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Contents

1.1 golang-protobuf 1.0.1

1.1.1 Available under license

1.2 go-sql-driver-mysql 1.5.0

1.2.1 Available under license

1.3 nuid 1.0.1

1.3.1 Available under license

1.4 bytebufferpool 1.0.0

1.4.1 Available under license

1.5 go-runewidth 0.0.3

1.5.1 Available under license

1.6 nose 1.3.7

1.6.1 Available under license

1.7 queue 1.1.0

1.7.1 Available under license

1.8 gax-go 2.0.5

1.8.1 Available under license

1.9 inotify 0.2.10

1.9.1 Available under license

1.10 visual-studio-runtime 15.9.9(VC++ 2017)

1.10.1 Available under license

1.11 opencensus 0.2.1

1.11.1 Available under license

1.12 jackc-chunkreader 2.0.1

1.12.1 Available under license

1.13 dlintw-goconf 0.0.0-20120228082610-dcc070983490

1.13.1 Available under license

- 1.14 jackc-pgpassfile 1.0.0**
 - 1.14.1 Available under license
- 1.15 blang-semver 3.5.1+incompatible**
 - 1.15.1 Available under license
- 1.16 jackc-pgio 1.0.0**
 - 1.16.1 Available under license
- 1.17 gojsonreference 0.0.0-20180127040603-bd5ef7bd5415**
 - 1.17.1 Available under license
- 1.18 jackc-pgservicefile 0.0.0-20200714003250-2b9c44734f2b**
 - 1.18.1 Available under license
- 1.19 modern-go-concurrent 0.0.0-20180306012644-bacd9c7ef1dd**
 - 1.19.1 Available under license
- 1.20 jcmtturner-rpc 2.0.3**
 - 1.20.1 Available under license
- 1.21 jcmtturner-aescts 2.0.0**
 - 1.21.1 Available under license
- 1.22 jcmtturner-dnsutils 2.0.0**
 - 1.22.1 Available under license
- 1.23 go-systemd 22.3.2**
 - 1.23.1 Available under license
- 1.24 x-crypto 0.0.0-20210616213533-5ff15b29337e**
 - 1.24.1 Available under license
- 1.25 zap 1.17.0**
 - 1.25.1 Available under license
- 1.26 klauspost-compress 1.13.6**
 - 1.26.1 Available under license
- 1.27 errwrap 1.0.0**
 - 1.27.1 Available under license
- 1.28 urfave-cli 1.20.0**
 - 1.28.1 Available under license
- 1.29 errors 0.9.1**
 - 1.29.1 Available under license
- 1.30 zap 1.19.1**
 - 1.30.1 Available under license
- 1.31 prometheus-procfs 0.7.3**
 - 1.31.1 Available under license
- 1.32 globesign-mgo 0.0.0-20181015135952-eeefdecb41b8**
 - 1.32.1 Available under license
- 1.33 mgo 0.0.0-20181015135952-eeefdecb41b8**

- 1.33.1 Available under license
- 1.34 profile 1.6.0**
 - 1.34.1 Available under license
- 1.35 gojsonpointer 0.0.0-20180127040702-4e3ac2762d5f**
 - 1.35.1 Available under license
- 1.36 golang-snappy 0.0.4**
 - 1.36.1 Available under license
- 1.37 lumberjack 2.0.0**
 - 1.37.1 Available under license
- 1.38 fsnotify 1.5.1**
 - 1.38.1 Available under license
- 1.39 sqlx 1.3.4**
 - 1.39.1 Available under license
- 1.40 golang 1.13.8**
 - 1.40.1 Available under license
- 1.41 json-iterator-go 1.1.12**
 - 1.41.1 Available under license
- 1.42 modern-go-reflect2 1.0.2**
 - 1.42.1 Available under license
- 1.43 pat 6226ea591a40176dd3ff9cd8eff81ed6ca721a00**
 - 1.43.1 Available under license
- 1.44 prometheus-common 0.32.1**
 - 1.44.1 Available under license
- 1.45 alpine-keys 2.4-r1**
 - 1.45.1 Available under license
- 1.46 antchfx-xpath 1.2.0**
 - 1.46.1 Available under license
- 1.47 lib-pq 1.10.4**
 - 1.47.1 Available under license
- 1.48 jackc-pgproto 2.2.0**
 - 1.48.1 Available under license
- 1.49 etcd-client 3.5.2**
 - 1.49.1 Available under license
- 1.50 etcd-client-pkg 3.5.2**
 - 1.50.1 Available under license
- 1.51 etcd 3.5.2**
 - 1.51.1 Available under license
- 1.52 antchfx-xmlquery 1.3.9**
 - 1.52.1 Available under license

- 1.53 andybalholm-brotli 1.0.4**
 - 1.53.1 Available under license
- 1.54 ordered-set 4.1.0**
 - 1.54.1 Available under license
- 1.55 jackc-pgtype 1.10.0**
 - 1.55.1 Available under license
- 1.56 jackc-pgx 4.15.0**
 - 1.56.1 Available under license
- 1.57 jackc-pgconn 1.11.0**
 - 1.57.1 Available under license
- 1.58 prometheus-client 1.12.1**
 - 1.58.1 Available under license
- 1.59 groupcache 0.0.0-20210331224755-41bb18bfe9da**
 - 1.59.1 Available under license
- 1.60 blang-semver 3.5.1+incompatible**
 - 1.60.1 Available under license
- 1.61 groupcache 0.0.0-20200121045136-8c9f03a8e57e**
 - 1.61.1 Available under license
- 1.62 gojsonschema 1.2.0**
 - 1.62.1 Available under license
- 1.63 gojsonpointer 0.0.0-20180127040702-4e3ac2762d5f**
 - 1.63.1 Available under license
- 1.64 go-uuid 1.2.1-0.20181028125025-b2ce2384e17b**
 - 1.64.1 Available under license
- 1.65 prometheus-client 1.11.1**
 - 1.65.1 Available under license
- 1.66 google-cloud-go 0.65.0**
 - 1.66.1 Available under license
- 1.67 jcmtturner-gofork 1.7.6**
 - 1.67.1 Available under license
- 1.68 lib-pq 1.10.5**
 - 1.68.1 Available under license
- 1.69 packaging 21.3**
 - 1.69.1 Available under license
- 1.70 my-test-package 1.0**
 - 1.70.1 Available under license
- 1.71 prometheus-client-model 0.2.0**
 - 1.71.1 Available under license
- 1.72 perks 1.0.1**

- 1.72.1 Available under license
- 1.73 tenacity 8.2.2**
 - 1.73.1 Available under license
- 1.74 gogo-protobuf 1.3.2**
 - 1.74.1 Available under license
- 1.75 msgpack 1.0.5**
 - 1.75.1 Available under license
- 1.76 influxdb 1.8.10**
 - 1.76.1 Available under license
- 1.77 fasthttp 1.40.0**
 - 1.77.1 Available under license
- 1.78 prometheus 1.2.0**
 - 1.78.1 Available under license
- 1.79 mpdecimal 2.5.1-r2**
 - 1.79.1 Available under license
- 1.80 gdbm 1.23-r1**
 - 1.80.1 Available under license
- 1.81 ldns 1.8.3-r2**
 - 1.81.1 Available under license
- 1.82 iputils 20221126-r2**
 - 1.82.1 Available under license
- 1.83 iputils-clockdiff 20221126-r2**
 - 1.83.1 Available under license
- 1.84 drill 1.8.3-r2**
 - 1.84.1 Available under license
- 1.85 iputils-arping 20221126-r2**
 - 1.85.1 Available under license
- 1.86 iputils-tracepath 20221126-r2**
 - 1.86.1 Available under license
- 1.87 python-setuptools 67.7.2**
 - 1.87.1 Available under license
- 1.88 libucontext 1.2-r2**
 - 1.88.1 Available under license
- 1.89 chardet 5.1.0**
 - 1.89.1 Available under license
- 1.90 wget 1.21.4-r0**
 - 1.90.1 Available under license
- 1.91 readline 8.2.1-r2**
 - 1.91.1 Available under license

1.92 bzip2 1.0.8-r6

1.92.1 Available under license

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1.93.1 Available under license

1.94 libffi 3.4.4-r3

1.94.1 Available under license

1.95 musl-obstack 1.2.3-r2

1.95.1 Available under license

1.96 libc-utils 0.7.2-r5

1.96.1 Available under license

1.97 python-requests 2.31.0

1.97.1 Available under license

1.98 log-rotate 3.21.0-r1

1.98.1 Available under license

1.99 acl 2.3.1-r4

1.99.1 Available under license

1.100 iputils-ping 20221126-r2

1.100.1 Available under license

1.101 tre 0.8.0-r2

1.101.1 Available under license

1.102 libcap 2.69-r1

1.102.1 Available under license

1.103 htop 3.2.2-r1

1.103.1 Available under license

1.104 rich 13.4.2

1.104.1 Available under license

1.105 pax-utils 1.3.7-r2

1.105.1 Available under license

1.106 platformdirs 3.8.1

1.106.1 Available under license

1.107 pgzip 1.0.2-0.20170402124221-0bf5dcad4ada

1.107.1 Available under license

1.108 roaring 0.4.13-0.20180809181101-fc520f41fab6

1.108.1 Available under license

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1.109.1 Available under license

1.110 autocommand 2.2.2

1.110.1 Available under license

1.111 py3-parsing-pyc 3.1.1-r0

- 1.111.1 Available under license
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 - 1.112.1 Available under license
- 1.113 eapache-go-xerial-snappy 0.0.0-20230731223053-c322873962e3**
 - 1.113.1 Available under license
- 1.114 libproc2 4.0.4-r0**
 - 1.114.1 Available under license
- 1.115 procps 4.0.4-r0**
 - 1.115.1 Available under license
- 1.116 libidn 2.3.4-r4**
 - 1.116.1 Available under license
- 1.117 python-setuptools 68.2.2**
 - 1.117.1 Available under license
- 1.118 urllib3 1.26.17**
 - 1.118.1 Available under license
- 1.119 gojsonreference 0.0.0-20180127040603-bd5ef7bd5415**
 - 1.119.1 Available under license
- 1.120 grpc-gateway 1.16.0**
 - 1.120.1 Available under license
- 1.121 pam 1.5.3-r7**
 - 1.121.1 Available under license
- 1.122 python-setuptools 65.5.0**
 - 1.122.1 Available under license
- 1.123 python-certifi 2023.07.22**
 - 1.123.1 Available under license
- 1.124 sh 1.14.3**
 - 1.124.1 Available under license
- 1.125 influxdb 1.9.4**
 - 1.125.1 Available under license
- 1.126 python-pip 23.3.1**
 - 1.126.1 Available under license
- 1.127 libgcc 13.2.1_git20231014-r0**
 - 1.127.1 Available under license
- 1.128 libstdc++ 13.2.1_git20231014-r0**
 - 1.128.1 Available under license
- 1.129 cpp 13.2.1_git20231014-r0**
 - 1.129.1 Available under license
- 1.130 gettext 0.22.3-r0**
 - 1.130.1 Available under license

1.131 packaging 23.2

1.131.1 Available under license

1.132 nghttp2 1.58.0-r0

1.132.1 Available under license

1.133 xz 5.4.5-r0

1.133.1 Available under license

1.134 utmps 0.1.2.2-r0

1.134.1 Available under license

1.135 brotli 1.1.0-r1

1.135.1 Available under license

1.136 musl 1.2.4_git20230717-r4

1.136.1 Available under license

1.137 py3-setuptools-pyc 68.2.2-r0

1.137.1 Available under license

1.138 py3-packaging-pyc 23.2-r0

1.138.1 Available under license

1.139 skalibs 2.14.0.1-r0

1.139.1 Available under license

1.140 go-unsnap-stream 0.0.0-20180323001048-9f0cb55181dd

1.140.1 Available under license

1.141 opentracing-go 1.0.3-0.20180606204148-bd9c31933947

1.141.1 Available under license

1.142 liner 1.0.1-0.20180619022028-8c1271fcf47f

1.142.1 Available under license

1.143 golang-snappy 0.0.4

1.143.1 Available under license

1.144 sarama 1.42.1

1.144.1 Available under license

1.145 ibm-sarama 1.42.1

1.145.1 Available under license

1.146 alpine-baselayout 3.4.3-r2

1.146.1 Available under license

1.147 xz-libs 5.4.5-r0

1.147.1 Available under license

1.148 musl-utils 1.2.4_git20230717-r4

1.148.1 Available under license

1.149 libmd 1.1.0-r0

1.149.1 Available under license

1.150 bash 5.2.21-r0

- 1.150.1 Available under license
- 1.151 libbsd 0.11.7-r3**
 - 1.151.1 Available under license
- 1.152 netcat-openbsd 1.226-r0**
 - 1.152.1 Available under license
- 1.153 popt 1.19-r3**
 - 1.153.1 Available under license
- 1.154 pcre 10.42-r2**
 - 1.154.1 Available under license
- 1.155 sqlite 3.44.2-r0**
 - 1.155.1 Available under license
- 1.156 libncursesw 6.4_p20231125-r0**
 - 1.156.1 Available under license
- 1.157 py3-pip-pyc 23.3.1-r0**
 - 1.157.1 Available under license
- 1.158 libpanelw 6.4_p20231125-r0**
 - 1.158.1 Available under license
- 1.159 go-uuid 1.4.0**
 - 1.159.1 Available under license
- 1.160 google-api-go-client 0.153.0**
 - 1.160.1 Available under license
- 1.161 x-oauth2 0.15.0**
 - 1.161.1 Available under license
- 1.162 mqttproto 1.6.1**
 - 1.162.1 Available under license
- 1.163 msgpack 1.1.9**
 - 1.163.1 Available under license
- 1.164 distlib 0.3.8**
 - 1.164.1 Available under license
- 1.165 golang-jwt 5.2.0**
 - 1.165.1 Available under license
- 1.166 miniredis 2.31.0**
 - 1.166.1 Available under license
- 1.167 etcd-client-pkg 3.5.11**
 - 1.167.1 Available under license
- 1.168 etcd 3.5.11**
 - 1.168.1 Available under license
- 1.169 etcd-client 3.5.11**
 - 1.169.1 Available under license

1.170 prometheus-client-model 0.4.0

1.170.1 Available under license

1.171 cpuid 1.1

1.171.1 Available under license

1.172 curl 8.5.0-r0

1.172.1 Available under license

1.173 shadow 4.14.2-r0

1.173.1 Available under license

1.174 gopkg.in-yaml 2.4.0

1.174.1 Available under license

1.175 golang-lru 0.5.4

1.175.1 Available under license

1.176 gcompat 1.1.0-r4

1.176.1 Available under license

1.177 ncurses 6.4_p20231125-r0

1.177.1 Available under license

1.178 py3-setuptools 68.2.2-r0

1.178.1 Available under license

1.179 py3-parsing 3.1.1-r0

1.179.1 Available under license

1.180 py3-packaging 23.2-r0

1.180.1 Available under license

1.181 py3-pip 23.3.1-r0

1.181.1 Available under license

1.182 nkeys 0.4.7

1.182.1 Available under license

1.183 zlib 1.3.1-r0

1.183.1 Available under license

1.184 zlib 1.2.3

1.184.1 Available under license

1.185 zlib 1.2.8

1.185.1 Available under license

1.186 zlib 1.2.5

1.186.1 Available under license

1.187 pierrec-lz4 4.1.18

1.187.1 Available under license

1.188 busybox 1.36.1-r19

1.188.1 Available under license

1.189 nspr 4.35-r4

- 1.189.1 Available under license
- 1.190 markupsafe 2.1.5**
 - 1.190.1 Available under license
- 1.191 python-pip 24.0**
 - 1.191.1 Available under license
- 1.192 tzdata 2024a-r0**
 - 1.192.1 Available under license
- 1.193 pierrec-lz4 4.1.21**
 - 1.193.1 Available under license
- 1.194 alpine-baselayout-data 3.4.3-r2**
 - 1.194.1 Available under license
- 1.195 antonmedv-expr 1.15.4**
 - 1.195.1 Available under license
- 1.196 robot-oam-grpc 0.0.0-20240212235908-c28eadb2197a**
 - 1.196.1 Available under license
- 1.197 google-uuid 1.6.0**
 - 1.197.1 Available under license
- 1.198 ca-certificates 20240226-r0**
 - 1.198.1 Available under license
- 1.199 klauspost-compress 1.17.7**
 - 1.199.1 Available under license
- 1.200 telegraf 1.29.5**
 - 1.200.1 Available under license
- 1.201 expat 2.6.2-r0**
 - 1.201.1 Available under license
- 1.202 importlib_resources 6.4.0**
 - 1.202.1 Available under license
- 1.203 c-ares 1.27.0-r0**
 - 1.203.1 Available under license
- 1.204 distro 1.8.0**
 - 1.204.1 Available under license
- 1.205 colorama 0.4.6**
 - 1.205.1 Available under license
- 1.206 idna 3.4**
 - 1.206.1 Available under license
- 1.207 google-cloud-go 0.65.0**
 - 1.207.1 Available under license
- 1.208 jaraco.context 5.3.0**
 - 1.208.1 Available under license

- 1.209 python 3.11.9-r0**
 - 1.209.1 Available under license
- 1.210 python3-pycache-pyc0 3.11.9-r0**
 - 1.210.1 Available under license
- 1.211 pyc 3.11.9-r0**
 - 1.211.1 Available under license
- 1.212 python3-pyc 3.11.9-r0**
 - 1.212.1 Available under license
- 1.213 python 3.11.9**
 - 1.213.1 Available under license
- 1.214 supervisor 4.2.4**
 - 1.214.1 Available under license
- 1.215 toml 0.3.1**
 - 1.215.1 Available under license
- 1.216 apk-tools 2.14.4-r0**
 - 1.216.1 Available under license
- 1.217 ca-certificates-bundle 20240226-r0**
 - 1.217.1 Available under license
- 1.218 scanelf 1.3.7-r2**
 - 1.218.1 Available under license
- 1.219 xxhash 2.3.0**
 - 1.219.1 Available under license
- 1.220 klauspost-compress 1.17.8**
 - 1.220.1 Available under license
- 1.221 jaraco-functools 4.0.1**
 - 1.221.1 Available under license
- 1.222 go-resiliency 1.4.0**
 - 1.222.1 Available under license
- 1.223 go.uber.org/atomi 1.10.0**
 - 1.223.1 Available under license
- 1.224 go-multierror 1.1.1**
 - 1.224.1 Available under license
- 1.225 go-immutable-radix 1.3.1**
 - 1.225.1 Available under license
- 1.226 packaging 24.0**
 - 1.226.1 Available under license
- 1.227 nss 3.99-r0**
 - 1.227.1 Available under license
- 1.228 tomli 2.0.1**

- 1.228.1 Available under license
- 1.229 platformdirs 2.6.2**
 - 1.229.1 Available under license
- 1.230 hashicorp-uuid 1.0.3**
 - 1.230.1 Available under license
- 1.231 spew 1.1.1**
 - 1.231.1 Available under license
- 1.232 rcrowley-go-metrics 0.0.0-20201227073835-cf1acfcdf475**
 - 1.232.1 Available under license
- 1.233 coreos-semver 0.3.0**
 - 1.233.1 Available under license
- 1.234 futures 3.4.0**
 - 1.234.1 Available under license
- 1.235 ibm-sarama 1.43.2**
 - 1.235.1 Available under license
- 1.236 libcurl 8.5.0-r0**
 - 1.236.1 Available under license
- 1.237 backports.tarfile 1.2.0**
 - 1.237.1 Available under license
- 1.238 x-sys 0.21.0**
 - 1.238.1 Available under license
- 1.239 x-net 0.26.0**
 - 1.239.1 Available under license
- 1.240 x-text 0.16.0**
 - 1.240.1 Available under license
- 1.241 more-itertools 10.3.0**
 - 1.241.1 Available under license
- 1.242 zipp 3.19.2**
 - 1.242.1 Available under license
- 1.243 packaging 24.1**
 - 1.243.1 Available under license
- 1.244 x-term 0.21.0**
 - 1.244.1 Available under license
- 1.245 x-crypto 0.24.0**
 - 1.245.1 Available under license
- 1.246 wheel 0.43.0**
 - 1.246.1 Available under license
- 1.247 importlib-metadata 8.0.0**
 - 1.247.1 Available under license

1.248 golang 1.22.5

1.248.1 Notifications

1.248.2 Available under license

1.249 gokrb5 8.4.4

1.249.1 Available under license

1.250 go-resiliency 1.6.0

1.250.1 Available under license

1.251 sarama 1.43.2

1.251.1 Available under license

1.252 openssl 3.1.6-r2

1.252.1 Available under license

1.253 grpc-go 1.65.0

1.253.1 Available under license

1.254 goprotobuf 1.5.4

1.254.1 Available under license

1.255 inflect 7.3.1

1.255.1 Available under license

1.256 jaraco.text 3.12.1

1.256.1 Available under license

1.257 typeguard 4.3.0

1.257.1 Available under license

1.258 libcrypto3 3.1.6-r2

1.258.1 Available under license

1.259 libintl 0.22.3-r0

1.259.1 Available under license

1.260 utmps-libs 0.1.2.2-r0

1.260.1 Available under license

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1.261.1 Available under license

1.262 libssl3 3.1.6-r2

1.262.1 Available under license

1.263 python-setuptools 71.1.0

1.263.1 Available under license

1.264 simple launcher 1.1.0.14

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1.265 importlib-resources 6.1.1-r0

1.265.1 Available under license

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1.266.1 Available under license

1.267 protobuf 1.34.2

1.267.1 Available under license

1.268 platformdirs 4.2.2

1.268.1 Available under license

1.269 genproto-googleapis-rpc 0.0.0-20240725223205-93522f1f2a9f

1.269.1 Available under license

1.270 nats.go 1.33.1

1.270.1 Available under license

1.271 genproto-googleapis-rpc 0.0.0-20240723171418-e6d459c13d2a

1.271.1 Available under license

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1.276.1 Available under license

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

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By Sean Eron Anderson
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** Rick Grehan, BYTE Magazine

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** Create:

** Revision: 3/95

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```
<Project Sdk="Microsoft.NET.Sdk">
```

```
<PropertyGroup>
```

```
<OutputType>Exe</OutputType>
```

```
<ApplicationManifest>App.manifest</ApplicationManifest>
```

```
</PropertyGroup>
```

```
<ItemGroup>
```

```
<Compile Include="Program.cs" />
```

```
<Compile Include="..\..\ServerContracts/Server.CoClasses.cs" />
```

```
<Compile Include="..\..\ServerContracts/Server.Contracts.cs" />
```

```
<Compile Include="..\..\ServerContracts/ServerGuids.cs" />
```

```
</ItemGroup>
```

```
<ItemGroup>
```

```
<ProjectReference Include="..\..\NativeServer/CMakeLists.txt" />
```

```
<ProjectReference Include="$(TestSourceDir)Common/CoreCLRTestLibrary/CoreCLRTestLibrary.csproj" />
```

```
</ItemGroup>
```

```
</Project>
```

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1.12 jackc-chunkreader 2.0.1

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1.13 dlintw-goconf 0.0.0-20120228082610-dcc070983490

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1.14 jackc-pgpassfile 1.0.0

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1.15 blang-semver 3.5.1+incompatible

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1.16 jackc-pgio 1.0.0

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1.17 gojsonreference 0.0.0-20180127040603-bd5ef7bd5415

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1.18 jackc-pgservicefile 0.0.0-20200714003250-2b9c44734f2b

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1.19 modern-go-concurrent 0.0.0-20180306012644-bacd9c7ef1dd

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1.20 jcmtturner-rpc 2.0.3

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1.24 x-crypto 0.0.0-20210616213533-5ff15b29337e

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1.26 klauspost-compress 1.13.6

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1.28 urfave-cli 1.20.0

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Found in path(s):

```
* /opt/cola/permits/1212966988_1633989798.74/0/cas-client-support-saml-3-4-1-sources-
jar/org/jasig/cas/client/validation/Saml11TicketValidationFilter.java
*
```



```
/opt/cola/permits/1212966988_1633989798.74/0/cas-client-support-saml-3-4-1-sources-  
jar/org/jasig/cas/client/util/SamlUtils.java  
* /opt/cola/permits/1212966988_1633989798.74/0/cas-client-support-saml-3-4-1-sources-  
jar/org/jasig/cas/client/validation/Saml11TicketValidator.java  
* /opt/cola/permits/1212966988_1633989798.74/0/cas-client-support-saml-3-4-1-sources-  
jar/org/jasig/cas/client/authentication/Saml11AuthenticationFilter.java
```

1.29 errors 0.9.1

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1.30 zap 1.19.1

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1.31 prometheus-procfs 0.7.3

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1.32 globalsign-mgo 0.0.0-20181015135952-eeefdecbb41b8

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1.33 mgo 0.0.0-20181015135952- eeefdecbb41b8

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1.34 profile 1.6.0

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1.35 gojsonpointer 0.0.0-20180127040702-4e3ac2762d5f

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1.36 golang-snappy 0.0.4

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```

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```

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Kai Backman <kaib@golang.org>
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Marc-Antoine Ruel <maruel@chromium.org>
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Nigel Tao <nigeltao@golang.org>
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1.37 lumberjack 2.0.0

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1.38 fsnotify 1.5.1

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1.39 sqlx 1.3.4

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1.40 golang 1.13.8

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```
# 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.
#
```

```
# 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.

# 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.

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1.41 json-iterator-go 1.1.12

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1.42 modern-go-reflect2 1.0.2

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1.43 pat

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1.44 prometheus-common 0.32.1

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1.45 alpine-keys 2.4-r1

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1.46 antchfx-xpath 1.2.0

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1.47 lib-pq 1.10.4

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

package pq

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

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

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

```

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

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

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

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

```

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1.48 jackc-pgproto 2.2.0

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1.49 etcd-client 3.5.2

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1.50 etcd-client-pkg 3.5.2

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1.52 antchfx-xmlquery 1.3.9

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1.54 ordered-set 4.1.0

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1.55 jackc-pgtype 1.10.0

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1.57 jackc-pgconn 1.11.0

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1.58 prometheus-client 1.12.1

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1.59 groupcache 0.0.0-20210331224755-41bb18bfe9da

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1.62 gojsonschema 1.2.0

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1.64 go-uuid 1.2.1-0.20181028125025-b2ce2384e17b

1.64.1 Available under license :

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1.65 prometheus-client 1.11.1

1.65.1 Available under license :

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

<http://github.com/golang/protobuf/>

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Support for streaming Protocol Buffer messages for the Go language (golang).

https://github.com/matttproud/golang_protobuf_extensions

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1.66 google-cloud-go 0.65.0

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package compute
```

```

import (
    "bytes"
    "context"
    "fmt"
    "io/ioutil"
    "net/http"
    "net/url"

    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"
    computepb "google.golang.org/genproto/googleapis/cloud/compute/v1"
    "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
}

// 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.
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
}

// 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
    }

    c := &licenseCodesRESTClient{
        endpoint: endpoint,
        httpClient: httpClient,
    }
    c.setGoogleClientInfo()

    return &LicenseCodesClient{internalClient: c, CallOptions: &LicenseCodesCallOptions{}}, 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, "gopic", versionClient, "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.
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, _ := url.Parse(c.endpoint)
    baseUrl.Path += fmt.Sprintf("/compute/v1/projects/%v/global/licenseCodes/%v", req.GetProject(),
req.GetLicenseCode())

    httpReq, err := http.NewRequest("GET", baseUrl.String(), nil)
    if err != nil {
        return nil, err
    }
    httpReq = httpReq.WithContext(ctx)
    // Set the headers
    for k, v := range c.xGoogMetadata {
        httpReq.Header[k] = v
    }
    httpReq.Header["Content-Type"] = []string{"application/json"}

    httpRsp,
    err := c.httpClient.Do(httpReq)
    if err != nil {
        return nil, err
    }
    defer httpRsp.Body.Close()

    if err = googleapi.CheckResponse(httpRsp); err != nil {
        return nil, err
    }

    buf, err := ioutil.ReadAll(httpRsp.Body)
    if err != nil {
        return nil, err
    }

```

```

}

unm := protojson.UnmarshalOptions{ AllowPartial: true, DiscardUnknown: true }
rsp := &computepb.LicenseCode{ }

if err := unm.Unmarshal(buf, rsp); err != nil {
    return nil, maybeUnknownEnum(err)
}
return rsp, 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, _ := url.Parse(c.endpoint)
    baseUrl.Path += fmt.Sprintf("/compute/v1/projects/%v/global/licenseCodes/%v/testIamPermissions",
req.GetProject(), req.GetResource())

    httpReq, err := http.NewRequest("POST", baseUrl.String(), bytes.NewReader(jsonReq))
    if err != nil {
        return nil, err
    }
    httpReq = httpReq.WithContext(ctx)
    // Set the headers
    for k, v := range c.xGoogMetadata {
        httpReq.Header[k] = v
    }
    httpReq.Header["Content-Type"] = []string{"application/json"}

    httpRsp, err := c.httpClient.Do(httpReq)
    if err != nil {
        return nil, err
    }
    defer httpRsp.Body.Close()

    if err = googleapi.CheckResponse(httpRsp); err != nil {
        return nil, err
    }
}

```

```

buf, err := ioutil.ReadAll(httpRsp.Body)
if err != nil {
    return nil, err
}

unm := protojson.UnmarshalOptions{ AllowPartial: true, DiscardUnknown: true}
rsp := &computepb.TestPermissionsResponse{ }

if err := unm.Unmarshal(buf, rsp); err != nil {
    return nil, maybeUnknownEnum(err)
}
return
rsp, nil
}
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// Code generated by protoc-gen-go_gapic. DO NOT EDIT.

package compute

import (
    "bytes"
    "context"
    "fmt"
    "io/ioutil"
    "math"
    "net/http"
    "net/url"

    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"

```

```

compute pb "google.golang.org/genproto/googleapis/cloud/compute/v1"
"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
}

// internalLicensesClient is an interface that defines the methods available from Google Compute Engine API.
type internalLicensesClient interface {
Close() error
setGoogleClientInfo(...string)
Connection() *grpc.ClientConn
Delete(context.Context, *computepb.DeleteLicenseRequest, ...gax.CallOption) (*Operation, error)
Get(context.Context, *computepb.GetLicenseRequest, ...gax.CallOption)
(*computepb.License, error)
GetIamPolicy(context.Context, *computepb.GetIamPolicyLicenseRequest, ...gax.CallOption) (*computepb.Policy,
error)
Insert(context.Context, *computepb.InsertLicenseRequest, ...gax.CallOption) (*Operation, error)
List(context.Context, *computepb.ListLicensesRequest, ...gax.CallOption) *LicenseIterator
SetIamPolicy(context.Context, *computepb.SetIamPolicyLicenseRequest, ...gax.CallOption) (*computepb.Policy,
error)
TestIamPermissions(context.Context, *computepb.TestIamPermissionsLicenseRequest, ...gax.CallOption)
(*computepb.TestPermissionsResponse, error)
}

// LicensesClient is a client for interacting with Google Compute Engine API.
// Methods, except Close, may be called concurrently. However, fields must not be modified concurrently with
method calls.
//
// The Licenses API.
type LicensesClient struct {
// The internal transport-dependent client.
internalClient internalLicensesClient

```



```

// The call options for this service.
CallOptions
*LicensesCallOptions
}

// Wrapper methods routed to the internal client.

// Close closes the connection to the API service. The user should invoke this when
// the client is no longer required.
func (c *LicensesClient) Close() error {
    return c.internalClient.Close()
}

// setGoogleClientInfo sets the name and version of the application in
// the `x-goog-api-client` header passed on each request. Intended for
// use by Google-written clients.
func (c *LicensesClient) setGoogleClientInfo(keyval ...string) {
    c.internalClient.setGoogleClientInfo(keyval...)
}

// Connection returns a connection to the API service.
//
// Deprecated.
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

    // The x-goog-* metadata to be sent with each request.
    xGoogMetadata metadata.MD
}

```

```

// 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
    }

    c := &licensesRESTClient{
        endpoint: endpoint,
        httpClient: httpClient,
    }
    c.setGoogleClientInfo()

    return &LicensesClient{internalClient: c, CallOptions: &LicensesCallOptions{}}, 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, "gapi", versionClient, "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
    return nil
}

// Connection returns a connection to the API service.
//

```

```

// Deprecated.
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, _ := url.Parse(c.endpoint)
    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()

    httpReq, err := http.NewRequest("DELETE", baseUrl.String(), nil)
    if err != nil {
        return nil, err
    }
    httpReq = httpReq.WithContext(ctx)
    // Set the headers
    for k, v := range c.xGoogMetadata {
        httpReq.Header[k] = v
    }
    httpReq.Header["Content-Type"] = []string{"application/json"}

    httpRsp, err := c.httpClient.Do(httpReq)
    if err != nil {
        return nil, err
    }
    defer httpRsp.Body.Close()

    if err = googleapi.CheckResponse(httpRsp);
    err != nil {
        return nil, err
    }

    buf, err := ioutil.ReadAll(httpRsp.Body)
    if err != nil {
        return nil, err
    }

    unmarshalOptions := protojson.UnmarshalOptions{AllowPartial: true, DiscardUnknown: true}

```

```

rsp := &computepb.Operation{ }

if err := unmarshal(buf, rsp); err != nil {
    return nil, maybeUnknownEnum(err)
}
op := &Operation{proto: rsp}
return op, err
}

// 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, _ := url.Parse(c.endpoint)
    baseUrl.Path += fmt.Sprintf("/compute/v1/projects/%v/global/licenses/%v", req.GetProject(), req.GetLicense())

    httpReq, err := http.NewRequest("GET", baseUrl.String(), nil)
    if err != nil {
        return nil, err
    }
    httpReq = httpReq.WithContext(ctx)
    // Set the headers
    for
    k, v := range c.xGoogMetadata {
        httpReq.Header[k] = v
    }
    httpReq.Header["Content-Type"] = []string{"application/json"}

    httpRsp, err := c.httpClient.Do(httpReq)
    if err != nil {
        return nil, err
    }
    defer httpRsp.Body.Close()

    if err = googleapi.CheckResponse(httpRsp); err != nil {
        return nil, err
    }

    buf, err := ioutil.ReadAll(httpRsp.Body)
    if err != nil {
        return nil, err
    }

    unmarshalOptions := protojson.UnmarshalOptions{AllowPartial: true, DiscardUnknown: true}
    rsp := &computepb.License{ }

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

```

```

}
return rsp, 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,
    _ := url.Parse(c.endpoint)
    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()

    httpReq, err := http.NewRequest("GET", baseUrl.String(), nil)
    if err != nil {
        return nil, err
    }
    httpReq = httpReq.WithContext(ctx)
    // Set the headers
    for k, v := range c.xGoogMetadata {
        httpReq.Header[k] = v
    }
    httpReq.Header["Content-Type"] = []string{"application/json"}

    httpRsp, err := c.httpClient.Do(httpReq)
    if err != nil {
        return nil, err
    }
    defer httpRsp.Body.Close()

    if err = googleapi.CheckResponse(httpRsp); err != nil {
        return nil, err
    }

    buf, err := ioutil.ReadAll(httpRsp.Body)
    if err != nil {
        return nil, err
    }

    unmarshalOptions := protojson.UnmarshalOptions{AllowPartial: true,

```

```

DiscardUnknown: true}
rsp := &computepb.Policy{ }

if err := unmarshal(buf, rsp); err != nil {
    return nil, maybeUnknownEnum(err)
}
return rsp, 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, _ := url.Parse(c.endpoint)
    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()

    httpReq, err := http.NewRequest("POST", baseUrl.String(), bytes.NewReader(jsonReq))
    if
    err != nil {
        return nil, err
    }
    httpReq = httpReq.WithContext(ctx)
    // Set the headers
    for k, v := range c.xGoogMetadata {
        httpReq.Header[k] = v
    }
    httpReq.Header["Content-Type"] = []string{"application/json"}

    httpRsp, err := c.httpClient.Do(httpReq)
    if err != nil {
        return nil, err
    }
    defer httpRsp.Body.Close()

```

```

if err = googleapi.CheckResponse(httpRsp); err != nil {
    return nil, err
}

```

```

buf, err := ioutil.ReadAll(httpRsp.Body)
if err != nil {
    return nil, err
}

```

```

unm := protojson.UnmarshalOptions{AllowPartial: true, DiscardUnknown: true}
rsp := &compute.Operation{}

```

```

if err := unm.Unmarshal(buf, rsp); err != nil {
    return nil, maybeUnknownEnum(err)
}
op := &Operation{proto: rsp}
return op, err
}

```

// 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 *compute.ListLicensesRequest, opts
...gax.CallOption) *LicenseIterator {

```

```

    it := &LicenseIterator{}

```

```

    req = proto.Clone(req).(*compute.ListLicensesRequest)

```

```

    unm := protojson.UnmarshalOptions{AllowPartial: true, DiscardUnknown: true}

```

```

    it.InternalFetch = func(pageSize int, pageToken string) ([]*compute.License, string, error) {

```

```

        resp := &compute.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, _ := url.Parse(c.endpoint)

```

```

        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()

httpReq, err := http.NewRequest("GET", baseUrl.String(), nil)
if err != nil {
    return nil, "", err
}

// Set the headers
for k, v := range c.xGoogMetadata {
    httpReq.Header[k] = v
}

httpReq.Header["Content-Type"] = []string{"application/json"}
httpRsp, err := c.httpClient.Do(httpReq)
if
err != nil {
    return nil, "", err
}
defer httpRsp.Body.Close()

if err = googleapi.CheckResponse(httpRsp); err != nil {
    return nil, "", err
}

buf, err := ioutil.ReadAll(httpRsp.Body)
if err != nil {
    return nil, "", err
}

unm.Unmarshal(buf, resp)
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, _ := url.Parse(c.endpoint)
    baseUrl.Path += fmt.Sprintf("/compute/v1/projects/%v/global/licenses/%v/setIamPolicy", req.GetProject(),
req.GetResource())

    httpReq, err := http.NewRequest("POST", baseUrl.String(), bytes.NewReader(jsonReq))
    if err != nil {
        return nil, err
    }
    httpReq = httpReq.WithContext(ctx)
    // Set the headers
    for k, v := range c.xGoogMetadata {
        httpReq.Header[k] = v
    }
    httpReq.Header["Content-Type"] = []string{"application/json"}

    httpRsp, err := c.httpClient.Do(httpReq)
    if err != nil {
        return nil, err
    }
    defer httpRsp.Body.Close()
}

```

```

if err = googleapi.CheckResponse(httpRsp); err != nil {
    return nil, err
}

buf,
err := ioutil.ReadAll(httpRsp.Body)
if err != nil {
    return nil, err
}

unm := protojson.UnmarshalOptions{ AllowPartial: true, DiscardUnknown: true}
rsp := &computepb.Policy{ }

if err := unm.Unmarshal(buf, rsp); err != nil {
    return nil, maybeUnknownEnum(err)
}
return rsp, 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, _ := url.Parse(c.endpoint)
    baseUrl.Path += fmt.Sprintf("/compute/v1/projects/%v/global/licenses/%v/testIamPermissions", req.GetProject(),
req.GetResource())

    httpReq, err := http.NewRequest("POST", baseUrl.String(), bytes.NewReader(jsonReq))
    if err != nil {
        return nil, err
    }
    httpReq = httpReq.WithContext(ctx)
    // Set the headers
    for k, v := range c.xGoogMetadata {
        httpReq.Header[k] = v
    }
    httpReq.Header["Content-Type"] = []string{ "application/json" }

    httpRsp, err := c.httpClient.Do(httpReq)
    if err != nil {

```

```

    return nil, err
}
defer httpRsp.Body.Close()

if err = googleapi.CheckResponse(httpRsp); err != nil {
    return nil, err
}

buf, err := ioutil.ReadAll(httpRsp.Body)
if err != nil {
    return nil, err
}

unm := protojson.UnmarshalOptions{AllowPartial: true, DiscardUnknown: true}
rsp := &computepb.TestPermissionsResponse{}

if err := unm.Unmarshal(buf, rsp); err != nil {
    return nil, maybeUnknownEnum(err)
}
return rsp, nil
}

// LicenseIterator manages a stream of *computepb.License.
type LicenseIterator struct {
    items []*computepb.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 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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// Code generated by protoc-gen-go_gapic. DO NOT EDIT.

package compute_test

import (
"context"

compute "cloud.google.com/go/compute/apiv1"
computepb "google.golang.org/genproto/googleapis/cloud/compute/v1"
)

func ExampleNewLicenseCodesRESTClient() {

```

```

ctx := context.Background()
c, err := compute.NewLicenseCodesRESTClient(ctx)
if err != nil {
    // TODO: Handle error.
}
defer c.Close()

// TODO: Use
client.
_ = c
}

func ExampleLicenseCodesClient_Get() {
ctx := context.Background()
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/google.golang.org/genproto/googleapis/cloud/compute/v1#GetLicenseCodeRequest.
}
resp, err := c.Get(ctx, req)
if err != nil {
    // TODO: Handle error.
}
// TODO: Use resp.
_ = resp
}

func ExampleLicenseCodesClient_TestIamPermissions() {
ctx := context.Background()
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/google.golang.org/genproto/googleapis/cloud/compute/v1#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"
```

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

```
    computepb "google.golang.org/genproto/googleapis/cloud/compute/v1"
```

```
)
```

```
func ExampleNewLicensesRESTClient() {
```

```
    ctx := context.Background()
```

```
    c, err := compute.NewLicensesRESTClient(ctx)
```

```
    if err != nil {
```

```
        // TODO: Handle error.
```

```
    }
```

```
    defer
```

```
    c.Close()
```

```
    // TODO: Use client.
```

```
    _ = c
```

```
}
```

```
func ExampleLicensesClient_Delete() {
```

```
    ctx := context.Background()
```

```
    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/google.golang.org/genproto/googleapis/cloud/compute/v1#DeleteLicenseRequest.
}
resp, err := c.Delete(ctx, req)
if err != nil {
// TODO: Handle error.
}
// TODO: Use resp.
_ = resp
}

func ExampleLicensesClient_Get() {
ctx := context.Background()
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/google.golang.org/genproto/googleapis/cloud/compute/v1#GetLicenseRequest.
}
resp, err := c.Get(ctx, req)
if err != nil {
// TODO: Handle error.
}
// TODO: Use resp.
_ = resp
}

func ExampleLicensesClient_GetIamPolicy()
{
ctx := context.Background()
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/google.golang.org/genproto/googleapis/cloud/compute/v1#GetIamPolicyLicenseRequest.
}

```

```

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

func ExampleLicensesClient_Insert() {
    ctx := context.Background()
    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/google.golang.org/genproto/googleapis/cloud/compute/v1#InsertLicenseRequest.
    }
    resp, err := c.Insert(ctx, req)
    if err != nil {
        // TODO: Handle error.
    }
    // TODO: Use resp.
    _ = resp
}

func ExampleLicensesClient_List() {
    ctx :=
    context.Background()
    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/google.golang.org/genproto/googleapis/cloud/compute/v1#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()
    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/google.golang.org/genproto/googleapis/cloud/compute/v1#SetIamPolicyLicenseRequest.
    }
    resp, err := c.SetIamPolicy(ctx, req)
    if err != nil {
        // TODO: Handle error.
    }
    // TODO: Use resp.
    _ = resp
}

func
ExampleLicensesClient_TestIamPermissions() {
    ctx := context.Background()
    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/google.golang.org/genproto/googleapis/cloud/compute/v1#TestIamPermissionsLicenseRequest.
    }
    resp, err := c.TestIamPermissions(ctx, req)
    if err != nil {
        // TODO: Handle error.
    }
    // TODO: Use resp.
    _ = resp
}
}

```

1.67 jcmturner-gofork 1.7.6

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1.68 lib-pq 1.10.5

1.68.1 Available under license :

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

```
package pq
```

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



```

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

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

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

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

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

// ConnectorWithNoticeHandler creates or sets the given handler for the given
// connector. If the given connector is a result of calling this function

```

```

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

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1.69 packaging 21.3

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1.70 my-test-package 1.0

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```
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```

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```
***** */
```

Found in path(s):

```
* /opt/cola/permits/1401487065_1661623039.6387527/0/react-my-test-package-1-0-0-tgz/package/dist/index.js  
*
```

```
/opt/cola/permits/1401487065_1661623039.6387527/0/react-my-test-package-1-0-0-tgz/package/dist/index.es.js
```

1.71 prometheus-client-model 0.2.0

1.71.1 Available under license :

Data model artifacts for Prometheus.

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1.75 msgpack 1.0.5

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1.77 fasthttp 1.40.0

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1.78 prometheus 1.2.0

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1.79 mpdecimal 2.5.1-r2

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1.86 iputils-tracepath 20221126-r2

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1.87 python-setuptools 67.7.2

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1.88 libucontext 1.2-r2

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1.94 libffi 3.4.4-r3

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1.95 musl-obstack 1.2.3-r2

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1.96 libc-utils 0.7.2-r5

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

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```

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dev/main/libc-dev/sys-queue.h

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* /opt/cola/permits/1686513755_1685082238.691036/0/aports-master-main-libc-dev-zip/aports-master-main-libc-dev/main/libc-dev/sys-tree.h

1.97 python-requests 2.31.0

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1.98 log-rotate 3.21.0-r1

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```

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1.102 libcap 2.69-r1

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```
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```

```
<signature of Ty Coon>, 1 April 1989
Ty Coon, President of Vice
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1.103 htop 3.2.2-r1

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The following people have contributed to the development of Rich:

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1.105 pax-utils 1.3.7-r2

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1.114 libproc2 4.0.4-r0

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[This is the first released version of the library GPL. It is

numbered 2 because it goes with version 2 of the ordinary GPL.]

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1.115 procps 4.0.4-r0

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

```
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it under the terms of the GNU  
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the Free Software Foundation; either version 2 of the License, or  
(at your option) any later version.
```

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

```
Gnomovision version 69, Copyright (C) year name of author
Gnomovision comes with ABSOLUTELY NO WARRANTY; for details type `show w'.
This is free software, and you are welcome to redistribute
it
under certain conditions; type `show c' for details.
```

The hypothetical commands `show w' and `show c' should show the appropriate
parts of the General Public License. Of course, the commands you use may
be called something other than `show w' and `show c'; they could even be
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You should also get your employer (if you work as a programmer) or your
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necessary. Here is a sample; alter the names:

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

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

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

However, unrestricted linking of non-free programs would deprive the users of those programs of all benefit from the free status of the libraries themselves. This Library General Public License is intended to permit developers of non-free programs to use free libraries, while preserving your freedom as a user of such programs to change the free libraries that are incorporated in them. (We have not seen how to achieve this as regards changes in header files, but we have achieved it as regards changes in the actual functions of the Library.) The hope is that this will lead to faster development of free libraries.

The precise terms and conditions for copying, distribution and modification follow. Pay close attention to the difference between a "work based on the library" and a "work that uses the library". The former contains code derived from the library, while the latter only works together with the library.

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collective works based on the Library.

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This option is useful when you wish to copy part of the code of the Library into a program that is not a library.

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1.116 libidn 2.3.4-r4

1.116.1 Available under license :

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Version 3, 29 June 2007

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1.117 python-setuptools 68.2.2

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

In May 2000, Guido and the Python core development team moved to BeOpen.com to form the BeOpen PythonLabs team. In October of the same year, the PythonLabs team moved to Digital Creations (now Zope Corporation, see <http://www.zope.com>). In 2001, the Python Software Foundation (PSF, see <http://www.python.org/psf/>) was formed, a non-profit organization created specifically to own Python-related Intellectual Property. Zope Corporation is a sponsoring member of the PSF.

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1.3 thru 1.5.2	1.2	1995-1999	CNRI	yes
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1.6.1	1.6	2001	CNRI	yes (2)
2.1	2.0+1.6.1	2001	PSF	no
2.0.1	2.0+1.6.1	2001	PSF	yes
2.1.1	2.1+2.0.1	2001	PSF	yes

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1.118 urllib3 1.26.17

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1.119 gojsonreference 0.0.0-20180127040603-bd5ef7bd5415

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1.120 grpc-gateway 1.16.0

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1.121 pam 1.5.3-r7

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```

For each user matching `patterns`, disable TTY auditing. This overrides any previous `enable` option matching the same user name on the command line. See NOTES for further description of `patterns`.

`enable=patterns`

For each user matching `patterns`, enable TTY auditing. This overrides any previous `disable` option matching the same user name on the

command line. See NOTES

for further description of `patterns`.

`open_only`

Set the TTY audit flag when opening the session, but do not restore it when closing the session. Using this option is necessary for some services that don't `fork()` to run the authenticated session, such as `sudo`.

`log_passwd`

Log keystrokes when ECHO mode is off but ICANON mode is active.

This is the mode in which the tty is placed during password entry.

By default, passwords are not logged. This option may not be available on older kernels (3.9?).

6.36.3. MODULE TYPES PROVIDED

Only the `session` type is supported.

6.36.4. RETURN VALUES

<code>PAM_SESSION_ERR</code>

Error reading or modifying the TTY audit flag. See the system log for more details.

`PAM_SUCCESS`

Success.

6.36.5. NOTES

When TTY auditing is enabled, it is inherited by all processes started by that user. In particular, daemons restarted by a user will still have

TTY auditing enabled, and audit TTY input even by other users unless auditing for these users is explicitly disabled. Therefore, it is

recommended to use `disable=*` as the first option for most daemons using PAM.

To view the data that was logged by the kernel to audit use

the command `aureport --tty`.

</p><p>

The `<code class="option"><em class="replaceable"><code>patterns</code></code>` are comma separated lists of glob patterns or ranges of uids. A range is specified as `<em class="replaceable"><code>min_uid</code>:<em class="replaceable"><code>max_uid</code>` where one of these values can be empty. If `<em class="replaceable"><code>min_uid</code>` is empty only user with the uid `<em class="replaceable"><code>max_uid</code>` will be matched. If `<em class="replaceable"><code>max_uid</code>` is empty users with the uid greater than or equal to `<em class="replaceable"><code>min_uid</code>` will be matched.

</p><p>

Please note that passwords in some circumstances may be logged by TTY auditing even if the `<code class="option">log_passwd</code>` is not used. For example, all input to an ssh session will be logged - even if there is a password being typed into some software running at the remote host because only the local TTY state affects the local TTY auditing.

</p></div><div class="section"><div class="titlepage"><div><div><h3 class="title">6.36.6. EXAMPLES</h3></div></div></div><p>

Audit all administrative actions.

</p><pre class="programlisting">

session required pam_tty_audit.so disable=* enable=root

</pre><p>

</p></div><div class="section"><div class="titlepage"><div><div><h3 class="title">6.36.7. AUTHOR</h3></div></div></div><p>

pam_tty_audit was written by Miloslav Trma

<mitr@redhat.com>

The log_passwd option was added by Richard Guy Briggs

<rgb@redhat.com>

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The Linux-PAM Module Writers' Guide

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Thorsten Kukuk

<kukuk@thkukuk.de>

Version 1.1.2, 31. August 2010

Abstract

This manual documents what a programmer needs to know in order to write a module that conforms to the Linux-PAM standard. It also discusses some security issues from the point of view of the module programmer.

1. Introduction

1.1. Description

1.2. Synopsis

2. What can be expected by the module

2.1. Getting and setting PAM_ITEMS and data

2.1.1. Set module internal data

2.1.2. Get module internal data

2.1.3. Setting PAM items

2.1.4. Getting PAM items

2.1.5. Get user name

2.1.6. The conversation function

2.1.7. Set or change PAM environment variable

2.1.8. Get a PAM environment variable

2.1.9. Getting the

PAM environment

2.2. Other functions provided by libpam

2.2.1. Strings describing PAM error codes

2.2.2. Request a delay on failure

3. What is expected of a module

3.1. Overview

3.1.1. Functional independence

3.1.2. Minimizing administration problems

3.1.3. Arguments supplied to the module

3.2. Authentication management

3.2.1. Service function for user authentication

3.2.2. Service function to alter credentials

3.3. Account management

3.3.1. Service function for account management

3.4. Session management

3.4.1. Service function to start session management

3.4.2. Service function to terminate session management

3.5. Authentication token management

3.5.1. Service function to alter authentication token

4. Generic optional arguments

5. Programming notes

5.1. Security issues for module creation

5.1.1. Sufficient resources

5.1.2. Who's who?

5.1.3. Using the conversation function

5.1.4. Authentication tokens

5.2. Use of syslog(3)

5.3. Modules that require system libraries

6. An example module

7. See also

8. Author/acknowledgments

9. Copyright information for this document

Chapter 1. Introduction

1.1. Description

Linux-PAM (Pluggable Authentication Modules for Linux) is a library that enables the local system administrator to choose how individual applications authenticate users. For an overview of the Linux-PAM library see the Linux-PAM System Administrators' Guide.

A Linux-PAM module is a single executable binary file that can be loaded by the

Linux-PAM interface library. This PAM library is configured locally with a system file, `/etc/pam.conf`, to authenticate a user request via the locally available authentication modules. The modules themselves will usually be located in the directory `/lib/security` (or `/lib64/security`, depending on the architecture) and take the form of dynamically loadable object files (see `dlopen(3)`). Alternatively, the modules can be statically linked into the Linux-PAM library; this is mostly to allow Linux-PAM to be used on platforms without dynamic linking available, but this is a deprecated functionality. It is the Linux-PAM interface that is called by an application and it is the responsibility of the library to locate, load and call the appropriate functions in a Linux-PAM-module.

Except for the immediate purpose of interacting with the user (entering a password etc..) the module should never call the application directly. This exception requires a "conversation mechanism" which is documented below.

1.2. Synopsis

```
#include <security/pam_modules.h>

gcc -fPIC -c pam_module.c
gcc -shared -o pam_module.so pam_module.o -lpam
```

Chapter 2. What can be expected by the module

Here we list the interface that the conventions that all Linux-PAM modules must adhere to.

2.1. Getting and setting PAM_ITEMS and data

First, we cover what the module should expect from the Linux-PAM library and a Linux-PAM aware application. Essentially this is the `libpam.*` library.

2.1.1. Set module internal data

```
#include <security/pam_modules.h>

int pam_set_data pamh,
(
    module_data_name,
    data,
    (*cleanup)(pam_handle_t *pamh, void *data, int
    error_status));

pam_handle_t *pamh;
```

```
const char *module_data_name;
void *data;
void (*cleanup)(pam_handle_t *pamh, void *data, int error_status);
```

2.1.1.1. DESCRIPTION

The `pam_set_data` function associates a pointer to an object with the (hopefully) unique string `module_data_name` in the PAM context specified by the `pamh` argument.

PAM modules may be dynamically loadable objects. In general such files should not contain static variables. This function and its counterpart `pam_get_data(3)`

, provide a mechanism for a module to associate some data with the handle `pamh`. Typically a module will call the `pam_set_data` function to register some data under a (hopefully) unique `module_data_name`. The data is available for use by other modules too but not by an application. Since this function stores only a pointer to the data, the module should not modify or free the content of it.

The function `cleanup()` is associated with the data and, if non-NULL, it is called when this data is over-written or following a call to `pam_end(3)`.

The `error_status` argument is used to indicate to the module the sort of action it is to take in cleaning this data item. As an example, Kerberos creates a ticket file during the authentication phase, this file might be associated with a data item. When `pam_end(3)` is called by the module, the `error_status` carries the return value of the `pam_authenticate(3)` or other libpam function as appropriate. Based on this value the Kerberos module may choose to delete the ticket file (authentication failure) or leave it in place.

The `error_status` may have been logically OR'd with either of the following two values:

PAM_DATA_REPLACE

When a data item is being replaced (through a second call to `pam_set_data`) this mask is used. Otherwise, the call is assumed to be from `pam_end(3)`.

PAM_DATA_SILENT

Which indicates that the process would prefer to perform the `cleanup()` quietly. That is, discourages logging/messages to the user. It is generally used to indicate that the current closing of the library is in a `fork(2)`ed process, and that the parent will take care of cleaning up things that exist outside of the current process space (files etc.).

2.1.1.2. RETURN VALUES

PAM_BUF_ERR

Memory buffer error.

PAM_SUCCESS

Data was successful stored.

PAM_SYSTEM_ERR

A NULL pointer was submitted as PAM handle or the function was called by an application.

2.1.2. Get module internal data

```
#include <security/pam_modules.h>
```

```
int
```

```
pam_get_data( pamh,  
              module_data_name,  
              data);
```

```
const pam_handle_t *pamh;  
const char *module_data_name;  
const void **data;
```

2.1.2.1. DESCRIPTION

This function together with the `pam_set_data(3)` function is useful to manage module-specific data meaningful only to the calling PAM module.

The `pam_get_data` function looks up the object associated with the (hopefully) unique string `module_data_name` in the PAM context specified by the `pamh` argument. A successful call to `pam_get_data` will result in `data` pointing to the object. Note, this data is not a copy and should be treated as constant by the module.

2.1.2.2. RETURN VALUES

PAM_SUCCESS

Data was successful retrieved.

PAM_SYSTEM_ERR

A NULL pointer was submitted as PAM handle or the function was called by an application.

PAM_NO_MODULE_DATA

Module data not found or there is an entry, but it has the value NULL.

2.1.3. Setting PAM items

```
#include  
<security/pam_modules.h>
```

```
int pam_set_item( pamh,  
                 item_type,  
                 item);
```

```
pam_handle_t *pamh;  
int item_type;  
const void *item;
```

2.1.3.1. DESCRIPTION

The `pam_set_item` function allows applications and PAM service modules to access and to update PAM information of `item_type`. For this a copy of the object pointed to by the `item` argument is created. The following `item_types` are supported:

PAM_SERVICE

The service name (which identifies that PAM stack that the PAM functions will use to authenticate the program).

PAM_USER

The username of the entity under whose identity service will be given. That is, following authentication, `PAM_USER` identifies the local entity that gets to use the service. Note, this value can be mapped from something (eg., "anonymous") to something else (eg. "guest119") by any module in the PAM stack. As such an application should consult the value of `PAM_USER` after each call to a PAM function.

PAM_USER_PROMPT

The string used when prompting for a user's name. The default value for this string is a localized version of "login: ".

PAM_TTY

The terminal name prefixed by /dev/ for device files. In the past, graphical X-based applications used to store the \$DISPLAY variable here, but with the introduction of PAM_XDISPLAY this usage is deprecated.

PAM_RUSER

The requesting user name: local name for a locally requesting user or a remote user name for a remote requesting user.

Generally an application or module will attempt to supply the value that is most strongly authenticated (a local account before a remote one. The level of trust in this value is embodied in the actual authentication stack associated with the application, so it is ultimately at the discretion of the system administrator.

PAM_RUSER@PAM_RHOST should always identify the requesting user. In some cases, PAM_RUSER may be NULL. In such situations, it is unclear who the requesting entity is.

PAM_RHOST

The requesting hostname (the hostname of the machine from which the PAM_RUSER entity is requesting service). That is PAM_RUSER@PAM_RHOST does identify the requesting user. In some applications, PAM_RHOST may be NULL. In such situations, it is unclear where the authentication request is originating from.

PAM_AUTHTOK

The authentication token (often a password). This token should be ignored by all module functions besides pam_sm_authenticate(3) and pam_sm_chauthtok(3). In the former function it is used to pass the most recent authentication token from one stacked module to another. In the latter function the token is used for another purpose. It contains the currently active authentication token.

PAM_OLDAUTHTOK

The old authentication token. This token should be ignored by all module functions except pam_sm_chauthtok(3).

PAM_CONV

The pam_conv structure. See

pam_conv(3).

The following additional items are specific to Linux-PAM and should not be used in portable applications:

PAM_FAIL_DELAY

A function pointer to redirect centrally managed failure delays. See pam_fail_delay(3).

PAM_XDISPLAY

The name of the X display. For graphical, X-based applications the value for this item should be the \$DISPLAY variable. This value may be used independently of PAM_TTY for passing the name of the display.

PAM_XAUTHDATA

A pointer to a structure containing the X authentication data required to make a connection to the display specified by PAM_XDISPLAY, if such information is necessary. See pam_xauth_data(3).

PAM_AUTHTOK_TYPE

The default action is for the module to use the following prompts when requesting passwords: "New UNIX password: " and "Retype UNIX password: ". The example word UNIX can be replaced with this item, by default it is empty. This item is used by pam_get_authtok(3).

For all item_types,

other than PAM_CONV and PAM_FAIL_DELAY, item is a pointer to a <NUL> terminated character string. In the case of PAM_CONV, item points to an initialized pam_conv structure. In the case of PAM_FAIL_DELAY, item is a function pointer: void (*delay_fn)(int retval, unsigned usec_delay, void *appdata_ptr)

Both, PAM_AUTHTOK and PAM_OLDAUTHTOK, will be reset before returning to the application. Which means an application is not able to access the authentication tokens.

2.1.3.2. RETURN VALUES

PAM_BAD_ITEM

The application attempted to set an undefined or inaccessible item.

PAM_BUF_ERR

Memory buffer error.

PAM_SUCCESS

Data was successful updated.

PAM_SYSTEM_ERR

The pam_handle_t passed as first argument was invalid.

2.1.4. Getting PAM items

```
#include <security/pam_modules.h>
```

```
int pam_get_item( pamh,  
                 item_type,  
                 item);
```

```
const pam_handle_t *pamh;  
int item_type;  
const void **item;
```

2.1.4.1. DESCRIPTION

The pam_get_item function allows applications and PAM service modules to access and retrieve PAM information of item_type. Upon successful return, item contains a pointer to the value of the corresponding item. Note, this is a pointer to the actual data and should not be free()'ed or over-written! The following values are supported for item_type:

PAM_SERVICE

The service name (which identifies that PAM stack that the PAM functions will use to authenticate the program).

PAM_USER

The username of the entity under whose identity service will be given. That is, following authentication, PAM_USER identifies the local entity that gets to use the service. Note, this value can be mapped from something (eg., "anonymous") to something else (eg. "guest119") by any module in the PAM stack. As such an application should consult the value of PAM_USER after each call to a PAM function.

PAM_USER_PROMPT

The string used when prompting for a user's name. The default value for this string is a localized version of "login: ".

PAM_TTY

The terminal name prefixed by /dev/ for device files. In the past, graphical X-based applications used to store the \$DISPLAY variable here, but with the introduction of PAM_XDISPLAY this usage is deprecated.

PAM_RUSER

The requesting user name: local name for a locally requesting user or a remote user name for a remote requesting user.

Generally an application or module will attempt to supply the value that is most strongly authenticated (a local account before a remote one. The level of trust in this value is embodied in the actual authentication stack associated with the application, so it is ultimately at the discretion of the system administrator.

PAM_RUSER@PAM_RHOST should always identify the requesting user. In some cases, PAM_RUSER may be NULL. In such situations, it is unclear who the requesting entity is.

PAM_RHOST

The requesting hostname (the hostname of the machine from which the PAM_RUSER entity is requesting service). That is PAM_RUSER@PAM_RHOST does identify the requesting user. In some applications, PAM_RHOST may be NULL. In such situations, it is unclear where the authentication request is originating from.

PAM_AUTHTOK

The authentication token (often a password). This token should be ignored by all module functions besides pam_sm_authenticate(3) and pam_sm_chauthtok(3). In the former function it is used to pass the most recent authentication token from one stacked module to another. In the latter function the token is used for another purpose. It contains the currently active authentication token.

PAM_OLDAUTHTOK

The old authentication token. This token should be ignored by all module functions except pam_sm_chauthtok(3).

PAM_CONV

The pam_conv structure. See pam_conv(3).

The following additional items are specific to Linux-PAM and should not be used in portable applications:

PAM_FAIL_DELAY

A function pointer to redirect centrally managed failure delays. See pam_fail_delay(3).

PAM_XDISPLAY

The name of the X display. For graphical, X-based applications the value for this item should be the \$DISPLAY variable. This value may be used independently of PAM_TTY for passing the name of the display.

PAM_XAUTHDATA

A pointer to a structure containing the X authentication data required to make a connection to the display specified by PAM_XDISPLAY, if such information is necessary. See pam_xauth_data(3).

PAM_AUTHTOK_TYPE

The default action is for the module to use the following prompts when requesting passwords: "New UNIX password: " and "Retype UNIX password: ". The example word UNIX can be replaced with this item, by default it is empty. This item is used by pam_get_authtok(3).

If a service module wishes to obtain the name of the user, it should not use this function, but instead perform a call to pam_get_user(3).

Only

a service module is privileged to read the authentication tokens, PAM_AUTHTOK and PAM_OLDAUTHTOK.

2.1.4.2. RETURN VALUES

PAM_BAD_ITEM

The application attempted to set an undefined or inaccessible item.

PAM_BUF_ERR

Memory buffer error.

PAM_PERM_DENIED

The value of item was NULL.

PAM_SUCCESS

Data was successful updated.

PAM_SYSTEM_ERR

The pam_handle_t passed as first argument was invalid.

2.1.5. Get user name

```
#include <security/pam_modules.h>
```

```
int pam_get_user( pamh,  
                 user,  
                 prompt);
```

```
const pam_handle_t *pamh;  
const char **user;  
const char *prompt;
```

2.1.5.1. DESCRIPTION

The pam_get_user function returns the name of the user specified by pam_start(3). If no user was specified it returns what pam_get_item(pamh, PAM_USER, ...); would have returned. If this is NULL it obtains the username via the pam_conv(3) mechanism, it prompts the user with the first non-NULL string in the following list:

- The prompt argument passed to the function.
- What is returned by pam_get_item(pamh, PAM_USER_PROMPT, ...);
- The default prompt: "login: "

By whatever means the username is obtained, a pointer to it is returned as the contents of *user. Note, this memory should not be free()'d or modified by the module.

This function sets the PAM_USER item associated with the pam_set_item(3) and pam_get_item(3) functions.

2.1.5.2. RETURN VALUES

PAM_SUCCESS

User name was successful retrieved.

PAM_SYSTEM_ERR

A NULL pointer was submitted.

PAM_CONV_ERR

The conversation method supplied by the application failed to obtain the username.

PAM_BUF_ERR

Memory buffer error.

PAM_ABORT

Error resuming an old conversation.

PAM_CONV_AGAIN

The conversation method supplied by the application is waiting for an event.

2.1.6. The conversation function

```
#include <security/pam_appl.h>
```

```
struct pam_message {  
    int msg_style;  
    const char *msg;  
};
```

```
struct  
pam_response {  
    char *resp;  
    int resp_retcode;  
};
```

```
struct pam_conv {  
    int (*conv)(int num_msg, const struct pam_message **msg,  
                struct pam_response **resp, void *appdata_ptr);  
    void *appdata_ptr;  
};
```

2.1.6.1. DESCRIPTION

The PAM library uses an application-defined callback to allow a direct communication between a loaded module and the application. This callback is specified by the struct `pam_conv` passed to `pam_start(3)` at the start of the transaction.

When a module calls the referenced `conv()` function, the argument `appdata_ptr` is set to the second element of this structure.

The other arguments of a call to `conv()` concern the information exchanged by module and application. That is to say, `num_msg` holds the length of the array of pointers, `msg`. After a successful return, the pointer `resp` points to an array of `pam_response` structures, holding the application supplied text. The `resp_retcode` member of this struct is unused and should be set to zero. It is the caller's responsibility to release both, this array and the responses themselves, using `free(3)`. Note, `*resp` is a struct `pam_response` array and not an array of pointers.

The number of responses is always equal to the `num_msg` conversation function argument. This does require that the response array is `free(3)`'d after every call to the conversation function. The index of the responses corresponds directly to the prompt index in the `pam_message` array.

On failure, the conversation function should release any resources it has allocated, and return one of the predefined PAM error codes.

Each message can have one of four types, specified by the `msg_style` member of struct `pam_message`:

PAM_PROMPT_ECHO_OFF

Obtain a string without echoing any text.

PAM_PROMPT_ECHO_ON

Obtain a string whilst echoing text.

PAM_ERROR_MSG

Display an error message.

PAM_TEXT_INFO

Display some text.

The point of having an array of messages is that it becomes possible to pass a

number of things to the application in a single call from the module. It can also be convenient for the application that related things come at once: a windows based application can then present a single form with many messages/prompts on at once.

In passing, it is worth noting that there is a discrepancy between the way Linux-PAM handles the const struct pam_message **msg conversation function argument and the way that Solaris' PAM (and derivatives, known to include HP/UX, are there others?) does. Linux-PAM interprets the msg argument as entirely equivalent to the following prototype const struct pam_message *msg[] (which, in spirit, is consistent with the commonly used prototypes for argv argument to the familiar main() function: char **argv; and char *argv[]). Said another way Linux-PAM interprets the msg argument as a pointer to an array of num_msg read only 'struct pam_message' pointers. Solaris' PAM implementation interprets this argument as a pointer to a pointer to an array of num_msg pam_message structures.

Fortunately, perhaps, for most module/application developers when num_msg has a value of one these two definitions are entirely equivalent. Unfortunately, casually raising this number to two has led to unanticipated compatibility problems.

For what its worth the two known module writer work-arounds for trying to maintain source level compatibility with both PAM implementations are:

- never call the conversation function with num_msg greater than one.
- set up msg as doubly referenced so both types of conversation function can find the messages. That is, make

```
msg[n] = & (( *msg )[n])
```

2.1.6.2. RETURN VALUES

PAM_BUF_ERR

Memory buffer error.

PAM_CONV_ERR

Conversation failure. The application should not set *resp.

PAM_SUCCESS

Success.

2.1.7. Set or change PAM environment variable

```
#include <security/pam_appl.h>
```

```
int pam_putenv( pamh,  
               name_value);
```

```
pam_handle_t *pamh;  
const char *name_value;
```

2.1.7.1.

DESCRIPTION

The `pam_putenv` function is used to add or change the value of PAM environment variables as associated with the `pamh` handle.

The `pamh` argument is an authentication handle obtained by a prior call to `pam_start()`. The `name_value` argument is a single NUL terminated string of one of the following forms:

`NAME=value of variable`

In this case the environment variable of the given `NAME` is set to the indicated value: `value of variable`. If this variable is already known, it is overwritten. Otherwise it is added to the PAM environment.

`NAME=`

This function sets the variable to an empty value. It is listed separately to indicate that this is the correct way to achieve such a setting.

`NAME`

Without an '=' the `pam_putenv()` function will delete the corresponding variable from the PAM environment.

`pam_putenv()` operates on a copy of `name_value`, which means in contrast to `putenv(3)`, the application is responsible for freeing the data.

2.1.7.2. RETURN

VALUES

`PAM_PERM_DENIED`

Argument `name_value` given is a NULL pointer.

`PAM_BAD_ITEM`

Variable requested (for deletion) is not currently set.

PAM_ABORT

The pamh handle is corrupt.

PAM_BUF_ERR

Memory buffer error.

PAM_SUCCESS

The environment variable was successfully updated.

2.1.8. Get a PAM environment variable

```
#include <security/pam_appl.h>
```

```
const char *pam_getenv( pamh,  
                        name);
```

```
pam_handle_t *pamh;  
const char *name;
```

2.1.8.1. DESCRIPTION

The `pam_getenv` function searches the PAM environment list as associated with the handle `pamh` for an item that matches the string pointed to by `name` and returns a pointer to the value of the environment variable. The application is not allowed to free the data.

2.1.8.2. RETURN VALUES

The `pam_getenv` function returns `NULL` on failure.

2.1.9. Getting the PAM environment

```
#include <security/pam_appl.h>
```

```
char **pam_getenvlist( pamh);
```

```
pam_handle_t *pamh;
```

2.1.9.1. DESCRIPTION

The `pam_getenvlist`

function returns a complete copy of the PAM environment as associated with the handle pamh. The PAM environment variables represent the contents of the regular environment variables of the authenticated user when service is granted.

The format of the memory is a malloc()'d array of char pointers, the last element of which is set to NULL. Each of the non-NULL entries in this array point to a NUL terminated and malloc()'d char string of the form: "name=value".

It should be noted that this memory will never be free()'d by libpam. Once obtained by a call to pam_getenvlist, it is the responsibility of the calling application to free() this memory.

It is by design, and not a coincidence, that the format and contents of the returned array matches that required for the third argument of the execl(3) function call.

2.1.9.2. RETURN VALUES

The pam_getenvlist function returns NULL on failure.

2.2. Other functions provided by libpam

2.2.1. Strings describing PAM error codes

```
#include
<security/pam_appl.h>

const char *pam_strerror( pamh,
                        errnum);

pam_handle_t *pamh;
int errnum;
```

2.2.1.1. DESCRIPTION

The pam_strerror function returns a pointer to a string describing the error code passed in the argument errnum, possibly using the LC_MESSAGES part of the current locale to select the appropriate language. This string must not be modified by the application. No library function will modify this string.

2.2.1.2. RETURN VALUES

This function returns always a pointer to a string.

2.2.2. Request a delay on failure

```
#include <security/pam_appl.h>
```

```
int pam_fail_delay( pamh,  
                  usec);
```

```
pam_handle_t *pamh;  
unsigned int usec;
```

2.2.2.1. DESCRIPTION

The `pam_fail_delay` function provides a mechanism by which an application or module can suggest a minimum delay of usec micro-seconds. The function keeps a record of the longest time requested with this function. Should `pam_authenticate(3)` fail, the failing return to the application is delayed by an amount of time randomly distributed (by up to 50%) about this longest value.

Independent of success, the delay time is reset to its zero default value when the PAM service module returns control to the application. The delay occurs after all authentication modules have been called, but before control is returned to the service application.

When using this function the programmer should check if it is available with:

```
#ifdef HAVE_PAM_FAIL_DELAY  
....  
#endif /* HAVE_PAM_FAIL_DELAY */
```

For applications written with a single thread that are event driven in nature, generating this delay may be undesirable. Instead, the application may want to register the delay in some other way. For example, in a single threaded server that serves multiple authentication requests from a single event loop, the application might want to simply mark a given connection as blocked until an application timer expires. For this reason the delay function can be changed with the

`PAM_FAIL_DELAY` item. It can be queried and set with `pam_get_item(3)` and `pam_set_item(3)` respectively. The value used to set it should be a function pointer of the following prototype:

```
void (*delay_fn)(int retval, unsigned usec_delay, void *appdata_ptr);
```

The arguments being the `retval` return code of the module stack, the `usec_delay` micro-second delay that libpam is requesting and the `appdata_ptr` that the application has associated with the current `pamh`. This last value was set by the application when it called `pam_start(3)` or explicitly with `pam_set_item(3)`.

Note that the `PAM_FAIL_DELAY` item is set to `NULL` by default. This indicates that PAM should perform a random delay as described above when authentication fails and a delay has been suggested. If an application does not want the PAM library to perform any delay on authentication failure, then the application must define a custom delay function that executes no statements and set the `PAM_FAIL_DELAY` item to point to this function.

2.2.2.2.

RETURN VALUES

PAM_SUCCESS

Delay was successful adjusted.

PAM_SYSTEM_ERR

A `NULL` pointer was submitted as PAM handle.

Chapter 3. What is expected of a module

The module must supply a sub-set of the six functions listed below. Together they define the function of a Linux-PAM module. Module developers are strongly urged to read the comments on security that follow this list.

3.1. Overview

The six module functions are grouped into four independent management groups. These groups are as follows: authentication, account, session and password. To be properly defined, a module must define all functions within at least one of these groups. A single module may contain the necessary functions for all four groups.

3.1.1. Functional independence

The independence of the four groups of service a module can offer means that the module should allow for the possibility that any one of these four services may legitimately be called in any order. Thus, the module writer should consider

the appropriateness of performing a service without the prior success of some other part of the module.

As an informative example, consider the possibility that an application applies to change a user's authentication token, without having first requested that Linux-PAM authenticate the user. In some cases this may be deemed appropriate: when root wants to change the authentication token of some lesser user. In other cases it may not be appropriate: when joe maliciously wants to reset alice's password; or when anyone other than the user themselves wishes to reset

their KERBEROS authentication token. A policy for this action should be defined by any reasonable authentication scheme, the module writer should consider this when implementing a given module.

3.1.2. Minimizing administration problems

To avoid system administration problems and the poor construction of a `/etc/pam.conf` file, the module developer may define all six of the following functions. For those functions that would not be called, the module should return `PAM_SERVICE_ERR` and write an appropriate message to the system log. When this action is deemed inappropriate, the function would simply return `PAM_IGNORE`.

3.1.3. Arguments supplied to the module

The `flags` argument of each of the following functions can be logically OR'd with `PAM_SILENT`, which is used to inform the module to not pass any text (errors or warnings) application.

The `argc` and `argv` arguments are taken from the line appropriate to this module---that is, with the `service_name` matching that of the application---in the configuration file (see the *Linux-PAM System Administrators' Guide*). Together these two parameters provide the number of arguments and an array of pointers to the individual argument tokens. This will be familiar to C programmers as the ubiquitous method of passing command arguments to the function `main()`. Note, however, that the first argument (`argv[0]`) is a true argument and not the name of the module.

3.2.

Authentication management

3.2.1. Service function for user authentication

```
#include <security/pam_modules.h>
```

```
int pam_sm_authenticate( pamh,  
                        flags,  
                        argc,  
                        argv);
```

```
pam_handle_t *pamh;  
int flags;  
int argc;  
const char **argv;
```

3.2.1.1. DESCRIPTION

The pam_sm_authenticate function is the service module's implementation of the pam_authenticate(3) interface.

This function performs the task of authenticating the user.

Valid flags, which may be logically OR'd with PAM_SILENT, are:

PAM_SILENT

Do not emit any messages.

PAM_DISALLOW_NULL_AUTH Tok

Return PAM_AUTH_ERR if the database of authentication tokens for this authentication mechanism has a NULL entry for the user. Without this flag, such a NULL token will lead to a success without the user being prompted.

3.2.1.2. RETURN VALUES

PAM_AUTH_ERR

Authentication failure.

PAM_CRED_INSUFFICIENT

For some reason the application does not have sufficient credentials to authenticate the user.

PAM_AUTHINFO_UNAVAIL

The modules were not able to access the authentication information. This might be due to a network or hardware failure etc.

PAM_SUCCESS

The authentication token was successfully updated.

PAM_USER_UNKNOWN

The supplied username is not known to the authentication service.

PAM_MAXTRIES

One or more of the authentication modules has reached its limit of tries authenticating the user. Do not try again.

3.2.2. Service function to alter credentials

```
#include <security/pam_modules.h>
```

```
int pam_sm_setcred( pamh,  
                  flags,  
                  argc,  
                  argv);
```

```
pam_handle_t *pamh;  
int flags;  
int argc;  
const char **argv;
```

3.2.2.1. DESCRIPTION

The `pam_sm_setcred` function is the service module's implementation of the `pam_setcred(3)` interface.

This function performs the task of altering the credentials of the user with respect to the corresponding authorization scheme. Generally, an authentication module may have access to more information about a user than their authentication token. This function is used to make such information available to the application. It should only be called after the user has been authenticated but before a session has been established.

Valid flags, which may be logically OR'd with `PAM_SILENT`, are:

`PAM_SILENT`

Do not emit any messages.

`PAM_ESTABLISH_CRED`

Initialize the credentials for the user.

`PAM_DELETE_CRED`

Delete the credentials associated with the authentication service.

`PAM_REINITIALIZE_CRED`

Reinitialize the user credentials.

`PAM_REFRESH_CRED`

Extend the lifetime of the user credentials.

The way the auth stack is navigated in order to evaluate the `pam_setcred()` function call, independent of the `pam_sm_setcred()` return codes, is exactly the same way that it was navigated when evaluating the `pam_authenticate()` library call. Typically, if a stack entry was ignored in evaluating `pam_authenticate()`, it will be ignored when `libpam` evaluates the `pam_setcred()` function call. Otherwise, the return codes from each module specific `pam_sm_setcred()` call are treated as required.

3.2.2.2. RETURN VALUES

PAM_CRED_UNAVAIL

This module cannot retrieve the user's credentials.

PAM_CRED_EXPIRED

The user's credentials have expired.

PAM_CRED_ERR

This module was unable to set the credentials of the user.

PAM_SUCCESS

The user credential was successfully set.

PAM_USER_UNKNOWN

The user is not known to this authentication module.

These, non-`PAM_SUCCESS`, return values will typically lead to the credential stack failing. The first such error will dominate in the return value of `pam_setcred()`.

3.3. Account management

3.3.1. Service function for account management

```
#include <security/pam_modules.h>
```

```
int pam_sm_acct_mgmt( pamh,  
                    flags,  
                    argc,  
                    argv);
```

```
pam_handle_t
*pamh;
int flags;
int argc;
const char **argv;
```

3.3.1.1. DESCRIPTION

The `pam_sm_acct_mgmt` function is the service module's implementation of the `pam_acct_mgmt(3)` interface.

This function performs the task of establishing whether the user is permitted to gain access at this time. It should be understood that the user has previously been validated by an authentication module. This function checks for other things. Such things might be: the time of day or the date, the terminal line, remote hostname, etc. This function may also determine things like the expiration on passwords, and respond that the user change it before continuing.

Valid flags, which may be logically OR'd with `PAM_SILENT`, are:

`PAM_SILENT`

Do not emit any messages.

`PAM_DISALLOW_NULL_AUTH Tok`

Return `PAM_AUTH_ERR` if the database of authentication tokens for this authentication mechanism has a `NULL` entry for the user.

3.3.1.2. RETURN VALUES

`PAM_ACCT_EXPIRED`

User account has expired.

`PAM_AUTH_ERR`

Authentication failure.

`PAM_NEW_AUTH Tok REQD`

The user's authentication token has expired. Before calling this function again the application will arrange for a new one to be given. This will likely result in a call to `pam_sm_chauthtok()`.

`PAM_PERM_DENIED`

Permission denied.

PAM_SUCCESS

The authentication token was successfully updated.

PAM_USER_UNKNOWN

User unknown to password service.

3.4. Session management

3.4.1. Service function to start session management

```
#include <security/pam_modules.h>
```

```
int pam_sm_open_session( pamh,  
                        flags,  
                        argc,  
                        argv);
```

```
pam_handle_t *pamh;  
int flags;  
int argc;  
const char **argv;
```

3.4.1.1. DESCRIPTION

The `pam_sm_open_session` function is the service module's implementation of the `pam_open_session(3)` interface.

This function is called to commence a session. The only valid value for `flags` is zero or:

PAM_SILENT

Do not emit any messages.

3.4.1.2. RETURN VALUES

PAM_SESSION_ERR

Cannot make/remove an entry for the specified session.

PAM_SUCCESS

The session was successfully started.

3.4.2. Service function to terminate session management

```
#include <security/pam_modules.h>
```

```
int pam_sm_close_session( pamh,  
                          flags,  
                          argc,  
                          argv);
```

```
pam_handle_t *pamh;  
int flags;  
int argc;  
const char **argv;
```

3.4.2.1. DESCRIPTION

The `pam_sm_close_session` function is the service module's implementation of the `pam_close_session(3)` interface.

This function is called to terminate a session. The only valid value for `flags` is zero or:

PAM_SILENT

Do not emit any messages.

3.4.2.2. RETURN VALUES

PAM_SESSION_ERR

Cannot make/remove an entry for the specified session.

PAM_SUCCESS

The session was successfully terminated.

3.5. Authentication token management

3.5.1. Service function to alter authentication token

```
#include <security/pam_modules.h>
```

```
int  
pam_sm_chauthtok( pamh,  
                  flags,
```

```
        argc,  
        argv);  
  
pam_handle_t *pamh;  
int flags;  
int argc;  
const char **argv;
```

3.5.1.1. DESCRIPTION

The `pam_sm_chauthtok` function is the service module's implementation of the `pam_chauthtok(3)` interface.

This function is used to (re-)set the authentication token of the user.

Valid flags, which may be logically OR'd with `PAM_SILENT`, are:

`PAM_SILENT`

Do not emit any messages.

`PAM_CHANGE_EXPIRED_AUTHTOK`

This argument indicates to the module that the user's authentication token (password) should only be changed if it has expired. This flag is optional and must be combined with one of the following two flags. Note, however, the following two options are mutually exclusive.

`PAM_PRELIM_CHECK`

This indicates that the modules are being probed as to their ready status for altering the user's authentication token. If the module requires access to another system over some network it should attempt to verify it can connect to this system on receiving this flag. If a module cannot establish it is ready to update the user's authentication token it should return `PAM_TRY_AGAIN`, this information will be passed back to the application.

If the control value `sufficient` is used in the password stack, the `PAM_PRELIM_CHECK` section of the modules following that control value is not always executed.

`PAM_UPDATE_AUTHTOK`

This informs the module that this is the call it should change the authorization tokens. If the flag is logically OR'd with `PAM_CHANGE_EXPIRED_AUTHTOK`, the token is only changed if it has actually

expired.

The PAM library calls this function twice in succession. The first time with PAM_PRELIM_CHECK and then, if the module does not return PAM_TRY_AGAIN, subsequently with PAM_UPDATE_AUTHTOK. It is only on the second call that the authorization token is (possibly) changed.

3.5.1.2. RETURN VALUES

PAM_AUTHTOK_ERR

The module was unable to obtain the new authentication token.

PAM_AUTHTOK_RECOVERY_ERR

The module was unable to obtain the old authentication token.

PAM_AUTHTOK_LOCK_BUSY

Cannot change the authentication token since it is currently locked.

PAM_AUTHTOK_DISABLE_AGING

Authentication token aging has been disabled.

PAM_PERM_DENIED

Permission denied.

PAM_TRY_AGAIN

Preliminary check was unsuccessful. Signals an immediate return to the application is desired.

PAM_SUCCESS

The authentication token was successfully updated.

PAM_USER_UNKNOWN

User unknown to password service.

Chapter 4. Generic optional arguments

Here we list the generic arguments that all modules can expect to be passed. They are not mandatory, and their absence should be accepted without comment by the module.

debug

Use the `pam_syslog(3)` call to log debugging information to the system log files.

use_first_pass

The module should not prompt the user for a password. Instead, it should obtain the previously typed password (by a call to `pam_get_item()` for the `PAM_AUTHTOK` item), and use that. If that doesn't work, then the user will not be authenticated. (This option is intended for `auth` and `passwd` modules only).

Chapter 5. Programming notes

Here we collect some pointers for the module writer to bear in mind when writing/developing a Linux-PAM compatible module.

5.1. Security issues for module creation

5.1.1. Sufficient resources

Care should be taken to ensure that the proper execution of a module is not compromised by a lack of system resources. If a module is unable to open sufficient files to perform its task, it should fail gracefully, or request additional resources. Specifically, the quantities manipulated by the `setrlimit(2)` family of commands should be taken into consideration.

5.1.2. Who's who?

Generally, the module may wish to establish the identity of the user requesting a service. This may not be the same as the username returned by `pam_get_user()`. Indeed, that is only going to be the name of the user under whose identity the service will be given. This is not necessarily the user that requests the service.

In other words, user `X` runs a program that is `setuid-Y`, it grants the user to have the permissions of `Z`. A specific example of this sort of service request is the `su` program: user `joe` executes `su` to become the user `jane`. In this situation `X=joe`, `Y=root` and `Z=jane`. Clearly, it is important that the module does not confuse these different users and grant an inappropriate level of privilege.

The following is the convention to be adhered to when juggling user-identities.

- X, the identity of the user invoking the service request. This is the user identifier; returned by the function `getuid(2)`.
- Y, the privileged identity of the application used to grant the requested service. This is the effective user identifier; returned by the function `geteuid(2)`.
- Z, the user under whose identity the service will be granted. This is the username returned by `pam_get_user()` and also stored in the Linux-PAM item, `PAM_USER`.
- Linux-PAM has a place for an additional user identity that a module may care to make use of. This is the `PAM_RUSER` item. Generally, network sensitive modules/applications may wish to set/read this item to establish the identity of the user requesting a service from a remote location.

Note, if a module wishes to modify the identity of either the uid or euid of the running process, it should take care to restore the original values prior to returning control to the Linux-PAM library.

5.1.3. Using the conversation function

Prior to calling the conversation function, the module should reset the contents of the pointer that will return the applications response. This is a good idea since the application may fail to fill the pointer and the module should be in a position to notice!

The module should be prepared for a failure from the conversation. The generic error would be `PAM_CONV_ERR`, but anything other than `PAM_SUCCESS` should be treated as indicating failure.

5.1.4. Authentication tokens

To ensure that the authentication tokens are not left lying around the items, `PAM_AUTHTOK` and `PAM_OLDAUTHTOK`, are not available to the application: they are defined in `<security/pam_modules.h>`. This is ostensibly for security reasons, but a maliciously programmed application will always have access to all memory of the process, so it is only superficially enforced. As a general rule the module should overwrite authentication tokens as soon as they are no longer needed. Especially before `free()`'ing them. The Linux-PAM library is required to do this when either of these authentication token items are `(re)set`.

Not to dwell too little on this concern; should the module store the authentication tokens either as (automatic) function variables or using `pam_[gs]et_data()`

the associated memory should be over-written explicitly before it is released. In the case of the latter storage mechanism, the associated `cleanup()` function should explicitly overwrite the `*data` before `free()`'ing it: for example,

```
/*
 * An example cleanup() function for releasing memory that was used to
 * store a password.
 */

int cleanup(pam_handle_t *pamh, void *data, int error_status)
{
    char *xx;

    if ((xx = data)) {
        while (*xx)
            *xx++ = '\0';
        free(data);
    }
    return PAM_SUCCESS;
}
```

5.2. Use of `syslog(3)`

Only rarely should error information be directed to the user. Usually, this is to be limited to “sorry you cannot login now” type messages. Information concerning errors in the configuration file, `/etc/pam.conf`, or due to some system failure encountered by the module, should be written to `syslog(3)` with facility-type `LOG_AUTHPRIV`.

With a few exceptions, the level of logging is, at the discretion of the module developer. Here is the recommended usage of different logging levels:

- As a general rule, errors encountered by a module should be logged at the `LOG_ERR` level. However, information regarding an unrecognized argument, passed to a module from an entry in the `/etc/pam.conf` file, is required to be logged at the `LOG_ERR` level.
- Debugging information, as activated by the `debug` argument to the module in `/etc/pam.conf`, should be logged at the `LOG_DEBUG` level.
- If a module discovers that its personal configuration file or some system file it uses for information is corrupted or somehow unusable, it should indicate this by logging messages at level, `LOG_ALERT`.
- Shortages of system resources, such as a failure to manipulate a file or

malloc() failures should be logged at level LOG_CRIT.

- Authentication failures, associated with an incorrectly typed password should be logged at level, LOG_NOTICE.

5.3. Modules that require system libraries

Writing a module is much like writing an application. You have to provide the "conventional hooks" for it to work correctly, like pam_sm_authenticate() etc., which would correspond to the main() function in a normal function.

Typically, the author may want to link against some standard system libraries. As when one compiles a normal program, this can be done for modules too: you simply append the -LXXX arguments for the desired libraries when you create the shared module object. To make sure a module is linked to the libwhatever.so library when it is dlopen()ed, try:

```
% gcc -shared -o pam_module.so pam_module.o -lwhatever
```

Chapter 6. An example module

At some point, we may include a fully commented example of a module in this document. For now, please look at the modules directory of the Linux-PAM sources.

Chapter 7. See also

- The Linux-PAM System Administrators' Guide.
- The Linux-PAM Application Developers' Guide.
- The V. Samar and R. Schemers (SunSoft), ``UNIFIED LOGIN WITH PLUGGABLE AUTHENTICATION MODULES'', Open Software Foundation Request For Comments 86.0, October 1995.

Chapter 8. Author/acknowledgments

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Chapter 9. Copyright information for this document

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Found in path(s):

* /opt/cola/permits/1822720343_1704297183.37862/0/linux-pam-1-5-3-docs-tar-xz/Linux-PAM-1.5.3/doc/mwg/Linux-PAM_MWG.txt

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

The Linux-PAM System Administrators' Guide

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Abstract

This manual documents what a system-administrator needs to know about the Linux-PAM library. It covers the correct syntax of the PAM configuration file and discusses strategies for maintaining a secure system.

1. Introduction
2. Some comments on the text
3. Overview
4. The Linux-PAM configuration file
 - 4.1. Configuration file syntax
 - 4.2. Directory based configuration
 - 4.3. Example configuration file entries
5. Security issues
 - 5.1. If something goes wrong
 - 5.2. Avoid having a weak `other' configuration
6. A reference guide for available modules
 - 6.1. pam_access - logdaemon style login access control
 - 6.2. pam_debug - debug the PAM stack
 - 6.3. pam_deny

- locking-out PAM module
- 6.4. pam_echo - print text messages
- 6.5. pam_env - set/unset environment variables
- 6.6. pam_exec - call an external command
- 6.7. pam_faildelay - change the delay on failure per-application
- 6.8. pam_faillock - temporarily locking access based on failed authentication attempts during an interval
- 6.9. pam_filter - filter module
- 6.10. pam_ftp - module for anonymous access
- 6.11. pam_group - module to modify group access
- 6.12. pam_issue - add issue file to user prompt
- 6.13. pam_keyinit - display the keyinit file
- 6.14. pam_lastlog - display date of last login
- 6.15. pam_limits - limit resources
- 6.16. pam_listfile - deny or allow services based on an arbitrary file
- 6.17. pam_localuser - require users to be listed in /etc/passwd
- 6.18. pam_loginuid - record user's login uid to the process attribute
- 6.19. pam_mail - inform about available mail
- 6.20. pam_mkhome - create users home directory
- 6.21. pam_motd - display the motd file
- 6.22. pam_namespace - setup a private namespace
- 6.23. pam_nologin - prevent non-root users from login
- 6.24. pam_permit - the promiscuous module
- 6.25. pam_pwhistory - grant access using .pwhistory file
- 6.26. pam_rhosts - grant access using .rhosts file
- 6.27. pam_rootok - gain only root access
- 6.28. pam_securetty - limit root login to special devices
- 6.29. pam_selinux - set the default security context
- 6.30. pam_sepermit - allow/reject access based on SELinux mode
- 6.31. pam_setquota - set or modify disk quotas on session start
- 6.32. pam_shells - check for valid login shell
- 6.33. pam_succeed_if - test account characteristics
- 6.34. pam_time - time controlled access
- 6.35. pam_timestamp - authenticate using cached successful authentication attempts
- 6.36. pam_tty_audit - enable/disable tty auditing
- 6.37. pam_umask - set the file mode creation mask
- 6.38. pam_unix - traditional
- password authentication
- 6.39. pam_userdb - authenticate against a db database
- 6.40. pam_warn - logs all PAM items
- 6.41. pam_wheel - only permit root access to members of group wheel
- 6.42. pam_xauth - forward xauth keys between users

7. See also

8. Author/acknowledgments

9. Copyright information for this document

Chapter 1. Introduction

Linux-PAM (Pluggable Authentication Modules for Linux) is a suite of shared libraries that enable the local system administrator to choose how applications authenticate users.

In other words, without (rewriting and) recompiling a PAM-aware application, it is possible to switch between the authentication mechanism(s) it uses. Indeed, one may entirely upgrade the local authentication system without touching the applications themselves.

Historically an application that has required a given user to be authenticated, has had to be compiled to use a specific authentication mechanism. For example, in the case of traditional UN*X systems, the identity of the user is verified by the user entering a correct password. This password, after being prefixed by a two character ``salt'', is encrypted (with `crypt(3)`). The user is then authenticated if this encrypted password is identical to the second field of the user's entry in the system password database (the `/etc/passwd` file). On such systems, most if not all forms of privileges are granted based on this single authentication scheme. Privilege comes in the form of a personal user-identifier (UID) and membership of various groups. Services and applications are available based on the personal and group identity of the user. Traditionally, group membership has been assigned based on entries in the `/etc/group` file.

It is the purpose of the Linux-PAM project to separate the development of privilege granting software from the development of secure and appropriate authentication schemes. This is accomplished by providing a library of functions that an application may use to request that a user be authenticated.

This PAM library is configured locally with a system file, `/etc/pam.conf` (or a series of configuration files located in `/etc/pam.d/`) to authenticate a user request via the locally available authentication modules. The modules themselves will usually be located in the directory `/lib/security` or `/lib64/security` and take the form of dynamically loadable object files (see `dlopen(3)`).

Chapter 2. Some comments on the text

Before proceeding to read the rest of this document, it should be noted that the text assumes that certain files are placed in certain directories. Where they have been specified, the conventions we adopt here for locating these files are those of the relevant RFC (RFC-86.0, see bibliography"). If you are using a distribution of Linux (or some other operating system) that supports PAM but chooses to distribute these files in a different way you should be careful when copying examples directly from the text.

As an example of the above, where it is explicit, the text assumes that PAM loadable object files (the modules) are to be located in the following directory: `/lib/security/` or `/lib64/security` depending on the architecture. This is generally the location that seems to be compatible with the Filesystem Hierarchy Standard (FHS). On Solaris, which has its own licensed version of PAM, and some other implementations of UN*X, these files can be found in `/usr/lib/security`. Please be careful to perform the necessary transcription when using the examples from the text.

Chapter 3. Overview

For the uninitiated, we begin by considering an example. We take an application that grants some service to users; login is one such program. Login does two things, it first establishes that the requesting user is whom they claim to be and second provides them with the requested service: in the case of login the service is a command shell (bash, tcsh, zsh, etc.) running with the identity of the user.

Traditionally, the former step is achieved by the login application prompting the user for a password and then verifying that it agrees with that located on the system; hence verifying that as far as the system is concerned the user is who they claim to be. This is the task that is delegated to Linux-PAM.

From the perspective of the application programmer (in this case the person that wrote the login application), Linux-PAM takes care of this authentication task -- verifying the identity of the user.

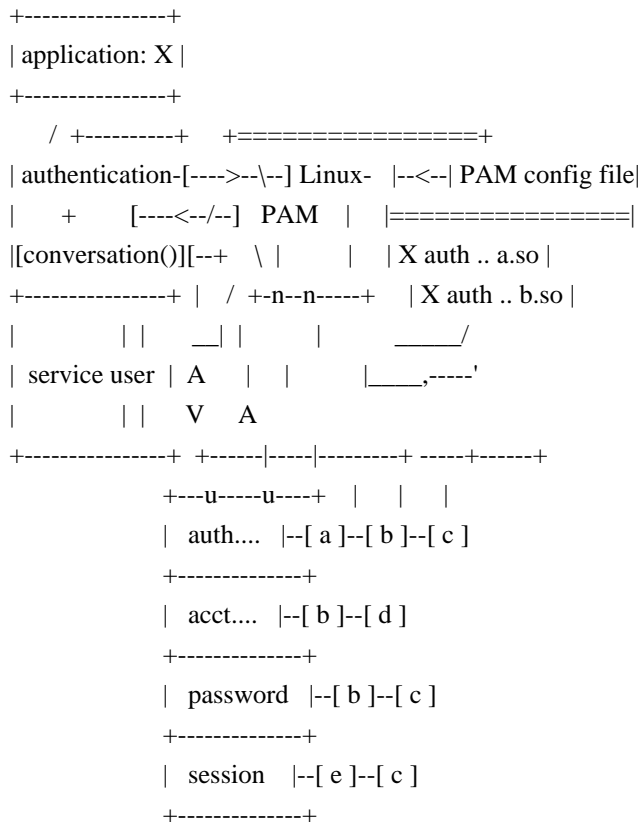
The flexibility of Linux-PAM is that you, the system administrator, have the freedom to stipulate which authentication scheme is to be used. You have the freedom to set the scheme for any/all PAM-aware applications on your Linux system. That is, you can authenticate from anything as naive as simple trust (pam_permit) to something as paranoid as a combination of a retinal scan, a voice print and a one-time password!

To illustrate the flexibility you face, consider the following situation: a system administrator (parent) wishes to improve the mathematical ability of her users (children). She can configure their favorite ``Shoot 'em up game" (PAM-aware of course) to authenticate them with a request for the product of a couple of random numbers less than 12. It is clear that if the game is any good they will soon learn their multiplication tables. As they mature, the authentication can be upgraded to include (long) division!

Linux-PAM deals with four separate types of (management) task. These are: authentication management; account management; session management; and password management. The association of the preferred management scheme with the

behavior of an application is made with entries in the relevant Linux-PAM configuration file. The management functions are performed by modules specified in the configuration file. The syntax for this file is discussed in the section below.

Here is a figure that describes the overall organization of Linux-PAM:



By way of explanation, the left of the figure represents the application; application X. Such an application interfaces with the Linux-PAM library and knows none of the specifics of its configured authentication method. The Linux-PAM library (in the center) consults the contents of the PAM configuration file and loads the modules that are appropriate for application-X. These modules fall into one of four management groups (lower-center) and are stacked in the order they appear in the configuration file. These modules, when called by Linux-PAM, perform the various authentication tasks for the application. Textual information, required from/or offered to the user, can be exchanged through the use of the application-supplied conversation function.

If a program is going to use PAM, then it has to have PAM functions explicitly coded into the program. If you have access to the source code you can add the appropriate PAM functions. If you do not have access to the source code, and the

binary does not have the PAM functions included, then it is not possible to use PAM.

Chapter 4. The Linux-PAM configuration file

When a PAM aware privilege granting application is started, it activates its attachment to the PAM-API. This activation performs a number of tasks, the most important being the reading of the configuration file(s): `/etc/pam.conf`. Alternatively and preferably, the configuration can be set by individual configuration files located in a `pam.d` directory. The presence of this directory will cause Linux-PAM to ignore `/etc/pam.conf`.

These files list the PAMs that will do the authentication tasks required by this service, and the appropriate behavior of the PAM-API in the event that individual PAMs fail.

4.1. Configuration file syntax

The syntax of the `/etc/pam.conf` configuration file is as follows. The file is made up of a list of rules, each rule is typically placed on a single line, but may be extended with an escaped end of line: ``\. Comments are preceded with `#' marks and extend to the next end of line.`

The format of each rule is a space separated collection of tokens, the first three being case-insensitive:

```
service type control module-path module-arguments
```

The syntax of files contained in the `/etc/pam.d/` directory, are identical except for the absence of any service field. In this case, the service is the name of the file in the `/etc/pam.d/` directory. This filename must be in lower case.

An important feature of PAM, is that a number of rules may be stacked to combine the services of a number of PAMs for a given authentication task.

The service is typically the familiar name of the corresponding application: `login` and `su` are good examples. The `service-name`, other, is reserved for giving default rules. Only lines that mention the current service (or in the absence of such, the other entries) will be associated with the given service-application.

The type is the management group that the rule corresponds to. It is used to specify which of the management groups the subsequent module is to be associated with. Valid entries are:

account

this module type performs non-authentication based account management. It is typically used to restrict/permit access to a service based on the time of day, currently available system resources (maximum number of users) or perhaps the location of the applicant user -- 'root' login only on the console.

auth

this module type provides two aspects of authenticating the user. Firstly, it establishes that the user is who they claim to be, by instructing the application to prompt the user for a password or other means of identification. Secondly, the module can grant group membership or other privileges through its credential granting properties.

password

this module type is required for updating the authentication token associated with the user. Typically, there is one module for each 'challenge/response' based authentication (auth) type.

session

this module type is associated with doing things that need to be done for the user before/after they can be given service. Such things include the logging of information concerning the opening/closing of some data exchange with a user, mounting directories, etc.

If the type value from the list above is prepended with a - character the PAM library will not log to the system log if it is not possible to load the module because it is missing in the system. This can be useful especially for modules which are not always installed on the system and are not required for correct authentication and authorization of the login session.

The third field, control, indicates the behavior of the PAM-API should the module fail to succeed in its authentication task. There are two types of syntax for this control field: the simple one has a single simple keyword; the more complicated one involves a square-bracketed selection of value=action pairs.

For the simple (historical) syntax valid control values are:

required

failure of such a PAM will ultimately lead to the PAM-API returning failure

but only after the remaining stacked modules (for this service and type) have been invoked.

requisite

like required, however, in the case that such a module returns a failure, control is directly returned to the application or to the superior PAM stack. The return value is that associated with the first required or requisite module to fail. Note, this flag can be used to protect against the possibility of a user getting the opportunity to enter a password over an unsafe medium. It is conceivable that such behavior might inform an attacker of valid accounts on a system. This possibility should be weighed against the not insignificant concerns of exposing a sensitive password in a hostile environment.

sufficient

if such a module succeeds and no prior required module has failed the PAM framework returns success to the application or to the superior PAM stack immediately without calling any further modules in the stack. A failure of a sufficient module is ignored and processing of the PAM module stack continues unaffected.

optional

the success or failure of this module is only important if it is the only module in the stack associated with this service+type.

include

include all lines of given type from the configuration file specified as an argument to this control.

substack

include all lines of given type from the configuration file specified as an argument to this control. This differs from include in that evaluation of the done and die actions in a substack does not cause skipping the rest of the complete module stack, but only of the substack. Jumps in a substack also can not make evaluation jump out of it, and the whole substack is counted as one module when the jump is done in a parent stack. The reset action will reset the state of a module stack to the state it was in as of beginning of the substack evaluation.

For the more complicated syntax valid control values have the following form:

[value1=action1 value2=action2 ...]

Where valueN corresponds to the return code from the function invoked in the module for which the line is defined. It is selected from one of these: success, open_err, symbol_err, service_err, system_err, buf_err, perm_denied, auth_err, cred_insufficient, authinfo_unavail, user_unknown, maxtries, new_authtok_reqd, acct_expired, session_err, cred_unavail, cred_expired, cred_err, no_module_data, conv_err, authtok_err, authtok_recover_err, authtok_lock_busy, authtok_disable_aging, try_again, ignore, abort, authtok_expired, module_unknown, bad_item, conv_again, incomplete, and default.

The last of these, default, implies 'all valueN's not mentioned explicitly.

Note, the full list of PAM errors is available in /usr/include/security/_pam_types.h. The actionN can take one of the following forms:

ignore

when used with a stack of modules, the module's return status will not contribute to the return code the application obtains.

bad

this action indicates that the return code should be thought of as indicative of the module failing. If this module is the first in the stack to fail, its status value will be used for that of the whole stack. This is the default action for all return codes.

die

equivalent to bad with the side effect of terminating the module stack and PAM immediately returning to the application.

ok

this tells PAM that the administrator thinks this return code should contribute directly to the return code of the full stack of modules. In other words, if the former state of the stack would lead to a return of PAM_SUCCESS, the module's return code will override this value. Note, if the former state of the stack holds some value that is indicative of a modules failure, this 'ok' value will not be used to override that value.

done

equivalent to ok with the side effect of terminating the module stack and PAM immediately returning to the application unless there was a non-ignored

module failure before.

N (an unsigned integer)

jump over the next N modules in the stack. Note that N equal to 0 is not allowed, it would be treated as ignore in such case. The side effect depends on the PAM function call: for pam_authenticate, pam_acct_mgmt, pam_chauthtok, and pam_open_session it is ignore; for pam_setcred and pam_close_session it is one of ignore, ok, or bad depending on the module's return value.

reset

clear all memory of the state of the module stack and start again with the next stacked module.

If a return code's action is not specifically defined via a valueN token, and the default value is not specified, that return code's action defaults to bad.

Each of the four keywords: required; requisite; sufficient; and optional, have an equivalent expression in terms of the [...] syntax. They are as follows:

required

```
[success=ok new_authtok_reqd=ok ignore=ignore default=bad]
```

requisite

```
[success=ok new_authtok_reqd=ok ignore=ignore default=die]
```

sufficient

```
[success=done new_authtok_reqd=done default=ignore]
```

optional

```
[success=ok new_authtok_reqd=ok default=ignore]
```

module-path is either the full filename of the PAM to be used by the application (it begins with a '/'), or a relative pathname from the default module location: /lib/security/ or /lib64/security/, depending on the architecture.

module-arguments are a space separated list of tokens that can be used to modify the specific behavior of the given PAM. Such arguments will be documented for each individual module. Note, if you wish to include spaces in an argument, you should surround that argument with square brackets.


```
squid auth required pam_mysql.so user=passwd_query passwd=mada \  
    db=eminence [query=select  
user_name from internet_service \  
    where user_name='%u' and password=PASSWORD('%p') and \  
    service='web_proxy']
```

When using this convention, you can include ``` characters inside the string, and if you wish to include a ``` character inside the string that will survive the argument parsing, you should use ````. In other words:

```
[..[.``]..] --> ..[.``]..
```

Any line in (one of) the configuration file(s), that is not formatted correctly, will generally tend (erring on the side of caution) to make the authentication process fail. A corresponding error is written to the system log files with a call to `syslog(3)`.

4.2. Directory based configuration

More flexible than the single configuration file is it to configure `libpam` via the contents of `pam.d` directories. In this case the directories are filled with files each of which has a filename equal to a service-name (in lower-case): it is the personal configuration file for the named service.

Vendor-supplied

PAM configuration files might be installed in the system directory `/usr/lib/pam.d/` or a configurable vendor specific directory instead of the machine configuration directory `/etc/pam.d/`. If no machine configuration file is found, the vendor-supplied file is used. All files in `/etc/pam.d/` override files with the same name in other directories.

The syntax of each file in `pam.d` is similar to that of the `/etc/pam.conf` file and is made up of lines of the following form:

```
type control module-path module-arguments
```

The only difference being that the service-name is not present. The service-name is of course the name of the given configuration file. For example, `/etc/pam.d/login` contains the configuration for the login service.

4.3. Example configuration file entries

In this section, we give some examples of entries that can be present in the Linux-PAM configuration file. As a first attempt at configuring your system you

could do worse than to implement these.

If a system is to be considered secure, it had better have a reasonably secure 'other entry. The following is a paranoid setting (which is not a bad place to start!):

```
#
# default; deny access
#
other auth required pam_deny.so
other account required pam_deny.so
other password required pam_deny.so
other session required pam_deny.so
```

Whilst fundamentally a secure default, this is not very sympathetic to a misconfigured system. For example, such a system is vulnerable to locking everyone out should the rest of the file become badly written.

The module `pam_deny` (documented in a later section) is not very sophisticated. For example, it logs no information when it is invoked so unless the users of a system contact the administrator when failing to execute a service application, the administrator may go for a long while in ignorance of the fact that his system is misconfigured.

The addition of the following line before those in the above example would provide a suitable warning to the administrator.

```
#
# default; wake up! This application is not configured
#
other auth required pam_warn.so
other password required pam_warn.so
```

Having two 'other auth' lines is an example of stacking.

On a system that uses the `/etc/pam.d/` configuration, the corresponding default setup would be achieved with the following file:

```
#
# default configuration: /etc/pam.d/other
#
auth required pam_warn.so
auth required pam_deny.so
account required pam_deny.so
```

```
password required    pam_warn.so
password required    pam_deny.so
session required     pam_deny.so
```

This is the only explicit example we give for an `/etc/pam.d/` file. In general, it should be clear how to transpose the remaining examples to this configuration scheme.

On a less sensitive computer, one on which the system administrator wishes to remain ignorant of much of the power of Linux-PAM, the following selection of lines (in `/etc/pam.d/other`) is likely to mimic the historically familiar Linux setup.

```
#
# default; standard UN*X access
#
auth    required    pam_unix.so
account required    pam_unix.so
password required    pam_unix.so
session required    pam_unix.so
```

In general this will provide a starting place for most applications.

Chapter 5. Security issues

5.1. If something goes wrong

Linux-PAM has the potential to seriously change the security of your system. You can choose to have no security or absolute security (no access permitted). In general, Linux-PAM errs towards the latter. Any number of configuration errors can disable access to your system partially, or completely.

The most dramatic problem that is likely to be encountered when configuring Linux-PAM is that of deleting the configuration file(s): `/etc/pam.d/*` and/or `/etc/pam.conf`. This will lock you out of your own system!

To recover, your best bet is to restore the system from a backup or boot the system into a rescue system and correct things from there.

5.2.

Avoid having a weak `other` configuration

It is not a good thing to have a weak default (`other`) entry. This service is the default configuration for all PAM aware applications and if it is weak, your system is likely to be vulnerable to attack.

Here is a sample "other" configuration file. The pam_deny module will deny access and the pam_warn module will send a syslog message to auth.notice:

```
#
# The PAM configuration file for the `other' service
#
auth    required pam_deny.so
auth    required pam_warn.so
account required pam_deny.so
account required pam_warn.so
password required pam_deny.so
password required pam_warn.so
session required pam_deny.so
session required pam_warn.so
```

Chapter 6. A reference guide for available modules

Here, we collect together the descriptions of the various modules coming with Linux-PAM.

6.1. pam_access - logdaemon style login access control

```
pam_access.so [ debug ] [ nodelgroup ] [ noaudit ] [ accessfile=file ] [
fieldsep=sep
] [ listsep=sep ]
```

6.1.1. DESCRIPTION

The pam_access PAM module is mainly for access management. It provides logdaemon style login access control based on login names, host or domain names, internet addresses or network numbers, or on terminal line names, X \$DISPLAY values, or PAM service names in case of non-networked logins.

By default rules for access management are taken from config file /etc/security /access.conf if you don't specify another file. Then individual *.conf files from the /etc/security/access.d/ directory are read. The files are parsed one after another in the order of the system locale. The effect of the individual files is the same as if all the files were concatenated together in the order of parsing. This means that once a pattern is matched in some file no further files are parsed. If a config file is explicitly specified with the accessfile option the files in the above directory are not parsed.

By default rules for access management are taken from config file /etc/security /access.conf or, if that one is not present, the file %vendordir%/security/ access.conf. These settings can be overruled by setting in a config file

explicitly specified with the `accessfile` option. Then individual `*.conf` files from the `/etc/security/access.d/` and `%vendordir%/security/access.d` directories are read. If `/etc/security/access.d/@filename@.conf` exists, then `%vendordir%/security/access.d/@filename@.conf` will not be used. All `access.d/*.conf` files are sorted by their `@filename@.conf` in lexicographic order regardless of which of the directories they reside in. The effect of the individual files is the same as if all the files were concatenated together in the order of parsing. This means that once a pattern is matched in some file no further files are parsed. If a config file is explicitly specified with the `accessfile` option the files in the above directories are not parsed.

If Linux PAM is compiled with audit support the module will report when it denies access based on origin (host, tty, etc.).

6.1.2. DESCRIPTION

The `/etc/security/access.conf` file specifies (user/group, host), (user/group, network/netmask), (user/group, tty), (user/group, X-\$DISPLAY-value), or (user/group, pam-service-name) combinations for which a login will be either accepted or refused.

When someone logs in, the file `access.conf` is scanned for the first entry that matches the (user/group, host) or (user/group, network/netmask) combination, or, in case of non-networked logins, the first entry that matches the (user/group, tty) combination, or in the case of non-networked logins without a tty, the first entry that matches the (user/group, X-\$DISPLAY-value) or (user/group, pam-service-name/) combination. The permissions field of that table entry determines whether the login will be accepted or refused.

Each line of the login access control table has three fields separated by a ":" character (colon):

```
permission:users/groups:origins
```

The first field, the permission field, can be either a "+" character (plus) for access granted or a "-" character (minus) for access denied.

The second field, the users/group field, should be a list of one or more login names, group names, or ALL (which always matches). To differentiate user entries from group entries, group entries should be written with brackets, e.g. (group).

The third field, the origins field, should be a list of one or more tty names (for non-networked logins), X \$DISPLAY values or PAM service names (for non-networked logins without a tty), host names, domain names (begin with "."), host addresses, internet network numbers (end with "."), internet network

addresses with network mask (where network mask can be a decimal number or an internet address also), ALL (which always matches) or LOCAL. The LOCAL keyword matches if and only if `pam_get_item(3)`, when called with an `item_type` of `PAM_RHOST`, returns NULL or an empty string (and therefore the `origins` field is compared against the return value of `pam_get_item(3)` called with an `item_type` of `PAM_TTY` or, absent that, `PAM_SERVICE`).

If supported by the system you can use `@netgroupname` in host or user patterns. The `@@netgroupname` syntax is supported in the user pattern only and it makes the local system hostname to be passed to the `netgroup` match call in addition to the user name. This might not work correctly on some `libc` implementations causing the match to always fail.

The EXCEPT operator makes it possible to write very compact rules.

If the `nodegroup` is not set, the group file is searched when a name does not match that of the logged-in user. Only groups are matched in which users are explicitly listed. However the PAM module does not look at the primary group id of a user.

The `"#"` character at start of line (no space at front) can be used to mark this line as a comment line.

6.1.3. OPTIONS

`accessfile=/path/to/access.conf`

Indicate an alternative `access.conf` style configuration file to override the default.

This can be useful when different services need different access lists.

`debug`

A lot of debug information is printed with `syslog(3)`.

`noaudit`

Do not report logins from disallowed hosts and ttys to the audit subsystem.

`fieldsep=separators`

This option modifies the field separator character that `pam_access` will recognize when parsing the access configuration file. For example: `fieldsep=|` will cause the default ``:'` character to be treated as part of a field value and ``|'` becomes the field separator. Doing this may be useful in conjunction with a system that wants to use `pam_access` with X based

applications, since the PAM_TTY item is likely to be of the form "hostname:0" which includes a `:` character in its value. But you should not need this.

listsep=separators

This option modifies the list separator character that pam_access will recognize when parsing the access configuration file. For example: listsep =, will cause the default ` ` (space) and `\\t` (tab) characters to be treated as part of a list element value and ``,` becomes the only list element separator. Doing this may be useful on a system with group information obtained from a Windows domain, where the default built-in groups "Domain Users", "Domain Admins" contain a space.

nodefgroup

User tokens which are not enclosed in parentheses will not be matched against the group database. The backwards compatible default is to try the group database match even for tokens not enclosed in parentheses.

6.1.4. MODULE TYPES PROVIDED

All module types (auth, account, password and session) are provided.

6.1.5. RETURN VALUES

PAM_SUCCESS

Access was granted.

PAM_PERM_DENIED

Access was not granted.

PAM_IGNORE

pam_setcred was called which does nothing.

PAM_ABORT

Not all relevant data or options could be gotten.

PAM_USER_UNKNOWN

The user is not known to the system.

6.1.6. FILES

/etc/security/access.conf

Default configuration file

%vendordir%/security/access.conf

Default configuration file if /etc/security/access.conf does not exist.

6.1.7. EXAMPLES

These are some example lines which might be specified in /etc/security/access.conf.

User root should be allowed to get access via cron, X11 terminal :0, tty1, ..., tty5, tty6.

```
+:root:crond :0 tty1 tty2 tty3 tty4 tty5 tty6
```

User root should be allowed to get access from hosts which own the IPv4 addresses. This does not mean that the connection have to be a IPv4 one, a IPv6 connection from a host with one of this IPv4 addresses does work, too.

```
+:root:192.168.200.1 192.168.200.4 192.168.200.9
```

```
+:root:127.0.0.1
```

User root should get access from network 192.168.201. where the term will be evaluated by string matching. But it might be better to use network/netmask instead. The same meaning of 192.168.201. is 192.168.201.0/24 or 192.168.201.0/255.255.255.0.

```
+:root:192.168.201.
```

User root should be able to have access from hosts
foo1.bar.org and
foo2.bar.org (uses string matching also).

```
+:root:foo1.bar.org foo2.bar.org
```

User root should be able to have access from domain foo.bar.org (uses string matching also).

```
+:root:.foo.bar.org
```

User root should be denied to get access from all other sources.

```
 -:root:ALL
```


User foo and members of netgroup admins should be allowed to get access from all sources. This will only work if netgroup service is available.

```
+:@admins foo:ALL
```

User john and foo should get access from IPv6 host address.

```
+:john foo:2001:db8:0:101::1
```

User john should get access from IPv6 net/mask.

```
+:john:2001:db8:0:101::/64
```

Members of group wheel should be allowed to get access from all sources.

```
+: (wheel):ALL
```

Disallow console logins to all but the shutdown, sync and all other accounts, which are a member of the wheel group.

```
 -:ALL EXCEPT (wheel) shutdown sync:LOCAL
```

All other users should be denied to get access from all sources.

```
 -:ALL:ALL
```

6.1.8. AUTHORS

The logdaemon style login access control scheme was designed and implemented by Wietse Venema. The pam_access PAM module was developed by Alexei Nogin <alexei@nogin.dnrtm.ru>. The IPv6 support and the network(address) / netmask feature was developed and provided by Mike Becher <mike.becher@lrz-muenchen.de>.

6.2. pam_debug - debug the PAM stack

```
pam_debug.so [ auth=value ] [ cred=value ] [ acct=value ] [ prechauthtok=value ] [ chauthtok=value ] [ auth=value ] [ open_session=value ] [ close_session=value ]
```

6.2.1. DESCRIPTION

The pam_debug PAM module is intended as a debugging aide for determining how the PAM stack is operating. This module returns what its module arguments tell it to return.

6.2.2. OPTIONS

auth=value

The pam_sm_authenticate(3) function will return value.

cred=value

The pam_sm_setcred(3) function will return value.

acct=value

The pam_sm_acct_mgmt(3) function will return value.

prechauthtok=value

The pam_sm_chauthtok(3) function will return value if the PAM_PRELIM_CHECK flag is set.

chauthtok=value

The pam_sm_chauthtok(3) function will return value if the PAM_PRELIM_CHECK flag is not set.

open_session=value

The pam_sm_open_session(3) function will return value.

close_session=value

The pam_sm_close_session(3) function will return value.

Where value can be one of: success, open_err, symbol_err, service_err, system_err, buf_err, perm_denied, auth_err, cred_insufficient, authinfo_unavail, user_unknown, maxtries, new_authtok_reqd, acct_expired, session_err, cred_unavail, cred_expired, cred_err, no_module_data, conv_err, authtok_err, authtok_recover_err, authtok_lock_busy, authtok_disable_aging, try_again, ignore, abort, authtok_expired, module_unknown, bad_item, conv_again, incomplete.

6.2.3. MODULE TYPES PROVIDED

All module types (auth, account, password and session) are provided.

6.2.4. RETURN VALUES

PAM_SUCCESS

Default return code if no other value was specified, else specified return value.

6.2.5. EXAMPLES

```
auth requisite
    pam_permit.so
auth [success=2 default=ok] pam_debug.so auth=perm_denied cred=success
auth [default=reset] pam_debug.so auth=success cred=perm_denied
auth [success=done default=die] pam_debug.so
auth optional pam_debug.so auth=perm_denied cred=perm_denied
auth sufficient pam_debug.so auth=success cred=success
```

6.2.6. AUTHOR

pam_debug was written by Andrew G. Morgan <morgan@kernel.org>.

6.3. pam_deny - locking-out PAM module

pam_deny.so

6.3.1. DESCRIPTION

This module can be used to deny access. It always indicates a failure to the application through the PAM framework. It might be suitable for using for default (the OTHER) entries.

6.3.2. OPTIONS

This module does not recognise any options.

6.3.3. MODULE TYPES PROVIDED

All module types (account, auth, password and session) are provided.

6.3.4. RETURN VALUES

PAM_AUTH_ERR

This is returned by the account and auth services.

PAM_CRED_ERR

This is returned by the setcred function.

PAM_AUTHTOK_ERR

This is returned by the password service.

PAM_SESSION_ERR

This is returned by the session service.

6.3.5. EXAMPLES

```
##%PAM-1.0
#
# If we don't have config entries for a service, the
# OTHER entries are used. To be secure, warn and deny
# access to everything.
other auth    required    pam_warn.so
other auth    required    pam_deny.so
other account required    pam_warn.so
other account required    pam_deny.so
other password required    pam_warn.so
other password required    pam_deny.so
other session required    pam_warn.so
other session required    pam_deny.so
```

6.3.6. AUTHOR

pam_deny was written by Andrew G. Morgan <morgan@kernel.org>

6.4. pam_echo - print text messages

```
pam_echo.so [ file=/path/message ]
```

6.4.1. DESCRIPTION

The pam_echo PAM module is for printing text messages to inform user about special things. Sequences starting with the % character are interpreted in the following way:

%H

The name of the remote
host (PAM_RHOST).

%h

The name of the local host.

%s

The service name (PAM_SERVICE).

%t

The name of the controlling terminal (PAM_TTY).

%U

The remote user name (PAM_RUSER).

%u

The local user name (PAM_USER).

All other sequences beginning with % expands to the characters following the % character.

6.4.2. OPTIONS

file=/path/message

The content of the file /path/message will be printed with the PAM conversion function as PAM_TEXT_INFO.

6.4.3. MODULE TYPES PROVIDED

All module types (auth, account, password and session) are provided.

6.4.4. RETURN VALUES

PAM_BUF_ERR

Memory buffer error.

PAM_SUCCESS

Message was successful printed.

PAM_IGNORE

PAM_SILENT flag was given or message file does not exist, no message printed.

6.4.5. EXAMPLES

For an example of the use of this module, we show how it may be used to print information about good passwords:

password optional pam_echo.so file=/usr/share/doc/good-password.txt
password required
pam_unix.so

6.4.6. AUTHOR

Thorsten Kukuk <kukuk@thkukuk.de>

6.5. pam_env - set/unset environment variables

```
pam_env.so [ debug ] [ conffile=conf-file ] [ envfile=env-file ] [ readenv=0|1  
] [ user_envfile=env-file ] [ user_readenv=0|1 ]
```

6.5.1. DESCRIPTION

The pam_env PAM module allows the (un)setting of environment variables. Supported is the use of previously set environment variables as well as PAM_ITEMS such as PAM_RHOST.

Rules for (un)setting of variables can be defined in an own config file. The path to this file can be specified with the conffile option. If this file does not exist, the default rules are taken from the config files /etc/security/pam_env.conf and /etc/security/pam_env.conf.d/*.conf. If the file /etc/security/pam_env.conf does not exist, the rules are taken from the files %vendordir%/security/pam_env.conf, %vendordir%/security/pam_env.conf.d/*.conf and /etc/security/pam_env.conf.d/*.conf in that order.

By default rules for (un)setting of variables are taken from the config file /etc/security/pam_env.conf. If this file does not exist %vendordir%/security/pam_env.conf is used. An alternate file can be specified with the conffile option, which overrules all other files.

By default rules for (un)setting of variables are taken from the config file /etc/security/pam_env.conf. An alternate file can be specified with the conffile option.

Environment variables can be defined in a file with simple KEY=VAL pairs on separate lines. The path to this file can be specified with the envfile option. If this file has not been defined, the settings are read from the files /etc/security/environment and /etc/security/environment.d/*. If the file /etc/environment does not exist, the settings are read from the files %vendordir%/environment, %vendordir%/environment.d/* and /etc/environment.d/* in that order. And last but not least, with the readenv option this mechanism can be completely disabled.

Second a file (/etc/environment by default) with simple KEY=VAL pairs on separate lines will be read. If this file does not exist, %vendordir%/etc/environment is used. With the envfile option an alternate file can be specified, which overrides all other files. And with the readenv option this can be completely disabled.

Second a file (/etc/environment by default) with simple KEY=VAL pairs on separate lines will be read. With the envfile option an alternate file can be specified. And with the readenv option this can be completely disabled.

Third it will read a user configuration file (\$HOME/.pam_environment by default). The default file can be changed with the user_envfile option and it can be turned on and off with the user_readenv option.

Since setting of PAM environment variables can have side effects to other modules, this module should be the last one on the stack.

6.5.2. DESCRIPTION

The %vendordir%/security/pam_env.conf and /etc/security/pam_env.conf files specify the environment variables to be set, unset or modified by pam_env(8).

When someone logs in, these files are read and the environment variables are set according.

The /etc/security/pam_env.conf file specifies the environment variables to be set, unset or modified by pam_env(8). When someone logs in, this file is read and the environment variables are set according.

Each line starts with the variable name, there are then two possible options for each variable DEFAULT and OVERRIDE. DEFAULT allows an administrator to set the value of the variable to some default value, if none is supplied then the empty string is assumed. The OVERRIDE option tells pam_env that it should enter in its value (overriding the default value) if there is one to use. When OVERRIDE is not used, "" is assumed and no override will be done.

VARIABLE [DEFAULT=[value]] [OVERRIDE=[value]]

(Possibly non-existent) environment variables may be used in values using the \${string} syntax and (possibly non-existent) PAM_ITEMS as well as HOME and SHELL may be used in values using

the @{string} syntax. Both the \$ and @ characters can be backslash escaped to be used as literal values values can be delimited with "", escaped " not supported. Note that many environment variables that you would like to use may not be set by the time the module is called. For example, \${HOME} is used below several times, but many PAM applications don't make it available by the time you need it. The special variables @{HOME} and @{SHELL}

are expanded to the values for the user from his passwd entry.

The "#" character at start of line (no space at front) can be used to mark this line as a comment line.

The %vendordir%/environment and /etc/environment files specify the environment variables to be set. These files must consist of simple NAME=VALUE pairs on separate lines. The pam_env(8) module will read these files after the pam_env.conf file.

The /etc/environment file specifies the environment variables to be set. The file must consist of simple NAME=VALUE pairs on separate lines.

The pam_env(8) module will read the file after the pam_env.conf file.

6.5.3. OPTIONS

`conffile=/path/to/pam_env.conf`

Indicate an alternative pam_env.conf style configuration file to override the default. This can be useful when different services need different environments.

`debug`

A lot of debug information is printed with syslog(3).

`envfile=/path/to/environment`

Indicate an alternative environment file to override the default. The syntax are simple KEY=VAL pairs on separate lines. The export instruction can be specified for bash compatibility, but will be ignored. This can be useful when different services need different environments.

`readenv=0|1`

Turns on or off the reading of the file specified by envfile (0 is off, 1 is on). By default this option is on.

`user_envfile=filename`

Indicate an alternative .pam_environment file to override the default. The syntax is the same as for /etc/security/pam_env.conf. The filename is relative to the user home directory. This can be useful when different services need different environments.

`user_readenv=0|1`

Turns on or off the reading of the user specific environment file. 0 is off, 1 is on. By default this option is off as user supplied environment variables in the PAM environment could affect behavior of subsequent modules in the stack without the consent of the system administrator.

Due to problematic security this functionality is deprecated since the 1.5.0 version and will be removed completely at some point in the future.

6.5.4. MODULE TYPES PROVIDED

The auth and session module types are provided.

6.5.5. RETURN VALUES

PAM_ABORT

Not all relevant data or options could be gotten.

PAM_BUF_ERR

Memory buffer error.

PAM_IGNORE

No pam_env.conf and environment file was found.

PAM_SUCCESS

Environment variables were set.

6.5.6. FILES

%vendordir%/security/pam_env.conf, /etc/security/pam_env.conf

Default configuration
file

%vendordir%/environment, /etc/environment

Default environment file

\$HOME/.pam_environment

User specific environment file

6.5.7. EXAMPLES

These are some example lines which might be specified in /etc/security/pam_env.conf.

Set the REMOTEHOST variable for any hosts that are remote, default to "localhost" rather than not being set at all

```
REMOTEHOST    DEFAULT=localhost OVERRIDE=@{PAM_RHOST}
```

Set the DISPLAY variable if it seems reasonable

```
DISPLAY       DEFAULT=${REMOTEHOST}:0.0 OVERRIDE=${DISPLAY}
```

Now some simple variables

```
PAGER         DEFAULT=less
MANPAGER      DEFAULT=less
LESS          DEFAULT="M q e h15 z23 b80"
NNTPSERVER    DEFAULT=localhost
PATH          DEFAULT=${HOME}/bin:/usr/local/bin:/bin\
:/usr/bin:/usr/local/bin/X11:/usr/bin/X11
XDG_DATA_HOME DEFAULT=@{HOME}/share/
```

Silly examples of escaped variables, just to show how they work.

```
DOLLAR        DEFAULT=\$
DOLLARDOLLAR
DEFAULT=      OVERRIDE=\${DOLLAR}
DOLLARPLUS    DEFAULT=\${REMOTEHOST}\${REMOTEHOST}
ATSIGN        DEFAULT=""    OVERRIDE=@
```

6.5.8. AUTHOR

pam_env was written by Dave Kinchlea <kinch@kinch.ark.com>.

6.6. pam_exec - call an external command

```
pam_exec.so [ debug ] [ expose_authtok ] [ seteuid ] [ quiet ] [ quiet_log ] [
stdout ] [ log=file ] [ type=type ] command [ ... ]
```

6.6.1. DESCRIPTION

pam_exec is a PAM module that can be used to run an external command.

The child's environment is set to the current PAM environment list, as returned

by `pam_getenvlist(3)` In addition, the following PAM items are exported as environment variables: `PAM_RHOST`, `PAM_RUSER`, `PAM_SERVICE`, `PAM_TTY`, `PAM_USER` and `PAM_TYPE`, which contains one of the module types: `account`, `auth`, `password`, `open_session` and `close_session`.

Commands called by `pam_exec` need to be aware of that the user can have control over the environment.

6.6.2. OPTIONS

`debug`

Print debug information.

`expose_authtok`

During authentication the calling command can read the password from `stdin` (3). Only first `PAM_MAX_RESP_SIZE` bytes of a password are provided to the command.

`log=file`

The output of the command is appended to `file`

`type=type`

Only run the command if the module type matches the given type.

`stdout`

Per default the output of the executed command is written to `/dev/null`. With this option, the `stdout` output of the executed command is redirected to the calling application. It's in the responsibility of this application what happens with the output. The `log` option is ignored.

`quiet`

Per default `pam_exec.so` will echo the exit status of the external command if it fails. Specifying this option will suppress the message.

`quiet_log`

Per default `pam_exec.so` will log the exit status of the external command if it fails. Specifying this option will suppress the log message.

`seteuid`

Per default `pam_exec.so` will execute the external command

with the real user ID of the calling process. Specifying this option means the command is run with the effective user ID.

6.6.3. MODULE TYPES PROVIDED

All module types (auth, account, password and session) are provided.

6.6.4. RETURN VALUES

PAM_SUCCESS

The external command was run successfully.

PAM_BUF_ERR

Memory buffer error.

PAM_CONV_ERR

The conversation method supplied by the application failed to obtain the username.

PAM_INCOMPLETE

The conversation method supplied by the application returned PAM_CONV_AGAIN.

PAM_SERVICE_ERR

No argument or a wrong number of arguments were given.

PAM_SYSTEM_ERR

A system error occurred or the command to execute failed.

PAM_IGNORE

pam_setcred was called, which does not execute the command. Or, the value given for the type= parameter did not match the module type.

6.6.5. EXAMPLES

Add the following line to /etc/pam.d/passwd to rebuild the NIS database after each local password change:

```
password optional pam_exec.so seteuid /usr/bin/make -C /var/yp
```

This will execute the command

```
make -C /var/yp
```

with effective user ID.

6.6.6. AUTHOR

pam_exec was written by Thorsten Kukuk <kukuk@thkukuk.de> and Josh Triplett <josh@joshtriplett.org>.

6.7. pam_faildelay - change the delay on failure per-application

```
pam_faildelay.so [ debug ] [ delay=microseconds ]
```

6.7.1. DESCRIPTION

pam_faildelay is a PAM module that can be used to set the delay on failure per-application.

If no delay is given, pam_faildelay will use the value of FAIL_DELAY from /etc/login.defs.

6.7.2. OPTIONS

debug

Turns on debugging messages sent to syslog.

delay=N

Set the delay on failure to N microseconds.

6.7.3. MODULE TYPES PROVIDED

Only the auth module type is provided.

6.7.4. RETURN VALUES

PAM_IGNORE

Delay was successful adjusted.

PAM_SYSTEM_ERR

The specified delay was not valid.

6.7.5. EXAMPLES

The following example will set the delay on failure to 10 seconds:

```
auth
optional pam_faildelay.so delay=10000000
```

6.7.6. AUTHOR

pam_faildelay was written by Darren Tucker <dtucker@zip.com.au>.

6.8. pam_faillock - temporarily locking access based on failed authentication attempts during an interval

```
auth ... pam_faillock.so { preauth|authfail|authsucc } [ conf=/path/to/
config-file ] [ dir=/path/to/tally-directory ] [ even_deny_root ] [ deny=n ] [
fail_interval=n ] [ unlock_time=n ] [ root_unlock_time=n ] [ admin_group=name ]
[ audit ] [ silent ] [ no_log_info ]
```

```
account ... pam_faillock.so [ dir=/path/to/tally-directory ] [ no_log_info ]
```

6.8.1. DESCRIPTION

This module maintains a list of failed authentication attempts per user during a specified interval and locks the account in case there were more than deny consecutive failed authentications.

Normally, failed attempts to authenticate root will not cause the root account to become blocked, to prevent denial-of-service: if your users aren't given shell accounts and root may only login via su or at the machine console (not telnet/rsh, etc), this is safe.

6.8.2. OPTIONS

```
{preauth|authfail|authsucc}
```

This argument must be set accordingly to the position of this module instance in the PAM stack.

The preauth argument must be used when the module is called before the modules which ask for the user credentials such as the password. The module just examines whether the user should be blocked from accessing the service in case there were anomalous number of failed consecutive authentication attempts recently. This call is optional if authsucc is used.

The authfail argument must be used when the module is called after the

modules which determine the authentication outcome, failed. Unless the user is already blocked due to previous authentication failures, the module will record the failure into the appropriate user tally file.

The `authsucc` argument must be used when the module is called after the modules which determine the authentication outcome, succeeded. Unless the user is already blocked due to previous authentication failures, the module will then clear the record of the failures in the respective user tally file. Otherwise it will return authentication error. If this call is not done, the `pam_faillock` will not distinguish between consecutive and non-consecutive failed authentication attempts. The `preauth` call must be used in such case. Due to complications in the way the PAM stack can be configured it is also possible to call `pam_faillock` as an account module. In such configuration the module must be also called in the `preauth` stage.

`conf=/path/to/config-file`

Use another configuration file instead of the default `/etc/security/faillock.conf`.

Use another configuration file instead of the default which is to use the file `/etc/security/faillock.conf` or, if that one is not present, the file `%vendordir%/security/faillock.conf`.

The options for configuring the module behavior are described in the `faillock.conf(5)` manual page. The options specified on the module command line override the values from the configuration file.

6.8.3. MODULE TYPES PROVIDED

The `auth` and `account` module types are provided.

6.8.4. RETURN VALUES

PAM_AUTH_ERR

An invalid option was given, the module was not able to retrieve the user name, no valid counter file was found, or too many failed logins.

PAM_BUF_ERR

Memory buffer error.

PAM_CONV_ERR

The conversation method supplied by the application failed to obtain the

username.

PAM_INCOMPLETE

The conversation method supplied by the application returned PAM_CONV_AGAIN.

PAM_SUCCESS

Everything was successful.

PAM_IGNORE

User not present in passwd database.

6.8.5. EXAMPLES

Here are two possible configuration examples for /etc/pam.d/login. They make pam_faillock to lock the account after 4 consecutive failed logins during the default interval of 15 minutes. Root account will be locked as well. The accounts will be automatically unlocked after 20 minutes.

In the first example the module is called only in the auth phase and the module does not print any information about the account being blocked by pam_faillock. The preauth call can be added to tell users that their logins are blocked by the module and also to abort the authentication without even asking for password in such case.

/etc/security/faillock.conf file example:

```
deny=4
unlock_time=1200
silent
```

/etc/pam.d/config file example:

```
auth    required    pam_securetty.so
auth    required    pam_env.so
auth    required    pam_nologin.so
# optionally call: auth requisite pam_faillock.so preauth
# to display the message about account being locked
auth    [success=1 default=bad] pam_unix.so
auth    [default=die] pam_faillock.so authfail
auth    sufficient  pam_faillock.so authsucc
auth    required    pam_deny.so
account required    pam_unix.so
```



```

password required pam_unix.so
shadow
session required pam_selinux.so close
session required pam_loginuid.so
session required pam_unix.so
session required pam_selinux.so open

```

In the second example the module is called both in the auth and account phases and the module informs the authenticating user when the account is locked if silent option is not specified in the faillock.conf.

```

auth required pam_securetty.so
auth required pam_env.so
auth required pam_nologin.so
auth required pam_faillock.so preauth
# optionally use requisite above if you do not want to prompt for the password
# on locked accounts
auth sufficient pam_unix.so
auth [default=die] pam_faillock.so authfail
auth required pam_deny.so
account required pam_faillock.so
# if you drop the above call to pam_faillock.so the lock will be done also
# on non-consecutive authentication failures
account required pam_unix.so
password required pam_unix.so
shadow
session required pam_selinux.so close
session required pam_loginuid.so
session required pam_unix.so
session required pam_selinux.so open

```

6.8.6. AUTHOR

pam_faillock was written by Tomas Mraz.

6.9. pam_filter - filter module

```
pam_filter.so [ debug ] [ new_term ] [ non_term ] run1|run2 filter [ ... ]
```

6.9.1. DESCRIPTION

This module is intended to be a platform for providing access to all of the input/output that passes between the user and the application. It is only suitable for tty-based and (stdin/stdout) applications.

To function this module requires filters to be installed on the system. The

single filter provided with the module simply transposes upper and lower case letters in the input and output streams. (This can be very annoying and is not kind to termcap based editors).

Each component of the module has the potential to invoke the desired filter. The filter is always `execv(2)` with the privilege of the calling application and not that of the user. For this reason it cannot usually be killed by the user without closing their session.

6.9.2. OPTIONS

`debug`

Print debug information.

`new_term`

The default action of the filter is to set the `PAM_TTY` item to indicate the terminal that the user is using to connect to the application. This argument indicates that the filter should set `PAM_TTY` to the filtered pseudo-terminal.

`non_term`

don't try to set the `PAM_TTY` item.

`runX`

In order that the module can invoke a filter it should know when to invoke it. This argument is required to tell the filter when to do this.

Permitted values for `X` are 1 and 2. These indicate the precise time that the filter is to be run. To understand this concept it will be useful to have read the `pam(3)` manual page. Basically, for each management group there are up to two ways of calling the module's functions. In the case of the authentication and session components there are actually two separate functions. For the case of authentication, these functions are `pam_authenticate(3)` and `pam_setcred(3)`, here `run1` means run the filter from the `pam_authenticate` function and `run2` means run the filter from `pam_setcred`. In the case of the session modules, `run1` implies that the filter is invoked at the `pam_open_session(3)` stage, and `run2` for `pam_close_session(3)`.

For the case of the account component. Either `run1` or `run2` may be used.

For the case of the password component, `run1` is used to indicate that the

filter is run on the first occasion of pam_chauthtok(3) (the PAM_PRELIM_CHECK phase) and run2 is used to indicate that the filter is run on the second occasion (the PAM_UPDATE_AUTHTOK phase).

filter

The full pathname of the filter to be run and any command line arguments that the filter might expect.

6.9.3. MODULE TYPES PROVIDED

All module types (auth, account, password and session) are provided.

6.9.4. RETURN VALUES

PAM_SUCCESS

The new filter was set successfully.

PAM_ABORT

Critical error, immediate abort.

6.9.5. EXAMPLES

Add the following line to /etc/pam.d/login to see how to configure login to transpose upper and lower case letters once the user has logged in:

```
session required pam_filter.so run1 /lib/security/pam_filter/upperLOWER
```

6.9.6. AUTHOR

pam_filter was written by Andrew G. Morgan <morgan@kernel.org>.

6.10. pam_ftp - module for anonymous access

```
pam_ftp.so [ debug ] [ ignore ] [ users=XXX,YYY, ...]
```

6.10.1. DESCRIPTION

pam_ftp is a PAM module which provides a pluggable anonymous ftp mode of access.

This module intercepts the user's name and password. If the name is ftp or anonymous, the user's password is broken up at the @ delimiter into a PAM_RUSER and a PAM_RHOST part; these pam-items being set accordingly. The username (PAM_USER) is set to ftp. In this case the module succeeds. Alternatively, the

module sets the PAM_AUTHTOK item with the entered password and fails.

This module is not safe and easily spoofable.

6.10.2. OPTIONS

debug

Print debug information.

ignore

Pay no attention to the email address of the user (if supplied).

ftp=XXX,YYY,...

Instead of ftp or anonymous, provide anonymous login to the comma separated list of users: XXX,YYY,.... Should the applicant enter one of these usernames the returned username is set to the first in the list: XXX.

6.10.3. MODULE TYPES PROVIDED

Only the auth module type is provided.

6.10.4. RETURN VALUES

PAM_SUCCESS

The authentication was successful.

PAM_USER_UNKNOWN

User not known.

6.10.5. EXAMPLES

Add the following line to /etc/pam.d/ftpd to handle ftp style anonymous login:

```
#
# ftpd; add ftp-specifics. These lines enable anonymous ftp over
# standard UN*X access (the listfile entry blocks access to
# users listed in /etc/ftpusers)
#
auth sufficient pam_ftp.so
auth required pam_unix.so use_first_pass
auth required pam_listfile.so
```

\
onerr=succeed item=user sense=deny file=/etc/ftpusers

6.10.6. AUTHOR

pam_ftp was written by Andrew G. Morgan <morgan@kernel.org>.

6.11. pam_group - module to modify group access

pam_group.so

6.11.1. DESCRIPTION

The pam_group PAM module does not authenticate the user, but instead it grants group memberships (in the credential setting phase of the authentication module) to the user. Such memberships are based on the service they are applying for.

By default rules for group memberships are taken from config file /etc/security/group.conf.

If /etc/security/group.conf does not exist, %vendordir%/security/group.conf is used.

This module's usefulness relies on the file-systems accessible to the user. The point being that once granted the membership of a group, the user may attempt to create a setgid binary with a restricted group ownership. Later, when the user is not given membership to this group, they can recover group membership with the precompiled binary.

The reason that the file-systems that the user has access to are so significant, is the fact that when a system is mounted nosuid the user is unable to create or execute such a binary file. For this module to provide any level of security, all file-systems that the user has write access to should be mounted nosuid.

The pam_group module functions in parallel with the /etc/group file. If the user is granted any groups based on the behavior of this module, they are granted in addition to those entries /etc/group (or equivalent).

6.11.2. DESCRIPTION

The pam_group PAM module does not authenticate the user, but instead it grants group memberships (in the credential setting phase of the authentication module) to the user. Such memberships are based on the service they are applying for.

For this module to function correctly there must be a correctly formatted /etc/

security/group.conf file present. White spaces are ignored and lines maybe extended with '\ (escaped newlines). Text following a '#' is ignored to the end of the line.

The syntax of the lines is as follows:

```
services;ttys;users;times;groups
```

The first field, the services field, is a logic list of PAM service names that the rule applies to.

The second field, the tty field, is a logic list of terminal names that this rule applies to.

The third field, the users field, is a logic list of users, or a UNIX group, or a netgroup of users to whom this rule applies. Group names are preceded by a '%' symbol, while netgroup names are preceded by a '@' symbol.

A logic list namely means individual tokens that are optionally prefixed with '!' (logical not) and separated with '&' (logical and) and '|' (logical or).

For these items the simple wildcard '*' may be used only once. With UNIX groups or netgroups no wildcards or logic operators are allowed.

The times field is used to indicate "when" these groups are to be given to the user. The format here is a logic list of day/time-range entries. The days are specified by

a sequence of two character entries, MoTuSa for example is Monday Tuesday and Saturday. Note that repeated days are unset MoMo = no day, and MoWk = all weekdays bar Monday. The two character combinations accepted are Mo Tu We Th Fr Sa Su Wk Wd Al, the last two being week-end days and all 7 days of the week respectively. As a final example, AlFr means all days except Friday.

Each day/time-range can be prefixed with a '!' to indicate "anything but". The time-range part is two 24-hour times HHMM, separated by a hyphen, indicating the start and finish time (if the finish time is smaller than the start time it is deemed to apply on the following day).

The groups field is a comma or space separated list of groups that the user inherits membership of. These groups are added if the previous fields are satisfied by the user's request.

For a rule to be active, ALL of service+ttys+users must be satisfied by the applying process.

6.11.3. OPTIONS

This module does not recognise any options.

6.11.4.

MODULE TYPES PROVIDED

Only the auth module type is provided.

6.11.5. RETURN VALUES

PAM_SUCCESS

group membership was granted.

PAM_ABORT

Not all relevant data could be gotten.

PAM_BUF_ERR

Memory buffer error.

PAM_CRED_ERR

Group membership was not granted.

PAM_IGNORE

pam_sm_authenticate was called which does nothing.

PAM_USER_UNKNOWN

The user is not known to the system.

6.11.6. FILES

/etc/security/group.conf

Default configuration file

6.11.7. EXAMPLES

These are some example lines which might be specified in /etc/security/group.conf.

Running 'xsh' on tty* (any ttyXXX device), the user 'us' is given access to the floppy (through membership of the floppy group)

```
xsh;tty*&!ttyp*;us;A10000-2400;floppy
```

Running 'xsh' on tty* (any ttyXXX device), the users 'sword', 'pike' and 'shield' are given access to games (through membership of the floppy group) after work hours.

```
xsh; tty* ;sword|pike|shield;!Wk0900-1800;games, sound
xsh; tty* ;*;A10900-1800;floppy
```

Any

member of the group 'admin' running 'xsh' on tty*, is granted access (at any time) to the group 'plugdev'

```
xsh; tty* ;%admin;A10000-2400;plugdev
```

6.11.8. AUTHORS

pam_group was written by Andrew G. Morgan <morgan@kernel.org>.

6.12. pam_issue - add issue file to user prompt

```
pam_issue.so [ noesc ] [ issue=issue-file-name ]
```

6.12.1. DESCRIPTION

pam_issue is a PAM module to prepend an issue file to the username prompt. It also by default parses escape codes in the issue file similar to some common getty's (using \x format).

Recognized escapes:

\d

current day

\l

name of this tty

\m

machine architecture (uname -m)

\n

machine's network node hostname (uname -n)

\o

domain name of this system

\r

release number of operating system (uname -r)

\t

current time

\s

operating system name (uname -s)

\u

number of users currently logged in

\U

same as \u except it is suffixed with "user" or "users" (eg. "1 user" or "10 users")

\v

operating system version and build date (uname -v)

6.12.2. OPTIONS

noesc

Turns off escape code parsing.

issue=issue-file-name

The file to output if not using the default.

6.12.3. MODULE TYPES PROVIDED

Only the auth module type is provided.

6.12.4. RETURN VALUES

PAM_BUF_ERR

Memory buffer error.

PAM_IGNORE

The prompt was already changed.

PAM_SERVICE_ERR

A service module error occurred.

PAM_SUCCESS

The new prompt was set successfully.

6.12.5. EXAMPLES

Add the following line to `/etc/pam.d/login` to set the user specific issue at login:

```
auth optional pam_issue.so issue=/etc/issue
```

6.12.6. AUTHOR

`pam_issue` was written by Ben Collins <bcollins@debian.org>.

6.13. pam_keyinit - display the keyinit file

```
pam_keyinit.so [ debug ] [ force ] [ revoke ]
```

6.13.1. DESCRIPTION

The `pam_keyinit` PAM module ensures that the invoking process has a session keyring other than the user default session keyring.

The module checks to see if the process's session keyring is the `user-session-keyring(7)`, and, if it is, creates a new `session-keyring(7)` with which to replace it. If a new session keyring is created, it will install a link to the `user-keyring(7)` in the session keyring so that keys common to the user will be automatically accessible through it. The session keyring of the invoking process will thenceforth be inherited by all its children unless they override it.

In order to allow other PAM modules to attach tokens to the keyring, this module provides both an `auth` (limited to `pam_setcred(3)`) and a `session` component. The session keyring is created in the module called. Moreover this module should be included as early as possible in a PAM configuration.

This module is intended primarily for use by login processes. Be aware that after the session keyring has been replaced, the old session keyring and the keys it contains will no longer be accessible.

This module should not, generally, be invoked by programs like su, since it is usually desirable for the key set to percolate through to the alternate context. The keys have their own permissions system to manage this.

The keyutils package is used to manipulate keys more directly. This can be obtained from:

Keyutils

6.13.2. OPTIONS

debug

Log debug information with syslog(3).

force

Causes the session keyring of the invoking process to be replaced unconditionally.

revoke

Causes the session keyring of the invoking process to be revoked when the invoking process exits if the session keyring was created for this process in the first place.

6.13.3. MODULE TYPES PROVIDED

Only the session module type is provided.

6.13.4. RETURN VALUES

PAM_SUCCESS

This module will usually return this value

PAM_AUTH_ERR

Authentication failure.

PAM_BUF_ERR

Memory buffer error.

PAM_IGNORE

The return value should be ignored by PAM dispatch.

PAM_SERVICE_ERR

Cannot determine the user name.

PAM_SESSION_ERR

This module will return this value if its arguments are invalid or if a system error such as ENOMEM occurs.

PAM_USER_UNKNOWN

User not known.

6.13.5. EXAMPLES

Add this line to your login entries to start each login session with its own session keyring:

```
session required pam_keyinit.so
```

This will prevent keys from one session leaking into another session for the same user.

6.13.6. AUTHOR

pam_keyinit was written by David Howells, <dhowells@redhat.com>.

6.14. pam_lastlog - display date of last login

```
pam_lastlog.so [ debug ] [ silent ] [ never ] [ nodate ] [ nohost ] [ noterm ]  
[ nowtmp ] [ nouupdate ] [ showfailed ] [ inactive=<days> ] [ unlimited ]
```

6.14.1. DESCRIPTION

pam_lastlog is a PAM module to display a line of information about the last login of the user. In addition, the module maintains the /var/log/lastlog file.

Some applications may perform this function themselves. In such cases, this module is not necessary.

The module checks LASTLOG_UID_MAX option in /etc/login.defs and does not update or display last login records for users with UID higher than its value. If the option is not present or its value is invalid, no user ID limit is applied.

If the module is called in the auth or account phase, the accounts that were not used recently enough will be disallowed to log in. The check is not performed for the root account so the root is never locked out. It is also not performed for users with UID higher than the LASTLOG_UID_MAX value.

6.14.2. OPTIONS

debug

Print debug information.

silent

Don't inform the user about any previous login, just update the /var/log/lastlog file. This option does not affect display of bad login attempts.

never

If the /var/log/lastlog file does not contain any old entries for the user, indicate that the user has never previously logged in with a welcome message.

nodate

Don't display the date of the last login.

noterm

Don't display the terminal name on which the last login was attempted.

nohost

Don't indicate from which host the last login was attempted.

nowtmp

Don't update the wtmp entry.

noupdate

Don't update any file.

showfailed

Display number of failed login attempts and the date of the last failed attempt from btmp. The date is not displayed when nodate is specified.

inactive=<days>

This option is specific for the auth or account phase. It specifies the number of days after the last login of the user when the user will be locked out by the module. The default value is 90.

unlimited

If the fsize limit is set, this option can be used to override it, preventing failures on systems with large UID values that lead lastlog to become a huge sparse file.

6.14.3. MODULE TYPES PROVIDED

The auth and account module type allows one to lock out users who did not login recently enough. The session module type is provided for displaying the information about the last login and/or updating the lastlog and wtmp files.

6.14.4.

RETURN VALUES

PAM_SUCCESS

Everything was successful.

PAM_SERVICE_ERR

Internal service module error.

PAM_USER_UNKNOWN

User not known.

PAM_AUTH_ERR

User locked out in the auth or account phase due to inactivity.

PAM_IGNORE

There was an error during reading the lastlog file in the auth or account phase and thus inactivity of the user cannot be determined.

6.14.5. EXAMPLES

Add the following line to `/etc/pam.d/login` to display the last login time of a user:

```
session required pam_lastlog.so nowtmp
```

To reject the user if he did not login during the previous 50 days the following line can be used:

```
auth required pam_lastlog.so inactive=50
```

6.14.6. AUTHOR

`pam_lastlog` was written by Andrew G. Morgan <morgan@kernel.org>.

Inactive account lock out added by Tomáš Mráz <tm@t8m.info>.

6.15. pam_limits - limit resources

```
pam_limits.so [ conf=/path/to/limits.conf ] [ debug ] [ set_all ] [ utmp_early ] [ noaudit ]
```

6.15.1. DESCRIPTION

The

`pam_limits` PAM module sets limits on the system resources that can be obtained in a user-session. Users of `uid=0` are affected by this limits, too.

By default limits are taken from the `/etc/security/limits.conf` config file. Then individual `*.conf` files from the `/etc/security/limits.d/` directory are read. The files are parsed one after another in the order of "C" locale. The effect of the individual files is the same as if all the files were concatenated together in the order of parsing. If a config file is explicitly specified with a module option then the files in the above directory are not parsed.

By default limits are taken from the `/etc/security/limits.conf` config file or, if that one is not present, the file `%vendordir%/security/limits.conf`. Then individual `*.conf` files from the `/etc/security/limits.d/` and `%vendordir%/security/limits.d` directories are read. If `/etc/security/limits.d/@filename@.conf` exists, then `%vendordir%/security/limits.d/@filename@.conf` will not be used.

All `limits.d/*.conf` files are sorted by their `@filename@.conf` in lexicographic order regardless of which of the directories they reside in. The effect of the individual files is the same as if all the files were concatenated together in the order of parsing. If a config file is explicitly

specified with the config option the files in the above directories are not parsed.

The module must not be called by a multithreaded application.

If Linux PAM is compiled with audit support the module will report when it denies access based on limit of maximum number of concurrent login sessions.

6.15.2. DESCRIPTION

The pam_limits.so module applies ulimit limits, nice priority and number of simultaneous login sessions limit to user login sessions. This description of the configuration file syntax applies to the /etc/security/limits.conf file and *.conf files in the /etc/security/limits.d directory.

The syntax of the lines is as follows:

<domain> <type> <item> <value>

The fields listed above should be filled as follows:

<domain>

a username

a groupname, with @group syntax. This should not be confused with netgroups.

the wildcard *, for default entry.

the wildcard %, for maxlogins limit only, can also be used with %group syntax. If the % wildcard is used alone it is identical to using * with maxsyslogins limit. With a group specified after % it limits the total number of logins of all users that are member of the group.

an uid range specified as <min_uid>:<max_uid>. If min_uid is omitted, the match is exact for the max_uid. If max_uid is omitted, all uids greater than or equal min_uid match.

a gid range specified as @<min_gid>:<max_gid>. If min_gid is omitted, the match is exact for the max_gid. If max_gid is omitted, all gids greater than or equal min_gid match. For the exact match all groups including the user's supplementary groups are examined. For the range matches only the user's primary group is examined.

a gid specified as %:<gid> applicable to maxlogins limit only. It limits the total number of logins of all users that are member of the

group with the specified gid.

<type>

hard

for enforcing hard resource limits. These limits are set by the superuser and enforced by the Kernel. The user cannot raise his requirement of system resources above such values.

soft

for enforcing soft resource limits. These limits are ones that the user can move up or down within the permitted range by any pre-existing hard limits. The values specified with this token can be thought of as default values, for normal system usage.

-

for enforcing both soft and hard resource limits together.

Note, if you specify a type of '-' but neglect to supply the item and value fields then the module will never enforce any limits on the specified user/group etc. .

<item>

core

limits the core file size (KB)

data

maximum data size (KB)

fsize

maximum filesize (KB)

memlock

maximum locked-in-memory address space (KB)

nofile

maximum number of open file descriptors

rss

maximum resident set size (KB) (Ignored in Linux 2.4.30 and higher)

stack

maximum stack size (KB)

cpu

maximum CPU time (minutes)

nproc

maximum number of processes

as

address space limit (KB)

maxlogins

maximum number of logins for this user (this limit does not apply to user with uid=0)

maxsyslogins

maximum number of all logins on system; user is not allowed to log-in if total number of all user logins is greater than specified number (this limit does not apply to user with uid=0)

nonewprivs

value of 0 or 1; if set to 1 disables acquiring new privileges

by

invoking `prctl(PR_SET_NO_NEW_PRIVS)`

priority

the priority to run user process with (negative values boost process priority)

locks

maximum locked files (Linux 2.4 and higher)

sigpending

maximum number of pending signals (Linux 2.6 and higher)

msgqueue

maximum memory used by POSIX message queues (bytes) (Linux 2.6 and higher)

nice

maximum nice priority allowed to raise to (Linux 2.6.12 and higher)
values: [-20,19]

rtprio

maximum realtime priority allowed for non-privileged processes (Linux 2.6.12 and higher)

All items support the values -1, unlimited or infinity indicating no limit, except for priority, nice, and nonewprivs. If nofile is to be set to one of these values, it will be set to the contents of /proc/sys/fs/nr_open instead (see setrlimit(3)).

If a hard limit or soft limit of a resource is set to a valid value, but outside of the supported range of the local system, the system may reject the new limit or unexpected behavior may occur. If the control value required is used, the module will reject the login if a limit could not be set.

In general, individual limits have priority over group limits, so if you impose no limits for admin group, but one of the members in this group have a limits line, the user will have its limits set according to this line.

Also, please note that all limit settings are set per login. They are not global, nor are they permanent; existing only for the duration of the session. One exception is the maxlogin option, this one is system wide. But there is a race, concurrent logins at the same time will not always be detect as such but only counted as one.

In the limits configuration file, the '#' character introduces a comment - after which the rest of the line is ignored.

The pam_limits module does report configuration problems found in its configuration file and errors via syslog(3).

6.15.3. OPTIONS

conf=/path/to/limits.conf

Indicate an alternative limits.conf style configuration file to override the default.

debug

Print debug information.

set_all

Set the limits for which no value is specified in the configuration file to the one from the process with the PID 1. Please note that if the init process is systemd these limits will not be the kernel default limits and this option should not be used.

utmp_early

Some broken applications actually allocate a utmp entry for the user before the user is admitted to the system. If some of the services you are configuring PAM for do this, you can selectively use this module argument to compensate for this behavior and at the same time maintain system-wide consistency with a single limits.conf file.

noaudit

Do not report exceeded maximum logins count to the audit subsystem.

6.15.4. MODULE TYPES PROVIDED

Only the session module type is provided.

6.15.5. RETURN VALUES

PAM_ABORT

Cannot get current limits.

PAM_IGNORE

No limits found for this user.

PAM_PERM_DENIED

New limits could not be set.

PAM_SERVICE_ERR

Cannot read config file.

PAM_SESSION_ERR

Error recovering account name.

PAM_SUCCESS

Limits were changed.

PAM_USER_UNKNOWN

The user is not known to the system.

6.15.6. FILES

/etc/security/limits.conf

Default configuration file

%vendordir%/security/limits.conf

Default configuration file if /etc/security/limits.conf does not exist.

6.15.7. EXAMPLES

These are some example lines which might be specified in /etc/security/limits.conf.

```
*      soft  core      0
*      hard  nofile    512
@student  hard  nproc     20
@faculty  soft  nproc     20
@faculty  hard  nproc     50
ftp       hard  nproc      0
@student  -    maxlogins  4
@student  -    nonewprivs 1
:123      hard  cpu
          5000
@500:     soft  cpu       10000
600:700   hard  locks     10
```

6.15.8. AUTHORS

pam_limits was initially written by Cristian Gafton <gafton@redhat.com>

6.16. pam_listfile - deny or allow services based on an arbitrary file

pam_listfile.so item=[tty|user|rhost|ruser|group|shell] sense=[allow|deny] file

`=/path/filename onerr=[succeed|fail] [apply=[user|@group]] [quiet]`

6.16.1. DESCRIPTION

`pam_listfile` is a PAM module which provides a way to deny or allow services based on an arbitrary file.

The module gets the item of the type specified -- `user` specifies the username, `PAM_USER`; `tty` specifies the name of the terminal over which the request has been made, `PAM_TTY`; `rhost` specifies the name of the remote host (if any) from which the request was made, `PAM_RHOST`; and `ruser` specifies the name of the remote user (if available) who made the request, `PAM_RUSER` -- and looks for an instance of that item in the `file=/filename`. `filename` contains one line per item

listed. If the item is found, then if `sense=allow`, `PAM_SUCCESS` is returned, causing the authorization request to succeed; else if `sense=deny`, `PAM_AUTH_ERR` is returned, causing the authorization request to fail.

If an error is encountered (for instance, if `filename` does not exist, or a poorly-constructed argument is encountered), then if `onerr=succeed`, `PAM_SUCCESS` is returned, otherwise if `onerr=fail`, `PAM_AUTH_ERR` or `PAM_SERVICE_ERR` (as appropriate) will be returned.

An additional argument, `apply=`, can be used to restrict the application of the above to a specific user (`apply=username`) or a given group (`apply=@groupname`). This added restriction is only meaningful when used with the `tty`, `rhost` and `shell` items.

Besides this last one, all arguments should be specified; do not count on any default behavior.

No credentials are awarded by this module.

6.16.2. OPTIONS

`item=[tty|user|rhost|ruser|group|shell]`

What is listed in the file and should be checked for.

`sense=[allow|deny]`

Action to take if found in file, if the item is NOT found in the file, then the opposite action is requested.

`file=/path/filename`

File containing one item per line. The file needs to be a plain file and not world writable.

onerr=[succeed|fail]

What to do if something weird happens like being unable to open the file.

apply=[user|@group]

Restrict the user class for which the restriction apply. Note that with item=[user|ruser|group] this does not make sense, but for item=[tty|rhost|shell] it have a meaning.

quiet

Do not treat service refusals or missing list files as errors that need to be logged.

6.16.3. MODULE TYPES PROVIDED

All module types (auth, account, password and session) are provided.

6.16.4. RETURN VALUES

PAM_AUTH_ERR

Authentication failure.

PAM_BUF_ERR

Memory buffer error.

PAM_IGNORE

The rule does not apply to the apply option.

PAM_SERVICE_ERR

Error in service module.

PAM_SUCCESS

Success.

6.16.5.

EXAMPLES

Classic 'ftusers' authentication can be implemented with this entry in /etc/pam.d/ftpd:

```
#
# deny ftp-access to users listed in the /etc/ftpusers file
#
auth required pam_listfile.so \
    onerr=succeed item=user sense=deny file=/etc/ftpusers
```

Note, users listed in /etc/ftpusers file are (counterintuitively) not allowed access to the ftp service.

To allow login access only for certain users, you can use a /etc/pam.d/login entry like this:

```
#
# permit login to users listed in /etc/loginusers
#
auth required pam_listfile.so \
    onerr=fail item=user sense=allow file=/etc/loginusers
```

For this example to work, all users who are allowed to use the login service should be listed in the file /etc/loginusers. Unless you are explicitly trying to lock out root, make sure that when you do this, you leave a way for root to log in, either by listing root in /etc/loginusers, or by listing a user who is able to su to the root account.

6.16.6. AUTHOR

pam_listfile
was written by Michael K. Johnson <johnsonm@redhat.com> and Elliot Lee <sopwith@cuc.edu>.

6.17. pam_localuser - require users to be listed in /etc/passwd

```
pam_localuser.so [ debug ] [ file=/path/passwd ]
```

6.17.1. DESCRIPTION

pam_localuser is a PAM module to help implementing site-wide login policies, where they typically include a subset of the network's users and a few accounts that are local to a particular workstation. Using pam_localuser and pam_wheel or pam_listfile is an effective way to restrict access to either local users and/or a subset of the network's users.

This could also be implemented using pam_listfile.so and a very short awk script invoked by cron, but it's common enough to have been separated out.

6.17.2. OPTIONS

debug

Print debug information.

file=/path/passwd

Use a file other than /etc/passwd.

6.17.3. MODULE TYPES PROVIDED

All module types (account, auth, password and session) are provided.

6.17.4. RETURN VALUES

PAM_SUCCESS

The
new localuser was set successfully.

PAM_BUF_ERR

Memory buffer error.

PAM_CONV_ERR

The conversation method supplied by the application failed to obtain the
username.

PAM_INCOMPLETE

The conversation method supplied by the application returned
PAM_CONV_AGAIN.

PAM_SERVICE_ERR

The user name is not valid or the passwd file is unavailable.

PAM_PERM_DENIED

The user is not listed in the passwd file.

6.17.5. EXAMPLES

Add the following lines to /etc/pam.d/su to allow only local users or group
wheel to use su.

account sufficient pam_localuser.so

account required pam_wheel.so

6.17.6. AUTHOR

pam_localuser was written by Nalin Dahyabhai <nalin@redhat.com>.

6.18. pam_loginuid - record user's login uid to the process attribute

pam_loginuid.so [require_auditd]

6.18.1. DESCRIPTION

The pam_loginuid module sets the loginuid process attribute for the process that was authenticated. This is necessary for applications to be correctly audited. This PAM module

should only be used for entry point applications like:

login, sshd, gdm, vsftpd, crond and atd. There are probably other entry point applications besides these. You should not use it for applications like sudo or su as that defeats the purpose by changing the loginuid to the account they just switched to.

6.18.2. OPTIONS

require_auditd

This option, when given, will cause this module to query the audit daemon status and deny logins if it is not running.

6.18.3. MODULE TYPES PROVIDED

Only the session module type is provided.

6.18.4. RETURN VALUES

PAM_SUCCESS

The loginuid value is set and auditd is running if check requested.

PAM_IGNORE

The /proc/self/loginuid file is not present on the system or the login process runs inside uid namespace and kernel does not support overwriting loginuid.

PAM_SESSION_ERR

Any other error prevented setting loginuid or auditd is not running.

6.18.5. EXAMPLES

```
##PAM-1.0
auth    required pam_unix.so
auth    required
        pam_nologin.so
account required pam_unix.so
password required pam_unix.so
session required pam_unix.so
session required pam_loginuid.so
```

6.18.6. AUTHOR

pam_loginuid was written by Steve Grubb <sgrubb@redhat.com>

6.19. pam_mail - inform about available mail

```
pam_mail.so [ close ] [ debug ] [ dir=maildir ] [ empty ] [ hash=count ] [
noenv ] [ nopen ] [ quiet ] [ standard ]
```

6.19.1. DESCRIPTION

The pam_mail PAM module provides the "you have new mail" service to the user. It can be plugged into any application that has credential or session hooks. It gives a single message indicating the newness of any mail it finds in the user's mail folder. This module also sets the PAM environment variable, MAIL, to the user's mail directory.

If the mail pool file (be it /var/mail/\$USER or a pathname given with the dir= parameter) is a directory then pam_mail assumes it is in the Maildir format.

6.19.2. OPTIONS

close

Indicate if the user has any mail also on logout.

debug

Print debug information.

dir=maildir

Look for the user's mail in an alternative location defined by maildir/<login>. The default location for mail is /var/mail/<login>. Note, if the

supplied maildir is prefixed by a '~', the directory is interpreted as indicating a file in the user's home directory.

empty

Also print message if user has no mail.

hash=count

Mail directory hash depth. For example, a hashcount of 2 would make the mail file be /var/spool/mail/u/s/user.

noenv

Do not set the MAIL environment variable.

nopen

Don't print any mail information on login. This flag is useful to get the MAIL environment variable set, but to not display any information about it.

quiet

Only report when there is new mail.

standard

Old style "You have..." format which doesn't show the mail spool being used. This also implies "empty".

6.19.3. MODULE TYPES PROVIDED

The session and auth (on establishment and deletion of credentials) module types are provided.

6.19.4. RETURN VALUES

PAM_BUF_ERR

Memory buffer error.

PAM_SERVICE_ERR

Badly formed arguments.

PAM_SUCCESS

Success.

PAM_USER_UNKNOWN

User not known.

6.19.5. EXAMPLES

Add the following line to `/etc/pam.d/login` to indicate that the user has new mail when they login to the system.

```
session optional pam_mail.so standard
```

6.19.6. AUTHOR

`pam_mail` was written by Andrew G. Morgan <morgan@kernel.org>.

6.20. pam_mkhome - create users home directory

```
pam_mkhome.so [ silent ] [ debug ] [ umask=mode ] [ skel=skeldir ]
```

6.20.1. DESCRIPTION

The `pam_mkhome` PAM module will create a users home directory if it does not exist when the session begins. This allows users to be present in central database (such as NIS, kerberos or LDAP) without using a distributed file system or pre-creating a large number of directories. The skeleton directory (usually `/etc/skel/`) is used to copy default files and also sets a `umask` for the creation.

The new users home directory will not be removed after logout of the user.

6.20.2. OPTIONS

`silent`

Don't print informative messages.

`debug`

Turns on debugging via `syslog(3)`.

`umask=mask`

The file mode creation mask is set to `mask`. The default value of `mask` is `0022`. If this option is not specified, then the permissions of created user

home directory is set to the value of HOME_MODE configuration item from /etc/login.defs. If there is no such configuration item then the value is computed from the value of UMASK in the same file. If there is no such configuration option either the default value of 0755 is used for the mode.

skel=/path/to/skel/directory

Indicate an alternative skel directory to override the default /etc/skel.

6.20.3. MODULE TYPES PROVIDED

Only the session module type is provided.

6.20.4. RETURN VALUES

PAM_BUF_ERR

Memory buffer error.

PAM_PERM_DENIED

Not enough permissions to create the new directory or read the skel directory.

PAM_USER_UNKNOWN

User not known to the underlying authentication module.

PAM_SUCCESS

Environment variables were set.

6.20.5. EXAMPLES

A sample /etc/pam.d/login file:

```
auth    requisite pam_securetty.so
auth    sufficient pam_ldap.so
auth    required pam_unix.so
auth    required pam_nologin.so
account sufficient pam_ldap.so
account required pam_unix.so
password required pam_unix.so
session required pam_mkhomedir.so skel=/etc/skel/ umask=0022
session required pam_unix.so
session optional pam_lastlog.so
session optional pam_mail.so standard
```

6.20.6. AUTHOR

pam_mkhome was written by Jason Gunthorpe <jgg@debian.org>.

6.21. pam_motd - display the motd file

pam_motd.so [motd=/path/filename] [motd_dir=/path/dirname.d]

6.21.1. DESCRIPTION

pam_motd is a PAM module that can be used to display arbitrary motd (message of the day) files after a successful login.

By default, pam_motd shows files in the following locations:

```
/etc/motd
/run/motd
/usr/lib/motd
/etc/motd.d/
/run/motd.d/
/usr/lib/motd.d/
```

Each message size is limited to 64KB.

If /etc/motd does not exist, then /run/motd is shown. If /run/motd does not exist, then /usr/lib/motd is shown.

Similar overriding behavior applies to the directories. Files in /etc/motd.d/ override files with the same name in /run/motd.d/ and /usr/lib/motd.d/. Files in /run/motd.d/ override files with the same name in /usr/lib/motd.d/.

Files in the directories listed above are displayed in lexicographic order by name. Moreover, the files are filtered by reading them with the credentials of the target user authenticating on the system.

To silence a message, a symbolic link with target /dev/null may be placed in /etc/motd.d with the same filename as the message to be silenced. Example: Creating a symbolic link as follows silences /usr/lib/motd.d/my_motd.

```
ln -s /dev/null /etc/motd.d/my_motd
```

The MOTD_SHOWN=pam environment variable is set after showing the motd files, even when all of them were silenced using symbolic links.

6.21.2. OPTIONS

motd=/path/filename

The /path/filename file is displayed as message of the day. Multiple paths to try can be specified as a colon-separated list. By default this option is set to /etc/motd:/run/motd:/usr/lib/motd.

motd_dir=/path/dirname.d

The /path/dirname.d directory is scanned and each file contained inside of it is displayed. Multiple directories to scan can be specified as a colon-separated list. By default this option is set to /etc/motd.d:/run/motd.d:/usr/lib/motd.d.

When no options are given, the default behavior applies for both options. Specifying either option (or both) will disable the default behavior for both options.

6.21.3. MODULE TYPES PROVIDED

Only the session module type is provided.

6.21.4. RETURN VALUES

PAM_ABORT

Not all relevant data or options could be obtained.

PAM_BUF_ERR

Memory
buffer error.

PAM_IGNORE

This is the default return value of this module.

6.21.5. EXAMPLES

The suggested usage for /etc/pam.d/login is:

```
session optional pam_motd.so
```

To use a motd file from a different location:

```
session optional pam_motd.so motd=/elsewhere/motd
```


To use a motd file from elsewhere, along with a corresponding .d directory:

```
session optional pam_motd.so motd=/elsewhere/motd motd_dir=/elsewhere/motd.d
```

6.21.6. AUTHOR

pam_motd was written by Ben Collins <bcollins@debian.org>.

The motd_dir= option was added by Allison Karlitskaya <allison.karlitskaya@redhat.com>.

6.22. pam_namespace - setup a private namespace

```
pam_namespace.so [ debug ] [ unmnt_remnt ] [ unmnt_only ] [ require_selinux ] [
gen_hash ] [ ignore_config_error ] [ ignore_instance_parent_mode ] [
unmount_on_close ] [ use_current_context ] [ use_default_context ] [
mount_private ]
```

6.22.1. DESCRIPTION

The pam_namespace PAM module sets up a private namespace for a session with polyinstantiated directories. A polyinstantiated directory provides a different instance of itself based on user name, or when using SELinux, user name, security context or both. If an executable script /etc/security/namespace.init exists, it is used to initialize the instance directory after it is set up and mounted on the polyinstantiated directory. The script receives the polyinstantiated directory path, the instance directory path, flag whether the instance directory was newly created (0 for no, 1 for yes), and the user name as its arguments.

If /etc/security/namespace.init does not exist, %vendordir%/security/namespace.init is the alternative to be used for it.

The pam_namespace module disassociates the session namespace from the parent namespace. Any mounts/unmounts performed in the parent namespace, such as mounting of devices, are not reflected in the session namespace. To propagate selected mount/unmount events from the parent namespace into the disassociated session namespace, an administrator may use the special shared-subtree feature.

For additional information on shared-subtree feature, please refer to the mount (8) man page and the shared-subtree description at <http://lwn.net/Articles/159077> and <http://lwn.net/Articles/159092>.

6.22.2. DESCRIPTION

The `pam_namespace.so` module allows setup of private namespaces with polyinstantiated directories. Directories can be polyinstantiated based on user name or, in the case of SELinux, user name, sensitivity level or complete security context. If an executable script `/etc/security/namespace.init` exists, it is used to initialize the namespace every time an instance directory is set up and mounted. The script receives the polyinstantiated directory path and the instance directory path as its arguments.

The `/etc/security/namespace.conf` file specifies which directories are polyinstantiated, how they are polyinstantiated, how instance directories would be named, and any users for whom polyinstantiation would not be performed.

The

`/etc/security/namespace.conf` file (or `%vendordir%/security/namespace.conf` if it does not exist) specifies which directories are polyinstantiated, how they are polyinstantiated, how instance directories would be named, and any users for whom polyinstantiation would not be performed. Then individual `*.conf` files from the `/etc/security/namespace.d/` and `%vendordir%/security/namespace.d` directories are taken too. If `/etc/security/namespace.d/@filename@.conf` exists, then `%vendordir%/security/namespace.d/@filename@.conf` will not be used. All `namespace.d/*.conf` files are sorted by their `@filename@.conf` in lexicographic order regardless of which of the directories they reside in.

When someone logs in, the file `namespace.conf` is scanned. Comments are marked by `#` characters. Each non comment line represents one polyinstantiated directory. The fields are separated by spaces but can be quoted by `"` characters also escape sequences `\b`, `\n`, and `\t` are recognized. The fields are as follows:

```
polydir
instance_prefix method list_of_uids
```

The first field, `polydir`, is the absolute pathname of the directory to polyinstantiate. The special string `$HOME` is replaced with the user's home directory, and `$USER` with the username. This field cannot be blank.

The second field, `instance_prefix` is the string prefix used to build the pathname for the instantiation of `<polydir>`. Depending on the polyinstantiation method it is then appended with "instance differentiation string" to generate the final instance directory path. This directory is created if it did not exist already, and is then bind mounted on the `<polydir>` to provide an instance of `<polydir>` based on the `<method>` column. The special string `$HOME` is replaced with the user's home directory, and `$USER` with the username. This field cannot be blank.

The third field, `method`, is the method used for polyinstantiation. It can take these values; "user" for polyinstantiation based on user name, "level" for polyinstantiation based on process

MLS level and user name, "context" for polyinstantiation based on process security context and user name, "tmpfs" for mounting tmpfs filesystem as an instance dir, and "tmpdir" for creating temporary directory as an instance dir which is removed when the user's session is closed. Methods "context" and "level" are only available with SELinux. This field cannot be blank.

The fourth field, list_of_uids, is a comma separated list of user names for whom the polyinstantiation is not performed. If left blank, polyinstantiation will be performed for all users. If the list is preceded with a single "~" character, polyinstantiation is performed only for users in the list.

The method field can contain also following optional flags separated by : characters.

create=mode,owner,group - create the polyinstantiated directory. The mode, owner and group parameters are optional. The default for mode is determined by umask, the default owner is the user whose session is opened, the default group is the primary group of the user.

iscript=path - path to the instance directory init script. The base directory for relative paths is /etc/security/namespace.d.

noinit - instance directory init script will not be executed.

shared - the instance directories for "context" and "level" methods will not contain the user name and will be shared among all users.

mntopts=value - value of this flag is passed to the mount call when the tmpfs mount is done. It allows for example the specification of the maximum size of the tmpfs instance that is created by the mount call. In addition to options specified in the tmpfs(5) manual the nosuid, noexec, and nodev flags can be used to respectively disable setuid bit effect, disable running executables, and disable devices to be interpreted on the mounted tmpfs filesystem.

The directory where polyinstantiated instances are to be created, must exist and must have, by default, the mode of 0000. The requirement that the instance parent be of mode 0000 can be overridden with the command line option ignore_instance_parent_mode

In case of context or level polyinstantiation the SELinux context which is used for polyinstantiation is the context used for executing a new process as obtained by getexeccon. This context must be set by the calling application or pam_selinux.so module. If this context is not set the polyinstantiation will be based just on user name.

The "instance differentiation string" is <user name> for "user" method and <user name>_<raw directory context> for "context" and "level" methods. If the whole string is too long the end of it is replaced with md5sum of itself. Also when command line option gen_hash is used the whole string is replaced with md5sum of itself.

6.22.3. OPTIONS

debug

A lot of debug information is logged using syslog

unmnt_remnt

For programs such as su and newrole, the login session has already setup a polyinstantiated namespace. For these programs, polyinstantiation is performed based on new user id or security context, however the command first needs to undo the polyinstantiation performed by login. This argument instructs the command to first undo previous polyinstantiation before proceeding with new polyinstantiation based on new id/context

unmnt_only

For trusted programs that want to undo any existing bind mounts and process instance directories on their own, this argument allows them to unmount currently mounted instance directories

require_selinux

If selinux is not enabled, return failure

gen_hash

Instead of using the security context string for the instance name, generate and use its md5 hash.

ignore_config_error

If a line in the configuration file corresponding to a polyinstantiated directory contains format error, skip that line process the next line. Without this option, pam will return an error to the calling program resulting in termination of the session.

ignore_instance_parent_mode

Instance

parent directories by default are expected to have the restrictive mode of 000. Using this option, an administrator can choose to ignore the mode of the instance parent. This option should be used with caution as it will reduce security and isolation goals of the polyinstantiation mechanism.

`unmount_on_close`

Explicitly unmount the polyinstantiated directories instead of relying on automatic namespace destruction after the last process in a namespace exits. This option should be used only in case it is ensured by other means that there cannot be any processes running in the private namespace left after the session close. It is also useful only in case there are multiple pam session calls in sequence from the same process.

`use_current_context`

Useful for services which do not change the SELinux context with `setexeccon` call. The module will use the current SELinux context of the calling process for the level and context polyinstantiation.

`use_default_context`

Useful for services which do not use `pam_selinux` for changing the SELinux context with `setexeccon` call. The module will use the default SELinux context of the user for the level and context polyinstantiation.

`mount_private`

This option can be used on systems where the `/` mount point or its submounts are made shared (for example with a `mount --make-rshared / command`). The module will mark the whole directory tree so any mount and unmount operations in the polyinstantiation namespace are private. Normally the `pam_namespace` will try to detect the shared `/` mount point and make the polyinstantiated directories private automatically. This option has to be used just when only a subtree is shared and `/` is not.

Note that mounts and unmounts done in the private namespace will not affect the parent namespace if this option is used or when the shared `/` mount point is autodetected.

6.22.4. MODULE TYPES PROVIDED

Only

the session module type is provided. The module must not be called from multithreaded processes.

6.22.5. RETURN VALUES

PAM_SUCCESS

Namespace setup was successful.

PAM_SERVICE_ERR

Unexpected system error occurred while setting up namespace.

PAM_SESSION_ERR

Unexpected namespace configuration error occurred.

6.22.6. FILES

/etc/security/namespace.conf

Main configuration file

%vendordir%/security/namespace.conf

Default configuration file if /etc/security/namespace.conf does not exist.

/etc/security/namespace.d

Directory for additional configuration files

%vendordir%/security/namespace.d

Directory for additional vendor specific configuration files.

/etc/security/namespace.init

Init script for instance directories

%vendordir%/security/namespace.init

Vendor init script for instance directories if /etc/security/namespace.init does not exist.

6.22.7. EXAMPLES

These are some example lines which might be specified in /etc/security/namespace.conf.

```
# The following three lines will polyinstantiate /tmp,  
# /var/tmp and user's home directories. /tmp and /var/tmp
```

```

# will be polyinstantiated based on the security level
# as well as user name, whereas home directory will be
# polyinstantiated based on the full security context and user name.
# Polyinstantiation will not be performed for user root
# and adm for directories /tmp and /var/tmp, whereas home
# directories will be polyinstantiated for all users.
#
# Note that instance directories do not have to reside inside
# the polyinstantiated directory. In the examples below,
# instances of /tmp will be created in /tmp-inst directory,
# where as instances of /var/tmp and users home directories
# will reside within the directories that are being
# polyinstantiated.
#
/tmp /tmp-inst/ level root,adm
/var/tmp /var/tmp/tmp-inst/ level root,adm
$HOME $HOME/$USER.inst/inst- context

```

For the <service>s you need polyinstantiation (login for example) put the following line in /etc/pam.d/<service> as the last line for session group:

```
session required pam_namespace.so [arguments]
```

This module also depends on pam_selinux.so setting the context.

6.22.8. AUTHORS

The namespace setup scheme was designed by Stephen Smalley, Janak Desai and Chad Sellers. The pam_namespace PAM module was developed by Janak Desai <janak@us.ibm.com>, Chad Sellers <csellers@tresys.com> and Steve Grubb <sgrubb@redhat.com>. Additional improvements by Xavier Toth <txtoth@gmail.com> and Tomas Mraz <tmraz@redhat.com>.

6.23. pam_nologin - prevent non-root users from login

```
pam_nologin.so [ file=/path/nologin ] [ successok ]
```

6.23.1. DESCRIPTION

pam_nologin is a PAM module that prevents users from logging into the system when /var/run/nologin or /etc/nologin exists. The contents of the file are displayed to the user. The pam_nologin module has no effect on the root user's ability to log in.

6.23.2. OPTIONS

file=/path/nologin

Use this file instead the default /var/run/nologin or /etc/nologin.

successok

Return PAM_SUCCESS if no file exists, the default is PAM_IGNORE.

6.23.3. MODULE TYPES PROVIDED

The auth and account module types are provided.

6.23.4. RETURN VALUES

PAM_AUTH_ERR

The user is not root and /etc/nologin exists, so the user is not permitted to log in.

PAM_BUF_ERR

Memory buffer error.

PAM_IGNORE

This is the default return value.

PAM_SUCCESS

Success: either the user is root or the nologin file does not exist.

PAM_USER_UNKNOWN

User not known to the underlying authentication module.

6.23.5. EXAMPLES

The suggested usage for /etc/pam.d/login is:

```
auth required pam_nologin.so
```

6.23.6. AUTHOR

pam_nologin was written by Michael K. Johnson <johnsonm@redhat.com>.

6.24. pam_permit - the promiscuous module

pam_permit.so

6.24.1. DESCRIPTION

pam_permit is a PAM module that always permit access. It does nothing else.

In the case of authentication, the user's name will be set to nobody if the application didn't set one. Many applications and PAM modules become confused if this name is unknown.

This module is very dangerous. It should be used with extreme caution.

6.24.2. OPTIONS

This module does not recognise any options.

6.24.3. MODULE TYPES PROVIDED

The auth, account, password and session module types are provided.

6.24.4. RETURN VALUES

PAM_SUCCESS

This module always returns this value.

6.24.5. EXAMPLES

Add this line to your other login entries to disable account management, but continue to permit users to log in.

```
account required pam_permit.so
```

6.24.6. AUTHOR

pam_permit was written by Andrew G. Morgan, <morgan@kernel.org>.

6.25. pam_pwhistory - grant access using .pwhistory file

```
pam_pwhistory.so [ debug ] [ use_authtok ] [ enforce_for_root ] [ remember=N ]  
[ retry=N ] [ authtok_type=STRING ] [ file=/path/filename ] [ conf=/path/to/  
config-file  
]
```

6.25.1. DESCRIPTION

This module saves the last passwords for each user in order to force password change history and keep the user from alternating between the same password too frequently.

This module does not work together with kerberos. In general, it does not make much sense to use this module in conjunction with NIS or LDAP, since the old passwords are stored on the local machine and are not available on another machine for password history checking.

6.25.2. OPTIONS

debug

Turns on debugging via syslog(3).

use_authtok

When password changing enforce the module to use the new password provided by a previously stacked password module (this is used in the example of the stacking of the pam_passwdqc module documented below).

enforce_for_root

If this option is set, the check is enforced for root, too.

remember=N

The last N passwords for each user are saved. The default is 10. Value of 0 makes the module to keep the existing contents of the opasswd file unchanged.

retry=N

Prompt user at most N times before returning with error. The default is 1.

authtok_type=STRING

See pam_get_authtok(3) for more details.

file=/path/filename

Store password history in file /path/filename rather than the default location. The default location is /etc/security/opasswd.

conf=/path/to/config-file

Use another configuration file instead of the default /etc/security/

pwhistory.conf.

The options for configuring the module behavior are described in the pwhistory.conf(5) manual page. The options specified on the module command line override the values from the configuration file.

6.25.3. MODULE TYPES PROVIDED

Only the password module type is provided.

6.25.4. RETURN VALUES

PAM_AUTHTOK_ERR

No new password was entered, the user aborted password change or new password couldn't be set.

PAM_IGNORE

Password history was disabled.

PAM_MAXTRIES

Password was rejected too often.

PAM_USER_UNKNOWN

User is not known to system.

6.25.5. FILES

/etc/security/opasswd

Default file with password history

/etc/security/pwhistory.conf

Config file for pam_pwhistory options

%vendordir%/security/pwhistory.conf

Config file for pam_pwhistory options. It will be used if /etc/security/pwhistory.conf does not exist.

6.25.6. EXAMPLES

An example password section would be:

```
##PAM-1.0
password required pam_pwhistory.so
password required pam_unix.so use_authok
```

In combination with pam_passwdqc:

```
##PAM-1.0
password required pam_passwdqc.so config=/etc/passwdqc.conf
password required pam_pwhistory.so use_authok
password required pam_unix.so use_authok
```

6.25.7. AUTHOR

pam_pwhistory was written by Thorsten Kukuk <kukuk@thkukuk.de>

6.26. pam_rhosts - grant access using .rhosts file

pam_rhosts.so

6.26.1. DESCRIPTION

This module performs the standard network authentication for services, as used by traditional implementations of rlogin and rsh etc.

The authentication mechanism of this module is based on the contents of two files; /etc/hosts.equiv (or and ~/.rhosts. Firstly, hosts listed in the former file are treated as equivalent to the localhost. Secondly, entries in the user's own copy of the latter file is used to map "remote-host remote-user" pairs to that user's account on the current host. Access is granted to the user if their host is present in /etc/hosts.equiv and their remote account is identical to their local one, or if their remote account has an entry in their personal configuration file.

The module authenticates a remote user (internally specified by the item PAM_RUSER connecting from the remote host (internally specified by the item PAM_RHOST). Accordingly, for applications to be compatible this authentication module they must set these items prior to calling pam_authenticate(). The module is not capable of independently probing the network connection for such information.

6.26.2. OPTIONS

debug

Print debug information.

silent

Don't print informative messages.

superuser=account

Handle account as root.

6.26.3. MODULE TYPES PROVIDED

Only the auth module type is provided.

6.26.4. RETURN VALUES

PAM_AUTH_ERR

The remote host, remote user name or the local user name couldn't be determined or access was denied by .rhosts file.

PAM_USER_UNKNOWN

User is not known to system.

6.26.5. EXAMPLES

To grant a remote user access by /etc/hosts.equiv or .rhosts for rsh add the following lines to /etc/pam.d/rsh:

```
##PAM-1.0
#
auth    required    pam_rhosts.so
auth    required    pam_nologin.so
auth    required    pam_env.so
auth    required    pam_unix.so
```

6.26.6. AUTHOR

pam_rhosts was written by Thorsten Kukuk <kukuk@thkukuk.de>

6.27. pam_rootok - gain only root access

pam_rootok.so [debug]

6.27.1. DESCRIPTION

pam_rootok is a PAM module that authenticates the user if their UID is 0.

Applications

that are created setuid-root generally retain the UID of the user but run with the authority of an enhanced effective-UID. It is the real UID that is checked.

6.27.2. OPTIONS

debug

Print debug information.

6.27.3. MODULE TYPES PROVIDED

The auth, account and password module types are provided.

6.27.4. RETURN VALUES

PAM_SUCCESS

The UID is 0.

PAM_AUTH_ERR

The UID is not 0.

6.27.5. EXAMPLES

In the case of the su(1) application the historical usage is to permit the superuser to adopt the identity of a lesser user without the use of a password. To obtain this behavior with PAM the following pair of lines are needed for the corresponding entry in the /etc/pam.d/su configuration file:

```
# su authentication. Root is granted access by default.  
auth sufficient pam_rootok.so  
auth required pam_unix.so
```

6.27.6. AUTHOR

pam_rootok was written by Andrew G. Morgan, <morgan@kernel.org>.

6.28. pam_securetty - limit root login to special devices

```
pam_securetty.so [ debug  
]
```

6.28.1. DESCRIPTION

pam_securetty is a PAM module that allows root logins only if the user is logging in on a "secure" tty, as defined by the listing in the securetty file. pam_securetty checks at first, if /etc/securetty exists. If not and it was built with vendordir support, it will use %vendordir%/securetty. pam_securetty also checks that the securetty files are plain files and not world writable. It will also allow root logins on the tty specified with console= switch on the kernel command line and on ttys from the /sys/class/tty/console/active.

This module has no effect on non-root users and requires that the application fills in the PAM_TTY item correctly.

For canonical usage, should be listed as a required authentication method before any sufficient authentication methods.

6.28.2. OPTIONS

debug

Print debug information.

noconsole

Do not automatically allow root logins on the kernel console device, as specified on the kernel command line or by the sys file, if it is not also specified in the securetty file.

6.28.3. MODULE TYPES PROVIDED

Only the auth module type is provided.

6.28.4. RETURN VALUES

PAM_SUCCESS

The user is allowed to continue authentication. Either the user is not root, or the root user is trying to log in on an acceptable device.

PAM_AUTH_ERR

Authentication is rejected. Either root is attempting to log in via an unacceptable device, or the securetty file is world writable or not a normal file.

PAM_BUF_ERR

Memory buffer error.

PAM_CONV_ERR

The conversation method supplied by the application failed to obtain the username.

PAM_INCOMPLETE

The conversation method supplied by the application returned PAM_CONV_AGAIN.

PAM_SERVICE_ERR

An error occurred while the module was determining the user's name or tty, or the module could not open the securetty file.

PAM_USER_UNKNOWN

The module could not find the user name in the /etc/passwd file to verify whether the user had a UID of 0. Therefore, the results of running this module are ignored.

6.28.5. EXAMPLES

```
auth required pam_securetty.so
auth required pam_unix.so
```

6.28.6. AUTHOR

pam_securetty was written by Elliot Lee <sopwith@cuc.edu>.

6.29. pam_selinux - set the default security context

```
pam_selinux.so [ open ] [ close ] [ restore ] [ nottys ] [ debug ] [ verbose ]
[ select_context ] [ env_params ] [ use_current_range ]
```

6.29.1. DESCRIPTION

pam_selinux is a PAM module that sets up the default SELinux security context for the next executed process.

When a new session is started, the open_session part of the module computes and sets up the execution security context used for the next execve(2) call, the file security context for the controlling terminal, and the security context used for creating a new kernel keyring.

When the session is ended, the `close_session` part of the module restores old security contexts that were in effect before the change made by the `open_session` part of the module.

Adding `pam_selinux` into the PAM stack might disrupt behavior of other PAM modules which execute applications. To avoid that, `pam_selinux.so` open should be placed after such modules in the PAM stack, and `pam_selinux.so` close should be placed before them. When such a placement is not feasible, `pam_selinux.so` restore could be used to temporarily restore original security contexts.

6.29.2. OPTIONS

`open`

Only execute the `open_session` part of the module.

`close`

Only execute the `close_session` part of the module.

`restore`

In `open_session` part of the module, temporarily restore the security contexts as they were before the previous call of the module. Another call of this module without the `restore` option will set up the new security contexts again.

`nottys`

Do not setup security context of the controlling terminal.

`debug`

Turn on debug messages via `syslog(3)`.

`verbose`

Attempt to inform the user when security context is set.

`select_context`

Attempt to ask the user for a custom security context role. If MLS is on, ask also for sensitivity level.

`env_params`

Attempt to obtain a custom security context role from PAM environment. If

MLS is on, obtain also sensitivity level. This option and the `select_context` option are mutually exclusive. The respective PAM environment variables are `SELINUX_ROLE_REQUESTED`, `SELINUX_LEVEL_REQUESTED`, and `SELINUX_USE_CURRENT_RANGE`. The first two variables are self describing and the last one if set to 1 makes the PAM module behave as if the `use_current_range` was specified on the command line of the module.

`use_current_range`

Use the sensitivity level of the current process for the user context instead of the default level. Also suppresses asking of the sensitivity level from the user or obtaining it from PAM environment.

6.29.3. MODULE TYPES PROVIDED

Only the session module type is provided.

6.29.4. RETURN VALUES

`PAM_SUCCESS`

The security context was set successfully.

`PAM_SESSION_ERR`

Unable to get or set a valid context.

`PAM_USER_UNKNOWN`

The user is not known to the system.

`PAM_BUF_ERR`

Memory allocation error.

6.29.5. EXAMPLES

```
auth    required pam_unix.so
session required pam_permit.so
session optional pam_selinux.so
```

6.29.6. AUTHOR

`pam_selinux` was written by Dan Walsh <dwalsh@redhat.com>.

6.30. `pam_sepermit` - allow/reject access based on SELinux mode

pam_sepermit.so [debug] [conf=/path/to/config/file]

6.30.1. DESCRIPTION

The pam_sepermit module allows or denies login depending on SELinux enforcement state.

When the user which is logging in matches an entry in the config file he is allowed access only when the SELinux is in enforcing mode. Otherwise he is denied access. For users not matching any entry in the config file the pam_sepermit module returns PAM_IGNORE return value.

The config file contains a list of user names one per line with optional arguments. If the name is prefixed with @ character it means that all users in the group name match. If it is prefixed with a % character the SELinux user is used to match against the name instead of the account name. Note that when SELinux is disabled the SELinux user assigned to the account cannot be determined. This means that such entries are never matched when SELinux is disabled and pam_sepermit will return PAM_IGNORE.

See sepermit.conf(5) for details.

If there is no explicitly specified configuration file and /etc/security/sepermit.conf does not exist, %vendordir%/security/sepermit.conf is used.

6.30.2. OPTIONS

debug

Turns on debugging via syslog(3).

conf=/path/to/config/file

Path to alternative config file overriding the default.

6.30.3. MODULE TYPES PROVIDED

The auth and account module types are provided.

6.30.4. RETURN VALUES

PAM_AUTH_ERR

SELinux is disabled or in the permissive mode and the user matches.

PAM_SUCCESS

SELinux is in the enforcing mode and the user matches.

PAM_IGNORE

The user does not match any entry in the config file.

PAM_USER_UNKNOWN

The module was unable to determine the user's name.

PAM_SERVICE_ERR

Error during reading or parsing the config file.

6.30.5. FILES

/etc/security/sepermit.conf

Default configuration file

6.30.6. EXAMPLES

```
auth [success=done ignore=ignore default=bad] pam_sepermit.so
auth required pam_unix.so
account required pam_unix.so
session required pam_permit.so
```

6.30.7. AUTHOR

pam_sepermit and this manual page were written by Tomas Mraz
<tmraz@redhat.com>.

6.31. pam_setquota - set or modify disk quotas on session start

```
pam_setquota.so [ fs=/home ] [ overwrite=0 ] [ debug=0 ] [ startuid=1000 ] [
enduid=0 ] [ bsoftlimit=19000 ] [ bhardlimit=20000 ] [ isoftlimit=3000 ] [
ihardlimit=4000 ]
```

6.31.1. DESCRIPTION

pam_setquota is a PAM module to set or modify a disk quota at session start

This makes quotas usable with central user databases, such as MySQL or LDAP.

6.31.2. OPTIONS

fs=/home

The device file or mountpoint the policy applies to. Defaults to the filesystem containing the users home directory.

overwrite=0

Overwrite an existing quota. Note: Enabling this will remove the ability for the admin to manually configure different quotas for users for a filesystem with edquota(8). (Defaults to 0)

debug=0

Enable debugging. A value of 1 outputs the old and new quota on a device. A value of 2 also prints out the matched and found filesystems should fs be unset. (Defaults to 0)

startuid=1000

Describe the start of the UID range the policy is applied to. (Defaults to UID_MIN from login.defs or the uidmin value defined at compile-time if UID_MIN is undefined.)

enduid=0

Describe the end of the UID range the policy is applied to. Setting enduid=0 results in an open-ended UID range (i.e. all uids greater than startuid are included). (Defaults to 0)

bsoftlimit=19000

Soft limit for disk quota blocks, as defined by quotactl(2). Note: bsoftlimit and bhardlimit must be set at the same time!

bhardlimit=20000

Hard limit for disk quota blocks, as defined by quotactl(2). Note: bsoftlimit and bhardlimit must be set at the same time!

isoftlimit=3000

Soft limit for inodes, as defined by quotactl(2). Note: isoftlimit and ihardlimit must be set at the same time!

ihardlimit=4000

Hard limit for inodes, as defined by quotactl(2). Note: isoftlimit and

ihardlimit must be set at the same time!

6.31.3. MODULE TYPES PROVIDED

Only the session module type is provided.

6.31.4. RETURN VALUES

PAM_SUCCESS

The quota was set successfully.

PAM_IGNORE

No action was taken because either the UID of the user was outside of the specified range, a quota already existed and `overwrite=1` was not configured or no limits were configured at all.

PAM_USER_UNKNOWN

The user was not found.

PAM_PERM_DENIED

`/proc/mounts` could not be opened.

The filesystem
or device specified was not found.

The limits for the user could not be retrieved. See syslog for more information.

The limits for the user could not be set. See syslog for more information.

Either `isoftlimit/ihardlimit` or `bsoftlimit/bhardlimit` were not set at the same time.

6.31.5. EXAMPLES

A single invocation of ``pam_setquota`` applies a specific policy to a UID range. Applying different policies to specific UID ranges is done by invoking `pam_setquota` more than once. The last matching entry defines the resulting quota.

```
session required pam_setquota.so bsoftlimit=1000 bhardlimit=2000 isoftlimit=1000 ihardlimit=2000  
startuid=1000 enduid=0 fs=/home
```

```
session required pam_setquota.so bsoftlimit=19000 bhardlimit=20000 isoftlimit=3000 ihardlimit=4000  
startuid=2001 enduid=3000 fs=/dev/sda1
```

session required pam_setquota.so bsoftlimit=19000 bhardlimit=20000 isoftlimit=3000 ihardlimit=4000
startuid=3001 enduid=4000 fs=/dev/sda1 overwrite=1

6.31.6.

AUTHOR

pam_setquota was originally written by Ruslan Savchenko <savrus@mexmat.net>.

Further modifications were made by Shane Tzen <shane@ict.usc.edu>, Sven Hartge <sven@svenhartge.de> and Keller Fuchs <kellerfuchs@hashbang.sh>.

6.32. pam_shells - check for valid login shell

pam_shells.so

6.32.1. DESCRIPTION

pam_shells is a PAM module that only allows access to the system if the user's shell is listed in /etc/shells.

If this file does not exist, entries are taken from files %vendordir%/shells, %vendordir%/shells.d/* and /etc/shells.d/* in that order.

It also checks if needed files (e.g. /etc/shells) are plain files and not world writable.

6.32.2. OPTIONS

This module does not recognise any options.

6.32.3. MODULE TYPES PROVIDED

The auth and account module types are provided.

6.32.4. RETURN VALUES

PAM_AUTH_ERR

Access to the system was denied.

PAM_SUCCESS

The user's login shell was listed as valid shell in /etc/shells.

PAM_SERVICE_ERR

The module was not

able to get the name of the user.

6.32.5. EXAMPLES

```
auth required pam_shells.so
```

6.32.6. AUTHOR

pam_shells was written by Erik Troan <ewt@redhat.com>.

6.33. pam_succeed_if - test account characteristics

```
pam_succeed_if.so [flag...] [condition...]
```

6.33.1. DESCRIPTION

pam_succeed_if.so is designed to succeed or fail authentication based on characteristics of the account belonging to the user being authenticated or values of other PAM items. One use is to select whether to load other modules based on this test.

The module should be given one or more conditions as module arguments, and authentication will succeed only if all of the conditions are met.

6.33.2. OPTIONS

The following flags are supported:

debug

Turns on debugging messages sent to syslog.

use_uid

Evaluate conditions using the account of the user whose UID the application is running under instead of the user being authenticated.

quiet

Don't log failure or success to the system log.

quiet_fail

Don't log failure to the system log.

quiet_success

Don't log success to the system log.

audit

Log unknown users to the system log.

Conditions are three words: a field, a test, and a value to test for.

Available fields are user, uid, gid, shell, home, ruser, rhost, tty and service

:

field < number

Field has a value numerically less than number.

field <= number

Field has a value numerically less than or equal to number.

field eq number

Field has a value numerically equal to number.

field >= number

Field has a value numerically greater than or equal to number.

field > number

Field has a value numerically greater than number.

field ne number

Field has a value numerically different from number.

field = string

Field exactly matches the given string.

field != string

Field does not match the given string.

field =~ glob

Field matches the given glob.

field !~ glob

Field does not match the given glob.

field in item:item:...

Field is contained in the list of items separated by colons.

field notin item:item:...

Field is not contained in the list of items separated by colons.

user ingroup group[:group:....]

User is in given group(s).

user notingroup group[:group:....]

User is not in given group(s).

user inetgr netgroup

(user,host) is in given netgroup.

user notinetgr group

(user,host) is not in given netgroup.

6.33.3. MODULE TYPES PROVIDED

All module types (account, auth, password and session) are provided.

6.33.4. RETURN VALUES

PAM_SUCCESS

The condition was true.

PAM_AUTH_ERR

The condition was false.

PAM_SERVICE_ERR

A service error occurred or the arguments can't be parsed correctly.

6.33.5. EXAMPLES

To emulate the behaviour of pam_wheel, except there is no fallback to group 0

being only approximated by checking also the root group membership:

```
auth required pam_succeed_if.so quiet user ingroup wheel:root
```

Given that the type matches, only

loads the othermodule rule if the UID is over

500. Adjust the number after default to skip several rules.

```
type [default=1 success=ignore] pam_succeed_if.so quiet uid > 500
```

type required othermodule.so arguments...

6.33.6. AUTHOR

Nalin Dahyabhai <nalin@redhat.com>

6.34. pam_time - time controlled access

```
pam_time.so [ conffile=conf-file ] [ debug ] [ noaudit ]
```

6.34.1. DESCRIPTION

The pam_time PAM module does not authenticate the user, but instead it restricts access to a system and or specific applications at various times of the day and on specific days or over various terminal lines. This module can be configured to deny access to (individual) users based on their name, the time of day, the day of week, the service they are applying for and their terminal from which they are making their request.

By default rules for time/port access are taken from config file /etc/security/time.conf. An alternative file can be specified with the conffile option.

If there is no explicitly specified

configuration file and /etc/security/

time.conf does not exist, %vendordir%/security/time.conf is used.

If Linux PAM is compiled with audit support the module will report when it denies access.

6.34.2. DESCRIPTION

The pam_time PAM module does not authenticate the user, but instead it restricts access to a system and or specific applications at various times of the day and on specific days or over various terminal lines. This module can be configured to deny access to (individual) users based on their name, the time of day, the day of week, the service they are applying for and their terminal from which they are making their request.

For this module to function correctly there must be a correctly formatted `/etc/security/time.conf` file present. White spaces are ignored and lines may be extended with `\` (escaped newlines). Text following a `#` is ignored to the end of the line.

The syntax of the lines is as follows:

```
services;ttys;users;times
```

In words, each rule occupies a line, terminated with a newline or the beginning of a comment; a `#`. It contains four fields separated with semicolons, `;`:

The first field, the `services` field, is a logic list of PAM service names that the rule applies to.

The second field, the `tty` field, is a logic list of terminal names that this rule applies to.

The third field, the `users` field, is a logic list of users or a netgroup of users to whom this rule applies.

A logic list namely means individual tokens that are optionally prefixed with `!` (logical not) and separated with `&` (logical and) and `|` (logical or).

For these items the simple wildcard `*` may be used only once. With netgroups no wildcards or logic operators are allowed.

The `times` field is used to indicate the times at which this rule applies. The format here is a logic list of day/time-range entries. The days are specified by a sequence of two character entries, `MoTuSa` for example is Monday Tuesday and Saturday. Note that repeated days are unset `MoMo` = no day, and `MoWk` = all weekdays bar Monday. The two character combinations accepted are `Mo Tu We Th Fr Sa Su Wk Wd Al`, the last two being week-end days and all 7 days of the week respectively. As a final example, `AlFr` means all days except Friday.

Each day/time-range can be prefixed with a `!` to indicate "anything but". The time-range part is two 24-hour times `HHMM`, separated by a hyphen, indicating the start and finish time (if the finish time is smaller than the start time it is deemed to apply on the following day).

For a rule to be active, ALL of `service+ttys+users` must be satisfied by the applying process.

Note, currently there is no daemon enforcing the end of a session. This needs to be remedied.

Poorly formatted rules are logged as errors using syslog(3).

6.34.3. OPTIONS

conffile=/path/to/time.conf

Indicate an alternative time.conf style configuration file to override the default.

debug

Some debug information is printed with syslog(3).

noaudit

Do not report logins at disallowed time to the audit subsystem.

6.34.4. MODULE TYPES PROVIDED

Only the account type is provided.

6.34.5. RETURN VALUES

PAM_SUCCESS

Access was granted.

PAM_ABORT

Not all relevant data could be gotten.

PAM_BUF_ERR

Memory buffer error.

PAM_PERM_DENIED

Access was not granted.

PAM_USER_UNKNOWN

The user is not known to the system.

6.34.6. FILES

/etc/security/time.conf

Default configuration file

6.34.7. EXAMPLES

These are some example lines which might be specified in `/etc/security/time.conf`.

All users except for root are denied access to console-login at all times:

```
login ; tty* & !tty* ; !root ; !A10000-2400
```

Games (configured to use PAM) are only to be accessed out of working hours. This rule does not apply to the user waster:

```
games ; * ; !waster ; Wd0000-2400 | Wk1800-0800
```

6.34.8. AUTHOR

`pam_time` was written by Andrew G. Morgan <morgan@kernel.org>.

6.35. `pam_timestamp` - authenticate using cached successful authentication attempts

```
pam_timestamp.so  
[ timestampdir=directory ] [ timestamp_timeout=number ] [  
verbose ] [ debug ]
```

6.35.1. DESCRIPTION

In a nutshell, `pam_timestamp` caches successful authentication attempts, and allows you to use a recent successful attempt as the basis for authentication. This is similar mechanism which is used in `sudo`.

When an application opens a session using `pam_timestamp`, a timestamp file is created in the `timestampdir` directory for the user. When an application attempts to authenticate the user, a `pam_timestamp` will treat a sufficiently recent timestamp file as grounds for succeeding.

The default encryption hash is taken from the `HMAC_CRYPTO_ALGO` variable from `/etc/login.defs`.

6.35.2. OPTIONS

```
timestampdir=directory
```

Specify an alternate directory where pam_timestamp creates timestamp files.

timestamp_timeout=number

How long should pam_timestamp treat timestamp as valid after their last modification date (in seconds). Default is 300 seconds.

verbose

Attempt to inform the user when access is granted.

debug

Turns on debugging messages sent to syslog(3).

6.35.3. MODULE TYPES PROVIDED

The auth and session module types are provided.

6.35.4. RETURN VALUES

PAM_AUTH_ERR

The module was not able to retrieve the user name or no valid timestamp file was found.

PAM_SUCCESS

Everything was successful.

PAM_SESSION_ERR

Timestamp file could not be created or updated.

6.35.5. NOTES

Users can get confused when they are not always asked for passwords when running a given program. Some users reflexively begin typing information before noticing that it is not being asked for.

6.35.6. EXAMPLES

```
auth sufficient pam_timestamp.so verbose
```

```
auth required pam_unix.so
```

```
session required pam_unix.so
```

```
session optional pam_timestamp.so
```

6.35.7. FILES

/var/run/pam_timestamp/...

timestamp files and directories

6.35.8. AUTHOR

pam_timestamp was written by Nalin Dahyabhai.

6.36. pam_tty_audit - enable/disable tty auditing

pam_tty_audit.so [disable=patterns] [enable=patterns]

6.36.1. DESCRIPTION

The pam_tty_audit PAM module is used to enable or disable TTY auditing. By default, the kernel does not audit input on any TTY.

6.36.2. OPTIONS

disable=patterns

For each user matching patterns, disable TTY auditing. This overrides any previous enable option matching the same user name on the command line. See NOTES for further description of patterns.

enable=patterns

For each user matching patterns, enable TTY auditing. This overrides any previous disable option matching the same user name on the command line. See NOTES for further description of patterns.

open_only

Set the TTY audit flag when opening the session, but do not restore it when closing the session. Using this option is necessary for some services that don't fork() to run the authenticated session, such as sudo.

log_passwd

Log keystrokes when ECHO mode is off but ICANON mode is active. This is the mode in which the tty is placed during password entry. By default, passwords are not logged. This option may not be available on older kernels (3.9?).

6.36.3. MODULE TYPES PROVIDED

Only the session type is supported.

6.36.4. RETURN VALUES

PAM_SESSION_ERR

Error reading or modifying the TTY audit flag. See the system log for more details.

PAM_SUCCESS

Success.

6.36.5. NOTES

When TTY auditing is enabled, it is inherited by all processes started by that user. In particular, daemons restarted by a user will still have TTY auditing enabled, and audit TTY input even by other users unless auditing for these users is explicitly disabled. Therefore, it is recommended to use `disable=*` as the first option for most daemons using PAM.

To view the data that was logged by the kernel to audit use the command `aureport --tty`.

The patterns are comma separated lists of glob patterns or ranges of uids. A range is specified as `min_uid:max_uid` where one of these values can be empty.

If `min_uid` is empty only user with the uid `max_uid` will be matched. If `max_uid` is empty users with the uid greater than or equal to `min_uid` will be matched.

Please note that passwords in some circumstances may be logged by TTY auditing even if the `log_passwd` is not used. For example, all input to an ssh session will be logged - even if there is a password being typed into some software running at the remote host because only the local TTY state affects the local TTY auditing.

6.36.6. EXAMPLES

Audit all administrative actions.

```
session required pam_tty_audit.so disable=* enable=root
```

6.36.7. AUTHOR

pam_tty_audit was written by Miloslav Trma <mitr@redhat.com>. The log_passwd option was added by Richard Guy Briggs <rgb@redhat.com>.

6.37. pam_umask - set the file mode creation mask

```
pam_umask.so [ debug ] [ silent ] [ usergroups ] [ nousergroups ] [ umask=mask ]
```

6.37.1. DESCRIPTION

pam_umask is a PAM module to set the file mode creation mask of the current environment.

The umask affects the default permissions assigned to newly created files.

The PAM module tries to get the umask value from the following places in the following order:

- umask= entry in the user's GECOS field
- umask= argument
- UMASK entry from /etc/login.defs
- UMASK= entry from /etc/default/login

The GECOS field is split on comma ',' characters. The module also in addition to the umask= entry recognizes pri= entry, which sets the nice priority value for the session, and ulimit= entry, which sets the maximum size of files the processes in the session can create.

6.37.2. OPTIONS

debug

Print debug information.

silent

Don't print informative messages.

usergroups

If the user is not root and the username is the same as primary group name, the umask group bits are set to be the same as owner bits (examples: 022 -> 002, 077 -> 007).

nousergroups

This is the direct opposite of the `usergroups` option described above, which can be useful in case `pam_umask` has been compiled with `usergroups` enabled by default and you want to disable it at runtime.

`umask=mask`

Sets the calling process's file mode creation mask (`umask`) to `mask & 0777`. The value is interpreted as Octal.

6.37.3. MODULE TYPES PROVIDED

Only the session type is provided.

6.37.4. RETURN VALUES

PAM_SUCCESS

The new `umask` was set successfully.

PAM_BUF_ERR

Memory buffer error.

PAM_CONV_ERR

The conversation method supplied by the application failed to obtain the username.

PAM_INCOMPLETE

The conversation method supplied by the application returned `PAM_CONV_AGAIN`.

PAM_SERVICE_ERR

No username was given.

PAM_USER_UNKNOWN

User not known.

6.37.5. EXAMPLES

Add the following line to `/etc/pam.d/login` to set the user specific `umask` at login:

session optional pam_umask.so umask=0022

6.37.6. AUTHOR

pam_umask was written by Thorsten Kukuk <kukuk@thkukuk.de>.

6.38. pam_unix - traditional password authentication

pam_unix.so

[...]

6.38.1. DESCRIPTION

This is the standard Unix authentication module. It uses standard calls from the system's libraries to retrieve and set account information as well as authentication. Usually this is obtained from the `/etc/passwd` and the `/etc/shadow` file as well if shadow is enabled.

The account component performs the task of establishing the status of the user's account and password based on the following shadow elements: `expire`, `last_change`, `max_change`, `min_change`, `warn_change`. In the case of the latter, it may offer advice to the user on changing their password or, through the `PAM_AUTHTOKEN_REQD` return, delay giving service to the user until they have established a new password. The entries listed above are documented in the `shadow(5)` manual page. Should the user's record not contain one or more of these entries, the corresponding shadow check is not performed.

The authentication component performs the task of checking the users credentials (password).

The default action of this module is to not permit the user access to a service if their official password is blank.

A helper binary, `unix_chkpwd(8)`, is provided to check the user's password when it is stored in a read protected database. This binary is very simple and will only check the password of the user invoking it. It is called transparently on behalf of the user by the authenticating component of this module. In this way it is possible for applications like `xlock(1)` to work without being `setuid-root`. The module, by default, will temporarily turn off `SIGCHLD` handling for the duration of execution of the helper binary. This is generally the right thing to do, as many applications are not prepared to handle this signal from a child they didn't know was `fork()`d. The `noreap` module argument can be used to suppress this temporary shielding and may be needed for use with certain applications.

The maximum length of a password supported by the `pam_unix` module via the helper binary

is PAM_MAX_RESP_SIZE - currently 512 bytes. The rest of the password provided by the conversation function to the module will be ignored.

The password component of this module performs the task of updating the user's password. The default encryption hash is taken from the ENCRYPT_METHOD variable from /etc/login.defs

The session component of this module logs when a user logs in or leaves the system.

Remaining arguments, supported by other functions of this module, are silently ignored. Other arguments are logged as errors through syslog(3).

6.38.2. OPTIONS

debug

Turns on debugging via syslog(3).

audit

A little more extreme than debug.

quiet

Turns off informational messages namely messages about session open and close via syslog(3).

nullok

The default action of this module is to not permit the user access to a service if their official password is blank. The nullok argument overrides this default.

nullresetok

Allow users to authenticate with blank password if password reset is enforced even if nullok is not set. If password reset is not required and nullok is not set the authentication with blank password will be denied.

try_first_pass

Before prompting the user for their password, the module first tries the previous stacked module's password in case that satisfies this module as well.

use_first_pass

The argument `use_first_pass` forces the module to use a previous stacked modules password and will never prompt the user - if no password is available or the password is not appropriate, the user will be denied access.

`nodelay`

This argument can be used to discourage the authentication component from requesting a delay should the authentication as a whole fail. The default action is for the module to request a delay-on-failure of the order of two second.

`use_authok`

When password changing enforce the module to set the new password to the one provided by a previously stacked password module (this is used in the example of the stacking of the `pam_passwdqc` module documented below).

`authok_type=type`

This argument can be used to modify the password prompt when changing passwords to include the type of the password. Empty by default.

`nis`

NIS RPC is used for setting new passwords.

`remember=n`

The last `n` passwords for each user are saved in `/etc/security/opasswd` in order to force password change history and keep the user from alternating between the same password too frequently. The MD5 password hash algorithm is used for storing the old passwords. Instead of this option the `pam_pwhistory` module should be used.

`shadow`

Try to maintain a shadow based system.

`md5`

When a user changes their password next, encrypt it with the MD5 algorithm.

`bigcrypt`

When a user changes their password next, encrypt it with the DEC C2

algorithm.

sha256

When a user changes their password next, encrypt it with the SHA256 algorithm. The SHA256 algorithm must be supported by the crypt(3) function.

sha512

When a user changes their password next, encrypt it with the SHA512 algorithm. The SHA512 algorithm must be supported by the crypt(3) function.

blowfish

When a user changes their password next, encrypt it with the blowfish algorithm. The blowfish algorithm must be supported by the crypt(3) function.

gost_ycrypt

When a user changes their password next, encrypt it with the gost-ycrypt algorithm. The gost-ycrypt algorithm must be supported by the crypt(3) function.

ycrypt

When a user changes their password next, encrypt it with the ycrypt algorithm. The ycrypt algorithm must be supported by the crypt(3) function.

rounds=n

Set the optional number of rounds of the SHA256, SHA512, blowfish, gost-ycrypt, and ycrypt password hashing algorithms to n.

broken_shadow

Ignore errors reading shadow information for users in the account management module.

minlen=n

Set a minimum password length of n characters. The max. for DES crypt based passwords are 8 characters.

no_pass_expiry

When set ignore password expiration as defined by the shadow entry of the user. The option has an effect only in case pam_unix was not used for the authentication or it returned authentication failure meaning that other authentication source or method succeeded. The example can be public key authentication in sshd. The module will return PAM_SUCCESS instead of eventual PAM_NEW_AUTHTOK_REQD or PAM_AUTHTOK_EXPIRED.

Invalid arguments are logged with syslog(3).

6.38.3. MODULE TYPES PROVIDED

All module types (account, auth, password and session) are provided.

6.38.4. RETURN VALUES

PAM_IGNORE

Ignore this module.

6.38.5. EXAMPLES

An example usage for /etc/pam.d/login would be:

```
# Authenticate the user
auth    required pam_unix.so
# Ensure users account and password are still
active
account required pam_unix.so
# Change the user's password, but at first check the strength
# with pam_passwdqc(8)
password required pam_passwdqc.so config=/etc/passwdqc.conf
password required pam_unix.so use_authok nullok yescrypt
session required pam_unix.so
```

6.38.6. AUTHOR

pam_unix was written by various people.

6.39. pam_userdb - authenticate against a db database

```
pam_userdb.so db=/path/database [ debug ] [ crypt=[crypt|none] ] [ icase ] [
dump ] [ try_first_pass ] [ use_first_pass ] [ unknown_ok ] [ key_only ]
```

6.39.1. DESCRIPTION

The pam_userdb module is used to verify a username/password pair against values

stored in a Berkeley DB database. The database is indexed by the username, and the data fields corresponding to the username keys are the passwords.

6.39.2. OPTIONS

`crypt=[crypt|none]`

Indicates whether encrypted or plaintext passwords are stored in the database. If it is `crypt`, passwords should be stored in the database in `crypt(3)` form. If `none` is selected, passwords should be stored in the database as plaintext.

`db=/path/database`

Use the `/path/database` database for performing lookup. There is no default; the module will return `PAM_IGNORE` if no database is provided. Note that the path to the database file should be specified without the `.db` suffix.

`debug`

Print debug information. Note that password hashes, both from `db` and computed, will be printed to `syslog`.

`dump`

Dump all the entries in the database to the log. Don't do this by default!

`icase`

Make the password verification to be case insensitive (ie when working with registration numbers and such). Only works with plaintext password storage.

`try_first_pass`

Use the authentication token previously obtained by another module that did the conversation with the application. If this token can not be obtained then the module will try to converse. This option can be used for stacking different modules that need to deal with the authentication tokens.

`use_first_pass`

Use the authentication token previously obtained by another module that did the conversation with the application. If this token can not be obtained then the module will fail. This option can be used for stacking different modules that need to deal with the authentication tokens.

unknown_ok

Do not return error when checking for a user that is not in the database.
This can be used to stack more than one pam_userdb module that will check a username/password pair in more than a database.

key_only

The username and password are concatenated together in the database hash as 'username-password' with a random value. if the concatenation of the username and password with a dash in the middle returns any result, the user is valid. this is useful in cases where the username may not be unique but the username and password pair are.

6.39.3. MODULE TYPES PROVIDED

The auth and account module types are provided.

6.39.4. RETURN VALUES

PAM_AUTH_ERR

Authentication failure.

PAM_AUTHTOK_RECOVERY_ERR

Authentication information cannot be recovered.

PAM_BUF_ERR

Memory buffer error.

PAM_CONV_ERR

Conversation failure.

PAM_SERVICE_ERR

Error in service module.

PAM_SUCCESS

Success.

PAM_USER_UNKNOWN

User not known to the underlying authentication module.

6.39.5. EXAMPLES

```
auth sufficient pam_userdb.so icase db=/etc/dbtest
```

6.39.6. AUTHOR

pam_userdb was written by Cristian Gafton >gafton@redhat.com<.

6.40. pam_warn - logs all PAM items

pam_warn.so

6.40.1. DESCRIPTION

pam_warn is a PAM module that logs the service, terminal, user, remote user and remote host to syslog(3). The items are not probed for, but instead obtained from the standard PAM items. The module always returns PAM_IGNORE, indicating that it does not want to affect the authentication process.

6.40.2. OPTIONS

This module does not recognise any options.

6.40.3. MODULE

TYPES PROVIDED

The auth, account, password and session module types are provided.

6.40.4. RETURN VALUES

PAM_IGNORE

This module always returns PAM_IGNORE.

6.40.5. EXAMPLES

```
##%PAM-1.0
#
# If we don't have config entries for a service, the
# OTHER entries are used. To be secure, warn and deny
# access to everything.
other auth    required    pam_warn.so
other auth    required    pam_deny.so
other account required    pam_warn.so
other account required    pam_deny.so
other password required    pam_warn.so
```

other password required pam_deny.so
other session required pam_warn.so
other session required pam_deny.so

6.40.6. AUTHOR

pam_warn was written by Andrew G. Morgan <morgan@kernel.org>.

6.41. pam_wheel - only permit root access to members of group wheel

pam_wheel.so [debug] [deny] [group=name] [root_only] [trust] [use_uid]

6.41.1. DESCRIPTION

The pam_wheel PAM module is used to enforce the so-called wheel group. By default

it permits access to the target user if the applicant user is a member of the wheel group. If no group with this name exist, the module is using the group with the group-ID 0.

6.41.2. OPTIONS

debug

Print debug information.

deny

Reverse the sense of the auth operation: if the user is trying to get UID 0 access and is a member of the wheel group (or the group of the group option), deny access. Conversely, if the user is not in the group, return PAM_IGNORE (unless trust was also specified, in which case we return PAM_SUCCESS).

group=name

Instead of checking the wheel or GID 0 groups, use the name group to perform the authentication.

root_only

The check for wheel membership is done only when the target user UID is 0.

trust

The pam_wheel module will return PAM_SUCCESS instead of PAM_IGNORE if the

user is a member of the wheel group (thus with a little play stacking the modules the wheel members may be able to su to root without being prompted for a passwd).

use_uid

The check will be done against the real uid of the calling process, instead of trying to obtain the user from the login session associated with the terminal in use.

6.41.3. MODULE TYPES PROVIDED

The auth and account module types are provided.

6.41.4. RETURN VALUES

PAM_AUTH_ERR

Authentication failure.

PAM_BUF_ERR

Memory buffer error.

PAM_IGNORE

The return value should be ignored by PAM dispatch.

PAM_PERM_DENIED

Permission denied.

PAM_SERVICE_ERR

Cannot determine the user name.

PAM_SUCCESS

Success.

PAM_USER_UNKNOWN

User not known.

6.41.5. EXAMPLES

The root account gains access by default (rootok), only wheel members can

become root (wheel) but Unix authenticate non-root applicants.

```
su  auth  sufficient  pam_rootok.so
su  auth  required   pam_wheel.so
su  auth  required   pam_unix.so
```

6.41.6. AUTHOR

pam_wheel was written by Cristian Gafton <gafton@redhat.com>.

6.42.

pam_xauth - forward xauth keys between users

```
pam_xauth.so [ debug ] [ xauthpath=/path/to/xauth ] [ systemuser=UID ] [
targetuser=UID ]
```

6.42.1. DESCRIPTION

The pam_xauth PAM module is designed to forward xauth keys (sometimes referred to as "cookies") between users.

Without pam_xauth, when xauth is enabled and a user uses the su(1) command to assume another user's privileges, that user is no longer able to access the original user's X display because the new user does not have the key needed to access the display. pam_xauth solves the problem by forwarding the key from the user running su (the source user) to the user whose identity the source user is assuming (the target user) when the session is created, and destroying the key when the session is torn down.

This means, for example, that when you run su(1) from an xterm session, you will be able to run X programs without explicitly dealing with the xauth(1) xauth command or ~/.Xauthority files.

pam_xauth will only forward
keys if xauth can list a key connected to the
\$DISPLAY environment variable.

Primitive access control is provided by ~/.xauth/export in the invoking user's home directory and ~/.xauth/import in the target user's home directory.

If a user has a ~/.xauth/import file, the user will only receive cookies from users listed in the file. If there is no ~/.xauth/import file, the user will accept cookies from any other user.

If a user has a .xauth/export file, the user will only forward cookies to users listed in the file. If there is no ~/.xauth/export file, and the invoking user is not root, the user will forward cookies to any other user. If there is no ~

/.xauth/export file, and the invoking user is root, the user will not forward cookies to other users.

Both the import and export files support wildcards (such as *). Both the import and export files can be empty, signifying that no users are allowed.

6.42.2. OPTIONS

debug

Print debug information.

xauthpath=/path/to/xauth

Specify the path the xauth program (it is expected in /usr/X11R6/bin/xauth, /usr/bin/xauth, or /usr/bin/X11/xauth by default).

systemuser=UID

Specify the highest UID which will be assumed to belong to a "system" user. pam_xauth will refuse to forward credentials to users with UID less than or equal to this number, except for root and the "targetuser", if specified.

targetuser=UID

Specify a single target UID which is exempt from the systemuser check.

6.42.3. MODULE TYPES PROVIDED

Only the session type is provided.

6.42.4. RETURN VALUES

PAM_BUF_ERR

Memory buffer error.

PAM_PERM_DENIED

Permission denied by import/export file.

PAM_SESSION_ERR

Cannot determine user name, UID or access users home directory.

PAM_SUCCESS

Success.

PAM_USER_UNKNOWN

User not known.

6.42.5. EXAMPLES

Add the following line to `/etc/pam.d/su` to forward `xauth` keys between users when calling `su`:

```
session optional pam_xauth.so
```

6.42.6. AUTHOR

`pam_xauth` was

written by Nalin Dahyabhai <nalin@redhat.com>, based on original version by Michael K. Johnson <johnsonm@redhat.com>.

Chapter 7. See also

- The Linux-PAM Application Writers' Guide.
- The Linux-PAM Module Writers' Guide.
- The V. Samar and R. Schemers (SunSoft), ``UNIFIED LOGIN WITH PLUGGABLE AUTHENTICATION MODULES'', Open Software Foundation Request For Comments 86.0, October 1995.

Chapter 8. Author/acknowledgments

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Chapter 9. Copyright information for this document

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Found in path(s):

* /opt/cola/permits/1822720343_1704297183.37862/0/linux-pam-1-5-3-docs-tar-xz/Linux-PAM-1.5.3/doc/sag/Linux-PAM_SAG.txt

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

The Linux-PAM Application Developers' Guide

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Abstract

This manual documents what an application developer needs to know about the Linux-PAM library. It describes how an application might use the Linux-PAM library to authenticate users. In addition it contains a description of the functions to be found in libpam_misc library, that can be used in general applications. Finally, it contains some comments on PAM related security issues for the application developer.

1. Introduction

1.1. Description

1.2. Synopsis

2. Overview

3. The public interface to Linux-PAM

3.1. What can be expected by the application

3.1.1. Initialization of PAM transaction

3.1.2. Termination of PAM transaction

3.1.3. Setting

PAM items

3.1.4. Getting PAM items

3.1.5. Strings describing PAM error codes

3.1.6. Request a delay on failure

3.1.7. Authenticating the user

3.1.8. Setting user credentials

3.1.9. Account validation management

3.1.10. Updating authentication tokens

3.1.11. Start PAM session management

3.1.12. terminating PAM session management

3.1.13. Set or change PAM environment variable

3.1.14. Get a PAM environment variable

- 3.1.15. Getting the PAM environment
- 3.2. What is expected of an application
 - 3.2.1. The conversation function
- 3.3. Programming notes
- 4. Security issues of Linux-PAM
 - 4.1. Care about standard library calls
 - 4.2. Choice of a service name
 - 4.3. The conversation function
 - 4.4. The identity of the user
 - 4.5. Sufficient resources
- 5. A library of miscellaneous helper functions
 - 5.1. Functions supplied
 - 5.1.1. Text based conversation function
 - 5.1.2. Transcribing an environment to that of PAM
 - 5.1.3. Liberating a locally saved environment
 - 5.1.4. BSD like PAM environment variable setting
- 6. Porting legacy applications
- 7. Glossary of PAM related terms
- 8. An example application
- 9. Files
- 10. See also
- 11. Author/acknowledgments
- 12. Copyright information for this document

Chapter 1. Introduction

1.1. Description

Linux-PAM (Pluggable Authentication Modules for Linux) is a library that enables the local system administrator to choose how individual applications authenticate users. For an overview of the Linux-PAM library see the Linux-PAM System Administrators' Guide.

It is the purpose of the Linux-PAM project to liberate the development of privilege granting software from the development of secure and appropriate authentication schemes. This is accomplished by providing a documented library of functions that an application may use for all forms of user authentication management. This library dynamically

loads locally configured authentication modules that actually perform the authentication tasks.

From the perspective of an application developer the information contained in the local configuration of the PAM library should not be important. Indeed it is intended that an application treat the functions documented here as a 'black box' that will deal with all aspects of user authentication. 'All aspects' includes user verification, account management, session initialization/termination and also the resetting of passwords (authentication tokens).

1.2. Synopsis

For general applications that wish to use the services provided by Linux-PAM the following is a summary of the relevant linking information:

```
#include <security/pam_appl.h>
```

```
cc -o application .... -lpam
```

In addition to libpam, there is a library of miscellaneous functions that make the job of writing PAM-aware applications easier (this library is not covered in the DCE-RFC for PAM and is specific to the Linux-PAM distribution):

```
#include  
<security/pam_appl.h>  
#include <security/pam_misc.h>
```

```
cc -o application .... -lpam -lpam_misc
```

Chapter 2. Overview

Most service-giving applications are restricted. In other words, their service is not available to all and every prospective client. Instead, the applying client must jump through a number of hoops to convince the serving application that they are authorized to obtain service.

The process of authenticating a client is what PAM is designed to manage. In addition to authentication, PAM provides account management, credential management, session management and authentication-token (password changing) management services. It is important to realize when writing a PAM based application that these services are provided in a manner that is transparent to the application. That is to say, when the application is written, no assumptions can be made about how the client will be authenticated.

The process of authentication is performed by the PAM library via a call to `pam_authenticate()`.

The return value of this function will indicate whether a named client (the user) has been authenticated. If the PAM library needs to prompt the user for any information, such as their name or a password then it will do so. If the PAM library is configured to authenticate the user using some silent protocol, it will do this too. (This latter case might be via some hardware interface for example.)

It is important to note that the application must leave all decisions about when to prompt the user at the discretion of the PAM library.

The PAM library, however, must work equally well for different styles of application. Some applications, like the familiar login and passwd are terminal based applications, exchanges of information with the client in these cases is as plain text messages. Graphically based applications, however, have a more sophisticated interface. They generally interact with the user via specially constructed dialogue boxes. Additionally, network based services require that text messages exchanged with the client are specially formatted for automated processing: one such example is ftpd which prefixes each exchanged message with a numeric identifier.

The presentation of simple requests to a client is thus something very dependent on the protocol that the serving application will use. In spite of the fact that PAM demands that it drives the whole authentication process, it is not possible to leave such protocol subtleties up to the PAM library. To overcome this potential problem, the application provides the PAM library with a conversation function. This function is called from within the PAM library and enables the PAM to directly interact with the client. The sorts of things that this conversation function must be able to do are prompt the user with text and/or obtain textual input from the user for processing by the PAM library. The details of this function are provided in a later section.

For example, the conversation function may be called by the PAM library with a request to prompt the user for a password. Its job is to reformat the prompt request into a form that the client will understand. In the case of ftpd, this might involve prefixing the string with the number 331 and sending the request over the network to a connected client. The conversation function will then obtain any reply and, after extracting the typed password, will return this string of text to the PAM library. Similar concerns need to be addressed in the case of an X-based graphical server.

There are a number of issues that need to be addressed when one is porting an existing application to become PAM compliant. A section below has been devoted to this: Porting legacy applications.

Besides authentication, PAM provides other forms of management. Session management is provided with calls to `pam_open_session()` and `pam_close_session`

() . What these functions actually do is up to the local administrator. But typically, they could be used to log entry and exit from the system or for mounting and unmounting the user's home directory. If an application provides continuous service for a period of time, it should probably call these functions, first open after the user is authenticated and then close when the service is terminated.

Account management is another area that an application developer should include with a call to `pam_acct_mgmt()`. This call will perform checks on the good health of the user's account (has it expired etc.). One of the things this function may check is whether the user's authentication token has expired - in such a case the application may choose to attempt to update it with a call to `pam_chauthtok()`, although some applications are not suited to this task (ftp for example) and in this case the application should deny access to the user.

PAM is also capable of setting and deleting the user's credentials with the call `pam_setcred()`. This function should always be called after the user is authenticated and before service is offered to the user. By convention, this should be the last call to the PAM library before the PAM session is opened. What exactly a credential is, is not well defined. However, some examples are given in the glossary below.

Chapter 3. The public interface to Linux-PAM

Firstly, the relevant include file for the Linux-PAM library is `<security/pam_appl.h>`. It contains the definitions for a number of functions. After listing these functions, we collect some guiding remarks for programmers.

3.1. What can be expected by the application

3.1.1. Initialization of PAM transaction

```
#include <security/pam_appl.h>

int pam_start( service_name,
              user,
              pam_conversation,
              pamh);

const char *service_name;
const char *user;
const struct pam_conv *pam_conversation;
pam_handle_t **pamh;

int pam_start_confdir( service_name,
```

```
        user,  
  
    pam_conversation,  
        confdir,  
        pamh);  
  
const char *service_name;  
const char *user;  
const struct pam_conv *pam_conversation;  
const char *confdir;  
pam_handle_t **pamh;
```

3.1.1.1. DESCRIPTION

The `pam_start` function creates the PAM context and initiates the PAM transaction. It is the first of the PAM functions that needs to be called by an application. The transaction state is contained entirely within the structure identified by this handle, so it is possible to have multiple transactions in parallel. But it is not possible to use the same handle for different transactions, a new one is needed for every new context.

The `service_name` argument specifies the name of the service to apply and will be stored as `PAM_SERVICE` item in the new context. The policy for the service will be read from the file `/etc/pam.d/service_name` or, if that file does not exist, from `/etc/pam.conf`.

The `user` argument can specify the name of the target user and will be stored as `PAM_USER` item. If the argument is `NULL`, the module has to ask for this item if necessary.

The `pam_conversation` argument points to a struct `pam_conv` describing the conversation function to use. An application must provide this for direct communication between a loaded module and the application.

Following a successful return (`PAM_SUCCESS`) the contents of `pamh` is a handle that contains the PAM context for successive calls to the PAM functions. In an error case is the content of `pamh` undefined.

The `pam_handle_t` is a blind structure and the application should not attempt to probe it directly for information. Instead the PAM library provides the functions `pam_set_item(3)` and `pam_get_item(3)`. The PAM handle cannot be used for multiple authentications at the same time as long as `pam_end` was not called on it before.

The `pam_start_confdir` function behaves like the `pam_start` function but it also allows setting `confdir` argument with a path to a directory to override

the default (/etc/pam.d) path for service policy files. If the confdir is NULL, the function works exactly the same as pam_start.

3.1.1.2. RETURN VALUES

PAM_ABORT

General failure.

PAM_BUF_ERR

Memory buffer error.

PAM_SUCCESS

Transaction was successfully started.

PAM_SYSTEM_ERR

System error, for example a NULL pointer was submitted instead of a pointer to data.

3.1.2. Termination of PAM transaction

```
#include <security/pam_appl.h>
```

```
int pam_end( pamh,  
            pam_status);
```

```
pam_handle_t *pamh;  
int pam_status;
```

3.1.2.1. DESCRIPTION

The pam_end function terminates the PAM transaction and is the last function an application should call in the PAM context. Upon return the handle pamh is no longer valid and all memory associated with it will be invalid.

The pam_status argument should be set to the value returned to the application by the last PAM library call.

The value taken by pam_status is used as an argument to the module specific callback

function, cleanup() (See pam_set_data(3) and pam_get_data(3)). In this way the module can be given notification of the pass/fail nature of the tear-down process, and perform any last minute tasks that are appropriate to

the module before it is unlinked. This argument can be logically OR'd with PAM_DATA_SILENT to indicate that the module should not treat the call too seriously. It is generally used to indicate that the current closing of the library is in a fork(2)ed process, and that the parent will take care of cleaning up things that exist outside of the current process space (files etc.).

This function free's all memory for items associated with the pam_set_item(3) and pam_get_item(3) functions. Pointers associated with such objects are not valid anymore after pam_end was called.

3.1.2.2. RETURN VALUES

PAM_SUCCESS

Transaction was successful terminated.

PAM_SYSTEM_ERR

System error, for example a NULL pointer was submitted as PAM handle or the function was called by a module.

3.1.3. Setting PAM items

```
#include <security/pam_modules.h>
```

```
int pam_set_item( pamh,  
                 item_type,  
                 item);
```

```
pam_handle_t *pamh;  
int item_type;  
const void *item;
```

3.1.3.1. DESCRIPTION

The pam_set_item function allows applications and PAM service modules to access and to update PAM information of item_type. For this a copy of the object pointed to by the item argument is created. The following item_types are supported:

PAM_SERVICE

The service name (which identifies that PAM stack that the PAM functions will use to authenticate the program).

PAM_USER

The username of the entity under whose identity service will be given. That is, following authentication, PAM_USER identifies the local entity that gets to use the service. Note, this value can be mapped from something (eg., "anonymous") to something else (eg. "guest119") by any module in the PAM stack. As such an application should consult the value of PAM_USER after each call to a PAM function.

PAM_USER_PROMPT

The string used when prompting for a user's name. The default value for this string is a localized version of "login: ".

PAM_TTY

The terminal name prefixed by /dev/ for device files. In the past, graphical X-based applications used to store the \$DISPLAY variable here, but with the introduction of PAM_XDISPLAY this usage is deprecated.

PAM_RUSER

The requesting user name: local name for a locally requesting user or a remote user name for a remote requesting user.

Generally an application or module will attempt to supply the value that is most strongly authenticated (a local account before a remote one. The level of trust in this value is embodied in the actual authentication stack associated with the application, so it is ultimately at the discretion of the system administrator.

PAM_RUSER@PAM_RHOST should always identify the requesting user. In some cases, PAM_RUSER may be NULL. In such situations, it is unclear who the requesting entity is.

PAM_RHOST

The requesting hostname (the hostname of the machine from which the PAM_RUSER entity is requesting service). That is PAM_RUSER@PAM_RHOST does identify the requesting user. In some applications, PAM_RHOST may be NULL. In such situations, it is unclear where the authentication request is originating from.

PAM_AUTHTOK

The authentication token (often a password). This token should be ignored

by all module functions besides `pam_sm_authenticate(3)` and `pam_sm_chauthtok(3)`. In the former function it is used to pass the most recent authentication token from one stacked module to another. In the latter function the token is used for another purpose. It contains the currently active authentication token.

PAM_OLDAUTHHTOK

The old authentication token. This token should be ignored by all module functions except `pam_sm_chauthtok(3)`.

PAM_CONV

The `pam_conv` structure. See `pam_conv(3)`.

The following additional items are specific to Linux-PAM and should not be used in portable applications:

PAM_FAIL_DELAY

A function pointer to redirect centrally managed failure delays. See `pam_fail_delay(3)`.

PAM_XDISPLAY

The name of the X display. For graphical, X-based applications the value for this item should be the `$DISPLAY` variable. This value may be used independently of `PAM_TTY` for passing the name of the display.

PAM_XAUTHDATA

A pointer to a structure containing the X authentication data required to make a connection to the display specified by `PAM_XDISPLAY`, if such information is necessary. See `pam_xauth_data(3)`.

PAM_AUTHHTOK_TYPE

The default action is for the module to use the following prompts when requesting passwords: "New UNIX password: " and "Retype UNIX password: ". The example word UNIX can be replaced with this item, by default it is empty. This item is used by `pam_get_authhtok(3)`.

For all `item_types`, other than `PAM_CONV` and `PAM_FAIL_DELAY`, `item` is a pointer to a `<NUL>` terminated character string. In the case of `PAM_CONV`, `item` points to an initialized `pam_conv` structure. In the case of `PAM_FAIL_DELAY`, `item` is a function pointer: `void (*delay_fn)(int retval, unsigned usec_delay, void *appdata_ptr)`

Both, PAM_AUTHTOK and PAM_OLDAUTHTOK, will be reset before returning to the application. Which means an application is not able to access the authentication tokens.

3.1.3.2. RETURN VALUES

PAM_BAD_ITEM

The application attempted to set an undefined or inaccessible item.

PAM_BUF_ERR

Memory buffer error.

PAM_SUCCESS

Data was successful updated.

PAM_SYSTEM_ERR

The pam_handle_t passed as first argument was invalid.

3.1.4. Getting PAM items

```
#include <security/pam_modules.h>
```

```
int pam_get_item( pamh,  
                 item_type,  
                 item);
```

```
const pam_handle_t *pamh;
```

```
int item_type;
```

```
const void **item;
```

3.1.4.1. DESCRIPTION

The pam_get_item function allows applications and PAM service modules to access and retrieve PAM information of item_type. Upon successful return, item contains a pointer to the value of the corresponding item. Note, this is a pointer to the actual data and should not be free()'ed or over-written! The following values are supported for item_type:

PAM_SERVICE

The service name (which identifies that PAM stack that the PAM functions will use to authenticate the program).

PAM_USER

The username of the entity under whose identity service will be given. That is, following authentication, PAM_USER identifies the local entity that gets to use the service. Note, this value can be mapped from something (eg., "anonymous") to something else (eg. "guest119") by any module in the PAM stack. As such an application should consult the value of PAM_USER after each call to a PAM function.

PAM_USER_PROMPT

The string used when prompting for a user's name. The default value for this string is a localized version of "login: ".

PAM_TTY

The terminal name prefixed by /dev/ for device files. In the past, graphical X-based applications used to store the \$DISPLAY variable here, but with the introduction of PAM_XDISPLAY this usage is deprecated.

PAM_RUSER

The requesting user name: local name for a locally requesting user or a remote user name for a remote requesting user.

Generally an application or module will attempt to supply the value that is most strongly authenticated (a local account before a remote one. The level of trust in this value is embodied in the actual authentication stack associated with the application, so it is ultimately at the discretion of the system administrator.

PAM_RUSER@PAM_RHOST should always identify the requesting user. In some cases, PAM_RUSER may be NULL. In such situations, it is unclear who the requesting entity is.

PAM_RHOST

The requesting hostname (the hostname of the machine from which the PAM_RUSER entity is requesting service). That is PAM_RUSER@PAM_RHOST does identify the requesting user. In some applications, PAM_RHOST may be NULL. In such situations, it is unclear where the authentication request is originating from.

PAM_AUTHTOK

The authentication token (often a password). This token should be ignored by all module functions besides `pam_sm_authenticate(3)` and `pam_sm_chauthtok(3)`. In the former function it is used to pass the most recent authentication token from one stacked module to another. In the latter function the token is used for another purpose. It contains the currently active authentication token.

PAM_OLDAUTH Tok

The old authentication token. This token should be ignored by all module functions except `pam_sm_chauthtok(3)`.

PAM_CONV

The `pam_conv` structure. See `pam_conv(3)`.

The following additional items are specific to Linux-PAM and should not be used in portable applications:

PAM_FAIL_DELAY

A function pointer to redirect centrally managed failure delays. See `pam_fail_delay(3)`.

PAM_XDISPLAY

The name of the X display. For graphical, X-based applications the value for this item should be the `$DISPLAY` variable. This value may be used independently of `PAM_TTY` for passing the name of the display.

PAM_XAUTHDATA

A pointer to a structure containing the X authentication data required to make a connection to the display specified by `PAM_XDISPLAY`, if such information is necessary. See `pam_xauth_data(3)`.

PAM_AUTH Tok TYPE

The default action is for the module to use the following prompts when requesting passwords: "New UNIX password: " and "Retype UNIX password: ". The example word UNIX can be replaced with this item, by default it is empty. This item is used by `pam_get_auth Tok(3)`.

If a service module wishes to obtain the name of the user, it should not use this function, but instead perform a call to `pam_get_user(3)`.

Only a service module is privileged to read the authentication tokens, PAM_AUTHTOK and PAM_OLDAUTHOK.

3.1.4.2. RETURN VALUES

PAM_BAD_ITEM

The application attempted to set an undefined or inaccessible item.

PAM_BUF_ERR

Memory buffer error.

PAM_PERM_DENIED

The value of item was NULL.

PAM_SUCCESS

Data was successful updated.

PAM_SYSTEM_ERR

The pam_handle_t passed as first argument was invalid.

3.1.5. Strings describing PAM error codes

```
#include <security/pam_appl.h>
```

```
const char *pam_strerror( pamh,  
                          errnum);
```

```
pam_handle_t *pamh;  
int errnum;
```

3.1.5.1. DESCRIPTION

The pam_strerror function returns a pointer to a string describing the error code passed in the argument errnum, possibly using the LC_MESSAGES part of the current locale to select the appropriate language. This string must not be modified by the application. No library function will modify this string.

3.1.5.2.

RETURN VALUES

This function returns always a pointer to a string.

3.1.6. Request a delay on failure

```
#include <security/pam_appl.h>

int pam_fail_delay( pamh,
                   usec);

pam_handle_t *pamh;
unsigned int usec;
```

3.1.6.1. DESCRIPTION

The `pam_fail_delay` function provides a mechanism by which an application or module can suggest a minimum delay of usec micro-seconds. The function keeps a record of the longest time requested with this function. Should `pam_authenticate(3)` fail, the failing return to the application is delayed by an amount of time randomly distributed (by up to 50%) about this longest value.

Independent of success, the delay time is reset to its zero default value when the PAM service module returns control to the application. The delay occurs after all authentication modules have been called, but before control is returned to the service application.

When using this function the programmer should check if it is available with:

```
#ifdef HAVE_PAM_FAIL_DELAY
....
#endif /* HAVE_PAM_FAIL_DELAY */
```

For applications written with a single thread that are event driven in nature, generating this delay may be undesirable. Instead, the application may want to register the delay in some other way. For example, in a single threaded server that serves multiple authentication requests from a single event loop, the application might want to simply mark a given connection as blocked until an application timer expires. For this reason the delay function can be changed with the `PAM_FAIL_DELAY` item. It can be queried and set with `pam_get_item(3)` and `pam_set_item(3)` respectively. The value used to set it should be a function pointer of the following prototype:

```
void (*delay_fn)(int retval, unsigned usec_delay, void *appdata_ptr);
```

The arguments being the `retval` return code of the module stack, the `usec_delay` micro-second delay that libpam is requesting and the `appdata_ptr` that the application has associated with the current `pamh`. This last

value was set by
the application when it called `pam_start(3)` or explicitly with `pam_set_item(3)`.

Note that the `PAM_FAIL_DELAY` item is set to `NULL` by default. This indicates that PAM should perform a random delay as described above when authentication fails and a delay has been suggested. If an application does not want the PAM library to perform any delay on authentication failure, then the application must define a custom delay function that executes no statements and set the `PAM_FAIL_DELAY` item to point to this function.

3.1.6.2. RETURN VALUES

PAM_SUCCESS

Delay was successful adjusted.

PAM_SYSTEM_ERR

A `NULL` pointer was submitted as PAM handle.

3.1.7. Authenticating the user

```
#include <security/pam_appl.h>
```

```
int pam_authenticate( pamh,  
                    flags);
```

```
pam_handle_t *pamh;  
int flags;
```

3.1.7.1. DESCRIPTION

The `pam_authenticate` function is used to authenticate the user. The user is required to provide an authentication token depending upon the authentication service, usually this is a password, but could also be a finger print.

The PAM service module may request that the user enter their username via the conversation mechanism (see `pam_start(3)` and `pam_conv(3)`). The name of the authenticated user will be present in the PAM item `PAM_USER`. This item may be recovered with a call to `pam_get_item(3)`.

The `pamh` argument is an authentication handle obtained by a prior call to `pam_start()`. The `flags` argument is the binary or of zero or more of the following values:

PAM_SILENT

Do not emit any messages.

PAM_DISALLOW_NULL_AUTH Tok

The PAM module service should return PAM_AUTH_ERR if the user does not have a registered authentication token.

3.1.7.2. RETURN VALUES

PAM_ABORT

The application should exit immediately after calling pam_end(3) first.

PAM_AUTH_ERR

The user was not authenticated.

PAM_CRED_INSUFFICIENT

For some reason the application does not have sufficient credentials to authenticate the user.

PAM_AUTHINFO_UNAVAIL

The modules were not able to access the authentication information. This might be due to a network or hardware failure etc.

PAM_MAXTRIES

One or more of the authentication modules has reached its limit of tries authenticating the user. Do not try again.

PAM_SUCCESS

The user was successfully authenticated.

PAM_USER_UNKNOWN

User unknown to authentication service.

3.1.8. Setting user credentials

```
#include <security/pam_appl.h>
```

```
int pam_setcred( pamh,  
                flags);
```

```
pam_handle_t *pamh;  
int flags;
```

3.1.8.1. DESCRIPTION

The `pam_setcred` function is used to establish, maintain and delete the credentials of a user. It should be called to set the credentials after a user has been authenticated and before a session is opened for the user (with `pam_open_session(3)`). The credentials should be deleted after the session has been closed (with `pam_close_session(3)`).

A credential is something that the user possesses. It is some property, such as a Kerberos ticket, or a supplementary group membership that make up the uniqueness of a given user. On a Linux system the user's UID and GID's are credentials too. However, it has been decided that these properties (along with the default supplementary groups of which the user is a member) are credentials that should be set directly by the application and not by PAM. Such credentials should be established, by the application, prior to a call to this function. For example, `initgroups(2)` (or equivalent) should have been performed.

Valid flags, any one of which, may be logically OR'd with `PAM_SILENT`, are:

`PAM_ESTABLISH_CRED`

Initialize the credentials for the user.

`PAM_DELETE_CRED`

Delete the user's credentials.

`PAM_REINITIALIZE_CRED`

Fully reinitialize the user's credentials.

`PAM_REFRESH_CRED`

Extend the lifetime of the existing credentials.

3.1.8.2. RETURN VALUES

`PAM_BUF_ERR`

Memory buffer error.

`PAM_CRED_ERR`

Failed to set user credentials.

PAM_CRED_EXPIRED

User credentials are expired.

PAM_CRED_UNAVAIL

Failed to retrieve user credentials.

PAM_SUCCESS

Data was successful stored.

PAM_SYSTEM_ERR

A NULL pointer was submitted as PAM handle, the function was called by a module or another system error occurred.

PAM_USER_UNKNOWN

User is not known to an authentication module.

3.1.9. Account validation management

```
#include <security/pam_appl.h>
```

```
int pam_acct_mgmt( pamh,  
                  flags);
```

```
pam_handle_t *pamh;  
int flags;
```

3.1.9.1. DESCRIPTION

The `pam_acct_mgmt` function is used to determine if the user's account is valid. It checks for authentication token and account expiration and verifies access restrictions. It is typically called after the user has been authenticated.

The `pamh` argument is an authentication handle obtained by a prior call to `pam_start()`. The `flags` argument is the binary or of zero or more of the following values:

PAM_SILENT

Do not emit any messages.

PAM_DISALLOW_NULL_AUTH Tok

The PAM module service should return PAM_NEW_AUTH Tok REQD if the user has a null authentication token.

3.1.9.2. RETURN VALUES

PAM_ACCT_EXPIRED

User account has expired.

PAM_AUTH_ERR

Authentication failure.

PAM_NEW_AUTH Tok REQD

The user account is valid but their authentication token is expired. The correct response to this return-value is to require that the user satisfies the pam_chauthtok() function before obtaining service. It may not be possible for some applications to do this. In such cases, the user should be denied access until such time as they can update their password.

PAM_PERM_DENIED

Permission denied.

PAM_SUCCESS

The authentication token was successfully updated.

PAM_USER_UNKNOWN

User unknown to password service.

3.1.10. Updating authentication tokens

```
#include <security/pam_appl.h>
```

```
int pam_chauthtok( pamh,  
                  flags);
```

```
pam_handle_t *pamh;  
int flags;
```

3.1.10.1.

DESCRIPTION

The `pam_chauthtok` function is used to change the authentication token for a given user (as indicated by the state associated with the handle `pamh`).

The `pamh` argument is an authentication handle obtained by a prior call to `pam_start()`. The `flags` argument is the binary or of zero or more of the following values:

PAM_SILENT

Do not emit any messages.

PAM_CHANGE_EXPIRED_AUTH Tok

This argument indicates to the modules that the user's authentication token (password) should only be changed if it has expired. If this argument is not passed, the application requires that all authentication tokens are to be changed.

3.1.10.2. RETURN VALUES

PAM_AUTH Tok_ERR

A module was unable to obtain the new authentication token.

PAM_AUTH Tok_RECOVERY_ERR

A module was unable to obtain the old authentication token.

PAM_AUTH Tok_LOCK_BUSY

One or more of the modules was unable to change the authentication token since it is currently locked.

PAM_AUTH Tok_DISABLE_AGING

Authentication token aging has been disabled for at least one of the modules.

PAM_PERM_DENIED

Permission denied.

PAM_SUCCESS

The authentication token was successfully updated.

PAM_TRY_AGAIN

Not all of the modules were in a position to update the authentication token(s). In such a case none of the user's authentication tokens are updated.

PAM_USER_UNKNOWN

User unknown to password service.

3.1.11. Start PAM session management

```
#include <security/pam_appl.h>
```

```
int pam_open_session( pamh,  
                    flags);
```

```
pam_handle_t *pamh;  
int flags;
```

3.1.11.1. DESCRIPTION

The `pam_open_session` function sets up a user session for a previously successful authenticated user. The session should later be terminated with a call to `pam_close_session(3)`.

It should be noted that the effective uid, `geteuid(2)`, of the application should be of sufficient privilege to perform such tasks as creating or mounting the user's home directory for example.

The flags argument is the binary or of zero or more of the following values:

PAM_SILENT

Do not emit any messages.

3.1.11.2. RETURN VALUES

PAM_ABORT

General failure.

PAM_BUF_ERR

Memory buffer error.

PAM_SESSION_ERR

Session failure.

PAM_SUCCESS

Session was successful created.

3.1.12. terminating PAM session management

```
#include <security/pam_appl.h>
```

```
int pam_close_session( pamh,  
                      flags);
```

```
pam_handle_t *pamh;  
int flags;
```

3.1.12.1. DESCRIPTION

The `pam_close_session` function is used to indicate that an authenticated session has ended. The session should have been created with a call to `pam_open_session(3)`.

It should be noted that the effective uid, `geteuid(2)`, of the application should be of sufficient privilege to perform such tasks as unmounting the user's home directory for example.

The flags argument is the binary or of zero or more of the following values:

PAM_SILENT

Do not emit any messages.

3.1.12.2.

RETURN VALUES

PAM_ABORT

General failure.

PAM_BUF_ERR

Memory buffer error.

PAM_SESSION_ERR

Session failure.

PAM_SUCCESS

Session was successful terminated.

3.1.13. Set or change PAM environment variable

```
#include <security/pam_appl.h>
```

```
int pam_putenv( pamh,  
               name_value);
```

```
pam_handle_t *pamh;  
const char *name_value;
```

3.1.13.1. DESCRIPTION

The `pam_putenv` function is used to add or change the value of PAM environment variables as associated with the `pamh` handle.

The `pamh` argument is an authentication handle obtained by a prior call to `pam_start()`. The `name_value` argument is a single NUL terminated string of one of the following forms:

NAME=value of variable

In this case the environment variable of the given NAME is set to the indicated value: value of variable. If this variable is already known, it is overwritten. Otherwise it is added to the PAM environment.

NAME=

This function sets the variable to an empty value. It is listed separately to indicate that this is the correct way to achieve such a setting.

NAME

Without an '=' the `pam_putenv()` function will delete the corresponding variable from the PAM environment.

`pam_putenv()` operates on a copy of `name_value`, which means in contrast to `putenv(3)`, the application is responsible for freeing the data.

3.1.13.2. RETURN VALUES

PAM_PERM_DENIED

Argument name_value given is a NULL pointer.

PAM_BAD_ITEM

Variable requested (for deletion) is not currently set.

PAM_ABORT

The pamh handle is corrupt.

PAM_BUF_ERR

Memory buffer error.

PAM_SUCCESS

The environment variable was successfully updated.

3.1.14. Get a PAM environment variable

```
#include <security/pam_appl.h>
```

```
const char *pam_getenv( pamh,  
                        name);
```

```
pam_handle_t *pamh;  
const char *name;
```

3.1.14.1. DESCRIPTION

The pam_getenv function searches the PAM environment list as associated with the handle pamh for an item that matches the string pointed to by name and returns a pointer to the value of the environment variable. The application is not allowed to free the data.

3.1.14.2. RETURN VALUES

The pam_getenv function returns NULL on failure.

3.1.15. Getting the PAM environment

```
#include <security/pam_appl.h>
```

```
char **pam_getenvlist( pamh);
```

```
pam_handle_t *pamh;
```

3.1.15.1. DESCRIPTION

The `pam_getenvlist` function returns a complete copy of the PAM environment as associated with the handle `pamh`. The PAM environment variables represent the contents of the regular environment variables of the authenticated user when service is granted.

The format of the memory is a `malloc()`'d array of char pointers, the last element of which is set to `NULL`. Each of the non-`NULL` entries in this array point to a NUL terminated and `malloc()`'d char string of the form: "name=value".

It should be noted that this memory will never be `free()`'d by `libpam`. Once obtained by a call to `pam_getenvlist`, it is the responsibility of the calling application to `free()` this memory.

It is by design, and not a coincidence, that the format and contents of the returned array matches that required for the third argument of the `execle(3)` function call.

3.1.15.2. RETURN VALUES

The `pam_getenvlist` function returns `NULL` on failure.

3.2. What is expected of an application

3.2.1. The conversation function

```
#include <security/pam_appl.h>
```

```
struct pam_message {  
    int msg_style;  
    const char *msg;  
};
```

```
struct pam_response {  
    char *resp;  
    int resp_retcode;  
};
```

```
struct pam_conv {  
    int (*conv)(int num_msg, const struct pam_message **msg,  
                struct pam_response **resp, void *appdata_ptr);  
    void *appdata_ptr;
```

```
};
```

3.2.1.1. DESCRIPTION

The PAM library uses an application-defined callback to allow a direct communication between a loaded module and the application. This callback is specified by the struct `pam_conv` passed to `pam_start(3)` at the start of the transaction.

When a module calls the referenced `conv()` function, the argument `appdata_ptr` is set to the second element of this structure.

The other arguments of a call to `conv()` concern the information exchanged by module and application. That is to say, `num_msg` holds the length of the array of pointers, `msg`. After a successful return, the pointer `resp` points to an array of `pam_response` structures, holding the application supplied text. The `resp_retcode` member of this struct is unused and should be set to zero. It is the caller's responsibility to release both, this array and the responses themselves, using `free(3)`. Note, `*resp` is a struct `pam_response` array and not an array of pointers.

The number of responses is always equal to the `num_msg` conversation function argument. This does require that the response array is `free(3)`'d after every call to the conversation function. The index of the responses corresponds directly to the prompt index in the `pam_message` array.

On failure, the conversation function should release any resources it has allocated, and return one of the predefined PAM error codes.

Each message can have one of four types, specified by the `msg_style` member of struct `pam_message`:

PAM_PROMPT_ECHO_OFF

Obtain a string without echoing any text.

PAM_PROMPT_ECHO_ON

Obtain a string whilst echoing text.

PAM_ERROR_MSG

Display an error message.

PAM_TEXT_INFO

Display some text.

The point of having an array of messages is that it becomes possible to pass a number of things to the application in a single call from the module. It can also be convenient for the application that related things come at once: a windows based application can then present a single form with many messages/prompts on at once.

In passing, it is worth noting that there is a discrepancy between the way Linux-PAM handles the const struct pam_message **msg conversation function argument and the way that Solaris' PAM (and derivatives, known to include HP/UX, are there others?) does. Linux-PAM interprets the msg argument as entirely equivalent to the following prototype const struct pam_message *msg[] (which, in spirit, is consistent with the commonly used prototypes for argv argument to the familiar main() function: char **argv; and char *argv[]). Said another way Linux-PAM interprets the msg argument as a pointer to an array of num_msg read only 'struct pam_message' pointers. Solaris' PAM implementation interprets this argument as a pointer to a pointer to an array of num_msg pam_message structures. Fortunately, perhaps, for most module/application developers when num_msg has a value of one these two definitions are entirely equivalent. Unfortunately, casually raising this number to two has led to unanticipated compatibility problems.

For what its worth the two known module writer work-arounds for trying to maintain source level compatibility with both PAM implementations are:

- never call the conversation function with num_msg greater than one.
- set up msg as doubly referenced so both types of conversation function can find the messages. That is, make

```
msg[n] = & ( ( *msg )[n] )
```

3.2.1.2. RETURN VALUES

PAM_BUF_ERR

Memory buffer error.

PAM_CONV_ERR

Conversation failure. The application should not set *resp.

PAM_SUCCESS

Success.

3.3. Programming notes

Note, all of the authentication service function calls accept the token `PAM_SILENT`, which instructs the modules to not send messages to the application. This token can be logically OR'd with any one of the permitted tokens specific to the individual function calls. `PAM_SILENT` does not override the prompting of the user for passwords etc., it only stops informative messages from being generated.

Chapter 4. Security issues of Linux-PAM

PAM, from the perspective of an application, is a convenient API for authenticating users. PAM modules generally have no increased privilege over that possessed by the application that is making use of it. For this reason, the application must take ultimate responsibility for protecting the environment in which PAM operates.

A poorly (or maliciously) written application can defeat any Linux-PAM module's authentication mechanisms by simply ignoring its return values. It is the application's task and responsibility to grant privileges and access to services. The Linux-PAM library simply assumes the responsibility of authenticating the user; ascertaining that the user is who they say they are. Care should be taken to anticipate all of the documented behavior of the Linux-PAM library functions. A failure to do this will most certainly lead to a future security breach.

4.1. Care about standard library calls

In general, writers of authorization-granting applications should assume that each module is likely to call any or all 'libc' functions. For 'libc' functions that return pointers to static/dynamically allocated structures (ie. the library allocates the memory and the user is not expected to 'free()' it) any module call to this function is likely to corrupt a pointer previously obtained by the application. The application programmer should either re-call such a 'libc' function after a call to the Linux-PAM library, or copy the structure contents to some safe area of memory before passing control to the Linux-PAM library.

Two important function classes that fall into this category are `getpwnam(3)` and `syslog(3)`.

4.2. Choice of a service name

When picking the service-name that corresponds to the first entry in the Linux-PAM configuration file, the application programmer should avoid the temptation of choosing something related to `argv[0]`. It is a trivial matter for any user to invoke any application on a system under a different name and this should not be permitted to cause a security breach.

In general, this is always the right advice if the program is `setuid`, or otherwise more privileged than the user that invokes it. In some cases, avoiding this advice is convenient, but as an author of such an application, you

should consider well the ways in which your program will be installed and used. (Its often the case that programs are not intended to be `setuid`, but end up being installed that way for convenience. If your program falls into this category, don't fall into the trap of making this mistake.)

To invoke some target application by another name, the user may symbolically link the target application with the desired name. To be precise all the user need do is, `ln -s /target/application ./preferred_name` and then run `./preferred_name`.

By studying the Linux-PAM configuration file(s), an attacker can choose the `preferred_name` to be that of a service enjoying minimal protection; for example a game which uses Linux-PAM to restrict access to certain hours of the day. If the service-name were to be linked to the filename under which the service was invoked, it is clear that the user is effectively in the position of dictating which authentication scheme the service uses. Needless to say, this is not a secure situation.

The conclusion is that the application developer should carefully define the service-name of an application. The safest thing is to make it a single hard-wired name.

4.3. The conversation function

Care should be taken to ensure that the `conv()` function is robust. Such a function is provided in the library `libpam_misc` (see below).

4.4. The identity of the user

The Linux-PAM modules will need to determine the identity of the user who requests a service, and the identity of the user who grants the service. These two users will seldom be the same. Indeed there is generally a third user identity to be considered, the new (assumed) identity of the user once the service is granted.

The need for keeping tabs on these identities is clearly an issue of security. One convention that is actively used by some modules is that the identity of

the user requesting a service should be the current UID (user ID) of the running process; the identity of the privilege granting user is the EUID (effective user ID) of the running process; the identity of the user, under whose name the service will be executed, is given by the contents of the PAM_USER pam_get_item(3). Note, modules can change the values of PAM_USER and PAM_RUSER during any of the pam_*() library calls. For this reason, the application should take care to use the pam_get_item() every time it wishes to establish who the authenticated user is (or will currently be).

For network-serving databases and other applications that provide their own security model (independent of the OS kernel) the above scheme is insufficient to identify the requesting user.

A more portable solution to storing the identity of the requesting user is to use the PAM_RUSER pam_get_item(3). The application should supply this value before attempting to authenticate the user with pam_authenticate(). How well this name can be trusted will ultimately be at the discretion of the local administrator (who configures PAM for your application) and a selected module may attempt to override the value where it can obtain more reliable data. If an application is unable to determine the identity of the requesting entity/user, it should not call pam_set_item(3) to set PAM_RUSER.

In addition to the PAM_RUSER item, the application should supply the PAM_RHOST (requesting host) item. As a general rule, the following convention for its value can be assumed: NULL = unknown; localhost = invoked directly from the local system; other.place.xyz = some component of the user's connection originates from this remote/requesting host. At present, PAM has no established convention for indicating whether the application supports a trusted path to communication from this host.

4.5. Sufficient resources

Care should be taken to ensure that the proper execution of an application is not compromised by a lack of system resources. If an application is unable to open sufficient files to perform its service, it should fail gracefully, or request additional resources. Specifically, the quantities manipulated by the setrlimit(2) family of commands should be taken into consideration.

This is also true of conversation prompts. The application should not accept prompts of arbitrary length with out checking for resource allocation failure and dealing with such extreme conditions gracefully and in a manner that preserves the PAM API. Such tolerance may be especially important when attempting to track a malicious adversary.

Chapter 5. A library of miscellaneous helper functions

To aid the work of the application developer a library of miscellaneous functions is provided. It is called `libpam_misc`, and contains a text based conversation function, and routines for enhancing the standard PAM-environment variable support.

The functions, structures and macros, made available by this library can be defined by including `<security/pam_misc.h>`. It should be noted that this library is specific to Linux-PAM and is not referred to in the defining DCE-RFC (see See also) below.

5.1. Functions supplied

5.1.1. Text based conversation function

```
#include <security/pam_misc.h>
```

```
int misc_conv( num_msg,  
              msgm,  
              response,  
              appdata_ptr);
```

```
int num_msg;  
const struct pam_message **msgm;  
struct pam_response **response;  
void *appdata_ptr;
```

5.1.1.1. DESCRIPTION

The `misc_conv` function is part of `libpam_misc` and not of the standard `libpam` library. This function will prompt the user with the appropriate comments and obtain the appropriate inputs as directed by authentication modules.

In addition to simply slotting into the appropriate `pam_conv(3)`, this function provides some time-out facilities. The function exports five variables that can be used by an application programmer to limit the amount of time this conversation function will spend waiting for the user to type something. The five variables are as follows:

```
time_t pam_misc_conv_warn_time;
```

This variable contains the time (as returned by `time(2)`) that the user should be first warned that the clock is ticking. By default it has the value 0, which indicates that no such warning will be given. The application may set its value to sometime in the future, but this should be

done prior to passing control to the Linux-PAM library.

```
const char *pam_misc_conv_warn_line;
```

Used in conjunction with `pam_misc_conv_warn_time`, this variable is a pointer to the string that will be displayed when it becomes time to warn the user that the timeout is approaching. Its default value is a translated version of "...Time is running out...", but this can be changed by the application prior to passing control to Linux-PAM.

```
time_t pam_misc_conv_die_time;
```

This variable contains the time (as returned by `time(2)`) that the will time out. By default it has the value 0, which indicates that the conversation function will not timeout. The application may set its value to sometime in the future, but this should be done prior to passing control to the Linux-PAM library.

```
const char *pam_misc_conv_die_line;
```

Used in conjunction with `pam_misc_conv_die_time`, this variable is a pointer to the string that will be displayed when the conversation times out. Its default value is a translated version of "...Sorry, your time is up!", but this can be changed by the application prior to passing control to Linux-PAM.

```
int pam_misc_conv_died;
```

Following a return from the Linux-PAM library, the value of this variable indicates whether the conversation has timed out. A value of 1 indicates the time-out occurred.

The following two function pointers are available for supporting binary prompts in the conversation function. They are optimized for the current incarnation of the `libpamc` library and are subject to change.

```
int (*pam_binary_handler_fn)(void *appdata, pamc_bp_t *prompt_p);
```

This function pointer is initialized to NULL but can be filled with a function that provides machine-machine (hidden) message exchange. It is intended for use with hidden authentication protocols such as RSA or Diffie-Hellman key exchanges. (This is still under development.)

```
int (*pam_binary_handler_free)(void *appdata, pamc_bp_t *delete_me);
```

This function pointer is initialized to `PAM_BP_RENEW(delete_me, 0, 0)`, but

can be redefined as desired by the application.

5.1.2. Transcribing an environment to that of PAM

```
#include <security/pam_misc.h>
```

```
int pam_misc_paste_env( pamh,  
                        user);
```

```
pam_handle_t *pamh;  
const char * const *user;
```

5.1.2.1. DESCRIPTION

This function takes the supplied list of environment pointers and uploads its contents to the PAM environment. Success is indicated by PAM_SUCCESS.

5.1.3. Liberating a locally saved environment

```
#include <security/pam_misc.h>
```

```
int pam_misc_drop_env( env);
```

```
char **env;
```

5.1.3.1. DESCRIPTION

This function is defined to complement the pam_getenvlist(3) function. It liberates the memory associated with env, overwriting with 0 all memory before free()ing it.

5.1.4. BSD like PAM environment variable setting

```
#include <security/pam_misc.h>
```

```
int pam_misc_setenv( pamh,  
                    name,  
                    value,  
                    readonly);
```

```
pam_handle_t *pamh;  
const char *name;  
const char *value;  
int readonly;
```

5.1.4.1. DESCRIPTION

This function performs a task equivalent to `pam_putenv(3)`, its syntax is, however, more like the BSD style function; `setenv()`. The name and value are concatenated with an '=' to form a name=value and passed to `pam_putenv()`. If, however, the PAM variable is already set, the replacement will only be applied if the last argument, `readonly`, is zero.

Chapter 6. Porting legacy applications

The point of PAM is that the application is not supposed to have any idea how the attached authentication modules will choose to authenticate the user.

So

all they can do is provide a conversation function that will talk directly to the user(client) on the modules' behalf.

Consider the case that you plug a retinal scanner into the login program. In this situation the user would be prompted: "please look into the scanner". No username or password would be needed - all this information could be deduced from the scan and a database lookup. The point is that the retinal scanner is an ideal task for a "module".

While it is true that a pop-daemon program is designed with the POP protocol in mind and no-one ever considered attaching a retinal scanner to it, it is also the case that the "clean" PAM'ification of such a daemon would allow for the possibility of a scanner module being attached to it. The point being that the "standard" pop-authentication protocol(s) [which will be needed to satisfy inflexible/legacy clients] would be supported by inserting an appropriate `pam_qpopper` module(s). However, having rewritten `popd` once in this way any new protocols can be implemented in-situ.

One simple test of a ported application would be to insert the `pam_permit` module and see if the application demands you type a password... In such a case, `xlock` would fail to lock the terminal - or would at best be a screen-saver, `ftp` would give password free access to all etc.. Neither of these is a very secure thing to do, but they do illustrate how much flexibility PAM puts in the hands of the local admin.

The key issue, in doing things correctly, is identifying what is part of the authentication procedure (how many passwords etc..) the exchange protocol (prefixes to prompts etc., numbers like 331 in the case of `ftpd`) and what is part of the service that the application delivers. PAM really needs to have total control in the authentication "procedure", the conversation function should only deal with reformatting user prompts and extracting responses from raw input.

Chapter 7. Glossary of PAM related terms

The following are a list of terms used within this document.

Authentication token

Generally, this is a password. However, a user can authenticate him/herself in a variety of ways. Updating the user's authentication token thus corresponds to refreshing the object they use to authenticate themselves with the system. The word password is avoided to keep open the possibility that the authentication involves a retinal scan or other non-textual mode of challenge/response.

Credentials

Having successfully authenticated the user, PAM is able to establish certain characteristics/attributes of the user. These are termed credentials. Examples of which are group memberships to perform privileged tasks with, and tickets in the form of environment variables etc. . Some user-credentials, such as the user's UID and GID (plus default group memberships) are not deemed to be PAM-credentials. It is the responsibility of the application to grant these directly.

Chapter 8. An example application

To get a flavor of the way a Linux-PAM application is written we include the following example. It prompts the user for their password and indicates whether their account is valid on the standard output, its return code also indicates the success (0 for success; 1 for failure).

```
/*
This program was contributed by Shane Watts
[modifications by AGM and kukuk]

You need to add the following (or equivalent) to the
/etc/pam.d/check_user file:
# check authorization
auth    required  pam_unix.so
account required  pam_unix.so
*/

#include <security/pam_appl.h>
#include <security/pam_misc.h>
#include <stdio.h>

static struct pam_conv conv = {
```

```

    misc_conv,
    NULL
};

int main(int argc, char *argv[])
{
    pam_handle_t *pamh=NULL;
    int retval;
    const char *user="nobody";

    if(argc == 2) {
        user = argv[1];
    }

    if(argc > 2) {
        fprintf(stderr, "Usage: check_user [username]\n");
        exit(1);
    }

    retval = pam_start("check_user",
user, &conv, &pamh);

    if (retval == PAM_SUCCESS)
        retval = pam_authenticate(pamh, 0); /* is user really user? */

    if (retval == PAM_SUCCESS)
        retval = pam_acct_mgmt(pamh, 0); /* permitted access? */

    /* This is where we have been authorized or not. */

    if (retval == PAM_SUCCESS) {
        fprintf(stdout, "Authenticated\n");
    } else {
        fprintf(stdout, "Not Authenticated\n");
    }

    if (pam_end(pamh,retval) != PAM_SUCCESS) { /* close Linux-PAM */
        pamh = NULL;
        fprintf(stderr, "check_user: failed to release authenticator\n");
        exit(1);
    }

    return ( retval == PAM_SUCCESS ? 0:1 ); /* indicate success */
}

```

Chapter 9. Files

/usr/include/security/pam_appl.h

Header file with interfaces for Linux-PAM applications.

/usr/include/security/pam_misc.h

Header file for useful library functions for making applications easier to write.

Chapter 10. See also

- The Linux-PAM System Administrators' Guide.
- The Linux-PAM Module Writers' Guide.
- The V. Samar and R. Schemers (SunSoft), ``UNIFIED LOGIN WITH PLUGGABLE AUTHENTICATION MODULES'', Open Software Foundation Request For Comments 86.0, October 1995.

Chapter 11. Author/acknowledgments

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Chapter 12. Copyright information for this document

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Found in path(s):

```
* /opt/cola/permits/1822720343_1704297183.37862/0/linux-pam-1-5-3-docs-tar-xz/Linux-PAM-1.5.3/doc/adg/Linux-PAM_ADG.txt
```

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```
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Found in path(s):

# 1.122 python-setuptools 65.5.0

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

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

In May 2000, Guido and the Python core development team moved to BeOpen.com to form the BeOpen PythonLabs team. In October of the same year, the PythonLabs team moved to Digital Creations (now Zope Corporation, see <http://www.zope.com>). In 2001, the Python Software Foundation (PSF, see <http://www.python.org/psf/>) was formed, a non-profit organization created specifically to own Python-related Intellectual Property. Zope Corporation is a sponsoring member

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|----------------|--------------|-----------|------------|---------------------|
| 0.9.0 thru 1.2 |              | 1991-1995 | CWI        | yes                 |
| 1.3 thru 1.5.2 | 1.2          | 1995-1999 | CNRI       | yes                 |
| 1.6            | 1.5.2        | 2000      | CNRI       | no                  |
| 2.0            | 1.6          | 2000      | BeOpen.com | no                  |
| 1.6.1          | 1.6          | 2001      | CNRI       | yes (2)             |
| 2.1            | 2.0+1.6.1    | 2001      | PSF        | no                  |
| 2.0.1          | 2.0+1.6.1    | 2001      | PSF        | yes                 |
| 2.1.1          | 2.1+2.0.1    | 2001      | PSF        | yes                 |
| 2.1.2          | 2.1.1        | 2002      | PSF        | yes                 |
| 2.1.3          | 2.1.2        | 2002      | PSF        | yes                 |
| 2.2 and above  |              |           |            |                     |
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## 1.123 python-certifi 2023.07.22

### 1.123.1 Available under license :

This package contains a modified version of ca-bundle.crt:

ca-bundle.crt -- Bundle of CA Root Certificates

Certificate data from Mozilla as of: Thu Nov 3 19:04:19 2011#  
This is a bundle of X.509 certificates of public Certificate Authorities  
(CA). These were automatically extracted from Mozilla's root certificates  
file (certdata.txt). This file can be found in the mozilla source tree:  
<https://hg.mozilla.org/mozilla-central/file/tip/security/nss/lib/ckfw/builtins/certdata.txt>  
It contains the certificates in PEM format and therefore  
can be directly used with curl / libcurl / php\_curl, or with  
an Apache+mod\_ssl webserver for SSL client authentication.  
Just configure this file as the SSLCACertificateFile.#

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@(#) \$RCSfile: certdata.txt,v

\$ \$Revision: 1.80 \$ \$Date: 2011/11/03 15:11:58 \$

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## 1.125 influxdb 1.9.4

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# 1.126 python-pip 23.3.1

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This package contains a modified version of ca-bundle.crt:

ca-bundle.crt -- Bundle of CA Root Certificates

Certificate data from Mozilla as of: Thu Nov 3 19:04:19 2011#

This is a bundle of X.509 certificates of public Certificate Authorities (CA). These were automatically extracted from Mozilla's root certificates file (certdata.txt). This file can be found in the mozilla source tree:

<https://hg.mozilla.org/mozilla-central/file/tip/security/nss/lib/ckfw/builtins/certdata.txt>

It contains the certificates in PEM format and therefore can be directly used with curl / libcurl / php\_curl, or with an Apache+mod\_ssl webserver for SSL client authentication.

Just configure this file as the SSLCACertificateFile.#

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@(#) \$RCSfile: certdata.txt,v  
\$ \$Revision: 1.80 \$ \$Date: 2011/11/03 15:11:58 \$  
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#### A. HISTORY OF THE SOFTWARE

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

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

In May 2000, Guido and the Python core development team moved to BeOpen.com to form the BeOpen PythonLabs team. In October of the same year, the PythonLabs team moved to Digital Creations, which became Zope Corporation. In 2001, the Python Software Foundation (PSF, see <https://www.python.org/psf/>) was formed, a non-profit organization created specifically to own Python-related Intellectual Property. Zope Corporation was a sponsoring member of the PSF.



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Python releases are Open Source (see <https://opensource.org> for the Open Source Definition). Historically, most, but not all, Python releases have also been GPL-compatible; the table below summarizes the various releases.

| Release        | Derived from | Year      | Owner      | GPL-compatible? (1) |
|----------------|--------------|-----------|------------|---------------------|
| 0.9.0 thru 1.2 |              | 1991-1995 | CWI        | yes                 |
| 1.3 thru 1.5.2 | 1.2          | 1995-1999 | CNRI       | yes                 |
| 1.6            | 1.5.2        | 2000      | CNRI       | no                  |
| 2.0            | 1.6          | 2000      | BeOpen.com | no                  |
| 1.6.1          | 1.6          | 2001      | CNRI       | yes (2)             |
| 2.1            | 2.0+1.6.1    | 2001      | PSF        | no                  |
| 2.0.1          | 2.0+1.6.1    | 2001      | PSF        | yes                 |
| 2.1.1          | 2.1+2.0.1    | 2001      | PSF        | yes                 |
| 2.1.2          | 2.1.1        | 2002      | PSF        | yes                 |
| 2.1.3          | 2.1.2        | 2002      | PSF        | yes                 |
| 2.2 and above  | 2.1.1        | 2001-now  | PSF        | yes                 |

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(2) According to Richard Stallman, 1.6.1 is not GPL-compatible, because its license has a choice of law clause. According to CNRI, however, Stallman's lawyer has told CNRI's lawyer that 1.6.1 is "not incompatible" with the GPL.

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### A. HISTORY OF THE SOFTWARE

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

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

In May 2000, Guido and the Python core development team moved to BeOpen.com to form the BeOpen PythonLabs team. In October of the same year, the PythonLabs team moved to Digital Creations (now Zope

Corporation, see <http://www.zope.com>). In 2001, the Python Software Foundation (PSF, see <http://www.python.org/psf/>) was formed, a non-profit organization created specifically to own Python-related Intellectual Property. Zope Corporation is a sponsoring member of the PSF.

All Python releases are Open Source (see <http://www.opensource.org> for the Open Source Definition). Historically, most, but not all, Python releases have also been GPL-compatible; the table below summarizes the various releases.

| Release        | Derived from | Year      | Owner      | GPL-compatible? (1) |
|----------------|--------------|-----------|------------|---------------------|
| 0.9.0 thru 1.2 |              | 1991-1995 | CWI        | yes                 |
| 1.3 thru 1.5.2 | 1.2          | 1995-1999 | CNRI       | yes                 |
| 1.6            | 1.5.2        | 2000      | CNRI       | no                  |
| 2.0            | 1.6          | 2000      | BeOpen.com | no                  |
| 1.6.1          | 1.6          | 2001      | CNRI       | yes (2)             |
| 2.1            | 2.0+1.6.1    | 2001      | PSF        | no                  |
| 2.0.1          | 2.0+1.6.1    | 2001      | PSF        | yes                 |
| 2.1.1          | 2.1+2.0.1    | 2001      | PSF        | yes                 |
| 2.2            | 2.1.1        | 2001      | PSF        | yes                 |
| 2.1.2          | 2.1.1        | 2002      | PSF        | yes                 |
| 2.1.3          |              |           |            |                     |
| 2.1.2          | 2002         | PSF       | yes        |                     |
| 2.2.1          | 2.2          | 2002      | PSF        | yes                 |
| 2.2.2          | 2.2.1        | 2002      | PSF        | yes                 |
| 2.2.3          | 2.2.2        | 2003      | PSF        | yes                 |
| 2.3            | 2.2.2        | 2002-2003 | PSF        | yes                 |
| 2.3.1          | 2.3          | 2002-2003 | PSF        | yes                 |
| 2.3.2          | 2.3.1        | 2002-2003 | PSF        | yes                 |
| 2.3.3          | 2.3.2        | 2002-2003 | PSF        | yes                 |
| 2.3.4          | 2.3.3        | 2004      | PSF        | yes                 |
| 2.3.5          | 2.3.4        | 2005      | PSF        | yes                 |
| 2.4            | 2.3          | 2004      | PSF        | yes                 |
| 2.4.1          | 2.4          | 2005      | PSF        | yes                 |
| 2.4.2          | 2.4.1        | 2005      | PSF        | yes                 |
| 2.4.3          | 2.4.2        | 2006      | PSF        | yes                 |
| 2.4.4          | 2.4.3        | 2006      | PSF        | yes                 |
| 2.5            | 2.4          | 2006      | PSF        | yes                 |
| 2.5.1          | 2.5          | 2007      | PSF        | yes                 |
| 2.5.2          | 2.5.1        | 2008      | PSF        | yes                 |
| 2.5.3          | 2.5.2        | 2008      | PSF        | yes                 |
| 2.6            | 2.5          | 2008      | PSF        | yes                 |
| 2.6.1          | 2.6          | 2008      | PSF        | yes                 |
| 2.6.2          | 2.6.1        | 2009      | PSF        | yes                 |

|       |       |      |     |     |
|-------|-------|------|-----|-----|
| 2.6.3 | 2.6.2 | 2009 | PSF | yes |
| 2.6.4 | 2.6.3 | 2009 | PSF | yes |
| 2.6.5 | 2.6.4 | 2010 | PSF | yes |
| 3.0   | 2.6   | 2008 | PSF | yes |
| 3.0.1 | 3.0   | 2009 | PSF | yes |
| 3.1   | 3.0.1 | 2009 | PSF | yes |
| 3.1.1 | 3.1   | 2009 | PSF | yes |
| 3.1.2 | 3.1   | 2010 | PSF | yes |
| 3.2   | 3.1   | 2010 | PSF | yes |

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Thanks to the many outside volunteers who have worked under Guido's direction to make these releases possible.

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Julian Seward, [jseward@bzip.org](mailto:jseward@bzip.org)  
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Any

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GCC RUNTIME LIBRARY EXCEPTION

Version 3.1, 31 March 2009

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smallexample

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

Ty Coon, President of Vice

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@page

@heading Appendix: How to Apply These Terms to Your New Programs

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@smallexample

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and a brief idea of what it does.}

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Gnomovision version

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@example

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@var{signature of Ty Coon}, 1 April 1989

Ty Coon, President of Vice

@end example

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- the GNU.Gettext.dll C# library,
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If such an object file uses only numerical parameters, data structure layouts and accessors, and small macros and small inline functions (ten lines or less in length), then the use of the object file is unrestricted, regardless of whether it is legally a derivative work. (Executables containing this object code plus portions of the Library will still fall under Section 6.)

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

the object code for the work under the terms of Section 6.

Any executables containing that work also fall under Section 6, whether or not they are linked directly with the Library itself.

^L

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b) Use a suitable shared library mechanism for linking with the Library. A suitable mechanism is one that (1) uses at run time a

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## 1.145 ibm-sarama 1.42.1

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## 1.146 alpine-baselayout 3.4.3-r2

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```
Automatically generated by apkbuild-cpan, template 3
Contributor: Valery Kartel <valery.kartel@gmail.com>
Maintainer: Celeste <cielesti@protonmail.com>
pkgname=perl-bsd-resource
#_pkgreal is used by apkbuild-cpan to find modules at MetaCpan
_pkgreal=BSD-Resource
pkgver=1.2911
pkgrel=9
pkgdesc="Perl extension implements the BSD process resource limit functions"
url="https://metacpan.org/release/BSD-Resource/"
arch="all"
license="Artistic-2.0 OR LGPL-2.0"
depends="perl"
makedepends="perl-dev"
subpackages="$pkgname-doc"
source="https://cpan.metacpan.org/authors/id/J/JH/JHI/BSD-Resource-$pkgver.tar.gz"
buildidir="$srcdir/${_pkgreal}-$pkgver"

build() {
 export CFLAGS=$(perl -MConfig -E 'say $Config{ccflags}')
 PERL_MM_USE_DEFAULT=1 perl -I. Makefile.PL INSTALLDIRS=vendor
 make
}

check() {
 export CFLAGS=$(perl -MConfig -E 'say $Config{ccflags}')
 make test
}

package() {
 make DESTDIR="$pkgdir" install
 find "$pkgdir" \(-name perllocal.pod -o -name .packlist \) -delete
}

sha512sums="
d0032d41c7c0468ed1c6d8f57b885f6cb97a5039d754c8cb60b2067daedaf53bd15fb6561a3d0f828df16dfa5417f663b
8065ba65f4fea16dc9262728b3b6b85
 BSD-Resource-1.2911.tar.gz
"

Contributor: Dhruvin Gandhi <contact@dhruvin.dev>
Maintainer: Patrycja Rosa <alpine@ptrcnull.me>
pkgname=py3-license-expression
_pkgname=license-expression
pkgver=30.2.0
pkgrel=0
pkgdesc="Library to parse, compare, simplify and normalize license expressions"
url="https://github.com/nexB/license-expression"
```

```
arch="noarch"
license="Apache-2.0"
depends="python3 py3-boolean.py"
makedepends="py3-setuptools py3-setuptools_scm py3-gpep517 py3-wheel"
checkdepends="py3-pytest py3-pytest-xdist"
subpackages="$pkgname-pyc"
source="https://files.pythonhosted.org/packages/source/l/${pkgname}/${pkgname}-${pkgver}.tar.gz"
builddir="$srcdir/${pkgname}-${pkgver}"
```

```
build() {
 gpep517 build-wheel \
 --wheel-dir .dist \
 --output-fd 3 3>&1 >&2
}
```

```
check() {
 python3 -m venv --clear --without-pip --system-site-packages .testenv
 .testenv/bin/python3 -m installer .dist/*.whl
 .testenv/bin/python3 -m pytest
}
```

```
package() {
 python3 -m installer -d "$pkgdir" \
 .dist/*.whl
}
```

```
sha512sums="
7be7ebab1d980063ab846a228c5247570d0e23ed52f4362ef7d88eb7a59274e6f74653b4e9cff8225597693087d750c5
bf7fcf604440d8d3d2976ebcd7442c24
 license-expression-30.2.0.tar.gz
"
```

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The Kohonen neural network code for color optimization was written by Anthony Dekker.

Parts Copyright (c) 1995 by C. Blanc and C. Schlick

The X-Spline code was written Carole Blanc ([blanc@labri.u-bordeaux.fr](mailto:blanc@labri.u-bordeaux.fr)) and Christophe Schlick ([schlick@labri.u-bordeaux.fr](mailto:schlick@labri.u-bordeaux.fr)) starting from an initial implementation done by C. Feuille, S. Grosbois, L. Maziere and L. Minihot as a student practice (Universite Bordeaux, France). For additional information about X-splines, see:

"X-Splines: A Spline Model Designed for the End User" by C. Blanc and C. Schlick, Proceedings of SIGGRAPH'95

<http://dept-info.labri.u-bordeaux.fr/~schlick/DOC/sig1.html>

# Maintainer: Jakub Panek <[me@panekj.dev](mailto:me@panekj.dev)>

pkgname=cargo-license

pkgver=0.5.1

pkgrel=4

pkgdesc="Cargo subcommand to see license of dependencies"

url="https://github.com/onur/cargo-license"

arch="all !s390x !riscv64" # rust

license="MIT"

makedepends="cargo cargo-auditable"

source="\$pkgname-\$pkgver.tar.gz::https://crates.io/api/v1/crates/cargo-license/\$pkgver/download"

prepare() {

default\_prepare

cargo fetch --target="\$CTARGET" --locked

}

build() {

cargo auditable build --release --frozen

}

check() {

cargo test --frozen

}

package() {

install -Dm755 target/release/cargo-license -t "\$pkgdir"/usr/bin

}

sha512sums="

4d8d430df91c6aac53d2305d3125eaaa492324e85c4db29d33d452b3848f33a55088e71247c6c72c6a62f4e924a374a

115bf14b4f398e7950b9eb52415f2244 cargo-license-0.5.1.tar.gz

"

# Contributor: Maxim Karasev <[begs@disroot.org](mailto:begs@disroot.org)>

# Maintainer: mio <[miyopan@e.email](mailto:miyopan@e.email)>

```

pkgname=bsd-games
pkgver=3.3
pkgrel=1
pkgdesc="traditional text mode games from BSD"
url="https://bsd-games.sourceforge.io/"
arch="all"
license="BSD-3-Clause"
install="$pkgname.post-install"
makedepends="ncurses-dev coreutils" # configure causes busybox expr error
subpackages="$pkgname-doc"
source="https://sourceforge.net/projects/bsd-games/files/bsd-games-$pkgver.tar.gz"
options="!check" # no tests

build() {
some GNU autoconf options are ignored, but it works
./configure \
--build=$CBUILD \
--host=$CHOST \
--prefix=/usr \
--sysconfdir=/etc \
--mandir=/usr/share/man \
--localstatedir=/var/lib # it really shouldn't be in /var
make
}

package() {
make DESTDIR="$pkgdir" install
install -Dm644 LICENSE "$pkgdir"/usr/share/licenses/bsd-games/LICENSE
}

sha512sums="
aaf36d09d4fe68514a5c279063d7e77a9a9a84c447037cba974b29faa07eb80c2aab2379d0699c196b5c27ffe1b2bb2c6
8d3390143e0e62d5e3d210ccfb61294
bsd-games-3.3.tar.gz
"

Contributor: Carlo Landmeter <clandmeter@alpinelinux.org>
Maintainer: Kevin Daudt <kdaudt@alpinelinux.org>
pkgname=spdx-licenses
pkgver=3.22
pkgrel=0
pkgdesc="Various data formats for the SPDX License List"
url="https://spdx.org/"
arch="noarch"
options="!check" # no test suite
license="CC-BY-3.0"
source="license-list-data-$pkgver.tar.gz::https://github.com/spdx/license-list-data/archive/v$pkgver.tar.gz"
builddir="$srcdir/license-list-data-$pkgver"
subpackages="$pkgname-list"

```

```

_types="html json rdfa rdfnt rdfturtle rdfxml template text"

for type in $_types; do
 subpackages="$subpackages $pkgname-$type:_subpkg"
done

package() {
 mkdir -p "$pkgdir"
}

_subpkg() {
 local type=${subpkgname/$pkgname-/}
 pkgdesc="$pkgdesc ($type)"
 install_if="$pkgname"
 mkdir -p "$subpkgdir"/usr/share/spdx
 cp -r "$builddir"/$type "$subpkgdir"/usr/share/spdx/
}

list() {
 pkgdesc="$pkgdesc (licence list)"
 mkdir -p "$subpkgdir"/usr/share/spdx
 local i; for i in "$builddir"/text/*.txt; do
 local license=${i##*/}
 echo
 ${license%. *} >> "$subpkgdir"/usr/share/spdx/license.lst
 done
}

sha512sums="
b213fe66699770d75a4c994a01a5c08325751423516c2fb871088a47e7e7ce605736064f5ce3a63dc1d3c462271832db
7bc464ac968df1888f9823787964c786 license-list-data-3.22.tar.gz
"

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```

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[vintagedreamworks@hotmail.com](mailto:vintagedreamworks@hotmail.com)

<http://www.geocities.com/SiliconValley/Campus/8645/index.html>

<http://members.nbc.com/silicon39/>

<http://www.mp3.com/silicon39>

<https://analoguesque.x10host.com/>

# Contributor: Fabian Affolter <[fabian@affolter-engineering.ch](mailto:fabian@affolter-engineering.ch)>

# Maintainer: Fabian Affolter <[fabian@affolter-engineering.ch](mailto:fabian@affolter-engineering.ch)>

pkgname=py3-flake8-copyright

\_pkgname=flake8-copyright

pkgver=0.2.4

pkgrel=1

pkgdesc="Extension for flake8 which checks for copyrights"

options="!check" # No testsuite

url="https://github.com/savoirfairelinux/flake8-copyright"

arch="noarch"

license="MIT"

depends="py3-flake8 py3-setuptools"

subpackages="\$pkgname-pyc"

source="https://files.pythonhosted.org/packages/source/\${\_pkgname:0:1}/\${\_pkgname}/\${\_pkgname}-\${pkgver}.tar.gz"

builddir="\$srcdir"/\$\_pkgname-\$pkgver

replaces="py-flake8-copyright" # Backwards compatibility

provides="py-flake8-copyright=\$pkgver-r\$pkgrel" # Backwards compatibility

build() {

```

python3 setup.py build
}

package() {
python3 setup.py install --skip-build --root="$pkgdir"
}

sha512sums="
a6ab47e1bb715618f075c51f398e18180404871b3b0faf1c2d30701d5203db6bc23771bf22ffb5bafcd8ee856b9b64237
b316bd503ae7dceed6ca284ccd5a74d flake8-copyright-0.2.4.tar.gz
"

Maintainer: Natanael Copa <ncopa@alpinelinux.org>
pkgname=libart-lgpl
pkgver=2.3.21
pkgrel=8
pkgdesc="A library for high-performance 2D graphics"
url="https://www.levien.com/libart/"
arch="all"
options="!check" # No test suite.
license="LGPL-2.0-or-later"
subpackages="$pkgname-dev"
source="https://download.gnome.org/sources/libart_igpl/2.3/libart_igpl-$pkgver.tar.bz2"

buildddir="$srcdir"/libart_igpl-$pkgver

prepare() {
update_config_sub
default_prepare
}

build() {
./configure \
--build=$CBUILD \
--host=$CHOST \
--prefix=/usr
make
}

package() {
make DESTDIR="$pkgdir" install
}

sha512sums="8a632a6a4da59e5e8c02ec2f5a57e36d182b325b46513765425e5f171ff9ae326af1b133725beba28f7e7
6654309e001aee9bace727b5b4c8589405256a3c020 libart_igpl-2.3.21.tar.bz2"
mini_sendmail - accept email on behalf of real sendmail

```

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## 1.147 xz-libs 5.4.5-r0

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```
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it
under certain conditions; type `show c' for details.
```

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```
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```

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

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Version 3, 29 June 2007

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The

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section 10

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=====

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include/bsd/vis.h  
man/bitstring.3bsd  
man/errc.3bsd  
man/explicit\_bzero.3bsd  
man/fgetln.3bsd  
man/fgetwln.3bsd  
man/fpurge.3bsd  
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man/queue.3bsd  
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man/reallocarray.3bsd  
man/reallocf.3bsd  
man/setmode.3bsd  
man/strmode.3bsd  
man/strnstr.3bsd  
man/strtoi.3bsd  
man/strtou.3bsd  
man/unvis.3bsd  
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src/getbsize.c  
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src/arc4random\_uniform.c  
src/arc4random\_unix.h  
src/arc4random\_win.h  
src/closefrom.c  
src/freezero.c  
src/getentropy\_aix.c  
src/getentropy\_bsd.c  
src/getentropy\_hpux.c  
src/getentropy\_hurd.c  
src/getentropy\_linux.c  
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## 1.156 libncursesw 6.4\_p20231125-r0

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Files: install-sh

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Calling this script install-sh is preferred over install.sh, to prevent `make` implicit rules from creating a file called install from it when there is no Makefile.

This script is compatible with the BSD install script, but was written from scratch. It can only install one file at a time, a restriction shared with many OS's install programs.

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-- vile: txtmode file-encoding=utf-8

## 1.157 py3-pip-pyc 23.3.1-r0

### 1.157.1 Available under license :

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This package contains a modified version of ca-bundle.crt:

ca-bundle.crt -- Bundle of CA Root Certificates

Certificate data from Mozilla as of: Thu Nov 3 19:04:19 2011#

This is a bundle of X.509 certificates of public Certificate Authorities (CA). These were automatically extracted from Mozilla's root certificates file (certdata.txt). This file can be found in the mozilla source tree:

<https://hg.mozilla.org/mozilla-central/file/tip/security/nss/lib/ckfw/builtins/certdata.txt>

It contains the certificates in PEM format and therefore can be directly used with curl / libcurl / php\_curl, or with an Apache+mod\_ssl webserver for SSL client authentication.

Just configure this file as the SSLCACertificateFile.#

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@(#) \$RCSfile: certdata.txt,v

\$ \$Revision: 1.80 \$ \$Date: 2011/11/03 15:11:58 \$

A. HISTORY OF THE SOFTWARE

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

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

In May 2000, Guido and the Python core development team moved to BeOpen.com to form the BeOpen PythonLabs team. In October of the same year, the PythonLabs team moved to Digital Creations, which became Zope Corporation. In 2001, the Python Software Foundation (PSF, see

<https://www.python.org/psf/>) was formed, a non-profit organization created specifically to own Python-related Intellectual Property. Zope Corporation was a sponsoring member of the PSF.

All

Python releases are Open Source (see <https://opensource.org> for the Open Source Definition). Historically, most, but not all, Python releases have also been GPL-compatible; the table below summarizes the various releases.

| Release        | Derived from | Year      | Owner      | GPL-compatible? (1) |
|----------------|--------------|-----------|------------|---------------------|
| 0.9.0 thru 1.2 |              | 1991-1995 | CWI        | yes                 |
| 1.3 thru 1.5.2 | 1.2          | 1995-1999 | CNRI       | yes                 |
| 1.6            | 1.5.2        | 2000      | CNRI       | no                  |
| 2.0            | 1.6          | 2000      | BeOpen.com | no                  |
| 1.6.1          | 1.6          | 2001      | CNRI       | yes (2)             |
| 2.1            | 2.0+1.6.1    | 2001      | PSF        | no                  |
| 2.0.1          | 2.0+1.6.1    | 2001      | PSF        | yes                 |
| 2.1.1          | 2.1+2.0.1    | 2001      | PSF        | yes                 |
| 2.1.2          | 2.1.1        | 2002      | PSF        | yes                 |
| 2.1.3          | 2.1.2        | 2002      | PSF        | yes                 |
| 2.2 and above  | 2.1.1        | 2001-now  | PSF        | yes                 |

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(2) According to Richard Stallman, 1.6.1 is not GPL-compatible, because its license has a choice of law clause. According to CNRI, however, Stallman's lawyer has told CNRI's lawyer that 1.6.1 is "not incompatible" with the GPL.

Thanks to the many outside volunteers who have worked under Guido's direction to make these releases possible.

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## A. HISTORY OF THE SOFTWARE

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

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

In May 2000, Guido and the Python core development team moved to BeOpen.com to form the BeOpen PythonLabs team. In October of the same year, the PythonLabs team moved to Digital Creations (now Zope Corporation, see <http://www.zope.com>). In 2001, the Python Software Foundation (PSF, see <http://www.python.org/psf/>) was formed, a non-profit organization created specifically to own Python-related Intellectual Property. Zope Corporation is a sponsoring member of the PSF.

All Python releases are Open Source (see <http://www.opensource.org> for the Open Source Definition). Historically, most, but not all, Python releases have also been GPL-compatible; the table below summarizes the various releases.

| Release        | Derived from | Year      | Owner      | GPL-compatible? (1) |
|----------------|--------------|-----------|------------|---------------------|
| 0.9.0 thru 1.2 |              | 1991-1995 | CWI        | yes                 |
| 1.3 thru 1.5.2 | 1.2          | 1995-1999 | CNRI       | yes                 |
| 1.6            | 1.5.2        | 2000      | CNRI       | no                  |
| 2.0            | 1.6          | 2000      | BeOpen.com | no                  |
| 1.6.1          | 1.6          | 2001      | CNRI       | yes (2)             |
| 2.1            | 2.0+1.6.1    | 2001      | PSF        | no                  |
| 2.0.1          | 2.0+1.6.1    | 2001      | PSF        | yes                 |
| 2.1.1          | 2.1+2.0.1    | 2001      | PSF        | yes                 |
| 2.2            | 2.1.1        | 2001      | PSF        | yes                 |
| 2.1.2          | 2.1.1        | 2002      | PSF        | yes                 |
| 2.1.3          |              |           |            |                     |

|       |       |           |     |     |
|-------|-------|-----------|-----|-----|
| 2.1.2 | 2002  | PSF       | yes |     |
| 2.2.1 | 2.2   | 2002      | PSF | yes |
| 2.2.2 | 2.2.1 | 2002      | PSF | yes |
| 2.2.3 | 2.2.2 | 2003      | PSF | yes |
| 2.3   | 2.2.2 | 2002-2003 | PSF | yes |
| 2.3.1 | 2.3   | 2002-2003 | PSF | yes |
| 2.3.2 | 2.3.1 | 2002-2003 | PSF | yes |
| 2.3.3 | 2.3.2 | 2002-2003 | PSF | yes |
| 2.3.4 | 2.3.3 | 2004      | PSF | yes |
| 2.3.5 | 2.3.4 | 2005      | PSF | yes |
| 2.4   | 2.3   | 2004      | PSF | yes |
| 2.4.1 | 2.4   | 2005      | PSF | yes |
| 2.4.2 | 2.4.1 | 2005      | PSF | yes |
| 2.4.3 | 2.4.2 | 2006      | PSF | yes |
| 2.4.4 | 2.4.3 | 2006      | PSF | yes |
| 2.5   | 2.4   | 2006      | PSF | yes |
| 2.5.1 | 2.5   | 2007      | PSF | yes |
| 2.5.2 | 2.5.1 | 2008      | PSF | yes |
| 2.5.3 | 2.5.2 | 2008      | PSF | yes |
| 2.6   | 2.5   | 2008      | PSF | yes |
| 2.6.1 | 2.6   | 2008      | PSF | yes |
| 2.6.2 | 2.6.1 | 2009      | PSF | yes |
| 2.6.3 | 2.6.2 | 2009      | PSF | yes |
| 2.6.4 | 2.6.3 | 2009      | PSF | yes |
| 2.6.5 | 2.6.4 | 2010      | PSF | yes |
| 3.0   | 2.6   | 2008      | PSF | yes |
| 3.0.1 | 3.0   | 2009      | PSF | yes |
| 3.1   | 3.0.1 | 2009      | PSF | yes |
| 3.1.1 | 3.1   | 2009      | PSF | yes |
| 3.1.2 | 3.1   | 2010      | PSF | yes |
| 3.2   | 3.1   | 2010      | PSF | yes |

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(2) According to Richard Stallman, 1.6.1 is not GPL-compatible, because its license has a choice of law clause. According to CNRI, however, Stallman's lawyer has told CNRI's lawyer that 1.6.1 is "not incompatible" with the GPL.

Thanks to the many outside volunteers who have worked under Guido's direction to make these releases possible.

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# 1.158 libpanelw 6.4\_p20231125-r0

## 1.158.1 Available under license :

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```
$Id: modules,v 1.11 2020/02/02 23:34:34 tom Exp $
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#
Author: Thomas E. Dickey 1995-on
#

@ base
Library objects
panel lib $(srcdir) $(HEADER_DEPS)
p_above lib $(srcdir) $(HEADER_DEPS)
```

p\_below lib \$(srcdir) \$(HEADER\_DEPS)  
p\_bottom lib \$(srcdir) \$(HEADER\_DEPS)  
p\_delete lib \$(srcdir) \$(HEADER\_DEPS)  
p\_hide lib \$(srcdir) \$(HEADER\_DEPS)  
p\_hidden lib \$(srcdir) \$(HEADER\_DEPS)  
p\_move lib \$(srcdir) \$(HEADER\_DEPS)  
p\_new lib \$(srcdir) \$(HEADER\_DEPS)  
p\_replace lib \$(srcdir) \$(HEADER\_DEPS)  
p\_show lib \$(srcdir) \$(HEADER\_DEPS)  
p\_top lib \$(srcdir) \$(HEADER\_DEPS)  
p\_update lib \$(srcdir) \$(HEADER\_DEPS)  
p\_user lib \$(srcdir) \$(HEADER\_DEPS)  
p\_win lib \$(srcdir) \$(HEADER\_DEPS)

# vile:makemode

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path(s):

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/* LINTLIBRARY */

/* ./panel.c */

#include <panel.priv.h>

#undef _nc_retrace_panel
PANEL *_nc_retrace_panel(
 PANEL *pan)
{ return(*(PANEL **)0); }

#undef _nc_my_visbuf
const char *_nc_my_visbuf(
 const void *ptr,
 int n)
{ return(*(const char **)0); }

#undef _nc_dPanel

```

```

void _nc_dPanel(
 const char *text,
 const PANEL *pan)
 { /* void */ }

#undef _nc_dStack
void _nc_dStack(
 const char *fmt,
 int num,
 const PANEL *pan)
 { /* void */ }

#undef _nc_Wnoutrefresh
void _nc_Wnoutrefresh(
 const
 PANEL *pan)
 { /* void */ }

#undef _nc_Touchpan
void _nc_Touchpan(
 const PANEL *pan)
 { /* void */ }

#undef _nc_Touchline
void _nc_Touchline(
 const PANEL *pan,
 int start,
 int count)
 { /* void */ }

/* ./p_above.c */

#undef ground_panel
PANEL *ground_panel(
 SCREEN *sp)
 { return(*(PANEL **)0); }

#undef panel_above
PANEL *panel_above(
 const PANEL *pan)
 { return(*(PANEL **)0); }

/* ./p_below.c */

#undef ceiling_panel
PANEL *ceiling_panel(
 SCREEN *sp)
 { return(*(PANEL **)0); }

```

```
#undef panel_below
PANEL *panel_below(
 const PANEL *pan)
{ return(*(PANEL **)0); }
```

```
/* ./p_bottom.c */
```

```
#undef bottom_panel
int bottom_panel(
 PANEL *pan)
{ return(*(int *)0); }
```

```
/* ./p_delete.c */
```

```
#undef del_panel
int del_panel(
 PANEL *pan)
{ return(*(int *)0); }
```

```
/* ./p_hide.c */
```

```
#undef hide_panel
int hide_panel(
 PANEL *pan)
{ return(*(int *)0); }
```

```
/* ./p_hidden.c */
```

```
#undef panel_hidden
int panel_hidden(
 const PANEL *pan)
{ return(*(int *)0); }
```

```
/* ./p_move.c
*/
```

```
#undef move_panel
int move_panel(
 PANEL *pan,
 int starty,
 int startx)
{ return(*(int *)0); }
```

```
/* ./p_new.c */
```

```
#undef new_panel
PANEL *new_panel(
```

```

WINDOW *win)
{ return(*(PANEL **)0); }

/* ./p_replace.c */

#undef replace_panel
int replace_panel(
 PANEL *pan,
 WINDOW *win)
{ return(*(int *)0); }

/* ./p_show.c */

#undef show_panel
int show_panel(
 PANEL *pan)
{ return(*(int *)0); }

/* ./p_top.c */

#undef top_panel
int top_panel(
 PANEL *pan)
{ return(*(int *)0); }

/* ./p_update.c */

#undef update_panels_sp
void update_panels_sp(
 SCREEN *sp)
{ /* void */ }

#undef update_panels
void update_panels(void)
{ /* void */ }

/* ./p_user.c */

#undef set_panel_userptr
int set_panel_userptr(
 PANEL *pan,
 const void *uptr)
{ return(*(int *)0); }

#undef panel_userptr
const void *panel_userptr(
 const PANEL *pan)
{ return(*(const void **)0); }

```

```
/* ./p_win.c */
```

```
#undef panel_window
WINDOW *panel_window(
 const PANEL *pan)
 { return(*(WINDOW **))0;
 }
```

Found in path(s):

\* /opt/cola/permits/1864355811\_1705961080.3554633/0/libpanel-6-4-zip/libpanel\_6.4/liblpanel

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```
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```

```
/******
```

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```

```
/* LINTLIBRARY */
```

```

/* ./panel.c */

#include <panel.priv.h>

#undef _nc_retrace_panel
PANEL *_nc_retrace_panel(
 PANEL *pan)
 { return(*(PANEL **)0); }

#undef _nc_my_visbuf
const char *_nc_my_visbuf(
 const void *ptr,
 int n)
 { return(*(const char **)0); }

#undef _nc_dPanel
void _nc_dPanel(
 const char *text,
 const PANEL *pan)
 { /* void */ }

#undef _nc_dStack
void _nc_dStack(
 const char *fmt,
 int num,
 const PANEL *pan)
 { /* void */ }

#undef _nc_Wnoutrefresh
void _nc_Wnoutrefresh(
 const
 PANEL *pan)
 { /* void */ }

#undef _nc_Touchpan
void _nc_Touchpan(
 const PANEL *pan)
 { /* void */ }

#undef _nc_Touchline
void _nc_Touchline(
 const PANEL *pan,
 int start,
 int count)
 { /* void */ }

/* ./p_above.c */

```

```
#undef ground_panel
PANEL *ground_panel(
 SCREEN *sp)
{ return(*(PANEL **)0); }
```

```
#undef panel_above
PANEL *panel_above(
 const PANEL *pan)
{ return(*(PANEL **)0); }
```

```
/* ./p_below.c */
```

```
#undef ceiling_panel
PANEL *ceiling_panel(
 SCREEN *sp)
{ return(*(PANEL **)0); }
```

```
#undef panel_below
PANEL *panel_below(
 const PANEL *pan)
{ return(*(PANEL **)0); }
```

```
/* ./p_bottom.c */
```

```
#undef bottom_panel
int bottom_panel(
 PANEL *pan)
{ return(*(int *)0); }
```

```
/* ./p_delete.c */
```

```
#undef del_panel
int del_panel(
 PANEL *pan)
{ return(*(int *)0); }
```

```
/* ./p_hide.c */
```

```
#undef hide_panel
int hide_panel(
 PANEL *pan)
{ return(*(int *)0); }
```

```
/* ./p_hidden.c */
```

```
#undef panel_hidden
int panel_hidden(
```

```

const PANEL *pan)
{ return(*(int *)0); }

/* ./p_move.c
*/

#undef move_panel
int move_panel(
 PANEL *pan,
 int starty,
 int startx)
{ return(*(int *)0); }

/* ./p_new.c */

#undef new_panel
PANEL *new_panel(
 WINDOW *win)
{ return(*(PANEL **)0); }

/* ./p_replace.c */

#undef replace_panel
int replace_panel(
 PANEL *pan,
 WINDOW *win)
{ return(*(int *)0); }

/* ./p_show.c */

#undef show_panel
int show_panel(
 PANEL *pan)
{ return(*(int *)0); }

/* ./p_top.c */

#undef top_panel
int top_panel(
 PANEL *pan)
{ return(*(int *)0); }

/* ./p_update.c */

#undef update_panels_sp
void update_panels_sp(
 SCREEN *sp)
{ /* void */ }

```



```

#undef update_panels
void update_panels(void)
 { /* void */ }

/* ./p_user.c */

#undef set_panel_userptr
int set_panel_userptr(
 PANEL *pan,
 const void *uptr)
 { return(*(int *)0); }

#undef panel_userptr
const void *panel_userptr(
 const PANEL *pan)
 { return(*(const void **)0); }

/* ./p_win.c */

#undef panel_window
WINDOW *panel_window(
 const PANEL *pan)
 { return(*(WINDOW **)0); }
}

```

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```

* /opt/cola/permits/1864355811_1705961080.3554633/0/libpanel-6-4-zip/libpanel_6.4/l-lib-lpanelt
* /opt/cola/permits/1864355811_1705961080.3554633/0/libpanel-6-4-zip/libpanel_6.4/l-lib-lpaneltw

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```

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```

```

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```

```

/* LINTLIBRARY */

```

```

/* ./panel.c */

```

```

#include <panel.priv.h>

```

```

#undef _nc_retrace_panel
PANEL *_nc_retrace_panel(
 PANEL *pan)
{ return(*(PANEL **)0); }

```

```

#undef _nc_my_visbuf
const char *_nc_my_visbuf(
 const void *ptr,
 int n)
{ return(*(const char **)0); }

```

```

#undef _nc_dPanel
void _nc_dPanel(
 const char *text,
 const PANEL *pan)

```

```

{ /* void */ }

#undef _nc_dStack
void _nc_dStack(
 const char *fmt,
 int num,
 const PANEL *pan)
{ /* void */ }

#undef _nc_Wnoutrefresh
void _nc_Wnoutrefresh(
 const
 PANEL *pan)
{ /* void */ }

#undef _nc_Touchpan
void _nc_Touchpan(
 const PANEL *pan)
{ /* void */ }

#undef _nc_Touchline
void _nc_Touchline(
 const PANEL *pan,
 int start,
 int count)
{ /* void */ }

/* ./p_above.c */

#undef ground_panel
PANEL *ground_panel(
 SCREEN *sp)
{ return(*(PANEL **)0); }

#undef panel_above
PANEL *panel_above(
 const PANEL *pan)
{ return(*(PANEL **)0); }

/* ./p_below.c */

#undef ceiling_panel
PANEL *ceiling_panel(
 SCREEN *sp)
{ return(*(PANEL **)0); }

#undef panel_below
PANEL *panel_below(

```

```

const PANEL *pan)
{ return(*(PANEL **)0); }

/* ./p_bottom.c */

#undef bottom_panel
int bottom_panel(
 PANEL *pan)
{ return(*(int *)0); }

/* ./p_delete.c */

#undef del_panel
int del_panel(
 PANEL *pan)
{ return(*(int *)0); }

/* ./p_hide.c */

#undef hide_panel
int hide_panel(
 PANEL *pan)
{ return(*(int *)0); }

/* ./p_hidden.c */

#undef panel_hidden
int panel_hidden(
 const PANEL *pan)
{ return(*(int *)0); }

/* ./p_move.c
*/

#undef move_panel
int move_panel(
 PANEL *pan,
 int starty,
 int startx)
{ return(*(int *)0); }

/* ./p_new.c */

#undef new_panel
PANEL *new_panel(
 WINDOW *win)
{ return(*(PANEL **)0); }

```

```

/* ./p_replace.c */

#undef replace_panel
int replace_panel(
 PANEL *pan,
 WINDOW *win)
{ return(*(int *)0); }

/* ./p_show.c */

#undef show_panel
int show_panel(
 PANEL *pan)
{ return(*(int *)0); }

/* ./p_top.c */

#undef top_panel
int top_panel(
 PANEL *pan)
{ return(*(int *)0); }

/* ./p_update.c */

#undef update_panels_sp
void update_panels_sp(
 SCREEN *sp)
{ /* void */ }

#undef update_panels
void update_panels(void)
{ /* void */ }

/* ./p_user.c */

#undef set_panel_userptr
int set_panel_userptr(
 PANEL *pan,
 const void *uptr)
{ return(*(int *)0); }

#undef panel_userptr
const void *panel_userptr(
 const PANEL *pan)
{ return(*(const void **)0); }

/* ./p_win.c */

```

```
#undef panel_window
WINDOW *panel_window(
 const PANEL *pan)
{ return(*(WINDOW **))0;
}
```

Found in path(s):

\* /opt/cola/permits/1864355811\_1705961080.3554633/0/libpanel-6-4-zip/libpanel\_6.4/libpanelw

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```

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* /opt/cola/permits/1864355811_1705961080.3554633/0/libpanel-6-4-zip/libpanel_6.4/p_below.c
* /opt/cola/permits/1864355811_1705961080.3554633/0/libpanel-6-4-zip/libpanel_6.4/panel.c

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* /opt/cola/permits/1864355811_1705961080.3554633/0/libpanel-6-4-zip/libpanel_6.4/p_update.c
* /opt/cola/permits/1864355811_1705961080.3554633/0/libpanel-6-4-zip/libpanel_6.4/p_hide.c
* /opt/cola/permits/1864355811_1705961080.3554633/0/libpanel-6-4-zip/libpanel_6.4/p_hidden.c

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Author: Thomas E. Dickey <dickey@clark.net> 1996
#
$(srcdir)/panel.h
vile:makemode

```

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# 1.159 go-uuid 1.4.0

## 1.159.1 Available under license :

Paul Borman <borman@google.com>

bmatsuo

shawnps

theory

jboverfelt

dsymonds

cd1

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A. HISTORY OF THE SOFTWARE

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

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

In May 2000, Guido and the Python core development team moved to BeOpen.com to form the BeOpen PythonLabs team. In October of the same year, the PythonLabs team moved to Digital Creations (now Zope Corporation, see <http://www.zope.com>). In 2001, the Python Software Foundation (PSF, see <http://www.python.org/psf/>) was formed, a non-profit organization created specifically to own Python-related Intellectual Property. Zope Corporation is a sponsoring member

of  
the PSF.

All Python releases are Open Source (see <http://www.opensource.org> for the Open Source Definition). Historically, most, but not all, Python releases have also been GPL-compatible; the table below summarizes the various releases.

| Release        | Derived from | Year      | Owner      | GPL-compatible? (1) |
|----------------|--------------|-----------|------------|---------------------|
| 0.9.0 thru 1.2 |              | 1991-1995 | CWI        | yes                 |
| 1.3 thru 1.5.2 | 1.2          | 1995-1999 | CNRI       | yes                 |
| 1.6            | 1.5.2        | 2000      | CNRI       | no                  |
| 2.0            | 1.6          | 2000      | BeOpen.com | no                  |
| 1.6.1          | 1.6          | 2001      | CNRI       | yes (2)             |
| 2.1            | 2.0+1.6.1    | 2001      | PSF        | no                  |
| 2.0.1          | 2.0+1.6.1    | 2001      | PSF        | yes                 |
| 2.1.1          | 2.1+2.0.1    | 2001      | PSF        | yes                 |
| 2.2            | 2.1.1        | 2001      | PSF        | yes                 |
| 2.1.2          | 2.1.1        | 2002      | PSF        | yes                 |
| 2.1.3          |              |           |            |                     |
| 2.1.2          | 2002         | PSF       | yes        |                     |
| 2.2.1          | 2.2          | 2002      | PSF        | yes                 |
| 2.2.2          | 2.2.1        | 2002      | PSF        | yes                 |
| 2.2.3          | 2.2.2        | 2003      | PSF        | yes                 |
| 2.3            | 2.2.2        | 2002-2003 | PSF        | yes                 |
| 2.3.1          | 2.3          | 2002-2003 | PSF        | yes                 |
| 2.3.2          | 2.3.1        | 2002-2003 | PSF        | yes                 |
| 2.3.3          | 2.3.2        | 2002-2003 | PSF        | yes                 |
| 2.3.4          | 2.3.3        | 2004      | PSF        | yes                 |
| 2.3.5          | 2.3.4        | 2005      | PSF        | yes                 |
| 2.4            | 2.3          | 2004      | PSF        | yes                 |
| 2.4.1          | 2.4          | 2005      | PSF        | yes                 |
| 2.4.2          | 2.4.1        | 2005      | PSF        | yes                 |
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| 2.5.1          | 2.5          | 2007      | PSF        | yes                 |
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| 2.5.3          | 2.5.2        | 2008      | PSF        | yes                 |
| 2.6            | 2.5          | 2008      | PSF        | yes                 |
| 2.6.1          | 2.6          | 2008      | PSF        | yes                 |
| 2.6.2          | 2.6.1        | 2009      | PSF        | yes                 |
| 2.6.3          | 2.6.2        | 2009      | PSF        | yes                 |
| 2.6.4          | 2.6.3        | 2009      | PSF        | yes                 |
| 2.6.5          | 2.6.4        | 2010      | PSF        | yes                 |
| 3.0            | 2.6          | 2008      | PSF        | yes                 |



|       |       |      |     |     |
|-------|-------|------|-----|-----|
| 3.0.1 | 3.0   | 2009 | PSF | yes |
| 3.1   | 3.0.1 | 2009 | PSF | yes |
| 3.1.1 | 3.1   | 2009 | PSF | yes |
| 3.1.2 | 3.1   | 2010 | PSF | yes |
| 3.2   | 3.1   | 2010 | PSF | yes |

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## 1.171 cpuid 1.1

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# 1.181 py3-pip 23.3.1-r0

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ca-bundle.crt -- Bundle of CA Root Certificates

Certificate data from Mozilla as of: Thu Nov 3 19:04:19 2011#

This is a bundle of X.509 certificates of public Certificate Authorities  
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file (certdata.txt). This file can be found in the mozilla source tree:

<https://hg.mozilla.org/mozilla-central/file/tip/security/nss/lib/ckfw/builtins/certdata.txt>

It contains the certificates in PEM format and therefore  
can be directly used with curl / libcurl / php\_curl, or with  
an Apache+mod\_ssl webserver for SSL client authentication.  
Just configure this file as the SSLCACertificateFile.#

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@(#) \$RCSfile: certdata.txt,v

\$ \$Revision: 1.80 \$ \$Date: 2011/11/03 15:11:58 \$

A. HISTORY OF THE SOFTWARE

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

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

In May 2000, Guido and the Python core development team moved to  
BeOpen.com to form the BeOpen PythonLabs team. In October of the same  
year, the PythonLabs team moved to Digital Creations, which became  
Zope Corporation. In 2001, the Python Software Foundation (PSF, see  
<https://www.python.org/psf/>) was formed, a non-profit organization  
created specifically to own Python-related Intellectual Property.  
Zope Corporation was a sponsoring member of the PSF.

All

Python releases are Open Source (see <https://opensource.org> for the Open Source Definition). Historically, most, but not all, Python releases have also been GPL-compatible; the table below summarizes the various releases.

| Release        | Derived from | Year      | Owner      | GPL-compatible? (1) |
|----------------|--------------|-----------|------------|---------------------|
| 0.9.0 thru 1.2 |              | 1991-1995 | CWI        | yes                 |
| 1.3 thru 1.5.2 | 1.2          | 1995-1999 | CNRI       | yes                 |
| 1.6            | 1.5.2        | 2000      | CNRI       | no                  |
| 2.0            | 1.6          | 2000      | BeOpen.com | no                  |
| 1.6.1          | 1.6          | 2001      | CNRI       | yes (2)             |
| 2.1            | 2.0+1.6.1    | 2001      | PSF        | no                  |
| 2.0.1          | 2.0+1.6.1    | 2001      | PSF        | yes                 |
| 2.1.1          | 2.1+2.0.1    | 2001      | PSF        | yes                 |
| 2.1.2          | 2.1.1        | 2002      | PSF        | yes                 |
| 2.1.3          | 2.1.2        | 2002      | PSF        | yes                 |
| 2.2 and above  | 2.1.1        | 2001-now  |            |                     |
| PSF            | yes          |           |            |                     |

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(2) According to Richard Stallman, 1.6.1 is not GPL-compatible, because its license has a choice of law clause. According to CNRI, however, Stallman's lawyer has told CNRI's lawyer that 1.6.1 is "not incompatible" with the GPL.

Thanks to the many outside volunteers who have worked under Guido's direction to make these releases possible.

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## A. HISTORY OF THE SOFTWARE

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

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

In May 2000, Guido and the Python core development team moved to BeOpen.com to form the BeOpen PythonLabs team. In October of the same year, the PythonLabs team moved to Digital Creations (now Zope Corporation, see <http://www.zope.com>). In 2001, the Python Software Foundation (PSF, see <http://www.python.org/psf/>) was formed, a non-profit organization created specifically to own Python-related Intellectual Property. Zope Corporation is a sponsoring member of the PSF.

All Python releases are Open Source (see <http://www.opensource.org> for the Open Source Definition). Historically, most, but not all, Python releases have also been GPL-compatible; the table below summarizes the various releases.

| Release        | Derived from | Year      | Owner      | GPL-compatible? (1) |
|----------------|--------------|-----------|------------|---------------------|
| 0.9.0 thru 1.2 |              | 1991-1995 | CWI        | yes                 |
| 1.3 thru 1.5.2 | 1.2          | 1995-1999 | CNRI       | yes                 |
| 1.6            | 1.5.2        | 2000      | CNRI       | no                  |
| 2.0            | 1.6          | 2000      | BeOpen.com | no                  |
| 1.6.1          | 1.6          | 2001      | CNRI       | yes (2)             |
| 2.1            | 2.0+1.6.1    | 2001      | PSF        | no                  |
| 2.0.1          | 2.0+1.6.1    | 2001      | PSF        | yes                 |
| 2.1.1          | 2.1+2.0.1    | 2001      | PSF        | yes                 |
| 2.2            | 2.1.1        | 2001      | PSF        | yes                 |
| 2.1.2          | 2.1.1        | 2002      | PSF        | yes                 |
| 2.1.3          |              |           |            |                     |
| 2.1.2          | 2002         | PSF       | yes        |                     |
| 2.2.1          | 2.2          | 2002      | PSF        | yes                 |
| 2.2.2          | 2.2.1        | 2002      | PSF        | yes                 |
| 2.2.3          | 2.2.2        | 2003      | PSF        | yes                 |
| 2.3            | 2.2.2        | 2002-2003 | PSF        | yes                 |
| 2.3.1          | 2.3          | 2002-2003 | PSF        | yes                 |

|       |       |           |     |     |
|-------|-------|-----------|-----|-----|
| 2.3.2 | 2.3.1 | 2002-2003 | PSF | yes |
| 2.3.3 | 2.3.2 | 2002-2003 | PSF | yes |
| 2.3.4 | 2.3.3 | 2004      | PSF | yes |
| 2.3.5 | 2.3.4 | 2005      | PSF | yes |
| 2.4   | 2.3   | 2004      | PSF | yes |
| 2.4.1 | 2.4   | 2005      | PSF | yes |
| 2.4.2 | 2.4.1 | 2005      | PSF | yes |
| 2.4.3 | 2.4.2 | 2006      | PSF | yes |
| 2.4.4 | 2.4.3 | 2006      | PSF | yes |
| 2.5   | 2.4   | 2006      | PSF | yes |
| 2.5.1 | 2.5   | 2007      | PSF | yes |
| 2.5.2 | 2.5.1 | 2008      | PSF | yes |
| 2.5.3 | 2.5.2 | 2008      | PSF | yes |
| 2.6   | 2.5   | 2008      | PSF | yes |
| 2.6.1 | 2.6   | 2008      | PSF | yes |
| 2.6.2 | 2.6.1 | 2009      | PSF | yes |
| 2.6.3 | 2.6.2 | 2009      | PSF | yes |
| 2.6.4 | 2.6.3 | 2009      | PSF | yes |
| 2.6.5 | 2.6.4 | 2010      | PSF | yes |
| 3.0   | 2.6   | 2008      | PSF | yes |
| 3.0.1 | 3.0   | 2009      | PSF | yes |
| 3.1   | 3.0.1 | 2009      | PSF | yes |
| 3.1.1 | 3.1   | 2009      | PSF | yes |
| 3.1.2 | 3.1   | 2010      | PSF | yes |
| 3.2   | 3.1   | 2010      | PSF | yes |

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```
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version 1.2.5, April 19th, 2010
```

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

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

In May 2000, Guido and the Python core development team moved to BeOpen.com to form the BeOpen PythonLabs team. In October of the same year, the PythonLabs team moved to Digital Creations (now Zope Corporation, see <http://www.zope.com>). In 2001, the Python Software Foundation (PSF, see <http://www.python.org/psf/>) was formed, a non-profit organization created specifically to own Python-related Intellectual Property. Zope Corporation is a sponsoring member of the PSF.

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| Release        | Derived from | Year      | Owner      | GPL-compatible? (1) |
|----------------|--------------|-----------|------------|---------------------|
| 0.9.0 thru 1.2 |              | 1991-1995 | CWI        | yes                 |
| 1.3 thru 1.5.2 | 1.2          | 1995-1999 | CNRI       | yes                 |
| 1.6            | 1.5.2        | 2000      | CNRI       | no                  |
| 2.0            | 1.6          | 2000      | BeOpen.com | no                  |
| 1.6.1          | 1.6          | 2001      | CNRI       | yes (2)             |
| 2.1            | 2.0+1.6.1    | 2001      | PSF        | no                  |
| 2.0.1          | 2.0+1.6.1    | 2001      | PSF        | yes                 |
| 2.1.1          | 2.1+2.0.1    | 2001      | PSF        | yes                 |
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|       |       |           |     |     |
|-------|-------|-----------|-----|-----|
| 2.1.2 | 2.1.1 | 2002      | PSF | yes |
| 2.1.3 |       |           |     |     |
| 2.1.2 | 2002  | PSF       | yes |     |
| 2.2.1 | 2.2   | 2002      | PSF | yes |
| 2.2.2 | 2.2.1 | 2002      | PSF | yes |
| 2.2.3 | 2.2.2 | 2003      | PSF | yes |
| 2.3   | 2.2.2 | 2002-2003 | PSF | yes |
| 2.3.1 | 2.3   | 2002-2003 | PSF | yes |
| 2.3.2 | 2.3.1 | 2002-2003 | PSF | yes |
| 2.3.3 | 2.3.2 | 2002-2003 | PSF | yes |
| 2.3.4 | 2.3.3 | 2004      | PSF | yes |
| 2.3.5 | 2.3.4 | 2005      | PSF | yes |
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| 2.4.1 | 2.4   | 2005      | PSF | yes |
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| 2.6.2 | 2.6.1 | 2009      | PSF | yes |
| 2.6.3 | 2.6.2 | 2009      | PSF | yes |
| 2.6.4 | 2.6.3 | 2009      | PSF | yes |
| 2.6.5 | 2.6.4 | 2010      | PSF | yes |
| 3.0   | 2.6   | 2008      | PSF | yes |
| 3.0.1 | 3.0   | 2009      | PSF | yes |
| 3.1   | 3.0.1 | 2009      | PSF | yes |
| 3.1.1 | 3.1   | 2009      | PSF | yes |
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This package contains a modified version of ca-bundle.crt:

ca-bundle.crt -- Bundle of CA Root Certificates

Certificate data from Mozilla as of: Thu Nov 3 19:04:19 2011#

This is a bundle of X.509 certificates of public Certificate Authorities (CA). These were automatically extracted from Mozilla's root certificates file (certdata.txt). This file can be found in the mozilla source tree:

<https://hg.mozilla.org/mozilla-central/file/tip/security/nss/lib/ckfw/builtins/certdata.txt>

It contains the certificates in PEM format and therefore can be directly used with curl / libcurl / php\_curl, or with an Apache+mod\_ssl webserver for SSL client authentication. Just configure this file as the SSLCertificateFile.#

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## 1.193 pierrec-lz4 4.1.21

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## 1.194 alpine-baselayout-data 3.4.3-r2

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```
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Contributor: Valery Kartel <valery.kartel@gmail.com>
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pkgname=perl-bsd-resource
#_pkgreal is used by apkbuild-cpan to find modules at MetaCpan
_pkgreal=BSD-Resource
pkgver=1.2911
pkgrel=9
pkgdesc="Perl extension implements the BSD process resource limit functions"
url="https://metacpan.org/release/BSD-Resource/"
arch="all"
license="Artistic-2.0 OR LGPL-2.0"
depends="perl"
makedepends="perl-dev"
subpackages="$pkgname-doc"
source="https://cpan.metacpan.org/authors/id/J/JH/JHI/BSD-Resource-$pkgver.tar.gz"
builddir="$srcdir/${_pkgreal}-$pkgver"

build() {
 export CFLAGS=$(perl -MConfig -E 'say $Config{ccflags}')
 PERL_MM_USE_DEFAULT=1 perl -I. Makefile.PL INSTALLDIRS=vendor
 make
}

check() {
 export CFLAGS=$(perl -MConfig -E 'say $Config{ccflags}')
 make test
}

package() {
 make DESTDIR="$pkgdir" install
 find "$pkgdir" \(-name perllocal.pod -o -name .packlist \) -delete
}
```

```

sha512sums="
d0032d41c7c0468ed1c6d8f57b885f6cb97a5039d754c8cb60b2067daedaf53bd15fb6561a3d0f828df16dfa5417f663b
8065ba65f4fea16dc9262728b3b6b85
 BSD-Resource-1.2911.tar.gz
"
Contributor: Dhruvin Gandhi <contact@dhruvin.dev>
Maintainer: Patrycja Rosa <alpine@ptrcnull.me>
pkgname=py3-license-expression
_pkgname=license-expression
pkgver=30.2.0
pkgrel=0
pkgdesc="Library to parse, compare, simplify and normalize license expressions"
url="https://github.com/nexB/license-expression"
arch="noarch"
license="Apache-2.0"
depends="python3 py3-boolean.py"
makedepends="py3-setuptools py3-setuptools_scm py3-gpep517 py3-wheel"
checkdepends="py3-pytest py3-pytest-xdist"
subpackages="$pkgname-pyc"
source="https://files.pythonhosted.org/packages/source/l/${_pkgname}/${_pkgname}-${pkgver}.tar.gz"
builddir="$srcdir/${_pkgname}-${pkgver}"

build() {
 gpep517 build-wheel \
 --wheel-dir .dist \
 --output-fd 3 3>&1 >&2
}

check() {
 python3 -m venv --clear --without-pip --system-site-packages .testenv
 .testenv/bin/python3 -m installer .dist/*.whl
 .testenv/bin/python3 -m pytest
}

package() {
 python3 -m installer -d "$pkgdir" \
 .dist/*.whl
}

sha512sums="
7be7ebab1d980063ab846a228c5247570d0e23ed52f4362ef7d88eb7a59274e6f74653b4e9cff8225597693087d750c5
bf7fcf604440d8d3d2976ebcd7442c24
 license-expression-30.2.0.tar.gz
"

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The Kohonen neural network code for color optimization was written by Anthony Dekker.

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The X-Spline code was written Carole Blanc (blanc@labri.u-bordeaux.fr) and Christophe Schlick (schlick@labri.u-bordeaux.fr) starting from an initial implementation done by C. Feuille, S. Grosbois, L. Maziere and L. Minihot as a student practice (Universite Bordeaux, France). For additional information about X-splines, see:

"X-Splines: A Spline Model Designed for the End User" by C. Blanc and C. Schlick, Proceedings of SIGGRAPH'95

<http://dept-info.labri.u-bordeaux.fr/~schlick/DOC/sig1.html>

# Maintainer: Jakub Panek <me@panekj.dev>

pkgname=cargo-license

pkgver=0.5.1

pkgrel=4

pkgdesc="Cargo subcommand to see license of dependencies"

url="https://github.com/onur/cargo-license"

arch="all !s390x !riscv64" # rust

license="MIT"

makedepends="cargo cargo-auditable"

source="\$pkgname-\$pkgver.tar.gz::https://crates.io/api/v1/crates/cargo-license/\$pkgver/download"

```
prepare() {
```

```
 default_prepare
```

```
 cargo fetch --target="$CTARGET" --locked
```

```
}
```

```
build() {
```

```
 cargo auditable build --release --frozen
```

```
}
```

```

check() {
 cargo test --frozen
}

package() {
 install -Dm755 target/release/cargo-license -t "$pkgdir"/usr/bin
}

sha512sums="
4d8d430df91c6aac53d2305d3125eae492324e85c4db29d33d452b3848f33a55088e71247c6c72c6a62f4e924a374a
115bf14b4f398e7950b9eb52415f2244 cargo-license-0.5.1.tar.gz
"

Contributor: Maxim Karasev <begs@disroot.org>
Maintainer: mio <miyopan@e.email>
pkgname=bsd-games
pkgver=3.3
pkgrel=1
pkgdesc="traditional text mode games from BSD"
url="https://bsd-games.sourceforge.io/"
arch="all"
license="BSD-3-Clause"
install="$pkgname.post-install"
makedepends="ncurses-dev coreutils" # configure causes busybox expr error
subpackages="$pkgname-doc"
source="https://sourceforge.net/projects/bsd-games/files/bsd-games-$pkgver.tar.gz"
options="!check" # no tests

build() {
 # some GNU autoconf options are ignored, but it works
 ./configure \
 --build=$CBUILD \
 --host=$CHOST \
 --prefix=/usr \
 --sysconfdir=/etc \
 --mandir=/usr/share/man \
 --localstatedir=/var/lib # it really shouldn't be in /var
 make
}

package() {
 make DESTDIR="$pkgdir" install
 install -Dm644 LICENSE "$pkgdir"/usr/share/licenses/bsd-games/LICENSE
}

sha512sums="
aaf36d09d4fe68514a5c279063d7e77a9a9a84c447037cba974b29faa07eb80c2aab2379d0699c196b5c27ffe1b2bb2c6
8d3390143e0e62d5e3d210ccfb61294
"

```

```

 bsd-games-3.3.tar.gz
"
Contributor: Carlo Landmeter <clandmeter@alpinelinux.org>
Maintainer: Kevin Daudt <kdaudt@alpinelinux.org>
pkgname=spdx-licenses
pkgver=3.22
pkgrel=0
pkgdesc="Various data formats for the SPDX License List"
url="https://spdx.org/"
arch="noarch"
options="!check" # no test suite
license="CC-BY-3.0"
source="license-list-data-$pkgver.tar.gz::https://github.com/spdx/license-list-data/archive/v$pkgver.tar.gz"
builddir="$srcdir/license-list-data-$pkgver"
subpackages="$pkgname-list"

_types="html json rdfa rdfnt rdfturtle rdfxml template text"

for type in $_types; do
 subpackages="$subpackages $pkgname-$type:_subpkg"
done

package() {
 mkdir -p "$pkgdir"
}

_subpkg() {
 local type=${subpkgname/$pkgname-/}
 pkgdesc="$pkgdesc ($type)"
 install_if="$pkgname"
 mkdir -p "$subpkgdir"/usr/share/spdx
 cp -r "$builddir"/$type "$subpkgdir"/usr/share/spdx/
}

list() {
 pkgdesc="$pkgdesc (licence list)"
 mkdir -p "$subpkgdir"/usr/share/spdx
 local i; for i in "$builddir"/text/*.txt; do
 local license=${i##*/}
 echo
 ${license%. *} >> "$subpkgdir"/usr/share/spdx/license.lst
 done
}

sha512sums="
b213fe66699770d75a4c994a01a5c08325751423516c2fb871088a47e7e7ce605736064f5ce3a63dc1d3c462271832db
7bc464ac968df1888f9823787964c786 license-list-data-3.22.tar.gz
"

```

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(EMU Soundfont 2 Format)

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Any feedback, contact Ian Wilson.

vintagedreamworks@hotmail.com

<http://www.geocities.com/SiliconValley/Campus/8645/index.html>

<http://members.nbc.com/silicon39/>

<http://www.mp3.com/silicon39>

<https://analoguesque.x10host.com/>

# Contributor: Fabian Affolter <fabian@affolter-engineering.ch>

# Maintainer: Fabian Affolter <fabian@affolter-engineering.ch>

pkgname=py3-flake8-copyright

\_pkgname=flake8-copyright

pkgver=0.2.4

```

pkgrel=1
pkgdesc="Extension for flake8 which checks for copyrights"
options="!check" # No testsuite
url="https://github.com/savoirfairelinux/flake8-copyright"
arch="noarch"
license="MIT"
depends="py3-flake8 py3-setuptools"
subpackages="$pkgname-pyc"
source="https://files.pythonhosted.org/packages/source/${_pkgname:0:1}/${_pkgname}/${_pkgname}-${pkgver}.tar.gz"
builddir="$srcdir"/"${_pkgname}-${pkgver}"

replaces="py-flake8-copyright" # Backwards compatibility
provides="py-flake8-copyright=${pkgver}-r${pkgrel}" # Backwards compatibility

build() {
 python3 setup.py build
}

package() {
 python3 setup.py install --skip-build --root="$pkgdir"
}

sha512sums="
a6ab47e1bb715618f075c51f398e18180404871b3b0faf1c2d30701d5203db6bc23771bf22ffb5bafcd8ee856b9b64237
b316bd503ae7dceed6ca284ccd5a74d flake8-copyright-0.2.4.tar.gz
"

mini_sendmail - accept email on behalf of real sendmail

```

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```
Maintainer: Natanael Copa <ncopa@alpinelinux.org>
```

```
pkgname=libart-igpl
```

```
pkgver=2.3.21
```

```
pkgrel=8
```

```
pkgdesc="A library for high-performance 2D graphics"
```

```
url="https://www.levien.com/libart/"
```

```
arch="all"
```

```
options="!check" # No test suite.
```

```
license="LGPL-2.0-or-later"
```

```
subpackages="$pkgname-dev"
```

```
source="https://download.gnome.org/sources/libart_igpl/2.3/libart_igpl-$pkgver.tar.bz2"
```

```
"
```

```
builddir="$srcdir"/libart_igpl-$pkgver
```

```
prepare() {
 update_config_sub
 default_prepare
}
```

```
build() {
 ./configure \
 --build=$CBUILD \
 --host=$CHOST \
 --prefix=/usr
 make
}
```

```
package() {
 make DESTDIR="$pkgdir" install
}
```

```
sha512sums="8a632a6a4da59e5e8c02ec2f5a57e36d182b325b46513765425e5f171ff9ae326af1b133725beba28f7e7
6654309e001aee9bace727b5b4c8589405256a3c020 libart_igpl-2.3.21.tar.bz2"
```

# 1.195 antonmedv-expr 1.15.4

## 1.195.1 Available under license :

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# 1.196 robot-oam-grpc 0.0.0-20240212235908-c28eadb2197a

## 1.196.1 Available under license :

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# 1.197 google-uuid 1.6.0

## 1.197.1 Available under license :

Paul Borman <borman@google.com>  
bmatsuo  
shawnps  
theory  
jboverfelt

dsymonds  
cd1  
wallclockbuilder  
dansouza

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## 1.198 ca-certificates 20240226-r0

### 1.198.1 Available under license :

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):

\* /opt/cola/permits/1919538345\_1710807720.5754924/0/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.
```

```
*
```

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```

```
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```
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```

```
*
```

```

```

```
This Perl script creates a fresh ca-bundle.crt file for use with libcurl.
```

```
It downloads certdata.txt from Mozilla's source tree (see URL below),
```

```
then parses certdata.txt and extracts CA Root Certificates into PEM format.
```

```
These are then processed with the OpenSSL commandline tool to produce the
```

```
final ca-bundle.crt file.
```

```
The script is based on the parse-certs script written by Roland Krikava.
```

```
This Perl script works on almost any platform since its only external
```

```
dependency is the OpenSSL commandline tool for optional text listing.
```

```
Hacked by Guenter Knauf.
```

```
#
```

```
use Encode;
```

```
use Getopt::Std;
```

```
use MIME::Base64;
```

```
use strict;
```

```
use warnings;
```

```
use vars qw($opt_b $opt_d $opt_f $opt_h $opt_i $opt_k $opt_l $opt_m $opt_n $opt_p $opt_q $opt_s $opt_t $opt_u
```

```
$opt_v $opt_w);
```

```
use List::Util;
```

```
use Text::Wrap;
```

```

use Time::Local;
my $MOD_SHA = "Digest::SHA";
eval "require
$MOD_SHA";
if ($@) {
$MOD_SHA = "Digest::SHA::PurePerl";
eval "require $MOD_SHA";
}
eval "require LWP::UserAgent";

my %urls = (
'nss' =>
'https://hg.mozilla.org/projects/nss/raw-file/default/lib/ckfw/builtins/certdata.txt',
'central' =>
'https://hg.mozilla.org/mozilla-central/raw-file/default/security/nss/lib/ckfw/builtins/certdata.txt',
'beta' =>
'https://hg.mozilla.org/releases/mozilla-beta/raw-file/default/security/nss/lib/ckfw/builtins/certdata.txt',
'release' =>
'https://hg.mozilla.org/releases/mozilla-release/raw-file/default/security/nss/lib/ckfw/builtins/certdata.txt',
);

$opt_d = 'release';

If the OpenSSL commandline is not in search path you can configure it here!
my $openssl = 'openssl';

my $version = '1.27';

$opt_w = 76; # default base64 encoded lines length

default cert types to include in the output (default is to include CAs which may issue SSL server certs)
my $default_mozilla_trust_purposes = "SERVER_AUTH";
my $default_mozilla_trust_levels
= "TRUSTED_DELEGATOR";
$opt_p = $default_mozilla_trust_purposes . ":" . $default_mozilla_trust_levels;

my @valid_mozilla_trust_purposes = (
"DIGITAL_SIGNATURE",
"NON_REPUDIATION",
"KEY_ENCIPHERMENT",
"DATA_ENCIPHERMENT",
"KEY_AGREEMENT",
"KEY_CERT_SIGN",
"CRL_SIGN",
"SERVER_AUTH",
"CLIENT_AUTH",
"CODE_SIGNING",
"EMAIL_PROTECTION",

```

```

"IPSEC_END_SYSTEM",
"IPSEC_TUNNEL",
"IPSEC_USER",
"TIME_STAMPING",
"STEP_UP_APPROVED"
);

my @valid_mozilla_trust_levels = (
"TRUSTED_DELEGATOR", # CAs
"NOT_TRUSTED", # Don't trust these certs.
"MUST_VERIFY_TRUST", # This explicitly tells us that it ISN'T a CA but is otherwise ok. In other words, this
 # should tell the app to ignore any other sources that claim this is a CA.
"TRUSTED" # This cert is trusted, but only for itself and not for delegates (i.e. it is not a CA).
);

my $default_signature_algorithms = $opt_s = "MD5";

my @valid_signature_algorithms = (
"MD5",
"SHA1",
"SHA256",
"SHA384",
"SHA512"
);

$0 =~ s@.*(/\@ @;
$Getopt::Std::STANDARD_HELP_VERSION = 1;
getopts('bd:fhiklmnp:qs:tuvw:');

if(!defined($opt_d)) {
 # to make plain "-d" use not cause warnings, and actually still work
 $opt_d = 'release';
}

Use predefined URL or else custom URL specified on command line.
my $url;
if(defined($urls{$opt_d})) {
 $url = $urls{$opt_d};
 if(!$opt_k && $url !~ /^https:\//i) {
 die "The URL for '$opt_d' is not HTTPS. Use -k to override (insecure).\n";
 }
}
else {
 $url = $opt_d;
}

my $curl = `curl -V`;

```

```

if ($opt_i) {
 print ("=" x 78 . "\n");
 print "Script Version : $version\n";
 print "Perl Version : $]\n";
 print "Operating System Name : $^O\n";
 print "Getopt::Std.pm Version : ${Getopt::Std::VERSION}\n";
 print "Encode::Encoding.pm Version : ${Encode::Encoding::VERSION}\n";
 print "MIME::Base64.pm Version : ${MIME::Base64::VERSION}\n";
 print "LWP::UserAgent.pm
Version : ${LWP::UserAgent::VERSION}\n" if($LWP::UserAgent::VERSION);
 print "LWP.pm Version : ${LWP::VERSION}\n" if($LWP::VERSION);
 print "Digest::SHA.pm Version : ${Digest::SHA::VERSION}\n" if ($Digest::SHA::VERSION);
 print "Digest::SHA::PurePerl.pm Version : ${Digest::SHA::PurePerl::VERSION}\n" if
($Digest::SHA::PurePerl::VERSION);
 print ("=" x 78 . "\n");
}

```

```

sub warning_message() {
 if ($opt_d =~ m/^risk$/i) { # Long Form Warning and Exit
 print "Warning: Use of this script may pose some risk:\n";
 print "\n";
 print " 1) If you use HTTP URLs they are subject to a man in the middle attack\n";
 print " 2) Default to 'release', but more recent updates may be found in other trees\n";
 print " 3) certdata.txt file format may change, lag time to update this script\n";
 print " 4) Generally unwise to blindly trust CAs without manual review & verification\n";
 print " 5) Mozilla apps use additional security
checks aren't represented in certdata\n";
 print " 6) Use of this script will make a security engineer grind his teeth and\n";
 print " swear at you. ;)\n";
 exit;
 } else { # Short Form Warning
 print "Warning: Use of this script may pose some risk, -d risk for more details.\n";
 }
}

```

```

sub HELP_MESSAGE() {
 print "Usage:\t${0} [-b] [-d<certdata>] [-f] [-i] [-k] [-l] [-n] [-p<purposes:levels>] [-q] [-s<algorithms>] [-t] [-u] [-v] [-w<l>] [<outputfile>]\n";
 print "\t-b\tbackup an existing version of ca-bundle.crt\n";
 print "\t-d\tspecify Mozilla tree to pull certdata.txt or custom URL\n";
 print "\t\t Valid names are:\n";
 print "\t\t ", join(", ", map { ($_ =~ m/$opt_d/) ? "$_ (default)" : "$_" } sort keys %urls), "\n";
 print "\t-f\tforce rebuild even if certdata.txt is current\n";
 print "\t-i\tprint version info about used modules\n";
 print "\t-k\tallow URLs other than HTTPS, enable HTTP fallback (insecure)\n";
 print "\t-l\tprint license info
about certdata.txt\n";
 print "\t-m\tinclude meta data in output\n";
}

```





```

 s/^\s+//; # strip leading spaces
 s/\s+$//; # strip trailing spaces
 uc $_ # return the modified string as upper case
} split(',', $param_string);

Find all values which are not in the list of valid values or "ALL"
my @invalid = grep { !is_in_list($_,"ALL",@valid_values) } @values;

if (scalar(@invalid) > 0) {
 # Tell the user which parameters were invalid and print the standard help message which will exit
 print "Error: Invalid ", $description, scalar(@invalid) == 1 ? " : " : "s: ", join(", ", map { "\"$_\""} @invalid),
 "\n";
 HELP_MESSAGE();
}

@values = @valid_values if (is_in_list("ALL",@values));

return @values;
}

sub sha256 {
 my $result;
 if ($Digest::SHA::VERSION || $Digest::SHA::PurePerl::VERSION) {
 open(FILE, $_[0]) or die "Can't open '$_[0]': $!";
 binmode(FILE);
 $result = $MOD_SHA->new(256)->addfile(*FILE)->hexdigest;
 close(FILE);
 } else {
 # Use OpenSSL command if Perl Digest::SHA modules not available
 $result = `"$openssl" dgst -r -sha256 "$_[0]"`;
 $result =~ s/^\s+([0-9a-f]{64}) .+/$1/is;
 }
 return $result;
}

sub oldhash {
 my $hash = "";
 open(C, "<$_[0]") || return 0;
 while(<C>) {
 chomp;
 if($_ =~ /^#\s# 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_1);
while (<TXT>) {
print CRT;
print if ($opt_1);
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_DISTRICT_AFTER MULTILINE_OCTAL

```

```

\062\060\060\066\061\067\060\060\060\060\060\060\132
END

if (/^CKA_NSS_SERVER_DISTRICT_AFTER (CK_BBOOL CK_FALSE|MULTILINE_OCTAL)/) {
 if($1 eq "MULTILINE_OCTAL") {
 my @timestamp;
 while (<TXT>) {
 last if (/^END/);
 chomp;
 my @octets = split(\\);
 shift @octets;
 for (@octets) {
 push
@timestamp, chr(oct);
 }
 }
 # A trailing Z in the timestamp signifies UTC
 if($timestamp[12] ne "Z") {
 report "distrust date stamp is not using UTC";
 }
 # Example date: 200617000000Z
 # Means 2020-06-17 00:00:00 UTC
 my $distrustat =
 timegm($timestamp[10] . $timestamp[11], # second
 $timestamp[8] . $timestamp[9], # minute
 $timestamp[6] . $timestamp[7], # hour
 $timestamp[4] . $timestamp[5], # day
 ($timestamp[2] . $timestamp[3]) - 1, # month
 "20" . $timestamp[0] . $timestamp[1]); # year
 if(time >= $distrustat) {
 # not trusted anymore
 $skipnum++;
 report "Skipping: $scaname is not trusted anymore" if ($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/) {
 $scka_value="";
 while (<TXT>) {
 last if (/^END/);
 chomp;
 my @octets = split(\\);
 shift @octets;
 for (@octets) {
 $scka_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: $scaname. Trust purpose: $1. Trust Level: $2";
 } elsif (is_in_list($2,@valid_mozilla_trust_levels)) {
 report "Warning:
Unrecognized trust level for cert: $scaname. 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: $scaname" if ($opt_v);
} else {
 my $data = $scka_value;
 $scka_value = "";
 my $encoded = MIME::Base64::encode_base64($data, "");
 $encoded =~ s/(.{1,$opt_w})/$1\n/g;
 my $pem = "-----BEGIN CERTIFICATE-----\n"
 . $encoded
 . "-----END CERTIFICATE-----\n";
 print CRT "\n$scaname\n";
 print CRT @precert if($opt_m);
 my $maxLength = length(decode('UTF-8', $scaname, Encode::FB_CROAK | Encode::LEAVE_SRC));
 if ($opt_t) {
 foreach my $key (keys %trust_purposes_by_level) {
 my $string = $key . ": " . join(" ", @{$trust_purposes_by_level{$key}});

```

```

 $maxStringLength = List::Util::max(length($string), $maxStringLength
);
 print CRT $string . "\n";
}
}
print CRT ("=" x $maxStringLength . "\n");
if (!$opt_t) {
 print CRT $pem;
} else {
 my $pipe = "";
 foreach my $hash (@included_signature_algorithms) {
 $pipe = "|$openssl x509 -" . $hash . " -fingerprint -noout -inform PEM";
 if (!$stdout) {
 $pipe .= " >> $crt.~";
 close(CRT) or die "Couldn't close $crt.~: $!";
 }
 open(TMP, $pipe) or die "Couldn't open openssl pipe: $!";
 print TMP $pem;
 close(TMP) or die "Couldn't close openssl pipe: $!";
 if (!$stdout) {
 open(CRT, ">>$crt.~") or die "Couldn't open $crt.~: $!";
 }
 }
 $pipe = "|$openssl x509 -text -inform PEM";
 if (!$stdout) {
 $pipe .= " >> $crt.~";
 close(CRT) or die "Couldn't close $crt.~: $!";
 }
 open(TMP, $pipe) or die "Couldn't open openssl pipe: $!";
 print TMP
 $pem;
 close(TMP) or die "Couldn't close openssl pipe: $!";
 if (!$stdout) {
 open(CRT, ">>$crt.~") or die "Couldn't open $crt.~: $!";
 }
}
report "Parsing: $cname" if ($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: $!\n";
}
report "Done ($crtnum CA certs processed, $skipnum skipped).";

```

Found in path(s):

```

* /opt/cola/permits/1919538345_1710807720.5754924/0/ca-certificates-20230506-tar-bz2/ca-certificates-20230506/mk-ca-bundle.pl

```

# 1.199 klauspost-compress 1.17.7

## 1.199.1 Available under license :

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either J's name or J's organization's name should be
added to the AUTHORS file, depending on whether the
individual or corporate
CLA was used.
```

```
Names should be added to this file like so:
```

```
Name <email address>
```

```
Please keep the list sorted.
```

```
Alex Legg <alexlegg@google.com>
Damian Gryski <dgryski@gmail.com>
Eric Buth <eric@topos.com>
Jan Mercl <0xjnm1@gmail.com>
Jonathan Swinney <jswinney@amazon.com>
Kai Backman <kaib@golang.org>
Klaus Post <klauspost@gmail.com>
Marc-Antoine Ruel <maruel@chromium.org>
Nigel Tao <nigeltao@golang.org>
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# 1.200 telegraf 1.29.5

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```

```
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Dependency license verification tool
```

This tool allows the verification of information in ``docs/LICENSE_OF_DEPENDENCIES.md`` against the linked license information. To do so, the license reported by the user is checked against the license classification of the downloaded license file for each dependency.

## ## Building

```
```shell
make build_tools
```
```

## ## Running

The simplest way to run the verification tool is to execute

```
```shell
telegraf$ ./tools/license_checker/license_checker
```
```

using the current directory as telegraf's root directory and verifies all licenses. Only errors will be reported by default.

There are multiple options you can use to customize the verification. Take a look at

```
```shell
telegraf$ ./tools/license_checker/license_checker --help
```
```

to get an overview.

As the verification tool downloads each license file linked in the dependency license document, you should be careful on not exceeding the access limits of e.g. GitHub by running the tool too frequent.

Some packages change the license for newer versions. As we always link to the latest license text the classification might not match the actual license of our used dependency. Furthermore, some license text might be wrongly classified, or not classified at all. In these cases, you can use a `_whitelist_` to explicitly state the license SPDX classifier for those packages.

See the [whitelist section](#whitelist) for more details.

The recommended use in telegraf is to run

```
```shell
telegraf$ ./tools/license_checker/license_checker \
    -whitelist ./tools/license_checker/data/whitelist
```
```

using the code-versioned whitelist. This command will report all non-matching entries with an `ERR:` prefix.

## ## Whitelist

Whitelist entries contain explicit license information for a set of packages to use instead of classification. Each entry in the whitelist is a line of the form

```
```text
[comparison operator]<package name>[@vX.Y.Z] <license SPDX>
```
```

where the `_comparison operator_` is one of

`>`, `>=`, `=`, `<=` or `<`

and the `_license SPDX_` is a [SPDX license identifier][spdx].

In case no package version is specified, the entry matches all versions of the library. Furthermore, the comparison operator can be omitted which is equivalent to an exact match (`=`).

The entries are processed in order until the first match is found.

Here is an example of a whitelist. Assume that you have library `github.com/foo/bar` which started out with the `MIT` license until version 1.0.0 where it changed to `EFL-1.0` until it again changed to `EFL-2.0` starting `__after__` version 2.3.0. In this case the whitelist should look like this

```
```text
<github.com/foo/bar@v1.0.0 MIT
<=github.com/foo/bar@v2.3.0 EFL-1.0
github.com/foo/bar EFL-2.0
```
```

All versions below 1.0.0 are matched by the first line and are thus classified as `MIT`. The second line matches everything that is above 1.0.0 (thus not matched by the first line) until (and including) 2.3.0. The last line with catch everything that was

passing the first  
two lines i.e. everything after 2.3.0.

```
[spdx]: https://spdx.org/licenses/
Licenses of dependencies
```

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## Telegraf used and modified code from these projects

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package main

```
import (
 "bufio"
 "log"
 "os"
 "regexp"
 "strings"

 "github.com/coreos/go-semver/semver"
)
```

```
type whitelist []whitelistEntry
```

```
type whitelistEntry struct {
 Name string
 Version *semver.Version
 Operator string
 License string
}
```

```
var re = regexp.MustCompile(`^[<=>]+\s*?([-\.\\w]+)(@[v][d\.]+)?\s+([-\.\\w]+)$`)
```

```
func (w *whitelist) Parse(filename string) error {
 file, err := os.Open(filename)
 if err != nil {
 return err
 }
 defer file.Close()
```

```
 // Read file line-by-line and split by semicolon
```

```
 lineno := 0
```

```
 scanner := bufio.NewScanner(file)
```

```
 for scanner.Scan() {
```

```
 line := strings.TrimSpace(scanner.Text())
```

```
 lineno++
```

```
 if strings.HasPrefix(line, "#") {
```

```
 // Comment
```

```
 continue
```

```
 }
```

```
 groups := re.FindAllStringSubmatch(line, -1)
```

```

if len(groups) != 1 {
 log.Printf("WARN: Ignoring not matching entry in line %d", lineno)
 continue
}
group := groups[0]
if len(group) != 5 {
 // Malformed
 log.Printf("WARN: Ignoring malformed entry in line %d", lineno)
 continue
}

//
An entry has the form:
// [operator]<package name>[@version] [license SPDX]
var operator, version string
if group[1] != "" {
 operator = strings.TrimSpace(group[1])
}
name := group[2]
if group[3] != "" {
 version = strings.TrimSpace(group[3])
 version = strings.TrimLeft(version, "@v")
}
license := strings.TrimSpace(group[4])

entry := whitelistEntry{Name: name, License: license, Operator: operator}
if version != "" {
 entry.Version, err = semver.NewVersion(version)
 if err != nil {
 // Malformed
 log.Printf("Ignoring malformed version in line %d: %v", lineno, err)
 continue
 }
}
if entry.Operator == "" {
 entry.Operator = "="
}
}
}
*w = append(*w, entry)
}

return scanner.Err()
}

func (w *whitelist) Check(pkg, version, spdx string) (ok, found bool) {
 v := strings.TrimSpace(version)
 v = strings.TrimPrefix(v, "v")
 if v == "" {
 return false, false
 }
}

```

```

}
pkgver := *semver.New(v)

for _, entry := range *w {
 if entry.Name
 != pkg {
 continue
 }

 var match bool
 switch entry.Operator {
 case "":
 match = true
 case "=":
 match = pkgver.Equal(*entry.Version)
 case "<":
 match = pkgver.LessThan(*entry.Version)
 case "<=":
 match = pkgver.LessThan(*entry.Version) || pkgver.Equal(*entry.Version)
 case ">":
 match = !(pkgver.LessThan(*entry.Version) || pkgver.Equal(*entry.Version))
 case ">=":
 match = !pkgver.LessThan(*entry.Version)
 }
 if match {
 return entry.License == spdx, true
 }
}

return false, false
}

```

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```
package main
```

```
import (
 "errors"
 "fmt"
 "io"
 "net/http"
 "net/url"
 "strings"

 "github.com/google/licensecheck"
)
```

```
type packageInfo struct {
 name string
 version string
 license string
 url string
 spdx string
}
```

```
func (pkg *packageInfo) ToSPDX() {
 pkg.spdx = nameToSPDX[pkg.license]
}
```

```
func (pkg *packageInfo) Classify() (float64, error) {
 // Check for a valid SPDX
 if pkg.spdx == "" {
 return 0.0, fmt.Errorf("empty SPDX for license %q", pkg.license)
 }
```

```
 // Download the license text
 source, err := normalizeURL(pkg.url)
 if err != nil {
 return 0.0, fmt.Errorf("%q is not a valid URL: %w", pkg.url, err)
 }
 debugf("%q downloading from %q", pkg.name, source)
```

```
 response, err := http.Get(source.String())
 if err != nil {
 return 0.0, fmt.Errorf("download from %q failed: %w", source, err)
 }
 if response.StatusCode < 200 || response.StatusCode > 299 {
```

```

status := response.StatusCode
return 0.0, fmt.Errorf("download from %q failed %d: %s", source, status, http.StatusText(status))
}
defer
response.Body.Close()
text, err := io.ReadAll(response.Body)
if err != nil {
return 0.0, fmt.Errorf("reading body failed: %w", err)
}
if len(text) < 1 {
return 0.0, errors.New("empty body")
}

// Classify the license text
coverage := licensecheck.Scan(text)
if len(coverage.Match) == 0 {
return coverage.Percent, errors.New("no match found")
}
match := coverage.Match[0]
debugf("%q found match: %q with confidence %f%%", pkg.name, match.ID, coverage.Percent)

if match.ID != pkg.spdx {
return coverage.Percent, fmt.Errorf("classification %q does not match", match.ID)
}
return coverage.Percent, nil
}

func normalizeURL(raw string) (*url.URL, error) {
u, err := url.Parse(raw)
if err != nil {
return nil, err
}

switch u.Hostname() {
case "github.com":
u.Host = "raw.githubusercontent.com"
var cleaned []string
for _, p := range strings.Split(u.Path, "/") {
// Filter out elements
if p == "blob" {
continue
}
}
cleaned = append(cleaned,
p)
}
u.Path = strings.Join(cleaned, "/")
case "gitlab.com":
u.Path = strings.Replace(u.Path, "/-/blob/", "/-/raw/", 1)

```

```
case "git.octo.it":
 parts := strings.Split(u.RawQuery, ";")
 for i, p := range parts {
 if p == "a=blob" {
 parts[i] = "a=blob_plain"
 break
 }
 }
 u.RawQuery = strings.Join(parts, ";")
}

return u, nil
}
```

## 1.201 expat 2.6.2-r0

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## 1.202 importlib\_resources 6.4.0

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# 1.204 distro 1.8.0

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```

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

```
package compute
```

```
import (
 "bytes"
 "context"
 "fmt"
 "io/ioutil"
 "net/http"
 "net/url"

 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"
 computepb "google.golang.org/genproto/googleapis/cloud/compute/v1"
 "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
}

// 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.
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
}

// 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
 }
}

```

```

}

c := &licenseCodesRESTClient{
 endpoint: endpoint,
 httpClient: httpClient,
}
c.setGoogleClientInfo()

return &LicenseCodesClient{internalClient: c, CallOptions: &LicenseCodesCallOptions{}}, 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, "gopic", versionClient, "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.
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, _ := url.Parse(c.endpoint)
 baseUrl.Path += fmt.Sprintf("/compute/v1/projects/%v/global/licenseCodes/%v", req.GetProject(),
req.GetLicenseCode())
```

```
 httpReq, err := http.NewRequest("GET", baseUrl.String(), nil)
 if err != nil {
 return nil, err
 }
 httpReq = httpReq.WithContext(ctx)
 // Set the headers
 for k, v := range c.xGoogMetadata {
 httpReq.Header[k] = v
 }
 httpReq.Header["Content-Type"] = []string{"application/json"}
```

```
 httpRsp,
 err := c.httpClient.Do(httpReq)
 if err != nil {
 return nil, err
 }
 defer httpRsp.Body.Close()
```

```
 if err = googleapi.CheckResponse(httpRsp); err != nil {
 return nil, err
 }
```

```
 buf, err := ioutil.ReadAll(httpRsp.Body)
 if err != nil {
 return nil, err
 }
```

```
 unmarshalOptions := protojson.UnmarshalOptions{AllowPartial: true, DiscardUnknown: true}
 rsp := &computepb.LicenseCode{}
```

```
 if err := unmarshalOptions.Unmarshal(buf, rsp); err != nil {
 return nil, maybeUnknownEnum(err)
 }
 return rsp, 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, _ := url.Parse(c.endpoint)
baseUrl.Path += fmt.Sprintf("/compute/v1/projects/%v/global/licenseCodes/%v/testIamPermissions",
req.GetProject(), req.GetResource())

httpReq, err := http.NewRequest("POST", baseUrl.String(), bytes.NewReader(jsonReq))
if err != nil {
 return nil, err
}
httpReq = httpReq.WithContext(ctx)
// Set the headers
for k, v := range c.xGoogMetadata {
 httpReq.Header[k] = v
}
httpReq.Header["Content-Type"] = []string{"application/json"}

httpRsp, err := c.httpClient.Do(httpReq)
if err != nil {
 return nil, err
}
defer httpRsp.Body.Close()

if err = googleapi.CheckResponse(httpRsp); err != nil {
 return nil, err
}

buf, err := ioutil.ReadAll(httpRsp.Body)
if err != nil {
 return nil, err
}

unm := protojson.UnmarshalOptions{ AllowPartial: true, DiscardUnknown: true }
rsp := &computepb.TestPermissionsResponse{ }

if err := unm.Unmarshal(buf, rsp); err != nil {
 return nil, maybeUnknownEnum(err)
}
return
rsp, nil
}

```



```
// Copyright 2021 Google LLC
//
// Licensed under the Apache License, Version 2.0 (the "License");
// you may not use this file except in compliance with the License.
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//
// https://www.apache.org/licenses/LICENSE-2.0
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// distributed under the License is distributed on an "AS IS" BASIS,
// WITHOUT WARRANTIES OR CONDITIONS OF ANY KIND, either express or implied.
// See the License for the specific language governing permissions and
// limitations under the License.
```

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

```
package compute
```

```
import (
```

```
 "bytes"
```

```
 "context"
```

```
 "fmt"
```

```
 "io/ioutil"
```

```
 "math"
```

```
 "net/http"
```

```
 "net/url"
```

```
 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"
```

```
 computepb "google.golang.org/genproto/googleapis/cloud/compute/v1"
```

```
 "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
}

// internalLicensesClient is an interface that defines the methods available from Google Compute Engine API.
type internalLicensesClient interface {
 Close() error
 setGoogleClientInfo(...string)
 Connection() *grpc.ClientConn
 Delete(context.Context, *computepb.DeleteLicenseRequest, ...gax.CallOption) (*Operation, error)
 Get(context.Context, *computepb.GetLicenseRequest, ...gax.CallOption)
 (*computepb.License, error)
 GetIamPolicy(context.Context, *computepb.GetIamPolicyLicenseRequest, ...gax.CallOption) (*computepb.Policy,
 error)
 Insert(context.Context, *computepb.InsertLicenseRequest, ...gax.CallOption) (*Operation, error)
 List(context.Context, *computepb.ListLicensesRequest, ...gax.CallOption) *LicenseIterator
 SetIamPolicy(context.Context, *computepb.SetIamPolicyLicenseRequest, ...gax.CallOption) (*computepb.Policy,
 error)
 TestIamPermissions(context.Context, *computepb.TestIamPermissionsLicenseRequest, ...gax.CallOption)
 (*computepb.TestPermissionsResponse, error)
}

// LicensesClient is a client for interacting with Google Compute Engine API.
// Methods, except Close, may be called concurrently. However, fields must not be modified concurrently with
// method calls.
//
// The Licenses API.
type LicensesClient struct {
 // The internal transport-dependent client.
 internalClient internalLicensesClient

 // The call options for this service.
 CallOptions
 *LicensesCallOptions
}

// Wrapper methods routed to the internal client.

// Close closes the connection to the API service. The user should invoke this when
// the client is no longer required.
func (c *LicensesClient) Close() error {
 return c.internalClient.Close()
}

// setGoogleClientInfo sets the name and version of the application in
// the `x-goog-api-client` header passed on each request. Intended for

```

```

// use by Google-written clients.
func (c *LicensesClient) setGoogleClientInfo(keyval ...string) {
 c.internalClient.setGoogleClientInfo(keyval...)
}

// Connection returns a connection to the API service.
//
// Deprecated.
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

// The x-goog-* metadata to be sent with each request.
xGoogMetadata metadata.MD
}

// 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
}

c := &licensesRESTClient{
endpoint: endpoint,
httpClient: httpClient,
}
c.setGoogleClientInfo()

```

```

return &LicensesClient{internalClient: c, CallOptions: &LicensesCallOptions{}}, 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", versionClient, "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
return nil
}

// Connection returns a connection to the API service.
//
// Deprecated.
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, _ := url.Parse(c.endpoint)
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()

httpReq, err := http.NewRequest("DELETE", baseUrl.String(), nil)
if err != nil {
 return nil, err
}
httpReq = httpReq.WithContext(ctx)
// Set the headers
for k, v := range c.xGoogMetadata {
 httpReq.Header[k] = v
}
httpReq.Header["Content-Type"] = []string{"application/json"}

httpRsp, err := c.httpClient.Do(httpReq)
if err != nil {
 return nil, err
}
defer httpRsp.Body.Close()

if err = googleapi.CheckResponse(httpRsp);
err != nil {
 return nil, err
}

buf, err := ioutil.ReadAll(httpRsp.Body)
if err != nil {
 return nil, err
}

unm := protojson.UnmarshalOptions{AllowPartial: true, DiscardUnknown: true}
rsp := &computepb.Operation{ }

if err := unm.Unmarshal(buf, rsp); err != nil {
 return nil, maybeUnknownEnum(err)
}
op := &Operation{proto: rsp}
return op, err
}

// 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, _ := url.Parse(c.endpoint)
 baseUrl.Path += fmt.Sprintf("/compute/v1/projects/%v/global/licenses/%v", req.GetProject(), req.GetLicense())

```

```

httpReq, err := http.NewRequest("GET", baseUrl.String(), nil)
if err != nil {
 return nil, err
}
httpReq = httpReq.WithContext(ctx)
// Set the headers
for
k, v := range c.xGoogMetadata {
 httpReq.Header[k] = v
}
httpReq.Header["Content-Type"] = []string{"application/json"}

httpRsp, err := c.httpClient.Do(httpReq)
if err != nil {
 return nil, err
}
defer httpRsp.Body.Close()

if err = googleapi.CheckResponse(httpRsp); err != nil {
 return nil, err
}

buf, err := ioutil.ReadAll(httpRsp.Body)
if err != nil {
 return nil, err
}

unm := protojson.UnmarshalOptions{AllowPartial: true, DiscardUnknown: true}
rsp := &computepb.License{}

if err := unm.Unmarshal(buf, rsp); err != nil {
 return nil, maybeUnknownEnum(err)
}
return rsp, 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,
 _ := url.Parse(c.endpoint)
 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()

httpReq, err := http.NewRequest("GET", baseUrl.String(), nil)
if err != nil {
 return nil, err
}
httpReq = httpReq.WithContext(ctx)
// Set the headers
for k, v := range c.xGoogMetadata {
 httpReq.Header[k] = v
}
httpReq.Header["Content-Type"] = []string{"application/json"}

httpRsp, err := c.httpClient.Do(httpReq)
if err != nil {
 return nil, err
}
defer httpRsp.Body.Close()

if err = googleapi.CheckResponse(httpRsp); err != nil {
 return nil, err
}

buf, err := ioutil.ReadAll(httpRsp.Body)
if err != nil {
 return nil, err
}

unm := protojson.UnmarshalOptions{AllowPartial: true,
DiscardUnknown: true}
rsp := &computepb.Policy{}

if err := unm.Unmarshal(buf, rsp); err != nil {
 return nil, maybeUnknownEnum(err)
}
return rsp, 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, _ := url.Parse(c.endpoint)
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()

httpReq, err := http.NewRequest("POST", baseUrl.String(), bytes.NewReader(jsonReq))
if
err != nil {
 return nil, err
}
httpReq = httpReq.WithContext(ctx)
// Set the headers
for k, v := range c.xGoogMetadata {
 httpReq.Header[k] = v
}
httpReq.Header["Content-Type"] = []string{"application/json"}

httpRsp, err := c.httpClient.Do(httpReq)
if err != nil {
 return nil, err
}
defer httpRsp.Body.Close()

if err = googleapi.CheckResponse(httpRsp); err != nil {
 return nil, err
}

buf, err := ioutil.ReadAll(httpRsp.Body)
if err != nil {
 return nil, err
}

unm := protojson.UnmarshalOptions{AllowPartial: true, DiscardUnknown: true}
rsp := &compute.Operation{ }

if err := unm.Unmarshal(buf, rsp); err != nil {
 return nil, maybeUnknownEnum(err)
}
op := &Operation{proto: rsp}

```

```
return op, err
```

```
}
```

// List retrieves the list of licenses available in the specified project. This method does not get any licenses that belong to other projects, including licenses attached to publicly-available images, like Debian 9. If you want to get a list of

publicly-available licenses, use this method to make a request to the respective image project, such as debian-cloud or windows-cloud. Caution This resource is intended for use only by third-party partners who are creating Cloud Marketplace images.

```
func (c *licensesRESTClient) List(ctx context.Context, req *computepb.ListLicensesRequest, opts
```

```
...gax.CallOption) *LicenseIterator {
```

```
it := &LicenseIterator{}
```

```
req = proto.Clone(req).(*computepb.ListLicensesRequest)
```

```
unm := protojson.UnmarshalOptions{AllowPartial: true, DiscardUnknown: true}
```

```
it.InternalFetch = func(pageSize int, pageToken string) ([]*computepb.License, string, error) {
```

```
resp := &computepb.LicensesListResponse{}
```

```
if pageToken != "" {
```

```
req.PageToken = proto.String(pageToken)
```

```
}
```

```
if pageSize > math.MaxInt32 {
```

```
req.MaxResults = proto.Uint32(math.MaxInt32)
```

```
} else if pageSize != 0 {
```

```
req.MaxResults = proto.Uint32(uint32(pageSize))
```

```
}
```

```
baseUrl, _ := url.Parse(c.endpoint)
```

```
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()
```

```
httpReq, err := http.NewRequest("GET", baseUrl.String(), nil)
```

```

if err != nil {
 return nil, "", err
}

// Set the headers
for k, v := range c.xGoogMetadata {
 httpReq.Header[k] = v
}

httpReq.Header["Content-Type"] = []string{"application/json"}
httpRsp, err := c.httpClient.Do(httpReq)
if
err != nil {
 return nil, "", err
}
defer httpRsp.Body.Close()

if err = googleapi.CheckResponse(httpRsp); err != nil {
 return nil, "", err
}

buf, err := ioutil.ReadAll(httpRsp.Body)
if err != nil {
 return nil, "", err
}

unm.Unmarshal(buf, resp)
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, _ := url.Parse(c.endpoint)
 baseUrl.Path += fmt.Sprintf("/compute/v1/projects/%v/global/licenses/%v/setIamPolicy", req.GetProject(),
req.GetResource())

 httpReq, err := http.NewRequest("POST", baseUrl.String(), bytes.NewReader(jsonReq))
 if err != nil {
 return nil, err
 }
 httpReq = httpReq.WithContext(ctx)
 // Set the headers
 for k, v := range c.xGoogMetadata {
 httpReq.Header[k] = v
 }
 httpReq.Header["Content-Type"] = []string{"application/json"}

 httpRsp, err := c.httpClient.Do(httpReq)
 if err != nil {
 return nil, err
 }
 defer httpRsp.Body.Close()

 if err = googleapi.CheckResponse(httpRsp); err != nil {
 return nil, err
 }

 buf,
err := ioutil.ReadAll(httpRsp.Body)
 if err != nil {
 return nil, err
 }

 unmarshalOptions := protojson.UnmarshalOptions{AllowPartial: true, DiscardUnknown: true}
 rsp := &computepb.Policy{}

 if err := unmarshalOptions.Unmarshal(buf, rsp); err != nil {
 return nil, maybeUnknownEnum(err)
 }
}
```

```

return rsp, 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, _ := url.Parse(c.endpoint)
 baseUrl.Path += fmt.Sprintf("/compute/v1/projects/%v/global/licenses/%v/testIamPermissions", req.GetProject(),
req.GetResource())

 httpReq, err := http.NewRequest("POST", baseUrl.String(), bytes.NewReader(jsonReq))
 if err != nil {
 return nil, err
 }
 httpReq = httpReq.WithContext(ctx)
 // Set the headers
 for k, v := range c.xGoogMetadata {
 httpReq.Header[k] = v
 }
 httpReq.Header["Content-Type"] = []string{"application/json"}

 httpRsp, err := c.httpClient.Do(httpReq)
 if err != nil {
 return nil, err
 }
 defer httpRsp.Body.Close()

 if err = googleapi.CheckResponse(httpRsp); err != nil {
 return nil, err
 }

 buf, err := ioutil.ReadAll(httpRsp.Body)
 if err != nil {
 return nil, err
 }

 unmarshalOptions := protojson.UnmarshalOptions{AllowPartial: true, DiscardUnknown: true}
 rsp := &computepb.TestPermissionsResponse{}

```

```

if err := unm.Unmarshal(buf, rsp); err != nil {
 return nil, maybeUnknownEnum(err)
}
return rsp, nil
}

// LicenseIterator manages a stream of *computepb.License.
type LicenseIterator struct {
 items []*computepb.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 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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package compute_test

import (
 "context"

 compute "cloud.google.com/go/compute/apiv1"
 computepb "google.golang.org/genproto/googleapis/cloud/compute/v1"
)

func ExampleNewLicenseCodesRESTClient() {
 ctx := context.Background()
 c, err := compute.NewLicenseCodesRESTClient(ctx)
 if err != nil {
 // TODO: Handle error.
 }
 defer c.Close()

 // TODO: Use
 client.
 _ = c
}

func ExampleLicenseCodesClient_Get() {
 ctx := context.Background()
 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/google.golang.org/genproto/googleapis/cloud/compute/v1#GetLicenseCodeRequest.
}
resp, err := c.Get(ctx, req)
if err != nil {
// TODO: Handle error.
}
// TODO: Use resp.
_ = resp
}

func ExampleLicenseCodesClient_TestIamPermissions() {
ctx := context.Background()
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/google.golang.org/genproto/googleapis/cloud/compute/v1#TestIamPermissionsLicenseCodeRequest.
}
resp, err := c.TestIamPermissions(ctx, req)
if err != nil {
// TODO: Handle error.
}
//
//
// TODO: Use resp.
_ = resp
}

```

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package compute_test

import (
 "context"

 compute "cloud.google.com/go/compute/apiv1"
 "google.golang.org/api/iterator"
 computepb "google.golang.org/genproto/googleapis/cloud/compute/v1"
)

func ExampleNewLicensesRESTClient() {
 ctx := context.Background()
 c, err := compute.NewLicensesRESTClient(ctx)
 if err != nil {
 // TODO: Handle error.
 }
 defer
 c.Close()

 // TODO: Use client.
 _ = c
}

func ExampleLicensesClient_Delete() {
 ctx := context.Background()
 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/google.golang.org/genproto/googleapis/cloud/compute/v1#DeleteLicenseRequest.
 }
 resp, err := c.Delete(ctx, req)
 if err != nil {
 // TODO: Handle error.
 }
 // TODO: Use resp.
 _ = resp
}

func ExampleLicensesClient_Get() {

```

```

ctx := context.Background()
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/google.golang.org/genproto/googleapis/cloud/compute/v1#GetLicenseRequest.
}
resp, err := c.Get(ctx, req)
if err != nil {
 // TODO: Handle error.
}
// TODO: Use resp.
_ = resp
}

func ExampleLicensesClient_GetIamPolicy()
{
 ctx := context.Background()
 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/google.golang.org/genproto/googleapis/cloud/compute/v1#GetIamPolicyLicenseRequest.
 }
 resp, err := c.GetIamPolicy(ctx, req)
 if err != nil {
 // TODO: Handle error.
 }
 // TODO: Use resp.
 _ = resp
}

func ExampleLicensesClient_Insert() {
 ctx := context.Background()
 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/google.golang.org/genproto/googleapis/cloud/compute/v1#InsertLicenseRequest.
}
resp, err := c.Insert(ctx, req)
if err != nil {
 // TODO: Handle error.
}
// TODO: Use resp.
_ = resp
}

```

```

func ExampleLicensesClient_List() {
 ctx :=
 context.Background()
 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/google.golang.org/genproto/googleapis/cloud/compute/v1#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()
 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/google.golang.org/genproto/googleapis/cloud/compute/v1#SetIamPolicyLicenseRequest.
}
resp, err := c.SetIamPolicy(ctx, req)
if err != nil {
// TODO: Handle error.
}
// TODO: Use resp.
_ = resp
}

func
ExampleLicensesClient_TestIamPermissions() {
ctx := context.Background()
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/google.golang.org/genproto/googleapis/cloud/compute/v1#TestIamPermissionsLicenseRequest.
}
resp, err := c.TestIamPermissions(ctx, req)
if err != nil {
// TODO: Handle error.
}
// TODO: Use resp.
_ = resp
}

```

## 1.208 jaraco.context 5.3.0

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# 1.209 python 3.11.9-r0

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

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

In May 2000, Guido and the Python core development team moved to BeOpen.com to form the BeOpen PythonLabs team. In October of the same year, the PythonLabs team moved to Digital Creations, which became Zope Corporation. In 2001, the Python Software Foundation (PSF, see <https://www.python.org/psf/>) was formed, a non-profit organization created specifically to own Python-related Intellectual Property. Zope Corporation was a sponsoring member of the PSF.

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| Release        | Derived from | Year      | Owner      | GPL-compatible? (1) |
|----------------|--------------|-----------|------------|---------------------|
| 0.9.0 thru 1.2 |              | 1991-1995 | CWI        | yes                 |
| 1.3 thru 1.5.2 | 1.2          | 1995-1999 | CNRI       | yes                 |
| 1.6            | 1.5.2        | 2000      | CNRI       | no                  |
| 2.0            | 1.6          | 2000      | BeOpen.com | no                  |
| 1.6.1          | 1.6          | 2001      | CNRI       | yes (2)             |
| 2.1            | 2.0+1.6.1    | 2001      | PSF        | no                  |
| 2.0.1          | 2.0+1.6.1    | 2001      | PSF        | yes                 |
| 2.1.1          | 2.1+2.0.1    | 2001      | PSF        | yes                 |
| 2.1.2          | 2.1.1        | 2002      | PSF        | yes                 |
| 2.1.3          | 2.1.2        | 2002      | PSF        | yes                 |
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| 1.3 thru 1.5.2 | 1.2          | 1995-1999 | CNRI       | yes                 |
| 1.6            | 1.5.2        | 2000      | CNRI       | no                  |
| 2.0            | 1.6          | 2000      | BeOpen.com | no                  |
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| 2.0.1          | 2.0+1.6.1    | 2001      | PSF        | yes                 |
| 2.1.1          | 2.1+2.0.1    | 2001      | PSF        | yes                 |
| 2.1.2          | 2.1.1        | 2002      | PSF        | yes                 |
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Python was created in the early 1990s by Guido van Rossum at Stichting Mathematisch Centrum (CWI, see <https://www.cwi.nl>) in the Netherlands as a successor of a language called ABC. Guido remains Python's principal author, although it includes many contributions from others.

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

In May 2000, Guido and the Python core development team moved to BeOpen.com to form the BeOpen PythonLabs team. In October of the same year, the PythonLabs team moved to Digital Creations, which became Zope Corporation. In 2001, the Python Software Foundation (PSF, see <https://www.python.org/psf/>) was formed, a non-profit organization created specifically to own Python-related Intellectual Property. Zope Corporation was a sponsoring member of the PSF.

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| Release        | Derived from | Year      | Owner      | GPL-compatible? (1) |
|----------------|--------------|-----------|------------|---------------------|
| 0.9.0 thru 1.2 |              | 1991-1995 | CWI        | yes                 |
| 1.3 thru 1.5.2 | 1.2          | 1995-1999 | CNRI       | yes                 |
| 1.6            | 1.5.2        | 2000      | CNRI       | no                  |
| 2.0            | 1.6          | 2000      | BeOpen.com | no                  |
| 1.6.1          | 1.6          | 2001      | CNRI       | yes (2)             |
| 2.1            | 2.0+1.6.1    | 2001      | PSF        | no                  |
| 2.0.1          | 2.0+1.6.1    | 2001      | PSF        | yes                 |
| 2.1.1          | 2.1+2.0.1    | 2001      | PSF        | yes                 |
| 2.1.2          | 2.1.1        | 2002      | PSF        | yes                 |
| 2.1.3          | 2.1.2        | 2002      | PSF        | yes                 |
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Python was created in the early 1990s by Guido van Rossum at Stichting Mathematisch Centrum (CWI, see <https://www.cwi.nl>) in the Netherlands as a successor of a language called ABC. Guido remains Python's principal author, although it includes many contributions from others.

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

In May 2000, Guido and the Python core development team moved to BeOpen.com to form the BeOpen PythonLabs team. In October of the same year, the PythonLabs team moved to Digital Creations, which became Zope Corporation. In 2001, the Python Software Foundation (PSF, see <https://www.python.org/psf/>) was formed, a non-profit organization created specifically to own Python-related Intellectual Property. Zope Corporation was a sponsoring member of the PSF.

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| Release        | Derived from | Year      | Owner      | GPL-compatible? (1) |
|----------------|--------------|-----------|------------|---------------------|
| 0.9.0 thru 1.2 |              | 1991-1995 | CWI        | yes                 |
| 1.3 thru 1.5.2 | 1.2          | 1995-1999 | CNRI       | yes                 |
| 1.6            | 1.5.2        | 2000      | CNRI       | no                  |
| 2.0            | 1.6          | 2000      | BeOpen.com | no                  |
| 1.6.1          | 1.6          | 2001      | CNRI       | yes (2)             |
| 2.1            | 2.0+1.6.1    | 2001      | PSF        | no                  |
| 2.0.1          | 2.0+1.6.1    | 2001      | PSF        | yes                 |
| 2.1.1          | 2.1+2.0.1    | 2001      | PSF        | yes                 |
| 2.1.2          | 2.1.1        | 2002      | PSF        | yes                 |
| 2.1.3          | 2.1.2        | 2002      | PSF        | yes                 |
| 2.2 and above  | 2.1.1        | 2001-now  | PSF        | yes                 |

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## 1.215 toml 0.3.1

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```
#!/usr/bin/env perl

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This Perl script creates a fresh ca-bundle.crt file for use with libcurl.
It downloads certdata.txt from Mozilla's source tree (see URL below),
```

```

then parses certdata.txt and extracts CA Root Certificates into PEM format.
These are then processed with the OpenSSL commandline tool to produce the
final ca-bundle.crt file.
The script is based on the parse-certs script written by Roland Krikava.
This Perl script works on almost any platform since its only external
dependency is the OpenSSL commandline tool for optional text listing.
Hacked by Guenter Knauf.
#
use Encode;
use Getopt::Std;
use MIME::Base64;
use strict;
use warnings;
use vars qw($opt_b $opt_d $opt_f $opt_h $opt_i $opt_k $opt_l $opt_m $opt_n $opt_p $opt_q $opt_s $opt_t $opt_u
$opt_v $opt_w);
use List::Util;
use Text::Wrap;
use Time::Local;
my $MOD_SHA = "Digest::SHA";
eval "require
$MOD_SHA";
if ($@) {
$MOD_SHA = "Digest::SHA::PurePerl";
eval "require $MOD_SHA";
}
eval "require LWP::UserAgent";

my %urls = (
'nss' =>
'https://hg.mozilla.org/projects/nss/raw-file/default/lib/ckfw/builtins/certdata.txt',
'central' =>
'https://hg.mozilla.org/mozilla-central/raw-file/default/security/nss/lib/ckfw/builtins/certdata.txt',
'beta' =>
'https://hg.mozilla.org/releases/mozilla-beta/raw-file/default/security/nss/lib/ckfw/builtins/certdata.txt',
'release' =>
'https://hg.mozilla.org/releases/mozilla-release/raw-file/default/security/nss/lib/ckfw/builtins/certdata.txt',
);

$opt_d = 'release';

If the OpenSSL commandline is not in search path you can configure it here!
my $openssl = 'openssl';

my $version = '1.27';

$opt_w = 76; # default base64 encoded lines length

default cert types to include in the output (default is to include CAs which may issue SSL server certs)

```



```

my $default_mozilla_trust_purposes = "SERVER_AUTH";
my $default_mozilla_trust_levels
= "TRUSTED_DELEGATOR";
$opt_p = $default_mozilla_trust_purposes . ":" . $default_mozilla_trust_levels;

my @valid_mozilla_trust_purposes = (
"DIGITAL_SIGNATURE",
"NON_REPUDIATION",
"KEY_ENCIPHERMENT",
"DATA_ENCIPHERMENT",
"KEY_AGREEMENT",
"KEY_CERT_SIGN",
"CRL_SIGN",
"SERVER_AUTH",
"CLIENT_AUTH",
"CODE_SIGNING",
"EMAIL_PROTECTION",
"IPSEC_END_SYSTEM",
"IPSEC_TUNNEL",
"IPSEC_USER",
"TIME_STAMPING",
"STEP_UP_APPROVED"
);

my @valid_mozilla_trust_levels = (
"TRUSTED_DELEGATOR", # CAs
"NOT_TRUSTED", # Don't trust these certs.
"MUST_VERIFY_TRUST", # This explicitly tells us that it ISN'T a CA but is otherwise ok. In other words, this
 # should tell the app to ignore any other sources that claim this is a CA.
"TRUSTED" # This cert is trusted, but only for itself and not for delegates (i.e. it is not a CA).
);

my $default_signature_algorithms = $opt_s = "MD5";

my @valid_signature_algorithms = (
"MD5",
"SHA1",
"SHA256",
"SHA384",
"SHA512"
);

$0 =~ s@.*(//\.)@@;
$Getopt::Std::STANDARD_HELP_VERSION = 1;
getopts('bd:fhiklmnp:qs:tuvw:');

if(!defined($opt_d)) {
 # to make plain "-d" use not cause warnings, and actually still work

```

```

 $opt_d = 'release';
}

Use predefined URL or else custom URL specified on command line.
my $url;
if(defined($urls{$opt_d})) {
 $url = $urls{$opt_d};
 if(!$opt_k && $url !~ /^https:\//i) {
 die "The URL for '$opt_d' is not HTTPS. Use -k to override (insecure).\n";
 }
}
else {
 $url = $opt_d;
}

my $curl = `curl -V`;

if ($opt_i) {
 print ("=" x 78 . "\n");
 print "Script Version : $version\n";
 print "Perl Version : $]\n";
 print "Operating System Name : $^O\n";
 print "Getopt::Std.pm Version : ${Getopt::Std::VERSION}\n";
 print "Encode::Encoding.pm Version : ${Encode::Encoding::VERSION}\n";
 print "MIME::Base64.pm Version : ${MIME::Base64::VERSION}\n";
 print "LWP::UserAgent.pm
Version : ${LWP::UserAgent::VERSION}\n" if($LWP::UserAgent::VERSION);
 print "LWP.pm Version : ${LWP::VERSION}\n" if($LWP::VERSION);
 print "Digest::SHA.pm Version : ${Digest::SHA::VERSION}\n" if ($Digest::SHA::VERSION);
 print "Digest::SHA::PurePerl.pm Version : ${Digest::SHA::PurePerl::VERSION}\n" if
($Digest::SHA::PurePerl::VERSION);
 print ("=" x 78 . "\n");
}

sub warning_message() {
 if ($opt_d =~ m/^risk$/i) { # Long Form Warning and Exit
 print "Warning: Use of this script may pose some risk:\n";
 print "\n";
 print " 1) If you use HTTP URLs they are subject to a man in the middle attack\n";
 print " 2) Default to 'release', but more recent updates may be found in other trees\n";
 print " 3) certdata.txt file format may change, lag time to update this script\n";
 print " 4) Generally unwise to blindly trust CAs without manual review & verification\n";
 print " 5) Mozilla apps use additional security
checks aren't represented in certdata\n";
 print " 6) Use of this script will make a security engineer grind his teeth and\n";
 print " swear at you. :)\n";
 exit;
 } else { # Short Form Warning

```

```

 print "Warning: Use of this script may pose some risk, -d risk for more details.\n";
}
}

sub HELP_MESSAGE() {
 print "Usage:\t${0} [-b] [-d<certdata>] [-f] [-i] [-k] [-l] [-n] [-p<purposes:levels>] [-q] [-s<algorithms>] [-t] [-u] [-v] [-w<l>] [<outputfile>]\n";
 print "\t-b\tbackup an existing version of ca-bundle.crt\n";
 print "\t-d\tspecify Mozilla tree to pull certdata.txt or custom URL\n";
 print "\t\t Valid names are:\n";
 print "\t\t ", join(", ", map { ($_ =~ m/$opt_d/) ? "$_" : "$_" } sort keys %urls), "\n";
 print "\t-f\tforce rebuild even if certdata.txt is current\n";
 print "\t-i\tprint version info about used modules\n";
 print "\t-k\tallow URLs other than HTTPS, enable HTTP fallback (insecure)\n";
 print "\t-l\tprint license info about certdata.txt\n";
 print "\t-m\tinclude meta data in output\n";
 print "\t-n\tno download of certdata.txt (to use existing)\n";
 print wrap("\t\t", "\t\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
 uc $_ # return the modified string as upper case
} split(',', $param_string);

Find all values which are not in the list of valid values or "ALL"
my @invalid = grep { !is_in_list($_,"ALL",@valid_values) } @values;

if (scalar(@invalid) > 0) {
 # Tell the user which parameters were invalid and print the standard help message which will exit
 print "Error: Invalid ", $description, scalar(@invalid) == 1 ? " ": "s: ", join(", ", map { "\"$_\"" } @invalid),
"\n";
 HELP_MESSAGE();
}

@values = @valid_values if (is_in_list("ALL",@values));

return @values;
}

sub sha256 {
my $result;
if ($Digest::SHA::VERSION || $Digest::SHA::PurePerl::VERSION) {
 open(FILE, $_[0]) or die "Can't open '$_[0]': $!";
 binmode(FILE);
 $result = $MOD_SHA->new(256)->addfile(*FILE)->hexdigest;
 close(FILE);
} else {
 # Use OpenSSL command if Perl Digest::SHA modules not available
 $result = `"$openssl" dgst -r -sha256 "$_[0]"`;
 $result =~ s/^\{[0-9a-f]{64}\} .+$/1/is;
}
}

```

```

}
return $result;
}

sub oldhash {
my $hash = "";
open(C, "<$_[0]>" || return 0;
while(<C>) {
 chomp;
 if($_ =~ /^#\# SHA256: (.*)/) {
 $hash = $1;
 last;
 }
}
close(C);
return $hash;
}

if ($opt_p !~ m:/) {
print "Error: Mozilla trust identifier list must include both purposes and levels\n";
HELP_MESSAGE();
}

(my $included_mozilla_trust_purposes_string, my $included_mozilla_trust_levels_string) = split(':', $opt_p);
my @included_mozilla_trust_purposes = parse_csv_param("trust purpose",
$included_mozilla_trust_purposes_string, @valid_mozilla_trust_purposes);
my @included_mozilla_trust_levels = parse_csv_param("trust level", $included_mozilla_trust_levels_string,
@valid_mozilla_trust_levels);

my @included_signature_algorithms = parse_csv_param("signature algorithm", $opt_s,
@valid_signature_algorithms);

sub should_output_cert(%) {
my
%trust_purposes_by_level = @_;

foreach my $level (@included_mozilla_trust_levels) {
 # for each level we want to output, see if any of our desired purposes are included
 return 1 if (defined(List::Util::first { is_in_list($_, @included_mozilla_trust_purposes) }
@{ $trust_purposes_by_level{ $level } }));
}

return 0;
}

my $crt = $ARGV[0] || 'ca-bundle.crt';
(my $txt = $url) =~ s@(.*/|\?.*)@@g;

```

```

my $stdout = $crt eq '-';
my $resp;
my $fetched;

my $oldhash = oldhash($crt);

report "SHA256 of old file: $oldhash";

if(!$opt_n) {
report "Downloading $txt ...";

If we have an HTTPS URL then use curl
if($url =~ /^https:\//i) {
if($curl) {
if($curl =~ /^Protocols:.* https(|$)/m) {
report "Get certdata with curl!";
my $proto = !$opt_k ? "--proto=https" : "";
my $quiet = $opt_q ? "-s" : "";
my @out = `curl -w % {response_code} $proto $quiet -o "$txt" "$url"`;
if(! $? && @out && $out[0] == 200) {
$fetched = 1;
report "Downloaded $txt";
}
else {
report "Failed downloading via HTTPS with curl!";
if(-e $txt && !unlink($txt)) {
report "Failed to remove '$txt': $!";
}
}
}
else {
report "curl lacks https support";
}
}
else {
report "curl not found";
}
}

If nothing was fetched then use LWP
if(!$fetched) {
if($url =~ /^https:\//i) {
report "Falling back to HTTP";
$url =~ s/^https:\//http:\//i;
}
if(!$opt_k) {
report "URLs other than HTTPS are disabled by default, to enable use -k";
}
}

```

```

 exit 1;
}
report "Get certdata with LWP!";
if(!defined(${LWP::UserAgent::VERSION})) {
 report "LWP is not available (LWP::UserAgent not found)";
 exit 1;
}
my $sua = new LWP::UserAgent(agent => "$0/$version");
$sua->env_proxy();
$response = $sua->mirror($url, $txt);
if($response && $response->code eq '304') {
 report "Not modified";
 exit 0 if -e $crt && !$opt_f;
}
else {
 $fetched = 1;
 report "Downloaded $txt";
}
if(!$response || $response->code !~ /^(?:200|304)$/) {
 report "Unable to download latest data: "
 . ($response? $response->code . ' - ' . $response->message : "LWP failed");
 exit 1 if -e $crt || !-r $txt;
}
}
}

my $filedate = $response ? $response->last_modified : (stat($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);
 }
}
}

```





```

 $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(/\//);
 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: $scaname. Trust purpose: $1. Trust Level: $2";
 } elsif (!is_in_list($2,@valid_mozilla_trust_levels)) {
 report "Warning:
Unrecognized trust level for cert: $scaname. 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: $scaname" if ($opt_v);
} else {
 my $data = $cka_value;
 $cka_value = "";
 my $encoded = MIME::Base64::encode_base64($data, "");
 $encoded =~ s/(.{1,${opt_w}})/$1\n/g;
 my $pem = "-----BEGIN CERTIFICATE-----\n"
 . $encoded
 . "-----END CERTIFICATE-----\n";
 print CRT "\n$scaname\n";
 print CRT @precert if($opt_m);
 my $maxLength = length(decode('UTF-8', $scaname, Encode::FB_CROAK | Encode::LEAVE_SRC));
 if ($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 $maxLength . "\n");
 if (!$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):

```

* /opt/cola/permits/1978342439_1713364772.434879/0/ca-certificates-bundle-20230506-r0-os-alpine-3-18-0-tar-
xz/ca-certificates-20230506-tar-bz2/ca-certificates-20230506/mk-ca-bundle.pl

```

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

```

/* c_rehash.c - Create hash symlinks for certificates

```

```

* C implementation based on the original Perl and shell versions

```

```

*

```

```

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```

```

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```

```

*

```

```

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```

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```

```

*/

```

Found in path(s):

\* /opt/cola/permits/1978342439\_1713364772.434879/0/ca-certificates-bundle-20230506-r0-os-alpine-3-18-0-tar-xz/ca-certificates-20230506-tar-bz2/ca-certificates-20230506/c\_rehash.c

# 1.218 scanelf 1.3.7-r2

## 1.218.1 Available under license :

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Version 2, June 1991

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## 1.221 jaraco-functools 4.0.1

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## 1.241 more-itertools 10.3.0

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## 1.242 zipp 3.19.2

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gokrb5

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## 1.254 goprotobuf 1.5.4

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## 1.255 inflect 7.3.1

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@subheading END OF TERMS AND CONDITIONS

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@smallexample

@var{one line to give the library's name and an idea of what it does.}

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

Ty Coon, President of Vice

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@page

@heading Appendix: How to Apply These Terms to Your New Programs

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and a brief idea of what it does.}

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```
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Gnomovision version
69, Copyright (C) @var{year} @var{name of author}
Gnomovision comes with ABSOLUTELY NO WARRANTY; for details type `show w'.
This is free software, and you are welcome to redistribute it
under certain conditions; type `show c' for details.
@end smallexample
```

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```
@example
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`Gnomovision' (which makes passes at compilers) written by James Hacker.
```

```
@var{signature of Ty Coon}, 1 April 1989
Ty Coon, President of Vice
@end example
```

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```
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```

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## 1.260 utmps-libs 0.1.2.2-r0

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Found in path(s):

```
* /opt/cola/permits/2107250486_1721401668.7303083/0/ssl-client-c-zip/ssl_client.c
```

## 1.262 libssl3 3.1.6-r2

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Version 3, 29 June 2007

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#### A. HISTORY OF THE SOFTWARE

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

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

In May 2000, Guido and the Python core development team moved to

BeOpen.com to form the BeOpen PythonLabs team. In October of the same year, the PythonLabs team moved to Digital Creations, which became Zope Corporation. In 2001, the Python Software Foundation (PSF, see <https://www.python.org/psf/>) was formed, a non-profit organization created specifically to own Python-related Intellectual Property. Zope Corporation was a sponsoring member of the PSF.

All

Python releases are Open Source (see <https://opensource.org> for the Open Source Definition). Historically, most, but not all, Python releases have also been GPL-compatible; the table below summarizes the various releases.

| Release        | Derived from | Year      | Owner      | GPL-compatible? (1) |
|----------------|--------------|-----------|------------|---------------------|
| 0.9.0 thru 1.2 |              | 1991-1995 | CWI        | yes                 |
| 1.3 thru 1.5.2 | 1.2          | 1995-1999 | CNRI       | yes                 |
| 1.6            | 1.5.2        | 2000      | CNRI       | no                  |
| 2.0            | 1.6          | 2000      | BeOpen.com | no                  |
| 1.6.1          | 1.6          | 2001      | CNRI       | yes (2)             |
| 2.1            | 2.0+1.6.1    | 2001      | PSF        | no                  |
| 2.0.1          | 2.0+1.6.1    | 2001      | PSF        | yes                 |
| 2.1.1          | 2.1+2.0.1    | 2001      | PSF        | yes                 |
| 2.1.2          | 2.1.1        | 2002      | PSF        | yes                 |
| 2.1.3          | 2.1.2        | 2002      | PSF        | yes                 |
| 2.2 and above  | 2.1.1        | 2001-now  | PSF        | yes                 |

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(2) According to Richard Stallman, 1.6.1 is not GPL-compatible, because its license has a choice of law clause. According to CNRI, however, Stallman's lawyer has told CNRI's lawyer that 1.6.1 is "not incompatible" with the GPL.

Thanks to the many outside volunteers who have worked under Guido's direction to make these releases possible.

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## 1.264 simple launcher 1.1.0.14

### 1.264.1 Available under license :

A. HISTORY OF THE SOFTWARE

=====

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

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

In May 2000, Guido and the Python core development team moved to BeOpen.com to form the BeOpen PythonLabs team. In October of the same year, the PythonLabs team moved to Digital Creations (now Zope Corporation, see <http://www.zope.com>). In 2001, the Python Software Foundation (PSF, see <http://www.python.org/psf/>) was formed, a non-profit organization created specifically to own Python-related Intellectual Property. Zope Corporation is a sponsoring member of the PSF.

All Python releases are Open Source (see <http://www.opensource.org> for the Open Source Definition). Historically, most, but not all, Python releases have also been GPL-compatible; the table below summarizes the various releases.

| Release        | Derived from | Year      | Owner      | GPL-compatible? (1) |
|----------------|--------------|-----------|------------|---------------------|
| 0.9.0 thru 1.2 |              | 1991-1995 | CWI        | yes                 |
| 1.3 thru 1.5.2 | 1.2          | 1995-1999 | CNRI       | yes                 |
| 1.6            | 1.5.2        | 2000      | CNRI       | no                  |
| 2.0            | 1.6          | 2000      | BeOpen.com | no                  |
| 1.6.1          | 1.6          | 2001      | CNRI       | yes (2)             |
| 2.1            | 2.0+1.6.1    | 2001      | PSF        | no                  |
| 2.0.1          | 2.0+1.6.1    | 2001      | PSF        | yes                 |
| 2.1.1          | 2.1+2.0.1    | 2001      | PSF        | yes                 |
| 2.2            | 2.1.1        | 2001      | PSF        | yes                 |
| 2.1.2          | 2.1.1        | 2002      | PSF        | yes                 |
| 2.1.3          |              |           |            |                     |
| 2.1.2          | 2002         | PSF       | yes        |                     |
| 2.2.1          | 2.2          | 2002      | PSF        | yes                 |
| 2.2.2          | 2.2.1        | 2002      | PSF        | yes                 |
| 2.2.3          | 2.2.2        | 2003      | PSF        | yes                 |
| 2.3            | 2.2.2        | 2002-2003 | PSF        | yes                 |
| 2.3.1          | 2.3          | 2002-2003 | PSF        | yes                 |
| 2.3.2          | 2.3.1        | 2002-2003 | PSF        | yes                 |
| 2.3.3          | 2.3.2        | 2002-2003 | PSF        | yes                 |
| 2.3.4          | 2.3.3        | 2004      | PSF        | yes                 |



|       |       |      |     |     |
|-------|-------|------|-----|-----|
| 2.3.5 | 2.3.4 | 2005 | PSF | yes |
| 2.4   | 2.3   | 2004 | PSF | yes |
| 2.4.1 | 2.4   | 2005 | PSF | yes |
| 2.4.2 | 2.4.1 | 2005 | PSF | yes |
| 2.4.3 | 2.4.2 | 2006 | PSF | yes |
| 2.4.4 | 2.4.3 | 2006 | PSF | yes |
| 2.5   | 2.4   | 2006 | PSF | yes |
| 2.5.1 | 2.5   | 2007 | PSF | yes |
| 2.5.2 | 2.5.1 | 2008 | PSF | yes |
| 2.5.3 | 2.5.2 | 2008 | PSF | yes |
| 2.6   | 2.5   | 2008 | PSF | yes |
| 2.6.1 | 2.6   | 2008 | PSF | yes |
| 2.6.2 | 2.6.1 | 2009 | PSF | yes |
| 2.6.3 | 2.6.2 | 2009 | PSF | yes |
| 2.6.4 | 2.6.3 | 2009 | PSF | yes |
| 2.6.5 | 2.6.4 | 2010 | PSF | yes |
| 3.0   | 2.6   | 2008 | PSF | yes |
| 3.0.1 | 3.0   | 2009 | PSF | yes |
| 3.1   | 3.0.1 | 2009 | PSF | yes |
| 3.1.1 | 3.1   | 2009 | PSF | yes |
| 3.1.2 | 3.1   | 2010 | PSF | yes |
| 3.2   | 3.1   | 2010 | PSF | yes |

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=====

The Distutils2 project was started by Tarek Ziad and is currently maintained by ric Araujo. Many people have contributed to the project.

distlib has started off using some of the code from distutil2.

If you're making a patch, please add your name below in alphabetical order, and welcome into the Fellowship of the Packaging!

Thanks to:

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- Ali Afshar
- David Barnett
- Pior Bastida
- Anthony Baxter
- Erik Bray
- C. Titus Brown
- Francisco Martn Brugu
- Nicolas Cadou
- Godefroid Chapelle
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- Alexandre Vassalotti
- Nadeem Vawda

Metadata-Version: 1.0

Name: setuptools

Version: 0.6c9

Summary: Download, build, install, upgrade, and uninstall Python packages -- easily!

Home-page: <http://pypi.org/pypi/setuptools>

Author: Phillip J. Eby

Author-email: [distutils-sig@python.org](mailto:distutils-sig@python.org)

License: PSF or ZPL

Description: =====

Installing and Using Setuptools

=====

.. contents:: **Table of Contents**

-----

Installation Instructions

-----

Windows

=====

Install setuptools using the provided ``.exe`` installer. If you've previously installed older versions of setuptools, please delete all ``setuptools\*.egg`` and ``setuptools.pth`` files from your system's ``site-packages`` directory (and any other ``sys.path`` directories) **FIRST**.

If you are upgrading a previous version of setuptools that was installed using an ``.exe`` installer,

please be sure to also *\*uninstall that older version\**

via your system's "Add/Remove Programs" feature, **BEFORE** installing the newer version.

Once installation is complete, you will find an ``easy\_install.exe`` program in your Python ``Scripts`` subdirectory. Be sure to add this directory to your ``PATH`` environment variable, if you haven't already done so.

RPM-Based Systems

=====

Install setuptools using the provided source RPM. The included ``.spec`` file assumes you are installing using the default ``python`` executable, and is not specific to a particular Python version. The ``easy\_install`` executable will be installed to a system ``bin`` directory such as ``/usr/bin``.

If you wish to install to a location other than the default Python installation's default ``site-packages`` directory (and ``\$prefix/bin`` for scripts), please use the ``.egg``-based installation approach described in the following section.



Cygwin, Mac OS X, Linux, Other

=====

1. Download the appropriate egg for your version of Python (e.g. ``setuptools-0.6c9-py2.4.egg``). Do NOT rename it.
2. Run it as if it were a shell script, e.g. ``sh setuptools-0.6c9-py2.4.egg``. Setuptools will install itself using the matching version of Python (e.g. ``python2.4``), and will place the ``easy\_install`` executable in the default location for installing Python scripts (as determined by the standard distutils configuration files, or by the Python installation).

If you want to install setuptools to somewhere other than ``site-packages`` or your default distutils installation locations for libraries and scripts, you may include EasyInstall command-line options such as ``--prefix``, ``--install-dir``, and so on, following the ``.egg`` filename

on the same

command line. For example::

```
sh setuptools-0.6c9-py2.4.egg --prefix=~
```

You can use ``--help`` to get a full options list, but we recommend consulting the `EasyInstall manual`\_ for detailed instructions, especially `the section on custom installation locations`\_.

.. \_EasyInstall manual: <http://peak.telecommunity.com/DevCenter/EasyInstall>

.. \_the section on custom installation locations: <http://peak.telecommunity.com/DevCenter/EasyInstall#custom-installation-locations>

Cygwin Note

-----

If you are trying to install setuptools for the **Windows** version of Python (as opposed to the Cygwin version that lives in ``/usr/bin``), you must make sure that an appropriate executable (``python2.3``, ``python2.4``, or ``python2.5``) is on your **Cygwin** ``PATH`` when invoking the egg. For example, doing the following at a Cygwin bash prompt will install setuptools for the **Windows** Python found at ``C:\Python24``:

```
In -s /cygdrive/c/Python24/python.exe python2.4
PATH=.:$PATH sh setuptools-0.6c9-py2.4.egg
rm python2.4
```

Downloads

=====

All setuptools downloads can be found at `the project's home page in the Python Package Index`. Scroll to the very bottom of the page to find the links.

.. \_the project's home page in the Python Package Index: <http://pypi.org/pypi/setuptools>

In addition to the PyPI downloads, the development version of ``setuptools`` is available from the `Python SVN sandbox`, and in-development versions of the `0.6 branch` are available as well.

.. \_0.6 branch: <http://svn.python.org/projects/sandbox/branches/setuptools-0.6/#egg=setuptools-dev06>

.. \_Python SVN sandbox: <http://svn.python.org/projects/sandbox/trunk/setuptools/#egg=setuptools-dev>

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Using

Setuptools and EasyInstall

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Here are some of the available manuals, tutorials, and other resources for learning about Setuptools, Python Eggs, and EasyInstall:

- \* `The EasyInstall user's guide and reference manual`\_
- \* `The setuptools Developer's Guide`\_
- \* `The pkg\_resources API reference`\_
- \* `Package Compatibility Notes`\_ (user-maintained)
- \* `The Internal Structure of Python Eggs`\_

Questions, comments, and bug reports should be directed to the `distutils-sig mailing list`. If you have written (or know of) any tutorials, documentation, plug-ins, or other resources for setuptools users, please let us know about them there, so this reference list can be updated. If you have working, \*tested\* patches to correct problems or add features, you may submit them to the `setuptools bug tracker`.

.. \_setuptools bug tracker: <http://bugs.python.org/setuptools/>

.. \_Package Compatibility Notes: <http://peak.telecommunity.com/DevCenter/PackageNotes>

.. \_The Internal Structure of Python Eggs: <http://peak.telecommunity.com/DevCenter/EggFormats>

.. \_The setuptools Developer's Guide: <http://peak.telecommunity.com/DevCenter/setuptools>

.. \_The pkg\_resources API reference: <http://peak.telecommunity.com/DevCenter/PkgResources>

.. \_The EasyInstall user's guide and reference manual: <http://peak.telecommunity.com/DevCenter/EasyInstall>

.. \_distutils-sig mailing list: <http://mail.python.org/pipermail/distutils-sig/>

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Credits

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\* The original design for the ``egg`` format and the ``pkg\_resources`` API was co-created by Phillip Eby and Bob Ippolito. Bob also implemented the first version of ``pkg\_resources``, and supplied the OS X operating system version compatibility algorithm.

\* Ian Bicking implemented many early "creature comfort" features of `easy_install`, including support for downloading via Sourceforge and Subversion repositories. Ian's comments on the Web-SIG about WSGI application deployment also inspired the concept of "entry points" in eggs, and he has given talks at PyCon and elsewhere to inform and educate the community about eggs and `setuptools`.

\* Jim Fulton contributed time and effort to build automated tests of various aspects of ``easy\_install``, and supplied the doctests for the command-line ``.exe`` wrappers on Windows.

\* Phillip J. Eby is the principal author and maintainer of `setuptools`, and first proposed the idea of an importable binary distribution format for Python application plug-ins.

\* Significant parts of the implementation of `setuptools` were funded by the Open Source Applications Foundation, to provide a plug-in infrastructure for the Chandler PIM application.

In addition, many OSAF staffers (such as Mike "Code Bear" Taylor) contributed their time and stress as guinea pigs for the use of eggs and `setuptools`, even before eggs were "cool". (Thanks, guys!)

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# 1.267 protobuf 1.34.2

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## 1.273 typing-extensions 4.12.2

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

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

In May 2000, Guido and the Python core development team moved to BeOpen.com to form the BeOpen PythonLabs team. In October of the same year, the PythonLabs team moved to Digital Creations, which became Zope Corporation. In 2001, the Python Software Foundation (PSF, see <https://www.python.org/psf/>) was formed, a non-profit organization created specifically to own Python-related Intellectual Property. Zope Corporation was a sponsoring member of the PSF.

All

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| 0.9.0 thru 1.2 | 1.2          | 1991-1995 | CWI        | yes                 |
| 1.3 thru 1.5.2 | 1.2          | 1995-1999 | CNRI       | yes                 |
| 1.6            | 1.5.2        | 2000      | CNRI       | no                  |
| 2.0            | 1.6          | 2000      | BeOpen.com | no                  |
| 1.6.1          | 1.6          | 2001      | CNRI       | yes (2)             |
| 2.1            | 2.0+1.6.1    | 2001      | PSF        | no                  |
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| 2.1.1          | 2.1+2.0.1    | 2001      | PSF        | yes                 |
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| 2.1.3          | 2.1.2        | 2002      | PSF        | yes                 |
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## 1.274 importlib-metadata 4.11.1

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## 1.276 errors 0.9.1

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## 1.277 logrus 1.8.1

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