
impl.Ztpsv(uplo, trans, diag, n, ap, x, incX)
// If Ztpsv is correct, $A^{-1} * A = I$ and x contains again its original value.

name := fmt.Sprintf("uplo=%v,trans=%v,diag=%v,n=%v,incX=%v", uplo, trans, diag, n, incX)
if !zsame(ap, apCopy) {
 t.Errorf("%v: unexpected modification of ap", name)
}
if !zSameAtNonstrided(x, want, incX) {
 t.Errorf("%v: unexpected modification of x\nwant %v\ngot %v", name, want, x)
}
if !zEqualApproxAtStrided(x, want, incX,
tol) {
 t.Errorf("%v: unexpected result\nwant %v\ngot %v", name, want, x)
}
}
graph{STRI{STRI}{STRI}{STRI}STRI}
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package gonum

import (

```

```

"gonum.org/v1/gonum/blas"
"gonum.org/v1/gonum/internal/asm/f32"
"gonum.org/v1/gonum/internal/asm/f64"
)

```

// TODO(Kunde21): Merge these methods back into level2double/level2single when Sgemv assembly kernels are merged into f32.

```

// Dgemv computes
// y = alpha * A * x + beta * y if tA = blas.NoTrans
// y = alpha * A * x + beta * y if tA = blas.Trans or blas.ConjTrans
// where A is an mn dense matrix, x and y are vectors, and alpha and beta are scalars.
func (Implementation) Dgemv(tA blas.Transpose, m, n int, alpha float64, a []float64, lda int, x []float64, incX int,
beta float64, y []float64, incY int) {
 if tA != blas.NoTrans && tA != blas.Trans && tA != blas.ConjTrans {
 panic(badTranspose)
 }
 if m < 0 {
 panic(mLT0)
 }
 if n < 0 {
 panic(nLT0)
 }
 if lda < max(1, n) {
 panic(badLdA)
 }
 if
 incX == 0 {
 panic(zeroIncX)
 }
 if incY == 0 {
 panic(zeroIncY)
 }
 // Set up indexes
 lenX := m
 lenY := n
 if tA == blas.NoTrans {
 lenX = n
 lenY = m
 }

 // Quick return if possible
 if m == 0 || n == 0 {
 return
 }

 if (incX > 0 && (lenX-1)*incX >= len(x)) || (incX < 0 && (1-lenX)*incX >= len(x)) {
 panic(shortX)
 }

```

```

}
if (incY > 0 && (lenY-1)*incY >= len(y)) || (incY < 0 && (1-lenY)*incY >= len(y)) {
 panic(shortY)
}
if len(a) < lda*(m-1)+n {
 panic(shortA)
}

// Quick return if possible
if alpha == 0 && beta == 1 {
 return
}

if alpha == 0 {
 // First form y = beta * y
 if incY > 0 {
 Implementation{}.Dscal(lenY, beta, y, incY)
 } else {
 Implementation{}.Dscal(lenY, beta, y, -incY)
 }
 return
}

// Form y = alpha * A * x + y
if tA == blas.NoTrans {
 f64.GemvN(uintptr(m), uintptr(n), alpha, a, uintptr(lda), x, uintptr(incX), beta, y, uintptr(incY))
 return
}
// Cases where a is transposed.
f64.GemvT(uintptr(m), uintptr(n), alpha, a, uintptr(lda),
x, uintptr(incX), beta, y, uintptr(incY))
}

// Sgemv computes
// y = alpha * A * x + beta * y if tA = blas.NoTrans
// y = alpha * A * x + beta * y if tA = blas.Trans or blas.ConjTrans
// where A is an mn dense matrix, x and y are vectors, and alpha and beta are scalars.
//
// Float32 implementations are autogenerated and not directly tested.
func (Implementation) Sgemv(tA blas.Transpose, m, n int, alpha float32, a []float32, lda int, x []float32, incX int,
beta float32, y []float32, incY int) {
 if tA != blas.NoTrans && tA != blas.Trans && tA != blas.ConjTrans {
 panic(badTranspose)
 }
 if m < 0 {
 panic(mLT0)
 }
 if n < 0 {

```



```

panic(nLT0)
}
if lda < max(1, n) {
 panic(badLdA)
}
if incX == 0 {
 panic(zeroIncX)
}
if incY == 0 {
 panic(zeroIncY)
}

// Quick return if possible.
if m == 0 || n == 0 {
 return
}

// Set up indexes
lenX := m
lenY := n
if tA == blas.NoTrans {
 lenX = n
 lenY = m
}
if (incX > 0 && (lenX-1)*incX >= len(x)) || (incX < 0 && (1-lenX)*incX
>= len(x)) {
 panic(shortX)
}
if (incY > 0 && (lenY-1)*incY >= len(y)) || (incY < 0 && (1-lenY)*incY >= len(y)) {
 panic(shortY)
}
if len(a) < lda*(m-1)+n {
 panic(shortA)
}

// Quick return if possible.
if alpha == 0 && beta == 1 {
 return
}

// First form y = beta * y
if incY > 0 {
 Implementation{}.Sscal(lenY, beta, y, incY)
} else {
 Implementation{}.Sscal(lenY, beta, y, -incY)
}

if alpha == 0 {

```

```

return
}

var kx, ky int
if incX < 0 {
 kx = -(lenX - 1) * incX
}
if incY < 0 {
 ky = -(lenY - 1) * incY
}

// Form $y = \alpha * A * x + y$
if tA == blas.NoTrans {
 if incX == 1 && incY == 1 {
 for i := 0; i < m; i++ {
 y[i] += alpha * f32.DotUnitary(a[llda*i:llda*i+n], x[:n])
 }
 return
 }
 iy := ky
 for i := 0; i < m; i++ {
 y[iy] += alpha * f32.DotInc(x, a[llda*i:llda*i+n], uintptr(n), uintptr(incX), 1, uintptr(kx), 0)
 iy += incY
 }
 return
}

// Cases where a is transposed.
if incX == 1 && incY == 1 {
 for i := 0; i < m; i++ {
 tmp
 := alpha * x[i]
 if tmp != 0 {
 f32.AxpyUnitaryTo(y, tmp, a[llda*i:llda*i+n], y[:n])
 }
 }
 return
}

ix := kx
for i := 0; i < m; i++ {
 tmp := alpha * x[ix]
 if tmp != 0 {
 f32.AxpyInc(tmp, a[llda*i:llda*i+n], y, uintptr(n), 1, uintptr(incY), 0, uintptr(ky))
 }
 ix += incX
}
}

```

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```

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package testlapack

import (
 "testing"

 "golang.org/x/exp/rand"

 "gonum.org/v1/gonum/blas/blas64"
)

type Dorg2ler interface {
 Dorg2l(m, n, k int, a []float64, lda int, tau, work []float64)
 Dgeql2er
}

func Dorg2lTest(t *testing.T, impl Dorg2ler) {
 rnd := rand.New(rand.NewSource(1))
 for _, test := range []struct {
 m, n, k, lda int
 }{
 {5, 4, 3, 0},
 {5, 4, 4, 0},
 {3, 3, 2, 0},
 {5, 5, 5, 0},
 {5, 4, 3, 11},
 {5, 4, 4, 11},
 {3, 3, 2, 11},
 {5, 5, 5, 11},
 } {
 m := test.m
 n := test.n
 k := test.k
 lda := test.lda
 if lda == 0 {
 lda = n
 }

 a := make([]float64, m*lda)
 for i := range a {
 a[i] = rnd.NormFloat64()
 }
 tau := nanSlice(max(m, n))
 work := make([]float64, n)
 impl.Dgeql2(m, n, a, lda, tau, work)

 impl.Dorg2l(m, n, k, a, lda, tau[n-k:], work)
 }
}

```

```

if !hasOrthonormalColumns(blas64.General{Rows:
m, Cols: n, Data: a, Stride: lda}) {
 t.Errorf("Case m=%v, n=%v, k=%v: columns of Q not orthonormal", m, n, k)
}
}
}
}

graph{8.185791015625}
graph{N{N}N{N}N{N}N{N}{N}N{N}N{N}{N}N{N}{}}N{{{}}}{}{}{}{}{}{}{}{}
graph{{{STRE{STRE}}STRE{{{STRE{STRE}}}{STRE}}STRE{STRE{STRE}}}}}
graph{{{{{Digra9}}Digra5}Digra9{Digra5}}}

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// license that can be found in the LICENSE file.
```

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

 "gonum.org/v1/gonum/graph/internal/ordered"
 "gonum.org/v1/gonum/graph/simple"
)
```

```

g []intset
want [][]int64
}{
{
g: []intset{
0: linksTo(1),
1: linksTo(2, 7),
2: linksTo(3, 6),
3: linksTo(4),
4: linksTo(2, 5),
6: linksTo(3, 5),
7: linksTo(0, 6),
},
want: [][]int64{
{0, 1, 7, 0},
{2, 3, 4, 2},
{2, 6, 3, 4, 2},
},
},
{
g: []intset{
0: linksTo(1, 2, 3),

```

```

1: linksTo(2),
2: linksTo(3),
3: linksTo(1),
},
want: [][]int64{
 {1, 2, 3, 1},
},
},
{
 g: []intset{
 0: linksTo(1),
 1: linksTo(0, 2),
 2: linksTo(1),
 },
 want: [][]int64{
 {0, 1, 0},
 {1, 2, 1},
 },
},
{
 g: []intset{
 0: linksTo(1),
 1: linksTo(2, 3),
 2: linksTo(4, 5),
 3: linksTo(4, 5),
 4: linksTo(6),
 5:
 nil,
 6: nil,
 },
 want: nil,
},
{
 g: []intset{
 0: linksTo(1),
 1: linksTo(2, 3, 4),
 2: linksTo(0, 3),
 3: linksTo(4),
 4: linksTo(3),
 },
 want: [][]int64{
 {0, 1, 2, 0},
 {3, 4, 3},
 },
},
}

func TestDirectedCyclesIn(t *testing.T) {

```

```

for i, test := range cyclesInTests {
 g := simple.NewDirectedGraph()
 g.AddNode(simple.Node(-10)) // Make sure we test graphs with sparse IDs.
 for u, e := range test.g {
 // Add nodes that are not defined by an edge.
 if g.Node(int64(u)) == nil {
 g.AddNode(simple.Node(u))
 }
 for v := range e {
 g.SetEdge(simple.Edge{F: simple.Node(u), T: simple.Node(v)})
 }
 }
 cycles := DirectedCyclesIn(g)
 var got [][]int64
 if cycles != nil {
 got = make([][]int64, len(cycles))
 }
 // johnson.circuit does range iteration over maps,
 // so sort to ensure consistent ordering.
 for j, c := range cycles {
 ids := make([]int64, len(c))
 for k, n := range c {
 ids[k] = n.ID()
 }
 got[j] =
ids
 }
 sort.Sort(ordered.BySliceValues(got))
 if !reflect.DeepEqual(got, test.want) {
 t.Errorf("unexpected johnson result for %d:\n\tgot:%#v\n\twant:%#v", i, got, test.want)
 }
}
}
digraph {
 "A" -> "B" ["color"="red"]
}
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// license that can be found in the LICENSE file.

package quad

import (
 "math"
 "sync"
)

// FixedLocationer computes a set of quadrature locations and weights and stores

```

```

// them in-place into x and weight respectively. The number of points generated is equal to
// the len(x). The weights and locations should be chosen such that
// $\int_{\text{int\_min}}^{\text{max}} f(x) dx \approx \sum_i w_i f(x_i)$
type FixedLocationer interface {
 FixedLocations(x, weight []float64, min, max float64)
}

// FixedLocationSingle returns the location and weight for element k in a
// fixed quadrature rule with n total samples and integral bounds from min to max.
type FixedLocationSinger interface {
 FixedLocationSingle(n, k int, min, max float64) (x, weight float64)
}

// Fixed approximates the integral of the function f from min to max using a fixed
// n-point quadrature rule. During evaluation, f will be evaluated n times
// using
// the weights and locations specified by rule. That is, Fixed estimates
// $\int_{\text{int\_min}}^{\text{max}} f(x) dx \approx \sum_i w_i f(x_i)$
// If rule is nil, an acceptable default is chosen, otherwise it is
// assumed that the properties of the integral match the assumptions of rule.
// For example, Legendre assumes that the integration bounds are finite. If
// rule is also a FixedLocationSinger, the quadrature points are computed
// individually rather than as a unit.
//
// If concurrent <= 0, f is evaluated serially, while if concurrent > 0, f
// may be evaluated with at most concurrent simultaneous evaluations.
//
// min must be less than or equal to max, and n must be positive, otherwise
// Fixed will panic.
func Fixed(f func(float64) float64, min, max float64, n int, rule FixedLocationer, concurrent int) float64 {
 // TODO(btracey): When there are Hermite polynomial quadrature, add an additional
 // example to the documentation comment that talks about weight functions.
 if n <= 0 {
 panic("quad: non-positive number of locations")
 }
 if min > max {
 panic("quad: min > max")
 }
 if min == max {
 return 0
 }
 intfunc := f
 // If rule is non-nil it is assumed that the function and the constraints
 // of rule are aligned. If it is nil, wrap the function and do something
 // reasonable.
 // TODO(btracey): Replace wrapping with other quadrature rules when
 // we have rules that support infinite-bound integrals.

```

```

if rule == nil {
// int_a^b f(x)dx = int_u^-1(a)^u^-1(b) f(u(t))u'(t)dt
switch {
case math.IsInf(max, 1) && math.IsInf(min, -1):
// u(t) = (t/(1-t^2))
min = -1
max = 1
intfunc = func(x float64) float64 {
v := 1 - x*x
return f(x/v) * (1 + x*x) / (v * v)
}
case math.IsInf(max, 1):
// u(t) = a + t / (1-t)
a := min
min = 0
max = 1
intfunc = func(x float64) float64 {
v := 1 - x
return f(a+x/v) / (v * v)
}
case math.IsInf(min, -1):
// u(t) = a - (1-t)/t
a := max
min = 0
max = 1
intfunc = func(x float64)
float64 {
return f(a-(1-x)/x) / (x * x)
}
}
rule = Legendre{}
}
singer, isSinger := rule.(FixedLocationSinger)

var xs, weights []float64
if !isSinger {
xs = make([]float64, n)
weights = make([]float64, n)
rule.FixedLocations(xs, weights, min, max)
}

if concurrent > n {
concurrent = n
}

if concurrent <= 0 {
var integral float64
// Evaluate in serial.

```



```

if isSinger {
 for k := 0; k < n; k++ {
 x, weight := singer.FixedLocationSingle(n, k, min, max)
 integral += weight * intfunc(x)
 }
 return integral
}
for i, x := range xs {
 integral += weights[i] * intfunc(x)
}
return integral
}

```

```

// Evaluate concurrently
tasks := make(chan int)

```

```

// Launch distributor
go func() {
 for i := 0; i < n; i++ {
 tasks <- i
 }
 close(tasks)
}()

```

```

var mux sync.Mutex
var integral float64
var wg sync.WaitGroup
wg.Add(concurrent)
for i := 0; i < concurrent; i++ {
 // Launch workers
 go func() {
 defer wg.Done()
 var subIntegral
float64
 for k := range tasks {
 var x, weight float64
 if isSinger {
 x, weight = singer.FixedLocationSingle(n, k, min, max)
 } else {
 x = xs[k]
 weight = weights[k]
 }
 f := intfunc(x)
 subIntegral += f * weight
 }
 mux.Lock()
 integral += subIntegral
 mux.Unlock()
 }()
}

```

```

}0
}
wg.Wait()
return integral
}

```

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```
graph{Stria-9Stria}
```

```
digraph{e[l=<<E><R><D><D><D><D><R><E>>]}
```

```
 SUBROUTINE ZS1S2(ZRR, ZRI, S1R, S1I, S2R, S2I, NZ, ASCLE, ALIM,
```

```
 * IUF)
```

```
C***BEGIN PROLOGUE ZS1S2
```

```
C***REFER TO ZBESK,ZAIRY
```

```
C
```

```

C ZS1S2 TESTS FOR A POSSIBLE UNDERFLOW RESULTING FROM THE
C ADDITION OF THE I AND K FUNCTIONS IN THE ANALYTIC CON-
C TINUATION FORMULA WHERE S1=K FUNCTION AND S2=I FUNCTION.
C ON KODE=1 THE I AND K FUNCTIONS ARE DIFFERENT ORDERS OF
C MAGNITUDE, BUT FOR KODE=2 THEY CAN BE OF THE SAME ORDER
C OF MAGNITUDE AND THE MAXIMUM MUST BE AT LEAST ONE
C PRECISION ABOVE THE UNDERFLOW LIMIT.
C

```

```

C***ROUTINES CALLED ZABS,ZEXP,ZLOG
C***END PROLOGUE ZS1S2
C COMPLEX CZERO,C1,S1,S1D,S2,ZR
 DOUBLE PRECISION AA, ALIM, ALN, ASCLE, AS1, AS2, C1I, C1R, S1DI,
 * S1DR, S1I, S1R, S2I, S2R, ZEROI, ZEROR, ZRI, ZRR, ZABS
 INTEGER IUF, IDUM, NZ
 DATA ZEROR,ZEROI / 0.0D0 , 0.0D0 /
 NZ = 0
 AS1 = ZABS(CMPLX(S1R,S1I,kind=KIND(1.0D0)))
 AS2 = ZABS(CMPLX(S2R,S2I,kind=KIND(1.0D0)))
 IF (S1R.EQ.0.0D0 .AND. S1I.EQ.0.0D0)
 GO TO 10
 IF (AS1.EQ.0.0D0) GO TO 10
 ALN = -ZRR - ZRR + DLOG(AS1)
 S1DR = S1R
 S1DI = S1I
 S1R = ZEROR
 S1I = ZEROI
 AS1 = ZEROR
 IF (ALN.LT.(-ALIM)) GO TO 10
 CALL ZLOG(S1DR, S1DI, C1R, C1I, IDUM)
 C1R = C1R - ZRR - ZRR
 C1I = C1I - ZRI - ZRI
 CALL ZEXP(C1R, C1I, S1R, S1I)
 AS1 = ZABS(CMPLX(S1R,S1I,kind=KIND(1.0D0)))
 IUF = IUF + 1
10 CONTINUE
 AA = DMAX1(AS1,AS2)
 IF (AA.GT.ASCLE) THEN
 RETURN
 END IF
 S1R = ZEROR
 S1I = ZEROI
 S2R = ZEROR
 S2I = ZEROI
 NZ = 1
 IUF = 0
 RETURN
 END

graph{{{DiGrap}DiGrap{{DiGrap}}DiGrap}}}
digraph {e""[e=e,e=8]r st9->st9[l=""]st9->st0[l=""]st8->st8[l=""]st8->st0[l=""]st7->st8[l=""]st7->st7[l=""]st6->st6[l=""]st6->st0[l=""]st5->st6[l=""]st5->st5[l=""]st4->st4[l=""]st4->st0[l=""]st3->st4[l=""]st3->st3[l=""]st2->st9[l=""]st2->st7[l=""]st2->st2[l=""]st0->st0[l=""]st0->st0[l=""]st1->st5[l=""]st1->st3[l=""]st1->st1[l=""]st0->st2[l=""]st0->st1[l=""]st0->st0[l="0/0"];
}

graph{Sub_{{Sub_{{Sub_{{Sub_}Sub_}}}{Sub_{{}}}{Sub_{{Sub_{{Sub_}Sub_}}}{Sub_{{}}}}}}
/** github.com/ipfs/go-pinning-service-http-client@v0.1.0 **/

```

```
{{Types "Apache-2.0 MIT"}}
```

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```
<!-- SPDX-License-Identifier: Apache-2.0 OR MIT -->
`SPDX-License-Identifier: Apache-2.0 OR MIT`
graph{{{subGG}subGT}}
graph{{Gr_}{Gr_}}
graph{g_{g_}{g_{g_}}}
graph{{{{{DiGrapr}{DiGrapi}}}}{DiGrapn}}{DiGrapi}}{""}}}}
graph{st{st}st}
graph{{DiGrapR}DiGrapR}}
// SPDX-License-Identifier: Unlicense OR MIT
```

```
/*
Package clip provides operations for clipping paint operations.
Drawing outside the current clip area is ignored.
```

The current clip is initially the infinite set. An Op sets the clip  
to the intersection of the current clip and the clip area it  
represents. If you need to reset the current clip to its value  
before applying an Op, use op.StackOp.

General clipping areas are constructed with Path. Simpler special  
cases such as rectangular clip areas also exist as convenient  
constructors.

```
*/
package clip
```

```

*> \brief \b DLABAD
*
* ===== DOCUMENTATION =====
*
* Online html documentation available at
* http://www.netlib.org/lapack/explore-html/
*
*> \htmlonly
*> Download DLABAD + dependencies
*>
*> [TGZ]
*>
*> [ZIP]
*>
*> [TXT]
*> \endhtmlonly
*
* Definition:
* =====
*
* SUBROUTINE DLABAD(SMALL, LARGE)
*
* .. Scalar Arguments ..
* DOUBLE PRECISION LARGE, SMALL
* ..
*
*> \par Purpose:
* =====
*>
*> \verbatim
*>
*> DLABAD takes as input the values computed by DLAMCH for underflow and
*> overflow, and returns the square root of each of these values if the
*> log of LARGE is sufficiently
*> large. This subroutine is intended to
*> identify machines with a large exponent range, such as the Crays, and
*> redefine the underflow and overflow limits to be the square roots of
*> the values computed by DLAMCH. This subroutine is needed because
*> DLAMCH does not compensate for poor arithmetic in the upper half of
*> the exponent range, as is found on a Cray.
*> \endverbatim
*
* Arguments:
* =====
*
*> \param[in,out] SMALL
*> \verbatim

```

```

*> SMALL is DOUBLE PRECISION
*> On entry, the underflow threshold as computed by DLAMCH.
*> On exit, if LOG10(LARGE) is sufficiently large, the square
*> root of SMALL, otherwise unchanged.
*> \endverbatim
*>
*> \param[in,out] LARGE
*> \verbatim
*> LARGE is DOUBLE PRECISION
*> On entry, the overflow threshold as computed by DLAMCH.
*> On exit, if LOG10(LARGE) is sufficiently large, the square
*> root of LARGE, otherwise unchanged.
*> \endverbatim
*
* Authors:
*
* =====
*
*> \author Univ. of Tennessee
*> \author Univ. of California Berkeley
*> \author Univ. of Colorado Denver
*> \author NAG Ltd.
*
*> \date November 2011
*
*> \ingroup auxOTHERauxiliary
*
* =====
*
* SUBROUTINE DLABAD(SMALL, LARGE)
*
* -- LAPACK auxiliary routine (version 3.4.0) --
* -- LAPACK is a software package provided by Univ. of Tennessee, --
* -- Univ. of California Berkeley, Univ. of Colorado Denver and NAG Ltd.--
* November 2011
*
* .. Scalar Arguments ..
* DOUBLE PRECISION LARGE, SMALL
* ..
*
* =====
*
* .. Intrinsic Functions ..
* INTRINSIC LOG10, SQRT
* ..
*
* .. Executable Statements ..
*
* If it looks like we're on a Cray, take the square root of
* SMALL and LARGE to avoid overflow and underflow problems.

```

```

*
* IF(LOG10(LARGE).GT.2000.D0) THEN
* SMALL = SQRT(
SMALL)
* LARGE = SQRT(LARGE)
* END IF
*
 RETURN
*
* End of DLABAD
*
 END
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```

```
package spatial_test
```

```

import (
 "fmt"

 "gonum.org/v1/gonum/mat"
 "gonum.org/v1/gonum/stat/spatial"
)

func ExampleGlobalMoransI_linear() {
 data := []float64{0, 0, 0, 1, 1, 1, 0, 1, 0, 0}

 // The locality here describes spatial neighbor
 // relationships.
 locality := mat.NewDense(10, 10, []float64{
 0, 1, 0, 0, 0, 0, 0, 0, 0, 0,
 1, 0, 1, 0, 0, 0, 0, 0, 0, 0,
 0, 1, 0, 1, 0, 0, 0, 0, 0, 0,
 0, 0, 1, 0, 1, 0, 0, 0, 0, 0,
 0, 0, 0, 1, 0, 1, 0, 0, 0, 0,
 0, 0, 0, 0, 1, 0, 1, 0, 0, 0,
 0, 0, 0, 0, 0, 1, 0, 1, 0, 0,
 0, 0, 0, 0, 0, 0, 1, 0, 1, 0,
 0, 0, 0, 0, 0, 0, 0, 1, 0, 1,
 0, 0, 0, 0, 0, 0, 0, 0, 1, 0,
 })

 i, _, z := spatial.GlobalMoransI(data, nil, locality)

 fmt.Printf("Moran's I=%.4v z-score=%.4v\n", i, z)

 // Output:

```

```

//
// Moran's I=0.1111 z-score=0.6335
}

func ExampleGlobalMoransI_banded() {
 data := []float64{0,
 0, 0, 1, 1, 1, 0, 1, 0, 0}

 // The locality here describes spatial neighbor
 // relationships.
 // This example uses the band matrix representation
 // to improve time and space efficiency.
 locality := mat.NewBandDense(10, 10, 1, 1, []float64{
 0, 0, 1,
 1, 0, 1,
 1, 0, 1,
 1, 0, 1,
 1, 0, 1,
 1, 0, 1,
 1, 0, 1,
 1, 0, 1,
 1, 0, 1,
 1, 0, 1,
 1, 0, 0,
 })

 i, _, z := spatial.GlobalMoransI(data, nil, locality)

 fmt.Printf("Moran's I=%.4v z-score=%.4v\n", i, z)

 // Output:
 //
 // Moran's I=0.1111 z-score=0.6335
}

func ExampleGetisOrdGStar() {
 data := []float64{0, 0, 0, 1, 1, 1, 0, 1, 0, 0}

 // The locality here describes spatial neighbor
 // relationships including self.
 locality := mat.NewDense(10, 10, []float64{
 1, 1, 0, 0, 0, 0, 0, 0, 0, 0,
 1, 1, 1, 0, 0, 0, 0, 0, 0, 0,
 0, 1, 1, 1, 0, 0, 0, 0, 0, 0,
 0, 0, 1, 1, 1, 0, 0, 0, 0, 0,
 0, 0, 0, 1, 1, 1, 0, 0, 0, 0,
 0, 0, 0, 0, 1, 1, 1, 0, 0, 0,
 0, 0, 0, 0, 0, 1, 1, 1, 0, 0,
 0, 0, 0, 0, 0, 0, 1, 1, 1, 0,
 })

```



```

0,
0, 0, 0, 0, 0, 0, 1, 1, 1,
0, 0, 0, 0, 0, 0, 0, 0, 1, 1,
}))

for i, v := range data {
 fmt.Printf("v=%v G*i=%v .4v\n", v, spatial.GetisOrdGStar(i, data, nil, locality))
}

// Output:
//
// v=0 G*i=-1.225
// v=0 G*i=-1.604
// v=0 G*i=-0.2673
// v=1 G*i= 1.069
// v=1 G*i= 2.405
// v=1 G*i= 1.069
// v=0 G*i= 1.069
// v=1 G*i=-0.2673
// v=0 G*i=-0.2673
// v=0 G*i=-1.225
}

func ExampleGetisOrdGStar_banded() {
 data := []float64{0, 0, 0, 1, 1, 1, 0, 1, 0, 0}

 // The locality here describes spatial neighbor
 // relationships including self.
 // This example uses the band matrix representation
 // to improve time and space efficiency.
 locality := mat.NewBandDense(10, 10, 1, 1, []float64{
 0, 1, 1,
 1, 1, 1,
 1, 1, 1,
 1, 1, 1,
 1, 1, 1,
 1, 1, 1,
 1, 1, 1,
 1, 1, 1,
 1, 1, 1,
 1, 1, 0,
 })

 for i, v := range data {
 fmt.Printf("v=%v G*i=%v .4v\n", v, spatial.GetisOrdGStar(i, data, nil, locality))
 }

 // Output:

```

```
//
// v=0 G*i=-1.225
// v=0 G*i=-1.604
//
v=0 G*i=-0.2673
// v=1 G*i= 1.069
// v=1 G*i= 2.405
// v=1 G*i= 1.069
// v=0 G*i= 1.069
// v=1 G*i=-0.2673
// v=0 G*i=-0.2673
// v=0 G*i=-1.225
}
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// license that can be found in the LICENSE file.
```

```
package hyperdual
```

```
import (
 "fmt"
 "math"
 "strings"
)
```

```
// Number is a float64 precision hyperdual number.
type Number struct {
 Real, E1mag, E2mag, E1E2mag float64
}
```

```
var (
 zero = Number{}
 negZero = math.Float64frombits(1 << 63)
)
```

```
// Format implements fmt.Formatter.
func (d Number) Format(fs fmt.State, c rune) {
 prec, pOk := fs.Precision()
 if !pOk {
 prec = -1
 }
 width, wOk := fs.Width()
 if !wOk {
 width = -1
 }
 switch c {
 case 'v':
 if fs.Flag('#') {
```

```

 fmt.Fprintf(fs, "%T{Real:%#v, E1mag:%#v, E2mag:%#v, E1E2mag:%#v}", d, d.Real, d.E1mag, d.E2mag,
d.E1E2mag)
 return
}
if fs.Flag('+') {
 fmt.Fprintf(fs, "{Real:%+v, E1mag:%+v, E2mag:%+v, E1E2mag:%+v}", d.Real, d.E1mag, d.E2mag, d.E1E2mag)
 return
}
c = 'g'
prec = -1
fallthrough
case 'e', 'E', 'f', 'F', 'g', 'G':
 fre := fmtString(fs, c, prec,
width, false)
 fim := fmtString(fs, c, prec, width, true)
 fmt.Fprintf(fs, fmt.Sprintf("(%s%[2]s%[2]s%[2]s)", fre, fim), d.Real, d.E1mag, d.E2mag, d.E1E2mag)
default:
 fmt.Fprintf(fs, "%%!%c(%T=%[2]v)", c, d)
 return
}
}

```

// This is horrible, but it's what we have.

```

func fmtString(fs fmt.State, c rune, prec, width int, wantPlus bool) string {
 var b strings.Builder
 b.WriteByte('%')
 for _, f := range "0+- " {
 if fs.Flag(int(f)) || (f == '+' && wantPlus) {
 b.WriteByte(byte(f))
 }
 }
 if width >= 0 {
 fmt.Fprint(&b, width)
 }
 if prec >= 0 {
 b.WriteByte('.')
 if prec > 0 {
 fmt.Fprint(&b, prec)
 }
 }
 b.WriteRune(c)
 return b.String()
}

```

// Add returns the sum of x and y.

```

func Add(x, y Number) Number {
 return Number{
 Real: x.Real + y.Real,

```

```

 E1mag: x.E1mag + y.E1mag,
 E2mag: x.E2mag + y.E2mag,
 E1E2mag: x.E1E2mag + y.E1E2mag,
}
}

// Sub returns the difference of x and y, x-y.
func Sub(x, y Number) Number {
 return Number{
 Real: x.Real - y.Real,
 E1mag:
 x.E1mag - y.E1mag,
 E2mag: x.E2mag - y.E2mag,
 E1E2mag: x.E1E2mag - y.E1E2mag,
 }
}

// Mul returns the hyperdual product of x and y.
func Mul(x, y Number) Number {
 return Number{
 Real: x.Real * y.Real,
 E1mag: x.Real*y.E1mag + x.E1mag*y.Real,
 E2mag: x.Real*y.E2mag + x.E2mag*y.Real,
 E1E2mag: x.Real*y.E1E2mag + x.E1mag*y.E2mag + x.E2mag*y.E1mag + x.E1E2mag*y.Real,
 }
}

// Inv returns the hyperdual inverse of d.
//
// Special cases are:
// Inv(Inf) = 0-0-00
// Inv(0) = Inf-Inf-InfInf
func Inv(d Number) Number {
 if d.Real == 0 {
 return Number{
 Real: 1 / d.Real,
 E1mag: math.Inf(-1),
 E2mag: math.Inf(-1),
 E1E2mag: 1 / d.Real, // Return a signed inf from a signed zero.
 }
 }
 d2 := d.Real * d.Real
 return Number{
 Real: 1 / d.Real,
 E1mag: -d.E1mag / d2,
 E2mag: -d.E2mag / d2,
 E1E2mag: -d.E1E2mag/d2 + 2*d.E1mag*d.E2mag/(d2*d.Real),
 }
}

```

```

}

// Scale returns d scaled by f.
func Scale(f float64, d Number) Number {
 return Number{Real:
 f * d.Real, E1mag: f * d.E1mag, E2mag: f * d.E2mag, E1E2mag: f * d.E1E2mag}
}

// Abs returns the absolute value of d.
func Abs(d Number) Number {
 if math.Float64bits(d.Real)&(1<<63) == 0 {
 return d
 }
 return Scale(-1, d)
}
graph{DI9{DI9{{DI9}}DI9{DI9{{DI9}}}}}
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// license that can be found in the LICENSE file.

package testlapack

import (
 "testing"

 "golang.org/x/exp/rand"

 "gonum.org/v1/gonum/blas"
 "gonum.org/v1/gonum/blas/blas64"
)

type Dgeqp3er interface {
 Dlapmter
 Dgeqp3(m, n int, a []float64, lda int, jpvt []int, tau, work []float64, lwork int)
}

func Dgeqp3Test(t *testing.T, impl Dgeqp3er) {
 rnd := rand.New(rand.NewSource(1))
 for c, test := range []struct {
 m, n, lda int
 }{
 {1, 1, 0},
 {2, 2, 0},
 {3, 2, 0},
 {2, 3, 0},
 {1, 12, 0},
 {2, 6, 0},
 {3, 4, 0},
 }{

```

```

{4, 3, 0},
{6, 2, 0},
{12, 1, 0},
{1, 1, 20},
{2, 2, 20},
{3, 2, 20},
{2, 3, 20},
{1, 12, 20},
{2, 6, 20},
{3, 4, 20},
{4, 3, 20},
{6, 2, 20},
{12, 1, 20},
{129, 256, 0},
{256, 129, 0},
{129, 256, 266},
{256, 129, 266},
} {
n := test.n
m := test.m
lda := test.lda
if lda == 0 {
 lda = test.n
}
const (
 all
= iota
 some
 none
)
for _, free := range []int{all, some, none} {
 // Allocate mn matrix A and fill it with random numbers.
 a := make([]float64, m*lda)
 for i := range a {
 a[i] = rnd.Float64()
 }
 // Store a copy of A for later comparison.
 aCopy := make([]float64, len(a))
 copy(aCopy, a)
 // Allocate a slice of column pivots.
 jpvt := make([]int, n)
 for j := range jpvt {
 switch free {
 case all:
 // All columns are free.
 jpvt[j] = -1
 case some:
 // Some columns are free, some are leading columns.

```

```

 jpvt[j] = rnd.Intn(2) - 1 // -1 or 0
case none:
 // All columns are leading.
 jpvt[j] = 0
default:
 panic("bad freedom")
}
}
// Allocate a slice for scalar factors of elementary
// reflectors and fill it with random numbers. Dgeqp3
// will overwrite them with valid data.
k := min(m, n)
tau := make([]float64, k)
for i := range tau {
 tau[i] = rnd.Float64()
}
// Get optimal workspace
size for Dgeqp3.
work := make([]float64, 1)
impl.Dgeqp3(m, n, a, lda, jpvt, tau, work, -1)
lwork := int(work[0])
work = make([]float64, lwork)
for i := range work {
 work[i] = rnd.Float64()
}

// Compute a QR factorization of A with column pivoting.
impl.Dgeqp3(m, n, a, lda, jpvt, tau, work, lwork)

// Compute Q based on the elementary reflectors stored in A.
q := constructQ("QR", m, n, a, lda, tau)
// Check that Q is orthogonal.
if !isOrthogonal(q) {
 t.Errorf("Case %v, Q not orthogonal", c)
}

// Copy the upper triangle of A into R.
r := blas64.General{
 Rows: m,
 Cols: n,
 Stride: n,
 Data: make([]float64, m*n),
}
for i := 0; i < m; i++ {
 for j := i; j < n; j++ {
 r.Data[i*n+j] = a[i*lda+j]
 }
}

```





```

func Register() {
 register(text.Font{}, goregular.TTF)
 register(text.Font{Style: text.Italic},
 goitalic.TTF)
 register(text.Font{Weight: text.Bold}, gobold.TTF)
 register(text.Font{Style: text.Italic, Weight: text.Bold}, gobolditalic.TTF)
 register(text.Font{Weight: text.Medium}, gomedium.TTF)
 register(text.Font{Weight: text.Medium, Style: text.Italic}, gomediumitalic.TTF)
 register(text.Font{Variant: "Mono"}, gomono.TTF)
 register(text.Font{Variant: "Mono", Weight: text.Bold}, gomonobold.TTF)
 register(text.Font{Variant: "Mono", Weight: text.Bold, Style: text.Italic}, gomonobolditalic.TTF)
 register(text.Font{Variant: "Mono", Style: text.Italic}, gomonoitalic.TTF)
 register(text.Font{Variant: "Mono", Style: text.Italic}, gomonoitalic.TTF)
 register(text.Font{Variant: "Smallcaps"}, gosmallcaps.TTF)
 register(text.Font{Variant: "Smallcaps", Style: text.Italic}, gosmallcapsitalic.TTF)
}

```

```

func register(fnt text.Font, ttf []byte) {
 face, err := opentype.Parse(ttf)
 if err != nil {
 panic(fmt.Sprintf("failed to parse font: %v", err))
 }
 fnt.Typeface = "Go"
 font.Register(fnt, face)
}

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// license that can be found in the LICENSE file.

```

```

package gonum

```

```

import (
 "fmt"
 "testing"

 "golang.org/x/exp/rand"

 "gonum.org/v1/gonum/blas"
)

```

```

var benchSinkZ []complex128

```

```

func BenchmarkZher(b *testing.B) {
 for _, uplo := range []blas.Uplo{blas.Upper, blas.Lower} {
 for _, n := range []int{10, 100, 1000, 10000} {
 for _, inc := range []int{1, 10, 1000} {
 benchmarkZher(b, uplo, n, inc)
 }
 }
 }
}

```

```

}
}
}

func benchmarkZher(b *testing.B, uplo blas.Uplo, n, inc int) {
b.Run(fmt.Sprintf("Uplo%d-N%d-Inc%d", uplo, n, inc), func(b *testing.B) {
 rnd := rand.New(rand.NewSource(1))
 alpha := rnd.NormFloat64()
 x := make([]complex128, (n-1)*inc+1)
 for i := range x {
 x[i] = complex(rnd.NormFloat64(), rnd.NormFloat64())
 }
 a := make([]complex128, len(benchSinkZ))
 for i := range a {
 a[i] = complex(rnd.NormFloat64(), rnd.NormFloat64())
 }
 benchSinkZ = make([]complex128,
n*n)
 copy(benchSinkZ, a)
 b.ResetTimer()
 for i := 0; i < b.N; i++ {
 impl.Zher(uplo, n, alpha, x, inc, benchSinkZ, n)
 copy(benchSinkZ, a)
 }
})
}

graph{{stric9}stric9{stric4}}
graph{{{DiD{DiD{DiD}}}}}
graph{eD""eD""eN}
digraph{gs[r=e]n->gt[r=n]n->s[r=e]n->s[r=n]n->c[r=n]gt[r=n]n->r[r=e]n->s[r=n]a:gs->c[r=e]s->i[r=n]s->t[r=n]s->t[r=n]s->c[r=n]t->e[r=e]t->c[r=n]t->c[r=n]t->r[r=e]t->e[r=n]c->c[r=n]c->r[r=e]r->t[r=e]r->f[r=e]r->r[r=e]e->s[r=d]e->f[r=d]e->d[r=n]s->e[r=n]s->n[r=n]s->t[r=n]s->e[r=e]}
graph{{Dig}{Dig}{Dig}{Dig}Dig}
graph{SUBGRAT}
graph{Nodeh{Nodeh}}
graph{"\\\\"
\\\\"
omitting {sssssssss}\\"}
graph{{{diGE{diGE}}}}
graph{{{digra4}}}}
graph{{{{EDGD}EDGD}}}{""EDGD}{""EDGD}{{""{EDGD{}}}}EDGD}{{{{EDGD{EDGD}}}}EDGD{EDGD}}EDGD}
graph{{{{gra_}{gra_}}}}
graph{{DIG{DIGG}DIGG}{DIGG{DIG}DIG}}
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```

```

package network

import (
 "math"

 "gonum.org/v1/gonum/graph"
 "gonum.org/v1/gonum/graph/path"
)

// Closeness returns the closeness centrality for nodes in the graph g used to
// construct the given shortest paths.
//
// $C(v) = 1 / \sum_u d(u,v)$
//
// For directed graphs the incoming paths are used. Infinite distances are
// not considered.
func Closeness(g graph.Graph, p path.AllShortest) map[int64]float64 {
 nodes := graph.NodesOf(g.Nodes())
 c := make(map[int64]float64, len(nodes))
 for _, u := range nodes {
 uid := u.ID()
 var sum float64
 for _, v := range nodes {
 vid := v.ID()
 // The ordering here is not relevant for
 // undirected graphs, but we make sure we
 // are counting incoming paths.
 d := p.Weight(vid, uid)
 if math.IsInf(d, 0) {
 continue
 }
 sum += d
 }
 c[u.ID()] = 1 / sum
 }
 return c
}

// Farness returns the farness for nodes in the graph g used to construct
// the given shortest paths.
//
// $F(v) = \sum_u d(u,v)$
//
// For directed graphs the incoming paths are used. Infinite distances are
// not considered.
func Farness(g graph.Graph, p path.AllShortest) map[int64]float64 {
 nodes := graph.NodesOf(g.Nodes())

```

```

f := make(map[int64]float64, len(nodes))
for _, u := range nodes {
 uid := u.ID()
 var sum float64
 for _, v := range nodes {
 vid := v.ID()
 // The ordering here is not relevant for
 // undirected graphs, but we make sure we
 // are counting incoming paths.
 d := p.Weight(vid, uid)
 if math.IsInf(d, 0) {
 continue
 }
 sum += d
 }
 f[u.ID()] = sum
}
return f
}

// Harmonic returns the harmonic centrality for nodes in the graph g used to
// construct the given shortest paths.
//
// $H(v) = \sum_u \frac{1}{d(u,v)}$
//
// For directed graphs the incoming paths are used. Infinite distances are
// not considered.
func Harmonic(g graph.Graph,
p path.AllShortest) map[int64]float64 {
 nodes := graph.NodesOf(g.Nodes())
 h := make(map[int64]float64, len(nodes))
 for i, u := range nodes {
 uid := u.ID()
 var sum float64
 for j, v := range nodes {
 vid := v.ID()
 // The ordering here is not relevant for
 // undirected graphs, but we make sure we
 // are counting incoming paths.
 d := p.Weight(vid, uid)
 if math.IsInf(d, 0) {
 continue
 }
 if i != j {
 sum += 1 / d
 }
 }
 h[u.ID()] = sum
 }
}

```

```

}
return h
}

// Residual returns the Dangalchev's residual closeness for nodes in the graph
// g used to construct the given shortest paths.
//
// $C(v) = \sum_u \frac{1}{2^{d(u,v)}}$
//
// For directed graphs the incoming paths are used. Infinite distances are
// not considered.
func Residual(g graph.Graph, p path.AllShortest) map[int64]float64 {
 nodes := graph.NodesOf(g.Nodes())
 r := make(map[int64]float64, len(nodes))
 for i, u := range nodes {
 uid := u.ID()
 var sum float64
 for j, v := range nodes {
 vid
 := v.ID()
 // The ordering here is not relevant for
 // undirected graphs, but we make sure we
 // are counting incoming paths.
 d := p.Weight(vid, uid)
 if math.IsInf(d, 0) {
 continue
 }
 if i != j {
 sum += math.Exp2(-d)
 }
 }
 r[u.ID()] = sum
 }
 return r
}

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package mathext

import (
 "math"
 "testing"
)

func TestAiry(t *testing.T) {
 for _, test := range []struct {

```

```

z, ans complex128
}{
// Results computed using Octave.
{5, 1.08344428136074e-04},
{5i, 29.9014823980070 + 21.6778315987835i},
} {
ans := AiryAi(test.z)
if math.Abs(real(ans)-real(test.ans)) > 1e-10 {
t.Errorf("Real part mismatch. Got %v, want %v", real(ans), real(test.ans))
}
if math.Abs(imag(ans)-imag(test.ans)) > 1e-10 {
t.Errorf("Imaginary part mismatch. Got %v, want %v", imag(ans), imag(test.ans))
}
}
}
graph{SubGrapa}
graph{{diGrap}diGr{diGrap}diGr{diGrap}diGra{diGrap}diGr{diGrap}}
graph{DigraG{{DigraG{DigraD}DigraG{}}DigraG{DigraG}DigraG{DigraG}DigraG{DigraG}}}
graph{DIGRA0{DIGRA0}}
graph{N{N}{N}}
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package testblas

import (
 "testing"

 "gonum.org/v1/gonum/blas"
)

type Dtxmver interface {
 Dtrmv(ul blas.Uplo, tA blas.Transpose, d blas.Diag, n int, a []float64, lda int, x []float64, incX int)
 Dtbmv(ul blas.Uplo, tA blas.Transpose, d blas.Diag, n, k int, a []float64, lda int, x []float64, incX int)
 Dtpmv(ul blas.Uplo, tA blas.Transpose, d blas.Diag, n int, a []float64, x []float64, incX int)
}

type vec struct {
 data []float64
 inc int
}

var cases = []struct {
 n, k int
 ul blas.Uplo
 d blas.Diag
 ldab int

```

```

tr, tb, tp []float64
ins []vec
solNoTrans []float64
solTrans []float64
}{
{
n: 3,
k: 1,
ul: blas.Upper,
d: blas.NonUnit,
tr: []float64{1, 2, 0, 0, 3, 4, 0, 0, 5},
tb: []float64{1, 2, 3, 4, 5, 0},
ldab: 2,
tp: []float64{1, 2, 0, 3, 4, 5},
ins:
[]vec{
{[]float64{2, 3, 4}, 1},
{[]float64{2, 1, 3, 1, 4}, 2},
{[]float64{4, 1, 3, 1, 2}, -2},
},
solNoTrans: []float64{8, 25, 20},
solTrans: []float64{2, 13, 32},
},
{
n: 3,
k: 1,
ul: blas.Upper,
d: blas.Unit,
tr: []float64{1, 2, 0, 0, 3, 4, 0, 0, 5},
tb: []float64{1, 2, 3, 4, 5, 0},
ldab: 2,
tp: []float64{1, 2, 0, 3, 4, 5},
ins: []vec{
{[]float64{2, 3, 4}, 1},
{[]float64{2, 1, 3, 1, 4}, 2},
{[]float64{4, 1, 3, 1, 2}, -2},
},
solNoTrans: []float64{8, 19, 4},
solTrans: []float64{2, 7, 16},
},
{
n: 3,
k: 1,
ul: blas.Lower,
d: blas.NonUnit,
tr: []float64{1, 0, 0, 2, 3, 0, 0, 4, 5},
tb: []float64{0, 1, 2, 3, 4, 5},
ldab: 2,

```

```

tp: []float64{1, 2, 3, 0, 4, 5},
ins: []vec{
 {}float64{2, 3, 4}, 1},
 {}float64{2, 1, 3, 1, 4}, 2},
 {}float64{4, 1, 3, 1, 2}, -2},
},
solNoTrans: []float64{2, 13, 32},
solTrans: []float64{8, 25, 20},
},
{
 n: 3,
 k: 1,
 ul: blas.Lower,
 d:
 blas.Unit,
 tr: []float64{1, 0, 0, 2, 3, 0, 0, 4, 5},
 tb: []float64{0, 1, 2, 3, 4, 5},
 ldab: 2,
 tp: []float64{1, 2, 3, 0, 4, 5},
 ins: []vec{
 {}float64{2, 3, 4}, 1},
 {}float64{2, 1, 3, 1, 4}, 2},
 {}float64{4, 1, 3, 1, 2}, -2},
 },
 solNoTrans: []float64{2, 7, 16},
 solTrans: []float64{8, 19, 4},
 },
}

func DtxmvTest(t *testing.T, blasser Dtxmver) {

 for nc, c := range cases {
 for nx, x := range c.ins {
 in := make([]float64, len(x.data))
 copy(in, x.data)
 blasser.Dtrmv(c.ul, blas.NoTrans, c.d, c.n, c.tr, c.n, in, x.inc)
 if !dStridedSliceTolEqual(c.n, in, x.inc, c.solNoTrans, 1) {
 t.Error("Wrong Dtrmv result for: NoTrans in Case:", nc, "input:", nx)
 }

 in = make([]float64, len(x.data))
 copy(in, x.data)
 blasser.Dtrmv(c.ul, blas.Trans, c.d, c.n, c.tr, c.n, in, x.inc)
 if !dStridedSliceTolEqual(c.n, in, x.inc, c.solTrans, 1) {
 t.Error("Wrong Dtrmv result for: Trans in Case:", nc, "input:", nx)
 }
 }
 }
}

```



```

= make([]float64, len(x.data))
copy(in, x.data)
blasser.Dtbmv(c.ul, blas.NoTrans, c.d, c.n, c.k, c.tb, c.ldab, in, x.inc)
if !dStridedSliceTolEqual(c.n, in, x.inc, c.solNoTrans, 1) {
 t.Error("Wrong Dtbmv result for: NoTrans in Case:", nc, "input:", nx)
}

```

```

in = make([]float64, len(x.data))
copy(in, x.data)
blasser.Dtbmv(c.ul, blas.Trans, c.d, c.n, c.k, c.tb, c.ldab, in, x.inc)
if !dStridedSliceTolEqual(c.n, in, x.inc, c.solTrans, 1) {
 t.Error("Wrong Dtbmv result for: Trans in Case:", nc, "input:", nx)
}

```

```

in = make([]float64, len(x.data))
copy(in, x.data)
blasser.Dtpmv(c.ul, blas.NoTrans, c.d, c.n, c.tp, in, x.inc)
if !dStridedSliceTolEqual(c.n, in, x.inc, c.solNoTrans, 1) {
 t.Error("Wrong Dtpmv result for: NoTrans in Case:", nc, "input:", nx)
}

```

```

in = make([]float64, len(x.data))
copy(in, x.data)
blasser.Dtpmv(c.ul, blas.Trans, c.d, c.n, c.tp, in, x.inc)
if !dStridedSliceTolEqual(c.n, in, x.inc, c.solTrans, 1) {
 t.Error("Wrong
Dtpmv result for: Trans in Case:", nc, "input:", nx)
}
}
}
}

```

```
graph{{digraS}}
```

```
graph{Strr-9Strr-9Strr}
```

```
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```

```
// Use of this source code is governed by a BSD-style
```

```
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```

```
package optimize
```

```
import (
```

```
"fmt"
```

```
"math"
```

```
"reflect"
```

```
"testing"
```

```
"gonum.org/v1/gonum/optimize/functions"
```

```
)
```

```
func TestMoreThuente(t *testing.T) {
```

```

d := 0.001
c := 0.001
ls := &MoreThuyente{
 DecreaseFactor: d,
 CurvatureFactor: c,
}
testLinesearcher(t, ls, d, c, true)
}

func TestBisection(t *testing.T) {
 c := 0.1
 ls := &Bisection{
 CurvatureFactor: c,
 }
 testLinesearcher(t, ls, 0, c, true)
}

func TestBacktracking(t *testing.T) {
 d := 0.001
 ls := &Backtracking{
 DecreaseFactor: d,
 }
 testLinesearcher(t, ls, d, 0, false)
}

type funcGrader interface {
 Func([]float64) float64
 Grad([]float64, []float64)
}

type linesearcherTest struct {
 name string
 f func(float64) float64
 g func(float64) float64
}

func newLinesearcherTest(name string, fg funcGrader) linesearcherTest {
 grad := make([]float64, 1)
 return
 linesearcherTest{
 name: name,
 f: func(x float64) float64 {
 return fg.Func([]float64{x})
 },
 g: func(x float64) float64 {
 fg.Grad(grad, []float64{x})
 return grad[0]
 },
 }
}

```

```

}
}

func testLinesearcher(t *testing.T, ls Linesearcher, decrease, curvature float64, strongWolfe bool) {
 for i, prob := range []linesearcherTest{
 newLinesearcherTest("Concave-to-the-right function", functions.ConcaveRight{}),
 newLinesearcherTest("Concave-to-the-left function", functions.ConcaveLeft{}),
 newLinesearcherTest("Plassmann wiggly function (l=39, beta=0.01)", functions.Plassmann{L: 39, Beta: 0.01}),
 newLinesearcherTest("Yanai-Ozawa-Kaneko function (beta1=0.001, beta2=0.001)",
functions.YanaiOzawaKaneko{Beta1: 0.001, Beta2: 0.001}),
 newLinesearcherTest("Yanai-Ozawa-Kaneko function (beta1=0.01, beta2=0.001)",
functions.YanaiOzawaKaneko{Beta1: 0.01, Beta2: 0.001}),
 newLinesearcherTest("Yanai-Ozawa-Kaneko function (beta1=0.001, beta2=0.01)",
functions.YanaiOzawaKaneko{Beta1: 0.001,
Beta2: 0.01}),
 } {
 for _, initStep := range []float64{0.001, 0.1, 1, 10, 1000} {
 prefix := fmt.Sprintf("test %d (%v started from %v)", i, prob.name, initStep)

 f0 := prob.f(0)
 g0 := prob.g(0)
 if g0 >= 0 {
 panic("bad test function")
 }

 op := ls.Init(f0, g0, initStep)
 if !op.isEvaluation() {
 t.Errorf("%v: Linesearcher.Init returned non-evaluating operation %v", prefix, op)
 continue
 }

 var (
 err error
 k int
 f, g float64
 step float64
)
 loop:
 for {
 switch op {
 case MajorIteration:
 if f > f0+step*decrease*g0 {
 t.Errorf("%v: %v found step %v that does not satisfy the sufficient decrease condition",
prefix, reflect.TypeOf(ls), step)
 }
 }
 if strongWolfe && math.Abs(g) > curvature*(-g0) {
 t.Errorf("%v: %v found step %v that does not satisfy the curvature condition",
prefix, reflect.TypeOf(ls), step)
 }
 }
 }
 }
}

```

```

 }
 break loop
case FuncEvaluation:
 f = prob.f(step)
case GradEvaluation:
 g
= prob.g(step)
case FuncEvaluation | GradEvaluation:
 f = prob.f(step)
 g = prob.g(step)
default:
 t.Errorf("%v: Linesearcher returned an invalid operation %v", prefix, op)
 break loop
}

k++
if k == 1000 {
 t.Errorf("%v: %v did not finish", prefix, reflect.TypeOf(ls))
 break
}

op, step, err = ls.Iterate(f, g)
if err != nil {
 t.Errorf("%v: %v failed at step %v with %v", prefix, reflect.TypeOf(ls), step, err)
 break
}
}
}
}
}
}
Graph{Graph[] {Graph[]Graph[] }Graph[] }
digraph {r[l=" "]a:a->b:t a:1->d:2->y:""c:""->d:d->x:""c:""->y:""b:t->z:""}
graph{ {Digra{ {Digra{ }Digra} }Digra} }
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// license that can be found in the LICENSE file.

//go:generate go run generate_defined_types.go
//go:generate go run generate_constants.go defined_types.go

// Package constant provides fundamental constants satisfying unit.Uniter.
//
// Constant values reflect the values published at https://physics.nist.gov/cuu/index.html
// and are subject to change when the published values are updated.
package constant
graph{SubGraph}
graph{"\\\\"\\\\"\\\\"\\\\""}

```

```

digraph{node->nodk}
graph{{{DIGRAPc{{{DIGRAPy}{DIGRAPy}{DIGRAPy}{DIGRAPy}}DIGRAPy}}}}
graph{{{noe not}noe not}}
graph{{Edg2{{{Edg2}}Edg2}}Edg2{{{Edg2{{{Edg2}}Edg2}}{Edg2}}Edg2}}
digraph{w{w:sw->w:sw->w:sw}w:sw->w:sw}
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// Package dualquat provides the dual quaternion numeric type and functions.
//
// Dual quaternions provide a system for rigid transformation with interpolation
// and blending in . See https://www.cs.utah.edu/~ladislav/kavan06dual/kavan06dual.pdf and
// https://en.wikipedia.org/wiki/Dual_quaternion for more details.
package dualquat // imports "gonum.org/v1/gonum/num/dualquat"

// TODO(kortschak): Handle special cases properly.
// - Pow
graph{GRAPp{GRAPp{GRAPe}{GRAPp{GRAPe}{GRAPp}}}}
Graph{Gra{Gra}}
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package gonum

import (
 "math"

 "gonum.org/v1/gonum/lapack"
)

// Dlange returns the value of the specified norm of a general mn matrix A:
// lapack.MaxAbs: the maximum absolute value of any element.
// lapack.MaxColumnSum: the maximum column sum of the absolute values of the elements (1-norm).
// lapack.MaxRowSum: the maximum row sum of the absolute values of the elements (infinity-norm).
// lapack.Frobenius: the square root of the sum of the squares of the elements (Frobenius norm).
// If norm == lapack.MaxColumnSum, work must be of length n, and this function will
// panic otherwise. There are no restrictions on work for the other matrix norms.
func (impl Implementation) Dlange(norm lapack.MatrixNorm, m, n int, a []float64, lda int, work []float64) float64 {
 // TODO(btracey): These should probably be refactored
 // to use BLAS calls.
 switch {
 case norm != lapack.MaxRowSum && norm != lapack.MaxColumnSum && norm != lapack.Frobenius && norm
 != lapack.MaxAbs:
 panic(badNorm)
 case m < 0:
 panic(mLT0)
 }
}

```

```

case n < 0:
 panic(nLT0)
case lda < max(1, n):
 panic(badLdA)
}

// Quick return if possible.
if m == 0 || n == 0 {
 return 0
}

switch {
case len(a) < (m-1)*lda+n:
 panic(badLdA)
case norm == lapack.MaxColumnSum && len(work) < n:
 panic(shortWork)
}

switch norm {
case lapack.MaxAbs:
 var value float64
 for i := 0; i < m; i++ {
 for j := 0; j < n; j++ {
 value = math.Max(value, math.Abs(a[i*lda+j]))
 }
 }
 return value
case lapack.MaxColumnSum:
 for i := 0; i < n; i++ {
 work[i] = 0
 }
 for i := 0; i < m; i++ {
 for j := 0; j < n; j++ {
 work[j] += math.Abs(a[i*lda+j])
 }
 }
 var value float64
 for i := 0; i < n; i++ {
 value = math.Max(value, work[i])
 }
 return value
case lapack.MaxRowSum:
 var value float64
 for i := 0; i < m; i++ {
 var
sum float64
 for j := 0; j < n; j++ {
 sum += math.Abs(a[i*lda+j])

```

```

 }
 value = math.Max(value, sum)
}
return value
default:
// lapack.Frobenius
scale := 0.0
sum := 1.0
for i := 0; i < m; i++ {
 rowscale, rowsum := impl.Dlassq(n, a[i*lda:], 1, 0, 1)
 scale, sum = impl.Dcombssq(scale, sum, rowscale, rowsum)
}
return scale * math.Sqrt(sum)
}
}

// Code generated by "go generate gonum.org/v1/gonum/unit/constant; DO NOT EDIT.

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// license that can be found in the LICENSE file.

// +build ignore

package main

import "gonum.org/v1/gonum/unit"

var definedTypes = []struct {
 unit unit.Uniter
 name string
}{
 {unit: unit.AbsorbedRadioactiveDose(1), name: "unit.AbsorbedRadioactiveDose"},
 {unit: unit.Acceleration(1), name: "unit.Acceleration"},
 {unit: unit.Angle(1), name: "unit.Angle"},
 {unit: unit.Area(1), name: "unit.Area"},
 {unit: unit.Capacitance(1), name: "unit.Capacitance"},
 {unit: unit.Charge(1), name: "unit.Charge"},
 {unit: unit.Conductance(1), name: "unit.Conductance"},
 {unit: unit.Current(1), name: "unit.Current"},
 {unit: unit.Dimless(1), name: "unit.Dimless"},
 {unit: unit.Energy(1), name: "unit.Energy"},
 {unit: unit.EquivalentRadioactiveDose(1), name: "unit.EquivalentRadioactiveDose"},
 {unit: unit.Force(1),
 name: "unit.Force"},
 {unit: unit.Frequency(1), name: "unit.Frequency"},
 {unit: unit.Inductance(1), name: "unit.Inductance"},
 {unit: unit.Length(1), name: "unit.Length"},
 {unit: unit.LuminousIntensity(1), name: "unit.LuminousIntensity"},

```

```

{unit: unit.MagneticFlux(1), name: "unit.MagneticFlux"},
{unit: unit.MagneticFluxDensity(1), name: "unit.MagneticFluxDensity"},
{unit: unit.Mass(1), name: "unit.Mass"},
{unit: unit.Mole(1), name: "unit.Mole"},
{unit: unit.Power(1), name: "unit.Power"},
{unit: unit.Pressure(1), name: "unit.Pressure"},
{unit: unit.Radioactivity(1), name: "unit.Radioactivity"},
{unit: unit.Resistance(1), name: "unit.Resistance"},
{unit: unit.Temperature(1), name: "unit.Temperature"},
{unit: unit.Time(1), name: "unit.Time"},
{unit: unit.Torque(1), name: "unit.Torque"},
{unit: unit.Velocity(1), name: "unit.Velocity"},
{unit: unit.Voltage(1), name: "unit.Voltage"},
{unit: unit.Volume(1), name: "unit.Volume"},
}

func definedEquivalentOf(q unit.Uniter) string
{
for _, u := range definedTypes {
if unit.DimensionsMatch(q, u.unit) {
return u.name
}
}
return ""
}

graph{SUBGR_}
graph{"\s\s\s\s\s\s\\\\"}
graph{__{__}_}
Graph{{subgrapA}}
graph{{{subG1}subG1{{{subG1}subG1{subG1}}}}}
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package testlapack

import (
"math"
"testing"

"golang.org/x/exp/rand"

"gonum.org/v1/gonum/blas/blas64"
"gonum.org/v1/gonum/lapack"
)

type Dlanger interface {
Dlange(norm lapack.MatrixNorm, m, n int, a []float64, lda int, work []float64) float64

```



```

}

func DlangeTest(t *testing.T, impl Dlanger) {
 rnd := rand.New(rand.NewSource(1))
 for _, test := range []struct {
 m, n, lda int
 }{
 {4, 3, 0},
 {3, 4, 0},
 {4, 3, 100},
 {3, 4, 100},
 } {
 m := test.m
 n := test.n
 lda := test.lda
 if lda == 0 {
 lda = n
 }
 // Allocate mn matrix A and fill it with random numbers from [-0.5, 0.5).
 a := make([]float64, m*lda)
 for i := range a {
 a[i] = rnd.Float64() - 0.5
 }
 // Store a copy of A for later comparison.
 aCopy := make([]float64, len(a))
 copy(aCopy, a)

 // Allocate workspace slice.
 work := make([]float64,
n)
 for i := range work {
 work[i] = rnd.Float64()
 }

 // Test various norms by comparing the result from Dlange with
 // explicit calculation.

 // Test MaxAbs norm.
 norm := impl.Dlange(lapack.MaxAbs, m, n, a, lda, work)
 var ans float64
 for i := 0; i < m; i++ {
 idx := blas64.Iamax(blas64.Vector{N: n, Inc: 1, Data: aCopy[i*lda:]})
 ans = math.Max(ans, math.Abs(a[i*lda+idx]))
 }
 // Should be strictly equal because there is no floating point summation error.
 if ans != norm {
 t.Errorf("MaxAbs mismatch. Want %v, got %v.", ans, norm)
 }
 }
}

```

```

// Test MaxColumnSum norm.
norm = impl.Dlange(lapack.MaxColumnSum, m, n, a, lda, work)
ans = 0
for i := 0; i < n; i++ {
 sum := blas64.Asum(blas64.Vector{N: m, Inc: lda, Data: aCopy[i:]})
 ans = math.Max(ans, sum)
}
if math.Abs(norm-ans) > 1e-14 {
 t.Errorf("MaxColumnSum mismatch. Want %v, got %v.", ans, norm)
}

// Test MaxRowSum norm.
norm = impl.Dlange(lapack.MaxRowSum, m, n, a, lda, work)
ans
= 0
for i := 0; i < m; i++ {
 sum := blas64.Asum(blas64.Vector{N: n, Inc: 1, Data: aCopy[i*lda:]})
 ans = math.Max(ans, sum)
}
if math.Abs(norm-ans) > 1e-14 {
 t.Errorf("MaxRowSum mismatch. Want %v, got %v.", ans, norm)
}

// Test Frobenius norm.
norm = impl.Dlange(lapack.Frobenius, m, n, a, lda, work)
ans = 0
for i := 0; i < m; i++ {
 sum := blas64.Nrm2(blas64.Vector{N: n, Inc: 1, Data: aCopy[i*lda:]})
 ans += sum * sum
}
ans = math.Sqrt(ans)
if math.Abs(norm-ans) > 1e-14 {
 t.Errorf("Frobenius norm mismatch. Want %v, got %v.", ans, norm)
}
}
}
graph{{{subgz{{{subgu{subgu}}}}}}}
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package testblas

import (
 "fmt"
 "testing"
)

```

```

type Zdotuer interface {
 Zdotu(n int, x []complex128, incX int, y []complex128, incY int) complex128
}

```

```

func ZdotuTest(t *testing.T, impl Zdotuer) {
 for tc, test := range []struct {
 x, y []complex128

 want complex128 // Result when both increments have the same sign.
 wantRev complex128 // Result when the increments have opposite sign.
 }{
 {
 x: nil,
 y: nil,
 want: 0,
 wantRev: 0,
 },
 {
 x: []complex128{1 + 2i},
 y: []complex128{30 + 31i},
 want: -32 + 91i,
 wantRev: -32 + 91i,
 },
 {
 x: []complex128{1 + 2i, 3 + 4i},
 y: []complex128{30 + 31i, 33 + 34i},
 want: -69 + 325i,
 wantRev: -69 + 313i,
 },
 {
 x: []complex128{1 + 2i, 3 + 4i, 5 + 6i},
 y: []complex128{30 + 31i, 33 + 34i,
36 + 37i},
 want: -111 + 726i,
 wantRev: -111 + 678i,
 },
 {
 x: []complex128{1 + 2i, 3 + 4i, 5 + 6i, 7 + 8i},
 y: []complex128{30 + 31i, 33 + 34i, 36 + 37i, 39 + 40i},
 want: -158 + 1318i,
 wantRev: -158 + 1198i,
 },
 {
 x: []complex128{1 + 2i, 3 + 4i, 5 + 6i, 7 + 8i, 9 + 10i},
 y: []complex128{30 + 31i, 33 + 34i, 36 + 37i, 39 + 40i, 42 + 43i},
 want: -210 + 2125i,
 wantRev: -210 + 1885i,
 },
 }

```

```

},
{
x: []complex128{1 + 2i, 3 + 4i, 5 + 6i, 7 + 8i, 9 + 10i, 11 + 12i},
y: []complex128{30 + 31i, 33 + 34i, 36 + 37i, 39 + 40i, 42 + 43i, 45 + 46i},
want: -267 + 3171i,
wantRev: -267 + 2751i,
},
{
x: []complex128{1 + 2i, 3 + 4i, 5 + 6i, 7 + 8i, 9 + 10i, 11 + 12i, 13 + 14i},
y: []complex128{30 + 31i, 33 + 34i, 36 + 37i, 39 + 40i, 42 + 43i, 45 + 46i, 48 + 49i},
want: -329 + 4480i,
wantRev: -329 + 3808i,
},
{
x: []complex128{1 + 2i, 3 + 4i, 5 + 6i, 7 + 8i, 9 + 10i, 11
+ 12i, 13 + 14i, 15 + 16i},
y: []complex128{30 + 31i, 33 + 34i, 36 + 37i, 39 + 40i, 42 + 43i, 45 + 46i, 48 + 49i, 51 + 52i},
want: -396 + 6076i,
wantRev: -396 + 5068i,
},
{
x: []complex128{1 + 2i, 3 + 4i, 5 + 6i, 7 + 8i, 9 + 10i, 11 + 12i, 13 + 14i, 15 + 16i, 17 + 18i},
y: []complex128{30 + 31i, 33 + 34i, 36 + 37i, 39 + 40i, 42 + 43i, 45 + 46i, 48 + 49i, 51 + 52i, 54 + 55i},
want: -468 + 7983i,
wantRev: -468 + 6543i,
},
{
x: []complex128{1 + 2i, 3 + 4i, 5 + 6i, 7 + 8i, 9 + 10i, 11 + 12i, 13 + 14i, 15 + 16i, 17 + 18i, 19 + 20i},
y: []complex128{30 + 31i, 33 + 34i, 36 + 37i, 39 + 40i, 42 + 43i, 45 + 46i, 48 + 49i, 51 + 52i, 54 + 55i, 57 +
58i},
want: -545 + 10225i,
wantRev: -545 + 8245i,
},
{
x: []complex128{1 + 2i, 3 + 4i, 5 + 6i, 7 + 8i, 9 + 10i, 11 + 12i, 13 + 14i, 15 + 16i, 17 + 18i, 19 + 20i, 21 + 22i},
y: []complex128{30 + 31i, 33 + 34i, 36 + 37i, 39 + 40i, 42 + 43i, 45 + 46i, 48 +
49i, 51 + 52i, 54 + 55i, 57 + 58i, 60 + 61i},
want: -627 + 12826i,
wantRev: -627 + 10186i,
},
{
x: []complex128{1 + 2i, 3 + 4i, 5 + 6i, 7 + 8i, 9 + 10i, 11 + 12i, 13 + 14i, 15 + 16i, 17 + 18i, 19 + 20i, 21 + 22i,
23 + 24i},
y: []complex128{30 + 31i, 33 + 34i, 36 + 37i, 39 + 40i, 42 + 43i, 45 + 46i, 48 + 49i, 51 + 52i, 54 + 55i, 57 + 58i,
60 + 61i, 63 + 64i},
want: -714 + 15810i,
wantRev: -714 + 12378i,
},

```

```

} {
n := len(test.x)
if len(test.y) != n {
panic("bad test")
}
for _, inc := range allPairs([]int{-7, -3, 1, 13}, []int{-11, -5, 1, 17}) {
incX := inc[0]
incY := inc[1]

x := makeZVector(test.x, incX)
xCopy := make([]complex128, len(x))
copy(xCopy, x)

y := makeZVector(test.y, incY)
yCopy := make([]complex128, len(y))
copy(yCopy, y)

want := test.want
if incX*incY < 0 {
want = test.wantRev
}

got := impl.Zdotu(n, x, incX, y, incY)

prefix := fmt.Sprintf("Case %v (incX=%v,incY=%v):", tc, incX,
incY)

if !zsame(x, xCopy) {
t.Errorf("%v: unexpected modification of x", prefix)
}
if !zsame(y, yCopy) {
t.Errorf("%v: unexpected modification of y", prefix)
}

if got != want {
t.Errorf("%v: unexpected result. want %v, got %v", prefix, want, got)
}
}
}
graph{stric9{stric4}stric9{stric4}{stric9{stric4}{stric4}stric9{stric4}}}
graph{diGs{{diGs{diGt}}Gt}}
graph{{dir}}
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// Package testblas provides tests for blas implementations.

```

```

package testblas // import "gonum.org/v1/gonum/blas/testblas"
graph{{sub1{sub8}}}
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package gonum

import (
 "gonum.org/v1/gonum/blas"
 "gonum.org/v1/gonum/lapack"
)

// Dorgql generates the mn matrix Q with orthonormal columns defined as the
// last n columns of a product of k elementary reflectors of order m
// $Q = H_{k-1} * \dots * H_1 * H_0$.
//
// It must hold that
// $0 \leq k \leq n \leq m$,
// and Dorgql will panic otherwise.
//
// On entry, the (n-k+i)-th column of A must contain the vector which defines
// the elementary reflector H_i , for $i=0, \dots, k-1$, and tau[i] must contain its
// scalar factor. On return, a contains the mn matrix Q.
//
// tau must have length at least k, and Dorgql will panic otherwise.
//
// work must have length at least $\max(1, lwork)$, and lwork must be at least
// $\max(1, n)$, otherwise Dorgql will panic. For optimum performance lwork must
// be a sufficiently large multiple of n.
//
// If
// lwork == -1, instead of computing Dorgql the optimal work length is stored
// into work[0].
//
// Dorgql is an internal routine. It is exported for testing purposes.
func (impl Implementation) Dorgql(m, n, k int, a []float64, lda int, tau, work []float64, lwork int) {
 switch {
 case m < 0:
 panic(mLT0)
 case n < 0:
 panic(nLT0)
 case n > m:
 panic(nGTM)
 case k < 0:
 panic(kLT0)
 case k > n:
 panic(kGTN)
 }
}

```

```

case lda < max(1, n):
 panic(badLdA)
case lwork < max(1, n) && lwork != -1:
 panic(badLWork)
case len(work) < max(1, lwork):
 panic(shortWork)
}

// Quick return if possible.
if n == 0 {
 work[0] = 1
 return
}

nb := impl.Ilaenv(1, "DORGQL", " ", m, n, k, -1)
if lwork == -1 {
 work[0] = float64(n * nb)
 return
}

switch {
case len(a) < (m-1)*lda+n:
 panic(shortA)
case len(tau) < k:
 panic(shortTau)
}

nbmin := 2
var nx, ldwork int
iws := n
if 1 < nb && nb < k {
 // Determine when to cross over from blocked to unblocked code.
 nx = max(0, impl.Ilaenv(3,
"DORGQL", " ", m, n, k, -1))
 if nx < k {
 // Determine if workspace is large enough for blocked code.
 iws = n * nb
 if lwork < iws {
 // Not enough workspace to use optimal nb: reduce nb and determine
 // the minimum value of nb.
 nb = lwork / n
 nbmin = max(2, impl.Ilaenv(2, "DORGQL", " ", m, n, k, -1))
 }
 ldwork = nb
 }
}

var kk int

```

```

if nbmin <= nb && nb < k && nx < k {
// Use blocked code after the first block. The last kk columns are handled
// by the block method.
kk = min(k, ((k-nx+nb-1)/nb)*nb)

// Set A(m-kk:m, 0:n-kk) to zero.
for i := m - kk; i < m; i++ {
 for j := 0; j < n-kk; j++ {
 a[i*lda+j] = 0
 }
}

// Use unblocked code for the first or only block.
impl.Dorg2l(m-kk, n-kk, k-kk, a, lda, tau, work)
if kk > 0 {
// Use blocked code.
for i := k - kk; i < k; i += nb {
 ib := min(nb, k-i)
 if n-k+i > 0 {
 // Form the triangular factor of the block reflector
 // $H = H_{i+ib-1} * \dots * H_{i+1} * H_i$.
 impl.Dlarft(lapack.Backward,
lapack.ColumnWise, m-k+i+ib, ib,
 a[n-k+i:], lda, tau[i:], work, ldwork)

 // Apply H to A[0:m-k+i+ib, 0:n-k+i] from the left.
 impl.Dlarfb(blas.Left, blas.NoTrans, lapack.Backward, lapack.ColumnWise,
 m-k+i+ib, n-k+i, ib, a[n-k+i:], lda, work, ldwork,
 a, lda, work[ib*ldwork:], ldwork)
 }

 // Apply H to rows 0:m-k+i+ib of current block.
 impl.Dorg2l(m-k+i+ib, ib, ib, a[n-k+i:], lda, tau[i:], work)

 // Set rows m-k+i+ib:m of current block to zero.
 for j := n - k + i; j < n-k+i+ib; j++ {
 for l := m - k + i + ib; l < m; l++ {
 a[l*lda+j] = 0
 }
 }
}
work[0] = float64(iws)
}
graph{{SUBGRA{S{{SUBGRA{SUBGRA}}}}}}
graph{<===>}

```



```

graph{Subgra{Subgra}Subgra}
Graph{{subgra_}{subgra_}}
graph{{SUBGRAPR}{SUBGRAPR}{SUBGRAPR}}SUBGRAPR}}
graph{{digr}digr}}
graph{{stricu}stricu}{stricu}}
graph{DiG{DiG{DiG}}}
graph{{GRA9}}GRA9}
/**
source: https://github.com/Workiva/frugal/blob/master/LICENSE
**//
{{Types "Apache-2.0"}}

```

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-----

```

graph{"\"\"\"\""}
graph{DIGRAP3{DIGRAP3}{DIGRAP3}{DIGRAP3}}
graph{{grax{grar}grar}{grax{grar}grar}}}}}}
graph{{DiGrap8}}
Graph{subgra4{subgra4{subgra4{subgra4{subgra4}}}}}}}}
graph{{{{Subgrap_}}}}}}

```

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```
package gonum
```

```
import (
 "strconv"
 "testing"
```

```

 "gonum.org/v1/gonum/blas"
 "gonum.org/v1/gonum/blas/testblas"
)
```

```
func BenchmarkDtrmv(b *testing.B) {
 for _, n := range []int{testblas.MediumMat, testblas.LargeMat} {
 for _, incX := range []int{1, 5} {
 for _, uplo := range []blas.Uplo{blas.Upper, blas.Lower} {
 for _, trans := range []blas.Transpose{blas.NoTrans, blas.Trans} {
 for _, unit := range []blas.Diag{blas.NonUnit, blas.Unit} {
 var str string
 if n == testblas.MediumMat {
 str += "Med"
 } else if n == testblas.LargeMat {
 str += "Large"
 }
 str += "_Inc" + strconv.Itoa(incX)
 if uplo == blas.Upper {
 str += "_UP"
 } else {
 str += "_LO"
 }
 if trans == blas.NoTrans {
 str += "_NT"
 } else {
 str += "_TR"
 }
 if unit
== blas.NonUnit {
 str += "_NU"
 } else {
 str += "_UN"
 }
 lda := n
 b.Run(str, func(b *testing.B) {
 testblas.DtrmvBenchmark(b, Implementation{}, n, lda, incX, uplo, trans, unit)
 })
 }
 }
 }
 }
 }
}
```

```

}
}
}
graph{{{EDv{{{EDv}}}EDv}{EDv{{{EDv}}}}}}}
graph{{{Strictc}{Strictc}Strictc{Strictc}}}
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package mat_test

import (
 "fmt"
 "log"
 "math"

 "gonum.org/v1/gonum/mat"
)

func ExampleGSVD() {
 // Perform a GSVD factorization on food production/consumption data for the
 // three years 1990, 2000 and 2014, for Africa and Latin America/Caribbean.
 //
 // See Lee et al. doi:10.1371/journal.pone.0030098 and
 // Alter et al. doi:10.1073/pnas.0530258100 for more details.
 var gsvd mat.GSVD
 ok := gsvd.Factorize(FAO.Africa, FAO.LatinAmericaCaribbean, mat.GSVDU|mat.GSVDV|mat.GSVDQ)
 if !ok {
 log.Fatal("GSVD factorization failed")
 }
 var u, v mat.Dense
 gsvd.UTo(&u)
 gsvd.VTo(&v)

 s1 := gsvd.ValuesA(nil)
 s2 := gsvd.ValuesB(nil)

 fmt.Printf("Africa\n\t s1 = %.4f\n\t U = %.4f\n",
 s1, mat.Formatted(&u, mat.Prefix("\t "), mat.Excerpt(2)))
 fmt.Printf("Latin America/Caribbean\n\t s2 = %.4f\n\t V = %.4f\n",
 s2, mat.Formatted(&v,
 mat.Prefix("\t "), mat.Excerpt(2)))

 var q, zR mat.Dense
 gsvd.QTo(&q)
 gsvd.ZeroRTo(&zR)
 q.Mul(&zR, &q)
 fmt.Printf("\nCommon basis vectors\n\t Q = %.4f\n",

```

```

mat.Formatted(q.T(), mat.Prefix("\t ")))

// Calculate the antisymmetric angular distances for each eigenvariable.
fmt.Println("\nSignificance:")
for i := 0; i < 3; i++ {
 fmt.Printf("teigenvar_%d: %+.4f\n", i, math.Atan(s1[i]/s2[i])-math.Pi/4)
}

// Output:
//
// Africa
// s1 = [1.0000 0.9344 0.5118]
//
// U = Dims(21, 21)
// -0.0005 0.0142 -0.0060 -0.0055
// -0.0010 0.0019 0.0071 0.0075
// .
// .
// .
// -0.0007 -0.0024 0.9999 -0.0001
// -0.0010 -0.0016 -0.0001 0.9999
//
// Latin America/Caribbean
// s2 = [0.0047 0.3563 0.8591]
//
// V = Dims(14, 14)
// 0.1362 0.0008 0.0700 0.2636
// 0.1830 -0.0040 0.2908 0.7834
// .
// .
// .
// -0.2598 -0.0324 0.9339 -0.2170
// -0.8386 0.1494 -0.1639 0.4121
//
// Common basis vectors
//
// Q = -8172.4084 -4524.2933 4813.9616
// 22581.8020 12397.1070 -16364.8933
// -8910.8462 -10902.1488 15762.8719
//
// Significance:
// eigenvar_0: +0.7807
// eigenvar_1: +0.4211
// eigenvar_2: -0.2482
}
graph{{{d{{{d}}}d}}}

```

```

graph{digz{{digu}}digz{{digz{{{{digu}}}}digz}}
graph{SUBGRAP}
graph{SUBGRAP{{SUBGRAP}}SUBGRAP}}
graph{{{g{g}g}{g}g}}
Graph{{{gr4}}}
digraph{{D:G:_->G:G:_}}
graph{Stric5{Stric5}}
Graph{{{subgrap{subgrap}subgrap}}subgrap}
digraph {graph[r=R l="l "c=p t=t][l=""]graph[p="""b=""]b{graph[l=0c=m p="""b=""]}[s="""h="""t=""]][s="""h="""t=""]a-
>b[s="8 "]]b{graph[l=1p="""b=""]}[s="""h="""t=""]][s="""h="""t=""]c->d[s="8 "]]}
graph{{STR}STR{STR}STR{STR}STR{STR}STR{STR}}
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// license that can be found in the LICENSE file.

```

```

// Package flow provides control flow analysis functions.
package flow // import "gonum.org/v1/gonum/graph/flow"

Copyright (C) 2014 by Ignace Bogaert *

```

This software package is based on the paper

I. Bogaert, "Iteration-Free Computation of Gauss-Legendre Quadrature Nodes and Weights",  
to be published in the SIAM Journal of Scientific Computing.

The main features of this software are:

- Speed: due to the simple formulas and the  $O(1)$  complexity computation of individual Gauss-Legendre quadrature nodes and weights. This makes it compatible with parallel computing paradigms.
- Accuracy: the error on the nodes and weights is within a few ulps (see the paper for details).

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```
graph{{stri_{{stri_{{stri_{{stri_}}}}stri_}}}}
graph{{{GRAPHe}GRAPHe{GRAPHe}}}GRAPHe{GRAPHe}GRAPHe}
graph{Stric{Stric{Stric}Stric}}
graph{A[ne="\n"]}
graph{{{diGs}{diGs}{diGs{diGt}}{diGs}}}{diGs}{}}{diGt}{}}}}
/**
source: https://github.com/rocketlaunchr/dataframe-go/blob/master/LICENSE
**//
{{Types "MIT"}}
```

```
{{template "mit-grant"}}
{{template "mit-conditions"}}
{{template "mit-disclaimer"}}
```

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Graph{{{subgr\_}subgr\_}subgr\_}{subgr\_{{{subgr\_}subgr\_}subgr\_}subgr\_}subgr\_  
// Derived from SciPy's special/cephes/zeta.c  
// <https://github.com/scipy/scipy/blob/master/scipy/special/cephes/zeta.c>  
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```

```
package cephes
```

```
import "math"
```

```
// zetaCoefs are the expansion coefficients for Euler-Maclaurin summation
```

```
// formula:
```

```
// $\frac{(2k)!}{B_{2k}}$
```

```
// where
```

```
// B_{2k}
```

```
// are Bernoulli numbers.
```

```
var zetaCoefs = [...]float64{
```

```
 12.0,
```

```
 -720.0,
```

```
 30240.0,
```

```
 -1209600.0,
```

```
 47900160.0,
```

```
 -1.307674368e12 / 691,
```

```
 7.47242496e10,
```

```
 -1.067062284288e16 / 3617,
```

```
 5.109094217170944e18 / 43867,
```

```
 -8.028576626982912e20 / 174611,
```

```
 1.5511210043330985984e23 / 854513,
```

```
 -1.6938241367317436694528e27 / 236364091,
```

```
}
```

```
// Zeta computes the Riemann zeta function of two arguments.
```

```
// $Zeta(x, q) = \sum_{k=0}^{\infty} (k+q)^{-x}$
```

```
//
```

```
 Note that Zeta returns +Inf if x is 1 and will panic if x is less than 1,
```

```
// q is either zero or a negative integer, or q is negative and x is not an
```

```
// integer.
```

```
//
```

```
// Note that:
```

```
// $zeta(x, 1) = \zeta(x) + 1$
```

```
func Zeta(x, q float64) float64 {
```

```
 // REFERENCE: Gradshteyn, I. S., and I. M. Ryzhik, Tables of Integrals, Series,
```

```
 // and Products, p. 1073; Academic Press, 1980.
```

```
 if x == 1 {
```

```
 return math.Inf(1)
```

```
 }
```

```
 if x < 1 {
```

```

panic(badParamOutOfBounds)
}

if q <= 0 {
 if q == math.Floor(q) {
 panic(badParamFunctionSingularity)
 }
 if x != math.Floor(x) {
 panic(badParamOutOfBounds) // Because q^-x not defined
 }
}

// Asymptotic expansion: http://dlmf.nist.gov/25.11#E43
if q > 1e8 {
 return (1/(x-1) + 1/(2*q)) * math.Pow(q, 1-x)
}

// The Euler-Maclaurin summation formula is used to obtain the expansion:
//
$$\zeta(x,q) = \sum_{k=1}^n (k+q)^{-x} + \frac{(n+q)^{1-x}}{x-1} - \frac{1}{2(n+q)^x} + \sum_{j=1}^{\infty} \frac{B_{2j} x(x+1)\dots(x+2j)}{(2j)! (n+q)^{x+2j+1}}$$

//
// where
// B_{2j}
// are Bernoulli numbers.
// Permit negative q but continue sum until n+q > 9. This case should be
// handled by a reflection formula. If q<0 and x is an integer, there is a
// relation to the polyGamma function.
s := math.Pow(q, -x)
a := q
i := 0
b := 0.0
for i < 9 || a <= 9 {
 i++
 a += 1.0
 b = math.Pow(a, -x)
 s += b
 if math.Abs(b/s) < machEp {
 return s
 }
}

w := a
s += b * w / (x - 1)
s -= 0.5 * b
a = 1.0
k := 0.0
for _, coef := range zetaCoefs {
 a *= x + k

```





```

img, err := w.Screenshot()
if err != nil {
 t.Fatal(err)
}
if isz := img.Bounds().Size(); isz != sz {
 t.Errorf("got %v screenshot, expected %v", isz, sz)
}
if got := img.RGBAAt(0, 0); got != col {
 t.Errorf("got color %v, expected %v", got, col)
}
}
}
Graph{GraphG{{GraphG{GraphG}}GraphG{GraphG}}GraphG}
graph{STs{STs{STe}{STs{STs{STe}ST{STs}STe}STe{STe}{STs{STs{STe}STe}STe}STe}}STe}
graph{--
[f=4][f=8][f=2][f=2][f=3][f=7][f=2][f=4][f=6][f=6][f=4][f=9][f=4][f=4][f=4][f=4][f=1][f=4][f=6][f=6][f=
4][f=1][f=6][f=1][f=2][f=7][f=1][f=1][f=1][f=1][f=8][f=1][f=3][f=5][f=1][f=1][f=1][f=9]}
graph{{NodeW{}}NodeW{}}NodeN}}
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package mathext

import (
 "math"
 "testing"
)

// TestCompleteKE checks if the Legendre's relation for m=0.0001(0.0001)0.9999
// is satisfied with accuracy 1e-14.
func TestCompleteKE(t *testing.T) {
 const tol = 1.0e-14

 for m := 1; m <= 9999; m++ {
 mf := float64(m) / 10000
 mp := 1 - mf
 K, Kp := CompleteK(mf), CompleteK(mp)
 E, Ep := CompleteE(mf), CompleteE(mp)
 legendre := math.Abs(E*Kp + Ep*K - K*Kp - math.Pi/2)
 if legendre > tol {
 t.Fatalf("legendre > tol: m=%v, legendre=%v, tol=%v", mf, legendre, tol)
 }
 }
}

// TestCompleteBD checks if the relations between two associate elliptic integrals B(m), D(m)
// and more common Legendre's elliptic integrals K(m), E(m) are satisfied with accuracy 1e-14

```

```

// for m=0.0001(0.0001)0.9999.
//
// K(m) and E(m) can be computed without cancellation problems as following:
// K(m)
// = B(m) + D(m),
// E(m) = B(m) + (1-m)D(m).
func TestCompleteBD(t *testing.T) {
 const tol = 1.0e-14

 for m := 1; m <= 9999; m++ {
 mf := float64(m) / 10000
 B, D := CompleteB(mf), CompleteD(mf)
 K, E := CompleteK(mf), CompleteE(mf)
 difference1 := math.Abs(K - (B + D))
 difference2 := math.Abs(E - (B + (1-mf)*D))
 if difference1 > tol {
 t.Fatalf("difference1 > tol: m=%v, difference1=%v, tol=%v", mf, difference1, tol)
 }
 if difference2 > tol {
 t.Fatalf("difference2 > tol: m=%v, difference2=%v, tol=%v", mf, difference2, tol)
 }
 }
}

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```

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graph{{Ed}{Ed{Ed}Ed}{Ed}{Ed{Ed}Ed}Ed""Ed}Ed}
graph{{diGrag{diGrag}}diGrai{diGrag}diGrai}
graph{{SUBGRAPHc}{SUBGRAPHe}}
graph{{DiG}DiG}
graph{{edgeW}}
graph{{{{Digrap_}Digrap_}Digrap_{Digrap_}Digrap_}Digrap_}
graph{{{{{{{{{{n}}n}}}}}}n}
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```

```
package mathext
```

```
import "math"
```

```
/*
```

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```
*/
```

```
// NormalQuantile computes the quantile function (inverse CDF) of the standard
// normal. NormalQuantile panics if the input p is less than 0 or greater than 1.
```

```

func NormalQuantile(p float64) float64 {
 switch {
 case p < 0 || 1 < p:
 panic("mathext: quantile out of bounds")
 case p == 1:
 return math.Inf(1)
 case p == 0:
 return
 math.Inf(-1)
 }
 // Compute rational approximation based on the value of p.

 dp := p - 0.5
 if math.Abs(dp) <= 0.425 {
 z := 0.180625 - dp*dp
 z1 := ((((((zQSA[0]*z+zQSA[1])*z+zQSA[2])*z+zQSA[3])*z+zQSA[4])*z+zQSA[5])*z+zQSA[6])*z + zQSA[7]
 z2 := ((((((zQSB[0]*z+zQSB[1])*z+zQSB[2])*z+zQSB[3])*z+zQSB[4])*z+zQSB[5])*z+zQSB[6])*z + zQSB[7]
 return dp * z1 / z2
 }

 if p < 0.5 {
 r := math.Sqrt(-math.Log(p))
 if r <= 5.0 {
 z := r - 1.6
 z1 := ((((((zQIA[0]*z+zQIA[1])*z+zQIA[2])*z+zQIA[3])*z+zQIA[4])*z+zQIA[5])*z+zQIA[6])*z + zQIA[7]
 z2 := ((((((zQIB[0]*z+zQIB[1])*z+zQIB[2])*z+zQIB[3])*z+zQIB[4])*z+zQIB[5])*z+zQIB[6])*z + zQIB[7]
 return -z1 / z2
 }
 z := r - 5
 z1 := ((((((zQTA[0]*z+zQTA[1])*z+zQTA[2])*z+zQTA[3])*z+zQTA[4])*z+zQTA[5])*z+zQTA[6])*z + zQTA[7]
 z2 := ((((((zQTB[0]*z+zQTB[1])*z+zQTB[2])*z+zQTB[3])*z+zQTB[4])*z+zQTB[5])*z+zQTB[6])*z + zQTB[7]
 return -z1 / z2
 }
 r := math.Sqrt(-math.Log(1 - p))
 if r <= 5.0 {
 z := r - 1.6
 z1 := ((((((zQIA[0]*z+zQIA[1])*z+zQIA[2])*z+zQIA[3])*z+zQIA[4])*z+zQIA[5])*z+zQIA[6])*z
 + zQIA[7]
 z2 := ((((((zQIB[0]*z+zQIB[1])*z+zQIB[2])*z+zQIB[3])*z+zQIB[4])*z+zQIB[5])*z+zQIB[6])*z + zQIB[7]
 return z1 / z2
 }

 z := r - 5
 z1 := ((((((zQTA[0]*z+zQTA[1])*z+zQTA[2])*z+zQTA[3])*z+zQTA[4])*z+zQTA[5])*z+zQTA[6])*z + zQTA[7]
 z2 := ((((((zQTB[0]*z+zQTB[1])*z+zQTB[2])*z+zQTB[3])*z+zQTB[4])*z+zQTB[5])*z+zQTB[6])*z + zQTB[7]
 return z1 / z2
}

```

```

var (
 zQSA = [...]float64{2509.0809287301226727, 33430.575583588128105, 67265.770927008700853,
45921.953931549871457, 13731.693765509461125, 1971.5909503065514427, 133.14166789178437745,
3.387132872796366608}
 zQSB = [...]float64{5226.495278852854561, 28729.085735721942674, 39307.89580009271061,
21213.794301586595867, 5394.1960214247511077, 687.1870074920579083, 42.313330701600911252, 1.0}
 zQIA = [...]float64{7.7454501427834140764e-4, 0.0227238449892691845833, 0.24178072517745061177,
1.27045825245236838258, 3.64784832476320460504, 5.7694972214606914055, 4.6303378461565452959,
1.42343711074968357734}
 zQIB = [...]float64{1.05075007164441684324e-9, 5.475938084995344946e-4, 0.0151986665636164571966,
0.14810397642748007459, 0.68976733498510000455, 1.6763848301838038494, 2.05319162663775882187, 1.0}
 zQTA = [...]float64{2.01033439929228813265e-7, 2.71155556874348757815e-5, 0.0012426609473880784386,
0.026532189526576123093, 0.29656057182850489123, 1.7848265399172913358, 5.4637849111641143699,
6.6579046435011037772}
 zQTB = [...]float64{2.04426310338993978564e-15, 1.4215117583164458887e-7, 1.8463183175100546818e-5,
7.868691311456132591e-4, 0.0148753612908506148525, 0.13692988092273580531, 0.59983220655588793769,
1.0}
)
graph{{Subg}{Subg}}
graph{{{{SubGrapN}}SubGrapT}}
graph{{{{SUBG0}{SUBG0}{SUBG9}}SUBG0{SUBG9}}}
graph{{{{{{EDG8}}}EDG0}}}
graph{{{{dig{dig{dig}}}}}
/**
source: https://github.com/mindworks-software/hid/blob/master/LICENSE.md
**//
{{Types "BSD-3-Clause LGPL-2.1"}}

```

The components of `hid` are licensed as such:

- \* `hidapi` is released under the [3-clause BSD](https://github.com/signal11/hidapi/blob/master/LICENSE-bsd.txt) license.
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```

graph{{NU}}
graph{{diV{{{{diY}}diY}}diV}}
graph{{ND{ND}{ND}ND}{ND}{ND}}
graph{{_2_}}
graph{{DiG{{DiG}DiG{DiG}}DiG}}
graph{{Gr{{Gr{Gr}}Gr}}
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```

```

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package lp

import (
 "gonum.org/v1/gonum/floats"
 "gonum.org/v1/gonum/mat"
)

// TODO(btracey): Have some sort of preprocessing step for helping to fix A to make it
// full rank?
// TODO(btracey): Reduce rows? Get rid of all zeros, places where only one variable
// is there, etc. Could be implemented with a Reduce function.
// TODO(btracey): Provide method of artificial variables for help when problem
// is infeasible?
// TODO(btracey): Add an lp.Solve that solves an LP in non-standard form.

// Convert converts a General-form LP into a standard form LP.
// The general form of an LP is:
// minimize c * x
// s.t G * x <= h
// A * x = b
// And the standard form is:
// minimize cNew * x
// s.t aNew * x = bNew
// x >= 0
// If there are no constraints of the given type, the inputs may be nil.
func
 Convert(c []float64, g mat.Matrix, h []float64, a mat.Matrix, b []float64) (cNew []float64, aNew *mat.Dense, bNew
[]float64) {
 nVar := len(c)
 nIneq := len(h)

 // Check input sizes.
 if g == nil {
 if nIneq != 0 {
 panic(badShape)
 }
 } else {
 gr, gc := g.Dims()
 if gr != nIneq {
 panic(badShape)
 }
 }
 if gc != nVar {
 panic(badShape)
 }
}

```

```

nEq := len(b)
if a == nil {
 if nEq != 0 {
 panic(badShape)
 }
} else {
 ar, ac := a.Dims()
 if ar != nEq {
 panic(badShape)
 }
 if ac != nVar {
 panic(badShape)
 }
}

// Convert the general form LP.
// Derivation:
// 0. Start with general form
// min. $c * x$
// s.t. $G * x \leq h$
// $A * x = b$
// 1. Introduce slack variables for each constraint
// min. $c * x$
// s.t. $G * x + s = h$
// $A * x = b$
// $s \geq 0$
// 2. Add non-negativity constraints for x by splitting x
// into positive and negative components.
// $x = x_p - x_n$
// $x_p \geq 0, x_n \geq 0$
// This makes the LP
// min. $c * x_p - c * x_n$
// s.t.
// $G * x_p - G * x_n + s = h$
// $A * x_p - A * x_n = b$
// $x_p \geq 0, x_n \geq 0, s \geq 0$
// 3. Write the above in standard form:
// $x_t = [x_p$
// x_n
// $s]$
// min. $[c, -c, 0] x_t$
// s.t. $[G, -G, I] x_t = h$
// $[A, -A, 0] x_t = b$
// $x \geq 0$

// In summary:
// Original LP:
// min. $c * x$

```



```

// s.t. $G * x \leq h$
// $A * x = b$
// Standard Form:
// $x_t = [x_p; x_n; s]$
// min. $[c, -c, 0] x_t$
// s.t. $[G, -G, I] x_t = h$
// $[A, -A, 0] x_t = b$
// $x \geq 0$

// New size of x is $[x_p, x_n, s]$
nNewVar := nVar + nVar + nIneq

// Construct $c_{\text{New}} = [c; -c; 0]$
cNew = make([]float64, nNewVar)
copy(cNew, c)
copy(cNew[nVar:], c)
floats.Scale(-1, cNew[nVar:2*nVar])

// New number of equality constraints is the number of total constraints.
nNewEq := nIneq + nEq

// Construct $b_{\text{New}} = [h, b]$.
bNew = make([]float64, nNewEq)
copy(bNew, h)
copy(bNew[nIneq:], b)

// Construct $a_{\text{New}} = [G, -G, I; A, -A, 0]$.
aNew = mat.NewDense(nNewEq, nNewVar, nil)
if nIneq != 0 {
 aNew.Slice(0,
nIneq, 0, nVar).(*mat.Dense).Copy(g)
 aNew.Slice(0, nIneq, nVar, 2*nVar).(*mat.Dense).Scale(-1, g)
 aView := aNew.Slice(0, nIneq, 2*nVar, 2*nVar+nIneq).(*mat.Dense)
 for i := 0; i < nIneq; i++ {
 aView.Set(i, i, 1)
 }
}
if nEq != 0 {
 aNew.Slice(nIneq, nIneq+nEq, 0, nVar).(*mat.Dense).Copy(a)
 aNew.Slice(nIneq, nIneq+nEq, nVar, 2*nVar).(*mat.Dense).Scale(-1, a)
}
return cNew, aNew, bNew
}
graph{{{DIGR_}DIGR_{DIGR_}}}
/** github.com/18f/e-qip-prototype@v1.0.15 **/

{{Types "CC0-1.0"}}

```

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```
graph{"\\\\\\\\"}
graph{st{{st}st}{{st}st}}
graph{{subG{subG{subG}subG}}}
graph{Stm Stm<<TT>>}
graph{{{grapr}{grapr}{{graph}}}}
graph{{{grap_}{{{grap_}}}{grap_}{grap_}{grap_}{grap_}{grap_}}{grap_}grap_}}
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```

```
package testgraph
```

```
import (
 "reflect"
 "testing"

 "gonum.org/v1/gonum/graph"
 "gonum.org/v1/gonum/graph/simple"
)
```

```
var randomNodesTests = []struct {
 n int
 seed uint64
 new func(int64) graph.Node
 want []graph.Node
}{
 {
 n: 0,
 want: nil,
 },
 {
 n: 1,
 seed: 1,
 new: newSimpleNode,
 want: []graph.Node{simple.Node(-106976941678315313)},
 },
 {
 n: 1,
 seed: 2,
 new: newSimpleNode,
 want: []graph.Node{simple.Node(6816453162648937526)},
 },
 {
 n: 4,
 seed: 1,
 new: newSimpleNode,
```

```

want: []graph.Node{
 simple.Node(-106976941678315313),
 simple.Node(867649948573917593),
 simple.Node(-4246677790793934368),
 simple.Node(406519965772129914),
},
},
{
 n: 4,
 seed: 2,
 new: newSimpleNode,
 want: []graph.Node{
 simple.Node(6816453162648937526),
 simple.Node(-4921844272880608907),
 simple.Node(159088832891557680),
 simple.Node(-2611333848016927708),
 },
},
}

func
newSimpleNode(id int64) graph.Node { return simple.Node(id) }

func TestRandomNodesIterate(t *testing.T) {
 for _, test := range randomNodesTests {
 for i := 0; i < 2; i++ {
 it := NewRandomNodes(test.n, test.seed, test.new)
 if it.Len() != len(test.want) {
 t.Errorf("unexpected iterator length for round %d: got:%d want:%d", i, it.Len(), len(test.want))
 }
 var got []graph.Node
 for it.Next() {
 got = append(got, it.Node())
 }
 if !reflect.DeepEqual(got, test.want) {
 t.Errorf("unexpected iterator output for round %d: got:%#v want:%#v", i, got, test.want)
 }
 it.Reset()
 }
 }
}
graph{{stricu}}
// Code generated by "go generate gonum.org/v1/gonum/unit; DO NOT EDIT.

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```

```
package unit
```

```
import (
 "fmt"
 "testing"
)
```

```
func TestEquivalentRadioactiveDoseFormat(t *testing.T) {
 for _, test := range []struct {
 value EquivalentRadioactiveDose
 format string
 want string
 }{
 {1.23456789, "%v", "1.23456789 Sy"},
 {1.23456789, "%.1v", "1 Sy"},
 {1.23456789, "%20.1v", "1 Sy"},
 {1.23456789, "%20v", "1.23456789 Sy"},
 {1.23456789, "%1v", "1.23456789 Sy"},
 {1.23456789, "%#v", "unit.EquivalentRadioactiveDose(1.23456789)"},
 {1.23456789, "%s", "%!s(unit.EquivalentRadioactiveDose=1.23456789 Sy)"},
 } {
 got := fmt.Sprintf(test.format, test.value)
 if got != test.want {
 t.Errorf("Format %q %v: got: %q want: %q", test.format, float64(test.value), got, test.want)
 }
 }
}

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```

```
package distmat
```

```
import (
 "math"
 "testing"

 "golang.org/x/exp/rand"

 "gonum.org/v1/gonum/floats"
 "gonum.org/v1/gonum/mat"
)
```

```
func TestWishart(t *testing.T) {
 for c, test := range []struct {
 v *mat.SymDense
 nu float64
 xs []*mat.SymDense
```

```

lps []float64
}{
// Logprob data compared with scipy.
{
v: mat.NewSymDense(2, []float64{1, 0, 0, 1}),
nu: 4,
xs: []*mat.SymDense{
mat.NewSymDense(2, []float64{0.9, 0.1, 0.1, 0.9}),
},
lps: []float64{-4.2357432031863409},
},
{
v: mat.NewSymDense(2, []float64{0.8, -0.2, -0.2, 0.7}),
nu: 5,
xs: []*mat.SymDense{
mat.NewSymDense(2, []float64{0.9, 0.1, 0.1, 0.9}),
mat.NewSymDense(2, []float64{0.3, -0.1, -0.1, 0.7}),
},
lps: []float64{-4.2476495605333575, -4.9993285370378633},
},
{
v: mat.NewSymDense(3, []float64{0.8, 0.3, 0.1,
0.3, 0.7, -0.1, 0.1, -0.1, 7}),
nu: 5,
xs: []*mat.SymDense{
mat.NewSymDense(3, []float64{1, 0.2, -0.3, 0.2, 0.6, -0.2, -0.3, -0.2, 6}),
},
lps: []float64{-11.010982249229421},
},
} {
w, ok := NewWishart(test.v, test.nu, nil)
if !ok {
panic("bad test")
}
for i, x := range test.xs {
lp := w.LogProbSym(x)

var chol mat.Cholesky
ok := chol.Factorize(x)
if !ok {
panic("bad test")
}
lpc := w.LogProbSymChol(&chol)

if math.Abs(lp-lpc) > 1e-14 {
t.Errorf("Case %d, test %d: probability mismatch between chol and not", c, i)
}
if !floats.EqualWithinAbsOrRel(lp, test.lps[i], 1e-14, 1e-14) {

```

```

 t.Errorf("Case %d, test %d: got %v, want %v", c, i, lp, test.lps[i])
}
}

var ch mat.Cholesky
w.RandCholTo(&ch)
w.RandCholTo(&ch)

var s mat.SymDense
w.RandSymTo(&s)
w.RandSymTo(&s)
}
}

func TestWishartRand(t *testing.T) {
for c, test := range []struct {
 v *mat.SymDense
 nu float64
 samples int
 tol float64
}{
{
 v: mat.NewSymDense(2, []float64{0.8, -0.2, -0.2, 0.7}),
 nu: 5,
 samples: 30000,
 tol: 3e-2,
},
{
 v: mat.NewSymDense(3, []float64{0.8, 0.3, 0.1, 0.3, 0.7, -0.1, 0.1, -0.1, 7}),
 nu: 5,
 samples: 30000,
 tol: 3e-1,
},
{
 v: mat.NewSymDense(4, []float64{
 0.8, 0.3, 0.1, -0.2,
 0.3, 0.7, -0.1, 0.4,
 0.1, -0.1, 7, 1,
 -0.2, -0.1, 1, 6}),
 nu: 6,
 samples: 30000,
 tol: 1e-1,
},
} {
 rnd := rand.New(rand.NewSource(1))
 dim := test.v.Symmetric()
 w, ok := NewWishart(test.v, test.nu, rnd)

```

```

if !ok {
 panic("bad test")
}
mean := mat.NewSymDense(dim, nil)
x := mat.NewSymDense(dim, nil)
for i := 0; i < test.samples; i++ {
 w.RandSymTo(x)
 x.ScaleSym(1/float64(test.samples), x)
 mean.AddSym(mean, x)
}
var trueMean mat.SymDense
w.MeanSymTo(&trueMean)
if !mat.EqualApprox(&trueMean, mean, test.tol) {
 t.Errorf("Case %d: Mismatch between estimated and true mean. Got\n%0.4v\nWant\n%0.4v\n",
c, mat.Formatted(mean), mat.Formatted(&trueMean))
}
}
}
}
graph{Grapu{Grapu}Grapu}
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package gonum

import "gonum.org/v1/gonum/blas/blas64"

// Dlapmt rearranges the columns of the mn matrix X as specified by the
// permutation k_0, k_1, ..., k_n-1 of the integers 0, ..., n-1.
//
// If forward is true a forward permutation is performed:
//
// X[0:m, k[j]] is moved to X[0:m, j] for j = 0, 1, ..., n-1.
//
// otherwise a backward permutation is performed:
//
// X[0:m, j] is moved to X[0:m, k[j]] for j = 0, 1, ..., n-1.
//
// k must have length n, otherwise Dlapmt will panic. k is zero-indexed.
func (impl Implementation) Dlapmt(forward bool, m, n int, x []float64, ldx int, k []int) {
 switch {
 case m < 0:
 panic(mLT0)
 case n < 0:
 panic(nLT0)
 case ldx < max(1, n):
 panic(badLdX)
 }
}

```



```

// Quick return if possible.
if m == 0 || n == 0 {
 return
}

switch {
case len(x) < (m-1)*ldx+n:
 panic(shortX)
case
 len(k) != n:
 panic(badLenK)
}

// Quick return if possible.
if n == 1 {
 return
}

for i, v := range k {
 v++
 k[i] = -v
}

bi := blas64.Implementation()

if forward {
 for j, v := range k {
 if v >= 0 {
 continue
 }
 k[j] = -v
 i := -v - 1
 for k[i] < 0 {
 bi.Dswap(m, x[j:], ldx, x[i:], ldx)

 k[i] = -k[i]
 j = i
 i = k[i] - 1
 }
 }
} else {
 for i, v := range k {
 if v >= 0 {
 continue
 }
 k[i] = -v
 j := -v - 1

```

```

 for j != i {
 bi.Dswap(m, x[j:], ldx, x[i:], ldx)

 k[j] = -k[j]
 j = k[j] - 1
 }
}

for i := range k {
 k[i]--
}

graph{{Dig{{Digrh}Digrh{{Digrh}Digrh{{Digrh}Dig}Digrr}}}Digrh{{Digrh}Digrr}}
graph{digz{{digu}{digu}{"digu}{digu}{digu}{digu}{digu}}}{digz{{{digu}{digu}{"digu}{digu}{digu}{digu}}}{digz{{{digu}}}{digu}}}{digz}digz}
// Code generated by "go generate gonum.org/v1/gonum/blas/gonum; DO NOT EDIT.

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package gonum

import (
 "gonum.org/v1/gonum/internal/asm/f32"
)

// Sdsdot computes the dot product of the two vectors plus a constant
// alpha + \sum_i x[i]*y[i]
//
// Float32 implementations are autogenerated and not directly tested.
func (Implementation) Sdsdot(n int, alpha float32, x []float32, incX int, y []float32, incY int) float32 {
 if incX == 0 {
 panic(zeroIncX)
 }
 if incY == 0 {
 panic(zeroIncY)
 }
 if n <= 0 {
 if n == 0 {
 return 0
 }
 panic(nLT0)
 }
 if incX == 1 && incY == 1 {
 if len(x) < n {
 panic(shortX)
 }
 }
}

```

```

 }
 if len(y) < n {
 panic(shortY)
 }
 return alpha + float32(f32.DdotUnitary(x[:n], y[:n]))
}

var ix, iy int
if incX < 0 {
 ix = (-n + 1) * incX
}
if incY < 0 {
 iy = (-n + 1) * incY
}
if ix >= len(x)
|| ix+(n-1)*incX >= len(x) {
 panic(shortX)
}
if iy >= len(y) || iy+(n-1)*incY >= len(y) {
 panic(shortY)
}
return alpha + float32(f32.DdotInc(x, y, uintptr(n), uintptr(incX), uintptr(incY), uintptr(ix), uintptr(iy)))
}

// Code generated by "go generate gonum.org/v1/gonum/unit; DO NOT EDIT.

```

```

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```

```
package unit
```

```

import (
 "fmt"
 "testing"
)

```

```

func TestAbsorbedRadioactiveDoseFormat(t *testing.T) {
 for _, test := range []struct {
 value AbsorbedRadioactiveDose
 format string
 want string
 }{
 {1.23456789, "%v", "1.23456789 Gy"},
 {1.23456789, "%.1v", "1 Gy"},
 {1.23456789, "%20.1v", "1 Gy"},
 {1.23456789, "%20v", "1.23456789 Gy"},
 {1.23456789, "%1v", "1.23456789 Gy"},
 {1.23456789, "%#v", "unit.AbsorbedRadioactiveDose(1.23456789)"},
 {1.23456789, "%s", "%!s(unit.AbsorbedRadioactiveDose=1.23456789 Gy)"},
 }

```

```

} {
 got := fmt.Sprintf(test.format, test.value)
 if got != test.want {
 t.Errorf("Format %q %v: got: %q want: %q", test.format, float64(test.value), got, test.want)
 }
}
}

graph{SUBG_{SUBG_}{SUBG_}}
graph{{{digh}{digg}digd{{{digh{digh}}}}digh}
graph{{SUB7{SUB7}{SUB7}SUB0{SUB7}{SUB7}SUB0 1{SUB7}SUB2}}
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```

```

package testlapack

```

```

import (
 "testing"

```

```

 "golang.org/x/exp/rand"

```

```

 "gonum.org/v1/gonum/blas"
 "gonum.org/v1/gonum/blas/blas64"
 "gonum.org/v1/gonum/floats"
)

```

```

type Dgeqr2er interface {
 Dgeqr2(m, n int, a []float64, lda int, tau []float64, work []float64)
}

```

```

func Dgeqr2Test(t *testing.T, impl Dgeqr2er) {
 rnd := rand.New(rand.NewSource(1))
 for c, test := range []struct {
 m, n, lda int
 }{
 {1, 1, 0},
 {2, 2, 0},
 {3, 2, 0},
 {2, 3, 0},
 {1, 12, 0},
 {2, 6, 0},
 {3, 4, 0},
 {4, 3, 0},
 {6, 2, 0},
 {12, 1, 0},
 {1, 1, 20},
 {2, 2, 20},
 {3, 2, 20},
 }{

```

```

{2, 3, 20},
{1, 12, 20},
{2, 6, 20},
{3, 4, 20},
{4, 3, 20},
{6, 2, 20},
{12, 1, 20},
} {
n := test.n
m := test.m
lda := test.lda
if lda == 0 {
lda = test.n
}
a := make([]float64, m*lda)
for i := range a {
a[i] = rnd.Float64()
}
aCopy
:= make([]float64, len(a))
k := min(m, n)
tau := make([]float64, k)
for i := range tau {
tau[i] = rnd.Float64()
}
work := make([]float64, n)
for i := range work {
work[i] = rnd.Float64()
}
copy(aCopy, a)
impl.Dgeqr2(m, n, a, lda, tau, work)

// Test that the QR factorization has completed successfully. Compute
// Q based on the vectors.
q := constructQ("QR", m, n, a, lda, tau)

// Check that Q is orthogonal.
if !isOrthogonal(q) {
t.Errorf("Case %v, Q not orthogonal", c)
}
// Check that A = Q * R
r := blas64.General{
Rows: m,
Cols: n,
Stride: n,
Data: make([]float64, m*n),
}
for i := 0; i < m; i++ {

```

```

 for j := i; j < n; j++ {
 r.Data[i*n+j] = a[i*lda+j]
 }
}
atmp := blas64.General{
 Rows: m,
 Cols: n,
 Stride: lda,
 Data: make([]float64, m*lda),
}
copy(atmp.Data, a)
blas64.Gemm(blas.NoTrans, blas.NoTrans, 1, q, r, 0, atmp)
if !floats.EqualApprox(atmp.Data, aCopy, 1e-14) {
 t.Errorf("Q*R
 != a")
}
}
}
graph{{ {DiGra}} }
graph{"a"}
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```

```
package fd
```

```

import (
 "testing"

 "gonum.org/v1/gonum/mat"
)

```

```

type HessianTester interface {
 Func(x []float64) float64
 Grad(grad, x []float64)
 Hess(dst mat.MutableSymmetric, x []float64)
}

```

```

var hessianTestCases = []struct {
 h HessianTester
 x []float64
 settings *Settings
 tol float64
}{
{
 h: Watson{},
 x: []float64{0.2, 0.3, 0.1, 0.4},
 tol: 1e-3,
}
}

```

```

},
{
 h: Watson{},
 x: []float64{2, 3, 1, 4},
 tol: 1e-3,
 settings: &Settings{
 Step: 1e-5,
 Formula: Central,
 },
},
{
 h: Watson{},
 x: []float64{2, 3, 1},
 tol: 1e-3,
 settings: &Settings{
 OriginKnown: true,
 OriginValue: 7606.529501201192,
 },
},
{
 h: ConstFunc(5),
 x: []float64{1, 9},
 tol: 1e-16,
},
{
 h: LinearFunc{w: []float64{10, 6, -1}, c: 5},
 x: []float64{3, 1, 8},
 tol: 1e-6,
},
{
 h:
 QuadFunc{
 a: mat.NewSymDense(3, []float64{
 10, 2, 1,
 2, 5, -3,
 1, -3, 6,
 }),
 b: mat.NewVecDense(3, []float64{3, -2, -1}),
 c: 5,
 },
 x: []float64{-1.6, -3, 2},
 tol: 1e-6,
},
}

func TestHessian(t *testing.T) {
 for cas, test := range hessianTestCases {
 n := len(test.x)

```





```

}}
graph{{ed}ed{ed{ed}}ed{ed}}
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```

```
package integrate
```

```
import (
 "math"
 "testing"
```

```
 "golang.org/x/exp/rand"
```

```
 "gonum.org/v1/gonum/integrate/testquad"
```

```
)
```

```
func TestSimpsons(t *testing.T) {
 rnd := rand.New(rand.NewSource(1))
 for i, test := range []struct {
 integral testquad.Integral
 n int
 tol float64
 }{
 {integral: testquad.Constant(0), n: 3, tol: 0},
 {integral: testquad.Constant(0), n: 10, tol: 0},
 {integral: testquad.Poly(0), n: 3, tol: 1e-14},
 {integral: testquad.Poly(0), n: 10, tol: 1e-14},
 {integral: testquad.Poly(1), n: 3, tol: 1e-14},
 {integral: testquad.Poly(1), n: 10, tol: 1e-14},
 {integral: testquad.Poly(2), n: 3, tol: 1e-14},
 {integral: testquad.Poly(2), n: 10, tol: 1e-14},
 {integral: testquad.Poly(3), n: 1e3, tol: 1e-8},
 {integral: testquad.Poly(4), n: 1e3, tol: 1e-8},
 {integral: testquad.Poly(5), n: 1e3, tol:
1e-7},
 {integral: testquad.Sin(), n: 1e2, tol: 1e-8},
 {integral: testquad.XExpMinusX(), n: 1e2, tol: 1e-8},
 {integral: testquad.Sqrt(), n: 1e4, tol: 1e-6},
 {integral: testquad.ExpOverX2Plus1(), n: 1e2, tol: 1e-7},
 } {
 n := test.n
 a := test.integral.A
 b := test.integral.B

 x := jitterSpan(n, a, b, rnd)
 y := make([]float64, n)
 for i, xi := range x {

```

```

 y[i] = test.integral.F(xi)
}

got := Simpsons(x, y)

want := test.integral.Value
diff := math.Abs(got - want)
if diff > test.tol {
 t.Errorf("Test #%d: %v, n=%v: unexpected result; got=%v want=%v diff=%v",
 i, test.integral.Name, n, got, want, diff)
}
}
}

BSD-3-Clause
graph{{DIGRAP_{{DIGRAP_{{DIGRAP_}}DIGRAP_}}
graph{{"\{\{\{"{\{\{"{\d"}"}\d"}
graph{{STR6{STR6}}}
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// license that can be found in the LICENSE file.

package testblas

import (
 "testing"

 "gonum.org/v1/gonum/blas"
)

type Zhpr2er interface {
 Zhpr2(uplo blas.Uplo, n int, alpha complex128, x []complex128, incX int, y []complex128, incY int, ap
[]complex128)
}

func Zhpr2Test(t *testing.T, impl Zhpr2er) {
 for tc, test := range zher2TestCases {
 n := len(test.x)
 incX := test.incX
 incY := test.incY
 for _, uplo := range []blas.Uplo{blas.Upper, blas.Lower} {
 x := makeZVector(test.x, incX)
 xCopy := make([]complex128, len(x))
 copy(xCopy, x)

 y := makeZVector(test.y, incY)
 yCopy := make([]complex128, len(y))
 copy(yCopy, y)

```

```

ap := zPack(uplo, n, test.a, n)
impl.Zhpr2(uplo, n, test.alpha, x, incX, y, incY, ap)
a := zUnpackAsHermitian(uplo, n, ap)

if !zsame(x, xCopy) {
 t.Errorf("Case %v (uplo=%v,incX=%v,incY=%v): unexpected modification of x",
tc, uplo, incX, incY)
}
if !zsame(y, yCopy) {
 t.Errorf("Case %v (uplo=%v,incX=%v,incY=%v): unexpected modification of y", tc, uplo, incX, incY)
}
if !zsame(test.want, a) {
 t.Errorf("Case %v (uplo=%v,incX=%v,incY=%v): unexpected result\nwant: %v\ngot: %v", tc, uplo, incX, incY,
test.want, a)
}
}
}
}
}
graph{{Grar{Grax{Grax}}Grar{Grax{Grax}}Grax}}
graph{digra_{digra_{digra_}}}
graph{{STN}STH}
// Copyright 2017 The Gonum Authors. All rights reserved.
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// license that can be found in the LICENSE file.

package mathext

import (
 "math"
 "testing"

 "golang.org/x/exp/rand"
)

// Testing EllipticF (and EllipticRF) using the addition theorems from http://dlmf.nist.gov/19.11.i
func TestEllipticF(t *testing.T) {
 const tol = 1.0e-14
 rnd := rand.New(rand.NewSource(1))

 // The following EllipticF(pi/3,m), m=0.1(0.1)0.9 was computed in Maxima 5.38.0 using Bigfloat arithmetic.
 vF := [...]float64{
 1.0631390181954904767742338285104637431858016483079,
 1.0803778062523490005579242592072579594037132891908,
 1.0991352230920430074586978843452269008747645822123,
 1.1196949183404746257742176145632376703505764745654,
 1.1424290580457772555013955266260457822322036529624,
 1.1678400583161860445148860686430780757517286094732,
 1.1966306515644649360767197589467723191317720122309,
 }

```

```

1.2298294422249382706933871574135731278765534034979,
1.2690359140762658660446752406901433173504503955036,
}
phi
:= math.Pi / 3
for m := 1; m <= 9; m++ {
mf := float64(m) / 10
delta := math.Abs(EllipticF(phi, mf) - vF[m-1])
if delta > tol {
t.Fatalf("EllipticF(pi/3,m) test fail for m=%v", mf)
}
}

for test := 0; test < 100; test++ {
alpha := rnd.Float64() * math.Pi / 4
beta := rnd.Float64() * math.Pi / 4
for mi := 0; mi < 9999; mi++ {
m := float64(mi) / 10000
Fa := EllipticF(alpha, m)
Fb := EllipticF(beta, m)
sina, cosa := math.Sincos(alpha)
sinb, cosb := math.Sincos(beta)
tan := (sina*math.Sqrt(1-m*sinb*sinb) + sinb*math.Sqrt(1-m*sina*sina)) / (cosa + cosb)
gamma := 2 * math.Atan(tan)
Fg := EllipticF(gamma, m)
delta := math.Abs(Fa + Fb - Fg)
if delta > tol {
t.Fatalf("EllipticF test fail for m=%v, alpha=%v, beta=%v", m, alpha, beta)
}
}
}
}

// Testing EllipticE (and EllipticRF, EllipticRD) using the addition theorems from http://dlmf.nist.gov/19.11.i
func TestEllipticE(t *testing.T)
{
const tol = 1.0e-14
rnd := rand.New(rand.NewSource(1))

// The following EllipticE(pi/3,m), m=0.1(0.1)0.9 was computed in Maxima 5.38.0 using Bigfloat arithmetic.
vE := [...]float64{
1.0316510822817691068014397636905610074934300946730,
1.0156973658341766636288643556414001451527597364432,
9.9929636467826398814855428365155224243586391115108e-1,
9.8240033979859736941287149003648737502960015189033e-1,
9.6495145764299257550956863602992167490195750321518e-1,
9.4687829659158090935158610908054896203271861698355e-1,
9.2809053417715769009517654522979827392794124845027e-1,

```

```

9.0847044378047233264777277954768245721857017157916e-1,
8.8785835036531301307661603341327881634688308777383e-1,
}
phi := math.Pi / 3
for m := 1; m <= 9; m++ {
 mf := float64(m) / 10
 delta := math.Abs(EllipticE(phi, mf) - vE[m-1])
 if delta > tol {
 t.Fatalf("EllipticE(pi/3,m) test fail for m=%v", mf)
 }
}

for test := 0; test < 100; test++ {
 alpha := rnd.Float64() * math.Pi / 4
 beta
:= rnd.Float64() * math.Pi / 4
 for mi := 0; mi < 9999; mi++ {
 m := float64(mi) / 10000
 Ea := EllipticE(alpha, m)
 Eb := EllipticE(beta, m)
 sina, cosa := math.Sincos(alpha)
 sinb, cosb := math.Sincos(beta)
 tan := (sina*math.Sqrt(1-m*sinb*sinb) + sinb*math.Sqrt(1-m*sina*sina)) / (cosa + cosb)
 gamma := 2 * math.Atan(tan)
 Eg := EllipticE(gamma, m)
 delta := math.Abs(Ea + Eb - Eg - m*sina*sinb*math.Sin(gamma))
 if delta > tol {
 t.Fatalf("EllipticE test fail for m=%v, alpha=%v, beta=%v", m, alpha, beta)
 }
 }
}

graph{4[f=Gra2][f=5][f=2][f=9][f=2][f=0][f=2][f=1][f=2][f=2][f=2][f=4][f=8][f=2][f=2][f=3][f=7][f=2][f=4][f=6][f
=6][f=4]Gra9[f=4][f=9][f=4][f=4][f=4][f=4][f=1][f=4][f=6][f=6][f=4][f=1][f=6][f=1][f=2][f=7][f=1][f=1][f=1]
[f=1][f=8][f=1][f=3][f=5][f=1][f=1][f=1][f=9]}
graph{{Edga}Edga}
graph{{{STR6{STR6}}STR6{{{STR6}}STR6{STR6}}}}
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// license that can be found in the LICENSE file.

package gonum

import (
 "math"

 "gonum.org/v1/gonum/blas/blas64"
)

```

```

// Dlacn2 estimates the 1-norm of an nn matrix A using sequential updates with
// matrix-vector products provided externally.
//
// Dlacn2 is called sequentially and it returns the value of est and kase to be
// used on the next call.
// On the initial call, kase must be 0.
// In between calls, x must be overwritten by
// A * X if kase was returned as 1,
// A * X if kase was returned as 2,
// and all other parameters must not be changed.
// On the final return, kase is returned as 0, v contains A*W where W is a
// vector, and est = norm(V)/norm(W) is a lower bound for 1-norm of A.
//
// v, x, and isgn must all have length n and n must be at least 1, otherwise
// Dlacn2 will panic. isave is used for temporary storage.
//
// Dlacn2 is an internal routine.
It is exported for testing purposes.
func (impl Implementation) Dlacn2(n int, v, x []float64, isgn []int, est float64, kase int, isave *[3]int) (float64, int) {
 switch {
 case n < 1:
 panic(nLT1)
 case len(v) < n:
 panic(shortV)
 case len(x) < n:
 panic(shortX)
 case len(isgn) < n:
 panic(shortIsgn)
 case isave[0] < 0 || 5 < isave[0]:
 panic(badIsave)
 case isave[0] == 0 && kase != 0:
 panic(badIsave)
 }

 const itmax = 5
 bi := blas64.Implementation()

 if kase == 0 {
 for i := 0; i < n; i++ {
 x[i] = 1 / float64(n)
 }
 kase = 1
 isave[0] = 1
 return est, kase
 }
 switch isave[0] {
 case 1:

```

```

if n == 1 {
 v[0] = x[0]
 est = math.Abs(v[0])
 kase = 0
 return est, kase
}
est = bi.Dasum(n, x, 1)
for i := 0; i < n; i++ {
 x[i] = math.Copysign(1, x[i])
 isgn[i] = int(x[i])
}
kase = 2
isave[0] = 2
return est, kase
case 2:
 isave[1] = bi.Idamax(n, x, 1)
 isave[2] = 2
 for i := 0; i < n; i++ {
 x[i] = 0
 }
 x[isave[1]] = 1
 kase = 1
 isave[0]
= 3
 return est, kase
case 3:
 bi.Dcopy(n, x, 1, v, 1)
 estold := est
 est = bi.Dasum(n, v, 1)
 sameSigns := true
 for i := 0; i < n; i++ {
 if int(math.Copysign(1, x[i])) != isgn[i] {
 sameSigns = false
 break
 }
 }
 if !sameSigns && est > estold {
 for i := 0; i < n; i++ {
 x[i] = math.Copysign(1, x[i])
 isgn[i] = int(x[i])
 }
 kase = 2
 isave[0] = 4
 return est, kase
 }
case 4:
 jlast := isave[1]
 isave[1] = bi.Idamax(n, x, 1)

```

```

if x[jlast] != math.Abs(x[isave[1]]) && isave[2] < itmax {
 isave[2] += 1
 for i := 0; i < n; i++ {
 x[i] = 0
 }
 x[isave[1]] = 1
 kase = 1
 isave[0] = 3
 return est, kase
}
case 5:
 tmp := 2 * (bi.Dasum(n, x, 1)) / float64(3*n)
 if tmp > est {
 bi.Dcopy(n, x, 1, v, 1)
 est = tmp
 }
 kase = 0
 return est, kase
}
// Iteration complete. Final stage
altsgn := 1.0
for i := 0; i < n; i++ {
 x[i] = altsgn * (1 + float64(i)/float64(n-1))
 altsgn *= -1
}
kase = 1
isave[0] = 5
return est,
kase
}
graph{{SUBGRA}SUBGRA}
graph{{{S}S}S}{S}S{S}S}
dmitri.shuralyov.com/gpu/mtl v0.0.0-20190408044501-666a987793e9/go.mod
h1:H6x//7gZCb22OMCxBHrMx7a5I7Hp++hsVxbQ4BYO7hU=
github.com/BurntSushi/xgb v0.0.0-20160522181843-27f122750802/go.mod
h1:IVnqGOEym/WlBOVXweHU+Q+/VP0lqqI8lqeDx9IjBqo=
github.com/go-gl/glfw v0.0.0-20190409004039-e6da0acd62b1/go.mod
h1:vR7hzQXu2zJy9AVAgeJqvqgH9Q5CA+iKCZ2gyEVpxRU=
golang.org/x/crypto v0.0.0-20190308221718-c2843e01d9a2/go.mod
h1:djNgcEr1/C05ACkg1iLfiJU5Ep61QUkGW8qpdssI0+w=
golang.org/x/crypto v0.0.0-20190510104115-cbcb75029529/go.mod
h1:yigFU9vqHzYiE8UmvKecakEJjdnWj3jj499lnFckfCI=
golang.org/x/exp v0.0.0-20190306152737-a1d7652674e8/go.mod
h1:CJ0aWSM057203Lf6IL+f9T1iT9GBYDxfZKAQTCR3kQA=
golang.org/x/exp v0.0.0-20191002040644-a1355ae1e2c3
h1:n9HxLrNxWWtEb1cA950nuEEj3QnKbtsCJ6KjcgisNUs=
golang.org/x/exp v0.0.0-20191002040644-a1355ae1e2c3/go.mod
h1:NOZ3BPKG0ec/BKJQgnvsSFpcKLM5xXVWnvZS97DWHgE=

```





```

import (
 "fmt"

 "gonum.org/v1/gonum/blas/blas64"
 "gonum.org/v1/gonum/mat"
)

// This example shows how simple user types can be constructed to
// implement basic vector functionality within the mat package.
func Example_userVectors() {
 // Perform the cross product of [1 2 3 4] and [1 2 3].
 r := row{1, 2, 3, 4}
 c := column{1, 2, 3}

 var m mat.Dense
 m.Mul(c, r)

 fmt.Println(mat.Formatted(&m))

 // Output:
 //
 // 1 2 3 4
 // 2 4 6 8
 // 3 6 9 12
 //
 // row is a user-defined row vector.
 type row []float64

 // Dims, At and T minimally satisfy the mat.Matrix interface.
 func (v row) Dims() (r, c int) { return 1, len(v) }
 func (v row) At(_, j int) float64 { return v[j] }
 func (v row) T() mat.Matrix { return column(v) }

 // RawVector allows fast path computation with the vector.
 func
 (v row) RawVector() blas64.Vector {
 return blas64.Vector{N: len(v), Data: v, Inc: 1}
 }

 // column is a user-defined column vector.
 type column []float64

 // Dims, At and T minimally satisfy the mat.Matrix interface.
 func (v column) Dims() (r, c int) { return len(v), 1 }
 func (v column) At(i, _ int) float64 { return v[i] }
 func (v column) T() mat.Matrix { return row(v) }

```

```

// RawVector allows fast path computation with the vector.
func (v column) RawVector() blas64.Vector {
 return blas64.Vector{N: len(v), Data: v, Inc: 1}
}

// Code generated by "go generate gonum.org/v1/gonum/unit; DO NOT EDIT.

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// license that can be found in the LICENSE file.

package unit

import (
 "fmt"
 "testing"
)

func TestAccelerationFormat(t *testing.T) {
 for _, test := range []struct {
 value Acceleration
 format string
 want string
 }{
 {1.23456789, "%v", "1.23456789 m s^-2"},
 {1.23456789, "%.1v", "1 m s^-2"},
 {1.23456789, "%20.1v", "1 m s^-2"},
 {1.23456789, "%20v", "1.23456789 m s^-2"},
 {1.23456789, "%1v", "1.23456789 m s^-2"},
 {1.23456789, "%#v", "unit.Acceleration(1.23456789)"},
 {1.23456789, "%s", "%!s(unit.Acceleration=1.23456789 m s^-2)"},
 } {
 got := fmt.Sprintf(test.format, test.value)
 if got != test.want {
 t.Errorf("Format %q %v: got: %q want: %q", test.format, float64(test.value), got, test.want)
 }
 }
}

graph{<<><><><><><><>}
graph{Gra_}
// SPDX-License-Identifier: Unlicense OR MIT

/*
Package layout implements layouts common to GUI programs.

Constraints and dimensions

Constraints and dimensions form the interface between layouts and

```

interface child elements. This package operates on Widgets, functions that compute Dimensions from a set of constraints for acceptable widths and heights. Both the constraints and dimensions are maintained in an implicit Context to keep the Widget declaration short.

For example, to add space above a widget:

```
gtx := layout.NewContext(...)
gtx.Reset(...)

// Configure a top inset.
inset := layout.Inset{Top: unit.Dp(8), ...}
// Use the inset to lay out a widget.
inset.Layout(gtx, func() {
 // Lay out widget and determine its size given the constraints.
 ...
 dims := layout.Dimensions{...}
 gtx.Dimensions = dims
})
```

Note that the example does not generate any garbage even though the Inset is transient. Layouts that don't accept user input are designed to not escape to the heap during their use.

Layout operations are recursive: a child in a layout operation can itself be another layout. That way, complex user interfaces can be created from a few generic layouts.

This example both aligns and insets a child:

```
inset := layout.Inset{...}
inset.Layout(gtx, func() {
 align := layout.Align(...)
 align.Layout(gtx, func() {
 widget.Layout(gtx, ...)
 })
})
```

More complex layouts such as Stack and Flex lay out multiple children, and stateful layouts such as List accept user input.

```
*/
package layout
graph{Gr}
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// license that can be found in the LICENSE file.
```

```
package gonum
```

```
import (
 "math"
```

```

 "gonum.org/v1/gonum/blas"
 "gonum.org/v1/gonum/blas/blas64"
 "gonum.org/v1/gonum/lapack"
)
```

```

// Dsyev computes all eigenvalues and, optionally, the eigenvectors of a real
// symmetric matrix A.
```

```
//
```

```
// w contains the eigenvalues in ascending order upon return. w must have length
// at least n, and Dsyev will panic otherwise.
```

```
//
```

```
// On entry, a contains the elements of the symmetric matrix A in the triangular
// portion specified by uplo. If jobz == lapack.EVCompute, a contains the
// orthonormal eigenvectors of A on exit, otherwise jobz must be lapack.EVNone
// and on exit the specified triangular region is overwritten.
```

```
//
```

```
// work is temporary storage, and lwork specifies the usable memory length. At minimum,
```

```
// lwork >= 3*n-1, and Dsyev will panic otherwise. The amount of blocking is
```

```
// limited by
```

```
the usable length. If lwork == -1, instead of computing Dsyev the
```

```
// optimal work length is stored into work[0].
```

```
func (impl Implementation) Dsyev(jobz lapack.EVJob, uplo blas.Uplo, n int, a []float64, lda int, w, work []float64,
lwork int) (ok bool) {
```

```
 switch {
```

```
 case jobz != lapack.EVNone && jobz != lapack.EVCompute:
```

```
 panic(badEVJob)
```

```
 case uplo != blas.Upper && uplo != blas.Lower:
```

```
 panic(badUplo)
```

```
 case n < 0:
```

```
 panic(nLT0)
```

```
 case lda < max(1, n):
```

```
 panic(badLdA)
```

```
 case lwork < max(1, 3*n-1) && lwork != -1:
```

```
 panic(badLWork)
```

```
 case len(work) < max(1, lwork):
```

```
 panic(shortWork)
```

```
 }
```

```

 // Quick return if possible.
```

```
 if n == 0 {
```

```
 return true
```

```
 }
```

```

var opts string
if uplo == blas.Upper {
 opts = "U"
} else {
 opts = "L"
}
nb := impl.Ilaenv(1, "DSYTRD", opts, n, -1, -1, -1)
lworkopt := max(1, (nb+2)*n)
if lwork == -1 {
 work[0] = float64(lworkopt)
 return
}

switch {
case len(a) < (n-1)*lda+n:
 panic(shortA)
case len(w) < n:
 panic(shortW)
}

if n == 1 {
 w[0] = a[0]
 work[0]
 = 2
 if jobz == lapack.EVCompute {
 a[0] = 1
 }
 return true
}

safmin := dlamchS
eps := dlamchP
smlnum := safmin / eps
bignum := 1 / smlnum
rmin := math.Sqrt(smlnum)
rmax := math.Sqrt(bignum)

// Scale matrix to allowable range, if necessary.
anrm := impl.Dlansy(lapack.MaxAbs, uplo, n, a, lda, work)
scaled := false
var sigma float64
if anrm > 0 && anrm < rmin {
 scaled = true
 sigma = rmin / anrm
} else if anrm > rmax {
 scaled = true
 sigma = rmax / anrm
}

```

```

}
if scaled {
 kind := lapack.LowerTri
 if uplo == blas.Upper {
 kind = lapack.UpperTri
 }
 impl.Dlascl(kind, 0, 0, 1, sigma, n, n, a, lda)
}
var inde int
indtau := inde + n
indwork := indtau + n
llwork := lwork - indwork
impl.Dsytrd(uplo, n, a, lda, w, work[inde:], work[indtau:], work[indwork:], llwork)

// For eigenvalues only, call Dsterf. For eigenvectors, first call Dorgtr
// to generate the orthogonal matrix, then call Dsteqr.
if jobz == lapack.EVNone {
 ok = impl.Dsterf(n, w, work[inde:])
}
else {
 impl.Dorgtr(uplo, n, a, lda, work[indtau:], work[indwork:], llwork)
 ok = impl.Dsteqr(lapack.EVComp(jobz), n, w, work[inde:], a, lda, work[indtau:])
}
if !ok {
 return false
}

// If the matrix was scaled, then rescale eigenvalues appropriately.
if scaled {
 bi := blas64.Implementation()
 bi.Dscal(n, 1/sigma, w, 1)
}
work[0] = float64(lworkopt)
return true
}

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// license that can be found in the LICENSE file.

package gonum

import "math"

// Dlaqr1 sets v to a scalar multiple of the first column of the product
// (H - (sr1 + i*si1)*I)*(H - (sr2 + i*si2)*I)
// where H is a 22 or 33 matrix, I is the identity matrix of the same size,
// and i is the imaginary unit. Scaling is done to avoid overflows and most
// underflows.

```

```

//
// n is the order of H and must be either 2 or 3. It must hold that either sr1 =
// sr2 and si1 = -si2, or si1 = si2 = 0. The length of v must be equal to n. If
// any of these conditions is not met, Dlaqr1 will panic.
//
// Dlaqr1 is an internal routine. It is exported for testing purposes.
func (impl Implementation) Dlaqr1(n int, h []float64, ldh int, sr1, si1, sr2, si2 float64, v []float64) {
 switch {
 case n != 2 && n != 3:
 panic("lapack: n must be 2 or 3")
 case ldh < n:
 panic(badLdH)
 case len(h) < (n-1)*ldh+n:
 panic(shortH)
 case
 !((sr1 == sr2 && si1 == -si2) || (si1 == 0 && si2 == 0)):
 panic(badShifts)
 case len(v) != n:
 panic(shortV)
 }

 if n == 2 {
 s := math.Abs(h[0]-sr2) + math.Abs(si2) + math.Abs(h[ldh])
 if s == 0 {
 v[0] = 0
 v[1] = 0
 } else {
 h21s := h[ldh] / s
 v[0] = h21s*h[1] + (h[0]-sr1)*((h[0]-sr2)/s) - si1*(si2/s)
 v[1] = h21s * (h[0] + h[ldh+1] - sr1 - sr2)
 }
 return
 }

 s := math.Abs(h[0]-sr2) + math.Abs(si2) + math.Abs(h[ldh]) + math.Abs(h[2*ldh])
 if s == 0 {
 v[0] = 0
 v[1] = 0
 v[2] = 0
 } else {
 h21s := h[ldh] / s
 h31s := h[2*ldh] / s
 v[0] = (h[0]-sr1)*((h[0]-sr2)/s) - si1*(si2/s) + h[1]*h21s + h[2]*h31s
 v[1] = h21s*(h[0]+h[ldh+1]-sr1-sr2) + h[ldh+2]*h31s
 v[2] = h31s*(h[0]+h[2*ldh+2]-sr1-sr2) + h21s*h[2*ldh+1]
 }
}

```



```
// Code generated by "go generate gonum.org/v1/gonum/unit; DO NOT EDIT.
```

```
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```

```
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```

```
// license that can be found in the LICENSE file.
```

```
package unit
```

```
import (
 "fmt"
 "testing"
)
```

```
func TestMagneticFluxDensityFormat(t *testing.T) {
 for _, test := range []struct {
 value MagneticFluxDensity
 format string
 want string
 }{
 {1.23456789, "%v", "1.23456789 T"},
 {1.23456789, "%.1v", "1 T"},
 {1.23456789, "%20.1v", "1 T"},
 {1.23456789, "%20v", "1.23456789 T"},
 {1.23456789, "%1v", "1.23456789 T"},
 {1.23456789, "%#v", "unit.MagneticFluxDensity(1.23456789)"},
 {1.23456789, "%s", "%!s(unit.MagneticFluxDensity=1.23456789 T)"},
 } {
 got := fmt.Sprintf(test.format, test.value)
 if got != test.want {
 t.Errorf("Format %q %v: got: %q want: %q", test.format, float64(test.value), got, test.want)
 }
 }
}
```

```
graph{{{Di6}{Di6}{{Di6}{Di6}DiW}{DiW}}}}
```

```
*> \brief \b DCOPY
```

```
*
```

```
* ===== DOCUMENTATION =====
```

```
*
```

```
* Online html documentation available at
```

```
* http://www.netlib.org/lapack/explore-html/
```

```
*
```

```
* Definition:
```

```
* =====
```

```
*
```

```
* SUBROUTINE DCOPY(N,DX,INCX,DY,INCY)
```

```
*
```

```
* .. Scalar Arguments ..
```

```
* INTEGER INCX,INCY,N
```

```

* ..
* .. Array Arguments ..
* DOUBLE PRECISION DX(*),DY(*)
* ..
*
*
*> \par Purpose:
* =====
*>
*> \verbatim
*>
*> DCOPY copies a vector, x, to a vector, y.
*> uses unrolled loops for increments equal to one.
*> \endverbatim
*
* Authors:
* =====
*
*> \author Univ. of Tennessee
*> \author Univ. of California Berkeley
*> \author Univ. of Colorado Denver
*> \author NAG Ltd.
*
*> \date November 2011
*
*> \ingroup double_blas_level1
*
*> \par Further Details:
* =====
*>
*> \verbatim
*>
*> jack dongarra, linpack, 3/11/78.
> modified 12/3/93, array(1) declarations changed to array()
*> \endverbatim
*>
* =====
* SUBROUTINE DCOPY(N,DX,INCX,DY,INCY)
*
* -- Reference BLAS level1 routine (version 3.4.0) --
* -- Reference BLAS is a software package provided by Univ. of Tennessee, --
* -- Univ. of California Berkeley, Univ. of Colorado Denver and NAG Ltd.--
* November 2011
*
* .. Scalar Arguments ..
* INTEGER INCX,INCY,N
* ..
* .. Array Arguments ..

```

```

DOUBLE PRECISION DX(*),DY(*)
*
* ..
*
* =====
*
* .. Local Scalars ..
INTEGER I,IX,IY,M,MP1
*
* ..
* .. Intrinsic Functions ..
INTRINSIC MOD
*
* ..
IF (N.LE.0) RETURN
IF (INCX.EQ.1 .AND. INCY.EQ.1) THEN
*
* code for both increments equal to 1
*
*
* clean-up loop
*
M = MOD(N,7)
IF (M.NE.0) THEN
DO I = 1,M
DY(I) = DX(I)
END DO
IF (N.LT.7) RETURN
END IF
MP1 = M
+ 1
DO I = MP1,N,7
DY(I) = DX(I)
DY(I+1) = DX(I+1)
DY(I+2) = DX(I+2)
DY(I+3) = DX(I+3)
DY(I+4) = DX(I+4)
DY(I+5) = DX(I+5)
DY(I+6) = DX(I+6)
END DO
ELSE
*
* code for unequal increments or equal increments
* not equal to 1
*
IX = 1
IY = 1
IF (INCX.LT.0) IX = (-N+1)*INCX + 1
IF (INCY.LT.0) IY = (-N+1)*INCY + 1
DO I = 1,N
DY(IY) = DX(IX)

```

```

 IX = IX + INCX
 IY = IY + INCY
 END DO
END IF
RETURN
END

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// license that can be found in the LICENSE file.

package testlapack

import (
 "testing"

 "golang.org/x/exp/rand"

 "gonum.org/v1/gonum/blas"
 "gonum.org/v1/gonum/blas/blas64"
 "gonum.org/v1/gonum/floats"
)

type Dgels interface {
 Dgels(trans blas.Transpose, m, n, nrhs int, a []float64, lda int, b []float64, ldb int, work []float64, lwork int) bool
}

func DgelsTest(t *testing.T, impl Dgels) {
 rnd := rand.New(rand.NewSource(1))
 for _, trans := range []blas.Transpose{blas.NoTrans, blas.Trans} {
 for _, test := range []struct {
 m, n, nrhs, lda, ldb int
 }{
 {3, 4, 5, 0, 0},
 {3, 5, 4, 0, 0},
 {4, 3, 5, 0, 0},
 {4, 5, 3, 0, 0},
 {5, 3, 4, 0, 0},
 {5, 4, 3, 0, 0},
 {3, 4, 5, 10, 20},
 {3, 5, 4, 10, 20},
 {4, 3, 5, 10, 20},
 {4, 5, 3, 10, 20},
 {5, 3, 4, 10, 20},
 {5, 4, 3, 10, 20},
 {3, 4, 5, 20, 10},
 {3, 5, 4, 20, 10},
 {4, 3, 5, 20,

```

```

10},
{4, 5, 3, 20, 10},
{5, 3, 4, 20, 10},
{5, 4, 3, 20, 10},
{200, 300, 400, 0, 0},
{200, 400, 300, 0, 0},
{300, 200, 400, 0, 0},
{300, 400, 200, 0, 0},
{400, 200, 300, 0, 0},
{400, 300, 200, 0, 0},
{200, 300, 400, 500, 600},
{200, 400, 300, 500, 600},
{300, 200, 400, 500, 600},
{300, 400, 200, 500, 600},
{400, 200, 300, 500, 600},
{400, 300, 200, 500, 600},
{200, 300, 400, 600, 500},
{200, 400, 300, 600, 500},
{300, 200, 400, 600, 500},
{300, 400, 200, 600, 500},
{400, 200, 300, 600, 500},
{400, 300, 200, 600, 500},
} {
m := test.m
n := test.n
nrhs := test.nrhs

lda := test.lda
if lda == 0 {
lda = n
}
a := make([]float64, m*lda)
for i := range a {
a[i] = rnd.Float64()
}
aCopy := make([]float64, len(a))
copy(aCopy, a)

// Size of b is the same trans or no trans, because the number of rows
// has to be the max of (m,n).
mb := max(m, n)
nb := nrhs
ldb := test.ldb
if
ldb == 0 {
ldb = nb
}
b := make([]float64, mb*ldb)

```

```

for i := range b {
 b[i] = rnd.Float64()
}
bCopy := make([]float64, len(b))
copy(bCopy, b)

// Find optimal work length.
work := make([]float64, 1)
impl.Dgels(trans, m, n, nrhs, a, lda, b, ldb, work, -1)

// Perform linear solve
work = make([]float64, int(work[0]))
lwork := len(work)
for i := range work {
 work[i] = rnd.Float64()
}
impl.Dgels(trans, m, n, nrhs, a, lda, b, ldb, work, lwork)

// Check that the answer is correct by comparing to the normal equations.
aMat := blas64.General{
 Rows: m,
 Cols: n,
 Stride: lda,
 Data: make([]float64, len(aCopy)),
}
copy(aMat.Data, aCopy)
szAta := n
if trans == blas.Trans {
 szAta = m
}
aTA := blas64.General{
 Rows: szAta,
 Cols: szAta,
 Stride: szAta,
 Data: make([]float64, szAta*szAta),
}

// Compute A * A if notrans and A * A otherwise.
if trans == blas.NoTrans {
 blas64.Gemm(blas.Trans,
blas.NoTrans, 1, aMat, aMat, 0, aTA)
} else {
 blas64.Gemm(blas.NoTrans, blas.Trans, 1, aMat, aMat, 0, aTA)
}

// Multiply by X.
X := blas64.General{
 Rows: szAta,

```

```

Cols: nrhs,
Stride: ldb,
Data: b,
}
ans := blas64.General{
Rows: aTA.Rows,
Cols: X.Cols,
Stride: X.Cols,
Data: make([]float64, aTA.Rows*X.Cols),
}
blas64.Gemm(blas.NoTrans, blas.NoTrans, 1, aTA, X, 0, ans)

```

```

B := blas64.General{
Rows: szAta,
Cols: nrhs,
Stride: ldb,
Data: make([]float64, len(bCopy)),
}

```

```

copy(B.Data, bCopy)
var ans2 blas64.General
if trans == blas.NoTrans {
ans2 = blas64.General{
Rows: aMat.Cols,
Cols: B.Cols,
Stride: B.Cols,
Data: make([]float64, aMat.Cols*B.Cols),
}
} else {
ans2 = blas64.General{
Rows: aMat.Rows,
Cols: B.Cols,
Stride: B.Cols,
Data: make([]float64, aMat.Rows*B.Cols),
}
}

```

```

// Compute A
B if Trans or A * B otherwise
if trans == blas.NoTrans {
blas64.Gemm(blas.Trans, blas.NoTrans, 1, aMat, B, 0, ans2)
} else {
blas64.Gemm(blas.NoTrans, blas.NoTrans, 1, aMat, B, 0, ans2)
}
if !floats.EqualApprox(ans.Data, ans2.Data, 1e-12) {
t.Errorf("Normal equations not satisfied")
}
}

```

```

}
}
graph{{DIG}DIG}{DIG}}
graph{<R><T><T><R><T><T><T><R><T><T><R><R><T><T><R><R><T><T><R>}
graph{{DIGR1}{DIGR1}DIGR1}}
graph{SubGE{{SubGE{{SubGZ}SubGE{SubGZ}SubGS}SubGE{SubGZ}SubGZ}}}}
graph{{{{{{subGra{{subGrax}}subGra}subGrax}}subGra}}}}
Graph{{subr}{subu}subr}{subu}{subu}}
graph{{SUBB{SUBB}}}}
graph{Dir{Dir}}
graph n1{n1}
graph{""[diGr_=""]diGr_}
graph{{subGra}}
graph{digra_}
graph{Stric{Stricc{Strica-9Strica-9Strica-9Strica-9Strica-9Strica-9Strica-9Stric}Strica-9Strica-9Strica-9Strica-9Strica-9Strica-9Stric}}
graph{{{{subGr}subGr{subGr}{subGr}subGr}{subGr}subGr{subGr}{subGr}subGr}}
graph{SU{SU{SU}SU}}
graph G {
A
}
graph{{{{STRlr{{STRlr{STRlh{{{{STRlr{STRlr}}STRlr}}}}}}}}STRlr{STRlr}}STRlr}}
Graph{{Subgr_}}
graph{{digrap3}digrap4{digrap4}}
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```

```
package testlapack
```

```

import (
 "fmt"
 "testing"

 "golang.org/x/exp/rand"

 "gonum.org/v1/gonum/blas"
 "gonum.org/v1/gonum/blas/blas64"
)

```

```

type Dpotrier interface {
 Dpotri(uplo blas.Uplo, n int, a []float64, lda int) bool

 Dpotrf(uplo blas.Uplo, n int, a []float64, lda int) bool
}

```

```

func DpotriTest(t *testing.T, impl Dpotrier) {
 for _, uplo := range []blas.Uplo{blas.Upper, blas.Lower} {

```



```

name := "Upper"
if uplo == blas.Lower {
 name = "Lower"
}
t.Run(name, func(t *testing.T) {
 // Include small and large sizes to make sure that both
 // unblocked and blocked paths are taken.
 ns := []int{0, 1, 2, 3, 4, 5, 10, 25, 31, 32, 33, 63, 64, 65, 127, 128, 129}
 const tol = 1e-12

 bi := blas64.Implementation()
 rnd := rand.New(rand.NewSource(1))
 for _, n := range ns {
 for _, lda := range []int{max(1, n), n
+ 11} {
 prefix := fmt.Sprintf("n=%v,lda=%v", n, lda)

 // Generate a random diagonal matrix D with positive entries.
 d := make([]float64, n)
 Dlatm1(d, 3, 10000, false, 2, rnd)

 // Construct a positive definite matrix A as
 // A = U * D * U
 // where U is a random orthogonal matrix.
 a := make([]float64, n*lda)
 Dlagsy(n, 0, d, a, lda, rnd, make([]float64, 2*n))
 // Create a copy of A.
 aCopy := make([]float64, len(a))
 copy(aCopy, a)
 // Compute the Cholesky factorization of A.
 ok := impl.Dpotrf(uplo, n, a, lda)
 if !ok {
 t.Fatalf("%v: unexpected Cholesky failure", prefix)
 }

 // Compute the inverse inv(A).
 ok = impl.Dpotri(uplo, n, a, lda)
 if !ok {
 t.Errorf("%v: unexpected failure", prefix)
 continue
 }

 // Check that the triangle of A opposite to uplo has not been modified.
 if uplo == blas.Upper && !sameLowerTri(n, aCopy, lda, a, lda) {
 t.Errorf("%v: unexpected modification
in lower triangle", prefix)
 continue
 }

```

```

if uplo == blas.Lower && !sameUpperTri(n, aCopy, lda, a, lda) {
 t.Errorf("%v: unexpected modification in upper triangle", prefix)
 continue
}

// Change notation for the sake of clarity.
ainv := a
ldainv := lda

// Expand ainv into a full dense matrix so that we can call Dsymm below.
if uplo == blas.Upper {
 for i := 1; i < n; i++ {
 for j := 0; j < i; j++ {
 ainv[i*ldainv+j] = ainv[j*ldainv+i]
 }
 }
} else {
 for i := 0; i < n-1; i++ {
 for j := i + 1; j < n; j++ {
 ainv[i*ldainv+j] = ainv[j*ldainv+i]
 }
 }
}

// Compute A*inv(A) and store the result into want.
ldwant := max(1, n)
want := make([]float64, n*ldwant)
bi.Dsymm(blas.Left, uplo, n, n, 1, aCopy, lda, ainv, ldainv, 0, want, ldwant)

// Check that want is close to the identity matrix.
dist := distFromIdentity(n, want, ldwant)
if
dist > tol {
 t.Errorf("%v: |A * inv(A) - I| = %v is too large", prefix, dist)
}
}
})
}
}
graph{<TTDTTDDTT>}
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// license that can be found in the LICENSE file.

// This is a translation of the FFTPACK sint functions by
// Paul N Swarztrauber, placed in the public domain at
// http://www.netlib.org/fftpack/.

```

```

package fftpack

import "math"

// Sinti initializes the array work which is used in subroutine Sint.
// The prime factorization of n together with a tabulation of the
// trigonometric functions are computed and stored in work.
//
// Input parameter
//
// n The length of the sequence to be transformed. The method
// is most efficient when n+1 is a product of small primes.
//
// Output parameter
//
// work A work array with at least ceil(2.5*n) locations.
// Different work arrays are required for different values
// of n. The contents of work must not be changed between
// calls of Sint.
//
// ifac An integer work array of length at least
// 15.
func Sinti(n int, work []float64, ifac []int) {
 if len(work) < 5*(n+1)/2 {
 panic("fourier: short work")
 }
 if len(ifac) < 15 {
 panic("fourier: short ifac")
 }
 if n <= 1 {
 return
 }
 dt := math.Pi / float64(n+1)
 for k := 0; k < n/2; k++ {
 work[k] = 2 * math.Sin(float64(k+1)*dt)
 }
 Rffti(n+1, work[n/2:], ifac)
}

// Sint computes the Discrete Fourier Sine Transform of an odd
// sequence x(i). The transform is defined below at output parameter x.
//
// Sint is the unnormalized inverse of itself since a call of Sint
// followed by another call of Sint will multiply the input sequence
// x by 2*(n+1).
//
// The array work which is used by subroutine Sint must be

```

```

// initialized by calling subroutine Sinti(n,work).
//
// Input parameters
//
// n The length of the sequence to be transformed. The method
// is most efficient when n+1 is the product of small primes.
//
// x An array which contains the sequence to be transformed.
//
//
// work A work array
// with dimension at least $\text{ceil}(2.5*n)$
// in the program that calls Sint. The work array must be
// initialized by calling subroutine Sinti(n,work) and a
// different work array must be used for each different
// value of n. This initialization does not have to be
// repeated so long as n remains unchanged thus subsequent
// transforms can be obtained faster than the first.
//
// ifac An integer work array of length at least 15.
//
// Output parameters
//
// x for $i=1,\dots,n$
// $x(i)$ = the sum from $k=1$ to $k=n$
// $2*x(k)*\sin(k*i*\pi/(n+1))$
//
// A call of Sint followed by another call of
// Sint will multiply the sequence x by $2^{*(n+1)}$.
// Hence Sint is the unnormalized inverse
// of itself.
//
// work Contains initialization calculations which must not be
// destroyed between calls of Sint.
// ifac Contains initialization calculations which must not be
// destroyed
// between calls of Sint.
func Sint(n int, x, work []float64, ifac []int) {
 if len(x) < n {
 panic("fourier: short sequence")
 }
 if len(work) < $5*(n+1)/2$ {
 panic("fourier: short work")
 }
 if len(ifac) < 15 {
 panic("fourier: short ifac")
 }
 if n == 0 {

```

```

 return
}
sint1(n, x, work, work[n/2:], work[n/2+n+1:], ifac)
}

func sint1(n int, war, was, xh, x []float64, ifac []int) {
 const sqrt3 = 1.73205080756888

 for i := 0; i < n; i++ {
 xh[i] = war[i]
 war[i] = x[i]
 }

 switch n {
 case 1:
 xh[0] *= 2
 case 2:
 xh[0], xh[1] = sqrt3*(xh[0]+xh[1]), sqrt3*(xh[0]-xh[1])
 default:
 x[0] = 0
 for k := 0; k < n/2; k++ {
 kc := n - k - 1
 t1 := xh[k] - xh[kc]
 t2 := was[k] * (xh[k] + xh[kc])
 x[k+1] = t1 + t2
 x[kc+1] = t2 - t1
 }
 if n%2 != 0 {
 x[n/2+1] = 4 * xh[n/2]
 }
 rfftf1(n+1, x, xh, war, ifac)
 xh[0] = 0.5 * x[0]
 for i := 2; i < n; i += 2 {
 xh[i-1] = -x[i]
 xh[i] = xh[i-2] + x[i-1]
 }
 if n%2 == 0 {
 xh[n-1] = -x[n]
 }
 }

 for i := 0; i < n;
 i++ {
 x[i] = war[i]
 war[i] = xh[i]
 }
}

```



```

*> \verbatim
*> UPLO is CHARACTER*1
*> Specifies the part of the matrix A to be copied to B.
*> = 'U': Upper triangular part
*> = 'L': Lower triangular part
*> Otherwise: All of the matrix A
*> \endverbatim
*>
*> \param[in] M
*> \verbatim
*> M is INTEGER
*> The number of rows of the matrix A. M >= 0.
*> \endverbatim
*>
*> \param[in] N
*> \verbatim
*> N is INTEGER
*> The number of columns of the matrix A. N >= 0.
*> \endverbatim
*>
*> \param[in] A
*> \verbatim
*> A is DOUBLE PRECISION array, dimension (LDA,N)
*> The m by n matrix A. If UPLO = 'U', only the upper triangle
*> or trapezoid is accessed; if UPLO = 'L', only the lower
*> triangle or trapezoid is accessed.
*> \endverbatim
*>
*>
*> \param[in] LDA
*> \verbatim
*> LDA is INTEGER
*> The leading dimension of the array A. LDA >= max(1,M).
*> \endverbatim
*>
*> \param[out] B
*> \verbatim
*> B is DOUBLE PRECISION array, dimension (LDB,N)
*> On exit, B = A in the locations specified by UPLO.
*> \endverbatim
*>
*> \param[in] LDB
*> \verbatim
*> LDB is INTEGER
*> The leading dimension of the array B. LDB >= max(1,M).
*> \endverbatim
*>
*>
*> Authors:

```

```

* =====
*
*> \author Univ. of Tennessee
*> \author Univ. of California Berkeley
*> \author Univ. of Colorado Denver
*> \author NAG Ltd.
*
*> \date September 2012
*
*> \ingroup auxOTHERauxiliary
*
* =====
SUBROUTINE DLACPY(UPLO, M, N, A, LDA, B, LDB)
*
* -- LAPACK auxiliary routine (version 3.4.2) --
* -- LAPACK is a software package provided by Univ. of Tennessee, --
* -- Univ. of California Berkeley, Univ. of Colorado Denver and NAG
 Ltd.--
* September 2012
*
* .. Scalar Arguments ..
CHARACTER UPLO
INTEGER LDA, LDB, M, N
*
* ..
* .. Array Arguments ..
DOUBLE PRECISION A(LDA, *), B(LDB, *)
*
* ..
*
* =====
*
* .. Local Scalars ..
INTEGER I, J
*
* ..
* .. External Functions ..
LOGICAL LSAME
EXTERNAL LSAME
*
* ..
* .. Intrinsic Functions ..
INTRINSIC MIN
*
* ..
* .. Executable Statements ..
*
IF(LSAME(UPLO, 'U')) THEN
 DO 20 J = 1, N
 DO 10 I = 1, MIN(J, M)
 B(I, J) = A(I, J)
10 CONTINUE
20 CONTINUE

```



```

ELSE IF(LSAME(UPLO, 'L')) THEN
 DO 40 J = 1, N
 DO 30 I = J, M
 B(I, J) = A(I, J)
30 CONTINUE
40 CONTINUE
ELSE
 DO 60 J = 1, N
 DO 50 I = 1, M
 B(I,
J) = A(I, J)
50 CONTINUE
60 CONTINUE
END IF
RETURN
*
* End of DLACPY
*
END

graph{digz{{digu}}digz{{digu}}digz{{digu}}}
graph{strih{strih{strih{strih{strih{strii}}}}}}
graph{Gs{Gy}Gs{Gt}Gs{Gt}Gs{Gt}Gs{Gy}Gs{Gt}}
graph{{{edgeg}}edgeg}
graph{{SUBGRAPG}}
graph{w:w:w K:w w:w w:w K:w w:w w:w w:w K:w w:w K:w w:w w:w K:w w:w w:w w:w K}
graph{{subGrG}}
graph{{ed_{ed_{ed_{ed_}}ed_}}
graph{{DiG_{DiG_{DiG_{}}}}
graph{{{DIG}}}
graph{{graph_}}
graph{{{{Subgrap_{Subgrap_}}}}}
graph{"\\3"{"\\3"}
// Copyright 2015 The Gonum Authors. All rights reserved.
// Use of this source code is governed by a BSD-style
// license that can be found in the LICENSE file.

package linear

import (
 "gonum.org/v1/gonum/graph"
)

// NodeStack implements a LIFO stack of graph.Node.
type NodeStack []graph.Node

// Len returns the number of graph.Nodes on the stack.
func (s *NodeStack) Len() int { return len(*s) }

```

```

// Pop returns the last graph.Node on the stack and removes it
// from the stack.
func (s *NodeStack) Pop() graph.Node {
 v := *s
 v, n := v[:len(v)-1], v[len(v)-1]
 *s = v
 return n
}

// Push adds the node n to the stack at the last position.
func (s *NodeStack) Push(n graph.Node) { *s = append(*s, n) }

// NodeQueue implements a FIFO queue.
type NodeQueue struct {
 head int
 data []graph.Node
}

// Len returns the number of graph.Nodes in the queue.
func (q *NodeQueue) Len() int { return len(q.data) - q.head }

// Enqueue adds the node n to the back of the queue.
func (q *NodeQueue) Enqueue(n
graph.Node) {
 if len(q.data) == cap(q.data) && q.head > 0 {
 l := q.Len()
 copy(q.data, q.data[q.head:])
 q.head = 0
 q.data = append(q.data[:l], n)
 } else {
 q.data = append(q.data, n)
 }
}

// Dequeue returns the graph.Node at the front of the queue and
// removes it from the queue.
func (q *NodeQueue) Dequeue() graph.Node {
 if q.Len() == 0 {
 panic("queue: empty queue")
 }

 var n graph.Node
 n, q.data[q.head] = q.data[q.head], nil
 q.head++

 if q.Len() == 0 {
 q.head = 0
 q.data = q.data[:0]
 }
}

```

```
}

return n
}

// Reset clears the queue for reuse.
func (q *NodeQueue) Reset() {
 q.head = 0
 q.data = q.data[:0]
}

digraph{el
el}

graph{{STRE}STRE}

/* ** */graph""{e[e=""l=""e=""h=""t=""r=""][r=""]/**/"_""_""_""_""_""[r=""n=6]"_""_""[r=""t=""]"_""_""[r=""t=""]"_""_""[r=""t=""]"_""_""[r=""t=""]"_""_""_""_""_""_""}

// Copyright 2016 The Gonum Authors. All rights reserved.
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// license that can be found in the LICENSE file.

package testlapack

import (
 "fmt"
 "testing"

 "golang.org/x/exp/rand"

 "gonum.org/v1/gonum/blas"
 "gonum.org/v1/gonum/blas/bas64"
 "gonum.org/v1/gonum/lapack"
)

type Dgebaker interface {
 Dgebak(job lapack.BalanceJob, side lapack.EVSide, n, ilo, ihi int, scale []float64, m int, v []float64, ldv int)
}

func DgebakTest(t *testing.T, impl Dgebaker) {
 rnd := rand.New(rand.NewSource(1))

 for _, job := range []lapack.BalanceJob{lapack.BalanceNone, lapack.Permute, lapack.Scale, lapack.PermuteScale} {
 for _, side := range []lapack.EVSide{lapack.EVLeft, lapack.EVRight} {
 for _, n := range []int{0, 1, 2, 3, 4, 5, 6, 10, 18, 31, 53} {
 for _, extra := range []int{0, 11} {
 for cas := 0; cas < 100; cas++ {
 m := rnd.Intn(n + 1)
 v := randomGeneral(n, m, m+extra, rnd)
 var ilo, ihi int
 if v.Rows >
```

```

0 {
 ihi = rnd.Intn(n)
 ilo = rnd.Intn(ihi + 1)
} else {
 ihi = -1
}
testDgebak(t, impl, job, side, ilo, ihi, v, rnd)
}
}
}
}
}
}
}

```

```

func testDgebak(t *testing.T, impl Dgebaker, job lapack.BalanceJob, side lapack.EVSide, ilo, ihi int, v
blas64.General, rnd *rand.Rand) {

```

```

 const tol = 1e-15

```

```

 n := v.Rows

```

```

 m := v.Cols

```

```

 extra := v.Stride - v.Cols

```

```

 // Create D and D^{-1} by generating random scales between ilo and ihi.

```

```

 d := eye(n, n)

```

```

 dinv := eye(n, n)

```

```

 scale := nanSlice(n)

```

```

 if job == lapack.Scale || job == lapack.PermuteScale {

```

```

 if ilo == ihi {

```

```

 scale[ilo] = 1

```

```

 } else {

```

```

 for i := ilo; i <= ihi; i++ {

```

```

 scale[i] = 2 * rnd.Float64()

```

```

 d.Data[i*d.Stride+i] = scale[i]

```

```

 dinv.Data[i*dinv.Stride+i] = 1 / scale[i]

```

```

 }

```

```

 }

```

```

 }

```

```

 // Create P by generating random column swaps.

```

```

 p := eye(n, n)

```

```

 if job == lapack.Permute || job == lapack.PermuteScale {

```

```

 // Make up some random permutations.

```

```

 for i := n - 1; i > ihi; i-- {

```

```

 scale[i] = float64(rnd.Intn(i

```

```

+ 1))

```

```

 blas64.Swap(blas64.Vector{N: n, Data: p.Data[i:], Inc: p.Stride},

```

```

 blas64.Vector{N: n, Data: p.Data[int(scale[i]):], Inc: p.Stride})

```

```

 }

```

```

 for i := 0; i < ilo; i++ {

```

```

scale[i] = float64(i + rnd.Intn(ihi-i+1))
blas64.Swap(blas64.Vector{N: n, Data: p.Data[i:], Inc: p.Stride},
 blas64.Vector{N: n, Data: p.Data[int(scale[i]):], Inc: p.Stride})
}
}

got := cloneGeneral(v)
impl.Dgebak(job, side, n, ilo, ihi, scale, m, got.Data, got.Stride)

prefix := fmt.Sprintf("Case job=%v, side=%v, n=%v, ilo=%v, ihi=%v, m=%v, extra=%v",
 job, side, n, ilo, ihi, m, extra)

if !generalOutsideAllNaN(got) {
 t.Errorf("%v: out-of-range write to V\n%v", prefix, got.Data)
}

// Compute D*V or D^{-1}*V and store into dv.
dv := zeros(n, m, m)
if side == lapack.EVRight {
 blas64.Gemm(blas.NoTrans, blas.NoTrans, 1, d, v, 0, dv)
} else {
 blas64.Gemm(blas.NoTrans, blas.NoTrans, 1, dinv, v, 0, dv)
}
// Compute P*D*V or P*D^{-1}*V and store into want.
want := zeros(n,
 m, m)
blas64.Gemm(blas.NoTrans, blas.NoTrans, 1, p, dv, 0, want)

if !equalApproxGeneral(want, got, tol) {
 t.Errorf("%v: unexpected value of V", prefix)
}
}

graph{digra_{digra_}}
graph{{GRAPA GRAPG}}
graph{{Dig_}Dig_{Dig_}Dig_{Dig_}}
// Copyright 2016 The Gonum Authors. All rights reserved.
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// license that can be found in the LICENSE file.

package integrate

import (
 "math"
 "testing"

 "golang.org/x/exp/rand"

 "gonum.org/v1/gonum/integrate/testquad"

```

)

```
func TestTrapezoidal(t *testing.T) {
 rnd := rand.New(rand.NewSource(1))
 for i, test := range []struct {
 integral testquad.Integral
 n int
 tol float64
 }{
 {integral: testquad.Constant(0), n: 2, tol: 0},
 {integral: testquad.Constant(0), n: 10, tol: 0},
 {integral: testquad.Poly(0), n: 2, tol: 1e-14},
 {integral: testquad.Poly(0), n: 10, tol: 1e-14},
 {integral: testquad.Poly(1), n: 2, tol: 1e-14},
 {integral: testquad.Poly(1), n: 10, tol: 1e-14},
 {integral: testquad.Poly(2), n: 1e5, tol: 1e-8},
 {integral: testquad.Poly(3), n: 1e5, tol: 1e-8},
 {integral: testquad.Poly(4), n: 1e5, tol: 1e-7},
 {integral: testquad.Poly(5), n: 1e5, tol: 1e-7},
 {integral: testquad.Sin(), n: 1e5, tol:
1e-11},
 {integral: testquad.XExpMinusX(), n: 1e5, tol: 1e-10},
 {integral: testquad.Sqrt(), n: 1e5, tol: 1e-8},
 {integral: testquad.ExpOverX2Plus1(), n: 1e5, tol: 1e-10},
 } {
 n := test.n
 a := test.integral.A
 b := test.integral.B

 x := jitterSpan(n, a, b, rnd)
 y := make([]float64, n)
 for i, xi := range x {
 y[i] = test.integral.F(xi)
 }

 got := Trapezoidal(x, y)

 want := test.integral.Value
 diff := math.Abs(got - want)
 if diff > test.tol {
 t.Errorf("Test #%d: %v, n=%v: unexpected result; got=%v want=%v diff=%v",
 i, test.integral.Name, n, got, want, diff)
 }
 }
}

func jitterSpan(n int, a, b float64, rnd *rand.Rand) []float64 {
 dx := (b - a) / float64(n-1)
```

```

x := make([]float64, n)
x[0] = a
for i := 1; i < n-1; i++ {
 // Set x[i] to its regular location.
 x[i] = a + float64(i)*dx
 // Generate a random number in [-1,1).
 jitter := 2*rand.Float64() - 1
 // Jitter x[i] without crossing over its neighbors.
 x[i] += 0.4 * jitter * dx
}
x[n-1] =
b
return x
}
graph{{sub_}{sub_}{sub_{sub_}{sub_}}}}
graph{{STR}STR{STR}STR{STR}STR{STR}}
graph{{EDG}}
graph{"\I_0_1RRcrqU_86JW_d_977_4__9y78_Ph_4n_j__4RAJdz_JiyF_\0\I\1\3\I#\ur6u1_xS7_7__2_Yzs5EF
__RG02}}8}\I\3\I#\I\
"}
// Copyright 2017 The Gonum Authors. All rights reserved.
// Use of this source code is governed by a BSD-style
// license that can be found in the LICENSE file.

// Package samplemv implements advanced sampling routines from explicit and implicit
// probability distributions.
package samplemv // import "gonum.org/v1/gonum/stat/samplemv"
graph{G.089209850062616169452667236328125{{{}}}}
graph{{{digrap}digrap{digrap}}}
graph{{{e}{e}e}}}
// Copyright 2016 The Gonum Authors. All rights reserved.
// Use of this source code is governed by a BSD-style
// license that can be found in the LICENSE file.

package f32

// ScalUnitary is
// for i := range x {
// x[i] *= alpha
// }
func ScalUnitary(alpha float32, x []float32) {
 for i := range x {
 x[i] *= alpha
 }
}

// ScalUnitaryTo is
// for i, v := range x {

```

```

// dst[i] = alpha * v
// }
func ScalUnitaryTo(dst []float32, alpha float32, x []float32) {
 for i, v := range x {
 dst[i] = alpha * v
 }
}

// ScalInc is
// var ix uintptr
// for i := 0; i < int(n); i++ {
// x[ix] *= alpha
// ix += incX
// }
func ScalInc(alpha float32, x []float32, n, incX uintptr) {
 var ix uintptr
 for i := 0; i < int(n); i++ {
 x[ix] *= alpha
 ix += incX
 }
}

// ScalIncTo is
// var idst, ix uintptr
// for i := 0; i < int(n); i++ {
// dst[idst] = alpha * x[ix]
// ix += incX
// idst += incDst
// }
func ScalIncTo(dst []float32, incDst uintptr, alpha float32, x []float32, n, incX
uintptr) {
 var idst, ix uintptr
 for i := 0; i < int(n); i++ {
 dst[idst] = alpha * x[ix]
 ix += incX
 idst += incDst
 }
}
graph{{ {noc}noc}noc}
graph{{{ {die}die}die}}
[{
 "data": {
 "id": "n01",
 "type": "bezier"
 }
}, {
 "data": {
 "id": "n02"

```



```

 }
 }, {
 "data": {
 "id": "e01",
 "source": "n01",
 "target": "n02"
 },
 "classes": "bezier"
 }, {
 "data": {
 "id": "e02",
 "source": "n01",
 "target": "n02"
 },
 "classes": "bezier"
 }, {
 "data": {
 "id": "e03",
 "source": "n02",
 "target": "n01"
 },
 "classes": "bezier"
 }, {
 "data": {
 "id": "n03",
 "type": "unbundled-bezier"
 }
 }, {
 "data": {
 "id": "n04"
 }
 }, {
 "data": {
 "id": "e04",
 "source": "n03",
 "target": "n04"
 },
 "classes": "unbundled-bezier"
 }, {
 "data": {
 "id": "n05",
 "type": "unbundled-bezier(multiple)"
 }
 }, {
 "data": {
 "id": "n06"
 }
 }, {

```

```

"data": {
 "id": "e05",
 "source": "n05",
 "target": "n06"
},
"classes": "multi-unbundled-bezier"
}, {
"data": {
 "id": "n07",
 "type": "haystack"
}
}, {
"data": {
 "id": "n08"
}
}, {
"data": {
 "id": "e06",
 "source": "n08",
 "target": "n07"
},
"classes": "haystack"
}, {
"data": {
 "id": "e07",
 "source": "n08",
 "target": "n07"
},
"classes": "haystack"
}, {
"data": {
 "id": "e08",
 "source": "n08",
 "target": "n07"
},
"classes": "haystack"
}, {
"data": {
 "id": "e09",
 "source": "n08",
 "target": "n07"
},
"classes": "haystack"
}, {
"data": {
 "id": "n09",
 "type": "segments"
}

```

```

}, {
 "data": {
 "id": "n10"
 }
}, {
 "data": {
 "id": "e10",
 "source": "n09",
 "target": "n10"
 },
 "classes": "segments"
}]
graph{STRh}
graph{GRA{GRA}GRA}
graph{edg_{edg_{edg_{edg_}}edg_{edg_{edg_}}edg_}}
graph{{{subGG{subGG}{subGG<>subGG}{subGT}subGG}}subGG}
graph{{{DiD{DiD}}}}
graph{{{Gr4}}Gr8}
graph{e}
Graph[Edge[]{{Edge[]{{Edge[]Edge[]Edge[]}{Edge[]Edge[]Edge[]Edge[]}}}}
 DOUBLE PRECISION FUNCTION MYATAN(A)
 DOUBLE PRECISION A
 MYATAN = DATAN(A)
 RETURN
 END
// Copyright 2018 The Gonum Authors. All rights reserved.
// Use of this source code is governed by a BSD-style
// license that can be found in the LICENSE file.

package iterator_test

import (
 "reflect"
 "testing"

 "gonum.org/v1/gonum/graph"
 "gonum.org/v1/gonum/graph/iterator"
 "gonum.org/v1/gonum/graph/simple"
)

var orderedNodesTests = []struct {
 nodes []graph.Node
}{
 {nodes: nil},
 {nodes: []graph.Node{simple.Node(1)}},
 {nodes: []graph.Node{simple.Node(1), simple.Node(2), simple.Node(3), simple.Node(5)}},
 {nodes: []graph.Node{simple.Node(5), simple.Node(3), simple.Node(2), simple.Node(1)}},
}

```

```

func TestOrderedNodesIterate(t *testing.T) {
 for _, test := range orderedNodesTests {
 it := iterator.NewOrderedNodes(test.nodes)
 for i := 0; i < 2; i++ {
 if it.Len() != len(test.nodes) {
 t.Errorf("unexpected iterator length for round %d: got:%d want:%d", i, it.Len(), len(test.nodes))
 }
 var got []graph.Node
 for it.Next() {
 got = append(got, it.Node())
 }
 want
 := test.nodes
 if !reflect.DeepEqual(got, want) {
 t.Errorf("unexpected iterator output for round %d: got:%#v want:%#v", i, got, want)
 }
 it.Reset()
 }
 }
}

```

```

func TestOrderedNodesSlice(t *testing.T) {
 for _, test := range orderedNodesTests {
 it := iterator.NewOrderedNodes(test.nodes)
 for i := 0; i < 2; i++ {
 got := it.NodeSlice()
 want := test.nodes
 if !reflect.DeepEqual(got, want) {
 t.Errorf("unexpected iterator output for round %d: got:%#v want:%#v", i, got, want)
 }
 it.Reset()
 }
 }
}

```

```

var implicitNodesTests = []struct {
 beg, end int
 new func(int) graph.Node
 want []graph.Node
}{
 {
 beg: 1, end: 1,
 want: nil,
 },
 {
 beg: 1, end: 2,
 new: newSimpleNode,
 },
}

```

```

want: []graph.Node{simple.Node(1)},
},
{
 beg: 1, end: 5,
 new: newSimpleNode,
 want: []graph.Node{simple.Node(1), simple.Node(2), simple.Node(3), simple.Node(4)},
},
}

```

```

func newSimpleNode(id int) graph.Node { return simple.Node(id) }

```

```

func TestImplicitNodesIterate(t *testing.T)
{
 for _, test := range implicitNodesTests {
 it := iterator.NewImplicitNodes(test.beg, test.end, test.new)
 for i := 0; i < 2; i++ {
 if it.Len() != len(test.want) {
 t.Errorf("unexpected iterator length for round %d: got:%d want:%d", i, it.Len(), len(test.want))
 }
 var got []graph.Node
 for it.Next() {
 got = append(got, it.Node())
 }
 if !reflect.DeepEqual(got, test.want) {
 t.Errorf("unexpected iterator output for round %d: got:%#v want:%#v", i, got, test.want)
 }
 it.Reset()
 }
 }
}

```

```

var nodesTests = []struct {
 nodes map[int64]graph.Node
}{
 {nodes: nil},
 {nodes: make(map[int64]graph.Node)},
 {nodes: map[int64]graph.Node{1: simple.Node(1)}},
 {nodes: map[int64]graph.Node{1: simple.Node(1), 2: simple.Node(2), 3: simple.Node(3), 5: simple.Node(5)}},
 {nodes: map[int64]graph.Node{5: simple.Node(5), 3: simple.Node(3), 2: simple.Node(2), 1: simple.Node(1)}},
}

```

```

func TestNodesIterate(t *testing.T) {
 for _, test := range nodesTests {
 it := iterator.NewNodes(test.nodes)
 for
 i := 0; i < 2; i++ {
 if it.Len() != len(test.nodes) {
 t.Errorf("unexpected iterator length for round %d: got:%d want:%d", i, it.Len(), len(test.nodes))
 }
 }
 }
}

```

```

 }
 var got map[int64]graph.Node
 if test.nodes != nil {
 got = make(map[int64]graph.Node)
 }
 for it.Next() {
 n := it.Node()
 got[n.ID()] = n
 if len(got)+it.Len() != len(test.nodes) {
 t.Errorf("unexpected iterator length during iteration for round %d: got:%d want:%d", i, it.Len(), len(test.nodes))
 }
 }
 want := test.nodes
 if !reflect.DeepEqual(got, want) {
 t.Errorf("unexpected iterator output for round %d: got:%#v want:%#v", i, got, want)
 }
 func() {
 defer func() {
 r := recover()
 if r != nil {
 t.Errorf("unexpected panic: %v", r)
 }
 }()
 it.Next()
 }()
 it.Reset()
}
}
graph{{Gr}}
graph{EDA{EDA{EDA}EDA}}
graph{{{digr}{digr{{{digr}{digr}digr{digr}{digr}digr}}digr}}}}
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package mat_test

import (
 "fmt"

 "gonum.org/v1/gonum/mat"
)

func ExampleCol() {
 // This example copies the second column of a matrix into col, allocating a new slice of float64.
 m := mat.NewDense(3, 3, []float64{
 2.0, 9.0, 3.0,
 })
}

```

```

4.5, 6.7, 8.0,
1.2, 3.0, 6.0,
})

```

```

col := mat.Col(nil, 1, m)

```

```

fmt.Printf("col = %#v", col)

```

```

// Output:

```

```

//

```

```

// col = []float64{9, 6.7, 3}

```

```

}

```

```

func ExampleRow() {

```

```

// This example copies the third row of a matrix into row, allocating a new slice of float64.

```

```

m := mat.NewDense(3, 3, []float64{

```

```

2.0, 9.0, 3.0,

```

```

4.5, 6.7, 8.0,

```

```

1.2, 3.0, 6.0,

```

```

})

```

```

row := mat.Row(nil, 2, m)

```

```

fmt.Printf("row = %#v", row)

```

```

// Output:

```

```

//

```

```

// row = []float64{1.2, 3, 6}

```

```

}

```

```

graph{{No{No}No{No}{No}{No}}}

```

```

// Code generated by "go generate gonum.org/v1/gonum/unit; DO NOT EDIT.

```

```

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```

```

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```

```

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```

```

package unit

```

```

import (

```

```

 "fmt"

```

```

 "testing"

```

```

)

```

```

func TestTemperatureFormat(t *testing.T) {

```

```

 for _, test := range []struct {

```

```

 value Temperature

```

```

 format string

```

```

 want string

```

```

 }{

```

```

 {1.23456789, "%v", "1.23456789 K"},

```

```

{1.23456789, "%.1v", "1 K"},
{1.23456789, "%20.1v", "1 K"},
{1.23456789, "%20v", "1.23456789 K"},
{1.23456789, "%1v", "1.23456789 K"},
{1.23456789, "%#v", "unit.Temperature(1.23456789)"},
{1.23456789, "%s", "%!s(unit.Temperature=1.23456789 K)"},
} {
got := fmt.Sprintf(test.format, test.value)
if got != test.want {
t.Errorf("Format %q %v: got: %q want: %q", test.format, float64(test.value), got, test.want)
}
}
}
graph{DIGRR{DIGRC{DIGRB}DIGRB}}
graph{{digra}}
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// Package dualcmplx provides the anti-commutative dual complex numeric
// type and functions.
//
// See https://arxiv.org/abs/1601.01754v1 for details.
package dualcmplx // imports "gonum.org/v1/gonum/num/dualcmplx"

// TODO(kortschak): Handle special cases properly.
// - Pow
graph{NOA{NOA{NOA}NOA}}
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package kdtree

import "math"

var (
_ Interface = Points(nil)
_ Comparable = Point(nil)
)

// Point represents a point in a k-d space that satisfies the Comparable interface.
type Point []float64

// Compare returns the signed distance of p from the plane passing through c and
// perpendicular to the dimension d. The concrete type of c must be Point.
func (p Point) Compare(c Comparable, d Dim) float64 { q := c.(Point); return p[d] - q[d] }

```



```

// Dims returns the number of dimensions described by the receiver.
func (p Point) Dims() int { return len(p) }

// Distance returns the squared Euclidean distance between c and the receiver. The
// concrete type of c must be Point.
func (p Point) Distance(c Comparable) float64 {
 q := c.(Point)
 var sum float64
 for dim, c := range p {
 d := c - q[dim]
 sum += d * d
 }
 return sum
}

//
// Extend returns a bounding box that has been extended to include the receiver.
func (p Point) Extend(b *Bounding) *Bounding {
 if b == nil {
 b = &Bounding{append(Point(nil), p...), append(Point(nil), p...)}
 }
 min := b.Min.(Point)
 max := b.Max.(Point)
 for d, v := range p {
 min[d] = math.Min(min[d], v)
 max[d] = math.Max(max[d], v)
 }
 *b = Bounding{Min: min, Max: max}
 return b
}

// Points is a collection of point values that satisfies the Interface.
type Points []Point

func (p Points) Bounds() *Bounding {
 if p.Len() == 0 {
 return nil
 }
 min := append(Point(nil), p[0]...)
 max := append(Point(nil), p[0]...)
 for _, e := range p[1:] {
 for d, v := range e {
 min[d] = math.Min(min[d], v)
 max[d] = math.Max(max[d], v)
 }
 }
 return &Bounding{Min: min, Max: max}
}

```

```
func (p Points) Index(i int) Comparable { return p[i] }
func (p Points) Len() int { return len(p) }
func (p Points) Pivot(d Dim) int { return Plane{Points: p, Dim: d}.Pivot() }
func (p Points) Slice(start, end int) Interface { return p[start:end] }

// Plane is a wrapping type that allows a Points type be pivoted on a dimension.
// The Pivot method of Plane uses MedianOfRandoms sampling at most 100 elements
// to find a pivot element.
type Plane struct {
 Dim
 Points
}

// randomnesses is the maximum number of random values to sample for calculation of
// median of random elements.
const randomnesses = 100

func (p Plane) Less(i, j int) bool { return p.Points[i][p.Dim] < p.Points[j][p.Dim] }
func (p Plane) Pivot() int { return Partition(p, MedianOfRandoms(p, randomnesses)) }
func (p Plane) Slice(start, end int) SortSlicer { p.Points = p.Points[start:end]; return p }
func (p Plane) Swap(i, j int) { p.Points[i], p.Points[j] = p.Points[j], p.Points[i] }
graph{"Z\Z""Z"}
graph{{SubGrap}SubGrap}
graph{SUBGRAA}
graph{{d}gu{diGrH}}
graph{Digra}
graph{SU_{SU_}{SU_}{SU_{SU_{SU_}{SU_}{SU_{SU_}}}
/**/graph""{e[e=""l=""e=""h=""t=""r=""][r=""]**/"--""--""--""--""--""--""--""--""--""--""--""--""--"/**/"--
""[n=5]"--""[n=5]"--""[n=5]"--""[n=5]"--""[n=5]"--""[n=5]"--""[n=5]}
graph{diGrS{{{diGrS{{{diGrS}}}diGrS}}}diGrS}}}
graph{GR{GR{{{GR}}}}}
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package mathext

import (
 "math"
)

// Digamma returns the logarithmic derivative of the gamma function at x.
// (x) = d/dx (Ln ((x))).
func Digamma(x float64) float64 {
 // This is adapted from
 // http://web.science.mq.edu.au/~mjohnson/code/digamma.c
 var result float64
```

```

switch {
case math.IsNaN(x), math.IsInf(x, 1):
 return x
case math.IsInf(x, -1):
 return math.NaN()
case x == 0:
 return math.Copysign(math.Inf(1), -x)
case x < 0:
 if x == math.Floor(x) {
 return math.NaN()
 }
 // Reflection formula, http://dlmf.nist.gov/5.5#E4
 _, r := math.Modf(x)
 result = -math.Pi / math.Tan(math.Pi*r)
 x = 1 - x
}
for ; x < 7; x++ {
 // Recurrence relation, http://dlmf.nist.gov/5.5#E2
 result -= 1 / x
}
x -= 0.5
xx := 1 / x
xx2 := xx * xx
xx4 := xx2 * xx2
// Asymptotic expansion, http://dlmf.nist.gov/5.11#E2
result
+= math.Log(x) + (1.0/24.0)*xx2 - (7.0/960.0)*xx4 + (31.0/8064.0)*xx4*xx2 - (127.0/30720.0)*xx4*xx4
return result
}
/** github.com/andreasbriese/bbloom@v0.0.0-20190825152654-46b345b51c96 **/

```

```
{{Types "CC0-1.0"}}
```

Written in \_\_1\_\_ by \_\_3\_\_

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```
graph{{{graph_}{graph_}{graph_{{graph_{{graph_}{graph_}}}}graph_}}graph_}
```

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```
package gen
```

```
import "gonum.org/v1/gonum/graph"
```

```

// GraphBuilder is a graph that can have nodes and edges added.
type GraphBuilder interface {
 HasEdgeBetween(xid, yid int64) bool
 graph.Builder
}

func abs(a int) int {
 if a < 0 {
 return -a
 }
 return a
}

Graph{{subgra_}{subgra_{{subgra_}{{subgra_}{subgra_}}}subgra_}}
C preprocessing directives act as comments.
/* block comment */
// keywords are case-insensitive.
graph {
 node []
 Node []
 NODE []
 edge []
 Edge []
 EDGE []
 subgraph {}
 subGraph {}
 Subgraph {}
 SubGraph {}
 SUBGRAPH S {}
 A; B [style=filled, fillcolor=red]
 C:nw -- D:se
 "foo"
 .10
 -20
 3.14
 F [label=<<div>foo</div>>]
 H [label=<<div></div>>]
 _foo
 a10
}
Graph {
}
GRAPH {
}
digraph {
}
Digraph {
}
diGraph {
}

```

```

}
DiGraph {
}
DIGRAPH {
}
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package testlapack

import (
 "log"
 "testing"

 "golang.org/x/exp/rand"

 "gonum.org/v1/gonum/blas"
 "gonum.org/v1/gonum/blas/blas64"
 "gonum.org/v1/gonum/floats"
 "gonum.org/v1/gonum/lapack"
)

type Dpoconer interface {
 Dpotrf
 Dgecon
 Dlansy(norm lapack.MatrixNorm, uplo blas.Uplo, n int, a []float64, lda int, work []float64) float64
 Dpocon(uplo blas.Uplo, n int, a []float64, lda int, anorm float64, work []float64, iwork []int) float64
}

func DpoconTest(t *testing.T, impl Dpoconer) {
 for _, test := range []struct {
 a []float64
 n int
 cond float64
 uplo blas.Uplo
 }{
 {
 a: []float64{
 89, 59, 77,
 0, 107, 59,
 0, 0, 89,
 },
 uplo: blas.Upper,
 n: 3,
 cond: 0.050052137643379,
 },
 }

```

```

a: []float64{
 89, 0, 0,
 59, 107, 0,
 77, 59, 89,
},
uplo: blas.Lower,
n: 3,
cond:
0.050052137643379,
},
// Dgecon does not match Dpocon for this case. https://github.com/xianyi/OpenBLAS/issues/664.
{
a: []float64{
 2.9995576045549965, -2.0898894566158663, 3.965560740124006,
 0, 1.9634729526261008, -2.8681002706874104,
 0, 0, 5.502416670471008,
},
uplo: blas.Upper,
n: 3,
cond: 0.024054837369015203,
},
} {
n := test.n
a := make([]float64, len(test.a))
copy(a, test.a)
lda := n
uplo := test.uplo
work := make([]float64, 3*n)
anorm := impl.Dlansy(lapack.MaxColumnSum, uplo, n, a, lda, work)
// Compute cholesky decomposition
ok := impl.Dpotrf(uplo, n, a, lda)
if !ok {
 t.Errorf("Bad test, matrix not positive definite")
 continue
}
iwork := make([]int, n)
cond := impl.Dpocon(uplo, n, a, lda, anorm, work, iwork)
// Error if not the same order, otherwise log the difference.
if !floats.EqualWithinAbsOrRel(cond, test.cond, 1e0, 1e0) {
 t.Errorf("Cond mismatch. Want %v, got %v.", test.cond, cond)
}
else if !floats.EqualWithinAbsOrRel(cond, test.cond, 1e-14, 1e-14) {
 log.Printf("Dpocon cond mismatch. Want %v, got %v.", test.cond, cond)
}
}
rnd := rand.New(rand.NewSource(1))
bi := blas64.Implementation()
// Randomized tests compared against Dgecon.

```

```

for _, uplo := range []blas.Uplo{blas.Lower, blas.Upper} {
 for _, test := range []struct {
 n, lda int
 }{
 {3, 0},
 {3, 5},
 } {
 for trial := 0; trial < 100; trial++ {
 n := test.n
 lda := test.lda
 if lda == 0 {
 lda = n
 }
 a := make([]float64, n*lda)
 for i := range a {
 a[i] = rnd.NormFloat64()
 }

 // Multiply a by itself to make it symmetric positive definite.
 aCopy := make([]float64, len(a))
 copy(aCopy, a)
 bi.Dgemm(blas.Trans, blas.NoTrans, n, n, n, 1, aCopy, lda, aCopy, lda, 0, a, lda)

 aDat := make([]float64, len(aCopy))
 copy(aDat, a)

 aDense := make([]float64, len(a))
 if uplo == blas.Upper {
 for i := 0; i < n; i++ {
 for j := i; j <
n; j++ {
 v := a[i*lda+j]
 aDense[i*lda+j] = v
 aDense[j*lda+i] = v
 }
 }
 } else {
 for i := 0; i < n; i++ {
 for j := 0; j <= i; j++ {
 v := a[i*lda+j]
 aDense[i*lda+j] = v
 aDense[j*lda+i] = v
 }
 }
 }
 work := make([]float64, 4*n)
 iwork := make([]int, n)

```

```

anorm := impl.Dlansy(lapack.MaxColumnSum, uplo, n, a, lda, work)
ok := impl.Dpotrf(uplo, n, a, lda)
if !ok {
 t.Errorf("Bad test, matrix not positive definite")
 continue
}
got := impl.Dpocon(uplo, n, a, lda, anorm, work, iwork)

denseNorm := impl.Dlange(lapack.MaxColumnSum, n, n, aDense, lda, work)
ipiv := make([]int, n)
impl.Dgetrf(n, n, aDense, lda, ipiv)
want := impl.Dgecon(lapack.MaxColumnSum, n, aDense, lda, denseNorm, work, iwork)
// Error if not the same order, otherwise log the difference.
if !floats.EqualWithinAbsOrRel(want, got, 1e0, 1e0) {
 t.Errorf("Dpocon and Dgecon mismatch. Dpocon %v,
Dgecon %v.", got, want)
} else if !floats.EqualWithinAbsOrRel(want, got, 1e-14, 1e-14) {
 log.Printf("Dpocon and Dgecon mismatch. Dpocon %v, Dgecon %v.", got, want)
}
}
}
}
}
}
graph{STRICm{STRICm{STRICu}}}
graph{STRICS{{STRICS}{STRICS{{STRICS{{STRICI}STRICI}{STRICS{{STRICS{STRICI}}}}}}}}}
graph{{str}}
graph{STRICS{{STRICS{{STRICS{STRICI}}}}}
graph{G:c J:c J:c J:c J:c J:c}
graph {nob}
graph{SR{}}SS}
graph{{SubGrar}{SubGrat}{SubGrat}{SubGrat}SubGrat}
graph{"\"\""}
graph{{stria}}
 SUBROUTINE ZRATI(ZR, ZI, FNU, N, CYR, CYI, TOL)
C***BEGIN PROLOGUE ZRATI
C***REFER TO ZBESI,ZBESK,ZBESH
C
C ZRATI COMPUTES RATIOS OF I BESSEL FUNCTIONS BY BACKWARD
C RECURRENCE. THE STARTING INDEX IS DETERMINED BY FORWARD
C RECURRENCE AS DESCRIBED IN J. RES. OF NAT. BUR. OF STANDARDS-B,
C MATHEMATICAL SCIENCES, VOL 77B, P111-114, SEPTEMBER, 1973,
C BESSEL FUNCTIONS I AND J OF COMPLEX ARGUMENT AND INTEGER ORDER,
C BY D. J. SOOKNE.
C
C***ROUTINES CALLED ZABS,ZDIV
C***END PROLOGUE ZRATI
C COMPLEX Z,CY(1),CONE,CZERO,P1,P2,T1,RZ,PT,CDFNU
 DOUBLE PRECISION AK, AMAGZ, AP1, AP2, ARG, AZ, CDFNUI, CDFNUR,

```



```

* CONEI, CONER, CYI, CYR, CZEROI, CZEROR, DFNU, FDNU, FLAM, FNU,
* FNUP, PTI, PTR, P1I, P1R, P2I, P2R, RAK, RAP1, RHO, RT2, RZI,
* RZR, TEST, TEST1, TOL, TTI, TTR, T1I, T1R, ZI, ZR, ZABS
INTEGER I, ID, IDNU, INU, ITIME, K, KK, MAGZ, N
DIMENSION CYR(N), CYI(N)
DATA CZEROR,CZEROI,CONER,CONEI,RT2/
1 0.0D0, 0.0D0, 1.0D0,
0.0D0, 1.41421356237309505D0 /
 AZ = ZABS(CMPLX(ZR,ZI,kind=KIND(1.0D0)))
 INU = INT(SNGL(FNU))
 IDNU = INU + N - 1
 MAGZ = INT(SNGL(AZ))
 AMAGZ = DBLE(FLOAT(MAGZ+1))
 FDNU = DBLE(FLOAT(IDNU))
 FNUP = DMAX1(AMAGZ,FDNU)
 ID = IDNU - MAGZ - 1
 ITIME = 1
 K = 1
 PTR = 1.0D0/AZ
 RZR = PTR*(ZR+ZR)*PTR
 RZI = -PTR*(ZI+ZI)*PTR
 T1R = RZR*FNUP
 T1I = RZI*FNUP
 P2R = -T1R
 P2I = -T1I
 P1R = CONER
 P1I = CONEI
 T1R = T1R + RZR
 T1I = T1I + RZI
 IF (ID.GT.0) ID = 0
 AP2 = ZABS(CMPLX(P2R,P2I,kind=KIND(1.0D0)))
 AP1 = ZABS(CMPLX(P1R,P1I,kind=KIND(1.0D0)))
C-----
C THE OVERFLOW TEST ON K(FNU+I-1,Z) BEFORE THE CALL TO CBKNU
C GUARANTEES THAT P2 IS ON SCALE. SCALE TEST1 AND ALL SUBSEQUENT
C P2 VALUES BY AP1 TO ENSURE THAT AN OVERFLOW DOES NOT OCCUR
C PREMATURELY.
C-----
 ARG = (AP2+AP2)/(AP1*TOL)
 TEST1 = DSQRT(ARG)
 TEST = TEST1
 RAP1 = 1.0D0/AP1
 P1R = P1R*RAP1
 P1I = P1I*RAP1
 P2R = P2R*RAP1
 P2I = P2I*RAP1
 AP2 = AP2*RAP1
10 CONTINUE

```

```

K = K + 1
AP1 = AP2
PTR = P2R
PTI = P2I
P2R = P1R - (T1R*PTR-T1I*PTI)
P2I = P1I - (T1R*PTI+T1I*PTR)
P1R = PTR
P1I = PTI
T1R = T1R + RZR
T1I = T1I + RZI
AP2 = ZABS(CMPLX(P2R,P2I,kind=KIND(1.0D0)))
IF (AP1.LE.TEST) GO TO 10
IF (ITIME.EQ.2) GO TO 20
AK = ZABS(CMPLX(T1R,T1I,kind=KIND(1.0D0)))*0.5D0)
FLAM = AK + DSQRT(AK*AK-1.0D0)
RHO = DMIN1(AP2/AP1,FLAM)
TEST = TEST1*DSQRT(RHO/(RHO*RHO-1.0D0))
ITIME = 2
GO TO 10
20 CONTINUE
KK = K + 1 - ID
AK = DBLE(FLOAT(KK))
T1R = AK
T1I = CZEROI
DFNU = FNU + DBLE(FLOAT(N-1))
P1R = 1.0D0/AP2
P1I = CZEROI
P2R = CZEROR
P2I = CZEROI
DO
30 I=1,KK
 PTR = P1R
 PTI = P1I
 RAP1 = DFNU + T1R
 TTR = RZR*RAP1
 TTI = RZI*RAP1
 P1R = (PTR*TTR-PTI*TTI) + P2R
 P1I = (PTR*TTI+PTI*TTR) + P2I
 P2R = PTR
 P2I = PTI
 T1R = T1R - CONER
30 CONTINUE
 IF (P1R.NE.CZEROR .OR. P1I.NE.CZEROI) GO TO 40
 P1R = TOL
 P1I = TOL
40 CONTINUE
 CALL ZDIV(P2R, P2I, P1R, P1I, CYR(N), CYI(N))
 IF (N.EQ.1) RETURN

```



```

}{
{
 alpha: 1,
},
{
 alpha: 3,
 x: []complex128{
 0 - 3i,
 6 + 10i,
 -2 - 7i,
 },
 a: []complex128{
 -2 + 3i, -3 - 11i, 0 + 4i,
 -3 + 11i, -6 + 3i, 7 + 2i,
 0 - 4i, 7 - 2i, 18 + 3i,
 },
 want: []complex128{
 25 + 0i, -93 - 65i, 63 + 22i,
 -93 + 65i, 402 + 0i, -239 + 68i,
 63 - 22i, -239 - 68i, 177 + 0i},
 wantRev: []complex128{
 157 + 0i, -249 - 77i, 63 - 14i,
 -249 + 77i, 402 + 0i, -83 + 56i,
 63 + 14i, -83 - 56i, 45 + 0i,
 },
},
{
 alpha: 3,
 x: []complex128{
 -6 + 2i,
 -2 - 4i,
 0 + 0i,
 0 + 7i,
 },
 a: []complex128{
 2 + 3i, -9 + 7i, 3 + 11i,
 10 - 1i,
 -9 - 7i, 16 + 3i, -5 + 2i, -7 - 5i,
 3 - 11i, -5 - 2i, 14 + 3i, 2 - 1i,
 10 + 1i, -7 + 5i, 2 + 1i, 18 + 3i,
 },
 want: []complex128{
 122 + 0i, 3 - 77i, 3 + 11i, 52 + 125i,
 3 + 77i, 76 + 0i, -5 + 2i, -91 + 37i,
 3 - 11i, -5 - 2i, 14 + 0i, 2 - 1i,
 52 - 125i, -91 - 37i, 2 + 1i, 165 + 0i,
 },
 wantRev: []complex128{

```

```

149 + 0i, -9 + 7i, -81 - 31i, 52 - 127i,
-9 - 7i, 16 + 0i, -5 + 2i, -7 - 5i,
-81 + 31i, -5 - 2i, 74 + 0i, 14 + 83i,
52 + 127i, -7 + 5i, 14 - 83i, 138 + 0i,
},
},
{
alpha: 0,
x: []complex128{
-6 + 2i,
-2 - 4i,
0 + 0i,
0 + 7i,
},
a: []complex128{
2 + 0i, -9 + 7i, 3 + 11i, 10 - 1i,
-9 - 7i, 16 + 0i, -5 + 2i, -7 - 5i,
3 - 11i, -5 - 2i, 14 + 0i, 2 - 1i,
10 + 1i, -7 + 5i, 2 + 1i, 18 + 0i,
},
want: []complex128{
2 + 0i, -9 + 7i, 3 + 11i, 10 - 1i,
-9 - 7i, 16 + 0i, -5 + 2i, -7 - 5i,
3 - 11i, -5 - 2i, 14 + 0i, 2 - 1i,
10 + 1i, -7 + 5i, 2 + 1i, 18 + 0i,
},
wantRev: []complex128{
2 + 0i,
-9 + 7i, 3 + 11i, 10 - 1i,
-9 - 7i, 16 + 0i, -5 + 2i, -7 - 5i,
3 - 11i, -5 - 2i, 14 + 0i, 2 - 1i,
10 + 1i, -7 + 5i, 2 + 1i, 18 + 0i,
},
},
}

type Zherer interface {
Zher(uplo blas.Uplo, n int, alpha float64, x []complex128, incX int, a []complex128, lda int)
}

func ZherTest(t *testing.T, impl Zherer) {
for tc, test := range zherTestCases {
n := len(test.x)
for _, uplo := range []blas.Uplo{blas.Lower, blas.Upper} {
for _, incX := range []int{-11, -2, -1, 1, 2, 7} {
for _, lda := range []int{max(1, n), n + 11} {
x := makeZVector(test.x, incX)
xCopy := make([]complex128, len(x))

```

```

copy(xCopy, x)

a := makeZGeneral(test.a, n, n, lda)

var want []complex128
if incX > 0 {
 want = makeZGeneral(test.want, n, n, lda)
} else {
 want = makeZGeneral(test.wantRev, n, n, lda)
}

if uplo == blas.Upper {
 for i := 0; i < n; i++ {
 for j := 0; j < i; j++ {
 a[i*lda+j] = znan
 want[i*lda+j] = znan
 }
 }
} else {
 for i := 0; i < n; i++ {
 for j := i + 1; j < n; j++ {
 a[i*lda+j] = znan
 want[i*lda+j] = znan
 }
 }
}

impl.Zher(uplo, n, test.alpha, x, incX, a, lda)

if !zsame(x, xCopy) {
 t.Errorf("Case %v (uplo=%v,incX=%v,lda=%v,alpha=%v): unexpected modification of x", tc, uplo, incX, test.alpha,
lda)
}
if !zsame(want, a) {
 t.Errorf("Case %v (uplo=%v,incX=%v,lda=%v,alpha=%v): unexpected result\nwant: %v\ngot: %v", tc, uplo, incX,
lda, test.alpha, want, a)
}
}
}
}
}
}
}
}
}
graph{{diGrapg}}{{diGrapg}}{{diGrapd}}{{diGrapg}}{{diGrapg}}{{diGrapd}}
graph{st{st}{st}st}
graph{{G{G}G}G{G{G{G}G}G{G}G}G{G{G{Gw}G}G}G}
graph{{NO_}NO_}

```

```

graph{{{S}}}}
graph{{{digr4}digr7{digr}digr7{digr4}}digr2}
digraph{A->B C}
// Copyright 2015 The Gonum Authors. All rights reserved.
// Use of this source code is governed by a BSD-style
// license that can be found in the LICENSE file.

```

```

package testlapack

```

```

import (
 "testing"

```

```

 "golang.org/x/exp/rand"

```

```

 "gonum.org/v1/gonum/blas"

```

```

 "gonum.org/v1/gonum/blas/blas64"

```

```

)

```

```

type Dgerq2er interface {

```

```

 Dgerq2(m, n int, a []float64, lda int, tau []float64, work []float64)

```

```

}

```

```

func Dgerq2Test(t *testing.T, impl Dgerq2er) {

```

```

 rnd := rand.New(rand.NewSource(1))

```

```

 for c, test := range []struct {

```

```

 m, n, lda int

```

```

 }{

```

```

 {1, 1, 0},

```

```

 {2, 2, 0},

```

```

 {3, 2, 0},

```

```

 {2, 3, 0},

```

```

 {1, 12, 0},

```

```

 {2, 6, 0},

```

```

 {3, 4, 0},

```

```

 {4, 3, 0},

```

```

 {6, 2, 0},

```

```

 {12, 1, 0},

```

```

 {1, 1, 20},

```

```

 {2, 2, 20},

```

```

 {3, 2, 20},

```

```

 {2, 3, 20},

```

```

 {1, 12, 20},

```

```

 {2, 6, 20},

```

```

 {3, 4, 20},

```

```

 {4, 3, 20},

```

```

 {6, 2, 20},

```

```

 {12, 1, 20},

```

```

 } {

```

```

n := test.n
m := test.m
lda := test.lda
if lda == 0 {
 lda = test.n
}
a := make([]float64, m*lda)
for i := range a {
 a[i] = rnd.Float64()
}
aCopy := make([]float64, len(a))
k
:= min(m, n)
tau := make([]float64, k)
for i := range tau {
 tau[i] = rnd.Float64()
}
work := make([]float64, m)
for i := range work {
 work[i] = rnd.Float64()
}
copy(aCopy, a)
impl.Dgerq2(m, n, a, lda, tau, work)

// Test that the RQ factorization has completed successfully. Compute
// Q based on the vectors.
q := constructQ("RQ", m, n, a, lda, tau)

// Check that Q is orthogonal.
if !isOrthogonal(q) {
 t.Errorf("Case %v, Q not orthogonal", c)
}
// Check that A = R * Q
r := blas64.General{
 Rows: m,
 Cols: n,
 Stride: n,
 Data: make([]float64, m*n),
}
for i := 0; i < m; i++ {
 off := m - n
 for j := max(0, i-off); j < n; j++ {
 r.Data[i*r.Stride+j] = a[i*lda+j]
 }
}

got := blas64.General{
 Rows: m,

```



```

Cols: n,
Stride: lda,
Data: make([]float64, m*lda),
}
blas64.Gemm(blas.NoTrans, blas.NoTrans, 1, r, q, 0, got)
want := blas64.General{
Rows: m,
Cols: n,
Stride: lda,
Data:
aCopy,
}
if !equalApproxGeneral(got, want, 1e-14) {
t.Errorf("Case %d, R*Q != a\ngot: %+v\nwant: %+v", c, got, want)
}
}
}
graph{{DIGRAe}}
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// license that can be found in the LICENSE file.

package gen

import (
"testing"

"gonum.org/v1/gonum/graph/simple"
)

var smallWorldDimensionParameters = [][]int{
{50},
{10, 10},
{6, 5, 4},
}

func TestNavigableSmallWorldUndirected(t *testing.T) {
for p := 1; p < 5; p++ {
for q := 0; q < 10; q++ {
for r := 0.5; r < 10; r++ {
for _, dims := range smallWorldDimensionParameters {
g := &gnUndirected{UndirectedBuilder: simple.NewUndirectedGraph()}
orig := g.NewNode()
g.AddNode(orig)
err := NavigableSmallWorld(g, dims, p, q, r, nil)
n := 1
for _, d := range dims {
n *= d

```

```

 }
 if err != nil {
 t.Fatalf("unexpected error: dims=%v n=%d, p=%d, q=%d, r=%v: %v", dims, n, p, q, r, err)
 }
 if g.From(orig.ID()).Len() != 0 {
 t.Errorf("edge added from already existing node: dims=%v n=%d, p=%d, q=%d, r=%v", dims, n,
p, q, r)
 }
 if g.addBackwards {
 t.Errorf("edge added with From.ID > To.ID: dims=%v n=%d, p=%d, q=%d, r=%v", dims, n, p, q, r)
 }
 if g.addSelfLoop {
 t.Errorf("unexpected self edge: dims=%v n=%d, p=%d, q=%d, r=%v", dims, n, p, q, r)
 }
 if g.addMultipleEdge {
 t.Errorf("unexpected multiple edge: dims=%v n=%d, p=%d, q=%d, r=%v", dims, n, p, q, r)
 }
 }
 }
 }
 }
 }
}

```

```

func TestNavigableSmallWorldDirected(t *testing.T) {
 for p := 1; p < 5; p++ {
 for q := 0; q < 10; q++ {
 for r := 0.5; r < 10; r++ {
 for _, dims := range smallWorldDimensionParameters {
 g := &gnDirected{DirectedBuilder: simple.NewDirectedGraph()}
 err := NavigableSmallWorld(g, dims, p, q, r, nil)
 n := 1
 for _, d := range dims {
 n *= d
 }
 if err != nil {
 t.Fatalf("unexpected error: dims=%v n=%d, p=%d, q=%d, r=%v: %v", dims, n, p, q, r, err)
 }
 if g.addSelfLoop {
 t.Errorf("unexpected self edge: dims=%v n=%d, p=%d,
q=%d, r=%v", dims, n, p, q, r)
 }
 if g.addMultipleEdge {
 t.Errorf("unexpected multiple edge: dims=%v n=%d, p=%d, q=%d, r=%v", dims, n, p, q, r)
 }
 }
 }
 }
 }
}

```

```

}
graph{GR{GR{{GR{GR{{GR}GR}}{{GR}GR{GR{{GR}GR}}}}}}
graph{No0{No0}No0{No0}}
graph{/****/}
graph{{{subGra[]subGra{{subGra{}}{subGra{}}}}subGra{{subGra{}}{{subGra{}}subGra{subGra{}}}}subGra
}}}
graph{{sq{{sq{sq sq}sq}{sq sq}sq}sq}}
graph{{{{g{{g}g{g}g}g{g}{g}{g}}}}}
graph{{{{EB}}EB{{EB}EB{{EB}}EB{EB}}}}
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// license that can be found in the LICENSE file.

```

```

package testblas

```

```

import (
 "testing"

```

```

 "gonum.org/v1/gonum/blas"
 "gonum.org/v1/gonum/floats"
)

```

```

type Dsymmer interface {
 Dsymm(s blas.Side, ul blas.Uplo, m, n int, alpha float64, a []float64, lda int, b []float64, ldb int, beta float64, c
[]float64, ldc int)
}

```

```

func DsymmTest(t *testing.T, blasser Dsymmer) {
 for i, test := range []struct {
 m int
 n int
 side blas.Side
 ul blas.Uplo
 a []float64
 b []float64
 c []float64
 alpha float64
 beta float64
 ans []float64
 }{
 {
 side: blas.Left,
 ul: blas.Upper,
 m: 3,
 n: 4,
 a: []float64{
 {2, 3, 4},
 {0, 6, 7},
 },

```

```

{0, 0, 10},
},
b: [][]float64{
 {2, 3, 4, 8},
 {5, 6, 7, 15},
 {8, 9, 10, 20},
},
c: [][]float64{
 {8, 12, 2, 1},
 {9, 12, 9, 9},
 {12, 1, -1, 5},
},
alpha: 2,
beta:
3,
ans: [][]float64{
 {126, 156, 144, 285},
 {211, 252, 275, 535},
 {282, 291, 327, 689},
},
},
{
 side: blas.Left,
 ul: blas.Upper,
 m: 4,
 n: 3,
 a: [][]float64{
 {2, 3, 4, 8},
 {0, 6, 7, 9},
 {0, 0, 10, 10},
 {0, 0, 0, 11},
 },
 b: [][]float64{
 {2, 3, 4},
 {5, 6, 7},
 {8, 9, 10},
 {2, 1, 1},
 },
 c: [][]float64{
 {8, 12, 2},
 {9, 12, 9},
 {12, 1, -1},
 {1, 9, 5},
 },
 alpha: 2,
 beta: 3,
 ans: [][]float64{
 {158, 172, 160},

```

```

 {247, 270, 293},
 {322, 311, 347},
 {329, 385, 427},
 },
},
{
 side: blas.Left,
 ul: blas.Lower,
 m: 3,
 n: 4,
 a: [][]float64{
 {2, 0, 0},
 {3, 6, 0},
 {4, 7, 10},
 },
 b: [][]float64{
 {2, 3, 4, 8},
 {5, 6, 7, 15},
 {8, 9, 10, 20},
 },
 c: [][]float64{
 {8, 12, 2, 1},
 {9, 12, 9, 9},
 {12, 1, -1, 5},
 },
 alpha: 2,
 beta: 3,
 ans: [][]float64{
 {126, 156, 144, 285},
 {211, 252,
275, 535},
 {282, 291, 327, 689},
 },
},
{
 side: blas.Left,
 ul: blas.Lower,
 m: 4,
 n: 3,
 a: [][]float64{
 {2, 0, 0, 0},
 {3, 6, 0, 0},
 {4, 7, 10, 0},
 {8, 9, 10, 11},
 },
 b: [][]float64{
 {2, 3, 4},
 {5, 6, 7},

```

```

{8, 9, 10},
{2, 1, 1},
},
c: [][]float64{
{8, 12, 2},
{9, 12, 9},
{12, 1, -1},
{1, 9, 5},
},
alpha: 2,
beta: 3,
ans: [][]float64{
{158, 172, 160},
{247, 270, 293},
{322, 311, 347},
{329, 385, 427},
},
},
{
side: blas.Right,
ul: blas.Upper,
m: 3,
n: 4,
a: [][]float64{
{2, 0, 0, 0},
{3, 6, 0, 0},
{4, 7, 10, 0},
{3, 4, 5, 6},
},
b: [][]float64{
{2, 3, 4, 9},
{5, 6, 7, -3},
{8, 9, 10, -2},
},
c: [][]float64{
{8, 12, 2, 10},
{9, 12, 9, 10},
{12, 1, -1, 10},
},
alpha: 2,
beta: 3,
ans: [][]float64{
{32, 72, 86, 138},
{47, 108, 167, -6},
{68, 111, 197, 6},
},
},
{

```

```

side:
blas.Right,
ul: blas.Upper,
m: 4,
n: 3,
a: [][]float64{
 {2, 0, 0},
 {3, 6, 0},
 {4, 7, 10},
},
b: [][]float64{
 {2, 3, 4},
 {5, 6, 7},
 {8, 9, 10},
 {2, 1, 1},
},
c: [][]float64{
 {8, 12, 2},
 {9, 12, 9},
 {12, 1, -1},
 {1, 9, 5},
},
alpha: 2,
beta: 3,
ans: [][]float64{
 {32, 72, 86},
 {47, 108, 167},
 {68, 111, 197},
 {11, 39, 35},
},
},
{
side: blas.Right,
ul: blas.Lower,
m: 3,
n: 4,
a: [][]float64{
 {2, 0, 0, 0},
 {3, 6, 0, 0},
 {4, 7, 10, 0},
 {3, 4, 5, 6},
},
b: [][]float64{
 {2, 3, 4, 2},
 {5, 6, 7, 1},
 {8, 9, 10, 1},
},
c: [][]float64{

```

```

 {8, 12, 2, 1},
 {9, 12, 9, 9},
 {12, 1, -1, 5},
 },
 alpha: 2,
 beta: 3,
 ans: [][]float64{
 {94, 156, 164, 103},
 {145, 244, 301, 187},
 {208, 307, 397, 247},
 },
},
{
 side: blas.Right,
 ul: blas.Lower,
 m: 4,
 n: 3,
 a: [][]float64{
 {2,
0, 0},
 {3, 6, 0},
 {4, 7, 10},
 },
 b: [][]float64{
 {2, 3, 4},
 {5, 6, 7},
 {8, 9, 10},
 {2, 1, 1},
 },
 c: [][]float64{
 {8, 12, 2},
 {9, 12, 9},
 {12, 1, -1},
 {1, 9, 5},
 },
 alpha: 2,
 beta: 3,
 ans: [][]float64{
 {82, 140, 144},
 {139, 236, 291},
 {202, 299, 387},
 {25, 65, 65},
 },
},
} {
 aFlat := flatten(test.a)
 bFlat := flatten(test.b)
 cFlat := flatten(test.c)

```



```

ansFlat := flatten(test.ans)
blasser.Dsymm(test.side, test.ul, test.m, test.n, test.alpha, aFlat, len(test.a[0]), bFlat, test.n, test.beta, cFlat, test.n)
if !floats.EqualApprox(cFlat, ansFlat, 1e-14) {
 t.Errorf("Case %v: Want %v, got %v.", i, ansFlat, cFlat)
}
}
}
}
digraph{A:e->G:e->B:e->B:e->G:e}
graph{Digr{Digr{{Digr
{Digr{Digr{{Digr}}}}}}}
graph{<<NNNNN>>}
graph{{{Sub{Sub{Sub}Sub}Sub{Sub}Sub}Sub}{Subg}}
graph{"\#I\3\#I\3\#I\3"}
 SUBROUTINE XERROR(MESS,NMESS,L1,L2)
C
C THIS IS A DUMMY XERROR ROUTINE TO PRINT ERROR MESSAGES WITH NMESS
C CHARACTERS. L1 AND L2 ARE DUMMY PARAMETERS TO MAKE THIS CALL
C COMPATIBLE WITH THE SLATEC XERROR ROUTINE. THIS IS A FORTRAN 77
C ROUTINE.
C
 CHARACTER*(*) MESS
 NN=NMESS/70
 NR=NMESS-70*NN
 IF(NR.NE.0) NN=NN+1
 K=1
 PRINT 900
900 FORMAT(/)
 DO 10 I=1,NN
 KMIN=MIN0(K+69,NMESS)
 PRINT *, MESS(K:KMIN)
 K=K+70
10 CONTINUE
 PRINT 900
 RETURN
 END
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// license that can be found in the LICENSE file.

package netlib

// void dlahr2_(int* n, int* k, int* nb, double* a, int* lda, double* tau, double* t, int* ldt, double* y, int* ldy);
//
// void dlaqr5_(int* wantt, int* wantz, int* kacc22, int* n, int* ktop, int* kbot, int* nshfts,
// double* sr, double* si, double* h, int* ldh, int* iloz, int* ihiz,
// double* z, int* ldz, double* v, int* ldv, double* u, int* ldu,
// int* nv, double* wv, int* ldwv, int* nh, double* wh, int* ldwh);
import "C"

```

```

func Dlahr2(n, k, nb int, a []float64, lda int, tau, t []float64, ldt int, y []float64, ldy int) {
func() {
 n := C.int(n)
 k := C.int(k)
 nb := C.int(nb)
 lda := C.int(lda)
 ldt := C.int(ldt)
 ldy := C.int(ldy)
 C.dlahr2_((*C.int)(amp;n), (*C.int)(amp;k), (*C.int)(amp;nb),
 (*C.double)(amp;a[0]), (*C.int)(amp;lda),
 (*C.double)(amp;tau[0]),
 (*C.double)(amp;t[0]),
 (*C.int)(amp;ldt),
 (*C.double)(amp;y[0]), (*C.int)(amp;ldy))
}()
}

```

```

func Dlaqr5(wantt, wantz bool, kacc22 int, n, ktop, kbot int, nshfts int, sr, si []float64, h []float64,
ldh int, iloz, ihiz int, z []float64, ldz int, v []float64, ldv int,
u []float64, ldu int, nh int, wh []float64, ldwh int, nv int, wv []float64, ldwv int) {
func() {
 wt := C.int(0)
 if wantt {
 wt = 1
 }
 wz := C.int(0)
 if wantz {
 wz = 1
 }
 kacc22 := C.int(kacc22)
 n := C.int(n)
 ktop := C.int(ktop)
 kbot := C.int(kbot)
 nshfts := C.int(nshfts)
 ldh := C.int(ldh)
 iloz := C.int(iloz)
 ihiz := C.int(ihiz)
 ldz := C.int(ldz)
 ldv := C.int(ldv)
 ldu := C.int(ldu)
 nh := C.int(nh)
 ldwh := C.int(ldwh)
 nv := C.int(nv)
 ldwv := C.int(ldwv)
 C.dlaqr5_((*C.int)(amp;wt), (*C.int)(amp;wz), (*C.int)(amp;kacc22),
 (*C.int)(amp;n), (*C.int)(amp;ktop), (*C.int)(amp;kbot),
 (*C.int)(amp;nshfts), (*C.double)(amp;sr[0]), (*C.double)(amp;si[0]),

```

```

(*C.double)(&h[0]), (*C.int)(&ldh),
(*C.int)(&iloz), (*C.int)(&ihiz),
(*C.double)(&z[0]), (*C.int)(&ldz),
(*C.double)(&v[0]), (*C.int)(&ldv),
(*C.double)(&u[0]), (*C.int)(&ldu),
(*C.int)(&nh), (*C.double)(&wh[0]), (*C.int)(&ldwh),
(*C.int)(&nv), (*C.double)(&wv[0]), (*C.int)(&ldwv))
}()
}
graph{{SUB7{SUB7}SUB2}}
graph{{{Grar{Grax}Grax}Grax}}
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// license that can be found in the LICENSE file.

```

```
package distuv
```

```

import (
 "sort"
 "testing"

 "golang.org/x/exp/rand"

 "gonum.org/v1/gonum/floats"
)

```

```

func TestGamma(t *testing.T) {
 // Values a comparison with scipy
 for _, test := range []struct {
 x, alpha, want float64
 }{
 {0.9, 0.1, 0.046986817861555757},
 {0.9, 0.01, 0.0045384353289090401},
 {0.45, 0.01, 0.014137035997241795},
 } {
 pdf := Gamma{Alpha: test.alpha, Beta: 1}.Prob(test.x)
 if !floats.EqualWithinAbsOrRel(pdf, test.want, 1e-10, 1e-10) {
 t.Errorf("Pdf mismatch. Got %v, want %v", pdf, test.want)
 }
 }
 src := rand.New(rand.NewSource(1))
 for i, g := range []Gamma{

 {Alpha: 0.5, Beta: 0.8, Src: src},
 {Alpha: 0.9, Beta: 6, Src: src},
 {Alpha: 0.9, Beta: 500, Src: src},

 {Alpha: 1, Beta: 1, Src: src},
 }

```

```

 {Alpha: 1.6, Beta: 0.4, Src: src},
 {Alpha: 2.6, Beta: 1.5, Src: src},
 {Alpha: 5.6, Beta:
0.5, Src: src},
 {Alpha: 30, Beta: 1.7, Src: src},
 {Alpha: 30.2, Beta: 1.7, Src: src},
 } {
 testGamma(t, g, i)
 }
}

```

```

func testGamma(t *testing.T, f Gamma, i int) {
 // TODO(btracey): Replace this when Gamma implements FullDist.
 const (
 tol = 1e-2
 n = 1e5
 bins = 50
)
 x := make([]float64, n)
 generateSamples(x, f)
 sort.Float64s(x)

```

```

 testRandLogProbContinuous(t, i, 0, x, f, tol, bins)
 checkMean(t, i, x, f, tol)
 checkVarAndStd(t, i, x, f, 2e-2)
 checkExKurtosis(t, i, x, f, 2e-1)
 checkProbContinuous(t, i, x, f, 1e-3)
 checkQuantileCDFSurvival(t, i, x, f, 5e-2)
}

```

```

// SPDX-License-Identifier: Unlicense OR MIT

```

```

/*

```

Package pointer implements pointer events and operations.  
A pointer is either a mouse controlled cursor or a touch  
object such as a finger.

The InputOp operation is used to declare a handler ready for pointer  
events. Use an event.Queue to receive events.

## Areas

The area operations are used for specifying the area where  
subsequent InputOp are active.

For example, to set up a rectangular hit area:

```

var ops op.Ops

```

```
var h *Handler = ...
```

```
r := image.Rectangle{...}
pointer.Rect().Add(ops)
pointer.InputOp{Key: h}.Add(ops)
```

Note that areas compound: the effective area of multiple area operations is the intersection of the areas.

### Matching events

StackOp operations and input handlers form an implicit tree. Each stack operation is a node, and each input handler is associated with the most recent node.

For example:

```
ops := new(op.Ops)
var stack op.StackOp
var h1, h2 *Handler

stack.Push(ops)
pointer.InputOp{Key: h1}.Add(ops)
stack.Pop()

stack.Push(ops)
pointer.InputOp{Key:
h2}.Add(ops)
stack.Pop()
```

implies a tree of two inner nodes, each with one pointer handler.

When determining which handlers match an Event, only handlers whose areas contain the event position are considered. The matching proceeds as follows.

First, the foremost matching handler is included. If the handler has pass-through enabled, this step is repeated.

Then, all matching handlers from the current node and all parent nodes are included.

In the example above, all events will go to h2 only even though both handlers have the same area (the entire screen).

### Pass-through

The PassOp operations controls the pass-through setting. A handler's

pass-through setting is recorded along with the InputOp.

Pass-through handlers are useful for overlay widgets such as a hidden side drawer. When the user touches the side, both the (transparent) drawer handle and the interface below should receive pointer events.

## Disambiguation

When more than one handler matches a pointer event, the event queue follows a set of rules for distributing the event.

As long as the pointer has not received a Press event, all matching handlers receive all events.

When a pointer is pressed, the set of matching handlers is recorded. The set is not updated according to the pointer position and hit areas. Rather, handlers stay in the matching set until they no longer appear in a InputOp or when another handler in the set grabs the pointer.

A handler can exclude all other handler from its matching sets by setting the Grab flag in its InputOp. The Grab flag is sticky and stays in effect until the handler no longer appears in any matching sets.

The losing handlers are notified by a Cancel event.

For multiple grabbing handlers, the foremost handler wins.

## Priorities

Handlers know their position in a matching set of a pointer through event priorities. The Shared priority is for matching sets with multiple handlers; the Grabbed priority indicate exclusive access.

Priorities are useful for deferred gesture matching.

Consider a scrollable list of clickable elements. When the user touches an element, it is unknown whether the gesture is a click on the element or a drag (scroll) of the list. While the click handler might light up the element in anticipation of a click, the scrolling handler does not scroll on finger movements with lower than Grabbed priority.

Should the user release the finger, the click handler registers a click.

However, if the finger moves beyond a threshold, the scrolling handler

determines that the gesture is a drag and sets its Grab flag. The click handler receives a Cancel (removing the highlight) and further movements for the scroll handler has priority Grabbed, scrolling the list.

```
*/
```

```
package pointer
```

```
graph{SUBG_{SUBG_}}
```

```
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```

```
// Use of this source code is governed by a BSD-style
```

```
// license that can be found in the LICENSE file.
```

```
package testblas
```

```
import (
```

```
"testing"
```

```
"gonum.org/v1/gonum/blas"
```

```
"gonum.org/v1/gonum/floats"
```

```
)
```

```
type Dsyker interface {
```

```
Dsyrk(ul blas.Uplo, tA blas.Transpose, n, k int, alpha float64, a []float64, lda int, beta float64, c []float64, ldc int)
```

```
}
```

```
func DsykTest(t *testing.T, blasser Dsyker) {
```

```
for i, test := range []struct {
```

```
ul blas.Uplo
```

```
tA blas.Transpose
```

```
n int
```

```
k int
```

```
alpha float64
```

```
a [][]float64
```

```
c [][]float64
```

```
beta float64
```

```
ans [][]float64
```

```
}{
```

```
{
```

```
ul: blas.Upper,
```

```
tA: blas.NoTrans,
```

```
n: 3,
```

```
k: 2,
```

```
alpha: 0,
```

```
a: [][]float64{
```

```
{1, 2},
```

```
{3, 4},
```

```
{5, 6},
```

```
},
```

```
c: [][]float64{
```

```

{1, 2, 3},
{0, 5, 6},
{0, 0, 9},
},
beta: 2,
ans: [][]float64{
 {2, 4, 6},
 {0, 10, 12},
 {0, 0, 18},
},
},
{
 ul: blas.Lower,
 tA: blas.NoTrans,
 n:
 3,
 k: 2,
 alpha: 0,
 a: [][]float64{
 {1, 2},
 {3, 4},
 {5, 6},
 },
 c: [][]float64{
 {1, 0, 0},
 {2, 3, 0},
 {4, 5, 6},
 },
 beta: 2,
 ans: [][]float64{
 {2, 0, 0},
 {4, 6, 0},
 {8, 10, 12},
 },
},
{
 ul: blas.Upper,
 tA: blas.NoTrans,
 n: 3,
 k: 2,
 alpha: 3,
 a: [][]float64{
 {1, 2},
 {3, 4},
 {5, 6},
 },
 c: [][]float64{
 {1, 2, 3},

```



```

 {0, 4, 5},
 {0, 0, 6},
},
beta: 2,
ans: [][]float64{
 {17, 37, 57},
 {0, 83, 127},
 {0, 0, 195},
},
},
{
 ul: blas.Lower,
 tA: blas.NoTrans,
 n: 3,
 k: 2,
 alpha: 3,
 a: [][]float64{
 {1, 2},
 {3, 4},
 {5, 6},
 },
 c: [][]float64{
 {1, 0, 0},
 {2, 4, 0},
 {3, 5, 6},
 },
 beta: 2,
 ans: [][]float64{
 {17, 0, 0},
 {37, 83, 0},
 {57, 127, 195},
 },
},
{
 ul: blas.Upper,
 tA: blas.Trans,
 n: 3,
 k: 2,
 alpha: 3,
 a:
 [][]float64{
 {1, 3, 5},
 {2, 4, 6},
 },
 c: [][]float64{
 {1, 2, 3},
 {0, 4, 5},
 {0, 0, 6},

```

```

},
beta: 2,
ans: [][]float64{
 {17, 37, 57},
 {0, 83, 127},
 {0, 0, 195},
},
},
{
 ul: blas.Lower,
 tA: blas.Trans,
 n: 3,
 k: 2,
 alpha: 3,
 a: [][]float64{
 {1, 3, 5},
 {2, 4, 6},
 },
 c: [][]float64{
 {1, 0, 0},
 {2, 4, 0},
 {3, 5, 6},
 },
 beta: 2,
 ans: [][]float64{
 {17, 0, 0},
 {37, 83, 0},
 {57, 127, 195},
 },
},
{
 ul: blas.Upper,
 tA: blas.Trans,
 n: 3,
 k: 2,
 alpha: 3,
 a: [][]float64{
 {1, 3, 5},
 {2, 4, 6},
 },
 c: [][]float64{
 {1, 2, 3},
 {0, 4, 5},
 {0, 0, 6},
 },
 beta: 0,
 ans: [][]float64{
 {15, 33, 51},

```



and others

\*\*//

{{Types "GPL-2.0"}}

((  
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))??

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MA 02110-1301 USA  
||  
see <<http://www.gnu.org/licenses/>>.  
))  
digraph{w:sw->w:sw->w:sw}  
graph{{diGr\_[diGr\_=""]diGr\_=diGr\_}diGr\_[diGr\_=""]diGr\_=diGr\_}  
graph{{{SUBB}SUBB{SUBB}}}  
graph{{ST\_{{ST\_}}}ST\_  
Graph{{{subgrap{subgrap}subgrap}{subgrap{subgrap}}{subgrap{subgrap}subgrap}}{subgrap}  
graph{"\1"  
graph{m:h{x:m t:S}t:S}  
#  
graph{#  
#  
{#  
#  
#

```
#
{#
#
}}
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// license that can be found in the LICENSE file.
```

```
package distuv
```

```
import (
 "math"
 "testing"

 "golang.org/x/exp/rand"

 "gonum.org/v1/gonum/floats"
)
```

```
func TestCategoricalProb(t *testing.T) {
 for _, test := range [][]float64{
 {1, 2, 3, 0},
 } {
 dist := NewCategorical(test, nil)
 norm := make([]float64, len(test))
 floats.Scale(1/floats.Sum(norm), norm)
 for i, v := range norm {
 p := dist.Prob(float64(i))
 if math.Abs(p-v) > 1e-14 {
 t.Errorf("Probability mismatch element %d", i)
 }
 p = dist.Prob(float64(i) + 0.5)
 if p != 0 {
 t.Errorf("Non-zero probability for non-integer x")
 }
 }
 p := dist.Prob(-1)
 if p != 0 {
 t.Errorf("Non-zero probability for -1")
 }
 p = dist.Prob(float64(len(test)))
 if p != 0 {
 t.Errorf("Non-zero probability for len(test)")
 }
 }
}
```

```
func TestCategoricalRand(t *testing.T) {
```

```

for _, test := range [][]float64{
 {1,
 2, 3, 0},
} {
 dist := NewCategorical(test, nil)
 nSamples := 2000000
 counts := sampleCategorical(t, dist, nSamples)

 probs := make([]float64, len(test))
 for i := range probs {
 probs[i] = dist.Prob(float64(i))
 }
 same := samedDistCategorical(dist, counts, probs, 1e-2)
 if !same {
 t.Errorf("Probability mismatch. Want %v, got %v", probs, counts)
 }

 dist.Reweight(len(test)-1, 10)
 counts = sampleCategorical(t, dist, nSamples)
 probs = make([]float64, len(test))
 for i := range probs {
 probs[i] = dist.Prob(float64(i))
 }
 same = samedDistCategorical(dist, counts, probs, 1e-2)
 if !same {
 t.Errorf("Probability mismatch after Reweight. Want %v, got %v", probs, counts)
 }

 w := make([]float64, len(test))
 for i := range w {
 w[i] = rand.Float64()
 }

 dist.ReweightAll(w)
 counts = sampleCategorical(t, dist, nSamples)
 probs = make([]float64, len(test))
 for i := range probs {
 probs[i] = dist.Prob(float64(i))
 }
 same = samedDistCategorical(dist,
 counts, probs, 1e-2)
 if !same {
 t.Errorf("Probability mismatch after ReweightAll. Want %v, got %v", probs, counts)
 }
}

func sampleCategorical(t *testing.T, dist Categorical, nSamples int) []float64 {

```

```

counts := make([]float64, dist.Len())
for i := 0; i < nSamples; i++ {
 v := dist.Rand()
 if float64(int(v)) != v {
 t.Fatalf("Random number is not an integer")
 }
 counts[int(v)]++
}
sum := floats.Sum(counts)
floats.Scale(1/sum, counts)
return counts
}

func samedistCategorical(dist Categorical, counts, probs []float64, tol float64) bool {
 same := true
 for i, prob := range probs {
 if prob == 0 && counts[i] != 0 {
 same = false
 break
 }
 if !floats.EqualWithinAbsOrRel(prob, counts[i], tol, tol) {
 same = false
 break
 }
 }
 return same
}

func TestCategoricalCDF(t *testing.T) {
 for _, test := range [][]float64{
 {1, 2, 3, 0, 4},
 } {
 c := make([]float64, len(test))
 copy(c, test)
 floats.Scale(1/floats.Sum(c), c)
 sum := make([]float64,
 len(test))
 floats.CumSum(sum, c)

 dist := NewCategorical(test, nil)
 cdf := dist.CDF(-0.5)
 if cdf != 0 {
 t.Errorf("CDF of negative number not zero")
 }
 for i := range c {
 cdf := dist.CDF(float64(i))
 if math.Abs(cdf-sum[i]) > 1e-14 {
 t.Errorf("CDF mismatch %v. Want %v, got %v.", float64(i), sum[i], cdf)
 }
 }
 }
}

```

```

 }
 cdfp := dist.CDF(float64(i) + 0.5)
 if cdfp != cdf {
 t.Errorf("CDF mismatch for non-integer input")
 }
}
}
}

func TestCategoricalEntropy(t *testing.T) {
 for _, test := range []struct {
 weights []float64
 entropy float64
 }{
 {
 weights: []float64{1, 1},
 entropy: math.Ln2,
 },
 {
 weights: []float64{1, 1, 1, 1},
 entropy: math.Log(4),
 },
 {
 weights: []float64{0, 0, 1, 1, 0, 0},
 entropy: math.Ln2,
 },
 } {
 dist := NewCategorical(test.weights, nil)
 entropy := dist.Entropy()
 if math.IsNaN(entropy) || math.Abs(entropy-test.entropy) > 1e-14 {
 t.Errorf("Entropy mismatch. Want %v, got %v.", test.entropy, entropy)
 }
 }
}

```

```

func
TestCategoricalMean(t *testing.T) {
 for _, test := range []struct {
 weights []float64
 mean float64
 }{
 {
 weights: []float64{10, 0, 0, 0},
 mean: 0,
 },
 {
 weights: []float64{0, 10, 0, 0},
 mean: 1,
 },
 } {

```





```

// Package lapack provides interfaces for the LAPACK linear algebra standard.
package lapack // import "gonum.org/v1/gonum/lapack"
graph edl{{edn}edl}
graph{{e4{{e4}{e4}e4}e4}{e4}}
// Copyright 2015 The Gonum Authors. All rights reserved.
// Use of this source code is governed by a BSD-style
// license that can be found in the LICENSE file.

package testlapack

import (
 "math"
 "testing"

 "golang.org/x/exp/rand"
)

type Dlabrder interface {
 Dlabrd(m, n, nb int, a []float64, lda int, d, e, tauq, taup, x []float64, ldx int, y []float64, ldy int)
}

func DlabrdTest(t *testing.T, impl Dlabrder) {
 rnd := rand.New(rand.NewSource(1))
 for _, test := range []struct {
 m, n, nb, lda, ldx, ldy int
 }{
 {4, 5, 2, 0, 0, 0},
 {4, 5, 4, 0, 0, 0},
 {5, 5, 2, 0, 0, 0},
 {5, 5, 5, 0, 0, 0},
 {5, 4, 4, 0, 0, 0},
 {5, 4, 4, 0, 0, 0},

 {4, 5, 2, 10, 11, 12},
 {4, 5, 4, 10, 11, 12},
 {5, 5, 2, 10, 11, 12},
 {5, 5, 5, 10, 11, 12},
 {5, 4, 2, 10, 11, 12},
 {5, 4, 4, 10, 11, 12},

 {4, 5, 2, 11, 12, 10},
 {4, 5, 4, 11, 12, 10},
 {5, 5, 2, 11, 12, 10},
 {5, 5, 5, 11, 12, 10},
 {5, 4, 2, 11, 12, 10},
 {5, 4, 4, 11, 12, 10},

 {4, 5, 2, 12, 11, 10},
 }{

```

```

{4, 5, 4, 12,
11, 10},
{5, 5, 2, 12, 11, 10},
{5, 5, 5, 12, 11, 10},
{5, 4, 2, 12, 11, 10},
{5, 4, 4, 12, 11, 10},
} {
m := test.m
n := test.n
nb := test.nb
lda := test.lda
if lda == 0 {
 lda = n
}
ldy := test.ldy
if ldy == 0 {
 ldy = nb
}
ldx := test.ldx
if ldx == 0 {
 ldx = nb
}
a := make([]float64, m*lda)
for i := range a {
 a[i] = rnd.NormFloat64()
}
d := make([]float64, nb)
for i := range d {
 d[i] = math.NaN()
}
e := make([]float64, nb)
for i := range e {
 e[i] = math.NaN()
}
tauP := make([]float64, nb)
for i := range tauP {
 tauP[i] = math.NaN()
}
tauQ := make([]float64, nb)
for i := range tauP {
 tauQ[i] = math.NaN()
}
x := make([]float64, m*ldx)
for i := range x {
 x[i] = rnd.NormFloat64()
}
y := make([]float64, n*ldy)
for i := range y {

```

```

 y[i] = rnd.NormFloat64()
}
aCopy := make([]float64, len(a))
copy(aCopy, a)

// Compute the reduction.
impl.Dlabrd(m, n, nb, a, lda, d, e, tauQ, tauP, x,
ldx, y, ldy)

if m >= n && nb == n {
 tauP[n-1] = 0
}
if m < n && nb == m {
 tauQ[m-1] = 0
}
checkBidiagonal(t, m, n, nb, a, lda, d, e, tauP, tauQ, aCopy)
}
}
// Copyright 2018 The Gonum Authors. All rights reserved.
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// license that can be found in the LICENSE file.

package path

import (
 "sort"

 "gonum.org/v1/gonum/graph"
 "gonum.org/v1/gonum/graph/iterator"
)

// YenKShortestPaths returns the k-shortest loopless paths from s to t in g.
// YenKShortestPaths will panic if g contains a negative edge weight.
func YenKShortestPaths(g graph.Graph, k int, s, t graph.Node) [][]graph.Node {
 _, isDirected := g.(graph.Directed)
 yk := yenKSPAdjuster{
 Graph: g,
 isDirected: isDirected,
 }

 if wg, ok := g.(Weighted); ok {
 yk.weight = wg.Weight
 } else {
 yk.weight = UniformCost(g)
 }

 shortest, _ := DijkstraFrom(s, yk).To(t.ID())
 switch len(shortest) {

```

```

case 0:
 return nil
case 1:
 return [][]graph.Node{shortest}
}
paths := [][]graph.Node{shortest}

var pot []yenShortest
var root []graph.Node
for i := int64(1); i < int64(k); i++ {
 for n := 0; n < len(paths[i-1])-1; n++ {
 yk.reset()

 spur
:= paths[i-1][n]
 root := append(root[:0], paths[i-1][:n+1]...)

 for _, path := range paths {
 if len(path) <= n {
 continue
 }
 ok := true
 for x := 0; x < len(root); x++ {
 if path[x].ID() != root[x].ID() {
 ok = false
 break
 }
 }
 if ok {
 yk.removeEdge(path[n].ID(), path[n+1].ID())
 }
 }

 spath, weight := DijkstraFrom(spur, yk).To(t.ID())
 if len(root) > 1 {
 var rootWeight float64
 for x := 1; x < len(root); x++ {
 w, _ := yk.weight(root[x-1].ID(), root[x].ID())
 rootWeight += w
 }
 root = append(root[:len(root)-1], spath...)
 pot = append(pot, yenShortest{root, weight + rootWeight})
 } else {
 pot = append(pot, yenShortest{spath, weight})
 }
 }

 if len(pot) == 0 {

```

```

 break
}

sort.Sort(byPathWeight(pot))
best := pot[0].path
if len(best) <= 1 {
 break
}
paths = append(paths, best)
pot = pot[1:]
}

return paths
}

// yenShortest holds a path and its weight
// for sorting.
type yenShortest struct {
 path []graph.Node
 weight float64
}

type byPathWeight []yenShortest

func (s byPathWeight) Len() int { return len(s) }
func (s byPathWeight) Swap(i, j int) { s[i], s[j] = s[j], s[i] }
func (s byPathWeight) Less(i, j int) bool { return s[i].weight < s[j].weight }

// yenKSPAdjuster allows walked edges to be omitted from a graph
// without altering the embedded graph.
type yenKSPAdjuster struct {
 graph.Graph
 isDirected bool

 // weight is the edge weight function
 // used for shortest path calculation.
 weight Weighting

 // visitedEdges holds the edges that have
 // been removed by Yen's algorithm.
 visitedEdges map[[2]int64]struct{}
}

func (g yenKSPAdjuster) From(id int64) graph.Nodes {
 nodes := graph.NodesOf(g.Graph.From(id))
 for i := 0; i < len(nodes); {
 if g.canWalk(id, nodes[i].ID()) {
 i++

```

```

continue
}
nodes[i] = nodes[len(nodes)-1]
nodes = nodes[:len(nodes)-1]
}
return iterator.NewOrderedNodes(nodes)
}

func
(g yenKSPAdjuster) canWalk(u, v int64) bool {
_, ok := g.visitedEdges[[2]int64{u, v}]
return !ok
}

func (g yenKSPAdjuster) removeEdge(u, v int64) {
g.visitedEdges[[2]int64{u, v}] = struct{}{}
if g.isDirected {
g.visitedEdges[[2]int64{v, u}] = struct{}{}
}
}

func (g *yenKSPAdjuster) reset() {
g.visitedEdges = make(map[[2]int64]struct{})
}

func (g yenKSPAdjuster) Weight(xid, yid int64) (w float64, ok bool) {
return g.weight(xid, yid)
}

graph{di{di GG}}
graph{dig_{dig_{dig_}{dig_}dig_}dig_}
graph{{Grapg}}
graph{subGraph{subGrap}}
graph{"\\\\"
\\\\"
\\\\\\\\\\
\\\\"
sssss}s}\\\\\\\\\\\\
\\\\\\\\\\\\\\\\"}
graph<=>>{{<=>><=>}<=>>{{<=>><=>}}
graph{{digr4}}
graph{{E_{E_}}E_{E_{E_}}E_{E_}E_{E_}E_{E_}}
graph{{AAAA}AAAAA}
graph{{nN{nN{nN}nD}}nN{nN}nD}
graph{Edga}
graph{"""[diG_=""]}
graph{DigraG{{DigraG{DigraD}DigraG{DigraG}DigraG{DigraG}}}}
graph{{{digr}}{digr}digh{{{digh{{{digr}}{digr}digr}}digr}digr}}}

```

```

graph{{GR_{{GR_}}GR_}
graph{{{{digra}digra{digra}digra}}
graph{{{{stricN}stricN{{}stricN{stricN{{}stricN{stricN}}}}
graph{{{{ED8}}ED8{{{{ED8{ED8}{ED8}{ED8}{ED8}}ED8{{}ED8}}}}
graph{NODA}
graph{{{{{{stR}stI}}stI}
graph{{gr{{gr}}gr{{gr}}}}gr}}
// Copyright 2017 The Gonum Authors. All rights reserved.
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// license that can be found in the LICENSE file.

// Package lapack64 provides a set of convenient wrapper functions for LAPACK
// calls, as specified in the netlib standard (www.netlib.org).
//
// The native Go routines are used by default, and the Use function can be used
// to set an alternative implementation.
//
// If the type of matrix (General, Symmetric, etc.) is known and fixed, it is
// used in the wrapper signature. In many cases, however, the type of the matrix
// changes during the call to the routine, for example the matrix is symmetric on
// entry and is triangular on exit. In these cases the correct types should be checked
// in the documentation.
//
// The full set of Lapack functions is very large, and it is not clear that a
// full implementation is desirable, let alone feasible. Please open up an issue
// if there is a specific function you need and/or are
// willing to implement.
package lapack64 // import "gonum.org/v1/gonum/lapack/lapack64"
graph{b{{sua}b{sua}}}
graph{{{{Digr0}Digr0{{Digr0{Digr0}Digr0{Digr0}}}
graph{{{{Gra}Gra{Gra}Gra}}Gra}
graph{"|{"Pa"}
graph{{DiGrap_{{DiGrap_{{DiGrap_}}}
graph{{No}No}
This is the official list of people who can contribute
(and typically have contributed) code to the gonum
repository.
#
The AUTHORS file lists the copyright holders; this file
lists people. For example, Google employees would be listed here
but not in AUTHORS, because Google would hold the copyright.
#
When adding J Random Contributor's name to this file,
either J's name or J's organization's name should be
added to the AUTHORS file.
#
Names should be added to this file like so:
Name <email address>

```



#

# Please keep the list sorted.

Alexander Egunov <alexander.egunov@gmail.com>  
Andrew Brampton <brampton@gmail.com>  
Bill Gray <wgray@gogray.com>  
Bill Noon <noon.bill@gmail.com>  
Brendan Tracey <tracey.brendan@gmail.com>  
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 // license that can be found in the LICENSE file.

package mathext

```

import (
 "math"
 "testing"
)

func TestGammaIncReg(t *testing.T) {
 for i, test := range []struct {
 a, x, want float64
 }{
 // Results computed using scipy.special.gamminc
 {0, 0, 0},
 {0.0001, 1, 0.99997805936186279},
 {0.001, 0.005, 0.99528424172333985},
 {0.01, 10, 0.99999995718295021},
 {0.1, 10, 0.99999944520142825},
 {0.25, 0.75, 0.89993651328449831},
 {0.5, 0.5, 0.68268949213708596},
 {0.5, 2, 0.95449973610364147},
 {0.75, 2.5, 0.95053039734695643},
 {1, 0.5, 0.39346934028736652},
 {1, 1, 0.63212055882855778},
 {1.5, 0.75, 0.31772966966378746},
 {2.5, 1, 0.15085496391539038},
 {3, 0.05, 2.0067493624397931e-05},
 {3, 20, 0.99999954448504946},
 {5, 50, 1},
 {7, 10, 0.86985857911751696},
 {10, 0.9, 4.2519575433351128e-08},
 {10, 5, 0.031828057306204811},
 {25, 10, 4.6949381426799868e-05},
 }
 {
 if got := GammaIncReg(test.a, test.x); math.Abs(got-test.want) > 1e-10 {
 t.Errorf("test %d GammaIncReg(%g, %g) failed: got %g want %g", i, test.a, test.x, got, test.want)
 }
 }
}

func TestGammaIncRegComp(t *testing.T) {
 for i, test := range []struct {
 a, x, want float64
 }{
 // Results computed using scipy.special.gammincc
 {0.00001, 0.075, 2.0866541002417804e-05},
 {0.0001, 1, 2.1940638138146658e-05},
 {0.001, 0.005, 0.0047157582766601536},
 {0.01, 0.9, 0.0026263432520514662},
 {0.25, 0.75, 0.10006348671550169},
 }
}

```

```

{0.5, 0.5, 0.31731050786291404},
{0.75, 0.25, 0.65343980284081038},
{0.9, 0.01, 0.98359881081593148},
{1, 0, 1},
{1, 0.075, 0.92774348632855297},
{1, 1, 0.36787944117144233},
{1, 10, 4.5399929762484861e-05},
{1, math.Inf(1), 0},
{3, 20, 4.5551495055892125e-07},
{5, 10, 0.029252688076961127},
{10, 3, 0.99889751186988451},
{50, 25, 0.99999304669475242},
{100, 10, 1},
{500, 500, 0.49405285382921321},
{500, 550, 0.014614408126291296},
}
{
if got := GammaIncRegComp(test.a, test.x); math.Abs(got-test.want) > 1e-10 {
t.Errorf("test %d GammaIncRegComp(%g, %g) failed: got %g want %g", i, test.a, test.x, got, test.want)
}
}
}

```

```

func TestGammaIncRegInv(t *testing.T) {
for i, test := range []struct {
a, x, want float64
}{
// Results computed using scipy.special.gammincinv
{0.001, 0.99, 2.4259428385570885e-05},
{0.01, 0.99, 0.26505255025157959},
{0.1, 0.5, 0.00059339110446022798},
{0.2, 0.8, 0.26354363204872067},
{0.25, 0.5, 0.043673802352873381},
{0.5, 0.25, 0.050765522133810789},
{0.5, 0.5, 0.22746821155978625},
{0.75, 0.25, 0.15340752707472377},
{1, 0, 0},
{1, 0.075, 0.077961541469711862},
{1, 1, math.Inf(1)},
{2.5, 0.99, 7.5431362346944937},
{10, 0.5, 9.6687146147141299},
{25, 0.01, 14.853341349420646},
{25, 0.99, 38.076945624506337},
{50, 0.75, 54.570620535040511},
{100, 0.25, 93.08583383712174},
{1000, 0.01, 927.90815979664251},
{1000, 0.99, 1075.0328320864389},
{10000,

```

```

0.5, 9999.6666686420485},
} {
if got := GammaIncRegInv(test.a, test.x); math.Abs(got-test.want) > 1e-10 {
 t.Errorf("test %d GammaIncRegInv(%g, %g) failed: got %g want %g", i, test.a, test.x, got, test.want)
}
}
}

func TestGammaIncRegCompInv(t *testing.T) {
for i, test := range []struct {
 a, x, want float64
}{
 // Results computed using scipy.special.gamminccinv
 {0.001, 0.01, 2.4259428385570885e-05},
 {0.01, 0.01, 0.26505255025158292},
 {0.03, 0.4, 2.316980536227699e-08},
 {0.1, 0.5, 0.00059339110446022798},
 {0.1, 0.75, 5.7917132949696076e-07},
 {0.25, 0.25, 0.26062600197823282},
 {0.5, 0.1, 1.3527717270477047},
 {0.5, 0.5, 0.22746821155978625},
 {0.75, 0.25, 1.0340914067758025},
 {1, 0, math.Inf(1)},
 {1, 0.5, 0.69314718055994529},
 {1, 1, 0},
 {3, 0.75, 1.727299417860519},
 {25, 0.4, 25.945791937289371},
 {25, 0.7, 22.156653488661991},
 {10, 0.5, 9.6687146147141299},
 {100, 0.25, 106.5510925269767},
 {1000, 0.01, 1075.0328320864389},
 {1000,
0.99, 927.90815979664251},
 {10000, 0.5, 9999.6666686420485},
} {
if got := GammaIncRegCompInv(test.a, test.x); math.Abs(got-test.want) > 1e-10 {
 t.Errorf("test %d GammaIncRegCompInv(%g, %g) failed: got %g want %g", i, test.a, test.x, got, test.want)
}
}
}

graph{NOO}
graph{{ST6{ST6}ST6}}
Graph{subgrapA{{subgrapA}subgrapA}}
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package testlapack

```

```

import (
 "fmt"
 "testing"

 "golang.org/x/exp/rand"

 "gonum.org/v1/gonum/blas"
 "gonum.org/v1/gonum/blas/blas64"
)

type Dlauu2er interface {
 Dlauu2(uplo blas.Uplo, n int, a []float64, lda int)
}

func Dlauu2Test(t *testing.T, impl Dlauu2er) {
 for _, uplo := range []blas.Uplo{blas.Upper, blas.Lower} {
 name := "Upper"
 if uplo == blas.Lower {
 name = "Lower"
 }
 t.Run(name, func(t *testing.T) {
 ns := []int{0, 1, 2, 3, 4, 5, 10, 25}
 dlauuTest(t, impl.Dlauu2, uplo, ns)
 })
 }
}

func dlauuTest(t *testing.T, dlauu func(blas.Uplo, int, []float64, int), uplo blas.Uplo, ns []int) {
 const tol = 1e-13

 bi := blas64.Implementation()
 rnd := rand.New(rand.NewSource(1))

 for _, n := range ns {
 for _, lda := range []int{max(1, n), n + 11} {
 prefix := fmt.Sprintf("n=%v,lda=%v", n, lda)

 // Allocate
 nn matrix A and fill it with random numbers.
 // Only its uplo triangle will be used below.
 a := make([]float64, n*lda)
 for i := range a {
 a[i] = rnd.NormFloat64()
 }
 // Create a copy of A.
 aCopy := make([]float64, len(a))
 copy(aCopy, a)

```

```

// Compute U*U or L*L using Dlauu?.
dlauu(uplo, n, a, lda)

if n == 0 {
 continue
}

// * Check that the triangle of A opposite to uplo has not been modified.
// * Convert the result of Dlauu? into a dense symmetric matrix.
// * Zero out the triangle in aCopy opposite to uplo.
if uplo == blas.Upper {
 if !sameLowerTri(n, aCopy, lda, a, lda) {
 t.Errorf("%v: unexpected modification in lower triangle", prefix)
 continue
 }
 for i := 1; i < n; i++ {
 for j := 0; j < i; j++ {
 a[i*lda+j] = a[j*lda+i]
 aCopy[i*lda+j] = 0
 }
 }
} else {
 if !sameUpperTri(n, aCopy, lda, a, lda) {
 t.Errorf("%v: unexpected modification in upper triangle", prefix)
 continue
 }
 for
i := 0; i < n-1; i++ {
 for j := i + 1; j < n; j++ {
 a[i*lda+j] = a[j*lda+i]
 aCopy[i*lda+j] = 0
 }
 }
}

// Compute U*U or L*L using Dgemm with U and L
// represented as dense triangular matrices.
ldwant := n
want := make([]float64, n*ldwant)
if uplo == blas.Upper {
 // Use aCopy as a dense representation of the upper triangular U.
 u := aCopy
 ldu := lda
 // Compute U * U and store the result into want.
 bi.Dgemm(blas.NoTrans, blas.Trans, n, n, n,
 1, u, ldu, u, ldu, 0, want, ldwant)
} else {

```

```

// Use aCopy as a dense representation of the lower triangular L.
l := aCopy
ldl := lda
// Compute L * L and store the result into want.
bi.Dgemm(blas.Trans, blas.NoTrans, n, n, n,
1, l, ldl, l, ldl, 0, want, ldwant)
}
if !equalApprox(n, n, a, lda, want, tol) {
t.Errorf("%v: unexpected result", prefix)
}
}
}
}
graph{{gr4}gr7{{{gr4}gr4}gr7{gr4}}}}
// Derived from SciPy's special/c_misc/fsolve.c and special/c_misc/misc.h
// https://github.com/scipy/scipy/blob/master/scipy/special/c_misc/fsolve.c
// https://github.com/scipy/scipy/blob/master/scipy/special/c_misc/misc.h

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// license that can be found in the LICENSE file.

package mathext

import "math"

type objectiveFunc func(float64, []float64) float64

type fSolveResult uint8

const (
// An exact solution was found, in which case the first point on the
// interval is the value
fSolveExact fSolveResult = iota + 1
// Interval width is less than the tolerance
fSolveConverged
// Root-finding didn't converge in a set number of iterations
fSolveMaxIterations
)

const (
machEp = 1.0 / (1 << 53)
)

// falsePosition uses a combination of bisection and false position to find a
// root of a function within a given interval. This is guaranteed to converge,
// and always keeps

```



```

a bounding interval, unlike Newton's method. Inputs are:
// x1, x2: initial bounding interval
// f1, f2: value of f() at x1 and x2
// absErr, relErr: absolute and relative errors on the bounding interval
// bisectTil: if > 0.0, perform bisection until the width of the bounding
// interval is less than this
// f, fExtra: function to find root of is f(x, fExtra)
// Returns:
// result: whether an exact root was found, the process converged to a
// bounding interval small than the required error, or the max number
// of iterations was hit
// bestX: best root approximation
// bestF: function value at bestX
// errEst: error estimation
func falsePosition(x1, x2, f1, f2, absErr, relErr, bisectTil float64, f objectiveFunc, fExtra []float64) (fSolveResult,
float64, float64, float64) {
// The false position steps are either unmodified, or modified with the
// Anderson-Bjorck method as appropriate. Theoretically, this has a "speed of
// convergence" of
1.7 (bisection is 1, Newton is 2).
// Note that this routine was designed initially to work with gammaincinv, so
// it may not be tuned right for other problems. Don't use it blindly.

if f1*f2 >= 0 {
panic("Initial interval is not a bounding interval")
}

const (
maxIterations = 100
bisectIter = 4
bisectWidth = 4.0
)

const (
bisect = iota + 1
falseP
)

var state uint8
if bisectTil > 0 {
state = bisect
} else {
state = falseP
}

gamma := 1.0

w := math.Abs(x2 - x1)

```

```

lastBisectWidth := w

var nFalseP int
var x3, f3, bestX, bestF float64
for i := 0; i < maxIterations; i++ {
 switch state {
 case bisect:
 x3 = 0.5 * (x1 + x2)
 if x3 == x1 || x3 == x2 {
 // i.e., x1 and x2 are successive floating-point numbers
 bestX = x3
 if x3 == x1 {
 bestF = f1
 } else {
 bestF = f2
 }
 return fSolveConverged, bestX, bestF, w
 }

 f3 = f(x3, fExtra)
 if f3 == 0 {
 return fSolveExact, x3, f3, w
 }

 if f3*f2 < 0 {
 x1
 = x2
 f1 = f2
 }
 x2 = x3
 f2 = f3
 w = math.Abs(x2 - x1)
 lastBisectWidth = w
 if bisectTil > 0 {
 if w < bisectTil {
 bisectTil = -1.0
 gamma = 1.0
 nFalseP = 0
 state = falseP
 }
 } else {
 gamma = 1.0
 nFalseP = 0
 state = falseP
 }
 case falseP:
 s12 := (f2 - gamma*f1) / (x2 - x1)
 x3 = x2 - f2/s12

```

```

f3 = f(x3, fExtra)
if f3 == 0 {
 return fSolveExact, x3, f3, w
}

nFalseP++
if f3*f2 < 0 {
 gamma = 1.0
 x1 = x2
 f1 = f2
} else {
 // Anderson-Bjorck method
 g := 1.0 - f3/f2
 if g <= 0 {
 g = 0.5
 }
 gamma *= g
}
x2 = x3
f2 = f3
w = math.Abs(x2 - x1)

// Sanity check. For every 4 false position checks, see if we really are
// decreasing the interval by comparing to what bisection would have
// achieved (or, rather, a bit more lenient than that -- interval
// decreased by 4 instead of by 16, as the fp could be decreasing gamma
// for a bit). Note that this
should guarantee convergence, as it makes
// sure that we always end up decreasing the interval width with a
// bisection.
if nFalseP > bisectIter {
 if w*bisectWidth > lastBisectWidth {
 state = bisect
 }
 nFalseP = 0
 lastBisectWidth = w
}
}

tol := absErr + relErr*math.Max(math.Max(math.Abs(x1), math.Abs(x2)), 1.0)
if w <= tol {
 if math.Abs(f1) < math.Abs(f2) {
 bestX = x1
 bestF = f1
 } else {
 bestX = x2
 bestF = f2
 }
}

```

```

 return fSolveConverged, bestX, bestF, w
}
}

return fSolveMaxIterations, x3, f3, w
}
// Code generated by "go generate gonum.org/v1/gonum/unit; DO NOT EDIT.

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// license that can be found in the LICENSE file.

package unit

import (
 "errors"
 "fmt"
 "math"
 "unicode/utf8"
)

// Voltage represents a voltage in Volts.
type Voltage float64

const Volt Voltage = 1

// Unit converts the Voltage to a *Unit
func (v Voltage) Unit() *Unit {
 return New(float64(v), Dimensions{
 CurrentDim: -1,
 LengthDim: 2,
 MassDim: 1,
 TimeDim: -3,
 })
}

// Voltage allows Voltage to implement a Voltager interface
func (v Voltage) Voltage() Voltage {
 return v
}

// From converts the unit into the receiver. From returns an
// error if there is a mismatch in dimension
func (v *Voltage) From(u Uniter) error {
 if !DimensionsMatch(u, Volt) {
 *v = Voltage(math.NaN())
 return errors.New("Dimension mismatch")
 }
}

```

```

*v = Voltage(u.Unit().Value())
return nil
}

func (v Voltage)
Format(fs fmt.State, c rune) {
switch c {
case 'v':
if fs.Flag('#') {
fmt.Fprintf(fs, "%T(%v)", v, float64(v))
return
}
fallthrough
case 'e', 'E', 'f', 'F', 'g', 'G':
p, pOk := fs.Precision()
w, wOk := fs.Width()
const unit = " V"
switch {
case pOk && wOk:
fmt.Fprintf(fs, "%*.*"+string(c), pos(w-utf8.RuneCount([]byte(unit))), p, float64(v))
case pOk:
fmt.Fprintf(fs, "%.*"+string(c), p, float64(v))
case wOk:
fmt.Fprintf(fs, "%*"+string(c), pos(w-utf8.RuneCount([]byte(unit))), float64(v))
default:
fmt.Fprintf(fs, "%"+string(c), float64(v))
}
fmt.Fprint(fs, unit)
default:
fmt.Fprintf(fs, "%%!%c(%T=%g V)", c, v, float64(v))
}
}
}

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// license that can be found in the LICENSE file.

package distuv

import (
"math"

"golang.org/x/exp/rand"

"gonum.org/v1/gonum/mathext"
)

// ChiSquared implements the distribution, a one parameter distribution
// with support on the positive numbers.

```

```

//
// The density function is given by
// $1/(2^{k/2} * \Gamma(k/2)) * x^{k/2 - 1} * e^{-x/2}$
// It is a special case of the Gamma distribution, (k/2, 1/2).
//
// For more information, see https://en.wikipedia.org/wiki/Chi-squared_distribution.
type ChiSquared struct {
 // K is the shape parameter, corresponding to the degrees of freedom. Must
 // be greater than 0.
 K float64

 Src rand.Source
}

// CDF computes the value of the cumulative density function at x.
func (c ChiSquared) CDF(x float64) float64 {
 return mathext.GammaIncReg(c.K/2, x/2)
}

// ExKurtosis returns the excess kurtosis of the distribution.
func (c ChiSquared) ExKurtosis() float64 {
 return 12 / c.K
}

// LogProb computes the natural logarithm of the value of the probability
// density function at x.
func (c ChiSquared) LogProb(x float64) float64 {
 if x < 0 {
 return math.Inf(-1)
 }
 lg, _ := math.Lgamma(c.K / 2)
 return (c.K/2-1)*math.Log(x) - x/2 - (c.K/2)*math.Ln2 - lg
}

// Mean returns the mean of the probability distribution.
func (c ChiSquared) Mean() float64 {
 return c.K
}

// Mode returns the mode of the distribution.
func (c ChiSquared) Mode() float64 {
 return math.Min(c.K-2, 0)
}

// NumParameters returns the number of parameters in the distribution.
func (c ChiSquared) NumParameters() int {
 return 1
}

```

```

}

// Prob computes the value of the probability density function at x.
func (c ChiSquared) Prob(x float64) float64 {
 return math.Exp(c.LogProb(x))
}

// Rand returns a random sample drawn from the distribution.
func (c ChiSquared) Rand() float64 {
 return Gamma{c.K / 2, 0.5, c.Src}.Rand()
}

// Quantile returns the inverse of
// the cumulative distribution function.
func (c ChiSquared) Quantile(p float64) float64 {
 if p < 0 || p > 1 {
 panic(badPercentile)
 }
 return mathext.GammaIncRegInv(0.5*c.K, p) * 2
}

// StdDev returns the standard deviation of the probability distribution.
func (c ChiSquared) StdDev() float64 {
 return math.Sqrt(c.Variance())
}

// Survival returns the survival function (complementary CDF) at x.
func (c ChiSquared) Survival(x float64) float64 {
 if x < 0 {
 return 1
 }
 return mathext.GammaIncRegComp(0.5*c.K, 0.5*x)
}

// Variance returns the variance of the probability distribution.
func (c ChiSquared) Variance() float64 {
 return 2 * c.K
}

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package optimize

const (
 defaultBacktrackingContraction = 0.5
 defaultBacktrackingDecrease = 1e-4
 minimumBacktrackingStepSize = 1e-20

```

)

```
// Backtracking is a Linesearcher that uses backtracking to find a point that
// satisfies the Armijo condition with the given decrease factor. If the Armijo
// condition has not been met, the step size is decreased by ContractionFactor.
//
// The Armijo condition only requires the gradient at the beginning of each
// major iteration (not at successive step locations), and so Backtracking may
// be a good linesearch for functions with expensive gradients. Backtracking is
// not appropriate for optimizers that require the Wolfe conditions to be met,
// such as BFGS.
//
// Both DecreaseFactor and ContractionFactor must be between zero and one, and
// Backtracking will panic otherwise.
// If either DecreaseFactor or
// ContractionFactor are zero, it will be set to a reasonable default.
type Backtracking struct {
 DecreaseFactor float64 // Constant factor in the sufficient decrease (Armijo) condition.
 ContractionFactor float64 // Step size multiplier at each iteration (step *= ContractionFactor).

 stepSize float64
 initF float64
 initG float64

 lastOp Operation
}

func (b *Backtracking) Init(f, g float64, step float64) Operation {
 if step <= 0 {
 panic("backtracking: bad step size")
 }
 if g >= 0 {
 panic("backtracking: initial derivative is non-negative")
 }

 if b.ContractionFactor == 0 {
 b.ContractionFactor = defaultBacktrackingContraction
 }
 if b.DecreaseFactor == 0 {
 b.DecreaseFactor = defaultBacktrackingDecrease
 }
 if b.ContractionFactor <= 0 || b.ContractionFactor >= 1 {
 panic("backtracking: ContractionFactor must be between 0 and 1")
 }
 if b.DecreaseFactor <= 0 || b.DecreaseFactor >= 1 {
 panic("backtracking: DecreaseFactor must be between
0 and 1")
 }
}
```



```

b.stepSize = step
b.initF = f
b.initG = g

b.lastOp = FuncEvaluation
return b.lastOp
}

func (b *Backtracking) Iterate(f, _ float64) (Operation, float64, error) {
if b.lastOp != FuncEvaluation {
panic("backtracking: Init has not been called")
}

if ArmijoConditionMet(f, b.initF, b.initG, b.stepSize, b.DecreaseFactor) {
b.lastOp = MajorIteration
return b.lastOp, b.stepSize, nil
}
b.stepSize *= b.ContractionFactor
if b.stepSize < minimumBacktrackingStepSize {
b.lastOp = NoOperation
return b.lastOp, b.stepSize, ErrLinesearcherFailure
}
b.lastOp = FuncEvaluation
return b.lastOp, b.stepSize, nil
}
graph{"\Z{"\Z"}
graph{{{subgrapu{subgrapu}subgrapu{subgrapu}}}}
graph{{{subgr{subgr}subgr}gr}subgr}
graph{diGraX[diGraZ=""]}
Graph{{{Subgz}Subgt{Subgz}}}
graph{{noc}noc}
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// license that can be found in the LICENSE file.

// Package math32 provides float32 versions of standard library math package
// routines used by gonum/blas/native.
package math32 // import "gonum.org/v1/gonum/internal/math32"
graph{{Digp{{Digp{Digp{Digp{Digp}}}Digg}{Digp{Digp}}}Digg}}
// Copyright 2015 The Gonum Authors. All rights reserved.
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// license that can be found in the LICENSE file.

package testlapack

import (
"testing"

```

```

"golang.org/x/exp/rand"

"gonum.org/v1/gonum/blas/blas64"
"gonum.org/v1/gonum/floats"
"gonum.org/v1/gonum/lapack"
)

type Dorgbrer interface {
 Dorgbr(vect lapack.GenOrtho, m, n, k int, a []float64, lda int, tau, work []float64, lwork int)
 Dgebrder
}

func DorgbrTest(t *testing.T, impl Dorgbrer) {
 rnd := rand.New(rand.NewSource(1))
 for _, vect := range []lapack.GenOrtho{lapack.GenerateQ, lapack.GeneratePT} {
 for _, test := range []struct {
 m, n, k, lda int
 }{
 {5, 5, 5, 0},
 {5, 5, 3, 0},
 {5, 3, 5, 0},
 {3, 5, 5, 0},
 {3, 4, 5, 0},
 {3, 5, 4, 0},
 {4, 3, 5, 0},
 {4, 5, 3, 0},
 {5, 3, 4, 0},
 {5, 4, 3, 0},

 {5, 5, 5, 10},
 {5, 5, 3, 10},
 {5, 3, 5, 10},
 {3, 5, 5, 10},
 {3, 4, 5, 10},
 {3, 5, 4, 10},
 {4, 3, 5, 10},
 {4, 5, 3, 10},
 {5,
3, 4, 10},
 {5, 4, 3, 10},
 } {
 m := test.m
 n := test.n
 k := test.k
 lda := test.lda
 // Filter out bad tests
 if vect == lapack.GenerateQ {

```

```

if m < n || n < min(m, k) || m < min(m, k) {
 continue
}
} else {
if n < m || m < min(n, k) || n < min(n, k) {
 continue
}
}
// Sizes for Dorgbr.
var ma, na int
if vect == lapack.GenerateQ {
 if m >= k {
 ma = m
 na = k
 } else {
 ma = m
 na = m
 }
} else {
 if n >= k {
 ma = k
 na = n
 } else {
 ma = n
 na = n
 }
}
// a eventually needs to store either P or Q, so it must be
// sufficiently big.
var a []float64
if vect == lapack.GenerateQ {
 lda = max(m, lda)
 a = make([]float64, m*lda)
} else {
 lda = max(n, lda)
 a = make([]float64, n*lda)
}
for i := range a {
 a[i] = rnd.NormFloat64()
}

nTau := min(ma, na)
tauP := make([]float64, nTau)
tauQ := make([]float64, nTau)
d := make([]float64,
nTau)
e := make([]float64, nTau)
lwork := -1

```

```

work := make([]float64, 1)
impl.Dgebrd(ma, na, a, lda, d, e, tauQ, tauP, work, lwork)
work = make([]float64, int(work[0]))
lwork = len(work)
impl.Dgebrd(ma, na, a, lda, d, e, tauQ, tauP, work, lwork)

aCopy := make([]float64, len(a))
copy(aCopy, a)

var tau []float64
if vect == lapack.GenerateQ {
 tau = tauQ
} else {
 tau = tauP
}

impl.Dorgbr(vect, m, n, k, a, lda, tau, work, -1)
work = make([]float64, int(work[0]))
lwork = len(work)
impl.Dorgbr(vect, m, n, k, a, lda, tau, work, lwork)

var ans blas64.General
var nRows, nCols int
equal := true
if vect == lapack.GenerateQ {
 nRows = m
 nCols = m
 if m >= k {
 nCols = n
 }
 ans = constructQPBidiagonal(lapack.ApplyQ, ma, na, min(m, k), aCopy, lda, tau)
} else {
 nRows = n
 if k < n {
 nRows = m
 }
 nCols = n
 ansTmp := constructQPBidiagonal(lapack.ApplyP, ma, na, min(k, n), aCopy,
lda, tau)
 // Dorgbr actually computes P
 ans = transposeGeneral(ansTmp)
}
for i := 0; i < nRows; i++ {
 for j := 0; j < nCols; j++ {
 if !floats.EqualWithinAbsOrRel(a[i*lda+j], ans.Data[i*ans.Stride+j], 1e-8, 1e-8) {
 equal = false
 }
 }
}

```

```

 }
 if !equal {
 t.Errorf("Extracted matrix mismatch. gen = %v, m = %v, n = %v, k = %v", string(vect), m, n, k)
 }
}
}
}
graph{{{{{subgb{{subgb{subgf}}}}}}}
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// license that can be found in the LICENSE file.

package testlapack

import (
 "fmt"
 "testing"

 "golang.org/x/exp/rand"

 "gonum.org/v1/gonum/blas"
 "gonum.org/v1/gonum/blas/blas64"
)

type Dsytrdr interface {
 Dsytrd(uplo blas.Uplo, n int, a []float64, lda int, d, e, tau, work []float64, lwork int)

 Dorgqr(m, n, k int, a []float64, lda int, tau, work []float64, lwork int)
 Dorgql(m, n, k int, a []float64, lda int, tau, work []float64, lwork int)
}

func DsytrdTest(t *testing.T, impl Dsytrdr) {
 const tol = 1e-13
 rnd := rand.New(rand.NewSource(1))
 for tc, test := range []struct {
 n, lda int
 }{
 {1, 0},
 {2, 0},
 {3, 0},
 {4, 0},
 {10, 0},
 {50, 0},
 {100, 0},
 {150, 0},
 {300, 0},

 {1, 3},
 }

```

```

{2, 3},
{3, 7},
{4, 9},
{10, 20},
{50, 70},
{100, 120},
{150, 170},
{300, 320},
} {
for _, uplo := range []blas.Uplo{blas.Upper, blas.Lower} {
 for
_, wl := range []worklen{minimumWork, mediumWork, optimumWork} {
 n := test.n
 lda := test.lda
 if lda == 0 {
 lda = n
 }
 a := randomGeneral(n, n, lda, rnd)
 for i := 1; i < n; i++ {
 for j := 0; j < i; j++ {
 a.Data[i*a.Stride+j] = a.Data[j*a.Stride+i]
 }
 }
 aCopy := cloneGeneral(a)

 d := nanSlice(n)
 e := nanSlice(n - 1)
 tau := nanSlice(n - 1)

 var lwork int
 switch wl {
 case minimumWork:
 lwork = 1
 case mediumWork:
 work := make([]float64, 1)
 impl.Dsytrd(uplo, n, a.Data, a.Stride, d, e, tau, work, -1)
 lwork = (int(work[0]) + 1) / 2
 lwork = max(1, lwork)
 case optimumWork:
 work := make([]float64, 1)
 impl.Dsytrd(uplo, n, a.Data, a.Stride, d, e, tau, work, -1)
 lwork = int(work[0])
 }
 work := make([]float64, lwork)

 impl.Dsytrd(uplo, n, a.Data, a.Stride, d, e, tau, work, lwork)

 prefix := fmt.Sprintf("Case #%v: uplo=%v,n=%v,lda=%v,work=%v",

```

```

 tc, uplo, n, lda,
wl)

if !generalOutsideAllNaN(a) {
 t.Errorf("%v: out-of-range write to A", prefix)
}

// Extract Q by doing what Dorgtr does.
q := cloneGeneral(a)
if uplo == blas.Upper {
 for j := 0; j < n-1; j++ {
 for i := 0; i < j; i++ {
 q.Data[i*q.Stride+j] = q.Data[i*q.Stride+j+1]
 }
 q.Data[(n-1)*q.Stride+j] = 0
 }
 for i := 0; i < n-1; i++ {
 q.Data[i*q.Stride+n-1] = 0
 }
 q.Data[(n-1)*q.Stride+n-1] = 1
 if n > 1 {
 work = make([]float64, n-1)
 impl.Dorgql(n-1, n-1, n-1, q.Data, q.Stride, tau, work, len(work))
 }
} else {
 for j := n - 1; j > 0; j-- {
 q.Data[j] = 0
 for i := j + 1; i < n; i++ {
 q.Data[i*q.Stride+j] = q.Data[i*q.Stride+j-1]
 }
 }
 q.Data[0] = 1
 for i := 1; i < n; i++ {
 q.Data[i*q.Stride] = 0
 }
 if n > 1 {
 work = make([]float64, n-1)
 impl.Dorgqr(n-1, n-1, n-1, q.Data[q.Stride+1:], q.Stride, tau, work, len(work))
 }
}
if
!isOrthogonal(q) {
 t.Errorf("%v: Q not orthogonal", prefix)
}

// Construct symmetric tridiagonal T from d and e.
tMat := zeros(n, n, n)
for i := 0; i < n; i++ {

```

```
tMat.Data[i*tMat.Stride+i] = d[i]
}
if uplo == blas.Upper {
for j := 1; j < n; j++ {
tMat.Data[(j-1)*tMat.Stride+j] = e[j-1]
tMat.Data[j*tMat.Stride+j-1] = e[j-1]
}
} else {
for j := 0; j < n-1; j++ {
tMat.Data[(j+1)*tMat.Stride+j] = e[j]
tMat.Data[j*tMat.Stride+j+1] = e[j]
}
}
}

// Compute Q * A * Q.
tmp := zeros(n, n, n)
blas64.Gemm(blas.Trans, blas.NoTrans, 1, q, aCopy, 0, tmp)
got := zeros(n, n, n)
blas64.Gemm(blas.NoTrans, blas.NoTrans, 1, tmp, q, 0, got)

// Compare with T.
if !equalApproxGeneral(got, tMat, tol) {
t.Errorf("%v: Q*A*Q != T", prefix)
}
}
}
}
}
}

graph{{{Gra_}Gra_=Gra_}Gra_{Gra_{Gra_}Gra_}Gra_}Gra_}
/** ** */graph""{e[""]="\N"e[""]h[""]t[""]r[""]}[r[""]]/**/"--""--""--""--""[r[""]n=6]"--[r[""]t[""]]""-
-""[r[""]t[""]]""--[r[""]t[""]]""--[r[""]t[""]]""--[r[""]t[""]]""--[r[""]t[""]]""--""}
graph{{{Subg{Subg}Subg}{Subg{Subg}Subg}Subg}Subg}{Subg}}
graph{Nodd{Nodd{Nodd{Nodd{Nodd{Nodd}}}

// Derived from SciPy's special/cephes/polevl.h
// https://github.com/scipy/scipy/blob/master/scipy/special/cephes/polevl.h
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package cephes

import "math"

// polevl evaluates a polynomial of degree N
// y = c_0 + c_1 x_1 + c_2 x_2^2 ...
```



```

// where the coefficients are stored in reverse order, i.e. coef[0] = c_n and
// coef[n] = c_0.
func polevl(x float64, coef []float64, n int) float64 {
 ans := coef[0]
 for i := 1; i <= n; i++ {
 ans = ans*x + coef[i]
 }
 return ans
}

// p1evl is the same as polevl, except c_n is assumed to be 1 and is not included
// in the slice.
func p1evl(x float64, coef []float64, n int) float64 {
 ans := x + coef[0]
 for i := 1; i <= n-1; i++ {
 ans = ans*x + coef[i]
 }
 return
 ans
}

// ratevl evaluates a rational function
func ratevl(x float64, num []float64, m int, denom []float64, n int) float64 {
 // Source: Holin et. al., "Polynomial and Rational Function Evaluation",
 // http://www.boost.org/doc/libs/1_61_0/libs/math/doc/html/math_toolkit/roots/rational.html
 absx := math.Abs(x)

 var dir, idx int
 var y float64
 if absx > 1 {
 // Evaluate as a polynomial in 1/x
 dir = -1
 idx = m
 y = 1 / x
 } else {
 dir = 1
 idx = 0
 y = x
 }

 // Evaluate the numerator
 numAns := num[idx]
 idx += dir
 for i := 0; i < m; i++ {
 numAns = numAns*y + num[idx]
 idx += dir
 }

```

```

// Evaluate the denominator
if absx > 1 {
 idx = n
} else {
 idx = 0
}

denomAns := denom[idx]
idx += dir
for i := 0; i < n; i++ {
 denomAns = denomAns*y + denom[idx]
 idx += dir
}

if absx > 1 {
 pow := float64(n - m)
 return math.Pow(x, pow) * numAns / denomAns
}
return numAns / denomAns
}
// SPDX-License-Identifier: Unlicense OR MIT

package input

import (
 "encoding/binary"
 "time"

 "gioui.org/internal/opconst"
 "gioui.org/internal/ops"
 "gioui.org/io/event"
 "gioui.org/io/key"
 "gioui.org/io/pointer"
 "gioui.org/io/profile"
 "gioui.org/op"
)

// Router is a Queue implementation that routes events from
// all available input sources to registered handlers.
type Router struct {
 pqueue pointerQueue
 kqueue keyQueue

 handlers handlerEvents

 reader ops.Reader

 // InvalidateOp summary.

```

```

wakeup bool
wakeupTime time.Time

// ProfileOp summary.
profiling bool
profHandlers map[event.Key]struct{}
profile profile.Event
}

type handlerEvents struct {
 handlers map[event.Key][]event.Event
 hadEvents bool
}

func (q *Router) Events(k event.Key) []event.Event {
 events := q.handlers.Events(k)
 if _, isprof := q.profHandlers[k]; isprof {
 delete(q.profHandlers, k)
 events = append(events, q.profile)
 }
 return events
}

func (q *Router) Frame(ops *op.Ops) {
 q.handlers.Clear()
 q.wakeup
 = false
 q.profiling = false
 for k := range q.profHandlers {
 delete(q.profHandlers, k)
 }
 q.reader.Reset(ops)
 q.collect()

 q.pqueue.Frame(ops, &q.handlers)
 q.kqueue.Frame(ops, &q.handlers)
 if q.handlers.HadEvents() {
 q.wakeup = true
 q.wakeupTime = time.Time{}
 }
}

func (q *Router) Add(e event.Event) bool {
 switch e := e.(type) {
 case pointer.Event:
 q.pqueue.Push(e, &q.handlers)
 case key.EditEvent, key.Event, key.FocusEvent:
 q.kqueue.Push(e, &q.handlers)
 }
}

```

```

}
return q.handlers.HadEvents()
}

func (q *Router) TextInputState() TextInputState {
 return q.kqueue.InputState()
}

func (q *Router) collect() {
 for encOp, ok := q.reader.Decode(); ok; encOp, ok = q.reader.Decode() {
 switch opconst.OpType(encOp.Data[0]) {
 case opconst.TypeInvalidate:
 op := decodeInvalidateOp(encOp.Data)
 if !q.wakeup || op.At.Before(q.wakeupTime) {
 q.wakeup = true
 q.wakeupTime = op.At
 }
 case opconst.TypeProfile:
 op := decodeProfileOp(encOp.Data,
encOp.Refs)
 if q.profHandlers == nil {
 q.profHandlers = make(map[event.Key]struct{})
 }
 q.profiling = true
 q.profHandlers[op.Key] = struct{}{}
 }
 }
 }
}

func (q *Router) AddProfile(profile profile.Event) {
 q.profile = profile
}

func (q *Router) Profiling() bool {
 return q.profiling
}

func (q *Router) WakeupTime() (time.Time, bool) {
 return q.wakeupTime, q.wakeup
}

func (h *handlerEvents) init() {
 if h.handlers == nil {
 h.handlers = make(map[event.Key][]event.Event)
 }
}

func (h *handlerEvents) Set(k event.Key, evts []event.Event) {

```

```

h.init()
h.handlers[k] = evts
h.hadEvents = true
}

func (h *handlerEvents) Add(k event.Key, e event.Event) {
h.init()
h.handlers[k] = append(h.handlers[k], e)
h.hadEvents = true
}

func (h *handlerEvents) HadEvents() bool {
u := h.hadEvents
h.hadEvents = false
return u
}

func (h *handlerEvents) Events(k event.Key) []event.Event {
if events, ok := h.handlers[k]; ok {
h.handlers[k] = h.handlers[k][:0]
// Schedule another
frame if we delivered events to the user
// to flush half-updated state. This is important when a an
// event changes UI state that has already been laid out. In
// the worst case, we waste a frame, increasing power usage.
//
// Gio is expected to grow the ability to construct
// frame-to-frame differences and only render to changed
// areas. In that case, the waste of a spurious frame should
// be minimal.
h.hadEvents = h.hadEvents || len(events) > 0
return events
}
return nil
}

func (h *handlerEvents) Clear() {
for k := range h.handlers {
delete(h.handlers, k)
}
}

func decodeProfileOp(d []byte, refs []interface{}) profile.Op {
if opconst.OpType(d[0]) != opconst.TypeProfile {
panic("invalid op")
}
return profile.Op{
Key: refs[0].(event.Key),

```



```

func (a twoArray) at(i, j int) float64 {
 return a.data[i+a.jStride*j]
}

func (a twoArray) set(i, j int, v float64) {
 a.data[i+a.jStride*j] = v
}

func (a twoArray) add(i, j int, v float64) {
 a.data[i+a.jStride*j] += v
}

type threeArray struct {
 jStride, kStride int
 data []float64
}

func newThreeArray(i, j, k int, data []float64)
threeArray {
 if len(data) < i*j*k {
 panic("fourier: short data")
 }
 return threeArray{
 jStride: i,
 kStride: i * j,
 data: data[:i*j*k],
 }
}

func (a threeArray) at(i, j, k int) float64 {
 return a.data[i+a.jStride*j+a.kStride*k]
}

func (a threeArray) set(i, j, k int, v float64) {
 a.data[i+a.jStride*j+a.kStride*k] = v
}
graph{suF}
graph{Nodr{Nodr}Nodr}
graph{{Digr_{Digr_}Digr_{Digr_}}}
graph{G:nw nw:nw K:nw nw:nw}
graph{--}
graph{{diGo}diGh{diGo}{diGo}}
graph{graU{{graS}{graS}graS}{graS}{graS}}
// Code generated by "go generate gonum.org/v1/gonum/unit; DO NOT EDIT.

// Copyright 2019 The Gonum Authors. All rights reserved.
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```

```

// license that can be found in the LICENSE file.

package unit

import (
 "fmt"
 "testing"
)

func TestMoleFormat(t *testing.T) {
 for _, test := range []struct {
 value Mole
 format string
 want string
 }{
 {1.23456789, "%v", "1.23456789 mol"},
 {1.23456789, "%.1v", "1 mol"},
 {1.23456789, "%20.1v", " 1 mol"},
 {1.23456789, "%20v", " 1.23456789 mol"},
 {1.23456789, "%1v", "1.23456789 mol"},
 {1.23456789, "%#v", "unit.Mole(1.23456789)"},
 {1.23456789, "%s", "%!s(unit.Mole=1.23456789 mol)"},
 } {
 got := fmt.Sprintf(test.format, test.value)
 if got != test.want {
 t.Errorf("Format %q %v: got: %q want: %q", test.format, float64(test.value), got, test.want)
 }
 }
}

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// license that can be found in the LICENSE file.

package testblas

import (
 "gonum.org/v1/gonum/blas"
 "gonum.org/v1/gonum/floats"
)

type Dtpsver interface {
 Dtpsv(ul blas.Uplo, tA blas.Transpose, d blas.Diag, n int, ap []float64, x []float64, incX int)
}

func DtpsvTest(t *testing.T, blasser Dtpsver) {
 for i, test := range []struct {

```



```

n int
a [][]float64
ul blas.Uplo
tA blas.Transpose
d blas.Diag
x []float64
ans []float64
}{
{
n: 3,
a: [][]float64{
{1, 2, 3},
{0, 8, 15},
{0, 0, 8},
},
ul: blas.Upper,
tA: blas.NoTrans,
d: blas.NonUnit,
x: []float64{5, 6, 7},
ans: []float64{4.15625, -0.890625, 0.875},
},
{
n: 3,
a: [][]float64{
{1, 2, 3},
{0, 1, 15},
{0, 0, 1},
},
ul: blas.Upper,
tA: blas.NoTrans,
d: blas.Unit,
x: []float64{5, 6, 7},
ans: []float64{182,
-99, 7},
},
{
n: 3,
a: [][]float64{
{1, 0, 0},
{2, 8, 0},
{3, 15, 8},
},
ul: blas.Lower,
tA: blas.NoTrans,
d: blas.NonUnit,
x: []float64{5, 6, 7},
ans: []float64{5, -0.5, -0.0625},
},

```

```

{
 n: 3,
 a: [][]float64{
 {1, 0, 0},
 {2, 8, 0},
 {3, 15, 8},
 },
 ul: blas.Lower,
 tA: blas.NoTrans,
 d: blas.Unit,
 x: []float64{5, 6, 7},
 ans: []float64{5, -4, 52},
},
{
 n: 3,
 a: [][]float64{
 {1, 2, 3},
 {0, 8, 15},
 {0, 0, 8},
 },
 ul: blas.Upper,
 tA: blas.Trans,
 d: blas.NonUnit,
 x: []float64{5, 6, 7},
 ans: []float64{5, -0.5, -0.0625},
},
{
 n: 3,
 a: [][]float64{
 {1, 2, 3},
 {0, 8, 15},
 {0, 0, 8},
 },
 ul: blas.Upper,
 tA: blas.Trans,
 d: blas.Unit,
 x: []float64{5, 6, 7},
 ans: []float64{5, -4, 52},
},
{
 n: 3,
 a: [][]float64{
 {1, 0, 0},
 {2, 8, 0},
 {3, 15, 8},
 },
 ul: blas.Lower,
 tA: blas.Trans,

```

```
d: blas.NonUnit,
x: []float64{5, 6, 7},
ans: []float64{4.15625, -0.890625, 0.875},
},
{
n: 3,
a: [][]float64{{
 {1, 0, 0},
 {2, 1, 0},
 {3, 15, 1},
}},
ul: blas.Lower,
tA: blas.Trans,
d: blas.Unit,
x: []float64{5, 6, 7},
ans: []float64{182, -99, 7},
},
} {

incTest := func(incX, extra int) {
 aFlat := flattenTriangular(test.a, test.ul)
 x := makeIncremented(test.x, incX, extra)
 blasser.Dtpsv(test.ul, test.tA, test.d, test.n, aFlat, x, incX)
 ans := makeIncremented(test.ans, incX, extra)
 if !floats.EqualApprox(x, ans, 1e-14) {
 t.Errorf("Case %v, incX = %v: Want %v, got %v.", i, incX, ans, x)
 }
}

incTest(1, 0)
incTest(-2, 0)
incTest(3, 0)
incTest(-3, 8)
incTest(4, 2)
}
}

graph{NO}

graph{{{STRE{STRE}}STRE{{{STRE{STRE}}STRE{STRE}}}}}
graph{{{dig{dig}}}}
graph{SUBh{SUBo}{SUBo}}
graph{<NNNNNN>}
graph{{gr{{gr}{gr}{gr}}gr{{gr}{gr}{gr}}gr}}
graph{{{{SUB{{{SUB}}SUB}}}}{{{{SUB}}SUB}}{SUB{{{SUB}}SUB}}>{{SUB{{SUB}}SUB}}{SUB{{{S
UB}}SUB{{{}}}{SUB{{{}}}}SUB{{{SUB}}}}}}{{{{{}}}}{{{{{}}}}{>{{{{{}}}}>{{{{{}}}}}}}}}}
}}
graph{Strir{Strit}}
graph{subGraA{{subGraA{subGraB}}{subGraA{subGraB}}GraB}GraB}}
graph{{""_3_3VO1_1wgYc8kRij8q8_1PyG1YO0_iryntlS5u4T4zbq9VH7G1_ZAB_8tO9W}""_3_3VO1_1wgYc
8kRij8q8_1PyG1YO0_iryntlS5u4T4zbq9VH7G1_ZAB_8tO9W}""_3_3VO1_1wgYc8kRij8q8_1PyG1YO0_iryntl
```



```

var nn int
var t float64
for {
 if n0 < i0 {
 return i0, n0, pp, dmin, sigma, desig, qmax, nFail, iter, nDiv, ttype, dmin1, dmin2, dn, dn1, dn2, g, tau
 }
 if n0 == i0 {
 z[4*(n0+1)-4] = z[4*(n0+1)+pp-4] + sigma
 n0--
 continue
 }
 nn = 4*(n0+1) + pp - 1
 if n0 != i0+1 {
 // Check whether e[n0-1] is negligible, 1 eigenvalue.
 if z[nn-5] > tol2*(sigma+z[nn-3]) && z[nn-2*pp-4] > tol2*z[nn-7] {
 // Check whether e[n0-2] is negligible, 2 eigenvalues.
 if z[nn-9] > tol2*sigma && z[nn-2*pp-8] > tol2*z[nn-11] {
 break
 }
 } else {
 z[4*(n0+1)-4] = z[4*(n0+1)+pp-4] + sigma
 n0--
 continue
 }
 }
 if z[nn-3] > z[nn-7] {
 z[nn-3], z[nn-7] = z[nn-7], z[nn-3]
 }
 t = 0.5 * (z[nn-7] - z[nn-3] + z[nn-5])
 if z[nn-5] > z[nn-3]*tol2 && t != 0 {
 s := z[nn-3] * (z[nn-5] / t)
 if s <= t {
 s = z[nn-3] * (z[nn-5] / (t * (1 + math.Sqrt(1+s/t))))
 } else {
 s = z[nn-3] * (z[nn-5] / (t + math.Sqrt(t)*math.Sqrt(t+s)))
 }
 }
 t
 = z[nn-7] + (s + z[nn-5])
 z[nn-3] *= z[nn-7] / t
 z[nn-7] = t
}
z[4*(n0+1)-8] = z[nn-7] + sigma
z[4*(n0+1)-4] = z[nn-3] + sigma
n0 -= 2
}
if pp == 2 {
 pp = 0
}

```

```

// Reverse the qd-array, if warranted.
if dmin <= 0 || n0 < n0in {
 if cbias*z[4*(i0+1)+pp-4] < z[4*(n0+1)+pp-4] {
 ipn4Out := 4 * (i0 + n0 + 2)
 for j4loop := 4 * (i0 + 1); j4loop <= 2*((i0+1)+(n0+1)-1); j4loop += 4 {
 ipn4 := ipn4Out - 1
 j4 := j4loop - 1

 z[j4-3], z[ipn4-j4-4] = z[ipn4-j4-4], z[j4-3]
 z[j4-2], z[ipn4-j4-3] = z[ipn4-j4-3], z[j4-2]
 z[j4-1], z[ipn4-j4-6] = z[ipn4-j4-6], z[j4-1]
 z[j4], z[ipn4-j4-5] = z[ipn4-j4-5], z[j4]
 }
 if n0-i0 <= 4 {
 z[4*(n0+1)+pp-2] = z[4*(i0+1)+pp-2]
 z[4*(n0+1)-pp-1] = z[4*(i0+1)-pp-1]
 }
 dmin2 = math.Min(dmin2, z[4*(i0+1)-pp-2])
 z[4*(n0+1)+pp-2] = math.Min(math.Min(z[4*(n0+1)+pp-2], z[4*(i0+1)+pp-2]), z[4*(i0+1)+pp+2])
 z[4*(n0+1)-pp-1] = math.Min(math.Min(z[4*(n0+1)-pp-1], z[4*(i0+1)-pp-1]), z[4*(i0+1)-pp+3])
 qmax
 = math.Max(math.Max(qmax, z[4*(i0+1)+pp-4]), z[4*(i0+1)+pp])
 dmin = math.Copysign(0, -1) // Fortran code has -zero, but -0 in go is 0
 }
}

// Choose a shift.
tau, ttype, g = impl.Dlasq4(i0, n0, z, pp, n0in, dmin, dmin1, dmin2, dn, dn1, dn2, tau, ttype, g)

// Call dqds until dmin > 0.
loop:
for {
 i0, n0, pp, tau, sigma, dmin, dmin1, dmin2, dn, dn1, dn2 = impl.Dlasq5(i0, n0, z, pp, tau, sigma)

 nDiv += n0 - i0 + 2
 iter++
 switch {
 case dmin >= 0 && dmin1 >= 0:
 // Success.
 goto done

 case dmin < 0 && dmin1 > 0 && z[4*n0-pp-1] < tol*(sigma+dn1) && math.Abs(dn) < tol*sigma:
 // Convergence hidden by negative dn.
 z[4*n0-pp+1] = 0
 dmin = 0
 goto done

```

```

case dmin < 0:
 // Tau too big. Select new Tau and try again.
 nFail++
 if ttype < -22 {
 // Failed twice. Play it safe.
 tau = 0
 } else if dmin1 > 0 {
 // Late failure. Gives excellent shift.
 tau = (tau + dmin) * (1 - 2*eps)
 ttype -= 11
 } else {
 // Early failure.
 Divide by 4.
 tau = tau / 4
 ttype -= 12
 }

case math.IsNaN(dmin):
 if tau == 0 {
 break loop
 }
 tau = 0

default:
 // Possible underflow. Play it safe.
 break loop
}

// Risk of underflow.
dmin, dmin1, dmin2, dn, dn1, dn2 = impl.Dlasq6(i0, n0, z, pp)
nDiv += n0 - i0 + 2
iter++
tau = 0

done:
if tau < sigma {
 desig += tau
 t = sigma + desig
 desig -= t - sigma
} else {
 t = sigma + tau
 desig += sigma - (t - tau)
}
sigma = t
return i0, n0, pp, dmin, sigma, desig, qmax, nFail, iter, nDiv, ttype, dmin1, dmin2, dn, dn1, dn2, g, tau
}

```

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package graphql

graph{{ {Edga}Edga}Edga}

graph ER{node[]stu node[e=e]{node[l=""]ne ne ne}grae nu node[e=d,sty=d,r=y]""""""ne--e--e--""[l=""n=1.00]""--  
e[l=""n=1.00]e--ne--""[l=""n=1.00]""--stu[l=""n=1.00]stu--grae stu--ne stu--nu stu--""[l=""n=1.00]""--  
e[l=""n=1.00]l""}

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package gonum

import (

"sort"

"gonum.org/v1/gonum/lapack"

)

// Dlasrt sorts the numbers in the input slice d. If s == lapack.SortIncreasing,

// the elements are sorted in increasing order. If s == lapack.SortDecreasing,

// the elements are sorted in decreasing order. For other values of s Dlasrt

// will panic.

//

// Dlasrt is an internal routine. It is exported for testing purposes.

func (impl Implementation) Dlasrt(s lapack.Sort, n int, d []float64) {

switch {

case n < 0:

panic(nLT0)

case len(d) < n:

panic(shortD)

}

d = d[:n]

switch s {

default:

panic(badSort)

case lapack.SortIncreasing:

sort.Float64s(d)

case lapack.SortDecreasing:

sort.Sort(sort.Reverse(sort.Float64Slice(d)))

}

}

// SPDX-License-Identifier: Unlicense OR MIT

package text



```

import (
 "gioui.org/op"
 "golang.org/x/image/math/fixed"
)

type layoutCache struct {
 m map[layoutKey]*layoutElem
 head, tail *layoutElem
}

type pathCache struct {
 m map[pathKey]*path
 head, tail *path
}

type layoutElem struct {
 next, prev *layoutElem
 key layoutKey
 layout *Layout
}

type path struct {
 next, prev *path
 key pathKey
 val op.CallOp
}

type layoutKey struct {
 ppem fixed.Int26_6
 str string
 opts LayoutOptions
}

type pathKey struct {
 ppem fixed.Int26_6
 str string
}

const maxSize = 1000

func (l *layoutCache) Get(k layoutKey) (*Layout, bool) {
 if lt, ok := l.m[k]; ok {
 l.remove(lt)
 l.insert(lt)
 return lt.layout, true
 }
 return nil, false
}

```

```

}

func (l *layoutCache) Put(k layoutKey, lt *Layout) {
 if l.m == nil {
 l.m = make(map[layoutKey]*layoutElem)
 l.head = new(layoutElem)
 l.tail = new(layoutElem)
 l.head.prev = l.tail
 l.tail.next = l.head
 }
 val
 := &layoutElem{key: k, layout: lt}
 l.m[k] = val
 l.insert(val)
 if len(l.m) > maxSize {
 oldest := l.tail.next
 l.remove(oldest)
 delete(l.m, oldest.key)
 }
}

func (l *layoutCache) remove(lt *layoutElem) {
 lt.next.prev = lt.prev
 lt.prev.next = lt.next
}

func (l *layoutCache) insert(lt *layoutElem) {
 lt.next = l.head
 lt.prev = l.head.prev
 lt.prev.next = lt
 lt.next.prev = lt
}

func (c *pathCache) Get(k pathKey) (op.CallOp, bool) {
 if v, ok := c.m[k]; ok {
 c.remove(v)
 c.insert(v)
 return v.val, true
 }
 return op.CallOp{}, false
}

func (c *pathCache) Put(k pathKey, v op.CallOp) {
 if c.m == nil {
 c.m = make(map[pathKey]*path)
 c.head = new(path)
 c.tail = new(path)
 c.head.prev = c.tail
 }
}

```

```

 c.tail.next = c.head
}
val := &path{key: k, val: v}
c.m[k] = val
c.insert(val)
if len(c.m) > maxSize {
 oldest := c.tail.next
 c.remove(oldest)
 delete(c.m, oldest.key)
}
}

func (c *pathCache) remove(v *path) {
 v.next.prev = v.prev
 v.prev.next = v.next
}

func (c
 *pathCache) insert(v *path) {
 v.next = c.head
 v.prev = c.head.prev
 v.prev.next = v
 v.next.prev = v
}

 SUBROUTINE ZACAI(ZR, ZI, FNU, KODE, MR, N, YR, YI, NZ, RL, TOL,
 * ELIM, ALIM)
C***BEGIN PROLOGUE ZACAI
C***REFER TO ZAIRY
C
C ZACAI APPLIES THE ANALYTIC CONTINUATION FORMULA
C
C K(FNU,ZN*EXP(MP))=K(FNU,ZN)*EXP(-MP*FNU) - MP*I(FNU,ZN)
C MP=PI*MR*CMPLX(0.0,1.0)
C
C TO CONTINUE THE K FUNCTION FROM THE RIGHT HALF TO THE LEFT
C HALF Z PLANE FOR USE WITH ZAIRY WHERE FNU=1/3 OR 2/3 AND N=1.
C ZACAI IS THE SAME AS ZACON WITH THE PARTS FOR LARGER ORDERS AND
C RECURRENCE REMOVED. A RECURSIVE CALL TO ZACON CAN RESULT IF ZACON
C IS CALLED FROM ZAIRY.
C
C***ROUTINES CALLED ZASYI,ZBKNU,ZMLRI,ZSERI,ZS1S2,D1MACH,ZABS
C***END PROLOGUE ZACAI
C COMPLEX CSGN,CSPN,C1,C2,Y,Z,ZN,CY
 DOUBLE PRECISION ALIM, ARG, ASCLE, AZ, CSGNR, CSGNI, CSPNR,
 * CSPNI, C1R, C1I, C2R, C2I, CYR, CYI, DFNU, ELIM, FMR, FNU, PI,
 * RL, SGN, TOL, YY, YR, YI, ZR, ZI, ZNR, ZNI, D1MACH, ZABS
 INTEGER INU, IUF, KODE, MR, N, NN, NW, NZ
 DIMENSION YR(N),

```

```

YI(N), CYR(2), CYI(2)
DATA PI / 3.14159265358979324D0 /
NZ = 0
ZNR = -ZR
ZNI = -ZI
AZ = ZABS(CMPLX(ZR,ZI,kind=KIND(1.0D0)))
NN = N
DFNU = FNU + DBLE(FLOAT(N-1))
IF (AZ.LE.2.0D0) GO TO 10
IF (AZ*AZ*0.25D0.GT.DFNU+1.0D0) GO TO 20
10 CONTINUE
C-----
C POWER SERIES FOR THE I FUNCTION
C-----
CALL ZSERI(ZNR, ZNI, FNU, KODE, NN, YR, YI, NW, TOL, ELIM, ALIM)
GO TO 40
20 CONTINUE
IF (AZ.LT.RL) GO TO 30
C-----
C ASYMPTOTIC EXPANSION FOR LARGE Z FOR THE I FUNCTION
C-----
CALL ZASYI(ZNR, ZNI, FNU, KODE, NN, YR, YI, NW, RL, TOL, ELIM,
* ALIM)
IF (NW.LT.0) GO TO 80
GO TO 40
30 CONTINUE
C-----
C
C MILLER ALGORITHM NORMALIZED BY THE SERIES FOR THE I FUNCTION
C-----
CALL ZMLRI(ZNR, ZNI, FNU, KODE, NN, YR, YI, NW, TOL)
IF(NW.LT.0) GO TO 80
40 CONTINUE
C-----
C ANALYTIC CONTINUATION TO THE LEFT HALF PLANE FOR THE K FUNCTION
C-----
CALL ZBKNU(ZNR, ZNI, FNU, KODE, 1, CYR, CYI, NW, TOL, ELIM, ALIM)
IF (NW.NE.0) GO TO 80
FMR = DBLE(FLOAT(MR))
SGN = -DSIGN(PI,FMR)
CSGMR = 0.0D0
CSGNI = SGN
IF (KODE.EQ.1) GO TO 50
YY = -ZNI
CSGMR = -CSGNI*DSIN(YY)
CSGNI = CSGNI*DCOS(YY)
50 CONTINUE
C-----

```

C CALCULATE CSPN=EXP(FNU\*PI\*I) TO MINIMIZE LOSSES OF SIGNIFICANCE

C WHEN FNU IS LARGE

C-----

INU = INT(SNGL(FNU))

ARG = (FNU-DBLE(FLOAT(INU)))\*SGN

CSPNR = DCOS(ARG)

CSPNI = DSIN(ARG)

IF (MOD(INU,2).EQ.0) GO TO 60

CSPNR = -CSPNR

CSPNI = -CSPNI

60 CONTINUE

C1R = CYR(1)

C1I = CYI(1)

C2R = YR(1)

C2I = YI(1)

IF (KODE.EQ.1) GO TO 70

IUF = 0

ASCLE = 1.0D+3\*D1MACH(1)/TOL

CALL ZS1S2(ZNR, ZNI, C1R, C1I, C2R, C2I, NW, ASCLE, ALIM, IUF)

NZ = NZ + NW

70 CONTINUE

YR(1) = CSPNR\*C1R - CSPNI\*C1I + CSGNR\*C2R - CSGNI\*C2I

YI(1) = CSPNR\*C1I + CSPNI\*C1R + CSGNR\*C2I + CSGNI\*C2R

RETURN

80 CONTINUE

NZ = -1

IF(NW.EQ.(-2)) NZ=-2

RETURN

END

graph{{{{{{subGn}subGc}}}}}

graph{{DiGra{DiGra}DiGra}}

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// Package util provides generated internal utility functions for DOT parsing.

package util // import "gonum.org/v1/gonum/graph/formats/dot/internal/util"

Graph{{gr4}gr7{{{{gr4}gr7}}}}

graph{e[l=<<D>b<D>|<">a<D>b<D>|<D>c>]}

graph{"\\\\"}

graph{EDG}

graph{{Dl{{Ds{Ds}}Ds{Ds}}}}

graph{{{{dn do}dn{dn do}do}dn{dn do}}}

graph{{dig\_}dig\_}

program testdsterf

implicit none

integer, parameter :: n = 4

real(kind=8), dimension(n) :: d

```

real(kind=8), dimension(n-1) :: e
integer :: info,i

d(1:4) = (/1D+00, 3D+00, 4D+00, 6D+00/)
e(1:3) = (/2D+00, 4D+00, 5D+00/)

call dsterf(n,d,e,info)
DO i = 1, n
 print *, d(i)
end do
end

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package testlapack

import (
 "fmt"
 "strings"
)

// This file implements types for helping to convert to Fortran testing capabilities.

// fortran64 is a float64 type that prints as a double precision constant in
// Fortran format.
type fortran64 float64

func (f fortran64) String() string {
 // Replace exponent with D
 s := fmt.Sprintf("%0.16E", f)
 s = strings.Replace(s, "E", "D", 1)
 return s
}

// printFortranArray prints a Go slice as an array that can be copied into a
// fortran script.
func printFortranArray(z []float64, name string) {
 fmt.Printf("%s(1:%d) = (/ %v, &\n", name, len(z), fortran64(z[0]))
 for i := 1; i < len(z)-1; i++ {
 fmt.Printf("%v, &\n", fortran64(z[i]))
 }
 fmt.Printf("%s/)\n", fortran64(z[len(z)-1]))
}

// Code generated by "go generate gonum.org/v1/gonum/unit/constant; DO NOT EDIT.

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```

```

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package constant

import (
 "fmt"

 "gonum.org/v1/gonum/unit"
)

// Gravitational is the universal gravitational constant (G), the proportionality constant connecting the gravitational
// force between two bodies.
// The dimensions of Gravitational are m^3 kg^-1 s^-2. The standard uncertainty of the constant is 1.5e-15 m^3 kg^-
// 1 s^-2.
const Gravitational = gravitationalUnits(6.6743e-11)

type gravitationalUnits float64

// Unit converts the gravitationalUnits to a *unit.Unit
func (cnst gravitationalUnits) Unit() *unit.Unit {
 return unit.New(float64(cnst), unit.Dimensions{
 unit.MassDim: -1,
 unit.LengthDim: 3,
 unit.TimeDim: -2,
 })
}

func (cnst gravitationalUnits) Format(fs fmt.State, c rune) {
 switch c {
 case 'v':
 if fs.Flag('#') {
 fmt.Fprintf(fs,
 "%T(%v)", cnst, float64(cnst))
 return
 }
 fallthrough
 case 'e', 'E', 'f', 'F', 'g', 'G':
 p, pOk := fs.Precision()
 w, wOk := fs.Width()
 switch {
 case pOk && wOk:
 fmt.Fprintf(fs, "%*.*"+string(c), w, p, cnst.Unit())
 case pOk:
 fmt.Fprintf(fs, "%.*"+string(c), p, cnst.Unit())
 case wOk:
 fmt.Fprintf(fs, "%*"+string(c), w, cnst.Unit())
 default:
 fmt.Fprintf(fs, "%"+string(c), cnst.Unit())
 }
 }
}

```

```

}
default:
 fmt.Fprintf(fs, "%%!"+string(c)+"(constant.gravitationalUnits=%v m^3 kg^-1 s^-2)", float64(cnst))
}
}
graph{{digu}{digu}}
graph{.5[h=.1t=.1t=.1t=.1t=.5]}
graph{diGrapS{{{diGrapC}diGrapS}}{{{diGrapC}diGrapS}}diGrapS}}
graph{{GRA}GRA}
graph{{_}_}
graph{subGrap{{{subGrap}}}}
graph{{ed}}
graph{{SUq}SUh{{SUq}SUf}SUh{{SUq}SUf{{SUq}SUq}}
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package gonum

import "gonum.org/v1/gonum/blas/blas64"

// Dlaswp swaps the rows k1 to k2 of a rectangular matrix A according to the
// indices in ipiv so that row k is swapped with ipiv[k].
//
// n is the number of columns of A and incX is the increment for ipiv. If incX
// is 1, the swaps are applied from k1 to k2. If incX is -1, the swaps are
// applied in reverse order from k2 to k1. For other values of incX Dlaswp will
// panic. ipiv must have length k2+1, otherwise Dlaswp will panic.
//
// The indices k1, k2, and the elements of ipiv are zero-based.
//
// Dlaswp is an internal routine. It is exported for testing purposes.
func (impl Implementation) Dlaswp(n int, a []float64, lda int, k1, k2 int, ipiv []int, incX int) {
 switch {
 case n < 0:
 panic(nLT0)
 case k2 < 0:
 panic(badK2)
 case k1 < 0 || k2 < k1:
 panic(badK1)
 case
 lda < max(1, n):
 panic(badLdA)
 case len(a) < (k2-1)*lda+n:
 panic(shortA)
 case len(ipiv) != k2+1:
 panic(badLenIpriv)
 case incX != 1 && incX != -1:

```



```

 panic(absIncNotOne)
}

if n == 0 {
 return
}

bi := blas64.Implementation()
if incX == 1 {
 for k := k1; k <= k2; k++ {
 bi.Dswap(n, a[k*lda:], 1, a[ipiv[k]*lda:], 1)
 }
 return
}
for k := k2; k >= k1; k-- {
 bi.Dswap(n, a[k*lda:], 1, a[ipiv[k]*lda:], 1)
}
}

// Code generated by "go generate gonum.org/v1/gonum/unit; DO NOT EDIT.

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// license that can be found in the LICENSE file.

package unit

import (
 "errors"
 "fmt"
 "math"
 "unicode/utf8"
)

// Force represents a force in Newtons.
type Force float64

const Newton Force = 1

// Unit converts the Force to a *Unit
func (f Force) Unit() *Unit {
 return New(float64(f), Dimensions{
 LengthDim: 1,
 MassDim: 1,
 TimeDim: -2,
 })
}

// Force allows Force to implement a Forcer interface

```

```

func (f Force) Force() Force {
 return f
}

// From converts the unit into the receiver. From returns an
// error if there is a mismatch in dimension
func (f *Force) From(u Uniter) error {
 if !DimensionsMatch(u, Newton) {
 *f = Force(math.NaN())
 return errors.New("Dimension mismatch")
 }
 *f = Force(u.Unit().Value())
 return nil
}

func (f Force) Format(fs fmt.State, c rune) {
 switch c {
 case
 'v':
 if fs.Flag('#') {
 fmt.Fprintf(fs, "%T(%v)", f, float64(f))
 return
 }
 fallthrough
 case 'e', 'E', 'f', 'F', 'g', 'G':
 p, pOk := fs.Precision()
 w, wOk := fs.Width()
 const unit = " N"
 switch {
 case pOk && wOk:
 fmt.Fprintf(fs, "%*.*"+string(c), pos(w-utf8.RuneCount([]byte(unit))), p, float64(f))
 case pOk:
 fmt.Fprintf(fs, "%*.*"+string(c), p, float64(f))
 case wOk:
 fmt.Fprintf(fs, "%*"+string(c), pos(w-utf8.RuneCount([]byte(unit))), float64(f))
 default:
 fmt.Fprintf(fs, ""+string(c), float64(f))
 }
 fmt.Fprint(fs, unit)
 default:
 fmt.Fprintf(fs, "%%!%c(%T=%g N)", c, f, float64(f))
 }
}

graph{{DiGrC}DiGrG}{DiGrC}}
graph{{sub_}{sub_}{sub_{sub_}{sub_}{sub_}}}
Graph{subgra4{subgra4}}
graph{"\"k\\}\"k\\t"}

```

```

graph{{STV}STV{STV}STV}
graph{{n_{n_{n_}n_{n_}{n_}{n_}n_{n_}{n_}}
graph{{{EDGv{EDGv{{EDGy}}}}}}}
digraph {
 A [name="hello \
world"]
}
graph{NOA}
digraph{5:n ->6:n ->3[l=""]l=""]l=""]l=""]l=""]0->1:n 0->2:n 0->3:n 0->4:n 0->5:n ->6:n ->7:n}
graph{{EDG{EDG}EDG{EDG}{EDG}EDG{EDG}{EDG{EDG}}}}
graph{Edgh}
graph{{{StriG}{StriG}{StriG}{StriG}}}StriC}
// Code generated by "go generate gonum.org/v1/gonum/unit; DO NOT EDIT.

```

```

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```

```

package unit

```

```

import (
 "errors"
 "fmt"
 "math"
 "unicode/utf8"
)

```

```

// Temperature represents a temperature in Kelvin.
type Temperature float64

```

```

const Kelvin Temperature = 1

```

```

// Unit converts the Temperature to a *Unit
func (t Temperature) Unit() *Unit {
 return New(float64(t), Dimensions{
 TemperatureDim: 1,
 })
}

```

```

// Temperature allows Temperature to implement a Temperatuer interface
func (t Temperature) Temperature() Temperature {
 return t
}

```

```

// From converts the unit into the receiver. From returns an
// error if there is a mismatch in dimension
func (t *Temperature) From(u Uniter) error {
 if !DimensionsMatch(u, Kelvin) {

```

```

*t = Temperature(math.NaN())
return errors.New("Dimension mismatch")
}
*t = Temperature(u.Unit().Value())
return nil
}

func
(t Temperature) Format(fs fmt.State, c rune) {
switch c {
case 'v':
if fs.Flag('#') {
fmt.Fprintf(fs, "%T(%v)", t, float64(t))
return
}
fallthrough
case 'e', 'E', 'f', 'F', 'g', 'G':
p, pOk := fs.Precision()
w, wOk := fs.Width()
const unit = " K"
switch {
case pOk && wOk:
fmt.Fprintf(fs, "%*.*"+string(c), pos(w-utf8.RuneCount([]byte(unit))), p, float64(t))
case pOk:
fmt.Fprintf(fs, "%.*"+string(c), p, float64(t))
case wOk:
fmt.Fprintf(fs, "%*"+string(c), pos(w-utf8.RuneCount([]byte(unit))), float64(t))
default:
fmt.Fprintf(fs, "%"+string(c), float64(t))
}
fmt.Fprint(fs, unit)
default:
fmt.Fprint(fs, "%%!%c(%T=%g K)", c, t, float64(t))
}
}
graph{{DIGRA}}{DIGRA}{DIGRA}{DIGRA}{DIGRA}{DIGRA}}
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package testblas

import (
"testing"

"golang.org/x/exp/rand"
)

```

```

type Izamaxer interface {
 Izamax(n int, x []complex128, incX int) int
}

func IzamaxTest(t *testing.T, impl Izamaxer) {
 rnd := rand.New(rand.NewSource(1))
 for _, n := range []int{0, 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 50, 100} {
 for _, incX := range []int{-5, 1, 2, 10} {
 aincX := abs(incX)
 var x []complex128
 if n > 0 {
 x = make([]complex128, (n-1)*aincX+1)
 }
 for i := range x {
 x[i] = znan
 }
 for i := 0; i < n; i++ {
 re := 2*rnd.Float64() - 1
 im := 2*rnd.Float64() - 1
 x[i*aincX] = complex(re, im)
 }

 want := -1
 if incX > 0 && n > 0 {
 want = rnd.Intn(n)
 x[want*incX] = 10 + 10i
 }
 got := impl.Izamax(n, x, incX)

 if got != want {
 t.Errorf("Case n=%v,incX=%v: unexpected result. want %v, got %v", n, incX, want, got)
 }
 }
 }
}

graph{{DigrapC{}}DigrapD}DigrapC}
graph{{Dli}}
graph{{{SubGrapp{{{SubGrapu}}}}}
graph{Edge[]{{{Edge[]{{Edge[]{{Edge[]}}Edge[]}}{Edge[]{{Edge[]}}Edge[]}}Edge[]}}}}
graph{subg}
// SPDX-License-Identifier: Unlicense OR MIT

package paint

import (
 "encoding/binary"
 "image"

```

```

"image/color"
"image/draw"
"math"

"gioui.org/f32"
"gioui.org/internal/opconst"
"gioui.org/op"
)

// ImageOp sets the material to an image.
type ImageOp struct {
 uniform bool
 color color.RGBA
 src *image.RGBA

 // handle is a key to uniquely identify this ImageOp
 // in a map of cached textures.
 handle interface{}
}

// ColorOp sets the material to a constant color.
type ColorOp struct {
 Color color.RGBA
}

// PaintOp draws the current material, respecting the
// clip path and transformation.
type PaintOp struct {
 Rect f32.Rectangle
}

func NewImageOp(src image.Image) ImageOp {
 switch src := src.(type) {
 case *image.Uniform:
 col := color.RGBAModel.Convert(src.C).(color.RGBA)
 return ImageOp{
 uniform: true,
 color: col,
 }
 case *image.RGBA:
 bounds := src.Bounds()
 if bounds.Min == (image.Point{}) && src.Stride == bounds.Dx()*4 {
 return ImageOp{
 src:
 src,
 handle: new(int),
 }
 }
 }
}

```

```

}

sz := src.Bounds().Size()
// Copy the image into a GPU friendly format.
dst := image.NewRGBA(image.Rectangle{
 Max: sz,
})
draw.Draw(dst, src.Bounds(), src, image.Point{}, draw.Src)
return ImageOp{
 src: dst,
 handle: new(int),
}
}

```

```

func (i ImageOp) Size() image.Point {
 if i.src == nil {
 return image.Point{}
 }
 return i.src.Bounds().Size()
}

```

```

func (i ImageOp) Add(o *op.Ops) {
 if i.uniform {
 ColorOp{
 Color: i.color,
 }.Add(o)
 return
 }
 data := o.Write(opconst.TypeImageLen, i.src, i.handle)
 data[0] = byte(opconst.TypeImage)
}

```

```

func (c ColorOp) Add(o *op.Ops) {
 data := o.Write(opconst.TypeColorLen)
 data[0] = byte(opconst.TypeColor)
 data[1] = c.Color.R
 data[2] = c.Color.G
 data[3] = c.Color.B
 data[4] = c.Color.A
}

```

```

func (d PaintOp) Add(o *op.Ops) {
 data := o.Write(opconst.TypePaintLen)
 data[0] = byte(opconst.TypePaint)
 bo := binary.LittleEndian
 bo.PutUint32(data[1:], math.Float32bits(d.Rect.Min.X))
 bo.PutUint32(data[5:],

```

```

math.Float32bits(d.Rect.Min.Y))
bo.PutUint32(data[9:], math.Float32bits(d.Rect.Max.X))
bo.PutUint32(data[13:], math.Float32bits(d.Rect.Max.Y))
}
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```

```

package dual

```

```

import "math"

```

```

// Sinh returns the hyperbolic sine of d.

```

```

//

```

```

// Special cases are:

```

```

// Sinh(0) = (0+N)

```

```

// Sinh(Inf) = Inf

```

```

// Sinh(NaN) = NaN

```

```

func Sinh(d Number) Number {

```

```

 if d.Real == 0 {

```

```

 return Number{

```

```

 Real: d.Real,

```

```

 Emag: d.Emag,

```

```

 }

```

```

 }

```

```

 if math.IsInf(d.Real, 0) {

```

```

 return Number{

```

```

 Real: d.Real,

```

```

 Emag: math.Inf(1),

```

```

 }

```

```

 }

```

```

 fn := math.Sinh(d.Real)

```

```

 deriv := math.Cosh(d.Real)

```

```

 return Number{

```

```

 Real: fn,

```

```

 Emag: deriv * d.Emag,

```

```

 }

```

```

}

```

```

// Cosh returns the hyperbolic cosine of d.

```

```

//

```

```

// Special cases are:

```

```

// Cosh(0) = 1

```

```

// Cosh(Inf) = +Inf

```

```

// Cosh(NaN) = NaN

```

```

func Cosh(d Number) Number {

```

```

 if math.IsInf(d.Real, 0) {

```

```

 return Number{

```



```

 Real: math.Inf(1),
 Emag: d.Real,
 }
}
fn := math.Cosh(d.Real)
deriv := math.Sinh(d.Real)
return Number{
 Real: fn,
 Emag: deriv * d.Emag,
}
}

```

// Tanh returns the hyperbolic  
tangent of d.

```

//
// Special cases are:
// Tanh(0) = (0+N)
// Tanh(Inf) = (1+0)
// Tanh(NaN) = NaN
func Tanh(d Number) Number {
 switch d.Real {
 case 0:
 return Number{
 Real: d.Real,
 Emag: d.Emag,
 }
 case math.Inf(1):
 return Number{
 Real: 1,
 Emag: 0,
 }
 case math.Inf(-1):
 return Number{
 Real: -1,
 Emag: 0,
 }
 }
 fn := math.Tanh(d.Real)
 deriv := 1 - fn*fn
 return Number{
 Real: fn,
 Emag: deriv * d.Emag,
 }
}

```

// Asinh returns the inverse hyperbolic sine of d.

```

//
// Special cases are:

```

```

// Asinh(0) = (0+N)
// Asinh(Inf) = Inf
// Asinh(NaN) = NaN
func Asinh(d Number) Number {
 if d.Real == 0 {
 return Number{
 Real: d.Real,
 Emag: d.Emag,
 }
 }
 fn := math.Asinh(d.Real)
 deriv := 1 / math.Sqrt(d.Real*d.Real+1)
 return Number{
 Real: fn,
 Emag: deriv * d.Emag,
 }
}

// Acosh returns the inverse hyperbolic cosine of d.
//
// Special cases are:
// Acosh(+Inf) = +Inf
// Acosh(1) = (0+Inf)
// Acosh(x) = NaN if x < 1
// Acosh(NaN) = NaN
func Acosh(d
Number) Number {
 if d.Real <= 1 {
 if d.Real == 1 {
 return Number{
 Real: 0,
 Emag: math.Inf(1),
 }
 }
 }
 return Number{
 Real: math.NaN(),
 Emag: math.NaN(),
 }
}
fn := math.Acosh(d.Real)
deriv := 1 / math.Sqrt(d.Real*d.Real-1)
return Number{
 Real: fn,
 Emag: deriv * d.Emag,
}
}

// Atanh returns the inverse hyperbolic tangent of d.

```

```

//
// Special cases are:
// Atanh(1) = +Inf
// Atanh(0) = (0+N)
// Atanh(-1) = -Inf
// Atanh(x) = NaN if x < -1 or x > 1
// Atanh(NaN) = NaN
func Atanh(d Number) Number {
 if d.Real == 0 {
 return Number{
 Real: d.Real,
 Emag: d.Emag,
 }
 }
 if math.Abs(d.Real) == 1 {
 return Number{
 Real: math.Inf(int(d.Real)),
 Emag: math.NaN(),
 }
 }
 fn := math.Atanh(d.Real)
 deriv := 1 / (1 - d.Real*d.Real)
 return Number{
 Real: fn,
 Emag: deriv * d.Emag,
 }
}

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package gonum

import "gonum.org/v1/gonum/blas"

// Dgeqr2 computes a QR factorization of the mn matrix A.
//
// In a QR factorization, Q is an mm orthonormal matrix, and R is an
// upper triangular mn matrix.
//
// A is modified to contain the information to construct Q and R.
// The upper triangle of a contains the matrix R. The lower triangular elements
// (not including the diagonal) contain the elementary reflectors. tau is modified
// to contain the reflector scales. tau must have length at least min(m,n), and
// this function will panic otherwise.
//
// The ith elementary reflector can be explicitly constructed by first extracting
// the

```

```

// v[j] = 0 j < i
// v[j] = 1 j == i
// v[j] = a[j*lda+i] j > i
// and computing H_i = I - tau[i] * v * v.
//
// The orthonormal matrix Q can be constructed from
// a product of these elementary
// reflectors, Q = H_0 * H_1 * ... * H_{k-1}, where k = min(m,n).
//
// work is temporary storage of length at least n and this function will panic otherwise.
//
// Dgeqr2 is an internal routine. It is exported for testing purposes.
func (impl Implementation) Dgeqr2(m, n int, a []float64, lda int, tau, work []float64) {
 // TODO(btracey): This is oriented such that columns of a are eliminated.
 // This likely could be re-arranged to take better advantage of row-major
 // storage.

 switch {
 case m < 0:
 panic(mLT0)
 case n < 0:
 panic(nLT0)
 case lda < max(1, n):
 panic(badLdA)
 case len(work) < n:
 panic(shortWork)
 }

 // Quick return if possible.
 k := min(m, n)
 if k == 0 {
 return
 }

 switch {
 case len(a) < (m-1)*lda+n:
 panic(shortA)
 case len(tau) < k:
 panic(shortTau)
 }

 for i := 0; i < k; i++ {
 // Generate elementary reflector H_i.
 a[i*lda+i], tau[i] = impl.Dlarfg(m-i, a[i*lda+i], a[min((i+1), m-1)*lda+i:], lda)
 if i < n-1 {
 aii
 := a[i*lda+i]
 a[i*lda+i] = 1

```

```

impl.Dlarf(blas.Left, m-i, n-i-1,
a[i*lda+i:], lda,
tau[i],
a[i*lda+i+1:], lda,
work)
a[i*lda+i] = aii
}
}
}
graph{Stt{{Stt{St}{St}}}
graph{{{grap{{{grap}}}grap{}grap{{{grap}}}}}
graph{{{Sub1}{Sub1}{Sub1}{Sub1}{Sub1}{Sub1}{Sub1}Sub5}{Sub1}{Sub1}}
graph{{DigV}{DigV}{DigV}DigP{DigV}{DigR}{DigV}{DigV}DigP}
graph{{{diGrap}{diGrap}{diGrap}diGrap}{diGrap}{diGrap}{diGrap}diGrap}
graph{STRICS{{{STRICS{STRICI}}}}}
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// license that can be found in the LICENSE file.

package path

import (
"gonum.org/v1/gonum/graph"
"gonum.org/v1/gonum/graph/internal/linear"
)

// BellmanFordFrom returns a shortest-path tree for a shortest path from u to all nodes in
// the graph g, or false indicating that a negative cycle exists in the graph. If the graph
// does not implement Weighted, UniformCost is used.
//
// The time complexity of BellmanFordFrom is O(|V|.|E|).
func BellmanFordFrom(u graph.Node, g graph.Graph) (path Shortest, ok bool) {
if g.Node(u.ID()) == nil {
return Shortest{from: u}, true
}
var weight Weighting
if wg, ok := g.(Weighted); ok {
weight = wg.Weight
} else {
weight = UniformCost(g)
}

nodes := graph.NodesOf(g.Nodes())

path = newShortestFrom(u, nodes)
path.dist[path.indexOf[u.ID()]] = 0

// Queue to keep track which nodes need to be relaxed.

```

```

// Only nodes whose vertex
distance changed in the previous iterations need to be relaxed again.
queue := newBellmanFordQueue(path.indexOf)
queue.enqueue(u)

// The maximum of edges in a graph is $|V| * (|V|-1)$ which is also the worst case complexity.
// If the queue-loop has more iterations than the amount of maximum edges
// it indicates that we have a negative cycle.
maxEdges := len(nodes) * (len(nodes) - 1)
var loops int

// TODO(kortschak): Consider adding further optimisations
// from http://arxiv.org/abs/1111.5414.
for queue.len() != 0 {
 u := queue.dequeue()
 uid := u.ID()
 j := path.indexOf[uid]

 for _, v := range graph.NodesOf(g.From(uid)) {
 vid := v.ID()
 k := path.indexOf[vid]
 w, ok := weight(uid, vid)
 if !ok {
 panic("bellman-ford: unexpected invalid weight")
 }

 joint := path.dist[j] + w
 if joint < path.dist[k] {
 path.set(k, joint, j)

 if !queue.has(vid) {
 queue.enqueue(v)
 }
 }
 }

 if loops > maxEdges {
 path.hasNegativeCycle = true
 return
 }
 path, false
 loops++
}

return path, true
}

// bellmanFordQueue is a queue for the Queue-based Bellman-Ford algorithm.

```

```

type bellmanFordQueue struct {
 // queue holds the nodes which need to be relaxed.
 queue linear.NodeQueue

 // onQueue keeps track whether a node is on the queue or not.
 onQueue []bool

 // indexOf contains a mapping holding the id of a node with its index in the onQueue array.
 indexOf map[int64]int
}

// enqueue adds a node to the bellmanFordQueue.
func (q *bellmanFordQueue) enqueue(n graph.Node) {
 i := q.indexOf[n.ID()]
 if q.onQueue[i] {
 panic("bellman-ford: already queued")
 }
 q.onQueue[i] = true
 q.queue.Enqueue(n)
}

// dequeue returns the first value of the bellmanFordQueue.
func (q *bellmanFordQueue) dequeue() graph.Node {
 n := q.queue.Dequeue()
 q.onQueue[q.indexOf[n.ID()]] = false
 return n
}

// len returns the number of nodes in the bellmanFordQueue.
func (q *bellmanFordQueue) len() int { return q.queue.Len() }

// has returns whether
// a node with the given id is in the queue.
func (q bellmanFordQueue) has(id int64) bool { return q.onQueue[q.indexOf[id]] }

// newBellmanFordQueue creates a new bellmanFordQueue.
func newBellmanFordQueue(indexOf map[int64]int) bellmanFordQueue {
 return bellmanFordQueue{
 onQueue: make([]bool, len(indexOf)),
 indexOf: indexOf,
 }
}
Graph{{subgr4}}
// SPDX-License-Identifier: Unlicense OR MIT

package app

import (

```

```

"os"
"strings"

"gioui.org/app/internal/window"
)

// extraArgs contains extra arguments to append to
// os.Args. The arguments are separated with |.
// Useful for running programs on mobiles where the
// command line is not available.
// Set with the go linker flag -X.
var extraArgs string

func init() {
 if extraArgs != "" {
 args := strings.Split(extraArgs, "|")
 os.Args = append(os.Args, args...)
 }
}

// DataDir returns a path to use for application-specific
// configuration data.
// On desktop systems, DataDir use os.UserConfigDir.
// On iOS NSDocumentDirectory is queried.
// For Android Context.getFilesDir is used.
//
// BUG: DataDir blocks on Android until init functions
// have completed.
func DataDir() (string, error) {
 return dataDir()
}

// Main must be called from the a program's main function. It
// blocks until there are no more windows active.
//
// Calling Main is necessary because some operating
// systems
// require control of the main thread of the program for
// running windows.
func Main() {
 window.Main()
}
graph{{ed}ed{ed}ed{ed}}
graph{{{Sb}}}So}
graph{{nN{nN{nN}nD}}}
graph{SubG{SubG}}
graph{{SUBGRAv}SUBGRAa}

```



```
// SPDX-License-Identifier: Unlicense OR MIT
```

```
package widget
```

```
import (
```

```
 "fmt"
```

```
 "image"
```

```
 "unicode/utf8"
```

```
 "gioui.org/f32"
```

```
 "gioui.org/layout"
```

```
 "gioui.org/op"
```

```
 "gioui.org/op/paint"
```

```
 "gioui.org/text"
```

```
 "golang.org/x/image/math/fixed"
```

```
)
```

```
// Label is a widget for laying out and drawing text.
```

```
type Label struct {
```

```
 // Alignment specify the text alignment.
```

```
 Alignment text.Alignment
```

```
 // MaxLines limits the number of lines. Zero means no limit.
```

```
 MaxLines int
```

```
}
```

```
type lineIterator struct {
```

```
 Lines []text.Line
```

```
 Clip image.Rectangle
```

```
 Alignment text.Alignment
```

```
 Width int
```

```
 Offset image.Point
```

```
 y, prevDesc fixed.Int26_6
```

```
}
```

```
const inf = 1e6
```

```
func (l *lineIterator) Next() (text.String, f32.Point, bool) {
```

```
 for len(l.Lines) > 0 {
```

```
 line := l.Lines[0]
```

```
 l.Lines = l.Lines[1:]
```

```
 x := align(l.Alignment, line.Width, l.Width) + fixed.I(l.Offset.X)
```

```
 l.y += l.prevDesc + line.Ascent
```

```
 l.prevDesc = line.Descent
```

```
 // Align baseline and line start to the pixel grid.
```

```
 off := fixed.Point26_6{X: fixed.I(x.Floor())},
```

```

Y: fixed.I(l.y.Ceil()))
l.y = off.Y
off.Y += fixed.I(l.Offset.Y)
if (off.Y + line.Bounds.Min.Y).Floor() > l.Clip.Max.Y {
 break
}
if (off.Y + line.Bounds.Max.Y).Ceil() < l.Clip.Min.Y {
 continue
}
str := line.Text
for len(str.Advances) > 0 {
 adv := str.Advances[0]
 if (off.X + adv + line.Bounds.Max.X - line.Width).Ceil() >= l.Clip.Min.X {
 break
 }
 off.X += adv
 _, s := utf8.DecodeRuneInString(str.String)
 str.String = str.String[s:]
 str.Advances = str.Advances[1:]
}
n := 0
endx := off.X
for i, adv := range str.Advances {
 if (endx + line.Bounds.Min.X).Floor() > l.Clip.Max.X {
 str.String = str.String[:n]
 str.Advances = str.Advances[:i]
 break
 }
 _, s := utf8.DecodeRuneInString(str.String[n:])
 n += s
 endx += adv
}
offf := f32.Point{X: float32(off.X) / 64, Y: float32(off.Y) / 64}
return str, offf, true
}
return text.String{}, f32.Point{}, false
}

func (l Label) Layout(gtx *layout.Context, s *text.Shaper,
 font text.Font, txt string) {
 cs := gtx.Constraints
 textLayout := s.Layout(gtx, font, txt, text.LayoutOptions{MaxWidth: cs.Width.Max})
 lines := textLayout.Lines
 if max := l.MaxLines; max > 0 && len(lines) > max {
 lines = lines[:max]
 }
 dims := linesDimens(lines)
 dims.Size = cs.Constrain(dims.Size)

```

```

clip := textPadding(lines)
clip.Max = clip.Max.Add(dims.Size)
it := lineIterator{
 Lines: lines,
 Clip: clip,
 Alignment: l.Alignment,
 Width: dims.Size.X,
}
for {
 str, off, ok := it.Next()
 if !ok {
 break
 }
 lclip := toRectF(clip).Sub(off)
 var stack op.StackOp
 stack.Push(gtx.Ops)
 op.TransformOp{}.Offset(off).Add(gtx.Ops)
 s.Shape(gtx, font, str).Add(gtx.Ops)
 paint.PaintOp{Rect: lclip}.Add(gtx.Ops)
 stack.Pop()
}
gtx.Dimensions = dims
}

func toRectF(r image.Rectangle) f32.Rectangle {
 return f32.Rectangle{
 Min: f32.Point{X: float32(r.Min.X), Y: float32(r.Min.Y)},
 Max: f32.Point{X: float32(r.Max.X), Y: float32(r.Max.Y)},
 }
}

func textPadding(lines
[]text.Line) (padding image.Rectangle) {
 if len(lines) == 0 {
 return
 }
 first := lines[0]
 if d := first.Ascent + first.Bounds.Min.Y; d < 0 {
 padding.Min.Y = d.Ceil()
 }
 last := lines[len(lines)-1]
 if d := last.Bounds.Max.Y - last.Descent; d > 0 {
 padding.Max.Y = d.Ceil()
 }
 if d := first.Bounds.Min.X; d < 0 {
 padding.Min.X = d.Ceil()
 }
 if d := first.Bounds.Max.X - first.Width; d > 0 {

```

```

padding.Max.X = d.Ceil()
}
return
}

func linesDimens(lines []text.Line) layout.Dimensions {
var width fixed.Int26_6
var h int
var baseline int
if len(lines) > 0 {
baseline = lines[0].Ascent.Ceil()
var prevDesc fixed.Int26_6
for _, l := range lines {
h += (prevDesc + l.Ascent).Ceil()
prevDesc = l.Descent
if l.Width > width {
width = l.Width
}
}
h += lines[len(lines)-1].Descent.Ceil()
}
w := width.Ceil()
return layout.Dimensions{
Size: image.Point{
X: w,
Y: h,
},
Baseline: h - baseline,
}
}

func align(aligned text.Alignment,
width fixed.Int26_6, maxWidth int) fixed.Int26_6 {
mw := fixed.I(maxWidth)
switch aligned {
case text.Middle:
return fixed.I(((mw - width) / 2).Floor())
case text.End:
return fixed.I((mw - width).Floor())
case text.Start:
return 0
default:
panic(fmt.Errorf("unknown alignment %v", aligned))
}
}

graph{*****/}
digraph {
A -> B; C

```

```

}
graph{{sub1{ }sub8{sub1{ }sub8{ }}}
graph{{{{{{DiD{DiD{DiD{ }}}DiD{DiD{ }}}}}
graph{NODG{NODG{ }}
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```

```

package gonum

```

```

import (
 "testing"

 "gonum.org/v1/gonum/blas/testblas"
)

```

```

func TestDgemv(t *testing.T) {
 testblas.DgemvTest(t, impl)
}

```

```

func TestDger(t *testing.T) {
 testblas.DgerTest(t, impl)
}

```

```

func TestDtxmv(t *testing.T) {
 testblas.DtxmvTest(t, impl)
}

```

```

func TestDgbmv(t *testing.T) {
 testblas.DgbmvTest(t, impl)
}

```

```

func TestDtbsv(t *testing.T) {
 testblas.DtbsvTest(t, impl)
}

```

```

func TestDsbbmv(t *testing.T) {
 testblas.DsbbmvTest(t, impl)
}

```

```

func TestDtbbmv(t *testing.T) {
 testblas.DtbbmvTest(t, impl)
}

```

```

func TestDtrsv(t *testing.T) {
 testblas.DtrsvTest(t, impl)
}

```

```

func TestDtrmv(t *testing.T) {
 testblas.DtrmvTest(t, impl)
}

func TestDsylv(t *testing.T) {
 testblas.DsylvTest(t, impl)
}

func TestDsyr(t *testing.T) {
 testblas.DsyrTest(t, impl)
}

func TestDsyr2(t *testing.T) {
 testblas.Dsyr2Test(t, impl)
}

func TestDspr2(t
 *testing.T) {
 testblas.Dspr2Test(t, impl)
}

func TestDspr(t *testing.T) {
 testblas.DsprTest(t, impl)
}

func TestDspmv(t *testing.T) {
 testblas.DspmvTest(t, impl)
}

func TestDtpsv(t *testing.T) {
 testblas.DtpsvTest(t, impl)
}

func TestDtpmv(t *testing.T) {
 testblas.DtpmvTest(t, impl)
}

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// license that can be found in the LICENSE file.

package gonum

// Iladlr scans a matrix for its last non-zero row. Returns -1 if the matrix
// is all zeros.
//
// Iladlr is an internal routine. It is exported for testing purposes.
func (Implementation) Iladlr(m, n int, a []float64, lda int) int {
 switch {

```

```

case m < 0:
 panic(mLT0)
case n < 0:
 panic(nLT0)
case lda < max(1, n):
 panic(badLdA)
}

if n == 0 || m == 0 {
 return -1
}

if len(a) < (m-1)*lda+n {
 panic(shortA)
}

// Check the common case where the corner is non-zero
if a[(m-1)*lda] != 0 || a[(m-1)*lda+n-1] != 0 {
 return m - 1
}
for i := m - 1; i >= 0; i-- {
 for j := 0; j < n; j++ {
 if a[i*lda+j] != 0 {
 return i
 }
 }
}
return -1
}
graph{""[diE=""diA=""diA=""]}
graph{"\\
\\
\\
\\
\\\\\\
\\
\\\\\\\\\\
sssubgrasss}s}\\\\\\\\\\
\\\\\\\\\\\\\\}
graph{{Digrap}}
graph{{{EDGD}EDGD{EDGD}}}}
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// This is a translation of the FFTPACK rfft functions by
// Paul N Swarztrauber, placed in the public domain at
// http://www.netlib.org/fftpack/.

```

```

package fftpack

import "math"

// Rffti initializes the array work which is used in both Rfftf
// and Rfftb. The prime factorization of n together with a
// tabulation of the trigonometric functions are computed and
// stored in work.
//
// Input parameter:
//
// n The length of the sequence to be transformed.
//
// Output parameters:
//
// work A work array which must be dimensioned at least 2*n.
// The same work array can be used for both Rfftf and Rfftb
// as long as n remains unchanged. different work arrays
// are required for different values of n. The contents of
// work must not be changed between calls of Rfftf or Rfftb.
//
// ifac A work array containing the factors of n. ifac must have
// length of at least 15.
func Rffti(n int, work []float64, ifac []int) {
 if len(work) < 2*n {
 panic("fourier: short work")
 }
 if len(ifac) < 15 {
 panic("fourier: short ifac")
 }
 if n == 1 {
 return
 }
 rffti1(n, work[n:2*n], ifac[:15])
}

func rffti1(n int, wa []float64, ifac []int) {
 ntryh := [4]int{4, 2, 3, 5}

 nl := n
 nf := 0

outer:
 for j, ntry := 0, 0; ; j++ {
 if j < 4 {
 ntry = ntryh[j]

```



```

 } else {
 ntry += 2
 }
 for {
 if nl%ntry != 0 {
 continue outer
 }

 ifac[nf+2] = ntry
 nl /= ntry
 nf++

 if ntry == 2 && nf != 1 {
 for i := 1; i < nf; i++ {
 ib := nf - i + 1
 ifac[ib+1] = ifac[ib]
 }
 ifac[2] = 2
 }

 if nl == 1 {
 break outer
 }
 }

 ifac[0] = n
 ifac[1] = nf
 if nf == 1 {
 return
 }
 argh := 2 * math.Pi / float64(n)

 is := 0
 l1 := 1
 for k1 := 0; k1 < nf-1; k1++ {
 ip := ifac[k1+2]
 ld := 0
 l2 := l1 * ip
 ido := n / l2
 for j :=
0; j < ip-1; j++ {
 ld += l1
 i := is
 fi := 0.
 argld := float64(ld) * argh
 for ii := 2; ii < ido; ii += 2 {
 fi++

```

```

 arg := fi * argld
 wa[i] = math.Cos(arg)
 wa[i+1] = math.Sin(arg)
 i += 2
 }
 is += ido
}
l1 = l2
}
}

// Rfftf computes the Fourier coefficients of a real perodic sequence
// (Fourier analysis). The transform is defined below at output
// parameter r.
//
// Input parameters:
//
// n The length of the array r to be transformed. The method
// is most efficient when n is a product of small primes.
// n may change so long as different work arrays are provided.
//
// r A real array of length n which contains the sequence
// to be transformed.
//
// work a work array which must be dimensioned at least 2*n.
// in the program that calls Rfftf. the work array must be
// initialized by calling subroutine rffti(n,work,ifac) and a
// different work array must be used for each different
//
// value of n. This initialization does not have to be
// repeated so long as n remains unchanged. Thus subsequent
// transforms can be obtained faster than the first.
// The same work array can be used by Rfftf and Rfftb.
//
// ifac A work array containing the factors of n. ifac must have
// length of at least 15.
//
// Output parameters:
//
// r r[0] = the sum from i=0 to i=n-1 of r[i]
//
// if n is even set l=n/2, if n is odd set l = (n+1)/2
// then for k = 1, ..., l-1
// r[2*k-1] = the sum from i = 0 to i = n-1 of
// r[i]*cos(k*i*2*pi/n)
// r[2*k] = the sum from i = 0 to i = n-1 of
// -r[i]*sin(k*i*2*pi/n)
//

```

```

// if n is even
// r[n-1] = the sum from i = 0 to i = n-1 of
// (-1)^i*r[i]
//
// This transform is unnormalized since a call of Rfftf
// followed by a call of Rfftb will multiply the input
// sequence by n.
//
// work
// contains results which must not be destroyed between
// calls of Rfftf or Rfftb.
// ifac contains results which must not be destroyed between
// calls of Rfftf or Rfftb.
func Rfftf(n int, r, work []float64, ifac []int) {
 if len(r) < n {
 panic("fourier: short sequence")
 }
 if len(work) < 2*n {
 panic("fourier: short work")
 }
 if len(ifac) < 15 {
 panic("fourier: short ifac")
 }
 if n == 1 {
 return
 }
 rfft1(n, r[:n], work[:n], work[n:2*n], ifac[:15])
}

func rfft1(n int, c, ch, wa []float64, ifac []int) {
 nf := ifac[1]
 na := true
 l2 := n
 iw := n - 1

 for k1 := 1; k1 <= nf; k1++ {
 kh := nf - k1
 ip := ifac[kh+2]
 l1 := l2 / ip
 ido := n / l2
 idl1 := ido * l1
 iw -= (ip - 1) * ido
 na = !na

 switch ip {
 case 4:
 ix2 := iw + ido
 ix3 := ix2 + ido

```

```

if na {
 radf4(ido, l1, ch, c, wa[iw:], wa[ix2:], wa[ix3:])
} else {
 radf4(ido, l1, c, ch, wa[iw:], wa[ix2:], wa[ix3:])
}
case 2:
if na {
 radf2(ido, l1, ch, c, wa[iw:])
}
else {
 radf2(ido, l1, c, ch, wa[iw:])
}
case 3:
ix2 := iw + ido
if na {
 radf3(ido, l1, ch, c, wa[iw:], wa[ix2:])
} else {
 radf3(ido, l1, c, ch, wa[iw:], wa[ix2:])
}
case 5:
ix2 := iw + ido
ix3 := ix2 + ido
ix4 := ix3 + ido
if na {
 radf5(ido, l1, ch, c, wa[iw:], wa[ix2:], wa[ix3:], wa[ix4:])
} else {
 radf5(ido, l1, c, ch, wa[iw:], wa[ix2:], wa[ix3:], wa[ix4:])
}
default:
if ido == 1 {
 na = !na
}
if na {
 radfg(ido, ip, l1, idl1, ch, ch, ch, c, c, wa[iw:])
 na = false
} else {
 radfg(ido, ip, l1, idl1, c, c, c, ch, ch, wa[iw:])
 na = true
}
}

l2 = l1
}

if na {
 return
}
for i := 0; i < n; i++ {

```

```

 c[i] = ch[i]
 }
}

func radf2(ido, l1 int, cc, ch, wa1 []float64) {
 cc3 := newThreeArray(ido, l1, 2, cc)
 ch3 := newThreeArray(ido, 2, l1, ch)

 for k := 0; k < l1; k++ {
 ch3.set(0, 0, k, cc3.at(0, k, 0)+cc3.at(0, k, 1))
 ch3.set(ido-1, 1, k, cc3.at(0, k, 0)-cc3.at(0, k, 1))
 }
 if ido <
 2 {
 return
 }
 if ido > 2 {
 idp2 := ido + 1
 for k := 0; k < l1; k++ {
 for i := 2; i < ido; i += 2 {
 ic := idp2 - (i + 1)
 tr2 := wa1[i-2]*cc3.at(i-1, k, 1) + wa1[i-1]*cc3.at(i, k, 1)
 ti2 := wa1[i-2]*cc3.at(i, k, 1) - wa1[i-1]*cc3.at(i-1, k, 1)
 ch3.set(i, 0, k, cc3.at(i, k, 0)+ti2)
 ch3.set(ic, 1, k, ti2-cc3.at(i, k, 0))
 ch3.set(i-1, 0, k, cc3.at(i-1, k, 0)+tr2)
 ch3.set(ic-1, 1, k, cc3.at(i-1, k, 0)-tr2)
 }
 }
 if ido%2 == 1 {
 return
 }
 }
 for k := 0; k < l1; k++ {
 ch3.set(0, 1, k, -cc3.at(ido-1, k, 1))
 ch3.set(ido-1, 0, k, cc3.at(ido-1, k, 0))
 }
}

func radf3(ido, l1 int, cc, ch, wa1, wa2 []float64) {
 const (
 taur = -0.5
 tau1 = 0.866025403784439 // sqrt(3)/2
)

 cc3 := newThreeArray(ido, l1, 3, cc)
 ch3 := newThreeArray(ido, 3, l1, ch)

```

```

for k := 0; k < l1; k++ {
 cr2 := cc3.at(0, k, 1) + cc3.at(0, k, 2)
 ch3.set(0, 0, k, cc3.at(0, k, 0)+cr2)
 ch3.set(0, 2, k, tau1*(cc3.at(0, k, 2)-cc3.at(0, k, 1)))
 ch3.set(ido-1, 1, k, cc3.at(0,
k, 0)+taur*cr2)
}
if ido < 2 {
 return
}
idp2 := ido + 1
for k := 0; k < l1; k++ {
 for i := 2; i < ido; i += 2 {
 ic := idp2 - (i + 1)
 dr2 := wa1[i-2]*cc3.at(i-1, k, 1) + wa1[i-1]*cc3.at(i, k, 1)
 di2 := wa1[i-2]*cc3.at(i, k, 1) - wa1[i-1]*cc3.at(i-1, k, 1)
 dr3 := wa2[i-2]*cc3.at(i-1, k, 2) + wa2[i-1]*cc3.at(i, k, 2)
 di3 := wa2[i-2]*cc3.at(i, k, 2) - wa2[i-1]*cc3.at(i-1, k, 2)
 cr2 := dr2 + dr3
 ci2 := di2 + di3
 ch3.set(i-1, 0, k, cc3.at(i-1, k, 0)+cr2)
 ch3.set(i, 0, k, cc3.at(i, k, 0)+ci2)
 tr2 := cc3.at(i-1, k, 0) + taur*cr2
 ti2 := cc3.at(i, k, 0) + taur*ci2
 tr3 := tau1 * (di2 - di3)
 ti3 := tau1 * (dr3 - dr2)
 ch3.set(i-1, 2, k, tr2+tr3)
 ch3.set(ic-1, 1, k, tr2-tr3)
 ch3.set(i, 2, k, ti2+ti3)
 ch3.set(ic, 1, k, ti3-ti2)
 }
}
}

```

```

func radf4(ido, l1 int, cc, ch, wa1, wa2, wa3 []float64) {
 const hsq2 = math.Sqrt2 / 2

```

```

 cc3 := newThreeArray(ido, l1, 4, cc)
 ch3 := newThreeArray(ido, 4, l1, ch)

```

```

 for k := 0; k < l1; k++ {
 tr1 :=
 cc3.at(0, k, 1) + cc3.at(0, k, 3)
 tr2 := cc3.at(0, k, 0) + cc3.at(0, k, 2)
 ch3.set(0, 0, k, tr1+tr2)
 ch3.set(ido-1, 3, k, tr2-tr1)
 ch3.set(ido-1, 1, k, cc3.at(0, k, 0)-cc3.at(0, k, 2))
 ch3.set(0, 2, k, cc3.at(0, k, 3)-cc3.at(0, k, 1))
 }
}

```

```

}
if ido < 2 {
 return
}
if ido > 2 {
 idp2 := ido + 1
 for k := 0; k < l1; k++ {
 for i := 2; i < ido; i += 2 {
 ic := idp2 - (i + 1)
 cr2 := wa1[i-2]*cc3.at(i-1, k, 1) + wa1[i-1]*cc3.at(i, k, 1)
 ci2 := wa1[i-2]*cc3.at(i, k, 1) - wa1[i-1]*cc3.at(i-1, k, 1)
 cr3 := wa2[i-2]*cc3.at(i-1, k, 2) + wa2[i-1]*cc3.at(i, k, 2)
 ci3 := wa2[i-2]*cc3.at(i, k, 2) - wa2[i-1]*cc3.at(i-1, k, 2)
 cr4 := wa3[i-2]*cc3.at(i-1, k, 3) + wa3[i-1]*cc3.at(i, k, 3)
 ci4 := wa3[i-2]*cc3.at(i, k, 3) - wa3[i-1]*cc3.at(i-1, k, 3)
 tr1 := cr2 + cr4
 tr4 := cr4 - cr2
 ti1 := ci2 + ci4
 ti4 := ci2 - ci4
 ti2 := cc3.at(i, k, 0) + ci3
 ti3 := cc3.at(i, k, 0) - ci3
 tr2 := cc3.at(i-1, k, 0) + cr3
 tr3 := cc3.at(i-1, k, 0) - cr3
 ch3.set(i-1,
0, k, tr1+tr2)
 ch3.set(ic-1, 3, k, tr2-tr1)
 ch3.set(i, 0, k, ti1+ti2)
 ch3.set(ic, 3, k, ti1-ti2)
 ch3.set(i-1, 2, k, ti4+tr3)
 ch3.set(ic-1, 1, k, tr3-ti4)
 ch3.set(i, 2, k, tr4+ti3)
 ch3.set(ic, 1, k, tr4-ti3)
 }
 }

 if ido%2 == 1 {
 return
 }
 for k := 0; k < l1; k++ {
 ti1 := -hsqrt2 * (cc3.at(ido-1, k, 1) + cc3.at(ido-1, k, 3))
 tr1 := hsqrt2 * (cc3.at(ido-1, k, 1) - cc3.at(ido-1, k, 3))
 ch3.set(ido-1, 0, k, tr1+cc3.at(ido-1, k, 0))
 ch3.set(ido-1, 2, k, cc3.at(ido-1, k, 0)-tr1)
 ch3.set(0, 1, k, ti1-cc3.at(ido-1, k, 2))
 ch3.set(0, 3, k, ti1+cc3.at(ido-1, k, 2))
 }
}

```

```

func radf5(ido, l1 int, cc, ch, wa1, wa2, wa3, wa4 []float64) {
 const (
 tr11 = 0.309016994374947
 ti11 = 0.951056516295154
 tr12 = -0.809016994374947
 ti12 = 0.587785252292473
)

 cc3 := newThreeArray(ido, l1, 5, cc)
 ch3 := newThreeArray(ido, 5, l1, ch)

 for k := 0; k < l1; k++ {
 cr2 := cc3.at(0, k, 4) + cc3.at(0, k, 1)
 ci5 := cc3.at(0, k, 4) - cc3.at(0,
 k, 1)
 cr3 := cc3.at(0, k, 3) + cc3.at(0, k, 2)
 ci4 := cc3.at(0, k, 3) - cc3.at(0, k, 2)
 ch3.set(0, 0, k, cc3.at(0, k, 0)+cr2+cr3)
 ch3.set(ido-1, 1, k, cc3.at(0, k, 0)+tr11*cr2+tr12*cr3)
 ch3.set(0, 2, k, ti11*ci5+ti12*ci4)
 ch3.set(ido-1, 3, k, cc3.at(0, k, 0)+tr12*cr2+tr11*cr3)
 ch3.set(0, 4, k, ti12*ci5-ti11*ci4)
 }

 if ido < 2 {
 return
 }
 idp2 := ido + 1
 for k := 0; k < l1; k++ {
 for i := 2; i < ido; i += 2 {
 ic := idp2 - (i + 1)
 dr2 := wa1[i-2]*cc3.at(i-1, k, 1) + wa1[i-1]*cc3.at(i, k, 1)
 di2 := wa1[i-2]*cc3.at(i, k, 1) - wa1[i-1]*cc3.at(i-1, k, 1)
 dr3 := wa2[i-2]*cc3.at(i-1, k, 2) + wa2[i-1]*cc3.at(i, k, 2)
 di3 := wa2[i-2]*cc3.at(i, k, 2) - wa2[i-1]*cc3.at(i-1, k, 2)
 dr4 := wa3[i-2]*cc3.at(i-1, k, 3) + wa3[i-1]*cc3.at(i, k, 3)
 di4 := wa3[i-2]*cc3.at(i, k, 3) - wa3[i-1]*cc3.at(i-1, k, 3)
 dr5 := wa4[i-2]*cc3.at(i-1, k, 4) + wa4[i-1]*cc3.at(i, k, 4)
 di5 := wa4[i-2]*cc3.at(i, k, 4) - wa4[i-1]*cc3.at(i-1, k, 4)
 cr2 := dr2 + dr5
 ci5
 := dr5 - dr2
 cr5 := di2 - di5
 ci2 := di2 + di5
 cr3 := dr3 + dr4
 ci4 := dr4 - dr3
 cr4 := di3 - di4

```



```

ci3 := di3 + di4
ch3.set(i-1, 0, k, cc3.at(i-1, k, 0)+cr2+cr3)
ch3.set(i, 0, k, cc3.at(i, k, 0)+ci2+ci3)
tr2 := cc3.at(i-1, k, 0) + tr11*cr2 + tr12*cr3
ti2 := cc3.at(i, k, 0) + tr11*ci2 + tr12*ci3
tr3 := cc3.at(i-1, k, 0) + tr12*cr2 + tr11*cr3
ti3 := cc3.at(i, k, 0) + tr12*ci2 + tr11*ci3
tr5 := ti11*cr5 + ti12*cr4
ti5 := ti11*ci5 + ti12*ci4
tr4 := ti12*cr5 - ti11*cr4
ti4 := ti12*ci5 - ti11*ci4
ch3.set(i-1, 2, k, tr2+tr5)
ch3.set(ic-1, 1, k, tr2-tr5)
ch3.set(i, 2, k, ti2+ti5)
ch3.set(ic, 1, k, ti5-ti2)
ch3.set(i-1, 4, k, tr3+tr4)
ch3.set(ic-1, 3, k, tr3-tr4)
ch3.set(i, 4, k, ti3+ti4)
ch3.set(ic, 3, k, ti4-ti3)
}
}
}

func radfg(ido, ip, l1, idl1 int, cc, c1, c2, ch, ch2, wa []float64) {
cc3 := newThreeArray(ido, ip, l1, cc)
c13 := newThreeArray(ido, l1, ip, c1)
ch3 := newThreeArray(ido, l1, ip, ch)
c2m := newTwoArray(idl1,
ip, c2)
ch2m := newTwoArray(idl1, ip, ch2)

arg := 2 * math.Pi / float64(ip)
dcp := math.Cos(arg)
dsp := math.Sin(arg)
ipph := (ip + 1) / 2
nbd := (ido - 1) / 2

if ido == 1 {
for ik := 0; ik < idl1; ik++ {
c2m.set(ik, 0, ch2m.at(ik, 0))
}
} else {
for ik := 0; ik < idl1; ik++ {
ch2m.set(ik, 0, c2m.at(ik, 0))
}
for j := 1; j < ip; j++ {
for k := 0; k < l1; k++ {
ch3.set(0, k, j, c13.at(0, k, j))

```

```

}
}

is := -ido - 1
if nbd > l1 {
 for j := 1; j < ip; j++ {
 is += ido
 for k := 0; k < l1; k++ {
 idij := is
 for i := 2; i < ido; i += 2 {
 idij += 2
 ch3.set(i-1, k, j, wa[idij-1]*c13.at(i-1, k, j)+wa[idij]*c13.at(i, k, j))
 ch3.set(i, k, j, wa[idij-1]*c13.at(i, k, j)-wa[idij]*c13.at(i-1, k, j))
 }
 }
 }
} else {
 for j := 1; j < ip; j++ {
 is += ido
 idij := is
 for i := 2; i < ido; i += 2 {
 idij += 2
 for k := 0; k < l1; k++ {
 ch3.set(i-1, k, j, wa[idij-1]*c13.at(i-1,
k, j)+wa[idij]*c13.at(i, k, j))
 ch3.set(i, k, j, wa[idij-1]*c13.at(i, k, j)-wa[idij]*c13.at(i-1, k, j))
 }
 }
 }
}
if nbd < l1 {
 for j := 1; j < ipph; j++ {
 jc := ip - j
 for i := 2; i < ido; i += 2 {
 for k := 0; k < l1; k++ {
 c13.set(i-1, k, j, ch3.at(i-1, k, j)+ch3.at(i-1, k, jc))
 c13.set(i-1, k, jc, ch3.at(i, k, j)-ch3.at(i, k, jc))
 c13.set(i, k, j, ch3.at(i, k, j)+ch3.at(i, k, jc))
 c13.set(i, k, jc, ch3.at(i-1, k, jc)-ch3.at(i-1, k, j))
 }
 }
 }
} else {
 for j := 1; j < ipph; j++ {
 jc := ip - j
 for k := 0; k < l1; k++ {
 for i := 2; i < ido; i += 2 {
 c13.set(i-1, k, j, ch3.at(i-1, k, j)+ch3.at(i-1, k, jc))

```

```

 c13.set(i-1, k, jc, ch3.at(i, k, j)-ch3.at(i, k, jc))
 c13.set(i, k, j, ch3.at(i, k, j)+ch3.at(i, k, jc))
 c13.set(i, k, jc, ch3.at(i-1, k, jc)-ch3.at(i-1, k, j))
 }
}
}
}
}

```

```

for j := 1; j < ipph; j++ {
 jc := ip - j
 for k := 0; k < l1; k++ {
 c13.set(0,
k, j, ch3.at(0, k, j)+ch3.at(0, k, jc))
 c13.set(0, k, jc, ch3.at(0, k, jc)-ch3.at(0, k, j))
 }
}
ar1 := 1.0
ai1 := 0.0
for l := 1; l < ipph; l++ {
 lc := ip - l
 ar1h := dcp*ar1 - dsp*ai1
 ai1 = dcp*ai1 + dsp*ar1
 ar1 = ar1h
 for ik := 0; ik < idl1; ik++ {
 ch2m.set(ik, l, c2m.at(ik, 0)+ar1*c2m.at(ik, 1))
 ch2m.set(ik, lc, ai1*c2m.at(ik, ip-1))
 }
 dc2 := ar1
 ds2 := ai1
 ar2 := ar1
 ai2 := ai1
 for j := 2; j < ipph; j++ {
 jc := ip - j
 ar2h := dc2*ar2 - ds2*ai2
 ai2 = dc2*ai2 + ds2*ar2
 ar2 = ar2h
 for ik := 0; ik < idl1; ik++ {
 ch2m.add(ik, l, ar2*c2m.at(ik, j))
 ch2m.add(ik, lc, ai2*c2m.at(ik, jc))
 }
 }
}
for j := 1; j < ipph; j++ {
 for ik := 0; ik < idl1; ik++ {
 ch2m.add(ik, 0, c2m.at(ik, j))
 }
}
}

```

```

if ido < l1 {
 for i := 0; i < ido; i++ {
 for k := 0; k < l1; k++ {
 cc3.set(i, 0, k, ch3.at(i, k, 0))
 }
 }
} else {
 for k := 0; k < l1; k++ {
 for i := 0; i < ido; i++ {
 cc3.set(i, 0, k, ch3.at(i, k, 0))
 }
 }
}
for
j := 1; j < ipph; j++ {
 jc := ip - j
 j2 := 2 * j
 for k := 0; k < l1; k++ {
 cc3.set(ido-1, j2-1, k, ch3.at(0, k, j))
 cc3.set(0, j2, k, ch3.at(0, k, jc))
 }
}

if ido == 1 {
 return
}
if nbd < l1 {
 for j := 1; j < ipph; j++ {
 jc := ip - j
 j2 := 2 * j
 for i := 2; i < ido; i += 2 {
 ic := ido - i
 for k := 0; k < l1; k++ {
 cc3.set(i-1, j2, k, ch3.at(i-1, k, j)+ch3.at(i-1, k, jc))
 cc3.set(ic-1, j2-1, k, ch3.at(i-1, k, j)-ch3.at(i-1, k, jc))
 cc3.set(i, j2, k, ch3.at(i, k, j)+ch3.at(i, k, jc))
 cc3.set(ic, j2-1, k, ch3.at(i, k, jc)-ch3.at(i, k, j))
 }
 }
 }
 return
}
for j := 1; j < ipph; j++ {
 jc := ip - j
 j2 := 2 * j
 for k := 0; k < l1; k++ {
 for i := 2; i < ido; i += 2 {

```

```

ic := ido - i
cc3.set(i-1, j2, k, ch3.at(i-1, k, j)+ch3.at(i-1, k, jc))
cc3.set(ic-1, j2-1, k, ch3.at(i-1, k, j)-ch3.at(i-1, k, jc))
cc3.set(i, j2, k, ch3.at(i, k, j)+ch3.at(i, k, jc))
cc3.set(ic, j2-1, k, ch3.at(i, k, jc)-ch3.at(i,
k, j))
}
}
}
}

// Rfftb computes the real perodic sequence from its Fourier
// coefficients (Fourier synthesis). The transform is defined
// below at output parameter r.
//
// Input parameters
//
// n The length of the array r to be transformed. The method
// is most efficient when n is a product of small primes.
// n may change so long as different work arrays are provided.
//
// r A real array of length n which contains the sequence
// to be transformed.
//
// work A work array which must be dimensioned at least 2*n.
// in the program that calls Rfftb. The work array must be
// initialized by calling subroutine rffti(n,work,ifac) and a
// different work array must be used for each different
// value of n. This initialization does not have to be
// repeated so long as n remains unchanged thus subsequent
// transforms can be obtained faster than the first.
// The same work
// array can be used by Rfftf and Rfftb.
//
// ifac A work array containing the factors of n. ifac must have
// length of at least 15.
//
// output parameters
//
// r for n even and for i = 0, ..., n
// $r[i] = r[0] + (-1)^i * r[n-1]$
// plus the sum from k=1 to k=n/2-1 of
// $2 * r(2*k-1) * \cos(k*i*2*pi/n)$
// $- 2 * r(2*k) * \sin(k*i*2*pi/n)$
//
// for n odd and for i = 0, ..., n-1
// $r[i] = r[0]$ plus the sum from k=1 to k=(n-1)/2 of
// $2 * r(2*k-1) * \cos(k*i*2*pi/n)$

```

```

// -2*r(2*k)*sin(k*i*2*pi/n)
//
// This transform is unnormalized since a call of Rfftf
// followed by a call of Rfftb will multiply the input
// sequence by n.
//
// work Contains results which must not be destroyed between
// calls of Rfftf or Rfftb.
// ifac Contains results which must not be destroyed between
// calls of Rfftf or Rfftb.
func Rfftb(n int, r, work []float64, ifac []int) {
 if len(r) < n {
 panic("fourier:
short sequence")
 }
 if len(work) < 2*n {
 panic("fourier: short work")
 }
 if len(ifac) < 15 {
 panic("fourier: short ifac")
 }
 if n == 1 {
 return
 }
 rfftb1(n, r[:n], work[:n], work[n:2*n], ifac[:15])
}

func rfftb1(n int, c, ch, wa []float64, ifac []int) {
 nf := ifac[1]
 na := false
 l1 := 1
 iw := 0

 for k1 := 1; k1 <= nf; k1++ {
 ip := ifac[k1+1]
 l2 := ip * l1
 ido := n / l2
 idl1 := ido * l1

 switch ip {
 case 4:
 ix2 := iw + ido
 ix3 := ix2 + ido
 if na {
 radb4(ido, l1, ch, c, wa[iw:], wa[ix2:], wa[ix3:])
 } else {
 radb4(ido, l1, c, ch, wa[iw:], wa[ix2:], wa[ix3:])
 }
 }
 }
}

```

```

na = !na
case 2:
if na {
 radb2(ido, l1, ch, c, wa[iw:])
} else {
 radb2(ido, l1, c, ch, wa[iw:])
}
na = !na
case 3:
ix2 := iw + ido
if na {
 radb3(ido, l1, ch, c, wa[iw:], wa[ix2:])
} else {
 radb3(ido, l1, c, ch, wa[iw:], wa[ix2:])
}
na = !na
case 5:
ix2 := iw + ido
ix3 := ix2 + ido
ix4 := ix3 + ido
if na {
 radb5(ido,
l1, ch, c, wa[iw:], wa[ix2:], wa[ix3:], wa[ix4:])
} else {
 radb5(ido, l1, c, ch, wa[iw:], wa[ix2:], wa[ix3:], wa[ix4:])
}
na = !na
default:
if na {
 radbg(ido, ip, l1, idl1, ch, ch, ch, c, c, wa[iw:])
} else {
 radbg(ido, ip, l1, idl1, c, c, c, ch, ch, wa[iw:])
}
if ido == 1 {
 na = !na
}
}

l1 = l2
iw += (ip - 1) * ido
}

if na {
 for i := 0; i < n; i++ {
 c[i] = ch[i]
 }
}
}

```

```

func radb2(ido, l1 int, cc, ch, wa1 []float64) {
 cc3 := newThreeArray(ido, 2, l1, cc)
 ch3 := newThreeArray(ido, l1, 2, ch)

 for k := 0; k < l1; k++ {
 ch3.set(0, k, 0, cc3.at(0, 0, k)+cc3.at(ido-1, 1, k))
 ch3.set(0, k, 1, cc3.at(0, 0, k)-cc3.at(ido-1, 1, k))
 }

 if ido < 2 {
 return
 }
 if ido > 2 {
 idp2 := ido + 1
 for k := 0; k < l1; k++ {
 for i := 2; i < ido; i += 2 {
 ic := idp2 - (i + 1)
 ch3.set(i-1, k, 0, cc3.at(i-1, 0, k)+cc3.at(ic-1, 1, k))
 tr2 := cc3.at(i-1, 0, k) - cc3.at(ic-1, 1, k)
 ch3.set(i, k, 0, cc3.at(i,
0, k)-cc3.at(ic, 1, k))
 ti2 := cc3.at(i, 0, k) + cc3.at(ic, 1, k)
 ch3.set(i-1, k, 1, wa1[i-2]*tr2-wa1[i-1]*ti2)
 ch3.set(i, k, 1, wa1[i-2]*ti2+wa1[i-1]*tr2)
 }
 }

 if ido%2 == 1 {
 return
 }
 }
 for k := 0; k < l1; k++ {
 ch3.set(ido-1, k, 0, 2*cc3.at(ido-1, 0, k))
 ch3.set(ido-1, k, 1, -2*cc3.at(0, 1, k))
 }
}

func radb3(ido, l1 int, cc, ch, wa1, wa2 []float64) {
 const (
 taur = -0.5
 tau1 = 0.866025403784439 // sqrt(3)/2
)

 cc3 := newThreeArray(ido, 3, l1, cc)
 ch3 := newThreeArray(ido, l1, 3, ch)

 for k := 0; k < l1; k++ {

```



```

tr2 := cc3.at(ido-1, 1, k) + cc3.at(ido-1, 1, k)
cr2 := cc3.at(0, 0, k) + taur*tr2
ch3.set(0, k, 0, cc3.at(0, 0, k)+tr2)
ci3 := tau1 * (cc3.at(0, 2, k) + cc3.at(0, 2, k))
ch3.set(0, k, 1, cr2-ci3)
ch3.set(0, k, 2, cr2+ci3)
}

if ido == 1 {
 return
}

idp2 := ido + 1
for k := 0; k < l1; k++ {
 for i := 2; i < ido; i += 2 {
 ic := idp2 - (i + 1)
 tr2 := cc3.at(i-1, 2, k) + cc3.at(ic-1, 1, k)
 cr2 := cc3.at(i-1, 0,
k) + taur*tr2
 ch3.set(i-1, k, 0, cc3.at(i-1, 0, k)+tr2)
 ti2 := cc3.at(i, 2, k) - cc3.at(ic, 1, k)
 ci2 := cc3.at(i, 0, k) + taur*ti2
 ch3.set(i, k, 0, cc3.at(i, 0, k)+ti2)
 cr3 := tau1 * (cc3.at(i-1, 2, k) - cc3.at(ic-1, 1, k))
 ci3 := tau1 * (cc3.at(i, 2, k) + cc3.at(ic, 1, k))
 dr2 := cr2 - ci3
 dr3 := cr2 + ci3
 di2 := ci2 + cr3
 di3 := ci2 - cr3
 ch3.set(i-1, k, 1, wa1[i-2]*dr2-wa1[i-1]*di2)
 ch3.set(i, k, 1, wa1[i-2]*di2+wa1[i-1]*dr2)
 ch3.set(i-1, k, 2, wa2[i-2]*dr3-wa2[i-1]*di3)
 ch3.set(i, k, 2, wa2[i-2]*di3+wa2[i-1]*dr3)
 }
}
}

func radb4(ido, l1 int, cc, ch, wa1, wa2, wa3 []float64) {
 cc3 := newThreeArray(ido, 4, l1, cc)
 ch3 := newThreeArray(ido, l1, 4, ch)

 for k := 0; k < l1; k++ {
 tr1 := cc3.at(0, 0, k) - cc3.at(ido-1, 3, k)
 tr2 := cc3.at(0, 0, k) + cc3.at(ido-1, 3, k)
 tr3 := cc3.at(ido-1, 1, k) + cc3.at(ido-1, 1, k)
 tr4 := cc3.at(0, 2, k) + cc3.at(0, 2, k)
 ch3.set(0, k, 0, tr2+tr3)
 ch3.set(0, k, 1, tr1-tr4)
 }
}

```

```

ch3.set(0, k,
2, tr2-tr3)
ch3.set(0, k, 3, tr1+tr4)
}

if ido < 2 {
return
}
if ido > 2 {
idp2 := ido + 1
for k := 0; k < l1; k++ {
for i := 2; i < ido; i += 2 {
ic := idp2 - (i + 1)
ti1 := cc3.at(i, 0, k) + cc3.at(ic, 3, k)
ti2 := cc3.at(i, 0, k) - cc3.at(ic, 3, k)
ti3 := cc3.at(i, 2, k) - cc3.at(ic, 1, k)
tr4 := cc3.at(i, 2, k) + cc3.at(ic, 1, k)
tr1 := cc3.at(i-1, 0, k) - cc3.at(ic-1, 3, k)
tr2 := cc3.at(i-1, 0, k) + cc3.at(ic-1, 3, k)
ti4 := cc3.at(i-1, 2, k) - cc3.at(ic-1, 1, k)
tr3 := cc3.at(i-1, 2, k) + cc3.at(ic-1, 1, k)
ch3.set(i-1, k, 0, tr2+tr3)
cr3 := tr2 - tr3
ch3.set(i, k, 0, ti2+ti3)
ci3 := ti2 - ti3
cr2 := tr1 - tr4
cr4 := tr1 + tr4
ci2 := ti1 + ti4
ci4 := ti1 - ti4
ch3.set(i-1, k, 1, wa1[i-2]*cr2-wa1[i-1]*ci2)
ch3.set(i, k, 1, wa1[i-2]*ci2+wa1[i-1]*cr2)
ch3.set(i-1, k, 2, wa2[i-2]*cr3-wa2[i-1]*ci3)
ch3.set(i, k, 2, wa2[i-2]*ci3+wa2[i-1]*cr3)
ch3.set(i-1, k, 3, wa3[i-2]*cr4-wa3[i-1]*ci4)
ch3.set(i,
k, 3, wa3[i-2]*ci4+wa3[i-1]*cr4)
}
}

if ido%2 == 1 {
return
}
}
for k := 0; k < l1; k++ {
ti1 := cc3.at(0, 1, k) + cc3.at(0, 3, k)
ti2 := cc3.at(0, 3, k) - cc3.at(0, 1, k)
tr1 := cc3.at(ido-1, 0, k) - cc3.at(ido-1, 2, k)
tr2 := cc3.at(ido-1, 0, k) + cc3.at(ido-1, 2, k)

```

```

ch3.set(ido-1, k, 0, tr2+tr2)
ch3.set(ido-1, k, 1, math.Sqrt2*(tr1-ti1))
ch3.set(ido-1, k, 2, ti2+ti2)
ch3.set(ido-1, k, 3, -math.Sqrt2*(tr1+ti1))
}
}

func radb5(ido, l1 int, cc, ch, wa1, wa2, wa3, wa4 []float64) {
const (
tr11 = 0.309016994374947
ti11 = 0.951056516295154
tr12 = -0.809016994374947
ti12 = 0.587785252292473
)

cc3 := newThreeArray(ido, 5, l1, cc)
ch3 := newThreeArray(ido, l1, 5, ch)

for k := 0; k < l1; k++ {
ti5 := cc3.at(0, 2, k) + cc3.at(0, 2, k)
ti4 := cc3.at(0, 4, k) + cc3.at(0, 4, k)
tr2 := cc3.at(ido-1, 1, k) + cc3.at(ido-1, 1, k)
tr3 := cc3.at(ido-1, 3, k) + cc3.at(ido-1, 3, k)
ch3.set(0, k, 0, cc3.at(0, 0, k)+tr2+tr3)
cr2
:= cc3.at(0, 0, k) + tr11*tr2 + tr12*tr3
cr3 := cc3.at(0, 0, k) + tr12*tr2 + tr11*tr3
ci5 := ti11*ti5 + ti12*ti4
ci4 := ti12*ti5 - ti11*ti4
ch3.set(0, k, 1, cr2-ci5)
ch3.set(0, k, 2, cr3-ci4)
ch3.set(0, k, 3, cr3+ci4)
ch3.set(0, k, 4, cr2+ci5)
}

if ido == 1 {
return
}

idp2 := ido + 1
for k := 0; k < l1; k++ {
for i := 2; i < ido; i += 2 {
ic := idp2 - (i + 1)
ti5 := cc3.at(i, 2, k) + cc3.at(ic, 1, k)
ti2 := cc3.at(i, 2, k) - cc3.at(ic, 1, k)
ti4 := cc3.at(i, 4, k) + cc3.at(ic, 3, k)
ti3 := cc3.at(i, 4, k) - cc3.at(ic, 3, k)
tr5 := cc3.at(i-1, 2, k) - cc3.at(ic-1, 1, k)

```

```

tr2 := cc3.at(i-1, 2, k) + cc3.at(ic-1, 1, k)
tr4 := cc3.at(i-1, 4, k) - cc3.at(ic-1, 3, k)
tr3 := cc3.at(i-1, 4, k) + cc3.at(ic-1, 3, k)
ch3.set(i-1, k, 0, cc3.at(i-1, 0, k)+tr2+tr3)
ch3.set(i, k, 0, cc3.at(i, 0, k)+ti2+ti3)
cr2 := cc3.at(i-1, 0, k) + tr11*tr2 + tr12*tr3
ci2 := cc3.at(i, 0, k) + tr11*ti2 + tr12*ti3
cr3 := cc3.at(i-1, 0, k) + tr12*tr2
+ tr11*tr3
ci3 := cc3.at(i, 0, k) + tr12*ti2 + tr11*ti3
cr5 := ti11*tr5 + ti12*tr4
ci5 := ti11*ti5 + ti12*ti4
cr4 := ti12*tr5 - ti11*tr4
ci4 := ti12*ti5 - ti11*ti4
dr3 := cr3 - ci4
dr4 := cr3 + ci4
di3 := ci3 + cr4
di4 := ci3 - cr4
dr5 := cr2 + ci5
dr2 := cr2 - ci5
di5 := ci2 - cr5
di2 := ci2 + cr5
ch3.set(i-1, k, 1, wa1[i-2]*dr2-wa1[i-1]*di2)
ch3.set(i, k, 1, wa1[i-2]*di2+wa1[i-1]*dr2)
ch3.set(i-1, k, 2, wa2[i-2]*dr3-wa2[i-1]*di3)
ch3.set(i, k, 2, wa2[i-2]*di3+wa2[i-1]*dr3)
ch3.set(i-1, k, 3, wa3[i-2]*dr4-wa3[i-1]*di4)
ch3.set(i, k, 3, wa3[i-2]*di4+wa3[i-1]*dr4)
ch3.set(i-1, k, 4, wa4[i-2]*dr5-wa4[i-1]*di5)
ch3.set(i, k, 4, wa4[i-2]*di5+wa4[i-1]*dr5)
}
}
}

func radbg(ido, ip, l1, idl1 int, cc, c1, c2, ch, ch2, wa []float64) {
cc3 := newThreeArray(ido, ip, l1, cc)
c13 := newThreeArray(ido, l1, ip, c1)
ch3 := newThreeArray(ido, l1, ip, ch)
c2m := newTwoArray(idl1, ip, c2)
ch2m := newTwoArray(idl1, ip, ch2)

arg :=
2 * math.Pi / float64(ip)
dcp := math.Cos(arg)
dsp := math.Sin(arg)
ipph := (ip + 1) / 2
nbd := (ido - 1) / 2

```

```

if ido < l1 {
 for i := 0; i < ido; i++ {
 for k := 0; k < l1; k++ {
 ch3.set(i, k, 0, cc3.at(i, 0, k))
 }
 }
} else {
 for k := 0; k < l1; k++ {
 for i := 0; i < ido; i++ {
 ch3.set(i, k, 0, cc3.at(i, 0, k))
 }
 }
}

for j := 1; j < ipph; j++ {
 jc := ip - j
 j2 := 2 * j
 for k := 0; k < l1; k++ {
 ch3.set(0, k, j, cc3.at(ido-1, j2-1, k)+cc3.at(ido-1, j2-1, k))
 ch3.set(0, k, jc, cc3.at(0, j2, k)+cc3.at(0, j2, k))
 }
}

if ido != 1 {
 if nbd < l1 {
 for j := 1; j < ipph; j++ {
 jc := ip - j
 j2 := 2 * j
 for i := 2; i < ido; i += 2 {
 ic := ido - i
 for k := 0; k < l1; k++ {
 ch3.set(i-1, k, j, cc3.at(i-1, j2, k)+cc3.at(ic-1, j2-1, k))
 ch3.set(i-1, k, jc, cc3.at(i-1, j2, k)-cc3.at(ic-1, j2-1, k))
 ch3.set(i, k, j, cc3.at(i, j2, k)-cc3.at(ic, j2-1, k))
 ch3.set(i, k, jc, cc3.at(i, j2, k)+cc3.at(ic, j2-1,
k))
 }
 }
 }
 } else {
 for j := 1; j < ipph; j++ {
 jc := ip - j
 j2 := 2 * j
 for k := 0; k < l1; k++ {
 for i := 2; i < ido; i += 2 {
 ic := ido - i
 ch3.set(i-1, k, j, cc3.at(i-1, j2, k)+cc3.at(ic-1, j2-1, k))
 ch3.set(i-1, k, jc, cc3.at(i-1, j2, k)-cc3.at(ic-1, j2-1, k))

```

```

 ch3.set(i, k, j, cc3.at(i, j2, k)-cc3.at(ic, j2-1, k))
 ch3.set(i, k, jc, cc3.at(i, j2, k)+cc3.at(ic, j2-1, k))
 }
}
}
}
}

```

```

ar1 := 1.0
ai1 := 0.0
for l := 1; l < ipph; l++ {
 lc := ip - l
 ar1h := dcp*ar1 - dsp*ai1
 ai1 = dcp*ai1 + dsp*ar1
 ar1 = ar1h
 for ik := 0; ik < idl1; ik++ {
 c2m.set(ik, l, ch2m.at(ik, 0)+ar1*ch2m.at(ik, 1))
 c2m.set(ik, lc, ai1*ch2m.at(ik, ip-1))
 }
 dc2 := ar1
 ds2 := ai1
 ar2 := ar1
 ai2 := ai1
 for j := 2; j < ipph; j++ {
 jc := ip - j
 ar2h := dc2*ar2 - ds2*ai2
 ai2 = dc2*ai2 + ds2*ar2
 ar2 = ar2h
 for ik := 0; ik < idl1; ik++ {
 c2m.add(ik, l, ar2*ch2m.at(ik, j))
 c2m.add(ik, lc, ai2*ch2m.at(ik,
jc))
 }
 }
}
}

```

```

for j := 1; j < ipph; j++ {
 for ik := 0; ik < idl1; ik++ {
 ch2m.add(ik, 0, ch2m.at(ik, j))
 }
}
for j := 1; j < ipph; j++ {
 jc := ip - j
 for k := 0; k < l1; k++ {
 ch3.set(0, k, j, c13.at(0, k, j)-c13.at(0, k, jc))
 ch3.set(0, k, jc, c13.at(0, k, j)+c13.at(0, k, jc))
 }
}
}

```

```

if ido != 1 {
 if nbd < l1 {
 for j := 1; j < ipph; j++ {
 jc := ip - j
 for i := 2; i < ido; i += 2 {
 for k := 0; k < l1; k++ {
 ch3.set(i-1, k, j, c13.at(i-1, k, j)-c13.at(i, k, jc))
 ch3.set(i-1, k, jc, c13.at(i-1, k, j)+c13.at(i, k, jc))
 ch3.set(i, k, j, c13.at(i, k, j)+c13.at(i-1, k, jc))
 ch3.set(i, k, jc, c13.at(i, k, j)-c13.at(i-1, k, jc))
 }
 }
 }
 } else {
 for j := 1; j < ipph; j++ {
 jc := ip - j
 for k := 0; k < l1; k++ {
 for i := 2; i < ido; i += 2 {
 ch3.set(i-1, k, j, c13.at(i-1, k, j)-c13.at(i, k, jc))
 ch3.set(i-1, k, jc, c13.at(i-1, k, j)+c13.at(i, k, jc))
 ch3.set(i, k, j, c13.at(i,
k, j)+c13.at(i-1, k, jc))
 ch3.set(i, k, jc, c13.at(i, k, j)-c13.at(i-1, k, jc))
 }
 }
 }
 }
}

```

```

if ido == 1 {
 return
}
for ik := 0; ik < idl1; ik++ {
 c2m.set(ik, 0, ch2m.at(ik, 0))
}
for j := 1; j < ip; j++ {
 for k := 0; k < l1; k++ {
 c13.set(0, k, j, ch3.at(0, k, j))
 }
}

```

```

is := -ido - 1
if nbd > l1 {
 for j := 1; j < ip; j++ {
 is += ido
 for k := 0; k < l1; k++ {
 idij := is

```

```

 for i := 2; i < ido; i += 2 {
 idij += 2
 c13.set(i-1, k, j, wa[idij-1]*ch3.at(i-1, k, j)-wa[idij]*ch3.at(i, k, j))
 c13.set(i, k, j, wa[idij-1]*ch3.at(i, k, j)+wa[idij]*ch3.at(i-1, k, j))
 }
}
}
return
}
for j := 1; j < ip; j++ {
 is += ido
 idij := is
 for i := 2; i < ido; i += 2 {
 idij += 2
 for k := 0; k < l1; k++ {
 c13.set(i-1, k, j, wa[idij-1]*ch3.at(i-1, k, j)-wa[idij]*ch3.at(i, k, j))
 c13.set(i, k, j, wa[idij-1]*ch3.at(i, k, j)+wa[idij]*ch3.at(i-1, k, j))
 }
 }
}
}
graph{{d3{d9{d3{d9}}}}}
graph{{Gr_}{Gr_}{Gr_}{Gr_}{Gr_}{Gr_}}
graph{{Gra_}Gra_}
graph{"\3\4{"\0\5\3\3\8\3\3\2"}
graph{Ed}
// Code generated by "go generate gonum.org/v1/gonum/unit; DO NOT EDIT.

```

```

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// license that can be found in the LICENSE file.

```

```
package unit
```

```

import (
 "fmt"
 "testing"
)

```

```

func TestVelocityFormat(t *testing.T) {
 for _, test := range []struct {
 value Velocity
 format string
 want string
 }{
 {1.23456789, "%v", "1.23456789 m s^-1"},
 {1.23456789, "%.1v", "1 m s^-1"},
 {1.23456789, "%20.1v", "1 m s^-1"},
 }

```



```

{1.23456789, "%20v", " 1.23456789 m s^-1"},
{1.23456789, "%1v", "1.23456789 m s^-1"},
{1.23456789, "%#v", "unit.Velocity(1.23456789)"},
{1.23456789, "%s", "%!s(unit.Velocity=1.23456789 m s^-1)"},
} {
got := fmt.Sprintf(test.format, test.value)
if got != test.want {
t.Errorf("Format %q %v: got: %q want: %q", test.format, float64(test.value), got, test.want)
}
}
}
// Copyright 2016 The Gonum Authors. All rights reserved.
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// license that can be found in the LICENSE file.

package testlapack

import (
"math"
"testing"

"gonum.org/v1/gonum/lapack"

"gonum.org/v1/gonum/lapack"
)

type Dlanster interface {
Dlanst(norm lapack.MatrixNorm, n int, d, e []float64) float64
Dlanger
}

func DlanstTest(t *testing.T, impl Dlanster) {
rnd := rand.New(rand.NewSource(1))
for _, norm := range []lapack.MatrixNorm{lapack.MaxAbs, lapack.MaxColumnSum, lapack.MaxRowSum, lapack.Frobenius} {
for _, n := range []int{1, 3, 10, 100} {
for cas := 0; cas < 100; cas++ {
// Generate randomly the main diagonal of the
// symmetric tridiagonal matrix A.
d := make([]float64, n)
for i := range d {
d[i] = rnd.NormFloat64()
}
// Generate randomly the off-diagonal of A.
e := make([]float64, n-1)
for i := range e {
e[i] = rnd.NormFloat64()
}
}
}
}

```

```

// Create A in dense representation.
m
:= n
lda := n
a := make([]float64, m*lda)
for i := 0; i < n; i++ {
 a[i*lda+i] = d[i]
}
for i := 0; i < n-1; i++ {
 a[i*lda+i+1] = e[i]
 a[(i+1)*lda+i] = e[i]
}

work := make([]float64, n)
// Compute a norm of A using Dlanst.
syNorm := impl.Dlanst(norm, n, d, e)
// Compute a reference value for the norm using
// Dlange and the dense representation of A.
geNorm := impl.Dlange(norm, m, n, a, lda, work)
if math.Abs(syNorm-geNorm) > 1e-12 {
 t.Errorf("Norm mismatch: norm = %v, cas = %v, n = %v. Want %v, got %v.", string(norm), cas, n, geNorm,
syNorm)
}
}
}
}
}
}
graph{digra_{digra_{{digra_{digra_{digra_}}}}digra_}}
Graph{{Subgr4}}
graph{{diGrapl{{diGrapl{{diGrapp}}diGrapp}}
graph{{NOD{NO{r}}}}

name: Feature request
about: Request an addition to an existing package

<!--
Please make sure your issue title matches the Go convention; a summary
of the problem, prefixed by the primary affected package.
-->
What are you trying to do?
<!-- Describe the problem you are trying to solve. -->

What did you try?
<!-- Please include a link to a minimal reproducer here. -->

```

### How does Gonum not allow you to achieve your goal?

### What version of Go and Gonum are you using?

<!--

Paste the output of `go version` and if you are installing Gonum from source, paste the output of `(cd \$(go env GOPATH)/src/gonum.org/v1/gonum && git rev-parse HEAD)`.

-->

### Is this feature absent from the current master?

### Are you able to help contribute the feature?

<!-- Can you provide code contributions or information to help? -->

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graph{<<TTDDTT>>}

graph{{gr}{gr}}gr{{gr}{{{gr}{}}}}gr}}

graph{{{subGr}subGr{subGr}{subGr}subGr}subGr}}

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graph{{{ed8}ed0}{ed8}ed0}

graph{{DY{DN}DY}DY{DN}{DY{DN}DY}DY{DN}DY}

graph{Subc{{Suba}Suba}}

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graph{<><>}

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// SPDX-License-Identifier: Unlicense OR MIT

package path

```
import (
 "unsafe"
)
```

// The vertex data suitable for passing to vertex programs.

```
type Vertex struct {
 CornerX, CornerY int16
 MaxY float32
 FromX, FromY float32
 CtrlX, CtrlY float32
 ToX, ToY float32
}
```

const VertStride = 7\*4 + 2\*2

```
func init() {
```

```

// Check that struct vertex has the expected size and
// that it contains no padding.
if unsafe.Sizeof>(*Vertex)(nil) != VertStride {
 panic("unexpected struct size")
}
}
graph{{{subG1}subG1{subG1}}}
graph{""""""}
graph{{DiG_}{DiG_}{DiG_}{DiG_}}
graph{SUBGRp{SUBGRp}}
graph{{{Ed3{{Ed2}}Ed3{{Ed2}}Ed2}}}
// Copyright 2017 The Gonum Authors. All rights reserved.
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// license that can be found in the LICENSE file.

```

```

package distuv

```

```

import (
 "sort"
 "testing"

 "golang.org/x/exp/rand"

 "gonum.org/v1/gonum/floats"
)

```

```

func TestPoissonProb(t *testing.T) {
 const tol = 1e-10
 for i, tt := range []struct {
 k float64
 lambda float64
 want float64
 }{
 {0, 1, 3.678794411714423e-01},
 {1, 1, 3.678794411714423e-01},
 {2, 1, 1.839397205857211e-01},
 {3, 1, 6.131324019524039e-02},
 {4, 1, 1.532831004881010e-02},
 {5, 1, 3.065662009762020e-03},
 {6, 1, 5.109436682936698e-04},
 {7, 1, 7.299195261338139e-05},
 {8, 1, 9.123994076672672e-06},
 {9, 1, 1.013777119630298e-06},

 {0, 2.5, 8.208499862389880e-02},
 {1, 2.5, 2.052124965597470e-01},
 {2, 2.5, 2.565156206996838e-01},
 {3, 2.5, 2.137630172497365e-01},
 }{

```

```

{4, 2.5, 1.336018857810853e-01},
{5, 2.5, 6.680094289054267e-02},
{6, 2.5, 2.783372620439277e-02},
{7, 2.5, 9.940616501568845e-03},
{8,
2.5, 3.106442656740263e-03},
{9, 2.5, 8.629007379834082e-04},

{0.5, 2.5, 0},
{1.5, 2.5, 0},
{2.5, 2.5, 0},
{3.5, 2.5, 0},
{4.5, 2.5, 0},
{5.5, 2.5, 0},
{6.5, 2.5, 0},
{7.5, 2.5, 0},
{8.5, 2.5, 0},
{9.5, 2.5, 0},
} {
p := Poisson{Lambda: tt.lambda}
got := p.Prob(tt.k)
if !floats.EqualWithinAbs(got, tt.want, tol) {
t.Errorf("test-%d: got=%e. want=%e\n", i, got, tt.want)
}
}
}

```

```

func TestPoissonCDF(t *testing.T) {
const tol = 1e-10
for i, tt := range []struct {
k float64
lambda float64
want float64
}{
{0, 1, 0.367879441171442},
{1, 1, 0.735758882342885},
{2, 1, 0.919698602928606},
{3, 1, 0.981011843123846},
{4, 1, 0.996340153172656},
{5, 1, 0.999405815182418},
{6, 1, 0.999916758850712},
{7, 1, 0.999989750803325},
{8, 1, 0.999998874797402},
{9, 1, 0.999999888574522},

{0, 2.5, 0.082084998623899},
{1, 2.5, 0.287297495183646},
{2, 2.5, 0.543813115883329},

```

```

{3, 2.5, 0.757576133133066},
{4,
2.5, 0.891178018914151},
{5, 2.5, 0.957978961804694},
{6, 2.5, 0.985812688009087},
{7, 2.5, 0.995753304510655},
{8, 2.5, 0.998859747167396},
{9, 2.5, 0.999722647905379},
} {
p := Poisson{Lambda: tt.lambda}
got := p.CDF(tt.k)
if !floats.EqualWithinAbs(got, tt.want, tol) {
t.Errorf("test-%d: got=%e. want=%e\n", i, got, tt.want)
}
}
}

```

```

func TestPoisson(t *testing.T) {
src := rand.New(rand.NewSource(1))
for i, b := range []Poisson{
{100, src},
{15, src},
{10, src},
{9.9, src},
{3, src},
{1.5, src},
{0.9, src},
} {
testPoisson(t, b, i)
}
}

```

```

func testPoisson(t *testing.T, p Poisson, i int) {
const (
tol = 1e-2
n = 1e6
)
x := make([]float64, n)
generateSamples(x, p)
sort.Float64s(x)

checkMean(t, i, x, p, tol)
checkVarAndStd(t, i, x, p, tol)
checkExKurtosis(t, i, x, p, 7e-2)
}
graph{NoR{{NoR}NoR}}
graph{G:nw K:nw nw:nw}

```

```

graph{{DiGray}DiGraq}
graph{SU_{SU_}SU_{}SU_{}SU_{SU_}}
graph{{{EDG}{EDG}}}
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// Use of this source code is governed by a BSD-style
// license that can be found in the LICENSE file.

package gonum

import (
 "gonum.org/v1/gonum/blas"
 "gonum.org/v1/gonum/blas/blas64"
)

// Dtrti2 computes the inverse of a triangular matrix, storing the result in place
// into a. This is the BLAS level 2 version of the algorithm.
//
// Dtrti2 is an internal routine. It is exported for testing purposes.
func (impl Implementation) Dtrti2(uplo blas.Uplo, diag blas.Diag, n int, a []float64, lda int) {
 switch {
 case uplo != blas.Upper && uplo != blas.Lower:
 panic(badUplo)
 case diag != blas.NonUnit && diag != blas.Unit:
 panic(badDiag)
 case n < 0:
 panic(nLT0)
 case lda < max(1, n):
 panic(badLdA)
 }

 if n == 0 {
 return
 }

 if len(a) < (n-1)*lda+n {
 panic(shortA)
 }

 bi := blas64.Implementation()

 nonUnit := diag == blas.NonUnit
 // TODO(btracey): Replace this with a row-major ordering.
 if uplo == blas.Upper {
 for
 j := 0; j < n; j++ {
 var ajj float64
 if nonUnit {
 ajj = 1 / a[j*lda+j]
 }
 }
 }

```

```

 a[j*lda+j] = a[j]
 a[j] *= -1
 } else {
 a[j] = -1
 }
 bi.Dtrmv(blas.Upper, blas.NoTrans, diag, j, a, lda, a[j:], lda)
 bi.Dscal(j, a[j], a[j:], lda)
}
return
}
for j := n - 1; j >= 0; j-- {
 var a[j] float64
 if nonUnit {
 a[j] = 1 / a[j*lda+j]
 a[j*lda+j] = a[j]
 a[j] *= -1
 } else {
 a[j] = -1
 }
 if j < n-1 {
 bi.Dtrmv(blas.Lower, blas.NoTrans, diag, n-j-1, a[(j+1)*lda+j+1:], lda, a[(j+1)*lda+j:], lda)
 bi.Dscal(n-j-1, a[j], a[(j+1)*lda+j:], lda)
 }
}
}
graph{{stricN}stricN{stric}stricN{stricN}}
graph {
 node []
 node []
 node []
 edge []
 edge []
 edge []
 {}
 {}
 {}
 {}
 subgraph S {}
 A
 B [style=filled fillcolor=red]
 C:nw -- D:se
 "foo"
 .10
 -20
 3.14
 F [label=<<div>foo</div>>]
 H [label=<<div></div>>]
 _foo

```



```

a10
}
graph {
}
graph {
}
digraph {
}
digraph {
}
digraph {
}
digraph {
}
digraph {
}
}
// Copyright 2014 The Gonum Authors. All rights reserved.
// Use of this source code is governed by a BSD-style
// license that can be found in the LICENSE file.

package testblas

import (
 "testing"

 "gonum.org/v1/gonum/blas"
)

type Dtbmver interface {
 Dtbmv(ul blas.Uplo, tA blas.Transpose, d blas.Diag, n, k int, a []float64, lda int, x []float64, incX int)
}

func DtbmvTest(t *testing.T, blasser Dtbmver) {
 for i, test := range []struct {
 ul blas.Uplo
 tA blas.Transpose
 d blas.Diag
 n int
 k int
 a [][]float64
 x []float64
 ans []float64
 }{
 {
 ul: blas.Upper,
 tA: blas.NoTrans,
 d: blas.Unit,
 n: 3,

```

```

k: 1,
a: [][]float64{
 {1, 2, 0},
 {0, 1, 4},
 {0, 0, 1},
},
x: []float64{2, 3, 4},
ans: []float64{8, 19, 4},
},
{
 ul: blas.Upper,
 tA: blas.NoTrans,
 d: blas.NonUnit,
 n: 5,
 k: 1,
 a: [][]float64{
 {1, 3, 0, 0, 0},
 {0, 6, 7, 0, 0},
 {0, 0, 2, 1, 0},
 {0, 0, 0, 12, 3},
 {0, 0, 0, 0, -1},
 },
 x:
 []float64{1, 2, 3, 4, 5},
 ans: []float64{7, 33, 10, 63, -5},
},
{
 ul: blas.Lower,
 tA: blas.NoTrans,
 d: blas.NonUnit,
 n: 5,
 k: 1,
 a: [][]float64{
 {7, 0, 0, 0, 0},
 {3, 6, 0, 0, 0},
 {0, 7, 2, 0, 0},
 {0, 0, 1, 12, 0},
 {0, 0, 0, 3, -1},
 },
 x: []float64{1, 2, 3, 4, 5},
 ans: []float64{7, 15, 20, 51, 7},
},
{
 ul: blas.Upper,
 tA: blas.Trans,
 d: blas.NonUnit,
 n: 5,
 k: 2,

```

```

a: [][]float64{
 {7, 3, 9, 0, 0},
 {0, 6, 7, 10, 0},
 {0, 0, 2, 1, 11},
 {0, 0, 0, 12, 3},
 {0, 0, 0, 0, -1},
},
x: []float64{1, 2, 3, 4, 5},
ans: []float64{7, 15, 29, 71, 40},
},
{
 ul: blas.Lower,
 tA: blas.Trans,
 d: blas.NonUnit,
 n: 5,
 k: 2,
 a: [][]float64{
 {7, 0, 0, 0, 0},
 {3, 6, 0, 0, 0},
 {9, 7, 2, 0, 0},
 {0, 10, 1, 12, 0},
 {0, 0, 11, 3, -1},
 },
 x: []float64{1, 2, 3, 4, 5},
 ans: []float64{40, 73, 65, 63, -5},
},
} {
 extra := 0
 var aFlat []float64
 if
 test.ul == blas.Upper {
 aFlat = flattenBanded(test.a, test.k, 0)
 } else {
 aFlat = flattenBanded(test.a, 0, test.k)
 }
 incTest := func(incX, extra int) {
 xnew := makeIncremented(test.x, incX, extra)
 ans := makeIncremented(test.ans, incX, extra)
 lda := test.k + 1
 blasser.Dtbmv(test.ul, test.tA, test.d, test.n, test.k, aFlat, lda, xnew, incX)
 if !dSliceTolEqual(ans, xnew) {
 t.Errorf("Case %v, Inc %v: Want %v, got %v", i, incX, ans, xnew)
 }
 }
 incTest(1, extra)
 incTest(3, extra)
 incTest(-2, extra)
}

```

```

}
graph{{Dig5}Dig5{{Dig5}Dig5}}
graph {no1}
graph{{DG{DG}DG{DG{DG}DG}}}}
graph{NOD}
graph{{DIGRC DIGRB}{DIGRC{DIGRB}DIGRC DIGRB}{DIGRC{DIGRB}}}
graph{SU{SU{{SU}SU{{SU}}}}}
graph{SR{{SR{{SR{}}SR{}}SS}}SR{}}SR{}}SR{}}SR{}}SS}
graph{{{graph_}{graph_}}}
digraph{A{A:ne->F:ne}F:ne}
graph{{sq{sq sq}sq}}
graph{{{grap_}{{{grap_}}}grap_{{grap_}}}grap_{{subg_}}}
graph{{d.650}}
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package testblas

import (
 "testing"

 "golang.org/x/exp/rand"

 "gonum.org/v1/gonum/blas"
)

func DgemvBenchmark(b *testing.B, impl Dgemver, tA blas.Transpose, m, n, incX, incY int) {
 var lenX, lenY int
 if tA == blas.NoTrans {
 lenX = n
 lenY = m
 } else {
 lenX = m
 lenY = n
 }
 xr := make([]float64, lenX)
 for i := range xr {
 xr[i] = rand.Float64()
 }
 x := makeIncremented(xr, incX, 0)
 yr := make([]float64, lenY)
 for i := range yr {
 yr[i] = rand.Float64()
 }
 y := makeIncremented(yr, incY, 0)
 a := make([]float64, m*n)
 for i := range a {

```

```

a[i] = rand.Float64()
}

b.ResetTimer()
for i := 0; i < b.N; i++ {
 impl.Dgemv(tA, m, n, 2, a, n, x, incX, 3, y, incY)
}
}

func DgerBenchmark(b *testing.B, impl Dgerer, m, n, incX, incY int) {
 xr := make([]float64, m)
 for i := range xr {
 xr[i] = rand.Float64()
 }
 x
 := makeIncremented(xr, incX, 0)
 yr := make([]float64, n)
 for i := range yr {
 yr[i] = rand.Float64()
 }
 y := makeIncremented(yr, incY, 0)
 a := make([]float64, m*n)
 for i := range a {
 a[i] = rand.Float64()
 }

 b.ResetTimer()
 for i := 0; i < b.N; i++ {
 impl.Dger(m, n, 2, x, incX, y, incY, a, n)
 }
}

type Sgerer interface {
 Sger(m, n int, alpha float32, x []float32, incX int, y []float32, incY int, a []float32, lda int)
}

func SgerBenchmark(b *testing.B, blasser Sgerer, m, n, incX, incY int) {
 xr := make([]float32, m)
 for i := range xr {
 xr[i] = rand.Float32()
 }
 x := makeIncremented32(xr, incX, 0)
 yr := make([]float32, n)
 for i := range yr {
 yr[i] = rand.Float32()
 }
 y := makeIncremented32(yr, incY, 0)
 a := make([]float32, m*n)

```

```

for i := range a {
 a[i] = rand.Float32()
}

b.ResetTimer()
for i := 0; i < b.N; i++ {
 blasser.Sger(m, n, 2, x, incX, y, incY, a, n)
}
}

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package c64

func conj(c complex64) complex64 { return complex(real(c), -imag(c)) }
graph{{ {digr4}digr7{digr}digr2}digr7{digr}digr2{digr{digr4}}digr2}
graph{ED{ED}ED{ED}ED{ED}}
graph{{DIGR_{DIGR_}}}
graph{{ {subG{subG}subG}} }
graph{{ {Edga}Edga}{Edga{Edga}{Edga}{Edga}Edga Edga}Edga}
// Code generated by gocc; DO NOT EDIT.

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// Universal Public Domain Dedication.

package util

import (
 "fmt"
)

func RuneToString(r rune) string {
 if r >= 0x20 && r < 0x7f {
 return fmt.Sprintf("%c", r)
 }
 switch r {
 case 0x07:
 return "\\a"
 case 0x08:
 return "\\b"
 }
}

```

```

case 0x0C:
 return "\\f"
case 0x0A:
 return "\\n"
case 0x0D:
 return "\\r"
case 0x09:
 return "\\t"
case 0x0b:
 return "\\v"
case 0x5c:
 return "\\\\"
case 0x27:
 return "\\'"
case 0x22:
 return "\\\""
}
if r < 0x10000 {
 return fmt.Sprintf("\\u%04x", r)
}
return fmt.Sprintf("\\U%08x", r)
}
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```

```
package kdtree
```

```
import (
 "sort"
```

```

 "golang.org/x/exp/rand"
)

```

```

// Partition partitions list such that all elements less than the value at
// pivot prior to the call are placed before that element and all elements
// greater than that value are placed after it. The final location of the
// element at pivot prior to the call is returned.

```

```

func Partition(list sort.Interface, pivot int) int {
 var index, last int
 if last = list.Len() - 1; last < 0 {
 return -1
 }
 list.Swap(pivot, last)
 for i := 0; i < last; i++ {
 if !list.Less(last, i) {
 list.Swap(index, i)
 index++
 }
 }
}

```

```

 }
 }
 list.Swap(last, index)
 return index
}

// SortSlicer satisfies the sort.Interface and is able to slice itself.
type SortSlicer interface {
 sort.Interface
 Slice(start, end int) SortSlicer
}

// Select partitions list such that all elements less than
// the kth element
// are placed before k in the resulting list and all elements greater than
// it are placed after the position k.
func Select(list SortSlicer, k int) int {
 var (
 start int
 end = list.Len()
)
 if k >= end {
 if k == 0 {
 return 0
 }
 panic("kdtree: index out of range")
 }
 if start == end-1 {
 return k
 }

 for {
 if start == end {
 panic("kdtree: internal inconsistency")
 }
 sub := list.Slice(start, end)
 pivot := Partition(sub, rand.Intn(sub.Len()))
 switch {
 case pivot == k:
 return k
 case k < pivot:
 end = pivot + start
 default:
 k -= pivot
 start += pivot
 }
 }
}

```



```

func min(a, b int) int {
 if a < b {
 return a
 }
 return b
}

// MedianOfMedians returns the index to the median value of the medians
// of groups of 5 consecutive elements.
func MedianOfMedians(list SortSlicer) int {
 n := list.Len() / 5
 for i := 0; i < n; i++ {
 left := i * 5
 sub := list.Slice(left, min(left+5, list.Len()-1))
 Select(sub, 2)
 list.Swap(i, left+2)
 }
 Select(list.Slice(0,
 min(n, list.Len()-1)), min(list.Len(), n/2))
 return n / 2
}

// MedianOfRandoms returns the index to the median value of up to n randomly
// chosen elements in list.
func MedianOfRandoms(list SortSlicer, n int) int {
 if l := list.Len(); l < n {
 n = l
 } else {
 rand.Shuffle(n, func(i, j int) { list.Swap(i, j) })
 }
 Select(list.Slice(0, n), n/2)
 return n / 2
}

graph{"\"\\\"\\\""}
graph{{{SubGrap_}{SubGrap_}}SubGrap_{{SubGrap_}}}}
graph{DigraG{{DigraG{DigraG}}}}
graph{{SU2}SU2{{SU2}SU2}{SU2}SU0{SU2}}
graph{SubG_}

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package testlapack

import (
 "math"
 "testing"

```

```

"gonum.org/v1/gonum/floats"
)

type Drscler interface {
 Drscl(n int, a float64, x []float64, incX int)
}

func DrsclTest(t *testing.T, impl Drscler) {
 for _, test := range []struct {
 x []float64
 a float64
 }{
 {
 x: []float64{1, 2, 3, 4, 5},
 a: 4,
 },
 {
 x: []float64{1, 2, 3, 4, 5},
 a: math.MaxFloat64,
 },
 {
 x: []float64{1, 2, 3, 4, 5},
 a: 1e-307,
 },
 } {
 xcopy := make([]float64, len(test.x))
 copy(xcopy, test.x)

 // Cannot test the scaling directly because of floating point scaling issues
 // (the purpose of Drscl). Instead, check that scaling and scaling back
 // yeilds approximately x. If overflow or underflow occurs then the scaling
 // won't match.
 impl.Drscl(len(test.x), test.a, xcopy, 1)
 if floats.Equal(xcopy, test.x) {
 t.Errorf("x
unchanged during call to drscl. a = %v, x = %v.", test.a, test.x)
 }
 impl.Drscl(len(test.x), 1/test.a, xcopy, 1)
 if !floats.EqualApprox(xcopy, test.x, 1e-14) {
 t.Errorf("x not equal after scaling and unscaling. a = %v, x = %v.", test.a, test.x)
 }
 }
}

graph{<D></></>}
graph{{GRAPA{GRAPA GRAPG}GRAPG}GRAPG}
graph{{Subg{Subg}{Subg}Subg}}

```

```
// SPDX-License-Identifier: Unlicense OR MIT
```

```
package material
```

```
import (
 "image"
 "image/color"

 "gioui.org/io/pointer"
 "gioui.org/layout"
 "gioui.org/op/paint"
 "gioui.org/text"
 "gioui.org/unit"
 "gioui.org/widget"
)
```

```
type checkable struct {
 Label string
 Color color.RGBA
 Font text.Font
 IconColor color.RGBA
 Size unit.Value
 shaper *text.Shaper
 checkedStateIcon *Icon
 uncheckedStateIcon *Icon
}
```

```
func (c *checkable) layout(gtx *layout.Context, checked bool) {
```

```
 var icon *Icon
 if checked {
 icon = c.checkedStateIcon
 } else {
 icon = c.uncheckedStateIcon
 }
}
```

```
 hmin := gtx.Constraints.Width.Min
 vmin := gtx.Constraints.Height.Min
 layout.Flex{Alignment: layout.Middle}.Layout(gtx,
 layout.Rigid(func() {
 layout.Align(layout.Center).Layout(gtx, func() {
 layout.UniformInset(unit.Dp(2)).Layout(gtx, func() {
 size := gtx.Px(c.Size)
 icon.Color = c.IconColor
 icon.Layout(gtx, unit.Px(float32(size)))
 gtx.Dimensions
 }
 }
 }
)
 = layout.Dimensions{
 Size: image.Point{X: size, Y: size},
```

```

 }
 })
})
}),

layout.Rigid(func() {
 gtx.Constraints.Width.Min = hmin
 gtx.Constraints.Height.Min = vmin
 layout.Align(layout.Start).Layout(gtx, func() {
 layout.UniformInset(unit.Dp(2)).Layout(gtx, func() {
 paint.ColorOp{Color: c.Color}.Add(gtx.Ops)
 widget.Label{}.Layout(gtx, c.shaper, c.Font, c.Label)
 })
 })
}),
)
pointer.Rect(image.Rectangle{Max: gtx.Dimensions.Size}).Add(gtx.Ops)
}
// Derived from SciPy's special/cephes/lanczos.c
// https://github.com/scipy/scipy/blob/master/scipy/special/cephes/lanczos.c

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package cephes

// Optimal values for G for each N are taken from
// http://web.mala.bc.ca/pughg/phdThesis/phdThesis.pdf,
// as are the theoretical error bounds.

// Constants calculated using the method described by Godfrey
// http://my.fit.edu/~gabdo/gamma.txt and elaborated by Toth at
// http://www.rskey.org/gamma.htm using NTL::RR at 1000 bit precision.

var lanczosNum = [...]float64{
 2.506628274631000270164908177133837338626,
 210.8242777515793458725097339207133627117,
 8071.672002365816210638002902272250613822,
 186056.2653952234950402949897160456992822,
 2876370.628935372441225409051620849613599,
 31426415.58540019438061423162831820536287,
 248874557.8620541565114603864132294232163,
 1439720407.311721673663223072794912393972,
 6039542586.35202800506429164430729792107,
 17921034426.03720969991975575445893111267,

```

```
35711959237.35566804944018545154716670596,
42919803642.64909876895789904700198885093,
23531376880.41075968857200767445163675473,
}
```

```
var
lanczosDenom = [...]float64{
1,
66,
1925,
32670,
357423,
2637558,
13339535,
45995730,
105258076,
150917976,
120543840,
39916800,
0,
}
```

```
var lanczosSumExpgScaledNum = [...]float64{
0.006061842346248906525783753964555936883222,
0.5098416655656676188125178644804694509993,
19.51992788247617482847860966235652136208,
449.9445569063168119446858607650988409623,
6955.999602515376140356310115515198987526,
75999.29304014542649875303443598909137092,
601859.6171681098786670226533699352302507,
3481712.15498064590882071018964774556468,
14605578.08768506808414169982791359218571,
43338889.32467613834773723740590533316085,
86363131.28813859145546927288977868422342,
103794043.1163445451906271053616070238554,
56906521.91347156388090791033559122686859,
}
```

```
var
lanczosSumExpgScaledDenom = [...]float64{
1,
66,
1925,
32670,
357423,
2637558,
13339535,
45995730,
```

```

105258076,
150917976,
120543840,
39916800,
0,
}

```

```

var lanczosSumNear1D = [...]float64{
0.3394643171893132535170101292240837927725e-9,
-0.2499505151487868335680273909354071938387e-8,
0.8690926181038057039526127422002498960172e-8,
-0.1933117898880828348692541394841204288047e-7,
0.3075580174791348492737947340039992829546e-7,
-0.2752907702903126466004207345038327818713e-7,
-0.1515973019871092388943437623825208095123e-5,
0.004785200610085071473880915854204301886437,
-0.1993758927614728757314233026257810172008,
1.483082862367253753040442933770164111678,
-3.327150580651624233553677113928873034916,
2.208709979316623790862569924861841433016,
}

```

```

var lanczosSumNear2D = [...]float64{
0.1009141566987569892221439918230042368112e-8,
-0.7430396708998719707642735577238449585822e-8,
0.2583592566524439230844378948704262291927e-7,
-0.5746670642147041587497159649318454348117e-7,
0.9142922068165324132060550591210267992072e-7,
-0.8183698410724358930823737982119474130069e-7,
-0.4506604409707170077136555010018549819192e-5,
0.01422519127192419234315002746252160965831,
-0.5926941084905061794445733628891024027949,
4.408830289125943377923077727900630927902,
-9.8907772644920670589288081640128194231,
6.565936202082889535528455955485877361223,
}

```

```

const
lanczosG = 6.024680040776729583740234375

```

```

func lanczosSum(x float64) float64 {
return ratevl(x,
lanczosNum[:],
len(lanczosNum)-1,
lanczosDenom[:],
len(lanczosDenom)-1)
}

```

```

func lanczosSumExpgScaled(x float64) float64 {
 return ratevl(x,
 lanczosSumExpgScaledNum[:],
 len(lanczosSumExpgScaledNum)-1,
 lanczosSumExpgScaledDenom[:],
 len(lanczosSumExpgScaledDenom)-1)
}

func lanczosSumNear1(dx float64) float64 {
 var result float64

 for i, val := range lanczosSumNear1D {
 k := float64(i + 1)
 result +=
 (-val * dx) / (k*dx + k*k)
 }

 return result
}

func lanczosSumNear2(dx float64) float64 {
 var result float64
 x := dx + 2

 for i, val := range lanczosSumNear2D {
 k := float64(i + 1)
 result += (-val * dx) / (x + k*x + k*k - 1)
 }

 return result
}
graph{{subgrap_}}
graph{{{{{{{{{{n}}n}}}}}}}}
graph{{ED8}}ED8{ED8}
graph{NOZ{NOZ}}
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// Package sampleuv implements advanced sampling routines from explicit and implicit
// probability distributions.
//
// Each sampling routine is implemented as a stateless function with a
// complementary wrapper type. The wrapper types allow the sampling routines
// to implement interfaces.
package sampleuv // import "gonum.org/v1/gonum/stat/sampleuv"
// Code generated by "go generate gonum.org/v1/gonum/unit/constant; DO NOT EDIT.

```

```

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package constant

import (
 "fmt"

 "gonum.org/v1/gonum/unit"
)

// Faraday is the Faraday constant, the magnitude of electric charge per mole of electrons.
// The dimensions of Faraday are A s mol-1. The constant is exact.
const Faraday = faradayUnits(96485.33212)

type faradayUnits float64

// Unit converts the faradayUnits to a *unit.Unit
func (cnst faradayUnits) Unit() *unit.Unit {
 return unit.New(float64(cnst), unit.Dimensions{
 unit.CurrentDim: 1,
 unit.TimeDim: 1,
 unit.MoleDim: -1,
 })
}

func (cnst faradayUnits) Format(fs fmt.State, c rune) {
 switch c {
 case 'v':
 if fs.Flag('#') {
 fmt.Fprintf(fs, "%T(%v)", cnst, float64(cnst))
 return
 }
 fallthrough
 case 'e', 'E', 'f', 'F', 'g', 'G':
 p, pOk := fs.Precision()
 w,
 wOk := fs.Width()
 switch {
 case pOk && wOk:
 fmt.Fprintf(fs, "%*.*"+string(c), w, p, cnst.Unit())
 case pOk:
 fmt.Fprintf(fs, "%. "+string(c), p, cnst.Unit())
 case wOk:
 fmt.Fprintf(fs, "%*"+string(c), w, cnst.Unit())
 default:
 fmt.Fprintf(fs, "%"+string(c), cnst.Unit())
 }
 }
}

```



```

}
default:
 fmt.Fprintf(fs, "%%!"+string(c)+"(constant.faradayUnits=%v A s mol^-1)", float64(cnst))
}
}
graph{Edgh{Edgh{Edgr}{Edgr}}Edgh}
graph{{DIGRA}}
mMIT License

```

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All forks of this package must be subject to the above provisions. This only applies to the fork itself and NOT the product(s) derived from this package or a fork of this package.

```

graph{{dn do}}
graph{{{graph_}{graph_}{graph_}{graph_}{graph_}}}graph_
graph{ED_}
graph{{{subgrap{subgrap}subgrap}}subgrap}
graph{GRAP{GRAP}}
graph{K185582076609134620766091346740222656257910156274077265625791015625}
graph{{{{{DI}}}}}
graph{{Nodr}Nodr}
graph{-.5{-.5{-.5}-.5{-.5{-.5}-.5}-.5}-.5}
graph{Di{Di{{{Di}Di}}Di}}
graph{Stm Stm Stm Stm Stm Stm Stm Stm Stm}

```

```

Graph{{Ed_{Ed_{Ed_}}Ed_{Ed_{Ed_{Ed_}}}}{Ed_{Ed_{Ed_{Ed_}}}}}
graph{{{DiGrag}DiGrag}DiGrag{DiGrag}DiGrag{DiGrag}}
graph{<R><T><R><T>}
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```

```

package layout

```

```

import (
 "fmt"
 "image/color"
 "math"

 "gonum.org/v1/plot"
 "gonum.org/v1/plot/plotter"
 "gonum.org/v1/plot/vg"
 "gonum.org/v1/plot/vg/draw"
)

```

```

const radius = vg.Length(15)

```

```

// render implements the plot.Plotter interface for graphs.
type render struct {
 GraphR2
}

```

```

func (p render) Plot(c draw.Canvas, plt *plot.Plot) {
 nodes := p.GraphR2.Nodes()
 if nodes.Len() == 0 {
 return
 }
 xys := make(plotter.XYs, 0, nodes.Len())
 ids := make([]string, 0, nodes.Len())
 for nodes.Next() {
 u := nodes.Node()
 uid := u.ID()
 ur2 := p.GraphR2.LayoutNodeR2(uid)
 xys = append(xys, plotter.XY(ur2.Coord2))
 ids = append(ids, fmt.Sprint(uid))
 to := p.GraphR2.From(uid)
 for to.Next() {
 v := to.Node()
 vid := v.ID()
 vr2 := p.GraphR2.LayoutNodeR2(vid)

 l, err := plotter.NewLine(plotter.XYs{plotter.XY(ur2.Coord2),

```

```

plotter.XY(vr2.Coord2))
 if err != nil {
 panic(err)
 }
 l.Plot(c, plt)
 if err != nil {
 panic(err)
 }
}
}

n, err := plotter.NewScatter(xys)
if err != nil {
 panic(err)
}
n.GlyphStyle.Shape = nodeGlyph{}
n.GlyphStyle.Radius = radius
n.Plot(c, plt)

l, err := plotter.NewLabels(plotter.XYLabels{XYS: xys, Labels: ids})
if err != nil {
 panic(err)
}
fnt, err := vg.MakeFont(plot.DefaultFont, vg.Points(18))
if err != nil {
 panic(err)
}
for i := range l.TextStyle {
 l.TextStyle[i] = draw.TextStyle{Font: fnt, XAlign: draw.XCenter, YAlign: -0.33}
}

l.Plot(c, plt)
}

// DataRange returns the minimum and maximum X and Y values
func (p render) DataRange() (xmin, xmax, ymin, ymax float64) {
 nodes := p.GraphR2.Nodes()
 if nodes.Len() == 0 {
 return
 }
 xys := make(plotter.XYs, 0, nodes.Len())
 for nodes.Next() {
 u := nodes.Node()
 uid := u.ID()
 ur2 := p.GraphR2.LayoutNodeR2(uid)
 xys = append(xys, plotter.XY(ur2.Coord2))
 }
 return plotter.XYRange(xys)
}

```

```

}

//
GlyphBoxes returns a slice of plot.GlyphBoxes, implementing the
// plot.GlyphBoxer interface.
func (p render) GlyphBoxes(plt *plot.Plot) []plot.GlyphBox {
 nodes := p.GraphR2.Nodes()
 if nodes.Len() == 0 {
 return nil
 }
 b := make([]plot.GlyphBox, nodes.Len())
 for i := 0; nodes.Next(); i++ {
 u := nodes.Node()
 uid := u.ID()
 ur2 := p.GraphR2.LayoutNodeR2(uid)

 b[i].X = plt.X.Norm(ur2.Coord2.X)
 b[i].Y = plt.Y.Norm(ur2.Coord2.Y)
 r := radius
 b[i].Rectangle = vg.Rectangle{
 Min: vg.Point{X: -r, Y: -r},
 Max: vg.Point{X: +r, Y: +r},
 }
 }
 return b
}

// nodeGlyph is a glyph that draws a filled circle.
type nodeGlyph struct{}

// DrawGlyph implements the GlyphDrawer interface.
func (nodeGlyph) DrawGlyph(c *draw.Canvas, sty draw.GlyphStyle, pt vg.Point) {
 var p vg.Path
 c.Push()
 c.SetColor(color.White)
 p.Move(vg.Point{X: pt.X + sty.Radius, Y: pt.Y})
 p.Arc(pt, sty.Radius, 0, 2*math.Pi)
 p.Close()
 c.Fill(p)
 c.Pop()
 c.Stroke(p)
}
graph{<<34694469519536141888238489627838134765625>>}
graph{{NODd}NODd{NODd}{NODd}NODd}
graph{{SUBGRA0}}
// Code generated by "go generate gonum.org/v1/gonum/unit/constant; DO NOT EDIT.

// Copyright 2019 The Gonum Authors. All rights reserved.

```

```

// Use of this source code is governed by a BSD-style
// license that can be found in the LICENSE file.

package constant

import (
 "fmt"
 "testing"
)

func TestFaradayFormat(t *testing.T) {
 for _, test := range []struct {
 format string
 want string
 }{
 {"%v", "96485.33212 A s mol^-1"},
 {"%.1v", "1e+05 A s mol^-1"},
 {"%50.1v", "1e+05 A s mol^-1"},
 {"%50v", "96485.33212 A s mol^-1"},
 {"%1v", "96485.33212 A s mol^-1"},
 {"%#v", "constant.faradayUnits(96485.33212)"},
 {"%s", "%!s(constant.faradayUnits=96485.33212 A s mol^-1)"},
 } {
 got := fmt.Sprintf(test.format, Faraday)
 if got != test.want {
 t.Errorf("Format %q: got: %q want: %q", test.format, got, test.want)
 }
 }
}

graph{{DIG}DIG}}
graph{{DiV{{DiW}{DiW}{DiW}{DiW}}DiV{{DiW}}}}
// Copyright 2019 The Gonum Authors. All rights reserved.
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// license that can be found in the LICENSE file.

// Package kdtree implements a k-d tree.
//
// See https://en.wikipedia.org/wiki/K-d_tree for more details of k-d tree functionality.
package kdtree // import "gonum.org/v1/gonum/spatial/kdtree"
Graph{{Subgr4}{Subgr4{Subgr4}}}
// Code generated by "go generate gonum.org/v1/gonum/unit/constant; DO NOT EDIT.

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// license that can be found in the LICENSE file.

package constant

```

```

import (
 "fmt"
 "testing"
)

func TestGravitationalFormat(t *testing.T) {
 for _, test := range []struct {
 format string
 want string
 }{
 {"%v", "6.6743e-11 m^3 kg^-1 s^-2"},
 {"%.1v", "7e-11 m^3 kg^-1 s^-2"},
 {"%50.1v", "7e-11 m^3 kg^-1 s^-2"},
 {"%50v", "6.6743e-11 m^3 kg^-1 s^-2"},
 {"%1v", "6.6743e-11 m^3 kg^-1 s^-2"},
 {"%#v", "constant.gravitationalUnits(6.6743e-11)"},
 {"%s", "%!s(constant.gravitationalUnits=6.6743e-11 m^3 kg^-1 s^-2)"},
 } {
 got := fmt.Sprintf(test.format, Gravitational)
 if got != test.want {
 t.Errorf("Format %q: got: %q want: %q", test.format, got, test.want)
 }
 }
}

graph{-.5{-.5{-.5{-.5{-.5{-.5{-.5}}}}}}
graph{{noU}noO{noU{noU}}}
// Copyright 2014 The Gonum Authors. All rights reserved.
// Use of this source code is governed by a BSD-style
// license that can be found in the LICENSE file.

```

```

package topo

```

```

import (
 "gonum.org/v1/gonum/graph"
 "gonum.org/v1/gonum/graph/traverse"
)

```

```

// IsPathIn returns whether path is a path in g.
//
// As special cases, IsPathIn returns true for a zero length path or for
// a path of length 1 when the node in path exists in the graph.
func IsPathIn(g graph.Graph, path []graph.Node) bool {
 switch len(path) {
 case 0:
 return true
 case 1:
 return g.Node(path[0].ID()) != nil
 default:

```

```

var canReach func(uid, vid int64) bool
switch g := g.(type) {
case graph.Directed:
 canReach = g.HasEdgeFromTo
default:
 canReach = g.HasEdgeBetween
}

for i, u := range path[:len(path)-1] {
 if !canReach(u.ID(), path[i+1].ID()) {
 return false
 }
}
return true
}
}

// PathExistsIn returns whether there is a path in g starting at from extending
// to to.
//
// PathExistsIn
// exists as a helper function. If many tests for path existence
// are being performed, other approaches will be more efficient.
func PathExistsIn(g graph.Graph, from, to graph.Node) bool {
 var t traverse.BreadthFirst
 return t.Walk(g, from, func(n graph.Node, _ int) bool { return n.ID() == to.ID() }) != nil
}

// ConnectedComponents returns the connected components of the undirected graph g.
func ConnectedComponents(g graph.Undirected) [][]graph.Node {
 var (
 w traverse.DepthFirst
 c []graph.Node
 cc [][]graph.Node
)
 during := func(n graph.Node) {
 c = append(c, n)
 }
 after := func() {
 cc = append(cc, []graph.Node(nil))
 cc[len(cc)-1] = append(cc[len(cc)-1], c...)
 c = c[:0]
 }
 w.WalkAll(g, nil, after, during)

 return cc
}

```

```

graph{GraA{{GraB}GraB}}
// Copyright 2019 The Gonum Authors. All rights reserved.
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// license that can be found in the LICENSE file.

package layout

import (
 "path/filepath"
 "testing"

 "gonum.org/v1/gonum/graph"
 "gonum.org/v1/gonum/graph/simple"
 "gonum.org/v1/gonum/spatial/r2"
 "gonum.org/v1/plot"
 "gonum.org/v1/plot/vg"
)

// tag is modified in isomap_noasm_test.go to "_noasm" when any
// build tag prevents use of the assembly numerical kernels.
var tag string

var isomapR2Tests = []struct {
 name string
 g graph.Graph
}{
 {
 name: "line_isomap",
 g: func() graph.Graph {
 edges := []simple.Edge{
 {simple.Node(0), simple.Node(1)},
 }
 g := simple.NewUndirectedGraph()
 for _, e := range edges {
 g.SetEdge(e)
 }
 return orderedGraph{g}
 }(),
 },
 {
 name: "square_isomap",
 g: func() graph.Graph {
 edges := []simple.Edge{
 {simple.Node(0), simple.Node(1)},
 {simple.Node(0), simple.Node(2)},
 {simple.Node(1), simple.Node(3)},
 {simple.Node(2),

```



```

simple.Node(3)},
}
g := simple.NewUndirectedGraph()
for _, e := range edges {
 g.SetEdge(e)
}
return orderedGraph{g}
}(),
},
{
 name: "tetrahedron_isomap",
 g: func() graph.Graph {
 edges := []simple.Edge{
 {simple.Node(0), simple.Node(1)},
 {simple.Node(0), simple.Node(2)},
 {simple.Node(0), simple.Node(3)},
 {simple.Node(1), simple.Node(2)},
 {simple.Node(1), simple.Node(3)},
 {simple.Node(2), simple.Node(3)},
 }
 g := simple.NewUndirectedGraph()
 for _, e := range edges {
 g.SetEdge(e)
 }
 return orderedGraph{g}
 }(),
},
{
 name: "sheet_isomap",
 g: func() graph.Graph {
 edges := []simple.Edge{
 {simple.Node(0), simple.Node(1)},
 {simple.Node(0), simple.Node(3)},
 {simple.Node(1), simple.Node(2)},
 {simple.Node(1), simple.Node(4)},
 {simple.Node(2), simple.Node(5)},
 {simple.Node(3), simple.Node(4)},
 {simple.Node(3), simple.Node(6)},
 {simple.Node(4), simple.Node(5)},
 {simple.Node(4),
simple.Node(7)},
 {simple.Node(5), simple.Node(8)},
 {simple.Node(6), simple.Node(7)},
 {simple.Node(7), simple.Node(8)},
 }
 g := simple.NewUndirectedGraph()
 for _, e := range edges {
 g.SetEdge(e)

```

```

 }
 return orderedGraph{g}
 }(),
},
{
 name: "tube_isomap",
 g: func() graph.Graph {
 edges := []simple.Edge{
 {simple.Node(0), simple.Node(1)},
 {simple.Node(0), simple.Node(2)},
 {simple.Node(0), simple.Node(3)},
 {simple.Node(1), simple.Node(2)},
 {simple.Node(1), simple.Node(4)},
 {simple.Node(2), simple.Node(5)},
 {simple.Node(3), simple.Node(4)},
 {simple.Node(3), simple.Node(5)},
 {simple.Node(3), simple.Node(6)},
 {simple.Node(4), simple.Node(5)},
 {simple.Node(4), simple.Node(7)},
 {simple.Node(5), simple.Node(8)},
 {simple.Node(6), simple.Node(7)},
 {simple.Node(6), simple.Node(8)},
 {simple.Node(7), simple.Node(8)},
 }
 g := simple.NewUndirectedGraph()
 for _, e := range edges {
 g.SetEdge(e)
 }
 return
 } orderedGraph{g}
 }(),
},
{
 name: "wp_page_isomap", // https://en.wikipedia.org/wiki/PageRank#/media/File:PageRanks-Example.jpg
 g: func() graph.Graph {
 edges := []simple.Edge{
 {simple.Node(0), simple.Node(3)},
 {simple.Node(1), simple.Node(2)},
 {simple.Node(1), simple.Node(3)},
 {simple.Node(1), simple.Node(4)},
 {simple.Node(1), simple.Node(5)},
 {simple.Node(1), simple.Node(6)},
 {simple.Node(1), simple.Node(7)},
 {simple.Node(1), simple.Node(8)},
 {simple.Node(3), simple.Node(4)},
 {simple.Node(4), simple.Node(5)},
 {simple.Node(4), simple.Node(6)},
 {simple.Node(4), simple.Node(7)},
 }

```

```

 {simple.Node(4), simple.Node(8)},
 {simple.Node(4), simple.Node(9)},
 {simple.Node(4), simple.Node(10)},
 }
 g := simple.NewUndirectedGraph()
 for _, e := range edges {
 g.SetEdge(e)
 }
 return orderedGraph{g}
}(),
},
}

func TestIsomapR2(t *testing.T) {
 for _, test := range isomapR2Tests {
 o :=
 NewOptimizerR2(test.g, IsomapR2{}.Update)
 var n int
 for o.Update() {
 n++
 }
 p, err := plot.New()
 if err != nil {
 t.Errorf("unexpected error: %v", err)
 continue
 }
 p.Add(render{o})
 p.HideAxes()
 path := filepath.Join("testdata", test.name+tag+".png")
 err = p.Save(10*vg.Centimeter, 10*vg.Centimeter, path)
 if err != nil {
 t.Errorf("unexpected error: %v", err)
 continue
 }
 ok := checkRenderedLayout(t, path)
 if !ok {
 got := make(map[int64]r2.Vector)
 nodes := test.g.Nodes()
 for nodes.Next() {
 id := nodes.Node().ID()
 got[id] = o.Coord2(id)
 }
 t.Logf("got node positions: %#v", got)
 }
 }
}

graph{{Digr0}{Digr0{Digr0}Digr0{Digr0}}}

```



```

_d _l
_l _k
`,
// Satisfiable system.
`_a _b
_b _f
_h _i
_a _b
_k _c
_f _h
_c _g
_f _g
_h _l
_h _i
_i _b
_i _e
_i _c
_g _a
_l _f
_j _i
_a _j
_a _b
_d _e
_k _a
_k _h
_l _d
_l _e
_l _f
_b _d
_b _g
_d _l
_l _e
`,

`fun fun
fun Gonum
Gonum Gonum
`,
}

// twoSat returns whether the system described in the data read from r is
// satisfiable and a set of states that satisfies the system.
// The syntax used by twoSat is " " where and may
// be negated by
// leading "" characters. twoSat uses the implication graph approach to
// system analysis.
func twoSat(r io.Reader) (state map[string]bool, ok bool) {
 g := simple.NewDirectedGraph()

```

```

sc := bufio.NewScanner(r)
nodes := make(map[string]node)
for count := 1; sc.Scan(); count++ {
 line := sc.Text()
 fields := strings.Split(line, "")
 if len(fields) != 2 {
 log.Fatalf("failed to parse on line %d %q: invalid syntax", count, line)
 }
 var variables [2]node
 for i, f := range fields {
 f = strings.TrimSpace(f)
 var negate bool
 for strings.Index(f, "") == 0 {
 f = strings.TrimPrefix(f, "")
 negate = !negate
 }
 n, ok := nodes[f]
 if !ok {
 n = node{
 id: int64(len(nodes) + 1), // id must not be zero.
 name: f,
 }
 nodes[f] = n
 }
 if negate {
 n = n.negated()
 }
 variables[i] = n
 }

 // Check for tautology.
 if variables[0].negated().ID() == variables[1].ID() {
 for _, v := range variables {
 if g.Node(v.ID())
== nil {
 g.AddNode(v)
 }
 }
 continue
 }

 // Add implications to the graph.
 g.SetEdge(simple.Edge{F: variables[0].negated(), T: variables[1]})
 g.SetEdge(simple.Edge{F: variables[1].negated(), T: variables[0]})
}

// Find implication inconsistencies.

```

```

sccs := topo.TarjanSCC(g)
for _, c := range sccs {
 set := make(map[int64]struct{})
 for _, n := range c {
 id := n.ID()
 if _, ok := set[-id]; ok {
 return nil, false
 }
 set[id] = struct{}{}
 }
}

// Assign states.
state = make(map[string]bool)
unknown:
for _, c := range sccs {
 for _, n := range c {
 if _, known := state[n.(node).name]; known {
 continue unknown
 }
 }
 for _, n := range c {
 n := n.(node)
 state[n.name] = n.id > 0
 }
}

return state, true
}

type node struct {
 id int64
 name string
}

func (n node) ID() int64 { return n.id }
func (n node) negated() node { return node{-n.id, n.name} }

func ExampleTarjanSCC_2sat() {
 for i, s := range systems {
 state, ok
 := twoSat(strings.NewReader(s))
 if !ok {
 fmt.Printf("system %d is not satisfiable\n", i)
 continue
 }
 var ps []string
 for v, t := range state {

```

[illegible]



```

 }
 }
 return nil
}

// check validates the semantics of the given graph.
func checkGraph(graph *ast.Graph) error {
 for _, stmt := range graph.Stmts {
 if err := checkStmt(graph, stmt); err != nil {
 return err
 }
 }
 return nil
}

// check validates the semantics of the given statement.
func checkStmt(graph *ast.Graph, stmt
ast.Stmt) error {
 switch stmt := stmt.(type) {
 case *ast.NodeStmt:
 return checkNodeStmt(graph, stmt)
 case *ast.EdgeStmt:
 return checkEdgeStmt(graph, stmt)
 case *ast.AttrStmt:
 return checkAttrStmt(graph, stmt)
 case *ast.Attr:
 // TODO: Verify that the attribute is indeed of graph component kind.
 return checkAttr(graph, ast.GraphKind, stmt)
 case *ast.Subgraph:
 return checkSubgraph(graph, stmt)
 default:
 panic(fmt.Sprintf("support for statement of type %T not yet implemented", stmt))
 }
}

// checkNodeStmt validates the semantics of the given node statement.
func checkNodeStmt(graph *ast.Graph, stmt *ast.NodeStmt) error {
 if err := checkNode(graph, stmt.Node); err != nil {
 return err
 }
 for _, attr := range stmt.Attrs {
 // TODO: Verify that the attribute is indeed of node component kind.
 if err := checkAttr(graph, ast.NodeKind, attr); err != nil {
 return err
 }
 }
 return nil
}

```

```

// checkEdgeStmt validates the semantics of the given edge statement.
func checkEdgeStmt(graph
*ast.Graph, stmt *ast.EdgeStmt) error {
// TODO: if graph.Strict, check for multi-edges.
if err := checkVertex(graph, stmt.From); err != nil {
return err
}
for _, attr := range stmt.Attrs {
// TODO: Verify that the attribute is indeed of edge component kind.
if err := checkAttr(graph, ast.EdgeKind, attr); err != nil {
return err
}
}
return checkEdge(graph, stmt.From, stmt.To)
}

// checkEdge validates the semantics of the given edge.
func checkEdge(graph *ast.Graph, from ast.Vertex, to *ast.Edge) error {
if !graph.Directed && to.Directed {
return fmt.Errorf("undirected graph %q contains directed edge from %q to %q", graph.ID, from, to.Vertex)
}
if err := checkVertex(graph, to.Vertex); err != nil {
return err
}
if to.To != nil {
return checkEdge(graph, to.Vertex, to.To)
}
return nil
}

// checkAttrStmt validates the semantics of the given attribute statement.
func checkAttrStmt(graph *ast.Graph, stmt *ast.AttrStmt) error {
for _, attr :=
range stmt.Attrs {
if err := checkAttr(graph, stmt.Kind, attr); err != nil {
return err
}
}
return nil
}

// checkAttr validates the semantics of the given attribute for the given
// component kind.
func checkAttr(graph *ast.Graph, kind ast.Kind, attr *ast.Attr) error {
switch kind {
case ast.GraphKind:
// TODO: Validate key-value pairs for graphs.

```



```

graph{sub{{{sub}sub}}}
graph{Edgh{Edgh{Edgr}}Edgh}
graph{{{gr}gr}gr}
graph{{GG GB GP}GB GP}
graph{St5{St1}}
Graph{Subgra_{{Subgra_{Subgra_}}Subgra_}}
graph{Nod0}
graph{edg{edg}edg}
graph{Di}
graph{di di{di }}
digraph{A:ne->F:ne}
graph{{{{{subGrc}{subGrn}}}}>{{{subGrc}{subGrc}{subGrn}}}}>{{{subGrc}{subGrc}{subGrn}}}}>{{{subGrc}{subGrc}{subGrn}}}}
subGrn}}}}}
// Copyright 2019 The Gonum Authors. All rights reserved.
// Use of this source code is governed by a BSD-style
// license that can be found in the LICENSE file.

package testlapack

import (
 "fmt"
 "math"
 "testing"

 "golang.org/x/exp/rand"
 "gonum.org/v1/gonum/blas"
 "gonum.org/v1/gonum/floats"
 "gonum.org/v1/gonum/lapack"
)

type Dpbconer interface {
 Dpbcon(uplo blas.Uplo, n, kd int, ab []float64, ldab int, anorm float64, work []float64, iwork []int) float64

 Dpbtrser
 Dlanger
 Dlansber
}

// DpbconTest tests Dpbcon by generating a random symmetric band matrix A and
// checking that the estimated condition number is not too different from the
// condition number computed via the explicit inverse of A.
func DpbconTest(t *testing.T, impl Dpbconer) {
 rnd := rand.New(rand.NewSource(1))
 for _, n := range []int{0, 1, 2, 3, 4, 5, 10, 50} {
 for _, kd := range []int{0, (n + 1) / 4, (3*n - 1) / 4, (5*n + 1) / 4} {
 for _, uplo := range []blas.Uplo{blas.Upper, blas.Lower} {
 for _,

```

```

ldab := range []int{kd + 1, kd + 1 + 3} {
 dpbconTest(t, impl, uplo, n, kd, ldab, rnd)
}
}
}
}
}

func dpbconTest(t *testing.T, impl Dpbconer, uplo blas.Uplo, n, kd, ldab int, rnd *rand.Rand) {
 const ratioThresh = 10

 name := fmt.Sprintf("uplo=%v,n=%v,kd=%v,ldab=%v", string(uplo), n, kd, ldab)

 // Generate a random symmetric positive definite band matrix.
 ab := randSymBand(uplo, n, kd, ldab, rnd)

 // Compute the Cholesky decomposition of A.
 abFac := make([]float64, len(ab))
 copy(abFac, ab)
 ok := impl.Dpbtrf(uplo, n, kd, abFac, ldab)
 if !ok {
 t.Fatalf("%v: bad test matrix, Dpbtrf failed", name)
 }

 // Compute the norm of A.
 work := make([]float64, 3*n)
 aNorm := impl.Dlansb(lapack.MaxColumnSum, uplo, n, kd, ab, ldab, work)

 // Compute an estimate of rCond.
 iwork := make([]int, n)
 abFacCopy := make([]float64, len(abFac))
 copy(abFacCopy, abFac)
 rCondGot := impl.Dpbcon(uplo, n, kd, abFac, ldab, aNorm, work, iwork)

 if !floats.Equal(abFac, abFacCopy) {
 t.Errorf("%v: unexpected modification of ab", name)
 }

 // Form the inverse of A to compute a good estimate of the condition number
 // rCondWant := 1/(norm(A) * norm(inv(A)))
 lda := max(1, n)
 aInv := make([]float64, n*lda)
 for i := 0; i < n; i++ {
 aInv[i*lda+i] = 1
 }
 impl.Dpbtrs(uplo, n, kd, n, abFac, ldab, aInv, lda)
 aInvNorm := impl.Dlange(lapack.MaxColumnSum, n, n, aInv, lda, work)

```

```
rCondWant := 1.0
if aNorm > 0 && aInvNorm > 0 {
 rCondWant = 1 / aNorm / aInvNorm
}

ratio := rCondTestRatio(rCondGot, rCondWant)
if ratio >= ratioThresh {
 t.Errorf("%v: unexpected value of rcond. got=%v, want=%v (ratio=%v)", name, rCondGot, rCondWant, ratio)
}
}
```

// rCondTestRatio returns a test ratio to compare two values of the reciprocal  
// of the condition number.  
//  
// This function corresponds to DGET06 in Reference LAPACK.

```
func rCondTestRatio(rcond, rcondc float64) float64 {
 const eps = dlamchE
 switch {
 case rcond > 0 && rcondc > 0:
 return math.Max(rcond, rcondc)/math.Min(rcond,
rcondc) - (1 - eps)
 case rcond > 0:
 return rcond / eps
 case rcondc > 0:
 return rcondc / eps
 default:
 return 0
 }
}
```

digraph {  
A ~ B  
}

```
graph{SUBGp{{{SUBGp{SUBGp{{SUBGp{SUBGp}}}}}{}SUBGp{{SUBGp{SUBGh{{SUBGp}}}}}}}}
graph{{{}}{{}}{{}}{{}}{{}}{{}}{{}}{{}}{{}}{{}}
```

graph{<[y=d][c=n][c=n][c=b][c=b][c=n]s[c=r][c=n][c=b][c=b][c=b][c=n][c=n][c=n][c=n][c=b][c=n][s=n]  
[[c=n][c=r][c=n][c=n]s[c=n][c=n][c=n]]e->[r=e]}

Graph{{{EDGG}}}

```
graph{{{(StriG){StriG}{StriG}{StriG}}{(StriG){StriG}{StriG}{StriG}{StriG}}StriC}
graph{{di}}
graph{Subgrap5}
```

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// Package amos implements functions originally in the Netlib code by Donald Amos.

```
package amos // import "gonum.org/v1/gonum/mathext/internal/amos"
```

graph{{{gr}{gr}}gr{{gr}{gr}{gr}{gr}{gr}}{gr}{gr}gr{{gr}{gr}{gr}{gr}{gr}{gr}{gr}{gr}}{

```

graph{NO_}
// SPDX-License-Identifier: Unlicense OR MIT

/*
Package key implements key and text events and operations.

The InputOp operations is used for declaring key input handlers. Use
an implementation of the Queue interface from package ui to receive
events.
*/
package key

import (
 "strings"

 "gioui.org/internal/opconst"
 "gioui.org/io/event"
 "gioui.org/op"
)

// InputOp declares a handler ready for key events.
// Key events are in general only delivered to the
// focused key handler. Set the Focus flag to request
// the focus.
type InputOp struct {
 Key event.Key
 Focus bool
}

// HideInputOp request that any on screen text input
// be hidden.
type HideInputOp struct{}

// A FocusEvent is generated when a handler gains or loses
// focus.
type FocusEvent struct {
 Focus bool
}

// An Event is generated when a key is pressed. For text input
// use EditEvent.
type Event struct {
 // Name of the key. For letters, the upper case form is used, via
 // unicode.ToUpper. The shift modifier is
 // taken into account, all other
 // modifiers are ignored. For example, the "shift-1" and "ctrl-shift-1"
 // combinations both give the Name "!" with the US keyboard layout.
 Name string

```

```

// Modifiers is the set of active modifiers when the key was pressed.
Modifiers Modifiers
}

// An EditEvent is generated when text is input.
type EditEvent struct {
 Text string
}

// Modifiers
type Modifiers uint32

const (
 // ModCtrl is the ctrl modifier key.
 ModCtrl Modifiers = 1 << iota
 // ModCommand is the command modifier key
 // found on Apple keyboards.
 ModCommand
 // ModShift is the shift modifier key.
 ModShift
 // ModAlt is the alt modifier key, or the option
 // key on Apple keyboards.
 ModAlt
 // ModSuper is the "logo" modifier key, often
 // represented by a Windows logo.
 ModSuper
)

const (
 // Names for special keys.
 NameLeftArrow = ""
 NameRightArrow = ""
 NameUpArrow = ""
 NameDownArrow = ""
 NameReturn = ""
 NameEnter = ""
 NameEscape = ""
 NameHome = ""
 NameEnd = ""
 NameDeleteBackward = ""
 NameDeleteForward = ""
 NamePageUp = ""
 NamePageDown = ""
 NameTab = ""
)

// Contain reports whether m contains all modifiers

```



```

// in m2.
func (m Modifiers) Contain(m2 Modifiers) bool {
 return m&m2 == m2
}

func (h InputOp) Add(o *op.Ops) {
 data := o.Write(opconst.TypeKeyInputLen, h.Key)
 data[0] = byte(opconst.TypeKeyInput)
 if h.Focus {
 data[1] = 1
 }
}

func (h HideInputOp) Add(o *op.Ops) {
 data := o.Write(opconst.TypeHideInputLen)
 data[0] = byte(opconst.TypeHideInput)
}

func (EditEvent) ImplementsEvent() {}
func (Event) ImplementsEvent() {}
func (FocusEvent) ImplementsEvent() {}

func (e Event) String() string {
 return "{" + string(e.Name) + " " + e.Modifiers.String() + "}"
}

func (m Modifiers) String() string {
 var strs []string
 if m.Contain(ModCtrl) {
 strs = append(strs, "ModCtrl")
 }
 if m.Contain(ModCommand) {
 strs = append(strs, "ModCommand")
 }
 if
 m.Contain(ModShift) {
 strs = append(strs, "ModShift")
 }
 if m.Contain(ModAlt) {
 strs = append(strs, "ModAlt")
 }
 if m.Contain(ModSuper) {
 strs = append(strs, "ModSuper")
 }
 return strings.Join(strs, "|")
}
graph{STRICU{{STRICU{STRICU}STRICU{STRICU}}}}

```

```

graph{STRIC{STRIC{STRIC{STRIC{STRIC{STRIC}STRIC}}}STRIC}}
graph{{{subGras{subGrax}subGru}subGrax}}subGrax}
graph{{SubGrt}{SubGrt}{SubGrh{{SubGrt}{SubGrt}SubGrt}{}}}
graph{subGrapD}
graph{{Digrap_}Digrap_}
graph{{ND{ND}{ND}ND}}
graph{Np{Np{Np{Np}Np}Np{{{Np}Np}}}}
graph{"AAAAAAAAAA"}
graph{{{DiGrr{{DiGre}}DiGru}}DiGru}
graph{{Stri}}
graph{SUA{SUA{SUA}SUA}{SUA}SUA}
digraph{{digrapn}F}
graph{DiG{DiG}{DiG{DiG}DiG}DiG}
graph{SUBGRAV{SUBGRAV{SUBGRAU}}SUBGRAV}
graph{Nod{Nod{Nod{Nod}No}Nod{Nod}Nod{Nod}No}Nod{Nod}}
graph{{{gr}gr{gr}}gr{{gr}gr}}
graph{stric9{stric4}stric9{stric4}{stric9{stric4}stric9{stric4}}}
graph{{{GG}GB GP}GB GG GB GP}GB GP}
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```

```
package testlapack
```

```

import (
 "fmt"
 "testing"

```

```

 "gonum.org/v1/gonum/blas/blas64"
)

```

```

type Dlaswper interface {
 Dlaswp(n int, a []float64, lda, k1, k2 int, ipiv []int, incX int)
}

```

```

func DlaswpTest(t *testing.T, impl Dlaswper) {
 for ti, test := range []struct {
 k1, k2 int
 ipiv []int
 incX int

```

```

 want blas64.General
 }{
 {
 k1: 0,
 k2: 2,
 ipiv: []int{0, 1, 2},
 incX: 1,

```

```

want: blas64.General{
 Rows: 4,
 Cols: 3,
 Stride: 3,
 Data: []float64{
 1, 2, 3,
 4, 5, 6,
 7, 8, 9,
 10, 11, 12,
 },
},
{
 k1: 0,
 k2: 2,
 ipiv: []int{0, 1, 2},
 incX: -1,
 want: blas64.General{
 Rows: 4,
 Cols: 3,
 Stride: 3,
 Data: []float64{
 1, 2, 3,
 4, 5, 6,
 7, 8, 9,
 10, 11, 12,
 },
 },
},
{
 k1: 0,
 k2: 2,
 ipiv: []int{1,
2, 3},
 incX: 1,
 want: blas64.General{
 Rows: 5,
 Cols: 3,
 Stride: 3,
 Data: []float64{
 4, 5, 6,
 7, 8, 9,
 10, 11, 12,
 1, 2, 3,
 13, 14, 15,
 },
 },
},
},

```

```

{
 k1: 0,
 k2: 2,
 ipiv: []int{1, 2, 3},
 incX: -1,
 want: blas64.General{
 Rows: 5,
 Cols: 3,
 Stride: 3,
 Data: []float64{
 10, 11, 12,
 1, 2, 3,
 4, 5, 6,
 7, 8, 9,
 13, 14, 15,
 },
 },
} {
 m := test.want.Rows
 n := test.want.Cols
 k1 := test.k1
 k2 := test.k2
 if len(test.ipiv) != k2+1 {
 panic("bad length of ipiv")
 }
 incX := test.incX
 for _, extra := range []int{0, 11} {
 a := zeros(m, n, n+extra)
 c := 1
 for i := 0; i < m; i++ {
 for j := 0; j < n; j++ {
 a.Data[i*a.Stride+j] = float64(c)
 c++
 }
 }

 ipiv := make([]int, len(test.ipiv))
 copy(ipiv, test.ipiv)

 impl.Dlaswp(n, a.Data, a.Stride, k1, k2, ipiv, incX)

 prefix := fmt.Sprintf("Case %v (m=%v,n=%v,k1=%v,k2=%v,extra=%v)",
 ti, m, n, k1, k2, extra)
 if !generalOutsideAllNaN(a) {
 t.Errorf("%v: out-of-range write to A", prefix)
 }
 }
}

```

```

 if !equalApproxGeneral(a, test.want, 0) {
 t.Errorf("%v: unexpected A\n%v\n%v", prefix, a, test.want)
 }
}
}
}
graph{*****}
graph{Subgrap{Subgrap}}
graph{{{DIGRAPA}}{}{}DIGRAPA}{}{}DIGRAPA{}{}DIGRAPA{}DIGRAPD{}{}DIGRAPD{}DIGRAPA
}{}<>{}{}DIGRAPA}}
// SPDX-License-Identifier: Unlicense OR MIT

```

```

package gpu

```

```

import (
 "time"

 "gioui.org/app/internal/gl"
)

```

```

type timers struct {
 ctx *context
 timers []*timer
}

```

```

type timer struct {
 Elapsed time.Duration
 ctx *context
 obj gl.Query
 state timerState
}

```

```

type timerState uint8

```

```

const (
 timerIdle timerState = iota
 timerRunning
 timerWaiting
)

```

```

func newTimers(ctx *context) *timers {
 return &timers{
 ctx: ctx,
 }
}

```

```

func (t *timers) newTimer() *timer {
 if t == nil {

```

```

 return nil
}
tt := &timer{
 ctx: t.ctx,
 obj: t.ctx.CreateQuery(),
}
t.timers = append(t.timers, tt)
return tt
}

func (t *timer) begin() {
 if t == nil || t.state != timerIdle {
 return
 }
 t.ctx.BeginQuery(gl.TIME_ELAPSED_EXT, t.obj)
 t.state = timerRunning
}

func (t *timer) end() {
 if t == nil || t.state != timerRunning {
 return
 }
 t.ctx.EndQuery(gl.TIME_ELAPSED_EXT)
 t.state = timerWaiting
}

func (t *timers) ready() bool {
 if t == nil {
 return false
 }
 for _, tt := range t.timers {
 if
 tt.state != timerWaiting {
 return false
 }
 if t.ctx.GetQueryObjectiv(tt.obj, gl.QUERY_RESULT_AVAILABLE) == 0 {
 return false
 }
 }
 for _, tt := range t.timers {
 tt.state = timerIdle
 nanos := t.ctx.GetQueryObjectiv(tt.obj, gl.QUERY_RESULT)
 tt.Elapsed = time.Duration(nanos)
 }
 return t.ctx.GetInteger(gl.GPU_DISJOINT_EXT) == 0
}

func (t *timers) release() {

```

```

if t == nil {
 return
}
for _, tt := range t.timers {
 t.ctx.DeleteQuery(tt.obj)
}
t.timers = nil
}
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// license that can be found in the LICENSE file.

package testblas

import (
 "testing"

 "gonum.org/v1/gonum/blas"
 "gonum.org/v1/gonum/floats"
)

type Dsyr2ker interface {
 Dsyr2k(ul blas.Uplo, tA blas.Transpose, n, k int, alpha float64, a [][]float64, lda int, b []float64, ldb int, beta float64, c []float64, ldc int)
}

func Dsyr2kTest(t *testing.T, blasser Dsyr2ker) {
 for i, test := range []struct {
 ul blas.Uplo
 tA blas.Transpose
 n int
 k int
 alpha float64
 a [][]float64
 b []float64
 c [][]float64
 beta float64
 ans [][]float64
 }{
 {
 ul: blas.Upper,
 tA: blas.NoTrans,
 n: 3,
 k: 2,
 alpha: 0,
 a: [][]float64{
 {1, 2},
 {3, 4},
 },
 },
 }

```

```

 {5, 6},
 },
 b: [][]float64{
 {7, 8},
 {9, 10},
 {11, 12},
 },
 c: [][]float64{
 {1, 2, 3},
 {0, 5, 6},
 {0, 0, 9},
 },
 beta: 2,
 ans:
 [][]float64{
 {2, 4, 6},
 {0, 10, 12},
 {0, 0, 18},
 },
},
{
 ul: blas.Lower,
 tA: blas.NoTrans,
 n: 3,
 k: 2,
 alpha: 0,
 a: [][]float64{
 {1, 2},
 {3, 4},
 {5, 6},
 },
 b: [][]float64{
 {7, 8},
 {9, 10},
 {11, 12},
 },
 c: [][]float64{
 {1, 0, 0},
 {2, 3, 0},
 {4, 5, 6},
 },
 beta: 2,
 ans: [][]float64{
 {2, 0, 0},
 {4, 6, 0},
 {8, 10, 12},
 },
},
},

```



```

{
 ul: blas.Upper,
 tA: blas.NoTrans,
 n: 3,
 k: 2,
 alpha: 3,
 a: [][]float64{
 {1, 2},
 {3, 4},
 {5, 6},
 },
 b: [][]float64{
 {7, 8},
 {9, 10},
 {11, 12},
 },
 c: [][]float64{
 {1, 2, 3},
 {0, 4, 5},
 {0, 0, 6},
 },
 beta: 2,
 ans: [][]float64{
 {140, 250, 360},
 {0, 410, 568},
 {0, 0, 774},
 },
},
{
 ul: blas.Lower,
 tA: blas.NoTrans,
 n: 3,
 k: 2,
 alpha: 3,
 a: [][]float64{
 {1, 2},
 {3, 4},
 {5, 6},
 },
 b: [][]float64{
 {7,
8},
 {9, 10},
 {11, 12},
 },
 c: [][]float64{
 {1, 0, 0},
 {2, 4, 0},

```

```

 {3, 5, 6},
 },
 beta: 2,
 ans: [][]float64{
 {140, 0, 0},
 {250, 410, 0},
 {360, 568, 774},
 },
},
{
 ul: blas.Upper,
 tA: blas.Trans,
 n: 3,
 k: 2,
 alpha: 3,
 a: [][]float64{
 {1, 3, 5},
 {2, 4, 6},
 },
 b: [][]float64{
 {7, 9, 11},
 {8, 10, 12},
 },
 c: [][]float64{
 {1, 2, 3},
 {0, 4, 5},
 {0, 0, 6},
 },
 beta: 2,
 ans: [][]float64{
 {140, 250, 360},
 {0, 410, 568},
 {0, 0, 774},
 },
},
{
 ul: blas.Lower,
 tA: blas.Trans,
 n: 3,
 k: 2,
 alpha: 3,
 a: [][]float64{
 {1, 3, 5},
 {2, 4, 6},
 },
 b: [][]float64{
 {7, 9, 11},
 {8, 10, 12},

```

```

},
c: [][]float64{
 {1, 0, 0},
 {2, 4, 0},
 {3, 5, 6},
},
beta: 2,
ans: [][]float64{
 {140, 0, 0},
 {250, 410, 0},
 {360, 568, 774},
},
},
} {
 aFlat := flatten(test.a)
 bFlat
:= flatten(test.b)
 cFlat := flatten(test.c)
 ansFlat := flatten(test.ans)
 blasser.Dsyr2k(test.ul, test.tA, test.n, test.k, test.alpha, aFlat, len(test.a[0]), bFlat, len(test.b[0]), test.beta, cFlat,
len(test.c[0]))
 if !floats.EqualApprox(ansFlat, cFlat, 1e-14) {
 t.Errorf("Case %v. Want %v, got %v.", i, ansFlat, cFlat)
 }
}
}
graph{{DiGrap8}{DiGrap8}{DiGrap8}<>{{DiGrap8}{DiGrap8}DiGrap8}
graph{e{{e}eQ-5e}e}eQ-5e}
graph{{{{{{Digra_{Digra_}}Digra_{Digra_}Digra_{Digra_{Digra_}}}}}}
graph{{nod_}nod_{nod_}}
graph{{{{{{{{Edge}}}}}}}}
graph{strA{strA}}
// Code generated by "go generate gonum.org/v1/gonum/unit; DO NOT EDIT.

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// license that can be found in the LICENSE file.

package unit

import (
 "errors"
 "fmt"
 "math"
 "unicode/utf8"
)

```

```

// Length represents a length in metres.

```

```

type Length float64

const Metre Length = 1

// Unit converts the Length to a *Unit
func (l Length) Unit() *Unit {
 return New(float64(l), Dimensions{
 LengthDim: 1,
 })
}

// Length allows Length to implement a Lengther interface
func (l Length) Length() Length {
 return l
}

// From converts the unit into the receiver. From returns an
// error if there is a mismatch in dimension
func (l *Length) From(u Uniter) error {
 if !DimensionsMatch(u, Metre) {
 *l = Length(math.NaN())
 return errors.New("Dimension mismatch")
 }
 *l = Length(u.Unit().Value())
 return nil
}

func (l Length) Format(fs fmt.State, c rune) {
 switch c {
 case 'v':
 if fs.Flag('#')
 {
 fmt.Fprintf(fs, "%T(%v)", l, float64(l))
 return
 }
 fallthrough
 case 'e', 'E', 'f', 'F', 'g', 'G':
 p, pOk := fs.Precision()
 w, wOk := fs.Width()
 const unit = " m"
 switch {
 case pOk && wOk:
 fmt.Fprintf(fs, "%*.*"+string(c), pos(w-utf8.RuneCount([]byte(unit))), p, float64(l))
 case pOk:
 fmt.Fprintf(fs, "%.*"+string(c), p, float64(l))
 case wOk:
 fmt.Fprintf(fs, "%*"+string(c), pos(w-utf8.RuneCount([]byte(unit))), float64(l))
 default:

```

```

 fmt.Fprintf(fs, "%"+string(c), float64(l))
}
fmt.Fprint(fs, unit)
default:
 fmt.Fprintf(fs, "%%!%c(%T=%g m)", c, l, float64(l))
}
}
graph{SUBGR7}
graph<=><=><=>{{<=><=><=>}<=><=><=><=>}<=><=><=><=>}<=><=><=><=>}}
graph{"\\\\\\\\\\\\\\\\\\\\"}
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```

```
package path
```

```
import (
 "testing"
```

```

 "gonum.org/v1/gonum/graph"
 "gonum.org/v1/gonum/graph/graphs/gen"
 "gonum.org/v1/gonum/graph/simple"
)

```

```

var (
 gnpUndirected_10_tenth = gnpUndirected(10, 0.1)
 gnpUndirected_100_tenth = gnpUndirected(100, 0.1)
 gnpUndirected_1000_tenth = gnpUndirected(1000, 0.1)
 gnpUndirected_10_half = gnpUndirected(10, 0.5)
 gnpUndirected_100_half = gnpUndirected(100, 0.5)
 gnpUndirected_1000_half = gnpUndirected(1000, 0.5)

 nswUndirected_10_2_2_2 = navigableSmallWorldUndirected(10, 2, 2, 2)
 nswUndirected_10_2_5_2 = navigableSmallWorldUndirected(10, 2, 5, 2)
 nswUndirected_100_5_10_2 = navigableSmallWorldUndirected(100, 5, 10, 2)
 nswUndirected_100_5_20_2 = navigableSmallWorldUndirected(100, 5, 20, 2)
)

```

```

func gnpUndirected(n int, p float64) graph.Undirected {
 g := simple.NewUndirectedGraph()
 gen.Gnp(g,
 n, p, nil)
 return g
}

```

```

func navigableSmallWorldUndirected(n, p, q int, r float64) graph.Undirected {
 g := simple.NewUndirectedGraph()
 gen.NavigableSmallWorld(g, []int{n, n}, p, q, r, nil)
}

```

```

return g
}

func manhattan(size int) func(x, y graph.Node) float64 {
return func(x, y graph.Node) float64 {
return manhattanBetween(coordinatesForID(x, size, size), coordinatesForID(y, size, size))
}
}

func coordinatesForID(n graph.Node, c, r int) [2]int {
id := n.ID()
if id >= int64(c*r) {
panic("out of range")
}
return [2]int{int(id) / r, int(id) % r}
}

// manhattanBetween returns the Manhattan distance between a and b.
func manhattanBetween(a, b [2]int) float64 {
var d int
for i, v := range a {
d += abs(v - b[i])
}
return float64(d)
}

func abs(a int) int {
if a < 0 {
return -a
}
return a
}

func BenchmarkAStarUndirected(b *testing.B) {
benchmarks := []struct {
name string
graph graph.Undirected
h Heuristic
}{
{"GNP Undirected 10 tenth", gnpUndirected_10_tenth,
nil},
{"GNP Undirected 100 tenth", gnpUndirected_100_tenth, nil},
{"GNP Undirected 1000 tenth", gnpUndirected_1000_tenth, nil},
{"GNP Undirected 10 half", gnpUndirected_10_half, nil},
{"GNP Undirected 100 half", gnpUndirected_100_half, nil},
{"GNP Undirected 1000 half", gnpUndirected_1000_half, nil},

{"NSW Undirected 10 2 2 2", nswUndirected_10_2_2_2, nil},

```

```

{"NSW Undirected 10 2 2 2 heuristic", nswUndirected_10_2_2_2, manhattan(10)},
{"NSW Undirected 10 2 5 2", nswUndirected_10_2_5_2, nil},
{"NSW Undirected 10 2 5 2 heuristic", nswUndirected_10_2_5_2, manhattan(10)},
{"NSW Undirected 100 5 10 2", nswUndirected_100_5_10_2, nil},
{"NSW Undirected 100 5 10 2 heuristic", nswUndirected_100_5_10_2, manhattan(100)},
{"NSW Undirected 100 5 20 2", nswUndirected_100_5_20_2, nil},
{"NSW Undirected 100 5 20 2 heuristic", nswUndirected_100_5_20_2, manhattan(100)},
}

```

```

for _, bm := range benchmarks {
 b.Run(bm.name, func(b *testing.B) {
 var expanded
 int
 for i := 0; i < b.N; i++ {
 _, expanded = AStar(simple.Node(0), simple.Node(1), bm.graph, bm.h)
 }
 if expanded == 0 {
 b.Fatal("unexpected number of expanded nodes")
 }
 })
}
}

```

```

var (
 gnpDirected_500_tenth = gnpDirected(500, 0.1)
 gnpDirected_1000_tenth = gnpDirected(1000, 0.1)
 gnpDirected_2000_tenth = gnpDirected(2000, 0.1)
 gnpDirected_500_half = gnpDirected(500, 0.5)
 gnpDirected_1000_half = gnpDirected(1000, 0.5)
 gnpDirected_2000_half = gnpDirected(2000, 0.5)
 gnpDirected_500_full = gnpDirected(500, 1)
 gnpDirected_1000_full = gnpDirected(1000, 1)
 gnpDirected_2000_full = gnpDirected(2000, 1)
)

```

```

func gnpDirected(n int, p float64) graph.Directed {
 g := simple.NewDirectedGraph()
 gen.Gnp(g, n, p, nil)
 return g
}

```

```

func BenchmarkBellmanFordFrom(b *testing.B) {
 benchmarks := []struct {
 name string
 graph graph.Directed
 }{
 {"500 tenth", gnpDirected_500_tenth},
 {"1000 tenth", gnpDirected_1000_tenth},
 }
}

```

```

{"2000 tenth", gnpDirected_2000_tenth},
{"500
half", gnpDirected_500_half},
{"1000 half", gnpDirected_1000_half},
{"2000 half", gnpDirected_2000_half},
{"500 full", gnpDirected_500_full},
{"1000 full", gnpDirected_1000_full},
{"2000 full", gnpDirected_2000_full},
}

for _, bm := range benchmarks {
 b.Run(bm.name, func(b *testing.B) {
 for i := 0; i < b.N; i++ {
 BellmanFordFrom(bm.graph.Node(0), bm.graph)
 }
 })
}
}
graph{SUBGp{SUBGh{SUBGp{SUBGp{SUBGp{SUBGh{SUBGp{SUBGp}}}}}}}
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package fd

import (
 "gonum.org/v1/gonum/floats"
 "gonum.org/v1/gonum/mat"
)

// ConstFunc is a constant function returning the value held by the type.
type ConstFunc float64

func (c ConstFunc) Func(x []float64) float64 {
 return float64(c)
}

func (c ConstFunc) Grad(grad, x []float64) {
 for i := range grad {
 grad[i] = 0
 }
}

func (c ConstFunc) Hess(dst mat.MutableSymmetric, x []float64) {

```



```

n := len(x)
for i := 0; i < n; i++ {
 for j := i; j < n; j++ {
 dst.SetSym(i, j, 0)
 }
}

// LinearFunc is a linear function returning w*x+c.
type LinearFunc struct {
 w []float64
 c float64
}

func (l LinearFunc) Func(x []float64) float64 {
 return floats.Dot(l.w, x) + l.c
}

func (l LinearFunc) Grad(grad, x []float64) {
 copy(grad, l.w)
}

func (l LinearFunc) Hess(dst mat.MutableSymmetric, x []float64) {
 n := len(x)
 for i
:= 0; i < n; i++ {
 for j := i; j < n; j++ {
 dst.SetSym(i, j, 0)
 }
 }
}

// QuadFunc is a quadratic function returning 0.5*x'*a*x + b*x + c.
type QuadFunc struct {
 a *mat.SymDense
 b *mat.VecDense
 c float64
}

func (q QuadFunc) Func(x []float64) float64 {
 v := mat.NewVecDense(len(x), x)
 var tmp mat.VecDense
 tmp.MulVec(q.a, v)
 return 0.5*mat.Dot(&tmp, v) + mat.Dot(q.b, v) + q.c
}

func (q QuadFunc) Grad(grad, x []float64) {
 var tmp mat.VecDense

```

```

v := mat.NewVecDense(len(x), x)
tmp.MulVec(q.a, v)
for i := range grad {
 grad[i] = tmp.At(i, 0) + q.b.At(i, 0)
}
}

func (q QuadFunc) Hess(dst mat.MutableSymmetric, x []float64) {
 n := len(x)
 for i := 0; i < n; i++ {
 for j := i; j < n; j++ {
 dst.SetSym(i, j, q.a.At(i, j))
 }
 }
}

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```

```

package mathext

```

```

import (
 "math"
 "testing"
)

```

```

func TestZeta(t *testing.T) {
 for i, test := range []struct {
 x, q, want float64
 }{
 // Results computed using scipy.special.zeta
 {1, 1, math.Inf(1)},
 {1.00001, 0.5, 100001.96352290553},
 {1.0001, 25, 9996.8017690244506},
 {1.001, 1, 1000.5772884760117},
 {1.01, 10, 97.773405639173305},
 {1.5, 2, 1.6123753486854886},
 {1.5, 20, 0.45287361712938717},
 {2, -0.7, 14.28618087263834},
 {2.5, 0.5, 6.2471106345688137},
 {5, 2.5, 0.013073166646113805},
 {7.5, 5, 7.9463377443314306e-06},
 {10, -0.5, 2048.0174503557578},
 {10, 0.5, 1024.0174503557578},
 {10, 7.5, 2.5578265694201971e-9},
 {12, 2.5, 1.7089167198843551e-5},
 {17, 0.5, 131072.00101513157},
 {20, -2.5, 2097152.0006014798},
 }

```

```
{20, 0.75, 315.3368689825316},
{25, 0.25, 1125899906842624.0},
{30, 1, 1.0000000009313275},
}
{
if got := Zeta(test.x, test.q); math.Abs(got-test.want) > 1e-10 {
t.Errorf("test %d Zeta(%g, %g) failed: got %g want %g", i, test.x, test.q, got, test.want)
}
}
}
}
graph{{{DiGrap}DiGrap{{DiGrap{{DiGrap}DiGrap}}DiGrap}}}
graph{{{{{st_}{st_}st_}{st_}st_}{st_}}}}
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// Package graph defines graph interfaces.
//
// Routines to test contract compliance by user implemented graph types
// are available in gonum.org/v1/gonum/graph/testgraph.
package graph // import "gonum.org/v1/gonum/graph"
graph{ED{ED{ED{ED}ED}ED{ED}ED{ED}ED}}
graph{{Su_{Su_}{Su_}}}
graph{{{subgr{{{{{{subgr}}}}}}{{subgr{""}}{{subgr{}subgr{{{subgr}}}}}}subgr}{subgr{{{subgr{}subgr{{}}}}}}}
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// Code generated by "go generate gonum.org/v1/gonum/unit; DO NOT EDIT.

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// license that can be found in the LICENSE file.

package unit

import (
"errors"
"fmt"
"math"
"unicode/utf8"
)

// Angle represents an angle in radians.
type Angle float64

const Rad Angle = 1
```

```

// Unit converts the Angle to a *Unit
func (a Angle) Unit() *Unit {
 return New(float64(a), Dimensions{
 AngleDim: 1,
 })
}

// Angle allows Angle to implement a Angleer interface
func (a Angle) Angle() Angle {
 return a
}

// From converts the unit into the receiver. From returns an
// error if there is a mismatch in dimension
func (a *Angle) From(u Uniter) error {
 if !DimensionsMatch(u, Rad) {
 *a = Angle(math.NaN())
 return errors.New("Dimension mismatch")
 }
 *a = Angle(u.Unit().Value())
 return nil
}

func (a Angle) Format(fs fmt.State, c rune) {
 switch c {
 case 'v':
 if fs.Flag('#') {
 fmt.Fprintf(fs,
 "%T(%v)", a, float64(a))
 return
 }
 fallthrough
 case 'e', 'E', 'f', 'F', 'g', 'G':
 p, pOk := fs.Precision()
 w, wOk := fs.Width()
 const unit = " rad"
 switch {
 case pOk && wOk:
 fmt.Fprintf(fs, "%*.*"+string(c), pos(w-utf8.RuneCount([]byte(unit))), p, float64(a))
 case pOk:
 fmt.Fprintf(fs, "%*.*"+string(c), p, float64(a))
 case wOk:
 fmt.Fprintf(fs, "%*"+string(c), pos(w-utf8.RuneCount([]byte(unit))), float64(a))
 default:
 fmt.Fprintf(fs, "%"+string(c), float64(a))
 }
 fmt.Fprint(fs, unit)
 default:

```

```

 fmt.Fprintf(fs, "%%!%c(%T=%g rad)", c, a, float64(a))
}
}
graph{digrapU}
graph{>{{{St}St}}}}
graph{{digu}}
graph{{DY{DN}DY}DY{DN}DY}
graph{{DIGRAPO{{DIGRAPO}DIGRAPO{{DIGRAPO}}}}}
graph{{{{gra{{gra{{gra{{gra{{gra{{gra}}}}}gra{{gra{{gra{{}}}}gra{{gra{{gra{{gra{{gra}}}}}{{gra}}}}}
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graph{{gr{gr}gr}}
Graph{{subgrapg}}
Graph{id}
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```

```

package gonum

```

```

import (
 "testing"

 "gonum.org/v1/gonum/blas/testblas"
)

```

```

func TestZgemm(t *testing.T) { testblas.ZgemmTest(t, impl) }
func TestZhemm(t *testing.T) { testblas.ZhemmTest(t, impl) }
func TestZherk(t *testing.T) { testblas.ZherkTest(t, impl) }
func TestZher2k(t *testing.T) { testblas.Zher2kTest(t, impl) }
func TestZsymm(t *testing.T) { testblas.ZsymmTest(t, impl) }
func TestZsyrk(t *testing.T) { testblas.ZsyrkTest(t, impl) }
func TestZsyr2k(t *testing.T) { testblas.Zsyr2kTest(t, impl) }
func TestZtrmm(t *testing.T) { testblas.ZtrmmTest(t, impl) }
func TestZtrsm(t *testing.T) { testblas.ZtrsmTest(t, impl) }
graph{{{{st{{st}}st}}st}st}
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```

```

package testlapack

```

```

import (
 "testing"

 "golang.org/x/exp/rand"

 "gonum.org/v1/gonum/floats"
)

```

```

type Dorg2rer interface {
 Dgeqrf
 Dorg2r(m, n, k int, a []float64, lda int, tau []float64, work []float64)
}

func Dorg2rTest(t *testing.T, impl Dorg2rer) {
 rnd := rand.New(rand.NewSource(1))
 for ti, test := range []struct {
 m, n, k, lda int
 }{
 {3, 3, 0, 0},
 {4, 3, 0, 0},
 {3, 3, 2, 0},
 {4, 3, 2, 0},

 {5, 5, 0, 20},
 {5, 5, 3, 20},
 {10, 5, 0, 20},
 {10, 5, 2, 20},
 } {
 m := test.m
 n := test.n
 lda := test.lda
 if lda == 0 {
 lda = test.n
 }
 // Allocate mn matrix A and fill it with random numbers.
 a := make([]float64, m*lda)
 for i := range a {
 a[i] = rnd.NormFloat64()
 }

 // Compute the QR decomposition of A.
 tau := make([]float64, min(m, n))
 work := make([]float64, 1)
 impl.Dgeqrf(m,
 n, a, lda, tau, work, -1)
 work = make([]float64, int(work[0]))
 impl.Dorg2r(m, n, a, lda, tau, work, len(work))

 // Compute the matrix Q explicitly using the first k elementary reflectors.
 k := test.k
 if k == 0 {
 k = n
 }
 q := constructQK("QR", m, n, k, a, lda, tau)
 }
}

```



```

var a mat.SymDense
a.SymOuterK(1, tmp)

fmt.Printf("a = %0.4v\n", mat.Formatted(&a, mat.Prefix(" ")))

// Compute the cholesky factorization.
var chol mat.Cholesky
if ok := chol.Factorize(&a); !ok {
 fmt.Println("a matrix is not positive semi-definite.")
}

// Find the determinant.
fmt.Printf("\nThe determinant of a is %0.4g\n\n", chol.Det())

// Use the factorization to solve the system of equations a * x = b.
b := mat.NewVecDense(4, []float64{1, 2, 3, 4})
var x mat.VecDense
if err := chol.SolveVecTo(&x, b); err != nil {
 fmt.Println("Matrix is near singular: ", err)
}
fmt.Println("Solve
a * x = b")
fmt.Printf("x = %0.4v\n", mat.Formatted(&x, mat.Prefix(" ")))

// Extract the factorization and check that it equals the original matrix.
var t mat.TriDense
chol.LTo(&t)
var test mat.Dense
test.Mul(&t, t.T())
fmt.Println()
fmt.Printf("L * L = %0.4v\n", mat.Formatted(&a, mat.Prefix(" ")))

// Output:
// a = 120 114 -4 -16
// 114 118 11 -24
// -4 11 58 17
// -16 -24 17 73
//
// The determinant of a is 1.543e+06
//
// Solve a * x = b
// x = -0.239
// 0.2732
// -0.04681
// 0.1031
//
// L * L = 120 114 -4 -16
// 114 118 11 -24

```



```

// -4 11 58 17
// -16 -24 17 73
}

func ExampleCholesky_SymRankOne() {
a := mat.NewSymDense(4, []float64{
 1, 1, 1, 1,
 0, 2, 3, 4,
 0, 0, 6, 10,
 0, 0, 0, 20,
})
fmt.Printf("A = %0.4v\n", mat.Formatted(a, mat.Prefix(" ")))

// Compute the Cholesky factorization.
var chol mat.Cholesky
if ok
:= chol.Factorize(a); !ok {
 fmt.Println("matrix a is not positive definite.")
}

x := mat.NewVecDense(4, []float64{0, 0, 0, 1})
fmt.Printf("\nx = %0.4v\n", mat.Formatted(x, mat.Prefix(" ")))

// Rank-1 update the factorization.
chol.SymRankOne(&chol, 1, x)
// Rank-1 update the matrix a.
a.SymRankOne(a, 1, x)

var au mat.SymDense
chol.ToSym(&au)

// Print the matrix that was updated directly.
fmt.Printf("\nA' = %0.4v\n", mat.Formatted(a, mat.Prefix(" ")))
// Print the matrix recovered from the factorization.
fmt.Printf("\nU' * U' = %0.4v\n", mat.Formatted(&au, mat.Prefix(" ")))

// Output:
// A = 1 1 1 1
// 1 2 3 4
// 1 3 6 10
// 1 4 10 20
//
// x = 0
// 0
// 0
// 1
//
// A' = 1 1 1 1

```

```

// 1 2 3 4
// 1 3 6 10
// 1 4 10 21
//
// U' * U' = 1 1 1 1
// 1 2 3 4
// 1 3 6
10
// 1 4 10 21
}
graph{{Digraz{Digraz{Digra}Digra}Digrax}Digrax}
graph{graU{graS}{graS}{graS}}
graph{{{Grar{}}Grax{}}}
graph{{{{{SUBGRAD}}SUBGRAL}}}}
graph{{{{SUBGRAPE{{{SUBGRAPk}}SUBGRAPk}}}}}
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package spatial

import (
 "math"

 "gonum.org/v1/gonum/mat"
 "gonum.org/v1/gonum/stat"
)

// TODO(kortschak): Implement weighted routines.

// GetisOrdGStar returns the Local Getis-Ord G*i statistic for element of the
// weighted data using the provided locality matrix. The returned value is a z-score.
//
// $G^*_i = \frac{\text{num}_i}{\text{den}_i}$
//
// $\text{num}_i = \sum_j (w_{ij} x_j) - \bar{X} \sum_j w_{ij}$
// $\text{den}_i = S \sqrt{((n \sum_j w_{ij}^2 - (\sum_j w_{ij})^2) / (n - 1))}$
// $\bar{X} = (\sum_j x_j) / n$
// $S = \sqrt{(\sum_j x_j^2 / n - (\bar{X})^2)}$
//
// GetisOrdGStar will panic if locality is not a square matrix with dimensions the
// same as the length of data or if i is not a valid index into data.
//
// See doi.org/10.1111%2Fj.1538-4632.1995.tb00912.x.
//
// Weighted Getis-Ord G*i is not currently implemented and GetisOrdGStar will

```

```

// panic
if weights is not nil.
func GetisOrdGStar(i int, data, weights []float64, locality mat.Matrix) float64 {
if weights != nil {
panic("spatial: weighted data not yet implemented")
}
r, c := locality.Dims()
if r != len(data) || c != len(data) {
panic("spatial: data length mismatch")
}

n := float64(len(data))
mean, std := stat.MeanStdDev(data, weights)
var dwd, dww, sw float64
if doer, ok := locality.(mat.RowNonZeroDoer); ok {
doer.DoRowNonZero(i, func(_, j int, w float64) {
sw += w
dwd += w * data[j]
dww += w * w
}))
} else {
for j, v := range data {
w := locality.At(i, j)
sw += w
dwd += w * v
dww += w * w
}
}
s := std * math.Sqrt((n-1)/n)

return (dwd - mean*sw) / (s * math.Sqrt((n*dww-sw*sw)/(n-1)))
}

// GlobalMoransI performs Global Moran's I calculation of spatial autocorrelation
// for the given data using the provided locality matrix. GlobalMoransI returns
// Moran's I, Var(I) and the z-score associated with those values.
// GlobalMoransI
// will panic if locality is not a square matrix with dimensions the
// same as the length of data.
//
// See https://doi.org/10.1111%2Fj.1538-4632.2007.00708.x.
//
// Weighted Global Moran's I is not currently implemented and GlobalMoransI will
// panic if weights is not nil.
func GlobalMoransI(data, weights []float64, locality mat.Matrix) (i, v, z float64) {
if weights != nil {
panic("spatial: weighted data not yet implemented")
}

```

```

if r, c := locality.Dims(); r != len(data) || c != len(data) {
 panic("spatial: data length mismatch")
}
mean := stat.Mean(data, nil)

doer, isDoer := locality.(mat.RowNonZeroDoer)

// Calculate Moran's I for the data.
var num, den, sum float64
for i, xi := range data {
 zi := xi - mean
 den += zi * zi
 if isDoer {
 doer.DoRowNonZero(i, func(_, j int, w float64) {
 sum += w
 zj := data[j] - mean
 num += w * zi * zj
 })
 } else {
 for j, xj := range data {
 w := locality.At(i, j)
 sum += w
 zj := xj - mean
 num +=
w * zi * zj
 }
 }
}
i = (float64(len(data)) / sum) * (num / den)

// Calculate Moran's E(I) for the data.
e := -1 / float64(len(data)-1)

// Calculate Moran's Var(I) for the data.
// http://pro.arcgis.com/en/pro-app/tool-reference/spatial-statistics/h-how-spatial-autocorrelation-moran-s-i-spatial-st.htm
// http://pro.arcgis.com/en/pro-app/tool-reference/spatial-statistics/h-global-morans-i-additional-math.htm
var s0, s1, s2 float64
var var2, var4 float64
for i, v := range data {
 v -= mean
 v *= v
 var2 += v
 var4 += v * v
}

var p2 float64
if isDoer {
 doer.DoRowNonZero(i, func(i, j int, wij float64) {

```

```

 wji := locality.At(j, i)

 s0 += wij

 v := wij + wji
 s1 += v * v

 p2 += v
 })
} else {
 for j := range data {
 wij := locality.At(i, j)
 wji := locality.At(j, i)

 s0 += wij

 v := wij + wji
 s1 += v * v

 p2 += v
 }
}
s2 += p2 * p2
}
s1 *= 0.5

n := float64(len(data))
a := n * ((n*n-3*n+3)*s1 - n*s2 + 3*s0*s0)
c
:= (n - 1) * (n - 2) * (n - 3) * s0 * s0
d := var4 / (var2 * var2)
b := d * ((n*n-n)*s1 - 2*n*s2 + 6*s0*s0)

v = (a-b)/c - e*e

// Calculate z-score associated with Moran's I for the data.
z = (i - e) / math.Sqrt(v)

return i, v, z
}
graph{{ed""ed}ed""ed{ed""ed}}
graph{{DiG_}}
graph{_[f=DiGra9]}
// SPDX-License-Identifier: Unlicense OR MIT

// +build android darwin,ios

package window

```

```

// Android only supports non-Java programs as c-shared libraries.
// Unfortunately, Go does not run a program's main function in
// library mode. To make Gio programs simpler and uniform, we'll
// link to the main function here and call it from Java.

import (
 "sync"
 _ "unsafe" // for go:linkname
)

//go:linkname mainMain main.main
func mainMain()

var runMainOnce sync.Once

func runMain() {
 runMainOnce.Do(func() {
 // Indirect call, since the linker does not know the address of main when
 // laying down this package.
 fn := mainMain
 go fn()
 })
}
graph{{subgz{{{subgu}}}}}
graph{graph[f=2][f=4][f=8][f=2][f=2][f=3][f=7][f=2][f=4][f=6][f=6][f=4][f=4][f=9][f=4][f=4][f=4][f=4][f=1][f=4][f=6][f=6][f=4][f=1][f=6][f=1][f=2][f=7][f=1][f=1][f=1][f=1][f=8][f=1][f=3][f=5][f=1][f=1][f=1][f=9]}
graph{Stm Stm Stm Stm Stm}
graph{{{{{subGra}}}subGra}}
digraph{e5-6e7->e1}
graph{{{graph_{{{graph_}{graph_}}}}graph_}{graph_}{graph_{{{graph_}{graph_}}}}graph_}{graph_}
graph{{{GRa{GRi}}{GRa{GRi}}{GRa{GRi}}}}{GRa}
graph{<K>}
graph{nod0{nod0}}
graph{<[l==d]}[l= iri][l="][l= iri][l="][l="]e>[e=d]}
This is the official list of people who can contribute
(and typically have contributed) code to the Go repository.
The AUTHORS file lists the copyright holders; this file
lists people. For example, Google employees are listed here
but not in AUTHORS, because Google holds the copyright.
#
The submission process automatically checks to make sure
that people submitting code are listed in this file (by email address).
#
Names should be added to this file only after verifying that
the individual or the individual's organization has agreed to
the appropriate Contributor License Agreement, found here:
#

```

```

http://code.google.com/legal/individual-cla-v1.0.html
http://code.google.com/legal/corporate-cla-v1.0.html
#
The agreement for individuals can be filled out on the web.
#
When adding J Random Contributor's name to this file,
either J's name or J's organization's name should be
added to the AUTHORS file, depending on whether the
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CLA was used.

Names should be added to this file like so:
Name <email address>
#
An entry with two email addresses specifies that the
first address should be used in the submit logs and
that the second address should be recognized as the
same person when interacting with Rietveld.

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```

}

func DtrconTest(t *testing.T, impl Dtrconer) {
 rnd := rand.New(rand.NewSource(1))
 for _, n := range []int{0, 1, 2, 3, 4, 5, 10, 50} {
 for _, uplo := range []blas.Uplo{blas.Lower, blas.Upper} {
 for _, diag := range []blas.Diag{blas.NonUnit, blas.Unit} {
 for _, lda := range []int{max(1, n), n + 3} {
 for _,
matttype := range []int{0, 1, 2} {
 dtrconTest(t, impl, rnd, uplo, diag, n, lda, matttype)
 }
 }
 }
 }
 }
}

func dtrconTest(t *testing.T, impl Dtrconer, rnd *rand.Rand, uplo blas.Uplo, diag blas.Diag, n, lda, matttype int) {
 const ratioThresh = 10

 a := make([]float64, max(0, (n-1)*lda+n))
 for i := range a {
 a[i] = rnd.Float64()
 }
 switch matttype {
 default:
 panic("bad matttype")
 case 0:
 // Matrix filled with consecutive integer values.
 // For lapack.MaxRowSum norm (infinity-norm) these matrices
 // sometimes lead to a slightly inaccurate estimate of the condition
 // number.
 c := 2.0
 for i := 0; i < n; i++ {
 for j := 0; j < n; j++ {
 a[i*lda+j] = c
 c += 1
 }
 }
 case 1:
 // Identity matrix.
 if uplo == blas.Upper {
 for i := 0; i < n; i++ {
 for j := i + 1; j < n; j++ {
 a[i*lda+j] = 0
 }
 }
 }
 }
}

```

```

 } else {
 for i := 0; i < n; i++ {
 for j := 0; j < i; j++ {
 a[i*lda+j] = 0
 }
 }
 }
 if diag == blas.NonUnit {
 for
i := 0; i < n; i++ {
 a[i*lda+i] = 1
 }
 }
 case 2:
 // Matrix filled with random values uniformly in [-1,1).
 // These matrices often lead to a slightly inaccurate estimate
 // of the condition number.
 for i := 0; i < n; i++ {
 for j := 0; j < n; j++ {
 a[i*lda+j] = 2*rand.Float64() - 1
 }
 }
 }
 aCopy := make([]float64, len(a))
 copy(aCopy, a)

 // Compute the inverse A^{-1} .
 aInv := make([]float64, len(a))
 copy(aInv, a)
 ok := impl.Dtrtri(uplo, diag, n, aInv, lda)
 if !ok {
 t.Fatalf("uplo=%v,diag=%v,n=%v,lda=%v,matttype=%v: bad matrix, Dtrtri failed", string(uplo), string(diag), n, lda,
matttype)
 }

 work := make([]float64, 3*n)
 iwork := make([]int, n)
 for _, norm := range []lapack.MatrixNorm{lapack.MaxColumnSum, lapack.MaxRowSum} {
 name := fmt.Sprintf("norm=%v,uplo=%v,diag=%v,n=%v,lda=%v,matttype=%v", string(norm), string(uplo),
string(diag), n, lda, matttype)

 // Compute the norm of A and A^{-1} .
 aNorm := impl.Dlantr(norm, uplo, diag, n, n, a, lda, work)
 aInvNorm
:= impl.Dlantr(norm, uplo, diag, n, n, aInv, lda, work)

 // Compute a good estimate of the condition number
 // rcondWant := 1/(norm(A) * norm(inv(A)))

```

```

rcondWant := 1.0
if aNorm > 0 && aInvNorm > 0 {
 rcondWant = 1 / aNorm / aInvNorm
}

// Compute an estimate of rcond using Dtrcon.
rcondGot := impl.Dtrcon(norm, uplo, diag, n, a, lda, work, iwork)
if !floats.Equal(a, aCopy) {
 t.Errorf("%v: unexpected modification of a", name)
}

ratio := rCondTestRatio(rcondGot, rcondWant)
if ratio >= ratioThresh {
 t.Errorf("%v: unexpected value of rcond; got=%v, want=%v (ratio=%v)",
 name, rcondGot, rcondWant, ratio)
}
}
}
graph{Nodr{{Nodr}Nodr}Nodr{Nodr}}
graph{{{digra4}{digra4}digra4}}}
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// Use of this source code is governed by a BSD-style
// license that can be found in the LICENSE file.

/*
* Cephes Math Library Release 2.4: March,1996
* Copyright 1984, 1996 by Stephen L. Moshier
*/

package cephes

import "math"

// Incbi computes the inverse of the regularized incomplete beta integral.
func Incbi(aa, bb, yy0 float64) float64 {
 var a, b, y0, d, y, x, x0, x1, lgm, yp, di, dithresh, yl, yh, xt float64
 var i, rflg, dir, nflg int

 if yy0 <= 0 {
 return (0.0)
 }
 if yy0 >= 1.0 {
 return (1.0)
 }
 x0 = 0.0
 yl = 0.0
 x1 = 1.0
 yh = 1.0

```

```

nflg = 0

if aa <= 1.0 || bb <= 1.0 {
 dithresh = 1.0e-6
 rflg = 0
 a = aa
 b = bb
 y0 = yy0
 x = a / (a + b)
 y = Incbet(a, b, x)
 goto ihalve
} else {
 dithresh = 1.0e-4
}
// Approximation to inverse function
yp = -Ndtri(yy0)

if yy0 > 0.5 {
 rflg = 1
 a = bb
 b = aa
 y0 = 1.0 - yy0
 yp = -yp
} else {
 rflg = 0
 a = aa
 b = bb
 y0 = yy0
}

lgm =
(yp*yp - 3.0) / 6.0
x = 2.0 / (1.0/(2.0*a-1.0) + 1.0/(2.0*b-1.0))
d = yp*math.Sqrt(x+lgm)/x - (1.0/(2.0*b-1.0)-1.0/(2.0*a-1.0))*(lgm+5.0/6.0-2.0/(3.0*x))
d = 2.0 * d
if d < minLog {
 // mtherr("incbi", UNDERFLOW)
 x = 0
 goto done
}
x = a / (a + b*math.Exp(d))
y = Incbet(a, b, x)
yp = (y - y0) / y0
if math.Abs(yp) < 0.2 {
 goto newt
}

/* Resort to interval halving if not close enough. */

```

ihalve:

```
dir = 0
di = 0.5
for i = 0; i < 100; i++ {
 if i != 0 {
 x = x0 + di*(x1-x0)
 if x == 1.0 {
 x = 1.0 - machEp
 }
 if x == 0.0 {
 di = 0.5
 x = x0 + di*(x1-x0)
 if x == 0.0 {
 // mtherr("incbi", UNDERFLOW)
 goto done
 }
 }
 y = Incbet(a, b, x)
 yp = (x1 - x0) / (x1 + x0)
 if math.Abs(yp) < dithresh {
 goto newt
 }
 yp = (y - y0) / y0
 if math.Abs(yp) < dithresh {
 goto newt
 }
 }
 if y < y0 {
 x0 = x
 y1 = y
 if dir < 0 {
 dir = 0
 di = 0.5
 } else if dir > 3 {
 di = 1.0 - (1.0-di)*(1.0-di)
 } else if
 }
 if dir > 1 {
 di = 0.5*di + 0.5
 } else {
 di = (y0 - y) / (yh - yl)
 }
 dir += 1
 if x0 > 0.75 {
 if rflg == 1 {
 rflg = 0
 a = aa
 b = bb
 }
 }
}
```



```

 y0 = yy0
 } else {
 rflg = 1
 a = bb
 b = aa
 y0 = 1.0 - yy0
 }
 x = 1.0 - x
 y = Incbet(a, b, x)
 x0 = 0.0
 yl = 0.0
 x1 = 1.0
 yh = 1.0
 goto ihalve
}
} else {
 x1 = x
 if rflg == 1 && x1 < machEp {
 x = 0.0
 goto done
 }
 yh = y
 if dir > 0 {
 dir = 0
 di = 0.5
 } else if dir < -3 {
 di = di * di
 } else if dir < -1 {
 di = 0.5 * di
 } else {
 di = (y - y0) / (yh - yl)
 }
 dir -= 1
}
}
// mtherr("incbi", PLOSS)
if x0 >= 1.0 {
 x = 1.0 - machEp
 goto done
}
if x <= 0.0 {
 // mtherr("incbi", UNDERFLOW)
 x = 0.0
 goto done
}

```

newt:

```

if nflg > 0 {

```

```

goto done
}
nflg = 1
lgm = lgam(a+b) - lgam(a) - lgam(b)

for i = 0; i < 8; i++ {
/* Compute the function at this point. */
if i != 0 {
y = Incbet(a, b, x)
}
if
y < yl {
x = x0
y = yl
} else if y > yh {
x = x1
y = yh
} else if y < y0 {
x0 = x
yl = y
} else {
x1 = x
yh = y
}
if x == 1.0 || x == 0.0 {
break
}
/* Compute the derivative of the function at this point. */
d = (a-1.0)*math.Log(x) + (b-1.0)*math.Log(1.0-x) + lgm
if d < minLog {
goto done
}
if d > maxLog {
break
}
d = math.Exp(d)
/* Compute the step to the next approximation of x. */
d = (y - y0) / d
xt = x - d
if xt <= x0 {
y = (x - x0) / (x1 - x0)
xt = x0 + 0.5*y*(x-x0)
if xt <= 0.0 {
break
}
}
if xt >= x1 {
y = (x1 - x) / (x1 - x0)

```

```

 xt = x1 - 0.5*y*(x1-x)
 if xt >= 1.0 {
 break
 }
}
x = xt
if math.Abs(d/x) < 128.0*machEp {
 goto done
}
}
/* Did not converge. */
dithresh = 256.0 * machEp
goto ihalve

done:

if rflg > 0 {
 if x <= machEp {
 x = 1.0 - machEp
 } else {
 x = 1.0 - x
 }
}
return (x)
}

func lgam(a float64) float64 {
 lg, _ := math.Lgamma(a)
 return
 lg
}
graph{{stri}stri{stri}}
Graph{DIGRAP{DIGRAP}}
graph{Subgra0}
graph{{dig0{{{dig0{{dig0}}}dig0}}}}
// SPDX-License-Identifier: Unlicense OR MIT

package window

import (
 "unsafe"

 "gioui.org/app/internal/egl"
)

type context struct {
 win *window
 *egl.Context

```

```

}

func (w *window) NewContext() (Context, error) {
 disp := egl.NativeDisplayType(unsafe.Pointer(w.HDC()))
 ctx, err := egl.NewContext(disp)
 if err != nil {
 return nil, err
 }
 return &context{win: w, Context: ctx}, nil
}

func (c *context) Release() {
 if c.Context != nil {
 c.Context.Release()
 c.Context = nil
 }
}

func (c *context) MakeCurrent() error {
 c.Context.ReleaseSurface()
 win, width, height := c.win.HWND()
 eglSurf := egl.NativeWindowType(win)
 if err := c.Context.CreateSurface(eglSurf, width, height); err != nil {
 return err
 }
 if err := c.Context.MakeCurrent(); err != nil {
 return err
 }
 c.Context.EnableVSync(true)
 return nil
}

func (c *context) Lock() {}

func (c *context) Unlock() {}
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// license that can be found in the LICENSE file.

package testlapack

import (
 "fmt"
 "testing"

 "golang.org/x/exp/rand"

 "gonum.org/v1/gonum/floats"

```

```

"gonum.org/v1/gonum/lapack"
)

type Dgeconer interface {
 Dgecon(norm lapack.MatrixNorm, n int, a []float64, lda int, anorm float64, work []float64, iwork []int) float64

 Dgetrier
 Dlanger
}

func DgeconTest(t *testing.T, impl Dgeconer) {
 rnd := rand.New(rand.NewSource(1))
 for _, n := range []int{0, 1, 2, 3, 4, 5, 10, 50} {
 for _, lda := range []int{max(1, n), n + 3} {
 dgeconTest(t, impl, rnd, n, lda)
 }
 }
}

func dgeconTest(t *testing.T, impl Dgeconer, rnd *rand.Rand, n, lda int) {
 const ratioThresh = 10

 // Generate a random square matrix A with elements uniformly in [-1,1).
 a := make([]float64, max(0, (n-1)*lda+n))
 for i := range a {
 a[i] = 2*rnd.Float64() - 1
 }

 // Allocate work slices.
 iwork := make([]int,
 n)
 work := make([]float64, max(1, 4*n))

 // Compute the LU factorization of A.
 aFac := make([]float64, len(a))
 copy(aFac, a)
 ipiv := make([]int, n)
 ok := impl.Dgetrf(n, n, aFac, lda, ipiv)
 if !ok {
 t.Fatalf("n=%v,lda=%v: bad matrix, Dgetrf failed", n, lda)
 }
 aFacCopy := make([]float64, len(aFac))
 copy(aFacCopy, aFac)

 // Compute the inverse A^{-1} from the LU factorization.
 aInv := make([]float64, len(aFac))
 copy(aInv, aFac)
 ok = impl.Dgetri(n, aInv, lda, ipiv, work, len(work))
}

```

```

if !ok {
 t.Fatalf("n=%v,lda=%v: bad matrix, Dgetri failed", n, lda)
}

for _, norm := range []lapack.MatrixNorm{lapack.MaxColumnSum, lapack.MaxRowSum} {
 name := fmt.Sprintf("norm%v,n=%v,lda=%v", string(norm), n, lda)

 // Compute the norm of A and A^{-1}.
 aNorm := impl.Dlange(norm, n, n, a, lda, work)
 aInvNorm := impl.Dlange(norm, n, n, aInv, lda, work)

 // Compute a good estimate of the condition number
 // rcondWant := 1/(norm(A) * norm(inv(A)))
 rcondWant := 1.0
 if aNorm
 > 0 && aInvNorm > 0 {
 rcondWant = 1 / aNorm / aInvNorm
 }

 // Compute an estimate of rcond using the LU factorization and Dgecon.
 rcondGot := impl.Dgecon(norm, n, aFac, lda, aNorm, work, iwork)
 if !floats.Equal(aFac, aFacCopy) {
 t.Errorf("%v: unexpected modification of aFac", name)
 }

 ratio := rCondTestRatio(rcondGot, rcondWant)
 if ratio >= ratioThresh {
 t.Errorf("%v: unexpected value of rcond; got=%v, want=%v (ratio=%v)",
 name, rcondGot, rcondWant, ratio)
 }
}
}
graph{
 {{{{{Stricy}}Stricy}{Stricy}}Stricy}}
 graph{{NOD{NOD{NOD}NOD}}NOD}
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 // Package hyperdual provides the hyperdual numeric type and functions. Hyperdual
 // numbers are an extension of the real numbers in the form a+b+b+d where
 // ^2=0 and ^2=0, but 0, 0 and 0.
 //
 // See https://doi.org/10.2514/6.2011-886 and http://adl.stanford.edu/hyperdual/ for
 // details of their properties and uses.
 package hyperdual // imports "gonum.org/v1/gonum/num/hyperdual"

 // TODO(kortschak): Handle special cases properly.
 // - Pow

```

# Gonum integrate

[[GoDoc](https://godoc.org/gonum.org/v1/gonum/integrate?status.svg)](https://godoc.org/gonum.org/v1/gonum/integrate)

Package integrate provides numerical evaluation of definite integrals of single-variable functions for the Go programming language.

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// license that can be found in the LICENSE file.

package distuv

```
import (
 "sort"
 "testing"
```

```

 "golang.org/x/exp/rand"
 "gonum.org/v1/gonum/floats"
)
```

```
func TestUniformProb(t *testing.T) {
 for _, test := range []struct {
 min, max, x, want float64
 }{
 {0, 1, 1, 1},
 {2, 4, 0, 0},
 {2, 4, 5, 0},
 {2, 4, 3, 0.5},
 {0, 100, 1, 0.01},
 } {
 pdf := Uniform{test.min, test.max, nil}.Prob(test.x)
 if !floats.EqualWithinAbsOrRel(pdf, test.want, 1e-15, 1e-15) {
 t.Errorf("Pdf mismatch, x = %v, min = %v, max = %v. Got %v, want %v", test.x, test.min, test.max, pdf, test.want)
 }
 }
}
```

```
func TestUniformCDF(t *testing.T) {
 for _, test := range []struct {
 min, max, x, want float64
 }{
 {0, 1, 1, 1},
 {0, 100, 100, 1},
 {0, 100, 0, 0},
 {0, 100, 50, 0.5},
 {0, 50, 10, 0.2},
 } {
 cdf := Uniform{test.min, test.max, nil}.CDF(test.x)
```







```
// Copyright 2017 Robin Eklind.
// This file is made available under a Creative Commons CC0 1.0
// Universal Public Domain Dedication.
```

```
package astx_test
```

```
import (
 "bytes"
 "io/ioutil"
 "testing"

 "gonum.org/v1/gonum/graph/formats/dot"
)
```

```
func TestParseFile(t *testing.T) {
 golden := []struct {
 in string
 out string
 }{
 {in: "../testdata/empty.dot"},
 {in: "../testdata/graph.dot"},
 {in: "../testdata/digraph.dot"},
 {in: "../testdata/strict.dot"},
 {in: "../testdata/multi.dot"},
 {in: "../testdata/named_graph.dot"},
 {in: "../testdata/node_stmt.dot"},
 {in: "../testdata/edge_stmt.dot"},
 {in: "../testdata/attr_stmt.dot"},
 {in: "../testdata/attr.dot"},
 {
 in: "../testdata/subgraph.dot",
 out: "../testdata/subgraph.golden",
 },
 {
 in:
 "../testdata/semi.dot",
 out: "../testdata/semi.golden",
 },
 {
 in: "../testdata/empty_attr.dot",
 out: "../testdata/empty_attr.golden",
 },
 {
 in: "../testdata/attr_lists.dot",
 out: "../testdata/attr_lists.golden",
 },
 {
 in: "../testdata/attr_sep.dot",
```

```

 out: "../testdata/attr_sep.golden",
},
{in: "../testdata/subgraph_vertex.dot"},
{in: "../testdata/port.dot"},
{in: "../testdata/quoted_id.dot"},
{
 in: "../testdata/backslash_newline_id.dot",
 out: "../testdata/backslash_newline_id.golden",
},
}
for _, g := range golden {
 file, err := dot.ParseFile(g.in)
 if err != nil {
 t.Errorf("%q: unable to parse file; %v", g.in, err)
 continue
 }
 // If no output path is specified, the input is already golden.
 out := g.in
 if len(g.out) > 0 {
 out = g.out
 }
 buf, err := ioutil.ReadFile(out)
 if err != nil {
 t.Errorf("%q: unable to read file; %v", g.in, err)
 continue
 }
 got := file.String()
 // Remove trailing newline.
 want
:= string(bytes.TrimSpace(buf))
 if got != want {
 t.Errorf("%q: graph mismatch; expected `%s`, got `%s`", g.in, want, got)
 }
}
}
graph{{rr}}
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// Use of this source code is governed by a BSD-style
// license that can be found in the LICENSE file.

package f64

import (
 "fmt"
 "testing"
)

var uniScal = []int64{1, 3, 10, 30, 1e2, 3e2, 1e3, 3e3, 1e4, 3e4}

```

```

func BenchmarkScalUnitary(t *testing.B) {
 tstName := "ScalUnitary"
 for _, ln := range uniScal {
 t.Run(fmt.Sprintf("%s-%d", tstName, ln), func(b *testing.B) {
 b.SetBytes(64 * ln)
 x := x[:ln]
 b.ResetTimer()
 for i := 0; i < b.N; i++ {
 ScalUnitary(a, x)
 }
 })
 }
}

```

```

func BenchmarkScalUnitaryTo(t *testing.B) {
 tstName := "ScalUnitaryTo"
 for _, ln := range uniScal {
 t.Run(fmt.Sprintf("%s-%d", tstName, ln), func(b *testing.B) {
 b.SetBytes(int64(64 * ln))
 x, y := x[:ln], y[:ln]
 b.ResetTimer()
 for i := 0; i < b.N; i++ {
 ScalUnitaryTo(y, a, x)
 }
 })
 }
}

```

```

var incScal = []struct {
 len uintptr
 inc []int
}{
 {1, []int{1}},
 {3, []int{1, 2, 4, 10}},
 {10, []int{1, 2, 4, 10}},
 {30, []int{1,
 2, 4, 10}},
 {1e2, []int{1, 2, 4, 10}},
 {3e2, []int{1, 2, 4, 10}},
 {1e3, []int{1, 2, 4, 10}},
 {3e3, []int{1, 2, 4, 10}},
 {1e4, []int{1, 2, 4, 10}},
}

```

```

func BenchmarkScalInc(t *testing.B) {
 tstName := "ScalInc"
 for _, tt := range incScal {

```

```
for _, inc := range tt.inc {
 t.Run(fmt.Sprintf("%s-%d-inc(%d)", tstName, tt.len, inc), func(b *testing.B) {
 b.SetBytes(int64(64 * tt.len))
 tstInc := uintptr(inc)
 for i := 0; i < b.N; i++ {
 ScalInc(a, x, uintptr(tt.len), tstInc)
 }
 })
}
}
}
}

func BenchmarkScalIncTo(t *testing.B) {
 tstName := "ScalIncTo"
 for _, tt := range incScal {
 for _, inc := range tt.inc {
 t.Run(fmt.Sprintf("%s-%d-inc(%d)", tstName, tt.len, inc), func(b *testing.B) {
 b.SetBytes(int64(64 * tt.len))
 tstInc := uintptr(inc)
 for i := 0; i < b.N; i++ {
 ScalIncTo(z, tstInc, a, x, uintptr(tt.len), tstInc)
 }
 })
 }
 }
}

graph{{{gr}{gr}}gr{{gr}}gr{{gr}{gr}{gr}{gr}{gr}{gr}}{{gr}{gr}}gr{{gr}{gr}{gr}{gr}{gr}{gr}{gr}{gr}{gr}{gr}{gr}{gr}}
{{{gr}{gr}}gr{{gr}{gr}{gr}{gr}{gr}{gr}{gr}gr}}}
graph{{GrG{GrG}{Grr>{{GrG{GrG}{GrC}GrG}{GrC}}}}GrG{GrC}}
graph{{{_____}}__{_____}}}
graph{{{DiGrap}} {{{{DiGrap}}}} DiGrap} {{{{DiGrap}DiGrap}DiGrap} {{{{DiGrap}DiGrap}DiGrap} {{}}}} {{{
DiGrap}}} {{{""}}}}}
graph{StriC{StriG}}
graph{{nod_}nod_{}nod_{nod_}}
graph{Strica-9Str{Strica-9Strica}}
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// license that can be found in the LICENSE file.

package testblas

import (
 "testing"

 "gonum.org/v1/gonum/blas"
)

type Zhprer interface {
```

```

Zhpr(uplo blas.Uplo, n int, alpha float64, x []complex128, incX int, ap []complex128)
}

func ZhprTest(t *testing.T, impl Zhprer) {
for tc, test := range zherTestCases {
n := len(test.x)
for _, uplo := range []blas.Uplo{blas.Upper, blas.Lower} {
for _, incX := range []int{-11, -2, -1, 1, 2, 7} {
x := makeZVector(test.x, incX)
xCopy := make([]complex128, len(x))
copy(xCopy, x)

ap := zPack(uplo, n, test.a, n)
impl.Zhpr(uplo, n, test.alpha, x, incX, ap)
a := zUnpackAsHermitian(uplo, n, ap)

var want []complex128
if incX > 0 {
want = makeZGeneral(test.want, n, n, max(1, n))
} else {
want = makeZGeneral(test.wantRev, n, n, max(1, n))
}

if !zsame(x, xCopy) {
t.Errorf("Case
%v (uplo=%v,incX=%v,alpha=%v): unexpected modification of x", tc, uplo, incX, test.alpha)
}
if !zsame(want, a) {
t.Errorf("Case %v (uplo=%v,incX=%v,alpha=%v): unexpected result\nwant: %v\ngot: %v", tc, uplo, incX,
test.alpha, want, a)
}
}
}
}
}

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package mathext

import "gonum.org/v1/gonum/mathext/internal/amos"

// AiryAi returns the value of the Airy function at z. The Airy function here,
// Ai(z), is one of the two linearly independent solutions to
// y'' - y*z = 0.
// See http://mathworld.wolfram.com/AiryFunctions.html for more detailed information.
func AiryAi(z complex128) complex128 {

```

```

// id specifies the order of the derivative to compute,
// 0 for the function itself and 1 for the derivative.
// kode specifies the scaling option. See the function
// documentation for the exact behavior.
id := 0
kode := 1
air, aii, _, _ := amos.Zairy(real(z), imag(z), id, kode)
return complex(air, aii)
}

// AiryAiDeriv returns the value of the derivative of the Airy function at z. The
// Airy function here, Ai(z), is one of the two linearly independent solutions to
//
// $y'' - y*z = 0$.
// See http://mathworld.wolfram.com/AiryFunctions.html for more detailed information.
func AiryAiDeriv(z complex128) complex128 {
// id specifies the order of the derivative to compute,
// 0 for the function itself and 1 for the derivative.
// kode specifies the scaling option. See the function
// documentation for the exact behavior.
id := 1
kode := 1
air, aii, _, _ := amos.Zairy(real(z), imag(z), id, kode)
return complex(air, aii)
}

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package gonum

import (
 "gonum.org/v1/gonum/blas"
 "gonum.org/v1/gonum/blas/blas64"
)

// Dlauum computes the product
// U * U if uplo is blas.Upper
// L * L if uplo is blas.Lower
// where U or L is stored in the upper or lower triangular part of A.
// Only the upper or lower triangle of the result is stored, overwriting
// the corresponding factor in A.
func (impl Implementation) Dlauum(uplo blas.Uplo, n int, a []float64, lda int) {
 switch {
 case uplo != blas.Upper && uplo != blas.Lower:
 panic(badUplo)
 case n < 0:
 panic(nLT0)
 }
}

```

```

case lda < max(1, n):
 panic(badLdA)
}

// Quick return if possible.
if n == 0 {
 return
}

if len(a) < (n-1)*lda+n {
 panic(shortA)
}

// Determine the block size.
opts := "U"
if uplo == blas.Lower {
 opts = "L"
}
nb := impl.Ilaenv(1, "DLAUUM", opts, n, -1, -1, -1)

if nb <=
1 || n <= nb {
 // Use unblocked code.
 impl.Dlauu2(uplo, n, a, lda)
 return
}

// Use blocked code.
bi := blas64.Implementation()
if uplo == blas.Upper {
 // Compute the product U*U.
 for i := 0; i < n; i += nb {
 ib := min(nb, n-i)
 bi.Dtrmm(blas.Right, blas.Upper, blas.Trans, blas.NonUnit,
 i, ib, 1, a[i*lda+i:], lda, a[i:], lda)
 impl.Dlauu2(blas.Upper, ib, a[i*lda+i:], lda)
 if n-i-ib > 0 {
 bi.Dgemm(blas.NoTrans, blas.Trans, i, ib, n-i-ib,
 1, a[i+ib:], lda, a[i*lda+i+ib:], lda, 1, a[i:], lda)
 bi.Dsyrk(blas.Upper, blas.NoTrans, ib, n-i-ib,
 1, a[i*lda+i+ib:], lda, 1, a[i*lda+i:], lda)
 }
 }
} else {
 // Compute the product L*L.
 for i := 0; i < n; i += nb {
 ib := min(nb, n-i)
 bi.Dtrmm(blas.Left, blas.Lower, blas.Trans, blas.NonUnit,

```



```

 ib, i, 1, a[i*lda+i:], lda, a[i*lda:], lda)
impl.Dlauu2(blas.Lower, ib, a[i*lda+i:], lda)
if n-i-ib > 0 {
 bi.Dgemm(blas.Trans, blas.NoTrans, ib, i, n-i-ib,
 1, a[(i+ib)*lda+i:], lda, a[(i+ib)*lda:],
lda, 1, a[i*lda:], lda)
 bi.Dsyrk(blas.Lower, blas.Trans, ib, n-i-ib,
 1, a[(i+ib)*lda+i:], lda, 1, a[i*lda+i:], lda)
}
}
}
}
graph{"\\{"\\""}
graph{{"{"{"{"{"subGn"}subGn}subGc{"{"{"subGn"}subGc"}"}"}"}
graph{{Ea}{Ea}{Ea}{Ea}{Ea}{Ea}}
graph{<< astx.AppendAttrList(X[0], X[2]) >>}
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package iterator_test

import (
 "reflect"
 "testing"

 "gonum.org/v1/gonum/graph"
 "gonum.org/v1/gonum/graph/iterator"
 "gonum.org/v1/gonum/graph/simple"
)

type line struct{ f, t int }

func (l line) From() graph.Node { return simple.Node(l.f) }
func (l line) To() graph.Node { return simple.Node(l.t) }
func (l line) ReversedLine() graph.Line { return line{f: l.t, t: l.f} }
func (l line) ID() int64 { return 1 }

var orderedLinesTests = []struct {
 lines []graph.Line
}{
 {lines: nil},
 {lines: []graph.Line{line{f: 1, t: 2}}},
 {lines: []graph.Line{line{f: 1, t: 2}, line{f: 2, t: 3}, line{f: 3, t: 4}, line{f: 4, t: 5}}},
 {lines: []graph.Line{line{f: 5, t: 4}, line{f: 4, t: 3}, line{f: 3, t: 2}, line{f: 2, t: 1}}},
}

func TestOrderedLinesIterate(t *testing.T) {

```

```

for _, test := range orderedLinesTests
{
 it := iterator.NewOrderedLines(test.lines)
 for i := 0; i < 2; i++ {
 if it.Len() != len(test.lines) {
 t.Errorf("unexpected iterator length for round %d: got:%d want:%d", i, it.Len(), len(test.lines))
 }
 var got []graph.Line
 for it.Next() {
 got = append(got, it.Line())
 }
 want := test.lines
 if !reflect.DeepEqual(got, want) {
 t.Errorf("unexpected iterator output for round %d: got:%#v want:%#v", i, got, want)
 }
 it.Reset()
 }
}

```

```

func TestOrderedLinesSlice(t *testing.T) {
 for _, test := range orderedLinesTests {
 it := iterator.NewOrderedLines(test.lines)
 for i := 0; i < 2; i++ {
 got := it.LineSlice()
 want := test.lines
 if !reflect.DeepEqual(got, want) {
 t.Errorf("unexpected iterator output for round %d: got:%#v want:%#v", i, got, want)
 }
 it.Reset()
 }
 }
}

```

```

type weightedLine struct {
 f, t int
 w float64
}

```

```

func (l weightedLine) From() graph.Node { return simple.Node(l.f) }
func (l weightedLine) To() graph.Node { return simple.Node(l.t) }
func (l weightedLine) ReversedLine() graph.Line { l.f, l.t = l.t, l.f; return l }
func (l weightedLine) Weight() float64 { return l.w }
func (l weightedLine) ID() int64 { return 1 }

```

```

var orderedWeightedLinesTests = []struct {
 lines []graph.WeightedLine
}

```

```

}{
{lines: nil},
{lines: []graph.WeightedLine{weightedLine{f: 1, t: 2, w: 1}}},
{lines: []graph.WeightedLine{weightedLine{f: 1, t: 2, w: 1}, weightedLine{f: 2, t: 3, w: 2}, weightedLine{f: 3, t: 4,
w: 3}, weightedLine{f: 4, t: 5, w: 4}}},
{lines: []graph.WeightedLine{weightedLine{f: 5, t: 4, w: 4}, weightedLine{f: 4, t: 3, w: 3}, weightedLine{f: 3, t: 2,
w: 2}, weightedLine{f: 2, t: 1, w: 1}}},
}

```

```

func TestOrderedWeightedLinesIterate(t *testing.T) {
for _, test := range orderedWeightedLinesTests {
it := iterator.NewOrderedWeightedLines(test.lines)
for i := 0; i < 2; i++ {
if it.Len() != len(test.lines) {
t.Errorf("unexpected iterator length for round
%d: got:%d want:%d", i, it.Len(), len(test.lines))
}
var got []graph.WeightedLine
for it.Next() {
got = append(got, it.WeightedLine())
}
want := test.lines
if !reflect.DeepEqual(got, want) {
t.Errorf("unexpected iterator output for round %d: got:%#v want:%#v", i, got, want)
}
it.Reset()
}
}
}

```

```

func TestOrderedWeightedLinesSlice(t *testing.T) {
for _, test := range orderedWeightedLinesTests {
it := iterator.NewOrderedWeightedLines(test.lines)
for i := 0; i < 2; i++ {
got := it.WeightedLineSlice()
want := test.lines
if !reflect.DeepEqual(got, want) {
t.Errorf("unexpected iterator output for round %d: got:%#v want:%#v", i, got, want)
}
it.Reset()
}
}
}
graph{{DigV}}{DigV}{DigV}DigP
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```



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```
graph{{DIR}{DIR}}
```

```
graph{{DG{DG}{DG}{DG{DG}}{DG}}{DG{DG}DG{DG}DG{{{DG{{{}}}}}}{DG}}{DG{DG}DG{{DG}}b}}
```

```
// Copyright 2017 The Gonum Authors. All rights reserved.
```

```
// Use of this code is governed by a BSD-style
```

```
// license that can be found in the LICENSE file
```

```
package floats_test
```

```
import (
 "bufio"
 "fmt"
 "log"
 "strings"
```

```
 "gonum.org/v1/gonum/floats"
 "gonum.org/v1/gonum/stat"
)
```

```
func ExampleParseWithNA() {
 // Calculate the mean of a list of numbers
 // ignoring missing values.
 const data = `6
missing
4
`
```

```
 var vals, weights []float64
 sc := bufio.NewScanner(strings.NewReader(data))
 for sc.Scan() {
 v, w, err := floats.ParseWithNA(sc.Text(), "missing")
 if err != nil {
 log.Fatal(err)
 }
 }
```

```

vals = append(vals, v)
weights = append(weights, w)
}
err := sc.Err()
if err != nil {
 log.Fatal(err)
}
fmt.Println(stat.Mean(vals, weights))

// Output:
// 5
}
github.com/ajstarks/svgo v0.0.0-20180226025133-644b8db467af
h1:wVe6/Ea46ZMeNkQjjBW6xcqyQA/j5e0D6GytH95g0gQ=
github.com/ajstarks/svgo v0.0.0-20180226025133-644b8db467af/go.mod
h1:K08gAheRH3/J6wwsYMMT4xOr94bZjxIelGM0+d/wbFw=
github.com/fogleman/gg v1.2.1-0.20190220221249-0403632d5b90
h1:WXb3TSNmHp2vHoCroCIB1foO/yQ36swABL8aOVeDpgg=
github.com/fogleman/gg v1.2.1-0.20190220221249-0403632d5b90/go.mod
h1:R/bRT+9gY/C5z7JzPU0zXsXHKM4/ayA+zqcVNZzPa1k=
github.com/golang/freetype v0.0.0-20170609003504-e2365dfdc4a0
h1:DACJavvAHhbrF08vX0COfcOBJRhZ8lUbR+ZWIs0Y5g=
github.com/golang/freetype v0.0.0-20170609003504-e2365dfdc4a0/go.mod
h1:E/TSTwGwJL78qG/PmXZO1EjYhfJinVAhrmmHX6Z8B9k=
github.com/jung-kurt/gofpdf v1.0.3-0.20190309125859-24315acbbda5
h1:PJr+ZMXIecYc1Ey2zucXdR73SMBtgjPgwa31099IMv0=
github.com/jung-kurt/gofpdf v1.0.3-0.20190309125859-24315acbbda5/go.mod
h1:7Id9E/uU8ce6rXgefFLgrJj/GYY22cpxn+r32jIOes=
golang.org/x/exp v0.0.0-20180321215751-8460e604b9de/go.mod
h1:CJ0aWSM057203Lf6IL+f9T1iT9GBByDxfZKAQTCR3kQA=
golang.org/x/exp
v0.0.0-20180807140117-3d87b88a115f/go.mod h1:CJ0aWSM057203Lf6IL+f9T1iT9GBByDxfZKAQTCR3kQA=
golang.org/x/exp v0.0.0-20190125153040-c74c464bbbfb2
h1:y102fOLFqhV41b+4GPiJoa0k/x+pJcEi2/HB1Y5T6fU=
golang.org/x/exp v0.0.0-20190125153040-c74c464bbbfb2/go.mod
h1:CJ0aWSM057203Lf6IL+f9T1iT9GBByDxfZKAQTCR3kQA=
golang.org/x/image v0.0.0-20180708004352-c73c2afc3b81
h1:00VmoUEYNlNz/aHIilyyQz/MHSqGoWJzpfV/HW8xpzI=
golang.org/x/image v0.0.0-20180708004352-c73c2afc3b81/go.mod
h1:ux5Hcp/YLpHSI86hEcLt0YII63i6oz57MZXIpbjZUs=
golang.org/x/tools v0.0.0-20180525024113-a5b4c53f6e8b/go.mod
h1:n7NCudcB/nEzxVGmLbDWY5pfWTLqBcC2KZ6jyYvM4mQ=
golang.org/x/tools v0.0.0-20190206041539-40960b6deb8e
h1:Io7mpb+aUAGF0MKxbyQ7HQl1VgB+cL6ZJZUFaFNqVV4=
golang.org/x/tools v0.0.0-20190206041539-40960b6deb8e/go.mod
h1:n7NCudcB/nEzxVGmLbDWY5pfWTLqBcC2KZ6jyYvM4mQ=
gonum.org/v1/gonum v0.0.0-20180816165407-929014505bf4/go.mod
h1:Y+Yx5eoAFn32cQvJDxZx5Dpnq+c3wtXuadVZAcxbbBo=

```

```

gonum.org/v1/netlib v0.0.0-20190313105609-8cb42192e0e0
h1:OE9mWmgKkjJyEmDAAAtGMPjXu+YNeGvK9VTSHY6+Qihc=
gonum.org/v1/netlib v0.0.0-20190313105609-8cb42192e0e0/go.mod
h1:wa6Ws7BG/ESfp6dHfk7C6KdzKA7wR7u/rKwOGE66zvw=
gonum.org/v1/plot v0.0.0-20190515093506-e2840ee46a6b
h1:Qh4dB5D/WpoUUp3lSod7qgoyEHbDGPUWjIbnqdqqe1k=
gonum.org/v1/plot v0.0.0-20190515093506-e2840ee46a6b/go.mod
h1:Wt8AAJl+ypCyYX3nZBvf6cAIx93T+c/OS2HFAYskSZc=
rsc.io/pdf v0.1.1 h1:k1MczvYDUvJBe93bYd7wrZLLUEcLZAuF824/I4e5Xr4=
rsc.io/pdf v0.1.1/go.mod h1:n8OzWcQ6Sp37PL01nO98y4iUCRdTGarVfzxY20ICaU4=
graph{Stm Stm Stm Stm Stm Stm}
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package distmat

var badDim = "distmat: dimension mismatch"
graph{{SubGrM}SubGrK}
graph{digz{{digu}{digu}{"digu}{digu}{digu}{digu}{digu}}{{digz{{digu}}}}digz}digz}
<?xml version="1.0" encoding="UTF-8"?>
<gexf xmlns="http://www.gexf.net/1.2draft" xmlns:viz="http://www.gexf.net/1.2draft/viz"
xmlns:xsi="http://www.w3.org/2001/XMLSchema-instance" xsi:schemaLocation="http://www.gexf.net/1.2draft
http://www.gexf.net/1.2draft/gexf.xsd" version="1.2">
 <graph>
 <nodes>
 <node id="a" label="glossy">
 <viz:color r="239" g="173" b="66" a="0.6"/>
 <viz:position x="15.783598" y="40.109245" z="0.0"/>
 <viz:size value="2.0375757"/>
 </node>
 </nodes>
 </graph>
</gexf>
graph{{SubG}{SubG}{SubG}{SubG}{SubG}{SubG}{SubG}{SubG}}
graph{{ED_}ED_{ED_}ED}
graph{{{{{{suG}}suG}}suG{{{{suG}}suG}}suG}}
graph{SUBG{SUBG{SUBG}SUBG}}
graph{A[e=d,r=d;r=e]}
graph{{DIGRAP_}}
graph{diGh{diGo}}
graph{Strr-9Strr-9Strr-9Strr}
graph{{SUBGRZ}{SUBGRR}SUBGRZ}
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package gonum

```

```

import (
 "gonum.org/v1/gonum/blas"
 "gonum.org/v1/gonum/lapack"
)

// Dorglq generates an mn matrix Q with orthonormal columns defined by the
// product of elementary reflectors as computed by Dgelqf.
// Q = H_0 * H_1 * ... * H_{k-1}
// Dorglq is the blocked version of Dorgl2 that makes greater use of level-3 BLAS
// routines.
//
// len(tau) >= k, 0 <= k <= m, and 0 <= m <= n.
//
// work is temporary storage, and lwork specifies the usable memory length. At minimum,
// lwork >= m, and the amount of blocking is limited by the usable length.
// If lwork == -1, instead of computing Dorglq the optimal work length is stored
// into work[0].
//
// Dorglq will panic if the conditions on input values are not met.
//
// Dorglq is an internal routine. It is exported for testing purposes.
func (impl Implementation) Dorglq(m,
 n, k int, a []float64, lda int, tau, work []float64, lwork int) {
 switch {
 case m < 0:
 panic(mLT0)
 case n < m:
 panic(nLTM)
 case k < 0:
 panic(kLT0)
 case k > m:
 panic(kGTM)
 case lda < max(1, n):
 panic(badLdA)
 case lwork < max(1, m) && lwork != -1:
 panic(badLWork)
 case len(work) < max(1, lwork):
 panic(shortWork)
 }

 if m == 0 {
 work[0] = 1
 return
 }

 nb := impl.Ilaenv(1, "DORGLQ", " ", m, n, k, -1)
 if lwork == -1 {

```



```

work[0] = float64(m * nb)
return
}

switch {
case len(a) < (m-1)*lda+n:
 panic(shortA)
case len(tau) < k:
 panic(shortTau)
}

nbmin := 2 // Minimum block size
var nx int // Crossover size from blocked to unblocked code
iws := m // Length of work needed
var ldwork int
if 1 < nb && nb < k {
 nx = max(0, impl.Ilaenv(3, "DORGLQ", " ", m, n, k, -1))
 if nx < k {
 ldwork = nb
 iws = m * ldwork
 if lwork < iws {
 nb = lwork / m
 ldwork = nb
 nbmin = max(2, impl.Ilaenv(2, "DORGLQ", " ", m, n, k, -1))
 }
 }
}

var
ki, kk int
if nbmin <= nb && nb < k && nx < k {
 // The first kk rows are handled by the blocked method.
 ki = ((k - nx - 1) / nb) * nb
 kk = min(k, ki+nb)
 for i := kk; i < m; i++ {
 for j := 0; j < kk; j++ {
 a[i*lda+j] = 0
 }
 }
}
if kk < m {
 // Perform the operation on columns kk to the end.
 impl.Dorgl2(m-kk, n-kk, k-kk, a[kk*lda+kk:], lda, tau[kk:], work)
}
if kk > 0 {
 // Perform the operation on column-blocks
 for i := ki; i >= 0; i -= nb {
 ib := min(nb, k-i)

```

```

if i+ib < m {
 impl.Dlarft(lapack.Forward, lapack.RowWise,
 n-i, ib,
 a[i*lda+i:], lda,
 tau[i:],
 work, ldwork)

 impl.Dlarfb(blas.Right, blas.Trans, lapack.Forward, lapack.RowWise,
 m-i-ib, n-i, ib,
 a[i*lda+i:], lda,
 work, ldwork,
 a[(i+ib)*lda+i:], lda,
 work[ib*ldwork:], ldwork)
}

impl.Dorgl2(ib, n-i, ib, a[i*lda+i:], lda, tau[i:], work)
for l := i; l < i+ib; l++ {
 for j := 0; j < i; j++ {
 a[l*lda+j] = 0
 }
}
}
}
}

work[0]
= float64(iws)
}

Graph{Di{Di}{Di{Di{Di}{Di{Di}Di{Di}}Di}Di{Di}{Di{Di}Di}Di}
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package licenses

// Files we should ignore.
// Set of "modulePath filePath".
var ignoreFiles = map[string]bool{
 // We told Elias Naur to put a sentence about dual-licensing into his COPYING file.
 // We no longer need it (since we now accept both licenses), but it fails detection
 // so we have to ignore it.
 "gioui.org COPYING": true,
}

graph{{Digp{Digp{Digp{Digp}}}Diggg}}
graph{n_{n_}{n_}{n_}}
graph{{{digraV}digraM}{digraV}digraU}}
graph{_[f=DiGr9]}
graph{{{{{{{{SUBGRAD}}SUBGRAD}}SUBGRAL}}SUBGRAD}}}
Graph{subgrapA{{{subgrapA}}{subgrapA}}{subgrapA}{{{subgrapA}}{subgrapA}}}
/** github.com/Tencent/bk-bcs@v0.0.0-20210107073425-12adaa1f349f */

```

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```
graph{{diGr_[diGr_=""diGr_=""diGr_=diGr_;diGr_]diGr_[diGr_=""diGr_=diGr_]}}
```

```
// +build aix darwin dragonfly freebsd linux netbsd openbsd solaris
```

```
package mem
```

```
import (
```

```
 "unsafe"
```

```
 "golang.org/x/sys/unix"
```

```
)
```

```
type slice struct {
```

```
 addr unsafe.Pointer
```

```
 len int
```

```
 cap int
```

```
}
```

```
func mmap(size uint) (unsafe.Pointer, error) {
```

```
 b, err := unix.Mmap(-1, 0, int(size), unix.PROT_READ|unix.PROT_WRITE,
```

```
 unix.MAP_PRIVATE|unix.MAP_ANONYMOUS)
```

```
 if err != nil {
```

```

 return nil, err
}
sl := (*slice)(unsafe.Pointer(&b))
return sl.addr, nil
}

func munmap(p unsafe.Pointer) error {
 size := int((*header)(p)).size + szheader
 b := *(*[]byte)(unsafe.Pointer(&slice{p, size, size}))
 return unix.Munmap(b)
}
graph{D5{D5{{D5}}D5{{D5}}}}
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// Package iterator provides node, edge and line iterators.
//
// The iterators provided satisfy the graph.Nodes, graph.Edges and
// graph.Lines interfaces.
package iterator
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package parser_test

import (
 "archive/zip"
 "bytes"
 "io/ioutil"
 "os"
 "testing"

 "gonum.org/v1/gonum/graph/formats/dot"
)

func TestParseFile(t *testing.T) {
 golden := []struct {
 in string
 out string
 }{

```

```

{in: "../testdata/empty.dot"},
{in: "../testdata/graph.dot"},
{in: "../testdata/digraph.dot"},
{in: "../testdata/strict.dot"},
{in: "../testdata/multi.dot"},
{in: "../testdata/named_graph.dot"},
{in: "../testdata/node_stmt.dot"},
{in: "../testdata/edge_stmt.dot"},
{in: "../testdata/attr_stmt.dot"},
{in: "../testdata/attr.dot"},
{
 in: "../testdata/subgraph.dot",
 out: "../testdata/subgraph.golden",
},
{
 in:
 "../testdata/semi.dot",
 out: "../testdata/semi.golden",
},
{
 in: "../testdata/empty_attr.dot",
 out: "../testdata/empty_attr.golden",
},
{
 in: "../testdata/attr_lists.dot",
 out: "../testdata/attr_lists.golden",
},
{
 in: "../testdata/attr_sep.dot",
 out: "../testdata/attr_sep.golden",
},
{in: "../testdata/subgraph_vertex.dot"},
{in: "../testdata/port.dot"},
{in: "../testdata/quoted_id.dot"},
{
 in: "../testdata/backslash_newline_id.dot",
 out: "../testdata/backslash_newline_id.golden",
},
}
for _, g := range golden {
 file, err := dot.ParseFile(g.in)
 if err != nil {
 t.Errorf("%q: unable to parse file; %v", g.in, err)
 continue
 }
 // If no output path is specified, the input is already golden.
 out := g.in
 if len(g.out) > 0 {

```

```

 out = g.out
}
buf, err := ioutil.ReadFile(out)
if err != nil {
 t.Errorf("%q: unable to read file; %v", g.in, err)
 continue
}
got := file.String()
// Remove
trailing newline.
want := string(bytes.TrimSpace(buf))
if got != want {
 t.Errorf("%q: graph mismatch; expected `%s`, got `%s`", g.in, want, got)
}
}
}

func TestParseFuzz(t *testing.T) {
 r, err := zip.OpenReader("../fuzz/corpus.zip")
 if err != nil {
 if os.IsNotExist(err) {
 t.Skip("no corpus")
 }
 t.Fatalf("failed to open corpus: %v", err)
 }
 defer r.Close()

 for _, f := range r.File {
 rc, err := f.Open()
 if err != nil {
 t.Fatalf("failed to open %q: %v", f.Name, err)
 }
 func() {
 defer func() {
 p := recover()
 if p != nil {
 t.Errorf("unexpected panic parsing %q: %v", f.Name, p)
 }
 }()

 _, err = dot.Parse(rc)
 if err != nil {
 t.Errorf("unexpected error parsing %q: %v", f.Name, err)
 }
 }()
 rc.Close()
 }
}

```

```

func TestParseError(t *testing.T) {
 golden := []struct {
 path string
 want string
 }{
 {
 path: "../testdata/error.dot",
 want: `Error in S30: INVALID(0,~), Pos(offset=13, line=2, column=7), expected one
of: { } graphx ; -- -> node edge [= subgraph : id `,
 },
 }
 for _, g := range golden {
 _, err := dot.ParseFile(g.path)
 if err == nil {
 t.Errorf("%q: expected error, got nil", g.path)
 continue
 }
 got := err.Error()
 if got != g.want {
 t.Errorf("%q: error mismatch; expected `%v`, got `%v`", g.path, g.want, got)
 continue
 }
 }
}

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// +build !noasm,!appengine,!safe

package f64

// L1Norm is
// for _, v := range x {
// sum += math.Abs(v)
// }
// return sum
func L1Norm(x []float64) (sum float64)

// L1NormInc is
// for i := 0; i < n*incX; i += incX {
// sum += math.Abs(x[i])
// }
// return sum
func L1NormInc(x []float64, n, incX int) (sum float64)

// AddConst is

```

```

// for i := range x {
// x[i] += alpha
// }
func AddConst(alpha float64, x []float64)

// Add is
// for i, v := range s {
// dst[i] += v
// }
func Add(dst, s []float64)

// ApyUnitary is
// for i, v := range x {
// y[i] += alpha * v
// }
func ApyUnitary(alpha float64, x, y []float64)

// ApyUnitaryTo is
// for i, v := range x {
// dst[i] = alpha*v + y[i]
// }
func ApyUnitaryTo(dst []float64, alpha float64, x, y []float64)

// ApyInc is
// for i := 0; i < int(n); i++
// {
// y[iy] += alpha * x[ix]
// ix += incX
// iy += incY
// }
func ApyInc(alpha float64, x, y []float64, n, incX, incY, ix, iy uintptr)

// ApyIncTo is
// for i := 0; i < int(n); i++ {
// dst[idst] = alpha*x[ix] + y[iy]
// ix += incX
// iy += incY
// idst += incDst
// }
func ApyIncTo(dst []float64, incDst, idst uintptr, alpha float64, x, y []float64, n, incX, incY, ix, iy uintptr)

// CumSum is
// if len(s) == 0 {
// return dst
// }
// dst[0] = s[0]
// for i, v := range s[1:] {
// dst[i+1] = dst[i] + v

```

```

// }
// return dst
func CumSum(dst, s []float64) []float64

// CumProd is
// if len(s) == 0 {
// return dst
// }
// dst[0] = s[0]
// for i, v := range s[1:] {
// dst[i+1] = dst[i] * v
// }
// return dst
func CumProd(dst, s []float64) []float64

// Div is
// for i, v := range s {
// dst[i] /= v
// }
func Div(dst, s []float64)

// DivTo is
// for i, v := range s {
// dst[i] = v / t[i]
// }
// return dst
func DivTo(dst, x, y []float64) []float64

//
// DotUnitary is
// for i, v := range x {
// sum += y[i] * v
// }
// return sum
func DotUnitary(x, y []float64) (sum float64)

// DotInc is
// for i := 0; i < int(n); i++ {
// sum += y[iy] * x[ix]
// ix += incX
// iy += incY
// }
// return sum
func DotInc(x, y []float64, n, incX, incY, ix, iy uintptr) (sum float64)

// L1Dist is
// var norm float64
// for i, v := range s {

```



```

// norm += math.Abs(t[i] - v)
// }
// return norm
func L1Dist(s, t []float64) float64

// LinfDist is
// var norm float64
// if len(s) == 0 {
// return 0
// }
// norm = math.Abs(t[0] - s[0])
// for i, v := range s[1:] {
// absDiff := math.Abs(t[i+1] - v)
// if absDiff > norm || math.IsNaN(norm) {
// norm = absDiff
// }
// }
// return norm
func LinfDist(s, t []float64) float64

// ScalUnitary is
// for i := range x {
// x[i] *= alpha
// }
func ScalUnitary(alpha float64, x []float64)

// ScalUnitaryTo is
// for i, v := range x {
// dst[i] = alpha * v
// }
func ScalUnitaryTo(dst
[]float64, alpha float64, x []float64)

// ScalInc is
// var ix uintptr
// for i := 0; i < int(n); i++ {
// x[ix] *= alpha
// ix += incX
// }
func ScalInc(alpha float64, x []float64, n, incX uintptr)

// ScalIncTo is
// var idst, ix uintptr
// for i := 0; i < int(n); i++ {
// dst[idst] = alpha * x[ix]
// ix += incX
// idst += incDst
// }

```

```

func ScalIncTo(dst []float64, incDst uintptr, alpha float64, x []float64, n, incX uintptr)

// Sum is
// var sum float64
// for i := range x {
// sum += x[i]
// }
func Sum(x []float64) float64
digraph{#->st3[l=""]st2->st9Rl=""st2->st7[l=""]st2->st2[l=""]st0->st0[l=""]st0->st0[l=""]st1->st5[l=""]st1->st3[l=""]st1->st1[l=""]st0->st2[l=""]st0->st1[l=""]st0->st0[l="0/0"]};
}
graph{{n_}{n_}{n_}}
graph{D5{{D5}}D5{{D5}}D5{{D7{D5}}D5}{D7{D5}}D5}}
graph{i42{i42}}
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package quat

import (
 "testing"

 "gonum.org/v1/gonum/floats"
)

var invTests = []struct {
 q Number
 wantNaN bool
}{
 {q: Number{Real: 1, Imag: 1, Jmag: 1, Kmag: 1}},
 {q: Number{Real: 3, Imag: -1, Jmag: 5, Kmag: -40}},
 {q: Number{Real: 1e6, Imag: -1e5, Jmag: 4, Kmag: -10}},
 {q: Number{Real: 0, Imag: 1, Jmag: 1, Kmag: 1}},
 {q: Number{Real: 1, Imag: 0, Jmag: 1, Kmag: 1}},
 {q: Number{Real: 1, Imag: 1, Jmag: 0, Kmag: 1}},
 {q: Number{Real: 1, Imag: 1, Jmag: 1, Kmag: 0}},
 {q: Number{}, wantNaN: true},
}

func TestInv(t *testing.T) {
 const tol = 1e-14
 for _, test := range invTests {
 got := Mul(test.q, Inv(test.q))
 if test.wantNaN {
 if !IsNaN(got) {
 t.Errorf("unexpected result for Mul(%v, Inv(%[1]v)): got:%v want:%v", test.q, got, NaN())
 }
 }
 }
}

```

```

 continue
}
if !(floats.EqualWithinAbsOrRel(got.Real, 1, tol,
tol) && floats.EqualWithinAbsOrRel(Abs(got), 1, tol, tol)) {
 t.Errorf("unexpected result for Mul(%v, Inv(%[1]v)): got:%v want:%v", test.q, got, Number{Real: 1})
}
}
}
}
graph{{STRIA}}
graph{{ {digra}digra{digra}{digra}digra{digra}}}
graph{U{xbzwysiquvtttdsqvni{W}hmdae{Tupusdgcijyrynlqbubgraphptubgraph""Optmtist""<< >>W}""}}
graph{{GrG{GrG{GrC}GrG{GrC}}
graph{{Grapu}Grapu{Grapu}Grapu}
graph{{ {NOD0}NOD0{NOD0}}NOD0}
digraph{e{e}{k=e}{k=e}{k=e}{k=e}{k=e}{k=e}{k=e}-9-5-7-2-0-3-6->0-3-2-1-1-6-4->{}->{}-1-2-0-4-4-4-4-5-9-
9-4-5->{}-9-9-8-0-9-3-9-5-9-4-9-5->{}->{}-2-5-9-7-1-5-3-0-8-4-1}
graph{{{ {Ed}Ed}Ed{Ed}}Ed}}
graph{STs{STe}STe}
graph{{GRAP}GRAP{{ {GRAP}GRAP}}GRAP}
graph{{ {ED8}}ED8}
graph{{stric9}{stric4}}
graph{subGrapr}
graph{Di{Di}}
graph{{GRAP}GRAP}
digraph{A:e->B:e->G:e}
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```

```

package c64

```

```

// ScalUnitary is
// for i := range x {
// x[i] *= alpha
// }
func ScalUnitary(alpha complex64, x []complex64) {
 for i := range x {
 x[i] *= alpha
 }
}

// ScalUnitaryTo is
// for i, v := range x {
// dst[i] = alpha * v
// }
func ScalUnitaryTo(dst []complex64, alpha complex64, x []complex64) {
 for i, v := range x {
 dst[i] = alpha * v
 }
}

```

```

}
}

// ScalInc is
// var ix uintptr
// for i := 0; i < int(n); i++ {
// x[ix] *= alpha
// ix += incX
// }
func ScalInc(alpha complex64, x []complex64, n, incX uintptr) {
 var ix uintptr
 for i := 0; i < int(n); i++ {
 x[ix] *= alpha
 ix += incX
 }
}

// ScalIncTo is
// var idst, ix uintptr
// for i := 0; i < int(n); i++ {
// dst[idst] = alpha * x[ix]
// ix += incX
// idst += incDst
// }
func ScalIncTo(dst []complex64, incDst uintptr, alpha complex64, x
[]complex64, n, incX uintptr) {
 var idst, ix uintptr
 for i := 0; i < int(n); i++ {
 dst[idst] = alpha * x[ix]
 ix += incX
 idst += incDst
 }
}

// SscalUnitary is
// for i, v := range x {
// x[i] = complex(real(v)*alpha, imag(v)*alpha)
// }
func SscalUnitary(alpha float32, x []complex64) {
 for i, v := range x {
 x[i] = complex(real(v)*alpha, imag(v)*alpha)
 }
}

// SscalInc is
// var ix uintptr
// for i := 0; i < int(n); i++ {
// x[ix] = complex(real(x[ix])*alpha, imag(x[ix])*alpha)

```

```

// ix += inc
// }
func SscalInc(alpha float32, x []complex64, n, inc uintptr) {
 var ix uintptr
 for i := 0; i < int(n); i++ {
 x[ix] = complex(real(x[ix])*alpha, imag(x[ix])*alpha)
 ix += inc
 }
}

graph{{{su5}}su5}
graph{StR{StR{StR}StR{StR}StR{StR{StR}StR}StR{StR{StR{StR}StR}StR{StR}}
graph{{{{{gJ}{{{{gO}}}}}}}}}}
graph{subN}
graph{{{Ea}{Ea}{Ea}{Ea}{Ea}{Ea}Ea{Ea}{Ea}{Ea}{Ea}{Ea}}
Graph{{{subu}subr}{subu}subr}{subu}{subu}}
graph{Edg2{{{Edg2}}Edg2}}
graph{A[r=d;]}
graph{{St_}{St_}St_}
graph{8.185582076609134674072265625791015625}
graph{{STRIR}}
digraph {a:0b:1}

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package gonum

import (
 "testing"

 "gonum.org/v1/gonum/blas/testblas"
)

func BenchmarkDgemvSmSmNoTransInc1(b *testing.B) {
 testblas.DgemvBenchmark(b, impl, NT, Sm, Sm, 1, 1)
}

func BenchmarkDgemvSmSmNoTransIncN(b *testing.B) {
 testblas.DgemvBenchmark(b, impl, NT, Sm, Sm, 2, 3)
}

func BenchmarkDgemvSmSmTransInc1(b *testing.B) {
 testblas.DgemvBenchmark(b, impl, T, Sm, Sm, 1, 1)
}

func BenchmarkDgemvSmSmTransIncN(b *testing.B) {
 testblas.DgemvBenchmark(b, impl, T, Sm, Sm, 2, 3)
}

```

```
func BenchmarkDgemvMedMedNoTransInc1(b *testing.B) {
 testblas.DgemvBenchmark(b, impl, NT, Med, Med, 1, 1)
}
```

```
func BenchmarkDgemvMedMedNoTransIncN(b *testing.B) {
 testblas.DgemvBenchmark(b, impl, NT, Med, Med, 2, 3)
}
```

```
func BenchmarkDgemvMedMedTransInc1(b *testing.B) {
 testblas.DgemvBenchmark(b, impl, T, Med, Med, 1, 1)
}
```

```
func BenchmarkDgemvMedMedTransIncN(b
 *testing.B) {
 testblas.DgemvBenchmark(b, impl, T, Med, Med, 2, 3)
}
```

```
func BenchmarkDgemvLgLgNoTransInc1(b *testing.B) {
 testblas.DgemvBenchmark(b, impl, NT, Lg, Lg, 1, 1)
}
```

```
func BenchmarkDgemvLgLgNoTransIncN(b *testing.B) {
 testblas.DgemvBenchmark(b, impl, NT, Lg, Lg, 2, 3)
}
```

```
func BenchmarkDgemvLgLgTransInc1(b *testing.B) {
 testblas.DgemvBenchmark(b, impl, T, Lg, Lg, 1, 1)
}
```

```
func BenchmarkDgemvLgLgTransIncN(b *testing.B) {
 testblas.DgemvBenchmark(b, impl, T, Lg, Lg, 2, 3)
}
```

```
func BenchmarkDgemvLgSmNoTransInc1(b *testing.B) {
 testblas.DgemvBenchmark(b, impl, NT, Lg, Sm, 1, 1)
}
```

```
func BenchmarkDgemvLgSmNoTransIncN(b *testing.B) {
 testblas.DgemvBenchmark(b, impl, NT, Lg, Sm, 2, 3)
}
```

```
func BenchmarkDgemvLgSmTransInc1(b *testing.B) {
 testblas.DgemvBenchmark(b, impl, T, Lg, Sm, 1, 1)
}
```

```
func BenchmarkDgemvLgSmTransIncN(b *testing.B) {
 testblas.DgemvBenchmark(b, impl, T, Lg, Sm, 2, 3)
}
```

```

}

func BenchmarkDgemvSmLgNoTransInc1(b *testing.B) {
 testblas.DgemvBenchmark(b,
 impl, NT, Sm, Lg, 1, 1)
}

func BenchmarkDgemvSmLgNoTransIncN(b *testing.B) {
 testblas.DgemvBenchmark(b, impl, NT, Sm, Lg, 2, 3)
}

func BenchmarkDgemvSmLgTransInc1(b *testing.B) {
 testblas.DgemvBenchmark(b, impl, T, Sm, Lg, 1, 1)
}

func BenchmarkDgemvSmLgTransIncN(b *testing.B) {
 testblas.DgemvBenchmark(b, impl, T, Sm, Lg, 2, 3)
}

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// +build !amd64 noasm appengine safe

package c64

// ApyUnitary is
// for i, v := range x {
// y[i] += alpha * v
// }
func ApyUnitary(alpha complex64, x, y []complex64) {
 for i, v := range x {
 y[i] += alpha * v
 }
}

// ApyUnitaryTo is
// for i, v := range x {
// dst[i] = alpha*v + y[i]
// }
func ApyUnitaryTo(dst []complex64, alpha complex64, x, y []complex64) {
 for i, v := range x {
 dst[i] = alpha*v + y[i]
 }
}

// ApyInc is
// for i := 0; i < int(n); i++ {

```

```

// y[iy] += alpha * x[ix]
// ix += incX
// iy += incY
// }
func AxyInc(alpha complex64, x, y []complex64, n, incX, incY, ix, iy uintptr) {
 for i := 0; i < int(n); i++ {
 y[iy] += alpha * x[ix]
 ix += incX
 iy += incY
 }
}

// AxyIncTo is
// for i := 0; i < int(n); i++ {
// dst[idst] = alpha*x[ix] + y[iy]
// ix += incX
// iy += incY
// }
// idst += incDst
// }
func AxyIncTo(dst []complex64, incDst, idst uintptr, alpha complex64, x, y []complex64, n, incX, incY, ix, iy
uintptr) {
 for i := 0; i < int(n); i++ {
 dst[idst] = alpha*x[ix] + y[iy]
 ix += incX
 iy += incY
 idst += incDst
 }
}

// DotcUnitary is
// for i, v := range x {
// sum += y[i] * conj(v)
// }
// return sum
func DotcUnitary(x, y []complex64) (sum complex64) {
 for i, v := range x {
 sum += y[i] * conj(v)
 }
 return sum
}

// DotcInc is
// for i := 0; i < int(n); i++ {
// sum += y[iy] * conj(x[ix])
// ix += incX
// iy += incY
// }

```



```
// return sum
func DotcInc(x, y []complex64, n, incX, incY, ix, iy uintptr) (sum complex64) {
 for i := 0; i < int(n); i++ {
 sum += y[iy] * conj(x[ix])
 ix += incX
 iy += incY
 }
 return sum
}
```

```
// DotuUnitary is
// for i, v := range x {
// sum += y[i] * v
// }
// return sum
func DotuUnitary(x, y []complex64) (sum complex64) {
 for i, v := range x {
 sum += y[i] * v
 }
 return sum
}
```

```
// DotuInc is
//
// for i := 0; i < int(n); i++ {
// sum += y[iy] * x[ix]
// ix += incX
// iy += incY
// }
// return sum
func DotuInc(x, y []complex64, n, incX, incY, ix, iy uintptr) (sum complex64) {
 for i := 0; i < int(n); i++ {
 sum += y[iy] * x[ix]
 ix += incX
 iy += incY
 }
 return sum
}
```

// Code generated by "go generate gonum.org/v1/gonum/unit; DO NOT EDIT.

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package unit

import (  
 "fmt"

```

"testing"
)

func TestPressureFormat(t *testing.T) {
 for _, test := range []struct {
 value Pressure
 format string
 want string
 }{
 {1.23456789, "%v", "1.23456789 Pa"},
 {1.23456789, "%.1v", "1 Pa"},
 {1.23456789, "%20.1v", "1 Pa"},
 {1.23456789, "%20v", "1.23456789 Pa"},
 {1.23456789, "%1v", "1.23456789 Pa"},
 {1.23456789, "%#v", "unit.Pressure(1.23456789)"},
 {1.23456789, "%s", "%!s(unit.Pressure=1.23456789 Pa)"},
 } {
 got := fmt.Sprintf(test.format, test.value)
 if got != test.want {
 t.Errorf("Format %q %v: got: %q want: %q", test.format, float64(test.value), got, test.want)
 }
 }
}

// SPDX-License-Identifier: Unlicense OR MIT

// +build !darwin

package key

// ModShortcut is the platform's shortcut modifier, usually the Ctrl
// key. On Apple platforms it is the Cmd key.
const ModShortcut = ModCtrl

<?xml version="1.0" encoding="UTF-8"?>
<gexf xmlns="http://www.gexf.net/1.2draft" xmlns:xsi="http://www.w3.org/2001/XMLSchema-instance"
xsi:schemaLocation="http://www.gexf.net/1.2draft http://www.gexf.net/1.2draft/gexf.xsd" version="1.2">
 <meta lastmodifieddate="2009-03-20">
 <creator>Gephi.org</creator>
 <description>A Web network</description>
 </meta>
 <graph defaultedgetype="directed">
 <attributes class="node">
 <attribute id="0" title="url" type="string"/>
 <attribute id="1" title="indegree" type="float"/>
 <attribute id="2" title="frog" type="boolean">
 <default>true</default>
 </attribute>
 </attributes>
 <nodes>

```



```

package testlapack

import (
 "fmt"
 "testing"

 "gonum.org/v1/gonum/blas/blas64"
)

type Dlapmter interface {
 Dlapmt(forward bool, m, n int, x []float64, ldx int, k []int)
}

func DlapmtTest(t *testing.T, impl Dlapmter) {
 for ti, test := range []struct {
 forward bool
 k []int

 want blas64.General
 }{
 {
 forward: true, k: []int{0, 1, 2},
 want: blas64.General{
 Rows: 4,
 Cols: 3,
 Stride: 3,
 Data: []float64{
 1, 2, 3,
 4, 5, 6,
 7, 8, 9,
 10, 11, 12,
 },
 },
 },
 {
 forward: false, k: []int{0, 1, 2},
 want: blas64.General{
 Rows: 4,
 Cols: 3,
 Stride: 3,
 Data: []float64{
 1, 2, 3,
 4, 5, 6,
 7, 8, 9,
 10, 11, 12,
 },
 },
 },
 }

```

```

},
{
 forward: true, k: []int{1, 2, 0},
 want: blas64.General{
 Rows: 4,
 Cols: 3,
 Stride:
3,
 Data: []float64{
 2, 3, 1,
 5, 6, 4,
 8, 9, 7,
 11, 12, 10,
 },
 },
},
{
 forward: false, k: []int{1, 2, 0},
 want: blas64.General{
 Rows: 4,
 Cols: 3,
 Stride: 3,
 Data: []float64{
 3, 1, 2,
 6, 4, 5,
 9, 7, 8,
 12, 10, 11,
 },
 },
},
} {
 m := test.want.Rows
 n := test.want.Cols
 if len(test.k) != n {
 panic("bad length of k")
 }

 for _, extra := range []int{0, 11} {
 x := zeros(m, n, n+extra)
 c := 1
 for i := 0; i < m; i++ {
 for j := 0; j < n; j++ {
 x.Data[i*x.Stride+j] = float64(c)
 c++
 }
 }

 k := make([]int, len(test.k))

```

```

copy(k, test.k)

impl.Dlapmt(test.forward, m, n, x.Data, x.Stride, k)

prefix := fmt.Sprintf("Case %v (forward=%t,m=%v,n=%v,extra=%v)", ti, test.forward, m, n, extra)
if !generalOutsideAllNaN(x) {
 t.Errorf("%v: out-of-range write to X", prefix)
}

if !equalApproxGeneral(x, test.want, 0) {
 t.Errorf("%v: unexpected X\n%v\n%v",
prefix, x, test.want)
}
}
}
}
}
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// license that can be found in the LICENSE file.

package path

import (
 "math"

 "golang.org/x/exp/rand"

 "gonum.org/v1/gonum/graph"
 "gonum.org/v1/gonum/graph/simple"
)

// JohnsonAllPaths returns a shortest-path tree for shortest paths in the graph g.
// If the graph does not implement Weighted, UniformCost is used. If a negative cycle
// exists in g, ok will be returned false and paths will not contain valid data.
//
// The time complexity of JohnsonAllPaths is $O(|V| \cdot |E| + |V|^2 \cdot \log|V|)$.
func JohnsonAllPaths(g graph.Graph) (paths AllShortest, ok bool) {
 adjusted := johnsonWeightAdjuster{Graph: g}
 if wg, ok := g.(Weighted); ok {
 adjusted.weight = wg.Weight
 } else {
 adjusted.weight = UniformCost(g)
 }

 paths = newAllShortest(graph.NodesOf(g.Nodes()), false)

 var q int64
 sign := int64(-1)

```

```

for {
 // Choose a random node ID until we find
 // one that is not in g.
 q
 = sign * rand.Int63()
 if _, exists := paths.indexOf[q]; !exists {
 break
 }
 sign *= -1
}

adjusted.adjustBy, ok = BellmanFordFrom(johnsonGraphNode(q), johnsonReWeight{adjusted, q})
if !ok {
 return paths, false
}

dijkstraAllPaths(adjusted, paths)

for i, u := range paths.nodes {
 hu := adjusted.adjustBy.WeightTo(u.ID())
 for j, v := range paths.nodes {
 if i == j {
 continue
 }
 hv := adjusted.adjustBy.WeightTo(v.ID())
 paths.dist.Set(i, j, paths.dist.At(i, j)-hu+hv)
 }
}

return paths, ok
}

// johnsonWeightAdjuster is an edge re-weighted graph constructed
// by the first phase of the Johnson algorithm such that no negative
// edge weights exist in the graph.
type johnsonWeightAdjuster struct {
 graph.Graph
 weight Weighting

 adjustBy Shortest
}

var _ graph.Weighted = johnsonWeightAdjuster{}

func (g johnsonWeightAdjuster) Node(id int64) graph.Node {
 panic("path: unintended use of johnsonWeightAdjuster")
}

```

```

func (g johnsonWeightAdjuster) WeightedEdge(_
 _ int64) graph.WeightedEdge {
 panic("path: unintended use of johnsonWeightAdjuster")
}

func (g johnsonWeightAdjuster) Weight(xid, yid int64) (w float64, ok bool) {
 w, ok = g.weight(xid, yid)
 return w + g.adjustBy.WeightTo(xid) - g.adjustBy.WeightTo(yid), ok
}

func (johnsonWeightAdjuster) HasEdgeBetween(_ _ int64) bool {
 panic("path: unintended use of johnsonWeightAdjuster")
}

// johnsonReWeight provides a query node to allow edge re-weighting
// using the Bellman-Ford algorithm for the first phase of the
// Johnson algorithm.
type johnsonReWeight struct {
 johnsonWeightAdjuster
 q int64
}

func (g johnsonReWeight) Node(id int64) graph.Node {
 if id != g.q {
 panic("path: unintended use of johnsonReWeight")
 }
 return simple.Node(id)
}

func (g johnsonReWeight) Nodes() graph.Nodes {
 return newJohnsonNodeIterator(g.q, g.Graph.Nodes())
}

func (g johnsonReWeight) From(id int64) graph.Nodes {
 if id == g.q {
 return g.Graph.Nodes()
 }
 return g.Graph.From(id)
}

func (g johnsonReWeight)
Edge(uid, vid int64) graph.Edge {
 if uid == g.q && g.Graph.Node(vid) != nil {
 return simple.Edge{F: johnsonGraphNode(g.q), T: simple.Node(vid)}
 }
 return g.Graph.Edge(uid, vid)
}

```



```

func (g johnsonReWeight) Weight(xid, yid int64) (w float64, ok bool) {
 switch g.q {
 case xid:
 return 0, true
 case yid:
 return math.Inf(1), false
 default:
 return g.weight(xid, yid)
 }
}

type johnsonGraphNode int64

func (n johnsonGraphNode) ID() int64 { return int64(n) }

func newJohnsonNodeIterator(q int64, nodes graph.Nodes) *johnsonNodeIterator {
 return &johnsonNodeIterator{q: q, nodes: nodes}
}

type johnsonNodeIterator struct {
 q int64
 nodes graph.Nodes
 qUsed, qOK bool
}

func (it *johnsonNodeIterator) Len() int {
 var len int
 if it.nodes != nil {
 len = it.nodes.Len()
 }
 if !it.qUsed {
 len++
 }
 return len
}

func (it *johnsonNodeIterator) Next() bool {
 if it.nodes != nil {
 ok := it.nodes.Next()
 if ok {
 return true
 }
 }
 if !it.qUsed {
 it.qOK
 = true
 it.qUsed = true
 return true
 }
}

```

```

}
it.qOK = false
return false
}

func (it *johnsonNodeIterator) Node() graph.Node {
 if it.qOK {
 return johnsonGraphNode(it.q)
 }
 if it.nodes == nil {
 return nil
 }
 return it.nodes.Node()
}

func (it *johnsonNodeIterator) Reset() {
 it.qOK = false
 it.qUsed = false
 if it.nodes == nil {
 return
 }
 it.nodes.Reset()
}
graph{{GRA}}{GRA}{GRA{GRA}{GRA}GRA}}
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// license that can be found in the LICENSE file.

package gonum

import "gonum.org/v1/gonum/blas"

// Dgerq2 computes an RQ factorization of the mn matrix A,
// A = R * Q.
// On exit, if m <= n, the upper triangle of the subarray
// A[0:m, n-m:n] contains the mm upper triangular matrix R.
// If m >= n, the elements on and above the (m-n)-th subdiagonal
// contain the mn upper trapezoidal matrix R.
// The remaining elements, with tau, represent the
// orthogonal matrix Q as a product of min(m,n) elementary
// reflectors.
//
// The matrix Q is represented as a product of elementary reflectors
// Q = H_0 H_1 . . . H_{min(m,n)-1}.
// Each H(i) has the form
// H_i = I - tau_i * v * v
// where v is a vector with v[0:n-k+i-1] stored in A[m-k+i, 0:n-k+i-1],
// v[n-k+i:n] = 0 and v[n-k+i] = 1.

```

```

//
// tau must have length min(m,n) and work must have length m, otherwise
// Dgerq2 will
// panic.
//
// Dgerq2 is an internal routine. It is exported for testing purposes.
func (impl Implementation) Dgerq2(m, n int, a []float64, lda int, tau, work []float64) {
 switch {
 case m < 0:
 panic(mLT0)
 case n < 0:
 panic(nLT0)
 case lda < max(1, n):
 panic(badLdA)
 case len(work) < m:
 panic(shortWork)
 }

 // Quick return if possible.
 k := min(m, n)
 if k == 0 {
 return
 }

 switch {
 case len(a) < (m-1)*lda+n:
 panic(shortA)
 case len(tau) < k:
 panic(shortTau)
 }

 for i := k - 1; i >= 0; i-- {
 // Generate elementary reflector H[i] to annihilate
 // A[m-k+i, 0:n-k+i-1].
 mki := m - k + i
 nki := n - k + i
 var aii float64
 aii, tau[i] = impl.Dlarfg(nki+1, a[mki*lda+nki], a[mki*lda:], 1)

 // Apply H[i] to A[0:m-k+i-1, 0:n-k+i] from the right.
 a[mki*lda+nki] = 1
 impl.Dlarf(blas.Right, mki, nki+1, a[mki*lda:], 1, tau[i], a, lda, work)
 a[mki*lda+nki] = aii
 }
}

graph{STs{STs{STe}STe}STe}
graph{{SubGra_}{SubGra_}}

```



```

// set is an integer set.
type set map[int64]struct{}

func linksTo(i ...int64) set {
 if len(i) == 0 {
 return nil
 }
 s := make(set)
 for _, v := range i {
 s[v] = struct{}{}
 }
 return s
}

$(CUR_SRCS) += d1mach.f zabs.f zasyi.f zbesk.f zbknu.f zexp.f zmlt.f zshch.f zuni1.f zunk2.f \
dgamln.f zacai.f zbesf.f zbesy.f zbuni.f zkscl.f zrati.f zsqr.f zuni2.f zuoik.f \
i1mach.f zacon.f zbesi.f zbinu.f zbunk.f zlog.f zs1s2.f zuchk.f zunik.f zwrsk.f \
xerror.f zairy.f zbesj.f zbiry.f zdiv.f zmlri.f zseri.f zunhj.f zunk1.f
graph{{SUBGRAPHE}}{SUBGRAPHE}{SUBGRAPHE}{SUBGRAPHP}}
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package testblas

import (
 "testing"

 "gonum.org/v1/gonum/blas"
)

type Ztpmver interface {
 Ztpmv(uplo blas.Uplo, trans blas.Transpose, diag blas.Diag, n int, ap []complex128, x []complex128, incX int)
}

func ZtpmvTest(t *testing.T, impl Ztpmver) {
 for tc, test := range ztrmvTestCases {
 n := len(test.x)
 uplo := test.uplo
 for _, trans := range []blas.Transpose{blas.NoTrans, blas.Trans, blas.ConjTrans} {
 for _, diag := range []blas.Diag{blas.NonUnit, blas.Unit} {
 for _, incX := range []int{-11, -2, -1, 1, 2, 7} {
 ap := zPack(uplo, n, test.a, n)
 apCopy := make([]complex128, len(ap))
 copy(apCopy, ap)

 x := makeZVector(test.x, incX)

```

```

impl.Ztpmv(uplo, trans, diag, n, ap, x, incX)

if !zsame(ap, apCopy) {
 t.Errorf("Case %v (uplo=%v,trans=%v,diag=%v,incX=%v): unexpected modification
of A", tc, uplo, trans, diag, incX)
}

var want []complex128
if diag == blas.NonUnit {
 switch {
 case trans == blas.NoTrans && incX > 0:
 want = makeZVector(test.want, incX)
 case trans == blas.NoTrans && incX < 0:
 want = makeZVector(test.wantNeg, incX)
 case trans == blas.Trans && incX > 0:
 want = makeZVector(test.wantTrans, incX)
 case trans == blas.Trans && incX < 0:
 want = makeZVector(test.wantTransNeg, incX)
 case trans == blas.ConjTrans && incX > 0:
 want = makeZVector(test.wantConjTrans, incX)
 case trans == blas.ConjTrans && incX < 0:
 want = makeZVector(test.wantConjTransNeg, incX)
 }
} else {
 switch {
 case trans == blas.NoTrans && incX > 0:
 want = makeZVector(test.wantUnit, incX)
 case trans == blas.NoTrans && incX < 0:
 want = makeZVector(test.wantUnitNeg, incX)
 case trans == blas.Trans && incX > 0:
 want = makeZVector(test.wantUnitTrans,
incX)
 case trans == blas.Trans && incX < 0:
 want = makeZVector(test.wantUnitTransNeg, incX)
 case trans == blas.ConjTrans && incX > 0:
 want = makeZVector(test.wantUnitConjTrans, incX)
 case trans == blas.ConjTrans && incX < 0:
 want = makeZVector(test.wantUnitConjTransNeg, incX)
 }
}
if !zsame(x, want) {
 t.Errorf("Case %v (uplo=%v,trans=%v,diag=%v,incX=%v): unexpected result\nwant %v\ngot %v", tc, uplo, trans,
diag, incX, want, x)
}
}
}
}
}
}
}

```

```

}
/*****/graph{*****/}
digraph{B:sw->G:sw}
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// license that can be found in the LICENSE file.

// +build !amd64 noasm appengine safe

package f64

// DotUnitary is
// for i, v := range x {
// sum += y[i] * v
// }
// return sum
func DotUnitary(x, y []float64) (sum float64) {
 for i, v := range x {
 sum += y[i] * v
 }
 return sum
}

// DotInc is
// for i := 0; i < int(n); i++ {
// sum += y[iy] * x[ix]
// ix += incX
// iy += incY
// }
// return sum
func DotInc(x, y []float64, n, incX, incY, ix, iy uintptr) (sum float64) {
 for i := 0; i < int(n); i++ {
 sum += y[iy] * x[ix]
 ix += incX
 iy += incY
 }
 return sum
}

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// license that can be found in the LICENSE file.

package testlapack

import (
 "testing"

 "golang.org/x/exp/rand"

```

```

"gonum.org/v1/gonum/blas"
"gonum.org/v1/gonum/blas/blas64"
"gonum.org/v1/gonum/floats"
)

type Dormr2er interface {
 Dgerqf(m, n int, a []float64, lda int, tau, work []float64, lwork int)
 Dormr2(side blas.Side, trans blas.Transpose, m, n, k int, a []float64, lda int, tau, c []float64, ldc int, work []float64)
}

func Dormr2Test(t *testing.T, impl Dormr2er) {
 rnd := rand.New(rand.NewSource(1))
 for _, side := range []blas.Side{blas.Left, blas.Right} {
 for _, trans := range []blas.Transpose{blas.NoTrans, blas.Trans} {
 for _, test := range []struct {
 common, adim, cdim, lda, ldc int
 }{
 {3, 4, 5, 0, 0},
 {3, 5, 4, 0, 0},
 {4, 3, 5, 0, 0},
 {4, 5, 3, 0, 0},
 {5, 3, 4, 0, 0},
 {5, 4, 3, 0, 0},
 {3, 4, 5, 6, 20},
 {3, 5, 4, 6,
20},
 {4, 3, 5, 6, 20},
 {4, 5, 3, 6, 20},
 {5, 3, 4, 6, 20},
 {5, 4, 3, 6, 20},
 {3, 4, 5, 20, 6},
 {3, 5, 4, 20, 6},
 {4, 3, 5, 20, 6},
 {4, 5, 3, 20, 6},
 {5, 3, 4, 20, 6},
 {5, 4, 3, 20, 6},
 } {
 ma := test.adim
 na := test.common
 var mc, nc int
 if side == blas.Left {
 mc = test.common
 nc = test.cdim
 } else {
 mc = test.cdim
 nc = test.common
 }
 }
 }
 }
}

```



```

// Generate a random matrix
lda := test.lda
if lda == 0 {
 lda = na
}
a := make([]float64, ma*lda)
for i := range a {
 a[i] = rnd.Float64()
}
ldc := test.ldc
if ldc == 0 {
 ldc = nc
}
// Compute random C matrix
c := make([]float64, mc*ldc)
for i := range c {
 c[i] = rnd.Float64()
}

// Compute RQ
k := min(ma, na)
tau := make([]float64, k)
work := make([]float64, 1)
impl.Dgerqf(ma, na, a, lda, tau, work, -1)
work = make([]float64, int(work[0]))
impl.Dgerqf(ma, na, a, lda,
tau, work, len(work))

// Build Q from result
q := constructQ("RQ", ma, na, a, lda, tau)

cMat := blas64.General{
 Rows: mc,
 Cols: nc,
 Stride: ldc,
 Data: make([]float64, len(c)),
}
copy(cMat.Data, c)
cMatCopy := blas64.General{
 Rows: cMat.Rows,
 Cols: cMat.Cols,
 Stride: cMat.Stride,
 Data: make([]float64, len(cMat.Data)),
}
copy(cMatCopy.Data, cMat.Data)
switch {
default:

```

```

panic("bad test")
case side == blas.Left && trans == blas.NoTrans:
 blas64.Gemm(blas.NoTrans, blas.NoTrans, 1, q, cMatCopy, 0, cMat)
case side == blas.Left && trans == blas.Trans:
 blas64.Gemm(blas.Trans, blas.NoTrans, 1, q, cMatCopy, 0, cMat)
case side == blas.Right && trans == blas.NoTrans:
 blas64.Gemm(blas.NoTrans, blas.NoTrans, 1, cMatCopy, q, 0, cMat)
case side == blas.Right && trans == blas.Trans:
 blas64.Gemm(blas.NoTrans, blas.Trans, 1, cMatCopy, q, 0, cMat)
}
// Do Dorm2r ard
compare
if side == blas.Left {
 work = make([]float64, nc)
} else {
 work = make([]float64, mc)
}
aCopy := make([]float64, len(a))
copy(aCopy, a)
tauCopy := make([]float64, len(tau))
copy(tauCopy, tau)
impl.Dormr2(side, trans, mc, nc, k, a[(ma-k)*lda:], lda, tau, c, ldc, work)
if !floats.Equal(a, aCopy) {
 t.Errorf("a changed in call")
}
if !floats.Equal(tau, tauCopy) {
 t.Errorf("tau changed in call")
}
if !floats.EqualApprox(cMat.Data, c, 1e-14) {
 t.Errorf("Multiplication mismatch.\n Want %v \n got %v.", cMat.Data, c)
}
}
}
}
}
graph{"\Zd{"\Z{"}}
graph{{{gra0{{{gra0}}}}}}
graph{{{SubGrap{{{SubGrap}}}}}}
graph{Edv{Edv""Edn""Eds}Edn""Eds}
graph{noG}
graph{{{stricc}{stricc}{stricm}}stricc}{stricc}{stricm}}
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// Package fftpack implements Discrete Fourier Transform functions
// ported from the Fortran implementation of FFTPACK.
package fftpack // import "gonum.org/v1/gonum/fourier/internal/fftpack"

```

```

graph{{gr{{gr}gr}gr}}
digraph {
 A:ne -> B:sw
 C:foo -> D:bar:se
 E:_ -> F
 G:n
 H:e
 I:s
 J:w
 K:nw
 L:c
}
graph{{E_{E_}}E_{E_}E_{E_}}
graph{No{No}No{No}No{No}N{No{No}No}No{No}N{No{No}No{No}No{No}{No}No{No}No{No}No}}
graph{dia}
graph{{{nod{nod}}}nod{nod}}}
graph{{str}str}
graph{{{Digw{Digz}{{Digw{Digz}}}}}}
graph{{Sx}}
graph{Subc{{Subc{{Suba}Suba}Suba}Suba}}
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```

```

package testlapack

```

```

import (
 "testing"

```

```

 "golang.org/x/exp/rand"

```

```

 "gonum.org/v1/gonum/blas"

```

```

 "gonum.org/v1/gonum/blas/blas64"

```

```

 "gonum.org/v1/gonum/floats"

```

```

)

```

```

type Dtrti2er interface {
 Dtrti2(uplo blas.Uplo, diag blas.Diag, n int, a []float64, lda int)
}

```

```

func Dtrti2Test(t *testing.T, impl Dtrti2er) {

```

```

 const tol = 1e-14

```

```

 for _, test := range []struct {

```

```

 a []float64

```

```

 n int

```

```

 uplo blas.Uplo

```

```

 diag blas.Diag

```

```

 ans []float64

```

```

}{
{
a: []float64{
2, 3, 4,
0, 5, 6,
8, 0, 8},
n: 3,
uplo: blas.Upper,
diag: blas.NonUnit,
ans: []float64{
0.5, -0.3, -0.025,
0, 0.2, -0.15,
8, 0, 0.125,
},
},
{
a: []float64{
5, 3, 4,
0, 7, 6,
10, 0, 8},
n: 3,
uplo: blas.Upper,
diag: blas.Unit,
ans: []float64{
5, -3, 14,
0, 7, -6,
10, 0, 8,
},
},
{
a:
[]float64{
2, 0, 0,
3, 5, 0,
4, 6, 8},
n: 3,
uplo: blas.Lower,
diag: blas.NonUnit,
ans: []float64{
0.5, 0, 0,
-0.3, 0.2, 0,
-0.025, -0.15, 0.125,
},
},
{
a: []float64{
1, 0, 0,
3, 1, 0,

```

```

 4, 6, 1},
 n: 3,
 uplo: blas.Lower,
 diag: blas.Unit,
 ans: []float64{
 1, 0, 0,
 -3, 1, 0,
 14, -6, 1,
 },
},
} {
impl.Dtrti2(test.uplo, test.diag, test.n, test.a, test.n)
if !floats.EqualApprox(test.ans, test.a, tol) {
 t.Errorf("Matrix inverse mismatch. Want %v, got %v.", test.ans, test.a)
}
}
rnd := rand.New(rand.NewSource(1))
bi := blas64.Implementation()
for _, uplo := range []blas.Uplo{blas.Upper, blas.Lower} {
 for _, diag := range []blas.Diag{blas.NonUnit, blas.Unit} {
 for _, test := range []struct {
 n, lda int
 }{
 {1, 0},
 {2, 0},
 {3, 0},
 {1, 5},
 {2, 5},
 {3, 5},
 } {
 n := test.n
 lda := test.lda
 if lda == 0 {
 lda = n
 }
 // Allocate nn
matrix A and fill it with random numbers.
 a := make([]float64, n*lda)
 for i := range a {
 a[i] = rnd.Float64()
 }
 for i := 0; i < n; i++ {
 // This keeps the matrices well conditioned.
 a[i*lda+i] += float64(n)
 }
 aCopy := make([]float64, len(a))
 copy(aCopy, a)
 // Compute the inverse of the uplo triangle.

```

```

impl.Dtrti2(uplo, diag, n, a, lda)
// Zero out the opposite triangle.
if uplo == blas.Upper {
 for i := 1; i < n; i++ {
 for j := 0; j < i; j++ {
 aCopy[i*lda+j] = 0
 a[i*lda+j] = 0
 }
 }
} else {
 for i := 0; i < n; i++ {
 for j := i + 1; j < n; j++ {
 aCopy[i*lda+j] = 0
 a[i*lda+j] = 0
 }
 }
}
if diag == blas.Unit {
 // Set the diagonal of A^{-1} and A explicitly to 1.
 for i := 0; i < n; i++ {
 a[i*lda+i] = 1
 aCopy[i*lda+i] = 1
 }
}
// Compute A^{-1} * A and store the result in ans.
ans := make([]float64, len(a))
bi.Dgemm(blas.NoTrans,
blas.NoTrans, n, n, n, 1, a, lda, aCopy, lda, 0, ans, lda)
// Check that ans is close to the identity matrix.
dist := distFromIdentity(n, ans, lda)
if dist > tol {
 t.Errorf("inv(A) * A - I = %v. Upper = %v, unit = %v, ans = %v", dist, uplo == blas.Upper, diag == blas.Unit, ans)
}
}
}
}
}
graph{DiGraphd{{DiGraphg}{DiGraphg}{DiGraphg}DiGraphg}{DiGraphg}{}}
graph{{ST_{{{{ST_}ST_}}ST_}}ST_}
// Copyright 2014 The Gonum Authors. All rights reserved.
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package set

import "gonum.org/v1/gonum/graph"

// Ints is a set of int identifiers.

```

```

type Ints map[int]struct{}

// The simple accessor methods for Ints are provided to allow ease of
// implementation change should the need arise.

// Add inserts an element into the set.
func (s Ints) Add(e int) {
 s[e] = struct{}{}
}

// Has reports the existence of the element in the set.
func (s Ints) Has(e int) bool {
 _, ok := s[e]
 return ok
}

// Remove deletes the specified element from the set.
func (s Ints) Remove(e int) {
 delete(s, e)
}

// Count reports the number of elements stored in the set.
func (s Ints) Count() int {
 return len(s)
}

// IntsEqual reports set equality between the parameters. Sets are equal if
// and only if they have the same elements.
func IntsEqual(a, b Ints) bool {
 if intsSame(a, b) {
 return true
 }

 if
 len(a) != len(b) {
 return false
 }

 for e := range a {
 if _, ok := b[e]; !ok {
 return false
 }
 }

 return true
}

// Int64s is a set of int64 identifiers.

```

```

type Int64s map[int64]struct{}

// The simple accessor methods for Ints are provided to allow ease of
// implementation change should the need arise.

// Add inserts an element into the set.
func (s Int64s) Add(e int64) {
 s[e] = struct{}{}
}

// Has reports the existence of the element in the set.
func (s Int64s) Has(e int64) bool {
 _, ok := s[e]
 return ok
}

// Remove deletes the specified element from the set.
func (s Int64s) Remove(e int64) {
 delete(s, e)
}

// Count reports the number of elements stored in the set.
func (s Int64s) Count() int {
 return len(s)
}

// Int64sEqual reports set equality between the parameters. Sets are equal if
// and only if they have the same elements.
func Int64sEqual(a, b Int64s) bool {
 if int64sSame(a, b) {
 return true
 }

 if len(a) != len(b) {
 return false
 }

 for e := range a {
 if _, ok := b[e]; !ok {
 return false
 }
 }

 return true
}

// Nodes is a set of nodes keyed in their integer identifiers.

```



```

type Nodes map[int64]graph.Node

// NewNodes returns a new Nodes.
func NewNodes() Nodes {
 return make(Nodes)
}

// NewNodes returns a new Nodes with the given size hint, n.
func NewNodesSize(n int) Nodes {
 return make(Nodes, n)
}

// The simple accessor methods for Nodes are provided to allow ease of
// implementation change should the need arise.

// Add inserts an element into the set.
func (s Nodes) Add(n graph.Node) {
 s[n.ID()] = n
}

// Remove deletes the specified element from the set.
func (s Nodes) Remove(e graph.Node) {
 delete(s, e.ID())
}

// Count returns the number of element in the set.
func (s Nodes) Count() int {
 return len(s)
}

// Has reports the existence of the elements in the set.
func (s Nodes) Has(n graph.Node) bool {
 _, ok := s[n.ID()]
 return ok
}

// CloneNodes returns a clone of src.
func CloneNodes(src Nodes) Nodes {
 dst
 := make(Nodes, len(src))
 for e, n := range src {
 dst[e] = n
 }
 return dst
}

// Equal reports set equality between the parameters. Sets are equal if
// and only if they have the same elements.

```

```

func Equal(a, b Nodes) bool {
 if same(a, b) {
 return true
 }

 if len(a) != len(b) {
 return false
 }

 for e := range a {
 if _, ok := b[e]; !ok {
 return false
 }
 }

 return true
}

// UnionOfNodes returns the union of a and b.
//
// The union of two sets, a and b, is the set containing all the
// elements of each, for instance:
//
// {a,b,c} UNION {d,e,f} = {a,b,c,d,e,f}
//
// Since sets may not have repetition, unions of two sets that overlap
// do not contain repeat elements, that is:
//
// {a,b,c} UNION {b,c,d} = {a,b,c,d}
//
func UnionOfNodes(a, b Nodes) Nodes {
 if same(a, b) {
 return CloneNodes(a)
 }

 dst := make(Nodes)
 for e, n := range a {
 dst[e] = n
 }
 for e, n := range b {
 dst[e] = n
 }

 return dst
}

// IntersectionOfNodes returns the intersection of

```

```

a and b.
//
// The intersection of two sets, a and b, is the set containing all
// the elements shared between the two sets, for instance:
//
// {a,b,c} INTERSECT {b,c,d} = {b,c}
//
// The intersection between a set and itself is itself, and thus
// effectively a copy operation:
//
// {a,b,c} INTERSECT {a,b,c} = {a,b,c}
//
// The intersection between two sets that share no elements is the empty
// set:
//
// {a,b,c} INTERSECT {d,e,f} = {}
//
func IntersectionOfNodes(a, b Nodes) Nodes {
 if same(a, b) {
 return CloneNodes(a)
 }
 dst := make(Nodes)
 if len(a) > len(b) {
 a, b = b, a
 }
 for e, n := range a {
 if _, ok := b[e]; ok {
 dst[e] = n
 }
 }
 return dst
}
graph{{{No_}No_}No_}
graph{{{SUBB}{SUBB}SUBB}SUBB{{{SUBB}{SUBB}SUBB}SUBB{{{SUBB}}}}}
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package stat_test

import (
 "fmt"

 "golang.org/x/exp/rand"

 "gonum.org/v1/gonum/stat"
)

```

```

func ExampleLinearRegression() {
 var (
 xs = make([]float64, 100)
 ys = make([]float64, 100)
 weights []float64
)

 line := func(x float64) float64 {
 return 1 + 3*x
 }

 for i := range xs {
 xs[i] = float64(i)
 ys[i] = line(xs[i]) + 0.1*rand.NormFloat64()
 }

 // Do not force the regression line to pass through the origin.
 origin := false

 alpha, beta := stat.LinearRegression(xs, ys, weights, origin)
 r2 := stat.RSquared(xs, ys, weights, alpha, beta)

 fmt.Printf("Estimated slope is: %v\n", alpha)
 fmt.Printf("Estimated offset is: %v\n", beta)
 fmt.Printf("R^2: %v\n", r2)

 // Output:
 // Estimated slope is: 0.988572424633503
 // Estimated offset is: 3.0001541344029676
 // R^2: 0.9999991095061128
 }
graph{No}
graph{{SUBGG{SUBGH}}SUBGH}
graph{{Dig}{Dig}Dig{Dig}{Dig}Dig}
Graph{subgrapA{subgrapA}{subgrapA{subgrapA}}}
graph{{SuG}SuG}
// Code generated by "go generate gonum.org/v1/gonum/unit; DO NOT EDIT.

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package unit

import (
 "fmt"
 "testing"
)

```

```

func TestPowerFormat(t *testing.T) {
 for _, test := range []struct {
 value Power
 format string
 want string
 }{
 {1.23456789, "%v", "1.23456789 W"},
 {1.23456789, "%.1v", "1 W"},
 {1.23456789, "%20.1v", "1 W"},
 {1.23456789, "%20v", "1.23456789 W"},
 {1.23456789, "%1v", "1.23456789 W"},
 {1.23456789, "%#v", "unit.Power(1.23456789)"},
 {1.23456789, "%s", "%!s(unit.Power=1.23456789 W)"},
 } {
 got := fmt.Sprintf(test.format, test.value)
 if got != test.want {
 t.Errorf("Format %q %v: got: %q want: %q", test.format, float64(test.value), got, test.want)
 }
 }
}

// SPDX-License-Identifier: Unlicense OR MIT

// +build linux freebsd windows

package headless

import (
 "gioui.org/app/internal/egl"
)

func newContext() (context, error) {
 return egl.NewContext(egl.EGL_DEFAULT_DISPLAY)
}

graph{<<TTDTTDDTT>>}
Graph{{{subr}{subu}subr}{subu}}
graph{>{{{subGrn}subGrc}{subGrc}{subGrn}}}}
// SPDX-License-Identifier: Unlicense OR MIT

// Package points standard output, standard error and the standard
// library package log to the platform logger.
package log
graph{{STR_}STR_}
graph{diG8{diG5{diG8{diG5{diG5{diG5{diG5{diG5{diG5}}}}}}}}
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```

```
// +build !amd64 noasm appengine safe
```

```
package f32
```

```
// AxyUnitary is
```

```
// for i, v := range x {
```

```
// y[i] += alpha * v
```

```
// }
```

```
func AxyUnitary(alpha float32, x, y []float32) {
```

```
 for i, v := range x {
```

```
 y[i] += alpha * v
```

```
 }
```

```
}
```

```
// AxyUnitaryTo is
```

```
// for i, v := range x {
```

```
// dst[i] = alpha*v + y[i]
```

```
// }
```

```
func AxyUnitaryTo(dst []float32, alpha float32, x, y []float32) {
```

```
 for i, v := range x {
```

```
 dst[i] = alpha*v + y[i]
```

```
 }
```

```
}
```

```
// AxyInc is
```

```
// for i := 0; i < int(n); i++ {
```

```
// y[iy] += alpha * x[ix]
```

```
// ix += incX
```

```
// iy += incY
```

```
// }
```

```
func AxyInc(alpha float32, x, y []float32, n, incX, incY, ix, iy uintptr) {
```

```
 for i := 0; i < int(n); i++ {
```

```
 y[iy] += alpha * x[ix]
```

```
 ix += incX
```

```
 iy += incY
```

```
 }
```

```
}
```

```
// AxyIncTo is
```

```
// for i := 0; i < int(n); i++ {
```

```
// dst[idst] = alpha*x[ix] + y[iy]
```

```
// ix += incX
```

```
// iy += incY
```

```
// idst +=
```

```
 incDst
```

```
// }
```

```
func AxyIncTo(dst []float32, incDst, idst uintptr, alpha float32, x, y []float32, n, incX, incY, ix, iy uintptr) {
```

```
 for i := 0; i < int(n); i++ {
```

```

 dst[idst] = alpha*x[ix] + y[iy]
 ix += incX
 iy += incY
 idst += incDst
}
}

// DotUnitary is
// for i, v := range x {
// sum += y[i] * v
// }
// return sum
func DotUnitary(x, y []float32) (sum float32) {
 for i, v := range x {
 sum += y[i] * v
 }
 return sum
}

// DotInc is
// for i := 0; i < int(n); i++ {
// sum += y[iy] * x[ix]
// ix += incX
// iy += incY
// }
// return sum
func DotInc(x, y []float32, n, incX, incY, ix, iy uintptr) (sum float32) {
 for i := 0; i < int(n); i++ {
 sum += y[iy] * x[ix]
 ix += incX
 iy += incY
 }
 return sum
}

// DdotUnitary is
// for i, v := range x {
// sum += float64(y[i]) * float64(v)
// }
// return
func DdotUnitary(x, y []float32) (sum float64) {
 for i, v := range x {
 sum += float64(y[i]) * float64(v)
 }
 return
}

// DdotInc is

```

```

// for i := 0; i < int(n); i++
{
// sum += float64(y[iy]) * float64(x[ix])
// ix += incX
// iy += incY
// }
// return
func DdotInc(x, y []float32, n, incX, incY, ix, iy uintptr) (sum float64) {
for i := 0; i < int(n); i++ {
sum += float64(y[iy]) * float64(x[ix])
ix += incX
iy += incY
}
return
}
graph{{{gra0{{{gra0{{{gra0{{{gra0{{{gra0{{{gra0}}}}}}}}}}}}}}
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```

```
package distuv
```

```

import (
"math"
"sort"
"testing"

```

```

"golang.org/x/exp/rand"
)

```

```

func TestTriangleConstraint(t *testing.T) {
defer func() {
if r := recover(); r == nil {
t.Errorf("The constraints were violated, but not caught")
}
}()
}

```

```

// test b < a
NewTriangle(3, 1, 2, nil)
// test c > b
NewTriangle(1, 2, 3, nil)
}

```

```

func TestTriangle(t *testing.T) {
src := rand.New(rand.NewSource(1))
for i, test := range []struct {
a, b, c float64
}{

```



```

{
 a: 0.0,
 b: 1.0,
 c: 0.5,
},
{
 a: 0.1,
 b: 0.3,
 c: 0.2,
},
{
 a: 1.0,
 b: 2.0,
 c: 1.5,
},
{
 a: 0.0,
 b: 1.0,
 c: 0.0,
},
] {
 f := NewTriangle(test.a, test.b, test.c, src)
 const (
 tol = 1e-2
 n = 1e6
)
 x := make([]float64, n)
 generateSamples(x, f)
 sort.Float64s(x)

 checkMean(t, i, x, f, tol)
 checkVarAndStd(t, i,
x, f, tol)
 checkEntropy(t, i, x, f, tol)
 checkExKurtosis(t, i, x, f, tol)
 checkSkewness(t, i, x, f, 5e-2)
 checkMedian(t, i, x, f, tol)
 checkQuantileCDFSurvival(t, i, x, f, tol)
 checkProbContinuous(t, i, x, f, 1e-10)
 checkProbQuantContinuous(t, i, x, f, tol)
}
}

func TestTriangleProb(t *testing.T) {
 pts := []univariateProbPoint{
 {
 loc: 0.5,
 prob: 0,
 }
 }
}

```

```

 cumProb: 0,
 logProb: math.Inf(-1),
 },
 {
 loc: 1,
 prob: 0,
 cumProb: 0,
 logProb: math.Inf(-1),
 },
 {
 loc: 2,
 prob: 1.0,
 cumProb: 0.5,
 logProb: 0,
 },
 {
 loc: 3,
 prob: 0,
 cumProb: 1,
 logProb: math.Inf(-1),
 },
}
testDistributionProbs(t, NewTriangle(1, 3, 2, nil), "Standard 1,2,3 Triangle", pts)
}
graph{{{Str{Str}}Str}}}
graph{{NO}}
// SPDX-License-Identifier: Unlicense OR MIT

// Package profiles provides access to rendering
// profiles.
package profile

import (
 "gioui.org/internal/opconst"
 "gioui.org/io/event"
 "gioui.org/op"
)

// Op registers a handler for receiving
// Events.
type Op struct {
 Key event.Key
}

// Event contains profile data from a single
// rendered frame.
type Event struct {
 // Timings. Very likely to change.

```

```

Timings string
}

func (p Op) Add(o *op.Ops) {
 data := o.Write(opconst.TypeProfileLen, p.Key)
 data[0] = byte(opconst.TypeProfile)
}

func (p Event) ImplementsEvent() {}
graph{St5{St5{St1}{St5{St1}St1{St1}St1}}
graph{{{stricc}{stricm}}stricc}{stricc}{stricm}}
graph{{diGrap}{diGrap}{diGrap}diGra{{diGrap}}{diGrap}{diGrap}{diGrap}}
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package distmv

import (
 "math"
 "testing"

 "gonum.org/v1/gonum/floats"
 "gonum.org/v1/gonum/mat"
 "gonum.org/v1/gonum/stat"
)

type prober interface {
 Prob(x []float64) float64
 LogProb(x []float64) float64
}

type probCase struct {
 dist prober
 loc []float64
 logProb float64
}

func testProbability(t *testing.T, cases []probCase) {
 for _, test := range cases {
 logProb := test.dist.LogProb(test.loc)
 if math.Abs(logProb-test.logProb) > 1e-14 {
 t.Errorf("LogProb mismatch: want: %v, got: %v", test.logProb, logProb)
 }
 prob := test.dist.Prob(test.loc)
 if math.Abs(prob-math.Exp(test.logProb)) > 1e-14 {
 t.Errorf("Prob mismatch: want: %v, got: %v", math.Exp(test.logProb), prob)
 }
 }
}

```

```

}
}

func generateSamples(x *mat.Dense, r Rander) {
 n, _ := x.Dims()
 for i := 0; i < n; i++ {
 r.Rand(x.RawRowView(i))
 }
}

type
 Meaner interface {
 Mean([]float64) []float64
 }

func checkMean(t *testing.T, cas int, x *mat.Dense, m Meaner, tol float64) {
 mean := m.Mean(nil)

 // Check that the answer is identical when using nil or non-nil.
 mean2 := make([]float64, len(mean))
 m.Mean(mean2)
 if !floats.Equal(mean, mean2) {
 t.Errorf("Mean mismatch when providing nil and slice. Case %v", cas)
 }

 // Check that the mean matches the samples.
 r, _ := x.Dims()
 col := make([]float64, r)
 meanEst := make([]float64, len(mean))
 for i := range meanEst {
 meanEst[i] = stat.Mean(mat.Col(col, i, x), nil)
 }
 if !floats.EqualApprox(mean, meanEst, tol) {
 t.Errorf("Returned mean and sample mean mismatch. Case %v. Empirical %v, returned %v", cas, meanEst, mean)
 }
}

type Cover interface {
 CovarianceMatrix(*mat.SymDense)
}

func checkCov(t *testing.T, cas int, x *mat.Dense, c Cover, tol float64) {
 var cov mat.SymDense
 c.CovarianceMatrix(&cov)
 n := cov.Symmetric()
 cov2 := mat.NewSymDense(n, nil)
 c.CovarianceMatrix(cov2)
 if

```

```

!mat.Equal(&cov, cov2) {
 t.Errorf("Cov mismatch when providing nil and matrix. Case %v", cas)
}
var cov3 mat.SymDense
c.CovarianceMatrix(&cov3)
if !mat.Equal(&cov, &cov3) {
 t.Errorf("Cov mismatch when providing zero matrix. Case %v", cas)
}

// Check that the covariance matrix matches the samples
var covEst mat.SymDense
stat.CovarianceMatrix(&covEst, x, nil)
if !mat.EqualApprox(&covEst, &cov, tol) {
 t.Errorf("Return cov and sample cov mismatch. Cas %v.\nGot:\n%0.4v\nWant:\n%0.4v", cas, mat.Formatted(&cov),
mat.Formatted(&covEst))
}
}
graph{{no9{{no9{{no6}}no6}}}
graph{{{{st_{{st_}}}}}
graph{{DiG_{{DiG_{{DiG_{{DiG_{{DiG_{{DiG_}}
graph{NoR{NoR}}
graph{su_{{su_}}su_{{su_}}
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// license that can be found in the LICENSE file.

package topo

import (
 "gonum.org/v1/gonum/graph"
 "gonum.org/v1/gonum/graph/internal/linear"
 "gonum.org/v1/gonum/graph/internal/set"
)

// UndirectedCyclesIn returns a set of cycles that forms a cycle basis in the graph g.
// Any cycle in g can be constructed as a symmetric difference of its elements.
func UndirectedCyclesIn(g graph.Undirected) [][]graph.Node {
 // From "An algorithm for finding a fundamental set of cycles of a graph"
 // https://doi.org/10.1145/363219.363232

 var cycles [][]graph.Node
 done := make(set.Int64s)
 var tree linear.NodeStack
 nodes := g.Nodes()
 for nodes.Next() {
 n := nodes.Node()
 id := n.ID()
 if done.Has(id) {

```

```

 continue
}
done.Add(id)

tree = tree[:0]
tree.Push(n)
from := sets{id: set.Int64s{}}
to := map[int64]graph.Node{id: n}

for tree.Len() != 0 {
 u := tree.Pop()
 uid
:= u.ID()
 adj := from[uid]
 for _, v := range graph.NodesOf(g.From(uid)) {
 vid := v.ID()
 switch {
 case uid == vid:
 cycles = append(cycles, []graph.Node{u})
 case !from.has(vid):
 done.Add(vid)
 to[vid] = u
 tree.Push(v)
 from.add(uid, vid)
 case !adj.Has(vid):
 c := []graph.Node{v, u}
 adj := from[vid]
 p := to[uid]
 for !adj.Has(p.ID()) {
 c = append(c, p)
 p = to[p.ID()]
 }
 c = append(c, p, c[0])
 cycles = append(cycles, c)
 adj.Add(uid)
 }
 }
}

return cycles
}

type sets map[int64]set.Int64s

func (s sets) add(uid, vid int64) {
 e, ok := s[vid]
 if !ok {

```

```
e = make(set.Int64s)
s[vid] = e
}
e.Add(uid)
}

func (s sets) has(uid int64) bool {
_, ok := s[uid]
return ok
}

module gonum.org/v1/gonum

go 1.12

require (
 golang.org/x/exp v0.0.0-20190125153040-c74c464bbbf2
 golang.org/x/tools v0.0.0-20190206041539-40960b6deb8e
 gonum.org/v1/netlib v0.0.0-20190313105609-8cb42192e0e0
 gonum.org/v1/plot v0.0.0-20190515093506-e2840ee46a6b
)

graph{
{{{subgb{}subgf}}}}}
graph{{diGrapg}}
graph{dS{dG}{dS{dG}{dS{dG}}dG}{dS{dG}}}
graph{{d{{d{d{d}}d}}d}}
graph{{{GRU{{{GRU{GRR}GRU}{GRU}}GRR}GRU}{GRU}}}
graph{{DiGrap}{{{DiGrap}}}DiGrap}{{{DiGrapr}{{DiGrap}DiGrap}}DiGrap}DiGrap}{{{DiGrap}DiGrap}DiGrap}{{{DiGrap}DiGrap}DiGrap}{{""DiGrap}}}DiGrap}DiGrap}
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package cmplx64

import math "gonum.org/v1/gonum/internal/math32"

// IsInf returns true if either real(x) or imag(x) is an infinity.
func IsInf(x complex64) bool {
if math.IsInf(real(x), 0) || math.IsInf(imag(x), 0) {
return true
}
return false
}

// Inf returns a complex infinity, complex(+Inf, +Inf).
```

```

func Inf() complex64 {
 inf := math.Inf(1)
 return complex(inf, inf)
}
graph{{edg3{{{{{{edg3{{edg3{{edg3}}edg3{{edg3{{edg3}}}}edg5{{edg5{{}}}}}}}}}}}}
/**
git.rwth-aachen.de/acs/public/ontology/owl/owl2go@v1.1.0
git.rwth-aachen.de/acs/public/ontology/owl/saref@v0.0.0-20200525140909-5b44cbefaa17
git.rwth-aachen.de/acs/public/cloud/mas/clonemap@v0.0.0-20201023111149-5c55954d016e
**//

```

```

{{Types "Apache-2.0 MIT"}}

```

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```

package gonum

```

```

import (
 "gonum.org/v1/gonum/blas"
 "gonum.org/v1/gonum/blas/blas64"
)

```

```

// Dpotrs solves a system of n linear equations A*X = B where A is an nn
// symmetric positive definite matrix and B is an nnrhs matrix. The matrix A is
// represented by its Cholesky factorization
// A = U*U if uplo == blas.Upper
// A = L*L if uplo == blas.Lower
// as computed by Dpotrf. On entry, B contains the right-hand side matrix B, on
// return it contains the solution matrix X.

```

```

func (Implementation) Dpotrs(uplo blas.Uplo, n, nrhs int, a []float64, lda int, b []float64, ldb int) {
 switch {
 case uplo != blas.Upper && uplo != blas.Lower:
 panic(badUplo)
 case n < 0:
 panic(nLT0)
 case nrhs < 0:
 panic(nrhsLT0)
 case lda < max(1, n):
 panic(badLdA)
 case ldb < max(1, nrhs):
 panic(badLdB)
 }
}

```



```

}

// Quick return if possible.
if
n == 0 || nrhs == 0 {
 return
}

switch {
case len(a) < (n-1)*lda+n:
 panic(shortA)
case len(b) < (n-1)*ldb+nrhs:
 panic(shortB)
}

bi := blas64.Implementation()

if uplo == blas.Upper {
 // Solve U * U * X = B where U is stored in the upper triangle of A.

 // Solve U * X = B, overwriting B with X.
 bi.Dtrsm(blas.Left, blas.Upper, blas.Trans, blas.NonUnit, n, nrhs, 1, a, lda, b, ldb)
 // Solve U * X = B, overwriting B with X.
 bi.Dtrsm(blas.Left, blas.Upper, blas.NoTrans, blas.NonUnit, n, nrhs, 1, a, lda, b, ldb)
} else {
 // Solve L * L * X = B where L is stored in the lower triangle of A.

 // Solve L * X = B, overwriting B with X.
 bi.Dtrsm(blas.Left, blas.Lower, blas.NoTrans, blas.NonUnit, n, nrhs, 1, a, lda, b, ldb)
 // Solve L * X = B, overwriting B with X.
 bi.Dtrsm(blas.Left, blas.Lower, blas.Trans, blas.NonUnit, n, nrhs, 1, a, lda, b, ldb)
}
}
Graph{{Grap5[]Grap5}Grap5}
graph{stric}
graph{<<TDTTDDTTa>>}
graph{{DiG8{DiG2{DiG2}}DiG8{DiG2}}DiG8}
graph{subGrap{subGrapu}}
graph{{No{No}{No}}}
/** github.com/dropbox/goebp@v0.0.0-20201020203810-72edb057c378 **/
{{Types "GPL-2.0"}}

```

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```
graph{{Digraph_}Digraph_}
graph{{GRAP{GRAP}}GRAP{{{GRAP}GRAP}}GRAP}
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package iterator

import "gonum.org/v1/gonum/graph"

// OrderedEdges implements the graph.Edges and graph.EdgeSlicer interfaces.
// The iteration order of OrderedEdges is the order of edges passed to
// NewEdgeIterator.
type OrderedEdges struct {
 idx int
 edges []graph.Edge
}

// NewOrderedEdges returns an OrderedEdges initialized with the provided edges.
func NewOrderedEdges(edges []graph.Edge) *OrderedEdges {
 return &OrderedEdges{idx: -1, edges: edges}
}

// Len returns the remaining number of edges to be iterated over.
func (e *OrderedEdges) Len() int {
 if e.idx >= len(e.edges) {
 return 0
 }
 if e.idx <= 0 {
 return len(e.edges)
 }
 return len(e.edges[e.idx:])
}

// Next returns whether the next call of Edge will return a valid edge.
func (e *OrderedEdges) Next() bool {
 if uint(e.idx)+1 < uint(len(e.edges)) {
 e.idx++
 return true
 }
 e.idx = len(e.edges)
 return false
}
```

```

}

// Edge returns the current edge of the iterator. Next must have been
// called prior to a call to Edge.
func (e *OrderedEdges) Edge() graph.Edge {
 if e.idx >= len(e.edges) || e.idx < 0 {
 return nil
 }
 return e.edges[e.idx]
}

// EdgeSlice returns all the remaining edges in the iterator and advances
// the iterator.
func (e *OrderedEdges) EdgeSlice() []graph.Edge {
 if e.idx >= len(e.edges) {
 return nil
 }
 idx := e.idx
 if idx == -1 {
 idx = 0
 }
 e.idx = len(e.edges)
 return e.edges[idx:]
}

// Reset returns the iterator to its initial state.
func (e *OrderedEdges) Reset() {
 e.idx = -1
}

// OrderedWeightedEdges implements the graph.Edges and graph.EdgeSlicer interfaces.
// The iteration order of OrderedWeightedEdges is the order of edges passed to
// NewEdgeIterator.
type OrderedWeightedEdges struct {
 idx int
 edges []graph.WeightedEdge
}

// NewOrderedWeightedEdges returns an OrderedWeightedEdges initialized with
// the provided edges.
func NewOrderedWeightedEdges(edges []graph.WeightedEdge) *OrderedWeightedEdges {
 return &OrderedWeightedEdges{idx: -1, edges: edges}
}

// Len returns the remaining number of edges to be iterated over.
func (e *OrderedWeightedEdges) Len() int {
 if e.idx >= len(e.edges) {
 return 0
 }

```

```

}
if e.idx <= 0 {
 return len(e.edges)
}
return len(e.edges[e.idx:])
}

// Next returns whether the next call of WeightedEdge will return a valid edge.
func (e *OrderedWeightedEdges) Next() bool {
 if uint(e.idx)+1 < uint(len(e.edges)) {
 e.idx++
 return true
 }
 e.idx = len(e.edges)
 return false
}

// WeightedEdge returns the current edge of the iterator. Next must have been
// called prior to a call to WeightedEdge.
func (e *OrderedWeightedEdges) WeightedEdge() graph.WeightedEdge {
 if e.idx >= len(e.edges) || e.idx < 0 {
 return nil
 }
 return e.edges[e.idx]
}

// WeightedEdgeSlice returns all the remaining edges in the iterator and advances
// the iterator.
func (e *OrderedWeightedEdges)
WeightedEdgeSlice() []graph.WeightedEdge {
 if e.idx >= len(e.edges) {
 return nil
 }
 idx := e.idx
 if idx == -1 {
 idx = 0
 }
 e.idx = len(e.edges)
 return e.edges[idx:]
}

// Reset returns the iterator to its initial state.
func (e *OrderedWeightedEdges) Reset() {
 e.idx = -1
}
graph{{SUB7{SUB7}SUB7{SUB7}SUB2}}
graph{{noc}noc{{{noc}noc}noc}}noc}

```

```

Graph{{subgraS{ }subgraM}}
graph{.5{.5{.5{.5}.5{.5{.5{.5}.5}}}}}
graph{{{{Subgi{Subgc}}Subgi}Subgi{Subgc}{Subgc}}}
graph{{{stri1{{stri5}}}}}
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package fd_test

import (
 "fmt"
 "math"

 "gonum.org/v1/gonum/diff/fd"
 "gonum.org/v1/gonum/mat"
)

func ExampleDerivative() {
 f := func(x float64) float64 {
 return math.Sin(x)
 }
 // Compute the first derivative of f at 0 using the default settings.
 fmt.Println("f'(0) ", fd.Derivative(f, 0, nil))
 // Compute the first derivative of f at 0 using the forward approximation
 // with a custom step size.
 df := fd.Derivative(f, 0, &fd.Settings{
 Formula: fd.Forward,
 Step: 1e-3,
 })
 fmt.Println("f'(0) ", df)

 f = func(x float64) float64 {
 return math.Pow(math.Cos(x), 3)
 }
 // Compute the second derivative of f at 0 using
 // the centered approximation, concurrent evaluation,
 // and a known function value at x.
 df = fd.Derivative(f, 0, &fd.Settings{
 Formula: fd.Central2nd,
 Concurrent: true,
 OriginKnown: true,
 OriginValue: f(0),
 })
 fmt.Println("f''(0) ", df)

 // Output:

```

```

// f'(0) 1
// f'(0) 0.9999998333333416
// f''(0) -2.999999981767587
}

func ExampleJacobian() {
f := func(dst, x []float64) {
 dst[0] = x[0] + 1
 dst[1] = 5 * x[2]
 dst[2] = 4*x[1]*x[1] - 2*x[2]
 dst[3] = x[2] * math.Sin(x[0])
}
jac := mat.NewDense(4, 3, nil)
fd.Jacobian(jac, f, []float64{1, 2, 3}, &fd.JacobianSettings{
 Formula: fd.Central,
 Concurrent: true,
})
fmt.Printf("J %.6v\n", mat.Formatted(jac, mat.Prefix(" ")))

// Output:
// J 1 0 0
// 0 0 5
// 0 16 -2
// 1.62091 0 0.841471
}

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```

```
package topo
```

```

// batageljZaversnikGraph is the example graph from
// figure 1 of http://arxiv.org/abs/cs/0310049v1
var batageljZaversnikGraph = []intset{
 0: nil,

 1: linksTo(2, 3),
 2: linksTo(4),
 3: linksTo(4),
 4: linksTo(5),
 5: nil,

 6: linksTo(7, 8, 14),
 7: linksTo(8, 11, 12, 14),
 8: linksTo(14),
 9: linksTo(11),
 10: linksTo(11),
 11: linksTo(12),

```

```

12: linksTo(18),
13: linksTo(14, 15),
14: linksTo(15, 17),
15: linksTo(16, 17),
16: nil,
17: linksTo(18, 19, 20),
18: linksTo(19, 20),
19: linksTo(20),
20: nil,
}

// intset is an integer set.
type intset map[int64]struct{}

func linksTo(i ...int64) intset {
 if len(i) == 0 {
 return nil
 }
 s := make(intset)
 for _, v := range i {
 s[v] = struct{}{}
 }
 return s
}

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package testlapack

import (
 "math"
 "testing"

 "golang.org/x/exp/rand"
)

type Dcombssqr interface {
 Dcombssq(scale1, ssq1, scale2, ssq2 float64) (scale, ssq float64)
}

func DcombssqTest(t *testing.T, impl Dcombssqr) {
 const tol = 1e-15

 rnd := rand.New(rand.NewSource(1))
 for i := 0; i < 10; i++ {
 // Generate random, non-negative input.
 scale1 := rnd.Float64()

```

```

ssq1 := rnd.Float64()
scale2 := rnd.Float64()
ssq2 := rnd.Float64()
switch i {
case 0:
 scale1 = 0
case 1:
 scale2 = 0
case 2:
 scale1, scale2 = 0, 0
}

// Compute scale and ssq such that
// $scale^2 * ssq := scale1^2 * ssq1 + scale2^2 * ssq2$
scale, ssq := impl.Dcombssq(scale1, ssq1, scale2, ssq2)

// Compute the expected result in a non-sophisticated way and
// compare against the result we got.
want := scale1*scale1*ssq1
+ scale2*scale2*ssq2
got := scale * scale * ssq
if math.Abs(want-got) >= tol {
 t.Errorf("Case %v: unexpected result; got %v, want %v", i, got, want)
}
}
}

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package layout

import (
 "gonum.org/v1/gonum/graph"
 "gonum.org/v1/gonum/graph/path"
 "gonum.org/v1/gonum/mat"
 "gonum.org/v1/gonum/spatial/r2"
 "gonum.org/v1/gonum/stat/mds"
)

// IsomapR2 implements a graph layout algorithm based on the Isomap
// non-linear dimensionality reduction method. Coordinates of nodes
// are computed by finding a Torgerson multidimensional scaling of
// the shortest path distances between all pairs of node in the graph.
// The all pair shortest path distances are calculated using the
// Floyd-Warshall algorithm and so IsomapR2 will not scale to large
// graphs. Graphs with more than one connected component cannot be
// laid out by IsomapR2.

```



```

type IsomapR2 struct{}

// Update is the IsomapR2 spatial graph update function.
func (IsomapR2) Update(g graph.Graph, layout LayoutR2) bool {
 nodes := graph.NodesOf(g.Nodes())
 v
 := isomap(g, nodes, 2)
 if v == nil {
 return false
 }

 // FIXME(kortschak): The Layout types do not have the capacity to
 // be cleared in the current API. Is this a problem? I don't know
 // at this stage. It might be if the layout is reused between graphs.
 // Someone may do this.

 for i, n := range nodes {
 layout.SetCoord2(n.ID(), r2.Vec{X: v.At(i, 0), Y: v.At(i, 1)})
 }
 return false
}

func isomap(g graph.Graph, nodes []graph.Node, dims int) *mat.Dense {
 p, ok := path.FloydWarshall(g)
 if !ok {
 return nil
 }

 dist := mat.NewSymDense(len(nodes), nil)
 for i, u := range nodes {
 for j, v := range nodes {
 dist.SetSym(i, j, p.Weight(u.ID(), v.ID()))
 }
 }
 var v mat.Dense
 k, _ := mds.TorgersonScaling(&v, nil, dist)
 if k < dims {
 return nil
 }

 return &v
}
graph{"\"k\\\"\"k\\\"\"k\\t"}
graph{{{DiGg{{DiGg}}}DiGa{{DiGg}DiGg{{DiGg}}}}}
graph{sub}
// Code generated by "go generate gonum.org/v1/gonum/unit; DO NOT EDIT.

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```

```
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```

```
package unit
```

```
import (
 "errors"
 "fmt"
 "math"
 "unicode/utf8"
)
```

```
// Charge represents an electric charge in Coulombs.
type Charge float64
```

```
const Coulomb Charge = 1
```

```
// Unit converts the Charge to a *Unit
func (ch Charge) Unit() *Unit {
 return New(float64(ch), Dimensions{
 CurrentDim: 1,
 TimeDim: 1,
 })
}
```

```
// Charge allows Charge to implement a Charger interface
func (ch Charge) Charge() Charge {
 return ch
}
```

```
// From converts the unit into the receiver. From returns an
// error if there is a mismatch in dimension
func (ch *Charge) From(u Uniter) error {
 if !DimensionsMatch(u, Coulomb) {
 *ch = Charge(math.NaN())
 return errors.New("Dimension mismatch")
 }
 *ch = Charge(u.Unit().Value())
 return nil
}
```

```
func (ch Charge) Format(fs fmt.State, c rune)
{
 switch c {
 case 'v':
 if fs.Flag('#') {
 fmt.Fprintf(fs, "%T(%v)", ch, float64(ch))
 }
 return
 }
}
```

```

}
fallthrough
case 'e', 'E', 'f', 'F', 'g', 'G':
 p, pOk := fs.Precision()
 w, wOk := fs.Width()
 const unit = " C"
 switch {
 case pOk && wOk:
 fmt.Fprintf(fs, "%*.*"+string(c), pos(w-utf8.RuneCount([]byte(unit))), p, float64(ch))
 case pOk:
 fmt.Fprintf(fs, "%*.*"+string(c), p, float64(ch))
 case wOk:
 fmt.Fprintf(fs, "%*"+string(c), pos(w-utf8.RuneCount([]byte(unit))), float64(ch))
 default:
 fmt.Fprintf(fs, "%"+string(c), float64(ch))
 }
 fmt.Fprint(fs, unit)
default:
 fmt.Fprintf(fs, "%%!%c(%T=%g C)", c, ch, float64(ch))
}
}

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// Gonum is a set of packages designed to make writing numerical and
// scientific algorithms productive, performant, and scalable.
//
// Gonum contains libraries for matrices and linear algebra; statistics,
// probability distributions, and sampling; tools for function
// differentiation, integration, and optimization; network creation and
// analysis; and more.
package gonum // import "gonum.org/v1/gonum"
graph{
{{{No_}No_}No_}No_}
graph{SUBGR}SUBGR{SUBGR}
graph{diG{diG{diG}}}
graph{E{{E}E}}
Graph{
{{{S}S}S}{S}S{S}S{S}S}
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package cmplx64

```

```

import math "gonum.org/v1/gonum/internal/math32"

// IsNaN returns true if either real(x) or imag(x) is NaN
// and neither is an infinity.
func IsNaN(x complex64) bool {
 switch {
 case math.IsInf(real(x), 0) || math.IsInf(imag(x), 0):
 return false
 case math.IsNaN(real(x)) || math.IsNaN(imag(x)):
 return true
 }
 return false
}

// NaN returns a complex ``not-a-number" value.
func NaN() complex64 {
 nan := math.NaN()
 return complex(nan, nan)
}
graph{<R><T><R><T><T><R>}
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package c128

import (
 "fmt"
 "testing"
)

func BenchmarkDotUnitary(t *testing.B) {
 for _, test := range []struct {
 name string
 f func(x, y []complex128) complex128
 }{
 {"DotcUnitary", DotcUnitary},
 {"DotuUnitary", DotuUnitary},
 } {
 for _, v := range []int64{1, 2, 3, 4, 5, 10, 100, 1e3, 5e3, 1e4, 5e4} {
 t.Run(fmt.Sprintf("%s-%d", test.name, v), func(b *testing.B) {
 x, y := x[:v], y[:v]
 b.SetBytes(256 * v)
 for i := 0; i < b.N; i++ {
 benchSink = test.f(x, y)
 }
 })
 }
 }
}

```

```

}
}

func BenchmarkDotInc(t *testing.B) {
for _, test := range []struct {
 name string
 f func(x, y []complex128, n, incX, incY, ix, iy uintptr) complex128
}{
 {"DotcInc", DotcInc},
 {"DotuInc", DotuInc},
} {
for _, ln := range []int{1, 2, 3, 4, 5, 10, 100, 1e3, 5e3, 1e4, 5e4} {
 for _, inc := range []int{1,
2, 4, 10, -1, -2, -4, -10} {
 t.Run(fmt.Sprintf("%s-%d-inc%d", test.name, ln, inc), func(b *testing.B) {
 b.SetBytes(int64(256 * ln))
 var idx int
 if inc < 0 {
 idx = (-ln + 1) * inc
 }
 for i := 0; i < b.N; i++ {
 benchSink = test.f(x, y, uintptr(ln),
 uintptr(inc), uintptr(inc),
 uintptr(idx), uintptr(idx))
 }
 })
 }
}
}
}

graph{strh{{{strh{{{strh{{{strh{{{strd}}}}}{{strh{{{strd}}}}}{{{strd}}}}}{{{strd}}}}}{{{strd}}}}}
graph{{{G_ G_}G_{G_{G_ G_}G_ G_}G_}}
graph{nw:nw:nw K:nw nw:nw nw:nw K:nw nw:nw nw:nw K:nw nw:nw}
graph{{{SUBGRAPo}}}
graph{{{St}}}}
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package testlapack

import (
 "math"
 "testing"

 "golang.org/x/exp/rand"

 "gonum.org/v1/gonum/floats"

```

)

```
type Dorgqrer interface {
 Dorg2rer
 Dorgqr(m, n, k int, a []float64, lda int, tau, work []float64, lwork int)
}
```

```
func DorgqrTest(t *testing.T, impl Dorgqrer) {
 rnd := rand.New(rand.NewSource(1))
 // TODO(btracey): Base tests off of nb and nx.
 for _, test := range []struct{ m, n, k, lda int }{
 {10, 10, 10, 0},
 {10, 10, 10, 20},
 {30, 10, 10, 0},
 {30, 20, 10, 20},

 {100, 100, 100, 0},
 {100, 100, 50, 0},
 {130, 100, 100, 0},
 {130, 100, 50, 0},
 {100, 100, 100, 150},
 {100, 100, 50, 150},
 {130, 100, 100, 150},
 {130, 100, 50, 150},

 {200, 200, 200, 0},
 {200, 200, 150, 0},
 {230, 200, 200, 0},
 {230, 200, 150, 0},
 {200, 200, 200, 250},
 {200, 200, 150, 250},
 {230, 200, 200, 250},
 {230, 200, 150,
250},
 } {
 m := test.m
 n := test.n
 k := test.k
 lda := test.lda
 if lda == 0 {
 lda = n
 }
 a := make([]float64, m*lda)
 for i := range a {
 a[i] = rnd.Float64()
 }
 work := make([]float64, 1)
 tau := make([]float64, n)
```

```

for i := range tau {
 tau[i] = math.NaN()
}
// Compute QR factorization.
impl.Dgeqrf(m, n, a, lda, tau, work, -1)
work = make([]float64, int(work[0]))
impl.Dgeqrf(m, n, a, lda, tau, work, len(work))

aUnblocked := make([]float64, len(a))
copy(aUnblocked, a)
for i := range work {
 work[i] = math.NaN()
}
impl.Dorg2r(m, n, k, aUnblocked, lda, tau, work)
// make sure work isn't used before initialized
for i := range work {
 work[i] = math.NaN()
}
impl.Dorgqr(m, n, k, a, lda, tau, work, len(work))
if !floats.EqualApprox(a, aUnblocked, 1e-10) {
 t.Errorf("Q Mismatch. m = %d, n = %d, k = %d, lda = %d", m, n, k, lda)
}
}
}
}
graph{diV{{diY}}}
graph{Dig_{Dig_}}
graph{subF}
// Copyright 2015 The Gonum Authors. All rights reserved.
// Use of this source code is governed by a BSD-style
// license that can be found in the LICENSE file.

package testlapack

import (
 "testing"

 "golang.org/x/exp/rand"

 "gonum.org/v1/gonum/blas"
 "gonum.org/v1/gonum/blas/blas64"
 "gonum.org/v1/gonum/floats"
)

type Dpotrfer interface {
 Dpotrf(ul blas.Uplo, n int, a []float64, lda int) (ok bool)
}

func DpotrfTest(t *testing.T, impl Dpotrfer) {

```

```

const tol = 1e-13
rnd := rand.New(rand.NewSource(1))
bi := blas64.Implementation()
for _, uplo := range []blas.Uplo{blas.Upper, blas.Lower} {
 for tc, test := range []struct {
 n int
 lda int
 }{
 {1, 0},
 {2, 0},
 {3, 0},
 {10, 0},
 {30, 0},
 {63, 0},
 {65, 0},
 {127, 0},
 {129, 0},
 {500, 0},
 {1, 10},
 {2, 10},
 {3, 10},
 {10, 20},
 {30, 50},
 {63, 100},
 {65, 100},
 {127, 200},
 {129, 200},
 {500, 600},
 } {
 n := test.n

 // Random diagonal matrix D with positive entries.
 d
:= make([]float64, n)
 Dlatm1(d, 4, 10000, false, 1, rnd)

 // Construct a positive definite matrix A as
 // A = U * D * U
 // where U is a random orthogonal matrix.
 lda := test.lda
 if lda == 0 {
 lda = n
 }
 a := make([]float64, n*lda)
 Dlagsy(n, 0, d, a, lda, rnd, make([]float64, 2*n))

 aCopy := make([]float64, len(a))
 copy(aCopy, a)
 }
}

```



```

ok := impl.Dpotrf(uplo, n, a, lda)
if !ok {
 t.Errorf("Case %v: unexpected failure for positive definite matrix", tc)
 continue
}

switch uplo {
case blas.Upper:
 for i := 0; i < n; i++ {
 for j := 0; j < i; j++ {
 a[i*lda+j] = 0
 }
 }
case blas.Lower:
 for i := 0; i < n; i++ {
 for j := i + 1; j < n; j++ {
 a[i*lda+j] = 0
 }
 }
default:
 panic("bad uplo")
}

ans := make([]float64, len(a))
switch uplo {
case blas.Upper:
 // Multiply U * U.
 bi.Dsyrk(uplo, blas.Trans, n, n, 1, a, lda, 0, ans, lda)
case blas.Lower:
 // Multiply L *
 L.
 bi.Dsyrk(uplo, blas.NoTrans, n, n, 1, a, lda, 0, ans, lda)
}

match := true
switch uplo {
case blas.Upper:
 for i := 0; i < n; i++ {
 for j := i; j < n; j++ {
 if !floats.EqualWithinAbsOrRel(ans[i*lda+j], aCopy[i*lda+j], tol, tol) {
 match = false
 }
 }
 }
case blas.Lower:
 for i := 0; i < n; i++ {
 for j := 0; j <= i; j++ {

```

```

 if !floats.EqualWithinAbsOrRel(ans[i*lda+j], aCopy[i*lda+j], tol, tol) {
 match = false
 }
}
}
}
if !match {
 t.Errorf("Case %v (uplo=%v,n=%v,lda=%v): unexpected result", tc, uplo, n, lda)
}

// Make one element of D negative so that A is not
// positive definite, and check that Dpotrf fails.
d[0] *= -1
Dlagsy(n, 0, d, a, lda, rnd, make([]float64, 2*n))
ok = impl.Dpotrf(uplo, n, a, lda)
if ok {
 t.Errorf("Case %v: unexpected success for not positive definite matrix", tc)
}
}
}
graph{{{edge8{{{edge5}}}edge5}edge5}edge5{edge5}}}
graph{{Nod{NOr{{{NOr}{NOr}Nod{NOr}}}{{NOr}{Nod{NOr}}}}}
// SPDX-License-Identifier: Unlicense OR MIT

package material

import (
 "gioui.org/layout"
 "gioui.org/text"
 "gioui.org/unit"
 "gioui.org/widget"
)

type CheckBox struct {
 checkable
}

func (t *Theme) CheckBox(label string) CheckBox {
 return CheckBox{
 checkable{
 Label: label,
 Color: t.Color.Text,
 IconColor: t.Color.Primary,
 Font: text.Font{
 Size: t.TextSize.Scale(14.0 / 16.0),
 },
 Size: unit.Dp(26),
 }
 }
}

```

```

shaper: t.Shaper,
checkedStateIcon: t.checkBoxCheckedIcon,
uncheckedStateIcon: t.checkBoxUncheckedIcon,
},
}
}

func (c CheckBox) Layout(gtx *layout.Context, checkBox *widget.CheckBox) {
c.layout(gtx, checkBox.Checked(gtx))
checkBox.Layout(gtx)
}
graph{StR{StR}StR{StR}}
graph{DiG{DiG{DiG}}DiG}
graph{{{grap_{{{grap_}}}grap_{{grap_}}}grap_}}
// Code generated by "go generate gonum.org/v1/gonum/unit/constant; DO NOT EDIT.

```

```

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// license that can be found in the LICENSE file.

```

```
package constant
```

```

import (
 "fmt"
 "testing"
)

```

```

func TestElectricConstantFormat(t *testing.T) {
 for _, test := range []struct {
 format string
 want string
 }{
 {"%v", "8.854187817620389e-12 A^2 s^4 kg^-1 m^-3"},
 {"%.1v", "9e-12 A^2 s^4 kg^-1 m^-3"},
 {"%50.1v", " 9e-12 A^2 s^4 kg^-1 m^-3"},
 {"%50v", " 8.854187817620389e-12 A^2 s^4 kg^-1 m^-3"},
 {"%1v", "8.854187817620389e-12 A^2 s^4 kg^-1 m^-3"},
 {"%#v", "constant.electricConstantUnits(8.854187817620389e-12)"},
 {"%s", "%!s(constant.electricConstantUnits=8.854187817620389e-12 A^2 s^4 kg^-1 m^-3)"},
 } {
 got := fmt.Sprintf(test.format, ElectricConstant)
 if got != test.want {
 t.Errorf("Format %q: got: %q want: %q", test.format, got, test.want)
 }
 }
}

```

```

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```

```

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package gonum

import "gonum.org/v1/gonum/blas"

// Dlacpy copies the elements of A specified by uplo into B. Uplo can specify
// a triangular portion with blas.Upper or blas.Lower, or can specify all of the
// element with blas.All.
//
// Dlacpy is an internal routine. It is exported for testing purposes.
func (impl Implementation) Dlacpy(uplo blas.Uplo, m, n int, a []float64, lda int, b []float64, ldb int) {
 switch {
 case uplo != blas.Upper && uplo != blas.Lower && uplo != blas.All:
 panic(badUplo)
 case m < 0:
 panic(mLT0)
 case n < 0:
 panic(nLT0)
 case lda < max(1, n):
 panic(badLdA)
 case ldb < max(1, n):
 panic(badLdB)
 }

 if m == 0 || n == 0 {
 return
 }

 switch {
 case len(a) < (m-1)*lda+n:
 panic(shortA)
 case len(b) < (m-1)*ldb+n:
 panic(shortB)
 }

 switch uplo {
 case blas.Upper:
 for i := 0; i < m; i++ {
 for j := i; j < n; j++ {
 b[i*ldb+j] = a[i*lda+j]
 }
 }
 case blas.Lower:
 for i := 0; i < m; i++ {
 for j := 0; j < min(i+1, n); j++ {
 b[i*ldb+j] = a[i*lda+j]
 }
 }
 }
}

```

```

 }
}
case blas.All:
 for i := 0; i < m; i++ {
 for j := 0; j < n; j++ {
 b[i*ldb+j] = a[i*lda+j]
 }
 }
}
}
}

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// license that can be found in the LICENSE file.

// +build !noasm,!appengine,!safe

package c128

// AxyUnitary is
// for i, v := range x {
// y[i] += alpha * v
// }
func AxyUnitary(alpha complex128, x, y []complex128)

// AxyUnitaryTo is
// for i, v := range x {
// dst[i] = alpha*v + y[i]
// }
func AxyUnitaryTo(dst []complex128, alpha complex128, x, y []complex128)

// AxyInc is
// for i := 0; i < int(n); i++ {
// y[iy] += alpha * x[ix]
// ix += incX
// iy += incY
// }
func AxyInc(alpha complex128, x, y []complex128, n, incX, incY, ix, iy uintptr)

// AxyIncTo is
// for i := 0; i < int(n); i++ {
// dst[idst] = alpha*x[ix] + y[iy]
// ix += incX
// iy += incY
// idst += incDst
// }
func AxyIncTo(dst []complex128, incDst, idst uintptr, alpha complex128, x, y []complex128, n, incX, incY, ix, iy
uintptr)

```

```

// DscalUnitary is
// for i, v := range
x {
// x[i] = complex(real(v)*alpha, imag(v)*alpha)
// }
func DscalUnitary(alpha float64, x []complex128)

// DscalInc is
// var ix uintptr
// for i := 0; i < int(n); i++ {
// x[ix] = complex(real(x[ix])*alpha, imag(x[ix])*alpha)
// ix += inc
// }
func DscalInc(alpha float64, x []complex128, n, inc uintptr)

// ScalInc is
// var ix uintptr
// for i := 0; i < int(n); i++ {
// x[ix] *= alpha
// ix += incX
// }
func ScalInc(alpha complex128, x []complex128, n, inc uintptr)

// ScalUnitary is
// for i := range x {
// x[i] *= alpha
// }
func ScalUnitary(alpha complex128, x []complex128)

// DotcUnitary is
// for i, v := range x {
// sum += y[i] * cmplx.Conj(v)
// }
// return sum
func DotcUnitary(x, y []complex128) (sum complex128)

// DotcInc is
// for i := 0; i < int(n); i++ {
// sum += y[iy] * cmplx.Conj(x[ix])
// ix += incX
// iy += incY
// }
// return sum
func DotcInc(x, y []complex128, n, incX, incY, ix, iy uintptr) (sum complex128)

// DotuUnitary is
//

```

```

for i, v := range x {
// sum += y[i] * v
// }
// return sum
func DotuUnitary(x, y []complex128) (sum complex128)

// DotuInc is
// for i := 0; i < int(n); i++ {
// sum += y[iy] * x[ix]
// ix += incX
// iy += incY
// }
// return sum
func DotuInc(x, y []complex128, n, incX, incY, ix, iy uintptr) (sum complex128)
graph TD
 s2["s2{{s4 s2{{s4 s5}}s5}}"]
 A["A[e=\"\\"]"]
 A --> s2
}
// Copyright 2017 The Gonum Authors. All rights reserved.
// Use of this source code is governed by a BSD-style
// license that can be found in the LICENSE file.

// Package mathext implements special math functions not implemented by the
// Go standard library.
package mathext // import "gonum.org/v1/gonum/mathext"
graph TD
 Ed2[Ed2] --> Ed3[Ed3]
 Ed3 --> Ed4[Ed4]
 Ed4 --> Ed5[Ed5]
 Ed5 --> Ed6[Ed6]
 Ed6 --> Ed7[Ed7]
 Ed7 --> Ed8[Ed8]
 Ed8 --> Ed9[Ed9]
 Ed9 --> Ed10[Ed10]
 Ed10 --> Ed11[Ed11]
 Ed11 --> Ed12[Ed12]
 Ed12 --> Ed13[Ed13]
 Ed13 --> Ed14[Ed14]
 Ed14 --> Ed15[Ed15]
 Ed15 --> Ed16[Ed16]
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 Ed36 --> Ed37[Ed37]
 Ed37 --> Ed38[Ed38]
 Ed38 --> Ed39[Ed39]
 Ed39 --> Ed40[Ed40]
 Ed40 --> Ed41[Ed41]
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 Ed136 --> Ed137[Ed137]
 Ed137 --> Ed138[Ed138]
 Ed138 --> Ed139[Ed139]
 Ed139 --> Ed140[Ed140]
 Ed140 --> Ed141[Ed141]
 Ed141 --> Ed142[Ed142]
 Ed142 --> Ed143[Ed143]
 Ed143 --> Ed144[Ed144]
 Ed144 --> Ed145[Ed145]
 Ed145 --> Ed146[Ed146]
 Ed146 --> Ed147[Ed147]
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 Ed148 --> Ed149[Ed149]
 Ed149 --> Ed150[Ed150]
 Ed150 --> Ed151[Ed151]
 Ed151 --> Ed152[Ed152]
 Ed152 --> Ed153[Ed153]
 Ed153 --> Ed154[Ed154]
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 Ed166 --> Ed167[Ed167]
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 Ed187 --> Ed188[Ed188]
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 Ed197 --> Ed198[Ed198]
 Ed198 --> Ed199[Ed199]
 Ed199 --> Ed200[Ed200]
 Ed200 --> Ed201[Ed201]
 Ed201 --> Ed202[Ed202]
 Ed202 --> Ed203[Ed203]
 Ed203 --> Ed204[Ed204]
 Ed204 --> Ed205[Ed205]
 Ed205 --> Ed206[Ed206]
 Ed206 --> Ed207[Ed207]
 Ed207 --> Ed208[Ed208]
 Ed208 --> Ed209[Ed
```

```

x []complex128
want []complex128
}{
{
alpha: 2 + 5i,
x: nil,
want: nil,
},
{
alpha: 2 + 5i,
x: []complex128{1 + 2i},
want: []complex128{-8 + 9i},
},
{
alpha: 2 + 5i,
x: []complex128{1 + 2i, 3 + 4i},
want: []complex128{-8 + 9i, -14 + 23i},
},
{
alpha: 2 + 5i,
x: []complex128{1 + 2i, 3 + 4i, 5 + 6i},
want: []complex128{-8 + 9i, -14 + 23i, -20 + 37i},
},
{
alpha: 2 + 5i,
x: []complex128{1 + 2i, 3 + 4i, 5 + 6i, 7 + 8i},
want: []complex128{-8 + 9i, -14 + 23i, -20 + 37i, -26 + 51i},
},
{
alpha: 2 + 5i,
x:
[]complex128{1 + 2i, 3 + 4i, 5 + 6i, 7 + 8i, 9 + 10i},
want: []complex128{-8 + 9i, -14 + 23i, -20 + 37i, -26 + 51i, -32 + 65i},
},
{
alpha: 2 + 5i,
x: []complex128{1 + 2i, 3 + 4i, 5 + 6i, 7 + 8i, 9 + 10i, 11 + 12i},
want: []complex128{-8 + 9i, -14 + 23i, -20 + 37i, -26 + 51i, -32 + 65i, -38 + 79i},
},
{
alpha: 2 + 5i,
x: []complex128{1 + 2i, 3 + 4i, 5 + 6i, 7 + 8i, 9 + 10i, 11 + 12i, 13 + 14i},
want: []complex128{-8 + 9i, -14 + 23i, -20 + 37i, -26 + 51i, -32 + 65i, -38 + 79i, -44 + 93i},
},
{
alpha: 2 + 5i,
x: []complex128{1 + 2i, 3 + 4i, 5 + 6i, 7 + 8i, 9 + 10i, 11 + 12i, 13 + 14i, 15 + 16i},
want: []complex128{-8 + 9i, -14 + 23i, -20 + 37i, -26 + 51i, -32 + 65i, -38 + 79i, -44 + 93i, -50 + 107i},

```



```

 },
 {
 alpha: 2 + 5i,
 x: []complex128{1 + 2i, 3 + 4i, 5 + 6i, 7 + 8i, 9 + 10i, 11 + 12i, 13 + 14i, 15 + 16i, 17 + 18i},
 want: []complex128{-8 + 9i, -14 + 23i, -20 + 37i, -26 + 51i, -32 + 65i, -38 + 79i, -44
+ 93i, -50 + 107i, -56 + 121i},
 },
 {
 alpha: 2 + 5i,
 x: []complex128{1 + 2i, 3 + 4i, 5 + 6i, 7 + 8i, 9 + 10i, 11 + 12i, 13 + 14i, 15 + 16i, 17 + 18i, 19 + 20i},
 want: []complex128{-8 + 9i, -14 + 23i, -20 + 37i, -26 + 51i, -32 + 65i, -38 + 79i, -44 + 93i, -50 + 107i, -56 + 121i, -
62 + 135i},
 },
 {
 alpha: 2 + 5i,
 x: []complex128{1 + 2i, 3 + 4i, 5 + 6i, 7 + 8i, 9 + 10i, 11 + 12i, 13 + 14i, 15 + 16i, 17 + 18i, 19 + 20i, 21 + 22i},
 want: []complex128{-8 + 9i, -14 + 23i, -20 + 37i, -26 + 51i, -32 + 65i, -38 + 79i, -44 + 93i, -50 + 107i, -56 + 121i, -
62 + 135i, -68 + 149i},
 },
 {
 alpha: 2 + 5i,
 x: []complex128{1 + 2i, 3 + 4i, 5 + 6i, 7 + 8i, 9 + 10i, 11 + 12i, 13 + 14i, 15 + 16i, 17 + 18i, 19 + 20i, 21 + 22i,
23 + 24i},
 want: []complex128{-8 + 9i, -14 + 23i, -20 + 37i, -26 + 51i, -32 + 65i, -38 + 79i, -44 + 93i, -50 + 107i, -56 + 121i, -
62 + 135i, -68 + 149i, -74 + 163i},
 },
 {
 alpha: 0,
 x: []complex128{1 + 2i, 3 + 4i, 5 + 6i, 7
+ 8i, 9 + 10i, 11 + 12i, 13 + 14i, 15 + 16i, 17 + 18i, 19 + 20i, 21 + 22i, 23 + 24i},
 want: []complex128{0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0},
 },
} {
 n := len(test.x)
 if len(test.want) != n {
 panic("bad test")
 }
 for _, incX := range []int{-3, -1, 1, 2, 4, 7, 10} {
 x := makeZVector(test.x, incX)
 xCopy := make([]complex128, len(x))
 copy(xCopy, x)

 want := makeZVector(test.want, incX)

 impl.Zscal(n, test.alpha, x, incX)

 prefix := fmt.Sprintf("Case %v (n=%v,incX=%v):", tc, n, incX)

```

```

if incX < 0 {
 if !zsame(x, xCopy) {
 t.Errorf("%v: unexpected modification of x\nwant %v\ngot %v", prefix, want, x)
 }
 continue
}
if !zsame(x, want) {
 t.Errorf("%v: unexpected result:\nwant: %v\ngot: %v", prefix, want, x)
}
}
}
}
graph{{di}di}
graph{{stric}stric{stric{stric{stric}}}}
graph{{NODd}NODd{NODd}NODd}
graph{EDGEg{{{EDGEg}EDGEg{EDGEg}{EDGEg}EDGEg{EDGEg}}}}}
 SUBROUTINE ZWRsk(ZRR, ZRI, FNU, KODE, N, YR, YI, NZ, CWR, CWI,
 * TOL, ELIM, ALIM)
C***BEGIN PROLOGUE ZWRsk
C***REFER TO ZBESi,ZBESK
C
C ZWRsk COMPUTES THE I BESSEL FUNCTION FOR RE(Z).GE.0.0 BY
C NORMALIZING THE I FUNCTION RATIOS FROM ZRATI BY THE WRONSKIAN
C
C***ROUTINES CALLED D1MACH,ZBKNU,ZRATI,ZABS
C***END PROLOGUE ZWRsk
C COMPLEX CINU,CSCL,CT,CW,C1,C2,RCT,ST,Y,ZR
 DOUBLE PRECISION ACT, ACW, ALIM, ASCLE, CINUI, CINUR, CSCLR, CTI,
 * CTR, CWI, CWR, C1I, C1R, C2I, C2R, ELIM, FNU, PTI, PTR, RACT,
 * STI, STR, TOL, YI, YR, ZRI, ZRR, ZABS, D1MACH
 INTEGER I, KODE, N, NW, NZ
 DIMENSION YR(N), YI(N), CWR(2), CWI(2)
C-----
C I(FNU+I-1,Z) BY BACKWARD RECURRENCE FOR RATIOS
C Y(I)=I(FNU+I,Z)/I(FNU+I-1,Z) FROM CRATI NORMALIZED BY THE
C WRONSKIAN WITH K(FNU,Z) AND K(FNU+1,Z) FROM CBKNU.
C-----
 NZ = 0
 CALL ZBKNU(ZRR, ZRI, FNU, KODE, 2, CWR, CWI, NW, TOL, ELIM, ALIM)
 IF (NW.NE.0) GO TO 50
 CALL ZRATI(ZRR, ZRI, FNU, N, YR, YI, TOL)
C-----
C RECUR FORWARD ON I(FNU+1,Z) = R(FNU,Z)*I(FNU,Z),
C R(FNU+J-1,Z)=Y(J), J=1,...,N
C-----
 CINUR = 1.0D0
 CINUI = 0.0D0
 IF (KODE.EQ.1) GO TO 10

```

```

 CINUR = DCOS(ZRI)
 CINUI = DSIN(ZRI)
10 CONTINUE
C-----
C ON LOW EXPONENT MACHINES THE K FUNCTIONS CAN BE CLOSE TO BOTH
C THE UNDER AND OVERFLOW LIMITS AND THE NORMALIZATION MUST BE
C SCALED TO PREVENT OVER OR UNDERFLOW. CUOIK HAS DETERMINED THAT
C THE RESULT IS ON SCALE.
C-----
 ACW = ZABS(CMPLX(CWR(2),CWI(2),kind=KIND(1.0D0)))
 ASCLE = 1.0D+3*D1MACH(1)/TOL
 CSCLR
= 1.0D0
 IF (ACW.GT.ASCLE) GO TO 20
 CSCLR = 1.0D0/TOL
 GO TO 30
20 CONTINUE
 ASCLE = 1.0D0/ASCLE
 IF (ACW.LT.ASCLE) GO TO 30
 CSCLR = TOL
30 CONTINUE
 C1R = CWR(1)*CSCLR
 C1I = CWI(1)*CSCLR
 C2R = CWR(2)*CSCLR
 C2I = CWI(2)*CSCLR
 STR = YR(1)
 STI = YI(1)
C-----
C CINU=CINU*(CONJG(CT)/CABS(CT))*(1.0D0/CABS(CT)) PREVENTS
C UNDER- OR OVERFLOW PREMATURELY BY SQUARING CABS(CT)
C-----
 PTR = STR*C1R - STI*C1I
 PTI = STR*C1I + STI*C1R
 PTR = PTR + C2R
 PTI = PTI + C2I
 CTR = ZRR*PTR - ZRI*PTI
 CTI = ZRR*PTI + ZRI*PTR
 ACT = ZABS(CMPLX(CTR,CTI,kind=KIND(1.0D0)))
 RACT = 1.0D0/ACT
 CTR = CTR*RACT
 CTI = -CTI*RACT
 PTR = CINUR*RACT
 PTI = CINUI*RACT
 CINUR = PTR*CTR - PTI*CTI
 CINUI = PTR*CTI + PTI*CTR
 YR(1) = CINUR*CSCLR
 YI(1) = CINUI*CSCLR
 IF (N.EQ.1) RETURN

```

```

DO 40 I=2,N
 PTR = STR*CINUR - STI*CINUI
 CINUI = STR*CINUI + STI*CINUR
 CINUR = PTR
 STR = YR(I)
 STI = YI(I)
 YR(I) = CINUR*CSCLR
 YI(I) = CINUI*CSCLR
40 CONTINUE
 RETURN
50 CONTINUE
 NZ = -1
 IF(NW.EQ.(-2)) NZ=-2
 RETURN
END
graph{Nod{Nod{Nod{No}Nod{Nod}}}
// Copyright 2014 The Gonum Authors. All rights reserved.
// Use of this source code is governed by a BSD-style
// license that can be found in the LICENSE file.

```

```
package multi_test
```

```
import (
 "math"
 "testing"
```

```
"golang.org/x/exp/rand"
```

```

"gonum.org/v1/gonum/graph"
"gonum.org/v1/gonum/graph/internal/set"
"gonum.org/v1/gonum/graph/iterator"
"gonum.org/v1/gonum/graph/multi"
"gonum.org/v1/gonum/graph/testgraph"
)

```

```

func directedBuilder(nodes []graph.Node, edges []testgraph.WeightedLine, _ _ float64) (g graph.Graph, n
[]graph.Node, e []testgraph.Edge, s, a float64, ok bool) {
 seen := set.NewNodes()
 dg := multi.NewDirectedGraph()
 for _, n := range nodes {
 seen.Add(n)
 dg.AddNode(n)
 }
 for _, edge := range edges {
 f := dg.Node(edge.From().ID())
 if f == nil {
 f = edge.From()
 }
 }
}

```

```

t := dg.Node(edge.To().ID())
if t == nil {
 t = edge.To()
}
cl := multi.Line{F: f, T: t, UID: edge.ID()}
seen.Add(cl.F)
seen.Add(cl.T)
e = append(e, cl)
dg.SetLine(cl)
}
if len(seen)
!= 0 {
 n = make([]graph.Node, 0, len(seen))
}
for _, sn := range seen {
 n = append(n, sn)
}
return dg, n, e, math.NaN(), math.NaN(), true
}

func TestDirected(t *testing.T) {
t.Run("EdgeExistence", func(t *testing.T) {
 testgraph.EdgeExistence(t, directedBuilder)
})
t.Run("LineExistence", func(t *testing.T) {
 testgraph.LineExistence(t, directedBuilder, true)
})
t.Run("NodeExistence", func(t *testing.T) {
 testgraph.NodeExistence(t, directedBuilder)
})
t.Run("ReturnAdjacentNodes", func(t *testing.T) {
 testgraph.ReturnAdjacentNodes(t, directedBuilder, true)
})
t.Run("ReturnAllLines", func(t *testing.T) {
 testgraph.ReturnAllLines(t, directedBuilder, true)
})
t.Run("ReturnAllNodes", func(t *testing.T) {
 testgraph.ReturnAllNodes(t, directedBuilder, true)
})
t.Run("ReturnNodeSlice", func(t *testing.T) {
 testgraph.ReturnNodeSlice(t, directedBuilder, true)
})

t.Run("AddNodes", func(t *testing.T) {
 testgraph.AddNodes(t, multi.NewDirectedGraph(), 100)
})
t.Run("AddArbitraryNodes",

```

```

func(t *testing.T) {
 testgraph.AddArbitraryNodes(t,
 multi.NewDirectedGraph(),
 testgraph.NewRandomNodes(100, 1, func(id int64) graph.Node { return multi.Node(id) }),
)
}

t.Run("RemoveNodes", func(t *testing.T) {
 g := multi.NewDirectedGraph()
 it := testgraph.NewRandomNodes(100, 1, func(id int64) graph.Node { return multi.Node(id) })
 for it.Next() {
 g.AddNode(it.Node())
 }
 it.Reset()
 rnd := rand.New(rand.NewSource(1))
 for it.Next() {
 u := it.Node()
 d := rnd.Intn(5)
 vit := g.Nodes()
 for d >= 0 && vit.Next() {
 v := vit.Node()
 d--
 g.SetLine(g.NewLine(u, v))
 }
 }
 testgraph.RemoveNodes(t, g)
})

t.Run("AddLines", func(t *testing.T) {
 testgraph.AddLines(t, 100,
 multi.NewDirectedGraph(),
 func(id int64) graph.Node { return multi.Node(id) },
 true, // Can update nodes.
)
})

t.Run("RemoveLines", func(t *testing.T) {
 g := multi.NewDirectedGraph()
 it := testgraph.NewRandomNodes(100, 1, func(id int64)
graph.Node { return multi.Node(id) })
 for it.Next() {
 g.AddNode(it.Node())
 }
 it.Reset()
 var lines []graph.Line
 rnd := rand.New(rand.NewSource(1))
 for it.Next() {
 u := it.Node()
 d := rnd.Intn(5)
 vit := g.Nodes()
 for d >= 0 && vit.Next() {

```

```

 v := vit.Node()
 d--
 l := g.NewLine(u, v)
 g.SetLine(l)
 lines = append(lines, l)
}
}
rnd.Shuffle(len(lines), func(i, j int) {
 lines[i], lines[j] = lines[j], lines[i]
})
testgraph.RemoveLines(t, g, iterator.NewOrderedLines(lines))
})
}

// Tests Issue #27
func TestEdgeOvercounting(t *testing.T) {
 g := generateDummyGraph()

 if neigh := graph.NodesOf(g.From(int64(2))); len(neigh) != 2 {
 t.Errorf("Node 2 has incorrect number of neighbors got neighbors %v (count %d), expected 2 neighbors {0,1}",
 neigh, len(neigh))
 }
}

func generateDummyGraph() *multi.DirectedGraph {
 nodes := [4]struct{ srcID, targetID int }{
 {2, 1},
 {1, 0},
 {2, 0},
 {0, 2},
 }

 g := multi.NewDirectedGraph()

 for
 i, n := range nodes {
 g.SetLine(multi.Line{F: multi.Node(n.srcID), T: multi.Node(n.targetID), UID: int64(i)})
 }

 return g
}

// Test for issue #123 https://github.com/gonum/graph/issues/123
func TestIssue123DirectedGraph(t *testing.T) {
 defer func() {
 if r := recover(); r != nil {
 t.Errorf("unexpected panic: %v", r)
 }
 }
}

```

```

}()
g := multi.NewDirectedGraph()

n0 := g.NewNode()
g.AddNode(n0)

n1 := g.NewNode()
g.AddNode(n1)

g.RemoveNode(n0.ID())

n2 := g.NewNode()
g.AddNode(n2)
}
graph{dig_}
graph{"\
""\
""\
""\
"}
graph{>{{{Digra_{Digra_}}}}}
graph{{""""" _"" _"" _"" _""c"""" _"" _"" _"" _"" _"" _"" _1_1wgYc8kRij8q8_1PyG1YO0_iryntlS5u4T4zbq9VH7G1_Z
AB_8tO9W}"""" _3_3VO1_1wgYc8kRij8q8_1PyG1YO0_iryntlS5u4T4z on zero
ValuetO9W}"" _3_3VO1_1wgYc8kRij8q8_1PyG1YO0_iryntlS5u4T4zbq9VH7G1_ZAB_8tO9W}"" _3_3VO1_1w
gYc8kRij8q8_1PyG1YO0_iryntlS5u4T4zbq9VH7G1_ZAB_8tO9W}""klS5u4T4zbq9VH7G1_ZAB_8tynklS5u4T4
zbq9VH7G1_ZAB_8tO9W}"" _3_3VO1_1wgYc1YO0_iryntlS5u4T4zbq9VH7G1_ZAB_8tO9W}"" _3_3VO1_1wg
Yc8kRij8q8_1PyG1YO0_iryntlS5u4T4zbq9VH7G1_ZAB_8tO9W}"" _3_3VO1_1wgYc8kRij8q8_1PyG1YO0_iry
ntlS5u4T4zbq9VH7G1_ZAB_}8tO9W}"""" _3_3VO1_1wgYc8kRij8q8_1PyG1YO0_iryntlS5u4T4zbq9VH7G1_Z
AB_8tO9W}"" _3_3VO1_1wgYc8kRij8q8_1PyG1YO0_iryntlS5u4T4zbq9VH7G1_ZAB_8tO9W}"" _O_3VO1_1w
gYc8kRij8q8_1PyG1YO0_iryntlS5u4T4zbq9VH7G1_ZAB_8tO9W}"" _3_3VO1_1wgYc8kRij8q8_1PyG1YO0_iry
ntlS5u4T4zbq9VH7G1_ZAB_8tO9W}"" _3_3VO1_1wgYc8kRij681_1PyG1YO0_iryntlS5u4T4zbq9VH7G1_ZA
B8kRij8q8_1PyG1YO0_iryntlS5u4T4zbq9VH7G1_ZAB_8tO9W}"""" _3_3VO1_1wgYc8kRij8q8_1PyG1YO0_iry
ntlS5u4T4zbq9VH7G1_ZAB_8tO9W}"" _3_3VO1_1wgYc8kRij8q8_1PyG1YO0_iryntlS5u4T4zbq9VH7G1_ZAB
_8tO9W}"" _3_3VO1_1wgYc8kRij8q8_1PyG1YO0_iryntlS5u4T4zbq9VH7G1_ZAB_8tO9W}"" _3_3VO1_1wgYc
8kRij8q8_1PyG1YO0_iryntlS5u4T4zbq9VH7G1_ZAB_8tO9W_3_3VO1_1wgYc8kRij8q8_1PyG1YO0_iryntlS5u
4T4zbq9VH7G1_ZAB_8tO9W}"" _3_3VO1_1wgYc8kRij8q8_1PyG1YO0_iryntlS5u4T4zbq9VH7G1_ZAB8kRij8
q8_1PyG1YO0_iryntlS5u4T4zbq9VH7G1_ZAB_8tO9W}"""" _3_3VO1_1wgYc8kRij8q8_1PyG1YO0_iryntlS5u4
T4zbq9VH7G1_ZAB_8tO9W}"" _3_3VO1_1wgYc8kRij8q8_1PyG1YO0_iryntlS5u4T4zbq9VH7G1_ZAB_8tO9
W}"" _3_3VO1_1wgYc8kRij8q8_1PyG1YO0_iryntlS5u4T4zbq9VH7G1_ZAB_8tO9W}"" _3_3VO1_1wgYc8kRij
8q8_1PyG1YO0_iryntlS5u4T4zbq9VH7G1_ZAB_8tO9W}"" _3_3VO1_1wgYc8kRij8q8_1PyG1YO0_iryntlS5u4
T4zbq9VH7G1_ZAB_8tO9W}"}
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// license that can be found in the LICENSE file.

package testblas

import (

```



```

"fmt"
"testing"
)

type Zdotcer interface {
 Zdotc(n int, x []complex128, incX int, y []complex128, incY int) complex128
}

func ZdotcTest(t *testing.T, impl Zdotcer) {
 for tc, test := range []struct {
 x, y []complex128

 want complex128 // Result when both increments have the same sign.
 wantRev complex128 // Result when the increments have opposite sign.
 }{
 {
 x: nil,
 y: nil,
 want: 0,
 wantRev: 0,
 },
 {
 x: []complex128{1 + 2i},
 y: []complex128{30 + 31i},
 want: 92 - 29i,
 wantRev: 92 - 29i,
 },
 {
 x: []complex128{1 + 2i, 3 + 4i},
 y: []complex128{30 + 31i, 33 + 34i},
 want: 327 - 59i,
 wantRev: 315 - 59i,
 },
 {
 x: []complex128{1 + 2i, 3 + 4i, 5 + 6i},
 y: []complex128{30 + 31i, 33 + 34i,
36 + 37i},
 want: 729 - 90i,
 wantRev: 681 - 90i,
 },
 {
 x: []complex128{1 + 2i, 3 + 4i, 5 + 6i, 7 + 8i},
 y: []complex128{30 + 31i, 33 + 34i, 36 + 37i, 39 + 40i},
 want: 1322 - 122i,
 wantRev: 1202 - 122i,
 },
 {
 x: []complex128{1 + 2i, 3 + 4i, 5 + 6i, 7 + 8i, 9 + 10i},

```

```

y: []complex128{30 + 31i, 33 + 34i, 36 + 37i, 39 + 40i, 42 + 43i},
want: 2130 - 155i,
wantRev: 1890 - 155i,
},
{
x: []complex128{1 + 2i, 3 + 4i, 5 + 6i, 7 + 8i, 9 + 10i, 11 + 12i},
y: []complex128{30 + 31i, 33 + 34i, 36 + 37i, 39 + 40i, 42 + 43i, 45 + 46i},
want: 3177 - 189i,
wantRev: 2757 - 189i,
},
{
x: []complex128{1 + 2i, 3 + 4i, 5 + 6i, 7 + 8i, 9 + 10i, 11 + 12i, 13 + 14i},
y: []complex128{30 + 31i, 33 + 34i, 36 + 37i, 39 + 40i, 42 + 43i, 45 + 46i, 48 + 49i},
want: 4487 - 224i,
wantRev: 3815 - 224i,
},
{
x: []complex128{1 + 2i, 3 + 4i, 5 + 6i, 7 + 8i, 9 + 10i, 11 + 12i, 13 + 14i,
15 + 16i},
y: []complex128{30 + 31i, 33 + 34i, 36 + 37i, 39 + 40i, 42 + 43i, 45 + 46i, 48 + 49i, 51 + 52i},
want: 6084 - 260i,
wantRev: 5076 - 260i,
},
{
x: []complex128{1 + 2i, 3 + 4i, 5 + 6i, 7 + 8i, 9 + 10i, 11 + 12i, 13 + 14i, 15 + 16i, 17 + 18i},
y: []complex128{30 + 31i, 33 + 34i, 36 + 37i, 39 + 40i, 42 + 43i, 45 + 46i, 48 + 49i, 51 + 52i, 54 + 55i},
want: 7992 - 297i,
wantRev: 6552 - 297i,
},
{
x: []complex128{1 + 2i, 3 + 4i, 5 + 6i, 7 + 8i, 9 + 10i, 11 + 12i, 13 + 14i, 15 + 16i, 17 + 18i, 19 + 20i},
y: []complex128{30 + 31i, 33 + 34i, 36 + 37i, 39 + 40i, 42 + 43i, 45 + 46i, 48 + 49i, 51 + 52i, 54 + 55i, 57 +
58i},
want: 10235 - 335i,
wantRev: 8255 - 335i,
},
{
x: []complex128{1 + 2i, 3 + 4i, 5 + 6i, 7 + 8i, 9 + 10i, 11 + 12i, 13 + 14i, 15 + 16i, 17 + 18i, 19 + 20i, 21 + 22i},
y: []complex128{30 + 31i, 33 + 34i, 36 + 37i, 39 + 40i, 42 + 43i, 45 + 46i, 48 + 49i, 51 + 52i, 54 + 55i,
57 + 58i, 60 + 61i},
want: 12837 - 374i,
wantRev: 10197 - 374i,
},
{
x: []complex128{1 + 2i, 3 + 4i, 5 + 6i, 7 + 8i, 9 + 10i, 11 + 12i, 13 + 14i, 15 + 16i, 17 + 18i, 19 + 20i, 21 + 22i,
23 + 24i},
y: []complex128{30 + 31i, 33 + 34i, 36 + 37i, 39 + 40i, 42 + 43i, 45 + 46i, 48 + 49i, 51 + 52i, 54 + 55i, 57 + 58i,
60 + 61i, 63 + 64i},

```

```

 want: 15822 - 414i,
 wantRev: 12390 - 414i,
},
} {
 n := len(test.x)
 if len(test.y) != n {
 panic("bad test")
 }
 for _, inc := range allPairs([]int{-7, -3, 1, 13}, []int{-11, -5, 1, 17}) {
 incX := inc[0]
 incY := inc[1]

 x := makeZVector(test.x, incX)
 xCopy := make([]complex128, len(x))
 copy(xCopy, x)

 y := makeZVector(test.y, incY)
 yCopy := make([]complex128, len(y))
 copy(yCopy, y)

 want := test.want
 if incX*incY < 0 {
 want = test.wantRev
 }

 got := impl.Zdotc(n, x, incX, y, incY)

 prefix := fmt.Sprintf("Case %v (incX=%v,incY=%v):", tc, incX, incY)

 if !zsame(x,
xCopy) {
 t.Errorf("%v: unexpected modification of x", prefix)
 }
 if !zsame(y, yCopy) {
 t.Errorf("%v: unexpected modification of y", prefix)
 }

 if got != want {
 t.Errorf("%v: unexpected result. want %v, got %v", prefix, want, got)
 }
 }
}
}
}
// Code generated by "go generate gonum.org/v1/gonum/unit; DO NOT EDIT.

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// license that can be found in the LICENSE file.

```

```
package unit
```

```
import (
 "fmt"
 "testing"
)
```

```
func TestRadioactivityFormat(t *testing.T) {
 for _, test := range []struct {
 value Radioactivity
 format string
 want string
 }{
 {1.23456789, "%v", "1.23456789 Bq"},
 {1.23456789, "%.1v", "1 Bq"},
 {1.23456789, "%20.1v", " 1 Bq"},
 {1.23456789, "%20v", " 1.23456789 Bq"},
 {1.23456789, "%1v", "1.23456789 Bq"},
 {1.23456789, "%#v", "unit.Radioactivity(1.23456789)"},
 {1.23456789, "%s", "%!s(unit.Radioactivity=1.23456789 Bq)"},
 } {
 got := fmt.Sprintf(test.format, test.value)
 if got != test.want {
 t.Errorf("Format %q %v: got: %q want: %q", test.format, float64(test.value), got, test.want)
 }
 }
}

graph{{ED_}ED_{ED_{ED_{ED_{ED_{ED_}}ED_}}}
Graph{{{subgra6{{{subgra4{{subgra6{{{subgra4{subgra4}}}}{subgr{subgra4{subgra2}}}}{subgra4{subgra4{{s
ubgra4{subgra4}}}}}}}}{subgr{subgra4{subgra4}}}{subgra4{subgra4{{subgra4{subgra4}}}}}}}
graph{{<<=>=>}<<=>=>}
graph{{{a{{SubGrap{{SubGrap{{SubGrap}}}}}}{SubGrap}}}}}
graph{{<<NN>>}}
digraph{nodee[noded->noded->nodee]}
// SPDX-License-Identifier: Unlicense OR MIT
```

```
/*
```

```
Package storage implements read and write storage permissions
on mobile devices.
```

```
Android
```

The following entries will be added to AndroidManifest.xml:

```
<uses-permission android:name="android.permission.READ_EXTERNAL_STORAGE"/>
<uses-permission android:name="android.permission.WRITE_EXTERNAL_STORAGE"/>
```

READ\_EXTERNAL\_STORAGE and WRITE\_EXTERNAL\_STORAGE are "dangerous" permissions. See documentation for package [gioui.org/app/permission](http://gioui.org/app/permission) for more information.

\*/

package storage

/\*\* github.com/libp2p/hydra-booster@v0.7.3 \*\*/

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graph{Stm:Stm O}

graph{<<gggg>>}

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// Ensure changes made to blas/native are reflected in blas/cgo where relevant.

/\*

Package gonum is a Go implementation of the BLAS API. This implementation panics when the input arguments are invalid as per the standard, for example if a vector increment is zero. Note that the treatment of NaN values is not specified, and differs among the BLAS implementations.

[gonum.org/v1/gonum/blas/blas64](http://gonum.org/v1/gonum/blas/blas64) provides helpful wrapper functions to the BLAS interface. The rest of this text describes the layout of the data for the input types.

Note that in the function documentation,  $x[i]$  refers to the  $i^{\text{th}}$  element of the vector, which will be different from the  $i^{\text{th}}$  element of the slice if  $\text{incX} \neq 1$ .

See [http://www.netlib.org/lapack/explore-html/d4/de1/\\_l\\_i\\_c\\_e\\_n\\_s\\_e\\_source.html](http://www.netlib.org/lapack/explore-html/d4/de1/_l_i_c_e_n_s_e_source.html) for more license information.

Vector arguments are effectively

strided slices. They have two input arguments,

a number of elements,  $n$ , and an increment,  $\text{incX}$ . The increment specifies the distance between elements of the vector. The actual Go slice may be longer than necessary.

The increment may be positive or negative, except in functions with only a single vector argument where the increment may only be positive. If the increment is negative,  $s[0]$  is the last element in the slice. Note that this is not the same as counting backward from the end of the slice, as  $\text{len}(s)$  may be longer than

necessary. So, for example, if  $n = 5$  and  $\text{incX} = 3$ , the elements of  $s$  are

```
[0 * * 1 * * 2 * * 3 * * 4 * * * ...]
```

where elements are never accessed. If  $\text{incX} = -3$ , the same elements are accessed, just in reverse order (4, 3, 2, 1, 0).

Dense matrices are specified by a number of rows, a number of columns, and a stride.

The stride specifies the number of entries in the slice between the first element of successive rows. The stride must be at least as large as the number of columns

but may be longer.

```
[a00 ... a0n a0* ... a1stride-1 a21 ... amn am* ... amstride-1]
```

Thus,  $\text{dense}[i*\text{ld} + j]$  refers to the  $\{i, j\}$ th element of the matrix.

Symmetric and triangular matrices (non-packed) are stored identically to Dense, except that only elements in one triangle of the matrix are accessed.

Packed symmetric and packed triangular matrices are laid out with the entries condensed such that all of the unreferenced elements are removed. So, the upper triangular matrix

```
[
 1 2 3
 0 4 5
 0 0 6
]
```

and the lower-triangular matrix

```
[
 1 0 0
 2 3 0
 4 5 6
]
```

will both be compacted as [1 2 3 4 5 6]. The  $(i, j)$  element of the original dense matrix can be found at element  $i*n - (i-1)*i/2 + j$  for upper triangular, and at element  $i * (i+1) / 2 + j$  for lower triangular.

Banded matrices are laid out in a compact format, constructed by removing the zeros in the rows and aligning the diagonals. For example, the matrix

```
[
 1 2 3 0 0 0

 4 5 6 7 0 0
 0 8 9 10 11 0
 0 0 12 13 14 15
 0 0 0 16 17 18
 0 0 0 0 19 20
]
```

implicitly becomes ( entries are never accessed)

```
[
```

```

* 1 2 3
4 5 6 7
8 9 10 11
12 13 14 15
16 17 18 *
19 20 * *
]

```

which is given to the BLAS routine as [ 1 2 3 4 ...].

See <http://www.crest.iu.edu/research/mtl/reference/html/banded.html>  
for more information

```

*/
package gonum // import "gonum.org/v1/gonum/blas/gonum"
graph{diV{{{diY}}diY}}diV}}diY}}diV}
graph{<><><><><><><><>}
Graph{Sun{Sur{Sur}{Sur}{Sun{Sur}}}}
graph{N_{N_}}
graph{Grapu{Grapu}}
graph{subG}
digraph{{{digrape}{digrape}{digrape}{digrape}{digrape}{digrape}}}
graph{gra}
// Copyright 2018 The Gonum Authors. All rights reserved.
// Use of this source code is governed by a BSD-style
// license that can be found in the LICENSE file.

```

```
package testlapack
```

```

import (
 "fmt"
 "testing"

 "golang.org/x/exp/rand"

 "gonum.org/v1/gonum/blas"
 "gonum.org/v1/gonum/blas/blas64"
)

type Dpotrs interface {
 Dpotrs(uplo blas.Uplo, n, nrhs int, a []float64, lda int, b []float64, ldb int)

 Dpotrf(uplo blas.Uplo, n int, a []float64, lda int) bool
}

func DpotrsTest(t *testing.T, impl Dpotrs) {
 const tol = 1e-14

 rnd := rand.New(rand.NewSource(1))
 bi := blas64.Implementation()

```

```

for _, uplo := range []blas.Uplo{blas.Upper, blas.Lower} {
for _, n := range []int{1, 2, 5} {
for _, nrhs := range []int{1, 2, 5, 10} {
for _, ld := range []struct{ a, b int }{
{n, nrhs},
{n + 7, nrhs},
{n, nrhs + 3},
{n + 7, nrhs + 3},
} {
// Construct a random SPD matrix A by first making a symmetric matrix
// and then ensuring that it is diagonally
dominant.
a := nanGeneral(n, n, ld.a)
for i := 0; i < n; i++ {
for j := i; j < n; j++ {
v := rnd.Float64()
a.Data[i*a.Stride+j] = v
a.Data[j*a.Stride+i] = v
}
}
for i := 0; i < n; i++ {
a.Data[i*a.Stride+i] += float64(n)
}

// Generate a random solution X.
want := nanGeneral(n, nrhs, ld.b)
for i := 0; i < n; i++ {
for j := 0; j < nrhs; j++ {
want.Data[i*want.Stride+j] = rnd.NormFloat64()
}
}

// Compute the right-hand side matrix as A * X.
b := nanGeneral(n, nrhs, ld.b)
bi.Dgemm(blas.NoTrans, blas.NoTrans, n, nrhs, n, 1, a.Data, a.Stride, want.Data, want.Stride, 0, b.Data, b.Stride)

// Compute the Cholesky decomposition of A.
ok := impl.Dpotrf(uplo, n, a.Data, a.Stride)
if !ok {
panic("bad test")
}

aCopy := cloneGeneral(a)

// Solve A * X = B.
impl.Dpotrs(uplo, n, nrhs, a.Data, a.Stride, b.Data, b.Stride)

```



```

 name := fmt.Sprintf("uplo=%v,n=%v,nrhs=%v,lda=%v,ldb=%v",
uplo, n, nrhs, a.Stride, b.Stride)

 if !generalOutsideAllNaN(a) {
 t.Errorf("%v: out-of-range modification of A", name)
 }
 if !equalApproxGeneral(a, aCopy, 0) {
 t.Errorf("%v: unexpected modification of A", name)
 }
 if !generalOutsideAllNaN(b) {
 t.Errorf("%v: out-of-range modification of B", name)
 }
 if !equalApproxGeneral(b, want, tol) {
 t.Errorf("%v: unexpected result\ngot %v\nwant %v", name, b, want)
 }
}
}
}
}
}
graph{STRICS{{STRICS}{STRICS{{STRICS{STRICI}}}}}
graph{{subg}subGrapc}
digraph{node_->node_;node_[l=""]node_[l=""]node_->node_ node_[l=""]node_->node_ node_[l=""]node_->node_
node_[l=""]node_->node_ node_[l=""]node_->node_ node_[l=""]node_->node_ node_[l=""]node_->node_
node_[l=""]node_->node_ node_[l=""]node_->node_ node_[l=""]node_->node_ node_[l=""]node_->node_->2}
// SPDX-License-Identifier: Unlicense OR MIT

package fling

import (
 "math"
 "runtime"
 "time"

 "gioui.org/unit"
)

type Animation struct {
 // Current offset in pixels.
 x float32
 // Initial time.
 t0 time.Time
 // Initial velocity in pixels pr second.
 v0 float32
}

var (
 // Pixels/second.

```

```

minFlingVelocity = unit.Dp(50)
maxFlingVelocity = unit.Dp(8000)
)

const (
 thresholdVelocity = 1
)

// Start a fling given a starting velocity. Returns whether a
// fling was started.
func (f *Animation) Start(c unit.Converter, now time.Time, velocity float32) bool {
 min := float32(c.Px(minFlingVelocity))
 v := velocity
 if -min <= v && v <= min {
 return false
 }
 max := float32(c.Px(maxFlingVelocity))
 if v > max {
 v = max
 } else if v < -max {
 v = -max
 }
 f.init(now, v)
 return true
}

func (f *Animation) init(now time.Time, v0 float32) {
 f.t0 = now
 f.v0 = v0
 f.x = 0
}

func (f *Animation) Active() bool {
 return f.v0 != 0
}

// Tick computes and returns a fling distance since
//
// the last time Tick was called.
func (f *Animation) Tick(now time.Time) int {
 if !f.Active() {
 return 0
 }
 var k float32
 if runtime.GOOS == "darwin" {
 k = -2 // iOS
 } else {
 k = -4.2 // Android and default
 }

```

```

}
t := now.Sub(f.t0)
// The acceleration $x''(t)$ of a point mass with a drag
// force, f , proportional with velocity, $x'(t)$, is
// governed by the equation
//
// $x''(t) = kx'(t)$
//
// Given the starting position $x(0) = 0$, the starting
// velocity $x'(0) = v0$, the position is then
// given by
//
// $x(t) = v0 * e^{(k*t)/k} - v0/k$
//
ekt := float32(math.Exp(float64(k) * t.Seconds()))
x := f.v0*ekt/k - f.v0/k
dist := x - f.x
idist := int(dist)
f.x += float32(idist)
// Solving for the velocity $x'(t)$ gives us
//
// $x'(t) = v0 * e^{(k*t)}$
v := f.v0 * ekt
if -thresholdVelocity < v && v < thresholdVelocity {
 f.v0 = 0
}
return idist
}
// Copyright 2018 The Gonum Authors. All rights reserved.
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// license that can be found in the LICENSE file.

// Package error provides generated internal error functions for DOT parsing.
package errors // import "gonum.org/v1/gonum/graph/formats/dot/internal/errors"
*> \brief \b XERBLA
*
* ===== DOCUMENTATION =====
*
* Online html documentation available at
* http://www.netlib.org/lapack/explore-html/
*
*> \htmlonly
*> Download XERBLA + dependencies
*>
*> [TGZ]
*>
*> [ZIP]
*>

```

```

*> [TXT]
*> \endhtmlonly
*
* Definition:
* =====
*
* SUBROUTINE XERBLA(SRNAME, INFO)
*
* .. Scalar Arguments ..
* CHARACTER*(*) SRNAME
* INTEGER INFO
* ..
*
*
*> \par Purpose:
* =====
*>
*> \verbatim
*>
*> XERBLA is an error handler for the LAPACK routines.
*> It is called by an LAPACK routine if an input parameter has an
*> invalid value. A message
*> is printed and execution stops.
*>
*> Installers may consider modifying the STOP statement in order to
*> call system-specific exception-handling facilities.
*> \endverbatim
*
* Arguments:
* =====
*
*> \param[in] SRNAME
*> \verbatim
> SRNAME is CHARACTER(*)
*> The name of the routine which called XERBLA.
*> \endverbatim
*>
*> \param[in] INFO
*> \verbatim
*> INFO is INTEGER
*> The position of the invalid parameter in the parameter list
*> of the calling routine.
*> \endverbatim
*
* Authors:
* =====
*
*> \author Univ. of Tennessee

```

```

*> \author Univ. of California Berkeley
*> \author Univ. of Colorado Denver
*> \author NAG Ltd.
*
*> \date November 2011
*
*> \ingroup auxOTHERauxiliary
*
* =====
* SUBROUTINE XERBLA(SRNAME, INFO)
*
* -- LAPACK auxiliary routine (version 3.4.0) --
* -- LAPACK is a software package provided by Univ. of Tennessee, --
*
* -- Univ. of California Berkeley, Univ. of Colorado Denver and NAG Ltd.--
* November 2011
*
* .. Scalar Arguments ..
* CHARACTER*(*) SRNAME
* INTEGER INFO
* ..
*
* =====
*
* .. Intrinsic Functions ..
* INTRINSIC LEN_TRIM
* ..
* .. Executable Statements ..
*
* WRITE(*, FMT = 9999)SRNAME(1:LEN_TRIM(SRNAME)), INFO
*
* STOP
*
* 9999 FORMAT(' ** On entry to ', A, ' parameter number ', I2, ' had ',
* $ 'an illegal value')
*
* End of XERBLA
*
* END
graph{{{DiGrc}}}
// SPDX-License-Identifier: Unlicense OR MIT

package ops

import (
 "encoding/binary"

 "gioui.org/internal/opconst"

```

```

"gioui.org/op"
)

// Reader parses an ops list.
type Reader struct {
 pc pc
 stack []macro
 ops *op.Ops
}

// EncodedOp represents an encoded op returned by
// Reader.
type EncodedOp struct {
 Key Key
 Data []byte
 Refs []interface{}
}

// Key is a unique key for a given op.
type Key struct {
 ops *op.Ops
 pc int
 version int
}

// Shadow of op.MacroOp.
type macroOp struct {
 pc pc
}

// Shadow of op.CallOp.
type callOp struct {
 ops *op.Ops
}

type pc struct {
 data int
 refs int
}

type macro struct {
 ops *op.Ops
 retPC pc
 endPC pc
}

type opMacroDef struct {
 endpc pc

```

```

}

// Reset start reading from the op list.
func (r *Reader) Reset(ops *op.Ops) {
 r.stack = r.stack[:0]
 r.pc = pc{}
 r.ops = ops
}

func (r *Reader) Decode() (EncodedOp, bool) {
 if r.ops == nil {
 return EncodedOp{}, false
 }
 for {
 if len(r.stack) > 0 {
 b := r.stack[len(r.stack)-1]
 if
 r.pc == b.endPC {
 r.ops = b.ops
 r.pc = b.retPC
 r.stack = r.stack[:len(r.stack)-1]
 continue
 }
 }
 data := r.ops.Data()
 data = data[r.pc.data:]
 if len(data) == 0 {
 return EncodedOp{}, false
 }
 key := Key{ops: r.ops, pc: r.pc.data, version: r.ops.Version()}
 t := opconst.OpType(data[0])
 n := t.Size()
 nrefs := t.NumRefs()
 data = data[:n]
 refs := r.ops.Refs()
 refs = refs[r.pc.refs:]
 refs = refs[:nrefs]
 switch t {
 case opconst.TypeAux:
 // An Aux operations is always wrapped in a macro, and
 // its length is the remaining space.
 block := r.stack[len(r.stack)-1]
 n += block.endPC.data - r.pc.data - opconst.TypeAuxLen
 data = data[:n]
 case opconst.TypeCall:
 var op callOp
 op.decode(data, refs)
 endPC := pc{

```

```

 data: len(op.ops.Data()),
 refs: len(op.ops.Refs()),
}
retPC := r.pc
retPC.data += n
retPC.refs += nrefs
r.stack = append(r.stack, macro{
 ops: r.ops,
 retPC: retPC,
 endPC: endPC,
})
r.pc
= pc{
 r.ops = op.ops
 continue
case opconst.TypeMacro:
 var op macroOp
 op.decode(data)
 macroData := r.ops.Data()[op.pc.data:]
 if opconst.OpType(macroData[0]) != opconst.TypeMacroDef {
 panic("invalid macro reference")
 }
 var opDef opMacroDef
 opDef.decode(macroData[:opconst.TypeMacroDef.Size()])
 retPC := r.pc
 retPC.data += n
 retPC.refs += nrefs
 r.stack = append(r.stack, macro{
 ops: r.ops,
 retPC: retPC,
 endPC: opDef.endpc,
 })
 r.pc = op.pc
 r.pc.data += opconst.TypeMacroDef.Size()
 r.pc.refs += opconst.TypeMacroDef.NumRefs()
 continue
case opconst.TypeMacroDef:
 var op opMacroDef
 op.decode(data)
 r.pc = op.endpc
 continue
}
r.pc.data += n
r.pc.refs += nrefs
return EncodedOp{Key: key, Data: data, Refs: refs}, true
}
}

```



```

func (op *opMacroDef) decode(data []byte) {
 if opconst.OpType(data[0]) != opconst.TypeMacroDef {
 panic("invalid op")
 }
 bo := binary.LittleEndian
 dataIdx := int(int32(bo.Uint32(data[1:])))
 refsIdx
 := int(int32(bo.Uint32(data[5:])))
 *op = opMacroDef{
 endpc: pc{
 data: dataIdx,
 refs: refsIdx,
 },
 }
}

func (m *callOp) decode(data []byte, refs []interface{}) {
 if opconst.OpType(data[0]) != opconst.TypeCall {
 panic("invalid op")
 }
 *m = callOp{
 ops: refs[0].(*op.Ops),
 }
}

func (m *macroOp) decode(data []byte) {
 if opconst.OpType(data[0]) != opconst.TypeMacro {
 panic("invalid op")
 }
 bo := binary.LittleEndian
 dataIdx := int(int32(bo.Uint32(data[1:])))
 refsIdx := int(int32(bo.Uint32(data[5:])))
 *m = macroOp{
 pc: pc{
 data: dataIdx,
 refs: refsIdx,
 },
 }
}
graph{ {{{{DiGra}}}DiGra}}
graph{{"\{\{\{"\}\d"}
graph{Stric5{Stric5{Stric5}}
graph{Gr{Gr}}
graph{SUB{{SUB}SUB}}
// Copyright 2016 The Gonum Authors. All rights reserved.
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// license that can be found in the LICENSE file.

```

```

package gonum

import "math"

// Dlae2 computes the eigenvalues of a 2x2 symmetric matrix
// [a b]
// [b c]
// and returns the eigenvalue with the larger absolute value as rt1 and the
// smaller as rt2.
//
// Dlae2 is an internal routine. It is exported for testing purposes.
func (impl Implementation) Dlae2(a, b, c float64) (rt1, rt2 float64) {
 sm := a + c
 df := a - c
 adf := math.Abs(df)
 tb := b + b
 ab := math.Abs(tb)
 acmx := c
 acmn := a
 if math.Abs(a) > math.Abs(c) {
 acmx = a
 acmn = c
 }
 var rt float64
 if adf > ab {
 rt = adf * math.Sqrt(1+(ab/adf)*(ab/adf))
 } else if adf < ab {
 rt = ab * math.Sqrt(1+(adf/ab)*(adf/ab))
 } else {
 rt = ab * math.Sqrt2
 }
 if sm < 0 {
 rt1 = 0.5 * (sm - rt)
 rt2 = (acmx/rt1)*acmn - (b/rt1)*b
 return rt1, rt2
 }
 if sm > 0 {
 rt1 = 0.5 * (sm + rt)
 rt2 = (acmx/rt1)*acmn
 - (b/rt1)*b
 return rt1, rt2
 }
 rt1 = 0.5 * rt
 rt2 = -0.5 * rt
 return rt1, rt2
}
graph{{DiGrap_{{DiGrap_{{DiGrap_{{DiGrap_}}}}}

```

```

graph{STRU{STRW}}
graph{{{digrr}digr}}
graph{""[diGr0=""]}
graph{{die{{die}die}die}}
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// license that can be found in the LICENSE file.

package integrate

import (
 "math"
 "math/bits"
)

// Romberg returns an approximate value of the integral
// \int_a^b f(x)dx
// computed using the Romberg's method. The function f is given
// as a slice of equally-spaced samples, that is,
// f[i] = f(a + i*dx)
// and dx is the spacing between the samples.
//
// The length of f must be 2^k + 1, where k is a positive integer,
// and dx must be positive.
//
// See https://en.wikipedia.org/wiki/Romberg%27s_method for a description of
// the algorithm.
func Romberg(f []float64, dx float64) float64 {
 if len(f) < 3 {
 panic("integral: invalid slice length: must be at least 3")
 }

 if dx <= 0 {
 panic("integral: invalid spacing: must be larger than 0")
 }

 n := len(f) - 1
 k := bits.Len(uint(n - 1))

 if len(f) != 1<<uint(k)+1 {
 panic("integral: invalid slice length: must be
 2^k + 1")
 }

 work := make([]float64, 2*(k+1))
 prev := work[:k+1]
 curr := work[k+1:]

```

```

h := dx * float64(n)
prev[0] = (f[0] + f[n]) * 0.5 * h

step := n
for i := 1; i <= k; i++ {
 h /= 2
 step /= 2
 var estimate float64
 for j := 0; j < n/2; j += step {
 estimate += f[2*j+step]
 }

 curr[0] = estimate*h + 0.5*prev[0]
 for j := 1; j <= i; j++ {
 factor := math.Pow(4, float64(j))
 curr[j] = (factor*curr[j-1] - prev[j-1]) / (factor - 1)
 }

 prev, curr = curr, prev
}
return prev[k]
}

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// license that can be found in the LICENSE file.

package gonum

import "gonum.org/v1/gonum/blas/blas64"

// Dlapll returns the smallest singular value of the n2 matrix A = [x y].
// The function first computes the QR factorization of A = Q*R, and then computes
// the SVD of the 2-by-2 upper triangular matrix r.
//
// The contents of x and y are overwritten during the call.
//
// Dlapll is an internal routine. It is exported for testing purposes.
func (impl Implementation) Dlapll(n int, x []float64, incX int, y []float64, incY int) float64 {
 switch {
 case n < 0:
 panic(nLT0)
 case incX <= 0:
 panic(badIncX)
 case incY <= 0:
 panic(badIncY)
 }

 // Quick return if possible.

```

```

if n == 0 {
 return 0
}

switch {
case len(x) < 1+(n-1)*incX:
 panic(shortX)
case len(y) < 1+(n-1)*incY:
 panic(shortY)
}

// Quick return if possible.
if n == 1 {
 return 0
}

// Compute
the QR factorization of the N-by-2 matrix [X Y].
a00, tau := impl.Dlarfg(n, x[0], x[incX:], incX)
x[0] = 1

bi := blas64.Implementation()
c := -tau * bi.Ddot(n, x, incX, y, incY)
bi.Daxpy(n, c, x, incX, y, incY)
a11, _ := impl.Dlarfg(n-1, y[incY], y[2*incY:], incY)

// Compute the SVD of 2-by-2 upper triangular matrix.
ssmin, _ := impl.Dlas2(a00, y[0], a11)
return ssmin
}
graph{{DN}DY}
graph{{DI}DI}}
graph{{digr4}digr7{digr4}}digr2}
graph{gr_}
graph{{DIGRAP_{{DIGRAP_}}{{DIGRAP_}DIGRAP_}}{{DIGRAP_}DIGRAP_}}DIGRAP_}}
DIGRAP_}}
/**
gopkg.in/adibiarsopt/dgraph.v83@v83.0.0-20171012064944-38e0eed888d7
gopkg.in/adibiarsopt/dgraph.v82@v82.0.0-20170922040331-84d68f09dda5
**//

{{Types "Apache-2.0 AGPL-3.0"}}

Dgraph Licensing

Server

```

Dgraph Server is available under [GNU AGPLv3](https://www.gnu.org/licenses/agpl-3.0.html).

## ## Drivers

Dgraph Go driver and any other drivers are available under [Apache 2.0](https://www.apache.org/licenses/LICENSE-2.0).

## ## Licensing Policy

The reasoning behind choosing AGPL license is explained in this [blog post](https://blog.dgraph.io/post/licensing/). The general idea is that using Dgraph for free even for commercial purposes is OK, as long as you release any modifications to the server code back to the community.

Most users don't need to modify server code, so they can continue to use Dgraph for free, forever. But, if you need to modify server code and are not ok with releasing the changes back, [get in touch](mailto:contact@dgraph.io) with us and we can set you up with a commercial or enterprise license.

If use of our drivers under the Apache 2.0 or the database under the AGPL v3 does not satisfy your organization's legal department, commercial licenses are available as well. Please [contact us](mailto:contact@dgraph.io) for more details.

## ## Trademark

Dgraph is a registered trademark of Dgraph Labs, Inc.

graph{{DiGrp}}DiGru}

SUBROUTINE ZMLT(AR, AI, BR, BI, CR, CI)

C\*\*\*BEGIN PROLOGUE ZMLT

C\*\*\*REFER TO ZBESH,ZBESI,ZBESJ,ZBESK,ZBESY,ZAIRY,ZBIRY

C

C DOUBLE PRECISION COMPLEX MULTIPLY, C=A\*B.

C

C\*\*\*ROUTINES CALLED (NONE)

C\*\*\*END PROLOGUE ZMLT

DOUBLE PRECISION AR, AI, BR, BI, CR, CI, CA, CB

CA = AR\*BR - AI\*BI

CB = AR\*BI + AI\*BR

CR = CA

CI = CB

RETURN

END

graph{r9u2j9c5y{{{B9a2z7e1i8w4l5g3g9p8w8x8u2a6n9y8c}}{}}}

graph{SUBGRZ{SUBGRZ{SUBGRR}SUBGRZ}

graph{{{grap}grap}}

graph{{SU2}SU2{{SU2}SU2}}

```

graph{no{no{no}}no}
Graph{{{SubD}SubD{{SubF}}SubD{SubD}SubD{{SubF}}SubD{SubF}}}
// Copyright 2015 The Gonum Authors. All rights reserved.
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// license that can be found in the LICENSE file.

package testlapack

import (
 "math"
 "testing"

 "golang.org/x/exp/rand"

 "gonum.org/v1/gonum/blas"
 "gonum.org/v1/gonum/blas/blas64"
)

type Dlasq1er interface {
 Dlasq1(n int, d, e, work []float64) int
 Dgetrf
}

func Dlasq1Test(t *testing.T, impl Dlasq1er) {
 rnd := rand.New(rand.NewSource(1))
 bi := blas64.Implementation()
 // TODO(btracey): Increase the size of this test when we have a more numerically
 // stable way to test the singular values.
 for _, n := range []int{1, 2, 5, 8} {
 work := make([]float64, 4*n)
 d := make([]float64, n)
 e := make([]float64, n-1)
 for cas := 0; cas < 1; cas++ {
 for i := range work {
 work[i] = rnd.Float64()
 }
 for i := range d {
 d[i] = rnd.NormFloat64() + 10
 }
 for i := range e {
 e[i] = rnd.NormFloat64()
 }
 ldm := n
 m := make([]float64, n*ldm)
 //
 Set up the matrix
 for i := 0; i < n; i++ {
 m[i*ldm+i] = d[i]
 }
 }
 }
}

```

```

 if i != n-1 {
 m[(i+1)*ldm+i] = e[i]
 }
}

ldmm := n
mm := make([]float64, n*ldmm)
bi.Dgemm(blas.Trans, blas.NoTrans, n, n, n, 1, m, ldm, m, ldm, 0, mm, ldmm)

impl.Dlasq1(n, d, e, work)

// Check that they are singular values. The
// singular values are the square roots of the
// eigenvalues of X * X
mmCopy := make([]float64, len(mm))
copy(mmCopy, mm)
ipiv := make([]int, n)
for elem, sv := range d[0:n] {
 copy(mm, mmCopy)
 lambda := sv * sv
 for i := 0; i < n; i++ {
 mm[i*ldm+i] -= lambda
 }

 // Compute LU.
 ok := impl.Dgetrf(n, n, mm, ldmm, ipiv)
 if !ok {
 // Definitely singular.
 continue
 }
 // Compute determinant
 var logdet float64
 for i := 0; i < n; i++ {
 v := mm[i*ldm+i]
 logdet += math.Log(math.Abs(v))
 }
 if math.Exp(logdet) > 2 {
 t.Errorf("Incorrect singular value. n = %d, cas = %d, elem = %d,
det = %v", n, cas, elem, math.Exp(logdet))
 }
}
}
}
}
}
// SPDX-License-Identifier: Unlicense OR MIT

package text

```



```

import (
 "gioui.org/op"
 "gioui.org/unit"
 "golang.org/x/image/font"
 "golang.org/x/image/math/fixd"
)

// A Line contains the measurements of a line of text.
type Line struct {
 Text String
 // Width is the width of the line.
 Width fixd.Int26_6
 // Ascent is the height above the baseline.
 Ascent fixd.Int26_6
 // Descent is the height below the baseline, including
 // the line gap.
 Descent fixd.Int26_6
 // Bounds is the visible bounds of the line.
 Bounds fixd.Rectangle26_6
}

type String struct {
 String string
 // Advances contain the advance of each rune in String.
 Advances []fixd.Int26_6
}

// A Layout contains the measurements of a body of text as
// a list of Lines.
type Layout struct {
 Lines []Line
}

// LayoutOptions specify the constraints of a text layout.
type LayoutOptions struct {
 // MaxWidth is the available width of the layout.
 MaxWidth int
}

// Style is the font style.
type Style int

// Weight is
// a font weight, in CSS units.
type Weight int

// Font specify a particular typeface, style and size.
type Font struct {

```

```

Typeface Typeface
Variant Variant
Size unit.Value
Style Style
// Weight is the text weight. If zero, Normal is used instead.
Weight Weight
}

// Face implements text layout and shaping for a particular font.
type Face interface {
 Layout(ppem fixed.Int26_6, str string, opts LayoutOptions) *Layout
 Shape(ppem fixed.Int26_6, str String) op.CallOp
 Metrics(ppem fixed.Int26_6) font.Metrics
}

// Typeface identifies a particular typeface design. The empty
// string denotes the default typeface.
type Typeface string

// Variant denotes a typeface variant such as "Mono" or "Smallcaps".
type Variant string

type Alignment uint8

const (
 Start Alignment = iota
 End
 Middle
)

const (
 Regular Style = iota
 Italic
)

const (
 Normal Weight = 400
 Medium Weight = 500
 Bold Weight = 600
)

func (a Alignment) String() string {
 switch a {
 case Start:
 return "Start"
 case
 End:
 return "End"

```

```

case Middle:
 return "Middle"
default:
 panic("unreachable")
}
}
graph{{ {str_}{str_} }}
graph{Nn{Nn}Nn{Nn{Nn}Nn}}
graph{{ DIGRAPG }}
graph{Np{Np}}
graph{<=><=><=><=><=><=><=><=><=><=><=><=><=>{<=>}}
graph{{ stric}{stric{stric{stric}}}}
graph{{ Edg2{{ {Edg2}}Edg2}}Edg2{{ {Edg2}}Edg2}}
digraph{e""[e=d]Dc[l=""]Noe[l=""]Df[l=""]Da[l=""][l=""]Da[l=""][l=""][l=""][l=""]e->l->e->e
Da->Da
Da->Df
Da->Df
Da->Noe
Df->Noe
Df->Df->l->Noe->Df->l->n
De->n->Df
Noe->Dcetafearg->WRdgdfl;
WRdgdfl->EGE;
ege->WRdgdfl;
}
graph{{{ Grar{Grax}Grax}}}
graph{subGr7}
// SPDX-License-Identifier: Unlicense OR MIT

// +build linux,!android freebsd

package window

import (
 "errors"
)

var mainDone = make(chan struct{})

func Main() {
 <-mainDone
}

// instead of creating files with build tags for each combination of wayland +/- x11
// let each driver initialize these variables with their own version of createWindow.
var wlDriver, x11Driver func(Callbacks, *Options) error

func NewWindow(window Callbacks, opts *Options) error {

```

```

var errFirst, err error
if wlDriver != nil {
 if err = wlDriver(window, opts); err == nil {
 return nil
 }
 errFirst = err
}
if x11Driver != nil {
 if err = x11Driver(window, opts); err == nil {
 return nil
 }
 if errFirst == nil {
 errFirst = err
 }
}
if errFirst != nil {
 return errFirst
}
return errors.New("app: no window driver available")
}
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```

```

// Package fourier provides functions to perform Discrete Fourier Transforms.
package fourier // import "gonum.org/v1/gonum/fourier"
graph{""[diGraA=""]}
graph{{{Grar{Grax{Grax}}Grax}Grax}}
graph{b{SubgraN{{{SubgraP}SubgraP}}}}
graph{NO{NO}}
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```

```

package distmv

```

```

// Quantiler returns the multi-dimensional inverse cumulative distribution function.
// len(x) must equal len(p), and if x is non-nil, len(x) must also equal len(p).
// If x is nil, a new slice will be allocated and returned, otherwise the quantile
// will be stored in-place into x. All of the values of p must be between 0 and 1,
// or Quantile will panic.
type Quantiler interface {
 Quantile(x, p []float64) []float64
}

```

```

// LogProber computes the log of the probability of the point x.
type LogProber interface {
 LogProb(x []float64) float64
}

```

```

}

// Rander generates a random number according to the distributon.
// If the input is non-nil, len(x) must equal len(p) and the dimension of the distribution,
// otherwise Quantile will panic.
// If the input is nil, a new slice will be allocated and returned.
type Rander
interface {
 Rand(x []float64) []float64
}

// RandLogProber is both a Rander and a LogProber.
type RandLogProber interface {
 Rander
 LogProber
}
graph{"\\3\\I#\\3\\I#\\3\\I#\\3\\I#"}
graph{{Su}{Su}Su{Su}}
// Copyright 2016 The Gonum Authors. All rights reserved.
// Use of this source code is governed by a BSD-style
// license that can be found in the LICENSE file.

package testlapack

import (
 "fmt"
 "math"
 "testing"

 "golang.org/x/exp/rand"

 "gonum.org/v1/gonum/blas"
 "gonum.org/v1/gonum/blas/blas64"
)

type Dlasy2er interface {
 Dlasy2(tranl, tranr bool, isgn, n1, n2 int, tl []float64, ldtl int, tr []float64, ldtr int, b []float64, ldb int, x []float64, ldx
 int) (scale, xnorm float64, ok bool)
}

func Dlasy2Test(t *testing.T, impl Dlasy2er) {
 rnd := rand.New(rand.NewSource(1))
 for _, tranl := range []bool{true, false} {
 for _, tranr := range []bool{true, false} {
 for _, isgn := range []int{1, -1} {
 for _, n1 := range []int{0, 1, 2} {
 for _, n2 := range []int{0, 1, 2} {
 for _, extra := range []int{0, 1, 2, 13} {

```

```

 for cas := 0; cas < 1000; cas++ {
 testDlasy2(t, impl, tranl, tranr, isgn, n1, n2, extra, rnd)
 }
}
}
}
}
}
}
}

func
testDlasy2(t *testing.T, impl Dlasy2er, tranl, tranr bool, isgn, n1, n2, extra int, rnd *rand.Rand) {
 const tol = 1e-10

 tl := randomGeneral(n1, n1, n1+extra, rnd)
 tr := randomGeneral(n2, n2, n2+extra, rnd)
 b := randomGeneral(n1, n2, n2+extra, rnd)
 x := randomGeneral(n1, n2, n2+extra, rnd)

 scale, xnorm, ok := impl.Dlasy2(tranl, tranr, isgn, n1, n2, tl.Data, tl.Stride, tr.Data, tr.Stride, b.Data, b.Stride, x.Data,
 x.Stride)
 if scale > 1 {
 t.Errorf("invalid value of scale, want <= 1, got %v", scale)
 }
 if n1 == 0 || n2 == 0 {
 return
 }

 prefix := fmt.Sprintf("Case n1=%v, n2=%v, isgn=%v", n1, n2, isgn)

 // Check any invalid modifications of x.
 if !generalOutsideAllNaN(x) {
 t.Errorf("%v: out-of-range write to x\n%v", prefix, x.Data)
 }

 var xnormWant float64
 for i := 0; i < n1; i++ {
 var rowsum float64
 for j := 0; j < n2; j++ {
 rowsum += math.Abs(x.Data[i*x.Stride+j])
 }
 if rowsum > xnormWant {
 xnormWant = rowsum
 }
 }
 if xnormWant != xnorm {
 t.Errorf("%v:

```

```

unexpected xnorm: want %v, got %v", prefix, xnormWant, xnorm)
}

// Multiply b by scale to get the wanted right-hand side.
for i := 0; i < n1; i++ {
 for j := 0; j < n2; j++ {
 b.Data[i*b.Stride+j] *= scale
 }
}
// Compute the wanted left-hand side.
lhsWant := randomGeneral(n1, n2, n2, rnd)
if tranl {
 blas64.Gemm(blas.Trans, blas.NoTrans, 1, tl, x, 0, lhsWant)
} else {
 blas64.Gemm(blas.NoTrans, blas.NoTrans, 1, tl, x, 0, lhsWant)
}
if tranr {
 blas64.Gemm(blas.NoTrans, blas.Trans, float64(isgn), x, tr, 1, lhsWant)
} else {
 blas64.Gemm(blas.NoTrans, blas.NoTrans, float64(isgn), x, tr, 1, lhsWant)
}
// Compare them.
for i := 0; i < n1; i++ {
 for j := 0; j < n2; j++ {
 diff := lhsWant.Data[i*lhsWant.Stride+j] - b.Data[i*b.Stride+j]
 if math.Abs(diff) > tol && ok {
 t.Errorf("%v: unexpected result, diff[%v,%v]=%v", prefix, i, j, diff)
 }
 }
}
}
graph{{{ST6}ST6}}
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// license that can be found in the LICENSE file.

package gonum

import "gonum.org/v1/gonum/blas"

// Dorm2r multiplies a general matrix C by an orthogonal matrix from a QR factorization
// determined by Dgeqrf.
// C = Q * C if side == blas.Left and trans == blas.NoTrans
// C = Q * C if side == blas.Left and trans == blas.Trans
// C = C * Q if side == blas.Right and trans == blas.NoTrans
// C = C * Q if side == blas.Right and trans == blas.Trans
// If side == blas.Left, a is a matrix of size mk, and if side == blas.Right
// a is of size nk.

```

```

//
// tau contains the Householder factors and is of length at least k and this function
// will panic otherwise.
//
// work is temporary storage of length at least n if side == blas.Left
// and at least m if side == blas.Right and this function will panic otherwise.
//
// Dorm2r is an internal routine. It is exported for testing
// purposes.
func (impl Implementation) Dorm2r(side blas.Side, trans blas.Transpose, m, n, k int, a []float64, lda int, tau, c
[]float64, ldc int, work []float64) {
 left := side == blas.Left
 switch {
 case !left && side != blas.Right:
 panic(badSide)
 case trans != blas.Trans && trans != blas.NoTrans:
 panic(badTrans)
 case m < 0:
 panic(mLT0)
 case n < 0:
 panic(nLT0)
 case k < 0:
 panic(kLT0)
 case left && k > m:
 panic(kGTM)
 case !left && k > n:
 panic(kGTN)
 case lda < max(1, k):
 panic(badLdA)
 case ldc < max(1, n):
 panic(badLdC)
 }

 // Quick return if possible.
 if m == 0 || n == 0 || k == 0 {
 return
 }

 switch {
 case left && len(a) < (m-1)*lda+k:
 panic(shortA)
 case !left && len(a) < (n-1)*lda+k:
 panic(shortA)
 case len(c) < (m-1)*ldc+n:
 panic(shortC)
 case len(tau) < k:
 panic(shortTau)
 case left && len(work) < n:

```



```

panic(shortWork)
case !left && len(work) < m:
 panic(shortWork)
}

if left {
 if trans == blas.NoTrans {
 for i := k - 1; i >= 0; i--
 {
 aii := a[i*lda+i]
 a[i*lda+i] = 1
 impl.Dlarf(side, m-i, n, a[i*lda+i:], lda, tau[i], c[i*ldc:], ldc, work)
 a[i*lda+i] = aii
 }
 return
 }
 for i := 0; i < k; i++ {
 aii := a[i*lda+i]
 a[i*lda+i] = 1
 impl.Dlarf(side, m-i, n, a[i*lda+i:], lda, tau[i], c[i*ldc:], ldc, work)
 a[i*lda+i] = aii
 }
 return
}
if trans == blas.NoTrans {
 for i := 0; i < k; i++ {
 aii := a[i*lda+i]
 a[i*lda+i] = 1
 impl.Dlarf(side, m, n-i, a[i*lda+i:], lda, tau[i], c[i:], ldc, work)
 a[i*lda+i] = aii
 }
 return
}
for i := k - 1; i >= 0; i-- {
 aii := a[i*lda+i]
 a[i*lda+i] = 1
 impl.Dlarf(side, m, n-i, a[i*lda+i:], lda, tau[i], c[i:], ldc, work)
 a[i*lda+i] = aii
}
}
Graph{{Grap5[]Grap5[]Grap5[]Grap5}Grap5}
module golang.org/x/time
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package gonum

```

```

import (
 "math"

 "gonum.org/v1/gonum/blas"
 "gonum.org/v1/gonum/lapack"
)

// Dlansb returns the given norm of an nn symmetric band matrix with kd
// super-diagonals.
//
// When norm is lapack.MaxColumnSum or lapack.MaxRowSum, the length of work must
// be at least n.
func (impl Implementation) Dlansb(norm lapack.MatrixNorm, uplo blas.Uplo, n, kd int, ab []float64, ldab int, work
[]float64) float64 {
 switch {
 case norm != lapack.MaxAbs && norm != lapack.MaxRowSum && norm != lapack.MaxColumnSum && norm !=
lapack.Frobenius:
 panic(badNorm)
 case uplo != blas.Upper && uplo != blas.Lower:
 panic(badUplo)
 case n < 0:
 panic(nLT0)
 case kd < 0:
 panic(kdLT0)
 case ldab < kd+1:
 panic(badLdA)
 }

 // Quick return if possible.
 if n == 0 {
 return 0
 }

 switch {
 case len(ab) < (n-1)*ldab+kd+1:
 panic(shortAB)
 case
len(work) < n && (norm == lapack.MaxColumnSum || norm == lapack.MaxRowSum):
 panic(shortWork)
 }

 var value float64
 switch norm {
 case lapack.MaxAbs:
 if uplo == blas.Upper {
 for i := 0; i < n; i++ {
 for j := 0; j < min(n-i, kd+1); j++ {
 aij := math.Abs(ab[i*ldab+j])

```

```

 if aij > value || math.IsNaN(aij) {
 value = aij
 }
}
} else {
 for i := 0; i < n; i++ {
 for j := max(0, kd-i); j < kd+1; j++ {
 aij := math.Abs(ab[i*ldab+j])
 if aij > value || math.IsNaN(aij) {
 value = aij
 }
 }
 }
}
}

case lapack.MaxColumnSum, lapack.MaxRowSum:
 work = work[:n]
 var sum float64
 if uplo == blas.Upper {
 for i := range work {
 work[i] = 0
 }
 for i := 0; i < n; i++ {
 sum := work[i] + math.Abs(ab[i*ldab])
 for j := i + 1; j < min(i+kd+1, n); j++ {
 aij := math.Abs(ab[i*ldab+j-i])
 sum += aij
 work[j] += aij
 }
 if sum > value || math.IsNaN(sum) {
 value = sum
 }
 }
 } else {
 for
i := 0; i < n; i++ {
 sum = 0
 for j := max(0, i-kd); j < i; j++ {
 aij := math.Abs(ab[i*ldab+kd+j-i])
 sum += aij
 work[j] += aij
 }
 work[i] = sum + math.Abs(ab[i*ldab+kd])
 }
 for _, sum := range work {
 if sum > value || math.IsNaN(sum) {
 value = sum
 }
 }
 }
}

```

```

}
}
case lapack.Frobenius:
scale := 0.0
ssq := 1.0
if uplo == blas.Upper {
if kd > 0 {
// Sum off-diagonals.
for i := 0; i < n-1; i++ {
ilen := min(n-i-1, kd)
rowscale, rowssq := impl.Dlassq(ilen, ab[i*ldab+1:], 1, 0, 1)
scale, ssq = impl.Dcombssq(scale, ssq, rowscale, rowssq)
}
ssq *= 2
}
// Sum diagonal.
dscale, dssq := impl.Dlassq(n, ab, ldab, 0, 1)
scale, ssq = impl.Dcombssq(scale, ssq, dscale, dssq)
} else {
if kd > 0 {
// Sum off-diagonals.
for i := 1; i < n; i++ {
ilen := min(i, kd)
rowscale, rowssq := impl.Dlassq(ilen, ab[i*ldab+kd-ilen:], 1, 0, 1)
scale, ssq = impl.Dcombssq(scale, ssq, rowscale, rowssq)
}
ssq
*= 2
}
// Sum diagonal.
dscale, dssq := impl.Dlassq(n, ab[kd:], ldab, 0, 1)
scale, ssq = impl.Dcombssq(scale, ssq, dscale, dssq)
}
value = scale * math.Sqrt(ssq)
}

return value
}
graph{SUBG{SUBG{SUBG{SUBG{SUBG{SUBG{SUBG{SUBG}}}}}}SUBG}}}
graph{{{S}S}S}{S}S{S}}
// Copyright 2017 The Gonum Authors. All rights reserved.
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// license that can be found in the LICENSE file.

package spatial_test

import (
 "fmt"

```

```

"math"

"gonum.org/v1/gonum/floats"
"gonum.org/v1/gonum/mat"
"gonum.org/v1/gonum/stat/spatial"
)

// Euclid is a mat.Matrix whose elements reflects the Euclidean
// distance between a series of unit-separated points strided
// to be arranged in an x by y grid.
type Euclid struct{ x, y int }

func (e Euclid) Dims() (r, c int) { return e.x * e.y, e.x * e.y }
func (e Euclid) At(i, j int) float64 {
 d := e.x * e.y
 if i < 0 || d <= i || j < 0 || d <= j {
 panic("bounds error")
 }
 if i == j {
 return 0
 }
 x := float64(j%e.x - i%e.x)
 y := float64(j/e.x - i/e.x)
 return 1 / math.Hypot(x, y)
}
func (e Euclid) T() mat.Matrix { return mat.Transpose{e} }

func ExampleGlobalMoransI_areal() {
 locality := Euclid{10, 10}

 data1 := []float64{
 1, 0, 0, 1, 0, 0, 1, 0, 0, 0,
 0, 1, 1, 0, 0, 1, 0,
 0, 0, 0,
 1, 0, 0, 1, 0, 0, 0, 0, 1, 0,
 0, 0, 1, 0, 1, 0, 1, 0, 0, 0,
 1, 0, 0, 0, 0, 0, 0, 1, 0, 0,
 0, 0, 0, 0, 1, 0, 0, 0, 0, 0,
 0, 0, 1, 0, 0, 0, 1, 0, 1, 0,
 1, 0, 0, 0, 0, 0, 0, 0, 0, 0,
 0, 0, 1, 0, 1, 0, 1, 0, 0, 0,
 1, 0, 0, 0, 0, 0, 0, 0, 1, 0,
 }
 i1, _, z1 := spatial.GlobalMoransI(data1, nil, locality)

 data2 := []float64{
 0, 0, 0, 0, 0, 0, 0, 0, 0, 0,
 0, 0, 0, 0, 0, 0, 0, 0, 0, 0,
 }

```

```

0, 0, 0, 1, 1, 0, 0, 0, 0, 0,
0, 0, 1, 1, 1, 1, 0, 0, 0, 0,
0, 0, 1, 1, 1, 1, 0, 0, 0, 0,
0, 0, 0, 1, 1, 1, 0, 0, 0, 0,
0, 0, 0, 0, 1, 0, 0, 0, 1, 0,
0, 0, 0, 0, 0, 0, 1, 1, 1,
0, 0, 0, 0, 0, 0, 1, 1, 1,
0, 0, 0, 0, 0, 0, 1, 1, 1,
}
i2, _, z2 := spatial.GlobalMoransI(data2, nil, locality)

fmt.Printf("%v scattered points Moran's I=%v z-score=%v\n", floats.Sum(data1), i1, z1)
fmt.Printf("%v clustered points Moran's I=%v z-score=%v\n", floats.Sum(data2), i2, z2)

// Output:
//
// 24 scattered points Moran's I=-0.02999 z-score=-1.913
// 24 clustered
points Moran's I=0.09922 z-score=10.52
}
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// license that can be found in the LICENSE file.

/*
* Cephes Math Library Release 2.1: January, 1989
* Copyright 1984, 1987, 1989 by Stephen L. Moshier
* Direct inquiries to 30 Frost Street, Cambridge, MA 02140
*/

package cephes

import "math"

// TODO(btracey): There is currently an implementation of this functionality
// in gonum/stat/distuv. Find out which implementation is better, and rectify
// by having distuv call this, or moving this implementation into
// gonum/mathext/internal/gonum.

// math.Sqrt(2*pi)
const s2pi = 2.50662827463100050242e0

// approximation for 0 <= |y - 0.5| <= 3/8
var P0 = [5]float64{
-5.99633501014107895267e1,
9.80010754185999661536e1,
-5.66762857469070293439e1,
1.39312609387279679503e1,

```

```

-1.23916583867381258016e0,
}

var Q0 = [8]float64{
/* 1.00000000000000000000E0, */
1.95448858338141759834e0,
4.67627912898881538453e0,
8.63602421390890590575e1,
-2.25462687854119370527e2,
2.00260212380060660359e2,
-8.20372256168333339912e1,
1.59056225126211695515e1,
-1.18331621121330003142e0,
}

//
Approximation for interval $z = \text{math.Sqrt}(-2 \log y)$ between 2 and 8
// i.e., y between $\exp(-2) = .135$ and $\exp(-32) = 1.27\text{e-}14$.
var P1 = [9]float64{
4.05544892305962419923e0,
3.15251094599893866154e1,
5.71628192246421288162e1,
4.40805073893200834700e1,
1.46849561928858024014e1,
2.18663306850790267539e0,
-1.40256079171354495875e-1,
-3.50424626827848203418e-2,
-8.57456785154685413611e-4,
}

var Q1 = [8]float64{
/* 1.00000000000000000000E0, */
1.57799883256466749731e1,
4.53907635128879210584e1,
4.13172038254672030440e1,
1.50425385692907503408e1,
2.50464946208309415979e0,
-1.42182922854787788574e-1,
-3.80806407691578277194e-2,
-9.33259480895457427372e-4,
}

// Approximation for interval $z = \text{math.Sqrt}(-2 \log y)$ between 8 and 64
// i.e., y between $\exp(-32) = 1.27\text{e-}14$ and $\exp(-2048) = 3.67\text{e-}890$.
var P2 = [9]float64{
3.23774891776946035970e0,
6.91522889068984211695e0,
3.93881025292474443415e0,

```

```

1.33303460815807542389e0,
2.01485389549179081538e-1,
1.23716634817820021358e-2,
3.01581553508235416007e-4,
2.65806974686737550832e-6,
6.23974539184983293730e-9,
}

var
Q2 = [8]float64{
/* 1.00000000000000000000E0, */
6.02427039364742014255e0,
3.67983563856160859403e0,
1.37702099489081330271e0,
2.16236993594496635890e-1,
1.34204006088543189037e-2,
3.28014464682127739104e-4,
2.89247864745380683936e-6,
6.79019408009981274425e-9,
}

// Ndtri returns the argument, x, for which the area under the
// Gaussian probability density function (integrated from
// minus infinity to x) is equal to y.
func Ndtri(y0 float64) float64 {
// For small arguments $0 < y < \exp(-2)$, the program computes
// $z = \text{math.Sqrt}(-2.0 * \text{math.Log}(y))$; then the approximation is
// $x = z - \text{math.Log}(z)/z - (1/z) P(1/z) / Q(1/z)$.
// There are two rational functions P/Q, one for $0 < y < \exp(-32)$
// and the other for y up
// to $\exp(-2)$. For larger arguments,
// $w = y - 0.5$, and $x/\text{math.Sqrt}(2\pi) = w + w^3 R(w^2)/S(w^2)$.
var x, y, z, y2, x0, x1 float64
var code int

if y0 <= 0.0 {
if y0 < 0 {
panic(badParamOutOfBounds)
}
return math.Inf(-1)
}
if y0 >= 1.0 {
if y0 > 1 {
panic(badParamOutOfBounds)
}
return math.Inf(1)
}
code = 1

```



```

y = y0
if y > (1.0 - 0.13533528323661269189) { /* 0.135... = exp(-2) */
 y = 1.0 - y
 code = 0
}

if y > 0.13533528323661269189 {
 y = y - 0.5
 y2 = y * y
 x = y + y*(y2*polevl(y2, P0[:], 4)/p1evl(y2, Q0[:], 8))
 x = x * s2pi
 return (x)
}

x = math.Sqrt(-2.0 * math.Log(y))
x0 = x - math.Log(x)/x

z = 1.0 / x
if x < 8.0 { /* y > exp(-32) = 1.2664165549e-14 */
 x1 = z * polevl(z, P1[:], 8) / p1evl(z, Q1[:], 8)
} else {
 x1 = z * polevl(z, P2[:], 8) / p1evl(z, Q2[:], 8)
}
x = x0 - x1
if code != 0 {
 x = -x
}
return (x)
}
graph{{{SUBG0{SUBG9}}}SUBG0{SUBG9}}}
graph{strict}
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// license that can be found in the LICENSE file.

package gonum

import (
 "math"

 "gonum.org/v1/gonum/blas"
 "gonum.org/v1/gonum/blas/blas64"
)

// Dpbtf2 computes the Cholesky factorization of a symmetric positive banded
// matrix ab. The matrix ab is nn with kd diagonal bands. The Cholesky
// factorization computed is
// A = U * U if ul == blas.Upper

```

```

// A = L * L if ul == blas.Lower
// ul also specifies the storage of ab. If ul == blas.Upper, then
// ab is stored as an upper-triangular banded matrix with kd super-diagonals,
// and if ul == blas.Lower, ab is stored as a lower-triangular banded matrix
// with kd sub-diagonals. On exit, the banded matrix U or L is stored in-place
// into ab depending on the value of ul. Dpbtf2 returns whether the factorization
// was successfully completed.
//
// The band storage scheme is illustrated below when n = 6, and kd = 2.
// The
// resulting Cholesky decomposition is stored in the same elements as the
// input band matrix (a11 becomes u11 or l11, etc.).
//
// ul = blas.Upper
// a11 a12 a13
// a22 a23 a24
// a33 a34 a35
// a44 a45 a46
// a55 a56 *
// a66 * *
//
// ul = blas.Lower
// * * a11
// * a21 a22
// a31 a32 a33
// a42 a43 a44
// a53 a54 a55
// a64 a65 a66
//
// Dpbtf2 is the unblocked version of the algorithm, see Dpbtrf for the blocked
// version.
//
// Dpbtf2 is an internal routine, exported for testing purposes.
func (Implementation) Dpbtf2(uplo blas.Uplo, n, kd int, ab []float64, ldab int) (ok bool) {
 switch {
 case uplo != blas.Upper && uplo != blas.Lower:
 panic(badUplo)
 case n < 0:
 panic(nLT0)
 case kd < 0:
 panic(kdLT0)
 case ldab < kd+1:
 panic(badLdA)
 }

 // Quick return if possible.
 if n == 0 {
 return true
 }

```

```

}

if len(ab) < (n-1)*ldab+kd+1 {
 panic(shortAB)
}

bi := blas64.Implementation()

kld := max(1, ldab-1)
if uplo == blas.Upper {
 // Compute the Cholesky
 factorization A = U * U.
 for j := 0; j < n; j++ {
 // Compute U(j,j) and test for non-positive-definiteness.
 ajj := ab[j*ldab]
 if ajj <= 0 {
 return false
 }
 ajj = math.Sqrt(ajj)
 ab[j*ldab] = ajj
 // Compute elements j+1:j+kn of row j and update the trailing submatrix
 // within the band.
 kn := min(kd, n-j-1)
 if kn > 0 {
 bi.Dscal(kn, 1/ajj, ab[j*ldab+1:], 1)
 bi.Dsyr(blas.Upper, kn, -1, ab[j*ldab+1:], 1, ab[(j+1)*ldab:], kld)
 }
 }
 return true
}
// Compute the Cholesky factorization A = L * L.
for j := 0; j < n; j++ {
 // Compute L(j,j) and test for non-positive-definiteness.
 ajj := ab[j*ldab+kd]
 if ajj <= 0 {
 return false
 }
 ajj = math.Sqrt(ajj)
 ab[j*ldab+kd] = ajj
 // Compute elements j+1:j+kn of column j and update the trailing submatrix
 // within the band.
 kn := min(kd, n-j-1)
 if kn > 0 {
 bi.Dscal(kn, 1/ajj, ab[(j+1)*ldab+kd-1:], kld)
 bi.Dsyr(blas.Lower, kn, -1, ab[(j+1)*ldab+kd-1:], kld, ab[(j+1)*ldab+kd:],
kld)
 }
}
}

```

```

return true
}
graph{SubgraG}
graph{{{subGr}subGr{subGr}subGr}subGr}}
graph{{{EDGD}}}}
graph{{{{{Gra_}Gra_}Gra_}Gra_}}
graph{SubgraN{{{SubgraP}}}}
graph{{{N}N}N}
digraph stru{stru[]stru[]stru->stru->stru stru->stru}
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// license that can be found in the LICENSE file.

package gonum

import "math"

// Dlaev2 computes the Eigen decomposition of a symmetric 22 matrix.
// The matrix is given by
// [a b]
// [b c]
// Dlaev2 returns rt1 and rt2, the eigenvalues of the matrix where |RT1| > |RT2|,
// and [cs1, sn1] which is the unit right eigenvalue for RT1.
// [cs1 sn1] [a b] [cs1 -sn1] = [rt1 0]
// [-sn1 cs1] [b c] [sn1 cs1] [0 rt2]
//
// Dlaev2 is an internal routine. It is exported for testing purposes.
func (impl Implementation) Dlaev2(a, b, c float64) (rt1, rt2, cs1, sn1 float64) {
 sm := a + c
 df := a - c
 adf := math.Abs(df)
 tb := b + b
 ab := math.Abs(tb)
 acmx := c
 acmn := a
 if math.Abs(a) > math.Abs(c) {
 acmx = a
 acmn = c
 }
 var rt float64
 if adf > ab {
 rt = adf * math.Sqrt(1+(ab/adf)*(ab/adf))
 } else if adf < ab {
 rt = ab * math.Sqrt(1+(adf/ab)*(adf/ab))
 } else
 {
 rt = ab * math.Sqrt(2)
 }
}

```

```

var sgn1 float64
if sm < 0 {
 rt1 = 0.5 * (sm - rt)
 sgn1 = -1
 rt2 = (acmx/rt1)*acmn - (b/rt1)*b
} else if sm > 0 {
 rt1 = 0.5 * (sm + rt)
 sgn1 = 1
 rt2 = (acmx/rt1)*acmn - (b/rt1)*b
} else {
 rt1 = 0.5 * rt
 rt2 = -0.5 * rt
 sgn1 = 1
}
var cs, sgn2 float64
if df >= 0 {
 cs = df + rt
 sgn2 = 1
} else {
 cs = df - rt
 sgn2 = -1
}
acs := math.Abs(cs)
if acs > ab {
 ct := -tb / cs
 sn1 = 1 / math.Sqrt(1+ct*ct)
 cs1 = ct * sn1
} else {
 if ab == 0 {
 cs1 = 1
 sn1 = 0
 } else {
 tn := -cs / tb
 cs1 = 1 / math.Sqrt(1+tn*tn)
 sn1 = tn * cs1
 }
}
if sgn1 == sgn2 {
 tn := cs1
 cs1 = -sn1
 sn1 = tn
}
return rt1, rt2, cs1, sn1
}
// SPDX-License-Identifier: Unlicense OR MIT

/*
Package bluetooth implements permissions to access Bluetooth and Bluetooth

```

Low Energy hardware, including the ability to discover and pair devices.

## Android

The following entries will be added to AndroidManifest.xml:

```
<uses-permission android:name="android.permission.BLUETOOTH"/>
<uses-permission android:name="android.permission.BLUETOOTH_ADMIN"/>
<uses-permission android:name="android.permission.ACCESS_FINE_LOCATION"/>
<uses-feature android:name="android.hardware.bluetooth" android:required="false"/>
<uses-feature android:name="android.hardware.bluetooth_le" android:required="false"/>
```

Note that ACCESS\_FINE\_LOCATION is required on Android before the Bluetooth device may be used.

See <https://developer.android.com/guide/topics/connectivity/bluetooth>.

ACCESS\_FINE\_LOCATION is a "dangerous" permission. See documentation for package [gioui.org/app/permission](https://developer.android.com/reference/android/permission/ACCESS_FINE_LOCATION) for more information.

\*/

package bluetooth

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package r2

// Vec is a 2D vector.

type Vec struct {

  X, Y float64

}

// Add returns the vector sum of p and q.

func (p Vec) Add(q Vec) Vec {

  p.X += q.X

  p.Y += q.Y

  return p

}

// Sub returns the vector sum of p and -q.

func (p Vec) Sub(q Vec) Vec {

  p.X -= q.X

  p.Y -= q.Y

  return p

}

// Scale returns the vector p scaled by f.

func (p Vec) Scale(f float64) Vec {

  p.X \*= f

```

p.Y *= f
return p
}

// Box is a 2D bounding box.
type Box struct {
 Min, Max Vec
}
graph{{Su}Su}
graph{DigraG{DigraG}}
// Code generated by "go generate gonum.org/v1/gonum/unit/constant; DO NOT EDIT.

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package constant

import "gonum.org/v1/gonum/unit"

// ElementaryCharge, is the elementary charge constant (e), the magnitude of electric charge carried by a single
// proton or electron.
// The dimensions of ElementaryCharge are A s. The constant is exact.
const ElementaryCharge = unit.Charge(1.602176634e-19)
graph{{Subg{Subg}Subg{Subg}{Subg}}}
graph{EDGE{EDGE{EDGE{EDGE{EDGE}}}}}
Graph{{Subgr_}Subgr_}
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// Package c128 provides complex128 vector primitives.
package c128 // import "gonum.org/v1/gonum/internal/asm/c128"
graph{SU{SU{SU{SU{S{SU{SU{SU{SU{SU{SU}}}}}}}}}}
graph{{SubGraG}{SubGraU}}
Graph{SubgrK{{{SubgrN}{SubgrN}}}}
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// Package network provides network analysis functions.
package network // import "gonum.org/v1/gonum/graph/network"
digraph{sw->sw:sw->sw:sw:sw}
/**
source: https://github.com/golang/freetype/blob/master/LICENSE
**/
{{Types "Freetype"}}

```

Use of the Freetype-Go software is subject to your choice of exactly one of the following two licenses:

- \* The FreeType License, which is similar to the original BSD license with an advertising clause, or
- \* The GNU General Public License (GPL), version 2 or later.

The text of these licenses are available in the licenses/ftl.txt and the licenses/gpl.txt files respectively. They are also available at <http://freetype.sourceforge.net/license.html>

The Luxi fonts in the testdata directory are licensed separately. See the testdata/COPYING file for details.

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package distmv

```
var (
 badQuantile = "distmv: quantile not between 0 and 1"
 badReceiver = "distmv: input slice is not nil or the correct length"
 badSizeMismatch = "distmv: size mismatch"
 badZeroDimension = "distmv: zero dimensional input"
 nonPosDimension = "distmv: non-positive dimension input"
)
```

```
const logTwoPi = 1.8378770664093454835606594728112352797227949472755668
```

// useAs gets a slice of size n. If len(x) == n, x is returned, if len(x) == 0

// then a slice is returned of length n.

```
func reuseAs(x []float64, n int) []float64 {
```

```
 if len(x) == n {
```

```
 return x
```

```
 }
```

```
 if len(x) == 0 {
```

```
 if cap(x) >= n {
```

```
 return x[:n]
```

```
 }
```

```
 return make([]float64, n)
```

```
 }
```

```
 panic(badReceiver)
```

```
}
```

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package mat



```

import (
 "math"
 "testing"

 "golang.org/x/exp/rand"

 "gonum.org/v1/gonum/blas/blas64"
)

func TestQR(t *testing.T) {
 for _, test := range []struct {
 m, n int
 }{
 {5, 5},
 {10, 5},
 } {
 m := test.m
 n := test.n
 a := NewDense(m, n, nil)
 for i := 0; i < m; i++ {
 for j := 0; j < n; j++ {
 a.Set(i, j, rand.NormFloat64())
 }
 }
 var want Dense
 want.CloneFrom(a)

 var qr QR
 qr.Factorize(a)
 var q, r Dense
 qr.QTo(&q)

 if !isOrthonormal(&q, 1e-10) {
 t.Errorf("Q is not orthonormal: m = %v, n = %v", m, n)
 }

 qr.RTo(&r)

 var got Dense
 got.Mul(&q, &r)
 if !EqualApprox(&got, &want, 1e-12) {
 t.Errorf("QR does not equal original matrix. \nWant: %v\nGot: %v", want, got)
 }
 }
}

func isOrthonormal(q *Dense, tol float64) bool {
 m, n := q.Dims()

```

```

if m != n {
 return false
}
for
i := 0; i < m; i++ {
 for j := i; j < m; j++ {
 dot := blas64.Dot(blas64.Vector{N: m, Inc: 1, Data: q.mat.Data[i*q.mat.Stride:]},
 blas64.Vector{N: m, Inc: 1, Data: q.mat.Data[j*q.mat.Stride:]})
 // Dot product should be 1 if i == j and 0 otherwise.
 if i == j && math.Abs(dot-1) > tol {
 return false
 }
 if i != j && math.Abs(dot) > tol {
 return false
 }
 }
}
return true
}

```

```

func TestQRSolveTo(t *testing.T) {
 for _, trans := range []bool{false, true} {
 for _, test := range []struct {
 m, n, bc int
 }{
 {5, 5, 1},
 {10, 5, 1},
 {5, 5, 3},
 {10, 5, 3},
 } {
 m := test.m
 n := test.n
 bc := test.bc
 a := NewDense(m, n, nil)
 for i := 0; i < m; i++ {
 for j := 0; j < n; j++ {
 a.Set(i, j, rand.Float64())
 }
 }
 br := m
 if trans {
 br = n
 }
 b := NewDense(br, bc, nil)
 for i := 0; i < br; i++ {
 for j := 0; j < bc; j++ {
 b.Set(i, j, rand.Float64())
 }
 }
 }
 }
}

```

```

 }
 var x Dense
 var qr QR
 qr.Factorize(a)
 qr.SolveTo(&x,
trans, b)

 // Test that the normal equations hold.
 // A * A * x = A * b if !trans
 // A * A * x = A * b if trans
 var lhs Dense
 var rhs Dense
 if trans {
 var tmp Dense
 tmp.Mul(a, a.T())
 lhs.Mul(&tmp, &x)
 rhs.Mul(a, b)
 } else {
 var tmp Dense
 tmp.Mul(a.T(), a)
 lhs.Mul(&tmp, &x)
 rhs.Mul(a.T(), b)
 }
 if !EqualApprox(&lhs, &rhs, 1e-10) {
 t.Errorf("Normal equations do not hold.\nLHS: %v\n, RHS: %v\n", lhs, rhs)
 }
}
}
}
// TODO(btracey): Add in testOneInput when it exists.
}

func TestQRSolveVecTo(t *testing.T) {
 for _, trans := range []bool{false, true} {
 for _, test := range []struct {
 m, n int
 }{
 {5, 5},
 {10, 5},
 } {
 m := test.m
 n := test.n
 a := NewDense(m, n, nil)
 for i := 0; i < m; i++ {
 for j := 0; j < n; j++ {
 a.Set(i, j, rand.Float64())
 }
 }
 br := m

```

```

 if trans {
 br = n
 }
 b := NewVecDense(br, nil)
 for i := 0; i < br; i++ {
 b.SetVec(i, rand.Float64())
 }
 var
x VecDense
 var qr QR
 qr.Factorize(a)
 qr.SolveVecTo(&x, trans, b)

 // Test that the normal equations hold.
 // A * A * x = A * b if !trans
 // A * A * x = A * b if trans
 var lhs Dense
 var rhs Dense
 if trans {
 var tmp Dense
 tmp.Mul(a, a.T())
 lhs.Mul(&tmp, &x)
 rhs.Mul(a, b)
 } else {
 var tmp Dense
 tmp.Mul(a.T(), a)
 lhs.Mul(&tmp, &x)
 rhs.Mul(a.T(), b)
 }
 if !EqualApprox(&lhs, &rhs, 1e-10) {
 t.Errorf("Normal equations do not hold.\nLHS: %v\n, RHS: %v\n", lhs, rhs)
 }
}

// TODO(btracey): Add in testOneInput when it exists.
}

func TestQRSolveCondTo(t *testing.T) {
 for _, test := range []*Dense{
 NewDense(2, 2, []float64{1, 0, 0, 1e-20}),
 NewDense(3, 2, []float64{1, 0, 0, 1e-20, 0, 0}),
 } {
 m, _ := test.Dims()
 var qr QR
 qr.Factorize(test)
 b := NewDense(m, 2, nil)
 var x Dense
 if err := qr.SolveTo(&x, false, b); err == nil {

```

```

t.Error("No error for near-singular matrix in matrix solve.")
}

bvec
:= NewVecDense(m, nil)
var xvec VecDense
if err := qr.SolveVecTo(&xvec, false, bvec); err == nil {
 t.Error("No error for near-singular matrix in matrix solve.")
}
}
}
}
graph{{DIGRAR{{{DIGRAR}}}}}
graph{{{EDv{{{EDv}EDv}{EDv{{{EDv}}}}}EDv}{EDv{{{EDv}}EDv}}}}}
graph{{"p2w9_9v0H3_9v3M6_5_0i{o1h1G1{s4_3_3O1_1g8k8q8_1G1O0S5u4T4q9H7G1_8t9}""Q0p2w9_9v0H3_9v3M6_5_0i{o1h1G1{s4_3_3O1_1g8k8q8_1G1O0S5u4T4q9H7G1_8t9}""Q0p2w9_9v0H3_9v3M6_5_0i{s4_3_3O1_1g8k8q8_1G1O0S5u4T4q9H7G1_8t9}}}}
graph{NOD0}
/** github.com/pathcl/GoCourse@v0.0.0-20200717073734-ce7d49ee58a2 **/

{{Types "CC-BY-SA-4.0"}}

```

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```
package gonum
```

```
import (
```

```
"math"
```

```
"gonum.org/v1/gonum/blas"
```

```
"gonum.org/v1/gonum/blas/blas64"
```

```
)
```

```
// Dpbcon returns an estimate of the reciprocal of the condition number (in the
```

```
// 1-norm) of an nn symmetric positive definite band matrix using the Cholesky
```

```
// factorization
```

```
// A = U*U if uplo == blas.Upper
```

```
// A = L*L if uplo == blas.Lower
```

```
// computed by Dpbtrf. The estimate is obtained for norm(inv(A)), and the
```

```
// reciprocal of the condition number is computed as
```

```
// rcond = 1 / (anorm * norm(inv(A))).
```

```
//
```

```
// The length of work must be at least 3*n and the length of iwork must be at
```

```
// least n.
```

```
func (impl Implementation) Dpbcon(uplo blas.Uplo, n, kd int, ab []float64, ldab int, anorm float64, work []float64,
```

```
iwork []int) (rcond float64) {
```

```

switch {
case uplo != blas.Upper && uplo != blas.Lower:
 panic(badUplo)
case n < 0:
 panic(nLT0)
case
kd < 0:
 panic(kdLT0)
case ldab < kd+1:
 panic(badLdA)
case anorm < 0:
 panic(badNorm)
}

```

```

// Quick return if possible.
if n == 0 {
 return 1
}

```

```

switch {
case len(ab) < (n-1)*ldab+kd+1:
 panic(shortAB)
case len(work) < 3*n:
 panic(shortWork)
case len(iwork) < n:
 panic(shortIWork)
}

```

```

// Quick return if possible.
if anorm == 0 {
 return 0
}

```

```

const smlnum = dlamchS

```

```

var (
 ainvm float64
 kase int
 isave [3]int
 normin bool

```

```

// Denote work slices.
x = work[:n]
v = work[n : 2*n]
cnorm = work[2*n : 3*n]
)
// Estimate the 1-norm of the inverse.
bi := blas64.Implementation()

```

```

for {
 ainvnm, kase = impl.Dlacn2(n, v, x, iwork, ainvnm, kase, &isave)
 if kase == 0 {
 break
 }
 var op1, op2 blas.Transpose
 if uplo == blas.Upper {
 // Multiply x by inv(U),
 op1 = blas.Trans
 // then by inv(U).
 op2 = blas.NoTrans
 } else {
 // Multiply x by inv(L),
 op1 = blas.NoTrans
 // then by inv(L).
 op2 = blas.Trans
 }
 scaleL
:= impl.Dlatbs(uplo, op1, blas.NonUnit, normin, n, kd, ab, ldab, x, cnorm)
 normin = true
 scaleU := impl.Dlatbs(uplo, op2, blas.NonUnit, normin, n, kd, ab, ldab, x, cnorm)
 // Multiply x by 1/scale if doing so will not cause overflow.
 scale := scaleL * scaleU
 if scale != 1 {
 ix := bi.Idamax(n, x, 1)
 if scale < math.Abs(x[ix])*smlnum || scale == 0 {
 return 0
 }
 impl.Drscl(n, scale, x, 1)
 }
}
if ainvnm == 0 {
 return 0
}
// Return the estimate of the reciprocal condition number.
return (1 / ainvnm) / anorm
}
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// license that can be found in the LICENSE file.

package f32

import (
 "fmt"
 "testing"
)

```

```

var (
 benchSink float32
 benchSink64 float64
)

func BenchmarkDotUnitary(t *testing.B) {
 const name = "DotUnitary"
 for _, v := range []int64{1, 2, 3, 4, 5, 10, 100, 1e3, 5e3, 1e4, 5e4} {
 t.Run(fmt.Sprintf("%s-%d", name, v), func(b *testing.B) {
 x, y := x[:v], y[:v]
 b.SetBytes(32 * v)
 for i := 0; i < b.N; i++ {
 benchSink = DotUnitary(x, y)
 }
 })
 }
}

```

```

func BenchmarkDdotUnitary(t *testing.B) {
 const name = "DdotUnitary"
 for _, v := range []int64{1, 2, 3, 4, 5, 10, 100, 1e3, 5e3, 1e4, 5e4} {
 t.Run(fmt.Sprintf("%s-%d", name, v), func(b *testing.B) {
 x, y := x[:v], y[:v]
 b.SetBytes(32 * v)
 for i := 0; i < b.N; i++ {
 benchSink64 = DdotUnitary(x, y)
 }
 })
 }
}

```

```

var incsDot = []struct {
 len int
 inc []int
}{
 {1, []int{1}},
 {3, []int{1, 2, 4, 10}},
 {10,
 []int{1, 2, 4, 10}},
 {30, []int{1, 2, 4, 10}},
 {1e2, []int{1, 2, 4, 10}},
 {3e2, []int{1, 2, 4, 10}},
 {1e3, []int{1, 2, 4, 10}},
 {3e3, []int{1, 2, 4, 10}},
 {1e4, []int{1, 2, 4, 10, -1, -2, -4, -10}},
}

```

```

func BenchmarkDotInc(t *testing.B) {

```



```

const name = "DotInc"
for _, tt := range incsDot {
 for _, inc := range tt.inc {
 t.Run(fmt.Sprintf("%s-%d-inc(%d)", name, tt.len, inc), func(b *testing.B) {
 b.SetBytes(int64(32 * tt.len))
 idx := 0
 if inc < 0 {
 idx = (-tt.len + 1) * inc
 }
 for i := 0; i < b.N; i++ {
 benchSink = DotInc(x, y, uintptr(tt.len), uintptr(inc), uintptr(inc), uintptr(idx), uintptr(idx))
 }
 })
 }
}

func BenchmarkDdotInc(t *testing.B) {
 const name = "DdotInc"
 for _, tt := range incsDot {
 for _, inc := range tt.inc {
 t.Run(fmt.Sprintf("%s-%d-inc(%d)", name, tt.len, inc), func(b *testing.B) {
 b.SetBytes(int64(32 * tt.len))
 idx := 0
 if inc < 0 {
 idx = (-tt.len + 1) * inc
 }
 for i := 0; i < b.N;
 i++ {
 benchSink64 = DdotInc(x, y, uintptr(tt.len), uintptr(inc), uintptr(inc), uintptr(idx), uintptr(idx))
 }
 })
 }
}

graph{{subGr_{subGr_{subGr_}}{subGr_{subGr_}}{{subGr_{subGr_}}{subGr_{subGr_}}{subGr_{subGr_}}{subGr_}}}}
// Code generated by "go generate gonum.org/v1/gonum/unit; DO NOT EDIT.

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// license that can be found in the LICENSE file.

package unit

import (
 "errors"
 "fmt"
 "math"

```

```

"unicode/utf8"
)

// Velocity represents a velocity in metres per second.
type Velocity float64

// Unit converts the Velocity to a *Unit
func (v Velocity) Unit() *Unit {
 return New(float64(v), Dimensions{
 LengthDim: 1,
 TimeDim: -1,
 })
}

// Velocity allows Velocity to implement a Velocityer interface
func (v Velocity) Velocity() Velocity {
 return v
}

// From converts the unit into the receiver. From returns an
// error if there is a mismatch in dimension
func (v *Velocity) From(u Uniter) error {
 if !DimensionsMatch(u, Velocity(0)) {
 *v = Velocity(math.NaN())
 return errors.New("Dimension mismatch")
 }
 *v = Velocity(u.Unit().Value())
 return nil
}

func (v Velocity) Format(fs fmt.State, c rune)
{
 switch c {
 case 'v':
 if fs.Flag('#') {
 fmt.Fprintf(fs, "%T(%v)", v, float64(v))
 return
 }
 fallthrough
 case 'e', 'E', 'f', 'F', 'g', 'G':
 p, pOk := fs.Precision()
 w, wOk := fs.Width()
 const unit = " m s^-1"
 switch {
 case pOk && wOk:
 fmt.Fprintf(fs, "%*.*"+string(c), pos(w-utf8.RuneCount([]byte(unit))), p, float64(v))
 case pOk:
 fmt.Fprintf(fs, "%.*"+string(c), p, float64(v))

```

```

case wOk:
 fmt.Fprintf(fs, "%*" + string(c), pos(w-utf8.RuneCount([]byte(unit))), float64(v))
default:
 fmt.Fprintf(fs, "%" + string(c), float64(v))
}
fmt.Fprint(fs, unit)
default:
 fmt.Fprintf(fs, "%%!%c(%T=%g m s^-1)", c, v, float64(v))
}
}
graph{DiGr{DiGr}}
graph{<{\Z>}
graph{{{edge5{{{edge5}}}edge5}}edge5{edge5}}}
graph{SubgrapU}
graph{{<><><><>}<><><>}
graph{{{su}{su}su}{su}su}{su}}
graph{<<=====>>}
graph{subGrapd}
graph{{STR}STR{STR}}
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```

```
package network
```

```

import (
 "math"

 "gonum.org/v1/gonum/floats"
 "gonum.org/v1/gonum/graph"
)

// HubAuthority is a Hyperlink-Induced Topic Search hub-authority score pair.
type HubAuthority struct {
 Hub float64
 Authority float64
}

// HITS returns the Hyperlink-Induced Topic Search hub-authority scores for
// nodes of the directed graph g. HITS terminates when the 2-norm of the
// vector difference between iterations is below tol. The returned map is
// keyed on the graph node IDs.
func HITS(g graph.Directed, tol float64) map[int64]HubAuthority {
 nodes := graph.NodesOf(g.Nodes())

 // Make a topological copy of g with dense node IDs.
 indexOf := make(map[int64]int, len(nodes))
 for i, n := range nodes {

```

```

 indexOf[n.ID()] = i
}
nodesLinkingTo := make([][]int, len(nodes))
nodesLinkedFrom := make([][]int, len(nodes))
for
i, n := range nodes {
 id := n.ID()
 for _, u := range graph.NodesOf(g.To(id)) {
 nodesLinkingTo[i] = append(nodesLinkingTo[i], indexOf[u.ID()])
 }
 for _, v := range graph.NodesOf(g.From(id)) {
 nodesLinkedFrom[i] = append(nodesLinkedFrom[i], indexOf[v.ID()])
 }
}

```

```

w := make([]float64, 4*len(nodes))
auth := w[:len(nodes)]
hub := w[len(nodes) : 2*len(nodes)]
for i := range nodes {
 auth[i] = 1
 hub[i] = 1
}
deltaAuth := w[2*len(nodes) : 3*len(nodes)]
deltaHub := w[3*len(nodes):]

```

```

var norm float64
for {
 norm = 0
 for v := range nodes {
 var a float64
 for _, u := range nodesLinkingTo[v] {
 a += hub[u]
 }
 deltaAuth[v] = auth[v]
 auth[v] = a
 norm += a * a
 }
 norm = math.Sqrt(norm)
}

```

```

for i := range auth {
 auth[i] /= norm
 deltaAuth[i] -= auth[i]
}

```

```

norm = 0
for u := range nodes {
 var h float64
 for _, v := range nodesLinkedFrom[u] {

```

```

 h += auth[v]
}
deltaHub[u] = hub[u]
hub[u] = h
norm += h * h
}
norm = math.Sqrt(norm)

for
i := range hub {
 hub[i] /= norm
 deltaHub[i] -= hub[i]
}

if floats.Norm(deltaAuth, 2) < tol && floats.Norm(deltaHub, 2) < tol {
 break
}
}

hubAuth := make(map[int64]HubAuthority, len(nodes))
for i, n := range nodes {
 hubAuth[n.ID()] = HubAuthority{Hub: hub[i], Authority: auth[i]}
}

return hubAuth
}
sudo: false

language: go

Do not move these lines; they are referred to by README.md.
Versions of go that are explicitly supported by gonum plus go tip.
go:
- 1.13.x
- 1.12.x
- master

os:
- linux
- osx
- windows

env:
global:
- GO111MODULE=on
- GOFLAGS="-mod=readonly"
matrix:
- TAGS=""

```

- TAGS="-tags bounds"
- TAGS="-tags noasm"
- TAGS="-tags appengine"

cache:

directories:

- \$HOME/.cache/go-build
- \$HOME/gopath/pkg/mod

git:

depth: 1

matrix:

fast\_finish: true

exclude:

- os: osx  
env: TAGS="-tags bounds"
- os: osx  
env: TAGS="-tags noasm"
- os: osx  
env: TAGS="-tags appengine"

- os: osx  
go: master

- os: windows  
env: TAGS="-tags bounds"
- os: windows  
env: TAGS="-tags noasm"
- os: windows  
env: TAGS="-tags appengine"

- os: windows  
go: master

allow\_failures:

- go: master

before\_install:

# Make sure we have the origin master to compare HEADs and

# save the sha for comparison in test-coverage.sh.

# It is

necessary to do this here since the rigmarole for

# Windows loses the link to the real origin master.

- git fetch --depth=1 origin master

- export ORIGIN\_MASTER=\$(git ls-remote origin master | cut -f1)

# This garbage is necessary because on windows, Travis

# helpfully sets core.autocrlf to true.

```

#
The block here repeats the clone after having unset
core.autocrlf. There is no simple way to do this
conditionally on OS because windows will not allow
a file to be removed or moved while the file is open,
and we use constructed paths to scripts to get
conditional execution.
#
Happy windowsing!
- pushd ../../..
- mv gonum.org/v1/gonum .
- git config --global core.autocrlf false
- git clone gonum gonum.org/v1/gonum
- popd

- ${TRAVIS_BUILD_DIR}/.travis/run-parts ${TRAVIS_BUILD_DIR}/.travis/deps.d/${TRAVIS_OS_NAME}

addons:
apt:
 packages:
 - graphviz

go_import_path: gonum.org/v1/gonum

Get deps, build, test, and ensure the code is gofmt'ed.
If we
are building as gonum, then we have access to the coveralls api key, so we can run coverage as well.
script:
- ${TRAVIS_BUILD_DIR}/.travis/run-parts ${TRAVIS_BUILD_DIR}/.travis/run.d/${TRAVIS_OS_NAME}
graph {}
graph{__}
graph{NoN{NoR{NoR}NoR{NoR}NoR{NoR}NoR{NoR}NoR}}
graph{D{D}}
graph{{{subg{{{subg}}}}}}
graph{{{STRIR}STRIR}}
// SPDX-License-Identifier: Unlicense OR MIT

// +build android

package app

import "C"

import (
 "sync"

 "gioui.org/app/internal/window"
)

```

```

var (
dataDirOnce sync.Once
dataPath string
)

func dataDir() (string, error) {
dataDirOnce.Do(func() {
dataPath = window.GetDataDir()
})
return dataPath, nil
}

graph{
{{{SUBGRA0}}}{{{}}}{{{}}}{{{}}}{{{SUBGRA0}}}{{{SUBGRA5}}}{{{SUBGRA0}}}}
{{{SUBGRA5}}}{{{SUBGRA5}}}{{{SUBGRA0}}}}{{{SUBGRA5}}}{{{SUBGRA0}}}{{{SUBGRA0}}}
{{{}}}{{{SUBGRA0}}}{{{SUBGRA5}}}}{{{SUBGRA5}}}{{{SUBGRA0}}}{{{SUBGRA0}}}{{{SUBGRA0}}}
{{{SUBGRA5}}}{{{SUBGRA0}}}{{{SUBGRA0}}}{{{SUBGRA5}}}{{{SUBGRA0}}}{{{SUBGRA5}}}{{{SUBGRA0}}}
}}}

SUBROUTINE ZUCHK(YR, YI, NZ, ASCLE, TOL)
C***BEGIN PROLOGUE ZUCHK
C***REFER TO ZSERI,ZUOIK,ZUNK1,ZUNK2,ZUNI1,ZUNI2,ZKSCL
C
C Y ENTERS AS A SCALED QUANTITY WHOSE MAGNITUDE IS GREATER THAN
C EXP(-ALIM)=ASCLE=1.0E+3*D1MACH(1)/TOL. THE TEST IS MADE TO SEE
C IF THE MAGNITUDE OF THE REAL OR IMAGINARY PART WOULD UNDERFLOW
C WHEN Y IS SCALED (BY TOL) TO ITS PROPER VALUE. Y IS ACCEPTED
C IF THE UNDERFLOW IS AT LEAST ONE PRECISION BELOW THE MAGNITUDE
C OF THE LARGEST COMPONENT; OTHERWISE THE PHASE ANGLE DOES NOT HAVE
C ABSOLUTE ACCURACY AND AN UNDERFLOW IS ASSUMED.
C
C***ROUTINES CALLED (NONE)
C***END PROLOGUE ZUCHK
C
C COMPLEX Y
DOUBLE PRECISION ASCLE, SS, ST, TOL, WR, WI, YR, YI
INTEGER NZ
NZ = 0
WR = DABS(YR)
WI = DABS(YI)
ST = DMIN1(WR,WI)
IF (ST.GT.ASCLE) RETURN
SS = DMAX1(WR,WI)
ST = ST/TOL
IF (SS.LT.ST) NZ = 1
RETURN
END

graph{SubGE{{{SubGE{SubGZ}SubGE{SubGZ}SubGZ}}}}
DOUBLE PRECISION FUNCTION MYSIN(A)
DOUBLE PRECISION A

```



```

 MYSIN = DSIN(A)
 RETURN
 END
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// license that can be found in the LICENSE file.

package mat

import (
 "testing"

 "golang.org/x/exp/rand"
)

func TestHOGSVD(t *testing.T) {
 const tol = 1e-10
 rnd := rand.New(rand.NewSource(1))
 for cas, test := range []struct {
 r, c int
 }{
 {5, 3},
 {5, 5},
 {150, 150},
 {200, 150},

 // Calculating A_i*A_j and A_j*A_i fails for wide matrices.
 {3, 5},
 } {
 r := test.r
 c := test.c
 for n := 3; n < 6; n++ {
 data := make([]Matrix, n)
 dataCopy := make([]*Dense, n)
 for trial := 0; trial < 10; trial++ {
 for i := range data {
 d := NewDense(r, c, nil)
 for j := range d.mat.Data {
 d.mat.Data[j] = rnd.Float64()
 }
 data[i] = d
 dataCopy[i] = DenseCopyOf(d)
 }
 }

 var gsvd HOGSVD
 ok := gsvd.Factorize(data...)
 if r >= c {
 if !ok {

```

```

 t.Errorf("HOGSVD factorization failed for %d %d%d matrices: %v", n, r, c, gsvd.Err())
 continue
 }
}
else {
 if ok {
 t.Errorf("HOGSVD factorization unexpectedly succeeded for %d %d%d matrices", n, r, c)
 }
 continue
}
for i := range data {
 if !Equal(data[i], dataCopy[i]) {
 t.Errorf("A changed during call to HOGSVD.Factorize")
 }
}
u, s, v := extractHOGSVD(&gsvd)
for i, want := range data {
 var got Dense
 sigma := NewDense(c, c, nil)
 for j := 0; j < c; j++ {
 sigma.Set(j, j, s[i][j])
 }

 got.Product(u[i], sigma, v.T())
 if !EqualApprox(&got, want, tol) {
 t.Errorf("test %d n=%d trial %d: unexpected answer\nU_%[4]d * S_%[4]d * V:\n% 0.2f\nD_%d:\n% 0.2f",
 cas, n, trial, i, Formatted(&got, Excerpt(5)), i, Formatted(want, Excerpt(5)))
 }
}
}
}
}
}
}

func extractHOGSVD(gsvd *HOGSVD) (u []*Dense, s [][]float64, v *Dense) {
 u = make([]*Dense, gsvd.Len())
 s = make([][]float64, gsvd.Len())
 for i := 0; i < gsvd.Len(); i++ {
 u[i] = &Dense{}
 gsvd.UTo(u[i],
 i)
 s[i] = gsvd.Values(nil, i)
 }
 v = &Dense{}
 gsvd.VTo(v)
 return u, s, v
}

```

```

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package distmv

import (
 "math"
 "testing"

 "gonum.org/v1/gonum/spatial/r1"
)

func TestUniformEntropy(t *testing.T) {
 for _, test := range []struct {
 Uniform *Uniform
 Entropy float64
 }{
 {
 NewUniform([]r1.Interval{{0, 1}, {0, 1}}, nil),
 0,
 },
 {
 NewUniform([]r1.Interval{{-1, 3}, {2, 8}, {-5, -3}}, nil),
 math.Log(48),
 },
 } {
 ent := test.Uniform.Entropy()
 if math.Abs(ent-test.Entropy) > 1e-14 {
 t.Errorf("Entropy mismatch. Got %v, want %v", ent, test.Entropy)
 }
 }
}

// Copyright 2015 The Gonum Authors. All rights reserved.
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// license that can be found in the LICENSE file.

package testlapack

import (
 "fmt"
 "testing"

 "golang.org/x/exp/rand"

 "gonum.org/v1/gonum/blas"
)

```

```

type Dlaseter interface {
 Dlaset(uplo blas.Uplo, m, n int, alpha, beta float64, a []float64, lda int)
}

func DlasetTest(t *testing.T, impl Dlaseter) {
 rnd := rand.New(rand.NewSource(1))
 for ti, test := range []struct {
 m, n int
 }{
 {0, 0},
 {1, 1},
 {1, 10},
 {10, 1},
 {2, 2},
 {2, 10},
 {10, 2},
 {11, 11},
 {11, 100},
 {100, 11},
 } {
 m := test.m
 n := test.n
 for _, uplo := range []blas.Uplo{blas.Upper, blas.Lower, blas.All} {
 for _, extra := range []int{0, 10} {
 a := randomGeneral(m, n, n+extra, rnd)
 alpha := 1.0
 beta := 2.0

 impl.Dlaset(uplo, m, n, alpha, beta, a.Data, a.Stride)

 prefix := fmt.Sprintf("Case #%v: m=%v,n=%v,uplo=%v,extra=%v",
 ti, m, n, uplo, extra)
 if !generalOutsideAllNaN(a)
 {
 t.Errorf("%v: out-of-range write to A", prefix)
 }
 for i := 0; i < min(m, n); i++ {
 if a.Data[i*a.Stride+i] != beta {
 t.Errorf("%v: unexpected diagonal of A", prefix)
 }
 }
 if uplo == blas.Upper || uplo == blas.All {
 for i := 0; i < m; i++ {
 for j := i + 1; j < n; j++ {
 if a.Data[i*a.Stride+j] != alpha {
 t.Errorf("%v: unexpected upper triangle of A", prefix)
 }
 }
 }
 }
 }
 }
}

```

```

 }
 }
 if uplo == blas.Lower || uplo == blas.All {
 for i := 1; i < m; i++ {
 for j := 0; j < min(i, n); j++ {
 if a.Data[i*a.Stride+j] != alpha {
 t.Errorf("%v: unexpected lower triangle of A", prefix)
 }
 }
 }
 }
 }
 }
 }
 }
 }
 }
 graph{N_}
 graph{{{{
 }}}

 {{{

 }}}

 {

 }}
 {

 }}

 }}
 graph{{{g}g}}
 Graph{Grap[]Grap[]Grap[]Grap[]Grap[]Grap}
 graph{{dy}}
 graph{{{DiGrag}DiGrag}{DiGrag}}
 graph{{{{{Digra_{Digra_}{Digra_{Digra_}}}}}}}
 graph{{{{{diGrS}}}diGrS{{{diGrS}}}diGrS}}}
 graph{{{{{str{str}}}}}}}
 graph{{d{d}d}}
 // Copyright 2017 The Gonum Authors. All rights reserved.
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 // Package gen provides random graph generation functions.

```

```

package gen // import "gonum.org/v1/gonum/graph/graphs/gen"
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// license that can be found in the LICENSE file.

package distuv

// Parameter represents a parameter of a probability distribution
type Parameter struct {
 Name string
 Value float64
}

var (
 badPercentile = "distuv: percentile out of bounds"
 badLength = "distuv: slice length mismatch"
 badSuffStat = "distuv: wrong suffStat length"
 badNoSamples = "distuv: must have at least one sample"
)

const (
 expNegOneHalf = 0.6065306597126334236037995349911804534419 // https://oeis.org/A092605
 eulerMascheroni = 0.5772156649015328606065120900824024310421 // https://oeis.org/A001620
 apery = 1.2020569031595942853997381615114499907649 // https://oeis.org/A002117
)

graph{{StrO}StrK}
// Copyright 2015 The Gonum Authors. All rights reserved.
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// license that can be found in the LICENSE file.

package mat

import (
 "gonum.org/v1/gonum/blas"
 "gonum.org/v1/gonum/blas/blas64"
 "gonum.org/v1/gonum/lapack/lapack64"
)

// Solve finds a minimum-norm solution to a system of linear equations defined
// by the matrices A and B. If A is singular or near-singular, a Condition error
// is returned. See the documentation for Condition for more information.
//
// The minimization problem solved depends on the input parameters:
// - if m >= n, find X such that ||A*X - B||_2 is minimized,
// - if m < n, find the minimum norm solution of A * X = B.
// The solution matrix, X, is stored in-place into the receiver.
func (m *Dense) Solve(a, b Matrix) error {
 ar, ac := a.Dims()

```

```

br, bc := b.Dims()
if ar != br {
 panic(ErrShape)
}
m.reuseAsNonZeroed(ac, bc)

// TODO(btracey): Add special cases for SymDense, etc.
aU, aTrans := untranspose(a)
bU,
bTrans := untranspose(b)
switch rma := aU.(type) {
case RawTriangular:
 side := blas.Left
 tA := blas.NoTrans
 if aTrans {
 tA = blas.Trans
 }

 switch rm := bU.(type) {
 case RawMatrixer:
 if m != bU || bTrans {
 if m == bU || m.checkOverlap(rm.RawMatrix()) {
 tmp := getWorkspace(br, bc, false)
 tmp.Copy(b)
 m.Copy(tmp)
 putWorkspace(tmp)
 break
 }
 m.Copy(b)
 }
 default:
 if m != bU {
 m.Copy(b)
 } else if bTrans {
 // m and b share data so Copy cannot be used directly.
 tmp := getWorkspace(br, bc, false)
 tmp.Copy(b)
 m.Copy(tmp)
 putWorkspace(tmp)
 }
 }

 rm := rma.RawTriangular()
 blas64.Trsm(side, tA, 1, rm, m.mat)
 work := getFloats(3*rm.N, false)
 iwork := getInts(rm.N, false)
 cond := lapack64.Trcon(CondNorm, rm, work, iwork)
 putFloats(work)

```

```

putInts(iwork)
if cond > ConditionTolerance {
 return Condition(cond)
}
return nil
}

switch {
case ar == ac:
 if a == b {
 // x
 = I.
 if ar == 1 {
 m.mat.Data[0] = 1
 return nil
 }
 for i := 0; i < ar; i++ {
 v := m.mat.Data[i*m.mat.Stride : i*m.mat.Stride+ac]
 zero(v)
 v[i] = 1
 }
 return nil
 }
 var lu LU
 lu.Factorize(a)
 return lu.SolveTo(m, false, b)
case ar > ac:
 var qr QR
 qr.Factorize(a)
 return qr.SolveTo(m, false, b)
default:
 var lq LQ
 lq.Factorize(a)
 return lq.SolveTo(m, false, b)
}
}

// SolveVec finds a minimum-norm solution to a system of linear equations defined
// by the matrix a and the right-hand side column vector b. If A is singular or
// near-singular, a Condition error is returned. See the documentation for
// Dense.Solve for more information.
func (v *VecDense) SolveVec(a Matrix, b Vector) error {
 if _, bc := b.Dims(); bc != 1 {
 panic(ErrShape)
 }
 _, c := a.Dims()

 // The Solve implementation is non-trivial, so rather than duplicate the code,

```



```

// instead recast the VecDenses as Dense and call the matrix code.

if rv, ok := b.(RawVectorer); ok
{
 bmat := rv.RawVector()
 if v != b {
 v.checkOverlap(bmat)
 }
 v.reuseAsNonZeroed(c)
 m := v.asDense()
 // We conditionally create bm as m when b and v are identical
 // to prevent the overlap detection code from identifying m
 // and bm as overlapping but not identical.
 bm := m
 if v != b {
 b := VecDense{mat: bmat}
 bm = b.asDense()
 }
 return m.Solve(a, bm)
}

v.reuseAsNonZeroed(c)
m := v.asDense()
return m.Solve(a, b)
}

graph{
 {{{{{{{edgeg}}edgeg{{{edgeg}}edgeg}}}}edgeg}}
 graph{{EDG{EDG{EDG}}}}
}
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// license that can be found in the LICENSE file.

package testblas

import (
 "testing"

 "gonum.org/v1/gonum/blas"
 "gonum.org/v1/gonum/floats"
)

type Dspmv interface {
 Dspmv(ul blas.Uplo, n int, alpha float64, ap []float64, x []float64, incX int, beta float64, y []float64, incY int)
}

func DspmvTest(t *testing.T, blasser Dspmv) {
 for i, test := range []struct {
 ul blas.Uplo
 n int
 }

```

```

a [][]float64
x []float64
y []float64
alpha float64
beta float64
ans []float64
}{
{
 ul: blas.Upper,
 n: 3,
 a: [][]float64{
 {5, 6, 7},
 {0, 8, 10},
 {0, 0, 13},
 },
 x: []float64{3, 4, 5},
 y: []float64{6, 7, 8},
 alpha: 2.1,
 beta: -3,
 ans: []float64{137.4, 189, 240.6},
},
{
 ul: blas.Lower,
 n: 3,
 a: [][]float64{
 {5, 0, 0},
 {6, 8, 0},
 {7, 10, 13},
 },
 x: []float64{3, 4, 5},
 y:
 []float64{6, 7, 8},
 alpha: 2.1,
 beta: -3,
 ans: []float64{137.4, 189, 240.6},
},
} {
incTest := func(incX, incY, extra int) {
 x := makeIncremented(test.x, incX, extra)
 y := makeIncremented(test.y, incY, extra)
 aFlat := flattenTriangular(test.a, test.ul)
 ans := makeIncremented(test.ans, incY, extra)

 blasser.Dspmv(test.ul, test.n, test.alpha, aFlat, x, incX, test.beta, y, incY)
 if !floats.EqualApprox(ans, y, 1e-14) {
 t.Errorf("Case %v, incX=%v, incY=%v: Want %v, got %v.", i, incX, incY, ans, y)
 }
}
}

```

```

incTest(1, 1, 0)
incTest(2, 3, 0)
incTest(3, 2, 0)
incTest(-3, 2, 0)
incTest(-2, 4, 0)
incTest(2, -1, 0)
incTest(-3, -4, 3)
}
}
graph{diG{{diG{diG}}}}
graph{{SU{{SU}}}}
graph{{ED}ED{ED}ED{ED}}
digraph {ep eg ef ee}
graph{sub{sub{{sub}{sub}}{sub{sub{{sub}{sub}sub}}}{sub}}}
graph{{subG1}{subG1}}
graph{diGra0[diGra0=""]}
graph{{subgr}subgr}
graph{DI{DI}}
Go Time

```

This repository provides supplementary Go time packages.

## ## Download/Install

The easiest way to install is to run ``go get -u golang.org/x/time``. You can also manually git clone the repository to ``$GOPATH/src/golang.org/x/time``.

## ## Report Issues / Send Patches

This repository uses Gerrit for code changes. To learn how to submit changes to this repository, see <https://golang.org/doc/contribute.html>.

The main issue tracker for the time repository is located at <https://github.com/golang/go/issues>. Prefix your issue with "x/time:" in the subject line, so it is easy to find.

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// license that can be found in the LICENSE file.

```
package mat
```

```
import (
 "testing"
```

```

 "golang.org/x/exp/rand"
)
```

```
func TestLUD(t *testing.T) {
```

```

for _, n := range []int{1, 5, 10, 11, 50} {
 a := NewDense(n, n, nil)
 for i := 0; i < n; i++ {
 for j := 0; j < n; j++ {
 a.Set(i, j, rand.NormFloat64())
 }
 }
 var want Dense
 want.CloneFrom(a)

 var lu LU
 lu.Factorize(a)

 var l, u TriDense
 lu.LTo(&l)
 lu.UTo(&u)
 var p Dense
 pivot := lu.Pivot(nil)
 p.Permutation(n, pivot)
 var got Dense
 got.Product(&p, &l, &u)
 if !EqualApprox(&got, &want, 1e-12) {
 t.Errorf("PLU does not equal original matrix.\nWant: %v\nGot: %v", want, got)
 }
}

func TestLURankOne(t *testing.T) {
 for _, pivoting := range []bool{true} {
 for _, n := range []int{3, 10, 50} {
 // Construct a random LU factorization
 lu := &LU{}
 lu.lu = NewDense(n, n, nil)
 for i := 0; i <
n; i++ {
 for j := 0; j < n; j++ {
 lu.lu.Set(i, j, rand.Float64())
 }
 }
 lu.pivot = make([]int, n)
 for i := range lu.pivot {
 lu.pivot[i] = i
 }
 if pivoting {
 // For each row, randomly swap with itself or a row after (like is done)
 // in the actual LU factorization.
 for i := range lu.pivot {
 idx := i + rand.Intn(n-i)

```

```

 lu.pivot[i], lu.pivot[idx] = lu.pivot[idx], lu.pivot[i]
 }
}
// Apply a rank one update. Ensure the update magnitude is larger than
// the equal tolerance.
alpha := rand.Float64() + 1
x := NewVecDense(n, nil)
y := NewVecDense(n, nil)
for i := 0; i < n; i++ {
 x.setVec(i, rand.Float64()+1)
 y.setVec(i, rand.Float64()+1)
}
a := luReconstruct(lu)
a.RankOne(a, alpha, x, y)

var luNew LU
luNew.RankOne(lu, alpha, x, y)
lu.RankOne(lu, alpha, x, y)

aR1New := luReconstruct(&luNew)
aR1 := luReconstruct(lu)

if !Equal(aR1, aR1New) {
 t.Error("Different answer when new receiver")
}
if
!EqualApprox(aR1, a, 1e-10) {
 t.Errorf("Rank one mismatch, pivot %v.\nWant: %v\nGot:%v\n", pivoting, a, aR1)
}
}
}
}

// luReconstruct reconstructs the original A matrix from an LU decomposition.
func luReconstruct(lu *LU) *Dense {
 var L, U TriDense
 lu.LTo(&L)
 lu.UTo(&U)
 var P Dense
 pivot := lu.Pivot(nil)
 P.Permutation(len(pivot), pivot)

 var a Dense
 a.Mul(&L, &U)
 a.Mul(&P, &a)
 return &a
}

```

```

func TestLUSolveTo(t *testing.T) {
 for _, test := range []struct {
 n, bc int
 }{
 {5, 5},
 {5, 10},
 {10, 5},
 } {
 n := test.n
 bc := test.bc
 a := NewDense(n, n, nil)
 for i := 0; i < n; i++ {
 for j := 0; j < n; j++ {
 a.Set(i, j, rand.NormFloat64())
 }
 }
 b := NewDense(n, bc, nil)
 for i := 0; i < n; i++ {
 for j := 0; j < bc; j++ {
 b.Set(i, j, rand.NormFloat64())
 }
 }
 var lu LU
 lu.Factorize(a)
 var x Dense
 if err := lu.SolveTo(&x, false, b); err != nil {
 continue
 }
 var got Dense
 got.Mul(a, &x)
 if !EqualApprox(&got,
 b, 1e-12) {
 t.Errorf("SolveTo mismatch for non-singular matrix. n = %v, bc = %v.\nWant: %v\nGot: %v", n, bc, b, got)
 }
 }
 // TODO(btracey): Add testOneInput test when such a function exists.
}

```

```

func TestLUSolveToCond(t *testing.T) {
 for _, test := range []*Dense{
 NewDense(2, 2, []float64{1, 0, 0, 1e-20}),
 } {
 m, _ := test.Dims()
 var lu LU
 lu.Factorize(test)
 b := NewDense(m, 2, nil)
 var x Dense
 if err := lu.SolveTo(&x, false, b); err == nil {

```

```

t.Error("No error for near-singular matrix in matrix solve.")
}

bvec := NewVecDense(m, nil)
var xvec VecDense
if err := lu.SolveVecTo(&xvec, false, bvec); err == nil {
 t.Error("No error for near-singular matrix in matrix solve.")
}
}
}

func TestLUSolveVecTo(t *testing.T) {
 for _, n := range []int{5, 10} {
 a := NewDense(n, n, nil)
 for i := 0; i < n; i++ {
 for j := 0; j < n; j++ {
 a.Set(i, j, rand.NormFloat64())
 }
 }
 b := NewVecDense(n, nil)
 for i := 0; i < n; i++ {
 b.SetVec(i, rand.NormFloat64())
 }
 var
 lu LU
 lu.Factorize(a)
 var x VecDense
 if err := lu.SolveVecTo(&x, false, b); err != nil {
 continue
 }
 var got VecDense
 got.MulVec(a, &x)
 if !EqualApprox(&got, b, 1e-12) {
 t.Errorf("SolveTo mismatch n = %v.\nWant: %v\nGot: %v", n, b, got)
 }
 }
 // TODO(btracey): Add testOneInput test when such a function exists.
}
graph{<<aa>>}
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// license that can be found in the LICENSE file.

package sampleuv

import (
 "sort"
 "testing"

```

```

"gonum.org/v1/gonum/floats"
"gonum.org/v1/gonum/stat"
"gonum.org/v1/gonum/stat/distuv"
)

const tol = 1e-2

type lhDist interface {
 Quantile(float64) float64
 CDF(float64) float64
}

func TestLatinHypercube(t *testing.T) {
 for _, nSamples := range []int{1, 2, 5, 10, 20} {
 samples := make([]float64, nSamples)
 for _, dist := range []lhDist{
 distuv.Uniform{Min: 0, Max: 1},
 distuv.Uniform{Min: 0, Max: 10},
 distuv.Normal{Mu: 5, Sigma: 3},
 } {
 LatinHypercube{Q: dist}.Sample(samples)
 sort.Float64s(samples)
 for i, v := range samples {
 p := dist.CDF(v)
 if p < float64(i)/float64(nSamples) || p > float64(i+1)/float64(nSamples) {
 t.Errorf("probability out of bounds")
 }
 }
 }
 }
}

func TestImportance(t *testing.T) {
 // Test by finding the expected
 value of a Normal.
 trueMean := 3.0
 target := distuv.Normal{Mu: trueMean, Sigma: 2}
 proposal := distuv.Normal{Mu: 0, Sigma: 5}
 nSamples := 100000
 x := make([]float64, nSamples)
 weights := make([]float64, nSamples)
 Importance{Target: target, Proposal: proposal}.SampleWeighted(x, weights)
 ev := stat.Mean(x, weights)
 if !floats.EqualWithinAbsOrRel(ev, trueMean, tol, tol) {
 t.Errorf("Mean mismatch: Want %v, got %v", trueMean, ev)
 }
}

```



```

func TestRejection(t *testing.T) {
 // Test by finding the expected value of a Normal.
 trueMean := 3.0
 target := distuv.Normal{Mu: trueMean, Sigma: 2}
 proposal := distuv.Normal{Mu: 0, Sigma: 5}

 nSamples := 20000
 x := make([]float64, nSamples)
 r := &Rejection{Target: target, Proposal: proposal, C: 100}
 r.Sample(x)
 ev := stat.Mean(x, nil)
 if !floats.EqualWithinAbsOrRel(ev, trueMean, tol, tol) {
 t.Errorf("Mean mismatch: Want %v, got %v", trueMean, ev)
 }
}

type condNorm struct {
 Sigma float64
}

func (c condNorm) ConditionalRand(y float64)
float64 {
 return distuv.Normal{Mu: y, Sigma: c.Sigma}.Rand()
}

func (c condNorm) ConditionalLogProb(x, y float64) float64 {
 return distuv.Normal{Mu: y, Sigma: c.Sigma}.LogProb(x)
}

func TestMetropolisHastings(t *testing.T) {
 // Test by finding the expected value of a Normal.
 trueMean := 3.0
 target := distuv.Normal{Mu: trueMean, Sigma: 2}
 proposal := condNorm{Sigma: 5}

 burnin := 500
 nSamples := 100000 + burnin
 x := make([]float64, nSamples)
 mh := MetropolisHastings{
 Initial: 100,
 Target: target,
 Proposal: proposal,

 BurnIn: burnin,
 }
 mh.Sample(x)
}

```

```

ev := stat.Mean(x, nil)
if !floats.EqualWithinAbsOrRel(ev, trueMean, tol, tol) {
 t.Errorf("Mean mismatch: Want %v, got %v", trueMean, ev)
}
}
graph{{GRA_{GRA_}GRA_}}
graph{SR{{SR{ }SR{ }SS}}SR{ }SS}
graph{{DIGRA0}}
graph{{Edgeh{{Edge_}{Edge_}{{Edge_}{Edge_}}Edge_}Edge_}}
graph{di9{{di9{di9}di3}}}
graph{{digr_}}
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// license that can be found in the LICENSE file.

```

```

package mathext

```

```

import (
 "testing"

 "gonum.org/v1/gonum/floats"
)

```

```

func TestNormalQuantile(t *testing.T) {
 // Values from https://www.johndcook.com/blog/normal_cdf_inverse/
 p := []float64{
 0.0000001,
 0.00001,
 0.001,
 0.05,
 0.15,
 0.25,
 0.35,
 0.45,
 0.55,
 0.65,
 0.75,
 0.85,
 0.95,
 0.999,
 0.99999,
 0.9999999,
 }
 ans := []float64{
 -5.199337582187471,
 -4.264890793922602,
 -3.090232306167813,
 -1.6448536269514729,
 }
}

```

```

-1.0364333894937896,
-0.6744897501960817,
-0.38532046640756773,
-0.12566134685507402,
0.12566134685507402,
0.38532046640756773,
0.6744897501960817,
1.0364333894937896,
1.6448536269514729,
3.090232306167813,
4.264890793922602,
5.199337582187471,
}
for i, v := range p {
 got := NormalQuantile(v)
 if !floats.EqualWithinAbsOrRel(got, ans[i], 1e-10, 1e-10) {
 t.Errorf("Quantile
mismatch. Case %d, want: %v, got: %v", i, ans[i], got)
 }
}
}

```

```
var nqtmp float64
```

```

func BenchmarkNormalQuantile(b *testing.B) {
 ps := make([]float64, 1000) // ensure there are small values
 floats.Span(ps, 0, 1)
 for i := 0; i < b.N; i++ {
 for _, v := range ps {
 nqtmp = NormalQuantile(v)
 }
 }
}

```

```
graph{gr}
```

```
*> \brief \b DLAPY2 returns sqrt(x2+y2).
```

```
*
```

```
* ===== DOCUMENTATION =====
```

```
*
```

```
* Online html documentation available at
```

```
* http://www.netlib.org/lapack/explore-html/
```

```
*
```

```
*> \htmlonly
```

```
*> Download DLAPY2 + dependencies
```

```
*>
```

```
*> [TGZ]
```

```
*>
```

```
*> [ZIP]
```

```
*>
```

```

*> [TXT]
*> \endhtmlonly
*
* Definition:
* =====
*
* DOUBLE PRECISION FUNCTION DLAPY2(X, Y)
*
* .. Scalar Arguments ..
* DOUBLE PRECISION X, Y
* ..
*
*
*> \par Purpose:
* =====
*>
*> \verbatim
*>
*> DLAPY2 returns sqrt(x**2+y**2), taking care not to cause unnecessary
*> overflow.
*> \endverbatim
*
* Arguments:
* =====
*
*> \param[in] X
*>
\verbatim
*> X is DOUBLE PRECISION
*> \endverbatim
*>
*> \param[in] Y
*> \verbatim
*> Y is DOUBLE PRECISION
*> X and Y specify the values x and y.
*> \endverbatim
*
* Authors:
* =====
*
*> \author Univ. of Tennessee
*> \author Univ. of California Berkeley
*> \author Univ. of Colorado Denver
*> \author NAG Ltd.
*
*> \date September 2012
*
*> \ingroup auxOTHERauxiliary

```

```

*
* =====
DOUBLE PRECISION FUNCTION DLAPY2(X, Y)
*
* -- LAPACK auxiliary routine (version 3.4.2) --
* -- LAPACK is a software package provided by Univ. of Tennessee, --
* -- Univ. of California Berkeley, Univ. of Colorado Denver and NAG Ltd.--
* September 2012
*
* .. Scalar Arguments ..
DOUBLE PRECISION X, Y
* ..
*
* =====
*
* .. Parameters ..
DOUBLE PRECISION ZERO
PARAMETER (ZERO = 0.0D0)

DOUBLE PRECISION ONE
PARAMETER (ONE = 1.0D0)
* ..
* .. Local Scalars ..
DOUBLE PRECISION W, XABS, YABS, Z
* ..
* .. Intrinsic Functions ..
INTRINSIC ABS, MAX, MIN, SQRT
* ..
* .. Executable Statements ..
*
XABS = ABS(X)
YABS = ABS(Y)
W = MAX(XABS, YABS)
Z = MIN(XABS, YABS)
IF(Z.EQ.ZERO) THEN
 DLAPY2 = W
ELSE
 DLAPY2 = W*SQRT(ONE+(Z / W)**2)
END IF
RETURN
*
* End of DLAPY2
*
END
graph{Dir{Dir{Dir}Dir}Dir}
graph{grap{grap}}
graph{SubgE{SubgJ{SubgJ}SubgJ}}

```

```

graph{{No}{No}}
graph{{digrr}{digrr}digr}}
// Copyright 2016 The Gonum Authors. All rights reserved.
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// license that can be found in the LICENSE file.

// +build !amd64 noasm appengine safe

package c128

import "math/cmplx"

// AxyUnitary is
// for i, v := range x {
// y[i] += alpha * v
// }
func AxyUnitary(alpha complex128, x, y []complex128) {
 for i, v := range x {
 y[i] += alpha * v
 }
}

// AxyUnitaryTo is
// for i, v := range x {
// dst[i] = alpha*v + y[i]
// }
func AxyUnitaryTo(dst []complex128, alpha complex128, x, y []complex128) {
 for i, v := range x {
 dst[i] = alpha*v + y[i]
 }
}

// AxyInc is
// for i := 0; i < int(n); i++ {
// y[iy] += alpha * x[ix]
// ix += incX
// iy += incY
// }
func AxyInc(alpha complex128, x, y []complex128, n, incX, incY, ix, iy uintptr) {
 for i := 0; i < int(n); i++ {
 y[iy] += alpha * x[ix]
 ix += incX
 iy += incY
 }
}

// AxyIncTo is
// for i := 0; i < int(n); i++ {

```

```

// dst[idst] = alpha*x[ix] + y[iy]
//
// ix += incX
// iy += incY
// idst += incDst
// }
func AxyIncTo(dst []complex128, incDst, idst uintptr, alpha complex128, x, y []complex128, n, incX, incY, ix, iy
uintptr) {
 for i := 0; i < int(n); i++ {
 dst[idst] = alpha*x[ix] + y[iy]
 ix += incX
 iy += incY
 idst += incDst
 }
}

// DscalUnitary is
// for i, v := range x {
// x[i] = complex(real(v)*alpha, imag(v)*alpha)
// }
func DscalUnitary(alpha float64, x []complex128) {
 for i, v := range x {
 x[i] = complex(real(v)*alpha, imag(v)*alpha)
 }
}

// DscalInc is
// var ix uintptr
// for i := 0; i < int(n); i++ {
// x[ix] = complex(real(x[ix])*alpha, imag(x[ix])*alpha)
// ix += inc
// }
func DscalInc(alpha float64, x []complex128, n, inc uintptr) {
 var ix uintptr
 for i := 0; i < int(n); i++ {
 x[ix] = complex(real(x[ix])*alpha, imag(x[ix])*alpha)
 ix += inc
 }
}

// ScalInc is
// var ix uintptr
// for i := 0; i < int(n); i++ {
// x[ix] *= alpha
// ix += incX
// }
func ScalInc(alpha complex128, x []complex128,

```

```

n, inc uintptr) {
var ix uintptr
for i := 0; i < int(n); i++ {
 x[ix] *= alpha
 ix += inc
}
}

// ScalUnitary is
// for i := range x {
// x[i] *= alpha
// }
func ScalUnitary(alpha complex128, x []complex128) {
 for i := range x {
 x[i] *= alpha
 }
}

// DotcUnitary is
// for i, v := range x {
// sum += y[i] * cmplx.Conj(v)
// }
// return sum
func DotcUnitary(x, y []complex128) (sum complex128) {
 for i, v := range x {
 sum += y[i] * cmplx.Conj(v)
 }
 return sum
}

// DotcInc is
// for i := 0; i < int(n); i++ {
// sum += y[iy] * cmplx.Conj(x[ix])
// ix += incX
// iy += incY
// }
// return sum
func DotcInc(x, y []complex128, n, incX, incY, ix, iy uintptr) (sum complex128) {
 for i := 0; i < int(n); i++ {
 sum += y[iy] * cmplx.Conj(x[ix])
 ix += incX
 iy += incY
 }
 return sum
}

// DotuUnitary is
// for i, v := range x {

```



```

// sum += y[i] * v
// }
// return sum
func DotuUnitary(x, y []complex128) (sum complex128) {
 for i, v := range x {
 sum +=
 y[i] * v
 }
 return sum
}

// DotuInc is
// for i := 0; i < int(n); i++ {
// sum += y[iy] * x[ix]
// ix += incX
// iy += incY
// }
// return sum
func DotuInc(x, y []complex128, n, incX, incY, ix, iy uintptr) (sum complex128) {
 for i := 0; i < int(n); i++ {
 sum += y[iy] * x[ix]
 ix += incX
 iy += incY
 }
 return sum
}

graph{{e4{{e4}{e4}}e4}{e4}}
graph{St5{St5{St1}}{St5{St1}St1}St1}}
graph{{<><><><><><>}<><>{<><><><><><>}<><><>}}
graph{{s}s}
graph{{SUq}SUh{{SUq}SUf{{SUq}SUq}}
graph{{G_ G_}G_{G_ G_}G_}}
<?xml version="1.0" encoding="UTF-8"?>
<gexf xmlns="http://www.gexf.net/1.2draft"
xmlns:viz="http://www.gexf.net/1.2draft/viz"
xmlns:xsi="http://www.w3.org/2001/XMLSchema-instance"
xsi:schemaLocation="http://www.gexf.net/1.2draft
http://www.gexf.net/1.2draft/gexf.xsd"
version="1.2">
 <meta lastmodifieddate="2009-10-01">
 <creator>Gephi.org</creator>
 <description>A hierarchy file</description>
 </meta>
 <graph mode="static" defaultedgetype="directed">
 <nodes>
 <node id="a" label="Kevin Bacon">
 <nodes>
 <node id="b" label="God">

```

```

<nodes>
 <node id="c" label="human1"/>
 <node id="d" label="human2"/>
 <node id="i" label="human3"/>
</nodes>
</node>
<node id="e" label="Me">
 <nodes>
 <node id="f" label="frog1"/>
 <node id="g" label="frog2"/>

 <node id="h" label="frog3"/>
 </nodes>
</node>
<node id="j" label="You" />
</nodes>
</node>
</nodes>
<edges>
 <edge id="0" source="b" target="e" />
 <edge id="1" source="c" target="d" />
 <edge id="2" source="c" target="i" />
 <edge id="3" source="g" target="b" />
 <edge id="4" source="f" target="a" />
 <edge id="5" source="f" target="g" />
 <edge id="6" source="f" target="h" />
 <edge id="7" source="g" target="h" />
 <edge id="8" source="a" target="j" />
</edges>
</graph>
</gexf>
graph{ {{{ {{DiD{DiD{DiD}}}}DiD{ {{{ {{DiD{DiD{DiD}}}}DiD{DiD}}}}}}}}
graph{{ {noe not}} }
graph{subF{subF}}
graph{{ {Sub}Sub{Sub}SuG}
graph{sue nodb}
graph{{{Gra_}Gra_}Gra_}
graph{{ {{Sh{ {{Sb}} }So}} }So}
graph{{ {GR_}}
package gl

import (
 "testing"
)

func TestGoString(t *testing.T) {
 tests := [][]2string{
 {"Hello\x00", "Hello"},

```

```

{"\x00", ""},
}
for _, test := range tests {
 got := GoString([]byte(test[0]))
 if exp := test[1]; exp != got {
 t.Errorf("expected %q got %q", exp, got)
 }
}
}
graph{diG{{diG{diG}diG}}}
graph{{{st{{st}}st}st}}st=st}
graph{{{gra_}{gra_}{gra_}{gra_}{gra_}{gra_}{gra_}{gra_}}
/** github.com/ichain/v0.22.4 **/

```

```

{{Types "Apache-2.0"}}

```

This software is

```

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```

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graph{Strica{Strica-9Strica-9Strica-9Strica-9Strica}}  
graph{{stria}stria{stria}}  
Graph{{SubD{SubF}}}  
// SPDX-License-Identifier: Unlicense OR MIT

package pointer

```

import (
 "encoding/binary"
 "image"
 "strings"
 "time"

 "gioui.org/f32"
 "gioui.org/internal/opconst"
 "gioui.org/io/event"
 "gioui.org/io/key"
 "gioui.org/op"
)

```

```

// Event is a pointer event.
type Event struct {
 Type Type

```

```

Source Source
// PointerID is the id for the pointer and can be used
// to track a particular pointer from Press to
// Release or Cancel.
PointerID ID
// Priority is the priority of the receiving handler
// for this event.
Priority Priority
// Time is when the event was received. The
// timestamp is relative to an undefined base.
Time time.Duration
// Buttons are the set of pressed mouse buttons for this event.
Buttons Buttons
// Hit is set when the event was within the registered
// area for the handler. Hit can be false when a pointer
// was pressed within the hit area, and then dragged
// outside it.
Hit bool
// Position is the position of the event, relative to
// the current transformation,
// as set by op.TransformOp.
Position f32.Point
// Scroll is the scroll amount, if any.
Scroll f32.Point
// Modifiers is the set of active modifiers when
// the mouse button was pressed.
Modifiers key.Modifiers
}

// AreaOp updates the hit area to the intersection of the current
// hit area and the area. The area is transformed before applying
// it.
type AreaOp struct {
 kind areaKind
 rect image.Rectangle
}

// InputOp declares an input handler ready for pointer
// events.
type InputOp struct {
 Key event.Key
 // Grab, if set, request that the handler get
 // Grabbed priority.
 Grab bool
}

// PassOp sets the pass-through mode.
type PassOp struct {

```

```

 Pass bool
}

type ID uint16

// Type of an Event.
type Type uint8

// Priority of an Event.
type Priority uint8

// Source of an Event.
type Source uint8

// Buttons is a set of mouse buttons
type Buttons uint8

// Must match app/internal/input.areaKind
type areaKind uint8

const (
 // A Cancel event is generated when the
 // current gesture is
 // interrupted by other handlers or the system.
 Cancel Type = iota
 // Press of a pointer.
 Press
 // Release of a pointer.
 Release
 // Move of a pointer.
 Move
)

const (
 // Mouse generated event.
 Mouse Source = iota
 // Touch generated event.
 Touch
)

const (
 // Shared priority is for handlers that
 // are part of a matching set larger than 1.
 Shared Priority = iota
 // Grabbed is used for matching sets of size 1.
 Grabbed
)

```

```

const (
 ButtonLeft Buttons = 1 << iota
 ButtonRight
 ButtonMiddle
)

const (
 areaRect areaKind = iota
 areaEllipse
)

// Rect constructs a rectangular hit area.
func Rect(size image.Rectangle) AreaOp {
 return AreaOp{
 kind: areaRect,
 rect: size,
 }
}

// Ellipse constructs an ellipsoid hit area.
func Ellipse(size image.Rectangle) AreaOp {
 return AreaOp{
 kind: areaEllipse,
 rect: size,
 }
}

func (op AreaOp) Add(o *op.Ops) {
 data := o.Write(opconst.TypeAreaLen)
 data[0] = byte(opconst.TypeArea)
 data[1] = byte(op.kind)
 bo :=
 binary.LittleEndian
 bo.PutUint32(data[2:], uint32(op.rect.Min.X))
 bo.PutUint32(data[6:], uint32(op.rect.Min.Y))
 bo.PutUint32(data[10:], uint32(op.rect.Max.X))
 bo.PutUint32(data[14:], uint32(op.rect.Max.Y))
}

func (h InputOp) Add(o *op.Ops) {
 data := o.Write(opconst.TypePointerInputLen, h.Key)
 data[0] = byte(opconst.TypePointerInput)
 if h.Grab {
 data[1] = 1
 }
}

func (op PassOp) Add(o *op.Ops) {

```

```

data := o.Write(opconst.TypePassLen)
data[0] = byte(opconst.TypePass)
if op.Pass {
 data[1] = 1
}
}

```

```

func (t Type) String() string {
 switch t {
 case Press:
 return "Press"
 case Release:
 return "Release"
 case Cancel:
 return "Cancel"
 case Move:
 return "Move"
 default:
 panic("unknown Type")
 }
}

```

```

func (p Priority) String() string {
 switch p {
 case Shared:
 return "Shared"
 case Grabbed:
 return "Grabbed"
 default:
 panic("unknown priority")
 }
}

```

```

func (s Source) String() string {
 switch s {
 case Mouse:
 return "Mouse"
 case Touch:
 return "Touch"
 default:
 panic("unknown
source")
 }
}

```

```

// Contain reports whether the set b contains
// all of the buttons.
func (b Buttons) Contain(buttons Buttons) bool {

```

```

return b&buttons == buttons
}

```

```

func (b Buttons) String() string {
var strs []string
if b.Contain(ButtonLeft) {
 strs = append(strs, "ButtonLeft")
}
if b.Contain(ButtonRight) {
 strs = append(strs, "ButtonRight")
}
if b.Contain(ButtonMiddle) {
 strs = append(strs, "ButtonMiddle")
}
return strings.Join(strs, "|")
}

```

```

func (Event) ImplementsEvent() {}
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```

```

package distuv

```

```

import (
 "math"
 "sort"
 "testing"

```

```

 "golang.org/x/exp/rand"

```

```

 "gonum.org/v1/gonum/floats"
)

```

```

func TestBetaProb(t *testing.T) {
 // Values a comparison with scipy
 for _, test := range []struct {
 x, alpha, beta, want float64
 }{
 {0.1, 2, 0.5, 0.079056941504209499},
 {0.5, 1, 5.1, 0.29740426605235754},
 {0.1, 0.5, 0.5, 1.0610329539459691},
 {1, 0.5, 0.5, math.Inf(1)},
 {-1, 0.5, 0.5, 0},
 } {
 pdf := Beta{Alpha: test.alpha, Beta: test.beta}.Prob(test.x)
 if !floats.EqualWithinAbsOrRel(pdf, test.want, 1e-10, 1e-10) {
 t.Errorf("Pdf mismatch. Got %v, want %v", pdf, test.want)
 }
 }
}

```



```

}
}
}

func TestBetaRand(t *testing.T) {
src := rand.New(rand.NewSource(1))
for i, b := range []Beta{
{Alpha: 0.5, Beta: 0.5, Src: src},
{Alpha: 5, Beta: 1, Src: src},
{Alpha: 2, Beta: 2, Src: src},
{Alpha: 2, Beta:
5, Src: src},
} {
testBeta(t, b, i)
}
}

func testBeta(t *testing.T, b Beta, i int) {
const (
tol = 1e-2
n = 5e4
bins = 10
)
x := make([]float64, n)
generateSamples(x, b)
sort.Float64s(x)

testRandLogProbContinuous(t, i, 0, x, b, tol, bins)
checkMean(t, i, x, b, tol)
checkVarAndStd(t, i, x, b, tol)
checkExKurtosis(t, i, x, b, 5e-2)
checkEntropy(t, i, x, b, 5e-3)
checkProbContinuous(t, i, x, b, 1e-3)
checkQuantileCDFSurvival(t, i, x, b, tol)
checkProbQuantContinuous(t, i, x, b, tol)
}
graph{Dir{Dir{Dir}Dir}Dir{Dir{Dir{Dir}Dir}}}
graph{{Edge_}}
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package gonum

import (
"math"

"gonum.org/v1/gonum/lapack"

```

)

// Dlascl multiplies an mn matrix by the scalar cto/cfrom.

//

// cfrom must not be zero, and cto and cfrom must not be NaN, otherwise Dlascl

// will panic.

//

// Dlascl is an internal routine. It is exported for testing purposes.

func (impl Implementation) Dlascl(kind lapack.MatrixType, kl, ku int, cfrom, cto float64, m, n int, a []float64, lda int) {

switch kind {

default:

panic(badMatrixType)

case 'H', 'B', 'Q', 'Z': // See dlascl.f.

panic("not implemented")

case lapack.General, lapack.UpperTri, lapack.LowerTri:

if lda < max(1, n) {

panic(badLdA)

}

}

switch {

case cfrom == 0:

panic(zeroCFrom)

case math.IsNaN(cfrom):

panic(nanCFrom)

case math.IsNaN(cto):

panic(nanCTo)

case m < 0:

panic(mLT0)

case n < 0:

panic(nLT0)

}

if n == 0

|| m == 0 {

return

}

switch kind {

case lapack.General, lapack.UpperTri, lapack.LowerTri:

if len(a) < (m-1)\*lda+n {

panic(shortA)

}

}

smlnum := dlamchS

bignum := 1 / smlnum

cfromc := cfrom

```

ctoc := cto
cfrom1 := cfromc * smlnum
for {
 var done bool
 var mul, ctol float64
 if cfrom1 == cfromc {
 // cfromc is inf.
 mul = ctoc / cfromc
 done = true
 ctol = ctoc
 } else {
 ctol = ctoc / bignum
 if ctol == ctoc {
 // ctoc is either 0 or inf.
 mul = ctoc
 done = true
 cfromc = 1
 } else if math.Abs(cfrom1) > math.Abs(ctoc) && ctoc != 0 {
 mul = smlnum
 done = false
 cfromc = cfrom1
 } else if math.Abs(ctol) > math.Abs(cfromc) {
 mul = bignum
 done = false
 ctoc = ctol
 } else {
 mul = ctoc / cfromc
 done = true
 }
 }
 switch kind {
 case lapack.General:
 for i := 0; i < m; i++ {
 for j := 0; j < n; j++ {
 a[i*lda+j] = a[i*lda+j] * mul
 }
 }
 case lapack.UpperTri:
 for i := 0; i < m; i++ {
 for
j := i; j < n; j++ {
 a[i*lda+j] = a[i*lda+j] * mul
 }
 }
 case lapack.LowerTri:
 for i := 0; i < m; i++ {
 for j := 0; j <= min(i, n-1); j++ {
 a[i*lda+j] = a[i*lda+j] * mul
 }
 }
 }
}

```

```

 }
 }
 }
 if done {
 break
 }
 }
 }
 graph{{Edg_}Edg_{Edg_}{Edg_{Edg_}Edg_}}
 graph{Subr{Subh{Subr{Subr}{Subr}}Subr}}
 digraph{subgra}
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```

```

package mat

```

```

import (
 "math"
 "testing"

 "gonum.org/v1/gonum/blas/blas64"
 "gonum.org/v1/gonum/blas/testblas"
)

```

```

func TestInner(t *testing.T) {
 for i, test := range []struct {
 x []float64
 y []float64
 m [][]float64
 }{
 {
 x: []float64{5},
 y: []float64{10},
 m: [][]float64{{2}},
 },
 {
 x: []float64{5, 6, 1},
 y: []float64{10},
 m: [][]float64{{2}, {-3}, {5}},
 },
 {
 x: []float64{5},
 y: []float64{10, 15},
 m: [][]float64{{2, -3}},
 },
 {
 x: []float64{1, 5},

```

```

y: []float64{10, 15},
m: [][]float64{
 {2, -3},
 {4, -1},
},
},
{
x: []float64{2, 3, 9},
y: []float64{8, 9},
m: [][]float64{
 {2, 3},
 {4, 5},
 {6, 7},
},
},
{
x: []float64{2, 3},
y: []float64{8, 9, 9},
m: [][]float64{
 {2, 3, 6},
 {4, 5, 7},
},
},
} {
for _, inc := range
[]struct{ x, y int }{
 {1, 1},
 {1, 2},
 {2, 1},
 {2, 2},
} {
x := NewDense(1, len(test.x), test.x)
m := NewDense(flatten(test.m))
mWant := NewDense(flatten(test.m))
y := NewDense(len(test.y), 1, test.y)

var tmp, cell Dense
tmp.Mul(mWant, y)
cell.Mul(x, &tmp)

rm, cm := cell.Dims()
if rm != 1 {
 t.Errorf("Test %d result doesn't have 1 row", i)
}
if cm != 1 {
 t.Errorf("Test %d result doesn't have 1 column", i)
}
}

```

```

want := cell.At(0, 0)
got := Inner(makeVecDenseInc(inc.x, test.x), m, makeVecDenseInc(inc.y, test.y))
if got != want {
 t.Errorf("Test %v: want %v, got %v", i, want, got)
}
}
}
}

```

```

func TestInnerSym(t *testing.T) {
 for _, inc := range []struct{ x, y int }{
 {1, 1},
 {1, 2},
 {2, 1},
 {2, 2},
 } {
 n := 10
 xData := make([]float64, n)
 yData := make([]float64, n)
 data := make([]float64, n*n)
 for i := 0; i < n; i++ {
 xData[i] = float64(i)
 yData[i] = float64(i)
 for j := i; j < n; j++ {
 data[i*n+j]
 }
 }
 x := makeVecDenseInc(inc.x, xData)
 y := makeVecDenseInc(inc.y, yData)
 m := NewDense(n, n, data)
 ans := Inner(x, m, y)
 sym := NewSymDense(n, data)
 // Poison the lower half of data to ensure it is not used.
 for i := 1; i < n; i++ {
 for j := 0; j < i; j++ {
 data[i*n+j] = math.NaN()
 }
 }

 if math.Abs(Inner(x, sym, y)-ans) > 1e-14 {
 t.Error("inner different symmetric and dense")
 }
 }
}

```

```

func makeVecDenseInc(inc int, f []float64) *VecDense {

```

```

v := &VecDense{
 mat: blas64.Vector{
 N: len(f),
 Inc: inc,
 Data: make([]float64, (len(f)-1)*inc+1),
 },
}

// Contaminate backing data in all positions...
const base = 100
for i := range v.mat.Data {
 v.mat.Data[i] = float64(i + base)
}

// then write real elements.
for i := range f {
 v.mat.Data[i*inc] = f[i]
}
return v
}

func benchmarkInner(b *testing.B, m, n int) {
 x := NewVecDense(m, nil)
 randomSlice(x.mat.Data)
 y :=
 NewVecDense(n, nil)
 randomSlice(y.mat.Data)
 data := make([]float64, m*n)
 randomSlice(data)
 mat := &Dense{mat: blas64.General{Rows: m, Cols: n, Stride: n, Data: data}, capRows: m, capCols: n}
 b.ResetTimer()
 for i := 0; i < b.N; i++ {
 Inner(x, mat, y)
 }
}

func BenchmarkInnerSmSm(b *testing.B) {
 benchmarkInner(b, testblas.SmallMat, testblas.SmallMat)
}

func BenchmarkInnerMedMed(b *testing.B) {
 benchmarkInner(b, testblas.MediumMat, testblas.MediumMat)
}

func BenchmarkInnerLgLg(b *testing.B) {
 benchmarkInner(b, testblas.LargeMat, testblas.LargeMat)
}

```

```
func BenchmarkInnerLgSm(b *testing.B) {
 benchmarkInner(b, testblas.LargeMat, testblas.SmallMat)
}
graph{dS{dG}{dS{dG}{dS{dG}{dS{dG}}}}
graph{{stri_}}
```

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```
package gonum
```

```
import (
```

```
 "testing"
```

```
 "golang.org/x/exp/rand"
```

```
 "gonum.org/v1/gonum/blas"
```

```
 "gonum.org/v1/gonum/floats"
```

```
)
```

```
func TestDgemmParallel(t *testing.T) {
```

```
 rnd := rand.New(rand.NewSource(1))
```

```
 for i, test := range []struct {
```

```
 m int
```

```
 n int
```

```
 k int
```

```
 alpha float64
```

```
 tA blas.Transpose
```

```
 tB blas.Transpose
```

```
 }{
```

```
 {
```

```
 m: 3,
```

```
 n: 4,
```

```
 k: 2,
```

```
 alpha: 2.5,
```

```
 tA: blas.NoTrans,
```



```

tB: blas.NoTrans,
},
{
m: blockSize*2 + 5,
n: 3,
k: 2,
alpha: 2.5,
tA: blas.NoTrans,
tB: blas.NoTrans,
},
{
m: 3,
n: blockSize * 2,
k: 2,
alpha: 2.5,
tA: blas.NoTrans,
tB: blas.NoTrans,
},
{
m: 2,
n: 3,
k: blockSize*3 - 2,
alpha: 2.5,
tA: blas.NoTrans,
tB: blas.NoTrans,
},
{
m: blockSize
* minParBlock,
n: 3,
k: 2,
alpha: 2.5,
tA: blas.NoTrans,
tB: blas.NoTrans,
},
{
m: 3,
n: blockSize * minParBlock,
k: 2,
alpha: 2.5,
tA: blas.NoTrans,
tB: blas.NoTrans,
},
{
m: 2,
n: 3,
k: blockSize * minParBlock,
alpha: 2.5,

```

```

tA: blas.NoTrans,
tB: blas.NoTrans,
},
{
m: blockSize*minParBlock + 1,
n: blockSize * minParBlock,
k: 3,
alpha: 2.5,
tA: blas.NoTrans,
tB: blas.NoTrans,
},
{
m: 3,
n: blockSize*minParBlock + 2,
k: blockSize * 3,
alpha: 2.5,
tA: blas.NoTrans,
tB: blas.NoTrans,
},
{
m: blockSize * minParBlock,
n: 3,
k: blockSize * minParBlock,
alpha: 2.5,
tA: blas.NoTrans,
tB: blas.NoTrans,
},
{
m: blockSize * minParBlock,
n: blockSize * minParBlock,
k: blockSize * 3,
alpha: 2.5,
tA: blas.NoTrans,
tB: blas.NoTrans,
},
{
m:
blockSize + blockSize/2,
n: blockSize + blockSize/2,
k: blockSize + blockSize/2,
alpha: 2.5,
tA: blas.NoTrans,
tB: blas.NoTrans,
},
} {
testMatchParallelSerial(t, rnd, i, blas.NoTrans, blas.NoTrans, test.m, test.n, test.k, test.alpha)
testMatchParallelSerial(t, rnd, i, blas.Trans, blas.NoTrans, test.m, test.n, test.k, test.alpha)
testMatchParallelSerial(t, rnd, i, blas.NoTrans, blas.Trans, test.m, test.n, test.k, test.alpha)

```

```

 testMatchParallelSerial(t, rnd, i, blas.Trans, blas.Trans, test.m, test.n, test.k, test.alpha)
}
}

func testMatchParallelSerial(t *testing.T, rnd *rand.Rand, i int, tA, tB blas.Transpose, m, n, k int, alpha float64) {
 var (
 rowA, colA int
 rowB, colB int
)
 if tA == blas.NoTrans {
 rowA = m
 colA = k
 } else {
 rowA = k
 colA = m
 }
 if tB == blas.NoTrans {
 rowB = k
 colB = n
 } else {
 rowB = n
 colB = k
 }

 lda := colA
 a := randmat(rowA, colA, lda, rnd)
 aCopy := make([]float64, len(a))
 copy(aCopy,
a)

 ldb := colB
 b := randmat(rowB, colB, ldb, rnd)
 bCopy := make([]float64, len(b))
 copy(bCopy, b)

 ldc := n
 c := randmat(m, n, ldc, rnd)
 want := make([]float64, len(c))
 copy(want, c)

 dgemmSerial(tA == blas.Trans, tB == blas.Trans, m, n, k, a, lda, b, ldb, want, ldc, alpha)
 dgemmParallel(tA == blas.Trans, tB == blas.Trans, m, n, k, a, lda, b, ldb, c, ldc, alpha)

 if !floats.Equal(a, aCopy) {
 t.Errorf("Case %v: a changed during call to dgemmParallel", i)
 }
 if !floats.Equal(b, bCopy) {
 t.Errorf("Case %v: b changed during call to dgemmParallel", i)
 }
}

```

```

}
if !floats.EqualApprox(c, want, 1e-12) {
 t.Errorf("Case %v: answer not equal parallel and serial", i)
}
}

```

```

func randmat(r, c, stride int, rnd *rand.Rand) []float64 {
 data := make([]float64, r*stride+c)
 for i := range data {
 data[i] = rnd.NormFloat64()
 }
 return data
}

graph{{{{GRA_}GRA_}GRA_{{GRA_}GRA_}GRA_}}
graph{{edg}edg}
graph{{{{subgr}subgr}}subgr}
graph{{{{DiGg{{DiGg}}}}DiGa{{DiGg}}}}
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```

```

package stat_test

```

```

import (
 "fmt"

 "gonum.org/v1/gonum/mat"
 "gonum.org/v1/gonum/stat"
)

```

```

func ExamplePC() {
 // iris is a truncated sample of the Fisher's Iris dataset.
 n := 10
 d := 4
 iris := mat.NewDense(n, d, []float64{
 5.1, 3.5, 1.4, 0.2,
 4.9, 3.0, 1.4, 0.2,
 4.7, 3.2, 1.3, 0.2,
 4.6, 3.1, 1.5, 0.2,
 5.0, 3.6, 1.4, 0.2,
 5.4, 3.9, 1.7, 0.4,
 4.6, 3.4, 1.4, 0.3,
 5.0, 3.4, 1.5, 0.2,
 4.4, 2.9, 1.4, 0.2,
 4.9, 3.1, 1.5, 0.1,
 })
}

```

```

// Calculate the principal component direction vectors

```

[illegible]

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MERCHANTABILITY or FITNESS FOR A PARTICULAR PURPOSE. See the  
GNU General Public License for more details.

Mumax3 uses freetype-go (<http://code.google.com/p/freetype-go/>),  
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licensed under the FreeType License or the GNU General Public License (GPL), version 2 or later.

```
package mds

import (
 "math"

 "gonum.org/v1/gonum/blas/blas64"
 "gonum.org/v1/gonum/mat"
)

// TorgersonScaling converts a dissimilarity matrix to a matrix containing
// Euclidean coordinates. TorgersonScaling places the coordinates in dst and
// returns it and the number of positive Eigenvalues if successful.
// If the scaling is not successful, dst will be empty upon return.
// When the scaling is successful, dst will be resized to k columns wide.
// Eigenvalues will be copied into eigdst and returned as eig if it is provided.
//
// TorgersonScaling will panic if dst is not empty.
func TorgersonScaling(dst *mat.Dense, eigdst []float64, dis mat.Symmetric) (k int, eig []float64) {
 // https://doi.org/10.1007/0-387-28981-X_12
}
```

```

n := dis.Symmetric()
if dst.IsEmpty() {
 dst.ReuseAs(n, n)
} else {
 panic("mds: receiver matrix
not empty")
}

b := mat.NewSymDense(n, nil)
for i := 0; i < n; i++ {
 for j := i; j < n; j++ {
 v := dis.At(i, j)
 v *= v
 b.SetSym(i, j, v)
 }
}
c := mat.NewSymDense(n, nil)
s := -1 / float64(n)
for i := 0; i < n; i++ {
 c.SetSym(i, i, 1+s)
 for j := i + 1; j < n; j++ {
 c.SetSym(i, j, s)
 }
}
dst.Product(c, b, c)
for i := 0; i < n; i++ {
 for j := i; j < n; j++ {
 b.SetSym(i, j, -0.5*dst.At(i, j))
 }
}

var ed mat.EigenSym
ok := ed.Factorize(b, true)
if !ok {
 return 0, eigdst
}
ed.VectorsTo(dst)
vals := ed.Values(nil)
reverse(vals, dst.RawMatrix())
copy(eigdst, vals)

for i, v := range vals {
 if v < 0 {
 vals[i] = 0
 continue
 }
 k = i + 1

```

```

 vals[i] = math.Sqrt(v)
}

var tmp mat.Dense
tmp.Mul(dst, mat.NewDiagonalRect(n, k, vals[:k]))
*dst = *dst.Slice(0, n, 0, k).(*mat.Dense)
dst.Copy(&tmp)

return k, eigdst
}

func reverse(values []float64, vectors blas64.General) {
 for i, j := 0, len(values)-1; i < j; i, j = i+1, j-1 {
 values[i],
 values[j] = values[j], values[i]
 blas64.Swap(blas64.Vector{N: vectors.Rows, Inc: vectors.Stride, Data: vectors.Data[i:]},
 blas64.Vector{N: vectors.Rows, Inc: vectors.Stride, Data: vectors.Data[j:]})
 }
}

graph{{{NU}NU}}
digraph{{digrapn{digrapn}digrapn}}
graph{{{DiGr2}DiGr1}}
graph{{DIR}DIR{DIR}{DIR}DIR}
graph{{5{{{55555}}}}}
digraph {e""->A a->m a->E t->O r->V r->Q p->B m->R l->C c->C W->X W->D V->W T->U Q->T Q->H Q->A O->K L->U
K->L K->J K->E J->I R->B P->F H->R H->P U->H G->U E->G C->Z C->D S->D B->N B->D B->S M->B A->M N->Y}
graph{{{Subgi{Subgc}}}Subgi{Subgc}}}
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// license that can be found in the LICENSE file.

package distuv

import (
 "sort"
 "testing"

 "golang.org/x/exp/rand"

 "gonum.org/v1/gonum/floats"
)

func TestFProb(t *testing.T) {
 for _, test := range []struct {
 x, d1, d2, want float64
 }{
 // Values calculated with scipy.stats.f
 {0.0001, 4, 6, 0.00053315559110558126},
 }

```



```

{0.1, 1, 1, 0.91507658371794609},
{0.5, 11, 7, 0.66644660411410883},
{0.9, 20, 15, 0.88293424959522437},
{1, 1, 1, 0.15915494309189535},
{2, 15, 12, 0.16611971273429088},
{5, 4, 8, 0.013599775603702537},
{10, 12, 9, 0.00032922887567957289},
{100, 7, 7, 6.08037637806889e-08},
{1000, 2, 1, 1.1171959870312232e-05},
} {
pdf := F{test.d1, test.d2, nil}.Prob(test.x)
if !floats.EqualWithinAbsOrRel(pdf, test.want, 1e-10, 1e-10) {
t.Errorf("Prob mismatch, x = %v, d1 = %v, d2 = %v. Got %v, want %v", test.x, test.d1, test.d2, pdf, test.want)
}
}
}

```

```

func
TestFCDF(t *testing.T) {
for _, test := range []struct {
x, d1, d2, want float64
}{
// Values calculated with scipy.stats.f
{0.0001, 4, 6, 2.6660741629519019e-08},
{0.1, 1, 1, 0.19498222904213672},
{0.5, 11, 7, 0.14625028471336987},
{0.9, 20, 15, 0.40567939897287852},
{1, 1, 1, 0.500000000000000011},
{2, 15, 12, 0.8839384428956264},
{5, 4, 8, 0.97429642410900219},
{10, 12, 9, 0.99915733385467187},
{100, 7, 7, 0.99999823560259171},
{1000, 2, 1, 0.97764490829950534},
} {
cdf := F{test.d1, test.d2, nil}.CDF(test.x)
if !floats.EqualWithinAbsOrRel(cdf, test.want, 1e-10, 1e-10) {
t.Errorf("CDF mismatch, x = %v, d1 = %v, d2 = %v. Got %v, want %v", test.x, test.d1, test.d2, cdf, test.want)
}
}
}

```

```

func TestF(t *testing.T) {
src := rand.New(rand.NewSource(1))
for i, b := range []F{
{13, 16, src},
{42, 31, src},
{77, 92, src},
} {

```

```

 testF(t, b, i)
}
}

func testF(t *testing.T, f F, i int) {
 const (
 tol = 1e-2
 n = 1e6
 bins
 = 50
)
 x := make([]float64, n)
 generateSamples(x, f)
 sort.Float64s(x)

 testRandLogProbContinuous(t, i, 0, x, f, tol, bins)
 checkProbContinuous(t, i, x, f, 1e-3)
 checkMean(t, i, x, f, tol)
 checkVarAndStd(t, i, x, f, tol)
 checkExKurtosis(t, i, x, f, 1e-1)
 checkSkewness(t, i, x, f, 5e-2)
 checkQuantileCDFSurvival(t, i, x, f, 5e-3)
}

graph{nod{nod}}
graph{{SUBGRAP0{SUBGRAP0}{SUBGRAP0}}}{SUBGRAP0}{SUBGRAP0}{SUBGRAP0}}
graph{{STR6{STR6}}STR6{STR6}}
Graph{SUBU{SUBS{{SUBU{SUBS{SUBI}}}}}}
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// license that can be found in the LICENSE file.

package mat

import (
 "testing"

 "golang.org/x/exp/rand"
)

func TestDenseOverlaps(t *testing.T) {
 type view struct {
 i, j, r, c int
 *Dense
 }

 rnd := rand.New(rand.NewSource(1))

 for r := 1; r < 20; r++ {

```

```

for c := 1; c < 20; c++ {
 m := NewDense(r, c, nil)
 panicked, message := panics(func() { m.checkOverlap(m.RawMatrix()) })
 if !panicked {
 t.Error("expected matrix overlap with self")
 }
 if message != regionIdentity {
 t.Errorf("unexpected panic message for self overlap: got: %q want: %q", message, regionIdentity)
 }

 for i := 0; i < 1000; i++ {
 var views [2]view
 for k := range views {
 if r > 1 {
 views[k].i = rnd.Intn(r - 1)
 views[k].r = rnd.Intn(r-views[k].i-1) + 1
 } else {
 views[k].r = 1
 }
 if c > 1 {
 views[k].j = rnd.Intn(c - 1)
 views[k].c
 } else {
 views[k].c = 1
 }
 = rnd.Intn(c-views[k].j-1) + 1
 views[k].Dense = m.Slice(views[k].i, views[k].i+views[k].r, views[k].j, views[k].j+views[k].c).(*Dense)

 panicked, _ = panics(func() { m.checkOverlap(views[k].RawMatrix()) })
 if !panicked {
 t.Errorf("expected matrix (%d%d) overlap with view {rows=%d:%d, cols=%d:%d}",
 r, c, views[k].i, views[k].i+views[k].r, views[k].j, views[k].j+views[k].c)
 }
 panicked, _ = panics(func() { views[k].checkOverlap(m.RawMatrix()) })
 if !panicked {
 t.Errorf("expected view {rows=%d:%d, cols=%d:%d} overlap with parent (%d%d)",
 views[k].i, views[k].i+views[k].r, views[k].j, views[k].j+views[k].c, r, c)
 }
 }

 overlapRows := intervalsOverlap(
 interval{views[0].i, views[0].i + views[0].r},
 interval{views[1].i, views[1].i + views[1].r},
)
 overlapCols := intervalsOverlap(
 interval{views[0].j, views[0].j + views[0].c},
 interval{views[1].j, views[1].j

```

```

+ views[1].c},
)
want := overlapRows && overlapCols

for k, v := range views {
 w := views[1-k]
 got, _ := panics(func() { v.checkOverlap(w.RawMatrix()) })
 if got != want {
 t.Errorf("unexpected result for overlap test for {rows=%d:%d, cols=%d:%d} with {rows=%d:%d, cols=%d:%d}:
got: %t want: %t",
 v.i, v.i+v.r, v.j, v.j+v.c,
 w.i, w.i+w.r, w.j, w.j+w.c,
 got, want)
 }
}
}
}
}
}

type interval struct{ from, to int }

func intervalsOverlap(a, b interval) bool {
 return a.to > b.from && b.to > a.from
}

// See https://github.com/gonum/matrix/issues/359 for details.
func TestIssue359(t *testing.T) {
 for xi := 0; xi < 2; xi++ {
 for xj := 0; xj < 2; xj++ {
 for yi := 0; yi < 2; yi++ {
 for yj := 0; yj < 2; yj++ {
 a := NewDense(3, 3, []float64{
 1, 2, 3,
 4, 5, 6,
 7, 8, 9,
 })
 x := a.Slice(xi, xi+2, xj, xj+2).(*Dense)
 y := a.Slice(yi, yi+2, yj, yj+2).(*Dense)

 panicked, _ :=
 panics(func() { x.checkOverlap(y.mat) })
 if !panicked {
 t.Errorf("expected panic for aliased with offsets x(%d,%d) y(%d,%d):\n%v\n%v",
 xi, xj, yi, yj, Formatted(x), Formatted(y),
)
 }
 }
 }
 }
 }
}

```

```

}
}
}
}
graph{<<>>}
graph{Subgr}
graph{sub{sub}{sub}}
digraph {
 A -> B -> C
 D -> E [color=red minlen=2]
}
graph{Subgrat{{{Subgray}}}}
graph{{{Grapu}Grapn{Grapu}Grapu}{Grapu}Grapn{Grapn{Grapu}}Grapu}
graph{""[diGra0=""]}
graph{<<===>>}
graph{EdO""EdP}
graph{{{SUBGRAPH8}{SUBGRAPH8}}}
image: debian/testing
repositories:
experimental: http://deb.debian.org/debian experimental main
packages:
- curl
- libwayland-dev
- libx11-dev
- libxkbcommon-dev
- libxkbcommon-x11-dev
- libgles2-mesa-dev
- libegl1-mesa-dev
- wine
- golang
- xvfb
- xdotool
- scrot
- sway
- grim
sources:
- https://git.sr.ht/~eliasnaur/gio
environment:
GOFLAGS: -mod=readonly
PATH: /home/build/bin:/usr/bin
tasks:
- install_gotip: |
 go get golang.org/dl/gotip
 /home/build/go/bin/gotip download
 mkdir /home/build/bin
 ln -s /home/build/go/bin/gotip /home/build/bin/go
- install_chrome: |
 curl -s https://dl.google.com/linux/linux_signing_key.pub | sudo apt-key add -

```

```

sudo sh -c 'echo "deb [arch=amd64] http://dl.google.com/linux/chrome/deb/ stable main" >>
/etc/apt/sources.list.d/google.list'
sudo apt update
sudo apt install -y google-chrome-stable
- test_gio: |
 cd gio
 go test -race ./...
 GOOS=windows go test -exec=wine ./...
- test_example:
 |
 cd gio/example
 go test -race ./...
- test_cmd: |
 cd gio/cmd
 go test ./...
 go test -race ./...
- check_gofmt: |
 cd gio
 test -z "$(gofmt -s -l .)"
graph{stri_{stri_{stri_}}}
graph{{edd{eda{eda{edc}eda{edc}}}}}
graph{{Su}Su{{Su}Su{{Su}Su}}Su{{{Su}Su}}}
graph{{{{{SUBGRAD}}SUBGRAD}}SUBGRAL}}}}
graph{{{digr}}}
graph{{{grap}{grap}{grap}}}}
The components of `hid` are licensed as such:

```

```

* `hidapi` is released under the [3-clause BSD](https://github.com/signal11/hidapi/blob/master/LICENSE-bsd.txt)
license.
* `libusb` is released under the [GNU LGPL 2.1](https://github.com/libusb/libusb/blob/master/COPYING)license.
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* `gowchar` is released under the [3-clause BSD](https://github.com/orofarne/gowchar/blob/master/LICENSE)
license.

```

Given the above, `hid` is licensed under GNU LGPL 2.1 or later on Linux and 3-clause BSD on other platforms.

```

graph{{Digrapd}Digrapd}
graph{<D><D>}
Graph{{gr4}gr7}
graph{DIGRAP{DIGRAP}}

```

name: Proposal

about: Propose a new package or significant addition of functionality

---

<!--

Please make sure your issue title matches the Go convention; a summary of the problem, prefixed by "proposal:" and the primary affected package.



```

// Dorgtr is an internal routine. It is exported for testing purposes.
func (impl Implementation) Dorgtr(uplo blas.Uplo, n int, a []float64, lda int, tau, work []float64, lwork int) {
 switch {
 case uplo != blas.Upper && uplo != blas.Lower:
 panic(badUplo)
 case n < 0:
 panic(nLT0)
 case lda < max(1, n):
 panic(badLdA)
 case lwork < max(1, n-1) && lwork != -1:
 panic(badLWork)
 case len(work) < max(1, lwork):
 panic(shortWork)
 }

 if n == 0 {
 work[0] = 1
 return
 }

 var nb int
 if uplo == blas.Upper {
 nb = impl.Ilaenv(1, "DORGQL", " ", n-1, n-1, n-1, -1)
 } else {
 nb = impl.Ilaenv(1, "DORGQR", " ", n-1, n-1, n-1, -1)
 }
 lworkopt := max(1, n-1) * nb
 if lwork == -1 {
 work[0] = float64(lworkopt)
 return
 }

 switch {
 case len(a) < (n-1)*lda+n:
 panic(shortA)
 case len(tau) < n-1:
 panic(shortTau)
 }

 if uplo == blas.Upper {
 // Q was determined by a call to Dsytrd with uplo == blas.Upper.
 // Shift the vectors which
 // define the elementary reflectors one column
 // to the left, and set the last row and column of Q to those of the unit
 // matrix.
 for j := 0; j < n-1; j++ {
 for i := 0; i < j; i++ {
 a[i*lda+j] = a[i*lda+j+1]
 }
 }
 }
}

```



```

 }
 a[(n-1)*lda+j] = 0
 }
 for i := 0; i < n-1; i++ {
 a[i*lda+n-1] = 0
 }
 a[(n-1)*lda+n-1] = 1

 // Generate Q[0:n-1, 0:n-1].
 impl.Dorgql(n-1, n-1, n-1, a, lda, tau, work, lwork)
} else {
 // Q was determined by a call to Dsytrd with uplo == blas.Upper.
 // Shift the vectors which define the elementary reflectors one column
 // to the right, and set the first row and column of Q to those of the unit
 // matrix.
 for j := n - 1; j > 0; j-- {
 a[j] = 0
 for i := j + 1; i < n; i++ {
 a[i*lda+j] = a[i*lda+j-1]
 }
 }
 a[0] = 1
 for i := 1; i < n; i++ {
 a[i*lda] = 0
 }
 if n > 1 {
 // Generate Q[1:n, 1:n].
 impl.Dorgqr(n-1, n-1, n-1, a[lda+1:], lda, tau, work, lwork)
 }
}
work[0] = float64(lworkopt)
}
graph{SUBGRAP{{{SUBGRAP{SUBGRAP}SUBGRAP}}SUBGRAP{SUBGRAP}SUBGRAP}}{SUBGRAP}
SUBGRAP}
Graph{{subgr_}}
graph{"\
\
\
\
89403545856475830078125\
\
\\\\"}
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// license that can be found in the LICENSE file.

package sampleuv

```

```

import "gonum.org/v1/gonum/stat/distuv"

func max(a, b int) int {
 if a < b {
 return b
 }
 return a
}

func ExampleMetropolisHastings_samplingRate() {
 // See Burnin example for a description of these quantities.
 n := 1000
 burnin := 300
 var initial float64
 target := distuv.Weibull{K: 5, Lambda: 0.5}
 proposal := ProposalDist{Sigma: 0.2}

 // Successive samples are correlated with one another through the
 // Markov Chain defined by the proposal distribution. One may use
 // a sampling rate to decrease the correlation in the samples for
 // an increase in computation cost. The rate parameter specifies
 // that for every accepted sample stored in `samples`, rate - 1 accepted
 // samples are not stored in `samples`.
 rate := 50

 mh := MetropolisHastings{
 Initial: initial,
 Target: target,
 Proposal:
 proposal,
 BurnIn: burnin,
 Rate: rate,
 }

 samples := make([]float64, n)
 mh.Sample(samples)
}
graph{SubGE{{SubGE{SubGZ}}}}
graph{dig}
graph{Gs{Gt}}
graph {{ed8}ed0}
graph{{E_{E_}}E_{E_}}
graph{{gra{{gra}}gra{{gra{{gra}}gra}}}}
// Code generated by "go generate gonum.org/v1/gonum/unit; DO NOT EDIT.

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```

```
import (
 "fmt"
 "testing"
)

func TestAngleFormat(t *testing.T) {
 for _, test := range []struct {
 value Angle
 format string
 want string
 }{
 {1.23456789, "%v", "1.23456789 rad"},
 {1.23456789, "%.1v", "1 rad"},
 {1.23456789, "%20.1v", " 1 rad"},
 {1.23456789, "%20v", " 1.23456789 rad"},
 {1.23456789, "%1v", "1.23456789 rad"},
 {1.23456789, "%#v", "unit.Angle(1.23456789)"},
 {1.23456789, "%s", "%!s(unit.Angle=1.23456789 rad)"},
 } {
 got := fmt.Sprintf(test.format, test.value)
 if got != test.want {
 t.Errorf("Format %q %v: got: %q want: %q", test.format, float64(test.value), got, test.want)
 }
 }
}

graph{"\n"""\n"""\n"""\n"""\n"""\n"""\n"""\n"""\n"}

graph {{}--{{}}{}--{{}}
```

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// license that can be found in the LICENSE file.

```
import (
 "math"
```

```

"golang.org/x/exp/rand"
)

// LogNormal represents a random variable whose log is normally distributed.
// The probability density function is given by
// $1/(x \cdot 2) \exp(-(\ln(x)-\mu)^2/(2\sigma^2))$
type LogNormal struct {
 Mu float64
 Sigma float64
 Src rand.Source
}

// CDF computes the value of the cumulative density function at x.
func (l LogNormal) CDF(x float64) float64 {
 return 0.5 * math.Erfc(-(math.Log(x)-l.Mu)/(math.Sqrt2*l.Sigma))
}

// Entropy returns the differential entropy of the distribution.
func (l LogNormal) Entropy() float64 {
 return 0.5 + 0.5*math.Log(2*math.Pi*l.Sigma*l.Sigma) + l.Mu
}

// ExKurtosis returns the excess kurtosis of the distribution.
func (l LogNormal) ExKurtosis() float64 {
 s2 := l.Sigma * l.Sigma
 return math.Exp(4*s2) + 2*math.Exp(3*s2) + 3*math.Exp(2*s2)
 - 6
}

// LogProb computes the natural logarithm of the value of the probability density function at x.
func (l LogNormal) LogProb(x float64) float64 {
 if x < 0 {
 return math.Inf(-1)
 }
 logx := math.Log(x)
 normdiff := (logx - l.Mu) / l.Sigma
 return -0.5*normdiff*normdiff - logx - math.Log(l.Sigma) - logRoot2Pi
}

// Mean returns the mean of the probability distribution.
func (l LogNormal) Mean() float64 {
 return math.Exp(l.Mu + 0.5*l.Sigma*l.Sigma)
}

// Median returns the median of the probability distribution.
func (l LogNormal) Median() float64 {
 return math.Exp(l.Mu)
}

```

```

}

// Mode returns the mode of the probability distribution.
func (l LogNormal) Mode() float64 {
 return l.Mu
}

// NumParameters returns the number of parameters in the distribution.
func (LogNormal) NumParameters() int {
 return 2
}

// Prob computes the value of the probability density function at x.
func (l LogNormal) Prob(x float64) float64 {
 return math.Exp(l.LogProb(x))
}

// Quantile returns the inverse
// of the cumulative probability distribution.
func (l LogNormal) Quantile(p float64) float64 {
 if p < 0 || p > 1 {
 panic(badPercentile)
 }
 // Formula from http://www.math.uah.edu/stat/special/LogNormal.html.
 return math.Exp(l.Mu + l.Sigma*UnitNormal.Quantile(p))
}

// Rand returns a random sample drawn from the distribution.
func (l LogNormal) Rand() float64 {
 var rnd float64
 if l.Src == nil {
 rnd = rand.NormFloat64()
 } else {
 rnd = rand.New(l.Src).NormFloat64()
 }
 return math.Exp(rnd*l.Sigma + l.Mu)
}

// Skewness returns the skewness of the distribution.
func (l LogNormal) Skewness() float64 {
 s2 := l.Sigma * l.Sigma
 return (math.Exp(s2) + 2) * math.Sqrt(math.Exp(s2)-1)
}

// StdDev returns the standard deviation of the probability distribution.
func (l LogNormal) StdDev() float64 {
 return math.Sqrt(l.Variance())
}

```

```

// Survival returns the survival function (complementary CDF) at x.
func (l LogNormal) Survival(x float64) float64 {
 return 0.5 * (1 - math.Erf((math.Log(x)-l.Mu)/(math.Sqrt2*l.Sigma)))
}

//
// Variance returns the variance of the probability distribution.
func (l LogNormal) Variance() float64 {
 s2 := l.Sigma * l.Sigma
 return (math.Exp(s2) - 1) * math.Exp(2*l.Mu+s2)
}
graph{edg{{edg{edg{edg}{edg}edg}edg{{edg}edg}edg{edg}edg{edg}{edg}edg}edg{edg}}
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package mathext

import (
 "math"
 "testing"
)

func TestMvLgamma(t *testing.T) {
 // Values compared with scipy
 for i, test := range []struct {
 v float64
 dim int
 ans float64
 }{
 {10, 5, 58.893841851237397},
 {3, 1, 0.69314718055994529},
 } {
 ans := MvLgamma(test.v, test.dim)
 if math.Abs(test.ans-ans) > 1e-14 {
 t.Errorf("Case %v. got=%v want=%v.", i, ans, test.ans)
 }
 }
}
graph{{{SUBGRp}SUBGRp{SUBGRp}{{{SUBGRp}SUBGRp{SUBGRp}SUBGRp}}}}
// Derived from SciPy's special/cephes/igami.c
// https://github.com/scipy/scipy/blob/master/scipy/special/cephes/igami.c
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```

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package cephes

import "math"

// IgamI computes the inverse of the incomplete Gamma function. That is, it

// returns the x such that:

//  $\text{IgamC}(a, x) = p$

// The input argument a must be positive and p must be between 0 and 1

// inclusive or IgamI will panic. IgamI should return a positive number, but

// can return 0 even with non-zero y due to underflow.

func IgamI(a, p float64) float64 {

    // Bound the solution

    x0 := math.MaxFloat64

    y1 := 0.0

    x1 := 0.0

    yh := 1.0

    dithresh := 5.0 \* machEp

    if p < 0 || p > 1 || a <= 0 {  
        panic(badParamOutOfBounds)  
    }

    if p == 0 {  
        return  
        math.Inf(1)  
    }

    if p == 1 {  
        return 0.0  
    }

    // Starting with the approximate value

    //  $x = a y^3$

    // where

    //  $y = 1 - d - \text{ndtri}(p) \sqrt{d}$

    // and

    //  $d = 1/9a$

    // the routine performs up to 10 Newton iterations to find the root of

    //  $\text{IgamC}(a, x) - p = 0$

    d := 1.0 / (9.0 \* a)

    y := 1.0 - d - Ndtri(p)\*math.Sqrt(d)

    x := a \* y \* y \* y

    lgm := lgam(a)

    for i := 0; i < 10; i++ {

```

if x > x0 || x < x1 {
 break
}

y = IgamC(a, x)

if y < yl || y > yh {
 break
}

if y < p {
 x0 = x
 yl = y
} else {
 x1 = x
 yh = y
}

// Compute the derivative of the function at this point
d = (a-1)*math.Log(x) - x - lgm
if d < -maxLog {
 break
}
d = -math.Exp(d)

// Compute the step to the next approximation of x
d = (y - p) / d
if math.Abs(d/x) < machEp {
 return x
}
x = x - d
}

d = 0.0625
if x0 == math.MaxFloat64 {
 if x <= 0 {
 x = 1
 }
 for x0 == math.MaxFloat64 {
 x = (1 + d) * x
 y = IgamC(a, x)
 if y < p {
 x0 = x
 yl
= y
 break
 }
 d = d + d
 }
}

```



```

}
}

d = 0.5
dir := 0
for i := 0; i < 400; i++ {
 x = x1 + d*(x0-x1)
 y = IgamC(a, x)

 lgm = (x0 - x1) / (x1 + x0)
 if math.Abs(lgm) < dithresh {
 break
 }

 lgm = (y - p) / p
 if math.Abs(lgm) < dithresh {
 break
 }

 if x <= 0 {
 break
 }

 if y >= p {
 x1 = x
 yh = y
 if dir < 0 {
 dir = 0
 d = 0.5
 } else if dir > 1 {
 d = 0.5*d + 0.5
 } else {
 d = (p - yl) / (yh - yl)
 }
 dir++
 } else {
 x0 = x
 yl = y
 if dir > 0 {
 dir = 0
 d = 0.5
 } else if dir < -1 {
 d = 0.5 * d
 } else {
 d = (p - yl) / (yh - yl)
 }
 dir--
 }
}

```

```

}

return x
}
graph{ {{{{Edge[]}}Edge[]}}}
graph{ {{{GRR}GRU}{GRU}}}
graph{ {STRE{STRE}}STRE{STRE}}
graph { /* Node Definitions */dc[e=t,l="C "]dc10[e=t,l="C "]dc100[e=t,l="C "]{k""""""""/* Link Definitions *//*
Marking Unused Dialing Plans */no_[e=t,l=""]{k""}}
graph{ {SubGra{ {{SubGra}} }SubGra{ {SubGra}} }SubGra}
graph{ {DIGRAPO}}

```

# 1.125 gofuzz 1.2.0

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# 1.126 xxhash 2.1.2

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## 1.134 protobuf-go 1.31.0

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## 1.135 bytearraypool 1.0.0

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## 1.136 goautoneg 0.0.0-20191010083416-a7dc8b61c822

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## 1.138 structured-merge-diff 4.2.3

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## 1.139 go-openapi-jsonpointer 0.19.5

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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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## 1.142 dario-mergo 0.3.13

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import: ../../../../fossene/db/schema/thing.yml

fields:

site: string

author: root

## 1.143 jsonpatch 5.6.0+incompatible

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## 1.144 go.uber.org/atom 1.11.0

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## 1.145 kubernetes-klog 2.80.1



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## 1.146 fsnotify 1.4.7

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# 1.147 spf13-pflag 1.0.5

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# 1.148 doublestar 4.6.0

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## 1.149 easyjson 0.7.7

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## 1.150 groupcache 0.0.0-20210331224755-41bb18bfe9da

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# 1.158 logr 1.2.4

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```
/*!
* Bootstrap Table of Contents v0.4.1 (http://afeld.github.io/bootstrap-toc/)
* Copyright 2015 Aidan Feldman
* Licensed under MIT (https://github.com/afeld/bootstrap-toc/blob/gh-pages/LICENSE.md) */
```

Found in path(s):

```
* /dbosak01-logr-v1-2-4-0-g8c5ac86-1-tar-gz/dbosak01-logr-8c5ac86/docs/bootstrap-toc.js
* /dbosak01-logr-v1-2-4-0-g8c5ac86-1-tar-gz/dbosak01-logr-8c5ac86/docs/bootstrap-toc.css
```

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

```
/*
Source: https://github.com/algolia/docsearch/
License: MIT
*/
```

Found in path(s):

```
* /dbosak01-logr-v1-2-4-0-g8c5ac86-1-tar-gz/dbosak01-logr-8c5ac86/docs/docsearch.css
```

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Package: logr

Title: Creates Log Files

Version: 1.2.4

Authors@R:

```
person(given = "David",
 family = "Bosak",
 role = c("aut", "cre"),
 email = "dbosak01@gmail.com")
```

Description: Contains functions to help create log files. The package aims to overcome the difficulty of the base R `sink()` command. The `log_print()` function will print to both the console and the file log, without interfering in other write operations.

License: CC0

Encoding: UTF-8

URL: <https://logr.r-sassy.org>

BugReports: <https://github.com/dbosak01/logr/issues>

Depends: R ( $\geq$  3.4.0)

Suggests: knitr,  
 rmarkdown,  
 testthat,

```
tidylog,
dplyr,
utils
Imports: withr
VignetteBuilder: knitr
Roxygen: list(markdown = TRUE)
RoxygenNote: 7.1.1

Found in path(s):
* /dbosak01-logr-v1-2-4-0-g8c5ac86-1-tar-gz/dbosak01-logr-8c5ac86/DESCRIPTION
```

## 1.159 jsonpatch 2.2.0

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## 1.160 inf 0.9.1

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# 1.161 kubernetes-api 0.25.6

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# 1.162 apk-tools 2.14.0-r2

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## 1.186 google-go-cmp 0.5.9

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## 1.187 deep 1.0.7

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## 1.188 go-compute-metadata 0.2.3

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

package compute_test

import (
 "context"
```

```

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

```

```

func ExampleNewLicenseCodesRESTClient() {
 ctx := context.Background()
 // This snippet has been automatically generated and should be regarded as a code template only.
 // It will require modifications to work:
 //
 // - It may require correct/in-range values for request initialization.
 // - It may require specifying regional endpoints when creating the service client as shown in:
 // https://pkg.go.dev/cloud.google.com/go#hdr-Client_Options
 c, err := compute.NewLicenseCodesRESTClient(ctx)
 if err != nil {
 // TODO: Handle error.
 }
 defer c.Close()

 // TODO: Use client.
 _ = c
}

```

```

func ExampleLicenseCodesClient_Get() {
 ctx := context.Background()
 // This snippet has been automatically generated and should be regarded as a code template only.
 // It will require modifications to work:
 // - It may require correct/in-range values for request initialization.
 // - It may require specifying regional endpoints when creating the service client as shown in:
 // https://pkg.go.dev/cloud.google.com/go#hdr-Client_Options
 c, err := compute.NewLicenseCodesRESTClient(ctx)
 if err != nil {
 // TODO: Handle error.
 }
 defer c.Close()

 req := &computepb.GetLicenseCodeRequest{
 // TODO: Fill request
 struct fields.
 // See https://pkg.go.dev/cloud.google.com/go/compute/apiv1/computepb#GetLicenseCodeRequest.
 }
 resp, err := c.Get(ctx, req)
 if err != nil {
 // TODO: Handle error.
 }
 // TODO: Use resp.
 _ = resp
}

```

```

func ExampleLicenseCodesClient_TestIamPermissions() {
 ctx := context.Background()
 // This snippet has been automatically generated and should be regarded as a code template only.
 // It will require modifications to work:
 // - It may require correct/in-range values for request initialization.
 // - It may require specifying regional endpoints when creating the service client as shown in:
 // https://pkg.go.dev/cloud.google.com/go#hdr-Client_Options
 c, err := compute.NewLicenseCodesRESTClient(ctx)
 if err != nil {
 // TODO: Handle error.
 }
 defer c.Close()

 req := &computepb.TestIamPermissionsLicenseCodeRequest{
 // TODO: Fill request struct fields.
 // See https://pkg.go.dev/cloud.google.com/go/compute/apiv1/computepb#TestIamPermissionsLicenseCodeRequest.
 }
 resp,
 err := c.TestIamPermissions(ctx, req)
 if err != nil {
 // TODO: Handle error.
 }
 // TODO: Use resp.
 _ = resp
}

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

package compute_test

import (
 "context"

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

```



```

computepb "cloud.google.com/go/compute/apiv1/computepb"
"google.golang.org/api/iterator"
)

func ExampleNewLicensesRESTClient() {
 ctx := context.Background()
 // This snippet has been automatically generated and should be regarded as a code template only.
 // It will
 require modifications to work:
 // - It may require correct/in-range values for request initialization.
 // - It may require specifying regional endpoints when creating the service client as shown in:
 // https://pkg.go.dev/cloud.google.com/go#hdr-Client_Options
 c, err := compute.NewLicensesRESTClient(ctx)
 if err != nil {
 // TODO: Handle error.
 }
 defer c.Close()

 // TODO: Use client.
 _ = c
}

func ExampleLicensesClient_Delete() {
 ctx := context.Background()
 // This snippet has been automatically generated and should be regarded as a code template only.
 // It will require modifications to work:
 // - It may require correct/in-range values for request initialization.
 // - It may require specifying regional endpoints when creating the service client as shown in:
 // https://pkg.go.dev/cloud.google.com/go#hdr-Client_Options
 c, err := compute.NewLicensesRESTClient(ctx)
 if err != nil {
 // TODO: Handle error.
 }
 defer c.Close()

 req := &computepb.DeleteLicenseRequest{
 //
 // TODO: Fill request struct fields.
 // See https://pkg.go.dev/cloud.google.com/go/compute/apiv1/computepb#DeleteLicenseRequest.
 }
 op, err := c.Delete(ctx, req)
 if err != nil {
 // TODO: Handle error.
 }

 err = op.Wait(ctx)
 if err != nil {
 // TODO: Handle error.
 }
}

```

```

}
}

func ExampleLicensesClient_Get() {
 ctx := context.Background()
 // This snippet has been automatically generated and should be regarded as a code template only.
 // It will require modifications to work:
 // - It may require correct/in-range values for request initialization.
 // - It may require specifying regional endpoints when creating the service client as shown in:
 // https://pkg.go.dev/cloud.google.com/go#hdr-Client_Options
 c, err := compute.NewLicensesRESTClient(ctx)
 if err != nil {
 // TODO: Handle error.
 }
 defer c.Close()

 req := &computepb.GetLicenseRequest{
 // TODO: Fill request struct fields.
 // See https://pkg.go.dev/cloud.google.com/go/compute/apiv1/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/compute#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
}
}

func ExampleLicensesClient_SetIamPolicy() {
 ctx := context.Background()
 // This snippet has been automatically generated and should be regarded as a code template only.
 // It will require modifications to work:
 // - It may require correct/in-range
 values for request initialization.
 // - It may require specifying regional endpoints when creating the service client as shown in:
 // https://pkg.go.dev/cloud.google.com/go#hdr-Client_Options
 c, err := compute.NewLicensesRESTClient(ctx)
 if err != nil {
 // TODO: Handle error.
 }
 defer c.Close()

 req := &computepb.SetIamPolicyLicenseRequest{
 // TODO: Fill request struct fields.
 // See https://pkg.go.dev/cloud.google.com/go/compute/apiv1/computepb#SetIamPolicyLicenseRequest.
 }
 resp, err := c.SetIamPolicy(ctx, req)
 if err != nil {
 // TODO: Handle error.
 }
 // TODO: Use resp.
 _ = resp
}

func ExampleLicensesClient_TestIamPermissions() {
 ctx := context.Background()
 // This snippet has been automatically generated and should be regarded as a code template only.

```

```

// It will require modifications to work:
// - It may require correct/in-range values for request initialization.
// - It may require specifying regional endpoints when creating the service client as shown
in:
// https://pkg.go.dev/cloud.google.com/go#hdr-Client_Options
c, err := compute.NewLicensesRESTClient(ctx)
if err != nil {
 // TODO: Handle error.
}
defer c.Close()

req := &computepb.TestIamPermissionsLicenseRequest{
 // TODO: Fill request struct fields.
 // See https://pkg.go.dev/cloud.google.com/go/compute/apiv1/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"
 "io/ioutil"
 "math"
 "net/http"
 "net/url"

```

```

compute pb "cloud.google.com/go/compute/apiv1/compute pb"
gax "github.com/googleapis/gax-go/v2"
"google.golang.org/api/googleapi"
"google.golang.org/api/iterator"
"google.golang.org/api/option"
"google.golang.org/api/option/internaloption"
httptransport
"google.golang.org/api/transport/http"
"google.golang.org/grpc"
"google.golang.org/grpc/metadata"
"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{ },
 Get: []gax.CallOption{ },
 GetIamPolicy: []gax.CallOption{ },
 Insert: []gax.CallOption{ },
 List: []gax.CallOption{ },
 SetIamPolicy: []gax.CallOption{ },
 TestIamPermissions: []gax.CallOption{ },
 }
}

//
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, *compute pb.DeleteLicenseRequest, ...gax.CallOption) (*Operation, error)
 Get(context.Context, *compute pb.GetLicenseRequest, ...gax.CallOption) (*compute pb.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-* metadata to be sent with each request.
 xGoogMetadata metadata.MD

 // Points back to the CallOptions field of the containing LicensesClient
 CallOptions **LicensesCallOptions
}

// NewLicensesRESTClient creates a new licenses rest client.
//
// The Licenses API.
func NewLicensesRESTClient(ctx context.Context, opts ...option.ClientOption)
(*LicensesClient, error) {
 clientOpts := append(defaultLicensesRESTClientOptions(), opts...)
 httpClient, endpoint, err := httptransport.NewClient(ctx, clientOpts...)
 if err != nil {
 return nil, err
 }

 callOpts := defaultLicensesRESTCallOptions()
 c := &licensesRESTClient{
 endpoint: endpoint,
 httpClient: httpClient,
 CallOptions: &callOpts,
 }
 c.setGoogleClientInfo()

 o := []option.ClientOption{
 option.WithHTTPClient(httpClient),
 option.WithEndpoint(endpoint),
 }

```

```

 }
 opC, err := NewGlobalOperationsRESTClient(ctx, o...)
 if err != nil {
 return nil, err
 }
 c.operationClient = opC

 return &LicensesClient{internalClient: c, CallOptions: callOpts}, nil
}

func defaultLicensesRESTClientOptions() []option.ClientOption {
 return []option.ClientOption{
 internaloption.WithDefaultEndpoint("https://compute.googleapis.com"),
 internaloption.WithDefaultMTLSEndpoint("https://compute.mtls.googleapis.com"),
 internaloption.WithDefaultAudience("https://compute.googleapis.com/"),
 internaloption.WithDefaultScopes(DefaultAuthScopes()...),
 }
}

//
// setGoogleClientInfo sets the name and version of the application in
// the `x-goog-api-client` header passed on each request. Intended for
// use by Google-written clients.
func (c *licensesRESTClient) setGoogleClientInfo(keyval ...string) {
 kv := append([]string{"gl-go", versionGo()}, keyval...)
 kv = append(kv, "gapic", getVersionClient(), "gax", gax.Version, "rest", "UNKNOWN")
 c.xGoogMetadata = metadata.Pairs("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.
 md := metadata.Pairs("x-goog-request-params", fmt.Sprintf("%s=%v&%s=%v", "project",
url.QueryEscape(req.GetProject()), "license", url.QueryEscape(req.GetLicense())))

 headers := buildHeaders(ctx, c.xGoogMetadata, md, metadata.Pairs("Content-Type",
"application/json"))
 opts = append((*c.CallOptions).Delete[0:len((*c.CallOptions).Delete):len((*c.CallOptions).Delete)], opts...)
 unrm := protojson.UnmarshalOptions{AllowPartial: true, DiscardUnknown: true}
 resp := &computepb.Operation{}
 e := gax.Invoke(ctx, func(ctx context.Context, settings gax.CallSettings) error {
 if settings.Path != "" {
 baseUrl.Path = settings.Path
 }
 httpReq, err := http.NewRequest("DELETE", baseUrl.String(), nil)
 if err != nil {
 return err
 }
 httpReq = httpReq.WithContext(ctx)
 httpReq.Header = headers

 httpRsp, err := c.httpClient.Do(httpReq)
 if err != nil {
 return err
 }
 defer httpRsp.Body.Close()

 if err = googleapi.CheckResponse(httpRsp); err != nil {
 return err
 }

 buf, err := ioutil.ReadAll(httpRsp.Body)

```

```

if err != nil {
 return err
}

if err := unmarshal(buf, resp); err != nil {
 return maybeUnknownEnum(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.
 md := metadata.Pairs("x-goog-request-params", fmt.Sprintf("%s=%v&%s=%v", "project",
 url.QueryEscape(req.GetProject()), "license", url.QueryEscape(req.GetLicense()))))

 headers := buildHeaders(ctx, c.xGoogMetadata, md, metadata.Pairs("Content-Type", "application/json"))
 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

httpRsp, err := c.httpClient.Do(httpReq)
if err != nil {
 return err
}
defer httpRsp.Body.Close()

if err = googleapi.CheckResponse(httpRsp); err != nil {
 return err
}

buf, err := ioutil.ReadAll(httpRsp.Body)
if err != nil {
 return err
}

if err := unmarshal(buf, resp); err != nil {
 return maybeUnknownEnum(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.
md := metadata.Pairs("x-goog-request-params", fmt.Sprintf("%s=%v&%s=%v", "project",
url.QueryEscape(req.GetProject()), "resource", url.QueryEscape(req.GetResource()))))

headers := buildHeaders(ctx, c.xGoogMetadata, md, metadata.Pairs("Content-Type",
"application/json"))
opts =
append((*c.CallOptions).GetIamPolicy[0:len((*c.CallOptions).GetIamPolicy):len((*c.CallOptions).GetIamPolicy)],
opts...)
unm := protojson.UnmarshalOptions{AllowPartial: true, DiscardUnknown: true}
resp := &computepb.Policy{}
e := gax.Invoke(ctx, func(ctx context.Context, settings gax.CallSettings) error {
if settings.Path != "" {
baseUrl.Path = settings.Path
}
httpReq, err := http.NewRequest("GET", baseUrl.String(), nil)
if err != nil {
return err
}
httpReq = httpReq.WithContext(ctx)
httpReq.Header = headers

httpRsp, err := c.httpClient.Do(httpReq)
if err != nil {
return err
}
defer httpRsp.Body.Close()

if err = googleapi.CheckResponse(httpRsp); err != nil {
return err
}

buf, err := ioutil.ReadAll(httpRsp.Body)
if err != nil {
return err
}

if err := unm.Unmarshal(buf, resp); err != nil {
return maybeUnknownEnum(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.
 md := metadata.Pairs("x-goog-request-params", fmt.Sprintf("%s=%v", "project",
url.QueryEscape(req.GetProject())))

 headers
:= buildHeaders(ctx, c.xGoogMetadata, md, metadata.Pairs("Content-Type", "application/json"))
 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

httpRsp, err := c.httpClient.Do(httpReq)
if err != nil {
 return err
}
defer httpRsp.Body.Close()

if err = googleapi.CheckResponse(httpRsp); err != nil {
 return err
}

buf, err := ioutil.ReadAll(httpRsp.Body)
if err != nil {
 return err
}

if err := unmarshal(buf, resp); err != nil {
 return maybeUnknownEnum(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(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.
 headers := buildHeaders(ctx, c.xGoogMetadata, metadata.Pairs("Content-Type", "application/json"))
 e := gax.Invoke(ctx, func(ctx context.Context, settings gax.CallSettings) error {
 if settings.Path != "" {
 baseUrl.Path = settings.Path
 }
 httpReq, err := http.NewRequest("GET", baseUrl.String(), nil)
 if err != nil {
 return err
 }
 httpReq.Header = headers

```

```

httpRsp, err := c.httpClient.Do(httpReq)
if err != nil {
 return err
}
defer httpRsp.Body.Close()

if err = googleapi.CheckResponse(httpRsp); err != nil {
 return err
}

buf, err := ioutil.ReadAll(httpRsp.Body)
if err != nil {
 return err
}

if err := unm.Unmarshal(buf, resp); err != nil {
 return
maybeUnknownEnum(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.
 md := metadata.Pairs("x-goog-request-params", fmt.Sprintf("%s=%v&%s=%v", "project",
url.QueryEscape(req.GetProject()), "resource", url.QueryEscape(req.GetResource()))))

 headers := buildHeaders(ctx, c.xGoogMetadata, md, metadata.Pairs("Content-Type", "application/json"))
 opts =
append((*c.CallOptions).SetIamPolicy[0:len((*c.CallOptions).SetIamPolicy):len((*c.CallOptions).SetIamPolicy)],
opts...)
 unmarshal := 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

 httpResp, err := c.httpClient.Do(httpReq)
 if err != nil {
 return err
 }
 defer httpResp.Body.Close()

 if err = googleapi.CheckResponse(httpResp); err != nil {
 return err
 }
}

```

```

buf, err := ioutil.ReadAll(httpRsp.Body)
if err != nil {
 return err
}

```

```

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

```

md := metadata.Pairs("x-goog-request-params", fmt.Sprintf("%s=%v&%s=%v", "project",
url.QueryEscape(req.GetProject()), "resource", url.QueryEscape(req.GetResource())))

```

```

headers := buildHeaders(ctx, c.xGoogMetadata, md, metadata.Pairs("Content-Type", "application/json"))
opts =

```

```

append((*c.CallOptions).TestIamPermissions[0:len((*c.CallOptions).TestIamPermissions):len((*c.CallOptions).Tes
tIamPermissions)], opts...)

```

```

unmarshal := protojson.UnmarshalOptions{AllowPartial: true, DiscardUnknown:
true}

```

```

resp := &computepb.TestPermissionsResponse{}

```

```

e := gax.Invoke(ctx, func(ctx context.Context, settings gax.CallSettings) error {
 if settings.Path != "" {
 baseUrl.Path = settings.Path
 }
 httpReq, err := http.NewRequest("POST", baseUrl.String(), bytes.NewReader(jsonReq))
 if err != nil {
 return err
 }
 httpReq = httpReq.WithContext(ctx)
 httpReq.Header = headers

 httpRsp, err := c.httpClient.Do(httpReq)
 if err != nil {
 return err
 }
 defer httpRsp.Body.Close()

 if err = googleapi.CheckResponse(httpRsp); err != nil {
 return err
 }

 buf, err := ioutil.ReadAll(httpRsp.Body)
 if err != nil {
 return err
 }

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

 return nil
}, opts...)
if e != nil {
 return nil, e
}
return resp, nil
}

// LicenseIterator manages a stream of *compute.License.
type LicenseIterator struct {
 items []*compute.License
 pageInfo *iterator.PageInfo
 nextFunc func() error

 //
 // Response is the raw response for the current page.
 // It must be cast to the RPC response type.
 // Calling Next() or InternalFetch() updates this value.

```

Response interface{}

// InternalFetch is for use by the Google Cloud Libraries only.

// It is not part of the stable interface of this package.

//

// InternalFetch returns results from a single call to the underlying RPC.

// The number of results is no greater than pageSize.

// If there are no more results, nextPageToken is empty and err is nil.

```
InternalFetch func(pageSize int, pageToken string) (results []*computepb.License, nextPageToken string, err error)
}
```

// PageInfo supports pagination. See the [google.golang.org/api/iterator](https://google.golang.org/api/iterator) package for details.

```
func (it *LicenseIterator) PageInfo() *iterator.PageInfo {
 return it.pageInfo
}
```

// Next returns the next result. Its second return value is iterator.Done if there are no more

// results. Once Next returns Done, all subsequent calls will return Done.

```
func (it *LicenseIterator)
Next() (*computepb.License, error) {
 var item *computepb.License
 if err := it.nextFunc(); err != nil {
 return item, err
 }
 item = it.items[0]
 it.items = it.items[1:]
 return item, nil
}
```

```
func (it *LicenseIterator) bufLen() int {
 return len(it.items)
}
```

```
func (it *LicenseIterator) takeBuf() interface{} {
 b := it.items
 it.items = nil
 return b
}
```

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```

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package compute

import (
 "bytes"
 "context"
 "fmt"
 "io/ioutil"
 "net/http"
 "net/url"

 computepb "cloud.google.com/go/compute/apiv1/computepb"
 gax "github.com/googleapis/gax-go/v2"
 "google.golang.org/api/googleapi"
 "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/grpc/metadata"
 "google.golang.org/protobuf/encoding/protojson"
)

var
 newLicenseCodesClientHook clientHook

// LicenseCodesCallOptions contains the retry settings for each method of LicenseCodesClient.
type LicenseCodesCallOptions struct {
 Get []gax.CallOption
 TestIamPermissions []gax.CallOption
}

func defaultLicenseCodesRESTCallOptions() *LicenseCodesCallOptions {
 return &LicenseCodesCallOptions{
 Get: []gax.CallOption{},
 TestIamPermissions: []gax.CallOption{},
 }
}

// internalLicenseCodesClient is an interface that defines the methods available from Google Compute Engine API.
type internalLicenseCodesClient interface {
 Close() error
 setGoogleClientInfo(...string)
 Connection() *grpc.ClientConn
 Get(context.Context, *computepb.GetLicenseCodeRequest, ...gax.CallOption) (*computepb.LicenseCode, error)
 TestIamPermissions(context.Context, *computepb.TestIamPermissionsLicenseCodeRequest, ...gax.CallOption)
}

```

```

(*computepb.TestPermissionsResponse, error)
}

// LicenseCodesClient 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 LicenseCodes API.
type LicenseCodesClient struct {
 // The internal transport-dependent client.
 internalClient internalLicenseCodesClient

 // The call options for this service.
 CallOptions *LicenseCodesCallOptions
}

// 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 *LicenseCodesClient) 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 *LicenseCodesClient) 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 *LicenseCodesClient) Connection() *grpc.ClientConn {
 return c.internalClient.Connection()
}

// Get return a specified license code. License codes are mirrored across all projects that have permissions to read the
// License Code. Caution This resource is intended for use only by third-party partners who are creating Cloud
// Marketplace images.
func (c *LicenseCodesClient) Get(ctx context.Context, req *computepb.GetLicenseCodeRequest, opts
...gax.CallOption) (*computepb.LicenseCode, error) {
 return c.internalClient.Get(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 *LicenseCodesClient) TestIamPermissions(ctx context.Context,
 req *computepb.TestIamPermissionsLicenseCodeRequest, 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 licenseCodesRESTClient struct {
 // The http endpoint to connect to.
 endpoint string

 // The http client.
 httpClient *http.Client

 // The x-goog-* metadata to be sent with each request.
 xGoogMetadata metadata.MD

 // Points back to the CallOptions field of the containing LicenseCodesClient
 CallOptions **LicenseCodesCallOptions
}

// NewLicenseCodesRESTClient creates a new license codes rest client.
//
// The LicenseCodes API.
func NewLicenseCodesRESTClient(ctx context.Context, opts ...option.ClientOption) (*LicenseCodesClient, error) {
 clientOpts := append(defaultLicenseCodesRESTClientOptions(), opts...)
 httpClient, endpoint, err := httptransport.NewClient(ctx,
 clientOpts...)
 if err != nil {
 return nil, err
 }

 callOpts := defaultLicenseCodesRESTCallOptions()
 c := &licenseCodesRESTClient{
 endpoint: endpoint,
 httpClient: httpClient,
 CallOptions: &callOpts,
 }
 c.setGoogleClientInfo()

 return &LicenseCodesClient{internalClient: c, CallOptions: callOpts}, nil
}

func defaultLicenseCodesRESTClientOptions() []option.ClientOption {
 return []option.ClientOption{

```

```

internaloption.WithDefaultEndpoint("https://compute.googleapis.com"),
internaloption.WithDefaultMTLSEndpoint("https://compute.mtls.googleapis.com"),
internaloption.WithDefaultAudience("https://compute.googleapis.com/"),
internaloption.WithDefaultScopes(DefaultAuthScopes()...),
}
}

// setGoogleClientInfo sets the name and version of the application in
// the `x-goog-api-client` header passed on each request. Intended for
// use by Google-written clients.
func (c *licenseCodesRESTClient) setGoogleClientInfo(keyval ...string) {
 kv := append([]string{"gl-go",
 versionGo()}, keyval...)
 kv = append(kv, "gapic", getVersionClient(), "gax", gax.Version, "rest", "UNKNOWN")
 c.xGoogMetadata = metadata.Pairs("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 *licenseCodesRESTClient) Close() error {
 // Replace httpClient with nil to force cleanup.
 c.httpClient = nil
 return nil
}

// Connection returns a connection to the API service.
//
// Deprecated: This method always returns nil.
func (c *licenseCodesRESTClient) Connection() *grpc.ClientConn {
 return nil
}

// Get return a specified license code. License codes are mirrored across all projects that have permissions to read the
// License Code. Caution This resource is intended for use only by third-party partners who are creating Cloud
// Marketplace images.
func (c *licenseCodesRESTClient) Get(ctx context.Context, req *computepb.GetLicenseCodeRequest, opts
...gax.CallOption)
(*computepb.LicenseCode, error) {
 baseUrl, err := url.Parse(c.endpoint)
 if err != nil {
 return nil, err
 }
 baseUrl.Path += fmt.Sprintf("/compute/v1/projects/%v/global/licenseCodes/%v", req.GetProject(),
req.GetLicenseCode())

 // Build HTTP headers from client and context metadata.
 md := metadata.Pairs("x-goog-request-params", fmt.Sprintf("%s=%v&%s=%v", "project",
url.QueryEscape(req.GetProject()), "license_code", url.QueryEscape(req.GetLicenseCode()))

```

```

headers := buildHeaders(ctx, c.xGoogMetadata, md, metadata.Pairs("Content-Type", "application/json"))
opts = append((*c.CallOptions).Get[0:len((*c.CallOptions).Get):len((*c.CallOptions).Get)], opts...)
unm := protojson.UnmarshalOptions{AllowPartial: true, DiscardUnknown: true}
resp := &computepb.LicenseCode{}
e := gax.Invoke(ctx, func(ctx context.Context, settings gax.CallSettings) error {
 if settings.Path != "" {
 baseUrl.Path = settings.Path
 }
 httpReq, err := http.NewRequest("GET", baseUrl.String(), nil)
 if err
 != nil {
 return err
 }
 httpReq = httpReq.WithContext(ctx)
 httpReq.Header = headers

 httpRsp, err := c.httpClient.Do(httpReq)
 if err != nil {
 return err
 }
 defer httpRsp.Body.Close()

 if err = googleapi.CheckResponse(httpRsp); err != nil {
 return err
 }

 buf, err := ioutil.ReadAll(httpRsp.Body)
 if err != nil {
 return err
 }

 if err := unm.Unmarshal(buf, resp); err != nil {
 return maybeUnknownEnum(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 *licenseCodesRESTClient) TestIamPermissions(ctx context.Context, req
*computepb.TestIamPermissionsLicenseCodeRequest, 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/licenseCodes/%v/testIamPermissions",
 req.GetProject(), req.GetResource())

 // Build HTTP headers from client and context metadata.
 md := metadata.Pairs("x-goog-request-params", fmt.Sprintf("%s=%v&%s=%v", "project",
 url.QueryEscape(req.GetProject()), "resource", url.QueryEscape(req.GetResource()))))

 headers := buildHeaders(ctx, c.xGoogMetadata, md, metadata.Pairs("Content-Type", "application/json"))
 opts =
 append((*c.CallOptions).TestIamPermissions[0:len((*c.CallOptions).TestIamPermissions):len((*c.CallOptions).TestIamPermissions)], opts...)
 unmarshalOptions := protojson.UnmarshalOptions{AllowPartial: true, DiscardUnknown: true}
 resp := &computepb.TestPermissionsResponse{}
 e := gax.Invoke(ctx, func(ctx context.Context, settings gax.CallSettings) error {
 if settings.Path
 != "" {
 baseUrl.Path = settings.Path
 }
 httpReq, err := http.NewRequest("POST", baseUrl.String(), bytes.NewReader(jsonReq))
 if err != nil {
 return err
 }
 httpReq = httpReq.WithContext(ctx)
 httpReq.Header = headers

 httpRsp, err := c.httpClient.Do(httpReq)
 if err != nil {
 return err
 }
 defer httpRsp.Body.Close()

 if err = googleapi.CheckResponse(httpRsp); err != nil {
 return err
 }
 })
}

```

```

buf, err := ioutil.ReadAll(httpRsp.Body)
if err != nil {
 return err
}

if err := unm.Unmarshal(buf, resp); err != nil {
 return maybeUnknownEnum(err)
}

return nil
}, opts...)
if e != nil {
 return nil, e
}
return resp, nil
}

```

# 1.189 fasttemplate 1.2.2

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# 1.190 quicktemplate 1.7.0

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# 1.191 zap 1.21.0

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# 1.192 x-term 0.12.0

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## 1.193 prometheus-common 0.44.0

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# 1.194 victoriametrics-fasthttp 1.2.0

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# 1.195 component-base 0.25.4

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# 1.196 x-time-rate 0.3.0

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# 1.198 kubernetes-yaml 1.3.0

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# 1.204 go-restful 3.10.0

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## 1.208 alpine-baselayout 3.4.3-r1

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```
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 * Create mount directories in fstab
 *
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 *
 * usage: mkmntdirs [fstab]
 *
 */
```

Found in path(s):

\* /alpine-baselayout-master-zip/alpine-baselayout-master/src/mkmntdirs.c

## 1.209 valyala-histogram 1.2.0

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## 1.210 kubernetes-client 0.25.6



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Protocol Buffers for Go with Gadgets

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

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# 1.215 controller-runtime 0.13.1

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## 1.218 victoriametrics-metrics 1.24.0

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