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Contents

1.1 libtomcrypt 1.17

1.1.1 Available under license

1.2 lua 5.1.5

1.2.1 Available under license

1.3 curl 7.30.0

1.3.1 Available under license

1.4 csrp 1.0

1.4.1 Available under license

1.5 libtommath 0.42.0

1.5.1 Available under license

1.6 xinetd 2.3.15

1.6.1 Available under license

1.7 zip 3.0

1.7.1 Available under license

1.8 enum34 1.1.6

1.8.1 Available under license

1.9 pkix-ssh 11.0

1.9.1 Available under license

1.10 inetutils 1.9.4

1.10.1 Available under license

1.11 libmnl 1.0.4

1.11.1 Available under license

1.12 lzo 2.10

1.12.1 Available under license

1.13 libtool 2.4.6

1.13.1 Available under license

1.14 zlib 1.2.3

1.14.1 Available under license

1.15 diffutils 3.7

1.15.1 Available under license

1.16 bzip2 1.0.8

1.17 zlib 1.2.8

1.17.1 Available under license

1.18 dmidecode 3.5

1.18.1 Available under license

1.19 ebttables 2.0.10

1.19.1 Available under license

1.20 tcl 8.3.2

1.20.1 Available under license

1.21 json-c 0.13.1

1.21.1 Available under license

1.22 lua-cjson 2.1.0

1.22.1 Available under license

1.23 net-tools 1.60

1.23.1 Available under license

1.24 jansson 2.7

1.24.1 Available under license

1.25 m4 1.4.18

1.25.1 Available under license

1.26 libusb 1.0.22

1.26.1 Available under license

1.27 lsof 4.91

1.27.1 Available under license

1.28 hd-parm 9.58

1.29 tar 1.32

1.29.1 Available under license

1.30 libunwind 1.3.1

1.30.1 Available under license

1.31 inotify-tools 3.14

1.31.1 Available under license

1.32 unzip 6

1.32.1 Available under license

1.33 netcf 0.2.8

1.33.1 Available under license

1.34 xz 5.2.4

1.34.1 Available under license

1.35 libidn 1.35

1.35.1 Available under license

1.36 decorator 4.4.1

1.36.1 Available under license

1.37 libpcap 1.9.1

1.37.1 Available under license

1.38 libxml2 2.9.10

1.38.1 Available under license

1.39 expat 2.2.9

1.39.1 Available under license

1.40 dosfs-tools 4.1

1.40.1 Available under license

1.41 readline 8.0

1.41.1 Available under license

1.42 libxslt 1.1.34

1.42.1 Available under license

1.43 dbus-glib 0.110

1.43.1 Available under license

1.44 findutils 4.7.0

1.44.1 Available under license

1.45 less 481

1.45.1 Available under license

1.46 networkx 2.4

1.46.1 Available under license

1.47 dhcp 4.4.2

1.47.1 Available under license

1.48 sqlite 3.31.1

1.48.1 Available under license

1.49 libunistring 0.9.10

1.49.1 Available under license

1.50 libyaml 0.2.2

1.50.1 Available under license

1.51 decorator 4.4.2

1.51.1 Available under license

1.52 bridgeutils 1.6

1.52.1 Available under license

1.53 libksba 1.3.5

1.53.1 Available under license

1.54 terminaltables 3.1.0

1.54.1 Available under license

1.55 iptables 1.8.4

1.55.1 Available under license

1.56 ncurses 6.2

1.56.1 Available under license

1.57 pciutils 3.6.4

1.57.1 Available under license

1.58 attr 2.4.48

1.58.1 Available under license

1.59 grep 3.4

1.59.1 Available under license

1.60 iproute 5.5.0

1.60.1 Available under license

1.61 kexec-tools 2.0.20

1.61.1 Available under license

1.62 parted 3.3

1.62.1 Available under license

1.63 rpcbind 1.2.5

1.63.1 Available under license

1.64 elfutils 0.178

1.64.1 Available under license

1.65 avahi 0.7

1.65.1 Available under license

1.66 cpio 2.13

1.66.1 Available under license

1.67 rpm 4.14.2

1.67.1 Available under license

1.68 oniguruma 5.9.5

1.68.1 Available under license

1.69 fdisk 2.35.1

1.69.1 Available under license

1.70 audit 2.8.5

1.70.1 Available under license

1.71 update-rc-d 0.8-r0.15

1.71.1 Available under license

1.72 netcat 0.7.1

1.72.1 Available under license

1.73 openssl 1.1.1

1.73.1 Available under license

1.74 libarchive 3.4.2

1.74.1 Available under license

1.75 ethtool 5.4

1.75.1 Available under license

1.76 glibc 2.31

1.76.1 Available under license

1.77 libgpg-error 1.37

1.77.1 Available under license

1.78 sed 4.8

1.78.1 Available under license

1.79 smartmontools 7.1

1.79.1 Available under license

1.80 strace 5.5

1.80.1 Available under license

1.81 tcl 8.6.10

1.81.1 Available under license

1.82 cracklib 2.9.5

1.82.1 Available under license

1.83 libnl3 3.5.0

1.83.1 Available under license

1.84 augeas 1.12.0

1.84.1 Available under license

1.85 libnettle6 3.5.1

1.85.1 Available under license

1.86 jansson 2.13.1

1.86.1 Available under license

1.87 urfave-cli 1.22.1

1.87.1 Available under license

1.88 mdadm 4.1

1.88.1 Available under license

1.89 zstd 1.3.6

1.89.1 Available under license

1.90 libidn 2.3.0

1.90.1 Available under license

1.91 lighttpd 1.4.55

1.91.1 Available under license

1.92 libssh2 1.9.0

1.92.1 Available under license

1.93 pkix-ssh 12.1

1.93.1 Available under license

1.94 i2c-tools 4.1

1.94.1 Available under license

1.95 openssh 8.0-p1

1.95.1 Available under license

1.96 openssh 8.2p1

1.96.1 Notifications

1.96.2 Available under license

1.97 go-md2man 2.0.0-20190314233015-f79a8a8ca69d

1.97.1 Available under license

1.98 readline 8.0-r0.7

1.98.1 Available under license

1.99 flex 2.6.4

1.99.1 Available under license

1.100 tcpdump 4.9.3

1.100.1 Available under license

1.101 openssl 1.1.1g

1.101.1 Available under license

1.102 gnutls 3.6.14

1.102.1 Available under license

1.103 protobuf 3.11.4

1.103.1 Available under license

1.104 bash 5.0.18

1.104.1 Available under license

1.105 iniparse 0.4

1.105.1 Available under license

1.106 prettytable 0.7.2

1.106.1 Available under license

1.107 pygpgme 0.3

1.107.1 Available under license

1.108 packaging 19.2

1.108.1 Available under license

1.109 psmisc 22.21

1.109.1 Available under license

1.110 nose 1.3.7

1.110.1 Available under license

1.111 efibootmgr 0.12

1.112 coreutils 8.31

1.112.1 Available under license

1.113 python-setuptools 42.0.2

1.113.1 Available under license

1.114 sg3-utils 1.42

1.114.1 Available under license

1.115 cronie 1.5.5

1.115.1 Available under license

1.116 grpc 1.24.3

1.116.1 Available under license

1.117 mnuralp-fileutils 0.5.0

1.117.1 Available under license

1.118 libtirpc 1.2.6

1.118.1 Available under license

1.119 glib 2.62.6

1.119.1 Available under license

1.120 libcap-ng 0.7.10

1.120.1 Available under license

1.121 libseccomp 2.4.3

1.121.1 Available under license

1.122 gdbm 1.18.1

1.122.1 Available under license

1.123 iconv 2.31

1.123.1 Available under license

1.124 libsodium 1.0.18

1.124.1 Available under license

1.125 slang 2.3.2

1.125.1 Available under license

1.126 base-passwd 3.5.3

1.126.1 Available under license

1.127 librabbitmq 0.10.0

1.127.1 Available under license

1.128 libassuan 2.5.3

1.128.1 Available under license

1.129 tdb 1.4.3

1.129.1 Available under license

1.130 npth 1.6

1.130.1 Available under license

1.131 go-units 0.4.0

1.131.1 Available under license

1.132 cJSON 1.7.3

1.132.1 Available under license

1.133 libgcrypt 1.8.5

1.133.1 Available under license

1.134 python-setuptools 56.0.0

1.134.1 Available under license

1.135 google-test 1.10.0

1.135.1 Available under license

1.136 at 3.1.23

1.136.1 Available under license

1.137 runc 1.0.0-rc93+gitAUTOINC+b4cb54c2ea

1.137.1 Available under license

1.138 open-ldap 1.2.5

1.138.1 Available under license

1.139 binutils 2.34.0

1.139.1 Available under license

1.140 procps 3.3.16

1.140.1 Available under license

1.141 shadow 4.8.1

1.141.1 Available under license

1.142 selectors2 2.0.2

1.142.1 Available under license

1.143 zeromq 4.3.4

1.143.1 Available under license

1.144 go-capability 0.0.0-20200815063812-42c35b437635

1.144.1 Available under license

1.145 opencontainers-runtime-spec 1.0.3-0.20210326190908-1c3f411f0417

1.145.1 Available under license

1.146 blackfriday 2.0.1

1.146.1 Available under license

1.147 sanitized-anchor-name 1.0.0

1.147.1 Available under license

1.148 linux-kernel 5.4.142

1.148.1 Available under license

1.149 backoff 4.1.1

1.149.1 Available under license

1.150 pmylund-go-cache 2.1.0+incompatible

1.150.1 Available under license

1.151 tdb 1.45.7

- 1.151.1 Available under license
- 1.152 libiniparser 1.5.2**
 - 1.152.1 Available under license
- 1.153 cyphar-filepath-securejoin 0.2.3**
 - 1.153.1 Available under license
- 1.154 six 1.14.0**
 - 1.154.1 Available under license
- 1.155 hiredis 1.0.2**
 - 1.155.1 Available under license
- 1.156 scapy 1.10.0**
 - 1.156.1 Available under license
- 1.157 openconfig-gnoi 0.0.0-20210902152759-d6d0463a58fe**
 - 1.157.1 Available under license
- 1.158 openconfig-grpctunnel 0.0.0-20210927193438-50bd2bfefafa**
 - 1.158.1 Available under license
- 1.159 openconfig-gnmi 0.0.0-20210914185457-51254b657b7d**
 - 1.159.1 Available under license
- 1.160 gnupg 2.2.27**
 - 1.160.1 Available under license
- 1.161 containerd-console 1.0.3**
 - 1.161.1 Available under license
- 1.162 mtd-utils 2.1.3**
 - 1.162.1 Available under license
- 1.163 libedit 3.1**
 - 1.163.1 Available under license
- 1.164 godbus 5.0.6**
 - 1.164.1 Available under license
- 1.165 sys-mountinfo 0.5.0**
 - 1.165.1 Available under license
- 1.166 python-prctl 1.7**
 - 1.166.1 Available under license
- 1.167 python-setuptools 45.2.0**
 - 1.167.1 Available under license
- 1.168 cilium-ebpf 0.7.0**
 - 1.168.1 Available under license
- 1.169 containerd 1.4.3+git0+33d90b72d1**
 - 1.169.1 Available under license
- 1.170 keyutils 1.6.1**
 - 1.170.1 Available under license

1.171 libsolvr 0.7.10

1.171.1 Available under license

1.172 gnupg 1.13.1-unknown

1.172.1 Available under license

1.173 libaio 0.3.111

1.173.1 Available under license

1.174 x-sys 0.0.0-20211116061358-0a5406a5449c

1.174.1 Available under license

1.175 sepolity 3.0

1.175.1 Available under license

1.176 libcomps 0.1.15

1.176.1 Available under license

1.177 ipy 1.00

1.177.1 Available under license

1.178 lvm2 2.03.06

1.178.1 Available under license

1.179 zstd 1.4.5

1.179.1 Available under license

1.180 opencontainers-selinux 1.10.0

1.180.1 Available under license

1.181 cryptsetup 2.3.7

1.181.1 Available under license

1.182 go-cache 2.1.0+incompatible

1.182.1 Available under license

1.183 groupcache 0.0.0-20210331224755-41bb18bfe9da

1.183.1 Available under license

1.184 goprotobuf 1.5.2

1.184.1 Available under license

1.185 logrus 1.8.1

1.185.1 Available under license

1.186 netlink 1.1.0

1.186.1 Available under license

1.187 libnsl 2.31

1.187.1 Available under license

1.188 sysfsutils 2.1.0

1.188.1 Available under license

1.189 python3-iniparse 0.4-r0.60

1.189.1 Available under license

1.190 dnf-plugins-core 2.1.5+git0+8d1f1758be-r0.60

1.190.1 Available under license

1.191 libnsl 1.2.0

1.191.1 Available under license

1.192 openssl 1.1.1q

1.192.1 Available under license

1.193 bind 9.11.37

1.193.1 Available under license

1.194 zlib 1.2.11

1.194.1 Available under license

1.195 popt 1.16-r3.56

1.195.1 Available under license

1.196 tcp-wrappers 7.6-r10.56

1.196.1 Available under license

1.197 go.mozilla.org-pkcs7 0.0.0-20210826202110-33d05740a352

1.197.1 Available under license

1.198 go-control-plane 0.10.3

1.198.1 Available under license

1.199 grpc-go 1.49.0

1.199.1 Available under license

1.200 protobuf 1.27.1

1.200.1 Available under license

1.201 futures 3.3.0

1.201.1 Available under license

1.202 packaging 16.8

1.202.1 Available under license

1.203 talloc 2.3.0

1.203.1 Available under license

1.204 bind 8.100

1.204.1 Available under license

1.205 intel-openmp 5.0.20140926

1.205.1 Available under license

1.206 gpgme 1.13.1

1.206.1 Available under license

1.207 gmp 6.2.0

1.207.1 Available under license

1.208 pyyaml 5.3.1

1.208.1 Available under license

1.209 openconfig-gribi 0.1.1-0.20221128181216-e88a095e6fe2

1.209.1 Available under license

1.210 systemd 244.5

1.210.1 Available under license

1.211 libnftnl 1.1.7

1.211.1 Available under license

1.212 libcheck 0.14.0

1.212.1 Available under license

1.213 berkeley-db 6.1.38-r1.26

1.213.1 Available under license

1.214 protoc-gen-validate 0.9.1

1.214.1 Available under license

1.215 redis 2.1.0

1.215.1 Available under license

1.216 fsnotify 1.6.0

1.216.1 Available under license

1.217 lxc 4.0.6

1.217.1 Available under license

1.218 openssl 1.1.1t

1.218.1 Notifications

1.218.2 Available under license

1.219 cncf-xds-go 0.0.0-20230105202645-06c439db220b

1.219.1 Available under license

1.220 createrepo-c 0.15.7

1.220.1 Available under license

1.221 x-net 0.7.0

1.221.1 Available under license

1.222 x-sys 0.5.0

1.222.1 Available under license

1.223 x-text 0.7.0

1.223.1 Available under license

1.224 x-crypto 0.6.0

1.224.1 Available under license

1.225 grpc-go 1.53.0

1.225.1 Available under license

1.226 setserial 2.17

1.226.1 Available under license

1.227 sysklogd 1.5.1

1.227.1 Available under license

1.228 berkeley-db 6.1.38

1.228.1 Available under license

1.229 quota 4.05

1.229.1 Available under license

1.230 p4lang-p4runtime 1.4.0-rc.5

1.230.1 Available under license

1.231 openconfig-ygot 0.25.7

1.231.1 Available under license

1.232 free-type 2.10.1-r0.7

1.232.1 Available under license

1.233 efivar 37-r0.7

1.233.1 Available under license

1.234 libffi 3.3-r0.7

1.234.1 Available under license

1.235 libsepol 3.0-r0.7

1.235.1 Available under license

1.236 ima-evm-utils 1.2.1+git0+3eab1f93b6-r0.7

1.236.1 Available under license

1.237 kmod 26-r0.7

1.237.1 Available under license

1.238 grub2 2.04

1.238.1 Available under license

1.239 selinux 3.0

1.239.1 Available under license

1.240 bsd-mailx 12.5

1.240.1 Available under license

1.241 libsemanage-common 3.0-r0.8

1.241.1 Available under license

1.242 harfbuzz 2.6.4-r0.8

1.242.1 Available under license

1.243 rpm 4.14.2.1-r0.8

1.243.1 Available under license

1.244 cairo 1.16.0-r0.8

1.244.1 Available under license

1.245 lm-sensors 3.6.0-r0.8

1.245.1 Available under license

1.246 rrdtool 1.7.2-r0.8

1.246.1 Available under license

1.247 policycoreutils 3.0-r0.8

1.247.1 Available under license

1.248 shared-mime-info 1.15-r0.8

1.248.1 Available under license
1.249 pango 1.44.7-r0.8
1.249.1 Available under license
1.250 libselinux-python 3.0-r0.8
1.250.1 Available under license
1.251 erlang-otp 5.10
1.251.1 Available under license
1.252 u-boot 2019.10
1.252.1 Available under license
1.253 lvm2 1.02.165
1.253.1 Available under license
1.254 makedumpfile 1.6.9
1.254.1 Available under license
1.255 yajl 2.1.0
1.255.1 Available under license
1.256 google-golang-org-genproto 0.0.0-20230222225845-10f96fb3dbec
1.256.1 Available under license
1.257 google-golang-org-genproto 0.0.0-20220608133413-ed9918b62aac
1.257.1 Available under license
1.258 leemcloughlin-logfile 0.0.0-20201123203928-cff1c8a30a10
1.258.1 Available under license
1.259 openconfig-bootz 0.1.0
1.259.1 Available under license
1.260 openconfig-gnsi 1.2.1
1.260.1 Available under license
1.261 openconfig-gnmi 0.0.0-20220617175856-41246b1b3507
1.261.1 Available under license
1.262 openconfig-gnoi 0.0.0-20220809151450-6bddacd72ef8
1.262.1 Available under license
1.263 libbpf 0.5.0
1.263.1 Available under license
1.264 usbutils 0.13.111
1.264.1 Available under license
1.265 libpciaccess 0.11.111
1.265.1 Available under license
1.266 protobuf 1.28.1
1.266.1 Available under license
1.267 golang 1.19.4
1.267.1 Available under license

1.268 golang 1.17.13

1.268.1 Available under license

1.269 setools 4.3.0-3.el8

1.269.1 Available under license

1.270 efiteols 1.9.2+git0+392836a46c-r0.7

1.270.1 Available under license

1.271 ima-policy 0.1-r0.7

1.271.1 Available under license

1.272 systemd-conf 244.3-r0.7

1.272.1 Available under license

1.273 shadow-securetty 4.6-r3.7

1.273.1 Available under license

1.274 selinux-labeldev 0.1-r0.7

1.274.1 Available under license

1.275 base-files 3.0.14-r89.8

1.275.1 Available under license

1.276 dnf-vars-arch 1.0-r0.7

1.276.1 Available under license

1.277 volatile-binds 1.0-r0.71

1.277.1 Available under license

1.278 refpolicy-targeted 2.20190201+git0+df696a3254-r0.9

1.278.1 Available under license

1.279 ca-certificates 20211016-r0.17

1.279.1 Available under license

1.280 initramfs-module-install 1.0-r1.7

1.280.1 Available under license

1.281 selinux-init 0.1-r0.8

1.281.1 Available under license

1.282 initramfs-module-install-efi 1.0-r4.7

1.282.1 Available under license

1.283 initramfs-module-setup-live 1.0-r4.7

1.283.1 Available under license

1.284 linux-yocto 5.4.142+git0+719be4bd6c_108b8b822e-r0.12

1.284.1 Available under license

1.285 initramfs-framework 1.0-r4.7

1.285.1 Available under license

1.286 libpng 1.6.37

1.286.1 Available under license

1.287 libcap 2.32

1.287.1 Available under license
1.288 fuse 2.9.9
1.288.1 Available under license
1.289 util-linux 2.35.1
1.289.1 Available under license
1.290 expat 2.4.7
1.290.1 Available under license
1.291 c-ares 1.18.1
1.291.1 Available under license
1.292 expat 2.2.8
1.292.1 Available under license
1.293 log-rotate 3.15.1
1.293.1 Available under license
1.294 gzip 1.10
1.294.1 Available under license
1.295 busybox 1.31.1
1.295.1 Available under license
1.296 python 2.7.18
1.296.1 Available under license
1.297 vim 8.2
1.297.1 Available under license
1.298 rsync 3.2.5
1.298.1 Available under license
1.299 sysstat 12.2.1
1.299.1 Available under license
1.300 python 3.9.1
1.300.1 Available under license
1.301 python 3.8.14
1.301.1 Available under license
1.302 wget 1.20.3
1.302.1 Available under license
1.303 file 5.38
1.303.1 Available under license
1.304 libvirt 6.1.0
1.304.1 Available under license
1.305 fuse 3.9.2
1.305.1 Available under license
1.306 e2fsprogs 1.45.7
1.306.1 Available under license

1.307 perl 5.30.0

1.307.1 Available under license

1.308 d-bus 1.12.24

1.308.1 Available under license

1.309 dnsmasq 2.84rc2

1.309.1 Available under license

1.310 curl 7.69.1

1.310.1 Available under license

1.311 acl 2.2.53

1.311.1 Available under license

1.312 pcre 7.8

1.312.1 Available under license

1.313 iputils 20190709

1.313.1 Available under license

1.314 lz4 1.9.2

1.314.1 Available under license

1.315 libevent 2.1.11

1.315.1 Available under license

1.316 python-pip 22.0.4

1.316.1 Available under license

1.317 libtasn 4.16.0

1.317.1 Available under license

1.318 errors 0.9.1

1.318.1 Available under license

1.319 networkx 2.2

1.319.1 Available under license

1.320 numpy 1.17.4

1.320.1 Notifications

1.320.2 Available under license

1.321 libcgrouper 0.11.111

1.321.1 Available under license

1.322 gawk 5.0.1

1.322.1 Available under license

1.323 sudo 1.8.32

1.323.1 Available under license

1.324 dnf 2.7.5-r0.68

1.324.1 Available under license

1.325 fontconfig 2.13.1-r0.7

1.325.1 Available under license

1.326 librepo 1.11.2-r0.8

1.326.1 Available under license

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1.328 libxcrypt 4.4.15-r0.7

1.328.1 Available under license

1.329 pam 1.3.1-r0.7

1.329.1 Available under license

1.330 rng-tools 6.9-r0.7

1.330.1 Available under license

1.331 libdnf 0.11.1-r0.66

1.331.1 Available under license

1.332 fribidi 1.0.9-r0.7

1.332.1 Available under license

1.333 pcre 8.44-r0.7

1.333.1 Available under license

1.334 pixman 0.38.4-r0.7

1.334.1 Available under license

1.335 opkg-utils 0.4.2-r0.7

1.335.1 Available under license

1.336 mtools 4.0.23-r0.7

1.336.1 Available under license

1.337 openmp 10.0.1-r0.7

1.337.1 Available under license

1.338 libcomps 0.1.15-r0.8

1.338.1 Available under license

1.339 python 3.8.14-r0.3

1.339.1 Available under license

1.340 kbd 2.2.0-r0.7

1.340.1 Available under license

1.341 pinentry 1.1.0-r0.7

1.341.1 Available under license

1.342 ima-inspect 0.13-r0.7

1.342.1 Available under license

1.343 libjitterentropy 3.4.1-r0.11

1.343.1 Available under license

1.344 docker 1.1.4+git0+974efd2dfc-r0.5.aarch64

1.344.1 Available under license

1.1 libtomcrypt 1.17

1.1.1 Available under license :

```
# /*
#  * SHA-512
#  * Implementation derived from LibTomCrypt (Tom St Denis)
#  *
#  * LibTomCrypt is a library that provides various cryptographic
#  * algorithms in a highly modular and flexible manner.
#  *
#  * The library is free for all purposes without any express
#  * guarantee it works.
#  *
#  * Tom St Denis, tomstdenis@gmail.com, http://libtomcrypt.org
#  */
```

1.2 lua 5.1.5

1.2.1 Available under license :

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1.3 curl 7.30.0

1.3.1 Available under license :

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=====

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zlib http://www.gzip.org/zlib/zlib_license.html

(Used for compressed Transfer-Encoding support) Uses an MIT-style license that shouldn't collide with any other library.

krb4

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1.4 csrp 1.0

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1.5 libtommath 0.42.0

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-- Tom St Denis

1.6 xinetd 2.3.15

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So, if you want, you may use any 2.N.* (N >= 3) version string for future xinetd versions that you release. Note that I am excluding the 2.2.* line; using

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1.7 zip 3.0

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1.8 enum34 1.1.6

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1.10 inetutils 1.9.4

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1.12 Izo 2.10

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1.14 zlib 1.2.3

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```
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   version 1.2.11, January 15th, 2017
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1.15 diffutils 3.7

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1.16 bzip2 1.0.8

1.17 zlib 1.2.8

1.17.1 Available under license :

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

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1.18 dmidecode 3.5

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1.19 ebttables 2.0.10

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```
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to redistribute 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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1.20 tcl 8.3.2

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1.21 json-c 0.13.1

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1.22 lua-cjson 2.1.0

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1.23 net-tools 1.60

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1.24 jansson 2.7

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Any executables

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```
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```

```
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1.28 hd-parm 9.58

1.29 tar 1.32

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section 10

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1.32 unzip 6

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The original unzip source code has been extensively modified and almost entirely rewritten (changes include random zipfile access rather than sequential; replacement of unimplode() with explode(); replacement of old unshrink() with new (unrelated) unshrink(); replacement of output routines; addition of inflate(), wildcards, filename-mapping, text translation, ...; etc.). As far as we can tell, only the core code of the unreduce method remained substantially similar to Mr. Smith's original source. As of UnZip

5.42, the complete

core code is now covered by the Info-ZIP Licence. Therefore, support for the reduce method has been removed.

The drop of the reduce method should only affect some test archives, reducing was never used in any publically distributed Zip program.

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- *
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- *
- * by Jim Luther (Apple Macintosh Developer Technical Support Emeritus)
- * with significant code contributions by Nitin Ganatra
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- *
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May 1994, (213) 851-9969 (voice), (213) 887-2127(?) (subscription BBS),
71150.2731@compuserve.com]:

"He says that he thought that whoever contacted him understood that
he has no objection to the Info-ZIP group's inclusion of his code.
His primary concern is that it remain freely distributable, he said."

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The decompression core code for the deflate method (inflate.[ch], explode.c) was originally written by Mark Adler who submitted it as public domain code.

1.33 netcf 0.2.8

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1.34 xz 5.2.4

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The original version for gzip was written by Paul Eggert.

Modified for XZ Utils by Andrew Dudman and Lasse Collin.

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1.37 libpcap 1.9.1

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1.38 libxml2 2.9.10

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1.40 dosfs-tools 4.1

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1.46 networkx 2.4

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1.47 dhcp 4.4.2

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* atf-c/ui.c: The format_paragraph and format_text functions were derived from the ones in the Monotone project, revision 3a0982da308228d796df35f98d787c5cff2bb5b6.

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* atf-c++/detail/io.hpp, atf-c++/detail/io.cpp, atf-c++/detail/io_test.cpp: These files were derived from the file_handle, systembuf, pipe and pistream classes and tests found in the Boost.Process library.

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* admin/check-style.sh,
admin/check-style-common.awk,
admin/check-style-cpp.awk, admin/check-style-shell.awk: These files, except the first one, were first implemented in the Buildtool project. They were later adapted to be part of Boost.Process and, during that process, the shell script was created.

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-->

<!-- \$Id\$ -->

<!-- Generate ISC copyright comments from Docbook copyright metadata. -->

<xsl:stylesheet version="1.0"

xmlns:xsl="http://www.w3.org/1999/XSL/Transform"

xmlns:xi="http://www.w3.org/2001/XInclude"

xmlns:db="http://docbook.org/ns/docbook">

```

<xsl:template name="isc.copyright.format">
  <xsl:param name="text"/>
  <xsl:value-of select="$isc.copyright.leader"/>
  <xsl:value-of select="normalize-space(substring-before($text, '&#10;'))"/>
  <xsl:text>&#10;</xsl:text>
  <xsl:variable name="rest" select="substring-after($text, '&#10;')"/>
  <xsl:if test="translate($rest, '&#9;&#32;', '')">
    <xsl:call-template name="isc.copyright.format">
      <xsl:with-param
name="text" select="$rest"/>
    </xsl:call-template>
  </xsl:if>
</xsl:template>

```

```

<xsl:variable name="isc.copyright.text">
  <xsl:text>
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    License, v. 2.0. If a copy of the MPL was not distributed with this
    file, You can obtain one at http://mozilla.org/MPL/2.0/.
  </xsl:text>
</xsl:variable>

```

```

<xsl:variable name="isc.copyright">
  <xsl:call-template name="isc.copyright.format">
    <xsl:with-param name="text">
      <xsl:for-each select="book/info/copyright | refentry/docinfo/copyright">
        <xsl:text>Copyright (C) </xsl:text>
        <xsl:call-template name="copyright.years">
          <xsl:with-param name="years" select="year"/>
        </xsl:call-template>
        <xsl:text> </xsl:text>
        <xsl:value-of select="holder"/>
        <xsl:value-of select="$isc.copyright.breakline"/>
        <xsl:text>&#10;</xsl:text>
      </xsl:for-each>
    <xsl:value-of select="$isc.copyright.text"/>
    </xsl:with-param>
  </xsl:call-template>
</xsl:variable>
</xsl:stylesheet>

```

<!--

- Local variables:
- mode: sgml
- End:

-->

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1.50 libyaml 0.2.2

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1.56 ncurses 6.2

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1.57 pciutils 3.6.4

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1.59 grep 3.4

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"Source code" for a work means the preferred form of the work for making modifications to it. For a library, complete source code means all the source code for all modules it contains, plus any associated

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Otherwise, if the work is a derivative of the Library, you may distribute the object code for the work under the terms of Section 6. Any executables containing that work also fall under Section 6, whether or not they are linked directly with the Library itself.

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You must give prominent notice with each copy of the work that the Library is used in it and that the Library and its use are covered by this License. You must supply a copy of this License. If the work during execution displays copyright notices, you must include the copyright notice for the Library among them, as well as a reference directing the user to the copy of this License. Also, you must do one of these things:

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

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normally

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1.66 cpio 2.13

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b) Convey the object code in, or embodied in, a physical product (including a physical distribution medium), accompanied by a written offer, valid for at least three years and valid for as long as you offer spare parts or customer

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

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if you want it, that you can change the software or use pieces of it
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These restrictions translate to certain responsibilities for you if
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For example, if you distribute copies of the library, whether gratis
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you. You must make sure that they, too, receive or can get the source
code. If you link a program with the library, you must provide
complete object files to the recipients so that they can relink them
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Also, for each distributor's protection, we want to make certain that everyone understands that there is no warranty for this free library. If the library is modified by someone else and passed on, we want its recipients to know that what they have is not the original version, so that any problems introduced by others will not reflect on the original authors' reputations.

Finally, any free program is threatened constantly by software patents. We wish to avoid the danger that companies distributing free software will individually obtain patent licenses, thus in effect transforming the program into proprietary software. To prevent this, we have made it clear that any patent must be licensed for everyone's free use or not licensed at all.

Most GNU software, including some libraries, is covered by the ordinary GNU General Public License, which was designed for utility programs. This license, the GNU Library General Public License, applies to certain designated libraries. This license is quite different from the ordinary one; be sure to read it in full, and don't assume that anything in it is the same as in the ordinary license.

The reason we have a separate public license for some libraries is that they blur the distinction we usually make between modifying or adding to a program and simply using it. Linking a program with a library, without changing the library, is in some sense simply using the library, and is analogous to running a utility program or application program. However, in a textual and legal sense, the linked executable is a combined work, a derivative of the original library, and the ordinary General Public License treats it as such.

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

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

The precise terms and conditions for copying, distribution and

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

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

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A "library" means a collection of software functions and/or data prepared so as to be conveniently linked with application programs (which use some of those functions and data) to form executables.

The "Library", below, refers to any such software library or work which has been distributed under these terms. A "work based on the Library" means either the Library or any derivative work under copyright law: that is to say, a work containing the Library or a portion of it, either verbatim or with modifications and/or translated straightforwardly into another language. (Hereinafter, translation is included without limitation in the term "modification".)

"Source code" for a work means the preferred form of the work for making modifications to it. For a library, complete source code means all the source code for all modules it contains, plus any associated interface definition files, plus the scripts used to control compilation and installation of the library.

Activities other than copying, distribution and modification are not covered by this License; they are outside its scope. The act of running a program using the Library is not restricted, and output from such a program is covered only if its contents constitute a work based on the Library (independent of the use of the Library in a tool for writing it). Whether that is true depends on what the Library does and what the program that uses the Library does.

1. You may copy and distribute verbatim copies of the Library's complete source code as you receive it, in any medium, provided that

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

2. You may modify your copy or copies of the Library or any portion of it, thus forming a work based on the Library, and copy and distribute such modifications or work under the terms of Section 1 above, provided that you also meet all of these conditions:

- a) The modified work must itself be a software library.
- b) You must cause the files modified to carry prominent notices stating that you changed the files and the date of any change.
- c) You must cause the whole of the work to be licensed at no charge to all third parties under the terms of this License.
- d) If a facility in the modified Library refers to a function or a table of data to be supplied by an application program that uses the facility, other than as an argument passed when the facility is invoked, then you must make a good faith effort to ensure that, in the event an application does not supply such function or table, the facility still operates, and performs whatever part of its purpose remains meaningful.

(For example, a function in a library to compute square roots has a purpose that is entirely well-defined independent of the application. Therefore, Subsection 2d requires that any application-supplied function or table used by this function must be optional: if the application does not supply it, the square root function must still compute square roots.)

These requirements apply to the modified work as a whole. If identifiable sections of that work are not derived from the Library, and can be reasonably considered independent and separate works in themselves, then this License, and its terms, do not apply to those sections when you distribute them as separate works. But when you distribute the same sections as part of a whole which is a work based on the Library, the distribution of the whole must be on the terms of this License, whose permissions for other licensees extend to the entire whole, and thus to each and every part regardless of who wrote

it.

Thus, it is not the intent of this section to claim rights or contest your rights to work written entirely by you; rather, the intent is to exercise the right to control the distribution of derivative or collective works based on the Library.

In addition, mere aggregation of another work not based on the Library with the Library (or with a work based on the Library) on a volume of a storage or distribution medium does not bring the other work under the scope of this License.

3. You may opt to apply the terms of the ordinary GNU General Public License instead of this License to a given copy of the Library. To do this, you must alter all the notices that refer to this License, so that they refer to the ordinary GNU General Public License, version 2, instead of to this License. (If a newer version than version 2 of the ordinary GNU General Public License has appeared, then you can specify that version instead if you wish.) Do not make any other change in these notices.

Once this change is made in a given copy, it is irreversible for that copy, so the ordinary GNU General Public License applies to all subsequent copies and derivative works made from that copy.

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

4. You may copy and distribute the Library (or a portion or derivative of it, under Section 2) in object code or executable form under the terms of Sections 1 and 2 above provided that you accompany it with the complete corresponding machine-readable source code, which must be distributed under the terms of Sections 1 and 2 above on a medium customarily used for software interchange.

If distribution of object code is made by offering access to copy from a designated place, then offering equivalent access to copy the source code from the same place satisfies the requirement to distribute the source code, even though third parties are not compelled to copy the source along with the object code.

5. A program that contains no derivative of any portion of the Library, but is designed to work with the Library by being compiled or linked with it, is called a "work that uses the Library". Such a work, in isolation, is not a derivative work of the Library, and therefore falls outside the scope of this License.

However, linking a "work that uses the Library" with the Library creates an executable that is a derivative of the Library (because it contains portions of the Library), rather than a "work that uses the library". The executable is therefore covered by this License. Section 6 states terms for distribution of such executables.

When a "work that uses the Library" uses material from a header file that is part of the Library, the object code for the work may be a derivative work of the Library even though the source code is not. Whether this is true is especially significant if the work can be linked without the Library, or if the work is itself a library. The threshold for this to be true is not precisely defined by law.

If such an object file uses only numerical parameters, data structure layouts and accessors, and small macros and small inline functions (ten lines or less in length), then the use of the object file is unrestricted, regardless of whether it is legally a derivative work. (Executables containing this object code plus portions of the Library will still fall under Section 6.)

Otherwise, if the work is a derivative of the Library, you may distribute the object code for the work under the terms of Section 6. Any executables containing that work also fall under Section 6, whether or not they are linked directly with the Library itself.

6. As an exception to the Sections above, you may also compile or link a "work that uses the Library" with the Library to produce a work containing portions of the Library, and distribute that work under terms of your choice, provided that the terms permit modification of the work for the customer's own use and reverse engineering for debugging such modifications.

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- a) Accompany the work with the complete corresponding machine-readable source code for the Library including whatever changes were used in the work (which must be distributed under Sections 1 and 2 above); and, if the work is an executable linked

with the Library, with the complete machine-readable "work that uses the Library", as object code and/or source code, so that the user can modify the Library and then relink to produce a modified executable containing the modified Library. (It is understood that the user who changes the contents of definitions files in the Library will not necessarily be able to recompile the application to use the modified definitions.)

b) Accompany the work with a written offer, valid for at least three years, to give the same user the materials

specified in Subsection 6a, above, for a charge no more than the cost of performing this distribution.

c) If distribution of the work is made by offering access to copy from a designated place, offer equivalent access to copy the above specified materials from the same place.

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

For an executable, the required form of the "work that uses the Library" must include any data and utility programs needed for reproducing the executable from it. However, as a special exception, the source code distributed need not include anything that is normally distributed (in either source or binary form) with the major components (compiler, kernel, and so on) of the operating system on which the executable runs, unless that component itself accompanies the executable.

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

7. You may place library facilities that are a work based on the Library side-by-side in a single library together with other library facilities not covered by this License, and distribute such a combined library, provided that the separate distribution of the work based on the Library and of the other library facilities is otherwise permitted, and provided that you do these two things:

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END OF TERMS AND CONDITIONS

Appendix: How to Apply These Terms to Your New Libraries

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For example, if you distribute copies of the library, whether gratis or for a fee, you must give the recipients all the rights that we gave you. You must make sure that they, too, receive or can get the source code. If you link other code with the library, you must provide complete object files to the recipients, so that they can relink them with the library after making changes to the library and recompiling it. And you must show them these terms so they know their rights.

We protect your rights with a two-step method: (1) we copyright the library, and (2) we offer you this license, which gives you legal permission to copy, distribute and/or modify the library.

To protect each distributor, we want to make it very clear that there is no warranty for the free library. Also, if the library is modified by someone else and passed on, the recipients should know that what they have is not the original version, so that the original author's reputation will not be affected by problems that might be introduced by others.

Finally, software patents pose a constant threat to the existence of any free program. We wish to make sure that a company cannot effectively restrict the users of a free program by obtaining a restrictive license from a patent holder. Therefore, we insist that any patent license obtained for a version of the library must be consistent with the full freedom of use specified in this license.

Most GNU software, including some libraries, is covered by the ordinary GNU General Public License. This license, the GNU Lesser General Public License, applies to certain designated libraries, and is quite different from the ordinary General Public License. We use this license for certain libraries in order to permit linking those libraries into non-free programs.

When a program is linked with a library, whether statically or using a shared library, the combination of the two is legally speaking a combined work, a derivative of the original library. The ordinary General Public License therefore permits such linking only if the entire combination fits its criteria of freedom. The Lesser General

Public License permits more lax criteria for linking other code with the library.

We call this license the "Lesser" General Public License because it does Less to protect the user's freedom than the ordinary General Public License. It also provides other free software developers Less of an advantage over competing non-free programs. These disadvantages are the reason we use the ordinary General Public License for many libraries. However, the Lesser license provides advantages in certain special circumstances.

For example, on rare occasions, there may be a special need to encourage the widest possible use of a certain library, so that it becomes a de-facto standard. To achieve this, non-free programs must be allowed to use the library. A more frequent case is that a free library does the same job as widely used non-free libraries. In this case, there is little to gain by limiting the free library to free software only, so we use the Lesser General Public License.

In other cases, permission to use a particular library in non-free programs enables a greater number of people to use a large body of free software. For example, permission to use the GNU C Library in non-free programs enables many more people to use the whole GNU operating system, as well as its variant, the GNU/Linux operating system.

Although the Lesser General Public License is Less protective of the users' freedom, it does ensure that the user of a program that is linked with the Library has the freedom and the wherewithal to run that program using a modified version of the Library.

The precise terms and conditions for copying, distribution and modification follow. Pay close attention to the difference between a "work based on the library" and a "work that uses the library". The former contains code derived from the library, whereas the latter must be combined with the library in order to run.

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"Source code" for a work means the preferred form of the work for making modifications to it. For a library, complete source code means all the source code for all modules it contains, plus any associated interface definition files, plus the scripts used to control compilation and installation of the library.

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

2. You may modify your copy or copies of the Library or any portion of it, thus forming a work based on the Library, and copy and distribute such modifications or work under the terms of Section 1 above, provided that you also meet all of these conditions:

- a) The modified work must itself be a software library.
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c) You must cause the whole of the work to be licensed at no charge to all third parties under the terms of this License.

d) If a facility in the modified Library refers to a function or a table of data to be supplied by an application program that uses the facility, other than as an argument passed when the facility is invoked, then you must make a good faith effort to ensure that, in the event an application does not supply such function or table, the facility still operates, and performs whatever part of its purpose remains meaningful.

(For example, a function in a library to compute square roots has a purpose that is entirely well-defined independent of the application. Therefore, Subsection 2d requires that any application-supplied function or table used by this function must be optional: if the application does not supply it, the square root function must still compute square roots.)

These requirements apply to the modified work as a whole. If identifiable sections of that work are not derived from the Library, and can be reasonably considered independent and separate works in themselves, then this License, and its terms, do not apply to those sections when you distribute them as separate works. But when you distribute the same sections as part of a whole which is a work based on the Library, the distribution of the whole must be on the terms of this License, whose permissions for other licensees extend to the entire whole, and thus to each and every part regardless of who wrote it.

Thus, it is not the intent of this section to claim rights or contest your rights to work written entirely by you; rather, the intent is to exercise the right to control the distribution of derivative or collective works based on the Library.

In addition, mere aggregation of another work not based on the Library with the Library (or with a work based on the Library) on a volume of a storage or distribution medium does not bring the other work under the scope of this License.

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Once this change is made in a given copy, it is irreversible for that copy, so the ordinary GNU General Public License applies to all subsequent copies and derivative works made from that copy.

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

4. You may copy and distribute the Library (or a portion or derivative of it, under Section 2) in object code or executable form under the terms of Sections 1 and 2 above provided that you accompany it with the complete corresponding machine-readable source code, which must be distributed under the terms of Sections 1 and 2 above on a medium customarily used for software interchange.

If distribution of object code is made by offering access to copy from a designated place, then offering equivalent access to copy the source code from the same place satisfies the requirement to distribute the source code, even though third parties are not compelled to copy the source along with the object code.

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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

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b) Use a suitable shared library mechanism for linking with the

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1.71 update-rc-d 0.8-r0.15

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```
#!/bin/sh
#
# update-rc.d Update the links in /etc/rc[0-9S].d/
#
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#
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```

```

initd="/etc/init.d"
etcd="/etc/rc"
notreally=0
force=0
dostart=0

usage()
{
cat >&2 <<EOF
usage: update-rc.d [-n] [-f] [-r <root>] <basename> remove
      update-rc.d [-n] [-r <root>] [-s] <basename> defaults [NN | sNN kNN]
      update-rc.d [-n] [-r <root>] [-s] <basename> start|stop NN runlvl [runlvl] [...] .
-n: not really
-f:
force
-r: alternate root path (default is /)
-s: invoke start methods if appropriate to current runlevel
EOF
}

checklinks()
{
local i dn fn remove=0
if [ "x$1" = "xremove" ]; then
echo " Removing any system startup links for $bn ..."
remove=1
fi

for i in 0 1 2 3 4 5 6 7 8 9 S; do
dn="{etcd}${i}.d"
if [ ! -d $dn ]; then
continue;
fi
for f in ${dn}/[SK]??${bn}; do
if [ -L $f ]; then
if [ $remove -eq 0 ]; then
return 1
fi
echo " $f"
if [ $notreally -eq 1 ]; then
continue
fi
rm $f
fi
done
done

return 0

```

```

}

dolink()
{
startstop=$1
lev=`echo $2 | cut -d/ -f1`
nn=`echo $2 | cut -d/ -f2`
fn="${etcd}${lev}.d/${startstop}${nn}${bn}"
echo " $fn -> ../init.d/${bn}"
if [ $notreally -eq 0 ]; then
mkdir -p `dirname $fn`
ln -s ../init.d/${bn} $fn
fi
if [ $dostart -eq 1 ] && [ $startstop = "S" ] && [ $lev = $RUNLEVEL ]; then
$fn start || true
fi
}

makelinks()
{
if ! checklinks; then
echo " System startup links for
$initd/${bn} already exist."
if [ $dostart -eq 1 ] && [ $notreally -eq 0 ] && [ -L ${etcd}${RUNLEVEL}.d/S?${bn} ]; then
${etcd}${RUNLEVEL}.d/S?${bn} restart || true
fi
exit 0
fi

echo " Adding system startup for $initd/${bn} ..."

for i in $startlinks; do
dolink S $i
done
for i in $stoplinks; do
dolink K $i
done
}

while [ $# -gt 0 ]; do
case $1 in
-n) notreally=1
shift
continue
;;
-f) force=1
shift
continue

```

```

;;
-s) dostart=1
shift
continue
;;
-r) shift
root=$1
initd="${root}${initd}"
etcdd="${root}${etcdd}"
shift
;;
-h | --help)
usage
exit 0
;;
-*)
usage
exit 1
;;
*)
break
;;
esac
done

if [ $# -lt 2 ]; then
usage
exit 1
fi

bn=$1
shift

if [ $1 != "remove" ]; then
if [ ! -f "$initd/$bn" ]; then
echo "update-rc.d: $initd/$bn: file does not exist" >&2
exit 1
fi
else
if [ -f "$initd/$bn" ]; then
if [ $force -eq 1 ]; then
echo "update-rc.d: $initd/$bn exists during rc.d purge
(continuing)" >&2
else
echo "update-rc.d: $initd/$bn exists during rc.d purge (use -f to force)" >&2
exit 1
fi
fi
fi

```

```

fi

if [ $dostart -eq 1 ]; then
#RUNLEVEL=`sed 's/.*\[(.*)\]/1/' < /proc/1/cmdline`
RUNLEVEL=`runlevel | cut -d" " -f2`
if [ "x$RUNLEVEL" = "x" ]; then
echo "Unable to determine current runlevel" >&2
exit 1
fi
fi
fi

```

```

case $1 in
remove)
checklinks "remove"
;;

```

```

defaults)
if [ $# -gt 3 ]; then
echo "defaults takes only one or two arguments" >&2
usage
exit 1
fi
start=20
stop=20
if [ $# -gt 1 ]; then
start=$2
stop=$2
fi
if [ $# -gt 2 ]; then
stop=$3
fi
start=`printf %02d $start`
stop=`printf %02d $stop`
stoplinks="0/$stop 1/$stop 6/$stop"
startlinks="2/$start 3/$start 4/$start 5/$start"
makelinks
;;

```

```

start | stop)
while [ $# -gt 0 ]; do
if [ $1 = "start" ]; then
letter=S
elif [ $1 = "stop" ]; then
letter=K
else
echo "expected start or stop" >&2
usage
exit 1

```

```

fi
shift
NN=`printf
%02d $1`
shift
while [ "x$1" != "x." ]; do
if [ $# -eq 0 ]; then
echo "action with list of runlevels not terminated by \`.`" >&2
exit 1
fi
level=$1
shift
case $letter in
S) startlinks="$startlinks $level/$NN" ;;
K) stoplinks="$stoplinks $level/$NN" ;;
esac
done
shift
done
makelinks
;;

*)
usage
exit 1
;;
esac

```

Found in path(s):

* /update-rc-d-master/zip/update-rc.d-master/update-rc.d

1.72 netcat 0.7.1

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1.73 openssl 1.1.1

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```
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```

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1.74 libarchive 3.4.2

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1.75 ethtool 5.4

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

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```
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1.76 glibc 2.31

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@subheading END OF TERMS AND CONDITIONS

@page

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Ty Coon, President of Vice
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AUTHOR: Michael J. McLennan
Bell Labs Innovations for Lucent Technologies
mmclennan@lucent.com
<http://www.tcltk.com/itcl>

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END OF TERMS AND CONDITIONS

^L

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To apply these terms, attach the following notices to the library. It is safest to attach them to the start of each source file to most effectively convey the exclusion of warranty; and each file should have at least the "copyright" line and a pointer to where the full notice is found.

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

Copyright (C) <year> <name of author>

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

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

Yoyodyne, Inc., hereby disclaims all copyright interest in the library `Frob' (a library for tweaking knobs) written by James Random Hacker.

<signature of Ty Coon>, 1 April 1990
Ty Coon, President of Vice

That's all there is to it!

EFFECTIVE OCT 2008, LICENSE IS BEING CHANGED TO LGPL-2.1 (though not reflected in released code until Nov 2009 - slow release cycle...)

Discussion thread from mailing list archive, with approval from everyone actively involved or holding original licensing rights included.

[Cracklib-devel] cracklib license
From: Mike Frysinger <vapier@ge...> - 2007-10-02 01:16

Attachments: Message as HTML
looks like 2.8.11 is out and marked as "GPL-2" ... releasing libraries unde=
r=20
GPL-2 is not desirable at all ... this is why the LGPL-2.1 exists
=2Dmike

Re: [Cracklib-devel] cracklib license
From: Neulinger, Nathan <nneul@um...> - 2007-10-02 01:18
I understand that, and you're welcome to bring it up with Alec directly and see if he wants to relicense his code as LGPL... but at this point, it was enough to just get it consistent and documented as to what it was released under. This wasn't actually a license change, just a clarification of the licensing that was already in place.=20

-- Nathan

=20

Nathan Neulinger EMail: nneul@um...

University of Missouri - Rolla Phone: (573) 341-6679

UMR Information Technology Fax: (573) 341-4216

> -----Original Message-----

> From: cracklib-devel-bounces@li...

> [mailto:cracklib-devel-bounces@li...] On Behalf Of

> Mike Frysinger

> Sent: Monday, October 01, 2007 8:15 PM

> To: cracklib-devel@li...

> Subject: [Cracklib-devel] cracklib license

>=20

> looks like 2.8.11 is out and marked as "GPL-2" ... releasing

> libraries under

> GPL-2 is not desirable at all ... this is why the LGPL-2.1 exists

> -mike

Re: [Cracklib-devel] cracklib license

From: Mike Frysinger <vapier@ge...> - 2007-10-02 01:33

Attachments: Message as HTML

On Monday 01 October 2007, Neulinger, Nathan

wrote:

> I understand that, and you're welcome to bring it up with Alec directly

> and see if he wants to relicense his code as LGPL... but at this point,

> it was enough to just get it consistent and documented as to what it was

> released under. This wasn't actually a license change, just a

> clarification of the licensing that was already in place.

the original license (before moving to sourceforge -- aka, 2.7) was not=20

GPL-2 ... it was a modified artistic license ... i didnt notice the license=

=20

change until it was mentioned in the latest notes.

unlike the old license, GPL-2 prevents people from using cracklib unless th=

eir=20

applications are also GPL-2 which imo is just wrong. it isnt the place of =

a=20

library to dictact to application writes what license they should be using.=

=20

thus LGPL-2.1 enters to fill this void.

=2Dmike

Re: [Cracklib-devel]

cracklib license

From: Neulinger, Nathan <nneul@um...> - 2007-10-02 01:46

Seems like the ideal thing here would be for you and the other distro maintainers to get together with Alec in a conversation and come to a decision as to what licensing scheme y'all want. I haven't really done much other than cleaning up the packaging and patches and a small bit of additional code, so whatever licensing y'all come up with is fine by me.

-- Nathan

=20

Nathan Neulinger EMail: nneul@um...

University of Missouri - Rolla Phone: (573) 341-6679

UMR Information Technology Fax: (573) 341-4216

> -----Original Message-----

> From: cracklib-devel-bounces@li...

> [mailto:cracklib-devel-bounces@li...] On Behalf Of

> Mike Frysinger

> Sent: Monday, October 01, 2007 8:33 PM

> To: Neulinger, Nathan

> Cc: cracklib-devel@li...; Alec Muffett

> Subject: Re: [Cracklib-devel] cracklib license

>=20

> On Monday 01 October 2007, Neulinger, Nathan wrote:

> > I understand that, and you're welcome to bring it up with Alec

> directly

> > and see if he wants to relicense his code as LGPL... but at this

> point,

> > it was enough to just get it consistent and documented as to what

> it was

> > released under. This wasn't actually a license change, just a

> > clarification of the licensing that was already in place.

>=20

> the original license (before moving to sourceforge -- aka, 2.7) was

> not

> GPL-2 ... it was a modified artistic license ... i didnt notice the

> license

> change until it was mentioned in the latest notes.

>=20

> unlike the old license, GPL-2 prevents people from using cracklib

> unless their

> applications are also GPL-2 which imo is just wrong. it isnt the

> place of a

> library

to dictact to application writes what license they should

> be using.

> thus LGPL-2.1 enters to fill this void.

> -mike

Re: [Cracklib-devel] cracklib license

From: Alec Muffett <alecm@cr...> - 2007-10-02 08:57

> Seems like the ideal thing here would be for you and the other distro
> maintainers to get together with Alec in a conversation and come to a
> decision as to what licensing scheme y'all want. I haven't really done
> much other than cleaning up the packaging and patches and a small
> bit of
> additional code, so whatever licensing y'all come up with is fine
> by me.

I am sympathetic. Guys, what do you reckon?

What I am hearing so far is that LGPL makes sense, since it can be
linked with any code, not just GPL...

-a

Re: [Cracklib-devel] cracklib license

From: Devin Reade <gdr@gn...> - 2007-10-02 15:04

I would like to see it under LGPL as well. I

think it is in everyone's

best interests to have as secure systems as possible, and I think tainting
it via GPL will just make it less likely that the library gets used, and
will not usually cause companies/developers to GPL the dependent code
(where it is not already GPL).

I like GPL, I use it when I can, but I don't think that it's the correct
license in this situation.

Devin

--

If it's sinful, it's more fun.

Re: [Cracklib-devel] cracklib license

From: Nalin Dahyabhai <nalin@re...> - 2008-01-28 16:32

On Tue, Oct 02, 2007 at 09:57:31AM +0100, Alec Muffett wrote:

> > Seems like the ideal thing here would be for you and the other distro
> > maintainers to get together with Alec in a conversation and come to a
> > decision as to what licensing scheme y'all want. I haven't really done
> > much other than cleaning up the packaging and patches and a small
> > bit of
> > additional

code, so whatever licensing y'all come up with is fine

> > by me.

>

> I am sympathetic. Guys, what do you reckon?

>

> What I am hearing so far is that LGPL makes sense, since it can be

> linked with any code, not just GPL...

My apologies for not chiming in in anything resembling a reasonable timeframe.

I'd also suggest the LGPL, for the reason you noted above. Alternately, GPLv2 with the option of using the library under a later version of the GPL would permit applications which were released under version 3 of the GPL to use the library, too, which would be sufficient for the packages which are included in Fedora. FWIW, I'd personally lean toward LGPL.

In any case, I thank you both for working on sorting this out.

Cheers,

Nalin

Re: [Cracklib-devel] cracklib license

From: Mike Frysinger <vapier@ge...> - 2008-10-05 21:27

Attachments: Message as HTML

On Monday 28 January 2008, Nalin Dahyabhai wrote:

> On Tue, Oct 02, 2007 at 09:57:31AM +0100, Alec Muffett wrote:

> > > Seems like the ideal thing here would be for you and the other distro

> > > maintainers to get together with Alec in a conversation and come to a

> > > decision as to what licensing scheme y'all want. I haven't really done

> > > much other than cleaning up the packaging and patches and a small

> > > bit of

> > > additional code, so whatever licensing y'all come up with is fine

> > > by me.

> >

> > I am sympathetic. Guys, what do you reckon?

> >

> > What I am hearing so far is that LGPL makes sense, since it can be

> > linked with any code, not just GPL...

>

> My apologies for not chiming in in anything resembling a reasonable

> timeframe.

>

> I'd also suggest the LGPL, for the reason you noted above. Alternately,

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the library under a later version of the
> GPL would permit applications which were released under version 3 of the
> GPL to use the library, too, which would be sufficient for the packages
> which are included in Fedora. FWIW, I'd personally lean toward LGPL.
>
> In any case, I thank you both for working on sorting this out.

looks like everyone is OK with LGPL-2.1 (GNU Lesser license), so can we make
the change now ?
-mike

Re: [Cracklib-devel] cracklib license
From: Alec Muffett <alecm@cr...> - 2008-10-05 23:18
>> In any case, I thank you both for working on sorting this out.
>
> looks like everyone is OK with LGPL-2.1 (GNU Lesser license), so can we make
> the change now ?

yes. go for it. thanks++

-a

Re: [Cracklib-devel] cracklib license
From: Mike Frysinger <vapier@ge...> - 2008-10-25 22:34

Attachments: Message as HTML
On Sunday 05 October
2008, Alec Muffett wrote:
> >> In any case, I thank you both for working on sorting this out.
> >
> > looks like everyone is OK with LGPL-2.1 (GNU Lesser license), so can we
> > make the change now ?
>
> yes. go for it. thanks++

Nathan Neulinger is the only one who can actually make said change ...
-mike

BELOW IS ORIGINAL LICENSING DISCUSSION RE CHANGING TO GPL from Artistic.

CrackLib was originally licensed with a variant of the Artistic license. In the

interests of wider acceptance and more modern licensing, it was switched with the original author's blessing to GPL v2.

This approval was carried out in email discussions in 2005, and has been reconfirmed as of 2007-10-01 with the following email from Alec Muffett.

The below email references nneul@umr.edu address, as that is the address that was used at the time. For any future emails regarding this, please use nneul@neulinger.org.

From
alecm@crypticide.com Mon Oct 1 12:26:03 2007
Received: from umr-exproto2.cc.umn.edu ([131.151.0.192]) by UMR-CMAIL1.umn.edu with Microsoft SMTPSVC(6.0.3790.3959);
Mon, 1 Oct 2007 12:26:03 -0500
Received: from scansrv2.srv.mst.edu ([131.151.1.114]) by umr-exproto2.cc.umn.edu with Microsoft SMTPSVC(6.0.3790.3959);
Mon, 1 Oct 2007 12:26:02 -0500
Received: (qmail 8022 invoked from network); 1 Oct 2007 16:59:55 -0000
Received: from smtp1.srv.mst.edu (131.151.1.43)
by scanin-ipv6.cc.umn.edu with SMTP; 1 Oct 2007 16:59:55 -0000
Received: from spunkymail-mx8.g.dreamhost.com (mx1.spunky.mail.dreamhost.com [208.97.132.47])
by smtp1.srv.mst.edu (8.13.1/8.13.1) with ESMTP id I91GxtpR020623
for <nneul@umr.edu>; Mon, 1 Oct 2007 11:59:55 -0500
Received: from rutherford.zen.co.uk (rutherford.zen.co.uk [212.23.3.142])
by spunkymail-mx8.g.dreamhost.com (Postfix) with ESMTP id 2C7734D311
for <nneul@neulinger.org>; Mon, 1 Oct 2007 09:59:50 -0700 (PDT)
Received: from
[82.68.43.14] (helo=[192.168.1.3])
by rutherford.zen.co.uk with esmtp (Exim 4.50)
id 1IcOcX-0004Qt-6L
for nneul@neulinger.org; Mon, 01 Oct 2007 16:59:49 +0000
Mime-Version: 1.0 (Apple Message framework v752.2)
In-Reply-To: <1b1b3fd80710010908k11dac0afp1f2dd471059ff9a4@mail.gmail.com>
References: <1190922867.3457.147.camel@localhost.localdomain>
<EC90713277D2BE41B7110CCD74E235CEF44F38@UMR-CMAIL1.umn.edu>
<1b1b3fd80710010908k11dac0afp1f2dd471059ff9a4@mail.gmail.com>
Content-Type: text/plain; charset=US-ASCII; delsp=yes; format=flowed
Message-Id: <117A1264-F6DC-4E25-B0DD-56FBFE6E9F@crypticide.com>
Content-Transfer-Encoding: 7bit
From: Alec Muffett <alecm@crypticide.com>
Subject: Re: cracklib license
Date: Mon, 1 Oct 2007 17:59:46 +0100
To: Nathan Neulinger <nneul@neulinger.org>

X-Mailer: Apple Mail (2.752.2)
X-Originating-Rutherford-IP: [82.68.43.14]
Return-Path: alecm@crypticide.com
X-OriginalArrivalTime: 01 Oct 2007 17:26:03.0008 (UTC) FILETIME=[2420C000:01C80450]
Status: RO
Content-Length:
585
Lines: 21

>
> ----- Forwarded message -----
> From: Neulinger, Nathan <nneul@umr.edu>
> Date: Sep 27, 2007 2:58 PM
> Subject: RE: cracklib license
> To: alecm@crypto.dircon.co.uk
>
> Any chance you could write me a self-contained email stating clearly
> that the license is being changed to GPL, so I could include that
> email
> in the repository and clean up the repository/tarballs? I have all the
> original discussion, but something succinct and self contained
> would be
> ideal.

The license for my code in the Cracklib distribution is henceforth GPL.

Happy now? :-)

-a

1.83 libnl3 3.5.0

1.83.1 Available under license :

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Version 2.1, February 1999

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[This is the first released version of the Lesser GPL. It also counts
as the successor of the GNU Library Public License, version 2, hence
the version number 2.1.]

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When we speak of free software, we are referring to freedom of use, not price. Our General Public Licenses are designed to make sure that you have the freedom to distribute copies of free software (and charge for this service if you wish); that you receive source code or can get it if you want it; that you can change the software and use pieces of it in new free programs; and that you are informed that you can do these things.

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We protect your rights with a two-step method: (1) we copyright the library, and (2) we offer you this license, which gives you legal permission to copy, distribute and/or modify the library.

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Finally, software

patents pose a constant threat to the existence of any free program. We wish to make sure that a company cannot effectively restrict the users of a free program by obtaining a restrictive license from a patent holder. Therefore, we insist that any patent license obtained for a version of the library must be consistent with the full freedom of use specified in this license.

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When a program is linked with a library, whether statically or using a shared library, the combination of the two is legally speaking a combined work, a derivative of the original library. The ordinary General Public License therefore permits such linking only if the entire combination fits its criteria of freedom. The Lesser General Public License permits more lax criteria for linking other code with the library.

We call this license the "Lesser" General Public License because it does Less to protect the user's freedom than the ordinary General Public License. It also provides other free software developers Less of an advantage over competing non-free programs. These disadvantages are the reason we use the ordinary General Public License for many libraries. However, the Lesser license provides advantages in certain special circumstances.

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Although the Lesser General Public License is Less protective of the

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A "library" means a collection of software functions and/or data prepared so as to be conveniently linked with application programs (which use some of those functions and data) to form executables.

The "Library", below, refers to any such software library or work which has been distributed under these terms. A "work based on the Library" means either the Library or any derivative work under copyright law: that is to say, a work containing the Library or a portion of it, either verbatim or with modifications and/or translated straightforwardly into another language. (Hereinafter, translation is included without limitation in the term "modification".)

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- b) You must cause the files modified to carry prominent notices stating that you changed the files and the date of any change.
- c) You must cause the whole of the work to be licensed at no charge to all third parties under the terms of this License.
- d) If a facility in the modified Library refers to a function or a table of data to be supplied by an application program that uses the facility, other than as an argument passed when the facility is invoked, then you must make a good faith effort to ensure that, in the event an application does not supply such function or table, the facility still operates, and performs whatever part of its purpose remains meaningful.

(For example, a function in a library to compute square roots has a purpose that is entirely well-defined independent of the application. Therefore, Subsection 2d requires that any application-supplied function or table used by this function must be optional: if the application does not supply it, the square root function must still compute square roots.)

These requirements apply to the modified work as a whole. If identifiable sections of that work are not derived from the Library, and can be reasonably considered independent and separate works in themselves, then this License, and its terms, do not apply to those sections when you distribute them as separate works. But when you distribute the same sections as part of a whole which is a work based

on the Library, the distribution of the whole must be on the terms of this License, whose permissions for other licensees extend to the entire whole, and thus to each and every part regardless of who wrote it.

Thus, it is not the intent of this section to claim rights or contest your rights to work written entirely by you; rather, the intent is to exercise the right to control the distribution of derivative or collective works based on the Library.

In addition, mere aggregation of another work not based on the Library with the Library (or with a work based on the Library) on a volume of a storage or distribution medium does not bring the other work under the scope of this License.

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License instead of this License to a given copy of the Library. To do this, you must alter all the notices that refer to this License, so that they refer to the ordinary GNU General Public License, version 2, instead of to this License. (If a newer version than version 2 of the ordinary GNU General Public License has appeared, then you can specify that version instead if you wish.) Do not make any other change in these notices.

Once this change is made in a given copy, it is irreversible for that copy, so the ordinary GNU General Public License applies to all subsequent copies and derivative works made from that copy.

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

4. You may copy and distribute the Library (or a portion or derivative of it, under Section 2) in object code or executable form under the terms of Sections 1 and 2 above provided that you accompany it with the complete corresponding machine-readable source code, which must be distributed under the terms of Sections 1 and 2 above on a medium customarily used for software interchange.

If distribution of object code is made by offering access to copy from a designated place, then offering equivalent access to copy the source code from the same place satisfies the requirement to distribute the source code, even though third parties are not compelled to copy the source along with the object code.

5. A program that contains no derivative of any portion of the Library, but is designed to work with the Library by being compiled or

linked with it, is called a "work that uses the Library". Such a work, in isolation, is not a derivative work of the Library, and therefore falls outside the scope of this License.

However, linking a "work that uses the Library" with the Library creates an executable that is a derivative of the Library (because it contains portions of the Library), rather than a "work that uses the library". The executable is therefore covered by this License. Section 6 states terms for distribution of such executables.

When a "work that uses the Library" uses material from a header file that is part of the Library, the object code for the work may be a derivative work of the Library even though the source code is not. Whether this is true is especially significant if the work can be linked without the Library, or if the work is itself a library. The threshold for this to be true is not precisely defined by law.

If such an object file uses only numerical parameters, data structure layouts and accessors, and small macros and small inline functions (ten lines or less in length), then the use of the object file is unrestricted, regardless of whether it is legally a derivative work. (Executables containing this object code plus portions of the Library will still fall under Section 6.)

Otherwise, if the work is a derivative of the Library, you may distribute the object code for the work under the terms of Section 6. Any executables containing that work also fall under Section 6, whether or not they are linked directly with the Library itself.

6. As an exception to the Sections above, you may also combine or link a "work that uses the Library" with the Library to produce a work containing portions of the Library, and distribute that work under terms of your choice, provided that the terms permit modification of the work for the customer's own use and reverse engineering for debugging such modifications.

You must give prominent notice with each copy of the work that the Library is used in it and that the Library and its use are covered by this License. You must supply a copy of this License. If the work during execution displays copyright notices, you must include the copyright notice for the Library among them, as well as a reference directing the user to the copy of this License. Also, you must do one of these things:

- a) Accompany

the work with the complete corresponding machine-readable source code for the Library including whatever changes were used in the work (which must be distributed under Sections 1 and 2 above); and, if the work is an executable linked with the Library, with the complete machine-readable "work that uses the Library", as object code and/or source code, so that the user can modify the Library and then relink to produce a modified executable containing the modified Library. (It is understood that the user who changes the contents of definitions files in the Library will not necessarily be able to recompile the application to use the modified definitions.)

- b) Use a suitable shared library mechanism for linking with the Library. A suitable mechanism is one that (1) uses at run time a copy of the library already present on the user's computer system, rather than copying library functions into the executable, and (2) will operate properly with a modified version of the library, if the user installs one, as long as the modified version is interface-compatible with the version that the work was made with.
- c) Accompany the work with a written offer, valid for at least three years, to give the same user the materials specified in Subsection 6a, above, for a charge no more than the cost of performing this distribution.
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*

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1.95 openssh 8.0-p1

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*

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1.96 openssh 8.2p1

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*

* Optimised ANSI C code for the Rijndael cipher (now AES)

*

* @author Vincent Rijmen <vincent.rijmen@esat.kuleuven.ac.be>

* @author Antoon Bosselaers <antoon.bosselaers@esat.kuleuven.ac.be>

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@c End:

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

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```
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```

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

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The End

1.102 gnutls 3.6.14

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Constant-time SSSE3 AES core implementation.

version 0.1

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By Mike Hamburg (Stanford University), 2009

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For details see https://shiftleft.org/papers/vector_aes/ and

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1.103 protobuf 3.11.4

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This file contains a list of people who have made large contributions to the public version of Protocol Buffers.

Original Protocol Buffers design and implementation:

Sanjay Ghemawat <sanjay@google.com>

Jeff Dean <jeff@google.com>

Daniel Dulitz <daniel@google.com>

Craig Silverstein

Paul Haahr <haahr@google.com>

Corey Anderson <corin@google.com>

(and many others)

Proto2 C++ and Java primary author:

Kenton Varda <kenton@google.com>

Proto2 Python primary authors:

Will Robinson <robinson@google.com>

Petar Petrov <petar@google.com>

Java Nano primary authors:

Brian Duff <bduff@google.com>

Tom Chao <chaot@google.com>

Max Cai <maxtroy@google.com>

Ulas Kirazci <ulas@google.com>

Large code contributions:

Jason Hsueh <jasonh@google.com>

Joseph Schorr <jschorr@google.com>

Wenbo Zhu <wenboz@google.com>

Large quantity of code reviews:

Scott Bruce <sbruce@google.com>
Frank Yellin
Neal Norwitz <nnorwitz@google.com>
Jeffrey Yasskin <jyasskin@google.com>
Ambrose
Feinstein <ambrose@google.com>

Documentation:

Lisa Carey <lcarey@google.com>

Maven packaging:

Gregory Kick <gak@google.com>

Patch contributors:

Kevin Ko <kevin.s.ko@gmail.com>
* Small patch to handle trailing slashes in --proto_path flag.

Johan Euphrosine <propy@aminche.com>
* Small patch to fix Python CallMethod().

Ulrich Kunitz <kune@deine-taler.de>
* Small optimizations to Python serialization.

Leandro Lucarella <llucax@gmail.com>
* VI syntax highlighting tweaks.
* Fix compiler to not make output executable.

Dilip Joseph <dilip.antony.joseph@gmail.com>
* Heuristic detection of sub-messages when printing unknown fields in text format.

Brian Atkinson <nairb774@gmail.com>
* Added @Override annotation to generated Java code where appropriate.

Vincent Choiniere <Choiniere.Vincent@hydro.qc.ca>
* Tru64 support.

Monty Taylor <monty.taylor@gmail.com>
* Solaris 10 + Sun Studio fixes.

Alek Storm <alek.storm@gmail.com>

* Slicing support for repeated scalar fields for the Python API.

Oleg Smolsky <oleg.smolsky@gmail.com>
* MS Visual Studio error format option.
* Detect unordered_map in stl_hash.m4.

Brian Olson <brianolson@google.com>
* gzip/zlib I/O support.

Michael Poole <mdpoole@troilus.org>
* Fixed warnings about generated constructors not explicitly initializing all fields (only present with certain compiler settings).
* Added generation of field number constants.

Wink Saville <wink@google.com>
* Fixed initialization ordering problem in logging code.

Will Pierce <willp@nuclei.com>
* Small patch improving performance of in Python serialization.

Alexandre Vassalotti <alexandre@peadrop.com>

- * Emacs mode for Protocol Buffers (editors/protobuf-mode.el).

Scott Stafford <scott.stafford@gmail.com>

- * Added Swap(), SwapElements(), and RemoveLast() to Reflection interface.

Alexander Melnikov <alm@sibmail.ru>

- * HPUX support.

Oliver Jowett <oliver.jowett@gmail.com>

- * Detect whether zlib is new enough in configure script.
- * Fixes for Solaris 10 32/64-bit confusion.

Evan Jones <evanj@mit.edu>

- * Optimize Java serialization code when writing a small message to a stream.
- * Optimize Java serialization of strings so that UTF-8 encoding happens only once per string per serialization call.
- * Clean up some Java warnings.
- * Fix bug with permanent callbacks that delete themselves when run.

Michael Kucharski <m.kucharski@gmail.com>

- * Added CodedInputStream.getTotalBytesRead().

Kacper Kowalik <xarthisius.kk@gmail.com>

- * Fixed m4/acx_pthread.m4 problem for some Linux distributions.

William Orr <will@worrbase.com>

- * Fixed detection of sched_yield on Solaris.
- * Added atomicops for Solaris

Andrew Paprocki <andrew@ishiboo.com>

- * Fixed minor IBM xLC compiler build issues
- * Added atomicops for AIX (POWER)

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1.104 bash 5.0.18

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1.105 iniparse 0.4

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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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Release from	Derived	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
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1.113 python-setuptools 42.0.2

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1.117 mnuralp-fileutils 0.5.0

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1.118 libtirpc 1.2.6

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1.119 glib 2.62.6

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When a program is linked with a library, whether statically or using a shared library, the combination of the two is legally speaking a combined work, a derivative of the original library. The ordinary General Public License therefore permits such linking only if the entire combination fits its criteria of freedom. The Lesser General Public License permits more lax criteria for linking other code with the library.

We call this license the "Lesser" General Public License because it does Less to protect the user's freedom than the ordinary General Public License. It also provides other free software developers Less of an advantage over competing non-free programs. These disadvantages

are the reason we use the ordinary General Public License for many libraries. However, the Lesser license provides advantages in certain special circumstances.

For example, on rare occasions, there may be a special need to encourage the widest possible use of a certain library, so that it becomes a de-facto standard. To achieve this, non-free programs must be allowed to use the library. A more frequent case is that a free library does the same job as widely used non-free libraries. In this case, there is little to gain by limiting the free library to free software only, so we use the Lesser General Public License.

In other cases, permission to use a particular library in non-free programs enables a greater number of people to use a large body of free software. For example, permission to use the GNU C Library in non-free programs enables many more people to use the whole GNU operating system, as well as its variant, the GNU/Linux operating system.

Although the Lesser General Public License is Less protective of the users' freedom, it does ensure that the user of a program that is linked with the Library has the freedom and the wherewithal to run that program using a modified version of the Library.

The precise terms and conditions for copying, distribution and modification follow. Pay close attention to the difference between a "work based on the library" and a "work that uses the library". The former contains code derived from the library, whereas the latter must be combined with the library in order to run.

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The "Library", below, refers to any such software library or work which has been distributed under these terms. A "work based on the Library" means either the Library or any derivative work under

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"Source code" for a work means the preferred form of the work for making modifications to it. For a library, complete source code means all the source code for all modules it contains, plus any associated interface definition files, plus the scripts used to control compilation and installation of the library.

Activities other than copying, distribution and modification are not covered by this License; they are outside its scope. The act of running a program using the Library is not restricted, and output from such a program is covered only if its contents constitute a work based on the Library (independent of the use of the Library in a tool for writing it). Whether that is true depends on what the Library does and what the program that uses the Library does.

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2. You may modify your copy or copies of the Library or any portion of it, thus forming a work based on the Library, and copy and distribute such modifications or work under the terms of Section 1 above, provided that you also meet all of these conditions:

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- b) You must cause the files modified to carry prominent notices stating that you changed the files and the date of any change.
- c) You must cause the whole of the work to be licensed at no charge to all third parties under the terms of this License.
- d) If a facility in the modified Library refers to a function or a

table of data to be supplied by an application program that uses the facility, other than as an argument passed when the facility is invoked, then you must make a good faith effort to ensure that, in the event an application does not supply such function or table, the facility still operates, and performs whatever part of its purpose remains meaningful.

(For example, a function in a library to compute square roots has a purpose that is entirely well-defined independent of the application. Therefore, Subsection 2d requires that any application-supplied function or table used by this function must be optional: if the application does not supply it, the square root function must still compute square roots.)

These requirements apply to the modified work as a whole. If identifiable sections of that work are not derived from the Library, and can be reasonably considered independent and separate works in themselves, then this License, and its terms, do not apply to those sections when you distribute them as separate works. But when you distribute the same sections as part of a whole which is a work based on the Library, the distribution of the whole must be on the terms of this License, whose permissions for other licensees extend to the entire whole, and thus to each and every part regardless of who wrote it.

Thus, it is not the intent of this section to claim rights or contest your rights to work written entirely by you; rather, the intent is to exercise the right to control the distribution of derivative or collective works based on the Library.

In addition, mere aggregation of another work not based on the Library with the Library (or with a work based on the Library) on a volume of a storage or distribution medium does not bring the other work under the scope of this License.

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Once this change is made in a given copy, it is irreversible for that copy, so the ordinary GNU General Public License applies to all

subsequent copies and derivative works made from that copy.

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

4. You may copy and distribute the Library (or a portion or derivative of it, under Section 2) in object code or executable form under the terms of Sections 1 and 2 above provided that you accompany it with the complete corresponding machine-readable source code, which must be distributed under the terms of Sections 1 and 2 above on a medium customarily used for software interchange.

If distribution of object code is made by offering access to copy from a designated place, then offering equivalent access to copy the source code from the same place satisfies the requirement to distribute the source code, even though third parties are not compelled to copy the source along with the object code.

5. A program that contains no derivative of any portion of the Library, but is designed to work with the Library by being compiled or linked with it, is called a "work that uses the Library". Such a work, in isolation, is not a derivative work of the Library, and therefore falls outside the scope of this License.

However, linking a "work that uses the Library" with the Library creates an executable that is a derivative of the Library (because it contains portions of the Library), rather than a "work that uses the library". The executable is therefore covered by this License. Section 6 states terms for distribution of such executables.

When a "work that uses the Library" uses material from a header file that is part of the Library, the object code for the work may be a derivative work of the Library even though the source code is not. Whether this is true is especially significant if the work can be linked without the Library, or if the work is itself a library. The threshold for this to be true is not precisely defined by law.

If such an object file uses only numerical parameters, data structure layouts and accessors, and small macros and small inline functions (ten lines or less in length), then the use of the object file is unrestricted, regardless of whether it is legally a derivative work. (Executables containing this object code plus portions of the Library will still fall under Section 6.)

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

object code for the work under the terms of Section 6.
Any executables containing that work also fall under Section 6,
whether or not they are linked directly with the Library itself.

6. As an exception to the Sections above, you may also combine or link a "work that uses the Library" with the Library to produce a work containing portions of the Library, and distribute that work under terms of your choice, provided that the terms permit modification of the work for the customer's own use and reverse engineering for debugging such modifications.

You must give prominent notice with each copy of the work that the Library is used in it and that the Library and its use are covered by this License. You must supply a copy of this License. If the work during execution displays copyright notices, you must include the copyright notice for the Library among them, as well as a reference directing the user to the copy of this License. Also, you must do one of these things:

a) Accompany the work with the complete corresponding machine-readable source code for the Library including whatever changes were used in the work (which must be distributed under Sections 1 and 2 above); and, if the work is an executable linked with the Library, with the complete machine-readable "work that uses the Library", as object code and/or source code, so that the user can modify the Library and then relink to produce a modified executable containing the modified Library. (It is understood that the user who changes the contents of definitions files in the Library will not necessarily be able to recompile the application to use the modified definitions.)

b) Use a suitable shared library mechanism for linking with the Library. A suitable mechanism is one that (1) uses at run time a copy of the library already present on the user's computer system, rather than copying library functions into the executable, and (2) will operate properly with a modified version of the library, if the user installs one, as long as the modified version is interface-compatible with the version that the work was made with.

c) Accompany the work with a written offer, valid for at least three years, to give the same user the materials specified in Subsection 6a, above, for a charge no more than the cost of performing this distribution.

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specified materials from the same place.

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

For an executable, the required form of the "work that uses the Library" must include any data and utility programs needed for reproducing the executable from it. However, as a special exception, the materials to be distributed need not include anything that is normally distributed (in either source or binary form) with the major components (compiler, kernel, and so on) of the operating system on which the executable runs, unless that component itself accompanies the executable.

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

7. You may place library facilities that are a work based on the Library side-by-side in a single library together with other library facilities not covered by this License, and distribute such a combined library, provided that the separate distribution of the work based on the Library and of the other library facilities is otherwise permitted, and provided that you do these two things:

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1.122 gdbm 1.18.1

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Some devices are designed to deny users access to install or run modified versions of the software inside them, although the manufacturer can do so. This is fundamentally incompatible with the aim of protecting users' freedom to change the software. The systematic pattern of such abuse occurs in the area of products for individuals to use, which is precisely where it is most unacceptable. Therefore, we have designed this version of the GPL to prohibit the practice for those products. If such problems arise substantially in other domains, we stand ready to extend this provision to those domains in future versions of the GPL, as needed to protect the freedom of users.

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

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

TERMS AND CONDITIONS

0. Definitions.

"This License" refers to version 3 of the GNU General Public License.

"Copyright" also means copyright-like laws that apply to other kinds of works, such as semiconductor masks.

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1. Source Code.

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

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

The "System Libraries" of an executable work include anything, other

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Major Component, or to implement a Standard Interface for which an implementation is available to the public in source code form. A "Major Component", in this context, means a major essential component (kernel, window system, and so on) of the specific operating system (if any) on which the executable work runs, or a compiler used to produce the work, or an object code interpreter used to run it.

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

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license the entire work, as a whole, under this

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b) Convey the object code in, or embodied in, a physical product (including a physical distribution medium), accompanied by a written offer, valid for at least three years and valid for as long as you offer spare parts or customer support for that product model, to give anyone who possesses the object code either (1) a copy of the Corresponding Source for all the software in the product that is covered by this License, on a durable physical

medium customarily used for software interchange, for a price no more than your reasonable cost of physically performing this conveying of source, or (2) access to copy the Corresponding Source from a network server at no charge.

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

d) Convey the object code by offering access from a designated place (gratis or for a charge), and offer equivalent access to the Corresponding Source in the same way through the same place at no further charge.

You need not require recipients to copy the Corresponding Source along with the object code. If the place to copy the object code is a network server, the Corresponding Source may be on a different server (operated by you or a third party) that supports equivalent copying facilities, provided you maintain clear directions next to the object code saying where to find the Corresponding Source. Regardless of what server hosts the Corresponding Source, you remain obligated to ensure that it is available for as long as needed to satisfy these requirements.

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Name: base-passwd

Maintainer: Colin Watson <cjwatson@debian.org>

Files: update-passwd.c, man/*

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X-Notes: Originally written by Ian Murdock <imurdock@debian.org> and
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1.131 go-units 0.4.0

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1.132 cJSON 1.7.3

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Contributors
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Original Author: [Dave Gamble](https://github.com/DaveGamble)

Current Maintainer: [Max Bruckner](https://github.com/FSMaxB)

- * [Ajay Bhargav](https://github.com/ajaybhargav)
- * [Alper Akcan](https://github.com/alperakcan)
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- * [Casperinous](https://github.com/Casperinous)
- * [Debora Grosse](https://github.com/DeboraG)
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1.134 python-setuptools 56.0.0

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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.

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1.3 thru 1.5.2	1.2	1995-1999	CNRI	yes
1.6	1.5.2	2000	CNRI	no
2.0	1.6	2000	BeOpen.com	no
1.6.1	1.6	2001	CNRI	yes (2)
2.1	2.0+1.6.1	2001	PSF	no
2.0.1	2.0+1.6.1	2001	PSF	yes
2.1.1	2.1+2.0.1	2001	PSF	yes

2.1.2	2.1.1	2002	PSF	yes
2.1.3	2.1.2	2002	PSF	yes
2.2 and above				
2.1.1	2001-now	PSF		yes

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Benoit Sigoure <tsuna@google.com>
Bogdan Pilocla <boo@google.com>
Chandler Carruth <chandlerc@google.com>
Dave MacLachlan <dmaclach@gmail.com>
David Anderson <danderson@google.com>
Dean Sturtevant
Gene Volovich <gv@cite.com>
Hal Burch <gmock@hburch.com>
Jeffrey Yasskin <jyasskin@google.com>
Jim Keller <jimkeller@google.com>
Joe Walnes <joe@truemesh.com>
Jon Wray <jwray@google.com>
Keir Mierle <mierle@gmail.com>
Keith Ray <keith.ray@gmail.com>
Kostya Serebryany <kcc@google.com>
Lev Makhlis
Manuel Klimek <klimek@google.com>
Mario Tanev <radix@google.com>
Mark Paskin
Markus Heule <markus.heule@gmail.com>
Matthew Simmons <simmonmt@acm.org>
Mike Bland <mbland@google.com>
Neal Norwitz <nnorwitz@gmail.com>
Nermin Ozkiranartli <nermin@google.com>
Owen
Carlsen <ocarlsen@google.com>
Paneendra Ba <paneendra@google.com>
Paul Menage <menage@google.com>
Piotr Kaminski <piotrk@google.com>
Russ Rufer <russ@pentad.com>
Sverre Sundsdal <sundsda@gmail.com>
Takeshi Yoshino <tyoshino@google.com>
Vadim Berman <vadimb@google.com>
Vlad Losev <vladl@google.com>
Wolfgang Klier <wklier@google.com>
Zhanyong Wan <wan@google.com>

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Ajay Joshi <jaj@google.com>
Balzs Dn <balazs.dan@gmail.com>
Bharat Mediratta <bharat@menalto.com>
Chandler Carruth <chandlerc@google.com>
Chris Prince <cprince@google.com>
Chris Taylor <taylorc@google.com>
Dan Egnor <egnor@google.com>
Eric Roman <eroman@chromium.org>
Hady Zalek <hady.zalek@gmail.com>
Jeffrey Yasskin <jyasskin@google.com>
Ji Sigursson <joi@google.com>
Keir Mierle <mierle@gmail.com>
Keith Ray <keith.ray@gmail.com>
Kenton Varda <kenton@google.com>
Manuel Klimek <klimek@google.com>
Markus Heule <markus.heule@gmail.com>
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Pasi Valminen <pasi.valminen@gmail.com>
Patrick Hanna <phanna@google.com>
Patrick Riley <pfr@google.com>
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Jackson <preston.a.jackson@gmail.com>
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Tracy Bialik <tracy@pentad.com>
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Vlad Losev <vladl@google.com>
Zhanyong Wan <wan@google.com>

1.136 at 3.1.23

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This package was debianized by its author Thomas Koenig <ig25@rz.uni-karlsruhe.de>, taken over and re-packaged first by Martin Schulze <joe@debian.org> and then by Siggie Brentrup <bsb@winnegan.de>, and then taken over by Ryan Murray <rmurray@debian.org>.

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In August 2015 the upstream development and Debian packaging were taken over by Jose M Calhariz <jose@calhariz.com>

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1.138 open-ldap 1.2.5

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iconv (Charset Conversion Library) v2.0

(28) Artem Bityuckiy (--enable-newlib-iconv)

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(This file is under construction.) *- text *-

If you've contributed to gas and your name isn't listed here, it is not meant as a slight. I just don't know about it. Email me, nickc@redhat.com and I'll correct the situation.

This file will eventually be deleted: The general info will go into the documentation, and info on specific files will go into an AUTHORS file, as requested by the FSF.

+++++

Dean Elsner wrote the original gas for vax. [more details?]

Jay Fenlason maintained gas for a while, adding support for gdb-specific debug information and the 68k series machines, most of the preprocessing pass, and extensive changes in messages.c, input-file.c, write.c.

K. Richard Pixley maintained gas for a while, adding various enhancements and many bug fixes, including merging support for several processors, breaking gas up to handle multiple object file format backends (including heavy rewrite, testing, an integration of the coff and b.out backends), adding configuration including heavy testing and verification of cross assemblers and file splits and renaming, converted gas to strictly ansi C including full prototypes, added support for m680[34]0 & cpu32, considerable work on i960 including a coff port (including considerable amounts of reverse engineering), a sparc opcode file rewrite, decstation, rs6000, and hp300hpux host ports, updated "know" assertions and made them work, much other reorganization, cleanup, and lint.

Ken Raeburn wrote the high-level BFD interface code to replace most of the code in format-specific I/O modules.

The original Vax-VMS support was contributed by David L. Kashtan. Eric Youngdale and Pat Rankin have done much work with it since.

The Intel 80386 machine description was written by Eliot Dresselhaus.

Minh Tran-Le at IntelliCorp contributed some AIX 386 support.

The Motorola 88k machine description was contributed by Devon Bowen of Buffalo University and Torbjorn Granlund of the Swedish Institute of Computer Science.

Keith

Knowles at the Open Software Foundation wrote the original MIPS back end (tc-mips.c, tc-mips.h), and contributed Rose format support that hasn't been merged in yet. Ralph Campbell worked with the MIPS code to support a.out format.

Support for the Zilog Z8k and Hitachi H8/300, H8/500 and SH processors (tc-z8k, tc-h8300, tc-h8500, tc-sh), and IEEE 695 object file format (obj-ieee), was written by Steve Chamberlain of Cygnus Solutions. Steve also modified the COFF back end (obj-coffbfd) to use BFD for some low-level operations, for use with the Hitachi, 29k and Zilog targets.

John Gilmore built the AMD 29000 support, added .include support, and simplified the configuration of which versions accept which pseudo-ops. He updated the 68k machine description so that Motorola's opcodes always produced fixed-size instructions (e.g. jsr), while synthetic instructions remained shrinkable (jbsr). John fixed many bugs, including true tested cross-compilation support, and one bug in relaxation that took a week and required the proverbial one-bit fix.

Ian Lance Taylor of Cygnus Solutions merged the Motorola and MIT syntaxes for the 68k, completed support for some COFF targets (68k, i386 SVR3, and SCO Unix), wrote the ECOFF support based on Michael Meissner's mips-tfile program, wrote the PowerPC and RS/6000 support, and made a few other minor patches. He handled the binutils releases for versions 2.7 through 2.9.

David Edelsohn contributed fixes for the PowerPC and AIX support.

Steve Chamberlain made gas able to generate listings.

Support for the HP9000/300 was contributed by Glenn Engel of HP.

Support for ELF format files has been worked on by Mark Eichin of Cygnus Solutions (original, incomplete implementation), Pete

Hoogenboom at the University of Utah (HPPA mainly), Michael Meissner of the Open Software Foundation (i386 mainly), and Ken Raeburn of Cygnus Solutions (sparc, initial 64-bit support).

Several engineers at Cygnus Solutions have also provided many small bug fixes and configuration enhancements.

The initial Alpha support was contributed by Carnegie-Mellon University. Additional work was done by Ken Raeburn of Cygnus Solutions. Richard Henderson then rewrote much of the Alpha support.

Ian Dall updated the support code for the National Semiconductor 32000 series, and added support for Mach 3 and NetBSD running on the PC532.

Klaus Kaempf ported the assembler and the binutils to openVMS/Alpha.

Steve Haworth contributed the support for the Texas Instruction c30 (tms320c30).

H.J. Lu has contributed many patches and much testing.

Alan Modra reworked much of the i386 backend, improving the error checking, updating the code, and improving the 16 bit support, using patches from the work of Martynas Kunigelis and H.J. Lu.

Many others have contributed large or small bugfixes and enhancements. If you've contributed significant work and are not mentioned on this list, and want to be, let us know. Some of the history has been lost; we aren't intentionally leaving anyone out.

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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.]

Preamble

The licenses for most software are designed to take away your freedom to share and change it. By contrast, the GNU General Public Licenses are intended to guarantee your freedom to share and change free software--to make sure the software is free for all its users.

This license, the Library General Public License, applies to some specially designated Free Software Foundation software, and to any other libraries whose authors decide to use it. You can use it for your libraries, too.

When we speak of free software, we are referring to freedom, not price. Our General Public Licenses are designed to make sure that you have the freedom to distribute copies of free software (and charge for this service if you wish), that you receive source code or can get it if you want it, that you can change the software or use pieces of it in new free programs; and that you know you can do these things.

To protect your rights, we need to make restrictions that forbid anyone to deny you these rights or to ask you to surrender the rights. These restrictions translate to certain responsibilities for you if you distribute copies of the library, or if you modify it.

For example, if you distribute copies of the library, whether gratis or for a fee, you must give the recipients all the rights that we gave you. You must make sure that they, too, receive or can get the source code. If you link a program with the library, you must provide complete object files to the recipients so that they can relink them with the library, after making changes to the library and recompiling it. And you must show them these terms so they know their rights.

Our method of protecting your rights has two steps: (1) copyright the library, and (2) offer you this license which gives you legal permission to copy, distribute and/or modify the library.

Also, for each distributor's protection, we want to make certain that everyone understands that there is no warranty for this free library. If the library is modified by someone else and passed on, we want its recipients to know that what they have is not the original version, so that any problems introduced by others will not reflect on the original authors' reputations.

Finally, any free program is threatened constantly by software patents. We wish to avoid the danger that companies distributing free software will individually obtain patent licenses, thus in effect transforming the program into proprietary software. To prevent this,

we have made it clear that any patent must be licensed
for everyone's
free use or not licensed at all.

Most GNU software, including some libraries, is covered by the ordinary GNU General Public License, which was designed for utility programs. This license, the GNU Library General Public License, applies to certain designated libraries. This license is quite different from the ordinary one; be sure to read it in full, and don't assume that anything in it is the same as in the ordinary license.

The reason we have a separate public license for some libraries is that they blur the distinction we usually make between modifying or adding to a program and simply using it. Linking a program with a library, without changing the library, is in some sense simply using the library, and is analogous to running a utility program or application program. However, in a textual and legal sense, the linked executable is a combined work, a derivative of the original library, and the ordinary General Public License treats it as such.

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

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

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

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

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0. This License Agreement applies to any software library which contains a notice placed by the copyright holder or other authorized party saying it may be distributed under the terms of this Library General Public License (also called "this License"). Each licensee is addressed as "you".

A "library" means a collection of software functions and/or data prepared so as to be conveniently linked with application programs (which use some of those functions and data) to form executables.

The "Library", below, refers to any such software library or work which has been distributed under these terms. A "work based on the Library" means either the Library or any derivative work under copyright law: that is to say, a work containing the Library or a portion of it, either verbatim or with modifications and/or translated straightforwardly into another language. (Hereinafter, translation is included without limitation in the term "modification".)

"Source code" for a work means the preferred form of the work for making modifications to it. For a library, complete source code means all the source code for all modules it contains, plus any associated interface definition files, plus the scripts used to control compilation and installation of the library.

Activities other than copying, distribution and modification are not covered by this License; they are outside its scope. The act of running a program using the Library is not restricted, and output from such a program is covered only if its contents constitute a work based on the Library (independent of the use of the Library in a tool for writing it). Whether that is true depends on what the Library does and what the program that uses the Library does.

1. You may copy and distribute verbatim copies of the Library's complete source code as you receive it, in any medium, provided that you conspicuously and appropriately publish on each copy an appropriate copyright notice and disclaimer of warranty; keep intact all the notices that refer to this License and to the absence of any warranty; and distribute a copy of this License along with the Library.

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

2. You may modify your copy or copies of the Library or any portion

of it, thus forming a work based on the Library, and copy and distribute such modifications or work under the terms of Section 1 above, provided that you also meet all of these conditions:

- a) The modified work must itself be a software library.
- b) You must cause the files modified to carry prominent notices stating that you changed the files and the date of any change.
- c) You must cause the whole of the work to be licensed at no charge to all third parties under the terms of this License.
- d) If a facility in the modified Library refers to a function or a table of data to be supplied by an application program that uses the facility, other than as an argument passed when the facility is invoked, then you must make a good faith effort to ensure that, in the event an application does not supply such function or table, the facility still operates, and performs whatever part of its purpose remains meaningful.

(For example, a function in a library to compute square roots has a purpose that is entirely well-defined independent of the application. Therefore, Subsection 2d requires that any application-supplied function or table used by this function must be optional: if the application does not supply it, the square root function must still compute square roots.)

These requirements apply to the modified work as a whole. If identifiable sections of that work are not derived from the Library, and can be reasonably considered independent and separate works in themselves, then this License, and its terms, do not apply to those sections when you distribute them as separate works. But when you distribute the same sections as part of a whole which is a work based on the Library, the distribution of the whole must be on the terms of this License, whose permissions for other licensees extend to the entire whole, and thus to each and every part regardless of who wrote it.

Thus, it is not the intent of this section to claim rights or contest your rights to work written entirely by you; rather, the intent is to exercise the right to control the distribution of derivative or collective works based on the Library.

In addition,
mere aggregation of another work not based on the Library
with the Library (or with a work based on the Library) on a volume of

a storage or distribution medium does not bring the other work under the scope of this License.

3. You may opt to apply the terms of the ordinary GNU General Public License instead of this License to a given copy of the Library. To do this, you must alter all the notices that refer to this License, so that they refer to the ordinary GNU General Public License, version 2, instead of to this License. (If a newer version than version 2 of the ordinary GNU General Public License has appeared, then you can specify that version instead if you wish.) Do not make any other change in these notices.

Once this change is made in a given copy, it is irreversible for that copy, so the ordinary GNU General Public License applies to all subsequent copies and derivative works made from that copy.

This option is useful when you wish to copy part of the code of the

Library into a program that is not a library.

4. You may copy and distribute the Library (or a portion or derivative of it, under Section 2) in object code or executable form under the terms of Sections 1 and 2 above provided that you accompany it with the complete corresponding machine-readable source code, which must be distributed under the terms of Sections 1 and 2 above on a medium customarily used for software interchange.

If distribution of object code is made by offering access to copy from a designated place, then offering equivalent access to copy the source code from the same place satisfies the requirement to distribute the source code, even though third parties are not compelled to copy the source along with the object code.

5. A program that contains no derivative of any portion of the Library, but is designed to work with the Library by being compiled or linked with it, is called a "work that uses the Library". Such a work, in isolation, is not a derivative work of the Library, and therefore falls outside the scope of this License.

However, linking a "work that uses the Library" with the Library creates an executable that is a derivative of the Library (because it contains portions of the Library), rather than a "work that uses the library". The executable is therefore covered by this License. Section 6 states terms for distribution of such executables.

When a "work that uses the Library" uses material from a header file that is part of the Library, the object code for the work may be a

derivative work of the Library even though the source code is not. Whether this is true is especially significant if the work can be linked without the Library, or if the work is itself a library. The threshold for this to be true is not precisely defined by law.

If such an object file uses only numerical parameters, data structure layouts and accessors, and small macros and small inline functions (ten lines or less in length), then the use of the object file is unrestricted, regardless of whether it is legally a derivative work. (Executables containing this object code plus portions of the Library will still fall under Section 6.)

Otherwise, if the work is a derivative of the Library, you may distribute the object code for the work under the terms of Section 6. Any executables containing that work also fall under Section 6, whether or not they are linked directly with the Library itself.

6. As an exception to the Sections above, you may also compile or link a "work that uses the Library" with the Library to produce a work containing portions of the Library, and distribute that work under terms of your choice, provided that the terms permit modification of the work for the customer's own use and reverse engineering for debugging such modifications.

You must give prominent notice with each copy of the work that the Library is used in it and that the Library and its use are covered by this License. You must supply a copy of this License. If the work during execution displays copyright notices, you must include the copyright notice for the Library among them, as well as a reference directing the user to the copy of this License. Also, you must do one of these things:

a) Accompany the work with the complete corresponding machine-readable source code for the Library including whatever changes were used in the work (which must be distributed under Sections 1 and 2 above); and, if the work is an executable linked with the Library, with the complete machine-readable "work that uses the Library", as object code and/or source code, so that the user can modify the Library and then relink to produce a modified executable containing the modified Library. (It is understood that the user who changes the contents of definitions files in the Library will not necessarily be able to recompile the application to use the modified definitions.)

b) Accompany the

work with a written offer, valid for at least three years, to give the same user the materials specified in Subsection 6a, above, for a charge no more than the cost of performing this distribution.

c) If distribution of the work is made by offering access to copy from a designated place, offer equivalent access to copy the above specified materials from the same place.

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

For an executable, the required form of the "work that uses the Library" must include any data and utility programs needed for reproducing the executable from it. However, as a special exception, the source code distributed need not include anything that is normally distributed (in either source or binary form) with the major components (compiler, kernel, and so on) of the operating system on which the executable runs, unless that component itself accompanies the executable.

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

7. You may place library facilities that are a work based on the Library side-by-side in a single library together with other library facilities not covered by this License, and distribute such a combined library, provided that the separate distribution of the work based on the Library and of the other library facilities is otherwise permitted, and provided that you do these two things:

a) Accompany the combined library with a copy of the same work based on the Library, uncombined with any other library facilities. This must be distributed under the terms of the Sections above.

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

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END OF TERMS AND CONDITIONS

Appendix: How to Apply These Terms to Your New Libraries

If you develop a new library, and you want it to be of the greatest possible use to the public, we recommend making it free software that everyone can redistribute and change. You can do so by permitting redistribution under these terms (or, alternatively, under the terms of the ordinary General Public License).

To apply these terms, attach the following notices to the library. It is safest to attach them to the start of each source file to most effectively convey the exclusion of warranty; and each file should have at least the "copyright" line and a pointer to where the full notice is found.

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

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You should have received a copy of the GNU Library General Public License along with this library; if not, write to the Free Software Foundation, Inc., 51 Franklin Street, Fifth Floor, Boston, MA 02110-1301, USA

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

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

Here is a sample; alter the names:

Yoyodyne, Inc., hereby disclaims all copyright interest in the library `Frob' (a library for tweaking knobs) written by James Random Hacker.

<signature of Ty Coon>, 1 April 1990
Ty Coon, President of Vice

That's all there is to it!

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Version 3, 29 June 2007

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When we speak of free software, we are referring to freedom, not price. Our General Public Licenses are designed to make sure that you have the freedom to distribute copies of free software (and charge for them if you wish), that you receive source code or can get it if you want it, that you can change the software or use pieces of it in new free programs, and that you know you can do these things.

To protect your rights, we need to prevent others from denying you these rights or asking you to surrender the rights. Therefore, you have certain responsibilities if you distribute copies of the software, or if you modify it: responsibilities to respect the freedom of others.

For example, if you distribute copies of such a program, whether gratis or for a fee, you must pass on to the recipients the same freedoms that you received. You must make sure that they, too, receive or can get the source code. And you must show them these terms so they know their rights.

Developers that use the GNU GPL protect your rights with two steps:

(1)

assert copyright on the software, and (2) offer you this License giving you legal permission to copy, distribute and/or modify it.

For the developers' and authors' protection, the GPL clearly explains that there is no warranty for this free software. For both users' and authors' sake, the GPL requires that modified versions be marked as changed, so that their problems will not be attributed erroneously to authors of previous versions.

Some devices are designed to deny users access to install or run modified versions of the software inside them, although the manufacturer can do so. This is fundamentally incompatible with the aim of protecting users' freedom to change the software. The systematic pattern of such abuse occurs in the area of products for individuals to use, which is precisely where it is most unacceptable. Therefore, we have designed this version of the GPL to prohibit the practice for those products. If such problems arise substantially in other domains, we stand

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

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

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

TERMS AND CONDITIONS

0. Definitions.

"This License" refers to version 3 of the GNU General Public License.

"Copyright" also means copyright-like laws that apply to other kinds of works, such as semiconductor masks.

"The Program" refers to any copyrightable work licensed under this License. Each licensee is addressed as "you". "Licensees" and "recipients" may be individuals or organizations.

To "modify" a work means to copy from or adapt all or part of the work in a fashion requiring copyright permission, other than the making of an exact copy. The resulting work is called a "modified version" of the earlier work or a work "based on" the earlier work.

A "covered work" means either the unmodified Program or a work based on the Program.

To "propagate" a work means to do anything with it that, without permission, would make you directly or secondarily liable for infringement under applicable copyright law, except executing it on a computer or modifying a private copy. Propagation includes copying, distribution (with or without modification), making available to the public, and in some countries other activities as well.

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

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1. Source Code.

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

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

The

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

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

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

The Corresponding Source for a work in source code form is that same work.

2. Basic Permissions.

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No covered work shall be deemed part of an effective technological measure under any applicable law fulfilling obligations under article 11 of the WIPO copyright treaty adopted on 20 December 1996, or similar laws prohibiting or restricting circumvention of such measures.

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4. Conveying Verbatim Copies.

You may convey verbatim copies of the Program's source code as you receive it, in any medium, provided that you conspicuously and appropriately publish on each copy an appropriate copyright notice; keep intact all notices stating that this License and any non-permissive terms added in accord with section 7 apply to the code; keep intact all notices of the absence of any warranty; and give all recipients a copy of this License along with the Program.

You may charge any price or no price for each copy that you convey, and you may offer support or warranty protection for a fee.

5. Conveying Modified Source Versions.

You may convey a work based on the Program, or the modifications to produce it from the Program, in the form of source code under the terms of section 4, provided that you also meet all of these conditions:

- a) The work must carry prominent notices stating that you modified

it, and giving a relevant date.

b) The work must carry prominent notices stating that it is released under this License and any conditions added under section 7. This requirement modifies the requirement in section 4 to "keep intact all notices".

c) You must license the entire work, as a whole, under this License to anyone who comes into possession of a copy. This License will therefore apply, along with any applicable section 7 additional terms, to the whole of the work, and all its parts, regardless of how they are packaged. This License gives no permission to license the work in any other way, but it does not invalidate such permission if you have separately received it.

d) If the work has interactive user interfaces, each must display Appropriate Legal Notices; however, if the Program has interactive interfaces that do not display Appropriate Legal Notices, your work need not make them do so.

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

6. Conveying Non-Source Forms.

You may convey a covered work in object code form under the terms of sections 4 and 5, provided that you also convey the machine-readable Corresponding Source under the terms of this License, in one of these ways:

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

b) Convey the object code in, or embodied in, a physical product (including a physical distribution medium), accompanied by a written offer, valid for at least three years

and valid for as

long as you offer spare parts or customer support for that product model, to give anyone who possesses the object code either (1) a copy of the Corresponding Source for all the software in the product that is covered by this License, on a durable physical medium customarily used for software interchange, for a price no more than your reasonable cost of physically performing this conveying of source, or (2) access to copy the Corresponding Source from a network server at no charge.

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

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

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@enumerate a

@item

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@item

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@item

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the machine-readable
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@item

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@item

Convey the object code in, or embodied in, a physical product (including a physical distribution medium), accompanied by a written offer, valid for at least three years and valid for as long as you offer spare parts or customer support for that product model, to give anyone who possesses the object code either (1) a copy of the Corresponding Source for all the software in the product that is covered by this License, on a durable physical medium customarily used for software interchange, for a price no more than your reasonable cost of physically performing this conveying of source, or (2) access to copy the Corresponding Source from a network server at no charge.

@item

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

@item

Convey the object code by offering access from a designated place

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

@item

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

@end enumerate

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Corresponding Source conveyed, and Installation Information provided, in accord with this

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@end enumerate

@heading END OF TERMS AND CONDITIONS

@heading How to Apply These Terms to Your New Programs

If you develop a new program, and you want it to be of the greatest possible use to the public, the best way to achieve this is to make it free software which everyone can redistribute and change under these terms.

To do so, attach the following notices to the program. It is safest to attach them to the start of each source file to most effectively state the exclusion of warranty; and each file should have at least the ``copyright" line and a pointer to where the full notice is found.

```
@smallexample
@var{one line to give the program's name and a brief idea of what it does.}
Copyright (C) @var{year} @var{name of author}
```

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```
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should have received a copy of the GNU General Public License
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@end smallexample
```

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

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

```
@smallexample
@var{program} Copyright (C) @var{year} @var{name of author}
This program comes with ABSOLUTELY NO WARRANTY; for details type @samp{show w}.
This is free software, and you are welcome to redistribute it
under certain conditions; type @samp{show c} for details.
@end smallexample
```

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

You should also get your employer (if you work as a programmer) or school,

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@c man end

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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.]

Preamble

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The reason we have a separate public license for some libraries is that they blur the distinction we usually make between modifying or adding to a program and simply using it. Linking a program with a library, without changing the library, is in some sense simply using the library, and is analogous to running a utility program or application program. However, in a textual and legal sense, the linked executable is a combined work, a derivative of the original library, and the ordinary General Public License treats it as such.

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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(For example, a function in a library to compute square roots has a purpose that is entirely well-defined independent of the application. Therefore, Subsection 2d requires that any

application-supplied function or table used by this function must
be optional: if the application does not supply it, the square root function must still compute square roots.)

These requirements apply to the modified work as a whole. If identifiable sections of that work are not derived from the Library, and can be reasonably considered independent and separate works in themselves, then this License, and its terms, do not apply to those sections when you distribute them as separate works. But when you distribute the same sections as part of a whole which is a work based on the Library, the distribution of the whole must be on the terms of this License, whose permissions for other licensees extend to the entire whole, and thus to each and every part regardless of who wrote it.

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5. A program that contains no derivative of any portion of the Library, but is designed to work with the Library by being compiled or linked with it, is called a "work that uses the Library". Such a work, in isolation, is not a derivative work of the Library, and therefore falls outside the scope of this License.

However, linking a "work that uses the Library" with the Library creates an executable that is a derivative of the Library (because it contains portions of the Library), rather than a "work that uses the library". The executable is therefore covered by this License. Section 6 states terms for distribution of such executables.

When a "work that uses the Library" uses material from a header file that is part of the Library, the object code for the work may be a derivative work of the Library even though the source code is not. Whether this is true is especially significant if the work can be linked without the Library, or if the work is itself a library. The threshold for this to be true is not precisely defined by law.

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1.140 procps 3.3.16

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(For example, a function in a library to compute square roots has

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/* nicstar.c v0.22 Jawaid Bazyar (bazyar@hypermall.com)

* nicstar.c, M. Welsh (matt.welsh@cl.cam.ac.uk)

*

* Hacked October, 1997 by Jawaid Bazyar, Interlink Advertising Services Inc.

* <http://www.hypermall.com/>

* 10/1/97 - commented out CFG_PHYIE bit - we don't care when the PHY

* interrupts us (except possibly for removal/insertion of the cable?)

* 10/4/97 - began heavy inline documentation of the code. Corrected typos

* and spelling mistakes.

* 10/5/97 - added code to handle PHY interrupts, disable PHY on

* loss of link, and correctly re-enable PHY when link is

* re-established. (put back CFG_PHYIE)

*

* Modified to work with the IDT7721 nicstar -- AAL5 (tested) only.

*

* R. D. Rechenmacher <ron@fnal.gov>, Aug. 6, 1997

*

* Linux driver for the IDT77201 NICStAR PCI ATM controller.

* PHY component is expected to be 155 Mbps S/UNI-Lite or IDT 77155;

* see init_nicstar() for PHY initialization to change this. This driver

* expects the Linux ATM stack to support scatter-gather

lists

* (skb->atm.iovcnt != 0) for Rx skb's passed to vcc->push.

*

* Implementing minimal-copy of received data:

* IDT always receives data into a small buffer, then large buffers

* as needed. This means that data must always be copied to create

* the linear buffer needed by most non-ATM protocol stacks (e.g. IP)

* Fix is simple: make large buffers large enough to hold entire

* SDU, and leave <small_buffer_data> bytes empty at the start. Then

* copy small buffer contents to head of large buffer.

* Trick is to avoid fragmenting Linux, due to need for a lot of large

* buffers. This is done by 2 things:

- * 1) skb->destructor / skb->atm.recycle_buffer
- * combined, allow nicstar_free_rx_skb to be called to
- * recycle large data buffers
- * 2) skb_clone of received buffers
- * See nicstar_free_rx_skb and linearize_buffer for implementation
- * details.
- *
- *
- *
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- *
- * M. Welsh, 6 July 1996
- *
- *
- */

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1.149 backoff 4.1.1

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1.151 tdb 1.45.7

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This is the Debian GNU/Linux prepackaged version of the static EXT2
file system consistency checker (e2fsck.static). The EXT2 utilities
were written by Theodore Ts'o <tytso@mit.edu> and Remy Card
<card@masi.ibp.fr>.

Sources were obtained from <http://sourceforge.net/projects/e2fsprogs>

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Theodore Ts'o
23-June-2007

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```
#
# This is a Makefile stub which handles the creation of BSD shared
# libraries.
#
# In order to use this stub, the following makefile variables must be defined.
#
# BSDLIB_VERSION = 1.0
# BSDLIB_IMAGE = libce
# BSDLIB_MYDIR = et
# BSDLIB_INSTALL_DIR = $(SHLIBDIR)
#
```

```
all:: image
```

```
real-subdirs:: Makefile
@echo " MKDIR pic"
@mkdir -p pic
```

```
BSD_LIB = $(BSDLIB_IMAGE).so.$(BSDLIB_VERSION)
```

BSDLIB_PIC_FLAG = -fpic

image: \$(BSD_LIB)

```
$(BSD_LIB): $(OBJS)
(cd pic; ld -Bshareable -o $(BSD_LIB) $(LDFLAGS_SHLIB) $(OBJS))
$(MV) pic/$(BSD_LIB) .
$(RM) -f ../$(BSD_LIB)
(cd ..; $(LN) $(LINK_BUILD_FLAGS) \
`echo $(my_dir) | sed -e 's;lib/;;'`/$(BSD_LIB) $(BSD_LIB))
```

```
install-shlibs install:: $(BSD_LIB)
@echo " INSTALL_PROGRAM $(BSDLIB_INSTALL_DIR)/$(BSD_LIB)"
@$(INSTALL_PROGRAM) $(BSD_LIB) \
$(DESTDIR)$$(BSDLIB_INSTALL_DIR)/$(BSD_LIB)
@-$(LDCONFIG)
```

install-strip: install

install-shlibs-strip:: install-shlibs

```
uninstall-shlibs uninstall::
$(RM) -f $(DESTDIR)$$(BSDLIB_INSTALL_DIR)/$(BSD_LIB)
```

```
clean::
$(RM)
-rf pic
$(RM) -f $(BSD_LIB)
$(RM) -f ../$(BSD_LIB)
This package was added to the e2fsprogs debian source package by
Theodore Ts'o <tytso@mit.edu> on Sat Mar 15 15:33:37 EST 2003
```

It is part of the main e2fsprogs distribution, which can be found at:

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1.152 libiniparser 1.5.2

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1.153 cyphar-filepath-securejoin 0.2.3

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1.154 six 1.14.0

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```
{
  "testfiles": [
    "test/*.uts",
    "test/contrib/*.uts"
  ],
  "remove_testfiles": [
    "test/linux.uts",
    "test/windows.uts",
    "test/contrib/cansocket_native.uts",
    "test/contrib/cansocket_python_can.uts"
  ],
  "onlyfailed": true,
  "preexec": {
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    "test/ssl2.uts": "load_layer(\"tls\")",
    "test/tls*.uts": "load_layer(\"tls\")"
  },
  "format": "text",
  "kw_ko": [
    "linux",
    "windows",
    "crypto_advanced",
    "ipv6",
    "vcan_socket"
  ]
}
```

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Version 3, 29 June 2007

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#+TITLE: List of code with permissive licenses as used by GnuPG.  
#+STARTUP: showall
```

* DNS resolver (dirmngr/dns.c)

dns.c - Recursive, Reentrant DNS Resolver.

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1.161 containerd-console 1.0.3

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1.164 godbus 5.0.6

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1.165 sys-mountinfo 0.5.0

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

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1.170 keyutils 1.6.1

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Yoyodyne, Inc., hereby disclaims all copyright interest in the
library `Frob' (a library for tweaking knobs) written by James Random Hacker.

<signature of Ty Coon>, 1 April 1990
Ty Coon, President of Vice

That's all there is to it!

1.171 libsolv 0.7.10

1.171.1 Available under license :

All files for the Windows compatibility layer are taken from musl,
except for unistd.h and fmemopen.c.

MUSL

musl as a whole is licensed under the following standard MIT license:

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TRE (tre.h, tre-mem.c)

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This is the license, copyright notice, and disclaimer for TRE, a regex matching package (library and tools) with support for approximate matching.

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1.172 gnupg 1.13.1-unknown

1.172.1 Available under license :

```
(21:protected-private-key(3:elg(1:p129:|B36I(s7}+ZJ/pvE;"tg7N ca"Gxvnyu&bB#h'7=89&oG
R<hO)(1:g1:)(1:y128:Ji]WU_UP}AQ\YMhAl|2e{ _tcMNDg]{QnWsK 4pY{$bDCs)(9:protected25:openpgp-s2k3-
sha1-aes-cbc((4:sha18:JcE7:6452224)16: i[Q*vK)192:FJA!O!ZAF
biJ&Tsb!t
&9@R\~V+x>?sedDz-W(yqf?u^e?s1saV8<T0:tC5%ZMh?$,y_e[1D)(12:protected-at15:20130812T105135)))
(21:protected-private-key(3:elg(1:p129:W#} }l;;m>
;4YV$Qg
LoLy~*Tru*+ID8"-9,:17^g*({ #7)(1:g1:)(1:y128:2o62,Tj/
rRi3sSS iCAYNYbVtAHKi7(UPp)?Od{'R^f)(9:protected25:openpgp-s2k3-sha1-aes-
cbc((4:sha18:fw`E7:5242880)16:aqR)192:5f1a-`{^EV699WoB\,:Rs1*W6Lu iZ
:=ZqURM47;pA3#DL
so8O)Th^P@IP0&.DR;"rkN7)(12:protected-at15:20101008T070216)))
#+TITLE: GPGME Python Bindings HOWTO Examples
#+LATEX_COMPILER: xelatex
#+LATEX_CLASS: article
```



```
#+LATEX_CLASS_OPTIONS: [12pt]
#+LATEX_HEADER: \usepackage{xltextra}
#+LATEX_HEADER: \usepackage[margin=1in]{geometry}
#+LATEX_HEADER: \setmainfont[Ligatures={Common}]{Times New Roman}
#+LATEX_HEADER: \author{Ben McGinnes <ben@gnupg.org>}
```

* Examples

```
:PROPERTIES:
:CUSTOM_ID: gpgme-python3-examples
:END:
```

The contents of this directory are the examples included in the /GNU Privacy Guard (GnuPG) Made Easy Python Bindings HOWTO/ file. Each script is explicitly for Python 3 and specifically for Python 3.4 or later.

Some of these scripts may work with Python 2.7, but there are no guarantees. They will include the relevant imports from the `__future__` module to facilitate that if possible.

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```
:PROPERTIES:
:CUSTOM_ID: copyright-and-license
:END:
```

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** Copyright (C) The GnuPG Project, 2018

```
:PROPERTIES:
:CUSTOM_ID: copyright
:END:
```

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```
:PROPERTIES:
:CUSTOM_ID: license
:END:
```

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cython

;;; gpgme-package.lisp

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;;;

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;;; along with GPGME; if not, write to the Free Software Foundation,
;;; Inc., 59 Temple Place - Suite 330, Boston, MA 02111-1307, USA.

;;; Conventions:

;;;

;;; gpg-error is used for error handling.

;;;

;;; Standard I/O streams are used for input and output.

(defpackage #:gpgme

(:use #:common-lisp #:cffi #:gpg-error)

(:import-from #:trivial-garbage
#:finalize)

(:export #:check-version

#:version*

#:context

#:protocol

#:armorp

#:textmodep

#:include-certs-default+

#:include-certs

#:keylist-mode

```

#:signers
#:sig-notations
#:with-context
#:key-data
#:get-key
#:op-encrypt
#:op-decrypt
#:op-sign
#:op-verify
#:op-import
#:op-export))
\input texinfo @c -*- texinfo -*-
@c %**start of header
@setfilename index.info
@settitle GNU Privacy Guard (GnuPG) Made Easy Python Bindings
@documentencoding utf-8
@documentlanguage en
@c %**end of header

@finalout
@titlepage
@title GNU Privacy Guard (GnuPG) Made Easy Python Bindings
@author Ben McGinnes
@end titlepage

@contents

@ifnottex
@node Top
@top GNU Privacy Guard (GnuPG) Made Easy Python Bindings
@end ifnottex

@menu
* GPGME Python Bindings::

@detailmenu
--- The Detailed Node Listing ---

GPGME Python Bindings

* Contents::

@end detailmenu
@end menu

@node GPGME Python Bindings
@chapter GPGME Python Bindings

```

@menu
* Contents::
@end menu

@node Contents
@section Contents

@itemize
@item
@uref{short-history, A short history of the project}
@item
@uref{what-is-new, What's New}
@itemize
@item
@uref{maintenance-mode, Maintenance Mode} (from January, 2019)
@end itemize
@item
@uref{what-was-new, What Was New}
@item
@uref{gpgme-python-howto, GPGME Python Bindings HOWTO}
@end
itemize

@bye
2011-12-02 Werner Koch <wk@g10code.com>

NB: ChangeLog files are no longer manually maintained. Starting on December 1st, 2011 we put change information only in the GIT commit log, and generate a top-level ChangeLog file from logs at "make dist". See doc/HACKING for details.

2011-05-12 Marcus Brinkmann <marcus@g10code.com>

* gpgme.texi (I/O Callback Example): Fix example code.

* gpgme.texi (Generating Keys): Fix OpenPGP parameters and reference GPG and GPGSM manual.

2010-01-05 Werner Koch <wk@g10code.com>

* gpgme.texi (Changing Passphrases): New.

2009-07-21 Werner Koch <wk@g10code.com>

* uiserver.texi (UI Server Encrypt): Add --expect-sign option to PREP_ENCRYPT.

2009-06-16 Marcus Brinkmann <marcus@g10code.de>

* gpgme.texi (Result Management): New section.

2009-06-16 Werner Koch <wk@g10code.com>

* gpgme.texi (Exporting Keys): Document gpgme_op_export_keys.
(Importing Keys): Document gpgme_op_import_keys.
(Data Buffer Meta-Data): Document URL encodings.

2009-05-28

Marcus Brinkmann <marcus@g10code.de>

* gpgme.texi (Library Version Check): Document selftest error.
(Creating Contexts): Likewise.

2009-05-18 Marcus Brinkmann <marcus@g10code.de>

* gpgme.texi (Encrypting a Plaintext): Document
GPGME_ENCRYPT_NO_ENCRYPT_TO.

2009-05-05 Marcus Brinkmann <marcus@g10code.de>

* gpgme.texi (Engine Information): Replace path by file_name.

2008-11-28 Werner Koch <wk@g10code.com>

* gpgme.texi (Listing Keys): Change description of the return
value to match the code. Spotted by Colin Leroy.

2008-10-15 Werner Koch <wk@g10code.com>

* uiserver.texi (Miscellaneous UI Server Commands): Add option
--protocol to the SENDER command.

2008-07-17 Werner Koch <wk@g10code.com>

* module-overview.sk: New.

2008-07-04 Werner Koch <wk@g10code.com>

* gpgme.texi (Algorithms): Add a hint on symmetric only encryption.

2008-06-27 Marcus Brinkmann <marcus@g10code.de>

* gpgme.texi (Cancellation): Document gpgme_cancel_async.

2008-06-25

Werner Koch <wk@g10code.com>

* gpgme.texi (Listing Keys): Updated example to the current API.
Noted by Nico Schottelius.

2008-06-05 Werner Koch <wk@g10code.com>

* uiserver.texi (Miscellaneous UI Server Commands): Describe
START_CONFDIALOG.

2008-06-04 Werner Koch <wk@g10code.com>

* gpgme.texi: Use @copying command. Change license to
GPLv3. Include protocol specs from GpgOL and GPGEEx. Minor
cleanups.

2008-03-11 Marcus Brinkmann <marcus@g10code.de>

* gpgme.texi (File Based Data Buffers): Document the need for
blocking operations.
(Callback Based Data Buffers): Likewise.

2008-03-05 Marcus Brinkmann <marcus@g10code.de>

* gpgme.texi (Library Version Check): Rename snippet function to
init_gpgme.
(I/O Callback Example): Call it here.

2008-01-28 Marcus Brinkmann <marcus@g10code.de>

* gpgme.texi: Document that data encoding affects some output data
objects now.

2007-09-27 Marcus Brinkmann <marcus@g10code.de>

* gpgme.texi (Protocols and Engines):
Document GPGME_PROTOCOL_UNKNOWN.

2007-09-11 Werner Koch <wk@g10code.com>

* gpgme.texi (I/O Callback Example): Typo fix.

2007-08-07 Werner Koch <wk@g10code.com>

* gpgme.texi (Verify): Describe chain_model.

2007-07-12 Werner Koch <wk@g10code.com>

* gpgme.texi (Library Version Check): Add remark that the socket layer will get initialized.

2007-06-05 Marcus Brinkmann <marcus@g10code.de>

* gpgme.texi (Advanced Key Editing): New section.

2007-05-21 Werner Koch <wk@g10code.com>

* Makefile.am (online): New target.

2007-05-18 Marcus Brinkmann <marcus@g10code.de>

* gpgme.texi (Error Strings): Fix documentation of gpgme_strerror_r.

2006-11-01 Moritz Schulte <moritz@g10code.com>

* gpgme.texi (Data Buffer I/O Operations): Fixed entry for gpgme_data_seek: OFFSET is not a pointer; some s/whence/offset/.

2006-09-25 Marcus Brinkmann <marcus@g10code.de>

* gpgme.texi (Destroying Data Buffers): Clarify that gpgme_data_release_and_get_mem destroys DH unconditionally.

2005-03-24

Marcus Brinkmann <marcus@g10code.de>

* gpgme.texi (Library Version Check): Make example code compatible to W32 systems.

2006-06-21 Marcus Brinkmann <marcus@g10code.de>

* gpgme.texi (Passphrase Callback): Fix inverted condition in description.

2005-12-20 Werner Koch <wk@g10code.com>

* gpgme.texi (Verify): Document pka_trust.

2005-12-06 Werner Koch <wk@g10code.com>

* gpgme.texi (Key Management): Updated to match the fixes for subkey fingerprints and theg secret flag.

2005-10-06 Marcus Brinkmann <marcus@g10code.de>

* gpgme.texi (Destroying Data Buffers): Document gpgme_free.

2005-10-02 Marcus Brinkmann <marcus@g10code.de>

* gpgme.texi (Key Management): Add the new member notations of
gpgme_sig_key_t.
(Key Listing Mode): Document GPGME_KEYLIST_MODE_SIG_NOTATIONS.

2005-10-01 Marcus Brinkmann <marcus@g10code.de>

* gpgme.texi: Enclose all return parameters of dectypedefuns in
curly brackets.

* gpgme.texi (Signature Notation Data): New
section.
(Verify): Added more about the notation data structure.

2005-09-30 Marcus Brinkmann <marcus@g10code.de>

* gpgme.texi (Data Buffer I/O Operations, Data Buffer Meta-Data):
New subsections.

* gpgme.texi: Replace plaintext_filename with file_name.

* gpgme.texi (Key Management): Document is_qualified.

2005-07-27 Marcus Brinkmann <marcus@g10code.de>

* gpgme.texi (Decrypt): Add plaintext_filename to
gpgme_decrypt_result_t.
(Verify): Likewise for gpgme_verify_result_t.

2005-06-03 Marcus Brinkmann <marcus@g10code.de>

* gpgme.texi (Verify): Add information about new fields in
gpgme_signature_t.

* gpgme.texi (Decrypt): Add gpgme_recipient_t.

2005-05-28 Marcus Brinkmann <marcus@g10code.de>

* gpgme.texi (Key Listing Mode): Fix return type of
gpgme_set_keylist_mode.
Reported by "Sergio" <ml_sergico@virgilio.it>.

2005-04-28 Marcus Brinkmann <marcus@g10code.de>

* gpgme.texi (Included Certificates): Document

GPGME_INCLUDE_CERTS_DEFAULT.

2005-01-12 Marcus

Brinkmann <marcus@g10code.de>

* gpgme.texi (Engine Configuration): New section.
(Crypto Engine): New subsection.

2004-12-07 Marcus Brinkmann <marcus@g10code.de>

* lesser.texi (Library Copying): Change from @appendixsec to
@appendix.
* gpgme.texi (Features): Change reference to GPL to one to LGPL.

* Makefile.am: Change license to LGPL.
(gpgme_TEXINFOS): Replace gpl.texi with lesser.texi.

* gpgme.texi: Change license to LGPL (also for documentation of
GPGME's license).
* lesser.texi: New file.
* gpl.texi: File removed.

* gpgme.texi (Creating Contexts): Fix cut&paste error. Reported
by Noel Torres <envite@rolamasao.org>.

2004-09-30 Marcus Brinkmann <marcus@g10code.de>

* Makefile.am (gpgme_TEXINFOS): Remove fdl.texi.
* gpgme.texi: Do not include fdl.texi. Change license to GPL.
* fdl.texi: File removed.

2004-09-29 Marcus Brinkmann <marcus@g10code.de>

* gpgme.texi (Key Management): Change type of keylist_mode in
gpgme_key_t to gpgme_keylist_mode_t.

2004-09-28

Marcus Brinkmann <marcus@g10code.de>

* gpgme.texi (Passphrase Callback): Fix last change.

2004-09-27 Marcus Brinkmann <marcus@g10code.de>

* gpgme.texi (Passphrase Callback): Document
GPG_ERR_NOT_IMPLEMENTED.

* gpgme.texi: Update copyright year for tex version.

2004-07-29 Moritz Schulte <moritz@g10code.com>

* gpgme.texi (Verify): Fix gpgme_get_key example (ancient force_update argument was still there).

2004-06-08 Marcus Brinkmann <marcus@g10code.de>

* gpgme.texi (Listing Keys): Elaborate on the length restrictions on search patterns.

* gpgme.texi (Decrypt and Verify): Document the NO_DATA error code.

(Verify): Document the relationship between gpgme_op_verify_result and the decrypt and verify operations.

2004-05-21 Marcus Brinkmann <marcus@g10code.de>

* gpgme.texi (Verify): Document GPG_ERR_CERT_REVOKED status.

* gpgme.texi (Decrypt): Add note about new field wrong_key_usage of gpgme_decrypt_result_t.

* gpgme.texi (Key Management): Add note about new field keylist_mode of gpgme_key_t.

2004-04-29 Marcus Brinkmann <marcus@g10code.de>

* gpgme.texi (Verify): Correct type of member wrong_key_usage.

2004-03-29 Moritz Schulte <moritz@duesseldorf.ccc.de>

* gpgme.texi (Verify): Fix type of gpgme_op_verify_result.

* gpgme.texi (Key Listing Mode): Typo fix.

2004-03-23 Marcus Brinkmann <marcus@g10code.de>

* gpgme.texi (Library Version Check): Fix the instruction when to set the locale.

2004-03-03 Marcus Brinkmann <marcus@g10code.de>

* gpgme.texi (I/O Callback Example Qt): New section by Marc Mutz.

2004-02-24 Marcus Brinkmann <marcus@g10code.de>

* gpgme.texi (cancellation): New section.

2004-02-17 Werner Koch <wk@gnupg.org>

* gpgme.texi (Key Listing Mode): Doc KEYLIST_MODE_VALIDATE.

2004-02-06 Moritz Schulte <mo@g10code.com>

* gpgme.texi: A couple of small fixes regarding the Largfile Support section.

2004-02-01 Marcus Brinkmann <marcus@g10code.de>

* gpgme.texi (Largefile Support): New section.

2004-01-13 Marcus Brinkmann <marcus@g10code.de>

* gpgme.texi (Key Management): Fix exportable field.

2003-12-25 Marcus Brinkmann <marcus@g10code.de>

* gpgme.texi (Key Management): Rename member class in gpgme_key_sig_t to sig_class.
(Creating a Signature): Likewise for gpgme_signature_t.

2003-12-23 Moritz Schulte <mo@g10code.com>

* gpgme.texi (Listing Keys): Minor clarification for gpgme_get_key.

2003-10-06 Marcus Brinkmann <marcus@g10code.de>

* gpgme.texi (Signal Handling): New section.

2003-09-14 Marcus Brinkmann <marcus@g10code.de>

* gpgme.texi (Multi Threading): Correct documentation on memory synchronization requirement.

* gpgme.texi (Locale): New section.
(Multi Threading): Set locale in example.

2003-09-13 Marcus Brinkmann <marcus@g10code.de>

* gpgme.texi (Error Strings): Add gpgme_strerror_r.

2003-09-13 Marcus Brinkmann <marcus@g10code.de>

* gpgme.texi (Multi Threading): Update documentation.

2003-09-03 Marcus Brinkmann <marcus@g10code.de>

*

gpgme.texi (Header): We don't use the assuan namespace anymore.
Document new thread options.

2003-08-14 Marcus Brinkmann <marcus@g10code.de>

* gpgme.texi (Creating a Signature): Change type of member class
to unsigned int.

2003-08-04 Marcus Brinkmann <marcus@g10code.de>

* gpgme.texi (Verify): Get error code from SIG->status in the code
for gpgme_get_sig_status.

2003-07-31 Marcus Brinkmann <marcus@g10code.de>

* gpgme.texi (Key Management): Add can_authenticate flag.

* gpgme.texi (Listing Keys): Document GPG_ERR_AMBIGUOUS_NAME for
gpgme_get_key.

2003-07-29 Marcus Brinkmann <marcus@g10code.de>

* Makefile.am (EXTRA_DIST): Remove variable.

* gpgme.texi (Encrypting a Plaintext): Bad passphrase is only
possible with symmetric encryption, change the wording to reflect
that.

* gpgme.texi (Creating a Signature): Document
GPG_ERR_UNUSABLE_SECKEY.

* gpgme.texi (Encrypting a Plaintext): Mention encrypt and sign
operations in result function.
(Creating
a Signature): Likewise.

2003-07-23 Marcus Brinkmann <marcus@g10code.de>

* gpgme.texi (Key Listing Mode): Remove word duplication.
(Listing Keys): Remove mentioning of force argument.
(Verify): Don't mention r_stat. Fix some typos.
(Decrypt and Verify): Correct info how to get the result. Don't
mention r_stat.
(Manipulating Data Buffers): Fix documentation of return value.

(Listing Keys): Update examples.
(Decrypt): Result might also be available when operation failed.
(Verify): Result might also be available when operation failed.
All spotted by Stphane Corthisy.

2003-07-22 Marcus Brinkmann <marcus@g10code.de>

* gpgme.texi (Error Sources): Fix cut and paste error.

2003-07-09 Marcus Brinkmann <marcus@g10code.de>

* gpgme.texi (Key Management): Clarify difference between can_sign and can_certify.
(Information About Keys): Likewise for GPGME_ATTR_CAN_SIGN and GPGME_ATTR_CAN_CERTIFY.

2003-07-08 Marcus Brinkmann <marcus@g10code.de>

* gpgme.texi (Progress Meter Callback): Change return type of gpgme_progress_cb_t to void.

2003-06-22 Marcus Brinkmann <marcus@g10code.de>

* gpgme.texi: Add 2003 to copyright notice.

* gpgme.texi (Header): Fix name space documentation on libgpg-error.

2003-06-22 Marcus Brinkmann <marcus@g10code.de>

* gpgme.texi (Multi Threading): Remove reference to gpgme_recipients_t.

2003-06-06 Marcus Brinkmann <marcus@g10code.de>

* gpgme.texi (Crypto Operations): Rename gpgme_invalid_user_id_t to gpgme_invalid_key_t.

2003-06-06 Marcus Brinkmann <marcus@g10code.de>

* gpgme.texi: Change error codes to GPG_ERR_* variants.
(Error Handling): Rewritten.

2003-05-29 Marcus Brinkmann <marcus@g10code.de>

* gpgme.texi (Exporting Keys): Change and document prototypes.
Add new gpgme_op_export_ext and gpgme_op_export_ext_start

variants.

(Selecting Recipients): Section removed.

(Encrypting a Plaintext): Change prototypes and document the changes.

2003-05-28 Marcus Brinkmann <marcus@g10code.de>

*

gpgme.texi (Exporting Keys): Change argument type from gpgme_recipient_t to gpgme_user_id_t.

(Encrypting a Plaintext): Likewise.

(Selecting Recipients): Rewritten.

2003-05-27 Marcus Brinkmann <marcus@g10code.de>

* gpgme.texi (Protocol Selection): Do not use @acronym in @node because that breaks texi2dvi.

* gpgme.texi (Passphrase Callback): Document new prototype.

2003-05-18 Marcus Brinkmann <marcus@g10code.de>

* gpgme.texi (Header): Remove Gpgme as namespace prefix. Add _GPGME to namespace prefix.

* gpgme.texi (Multi Threading): Add note about link order.

2003-05-04 Marcus Brinkmann <marcus@g10code.de>

* gpgme.texi (Listing Keys): Document what happens if key is not found.

* gpgme.texi (Importing Keys): Fix cut and paste error.

2003-04-30 Marcus Brinkmann <marcus@g10code.de>

* gpgme.texi (Encrypting a Plaintext): Remove reference to gpgme_get_op_info.

(Detailed Results): Subsection removed.

* gpgme.texi (Key Listing Mode): Add GPGME_KEYLIST_MODE_SIGS. (Manipulating

Keys): Add obsolescence note.

(Key Signatures): Likewise.

(Information About Keys): Likewise.

(Key Management): Add new data types GpgmeSubkey, GpgmeKeySig, GpgmeUserID, and all the information about GpgmeKey.

2003-04-29 Marcus Brinkmann <marcus@g10code.de>

* gpgme.texi (Listing Keys): Remove force_update argument from gpgme_get_key.

* gpgme.texi (Trust Item Management): Add data members of GpgmeTrustItem type.
(Information About Trust Items): Add note about obsolescence.
(Manipulating Trust Items): Add gpgme_trust_item_ref and gpgme_trust_item_unref.

2003-04-28 Marcus Brinkmann <marcus@g10code.de>

* gpgme.texi (Verify): Rewritten to take into account new and deprecated functions and data types.

* gpgme.texi (Decrypt): Descript gpgme_op_decrypt_result and GpgmeDecryptResult.

2003-04-27 Marcus Brinkmann <marcus@g10code.de>

* gpgme.texi (Encrypting a Plaintext): Add info about GpgmeEncryptResult and gpgme_op_encrypt_result.

* gpgme.texi
(Creating a Signature): Add info about GpgmeNewSignature, GpgmeSignResult and gpgme_op_sign_result.
(Crypto Operations): Add GpgmeInvalidUserID.
(Algorithms): New chapter.

* gpgme.texi (Deleting Keys): Document GPGME_Ambiguous_Specification.
(Error Values): Remove GPGME_Invalid_Type and GPGME_Invalid_Mode.
Add GPGME_Unknown_Reason, GPGME_Not_Found,
GPGME_Ambiguous_Specification, GPGME_Wrong_Key_Usage,
GPGME_Key_Revoked, GPGME_Key_Expired, GPGME_No_CRL_Known,
GPGME_CRL_Too_Old, GPGME_Policy_Mismatch, GPGME_No_Secret_Key,
GPGME_Key_Not_Trusted, GPGME_Issuer_Missing, GPGME_Chain_Too_Long,
GPGME_Unsupported_Algorithm, GPGME_Sig_Expired,
GPGME_Bad_Signature, GPGME_No_Public_Key.

2003-04-25 Marcus Brinkmann <marcus@g10code.de>

* gpgme.texi (Importing Keys): Change GPGME_IMPORT_PRIVATE to GPGME_IMPORT_SECRET.

* gpgme.texi (Importing Keys): Remove note about gpgme_get_op_info.
(Detailed Results): Remove note about import.

* gpgme.texi (Importing Keys): Add documentation for
GpgmeImportStatus, GpgmeImportResult and gpgme_op_import_result.

* gpgme.texi (Generating Keys): Fix documentation of public and secret arguments.

2003-04-24 Marcus Brinkmann <marcus@g10code.de>

* gpgme.texi (Generating Keys): Document changed gpgme_op_genkey and new gpgme_op_genkey_result function. Document GpgmeGenKeyResult data type.

* gpgme.texi (Error Values): Rename GPGME_No_Passphrase to GPGME_Bad_Passphrase.

* gpgme.texi (Decrypt): Likewise.
(Decrypt and Verify): Likewise.
(Creating a Signature): Likewise.
(Encrypting a Plaintext): Likewise.

* gpgme.texi (Error Values): Rename GPGME_No_Recipients to GPGME_No_UserID and GPGME_Invalid_Recipient to GPGME_Invalid_UserID.
(Encrypting a Plaintext): Likewise.

* gpgme.texi (Error Values): Remove GPGME_Busy and GPGME_No_Request.
(Listing Keys): Likewise.
(Listing Trust Items): Likewise.

2003-02-06 Marcus Brinkmann <marcus@g10code.de>

* gpgme.texi (Cancelling an Operation): Removed.
(Passphrase
Callback): Document new type for GpgmePassphraseCb.

2003-01-30 Marcus Brinkmann <marcus@g10code.de>

* gpgme.texi (Engine Information): Rename member part to file_name.

* gpgme.texi (Protocols and Engines): Document gpgme_get_protocol_name.

* gpgme.texi (Engine Information): Rewritten.

2003-01-29 Marcus Brinkmann <marcus@g10code.de>

* gpgme.texi (I/O Callback Interface): Document new even

GPGME_EVENT_START.

(Waiting For Completion): Document new possible return values.

(I/O Callback Interface): Document return type of GpgmeIOCb.

2003-01-29 Marcus Brinkmann <marcus@g10code.de>

* gpgme.texi (Hooking Up Into Idle Time): Section removed.

2002-12-24 Marcus Brinkmann <marcus@g10code.de>

* gpgme.texi (Verify): Drop R_STAT argument in gpgme_op_verify.

* gpgme.texi (Decrypt and Verify): Likewise for
gpgme_op_decrypt_verify.

2002-12-23 Marcus Brinkmann <marcus@g10code.de>

* gpgme.texi (Information About Keys): Document that
GPGME_ATTR_IS_SECRET is not representable
as a string anymore.

2002-12-22 Marcus Brinkmann <marcus@g10code.de>

* gpgme.texi (Key Signatures): New section.
(Listing Keys): Add gpgme_get_key.

2002-12-06 Marcus Brinkmann <marcus@g10code.de>

* gpgme.texi (Memory Based Data Buffers): New subsection.
(File Based Data Buffers): Likewise.
(Callback Based Data Buffers): Likewise.
(Manipulating Data Buffers): Update interfaces. Add
gpgme_data_seek.
* gpgme.texi (Engine Version Check): Remove gpgme_check_engine.

2002-11-21 Marcus Brinkmann <marcus@g10code.de>

* gpgme.texi (Verify): Document the new interface.

2002-11-19 Marcus Brinkmann <marcus@g10code.de>

* gpgme.texi (Generating Keys): Document new argument to
gpgme_op_genkey.

2002-11-05 Marcus Brinkmann <marcus@g10code.de>

* gpgme.texi (Verify): Fix prototype of gpgme_get_sig_key.
Reported by Miguel Coca <e970095@zipi.fi.upm.es>.

2002-08-30 Marcus Brinkmann <marcus@g10code.de>

- * gpgme.texi (Selecting Signers): Fix reference count.

2002-08-21

Marcus Brinkmann <marcus@g10code.de>

- * gpgme.texi (Header): Document name space.

2002-08-20 Marcus Brinkmann <marcus@g10code.de>

- * gpgme.texi (Importing Keys): Document gpgme_op_import_ext.

- * gpgme.texi (Importing Keys): Undocument EOF.

2002-08-14 Werner Koch <wk@gnupg.org>

- * gpgme.texi (Information About Keys): Changed GPGME_ATTR_TYPE.

2002-07-25 Marcus Brinkmann <marcus@g10code.de>

- * gpgme.texi (Deleting Keys): Say that secret keys might not be deleted.

2002-07-25 Marcus Brinkmann <marcus@g10code.de>

- * gpgme.texi (Information About Keys): Document (badly) the new key attributes.

- * gpgme.texi (Manipulating Data Buffers): Mention that backend tries to detect encoding automatically.

2002-07-03 Marcus Brinkmann <marcus@g10code.de>

- * gpgme.texi (Run Control): Update this section.
(Waiting For Completion): Likewise for this subsection.
(Cancelling an Operation): Likewise for this subsection.
(Using External Event Loops): New subsection with several subsubsections.

2002-06-28

Marcus Brinkmann <marcus@g10code.de>

- * gpgme.texi (Multi Threading): Remove item about the need to synchronize anything against gpgme_wait (except gpgme_wait itself).

2002-06-27 Marcus Brinkmann <marcus@g10code.de>

* gpgme.texi (Information About Keys): Fix documentation for IDX.
(Information About Trust Items): Likewise.

2002-06-26 Werner Koch <wk@gnupg.org>

* gpgme.texi (Importing Keys): Document the return value -1 of
gpgme_op_import.

2002-06-20 Werner Koch <wk@gnupg.org>

* gpgme.texi (Verify): Explain the new whatidx variable.

2002-06-10 Werner Koch <wk@gnupg.org>

* gpgme.texi (Verify): Document attribute GPGME_ATTR_ERRTOK.

2002-06-04 Marcus Brinkmann <marcus@g10code.de>

* gpgme.texi (Multi Threading): Document new autodetection.

2002-06-04 Marcus Brinkmann <marcus@g10code.de>

* Makefile.am (DISTCLEANFILES): New variable.

2002-05-26 Marcus Brinkmann <marcus@g10code.de>

* gpgme.texi: Some typographical corrections
throughout.

2002-05-09 Marcus Brinkmann <marcus@g10code.de>

* gpgme.texi (Using Automake): New section.

2002-05-09 Marcus Brinkmann <marcus@g10code.de>

* gpgme.texi (Multi Threading): Escape { and }.

2002-05-09 Marcus Brinkmann <marcus@g10code.de>

* gpgme.texi (Overview): Replace note about thread-safeness.
(Multi Threading): New section.

2002-05-03 Werner Koch <wk@gnupg.org>

* gpgme.texi (Manipulating Data Buffers): Changed some data types
to void*.

(Protocol Selection): Added gpgme_get_protocol.

(Verify): Updated to include the new attribute functions and status codes.

2002-04-27 Werner Koch <wk@gnupg.org>

* gpgme.texi (Manipulating Data Buffers): New type GpgmeDataEncoding.

2002-04-23 Marcus Brinkmann <marcus@g10code.de>

* gpgme.texi (Passphrase Callback): Document that either return argument can be NULL.

(Progress Meter Callback): Likewise.

2002-04-22 Marcus Brinkmann <marcus@g10code.de>

* gpgme.texi (Passphrase Callback): Fix small typo. Document the new function gpgme_get_passphrase_cb.
(Progress Meter Callback): Document the new function gpgme_get_progress_cb.

2002-04-16 Marcus Brinkmann <marcus@g10code.de>

* gpgme.texi (Creating a Signature): Fix function name. Reported by Wichert Ackerman <wichert@debian.org>.

2002-03-29 Marcus Brinkmann <marcus@g10code.de>

* gpgme.texi (direntry): End index entry with a full stop.
Patch submitted by Jose Carlos Garcia Sogo <jsogo@debian.org>.

2002-03-17 Marcus Brinkmann <marcus@g10code.de>

* gpgme.texi (Detailed Results): Fix syntax error in last change.

2002-03-08 Werner Koch <wk@gnupg.org>

* gpgme.texi (Detailed Results): Import does also return info.

2002-03-06 Marcus Brinkmann <marcus@g10code.de>

* gpgme.texi (Encrypting a Plaintext): Document symmetric encryption.

2002-03-06 Marcus Brinkmann <marcus@g10code.de>

* gpgme.texi (Error Strings): Add example.

* gpgme.texi (Listing Keys): Likewise.

2002-03-03 Marcus Brinkmann <marcus@g10code.de>

*

gpgme.texi (Information About Keys): Document GPGME_ATTR_EXPIRE.

2002-03-03 Marcus Brinkmann <marcus@g10code.de>

* gpgme.texi (Verify): Document verification of normal and cleartext signatures.

2002-02-27 Marcus Brinkmann <marcus@g10code.de>

* gpgme.texi (Listing Keys): Document gpgme_op_keylist_ext_start.

2002-02-27 Marcus Brinkmann <marcus@g10code.de>

* gpgme.texi (Encrypting a Plaintext): Document GPGME_Invalid_Recipients.
(Error Values): Likewise.

2002-02-26 Marcus Brinkmann <marcus@g10code.de>

* gpgme.texi (Encrypting a Plaintext): Document gpgme_op_encrypt_sign and gpgme_op_encrypt_sign_start.

2002-02-25 Marcus Brinkmann <marcus@g10code.de>

* gpgme.texi (Creating a Signature): Add a note about certificates to include.
(Included Certificates): New section.

2002-02-09 Marcus Brinkmann <marcus@g10code.de>

* gpgme.texi (Detailed Results): Remove literal tags.
(Generating Keys): Update documentation.

* gpgme.texi (Generating Keys):
Fix syntax error.

2002-02-06 Marcus Brinkmann <marcus@g10code.de>

* gpgme.texi (Waiting For Completion): Adjust doc to changes in the code.

2002-02-06 Marcus Brinkmann <marcus@g10code.de>

* gpgme.texi (Key Listing Mode): Update documentation.

2002-01-31 Marcus Brinkmann <marcus@g10code.de>

* gpgme.texi (Generating Keys): Document error at creation failure.

2002-01-30 Marcus Brinkmann <marcus@g10code.de>

* gpgme.texi (Deleting Keys): Document new error values.

2002-01-30 Marcus Brinkmann <marcus@g10code.de>

* gpgme.texi (Importing Keys): Add reference to gpgme_get_op_info.

2002-01-30 Marcus Brinkmann <marcus@g10code.de>

* gpgme.texi: Some spell checking.

2002-01-30 Marcus Brinkmann <marcus@g10code.de>

* gpgme.texi: Add all the gpgme_op_*_start functions.
Fill the concept index with many, many entries.

2002-01-29 Marcus Brinkmann <marcus@g10code.de>

* gpgme.texi (Run Control): New section.
(Verify): Document gpgme_get_notation.
(More Information):
New section describing gpgme_get_op_info.

2002-01-22 Marcus Brinkmann <marcus@g10code.de>

* gpgme.texi (Passphrase callback): Change GpgmePassphraseCb's
R_HD type from void* to void**.

2002-01-22 Marcus Brinkmann <marcus@g10code.de>

* gpgme.texi (Creating data buffers): Change
gpgme_data_new_from_filepart's LENGTH type from off_t to size_t.

2002-01-22 Marcus Brinkmann <marcus@g10code.de>

* gpgme.texi (Generating keys): New subsection.
(Exporting keys): Likewise.
(Importing keys): Likewise.
(Deleting keys): Likewise.

2002-01-16 Marcus Brinkmann <marcus@g10code.de>

* gpgme.texi: g10Code -> g10 Code

* gpgme.texi (Top): Complete detailmenu.

* gpgme.texi: Convert embarrassing cruft to the real thing.

2002-01-16 Marcus Brinkmann <marcus@g10code.de>

* ChangeLog: New file.

* gpgme.texi: Likewise.

* gpl.texi: Likewise.

* fdl.texi: Likewise.

* Makefile.am (info_TEXINFOS): New variable.

(gpgme_TEXINFOS): Likewise.

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\input texinfo @c -*- mode: texinfo; coding: utf-8; -*-

@documentencoding UTF-8

@setfilename gpgme.info

@include defs.inc

@settitle The 'GnuPG Made Easy' Reference Manual

@dircategory GNU Libraries

@direntry

* @acronym{GPGME}: (gpgme). Adding support for cryptography to your program.

@end direntry

@c Unify some of the indices.

@syncodeindex tp fn

@syncodeindex pg fn

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General Public License for more details.

@end copying

@c Macros used by the description of the UI server protocol

@macro clnt{string}

@sc{c:} \string\

@end macro

@macro srvr{string}

@sc{s:} \string\

@end macro

@c API version.

@macro since{string}

@sc{Since:} \string\

@end macro

@c

@c T I T L E P A G E

@c

@ifinfo

This file documents the @acronym{GPGME} library.

This is Edition @value{EDITION}, last updated @value{UPDATED}, of @cite{The `GnuPG Made Easy' Reference Manual}, for Version @value{VERSION}.

@c NOTE: Don't forget to update the year for the TeX version, too.

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@end ifinfo

@c We do not want that bastard short titlepage.

@c @iftex

@c @shorttitlepage The `GnuPG Made Easy' Reference Manual

@c @end iftex

@titlepage

@center @titlefont{The `GnuPG Made Easy'}

@sp 1

@center @titlefont{Reference Manual}
 @sp 6
 @center Edition @value{EDITION}
 @sp 1
 @center last updated @value{UPDATED}
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 @center for version @value{VERSION}
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 Published
 by The GnuPG Project@* c/o g10 Code GmbH@* Httenstr. 61@* 40699 Erkrath, Germany

@insertcopying
 @end titlepage
 @page

@summarycontents
 @contents

@ifnottex
 @node Top
 @top Main Menu
 This is Edition @value{EDITION}, last updated @value{UPDATED}, of
 @cite{The `GnuPG Made Easy' Reference Manual}, for Version
 @value{VERSION} of the @acronym{GPGME} library.
 @end ifnottex

@menu
 * Introduction:: How to use this manual.
 * Preparation:: What you should do before using the library.
 * Protocols and Engines:: Supported crypto protocols.
 * Algorithms:: Supported algorithms.
 * Error Handling:: Error numbers and their meanings.
 * Exchanging Data:: Passing data to and from @acronym{GPGME}.
 * Contexts:: Handling @acronym{GPGME} contexts.

Appendices

* UI Server Protocol:: The GnuPG UI Server Protocol.
 * Debugging:: How to solve problems.
 * Deprecated
 Functions:: Documentation of deprecated functions.
 * Library Copying:: The GNU Lesser General Public License says
 how you can copy and share `GnuPG Made Easy'.
 * Copying:: The GNU General Public License says how you
 can copy and share this manual.

Indices

- * Concept Index:: Index of concepts and programs.
- * Function and Data Index:: Index of functions, variables and data types.

@detailmenu

--- The Detailed Node Listing ---

Introduction

- * Getting Started:: Purpose of the manual, and how to use it.
- * Features:: Reasons to install and use @acronym{GPGME}.
- * Overview:: Basic architecture of the @acronym{GPGME} library.

Preparation

- * Header:: What header file you need to include.
- * Building the Source:: Compiler options to be used.
- * Largefile Support (LFS)::
How to use @acronym{GPGME} with LFS.
- * Using Automake:: Compiler options to be used the easy way.
- * Using Libtool:: Avoiding compiler options entirely.
- * Library Version Check:: Getting and verifying the library version.
- * Signal Handling:: How @acronym{GPGME} affects signal handling.
- * Multi-Threading:: How @acronym{GPGME} can be used in an MT environment.

Protocols and Engines

- * Engine Version Check:: Verifying the engine version.
- * Engine Information:: Obtaining more information about the engines.
- * Engine Configuration:: Changing the engine configuration.
- * OpenPGP:: Support for the OpenPGP protocol.
- * Cryptographic Message Syntax:: Support for the CMS.

Algorithms

- * Public Key Algorithms:: A list of all public key algorithms.
- * Hash Algorithms:: A list of all hash algorithms.

Error Handling

- * Error Values:: The error value and what it means.
- * Error Codes:: A list of important error codes.
- * Error Sources:: A list of important error sources.
- * Error Strings:: How to get a descriptive string from a value.

Exchanging Data

- * Creating Data Buffers:: Creating new data buffers.
- * Destroying Data Buffers:: Releasing data buffers.
- * Manipulating Data Buffers:: Operations on data buffers.

Creating Data Buffers

- * Memory Based Data Buffers:: Creating memory based data buffers.
- * File Based Data Buffers:: Creating file based data buffers.
- * Callback Based Data Buffers:: Creating callback based data buffers.

Manipulating Data Buffers

- * Data Buffer I/O Operations:: I/O operations on data buffers.
- * Data Buffer Meta-Data:: Meta-data manipulation of data buffers.
- * Data Buffer Convenience:: Convenience function for data buffers.

Contexts

- * Creating Contexts:: Creating new @acronym{GPGME} contexts.
- *
- Destroying Contexts:: Releasing @acronym{GPGME} contexts.
- * Result Management:: Managing the result of crypto operations.
- * Context Attributes:: Setting properties of a context.
- * Key Management:: Managing keys with @acronym{GPGME}.
- * Trust Item Management:: Managing trust items with @acronym{GPGME}.
- * Crypto Operations:: Using a context for cryptography.
- * Miscellaneous:: Miscellaneous operations.
- * Run Control:: Controlling how operations are run.

Context Attributes

- * Protocol Selection:: Selecting the protocol used by a context.
- * Crypto Engine:: Configuring the crypto engine.
- * Setting the Sender:: How to tell the engine the sender.
- * ASCII Armor:: Requesting @acronym{ASCII} armored output.
- * Text Mode:: Choosing canonical text mode.
- * Offline Mode:: Choosing offline mode.
- * Included Certificates::
Including a number of certificates.
- * Key Listing Mode:: Selecting key listing mode.
- * Passphrase Callback:: Getting the passphrase from the user.
- * Progress Meter Callback:: Being informed about the progress.
- * Status Message Callback:: Status messages received from gpg.
- * Locale:: Setting the locale of a context.

Key Management

- * Key objects:: Description of the key structures.
- * Listing Keys:: Browsing the list of available keys.
- * Information About Keys:: Requesting detailed information about keys.
- * Manipulating Keys:: Operations on keys.
- * Generating Keys:: Creating new key pairs.
- * Signing Keys:: Adding key signatures to public keys.
- * Exporting Keys:: Retrieving key data from the key ring.
- * Importing Keys:: Adding keys to the key ring.
- * Deleting Keys:: Removing keys from the key ring.
- * Changing Passphrases:: Change the passphrase of a key.
- * Changing TOFU Data:: Changing data pertaining to TOFU.
- * Advanced Key Editing:: Advanced key edit operation.

Trust Item Management

- * Listing Trust Items:: Browsing the list of available trust items.
- * Manipulating Trust Items:: Operations on trust items.

Crypto Operations

- * Decrypt:: Decrypting a ciphertext.
- * Verify:: Verifying a signature.
- * Decrypt and Verify:: Decrypting a signed ciphertext.
- * Sign:: Creating a signature.
- * Encrypt:: Encrypting a plaintext.

Sign

- * Selecting Signers:: How to choose the keys to sign with.
- * Creating a Signature:: How to create a signature.
- * Signature Notation Data:: How to add notation data to a signature.

Encrypt

- * Encrypting a Plaintext:: How to encrypt a plaintext.

Miscellaneous

- * Running other Programs:: Running other Programs.
- * Using the Assuan protocol:: Using the Assuan protocol.
- * Checking for updates:: How to check for software updates.

Run Control

- * Waiting For Completion:: Waiting until an operation is completed.
- * Using External Event Loops:: Advanced control over what happens when.

* Cancellation:: How to end pending operations prematurely.

Using External Event Loops

- * I/O Callback Interface:: How I/O callbacks are registered.
- * Registering I/O Callbacks:: How to use I/O callbacks for a context.
- * I/O Callback Example:: An example how to use I/O callbacks.
- * I/O Callback Example GTK+:: How to integrate @acronym{GPGME} in GTK+.
- * I/O Callback Example GDK:: How to integrate @acronym{GPGME} in GDK.
- * I/O Callback Example Qt:: How to integrate @acronym{GPGME} in Qt.

@end detailmenu

@end menu

@node Introduction

@chapter Introduction

'GnuPG Made Easy' (@acronym{GPGME}) is a C language library that allows to add support for cryptography to a program. It is designed to make access to public key crypto engines like GnuPG or GpgSM easier for applications. @acronym{GPGME} provides a high-level crypto API for encryption, decryption, signing, signature verification and key management.

@acronym{GPGME} uses GnuPG and GpgSM as its backends to support OpenPGP and the Cryptographic Message Syntax (CMS).

@menu

- * Getting Started:: Purpose of the manual, and how to use it.
- * Features:: Reasons to install and use @acronym{GPGME}.
- * Overview:: Basic architecture of the @acronym{GPGME} library.

@end menu

@node Getting Started

@section Getting Started

This manual documents the @acronym{GPGME} library programming interface. All functions and data types provided by the library are explained.

The reader is assumed to possess basic knowledge about cryptography in general, and public key cryptography in particular.

The underlying cryptographic engines that are used by the library are not explained, but where necessary, special features or requirements by an engine are mentioned as far as they are relevant to @acronym{GPGME} or its users.

This manual can be used in several ways. If read from the beginning to the end, it gives a good introduction into the library and how it can be used in an application. Forward references are included where necessary. Later on, the manual can be used as a reference manual to get just the information needed about any particular interface of the library. Experienced programmers might want to start looking at the examples at the end of the manual, and then only read up those parts of the interface which are unclear.

The documentation for the language bindings is currently not included in this manual. Those languages bindings follow the general programming model of `@acronym{GPGME}` but may provide some extra high level abstraction on top of the `@acronym{GPGME}` style API. For now please see the README files in the `@file{lang/}` directory of the source distribution.

`@node` Features

`@section` Features

`@acronym{GPGME}` has a couple of advantages over other libraries doing a similar job, and over implementing support for GnuPG or other crypto engines into your application directly.

`@table @asis`

`@item` it's free software

Anybody can use, modify, and redistribute it under the terms of the GNU Lesser General Public License (`@pxref{Library Copying}`).

`@item` it's flexible

`@acronym{GPGME}` provides transparent support for several cryptographic protocols by different engines. Currently, `@acronym{GPGME}` supports the OpenPGP protocol using GnuPG as the backend, and the Cryptographic Message Syntax using GpgSM as the backend.

`@item` it's easy

`@acronym{GPGME}` hides the differences between the protocols and engines from the programmer behind an easy-to-use interface. This way the programmer can focus on the other parts of the program, and still integrate

strong cryptography in his application. Once support for `@acronym{GPGME}` has been added to a program, it is easy to add support for other crypto protocols once `@acronym{GPGME}` backends provide them.

`@item` it's language friendly

`@acronym{GPGME}` comes with languages bindings for several common

programming languages: Common Lisp, C++, Python 2, and Python 3.

@end table

@node Overview

@section Overview

@acronym{GPGME} provides a data abstraction that is used to pass data to the crypto engine, and receive returned data from it. Data can be read from memory or from files, but it can also be provided by a callback function.

The actual cryptographic operations are always set within a context. A context provides configuration parameters that define the behaviour of all operations performed within it. Only one operation per context is allowed at any time, but when one operation is finished, you can run the next operation in the same context. There can be more than one context, and all can run different operations at the same time.

Furthermore, @acronym{GPGME} has rich key management facilities including listing keys, querying their attributes, generating, importing, exporting and deleting keys, and acquiring information about the trust path.

With some precautions, @acronym{GPGME} can be used in a multi-threaded environment, although it is not completely thread safe and thus needs the support of the application.

@node Preparation

@chapter Preparation

To use @acronym{GPGME}, you have to perform some changes to your sources and the build system. The necessary changes are small and explained in the following sections. At the end of this chapter, it is described how the library is initialized, and how the requirements of the library are verified.

@menu

- * Header:: What header file you need to include.
- * Building the Source:: Compiler options to be used.
- * Largefile Support (LFS):: How to use @acronym{GPGME} with LFS.
- * Using
 - Automake:: Compiler options to be used the easy way.
- * Using Libtool:: Avoiding compiler options entirely.
- * Library Version Check:: Getting and verifying the library version.
- * Signal Handling:: How @acronym{GPGME} affects signal handling.
- * Multi-Threading:: How @acronym{GPGME} can be used in an MT environment.

@end menu

@node Header

@section Header

@cindex header file

@cindex include file

All interfaces (data types and functions) of the library are defined in the header file ``gpgme.h'`. You must include this in all programs using the library, either directly or through some other header file, like this:

@example

```
#include <gpgme.h>
```

@end example

The name space of @acronym{GPGME} is @code{gpgme_*} for function names and data types and @code{GPGME_*} for other symbols. Symbols internal to @acronym{GPGME} take the form @code{_gpgme_*} and @code{_GPGME_*}.

Because @acronym{GPGME} makes use of the GPG Error library, using

@acronym{GPGME} will also use the @code{GPG_ERR_*} name space directly, and the @code{gpg_err*}, @code{gpg_str*}, and @code{gpgmt_*} name space indirectly.

@node Building the Source

@section Building the Source

@cindex compiler options

@cindex compiler flags

If you want to compile a source file including the ``gpgme.h'` header file, you must make sure that the compiler can find it in the directory hierarchy. This is accomplished by adding the path to the directory in which the header file is located to the compilers include file search path (via the @option{-I} option).

However, the path to the include file is determined at the time the source is configured. To solve this problem, gpgme ships with a small helper program @command{gpgme-config} that knows about the path to the include file and other configuration options. The options that need to be added to the compiler invocation at compile time are output by the @option{--cflags} option to @command{gpgme-config}. The following example

shows how it can be used at the command line:


```
@example
gcc -c foo.c `gpgme-config --cflags`
@end example
```

Adding the output of `@samp{gpgme-config --cflags}` to the compiler command line will ensure that the compiler can find the `@acronym{GPGME}` header file.

A similar problem occurs when linking the program with the library. Again, the compiler has to find the library files. For this to work, the path to the library files has to be added to the library search path (via the `@option{-L}` option). For this, the option `@option{--libs}` to `@command{gpgme-config}` can be used. For convenience, this option also outputs all other options that are required to link the program with `@acronym{GPGME}` (in particular, the `@samp{-lgpgme}` option). The example shows how to link `@file{foo.o}` with the `@acronym{GPGME}` library to a program `@command{foo}`.

```
@example
gcc -o foo foo.o `gpgme-config --libs`
@end example
```

Of course you can also combine both examples to a single command by specifying both options to `@command{gpgme-config}`:

```
@example
gcc -o foo foo.c `gpgme-config --cflags --libs`
@end example
```

If you need to detect the installed language bindings you can use `list` them using:

```
@example
gpgme-config --print-lang
@end example
```

or test for the availability using

```
@example
gpgme-config --have-lang=python && echo 'Bindings for Pythons available'
@end example
```

```
@node Largefile Support (LFS)
@section Largefile Support (LFS)
@cindex largefile support
@cindex LFS
```

`@acronym{GPGME}` is compiled with largefile support by default, if it is available on the system. This means that GPGME supports files larger than two gigabyte in size, if the underlying operating system can. On some systems, largefile support is already the default. On such systems, nothing special is required. However, some systems provide only support for files up to two gigabyte in size by default. Support for larger file sizes has to be specifically enabled.

To make a difficult situation even more complex, such systems provide two different types of largefile support. You can either get all relevant functions replaced with alternatives that are largefile capable, or you can get new functions and data types for largefile support added. Those new functions have the same name as their smallfile counterparts, but with a suffix of 64.

An example: The data type `@code{off_t}` is 32 bit wide on GNU/Linux PC systems. To address offsets in large files, you can either enable largefile support add-on. Then a new data type `@code{off64_t}` is provided, which is 64 bit wide. Or you can replace the existing `@code{off_t}` data type with its 64 bit wide counterpart. All occurrences of `@code{off_t}` are then automagically replaced.

As if matters were not complex enough, there are also two different types of file descriptors in such systems. This is important because if file descriptors are exchanged between programs that use a different maximum file size, certain errors must be produced on some file descriptors to prevent subtle overflow bugs from occurring.

As you can see, supporting two different maximum file sizes at the same time is not at all an easy task. However, the maximum file size does matter for `@acronym{GPGME}`, because some data types it uses in its interfaces are affected by that. For example, the `@code{off_t}` data type is used in the `@code{gpgme_data_seek}` function, to match its `@acronym{POSIX}` counterpart. This affects the call-frame of the function, and thus the ABI of the library. Furthermore, file descriptors can be exchanged between GPGME and the application.

For you as the user of the library, this means that your program must be compiled in the same file size mode as the library. Luckily, there is absolutely no valid reason for new programs to not enable largefile support by default and just use that. The compatibility modes (small file sizes or dual mode) can be considered an historic artefact, only useful to allow for a transitional period.

On POSIX

platforms `@acronym{GPGME}` is compiled using largefile support by default. This means that your application must do the same, at least as far as it is relevant for using the `@file{gpgme.h}` header file. All types in this header files refer to their largefile counterparts, if they are different from any default types on the system.

On 32 and 64 bit Windows platforms `@code{off_t}` is declared as 32 bit signed integer. There is no specific support for LFS in the C library. The recommendation from Microsoft is to use the native interface (`@code{CreateFile}` et al.) for large files. Released binary versions of `@acronym{GPGME}` (`libgpgme-11.dll`) have always been build with a 32 bit `@code{off_t}`. To avoid an ABI break we stick to this convention for 32 bit Windows by using `@code{long}` there. `@acronym{GPGME}` versions for 64 bit Windows have never been released and thus we are able to use `@code{int64_t}` instead of `@code{off_t}` there. For easier migration the typedef `@code{gpgme_off_t}` has been defined. The reason we cannot use `@code{off_t}` directly is that some toolchains (e.g. mingw64) introduce a POSIX compatible hack for `@code{off_t}`. Some widely used toolkits make use of this hack and in turn `@acronym{GPGME}` would need to use it also. However, this would introduce an ABI break and existing software making use of `libgpgme` might suffer from a severe break. Thus with version 1.4.2 we redefined all functions using `@code{off_t}` to use `@code{gpgme_off_t}` which is defined as explained above. This way we keep the ABI well defined and independent of any toolchain hacks. The bottom line is that LFS support in `@acronym{GPGME}` is only available on 64 bit versions of Windows.

On POSIX platforms you can enable largefile support, if it is different from the default on the system the application is compiled on, by using the Autoconf macro `@code{AC_SYS_LARGEFILE}`. If you do this, then you don't need to worry about anything else: It will just work. In this case you might also want to use `@code{AC_FUNC_FSEEKO}` to take advantage of some new interfaces, and `@code{AC_TYPE_OFF_T}` (just in case).

If you do not use Autoconf, you can define the preprocessor symbol `@code{_FILE_OFFSET_BITS}` to 64 *@emph{before}* including any header files, for example by specifying the option `@code{-D_FILE_OFFSET_BITS=64}` on the compiler command line. You will also want to define the preprocessor symbol `@code{LARGEFILE_SOURCE}` to 1 in this case, to take advantage of some new interfaces.

If you do not want to do either of the above, you probably know enough about the issue to invent your own solution. Just keep in mind that

the `@acronym{GPGME}` header file expects that largefile support is enabled, if it is available. In particular, we do not support dual mode (`@code{_LARGEFILE64_SOURCE}`).

```
@node Using Automake
@section Using Automake
@cindex automake
@cindex autoconf
```

It is much easier if you use GNU Automake instead of writing your own Makefiles. If you do that you do not have to worry about finding and invoking the `@command{gpgme-config}` script at all. `@acronym{GPGME}` provides an extension to Automake that does all the work for you.

```
@c A simple macro for optional variables.
@macro ovar{varname}
@r{[]@var{\varname\}@r{[]}
@end macro
@defmac AM_PATH_GPGME (@ovar{minimum-version}, @ovar{action-if-found}, @ovar{action-if-not-found})
@defmacx AM_PATH_GPGME_PTH (@ovar{minimum-version}, @ovar{action-if-found}, @ovar{action-if-not-found})
@defmacx AM_PATH_GPGME_PTHREAD (@ovar{minimum-version}, @ovar{action-if-found}, @ovar{action-if-not-found})
Check whether @acronym{GPGME} (at least version @var{minimum-version}, if given) exists on the host system. If it is found, execute @var{action-if-found}, otherwise do @var{action-if-not-found}, if given.
```

Additionally, the function defines `@code{GPGME_CFLAGS}` to the flags needed for compilation of the program to find the `@file{gpgme.h}` header file, and `@code{GPGME_LIBS}` to the linker flags needed to link the program to the `@acronym{GPGME}` library. If the used helper script does not match the target type you are building for a warning is printed and the string `@code{libgcrypt}` is appended to the variable `@code{gpg_config_script_warn}`.

`@code{AM_PATH_GPGME_PTH}` checks for the version of `@acronym{GPGME}` that can be used with GNU Pth, and defines `@code{GPGME_PTH_CFLAGS}` and `@code{GPGME_PTH_LIBS}`.

`@code{AM_PATH_GPGME_PTHREAD}` checks for the version of `@acronym{GPGME}` that can be used with the native pthread implementation, and defines `@code{GPGME_PTHREAD_CFLAGS}` and `@code{GPGME_PTHREAD_LIBS}`. Since version 1.8.0 this is no longer required to `GPGME_PTHREAD` as `@acronym{GPGME}` itself is thread safe.

This macro searches for `@command{gpgme-config}` along the PATH. If you are cross-compiling, it is useful to set the environment variable `@code{SYSROOT}` to the top directory of your target. The macro will then first look for the helper program in the `@file{bin}` directory below that top directory. An absolute directory name must be used for `@code{SYSROOT}`. Finally, if the configure command line option `@code{--with-gpgme-prefix}` is used, only its value is used for the top directory below which the helper script is expected.

`@end defmac`

You can use the defined Autoconf variables like this in your `@file{Makefile.am}`:

```
@example
AM_CPPFLAGS = $(GPGME_CFLAGS)
LDADD = $(GPGME_LIBS)
@end example
```

```
@node Using Libtool
@section Using Libtool
@cindex libtool
```

The easiest way is to just use GNU Libtool. If you use libtool, and link to `@code{libgpgme.la}`, `@code{libgpgme-pth.la}` or `@code{libgpgme-pthread.la}` respectively, everything will be done automatically by Libtool.

```
@node Library Version Check
@section Library Version Check
@cindex version check, of the library
```

```
@deftypefun {const char *} gpgme_check_version (@w{const char *}@var{required_version})
```

The function `@code{gpgme_check_version}` has four purposes. It can be used to retrieve the version number of the library. In addition it can verify

that the version number is higher than a certain required version number. In either case, the function initializes some sub-systems, and for this reason alone it must be invoked early in your program, before you make use of the other functions in `@acronym{GPGME}`. The last purpose is to run selftests.

As a side effect for W32 based systems, the socket layer will get initialized.

If `@var{required_version}` is `@code{NULL}`, the function returns a pointer to a statically allocated string containing the version number of the library.

If `@var{required_version}` is not `@code{NULL}`, it should point to a string containing a version number, and the function checks that the version of the library is at least as high as the version number provided. In this case, the function returns a pointer to a statically allocated string containing the version number of the library. If `@var{REQUIRED_VERSION}` is not a valid version number, or if the version requirement is not met, the function returns `@code{NULL}`.

If you use a version of a library that is backwards compatible with older releases, but contains additional interfaces which your program uses, this function provides a run-time check if the necessary features are provided by the installed version of the library.

If a selftest fails, the function may still succeed. Selftest errors are returned later when invoking `@code{gpgme_new}` or `@code{gpgme-data_new}`, so that a detailed error code can be returned (historically, `@code{gpgme_check_version}` does not return a detailed error code).

`@end deftypefun`

```
@deftypefun {int} gpgme_set_global_flag @
  (@w{const char *@var{name}}, @
  @w{const char *@var{value}})
```

`@since{1.4.0}`

On some systems it is not easy to set environment variables and thus hard to use `@acronym{GPGME}`'s internal trace facility for debugging. This function has been introduced as an alternative way to enable debugging and for a couple of other rarely used tweaks. It is important to assure that only one thread accesses `@acronym{GPGME}` functions between a call to this function and after the return from the call to `@code{gpgme_check_version}`.

All currently supported features require that this function is called as early as possible --- even before `@code{gpgme_check_version}`. The features are identified by the following values for `@var{name}`:

@table @code

@item debug

To enable debugging use the string ``debug" for @var{name} and @var{value} identical to the value used with the environment variable @code{GPGME_DEBUG}.

@item disable-gpgconf

Using this feature with any @var{value} disables the detection of the gpgconf program and thus forces GPGME to fallback into the simple OpenPGP only mode. It may be used to force the use of GnuPG-1 on systems which have both GPG versions installed. Note that in general the use of @code{gpgme_set_engine_info} is a better way to select a specific engine version.

@item gpgconf-name

@itemx gpg-name

Set the name of the gpgconf respective

gpg binary. The defaults are

@code{GNU/GnuPG/gpgconf} and @code{GNU/GnuPG/gpg}. Under Unix the leading directory part is ignored. Under Windows the leading directory part is used as the default installation directory; the @code{.exe} suffix is added by GPGME. Use forward slashed even under Windows.

@item require-gnupg

Set the minimum version of the required GnuPG engine. If that version is not met, GPGME fails early instead of trying to use the existent version. The given version must be a string with major, minor, and micro number. Example: "2.1.0".

@item w32-inst-dir

On Windows GPGME needs to know its installation directory to find its spawn helper. This is in general no problem because a DLL has this information. Some applications however link statically to GPGME and thus GPGME can only figure out the installation directory of this application which may be wrong in certain cases. By supplying an installation directory as value to this flag, GPGME will assume that that

directory is the installation directory. This flag has no effect on non-Windows platforms.

@end table

This function returns @code{0} on success. In contrast to other functions the non-zero return value on failure does not convey any error code. For setting ``debug" the only possible error cause is an out of memory condition; which would exhibit itself later anyway. Thus the return value may be ignored.

@end deftypefun

After initializing @acronym{GPGME}, you should set the locale information to the locale required for your output terminal. This locale information is needed for example for the curses and Gtk pinentry. Here is an example of a complete initialization:

```
@example
#include <locale.h>
#include <gpgme.h>

void
init_gpgme (void)
@{
  /* Initialize the locale environment. */
  setlocale (LC_ALL, "");
  gpgme_check_version (NULL);
  gpgme_set_locale (NULL, LC_CTYPE, setlocale (LC_CTYPE, NULL));
#ifdef LC_MESSAGES
  gpgme_set_locale (NULL, LC_MESSAGES, setlocale (LC_MESSAGES,
    NULL));
#endif
@}
@end example
```

Note that you are highly recommended to initialize the locale settings like this. @acronym{GPGME} can not do this for you because it would not be thread safe. The conditional on LC_MESSAGES is only necessary for portability to W32 systems.

```
@node Signal Handling
@section Signal Handling
@cindex signals
@cindex signal handling
```

The @acronym{GPGME} library communicates with child processes (the crypto engines). If a child process dies unexpectedly, for example due to a bug, or system problem, a @code{SIGPIPE} signal will be delivered to the application. The default action is to abort the program. To protect against this, @code{gpgme_check_version} sets the @code{SIGPIPE} signal action to @code{SIG_IGN}, which means that the signal will be ignored.

@acronym{GPGME} will only do that if the signal action for @code{SIGPIPE} is @code{SIG_DEF} at the time @code{gpgme_check_version} is called. If it is something different,

`GPGME` will take no action.

This means that if your application does not install any signal handler for `SIGPIPE`, you don't need to take any precautions. If you do install a signal handler for `SIGPIPE`, you must be prepared to handle any `SIGPIPE` events that occur due to `GPGME` writing to a defunct pipe. Furthermore, if your application is multi-threaded, and you install a signal action for `SIGPIPE`, you must make sure you do this either before `gpgme_check_version` is called or afterwards.

`Multi-Threading`
`Multi-Threading`
`thread-safeness`
`multi-threading`

The `GPGME` library is mostly thread-safe, and can be used in a multi-threaded environment but there are some requirements for multi-threaded use:

`bullet`
`item`

The function `gpgme_check_version` must be called before any other function in the library, because it initializes the thread support subsystem in `GPGME`. To achieve this in multi-threaded programs, you must synchronize the memory with respect to other threads that also want to use `GPGME`. For this, it is sufficient to call `gpgme_check_version` before creating the other threads using `GPGME`.
At least this is true for POSIX threads, as `pthread_create` is a function that synchronizes memory with respects to other threads. There are many functions which have this property, a complete list can be found in POSIX, IEEE Std 1003.1-2003, Base Definitions, Issue 6, in the definition of the term ``Memory Synchronization''. For other thread packages other, more relaxed or more strict rules may apply.

`item`
Any `gpgme_data_t` and `gpgme_ctx_t` object must only be accessed by one thread at a time. If multiple threads want to deal with the same object, the caller has to make sure that operations on that object are fully synchronized.

`item`
Only one thread at any time is allowed to call `gpgme_wait`. If multiple threads call this

function, the caller must make sure that all invocations are fully synchronized. It is safe to start asynchronous operations while a thread is running in `gpgme_wait`.

@item

The function `gpgme_strerror` is not thread safe. You have to use `gpgme_strerror_r` instead.

@end itemize

@node Protocols and Engines

@chapter Protocols and Engines

@cindex protocol

@cindex engine

@cindex crypto engine

@cindex backend

@cindex crypto backend

`GPGME` supports several cryptographic protocols, however, it does not implement them. Rather it uses backends (also called engines) which implement the protocol. `GPGME` uses inter-process communication to pass data back and forth between the application and the backend, but the details of the communication protocol and invocation of the backend is completely hidden by the interface. All complexity is handled by `GPGME`. Where an exchange of information between the application and the backend is necessary, `GPGME` provides the necessary callback function hooks and further interfaces.

@defcp {Data type} {enum `gpgme_protocol_t`}

@tindex `gpgme_protocol_t`

The `gpgme_protocol_t` type specifies the set of possible protocol values that are supported by `GPGME`. The following protocols are supported:

@table @code

@item `GPGME_PROTOCOL_OpenPGP`

@itemx `GPGME_PROTOCOL_OPENPGP`

This specifies the OpenPGP protocol.

@item `GPGME_PROTOCOL_CMS`

This specifies the Cryptographic Message Syntax.

@item `GPGME_PROTOCOL_GPGCONF`

Under development. Please ask on gnupg-devel@gnupg.org for help.

@item `GPGME_PROTOCOL_ASSUAN`

@since{1.2.0}

This specifies the raw Assuan protocol.

@item GPGME_PROTOCOL_G13

@since{1.3.0}

Under development. Please ask on @email{gnupg-devel@@gnupg.org} for help.

@item GPGME_PROTOCOL_UISERVER

Under development. Please ask on @email{gnupg-devel@@gnupg.org} for help.

@item GPGME_PROTOCOL_SPAWN

@since{1.5.0}

Special protocol for use with @code{gpgme_op_spawn}.

@item

GPGME_PROTOCOL_UNKNOWN

Reserved for future extension. You may use this to indicate that the used protocol is not known to the application. Currently, @acronym{GPGME} does not accept this value in any operation, though, except for @code{gpgme_get_protocol_name}.

@end table

@end deftp

@deftypefun {const char *} gpgme_get_protocol_name (@w{gpgme_protocol_t} @var{protocol})

The function @code{gpgme_get_protocol_name} returns a statically allocated string describing the protocol @var{protocol}, or @code{NULL} if the protocol number is not valid.

@end deftypefun

@menu

- * Engine Version Check:: Verifying the engine version.
- * Engine Information:: Obtaining more information about the engines.
- * Engine Configuration:: Changing the engine configuration.
- * OpenPGP:: Support for the OpenPGP protocol.
- * Cryptographic Message Syntax:: Support for the CMS.
- * Assuan:: Support for the raw Assuan protocol.

@end menu

@node

Engine Version Check

@section Engine Version Check

@cindex version check, of the engines

```
@deftypefun @w{const char *} gpgme_get_dirinfo (@w{cons char *}@var{what})  
@since{1.5.0}
```

The function `gpgme_get_dirinfo` returns a statically allocated string with the value associated to `@var{what}`. The returned values are the defaults and won't change even after `gpgme_set_engine_info` has been used to configure a different engine. `NULL` is returned if no value is available. Commonly supported values for `@var{what}` are:

`@table @code`

`@item homedir`

Return the default home directory.

`@item sysconfdir`

Return the name of the system configuration directory

`@item bindir`

Return the name of the directory with GnuPG program files.

`@item libdir`

Return the name of the directory with GnuPG related library files.

`@item libexecdir`

Return the name of the directory with GnuPG helper program files.

`@item datadir`

Return the name of the directory with GnuPG shared data.

`@item localedir`

Return

the name of the directory with GnuPG locale data.

`@item agent-socket`

Return the name of the socket to connect to the gpg-agent.

`@item agent-ssh-socket`

Return the name of the socket to connect to the ssh-agent component of gpg-agent.

`@item dirmngr-socket`

Return the name of the socket to connect to the dirmngr.

`@item uiserver-socket`

Return the name of the socket to connect to the user interface server.

`@item gpgconf-name`

Return the file name of the engine configuration tool.

@item gpg-name

Return the file name of the OpenPGP engine.

@item gpgsm-name

Return the file name of the CMS engine.

@item g13-name

Return the name of the file container encryption engine.

@item gpg-wks-client-name

Return the name of the Web Key Service tool.

@end table

@end deftypefun

@deftypefun gpgme_error_t gpgme_engine_check_version (@w{gpgme_protocol_t @var{protocol}})

The function @code{gpgme_engine_check_version} verifies that the engine implementing the protocol @var{PROTOCOL} is installed in the

expected path and meets the version requirement of @acronym{GPGME}.

This function returns the error code @code{GPG_ERR_NO_ERROR} if the engine is available and @code{GPG_ERR_INV_ENGINE} if it is not.

@end deftypefun

@node Engine Information

@section Engine Information

@cindex engine, information about

@deftp {Data type} {gpgme_engine_info_t}

@tindex gpgme_protocol_t

The @code{gpgme_engine_info_t} type specifies a pointer to a structure describing a crypto engine. The structure contains the following elements:

@table @code

@item gpgme_engine_info_t next

This is a pointer to the next engine info structure in the linked list, or @code{NULL} if this is the last element.

@item gpgme_protocol_t protocol

This is the protocol for which the crypto engine is used. You can convert this to a string with @code{gpgme_get_protocol_name} for printing.

@item const char *file_name

This is a string holding the file name of the executable of the crypto engine. Currently, it is never @code{NULL}, but using @code{NULL} is reserved for future use, so always check before you use it.

@item const char *home_dir

This is a string holding the directory name of the crypto engine's configuration directory. If it is @code{NULL}, then the default directory is used. See @code{gpgme_get_dirinfo} on how to get the default directory.

@item const char *version

This is a string containing the version number of the crypto engine. It might be @code{NULL} if the version number can not be determined, for example because the executable doesn't exist or is invalid.

@item const char *req_version

This is a string containing the minimum required version number of the crypto engine for @acronym{GPGME} to work correctly. This is the version number that @code{gpgme_engine_check_version} verifies against. Currently, it is never @code{NULL}, but using @code{NULL} is reserved for future use, so always check before you use it.

@end table

@end deftp

@deftypedefun gpgme_error_t gpgme_get_engine_info

(@w{gpgme_engine_info_t *}@var{info})

The function @code{gpgme_get_engine_info} returns a linked list of engine info structures in @var{info}. Each info structure describes the defaults of one configured backend.

The memory for the info structures is allocated the first time this function is invoked, and must not be freed by the caller.

This function returns the error code @code{GPG_ERR_NO_ERROR} if successful, and a system error if the memory could not be allocated.

@end deftypedefun

Here is an example how you can provide more diagnostics if you receive an error message which indicates that the crypto engine is invalid.

@example

gpgme_ctx_t ctx;

gpgme_error_t err;

[...]

```

if (gpgme_err_code (err) == GPG_ERR_INV_ENGINE)
@{
    gpgme_engine_info_t info;
    err = gpgme_get_engine_info (&info);
    if (!err)
    @{
        while (info && info->protocol != gpgme_get_protocol (ctx))
            info = info->next;
        if (!info)
            fprintf (stderr, "GPGME compiled without
support for protocol %s",
                    gpgme_get_protocol_name (info->protocol));
        else if (info->file_name && !info->version)
            fprintf (stderr, "Engine %s not installed properly",
                    info->file_name);
        else if (info->file_name && info->version && info->req_version)
            fprintf (stderr, "Engine %s version %s installed, "
                    "but at least version %s required", info->file_name,
                    info->version, info->req_version);
        else
            fprintf (stderr, "Unknown problem with engine for protocol %s",
                    gpgme_get_protocol_name (info->protocol));
    @}
@}
@end example

```

```

@node Engine Configuration
@section Engine Configuration
@cindex engine, configuration of
@cindex configuration of crypto backend

```

You can change the configuration of a backend engine, and thus change the executable program and configuration directory to be used. You can make these changes the default or set them for some contexts individually.

```

@deftypefun gpgme_error_t gpgme_set_engine_info (@w{gpgme_protocol_t @var{proto}}, @w{const char
*@var{file_name}}, @w{const char *@var{home_dir}})
@since{1.1.0}

```

The function `@code{gpgme_set_engine_info}` changes the default configuration of the crypto engine implementing the protocol `@var{proto}`.

`@var{file_name}` is the file name of the executable program

implementing this protocol, and `@var{home_dir}` is the directory name of the configuration directory for this crypto engine. If `@var{home_dir}` is `@code{NULL}`, the engine's default will be used.

The new defaults are not applied to already created GPGME contexts.

This function returns the error code `@code{GPG_ERR_NO_ERROR}` if successful, or an error code on failure.

`@end deftypefun`

The functions `@code{gpgme_ctx_get_engine_info}` and `@code{gpgme_ctx_set_engine_info}` can be used to change the engine configuration per context. `@xref{Crypto Engine}`.

`@node OpenPGP`

`@section OpenPGP`

`@cindex OpenPGP`

`@cindex GnuPG`

`@cindex`

protocol, GnuPG

`@cindex engine, GnuPG`

OpenPGP is implemented by GnuPG, the `@acronym{GNU}` Privacy Guard.

This is the first protocol that was supported by `@acronym{GPGME}`.

The OpenPGP protocol is specified by `@code{GPGME_PROTOCOL_OpenPGP}`.

`@node Cryptographic Message Syntax`

`@section Cryptographic Message Syntax`

`@cindex CMS`

`@cindex cryptographic message syntax`

`@cindex GpgSM`

`@cindex protocol, CMS`

`@cindex engine, GpgSM`

`@cindex S/MIME`

`@cindex protocol, S/MIME`

`@acronym{CMS}` is implemented by GpgSM, the S/MIME implementation for GnuPG.

The `@acronym{CMS}` protocol is specified by `@code{GPGME_PROTOCOL_CMS}`.

`@node Assuan`

`@section Assuan`

`@cindex ASSUAN`

@cindex protocol, ASSUAN

@cindex engine, ASSUAN

Assuan is the RPC library used by the various @acronym{GnuPG} components. The Assuan protocol allows one to talk to arbitrary Assuan servers using @acronym{GPGME}. @xref{Using the Assuan protocol}.

The ASSUAN protocol is specified by @code{GPGME_PROTOCOL_ASSUAN}.

@node Algorithms

@chapter

Algorithms

@cindex algorithms

The crypto backends support a variety of algorithms used in public key cryptography.@footnote{Some engines also provide symmetric only encryption; see the description of the encryption function on how to use this.} The following sections list the identifiers used to denote such an algorithm.

@menu

* Public Key Algorithms:: A list of all public key algorithms.

* Hash Algorithms:: A list of all hash algorithms.

@end menu

@node Public Key Algorithms

@section Public Key Algorithms

@cindex algorithms, public key

@cindex public key algorithms

Public key algorithms are used for encryption, decryption, signing and verification of signatures.

@deftp {Data type} {enum gpgme_pubkey_algo_t}

@tindex gpgme_pubkey_algo_t

The @code{gpgme_pubkey_algo_t} type specifies the set of all public key algorithms that are supported by @acronym{GPGME}. Possible values are:

@table @code

@item GPGME_PK_RSA

This value indicates the RSA (Rivest, Shamir, Adleman) algorithm.

@item GPGME_PK_RSA_E

Deprecated. This value indicates the RSA (Rivest, Shamir, Adleman) algorithm for encryption and decryption only.

@item GPGME_PK_RSA_S

Deprecated. This value indicates the RSA (Rivest, Shamir, Adleman) algorithm for signing and verification only.

@item GPGME_PK_DSA

This value indicates DSA, the Digital Signature Algorithm.

@item GPGME_PK_ELG

This value indicates ElGamal.

@item GPGME_PK_ELG_E

This value also indicates ElGamal and is used specifically in GnuPG.

@item GPGME_PK_ECC

@since{1.5.0}

This value is a generic indicator for elliptic curve algorithms.

@item GPGME_PK_ECDSA

@since{1.3.0}

This value indicates ECDSA, the Elliptic Curve Digital Signature Algorithm as defined by FIPS 186-2 and RFC-6637.

@item GPGME_PK_ECDH

@since{1.3.0}

This value indicates ECDH, the Elliptic Curve Diffie-Hellmann encryption algorithm as defined by RFC-6637.

@item GPGME_PK_EDDSA

@since{1.7.0}

This value indicates the EdDSA algorithm.

@end table

@end

deftp

@deftypefun {const char *} gpgme_pubkey_algo_name (@w{gpgme_pubkey_algo_t @var{algo}})

The function @code{gpgme_pubkey_algo_name} returns a pointer to a statically allocated string containing a description of the public key algorithm @var{algo}. This string can be used to output the name of the public key algorithm to the user.

If @var{algo} is not a valid public key algorithm, @code{NULL} is returned.

@end deftpfun

@deftpfun {char *} gpgme_pubkey_algo_string (@w{gpgme_subkey_t @var{key}})
@since{1.7.0}

The function @code{gpgme_pubkey_algo_string} is a convenience function to build and return an algorithm string in the same way GnuPG does (e.g. ``rsa2048" or ``ed25519"). The caller must free the result using @code{gpgme_free}. On error (e.g. invalid argument or memory exhausted), the function returns NULL and sets @code{ERRNO}.

@end deftpfun

@node Hash Algorithms

@section Hash Algorithms

@cindex algorithms, hash

@cindex algorithms, message digest

@cindex

hash algorithms

@cindex message digest algorithms

Hash (message digest) algorithms are used to compress a long message to make it suitable for public key cryptography.

@deftp {Data type} {enum gpgme_hash_algo_t}

@tindex gpgme_hash_algo_t

The @code{gpgme_hash_algo_t} type specifies the set of all hash algorithms that are supported by @acronym{GPGME}. Possible values are:

@table @code

@item GPGME_MD_MD5

@item GPGME_MD_SHA1

@item GPGME_MD_RMD160

@item GPGME_MD_MD2

@item GPGME_MD_TIGER

@item GPGME_MD_HAVAL

@item GPGME_MD_SHA256

@item GPGME_MD_SHA384

@item GPGME_MD_SHA512

@item GPGME_MD_SHA224

@since{1.5.0}

@item GPGME_MD_MD4

@item GPGME_MD_CRC32

@item GPGME_MD_CRC32_RFC1510

@item GPGME_MD_CRC24_RFC2440

@end table

@end deftp

@deftypefun {const char *} gpgme_hash_algo_name (@w{gpgme_hash_algo_t @var{algo}})

The function @code{gpgme_hash_algo_name} returns a pointer to a statically allocated string containing a description of the hash algorithm @var{algo}. This string can be used to output the name of the hash algorithm to the user.

If @var{algo} is not a valid hash algorithm, @code{NULL} is returned.

@end deftypefun

@node Error Handling

@chapter Error Handling

@cindex error handling

Many functions in @acronym{GPGME} can return an error if they fail. For this reason, the application should always catch the error condition and take appropriate measures, for example by releasing the resources and passing the error up to the caller, or by displaying a descriptive message to the user and cancelling the operation.

Some error values do not indicate a system error or an error in the operation, but the result of an operation that failed properly. For example, if you try to decrypt a tempered message, the decryption will fail. Another error value actually means that the end of a data buffer or list has been reached. The following descriptions explain for many error codes what they mean usually. Some error values have specific meanings if returned by a certain functions.

Such cases are described in the documentation of those functions.

@acronym{GPGME} uses the @code{libpgp-error} library. This allows to share the error codes with other components of the GnuPG system, and thus pass error values transparently from the crypto engine, or some helper application of the crypto engine, to the user. This way no information is lost. As a consequence, @acronym{GPGME} does not use its own identifiers for error codes, but uses those provided by @code{libpgp-error}. They usually start with @code{GPG_ERR_}.

However, @acronym{GPGME} does provide aliases for the functions defined in libpgp-error, which might be preferred for name space consistency.

@menu

* Error Values:: The error value and what it means.

* Error Sources:: A list of important error sources.
* Error Codes:: A list of important error codes.
* Error Strings:: How to get a descriptive string from a value.
@end menu

@node Error

Values

@section Error Values

@cindex error values

@cindex error codes

@cindex error sources

@deftp {Data type} {gpgme_err_code_t}

The @code{gpgme_err_code_t} type is an alias for the @code{libgpg-error} type @code{gpg_err_code_t}. The error code indicates the type of an error, or the reason why an operation failed.

A list of important error codes can be found in the next section.

@end deftp

@deftp {Data type} {gpgme_err_source_t}

The @code{gpgme_err_source_t} type is an alias for the @code{libgpg-error} type @code{gpg_err_source_t}. The error source has not a precisely defined meaning. Sometimes it is the place where the error happened, sometimes it is the place where an error was encoded into an error value. Usually the error source will give an indication to where to look for the problem. This is not always true, but it is attempted to achieve this goal.

A list of important error sources can be found in the next section.

@end deftp

@deftp {Data type} {gpgme_error_t}

The

@code{gpgme_error_t} type is an alias for the @code{libgpg-error} type @code{gpg_error_t}. An error value like this has always two components, an error code and an error source. Both together form the error value.

Thus, the error value can not be directly compared against an error code, but the accessor functions described below must be used. However, it is guaranteed that only 0 is used to indicate success (@code{GPG_ERR_NO_ERROR}), and that in this case all other parts of the error value are set to 0, too.

Note that in @acronym{GPGME}, the error source is used purely for diagnostical purposes. Only the error code should be checked to test

for a certain outcome of a function. The manual only documents the error code part of an error value. The error source is left unspecified and might be anything.

@end deftp

```
@deftypefun {static inline gpgme_err_code_t} gpgme_err_code (@w{gpgme_error_t @var{err}})
```

The static inline function @code{gpgme_err_code} returns the

@code{gpgme_err_code_t}

component of the error value @var{err}. This

function must be used to extract the error code from an error value in

order to compare it with the @code{GPG_ERR_*} error code macros.

@end deftypefun

```
@deftypefun {static inline gpgme_err_source_t} gpgme_err_source (@w{gpgme_error_t @var{err}})
```

The static inline function @code{gpgme_err_source} returns the

@code{gpgme_err_source_t} component of the error value @var{err}. This

function must be used to extract the error source from an error value in

order to compare it with the @code{GPG_ERR_SOURCE_*} error source macros.

@end deftypefun

```
@deftypefun {static inline gpgme_error_t} gpgme_err_make (@w{gpgme_err_source_t @var{source}},  
@w{gpgme_err_code_t @var{code}})
```

The static inline function @code{gpgme_err_make} returns the error

value consisting of the error source @var{source} and the error code

@var{code}.

This function can be used in callback functions to construct an error value to return it to the library.

@end deftypefun

@deftypefun

```
{static inline gpgme_error_t} gpgme_error (@w{gpgme_err_code_t @var{code}})
```

The static inline function @code{gpgme_error} returns the error value

consisting of the default error source and the error code @var{code}.

For @acronym{GPGME} applications, the default error source is

@code{GPG_ERR_SOURCE_USER_1}. You can define

@code{GPGME_ERR_SOURCE_DEFAULT} before including @file{gpgme.h} to change this default.

This function can be used in callback functions to construct an error value to return it to the library.

@end deftypefun

The @code{libgpg-error} library provides error codes for all system

error numbers it knows about. If @var{err} is an unknown error

number, the error code @code{GPG_ERR_UNKNOWN_ERRNO} is used. The

following functions can be used to construct error values from system

errno numbers.

```
@deftypefun {gpgme_error_t} gpgme_err_make_from_errno (@w{gpgme_err_source_t @var{source}}, @w{int @var{err}})
```

The function `gpgme_err_make_from_errno` is like

`gpgme_err_make`,

but it takes a system error like `errno`

instead of a `gpgme_err_code_t` error code.

```
@end deftypefun
```

```
@deftypefun {gpgme_error_t} gpgme_error_from_errno (@w{int @var{err}})
```

The function `gpgme_error_from_errno` is like `gpgme_error`,

but it takes a system error like `errno` instead of a

`gpgme_err_code_t` error code.

```
@end deftypefun
```

Sometimes you might want to map system error numbers to error codes directly, or map an error code representing a system error back to the system error number. The following functions can be used to do that.

```
@deftypefun {gpgme_err_code_t} gpgme_err_code_from_errno (@w{int @var{err}})
```

The function `gpgme_err_code_from_errno` returns the error code

for the system error `@var{err}`. If `@var{err}` is not a known system

error, the function returns `GPG_ERR_UNKNOWN_ERRNO`.

```
@end deftypefun
```

```
@deftypefun {int} gpgme_err_code_to_errno (@w{gpgme_err_code_t @var{err}})
```

The function `gpgme_err_code_to_errno`

returns the system error

for the error code `@var{err}`. If `@var{err}` is not an error code

representing a system error, or if this system error is not defined on

this system, the function returns `0`.

```
@end deftypefun
```

@node Error Sources

@section Error Sources

@cindex error codes, list of

The library `libgpg-error` defines an error source for every component of the GnuPG system. The error source part of an error value is not well defined. As such it is mainly useful to improve the diagnostic error message for the user.

If the error code part of an error value is `0`, the whole error value will be `0`. In this case the error source part is of course `GPG_ERR_SOURCE_UNKNOWN`.

The list of error sources that might occur in applications using @acronym{GPGME} is:

@table @code

@item GPG_ERR_SOURCE_UNKNOWN

The error source is not known. The value of this error source is @code{0}.

@item GPG_ERR_SOURCE_GPGME

The error source is @acronym{GPGME} itself. This is the default for errors that occur in the @acronym{GPGME} library.

@item GPG_ERR_SOURCE_GPG

The error source is GnuPG, which is the crypto engine used for the OpenPGP protocol.

@item GPG_ERR_SOURCE_GPGSM

The error source is GPGSM, which is the crypto engine used for the CMS protocol.

@item GPG_ERR_SOURCE_GCRYPT

The error source is @code{libgcrypt}, which is used by crypto engines to perform cryptographic operations.

@item GPG_ERR_SOURCE_GPGAGENT

The error source is @command{gpg-agent}, which is used by crypto engines to perform operations with the secret key.

@item GPG_ERR_SOURCE_PINENTRY

The error source is @command{pinentry}, which is used by @command{gpg-agent} to query the passphrase to unlock a secret key.

@item GPG_ERR_SOURCE_SCD

The error source is the SmartCard Daemon, which is used by @command{gpg-agent} to delegate operations with the secret key to a SmartCard.

@item GPG_ERR_SOURCE_KEYBOX

The error source is @code{libkbx}, a library used by the crypto engines to manage local keyrings.

@item GPG_ERR_SOURCE_USER_1

@item GPG_ERR_SOURCE_USER_2

@item GPG_ERR_SOURCE_USER_3

@item GPG_ERR_SOURCE_USER_4

These error sources are not used by any GnuPG component and can be

used by other software. For example, applications using `@acronym{GPGME}` can use them to mark error values coming from callback handlers. Thus `@code{GPG_ERR_SOURCE_USER_1}` is the default for errors created with `@code{gpgme_error}` and `@code{gpgme_error_from_erno}`, unless you define `@code{GPGME_ERR_SOURCE_DEFAULT}` before including `@file{gpgme.h}`.

@end table

@node Error Codes

@section Error Codes

@cindex error codes, list of

The library `@code{libgpg-error}` defines many error values. Most of them are not used by `@code{GPGME}` directly, but might be returned by `@acronym{GPGME}` because it received them from the crypto engine. The below list only includes such error codes that have a specific meaning in `@code{GPGME}`, or which are so common that you should know about them.

@table @code

@item GPG_ERR_EOF

This

value indicates the end of a list, buffer or file.

@item GPG_ERR_NO_ERROR

This value indicates success. The value of this error code is

`@code{0}`. Also, it is guaranteed that an error value made from the error code `@code{0}` will be `@code{0}` itself (as a whole). This means that the error source information is lost for this error code, however, as this error code indicates that no error occurred, this is generally not a problem.

@item GPG_ERR_GENERAL

This value means that something went wrong, but either there is not enough information about the problem to return a more useful error value, or there is no separate error value for this type of problem.

@item GPG_ERR_ENOMEM

This value means that an out-of-memory condition occurred.

@item GPG_ERR_E...

System errors are mapped to `GPG_ERR_FOO` where `FOO` is the symbol for the system error.

@item GPG_ERR_INV_VALUE

This value means that some user provided data was out of range. This can also refer to objects. For example,

if an empty

@code{gpgme_data_t} object was expected, but one containing data was provided, this error value is returned.

@item GPG_ERR_UNUSABLE_PUBKEY

This value means that some recipients for a message were invalid.

@item GPG_ERR_UNUSABLE_SECKEY

This value means that some signers were invalid.

@item GPG_ERR_NO_DATA

This value means that a @code{gpgme_data_t} object which was expected to have content was found empty.

@item GPG_ERR_CONFLICT

This value means that a conflict of some sort occurred.

@item GPG_ERR_NOT_IMPLEMENTED

This value indicates that the specific function (or operation) is not implemented. This error should never happen. It can only occur if you use certain values or configuration options which do not work, but for which we think that they should work at some later time.

@item GPG_ERR_DECRYPT_FAILED

This value indicates that a decryption operation was unsuccessful.

@item GPG_ERR_BAD_PASSPHRASE

This value means that the user did not provide a correct passphrase when requested.

@item GPG_ERR_CANCELED

This value means that the operation was canceled.

@item GPG_ERR_INV_ENGINE

This value means that the engine that implements the desired protocol is currently not available. This can either be because the sources were configured to exclude support for this engine, or because the engine is not installed properly.

@item GPG_ERR_AMBIGUOUS_NAME

This value indicates that a user ID or other specifier did not specify a unique key.

@item GPG_ERR_WRONG_KEY_USAGE

This value indicates that a key is not used appropriately.

@item GPG_ERR_CERT_REVOKED

This value indicates that a key signature was revoked.

@item GPG_ERR_CERT_EXPIRED

This value indicates that a key signature expired.

@item GPG_ERR_NO_CRL_KNOWN

This value indicates that no certificate revocation list is known for the certificate.

@item GPG_ERR_NO_POLICY_MATCH

This value indicates that a policy issue occurred.

@item GPG_ERR_NO_SECKEY

This value indicates that no secret key for the user ID is available.

@item GPG_ERR_MISSING_CERT

This value indicates that a key could not be imported because the issuer certificate is missing.

@item GPG_ERR_BAD_CERT_CHAIN

This value indicates that a key could not be imported because its certificate chain is not good, for example it could be too long.

@item GPG_ERR_UNSUPPORTED_ALGORITHM

This value means a verification failed because the cryptographic algorithm is not supported by the crypto backend.

@item GPG_ERR_BAD_SIGNATURE

This value means a verification failed because the signature is bad.

@item GPG_ERR_NO_PUBKEY

This value means a verification failed because the public key is not available.

@item GPG_ERR_USER_1

@item GPG_ERR_USER_2

@item ...

@item GPG_ERR_USER_16

These error codes are not used by any GnuPG component and can be freely used by other software. Applications using @acronym{GPGME} might use them to mark specific errors returned by callback handlers if no suitable error codes (including the system errors) for these errors exist already.

@end table

@node Error Strings
@section Error Strings
@cindex error values, printing of
@cindex error codes, printing of
@cindex error sources, printing of
@cindex error strings

@deftypefun {const char *} gpgme_strerror (@w{gpgme_error_t @var{err}})

The function @code{gpgme_strerror} returns a pointer to a statically allocated string containing a description of the error code contained in the error value @var{err}. This string can be used to output a diagnostic message to the user.

This function is not thread safe. Use @code{gpgme_strerror_r} in multi-threaded programs.

@end deftypefun

@deftypefun {int} gpgme_strerror_r (@w{gpgme_error_t @var{err}}, @w{char *@var{buf}}, @w{size_t @var{buflen}})

The function @code{gpgme_strerror_r} returns the error string for @var{err} in the user-supplied buffer @var{buf} of size @var{buflen}.

This function is, in contrast to @code{gpgme_strerror}, thread-safe if a thread-safe @code{strerror_r} function is provided by the system.

If

the function succeeds, 0 is returned and @var{buf} contains the string describing the error. If the buffer was not large enough, ERANGE is returned and @var{buf} contains as much of the beginning of the error string as fits into the buffer.

@end deftypefun

@deftypefun {const char *} gpgme_strsource (@w{gpgme_error_t @var{err}})

The function @code{gpgme_strerror} returns a pointer to a statically allocated string containing a description of the error source contained in the error value @var{err}. This string can be used to output a diagnostic message to the user.

@end deftypefun

The following example illustrates the use of @code{gpgme_strerror}:

@example

```
gpgme_ctx_t ctx;  
gpgme_error_t err = gpgme_new (&ctx);  
if (err)  
@{  
    fprintf (stderr, "%s: creating GpgME context failed: %s: %s\n",  
            argv[0], gpgme_strsource (err), gpgme_strerror (err));
```

```
    exit (1);
@}
@end example
```

```
@node Exchanging Data
@chapter Exchanging Data
@cindex data, exchanging
```

A lot of data has to be exchanged between the user and the crypto engine, like plaintext messages, ciphertext, signatures and information about the keys. The technical details about exchanging the data information are completely abstracted by @acronym{GPGME}. The user provides and receives the data via @code{gpgme_data_t} objects, regardless of the communication protocol between @acronym{GPGME} and the crypto engine in use.

```
@deftp {Data type} {gpgme_data_t}
The @code{gpgme_data_t} type is a handle for a container for generic
data, which is used by @acronym{GPGME} to exchange data with the user.
@end deftp
```

@code{gpgme_data_t} objects do not provide notifications on events. It is assumed that read and write operations are blocking until data is available. If this is undesirable, the application must ensure that all GPGME data operations always have data available, for example by using memory buffers or files rather than pipes or sockets. This might be relevant, for example, if the external event loop mechanism is used.

```
@deftp {Data type} {gpgme_off_t}
@since{1.4.1}
```

On POSIX platforms the @code{gpgme_off_t} type is an alias for @code{off_t}; it may be used interchangeable. On Windows platforms @code{gpgme_off_t} is defined as a long (i.e. 32 bit) for 32 bit Windows and as a 64 bit signed integer for 64 bit Windows.

```
@end deftp
```

```
@deftp {Data type} {gpgme_ssize_t}
The @code{gpgme_ssize_t} type is an alias for @code{ssize_t}. It has
only been introduced to overcome portability problems pertaining to
the declaration of @code{ssize_t} by different toolchains.
@end deftp
```

```
@menu
* Creating Data Buffers::      Creating new data buffers.
* Destroying Data Buffers::    Releasing data buffers.
* Manipulating Data Buffers::  Operations on data buffers.
@end menu
```

```
@node Creating Data Buffers
@section Creating Data Buffers
@cindex data buffer, creation
```

Data objects can be based on memory, files, or callback functions provided by the user. Not all operations are supported by all objects.

```
@menu
* Memory Based Data Buffers::  Creating memory based data buffers.
* File Based Data Buffers::    Creating file based data buffers.
* Callback Based Data Buffers:: Creating callback based data buffers.
@end menu
```

```
@node Memory Based Data Buffers
@subsection Memory Based Data Buffers
```

Memory based data objects store all data in allocated memory. This is convenient, but only practical for an amount of data that is a fraction of the available physical memory. The data has to be copied from its source and to its destination, which can often be avoided by using one of the other data object

```
@deftypedefun gpgme_error_t gpgme_data_new (@w{gpgme_data_t *}@var{dh})
The function @code{gpgme_data_new} creates a new @code{gpgme_data_t}
object and returns a handle for it in @var{dh}. The data object is
memory based and initially empty.
```

The function returns the error code @code{GPG_ERR_NO_ERROR} if the data object was successfully created, @code{GPG_ERR_INV_VALUE} if @var{dh} is not a valid pointer, and @code{GPG_ERR_ENOMEM} if not enough memory is available.

```
@end deftypedefun
```

```
@deftypedefun gpgme_error_t gpgme_data_new_from_mem (@w{gpgme_data_t *}@var{dh}, @w{const char
*@var{buffer}}, @w{size_t @var{size}}, @w{int @var{copy}})
The function @code{gpgme_data_new_from_mem} creates a new
```

@code{gpgme_data_t} object and fills it with @var{size} bytes starting from @var{buffer}.

If @var{copy} is not zero, a private copy of the data is made. If @var{copy} is zero, the data is taken from the specified buffer as needed, and the user has to ensure that the buffer remains valid for the whole life span of the data object.

The function returns the error code @code{GPG_ERR_NO_ERROR} if the data object was successfully created, @code{GPG_ERR_INV_VALUE} if @var{dh} or @var{buffer} is not a valid pointer, and @code{GPG_ERR_ENOMEM} if not enough memory is available.
@end deotypefun

```
@deftypefun gpgme_error_t gpgme_data_new_from_file (@w{gpgme_data_t *}@var{dh}), @w{const char *}@var{filename}), @w{int @var{copy}})
```

The function @code{gpgme_data_new_from_file} creates a new @code{gpgme_data_t} object and fills it with the content of the file @var{filename}.

If @var{copy} is not zero, the whole file is read in at initialization time and the file is not used anymore after that. This is the only mode supported currently. Later, a value of zero for @var{copy} might cause all reads to be delayed until the data is needed, but this is not yet implemented.

The function returns the error code @code{GPG_ERR_NO_ERROR} if the data object was successfully created, @code{GPG_ERR_INV_VALUE} if @var{dh} or @var{filename} is not a valid pointer, @code{GPG_ERR_NOT_IMPLEMENTED} if @var{code} is zero, and @code{GPG_ERR_ENOMEM} if not enough memory is available.
@end deotypefun

```
@deftypefun gpgme_error_t gpgme_data_new_from_filepart (@w{gpgme_data_t *}@var{dh}), @w{const char *}@var{filename}), @w{FILE *}@var{fp}), @w{off_t @var{offset}}), @w{size_t @var{length}})
```

The

function @code{gpgme_data_new_from_filepart} creates a new @code{gpgme_data_t} object and fills it with a part of the file specified by @var{filename} or @var{fp}.

Exactly one of @var{filename} and @var{fp} must be non-zero, the other must be zero. The argument that is not zero specifies the file from which @var{length} bytes are read into the data object, starting from @var{offset}.

The function returns the error code @code{GPG_ERR_NO_ERROR} if the data object was successfully created, @code{GPG_ERR_INV_VALUE} if @var{dh} and exactly one of @var{filename} and @var{fp} is not a valid

pointer, and `GPG_ERR_ENOMEM` if not enough memory is available.
@end deftypefun

@node File Based Data Buffers

@subsection File Based Data Buffers

File based data objects operate directly on file descriptors or streams. Only a small amount of data is stored in core at any time, so the size of the data objects is not limited by `GPGME`.

@deftypefun gpgme_error_t gpgme_data_new_from_fd (@w{gpgme_data_t *}@var{dh}, @w{int @var{fd}})

The function `gpgme_data_new_from_fd` creates a new `gpgme_data_t` object and uses the file descriptor `@var{fd}` to read from (if used as an input data object) and write to (if used as an output data object).

When using the data object as an input buffer, the function might read a bit more from the file descriptor than is actually needed by the crypto engine in the desired operation because of internal buffering.

Note that `GPGME` assumes that the file descriptor is set to blocking mode. Errors during I/O operations, except for `EINTR`, are usually fatal for crypto operations.

The function returns the error code `GPG_ERR_NO_ERROR` if the data object was successfully created, and `GPG_ERR_ENOMEM` if not enough memory is available.

@end deftypefun

@deftypefun gpgme_error_t gpgme_data_new_from_stream (@w{gpgme_data_t *}@var{dh}, @w{FILE *}@var{stream})

The function `gpgme_data_new_from_stream` creates a new `gpgme_data_t` object and uses the I/O stream `@var{stream}` to read from (if used as an input data object) and write to (if used as an output data object).

When using the data object as an input buffer, the function might read a bit more from the stream than is actually needed by the crypto engine in the desired operation because of internal buffering.

Note that `GPGME` assumes that the stream is in blocking mode. Errors during I/O operations, except for `EINTR`, are usually fatal for crypto operations.

The function returns the error code `GPG_ERR_NO_ERROR` if the

data object was successfully created, and `GPG_ERR_ENOMEM` if not enough memory is available.

@end deftypefun

@deftypefun `gpgme_error_t gpgme_data_new_from_estream (@w{gpgme_data_t *}@var{dh}), @w{gpgmt_stream_t @var{stream}})`

The function `gpgme_data_new_from_estream` creates a new `gpgme_data_t` object and uses the gpgmt stream `@var{stream}` to read from (if used as an input data object) and write to (if used as an output data object).

When using the data object as an input buffer, the function might read a bit more from the stream than is actually needed by the crypto engine in the desired operation because of internal buffering.

Note that GPGME assumes that the stream is in blocking mode. Errors during I/O operations, except for `EINTR`, are usually fatal for crypto operations.

The function returns the error code `GPG_ERR_NO_ERROR` if the data object was successfully created, and `GPG_ERR_ENOMEM` if not enough memory is available.

@end deftypefun

@node Callback Based Data Buffers

@subsection Callback Based Data Buffers

If neither memory nor file based data objects are a good fit for your application, you can implement the functions a data object provides yourself and create a data object from these callback functions.

@defcp {Data type} `{ssize_t (*gpgme_data_read_cb_t) (@w{void *}@var{handle}), @w{void @var{*buffer}}, @w{size_t @var{size}})}`

@tindex `gpgme_data_read_cb_t`

The `gpgme_data_read_cb_t` type is the type of functions which `GPGME` calls if it wants to read data from a user-implemented data object. The function should read up to `@var{size}` bytes from the current read position into the space starting at `@var{buffer}`. The `@var{handle}` is provided by the user at data object creation time.

Note that GPGME assumes that the read blocks until data is available. Errors during I/O operations, except for `EINTR`, are usually fatal for crypto operations.

The function should return the number of bytes read, 0 on EOF, and -1

on error. If an error occurs, `@var{errno}` should be set to describe the type of the error.

@end deftp

```
@deftp {Data type} {ssize_t (*gpgme_data_write_cb_t) (@w{void *}@var{handle}}, @w{const void  
@var{*buffer}}, @w{size_t @var{size}})}
```

```
@tindex gpgme_data_write_cb_t
```

The `@code{gpgme_data_write_cb_t}` type is the type of functions which `@acronym{GPGME}` calls if it wants to write data to a user-implemented data object. The function

should write up to `@var{size}` bytes to the current write position from the space starting at `@var{buffer}`. The `@var{handle}` is provided by the user at data object creation time.

Note that GPGME assumes that the write blocks until data is available.

Errors during I/O operations, except for EINTR, are usually fatal for crypto operations.

The function should return the number of bytes written, and -1 on error. If an error occurs, `@var{errno}` should be set to describe the type of the error.

@end deftp

```
@deftp {Data type} {off_t (*gpgme_data_seek_cb_t) (@w{void *}@var{handle}}, @w{off_t @var{offset}},  
@w{int @var{whence}})}
```

```
@tindex gpgme_data_seek_cb_t
```

The `@code{gpgme_data_seek_cb_t}` type is the type of functions which `@acronym{GPGME}` calls if it wants to change the current read/write position in a user-implemented data object, just like the `@code{lseek}` function.

The function should return the new read/write position, and -1 on error. If an error occurs, `@var{errno}` should be set to

describe the type of the error.

@end deftp

```
@deftp {Data type} {void (*gpgme_data_release_cb_t) (@w{void *}@var{handle})}
```

```
@tindex gpgme_data_release_cb_t
```

The `@code{gpgme_data_release_cb_t}` type is the type of functions which `@acronym{GPGME}` calls if it wants to destroy a user-implemented data object. The `@var{handle}` is provided by the user at data object creation time.

@end deftp

```
@deftp {Data type} {struct gpgme_data_cbs}
```

This structure is used to store the data callback interface functions described above. It has the following members:

@table @code

@item gpgme_data_read_cb_t read

This is the function called by @acronym{GPGME} to read data from the data object. It is only required for input data object.

@item gpgme_data_write_cb_t write

This is the function called by @acronym{GPGME} to write data to the data object. It is only required for output data object.

@item gpgme_data_seek_cb_t seek

This is the function called by @acronym{GPGME} to change the current read/write pointer in the data object (if available). It is optional.

@item gpgme_data_release_cb_t release

This is the function called by @acronym{GPGME} to release a data object. It is optional.

@end table

@end deftp

@deftypedefun gpgme_error_t gpgme_data_new_from_cbs (@w{gpgme_data_t *}@var{dh}),
@w{gpgme_data_cbs_t @var{cbs}}, @w{void *}@var{handle})

The function @code{gpgme_data_new_from_cbs} creates a new @code{gpgme_data_t} object and uses the user-provided callback functions to operate on the data object.

The handle @var{handle} is passed as first argument to the callback functions. This can be used to identify this data object.

The function returns the error code @code{GPG_ERR_NO_ERROR} if the data object was successfully created, and @code{GPG_ERR_ENOMEM} if not enough memory is available.

@end deftypedefun

@node Destroying Data Buffers

@section Destroying Data Buffers

@cindex data buffer, destruction

@deftypedefun void gpgme_data_release (@w{gpgme_data_t @var{dh}})

The function @code{gpgme_data_release} destroys the data object with the handle @var{dh}. It releases all associated resources that were not provided by the user in the first place.

@end deftypedefun

@deftypedefun {char *} gpgme_data_release_and_get_mem (@w{gpgme_data_t @var{dh}}, @w{size_t

*@var{length}})

The function @code{gpgme_data_release_and_get_mem} is like @code{gpgme_data_release}, except that it returns the data buffer and its length that was provided by the object.

The user has to release the buffer with @code{gpgme_free}. In case the user provided the data buffer in non-copy mode, a copy will be made for this purpose.

In case an error returns, or there is no suitable data buffer that can be returned to the user, the function will return @code{NULL}. In any case, the data object @var{dh} is destroyed.

@end deftypefun

@deftypefun void gpgme_free (@w{void *}@var{buffer})
@since{1.1.1}

The function @code{gpgme_free} releases the memory returned by @code{gpgme_data_release_and_get_mem} and @code{gpgme_pubkey_algo_string}.

It should be used instead of the system libraries @code{free} function in case different allocators are used by a program. This is often the case if gpgme is used under Windows as a DLL.

@end deftypefun

@node Manipulating Data Buffers
@section Manipulating Data Buffers
@cindex data buffer, manipulation

Data buffers contain data and meta-data. The following operations can be used to manipulate both.

@menu
* Data Buffer I/O Operations:: I/O operations on data buffers.
* Data Buffer Meta-Data:: Meta-data manipulation of data buffers.
* Data Buffer Convenience:: Convenience function for data buffers.
@end menu

@node Data Buffer I/O Operations
@subsection Data Buffer I/O Operations
@cindex data buffer, I/O operations
@cindex data buffer, read
@cindex data buffer, write

@cindex data buffer, seek

```
@deftypedefun ssize_t gpgme_data_read (@w{gpgme_data_t @var{dh}}, @w{void *@var{buffer}}, @w{size_t @var{length}})
```

The function @code{gpgme_data_read} reads up to @var{length} bytes from the data object with the handle @var{dh} into the space starting at @var{buffer}.

If no error occurs, the actual amount read is returned. If the end of the data object is reached, the function returns 0.

In all other cases, the function returns -1 and sets @var{errno}.
@end deftypedefun

```
@deftypedefun ssize_t gpgme_data_write (@w{gpgme_data_t @var{dh}}, @w{const void *@var{buffer}}, @w{size_t @var{size}})
```

The function @code{gpgme_data_write} writes up to @var{size} bytes starting from @var{buffer} into the data object with the handle @var{dh} at the current write position.

The function returns the number of bytes actually written, or -1 if an error occurs. If an error occurs, @var{errno} is set.
@end deftypedefun

```
@deftypedefun off_t gpgme_data_seek (@w{gpgme_data_t @var{dh}}, @w{off_t @var{offset}}, @w{int @var{whence}})
```

The function @code{gpgme_data_seek} changes the current read/write position.

The @var{whence} argument specifies how the @var{offset} should be interpreted. It must be one of the following symbolic constants:

@table @code

@item SEEK_SET

Specifies that @var{offset} is a count of characters from the beginning of the data object.

@item SEEK_CUR

Specifies that @var{offset} is a count of characters from the current file position. This count may be positive or negative.

@item SEEK_END

Specifies that @var{offset} is a count of characters from the end of the data object. A negative count specifies a position within the current extent of the data object; a positive count specifies a position past the current end. If you set the position past the

current end, and actually write data, you will extend the data object with zeros up to that position.

@end table

If successful, the function returns the resulting file position, measured in bytes from the beginning of the data object. You can use this feature together with `SEEK_CUR` to read the current read/write position.

If the function fails, -1 is returned and `@var{errno}` is set.

@end deftypefun

@node Data Buffer Meta-Data

@subsection Data Buffer Meta-Data

@cindex data buffer, meta-data

@cindex data buffer, file name

@cindex data buffer, encoding

@deftypefun {char *} gpgme_data_get_file_name (@w{gpgme_data_t @var{dh}})
@since{1.1.0}

The function `gpgme_data_get_file_name` returns a pointer to a string containing the file name associated with the data object. The file name will be stored in the output when encrypting or signing the data and will be returned to the user when decrypting or verifying the output data.

If no error occurs, the string containing the file name is returned. Otherwise, `NULL` will be returned.

@end deftypefun

@deftypefun gpgme_error_t gpgme_data_set_file_name (@w{gpgme_data_t @var{dh}}, @w{const char *@var{file_name}})
@since{1.1.0}

The function `gpgme_data_set_file_name` sets the file name associated with the data object. The file name will be stored in the output when encrypting or signing the data and will be returned to the user when decrypting or verifying the output data.

The function returns the error code `GPG_ERR_INV_VALUE` if `@var{dh}` is not a valid pointer and `GPG_ERR_ENOMEM` if not enough memory is available.

@end deftypefun

@def `ftp {Data type} {enum gpgme_data_encoding_t}`

@tindex `gpgme_data_encoding_t`

The `@code{gpgme_data_encoding_t}` type specifies the encoding of a `@code{gpgme_data_t}` object. For input data objects, the encoding is useful to give the backend a hint on the type of data. For output data objects, the encoding can specify the output data format on certain operations. Please note that not all backends support all encodings on all operations. The following data types are available:

@table @code

@item GPGME_DATA_ENCODING_NONE

This specifies that the encoding is not known. This is the default for a new data object. The backend will try its best to detect the encoding automatically.

@item GPGME_DATA_ENCODING_BINARY

This specifies
that the data is encoding in binary form; i.e. there is
no special encoding.

@item GPGME_DATA_ENCODING_BASE64

This specifies that the data is encoded using the Base-64 encoding scheme as used by `@acronym{MIME}` and other protocols.

@item GPGME_DATA_ENCODING_ARMOR

This specifies that the data is encoded in an armored form as used by OpenPGP and PEM.

@item GPGME_DATA_ENCODING_MIME

@since{1.7.0}

This specifies that the data is encoded as a MIME part.

@item GPGME_DATA_ENCODING_URL

@since{1.2.0}

The data is a list of linefeed delimited URLs. This is only useful with `@code{gpgme_op_import}`.

@item GPGME_DATA_ENCODING_URL0

@since{1.2.0}

The data is a list of binary zero delimited URLs. This is only useful with `@code{gpgme_op_import}`.

@item GPGME_DATA_ENCODING URLESC

@since{1.2.0}

The data is a list of linefeed delimited URLs with all control and space characters percent escaped. This mode is not yet implemented.

@end table

@end deftp

@deftypefun gpgme_data_encoding_t gpgme_data_get_encoding
(@w{gpgme_data_t @var{dh}})

The function @code{gpgme_data_get_encoding} returns the encoding of the data object with the handle @var{dh}. If @var{dh} is not a valid pointer (e.g. @code{NULL}) @code{GPGME_DATA_ENCODING_NONE} is returned.

@end deftypefun

@deftypefun gpgme_error_t gpgme_data_set_encoding (@w{gpgme_data_t @var{dh}}, gpgme_data_encoding_t @var{enc})

The function @code{gpgme_data_set_encoding} changes the encoding of the data object with the handle @var{dh} to @var{enc}.

@end deftypefun

@deftypefun {gpgme_error_t} gpgme_data_set_flag @
(@w{gpgme_data_t @var{dh}}, @
@w{const char *@var{name}}, @
@w{const char *@var{value}})

@since{1.7.0}

Some minor properties of the data object can be controlled with flags set by this function. The properties are identified by the following values for @var{name}:

@table @code

@item size-hint

The value is a decimal number with the length gpgme shall assume for this data object. This is useful if the data is provided by callbacks or via file descriptors but the application knows the total size of the data. If this is set the OpenPGP engine may use this to decide on buffer allocation strategies and to provide a total value for its progress information.

@end table

This function returns @code{0} on success.

@end deftypefun

@node Data Buffer Convenience
@subsection Data Buffer Convenience Functions
@cindex data buffer, convenience
@cindex type of data
@cindex identify

@deftp {Data type} {enum gpgme_data_type_t}
@tindex gpgme_data_type_t
@since{1.4.3}

The @code{gpgme_data_type_t} type is used to return the detected type of the content of a data buffer.

@end deftp

@table @code
@item GPGME_DATA_TYPE_INVALID
This is returned by @code{gpgme_data_identify} if it was not possible to identify the data. Reasons for this might be a non-seekable stream or a memory problem. The value is 0.
@item GPGME_DATA_TYPE_UNKNOWN
The type of the data is not known.
@item GPGME_DATA_TYPE_PGP_SIGNED
The
data is an OpenPGP signed message. This may be a binary signature, a detached one or a cleartext signature.
@item GPGME_DATA_TYPE_PGP_ENCRYPTED
@since{1.7.0}

The data is an OpenPGP encrypted message.
@item GPGME_DATA_TYPE_PGP_SIGNATURE
@since{1.7.0}

The data is an OpenPGP detached signature.
@item GPGME_DATA_TYPE_PGP_OTHER
This is a generic OpenPGP message. In most cases this will be encrypted data.
@item GPGME_DATA_TYPE_PGP_KEY
This is an OpenPGP key (private or public).
@item GPGME_DATA_TYPE_CMS_SIGNED
This is a CMS signed message.
@item GPGME_DATA_TYPE_CMS_ENCRYPTED
This is a CMS encrypted (enveloped data) message.
@item GPGME_DATA_TYPE_CMS_OTHER
This is used for other CMS message types.
@item GPGME_DATA_TYPE_X509_CERT
The data is a X.509 certificate
@item GPGME_DATA_TYPE_PKCS12

The data is a PKCS#12 message. This is commonly used to exchange private keys for X.509.

@end table

```
@deftypefun gpgme_data_type_t gpgme_data_identify (@w{gpgme_data_t @var{dh}})
@since{1.4.3}
```

The

function @code{gpgme_data_identify} returns the type of the data with the handle @var{dh}. If it is not possible to perform the identification, the function returns zero (@code{GPGME_DATA_TYPE_INVALID}). Note that depending on how the data object has been created the identification may not be possible or the data object may change its internal state (file pointer moved). For file or memory based data object, the state should not change.

@end deftypefun

@c

@c Chapter Contexts

@c

@node Contexts

@chapter Contexts

@cindex context

All cryptographic operations in @acronym{GPGME} are performed within a context, which contains the internal state of the operation as well as configuration parameters. By using several contexts you can run several cryptographic operations in parallel, with different configuration.

```
@deftp {Data type} {gpgme_ctx_t}
```

The @code{gpgme_ctx_t} type is a handle for a @acronym{GPGME} context, which is used to hold the configuration, status and result of

cryptographic operations.

@end deftp

@menu

- * Creating Contexts:: Creating new @acronym{GPGME} contexts.
- * Destroying Contexts:: Releasing @acronym{GPGME} contexts.
- * Result Management:: Managing the result of crypto operations.
- * Context Attributes:: Setting properties of a context.
- * Key Management:: Managing keys with @acronym{GPGME}.
- * Trust Item Management:: Managing trust items with @acronym{GPGME}.
- * Crypto Operations:: Using a context for cryptography.
- * Miscellaneous:: Miscellaneous operations
- * Run Control:: Controlling how operations are run.

@end menu

@node Creating Contexts

@section Creating Contexts

@cindex context, creation

@deftypefun gpgme_error_t gpgme_new (@w{gpgme_ctx_t *}@var{ctx})

The function @code{gpgme_new} creates a new @code{gpgme_ctx_t} object and returns a handle for it in @var{ctx}.

The function returns the error code @code{GPG_ERR_NO_ERROR} if the

context was successfully created, @code{GPG_ERR_INV_VALUE} if @var{ctx} is not a valid pointer, and @code{GPG_ERR_ENOMEM} if not enough memory is available. Also, it returns

@code{GPG_ERR_NOT_OPERATIONAL} if @code{gpgme_check_version} was not called to initialize GPGME, and @code{GPG_ERR_SELFTEST_FAILED} if a selftest failed. Currently, the only selftest is for Windows MingW32 targets to see if @code{-mms-bitfields} was used (as required).

@end deftypefun

@node Destroying Contexts

@section Destroying Contexts

@cindex context, destruction

@deftypefun void gpgme_release (@w{gpgme_ctx_t @var{ctx}})

The function @code{gpgme_release} destroys the context with the handle @var{ctx} and releases all associated resources.

@end deftypefun

@node Result Management

@section Result Management

@cindex context, result of operation

The detailed result of an operation is returned in operation-specific structures such as @code{gpgme_decrypt_result_t}. The corresponding retrieval

functions such as @code{gpgme_op_decrypt_result} provide static access to the results after an operation completes. Those structures shall be considered read-only and an application must not allocate such a structure on its own. The following interfaces make it possible to detach a result structure from its associated context and give it a lifetime beyond that of the current operation or context.

```
@deftypefun void gpgme_result_ref (@w{void *@var{result}})
@since{1.2.0}
```

The function `@code{gpgme_result_ref}` acquires an additional reference for the result `@var{result}`, which may be of any type `@code{gpgme_*_result_t}`. As long as the user holds a reference, the result structure is guaranteed to be valid and unmodified.

```
@end deftypefun
```

```
@deftypefun void gpgme_result_unref (@w{void *@var{result}})
@since{1.2.0}
```

The function `@code{gpgme_result_unref}` releases a reference for the result `@var{result}`. If this was the last reference, the result structure will be destroyed and all resources associated to it will be released.

```
@end deftypefun
```

Note that a context may hold its own references to result structures, typically until the context is destroyed or the next operation is started. In fact, these references are accessed through the `@code{gpgme_op_*_result}` functions.

```
@node Context Attributes
@section Context Attributes
@cindex context, attributes
```

```
@menu
```

- * Protocol Selection:: Selecting the protocol used by a context.
 - * Crypto Engine:: Configuring the crypto engine.
 - * Setting the Sender:: How to tell the engine the sender.
 - * ASCII Armor:: Requesting `@acronym{ASCII}` armored output.
 - * Text Mode:: Choosing canonical text mode.
 - * Offline Mode:: Choosing offline mode.
 - * Pinentry Mode:: Choosing the pinentry mode.
 - * Included Certificates:: Including a number of certificates.
 - * Key Listing Mode:: Selecting key listing mode.
 - * Passphrase Callback::
 Getting the passphrase from the user.
 - * Progress Meter Callback:: Being informed about the progress.
 - * Status Message Callback:: Status messages received from gpg.
 - * Context Flags:: Additional flags for a context.
 - * Locale:: Setting the locale of a context.
 - * Additional Logs:: Additional logs of a context.
- ```
@end menu
```

@node Protocol Selection  
@subsection Protocol Selection  
@cindex context, selecting protocol  
@cindex protocol, selecting

```
@deftypefun gpgme_error_t gpgme_set_protocol (@w{gpgme_ctx_t @var{ctx}}, @w{gpgme_protocol_t @var{proto}})
```

The function @code{gpgme\_set\_protocol} sets the protocol used within the context @var{ctx} to @var{proto}. All crypto operations will be performed by the crypto engine configured for that protocol.

@xref{Protocols and Engines}.

Setting the protocol with @code{gpgme\_set\_protocol} does intentionally not check if the crypto engine for that protocol is available and installed correctly. @xref{Engine Version Check}.

The function returns the error code @code{GPG\_ERR\_NO\_ERROR} if the protocol could be set successfully, and @code{GPG\_ERR\_INV\_VALUE} if @var{protocol} is not a valid protocol.

@end deftypefun

```
@deftypefun gpgme_protocol_t gpgme_get_protocol (@w{gpgme_ctx_t @var{ctx}})
```

The function @code{gpgme\_get\_protocol} retrieves the protocol currently use with the context @var{ctx}.

@end deftypefun

@node Crypto Engine  
@subsection Crypto Engine  
@cindex context, configuring engine  
@cindex engine, configuration per context

The following functions can be used to set and retrieve the configuration of the crypto engines of a specific context. The default can also be retrieved without any particular context.

@xref{Engine Information}. The default can also be changed globally.

@xref{Engine Configuration}.

```
@deftypefun gpgme_engine_info_t gpgme_ctx_get_engine_info (@w{gpgme_ctx_t @var{ctx}})
@since{1.1.0}
```

The function @code{gpgme\_ctx\_get\_engine\_info} returns a linked list of engine info structures. Each info structure describes the configuration of one configured backend, as used by the context @var{ctx}.

The result is valid until the next invocation of  
`@code{gpgme_ctx_set_engine_info}` for this particular context.

This function can not fail.  
`@end deftypefun`

```
@deftypefun gpgme_error_t gpgme_ctx_set_engine_info (@w{gpgme_ctx_t @var{ctx}}, @w{gpgme_protocol_t
@var{proto}}, @w{const char *@var{file_name}}, @w{const char *@var{home_dir}})
@since{1.1.0}
```

The function `@code{gpgme_ctx_set_engine_info}` changes the configuration of the crypto engine implementing the protocol `@var{proto}` for the context `@var{ctx}`.

`@var{file_name}` is the file name of the executable program implementing this protocol, and `@var{home_dir}` is the directory name of the configuration directory for this crypto engine. If `@var{home_dir}` is `@code{NULL}`, the engine's default will be used.

Currently this function must be used before starting the first crypto operation.

It is unspecified if and when the changes will take effect if the function is called after starting the first operation on the context `@var{ctx}`.

This function returns the error code `@code{GPG_ERR_NO_ERROR}` if successful, or an error code on failure.  
`@end deftypefun`

`@node Setting the Sender`  
`@subsection How to tell the engine the sender.`  
`@cindex context, sender`  
`@cindex sender`  
`@cindex From:`

Some engines can make use of the senders address, for example to figure out the best user id in certain trust models. For verification and signing of mails, it is thus suggested to let the engine know the sender ("From:") address. `@acronym{GPGME}` provides two functions to accomplish that. Note that the esoteric use of multiple "From:" addresses is not supported.

```
@deftypefun gpgme_error_t gpgme_set_sender @
(@w{gpgme_ctx_t @var{ctx}}, @
@w{int @var{address}})
```

@since{1.8.0}

The function @code{gpgme\_set\_sender} specifies the sender address for use in sign and verify operations. @var{address} is expected to be the ``addr-spec" part of an address but may also be a complete mailbox address, in which case this function extracts the ``addr-spec" from it. Using @code{NULL} for @var{address} clears the sender address.

The function returns 0 on success or an error code on failure. The most likely failure is that no valid ``addr-spec" was found in @var{address}.

@end deftypefun

```
@deftypefun @w{const char *} gpgme_get_sender @
 (@w{gpgme_ctx_t @var{ctx}})
```

@since{1.8.0}

The function @code{gpgme\_get\_sender} returns the current sender address from the context, or NULL if none was set. The returned value is valid as long as the @var{ctx} is valid and @code{gpgme\_set\_sender} has not been called again.

@end deftypefun

@c FIXME: Unfortunately, using @acronym here breaks texi2dvi.

@node ASCII Armor

@subsection @acronym{ASCII} Armor

@cindex context, armor mode

@cindex @acronym{ASCII} armor

@cindex armor mode

```
@deftypefun void gpgme_set_armor (@w{gpgme_ctx_t @var{ctx}},
 @w{int @var{yes}})
```

The function @code{gpgme\_set\_armor} specifies if the output should be @acronym{ASCII} armored. By default, output is not @acronym{ASCII} armored.

@acronym{ASCII} armored output is disabled if @var{yes} is zero, and enabled otherwise.

@end deftypefun

```
@deftypefun int gpgme_get_armor (@w{gpgme_ctx_t @var{ctx}})
```

The function @code{gpgme\_get\_armor} returns 1 if the output is

@acronym{ASCII} armored, and @code{0} if it is not, or if @var{ctx} is not a valid pointer.

@end deftypefun

@node Text Mode

@subsection Text Mode

@cindex context, text mode

@cindex text mode

@cindex canonical text mode

@deftypefun void gpgme\_set\_textmode (@w{gpgme\_ctx\_t @var{ctx}}, @w{int @var{yes}})

The function @code{gpgme\_set\_textmode} specifies if canonical text mode should be used. By default, text mode is not used.

Text mode is for example used for the RFC2015 signatures; note that the updated RFC 3156 mandates that the mail user agent does some preparations so that text mode is not needed anymore.

This option is only relevant to the OpenPGP crypto engine, and ignored by all other engines.

Canonical text mode is disabled if @var{yes} is zero, and enabled otherwise.

@end deftypefun

@deftypefun int gpgme\_get\_textmode (@w{gpgme\_ctx\_t @var{ctx}})

The function @code{gpgme\_get\_textmode} returns 1 if canonical text mode is enabled, and @code{0} if it is not, or if @var{ctx} is not a valid pointer.

@end deftypefun

@node Offline Mode

@subsection Offline Mode

@cindex context, offline mode

@cindex offline mode

@deftypefun void gpgme\_set\_offline (@w{gpgme\_ctx\_t @var{ctx}}, @w{int @var{yes}})

@since{1.6.0}

The function @code{gpgme\_set\_offline} specifies if offline mode should be used. Offline mode is disabled if @var{yes} is zero, and enabled otherwise. By default, offline mode is disabled.

The details of the offline mode depend on the used protocol and its backend engine. It may eventually be extended to be more stricter and



for example completely disable the use of Dirmngr for any engine.

For the CMS protocol the offline mode specifies whether Dirmngr shall be used to do additional validation that might require connecting external services (e.g. CRL / OCSP checks). Here the offline mode only affects the keylist mode `@code{GPGME_KEYLIST_MODE_VALIDATE}`.

For the OpenPGP protocol offline mode entirely disables the use of the Dirmngr and will thus guarantee that no network connections are done as part of an operation on this context. It has only an effect with GnuPG versions 2.1.23 or later.

For all other protocols the offline mode is currently ignored.

`@end deftypefun`

`@deftypefun int gpgme_get_offline (@w{gpgme_ctx_t @var{ctx}})  
@since{1.6.0}`

The function `@code{gpgme_get_offline}` returns 1 if offline mode is enabled, and `@code{0}` if it is not, or if `@var{ctx}` is not a valid pointer.

`@end deftypefun`

`@node Pinentry Mode`

`@subsection Pinentry Mode`

`@cindex context, pinentry mode`

`@cindex pinentry mode`

`@deftypefun gpgme_error_t gpgme_set_pinentry_mode  
(@w{gpgme_ctx_t @var{ctx}},  
@w{gpgme_pinentry_mode_t @var{mode}})`

`@since{1.4.0}`

The function `@code{gpgme_set_pinentry_mode}` specifies the pinentry mode to be used.

For GnuPG  $\geq$  2.1 this option is required to be set to

`@code{GPGME_PINENTRY_MODE_LOOPBACK}` to enable the passphrase callback mechanism in GPGME through `@code{gpgme_set_passphrase_cb}`.

`@end deftypefun`

`@deftypefun gpgme_pinentry_mode_t gpgme_get_pinentry_mode (@w{gpgme_ctx_t @var{ctx}})  
@since{1.4.0}`

The function `gpgme_get_pinentry_mode` returns the mode set for the context.

`@end deftypefun`

`@def tp {Data type} {enum gpgme_pinentry_mode_t}`

`@tindex gpgme_pinentry_mode_t`

`@since{1.4.0}`

The `gpgme_minentry_mode_t` type specifies the set of possible pinentry modes that are supported by `GPGME` if GnuPG  $\geq 2.1$  is used.

The following modes are supported:

`@table @code`

`@item GPGME_PINENTRY_MODE_DEFAULT`

`@since{1.4.0}`

Use the default of the agent, which is ask.

`@item GPGME_PINENTRY_MODE_ASK`

`@since{1.4.0}`

Force

the use of the Pinentry.

`@item GPGME_PINENTRY_MODE_CANCEL`

`@since{1.4.0}`

Emulate use of Pinentry's cancel button.

`@item GPGME_PINENTRY_MODE_ERROR`

`@since{1.4.0}`

Return a Pinentry error `No Pinentry`.

`@item GPGME_PINENTRY_MODE_LOOPBACK`

`@since{1.4.0}`

Redirect Pinentry queries to the caller.

This enables the use of `gpgme_set_passphrase_cb` because pinentry queries are redirected to gpgme.

Note: For 2.1.0 - 2.1.12 this mode requires `allow-loopback-pinentry` to be enabled in the `gpg-agent.conf` or an agent started with that option.

`@end table`

`@end deftp`

@node Included Certificates  
@subsection Included Certificates  
@cindex certificates, included

@deftypefun void gpgme\_set\_include\_certs (@w{gpgme\_ctx\_t @var{ctx}}, @w{int @var{nr\_of\_certs}})

The function @code{gpgme\_set\_include\_certs} specifies how many certificates should be included in an S/MIME signed message. By default, only the sender's certificate is included. The possible values of @var{nr\_of\_certs} are:

@table @code  
@item GPGME\_INCLUDE\_CERTS\_DEFAULT  
@since{1.0.3}

Fall back to the default of the crypto backend. This is the default for GPGME.

@item -2

Include all certificates except the root certificate.

@item -1

Include all certificates.

@item 0

Include no certificates.

@item 1

Include the sender's certificate only.

@item n

Include the first n certificates of the certificates path, starting from the sender's certificate. The number @code{n} must be positive.

@end table

Values of @var{nr\_of\_certs} smaller than -2 are undefined.

This option is only relevant to the CMS crypto engine, and ignored by all other engines.

@end deftypefun

@deftypefun int gpgme\_get\_include\_certs (@w{gpgme\_ctx\_t @var{ctx}})

The function @code{gpgme\_get\_include\_certs} returns the number of certificates to include into an S/MIME signed message.

@end deftypefun

@node Key Listing Mode  
@subsection Key Listing Mode  
@cindex key listing mode  
@cindex key listing, mode of

@deftypefun gpgme\_error\_t gpgme\_set\_keylist\_mode

(@w{gpgme\_ctx\_t @var{ctx}}, @w{gpgme\_keylist\_mode\_t @var{mode}})

The function `gpgme_set_keylist_mode` changes the default behaviour of the key listing functions. The value in `@var{mode}` is a bitwise-or combination of one or multiple of the following bit values:

@table @code

@item GPGME\_KEYLIST\_MODE\_LOCAL

The `GPGME_KEYLIST_MODE_LOCAL` symbol specifies that the local keyring should be searched for keys in the keylisting operation. This is the default.

Using only this option results in a `--list-keys`.

@item GPGME\_KEYLIST\_MODE\_EXTERN

The `GPGME_KEYLIST_MODE_EXTERN` symbol specifies that an external source should be searched for keys in the keylisting operation. The type of external source is dependent on the crypto engine used and whether it is combined with `GPGME_KEYLIST_MODE_LOCAL`. For example, it can be a remote keyserver or LDAP certificate server.

Using only this option results in a `--search-keys` for

`GPGME_PROTOCOL_OpenPGP`

and something similar to

`--list-external-keys` for `GPGME_PROTOCOL_CMS`.

@item GPGME\_KEYLIST\_MODE\_LOCATE

This is a shortcut for the combination of

`GPGME_KEYLIST_MODE_LOCAL` and `GPGME_KEYLIST_MODE_EXTERN`, which results in a `--locate-keys` for `GPGME_PROTOCOL_OpenPGP`.

@item GPGME\_KEYLIST\_MODE\_SIGS

The `GPGME_KEYLIST_MODE_SIGS` symbol specifies that the key signatures should be included in the listed keys.

@item GPGME\_KEYLIST\_MODE\_SIG\_NOTATIONS

@since{1.1.1}

The `GPGME_KEYLIST_MODE_SIG_NOTATIONS` symbol specifies that the signature notations on key signatures should be included in the listed keys. This only works if `GPGME_KEYLIST_MODE_SIGS` is also enabled.

@item GPGME\_KEYLIST\_MODE\_WITH\_TOFU

@since{1.7.0}

The `GPGME_KEYLIST_MODE_WITH_TOFU` symbol specifies that information pertaining to the TOFU trust model should be included in the listed keys.

@item GPGME\_KEYLIST\_MODE\_WITH\_SECRET

@since{1.5.1}

The @code{GPGME\_KEYLIST\_MODE\_WITH\_SECRET} returns information about the presence of a corresponding secret key in a public key listing. A public key listing with this mode is slower than a standard listing but can be used instead of a second run to list the secret keys. This is only supported for GnuPG versions >= 2.1.

@item GPGME\_KEYLIST\_MODE\_EPHEMERAL

@since{1.2.0}

The @code{GPGME\_KEYLIST\_MODE\_EPHEMERAL} symbol specifies that keys flagged as ephemeral are included in the listing.

@item GPGME\_KEYLIST\_MODE\_VALIDATE

@since{0.4.5}

The @code{GPGME\_KEYLIST\_MODE\_VALIDATE} symbol specifies that the backend should do key or certificate validation and not just get the validity information from an internal cache. This might be an expensive operation and is in general not useful. Currently only implemented for the S/MIME backend and ignored for other backends.

@end table

At least one of @code{GPGME\_KEYLIST\_MODE\_LOCAL} and @code{GPGME\_KEYLIST\_MODE\_EXTERN} must be specified. For future binary compatibility, you should get the current mode with @code{gpgme\_get\_keylist\_mode} and modify it by setting or clearing the appropriate bits, and then using that calculated value in the @code{gpgme\_set\_keylisting\_mode} operation. This will leave all other bits in the mode value intact (in particular those that are not used in the current version of the library).

The function returns the error code @code{GPG\_ERR\_NO\_ERROR} if the mode could be set correctly, and @code{GPG\_ERR\_INV\_VALUE} if @var{ctx} is not a valid pointer or @var{mode} is not a valid mode.  
@end deftypefun

@deftypefun gpgme\_keylist\_mode\_t gpgme\_get\_keylist\_mode (@w{gpgme\_ctx\_t @var{ctx}})

The function @code{gpgme\_get\_keylist\_mode} returns the current key listing mode of the context @var{ctx}. This value can then be modified and used in a subsequent @code{gpgme\_set\_keylisting\_mode}

operation to only affect the desired bits (and leave all others intact).

The function returns 0 if `@var{ctx}` is not a valid pointer, and the current mode

otherwise. Note that 0 is not a valid mode value.

@end deftypefun

@node Passphrase Callback

@subsection Passphrase Callback

@cindex callback, passphrase

@cindex passphrase callback

@deftp {Data type} {gpgme\_error\_t (\*gpgme\_passphrase\_cb\_t)(void \*`@var{hook}`, const char \*`@var{uid_hint}`, const char \*`@var{passphrase_info}`, @w{int `@var{prev_was_bad}`}}, @w{int `@var{fd}`}})

@tindex gpgme\_passphrase\_cb\_t

The `@code{gpgme_passphrase_cb_t}` type is the type of functions usable as passphrase callback function.

The argument `@var{uid_hint}` might contain a string that gives an indication for which user ID the passphrase is required. If this is not available, or not applicable (in the case of symmetric encryption, for example), `@var{uid_hint}` will be `@code{NULL}`.

The argument `@var{passphrase_info}`, if not `@code{NULL}`, will give further information about the context in which the passphrase is required. This information is engine and operation specific.

If this is the repeated attempt to get the passphrase, because previous attempts failed, then `@var{prev_was_bad}` is 1, otherwise it will be 0.

The user must write the passphrase, followed by a newline character, to the file descriptor `@var{fd}`. The function `@code{gpgme_io_writen}` should be used for the write operation. Note that if the user returns 0 to indicate success, the user must at least write a newline character before returning from the callback.

If an error occurs, return the corresponding `@code{gpgme_error_t}` value. You can use the error code `@code{GPG_ERR_CANCELED}` to abort the operation. Otherwise, return `@code{0}`.

Note: The `passphrase_cb` only works with GnuPG 1.x and 2.1.x and not with the 2.0.x series. See `@code{gpgme_set_pinentry_mode}` for more details on 2.1.x usage.

@end deftp

```
@deftypefun void gpgme_set_passphrase_cb (@w{gpgme_ctx_t @var{ctx}}, @w{gpgme_passphrase_cb_t
@var{passfunc}}, @w{void *@var{hook_value}})
```

The function `@code{gpgme_set_passphrase_cb}` sets the function that is used when a passphrase

needs to be provided by the user to

`@var{passfunc}`. The function `@var{passfunc}` needs to be implemented by the user, and whenever it is called, it is called with its first argument being `@var{hook_value}`. By default, no passphrase callback function is set.

Not all crypto engines require this callback to retrieve the passphrase. It is better if the engine retrieves the passphrase from a trusted agent (a daemon process), rather than having each user to implement their own passphrase query. Some engines do not even support an external passphrase callback at all, in this case the error code `@code{GPG_ERR_NOT_SUPPORTED}` is returned.

For GnuPG  $\geq 2.1$  the pinentry mode has to be set to

`@code{GPGME_PINENTRY_MODE_LOOPBACK}` to enable the passphrase callback.

See `@code{gpgme_set_pinentry_mode}`.

The user can disable the use of a passphrase callback function by calling `@code{gpgme_set_passphrase_cb}` with `@var{passfunc}` being `@code{NULL}`.

```
@end deftypefun
```

```
@deftypefun void gpgme_get_passphrase_cb
(@w{gpgme_ctx_t @var{ctx}}, @w{gpgme_passphrase_cb_t *@var{passfunc}}, @w{void
**@var{hook_value}})
```

The function `@code{gpgme_get_passphrase_cb}` returns the function that is used when a passphrase needs to be provided by the user in `@var{*passfunc}`, and the first argument for this function in `@var{*hook_value}`. If no passphrase callback is set, or `@var{ctx}` is not a valid pointer, `@code{NULL}` is returned in both variables.

`@var{passfunc}` or `@var{hook_value}` can be `@code{NULL}`. In this case, the corresponding value will not be returned.

```
@end deftypefun
```

```
@node Progress Meter Callback
```

```
@subsection Progress Meter Callback
```

```
@cindex callback, progress meter
```

```
@cindex progress meter callback
```

```
@deftp {Data type} {void (*gpgme_progress_cb_t)(void *@var{hook}, const char *@var{what}, int @var{type},
int @var{current}, int @var{total})}
```

@tindex gpgme\_progress\_cb\_t

The @code{gpgme\_progress\_cb\_t} type is the type of functions usable as progress callback function.

The arguments are specific to

the crypto engine. More information

about the progress information returned from the GnuPG engine can be found in the GnuPG source code in the file @file{doc/DETAILS} in the section PROGRESS.

@end deftp

```
@deftypefun void gpgme_set_progress_cb (@w{gpgme_ctx_t @var{ctx}}, @w{gpgme_progress_cb_t
@var{progfunc}}, @w{void *@var{hook_value}})
```

The function @code{gpgme\_set\_progress\_cb} sets the function that is used when progress information about a cryptographic operation is available. The function @var{progfunc} needs to be implemented by the user, and whenever it is called, it is called with its first argument being @var{hook\_value}. By default, no progress callback function is set.

Setting a callback function allows an interactive program to display progress information about a long operation to the user.

The user can disable the use of a progress callback function by calling @code{gpgme\_set\_progress\_cb} with @var{progfunc} being @code{NULL}.

@end deftypefun

```
@deftypefun void gpgme_get_progress_cb
(@w{gpgme_ctx_t @var{ctx}}, @w{gpgme_progress_cb_t *@var{progfunc}}, @w{void **@var{hook_value}})
```

The function @code{gpgme\_get\_progress\_cb} returns the function that is used to inform the user about the progress made in @var{\*progfunc}, and the first argument for this function in @var{\*hook\_value}. If no progress callback is set, or @var{ctx} is not a valid pointer, @code{NULL} is returned in both variables.

@var{progfunc} or @var{hook\_value} can be @code{NULL}. In this case, the corresponding value will not be returned.

@end deftypefun

@node Status Message Callback

@subsection Status Message Callback

@cindex callback, status message

@cindex status message callback

```
@deftp {Data type} {gpgme_error_t (*gpgme_status_cb_t)(void *@var{hook}, const char *@var{keyword}, const
char *@var{args})}
```



@tindex gpgme\_status\_cb\_t

The @code{gpgme\_status\_cb\_t} type is the type of function usable as a status message callback function.

The argument @var{keyword} is the name of the status message while the

@var{args} argument contains any arguments for the status message.

If an error occurs, return the corresponding @code{gpgme\_error\_t} value. Otherwise, return @code{0}.

@end deftp

```
@deftypefun void gpgme_set_status_cb (@w{gpgme_ctx_t @var{ctx}}, @w{gpgme_status_cb_t
@var{statusfunc}}, @w{void *@var{hook_value}})
@since{1.6.0}
```

The function @code{gpgme\_set\_status\_cb} sets the function that is used when a status message is received from gpg to @var{statusfunc}. The function @var{statusfunc} needs to be implemented by the user, and whenever it is called, it is called with its first argument being @var{hook\_value}. By default, no status message callback function is set.

The user can disable the use of a status message callback function by calling @code{gpgme\_set\_status\_cb} with @var{statusfunc} being @code{NULL}.

@end deftypefun

```
@deftypefun void gpgme_get_status_cb (@w{gpgme_ctx_t @var{ctx}}, @w{gpgme_status_cb_t
*@var{statusfunc}}, @w{void **@var{hook_value}})
@since{1.6.0}
```

The

function @code{gpgme\_get\_status\_cb} returns the function that is used to process status messages from gpg in @var{\*statusfunc}, and the first argument for this function in @var{\*hook\_value}. If no status message callback is set, or @var{ctx} is not a valid pointer, @code{NULL} is returned in both variables.

@end deftypefun

@node Context Flags

@subsection Context Flags

@cindex flags, of a context

```
@deftypefun {gpgme_error_t} gpgme_set_ctx_flag @
(@w{gpgme_ctx_t @var{ctx}}, @
@w{const char *@var{name}}, @
@w{const char *@var{value}})
```

@since{1.7.0}

Some minor properties of the context can be controlled with flags set by this function. The properties are identified by the following values for @var{name}:

@table @code

@item "redraw"

This flag is normally not changed by the caller because GPGME sets and clears it automatically: The flag is cleared before an operation and set if an operation noticed that the engine has launched a Pinentry.

A

Curses based application may use this information to redraw the screen; for example:

@example

```
err = gpgme_op_keylist_start (ctx, "foo@@example.org", 0);
while (!err)
 @{
 err = gpgme_op_keylist_next (ctx, &key);
 if (err)
 break;
 show_key (key);
 gpgme_key_release (key);
 @}
if ((s = gpgme_get_ctx_flag (ctx, "redraw")) && *s)
 redraw_screen ();
gpgme_release (ctx);
@end example
```

@item "full-status"

Using a @var{value} of "1" the status callback set by gpgme\_set\_status\_cb returns all status lines with the exception of PROGRESS lines. With the default of "0" the status callback is only called in certain situations.

@item "raw-description"

Setting the @var{value} to "1" returns human readable strings in a raw format. For example the non breaking space characters ("~") will not be removed from the @code{description} field of the @code{gpgme\_tofu\_info\_t} object.

@item "export-session-key"

Using a @var{value} of

"1" specifies that the context should try to export the symmetric session key when decrypting data. By default, or when using an empty string or "0" for @var{value}, session keys are not exported.

@item "override-session-key"

The string given in @var{value} is passed to the GnuPG engine to override the session key for decryption. The format of that session key is specific to GnuPG and can be retrieved during a decrypt operation when the context flag "export-session-key" is enabled. Please be aware that using this feature with GnuPG < 2.1.16 will leak the session key on many platforms via ps(1).

@item "auto-key-retrieve"

Setting the @var{value} to "1" asks the backend to automatically retrieve a key for signature verification if possible. Note that this option makes a "web bug" like behavior possible. Keyserver or Web Key Directory operators can see which keys you request, so by sending you a message signed by a brand new key (which you naturally will not have on your local keyring), the operator can tell both your IP address and the time when you verified the signature.

@item "request-origin"

The string given in @var{value} is passed to the GnuPG engines to request restrictions based on the origin of the request. Valid values are documented in the GnuPG manual and the gpg man page under the option @option{--request-origin}. Requires at least GnuPG 2.2.6 to have an effect.

@item "no-symkey-cache"

For OpenPGP disable the passphrase cache used for symmetrical en- and decryption. This cache is based on the message specific salt value. Requires at least GnuPG 2.2.7 to have an effect.

@item "ignore-mdc-error"

This flag passes the option @option{--ignore-mdc-error} to gpg. This can be used to force decryption of a message which failed due to a missing integrity check. This flag must be used with great caution and only if it is a known non-corrupted old message and the decryption result of the former try had the decryption result flag

@code{legacy\_cipher\_nomdc}

set. For failsafe reasons this flag is reset after each operation.

@item "auto-key-locate"

The string given in @var{value} is passed to gpg. This can be used to change the behavior of a @code{GPGME\_KEYLIST\_MODE\_LOCATE} keylisting. Valid values are documented in the GnuPG manual and the gpg man page under the option @option{--auto-key-locate}. Requires at least GnuPG 2.1.18.

Note: Keys retrieved through `@code{auto-key-locate}` are automatically imported in the keyring.

```
@item trust-model
@since{1.11.2}
```

Change the trust-model for all GnuPG engine operations. An empty string sets the trust-model back to the users default. If the trust-model is not supported by GnuPG the behavior is undefined and will likely cause all operations to fail. Example: "tofu+pgp".

This options should be used carefully with a strict version requirement. In some versions of GnuPG setting the trust-model changes the default trust-model for future operations. A change in the trust-model also can have unintended side effects, like rebuilding the trust-db.

```
@end table
```

This function returns `@code{0}` on success.

```
@end deftypefun
```

```
@deftypefun {const char *} gpgme_get_ctx_flag @
 (@w{gpgme_ctx_t @var{ctx}}, @
 @w{const char *@var{name}})
```

```
@since{1.8.0}
```

The value of flags settable by `@code{gpgme_set_ctx_flag}` can be retrieved by this function. If `@var{name}` is unknown the function returns `@code{NULL}`. For boolean flags an empty string is returned for False and the string "1" is returned for True; either `atoi(3)` or a test for an empty string can be used to get the boolean value.

```
@end deftypefun
```

```
@node Locale
@subsection Locale
@cindex locale, default
@cindex locale, of a context
```

A locale setting can be associated with a context. This locale is passed to the crypto engine, and used for applications like the PIN entry, which is displayed to the user when entering a passphrase is required.

The default locale is used to initialize the locale setting of all contexts created afterwards.

```
@deftypefun gpgme_error_t gpgme_set_locale (@w{gpgme_ctx_t @var{ctx}}, @w{int @var{category}},
@w{const char *@var{value}})
@since{0.4.3}
```

The function `gpgme_set_locale` sets the locale of the context `@var{ctx}`, or the default locale if `@var{ctx}` is a null pointer.

The locale settings that should be changed are specified by `@var{category}`. Supported categories are `LC_CTYPE`, `LC_MESSAGES`, and `LC_ALL`, which is a wildcard you can use if you want to change all the categories at once.

The value to be used for the locale setting is `@var{value}`, which will be copied to GPGME's internal data structures. `@var{value}` can be a null pointer, which disables setting the locale, and will make PIN entry and other applications use their default setting, which is usually not what you want.

Note that the settings are only used if the application runs on a text terminal, and that the settings should fit the configuration of the output terminal.

Normally, it is sufficient to initialize the default value at startup.

The function returns an error if not enough memory is available.  
@end deftypefun

```
@node Additional Logs
@subsection Additional Logs
@cindex auditlog, of the engine
@cindex auditlog
```

Additional logs can be associated with a context. These logs are engine specific and can be obtained with `gpgme_op_getauditlog`.

```
@deftypefun gpgme_error_t gpgme_op_getauditlog @
 (@w{gpgme_ctx_t @var{ctx}}, @w{gpgme_data_t @var{output}}, @
 @w{unsigned int @var{flags}})
@since{1.1.1}
```

The function `gpgme_op_getauditlog` is used to obtain additional logs as specified by `@var{flags}` into the `@var{output}` data. If

The function returns the error code `GPG_ERR_NO_ERROR` if a log could be queried from the engine, and `GPG_ERR_NOT_IMPLEMENTED` if the log specified in `@var{flags}` is not available for this engine. If no log is available `GPG_ERR_NO_DATA` is returned.

The value in `@var{flags}` is a bitwise-or combination of one or multiple of the following bit values:

`@table @code`  
`@item GPGME_AUDITLOG_DIAG`  
`@since{1.11.2}`

Obtain diagnostic output which would be written to `@code{stderr}` in interactive use of the engine. This can be used to provide additional diagnostic information in case of errors in other operations.

Note: If log-file has been set in the configuration the log will be empty and `GPG_ERR_NO_DATA` will be returned.

Implemented for: `GPGME_PROTOCOL_OpenPGP`

`@item GPGME_AUDITLOG_DEFAULT`  
`@since{1.11.2}`

This flag has the value 0 for compatibility reasons. Obtains additional information from the engine by issuing the `GETAUDITLOG` command. For `GPGME_PROTOCOL_CMS` this provides additional information about the X509 certificate chain.

Implemented for: `GPGME_PROTOCOL_CMS`

`@item GPGME_AUDITLOG_HTML`  
`@since{1.1.1}`

Same as `GPGME_AUDITLOG_DEFAULT` but in HTML.

Implemented for: `GPGME_PROTOCOL_CMS`  
`@end table`  
`@end deftypefun`

`@deftypefun`  
`gpgme_error_t gpgme_op_getauditlog_start @`  
`((@w{gpgme_ctx_t @var{ctx}}, @w{gpgme_data_t @var{output}}, @`  
`@w{unsigned int @var{flags}})`  
`@since{1.1.1}`

This is the asynchronous variant of `gpgme_op_getauditlog`.  
`@end deftp`

`@node Key Management`  
`@section Key Management`  
`@cindex key management`

Some of the cryptographic operations require that recipients or signers are specified. This is always done by specifying the respective keys that should be used for the operation. The following section describes how such keys can be selected and manipulated.

`@menu`  
\* Key objects:: Description of the key structures.  
\* Listing Keys:: Browsing the list of available keys.  
\* Information About Keys:: Requesting detailed information about keys.  
\* Manipulating Keys:: Operations on keys.  
\* Generating Keys:: Creating new key pairs.  
\* Signing Keys:: Adding key signatures to  
public keys.  
\* Exporting Keys:: Retrieving key data from the key ring.  
\* Importing Keys:: Adding keys to the key ring.  
\* Deleting Keys:: Removing keys from the key ring.  
\* Changing Passphrases:: Change the passphrase of a key.  
\* Changing TOFU Data:: Changing data pertaining to TOFU.  
\* Advanced Key Editing:: Advanced key edit operation.  
`@end menu`

`@node Key objects`  
`@subsection Key objects`

The keys are represented in GPGME by structures which may only be read by the application but never be allocated or changed. They are valid as long as the key object itself is valid.

`@deftp {Data type} gpgme_key_t`

The `gpgme_key_t` type is a pointer to a key object. It has the following members:

`@table @code`  
`@item gpgme_keylist_mode_t keylist_mode`  
`@since{0.9.0}`

The keylist mode that was active when the key was retrieved.

`@item unsigned int revoked : 1`

This is true if the key is revoked.

@item unsigned int expired

: 1

This is true if the key is expired.

@item unsigned int disabled : 1

This is true if the key is disabled.

@item unsigned int invalid : 1

This is true if the key is invalid. This might have several reasons, for a example for the S/MIME backend, it will be set during key listings if the key could not be validated due to missing certificates or unmatched policies.

@item unsigned int can\_encrypt : 1

This is true if the key (ie one of its subkeys) can be used for encryption.

@item unsigned int can\_sign : 1

This is true if the key (ie one of its subkeys) can be used to create data signatures.

@item unsigned int can\_certify : 1

This is true if the key (ie one of its subkeys) can be used to create key certificates.

@item unsigned int can\_authenticate : 1

@since{0.4.5}

This is true if the key (ie one of its subkeys) can be used for authentication.

@item unsigned int is\_qualified : 1

@since{1.1.0}

This is true if the key can be used for qualified signatures according to local government regulations.

@item unsigned int secret : 1

This is true if the key is a secret key. Note, that this will always be true even if the corresponding subkey flag may be false (offline/stub keys). This is only set if a listing of secret keys has been requested or if @code{GPGME\_KEYLIST\_MODE\_WITH\_SECRET} is active.

@item unsigned int origin : 5

@since{1.8.0}



Reserved for the origin of this key.

@item gpgme\_protocol\_t protocol

This is the protocol supported by this key.

@item char \*issuer\_serial

If @code{protocol} is @code{GPGME\_PROTOCOL\_CMS}, then this is the issuer serial.

@item char \*issuer\_name

If @code{protocol} is @code{GPGME\_PROTOCOL\_CMS}, then this is the issuer name.

@item char \*chain\_id

If @code{protocol} is @code{GPGME\_PROTOCOL\_CMS}, then this is the chain ID, which can be used to build the certificate chain.

@item gpgme\_validity\_t owner\_trust

If @code{protocol} is @code{GPGME\_PROTOCOL\_OpenPGP}, then this is the owner trust.

@item gpgme\_subkey\_t subkeys

This is a linked

list with the subkeys of the key. The first subkey in the list is the primary key and usually available.

@item gpgme\_user\_id\_t uids

This is a linked list with the user IDs of the key. The first user ID in the list is the main (or primary) user ID.

@item char \*fpr

@since{1.7.0}

This field gives the fingerprint of the primary key. Note that this is a copy of the fingerprint of the first subkey. For an incomplete key (for example from a verification result) a subkey may be missing but this field may be set nevertheless.

@item unsigned long last\_update

@since{1.8.0}

Reserved for the time of the last update of this key.

@end table

@end deftp

@def {Data type} gpgme\_subkey\_t  
@since{1.5.0}

The @code{gpgme\_subkey\_t} type is a pointer to a subkey structure. Subkeys are one component of a @code{gpgme\_key\_t} object. In fact, subkeys are those parts that contains the real information about the individual cryptographic keys that belong to the same key object. One @code{gpgme\_key\_t} can contain several subkeys. The first subkey in the linked list is also called the primary key.

The subkey structure has the following members:

@table @code  
@item gpgme\_subkey\_t next  
This is a pointer to the next subkey structure in the linked list, or @code{NULL} if this is the last element.

@item unsigned int revoked : 1  
This is true if the subkey is revoked.

@item unsigned int expired : 1  
This is true if the subkey is expired.

@item unsigned int disabled : 1  
This is true if the subkey is disabled.

@item unsigned int invalid : 1  
This is true if the subkey is invalid.

@item unsigned int can\_encrypt : 1  
This is true if the subkey can be used for encryption.

@item unsigned int can\_sign : 1  
This is true if the subkey can be used to create data signatures.

@item unsigned int can\_certify : 1  
This is true if the subkey can be used to create key certificates.

@item unsigned int can\_authenticate : 1  
@since{0.4.5}

This is true if the subkey can be used for authentication.

@item  
unsigned int is\_qualified : 1  
@since{1.1.0}

This is true if the subkey can be used for qualified signatures according to local government regulations.

@item unsigned int is\_de\_vs : 1  
@since{1.8.0}

This is true if the subkey complies with the rules for classified information in Germany at the restricted level (VS-NfD). This are currently RSA keys of at least 2048 bits or ECDH/ECDSA keys using a Brainpool curve.

@item unsigned int secret : 1

This is true if the subkey is a secret key. Note that it will be false if the key is actually a stub key; i.e. a secret key operation is currently not possible (offline-key). This is only set if a listing of secret keys has been requested or if @code{GPGME\_KEYLIST\_MODE\_WITH\_SECRET} is active.

@item gpgme\_pubkey\_algo\_t pubkey\_algo

This is the public key algorithm supported by this subkey.

@item unsigned int length

This is the length of the subkey (in bits).

@item char \*keyid

This is the key ID of the subkey in hexadecimal digits.

@item char

\*fpr

This is the fingerprint of the subkey in hexadecimal digits, if available.

@item char \*keygrip

@since{1.7.0}

The keygrip of the subkey in hex digit form or @code{NULL} if not available.

@item long int timestamp

This is the creation timestamp of the subkey. This is -1 if the timestamp is invalid, and 0 if it is not available.

@item long int expires

This is the expiration timestamp of the subkey, or 0 if the subkey does not expire.

@item unsigned int is\_cardkey : 1

@since{1.2.0}

True if the secret key is stored on a smart card.

@item char \*card\_number  
@since{1.2.0}

The serial number of a smart card holding this key or @code{NULL}.

@item char \*curve  
For ECC algorithms the name of the curve.

@end table  
@end deftp

@deftp {Data type} gpgme\_user\_id\_t

A user ID is a component of a @code{gpgme\_key\_t} object. One key can have many user IDs. The first one in the list is the main (or primary) user ID.

The user ID structure has the following members.

@table @code  
@item gpgme\_user\_id\_t  
next  
This is a pointer to the next user ID structure in the linked list, or @code{NULL} if this is the last element.

@item unsigned int revoked : 1  
This is true if the user ID is revoked.

@item unsigned int invalid : 1  
This is true if the user ID is invalid.

@item gpgme\_validity\_t validity  
This specifies the validity of the user ID.

@item char \*uid  
This is the user ID string.

@item char \*name  
This is the name component of @code{uid}, if available.

@item char \*comment  
This is the comment component of @code{uid}, if available.

@item char \*email  
This is the email component of @code{uid}, if available.

@item char \*address;

The mail address (addr-spec from RFC-5322) of the user ID string. This is general the same as the @code{email} part of this structure but might be slightly different. If no mail address is available @code{NULL} is stored.

@item gpgme\_tofu\_info\_t tofu  
@since{1.7.0}

If not @code{NULL} information from the TOFU database pertaining to this user id.

@item  
gpgme\_key\_sig\_t signatures  
This is a linked list with the signatures on this user ID.

@item unsigned int origin : 5  
@since{1.8.0}

Reserved for the origin of this user ID.

@item unsigned long last\_update  
@since{1.8.0}

Reserved for the time of the last update of this user ID.

@end table  
@end deftp

@deftp {Data type} gpgme\_tofu\_info\_t  
  
@since{1.7.0}

The @code{gpgme\_tofu\_info\_t} type is a pointer to a tofu info structure. Tofu info structures are one component of a @code{gpgme\_user\_id\_t} object, and provide information from the TOFU database pertaining to the user ID.

The tofu info structure has the following members:

@table @code  
@item gpgme\_key\_sig\_t next  
This is a pointer to the next tofu info structure in the linked list, or @code{NULL} if this is the last element.

@item unsigned int validity : 3

This is the TOFU validity. It can have the following values:

@table @code

@item 0

The value @code{0} indicates a conflict.

@item 1

The value @code{1} indicates a key without history.

@item 2

The value @code{2} indicates a key with too little history.

@item 3

The value @code{3} indicates a key with enough history for basic trust.

@item 4

The value @code{4} indicates a key with a lot of history.

@end table

@item unsigned int policy : 4

This is the TOFU policy, see @code{gpgme\_tofu\_policy\_t}.

@item unsigned short signcount

This is the number of signatures seen for this binding (or @code{USHRT\_MAX} if there are more than that).

@item unsigned short encrcount

This is the number of encryptions done with this binding (or @code{USHRT\_MAX} if there are more than that).

@item unsigned long signfirst

Number of seconds since Epoch when the first signature was seen with this binding.

@item unsigned long signlast

Number of seconds since Epoch when the last signature was seen with this binding.

@item unsigned long encrfirst

Number of seconds since Epoch when the first encryption was done with this binding.

@item unsigned long enclast

Number of seconds since  
Epoch when the last encryption was done with  
this binding.

@item char \*description

A human-readable string summarizing the TOFU data (or NULL).

@end table

@end deftp

@deftp {Data type} gpgme\_key\_sig\_t

The @code{gpgme\_key\_sig\_t} type is a pointer to a key signature structure.

Key signatures are one component of a @code{gpgme\_key\_t} object, and validate user IDs on the key in the OpenPGP protocol.

The signatures on a key are only available if the key was retrieved via a listing operation with the @code{GPGME\_KEYLIST\_MODE\_SIGS} mode enabled, because it can be expensive to retrieve all signatures of a key.

The signature notations on a key signature are only available if the key was retrieved via a listing operation with the @code{GPGME\_KEYLIST\_MODE\_SIG\_NOTATIONS} mode enabled, because it can be expensive to retrieve all signature notations.

The key signature structure has the following members:

@table @code

@item gpgme\_key\_sig\_t next

This is a pointer to the next key signature structure in the linked list, or @code{NULL} if this is the last element.

@item unsigned int revoked : 1

This is true if the key signature is a revocation signature.

@item unsigned int expired : 1

This is true if the key signature is expired.

@item unsigned int invalid : 1

This is true if the key signature is invalid.

@item unsigned int exportable : 1

This is true if the key signature is exportable.

@item gpgme\_pubkey\_algo\_t pubkey\_algo

This is the public key algorithm used to create the signature.

@item char \*keyid

This is the key ID of the key (in hexadecimal digits) used to create the signature.

@item long int timestamp

This is the creation timestamp of the key signature. This is -1 if the timestamp is invalid, and 0 if it is not available.

@item long int expires

This is the expiration timestamp of the key signature, or 0 if the key signature does not expire.

@item gpgme\_error\_t status

This is the status of the signature and has the same meaning as the member of the same name in a @code{gpgme\_signature\_t} object.

@item unsigned int sig\_class

This specifies the signature class of the key signature. The meaning is specific to the crypto engine.

@item char \*uid

This is the main user ID of the key used to create the signature.

@item char \*name

This is the name component of @code{uid}, if available.

@item char \*comment

This is the comment component of @code{uid}, if available.

@item char \*email

This is the email component of @code{uid}, if available.

@item gpgme\_sig\_notation\_t notations

This is a linked list with the notation data and policy URLs.

@end table

@end deftp

@node Listing Keys

@subsection Listing Keys

@cindex listing keys

@cindex key listing

@cindex key listing, start

@cindex key ring, list

@cindex key ring, search

@deftypedefun gpgme\_error\_t gpgme\_op\_keylist\_start (@w{gpgme\_ctx\_t @var{ctx}}, @w{const char



```
*@var{pattern}}, @w{int @var{secret_only}})
```

The function `gpgme_op_keylist_start` initiates a key listing operation inside the context `@var{ctx}`. It sets everything up so that subsequent invocations of `gpgme_op_keylist_next` return the keys in the list.

If `@var{pattern}` is `NULL`, all available keys are returned. Otherwise, `@var{pattern}` contains an engine specific expression that is used to limit the list to all keys matching the pattern. Note that the total length of the pattern is restricted to an engine-specific maximum (a couple of hundred characters are usually accepted). The pattern should be used to restrict the search to a certain common name or user, not to list many specific keys at once by listing their fingerprints or key IDs.

If `@var{secret_only}` is not `0`, the list is restricted to secret keys only.

The context will be busy until either all keys are received (and `gpgme_op_keylist_next` returns `GPG_ERR_EOF`), or `gpgme_op_keylist_end` is called to finish the operation.

The function returns the error code `GPG_ERR_INV_VALUE` if `@var{ctx}` is not a valid pointer, and passes through any errors that are reported by the crypto engine support routines.

```
@end deftypefun
```

```
@deftypefun gpgme_error_t gpgme_op_keylist_ext_start (@w{gpgme_ctx_t @var{ctx}}, @w{const char
*@var{pattern}}[], @w{int @var{secret_only}}, @w{int @var{reserved}})
```

The function `gpgme_op_keylist_ext_start` initiates an extended key listing operation inside the context `@var{ctx}`. It sets everything up so that subsequent invocations of `gpgme_op_keylist_next` return the keys in the list.

If `@var{pattern}` or `@var{*pattern}` is `NULL`, all available keys are returned. Otherwise, `@var{pattern}` is a `NULL` terminated array of strings that are used to limit the list to all keys matching at least one of the patterns verbatim. Note that the total length of all patterns is restricted to an engine-specific maximum (the exact limit also depends on the number of patterns and amount of quoting required, but a couple of hundred characters are usually accepted).

Patterns

should be used to restrict the search to a certain common name or user, not to list many specific keys at once by listing their

fingerprints or key IDs.

If `@var{secret_only}` is not `@code{0}`, the list is restricted to secret keys only.

The value of `@var{reserved}` must be `@code{0}`.

The context will be busy until either all keys are received (and `@code{gpgme_op_keylist_next}` returns `@code{GPG_ERR_EOF}`), or `@code{gpgme_op_keylist_end}` is called to finish the operation.

The function returns the error code `@code{GPG_ERR_INV_VALUE}` if `@var{ctx}` is not a valid pointer, and passes through any errors that are reported by the crypto engine support routines.

@end deotypefun

```
@deftypefun gpgme_error_t gpgme_op_keylist_from_data_start @
 (@w{gpgme_ctx_t @var{ctx}}, @
 @w{gpgme_data_t @var{data}}, @
 @w{int @var{reserved}})
```

@since{1.8.0}

The function `@code{gpgme_op_keylist_from_data_start}` initiates a key listing operation inside the context `@var{ctx}`. In

contrast to the

other key listing operation the keys are read from the supplied `@var{data}` and not from the local key database. The keys are also not imported into the local key database. The function sets everything up so that subsequent invocations of `@code{gpgme_op_keylist_next}` return the keys from `@var{data}`.

The value of `@var{reserved}` must be `@code{0}`.

This function requires at least GnuPG version 2.1.14 and currently works only with OpenPGP keys.

The context will be busy until either all keys are received (and `@code{gpgme_op_keylist_next}` returns `@code{GPG_ERR_EOF}`), or `@code{gpgme_op_keylist_end}` is called to finish the operation.

While the context is busy `@var{data}` may not be released.

The function returns the error code `@code{GPG_ERR_INV_VALUE}` if `@var{ctx}` is not a valid pointer, and passes through any errors that are reported by the crypto engine support routines.

@end deotypefun

```
@deftypefun gpgme_error_t gpgme_op_keylist_next (@w{gpgme_ctx_t @var{ctx}}, @w{gpgme_key_t
```

```
*@var{r_key}))
```

The function `gpgme_op_keylist_next` returns the next key in the list created by a previous `gpgme_op_keylist_start` operation in the context `ctx`. The key will have one reference for the user. [Manipulating Keys](#).

This is the only way to get at `gpgme_key_t` objects in `GPGME`.

If the last key in the list has already been returned, `gpgme_op_keylist_next` returns `GPG_ERR_EOF`.

The function returns the error code `GPG_ERR_INV_VALUE` if `ctx` or `r_key` is not a valid pointer, and `GPG_ERR_ENOMEM` if there is not enough memory for the operation.

```
@end deftypefun

@deftypefun gpgme_error_t gpgme_op_keylist_end (@w{gpgme_ctx_t ctx})
```

The function `gpgme_op_keylist_end` ends a pending key list operation in the context `ctx`.

After the operation completed successfully, the result of the key listing operation can be retrieved with `gpgme_op_keylist_result`.

The function returns the error code `GPG_ERR_INV_VALUE` if `ctx` is not a valid pointer, and `GPG_ERR_ENOMEM` if at some time during the operation there was not enough memory available.

The following example illustrates how all keys containing a certain string (`g10code`) can be listed with their key ID and the name and email address of the main user ID:

```
@example
gpgme_ctx_t ctx;
gpgme_key_t key;
gpgme_error_t err = gpgme_new (&ctx);

if (!err)
@{
 err = gpgme_op_keylist_start (ctx, "g10code", 0);
 while (!err)
 @{
 err = gpgme_op_keylist_next (ctx, &key);
```

```

 if (err)
 break;
 printf ("%s:", key->subkeys->keyid);
 if (key->uids && key->uids->name)
 printf (" %s", key->uids->name);
 if (key->uids && key->uids->email)
 printf (" <%s>", key->uids->email);
 putchar ('\n');
 gpgme_key_release (key);
@}
gpgme_release (ctx);
@}
if (gpg_err_code (err) != GPG_ERR_EOF)
@{
 fprintf (stderr,
"can not list keys: %s\n", gpgme_strerror (err));
 exit (1);
@}
@end example

```

@defun {Data type} {gpgme\_keylist\_result\_t}

This is a pointer to a structure used to store the result of a @code{gpgme\_op\_keylist\_\*} operation. After successfully ending a key listing operation, you can retrieve the pointer to the result with @code{gpgme\_op\_keylist\_result}. The structure contains the following member:

```

@table @code
@item unsigned int truncated : 1
This is true if the crypto backend had to truncate the result, and
less than the desired keys could be listed.
@end table
@end defun

```

@defun gpgme\_keylist\_result\_t gpgme\_op\_keylist\_result (@w{gpgme\_ctx\_t @var{ctx}})

The function @code{gpgme\_op\_keylist\_result} returns a @code{gpgme\_keylist\_result\_t} pointer to a structure holding the result of a @code{gpgme\_op\_keylist\_\*} operation. The pointer is only valid if the last operation on the context was a key listing operation, and if this operation finished successfully. The returned pointer is only valid until the next operation is started on the context.

@end defun

In a simple program, for which a blocking operation is acceptable, the following function can be used to retrieve a single key.

```
@deftypefun gpgme_error_t gpgme_get_key (@w{gpgme_ctx_t @var{ctx}}, @w{const char *@var{fpr}},
@w{gpgme_key_t *@var{r_key}}, @w{int @var{secret}})
```

The function `gpgme_get_key` gets the key with the fingerprint (or key ID) `@var{fpr}` from the crypto backend and return it in `@var{r_key}`. If `@var{secret}` is true, get the secret key. The currently active keylist mode is used to retrieve the key. The key will have one reference for the user.

If the key is not found in the keyring, `gpgme_get_key` returns the error code `GPG_ERR_EOF` and `*@var{r_key}` will be set to `NULL`.

The function returns the error code `GPG_ERR_INV_VALUE` if `@var{ctx}` or `@var{r_key}` is not a valid pointer or `@var{fpr}` is not a fingerprint or key ID, `GPG_ERR_AMBIGUOUS_NAME` if the key ID was not a unique specifier for a key, and `GPG_ERR_ENOMEM` if at some time during the operation there was not enough memory available.

```
@end deftypefun
```

**@node Information About Keys**

**@subsection Information About Keys**

**@cindex** key, information about

**@cindex** key, attributes

**@cindex** attributes, of a key

Please see the beginning of this section for more information about `gpgme_key_t` objects.

**@deftp {Data type} gpgme\_validity\_t**

The `gpgme_validity_t` type is used to specify the validity of a user ID in a key. The following validities are defined:

**@table @code**

**@item GPGME\_VALIDITY\_UNKNOWN**

The user ID is of unknown validity. The string representation of this validity is ```?''`.

**@item GPGME\_VALIDITY\_UNDEFINED**

The validity of the user ID is undefined. The string representation of this validity is ```q''`.

**@item GPGME\_VALIDITY\_NEVER**

The user ID is never valid. The string representation of this validity is ```n''`.

**@item GPGME\_VALIDITY\_MARGINAL**

The user ID  
is marginally valid. The string representation of this  
validity is ``m".

@item GPGME\_VALIDITY\_FULL

The user ID is fully valid. The string representation of this  
validity is ``f".

@item GPGME\_VALIDITY\_ULTIMATE

The user ID is ultimately valid. The string representation of this  
validity is ``u".

@end table

@end deftp

@node Manipulating Keys

@subsection Manipulating Keys

@cindex key, manipulation

@deftypefun void gpgme\_key\_ref (@w{gpgme\_key\_t @var{key}})

The function @code{gpgme\_key\_ref} acquires an additional reference for  
the key @var{key}.

@end deftypefun

@deftypefun void gpgme\_key\_unref (@w{gpgme\_key\_t @var{key}})

The function @code{gpgme\_key\_unref} releases a reference for the key  
@var{key}. If this was the last reference, the key will be destroyed  
and all resources associated to it will be released.

@end deftypefun

@node Generating Keys

@subsection Generating Keys

@cindex key, creation

@cindex key ring, add

GPGME provides a set of functions to create public key pairs.

Most of  
these functions require the use of GnuPG 2.1 and later; for older  
GnuPG versions the @code{gpgme\_op\_genkey} function can be used.  
Existing code which wants to update to the new functions or new code  
which shall supports older GnuPG versions may try the new functions  
first and provide a fallback to the old function if the error code  
@code{GPG\_ERR\_NOT\_SUPPORTED} is received.

@c

```

@c gpgme_op_createkey
@c
@deftypedefun gpgme_error_t gpgme_op_createkey @
 (@w{gpgme_ctx_t @var{ctx}}, @
 @w{const char *@var{userid}}, @
 @w{const char *@var{algo}}, @
 @w{unsigned long @var{reserved}}, @
 @w{unsigned long @var{expires}}, @
 @w{gpgme_key_t @var{extrakey}}, @
 @w{unsigned int @var{flags}});

@since{1.7.0}

```

The function `@code{gpgme_op_createkey}` generates a new key for the protocol active in the context `@var{ctx}`. As of now this function does only work for OpenPGP and requires at least version 2.1.13 of GnuPG.

`@var{userid}` is commonly the mail address associated with the key.

GPGME does not require a specific syntax but if more than a mail address is given, RFC-822 style format is suggested. The value is expected to be in UTF-8 encoding (i.e. no IDN encoding for mail addresses). This is a required parameter.

`@var{algo}` specifies the algorithm for the new key (actually a keypair of public and private key). For a list of supported algorithms, see the GnuPG manual. If `@var{algo}` is `@code{NULL}` or the string "default", the key is generated using the default algorithm of the engine. If the string "future-default" is used the engine may use an algorithm which is planned to be the default in a future release of the engine; however existing implementation of the protocol may not be able to already handle such future algorithms. For the OpenPGP protocol, the specification of a default algorithm, without requesting a non-default usage via `@var{flags}`, triggers the creation of a primary key plus a secondary key (subkey).

`@var{reserved}` must be set to zero.

`@var{expires}` specifies the expiration time in seconds. If you supply 0, a reasonable expiration time is chosen. Use the flag `@code{GPGME_CREATE_NOEXPIRE}` to create keys that do not expire. Note that this parameter takes an unsigned long value and not a `@code{time_t}` to avoid problems on systems which use a signed 32 bit `@code{time_t}`. Note further that the OpenPGP protocol uses 32 bit values for timestamps and thus can only encode dates up to the year 2106.

@var{extrakey} is currently not used and must be set to @code{NULL}.  
A future version of GPGME may use this parameter to create X.509 keys.

@var{flags} can be set to the bit-wise OR of the following flags:

```
@table @code
@item GPGME_CREATE_SIGN
@itemx GPGME_CREATE_ENCR
@itemx GPGME_CREATE_CERT
@itemx GPGME_CREATE_AUTH
@since{1.7.0}
```

Do not create the key with the default capabilities (key usage) of the requested algorithm but use those explicitly given by these flags:

``signing'', ``encryption'',  
``certification'', or ``authentication''.

The allowed combinations depend on the algorithm.

If any of these flags are set and a default algorithm has been selected only one key is created in the case of the OpenPGP protocol.

```
@item GPGME_CREATE_NOPASSWD
@since{1.7.0}
```

Request generation of the key without password protection.

```
@item GPGME_CREATE_SELFSIGNED
@since{1.7.0}
```

For an X.509 key do not create a CSR but a self-signed certificate.  
This has not yet been implemented.

```
@item GPGME_CREATE_NOSTORE
@since{1.7.0}
```

Do not store the created key in the local key database.  
This has not yet been implemented.

```
@item GPGME_CREATE_WANTPUB
@itemx GPGME_CREATE_WANTSEC
@since{1.7.0}
```

Return the public or secret key as part of the result structure.  
This has not yet been implemented.

```
@item GPGME_CREATE_FORCE
```



@since{1.7.0}

The engine does not allow the creation of a key with a user ID already existing in the local key database. This flag can be used to override this check.

@item GPGME\_CREATE\_NOEXPIRE

@since{1.8.0}

Request

generation of keys that do not expire.

@end table

After the operation completed successfully, information about the created key can be retrieved with @code{gpgme\_op\_genkey\_result}.

The function returns zero on success, @code{GPG\_ERR\_NOT\_SUPPORTED} if the engine does not support the command, or a bunch of other error codes.

@end deftypefun

@deftypefun gpgme\_error\_t gpgme\_op\_createkey\_start @

(@w{gpgme\_ctx\_t @var{ctx}}, @  
@w{const char \*@var{userid}}, @  
@w{const char \*@var{algo}}, @  
@w{unsigned long @var{reserved}}, @  
@w{unsigned long @var{expires}}, @  
@w{gpgme\_key\_t @var{extrakey}}, @  
@w{unsigned int @var{flags}});

@since{1.7.0}

The function @code{gpgme\_op\_createkey\_start} initiates a @code{gpgme\_op\_createkey} operation; see there for details. It must be completed by calling @code{gpgme\_wait} on the context. @xref{Waiting For Completion}.

@end deftypefun

@c

@c gpgme\_op\_createsubkey

@c

@deftypefun

gpgme\_error\_t gpgme\_op\_createsubkey @  
(@w{gpgme\_ctx\_t @var{ctx}}, @

```

@w{gpgme_key_t @var{key}}, @
@w{const char *@var{algo}}, @
@w{unsigned long @var{reserved}}, @
@w{unsigned long @var{expires}}, @
@w{unsigned int @var{flags}});

```

@since{1.7.0}

The function @code{gpgme\_op\_createsubkey} creates and adds a new subkey to the primary OpenPGP key given by @var{KEY}. The only allowed protocol in @var{ctx} is @code{GPGME\_PROTOCOL\_OPENPGP}. Subkeys (aka secondary keys) are a concept in the OpenPGP protocol to bind several keys to a primary key. As of now this function requires at least version 2.1.13 of GnuPG.

@var{key} specifies the key to operate on.

@var{algo} specifies the algorithm for the new subkey. For a list of supported algorithms, see the GnuPG manual. If @var{algo} is @code{NULL} or the string "default", the subkey is generated using the default algorithm for an encryption subkey of the engine. If the string "future-default" is used the engine may use an encryption algorithm which is planned to be the default in a future release of the engine; however existing implementation of the protocol may not be able to already handle such future algorithms.

@var{reserved} must be set to zero.

@var{expires} specifies the expiration time in seconds. If you supply 0, a reasonable expiration time is chosen. Use the flag @code{GPGME\_CREATE\_NOEXPIRE} to create keys that do not expire. Note that this parameter takes an unsigned long value and not a @code{time\_t} to avoid problems on systems which use a signed 32 bit @code{time\_t}. Note further that the OpenPGP protocol uses 32 bit values for timestamps and thus can only encode dates up to the year 2106.

@var{flags} takes the same values as described above for @code{gpgme\_op\_createkey}.

After the operation completed successfully, information about the created key can be retrieved with @code{gpgme\_op\_genkey\_result}.

The function returns zero on success, @code{GPG\_ERR\_NOT\_SUPPORTED} if the engine does not support the command, or a bunch of other error codes.

@end deftypefun

```
@deftypefun gpgme_error_t gpgme_op_createsubkey_start @
 (@w{gpgme_ctx_t @var{ctx}}, @
 @w{gpgme_key_t @var{key}}, @
 @w{const char *@var{algo}}, @
 @w{unsigned long @var{reserved}}, @
 @w{unsigned long @var{expires}}, @
 @w{unsigned int @var{flags}});
```

@since{1.7.0}

The function @code{gpgme\_op\_createsubkey\_start} initiates a @code{gpgme\_op\_createsubkey} operation; see there for details. It must be completed by calling @code{gpgme\_wait} on the context. @xref{Waiting For Completion}.

@end deftypefun

@c

@c gpgme\_op\_adduid

@c

```
@deftypefun gpgme_error_t gpgme_op_adduid @
 (@w{gpgme_ctx_t @var{ctx}}, @
 @w{gpgme_key_t @var{key}}, @
 @w{const char *@var{userid}}, @
 @w{unsigned int @var{flags}});
```

@since{1.7.0}

The function @code{gpgme\_op\_adduid} adds a new user ID to the OpenPGP key given by @var{KEY}. Adding additional user IDs after key creation is a feature of the OpenPGP protocol and thus the protocol for the context @var{ctx} must be set to OpenPGP. As of now this function requires at least version 2.1.13 of GnuPG.

@var{key} specifies the key to operate on.

@var{userid} is the user ID to add to the key. A user ID is commonly the mail address to be associated with the key. GPGME does not require a specific syntax but if more than a mail address is given, RFC-822 style format is suggested. The value is expected to be in UTF-8 encoding (i.e. no IDN encoding for mail addresses). This is a required parameter.

@var{flags} are currently not used and must be set to zero.

The function returns zero on success, @code{GPG\_ERR\_NOT\_SUPPORTED} if the engine does not support the command, or a bunch of other error codes.

@end deftypefun

```
@deftypefun gpgme_error_t gpgme_op_adduid_start @
 (@w{gpgme_ctx_t @var{ctx}}, @
 @w{gpgme_key_t @var{key}}, @
 @w{const char *@var{userid}}, @
 @w{unsigned
int @var{flags}});
```

@since{1.7.0}

The function @code{gpgme\_op\_adduid\_start} initiates a @code{gpgme\_op\_adduid} operation; see there for details. It must be completed by calling @code{gpgme\_wait} on the context. @xref{Waiting For Completion}.

@end deftypefun

@c

@c gpgme\_op\_revuid

@c

```
@deftypefun gpgme_error_t gpgme_op_revuid @
 (@w{gpgme_ctx_t @var{ctx}}, @
 @w{gpgme_key_t @var{key}}, @
 @w{const char *@var{userid}}, @
 @w{unsigned int @var{flags}});
```

@since{1.7.0}

The function @code{gpgme\_op\_revuid} revokes a user ID from the OpenPGP key given by @var{KEY}. Revoking user IDs after key creation is a feature of the OpenPGP protocol and thus the protocol for the context @var{ctx} must be set to OpenPGP. As of now this function requires at least version 2.1.13 of GnuPG.

@var{key} specifies the key to operate on.

@var{userid} is the user ID to be revoked from the key. The user ID must be given verbatim because the engine does an exact and case sensitive

match. Thus the `@code{uid}` field from the user ID object (`@code{gpgme_user_id_t}`) is to be used. This is a required parameter.

`@var{flags}` are currently not used and must be set to zero.

Note that the engine won't allow to revoke the last valid user ID. To change a user ID is better to first add the new user ID, then revoke the old one, and finally publish the key.

The function returns zero on success, `@code{GPG_ERR_NOT_SUPPORTED}` if the engine does not support the command, or a bunch of other error codes.

`@end deftypefun`

```
@deftypefun gpgme_error_t gpgme_op_revuid_start @
 (@w{gpgme_ctx_t @var{ctx}}, @
 @w{gpgme_key_t @var{key}}, @
 @w{const char *@var{userid}}, @
 @w{unsigned int @var{flags}});
```

`@since{1.7.0}`

The function `@code{gpgme_op_revuid_start}` initiates a `@code{gpgme_op_revuid}` operation; see there for details. It must be completed by calling `@code{gpgme_wait}` on the context. [@xref{Waiting For Completion}](#).

`@end deftypefun`

`@c`

`@c gpgme_op_set_uid_flag`

`@c`

`@deftypefun`

```
gpgme_error_t gpgme_op_set_uid_flag @
 (@w{gpgme_ctx_t @var{ctx}}, @
 @w{gpgme_key_t @var{key}}, @
 @w{const char *@var{userid}}, @
 @w{const char * @var{name}}, @
 @w{const char * @var{value}});
```

`@since{1.8.0}`

The function `@code{gpgme_op_set_uid_flag}` is used to set flags on a user ID from the OpenPGP key given by `@var{KEY}`. Setting flags on user IDs after key creation is a feature of the OpenPGP protocol and thus the protocol for the context `@var{ctx}` must be set to OpenPGP.

@var{key} specifies the key to operate on. This parameters is required.

@var{userid} is the user ID of the key to be manipulated. This user ID must be given verbatim because the engine does an exact and case sensitive match. Thus the @code{uid} field from the user ID object (@code{gpgme\_user\_id\_t}) is to be used. This is a required parameter.

@var{name} names the flag which is to be changed. The only currently supported flag is:

@table @code

@item

primary

This sets the primary key flag on the given user ID. All other primary key flag on other user IDs are removed. @var{value} must be given as NULL. For technical reasons this functions bumps the creation timestamp of all affected self-signatures up by one second. At least GnuPG version 2.1.20 is required.

@end table

The function returns zero on success, @code{GPG\_ERR\_NOT\_SUPPORTED} if the engine does not support the command, or a bunch of other error codes.

@end deftypefun

```
@deftypefun gpgme_error_t gpgme_op_set_uid_flag_start @
 (@w{gpgme_ctx_t @var{ctx}}, @
 @w{gpgme_key_t @var{key}}, @
 @w{const char *@var{userid}}, @
 @w{cons char * @var{name}}, @
 @w{cons char * @var{value}});
```

@since{1.8.0}

The function @code{gpgme\_op\_set\_uid\_flag\_start} initiates a @code{gpgme\_op\_set\_uid\_flag} operation; see there for details. It must be completed by calling @code{gpgme\_wait} on the context. @xref{Waiting For Completion}.

@end deftypefun

@c

@c gpgme\_op\_genkey

@c

@deftypefun

```
gpgme_error_t gpgme_op_genkey @
 (@w{gpgme_ctx_t @var{ctx}}, @
 @w{const char *@var{parms}}, @
 @w{gpgme_data_t @var{public}}, @
 @w{gpgme_data_t @var{secret}})
```

The function `@code{gpgme_op_genkey}` generates a new key pair in the context `@var{ctx}`. The meaning of `@var{public}` and `@var{secret}` depends on the crypto backend.

GPG does not support `@var{public}` and `@var{secret}`, they should be `@code{NULL}`. GnuPG will generate a key pair and add it to the standard key ring. The fingerprint of the generated key is available with `@code{gpgme_op_genkey_result}`.

GpgSM requires `@var{public}` to be a writable data object. GpgSM will generate a secret key (which will be stored by `@command{gpg-agent}`), and return a certificate request in `@var{public}`, which then needs to be signed by the certification authority and imported before it can be used. GpgSM does not make the fingerprint available.

The argument `@var{parms}` specifies parameters for the key in an string that looks something like XML. The details about the format of `@var{parms}` are specific to the crypto engine used by `@var{ctx}`. The first line of the parameters must be `@code{<GnupgKeyParams format="internal">}` and the last line must be `@code{</GnupgKeyParams>}`. Every line in between the first and last lines is treated as a Header: Value pair. In particular, no XML escaping is necessary if you need to include the characters `@code{<}`, `@code{>}`, or `@code{&}`.

Here is an example for GnuPG as the crypto engine (all parameters of OpenPGP key generation are documented in the GPG manual):

```
@example
<GnupgKeyParms format="internal">
Key-Type: default
Subkey-Type: default
Name-Real: Joe Tester
Name-Comment: with stupid passphrase
Name-Email: joe@@foo.bar
Expire-Date: 0
Passphrase: abc
</GnupgKeyParms>
@end example
```

Here is an example for GpgSM as the crypto engine (all parameters of

OpenPGP key generation are documented in the GPGSM manual):

```
@example
<GnupgKeyParms format="internal">
Key-Type:
RSA
Key-Length: 1024
Name-DN: C=de,O=g10 code,OU=Testlab,CN=Joe 2 Tester
Name-Email: joe@@foo.bar
</GnupgKeyParms>
@end example
```

Strings should be given in UTF-8 encoding. The only format supported for now is ``internal''. The content of the `GnupgKeyParms` container is passed verbatim to the crypto backend. Control statements are not allowed.

After the operation completed successfully, the result can be retrieved with `gpgme_op_genkey_result`.

The function returns the error code `GPG_ERR_NO_ERROR` if the operation could be started successfully, `GPG_ERR_INV_VALUE` if `parms` is not a well-formed string (e.g. does not have the expected tag-like headers and footers), `GPG_ERR_NOT_SUPPORTED` if `public` or `secret` is not valid, and `GPG_ERR_GENERAL` if no key was created by the backend.

```
@end deftpdefun
```

```
@deftpdefun gpgme_error_t gpgme_op_genkey_start (@w{gpgme_ctx_t @var{ctx}}, @w{const char
*@var{parms}}, @w{gpgme_data_t
@var{public}}, @w{gpgme_data_t @var{secret}})
```

The function `gpgme_op_genkey_start` initiates a `gpgme_op_genkey` operation. It can be completed by calling `gpgme_wait` on the context. [Waiting For Completion](#).

The function returns the error code `GPG_ERR_NO_ERROR` if the operation could be started successfully, `GPG_ERR_INV_VALUE` if `parms` is not a valid XML string, and `GPG_ERR_NOT_SUPPORTED` if `public` or `secret` is not `NULL`.

```
@end deftpdefun
```

```
@c
@c gpgme_op_genkey_result
@c
@c {Data type} {gpgme_genkey_result_t}
```



This is a pointer to a structure used to store the result of a `gpgme_op_genkey` operation. After successfully generating a key, you can retrieve the pointer to the result with `gpgme_op_genkey_result`. The structure contains the following members:

`@table`

`@item unsigned int primary : 1`

This flag is set to 1 if a primary key was created and to 0 if not.

`@item unsigned int sub : 1`

This

flag is set to 1 if a subkey was created and to 0 if not.

`@item unsigned int uid : 1`

This flag is set to 1 if a user ID was created and to 0 if not.

`@item char *fpr`

This is the fingerprint of the key that was created. If both a primary and a subkey were generated, the fingerprint of the primary key will be returned. If the crypto engine does not provide the fingerprint, `fpr` will be a null pointer.

`@item gpgme_data_t pubkey`

`@since{1.7.0}`

This will eventually be used to return the public key. It is currently not used.

`@item gpgme_data_t seckey`

`@since{1.7.0}`

This will eventually be used to return the secret key. It is currently not used.

`@end table`

`@end deftp`

`@deftypedef gpgme_genkey_result_t gpgme_op_genkey_result (@w{gpgme_ctx_t @var{ctx}})`

The function `gpgme_op_genkey_result` returns a `gpgme_genkey_result_t` pointer to a structure holding the result of a `gpgme_op_genkey` operation. The pointer is only valid if the last operation on the context was a `gpgme_op_genkey` or `gpgme_op_genkey_start` operation, and if this operation finished

successfully. The returned pointer is only valid until the next operation is started on the context.

@end deftypefun

@c

@c SIGNING KEYS

@c

@node Signing Keys

@subsection Signing Keys

@cindex key, signing

Key signatures are a unique concept of the OpenPGP protocol. They can be used to certify the validity of a key and are used to create the Web-of-Trust (WoT). Instead of using the @code{gpgme\_op\_interact} function along with a finite state machine, GPGME provides a convenient function to create key signatures when using modern GnuPG versions.

@c

@c gpgme\_op\_keysign

@c

@deftypefun gpgme\_error\_t gpgme\_op\_keysign @

(@w{gpgme\_ctx\_t @var{ctx}}, @

@w{gpgme\_key\_t @var{key}}, @

@w{const char \*@var{userid}}, @

@w{unsigned long @var{expires}}, @

@w{unsigned int @var{flags}});

@since{1.7.0}

The function @code{gpgme\_op\_keysign} adds a new key signature to the public key @var{KEY}. This function requires at least version 2.1.12 of GnuPG.

@var{CTX} is the usual context which describes the protocol to use (which must be OpenPGP) and has also the list of signer keys to be used for the signature. The common case is to use the default key for signing other keys. If another key or more than one key shall be used for a key signature, @code{gpgme\_signers\_add} can be used. @xref{Selecting Signers}.

@var{key} specifies the key to operate on.

@var{userid} selects the user ID or user IDs to be signed. If

`@var{userid}` is set to `@code{NULL}` all valid user IDs are signed. The user ID must be given verbatim because the engine does an exact and case sensitive match. Thus the `@code{uid}` field from the user ID object (`@code{gpgme_user_id_t}`) is to be used. To select more than one user ID put them all into one string separated by linefeed characters (`@code{\n}`) and set the flag `@code{GPGME_KEYSIGN_LFSEP}`.

`@var{expires}` specifies the expiration time of the new signature in seconds. The common case is to use 0 to not set an expiration date. However, if the configuration of the engine defines a default expiration for key signatures, that is still used unless the flag `@code{GPGME_KEYSIGN_NOEXPIRE}` is used. Note that this parameter takes an unsigned long value and not a `@code{time_t}` to avoid problems on systems which use a signed 32 bit `@code{time_t}`. Note further that the OpenPGP protocol uses 32 bit values for timestamps and thus can only encode dates up to the year 2106.

`@var{flags}` can be set to the bit-wise OR of the following flags:

|                                        |
|----------------------------------------|
| <code>@table @code</code>              |
| <code>@item GPGME_KEYSIGN_LOCAL</code> |
| <code>@since{1.7.0}</code>             |

Instead of creating an exportable key signature, create a key signature which is marked as non-exportable.

|                                        |
|----------------------------------------|
| <code>@item GPGME_KEYSIGN_LFSEP</code> |
| <code>@since{1.7.0}</code>             |

Although linefeeds are uncommon in user IDs this flag is required to explicitly declare that `@var{userid}` may contain several linefeed separated user IDs.

|                                                                                                                                                 |
|-------------------------------------------------------------------------------------------------------------------------------------------------|
| <code>@item GPGME_KEYSIGN_NOEXPIRE</code>                                                                                                       |
| Force                                                                                                                                           |
| the creation of a key signature without an expiration date. This overrides <code>@var{expire}</code> and any local configuration of the engine. |

`@end table`

The function returns zero on success, `@code{GPG_ERR_NOT_SUPPORTED}` if the engine does not support the command, or a bunch of other error codes.

`@end deftypefun`

```
@deftypefun gpgme_error_t gpgme_op_keysign_start @
 (@w{gpgme_ctx_t @var{ctx}}, @
 @w{gpgme_key_t @var{key}}, @
 @w{const char *@var{userid}}, @
 @w{unsigned long @var{expires}}, @
 @w{unsigned int @var{flags}});
```

```
@since{1.7.0}
```

The function `@code{gpgme_op_keysign_start}` initiates a `@code{gpgme_op_keysign}` operation; see there for details. It must be completed by calling `@code{gpgme_wait}` on the context. [@xref{Waiting For Completion}](#).

```
@end deftypefun
```

```
@c
```

```
@c EXPORTING KEYS
```

```
@c
```

```
@node Exporting Keys
```

```
@subsection Exporting Keys
```

```
@cindex key, export
```

```
@cindex key ring, export from
```

Exporting keys means the same as running `@command{gpg}` with the command `@option{--export}`.

However, a mode flag can be used to change the way the export works. The available mode flags are described below, they may be or-ed together.

```
@table @code
```

```
@item GPGME_EXPORT_MODE_EXTERN
```

If this bit is set, the output is send directly to the default keyserver. This is currently only allowed for OpenPGP keys. It is good practise to not send more than a few dozens key to a keyserver at one time. Using this flag requires that the `@var{keydata}` argument of the export function is set to `@code{NULL}`.

```
@item GPGME_EXPORT_MODE_MINIMAL
```

```
@since{1.3.1}
```

If this bit is set, the smallest possible key is exported. For OpenPGP keys it removes all signatures except for the latest self-signatures. For X.509 keys it has no effect.

@item GPGME\_EXPORT\_MODE\_SECRET

@since{1.6.0}

Instead of exporting the public key, the secret key is exported. This may not be combined with @code{GPGME\_EXPORT\_MODE\_EXTERN}. For X.509 the export format is PKCS#8.

@item GPGME\_EXPORT\_MODE\_RAW

@since{1.6.0}

If

this flag is used with @code{GPGME\_EXPORT\_MODE\_SECRET} for an X.509 key the export format will be changed to PKCS#1. This flag may not be used with OpenPGP.

@item GPGME\_EXPORT\_MODE\_PKCS12

@since{1.6.0}

If this flag is used with @code{GPGME\_EXPORT\_MODE\_SECRET} for an X.509 key the export format will be changed to PKCS#12 which also includes the certificate. This flag may not be used with OpenPGP.

@item GPGME\_EXPORT\_MODE\_NOUID

@since{1.12.0 - experimental}

Do not export user ids. Works only with certain gpg version.

@end table

@deftypefun gpgme\_error\_t gpgme\_op\_export (@w{gpgme\_ctx\_t @var{ctx}}, @w{const char \*@var{pattern}}, @w{gpgme\_export\_mode\_t @var{mode}}, @w{gpgme\_data\_t @var{keydata}})

The function @code{gpgme\_op\_export} extracts public keys and returns them in the data buffer @var{keydata}. The output format of the key data returned is determined by the @acronym{ASCII} armor attribute set for the context @var{ctx}, or, if that is not set, by the encoding specified for @var{keydata}.

If @var{pattern} is @code{NULL}, all available keys are returned. Otherwise, @var{pattern} contains an engine specific expression that is used to limit the list to all keys matching the pattern.

@var{mode} is usually 0; other values are described above.

The function returns the error code @code{GPG\_ERR\_NO\_ERROR} if the operation completed successfully, @code{GPG\_ERR\_INV\_VALUE} if @var{keydata} is not a valid empty data buffer, and passes through any

errors that are reported by the crypto engine support routines.

@end deftypefun

@deftypefun gpgme\_error\_t gpgme\_op\_export\_start (@w{gpgme\_ctx\_t @var{ctx}}, @w{const char \*@var{pattern}}, @w{gpgme\_export\_mode\_t @var{mode}}, @w{gpgme\_data\_t @var{keydata}})

The function @code{gpgme\_op\_export\_start} initiates a

@code{gpgme\_op\_export} operation. It can be completed by calling

@code{gpgme\_wait} on the context. @xref{Waiting For Completion}.

The function returns the error code @code{GPG\_ERR\_NO\_ERROR} if the operation

could be started successfully, and @code{GPG\_ERR\_INV\_VALUE}

if @var{keydata} is not a valid empty data buffer.

@end deftypefun

@deftypefun gpgme\_error\_t gpgme\_op\_export\_ext (@w{gpgme\_ctx\_t @var{ctx}}, @w{const char \*@var{pattern}}[], @w{gpgme\_export\_mode\_t @var{mode}}, @w{gpgme\_data\_t @var{keydata}})

The function @code{gpgme\_op\_export} extracts public keys and returns

them in the data buffer @var{keydata}. The output format of the key

data returned is determined by the @acronym{ASCII} armor attribute set

for the context @var{ctx}, or, if that is not set, by the encoding

specified for @var{keydata}.

If @var{pattern} or @var{\*pattern} is @code{NULL}, all available keys

are returned. Otherwise, @var{pattern} is a @code{NULL} terminated

array of strings that are used to limit the list to all keys matching

at least one of the patterns verbatim.

@var{mode} is usually 0; other values are described above.

The function returns the error code @code{GPG\_ERR\_NO\_ERROR} if the operation completed

successfully, @code{GPG\_ERR\_INV\_VALUE} if

@var{keydata} is not a valid empty data buffer, and passes through any

errors that are reported by the crypto engine support routines.

@end deftypefun

@deftypefun gpgme\_error\_t gpgme\_op\_export\_ext\_start (@w{gpgme\_ctx\_t @var{ctx}}, @w{const char \*@var{pattern}}[], @w{gpgme\_export\_mode\_t @var{mode}}, @w{gpgme\_data\_t @var{keydata}})

The function @code{gpgme\_op\_export\_ext\_start} initiates a

@code{gpgme\_op\_export\_ext} operation. It can be completed by calling

@code{gpgme\_wait} on the context. @xref{Waiting For Completion}.

The function returns the error code @code{GPG\_ERR\_NO\_ERROR} if the

operation could be started successfully, and @code{GPG\_ERR\_INV\_VALUE}

if @var{keydata} is not a valid empty data buffer.

@end deftypefun

```
@deftypefun gpgme_error_t gpgme_op_export_keys (@w{gpgme_ctx_t @var{ctx}}, @w{gpgme_key_t keys[]},
@w{gpgme_export_mode_t @var{mode}}, @w{gpgme_data_t @var{keydata}})
@since{1.2.0}
```

The function `@code{gpgme_op_export_keys}` extracts public keys and returns them in the data buffer `@var{keydata}`. The output format of the key data returned is determined by the `@acronym{ASCII}` armor attribute set for the context `@var{ctx}`, or, if that is not set, by the encoding specified for `@var{keydata}`.

The keys to export are taken from the `@code{NULL}` terminated array `@var{keys}`. Only keys of the currently selected protocol of `@var{ctx}` which do have a fingerprint set are considered for export. Other keys specified by the `@var{keys}` are ignored. In particular OpenPGP keys retrieved via an external key listing are not included.

`@var{mode}` is usually 0; other values are described above.

The function returns the error code `@code{GPG_ERR_NO_ERROR}` if the operation completed successfully, `@code{GPG_ERR_INV_VALUE}` if `@var{keydata}` is not a valid empty data buffer, `@code{GPG_ERR_NO_DATA}` if no useful keys are in `@var{keys}` and passes through any errors that are reported by the crypto engine support routines.

```
@end deftypefun
```

```
@deftypefun
gpgme_error_t gpgme_op_export_keys_start (@w{gpgme_ctx_t @var{ctx}}, @w{gpgme_key_t @var{keys}[]},
@w{gpgme_export_mode_t @var{mode}}, @w{gpgme_data_t @var{keydata}})
@since{1.2.0}
```

The function `@code{gpgme_op_export_keys_start}` initiates a `@code{gpgme_op_export_ext}` operation. It can be completed by calling `@code{gpgme_wait}` on the context. `@xref{Waiting For Completion}`.

The function returns the error code `@code{GPG_ERR_NO_ERROR}` if the operation could be started successfully, and `@code{GPG_ERR_INV_VALUE}` if `@var{keydata}` is not a valid empty data buffer, `@code{GPG_ERR_NO_DATA}` if no useful keys are in `@var{keys}` and passes through any errors that are reported by the crypto engine support routines.

```
@end deftypefun
```

`@node Importing Keys`

`@subsection Importing Keys`

`@cindex key, import`

`@cindex key ring, import to`

Importing keys means the same as running `@command{gpg}` with the command `@option{--import}`.

```
@deftypefun gpgme_error_t gpgme_op_import (@w{gpgme_ctx_t
@var{ctx}}, @w{gpgme_data_t @var{keydata}})
```

The function `@code{gpgme_op_import}` adds the keys in the data buffer `@var{keydata}` to the key ring of the crypto engine used by `@var{ctx}`. The format of `@var{keydata}` can be `@acronym{ASCII}` armored, for example, but the details are specific to the crypto engine.

After the operation completed successfully, the result can be retrieved with `@code{gpgme_op_import_result}`.

The function returns the error code `@code{GPG_ERR_NO_ERROR}` if the import was completed successfully, `@code{GPG_ERR_INV_VALUE}` if `@var{keydata}` if `@var{ctx}` or `@var{keydata}` is not a valid pointer, and `@code{GPG_ERR_NO_DATA}` if `@var{keydata}` is an empty data buffer.

```
@end deftypefun
```

```
@deftypefun gpgme_error_t gpgme_op_import_start (@w{gpgme_ctx_t @var{ctx}}, @w{gpgme_data_t
@var{keydata}})
```

The function `@code{gpgme_op_import_start}` initiates a `@code{gpgme_op_import}` operation. It can be completed by calling `@code{gpgme_wait}` on the context. `@xref{Waiting For Completion}`.

The function returns the error code `@code{GPG_ERR_NO_ERROR}` if the import could be started successfully, `@code{GPG_ERR_INV_VALUE}` if `@var{ctx}` or `@var{keydata}` is not a valid pointer, and `@code{GPG_ERR_NO_DATA}` if `@var{keydata}` is an empty data buffer.

```
@end deftypefun
```

```
@deftypefun gpgme_error_t gpgme_op_import_keys (@w{gpgme_ctx_t @var{ctx}}, @w{gpgme_key_t
*@var{keys}})
@since{1.2.0}
```

The function `@code{gpgme_op_import_keys}` adds the keys described by the `@code{NULL}` terminated array `@var{keys}` to the key ring of the crypto engine used by `@var{ctx}`. It is used to actually import and make keys permanent which have been retrieved from an external source (i.e. using `@code{GPGME_KEYLIST_MODE_EXTERN}`) earlier. The external keylisting must have been made with the same context configuration (in particular the same home directory). `@footnote{Thus it is a replacement for the usual workaround of exporting and then importing a key to make an X.509 key permanent.}` Note that for OpenPGP this may require



another access to the keyserver over the network.

Only keys of the currently selected protocol of `@var{ctx}` are considered for import. Other keys specified by the `@var{keys}` are ignored. As of now all considered keys must have been retrieved using the same method, i.e. the used key listing mode must be identical.

After the operation completed successfully, the result can be retrieved with `@code{gpgme_op_import_result}`.

To move keys from one home directory to another, export and import the keydata using `@code{gpgme_op_export}` and `@code{gpgme_op_import}`.

The function returns the error code `@code{GPG_ERR_NO_ERROR}` if the import was completed successfully, `@code{GPG_ERR_INV_VALUE}` if `@var{ctx}` is not a valid pointer, `@code{GPG_ERR_CONFLICT}` if the key listing mode does not match, and `@code{GPG_ERR_NO_DATA}` if no keys are considered for export.

`@end deftypefun`

`@deftypefun gpgme_error_t gpgme_op_import_keys_start (@w{gpgme_ctx_t @var{ctx}}, @w{gpgme_key_t *@var{keys}})`  
`@since{1.2.0}`

The

function `@code{gpgme_op_import_keys_start}` initiates a `@code{gpgme_op_import_keys}` operation. It can be completed by calling `@code{gpgme_wait}` on the context. `@xref{Waiting For Completion}`.

The function returns the error code `@code{GPG_ERR_NO_ERROR}` if the import was completed successfully, `@code{GPG_ERR_INV_VALUE}` if `@var{keydata}` if `@var{ctx}` or `@var{keydata}` is not a valid pointer, `@code{GPG_ERR_CONFLICT}` if the key listing mode does not match, and `@code{GPG_ERR_NO_DATA}` if no keys are considered for export.

`@end deftypefun`

`@defntp {Data type} {gpgme_import_status_t}`

This is a pointer to a structure used to store a part of the result of a `@code{gpgme_op_import}` operation. For each considered key one status is added that contains information about the result of the import. The structure contains the following members:

`@table @code`

`@item gpgme_import_status_t next`

This is a pointer to the next status structure in the linked list, or `@code{NULL}` if this is the last element.

`@item`

char \*fpr

This is the fingerprint of the key that was considered.

@item gpgme\_error\_t result

If the import was not successful, this is the error value that caused the import to fail. Otherwise the error code is

@code{GPG\_ERR\_NO\_ERROR}.

@item unsigned int status

This is a bit-wise OR of the following flags that give more information about what part of the key was imported. If the key was already known, this might be 0.

@table @code

@item GPGME\_IMPORT\_NEW

The key was new.

@item GPGME\_IMPORT\_UID

The key contained new user IDs.

@item GPGME\_IMPORT\_SIG

The key contained new signatures.

@item GPGME\_IMPORT\_SUBKEY

The key contained new sub keys.

@item GPGME\_IMPORT\_SECRET

The key contained a secret key.

@end table

@end table

@end deftp

@deftp {Data type} {gpgme\_import\_result\_t}

This is a pointer to a structure used to store the result of a

@code{gpgme\_op\_import} operation. After a successful import operation, you can retrieve the pointer to the result with

@code{gpgme\_op\_import\_result}.

The structure contains the following members:

@table @code

@item int considered

The total number of considered keys.

@item int no\_user\_id

The number of keys without user ID.

@item int imported

The total number of imported keys.

@item int imported\_rsa

The number of imported RSA keys.

@item int unchanged

The number of unchanged keys.

@item int new\_user\_ids

The number of new user IDs.

@item int new\_sub\_keys

The number of new sub keys.

@item int new\_signatures

The number of new signatures.

@item int new\_revocations

The number of new revocations.

@item int secret\_read

The total number of secret keys read.

@item int secret\_imported

The number of imported secret keys.

@item int secret\_unchanged

The number of unchanged secret keys.

@item int not\_imported

The number of keys not imported.

@item gpgme\_import\_status\_t imports

A list of gpgme\_import\_status\_t objects which contain more information about the keys for which an import was attempted.

@item int skipped\_v3\_keys

For

security reasons modern versions of GnuPG do not anymore support v3 keys (created with PGP 2.x) and ignores them on import. This counter provides the number of such skipped v3 keys.

@end table

@end deftp

@deftypedefun gpgme\_import\_result\_t gpgme\_op\_import\_result (@w{gpgme\_ctx\_t @var{ctx}})

The function @code{gpgme\_op\_import\_result} returns a

@code{gpgme\_import\_result\_t} pointer to a structure holding the result

of a `gpgme_op_import` operation. The pointer is only valid if the last operation on the context was a `gpgme_op_import` or `gpgme_op_import_start` operation, and if this operation finished successfully. The returned pointer is only valid until the next operation is started on the context.

@end deotypefun

@node Deleting Keys

@subsection Deleting Keys

@cindex key, delete

@cindex key ring, delete from

@deftypefun gpgme\_error\_t gpgme\_op\_delete\_ext (@w{gpgme\_ctx\_t @var{ctx}}, @w{const gpgme\_key\_t @var{key}}, @w{unsigned int @var{flags}})  
@since{1.9.1}

The

function `gpgme_op_delete_ext` deletes the key `@var{key}` from the key ring of the crypto engine used by `@var{ctx}`.

`@var{flags}` can be set to the bit-wise OR of the following flags:

@table @code

@item GPGME\_DELETE\_ALLOW\_SECRET

@since{1.9.1}

If not set, only public keys are deleted. If set, secret keys are deleted as well, if that is supported.

@item GPGME\_DELETE\_FORCE

@since{1.9.1}

If set, the user is not asked to confirm the deletion.

@end table

The function returns the error code `GPG_ERR_NO_ERROR` if the key was deleted successfully, `GPG_ERR_INV_VALUE` if `@var{ctx}` or `@var{key}` is not a valid pointer, `GPG_ERR_NO_PUBKEY` if `@var{key}` could not be found in the keyring, `GPG_ERR_AMBIGUOUS_NAME` if the key was not specified unambiguously, and `GPG_ERR_CONFLICT` if the secret key for `@var{key}` is available, but `@var{allow_secret}` is zero.

@end deotypefun

@deftypefun gpgme\_error\_t gpgme\_op\_delete\_ext\_start (@w{gpgme\_ctx\_t @var{ctx}}, @w{const gpgme\_key\_t @var{key}}, @w{unsigned int @var{flags}})  
@since{1.9.1}

The function `gpgme_op_delete_ext_start` initiates a `gpgme_op_delete` operation. It can be completed by calling `gpgme_wait` on the context. [Waiting For Completion](#).

The function returns the error code `GPG_ERR_NO_ERROR` if the operation was started successfully, and `GPG_ERR_INV_VALUE` if `ctx` or `key` is not a valid pointer.

`@end deftypefun`

The following functions allow only to use one particular flag.

```
@deftypefun gpgme_error_t gpgme_op_delete (@w{gpgme_ctx_t @var{ctx}}, @w{const gpgme_key_t
@var{key}}, @w{int @var{allow_secret}})
```

Similar to `gpgme_op_delete_ext`, but only the flag

`GPGME_DELETE_ALLOW_SECRET` can be provided.

`@end deftypefun`

```
@deftypefun gpgme_error_t gpgme_op_delete_start (@w{gpgme_ctx_t @var{ctx}}, @w{const gpgme_key_t
@var{key}}, @w{int @var{allow_secret}})
```

Similar to `gpgme_op_delete_ext_start`, but only the flag

`GPGME_DELETE_ALLOW_SECRET`

can be provided.

`@end deftypefun`

`@node Changing Passphrases`

`@subsection Changing Passphrases`

`@cindex passphrase, change`

```
@deftypefun gpgme_error_t gpgme_op_passwd @
(@w{gpgme_ctx_t @var{ctx}}, @
@w{const gpgme_key_t @var{key}}, @
@w{unsigned int @var{flags}})
```

`@since{1.3.0}`

The function `gpgme_op_passwd` changes the passphrase of the private key associated with `key`. The only allowed value for `flags` is `0`. The backend engine will usually popup a window to ask for the old and the new passphrase. Thus this function is not useful in a server application (where passphrases are not required anyway).

Note that old `gpg` engines (before version 2.0.15) do not support this command and will silently ignore it.

`@end deftypefun`

```
@deftypefun gpgme_error_t gpgme_op_passwd_start @
```

```
(@w{gpgme_ctx_t @var{ctx}}, @
@w{const gpgme_key_t @var{key}}, @
@w{unsigned int
@var{flags}})
```

```
@since{1.3.0}
```

The function `@code{gpgme_op_passwd_start}` initiates a `@code{gpgme_op_passwd}` operation. It can be completed by calling `@code{gpgme_wait}` on the context. `@xref{Waiting For Completion}`.

The function returns `@code{0}` if the operation was started successfully, and an error code if one of the arguments is not valid or the operation could not be started.

```
@end deftypefun
```

```
@c
```

```
@c CHANGING TOFU DATA
```

```
@c
```

```
@node Changing TOFU Data
```

```
@subsection Changing TOFU Data
```

```
@cindex validity, TOFU
```

The OpenPGP engine features a Trust-On-First-Use (TOFU) key validation model. For resolving conflicts it is necessary to declare the policy for a key. See the GnuPG manual for details on the TOFU implementation.

```
@deftp {Data type} {enum gpgme_tofu_policy_t}
@since{1.7.0}
```

```
@tindex gpgme_tofu_policy_t
```

The `@code{gpgme_tofu_policy_t}` type specifies the set of possible policy values that are supported by `@acronym{GPGME}`:

```
@table @code
```

```
@item GPGME_TOFU_POLICY_AUTO
```

```
Set the policy to
```

```
``auto".
```

```
@item GPGME_TOFU_POLICY_GOOD
```

```
Set the policy to ``good".
```

```
@item GPGME_TOFU_POLICY_BAD
```

```
Set the policy to ``bad".
```

```
@item GPGME_TOFU_POLICY_ASK
```

```
Set the policy to ``ask".
```

```
@item GPGME_TOFU_POLICY_UNKNOWN
```

```
Set the policy to ``unknown".
```

@end table

@end deftp

To change the policy for a key the following functions can be used:

```
@deftypefun gpgme_error_t gpgme_op_tofu_policy @
 (@w{gpgme_ctx_t @var{ctx}}, @
 @w{const gpgme_key_t @var{key}}, @
 @w{gpgme_tofu_policy_t @var{policy}})
```

@since{1.7.0}

The function @code{gpgme\_op\_tofu\_policy} changes the TOFU policy of @var{key}. The valid values for @var{policy} are listed above. As of now this function does only work for OpenPGP and requires at least version 2.1.10 of GnuPG.

The function returns zero on success, @code{GPG\_ERR\_NOT\_SUPPORTED} if the engine does not support the command, or a bunch of other error codes.

@end deftypefun

```
@deftypefun gpgme_error_t gpgme_op_tofu_policy_start @
```

```
 (@w{gpgme_ctx_t @var{ctx}}, @
 @w{const gpgme_key_t @var{key}}, @
 @w{gpgme_tofu_policy_t @var{policy}})
```

@since{1.7.0}

The function @code{gpgme\_op\_tofu\_policy\_start} initiates a @code{gpgme\_op\_tofu\_policy} operation. It can be completed by calling @code{gpgme\_wait} on the context. @xref{Waiting For Completion}.

The function returns @code{0} if the operation was started successfully, and an error code if one of the arguments is not valid or the operation could not be started.

@end deftypefun

@node Advanced Key Editing

@subsection Advanced Key Editing

@cindex key, edit

```
@defstp {Data type} {gpgme_error_t (*gpgme_interact_cb_t) @
```

```
(@w{void *@var{handle}}, @
@w{const char *@var{status}}, @
@w{const char *@var{args}}, @
@w{int @var{fd}}})
```

@since{1.7.0}

@tindex gpgme\_interact\_cb\_t

The @code{gpgme\_interact\_cb\_t} type is the type of functions which @acronym{GPGME} calls if it a key interact operation is on-going. The status keyword

@var{status} and the argument line @var{args} are passed through by @acronym{GPGME} from the crypto engine. An empty string represents EOF. The file descriptor @var{fd} is -1 for normal status messages. If @var{status} indicates a command rather than a status message, the response to the command should be written to @var{fd}. The @var{handle} is provided by the user at start of operation.

The function should return @code{GPG\_ERR\_FALSE} if it did not handle the status code, @code{0} for success, or any other error value.

@end deftp

```
@deftypedefun gpgme_error_t gpgme_op_interact (@w{gpgme_ctx_t @var{ctx}}, @
@w{gpgme_key_t @var{key}}, @
@w{unsigned int @var{flags}}, @
@w{gpgme_interact_cb_t @var{fnc}}, @
@w{void *@var{handle}}, @
@w{gpgme_data_t @var{out}})
```

@since{1.7.0}

The function @code{gpgme\_op\_interact} processes the key @var{KEY} interactively, using the interact callback function @var{FNC} with the handle @var{HANDLE}. The callback is invoked for every status and command request from the crypto engine. The output of the crypto engine is written to the data object @var{out}.

Note that the protocol between the callback function and the crypto engine is specific to the crypto engine and no further support in implementing this protocol correctly is provided by @acronym{GPGME}.

@var{flags} modifies the behaviour of the function; the only defined bit value is:

@table @code

@item GPGME\_INTERACT\_CARD



@since{1.7.0}

This is used for smartcard based keys and uses gpgs

@code{--card-edit} command.

@end table

The function returns @code{0} if the edit operation completes successfully, @code{GPG\_ERR\_INV\_VALUE} if @var{ctx} or @var{key} is not a valid pointer, and any error returned by the crypto engine or the edit callback handler.

@end deftypefun

```
@deftypefun gpgme_error_t gpgme_op_interact_start (@w{gpgme_ctx_t @var{ctx}}, @
 @w{gpgme_key_t @var{key}}, @
 @w{unsigned int @var{flags}}, @
 @w{gpgme_interact_cb_t @var{fnc}}, @
 @w{void
 *@var{handle}}, @
 @w{gpgme_data_t @var{out}})
```

@since{1.7.0}

The function @code{gpgme\_op\_interact\_start} initiates a @code{gpgme\_op\_interact} operation. It can be completed by calling @code{gpgme\_wait} on the context. @xref{Waiting For Completion}.

The function returns @code{0} if the operation was started successfully, and @code{GPG\_ERR\_INV\_VALUE} if @var{ctx} or @var{key} is not a valid pointer.

@end deftypefun

@node Trust Item Management

@section Trust Item Management

@cindex trust item

@strong{Caution:} The trust items interface is experimental.

@defftp {Data type} gpgme\_trust\_item\_t

The @code{gpgme\_trust\_item\_t} type is a pointer to a trust item object.

It has the following members:

@table @code

@item char \*keyid

This is a string describing the key to which this trust items belongs.

@item int type

This is the type of the trust item. A value of 1 refers to a key, a value of 2 refers to a user ID.

@item int level

This is the trust level.

@item char \*owner\_trust

The

owner trust if @code{type} is 1.

@item char \*validity

The calculated validity.

@item char \*name

The user name if @code{type} is 2.

@end table

@end deftp

@menu

\* Listing Trust Items::        Browsing the list of available trust items.

\* Manipulating Trust Items::    Operations on trust items.

@end menu

@node Listing Trust Items

@subsection Listing Trust Items

@cindex trust item list

@deftypefun gpgme\_error\_t gpgme\_op\_trustlist\_start (@w{gpgme\_ctx\_t @var{ctx}}, @w{const char \*@var{pattern}}, @w{int @var{max\_level}})

The function @code{gpgme\_op\_trustlist\_start} initiates a trust item listing operation inside the context @var{ctx}. It sets everything up so that subsequent invocations of @code{gpgme\_op\_trustlist\_next} return the trust items in the list.

The string @var{pattern} contains an engine specific expression that is used to limit the list to all trust items matching the pattern. It can not be the empty string.

The argument @var{max\_level} is currently ignored.

The context

will be busy until either all trust items are received

(and @code{gpgme\_op\_trustlist\_next} returns @code{GPG\_ERR\_EOF}), or

@code{gpgme\_op\_trustlist\_end} is called to finish the operation.

The function returns the error code `@code{GPG_ERR_INV_VALUE}` if `@var{ctx}` is not a valid pointer, and passes through any errors that are reported by the crypto engine support routines.

`@end deftypefun`

`@deftypefun gpgme_error_t gpgme_op_trustlist_next (@w{gpgme_ctx_t @var{ctx}}, @w{gpgme_trust_item_t *@var{r_item}})`

The function `@code{gpgme_op_trustlist_next}` returns the next trust item in the list created by a previous `@code{gpgme_op_trustlist_start}` operation in the context `@var{ctx}`. The trust item can be destroyed with `@code{gpgme_trust_item_release}`. `@xref{Manipulating Trust Items}`.

This is the only way to get at `@code{gpgme_trust_item_t}` objects in `@acronym{GPGME}`.

If the last trust item in the list has already been returned, `@code{gpgme_op_trustlist_next}` returns `@code{GPG_ERR_EOF}`.

The function returns the error code `@code{GPG_ERR_INV_VALUE}` if `@var{ctx}` or `@var{r_item}` is not a valid pointer, and `@code{GPG_ERR_ENOMEM}` if there is not enough memory for the operation.

`@end deftypefun`

`@deftypefun gpgme_error_t gpgme_op_trustlist_end (@w{gpgme_ctx_t @var{ctx}})`

The function `@code{gpgme_op_trustlist_end}` ends a pending trust list operation in the context `@var{ctx}`.

The function returns the error code `@code{GPG_ERR_INV_VALUE}` if `@var{ctx}` is not a valid pointer, and `@code{GPG_ERR_ENOMEM}` if at some time during the operation there was not enough memory available.

`@end deftypefun`

`@node Manipulating Trust Items`  
`@subsection Manipulating Trust Items`  
`@cindex trust item, manipulation`

`@deftypefun void gpgme_trust_item_ref (@w{gpgme_trust_item_t @var{item}})`

The function `@code{gpgme_trust_item_ref}` acquires an additional reference for the trust item `@var{item}`.

`@end deftypefun`

`@deftypefun void gpgme_trust_item_unref (@w{gpgme_trust_item_t @var{item}})`

The function `@code{gpgme_trust_item_unref}` releases a reference for the trust item `@var{item}`. If this was the last reference, the trust item will be destroyed and all resources associated to it will be

released.

@end deftypefun

@node Crypto Operations

@section Crypto Operations

@cindex cryptographic operation

Sometimes, the result of a crypto operation returns a list of invalid keys encountered in processing the request. The following structure is used to hold information about such a key.

@deftp {Data type} {gpgme\_invalid\_key\_t}

This is a pointer to a structure used to store a part of the result of a crypto operation which takes user IDs as one input parameter. The structure contains the following members:

@table @code

@item gpgme\_invalid\_key\_t next

This is a pointer to the next invalid key structure in the linked list, or @code{NULL} if this is the last element.

@item char \*fpr

The fingerprint or key ID of the invalid key encountered.

@item gpgme\_error\_t reason

An error code describing the reason why the key was found invalid.

@end table

@end deftp

@menu

\* Decrypt::                Decrypting a ciphertext.

\* Verify::                Verifying a signature.

\* Decrypt and Verify::    Decrypting a signed ciphertext.

\* Sign::                  Creating a signature.

\* Encrypt::                Encrypting a plaintext.

@end menu

@node Decrypt

@subsection Decrypt

@cindex decryption

@cindex cryptographic operation, decryption

@deftypefun gpgme\_error\_t gpgme\_op\_decrypt (@w{gpgme\_ctx\_t @var{ctx}}, @w{gpgme\_data\_t @var{cipher}}, @w{gpgme\_data\_t @var{plain}})

The function `@code{gpgme_op_decrypt}` decrypts the ciphertext in the data object `@var{cipher}` and stores it into the data object `@var{plain}`.

The function returns the error code `@code{GPG_ERR_NO_ERROR}` if the ciphertext could be decrypted successfully, `@code{GPG_ERR_INV_VALUE}` if `@var{ctx}`, `@var{cipher}` or `@var{plain}` is not a valid pointer, `@code{GPG_ERR_NO_DATA}` if `@var{cipher}` does not contain any data to decrypt, `@code{GPG_ERR_DECRYPT_FAILED}` if `@var{cipher}` is not a valid cipher text, `@code{GPG_ERR_BAD_PASSPHRASE}` if the passphrase for the secret key could not be retrieved, and passes through some errors that are reported by the crypto engine support routines.

`@end dectyfefun`

```
@dectyfefun gpgme_error_t gpgme_op_decrypt_start (@w{gpgme_ctx_t @var{ctx}}, @w{gpgme_data_t @var{cipher}}, @w{gpgme_data_t @var{plain}})
```

The function `@code{gpgme_op_decrypt_start}` initiates a `@code{gpgme_op_decrypt}` operation. It can be completed by calling `@code{gpgme_wait}` on the context. `@xref{Waiting For Completion}`.

The function returns the error code `@code{GPG_ERR_NO_ERROR}` if the operation could be started successfully, and `@code{GPG_ERR_INV_VALUE}` if `@var{cipher}` or `@var{plain}` is not a valid pointer.

`@end dectyfefun`

```
@dectyfefun gpgme_error_t gpgme_op_decrypt_ext (@
 @w{gpgme_ctx_t @var{ctx}}, @
 @w{gpgme_decrypt_flags_t @var{flags}}, @
 @w{gpgme_data_t
@var{cipher}}, @
 @w{gpgme_data_t @var{plain}})
```

`@since{1.8.0}`

The function `@code{gpgme_op_decrypt_ext}` is the same as `@code{gpgme_op_decrypt}` but has an additional argument `@var{flags}`. If `@var{flags}` is 0 both function behave identically.

The value in `@var{flags}` is a bitwise-or combination of one or multiple of the following bit values:

`@table @code`  
`@item GPGME_DECRYPT_VERIFY`  
`@since{1.8.0}`

The `@code{GPGME_DECRYPT_VERIFY}` symbol specifies that this function

shall exactly act as `gpgme_op_decrypt_verify`.

`GPGME_DECRYPT_UNWRAP`  
@since{1.8.0}

The `GPGME_DECRYPT_UNWRAP` symbol specifies that the output shall be an OpenPGP message with only the encryption layer removed. This requires GnuPG 2.1.12 and works only for OpenPGP. This is the counterpart to `GPGME_ENCRYPT_WRAP`.

@end table

The function returns the error codes as described for `gpgme_op_decrypt` respective `gpgme_op_encrypt`.  
@end deftypefun

```
@deftypefun gpgme_error_t gpgme_op_decrypt_ext_start
(@
 @w{gpgme_ctx_t @var{ctx}}, @
 @w{gpgme_decrypt_flags_t @var{flags}}, @
 @w{gpgme_data_t @var{cipher}}, @
 @w{gpgme_data_t @var{plain}})
```

@since{1.8.0}

The function `gpgme_op_decrypt_ext_start` initiates a `gpgme_op_decrypt_ext` operation. It can be completed by calling `gpgme_wait` on the context. @xref{Waiting For Completion}.

The function returns the error code `GPG_ERR_NO_ERROR` if the operation could be started successfully, and `GPG_ERR_INV_VALUE` if `@var{cipher}` or `@var{plain}` is not a valid pointer.  
@end deftypefun

@def{Data type} {gpgme\_recipient\_t}  
@since{1.1.0}

This is a pointer to a structure used to store information about the recipient of an encrypted text which is decrypted in a `gpgme_op_decrypt` operation. This information (except for the status field) is even available before the operation finished successfully, for example in a passphrase callback. The structure contains the following members:

@table @code  
@item gpgme\_recipient\_t next

This is a pointer to the next recipient structure in the linked list, or @code{NULL} if this is the last element.

@item gpgme\_pubkey\_algo\_t

The public key algorithm used in the encryption.

@item char \*keyid

This is the key ID of the key (in hexadecimal digits) used as recipient.

@item gpgme\_error\_t status

This is an error number with the error code GPG\_ERR\_NO\_SECKEY if the secret key for this recipient is not available, and 0 otherwise.

@end table

@end deftp

@deftp {Data type} {gpgme\_decrypt\_result\_t}

This is a pointer to a structure used to store the result of a

@code{gpgme\_op\_decrypt} operation. After successfully decrypting data, you can retrieve the pointer to the result with

@code{gpgme\_op\_decrypt\_result}. As with all result structures, it this structure shall be considered read-only and an application must not allocate such a structure on its own. The structure contains the following members:

@table

@code

@item char \*unsupported\_algorithm

If an unsupported algorithm was encountered, this string describes the algorithm that is not supported.

@item unsigned int wrong\_key\_usage : 1

@since{0.9.0}

This is true if the key was not used according to its policy.

@item unsigned int legacy\_cipher\_nomdc : 1

@since{1.11.2}

The message was made by a legacy algorithm without any integrity protection. This might be an old but legitimate message.

@item unsigned int is\_mime : 1;

@since{1.11.0}

The message claims that the content is a MIME object.

@item unsigned int is\_de\_vs : 1;

@since{1.10.0}

The message was encrypted in a VS-NfD compliant way. This is a specification in Germany for a restricted communication level.

@item gpgme\_recipient\_t recipients

@since{1.1.0}

This is a linked list of recipients to which this message was encrypted.

@item char \*file\_name

This is the filename of the original plaintext message file if it is known, otherwise this is a null pointer.

@item char \*session\_key

@since{1.8.0}

A

textual representation (nul-terminated string) of the session key used in symmetric encryption of the message, if the context has been set to export session keys (see @code{gpgme\_set\_ctx\_flag, "export-session-key"}), and a session key was available for the most recent decryption operation. Otherwise, this is a null pointer.

You must not try to access this member of the struct unless

@code{gpgme\_set\_ctx\_flag (ctx, "export-session-key")} returns success or @code{gpgme\_get\_ctx\_flag (ctx, "export-session-key")} returns true (non-empty string).

@item char \*symkey\_algo

@since{1.11.0}

A string with the symmetric encryption algorithm and mode using the format "<algo>.<mode>". Note that the deprecated non-MDC encryption mode of OpenPGP is given as "PGPCFB".

@end table

@end deftp

@deftypefun gpgme\_decrypt\_result\_t gpgme\_op\_decrypt\_result (@w{gpgme\_ctx\_t @var{ctx}})

The function @code{gpgme\_op\_decrypt\_result} returns a

@code{gpgme\_decrypt\_result\_t} pointer to a structure holding the

result of a @code{gpgme\_op\_decrypt} operation. The pointer is only valid if the last operation on the context was a

@code{gpgme\_op\_decrypt} or @code{gpgme\_op\_decrypt\_start} operation.

If the operation failed this might be a @code{NULL} pointer. The returned pointer is only valid until the next operation is started on the context.

@end deftypefun



@node Verify  
 @subsection Verify  
 @cindex verification  
 @cindex signature, verification  
 @cindex cryptographic operation, verification  
 @cindex cryptographic operation, signature check  
 @cindex signature notation data  
 @cindex notation data

```
@deftypefun gpgme_error_t gpgme_op_verify (@w{gpgme_ctx_t @var{ctx}}, @w{gpgme_data_t @var{sig}},
@w{gpgme_data_t @var{signed_text}}, @w{gpgme_data_t @var{plain}})
```

The function `@code{gpgme_op_verify}` verifies that the signature in the data object `@var{sig}` is a valid signature. If `@var{sig}` is a detached signature, then the signed text should be provided in `@var{signed_text}` and `@var{plain}` should be a null pointer.

Otherwise, if `@var{sig}` is a normal (or cleartext) signature, `@var{signed_text}` should be a null pointer and `@var{plain}` should be a writable data object that will contain the plaintext after successful verification.

The results of the individual signature verifications can be retrieved with `@code{gpgme_op_verify_result}`.

The function returns the error code `@code{GPG_ERR_NO_ERROR}` if the operation could be completed successfully, `@code{GPG_ERR_INV_VALUE}` if `@var{ctx}`, `@var{sig}` or `@var{plain}` is not a valid pointer, `@code{GPG_ERR_NO_DATA}` if `@var{sig}` does not contain any data to verify, and passes through any errors that are reported by the crypto engine support routines.

@end deftypefun

```
@deftypefun gpgme_error_t gpgme_op_verify_start (@w{gpgme_ctx_t @var{ctx}}, @w{gpgme_data_t
@var{sig}}, @w{gpgme_data_t @var{signed_text}}, @w{gpgme_data_t @var{plain}})
```

The function `@code{gpgme_op_verify_start}` initiates a `@code{gpgme_op_verify}` operation. It can be completed by calling `@code{gpgme_wait}` on the context. @xref{Waiting For Completion}.

The function returns the error code `@code{GPG_ERR_NO_ERROR}` if the operation could be started successfully, `@code{GPG_ERR_INV_VALUE}` if `@var{ctx}`, `@var{sig}` or `@var{plain}` is not a valid pointer, and `@code{GPG_ERR_NO_DATA}` if `@var{sig}` or `@var{plain}` does not contain any data to verify.

@end deftypefun

```
@defstp {Data type} {gpgme_sig_notation_t}
```

This is a pointer to a structure used to store a part of the result of

a `gpgme_op_verify` operation. The structure contains the following members:

`@table @code`

`@item gpgme_sig_notation_t next`

This is a pointer to the next new signature notation structure in the linked list, or `NULL` if this is the last element.

`@item char *name`

The name of the notation field. If this is `NULL`, then the member `value` will contain a policy URL.

`@item int name_len`

The length of the `name` field. For strings the length is counted without the trailing binary zero.

`@item char *value`

The value of the notation field. If `name` is `NULL`, then this is a policy URL.

`@item int value_len`

The length of the `value` field. For strings the length is counted without the trailing binary zero.

`@item gpgme_sig_notation_flags_t flags`

The accumulated flags field. This field contains the flags associated with the notation data in an accumulated form which can be used as an argument to the function `gpgme_sig_notation_add`. The value `flags` is a bitwise-or combination of one or multiple of the following bit values:

`@table @code`

`@item GPGME_SIG_NOTATION_HUMAN_READABLE`

`@since{1.1.0}`

The `GPGME_SIG_NOTATION_HUMAN_READABLE` symbol specifies that the notation data is in human readable form

`@item GPGME_SIG_NOTATION_CRITICAL`

`@since{1.1.0}`

The `GPGME_SIG_NOTATION_CRITICAL` symbol specifies that the notation data is critical.

`@end table`

`@item unsigned int human_readable : 1`

This is true if the `GPGME_SIG_NOTATION_HUMAN_READABLE` flag is set and false otherwise. This flag is only valid for notation data, not for policy URLs.

@item unsigned int critical : 1

This is true if the `GPGME_SIG_NOTATION_CRITICAL` flag is set and false otherwise. This flag is valid for notation data and policy URLs.

@end table

@end deftp

@deftp {Data type} {gpgme\_signature\_t}

This is a pointer to a structure used to store a part of the result of a `gpgme_op_verify` operation. The structure contains the following members:

@table @code

@item gpgme\_signature\_t next

This is a pointer to the next new signature structure in the linked list, or `NULL` if this is the last element.

@item gpgme\_sigsum\_t summary

This is a bit vector giving a summary of the signature status. It provides an easy interface to a defined semantic of the signature status. Checking just one bit is sufficient to see whether a signature is valid without any restrictions. This means that you can check for `GPGME_SIGSUM_VALID` like this:

@example

```
if ((sig.summary & GPGME_SIGSUM_VALID))
```

```
@{
```

```
 ..do stuff if valid..
```

```
@}
```

```
else
```

```
@{
```

```
 ..do stuff if not fully valid..
```

```
@}
```

```
@end example
```

The defined bits are:

@table @code

@item GPGME\_SIGSUM\_VALID

The signature is fully valid.

@item GPGME\_SIGSUM\_GREEN

The signature is good but one might want to display some extra

information. Check the other bits.

@item GPGME\_SIGSUM\_RED

The signature is bad. It might be useful to check other bits and display more information, i.e. a revoked certificate might not render a signature invalid when the message was received prior to the cause for the revocation.

@item GPGME\_SIGSUM\_KEY\_REVOKED

The key or at least one certificate has been revoked.

@item GPGME\_SIGSUM\_KEY\_EXPIRED

The key or one of the certificates has expired. It is probably a good idea to display the date of the expiration.

@item GPGME\_SIGSUM\_SIG\_EXPIRED

The signature has expired.

@item GPGME\_SIGSUM\_KEY\_MISSING

Can't verify due to  
a missing key or certificate.

@item GPGME\_SIGSUM\_CRL\_MISSING

The CRL (or an equivalent mechanism) is not available.

@item GPGME\_SIGSUM\_CRL\_TOO\_OLD

Available CRL is too old.

@item GPGME\_SIGSUM\_BAD\_POLICY

A policy requirement was not met.

@item GPGME\_SIGSUM\_SYS\_ERROR

A system error occurred.

@item GPGME\_SIGSUM\_TOFU\_CONFLICT

A TOFU conflict was detected.

@end table

@item char \*fpr

This is the fingerprint or key ID of the signature.

@item gpgme\_error\_t status

This is the status of the signature. In particular, the following status codes are of interest:

@table @code

@item GPG\_ERR\_NO\_ERROR

This status indicates that the signature is valid. For the combined

result this status means that all signatures are valid.

@item GPG\_ERR\_SIG\_EXPIRED

This status indicates that the signature is valid but expired. For the combined result this status means that all signatures are valid and expired.

@item GPG\_ERR\_KEY\_EXPIRED

This status indicates that the signature is valid but the key used to verify the signature has expired. For the combined result this status means that all signatures are valid and all keys are expired.

@item GPG\_ERR\_CERT\_REVOKED

This status indicates that the signature is valid but the key used to verify the signature has been revoked. For the combined result this status means that all signatures are valid and all keys are revoked.

@item GPG\_ERR\_BAD\_SIGNATURE

This status indicates that the signature is invalid. For the combined result this status means that all signatures are invalid.

@item GPG\_ERR\_NO\_PUBKEY

This status indicates that the signature could not be verified due to a missing key. For the combined result this status means that all signatures could not be checked due to missing keys.

@item GPG\_ERR\_GENERAL

This status indicates that there was some other error which prevented the signature verification.

@end table

@item gpgme\_sig\_notation\_t notations

This is a

linked list with the notation data and policy URLs.

@item unsigned long timestamp

The creation timestamp of this signature.

@item unsigned long exp\_timestamp

The expiration timestamp of this signature, or 0 if the signature does not expire.

@item unsigned int wrong\_key\_usage : 1

This is true if the key was not used according to its policy.

@item unsigned int pka\_trust : 2

This is set to the trust information gained by means of the PKA system.

Values are:

@table @code

@item 0

No PKA information available or verification not possible.

@item 1

PKA verification failed.

@item 2

PKA verification succeeded.

@item 3

Reserved for future use.

@end table

Depending on the configuration of the engine, this metric may also be reflected by the validity of the signature.

@item unsigned int chain\_model : 1

@since{1.1.6}

This is true if the validity of the signature has been checked using the chain model. In the chain model the time the signature has been created

must be within the validity period of the certificate and the time the certificate itself has been created must be within the validity period of the issuing certificate. In contrast the default validation model checks the validity of signature as well at the entire certificate chain at the current time.

@item gpgme\_validity\_t validity

The validity of the signature.

@item gpgme\_error\_t validity\_reason

If a signature is not valid, this provides a reason why.

@item gpgme\_pubkey\_algo\_t

The public key algorithm used to create this signature.

@item gpgme\_hash\_algo\_t

The hash algorithm used to create this signature.

@item char \*pka\_address

The mailbox from the PKA information or @code{NULL}.

@item gpgme\_key\_t key

@since{1.7.0}

An object describing the key used to create the signature. This key object may be incomplete in that it only conveys information

available directly with a signature. It may also be @code{NULL} if such information is not readily available.

@end table

@end

deftp

@deftp {Data type} {gpgme\_verify\_result\_t}

This is a pointer to a structure used to store the result of a

@code{gpgme\_op\_verify} operation. After verifying a signature, you can retrieve the pointer to the result with

@code{gpgme\_op\_verify\_result}. If the operation failed this might be a @code{NULL} pointer. The structure contains the following member:

@table @code

@item gpgme\_signature\_t signatures

A linked list with information about all signatures for which a verification was attempted.

@item char \*file\_name

This is the filename of the original plaintext message file if it is known, otherwise this is a null pointer. Warning: The filename is not covered by the signature.

@item unsigned int is\_mime : 1;

@since{1.11.0}

The message claims that the content is a MIME object. Warning: This flag is not covered by the signature.

@end table

@end deftp

@deftypefun gpgme\_verify\_result\_t gpgme\_op\_verify\_result (@w{gpgme\_ctx\_t @var{ctx}})

The function @code{gpgme\_op\_verify\_result}

returns a

@code{gpgme\_verify\_result\_t} pointer to a structure holding the result of a @code{gpgme\_op\_verify} operation. The pointer is only valid if the last operation on the context was a @code{gpgme\_op\_verify}, @code{gpgme\_op\_verify\_start}, @code{gpgme\_op\_decrypt\_verify} or @code{gpgme\_op\_decrypt\_verify\_start} operation, and if this operation finished successfully (for @code{gpgme\_op\_decrypt\_verify} and @code{gpgme\_op\_decrypt\_verify\_start}, the error code @code{GPG\_ERR\_NO\_DATA} counts as successful in this context). The returned pointer is only valid until the next operation is started on the context.

@end deftypefun

@node Decrypt and Verify  
@subsection Decrypt and Verify  
@cindex decryption and verification  
@cindex verification and decryption  
@cindex signature check  
@cindex cryptographic operation, decryption and verification

```
@deftypefun gpgme_error_t gpgme_op_decrypt_verify (@w{gpgme_ctx_t @var{ctx}}, @w{gpgme_data_t
@var{cipher}}, @w{gpgme_data_t @var{plain}})
```

The

function `@code{gpgme_op_decrypt_verify}` decrypts the ciphertext in the data object `@var{cipher}` and stores it into the data object `@var{plain}`. If `@var{cipher}` contains signatures, they will be verified.

After the operation completed, `@code{gpgme_op_decrypt_result}` and `@code{gpgme_op_verify_result}` can be used to retrieve more information about the signatures.

If the error code `@code{GPG_ERR_NO_DATA}` is returned, `@var{cipher}` does not contain any data to decrypt. However, it might still be signed. The information about detected signatures is available with `@code{gpgme_op_verify_result}` in this case.

The function returns the error code `@code{GPG_ERR_NO_ERROR}` if the ciphertext could be decrypted successfully, `@code{GPG_ERR_INV_VALUE}` if `@var{ctx}`, `@var{cipher}` or `@var{plain}` is not a valid pointer, `@code{GPG_ERR_NO_DATA}` if `@var{cipher}` does not contain any data to decrypt, `@code{GPG_ERR_DECRYPT_FAILED}` if `@var{cipher}` is not a valid cipher text, `@code{GPG_ERR_BAD_PASSPHRASE}` if the passphrase for the secret key could not be retrieved, and passes through any errors that are reported by the crypto engine support routines.  
@end deftypefun

```
@deftypefun gpgme_error_t gpgme_op_decrypt_verify_start (@w{gpgme_ctx_t @var{ctx}}, @w{gpgme_data_t
@var{cipher}}, @w{gpgme_data_t @var{plain}})
```

The function `@code{gpgme_op_decrypt_verify_start}` initiates a `@code{gpgme_op_decrypt_verify}` operation. It can be completed by calling `@code{gpgme_wait}` on the context. @xref{Waiting For Completion}.

The function returns the error code `@code{GPG_ERR_NO_ERROR}` if the operation could be started successfully, `@code{GPG_ERR_INV_VALUE}` if `@var{ctx}`, `@var{cipher}`, `@var{plain}` or `@var{r_stat}` is not a valid pointer, and `@code{GPG_ERR_NO_DATA}` if `@var{cipher}` does not contain any data to decrypt.



@end deftypefun

When processing mails it is sometimes useful to extract the actual mail address (the ``addr-spec") from a string. GPGME provides this helper function which uses the same semantics as the internal functions in GPGME and GnuPG:

```
@deftypefun @w{char *} gpgme_addrspec_from_uid (@w{const char *}@var{uid})
```

@since{1.7.1}

Return the mail address (called ``addr-spec" in RFC-5322) from the string @var{uid} which is assumed to be a user id (called ``address" in RFC-5322). All plain ASCII characters (i.e. those with bit 7 cleared) in the result are converted to lowercase. Caller must free the result using @code{gpgme\_free}. Returns @code{NULL} if no valid address was found (in which case @code{ERRNO} is set to @code{EINVAL}) or for other errors.

@end deftypefun

@node Sign

@subsection Sign

@cindex signature, creation

@cindex sign

@cindex cryptographic operation, signing

A signature can contain signatures by one or more keys. The set of keys used to create a signatures is contained in a context, and is applied to all following signing operations in this context (until the set is changed).

@menu

\* Selecting Signers::       How to choose the keys to sign with.

\*

  Creating a Signature::     How to create a signature.

\* Signature Notation Data::   How to add notation data to a signature.

@end menu

@node Selecting Signers

@subsubsection Selecting Signers

@cindex signature, selecting signers

@cindex signers, selecting

The key or the keys used to create a signature are stored in the

context. The following functions can be used to manipulate this list.

If no signer has been set into the context a default key is used for signing.

```
@deftypefun void gpgme_signers_clear (@w{gpgme_ctx_t @var{ctx}})
```

The function `@code{gpgme_signers_clear}` releases a reference for each key on the signers list and removes the list of signers from the context `@var{ctx}`.

Every context starts with an empty list.

```
@end deftypefun
```

```
@deftypefun gpgme_error_t gpgme_signers_add (@w{gpgme_ctx_t @var{ctx}}, @w{const gpgme_key_t @var{key}})
```

The function `@code{gpgme_signers_add}` adds the key `@var{key}` to the list of signers in the context `@var{ctx}`.

Calling this function

acquires an additional reference for the key.

```
@end deftypefun
```

```
@deftypefun @w{unsigned int} gpgme_signers_count (@w{const gpgme_ctx_t @var{ctx}})
@since{1.4.3}
```

The function `@code{gpgme_signers_count}` returns the number of signer keys in the context `@var{ctx}`.

```
@end deftypefun
```

```
@deftypefun gpgme_key_t gpgme_signers_enum (@w{const gpgme_ctx_t @var{ctx}}, @w{int @var{seq}})
```

The function `@code{gpgme_signers_enum}` returns the `@var{seq}`th key in the list of signers in the context `@var{ctx}`. An additional reference is acquired for the user.

If `@var{seq}` is out of range, `@code{NULL}` is returned.

```
@end deftypefun
```

```
@node Creating a Signature
```

```
@subsubsection Creating a Signature
```

```
@deftp {Data type} {enum gpgme_sig_mode_t}
```

```
@tindex gpgme_sig_mode_t
```

The `@code{gpgme_sig_mode_t}` type is used to specify the desired type of a signature. The following modes are available:

```
@table @code
```

```
@item GPGME_SIG_MODE_NORMAL
```

A normal signature is made, the output includes the plaintext and the

signature.

@item

GPGME\_SIG\_MODE\_DETACH

A detached signature is made.

@item GPGME\_SIG\_MODE\_CLEAR

A clear text signature is made. The @acronym{ASCII} armor and text mode settings of the context are ignored.

@end table

@end deftp

@deftypefun gpgme\_error\_t gpgme\_op\_sign (@w{gpgme\_ctx\_t @var{ctx}}, @w{gpgme\_data\_t @var{plain}}, @w{gpgme\_data\_t @var{sig}}, @w{gpgme\_sig\_mode\_t @var{mode}})

The function @code{gpgme\_op\_sign} creates a signature for the text in the data object @var{plain} and returns it in the data object

@var{sig}. The type of the signature created is determined by the

@acronym{ASCII} armor (or, if that is not set, by the encoding specified for @var{sig}), the text mode attributes set for the context

@var{ctx} and the requested signature mode @var{mode}.

After the operation completed successfully, the result can be retrieved with @code{gpgme\_op\_sign\_result}.

If an S/MIME signed message is created using the CMS crypto engine, the number of certificates to include in the message can be specified with

@code{gpgme\_set\_include\_certs}. @xref{Included Certificates}.

The function returns the error code @code{GPG\_ERR\_NO\_ERROR} if the signature could be created successfully, @code{GPG\_ERR\_INV\_VALUE} if @var{ctx}, @var{plain} or @var{sig} is not a valid pointer, @code{GPG\_ERR\_NO\_DATA} if the signature could not be created, @code{GPG\_ERR\_BAD\_PASSPHRASE} if the passphrase for the secret key could not be retrieved, @code{GPG\_ERR\_UNUSABLE\_SECKEY} if there are invalid signers, and passes through any errors that are reported by the crypto engine support routines.

@end deftypefun

@deftypefun gpgme\_error\_t gpgme\_op\_sign\_start (@w{gpgme\_ctx\_t @var{ctx}}, @w{gpgme\_data\_t @var{plain}}, @w{gpgme\_data\_t @var{sig}}, @w{gpgme\_sig\_mode\_t @var{mode}})

The function @code{gpgme\_op\_sign\_start} initiates a

@code{gpgme\_op\_sign} operation. It can be completed by calling

@code{gpgme\_wait} on the context. @xref{Waiting For Completion}.

The function returns the error code @code{GPG\_ERR\_NO\_ERROR}

if the operation could be

started successfully, and @code{GPG\_ERR\_INV\_VALUE} if @var{ctx},

@var{plain} or @var{sig} is not a valid pointer.

@end deftypefun

@deftp {Data type} {gpgme\_new\_signature\_t}

This is a pointer to a structure used to store a part of the result of a @code{gpgme\_op\_sign} operation. The structure contains the following members:

@table @code

@item gpgme\_new\_signature\_t next

This is a pointer to the next new signature structure in the linked list, or @code{NULL} if this is the last element.

@item gpgme\_sig\_mode\_t type

The type of this signature.

@item gpgme\_pubkey\_algo\_t pubkey\_algo

The public key algorithm used to create this signature.

@item gpgme\_hash\_algo\_t hash\_algo

The hash algorithm used to create this signature.

@item unsigned int sig\_class

The signature class of this signature.

@item long int timestamp

The creation timestamp of this signature.

@item char \*fpr

The fingerprint of the key which was used to create this signature.

@end table

@end deftp

@deftp

{Data type} {gpgme\_sign\_result\_t}

This is a pointer to a structure used to store the result of a @code{gpgme\_op\_sign} operation. After successfully generating a signature, you can retrieve the pointer to the result with @code{gpgme\_op\_sign\_result}. The structure contains the following members:

@table @code

@item gpgme\_invalid\_key\_t invalid\_signers

A linked list with information about all invalid keys for which a signature could not be created.

@item gpgme\_new\_signature\_t signatures

A linked list with information about all signatures created.

@end table

@end deftp

@deftypefun gpgme\_sig\_result\_t gpgme\_op\_sign\_result (@w{gpgme\_ctx\_t @var{ctx}})

The function @code{gpgme\_op\_sign\_result} returns a

@code{gpgme\_sig\_result\_t} pointer to a structure holding the result of a @code{gpgme\_op\_sign} operation. The pointer is only valid if the last operation on the context was a @code{gpgme\_op\_sign}, @code{gpgme\_op\_sign\_start}, @code{gpgme\_op\_encrypt\_sign} or @code{gpgme\_op\_encrypt\_sign\_start}

operation. If that operation failed, the function might return a @code{NULL} pointer. The returned pointer is only valid until the next operation is started on the context.

@end deftypefun

@node Signature Notation Data

@subsubsection Signature Notation Data

@cindex notation data

@cindex signature notation data

@cindex policy URL

Using the following functions, you can attach arbitrary notation data to a signature. This information is then available to the user when the signature is verified.

@deftypefun void gpgme\_sig\_notation\_clear (@w{gpgme\_ctx\_t @var{ctx}})

@since{1.1.0}

The function @code{gpgme\_sig\_notation\_clear} removes the notation data from the context @var{ctx}. Subsequent signing operations from this context will not include any notation data.

Every context starts with an empty notation data list.

@end deftypefun

@deftypefun gpgme\_error\_t gpgme\_sig\_notation\_add (@w{gpgme\_ctx\_t @var{ctx}}, @w{const char \*@var{name}}, @w{const char \*@var{value}}, @w{gpgme\_sig\_notation\_flags\_t @var{flags}})

@since{1.1.0}

The function @code{gpgme\_sig\_notation\_add} adds the notation data with the name @var{name} and the value @var{value} to the context @var{ctx}.

Subsequent signing operations will include this notation data, as well as any other notation data that was added since the creation of the

context or the last `gpgme_sig_notation_clear` operation.

The arguments `@var{name}` and `@var{value}` must be `NUL`-terminated strings in human-readable form. The flag `GPGME_SIG_NOTATION_HUMAN_READABLE` is implied (non-human-readable notation data is currently not supported). The strings must be in UTF-8 encoding.

If `@var{name}` is `NULL`, then `@var{value}` should be a policy URL.

The function `gpgme_sig_notation_add` returns the error code `GPG_ERR_NO_ERROR` if the notation data could be added successfully, `GPG_ERR_INV_VALUE` if `@var{ctx}` is not a valid pointer, or if `@var{name}`, `@var{value}` and `@var{flags}` are an invalid combination.

The function also passes through any errors that are reported by the crypto engine support routines.

`@end deftypefun`

```
@deftypefun gpgme_sig_notation_t gpgme_sig_notation_get (@w{const gpgme_ctx_t @var{ctx}})
@since{1.1.0}
```

The function `gpgme_sig_notation_get` returns the linked list of notation data structures that are contained in the context `@var{ctx}`.

If `@var{ctx}` is not a valid pointer, or there is no notation data added for this context, `NULL` is returned.

`@end deftypefun`

`@node Encrypt`

`@subsection Encrypt`

`@cindex encryption`

`@cindex cryptographic operation, encryption`

One plaintext can be encrypted for several recipients at the same time. The list of recipients is created independently of any context, and then passed to the encryption operation.

`@menu`

\* Encrypting a Plaintext::     How to encrypt a plaintext.

`@end menu`

`@node Encrypting a Plaintext`

`@subsubsection Encrypting a Plaintext`

```
@deftypefun gpgme_error_t gpgme_op_encrypt (@w{gpgme_ctx_t @var{ctx}},
```

@w{gpgme\_key\_t @var{recp}[]}, @w{gpgme\_encrypt\_flags\_t @var{flags}}, @w{gpgme\_data\_t @var{plain}}, @w{gpgme\_data\_t @var{cipher}})

The function @code{gpgme\_op\_encrypt} encrypts the plaintext in the data object @var{plain} for the recipients @var{recp} and stores the ciphertext in the data object @var{cipher}. The type of the ciphertext created is determined by the @acronym{ASCII} armor (or, if that is not set, by the encoding specified for @var{cipher}) and the text mode attributes set for the context @var{ctx}.

@var{recp} must be a @code{NULL}-terminated array of keys. The user must keep references for all keys during the whole duration of the call (but see @code{gpgme\_op\_encrypt\_start} for the requirements with the asynchronous variant).

The value in @var{flags} is a bitwise-or combination of one or multiple of the following bit values:

@table @code

@item GPGME\_ENCRYPT\_ALWAYS\_TRUST

The @code{GPGME\_ENCRYPT\_ALWAYS\_TRUST} symbol specifies that all the recipients in @var{recp} should be trusted, even if the keys do not have a high enough validity in the keyring. This flag should be used with care; in general it is not a good idea to use any untrusted keys.

@item GPGME\_ENCRYPT\_NO\_ENCRYPT\_TO

@since{1.2.0}

The @code{GPGME\_ENCRYPT\_NO\_ENCRYPT\_TO} symbol specifies that no default or hidden default recipients as configured in the crypto backend should be included. This can be useful for managing different user profiles.

@item GPGME\_ENCRYPT\_NO\_COMPRESS

@since{1.5.0}

The @code{GPGME\_ENCRYPT\_NO\_COMPRESS} symbol specifies that the plaintext shall not be compressed before it is encrypted. This is in some cases useful if the length of the encrypted message may reveal information about the plaintext.

@item GPGME\_ENCRYPT\_PREPARE

@itemx GPGME\_ENCRYPT\_EXPECT\_SIGN

The @code{GPGME\_ENCRYPT\_PREPARE} symbol is used with the UI Server protocol to prepare an encryption (i.e. sending the @code{PREP\_ENCRYPT} command). With the @code{GPGME\_ENCRYPT\_EXPECT\_SIGN} symbol the UI Server

is advised to  
also expect a sign command.

@item GPGME\_ENCRYPT\_SYMMETRIC  
@since{1.7.0}

The @code{GPGME\_ENCRYPT\_SYMMETRIC} symbol specifies that the output should be additionally encrypted symmetrically even if recipients are provided. This feature is only supported for the OpenPGP crypto engine.

@item GPGME\_ENCRYPT\_THROW\_KEYIDS  
@since{1.8.0}

The @code{GPGME\_ENCRYPT\_THROW\_KEYIDS} symbols requests that the identifiers for the decryption keys are not included in the ciphertext. On the receiving side, the use of this flag may slow down the decryption process because all available secret keys must be tried. This flag is only honored for OpenPGP encryption.

@item GPGME\_ENCRYPT\_WRAP  
@since{1.8.0}

The @code{GPGME\_ENCRYPT\_WRAP} symbol specifies that the input is an OpenPGP message and not a plain data. This is the counterpart to @code{GPGME\_DECRYPT\_UNWRAP}.

@item GPGME\_ENCRYPT\_WANT\_ADDRESS  
@since{1.11.0}

The @code{GPGME\_ENCRYPT\_WANT\_ADDRESS} symbol requests that all supplied keys or key specifications include a syntactically valid mail address. If this is not the case the operation is not even tried and the error code @code{GPG\_ERR\_INV\_USER\_ID} is returned. Only the address part of the key specification is conveyed to the backend. As of now the key must be specified using the @var{recpstring} argument of the extended encrypt functions. This feature is currently only supported for the OpenPGP crypto engine.

@end table

If @code{GPG\_ERR\_UNUSABLE\_PUBKEY} is returned, some recipients in @var{recp} are invalid, but not all. In this case the plaintext might be encrypted for all valid recipients and returned in @var{cipher} (if this happens depends on the crypto engine). More information about the invalid recipients is available with @code{gpgme\_op\_encrypt\_result}.



If `@var{recp}` is `@code{NULL}`, symmetric rather than public key encryption is performed. Symmetrically encrypted cipher text can be deciphered with `@code{gpgme_op_decrypt}`. Note that in this case the crypto

backend needs to retrieve a passphrase from the user.

Symmetric encryption is currently only supported for the OpenPGP crypto backend.

The function returns the error code `@code{GPG_ERR_NO_ERROR}` if the ciphertext could be created successfully, `@code{GPG_ERR_INV_VALUE}` if `@var{ctx}`, `@var{recp}`, `@var{plain}` or `@var{cipher}` is not a valid pointer, `@code{GPG_ERR_UNUSABLE_PUBKEY}` if `@var{recp}` contains some invalid recipients, `@code{GPG_ERR_BAD_PASSPHRASE}` if the passphrase for the symmetric key could not be retrieved, and passes through any errors that are reported by the crypto engine support routines.

`@end deftypefun`

```
@deftypefun gpgme_error_t gpgme_op_encrypt_start (@w{gpgme_ctx_t @var{ctx}}, @w{gpgme_key_t @var{recp}}[], @w{gpgme_encrypt_flags_t @var{flags}}, @w{gpgme_data_t @var{plain}}, @w{gpgme_data_t @var{cipher}})
```

The function `@code{gpgme_op_encrypt_start}` initiates a `@code{gpgme_op_encrypt}` operation. It can be completed by calling `@code{gpgme_wait}` on the context. `@xref{Waiting For Completion}`.

References to the keys only need to be held for the duration of this call. The user can release its references to the keys after this function returns, even if the operation is not yet finished.

The function returns the error code `@code{GPG_ERR_NO_ERROR}` if the operation could be started successfully, `@code{GPG_ERR_INV_VALUE}` if `@var{ctx}`, `@var{rset}`, `@var{plain}` or `@var{cipher}` is not a valid pointer, and `@code{GPG_ERR_UNUSABLE_PUBKEY}` if `@var{rset}` does not contain any valid recipients.

`@end deftypefun`

```
@deftypefun gpgme_error_t gpgme_op_encrypt_ext @
 (@w{gpgme_ctx_t @var{ctx}}, @
 @w{gpgme_key_t @var{recp}}[], @
 @w{const char *@var{recpstring}}, @
 @w{gpgme_encrypt_flags_t @var{flags}}, @
 @w{gpgme_data_t @var{plain}}, @w{gpgme_data_t @var{cipher}})
```

`@since{1.11.0}`

This is an extended version of `@code{gpgme_op_encrypt}` with `@var{recpstring}` as additional parameter. If `@var{recp}` is `NULL` and

@var{recpstring}

is not NULL, the latter is expected to be a linefeed delimited string with the set of key specifications. In contrast to @var{recp} the keys are given directly as strings and there is no need to first create key objects. Leading and trailing white space is remove from each line in @var{recpstring}. The keys are then passed verbatim to the backend engine.

For the OpenPGP backend several special keywords are supported to modify the operation. These keywords are given instead of a key specification. The currently supported keywords are:

@table @code

@item --hidden

@itemx --no-hidden

These keywords toggle between normal and hidden recipients for all following key specifications. When a hidden recipient is requested the gpg option @option{-R} (or @option{-F} in file mode) is used instead of @option{-r} (@option{-f} in file mode).

@item --file

@itemx --no-file

These keywords toggle between regular and file mode for all following key specification. In file mode the

option @option{-f} or @option{-F}

is passed to gpg. At least GnuPG version 2.1.14 is required to handle these options. The @code{GPGME\_ENCRYPT\_WANT\_ADDRESS} flag is ignored in file mode.

@item --

This keyword disables all keyword detection up to the end of the string. All keywords are treated as verbatim arguments.

@end table

To create a @var{recpstring} it is often useful to employ a strconcat style function. For example this function creates a string to encrypt to two keys:

@example

char \*

xbuild\_recstring (const char \*key1, const char \*key2)

@{

char \*result = gpgmt\_strconcat ("--\n", key1, "\n", key2, NULL);

if (!result)

@{ perror ("strconcat failed"); exit (2); @}

return result;

@}

@end example

Note the use of the double dash here; unless you want to specify a keyword, it is a good idea to avoid any possible trouble with key specifications starting with a double dash. The used `strconcat` function is available in Libgpg-error 1.28 and later; Libgpg-error (aka Gpgmt) is a dependency of GPGME. The number of arguments to `gpgmt_strconcat` is limited to 47 but that should always be sufficient. In case a larger and non-fixed number of keys are to be supplied the following code can be used:

```
@example
char *
xbuild_long_recstring (void)
@{
 gpgmt_stream_t memfp;
 const char *s;
 void *result;

 memfp = gpgmt_fopenmem (0, "w+b");
 if (!memfp)
 @ { perror ("fopenmem failed"); exit (2); @ }
 gpgmt_fputs ("--", memfp);
 while ((s = get_next_keyspec ()))
 @ {
 gpgmt_fputc ('\n', memfp);
 gpgmt_fputs (s, memfp);
 @ }
 gpgmt_fputc (0, memfp);
 if (gpgmt_ferror (memfp))
 @ { perror ("writing to memstream failed"); exit (2); @ }
 if (gpgmt_fclose_snatch (memfp, &result, NULL))
 @ { perror ("fclose_snatch failed"); exit (2); @ }
 return result;
@}
@end example
```

In this example `get_next_keyspec` is expected to return the next key to be added to the string. Please take care: Encrypting to a large number of recipients is often questionable due to security reasons and also for the technicality that all keys are currently passed on the command line to `gpg` which has as a platform specific length limitation.

@end deftypefun

```
@deftypefun gpgme_error_t gpgme_op_encrypt_ext_start @
 (@w{gpgme_ctx_t @var{ctx}}, @
 @w{gpgme_key_t @var{recp}[]}, @
 @w{const char *@var{recpstring}}, @
 @w{gpgme_encrypt_flags_t @var{flags}}, @
 @w{gpgme_data_t @var{plain}}, @w{gpgme_data_t @var{cipher}})
```

```
@since{1.11.0}
```

This is an extended version of `@code{gpgme_op_encrypt_start}` with `@var{recpstring}` as additional parameter. If `@var{recp}` is NULL and `@var{recpstring}` is not NULL, the latter is expected to be a linefeed delimited string with the set of key specifications. In contrast to `@var{recp}` the keys are given directly as strings and there is no need to first create key objects. The keys are passed verbatim to the backend engine.

```
@end deftypefun
```

```
@defntp
```

```
{Data type} {gpgme_encrypt_result_t}
```

This is a pointer to a structure used to store the result of a `@code{gpgme_op_encrypt}` operation. After successfully encrypting data, you can retrieve the pointer to the result with `@code{gpgme_op_encrypt_result}`. The structure contains the following members:

```
@table @code
```

```
@item gpgme_invalid_key_t invalid_recipients
```

A linked list with information about all invalid keys for which the data could not be encrypted.

```
@end table
```

```
@end defntp
```

```
@deftypefun gpgme_encrypt_result_t gpgme_op_encrypt_result (@w{gpgme_ctx_t @var{ctx}})
```

The function `@code{gpgme_op_encrypt_result}` returns a `@code{gpgme_encrypt_result_t}` pointer to a structure holding the result of a `@code{gpgme_op_encrypt}` operation. The pointer is only valid if the last operation on the context was a `@code{gpgme_op_encrypt}`, `@code{gpgme_op_encrypt_start}`, `@code{gpgme_op_sign}` or `@code{gpgme_op_sign_start}` operation. If this operation failed, this might be a `@code{NULL}` pointer. The returned pointer is only valid until the next operation is started on the context.

```
@end deftypefun
```

```
@deftypefun gpgme_error_t gpgme_op_encrypt_sign (@w{gpgme_ctx_t @var{ctx}}, @w{gpgme_key_t
@var{recp}}[], @w{gpgme_encrypt_flags_t @var{flags}}, @w{gpgme_data_t @var{plain}}, @w{gpgme_data_t
@var{cipher}})
```

The function `@code{gpgme_op_encrypt_sign}` does a combined encrypt and sign operation. It is used like `@code{gpgme_op_encrypt}`, but the ciphertext also contains signatures for the signers listed in `@var{ctx}`.

The combined encrypt and sign operation is currently only available for the OpenPGP crypto engine.

```
@end deftypefun
```

```
@deftypefun gpgme_error_t gpgme_op_encrypt_sign_start (@w{gpgme_ctx_t @var{ctx}}, @w{gpgme_key_t
@var{recp}}[], @w{gpgme_encrypt_flags_t @var{flags}}, @w{gpgme_data_t @var{plain}}, @w{gpgme_data_t
@var{cipher}})
```

The function `@code{gpgme_op_encrypt_sign_start}` initiates a `@code{gpgme_op_encrypt_sign}` operation. It can be completed by calling `@code{gpgme_wait}` on the context.

[@xref{Waiting For Completion}](#).

The function returns the error code `@code{GPG_ERR_NO_ERROR}` if the operation could be started successfully, and `@code{GPG_ERR_INV_VALUE}` if `@var{ctx}`, `@var{rset}`, `@var{plain}` or `@var{cipher}` is not a valid pointer.

```
@end deftypefun
```

```
@deftypefun gpgme_error_t gpgme_op_encrypt_sign_ext @
(@w{gpgme_ctx_t @var{ctx}}, @
@w{gpgme_key_t @var{recp}}[], @
@w{const char *@var{recpstring}}, @
@w{gpgme_encrypt_flags_t @var{flags}}, @
@w{gpgme_data_t @var{plain}}, @w{gpgme_data_t @var{cipher}})
```

```
@since{1.11.0}
```

This is an extended version of `@code{gpgme_op_encrypt_sign}` with `@var{recpstring}` as additional parameter. If `@var{recp}` is NULL and `@var{recpstring}` is not NULL, the latter is expected to be a linefeed delimited string with the set of key specifications. In contrast to `@var{recp}` the keys are given directly as strings and there is no need to first create the key objects. The keys are passed verbatim to the backend engine.

```
@end deftypefun
```

```
@deftypefun gpgme_error_t gpgme_op_encrypt_sign_ext_start @
```

```
(@w{gpgme_ctx_t @var{ctx}}, @
@w{gpgme_key_t @var{recp}[]}, @
@w{const char *@var{recpstring}}, @
@w{gpgme_encrypt_flags_t @var{flags}}, @
@w{gpgme_data_t @var{plain}}, @w{gpgme_data_t @var{cipher}})
```

```
@since{1.11.0}
```

This is an extended version of `@code{gpgme_op_encrypt_sign_start}` with `@var{recpstring}` as additional parameter. If `@var{recp}` is NULL and `@var{recpstring}` is not NULL, the latter is expected to be a linefeed delimited string with the set of key specifications. In contrast to `@var{recp}` the keys are given directly as strings and there is no need to first create the key objects. The keys are passed verbatim to the backend engine.

```
@end deftypefun
```

```
@node Miscellaneous
```

```
@section Miscellaneous operations
```

Here are some support functions which are sometimes useful.

```
@menu
```

```
* Running other Programs::
```

```
Running other Programs
```

```
* Using the Assuan protocol:: Using the Assuan protocol
```

```
* Checking for updates:: How to check for software updates
```

```
@end menu
```

```
@node Running other Programs
```

```
@subsection Running other Programs
```

GPGME features an internal subsystem to run the actual backend engines. Along with data abstraction object this subsystem can be used to run arbitrary simple programs which even need not be related to cryptographic features. It may for example be used to run tools which are part of the GnuPG system but are not directly accessible with the GPGME API.

```
@deftypefun gpgme_error_t gpgme_op_spawn @
```

```
(@w{gpgme_ctx_t @var{ctx}}, @w{const char *@var{file}}, @
@w{const char *@var{argv}[]}, @w{gpgme_data_t @var{datain}}, @
@w{gpgme_data_t @var{dataout}}, @w{gpgme_data_t @var{dataerr}}, @
@w{unsigned int @var{flags}})
```

@since{1.5.0}

The function @code{gpgme\_op\_spawn} runs the program @var{file} with the arguments taken from the NULL terminated array @var{argv}. If no arguments are required @var{argv} may be given as @code{NULL}. In the latter case or if @code{argv[0]} is the empty string, GPGME uses the basename of @var{file} for @code{argv[0]}. The file descriptors @code{stdin}, @code{stdout}, and @code{stderr} are connected to the data objects @var{datain}, @var{dataout}, and @var{dataerr}. If NULL is passed for one of these data objects the corresponding file descriptor is connected to @file{/dev/null}.

The value in @var{flags} is a bitwise-or combination of one or multiple of the following bit values:

@table @code  
@item GPGME\_SPAWN\_DETACHED  
@since{1.5.0}

Under Windows this flag inhibits the allocation of a new console for the program. This is useful for a GUI application which needs to call a command line helper tool.

@item GPGME\_SPAWN\_ALLOW\_SET\_FG  
@since{1.5.0}

Under Windows this flag allows the called program to put itself into the foreground.

@end table  
@end deftypefun

@deftypefun gpgme\_error\_t  
gpgme\_op\_spawn\_start @  
    (@w{gpgme\_ctx\_t @var{ctx}}, @w{const char \*@var{file}}, @  
    @w{const char \*@var{argv}[ ]}, @w{gpgme\_data\_t @var{datain}}, @  
    @w{gpgme\_data\_t @var{dataout}}, @w{gpgme\_data\_t @var{dataerr}}, @  
    @w{unsigned int @var{flags}})

@since{1.5.0}

This is the asynchronous variant of @code{gpgme\_op\_spawn}.  
@end deftypefun

@node Using the Assuan protocol  
@subsection Using the Assuan protocol

The Assuan protocol can be used to talk to arbitrary Assuan servers. By default it is connected to the GnuPG agent, but it may be connected to arbitrary servers by using `@code{gpgme_ctx_set_engine_info}`, passing the location of the servers socket as `@var{file_name}` argument, and an empty string as `@var{home_dir}` argument.

The Assuan protocol functions use three kinds of callbacks to transfer data:

```
@deftp {Data type} {gpgme_error_t (*gpgme_assuan_data_cb_t) @
 (@w{void *@var{opaque}}, @w{const void *@var{data}}, @
 @w{size_t @var{datalen}})}
```

@since{1.2.0}

This callback receives any data sent by the server. `@var{opaque}` is the pointer passed to `@code{gpgme_op_assuan_transact_start}`, `@var{data}` of length `@var{datalen}` refers to the data sent.

@end deftp

```
@deftp {Data type} {gpgme_error_t (*gpgme_assuan_inquire_cb_t) @
 (@w{void *@var{opaque}}, @w{const char *@var{name}}, @
 @w{const char *@var{args}}, @w{gpgme_data_t *@var{r_data}})}
```

@since{1.2.0}

This callback is used to provide additional data to the Assuan server. `@var{opaque}` is the pointer passed to `@code{gpgme_op_assuan_transact_start}`, `@var{name}` and `@var{args}` specify what kind of data the server requested, and `@var{r_data}` is used to return the actual data.

Note: Returning data is currently not implemented in `@acronym{GPGME}`.

@end deftp

```
@deftp {Data type} {gpgme_error_t (*gpgme_assuan_status_cb_t) @
 (@w{void *@var{opaque}}, @w{const char *@var{status}}, @
 @w{const char *@var{args}})}
```

@since{1.2.0}

This callback receives any status lines sent by the server. `@var{opaque}` is the pointer passed to `@code{gpgme_op_assuan_transact_start}`, `@var{status}` and `@var{args}` denote the status update sent.



@end deftp

```
@deftypefun gpgme_error_t gpgme_op_assuan_transact_start @
 (@w{gpgme_ctx_t @var{ctx}}, @w{const char *@var{command}}, @
 @w{gpgme_assuan_data_cb_t @var{data_cb}}, @
 @w{void * @var{data_cb_value}}, @
 @w{gpgme_assuan_inquire_cb_t @var{inquire_cb}}, @
 @w{void * @var{inquire_cb_value}}, @
 @w{gpgme_assuan_status_cb_t @var{status_cb}}, @
 @w{void * @var{status_cb_value}})
```

@since{1.2.0}

Send the Assuan @var{command} and return results via the callbacks.  
Any callback may be @code{NULL}. The result of the operation may be  
retrieved using @code{gpgme\_wait\_ext}.

Asynchronous variant.

@end deftypefun

```
@deftypefun gpgme_error_t gpgme_op_assuan_transact_ext @
 (@w{gpgme_ctx_t @var{ctx}}, @w{const char
 *@var{command}}, @
 @w{gpgme_assuan_data_cb_t @var{data_cb}}, @
 @w{void * @var{data_cb_value}}, @
 @w{gpgme_assuan_inquire_cb_t @var{inquire_cb}}, @
 @w{void * @var{inquire_cb_value}}, @
 @w{gpgme_assuan_status_cb_t @var{status_cb}}, @
 @w{void * @var{status_cb_value}}, @
 @w{gpgme_error_t *@var{op_err}})
```

Send the Assuan @var{command} and return results via the callbacks.  
The result of the operation is returned in @var{op\_err}.

Synchronous variant.

@end deftypefun

@node Checking for updates

@subsection How to check for software updates

The GnuPG Project operates a server to query the current versions of  
software packages related to GnuPG. GPGME can be used to  
access this online database and check whether a new version of a  
software package is available.

```
@deftp {Data type} {gpgme_query_swdb_result_t}
```

@since{1.8.0}

This is a pointer to a structure used to store the result of a `gpgme_op_query_swdb` operation. After successful call to that function, you can retrieve the pointer to the result with `gpgme_op_query_swdb_result`. The structure contains the following member:

`@table @code`

`@item name`

This is the name of the package.

`@item iversion`

The currently installed version or an empty string. This value is either a copy of the argument given to `gpgme_op_query_swdb` or the version of the installed software as figured out by GPGME or GnuPG.

`@item created`

This gives the date the file with the list of version numbers has originally been created by the GnuPG project.

`@item retrieved`

This gives the date the file was downloaded.

`@item warning`

If this flag is set either an error has occurred or some of the information in this structure are not properly set. For example if the version number of the installed software could not be figured out, the `@code{update}` flag may not reflect a required update status.

`@item update`

If this flag is set an update of the software is available.

`@item urgent`

If this flag is set an available update is important.

`@item noinfo`

If this flag is set, no valid information could be retrieved.

`@item unknown`

If this flag is set the given `@code{name}` is not known.

`@item tooold`

If this flag is set the available information is not fresh enough.

`@item error`

If this flag is set some other error has occurred.

@item version

The version string of the latest released version.

@item reldate

The release date of the latest released version.

@end table

@end deftp

@deftypefun gpgme\_error\_t gpgme\_op\_query\_swdb @

((@w{gpgme\_ctx\_t @var{ctx}}, @

@w{const char \*@var{name}}, @

@w{const char \*@var{iversion}}, @

@w{gpgme\_data\_t @var{reserved}}))

@since{1.8.0}

Query the software version database for software package @var{name} and check against the installed version given by @var{iversion}. If @var{iversion} is given as @code{NULL} a check is only done if GPGME can figure

out the version by itself (for example when using "gpgme" or "gnupg"). If @code{NULL} is used for @var{name} the current gpgme version is checked. @var{reserved} must be set to 0.

@end deftypefun

@deftypefun gpgme\_query\_swdb\_result\_t gpgme\_op\_query\_swdb\_result @

((@w{gpgme\_ctx\_t @var{ctx}}))

@since{1.8.0}

The function @code{gpgme\_op\_query\_swdb\_result} returns a @code{gpgme\_query\_swdb\_result\_t} pointer to a structure holding the result of a @code{gpgme\_op\_query\_swdb} operation. The pointer is only valid if the last operation on the context was a successful call to @code{gpgme\_op\_query\_swdb}. If that call failed, the result might be a @code{NULL} pointer. The returned pointer is only valid until the next operation is started on the context @var{ctx}.

@end deftypefun

@noindent

Here is an example on how to check whether GnuPG is current:

@example

```
#include <gpgme.h>
```

```

int
main (void)
@{
 gpg_error_t err;
 gpgme_ctx_t ctx;
 gpgme_query_swdb_result_t result;

 gpgme_check_version
 (NULL);
 err = gpgme_new (&ctx);
 if (err)
 fprintf (stderr, "error creating context: %s\n", gpg_strerror (err));
 else
 @{
 gpgme_set_protocol (ctx, GPGME_PROTOCOL_GPGCONF);

 err = gpgme_op_query_swdb (ctx, "gnupg", NULL, 0);
 if (err)
 fprintf (stderr, "error querying swdb: %s\n", gpg_strerror (err));
 else
 @{
 result = gpgme_op_query_swdb_result (ctx);
 if (!result)
 fprintf (stderr, "error querying swdb\n");
 if (!result->warning && !result->update)
 printf ("GnuPG version %s is current\n",
 result->iversion);
 else if (!result->warning && result->update)
 printf ("GnuPG version %s can be updated to %s\n",
 result->iversion, result->version);
 else
 fprintf (stderr, "error finding the update status\n");
 @}
 gpgme_release (ctx);
 @}
 return 0;
@}
@end example

```

@node Run Control

@section

Run Control

@cindex run control

@cindex cryptographic operation, running

@acronym{GPGME} supports running operations synchronously and asynchronously. You can use asynchronous operation to set up a

context up to initiating the desired operation, but delay performing it to a later point.

Furthermore, you can use an external event loop to control exactly when `@acronym{GPGME}` runs. This ensures that `@acronym{GPGME}` only runs when necessary and also prevents it from blocking for a long time.

`@menu`

- \* `Waiting For Completion::`      Waiting until an operation is completed.
- \* `Using External Event Loops::`    Advanced control over what happens when.
- \* `Cancellation::`                How to end pending operations prematurely.

`@end menu`

`@node Waiting For Completion`

`@subsection Waiting For Completion`

`@cindex cryptographic operation, wait for`

`@cindex wait for completion`

```
@deftypefun gpgme_ctx_t gpgme_wait (@w{gpgme_ctx_t @var{ctx}}, @w{gpgme_error_t *@var{status}},
@w{int @var{hang}})
```

The

function `@code{gpgme_wait}` continues the pending operation within the context `@var{ctx}`. In particular, it ensures the data exchange between `@acronym{GPGME}` and the crypto backend and watches over the run time status of the backend process.

If `@var{hang}` is true, the function does not return until the operation is completed or cancelled. Otherwise the function will not block for a long time.

The error status of the finished operation is returned in `@var{status}` if `@code{gpgme_wait}` does not return `@code{NULL}`.

The `@var{ctx}` argument can be `@code{NULL}`. In that case, `@code{gpgme_wait}` waits for any context to complete its operation.

`@code{gpgme_wait}` can be used only in conjunction with any context that has a pending operation initiated with one of the `@code{gpgme_op_*_start}` functions except `@code{gpgme_op_keylist_start}` and `@code{gpgme_op_trustlist_start}` (for which you should use the corresponding `@code{gpgme_op_*_next}` functions). If `@var{ctx}` is `@code{NULL}`, all of such contexts are waited upon and possibly returned. Synchronous operations running in parallel, as well as key and trust item list operations, do not affect `@code{gpgme_wait}`.

In a multi-threaded environment, only one thread should ever call `gpgme_wait` at any time, regardless of whether `ctx` is specified or not. This means that all calls to this function should be fully synchronized by locking primitives. It is safe to start asynchronous operations while a thread is running in `gpgme_wait`.

The function returns the `ctx` of the context which has finished the operation. If `hang` is false, and the timeout expires, `NULL` is returned and `*status` will be set to 0. If an error occurs, `NULL` is returned and the error is returned in `*status`.

@end deftypefun

@node Using External Event Loops  
@subsection Using External Event Loops  
@cindex event loop, external

`GPGME` hides the complexity of the communication between the library and the crypto engine. The price of this convenience is that the calling thread can block arbitrarily long waiting for the data returned by the crypto engine. In single-threaded programs, in particular if they are interactive, this is an unwanted side-effect. OTOH, if `gpgme_wait` is used without the `hang` option being enabled, it might be called unnecessarily often, wasting CPU time that could be used otherwise.

The I/O callback interface described in this section lets the user take control over what happens when. `GPGME` will provide the user with the file descriptors that should be monitored, and the callback functions that should be invoked when a file descriptor is ready for reading or writing. It is then the user's responsibility to decide when to check the file descriptors and when to invoke the callback functions. Usually this is done in an event loop, that also checks for events in other parts of the program. If the callback functions are only called when the file descriptors are ready, `GPGME` will never block. This gives the user more control over the program flow, and allows to perform other tasks when `GPGME` would block otherwise.

By using this advanced mechanism, `GPGME` can be integrated smoothly into GUI toolkits like GTK+ even for single-threaded programs.

@menu

\* I/O Callback Interface::      How I/O callbacks are registered.

- \* Registering I/O Callbacks:: How to use I/O callbacks for a context.
  - \* I/O Callback Example:: An example how to use I/O callbacks.
  - \* I/O Callback Example GTK+:: How to use @acronym{GPGME} with GTK+.
  - \* I/O Callback Example GDK:: How to use @acronym{GPGME} with GDK.
  - \* I/O Callback Example Qt:: How to use @acronym{GPGME} with Qt.
- @end menu

@node I/O Callback Interface

@subsubsection I/O Callback Interface

```
@deftp {Data type} {gpgme_error_t (*gpgme_io_cb_t) (@w{void *}@var{data}}, @w{int @var{fd}})}
@tindex gpgme_io_cb_t
```

The @code{gpgme\_io\_cb\_t} type  
is the type of functions which

@acronym{GPGME} wants to register as I/O callback handlers using the  
@code{gpgme\_register\_io\_cb\_t} functions provided by the user.

@var{data} and @var{fd} are provided by @acronym{GPGME} when the I/O  
callback handler is registered, and should be passed through to the  
handler when it is invoked by the user because it noticed activity on  
the file descriptor @var{fd}.

The callback handler always returns @code{0}, but you should consider  
the return value to be reserved for later use.

@end deftp

```
@deftp {Data type} {gpgme_error_t (*gpgme_register_io_cb_t) (@w{void *}@var{data}}, @w{int @var{fd}},
@w{int @var{dir}}, @w{gpgme_io_cb_t @var{fnc}}, @w{void *}@var{fnc_data}}, @w{void **}@var{tag}})}
@tindex gpgme_register_io_cb_t
```

The @code{gpgme\_register\_io\_cb\_t} type is the type of functions which can  
be called by @acronym{GPGME} to register an I/O callback function  
@var{fnc} for the file descriptor @var{fd} with the user.

@var{fnc\_data} should be passed as the first  
argument to @var{fnc}

when the handler is invoked (the second argument should be @var{fd}).

If @var{dir} is 0, @var{fnc} should be called by the user when  
@var{fd} is ready for writing. If @var{dir} is 1, @var{fnc} should be  
called when @var{fd} is ready for reading.

@var{data} was provided by the user when registering the  
@code{gpgme\_register\_io\_cb\_t} function with @acronym{GPGME} and will always  
be passed as the first argument when registering a callback function.  
For example, the user can use this to determine the event loop to  
which the file descriptor should be added.

@acronym{GPGME} will call this function when a crypto operation is  
initiated in a context for which the user has registered I/O callback

handler functions with `gpgme_set_io_cbs`. It can also call this function when it is in an I/O callback handler for a file descriptor associated to this context.

The user should return a unique handle in `@var{tag}` identifying this I/O callback registration, which will be passed to the `gpgme_register_io_cb_t` function without interpretation when the file descriptor should not be monitored anymore.

@end deftp

@deftp {Data type} {void (\*gpgme\_remove\_io\_cb\_t) (@w{void \*@var{tag}})}

The `gpgme_remove_io_cb_t` type is the type of functions which can be called by `GPGME` to remove an I/O callback handler that was registered before. `@var{tag}` is the handle that was returned by the `gpgme_register_io_cb_t` for this I/O callback.

`GPGME` can call this function when a crypto operation is in an I/O callback. It will also call this function when the context is destroyed while an operation is pending.

@end deftp

@deftp {Data type} {enum gpgme\_event\_io\_t}

@tindex gpgme\_event\_io\_t

The `gpgme_event_io_t` type specifies the type of an event that is reported to the user by `GPGME` as a consequence of an I/O operation. The following events are defined:

@table @code

@item GPGME\_EVENT\_START

The operation is fully initialized now, and you can start to run the registered I/O callback handlers now. Note that registered I/O callback handlers must not be run before this event is signalled. `@var{type_data}` is `NULL` and reserved for later use.

@item GPGME\_EVENT\_DONE

The operation is finished, the last I/O callback for this operation was removed. The accompanying `@var{type_data}` points to a `struct gpgme_io_event_done_data` variable that contains the status of the operation that finished. This event is signalled after the last I/O callback has been removed.

@item GPGME\_EVENT\_NEXT\_KEY

In a `gpgme_op_keylist_start` operation, the next key was received from the crypto engine. The accompanying `@var{type_data}` is a `gpgme_key_t` variable that contains the key with one reference for the user.



@item GPGME\_EVENT\_NEXT\_TRUSTITEM

In a @code{gpgme\_op\_trustlist\_start} operation, the next trust item was received from the crypto engine. The accompanying @var{type\_data} is a @code{gpgme\_trust\_item\_t} variable that contains the trust item with one reference for the user.

@end table

@end deftp

@deftp {Data type} {void (\*gpgme\_event\_io\_cb\_t) (@w{void \*}@var{data}), @w{gpgme\_event\_io\_t}@var{type}}, @w{void \*}@var{type\_data}}}

The @code{gpgme\_event\_io\_cb\_t} type is the type of functions which can be called by @acronym{GPGME} to signal an event for an operation running in a context which has I/O callback functions registered by the user.

@var{data} was provided by the user when registering the @code{gpgme\_event\_io\_cb\_t} function with @acronym{GPGME} and will always be passed as the first argument when registering a callback function. For example, the user can use this to determine the context in which this event has occurred.

@var{type} will specify the type of event that has occurred.

@var{type\_data} specifies the event further, as described in the above list of possible @code{gpgme\_event\_io\_t} types.

@acronym{GPGME} can call this function in an I/O callback handler.

@end deftp

@node

Registering I/O Callbacks

@subsubsection Registering I/O Callbacks

@deftp {Data type} {struct gpgme\_io\_cbs}

@tindex gpgme\_event\_io\_t

This structure is used to store the I/O callback interface functions described in the previous section. It has the following members:

@table @code

@item gpgme\_register\_io\_cb\_t add

This is the function called by @acronym{GPGME} to register an I/O callback handler. It must be specified.

@item void \*add\_priv

This is passed as the first argument to the @code{add} function when it is called by @acronym{GPGME}. For example, it can be used to determine the event loop to which the file descriptor should be added.

@item gpgme\_remove\_io\_cb\_t remove

This is the function called by @acronym{GPGME} to remove an I/O callback handler. It must be specified.

@item gpgme\_event\_io\_cb\_t event

This is the function called by @acronym{GPGME} to signal an event for an operation. It must be specified, because at least the start event must be processed.

@item void

\*event\_priv

This is passed as the first argument to the @code{event} function when it is called by @acronym{GPGME}. For example, it can be used to determine the context in which the event has occurred.

@end table

@end deftp

@deftypefun void gpgme\_set\_io\_cbs (@w{gpgme\_ctx\_t @var{ctx}}, @w{struct gpgme\_io\_cbs \*@var{io\_cbs}})

The function @code{gpgme\_set\_io\_cbs} enables the I/O callback interface for the context @var{ctx}. The I/O callback functions are specified by @var{io\_cbs}.

If @var{io\_cbs}->@code{add} is @code{NULL}, the I/O callback interface is disabled for the context, and normal operation is restored.

@end deftypefun

@deftypefun void gpgme\_get\_io\_cbs (@w{gpgme\_ctx\_t @var{ctx}}, @w{struct gpgme\_io\_cbs \*@var{io\_cbs}})

The function @code{gpgme\_get\_io\_cbs} returns the I/O callback functions set with @code{gpgme\_set\_io\_cbs} in @var{io\_cbs}.

@end deftypefun

@node I/O Callback Example

@subsubsection I/O Callback Example

To actually use an external event loop, you have to implement the I/O callback functions that are used by @acronym{GPGME} to register and unregister file descriptors. Furthermore, you have to actually monitor these file descriptors for activity and call the appropriate I/O callbacks.

The following example illustrates how to do that. The example uses locking to show in which way the callbacks and the event loop can run concurrently. For the event loop, we use a fixed array. For a real-world implementation, you should use a dynamically sized structure because the number of file descriptors needed for a crypto

operation in @acronym{GPGME} is not predictable.

```
@example
#include <assert.h>
#include <errno.h>
#include <stdlib.h>
#include <pthread.h>
#include <sys/types.h>
#include <gpgme.h>

/* The following structure holds the result of a crypto operation. */
struct op_result
@{
 int done;
 gpgme_error_t err;
@};

/* The following structure holds the data associated with one I/O
callback. */
struct one_fd
@{
 int fd;
 int dir;
 gpgme_io_cb_t
 fnc;
 void *fnc_data;
 void *loop;
@};

struct event_loop
@{
 pthread_mutex_t lock;
#define MAX_FDS 32
 /* Unused slots are marked with FD being -1. */
 struct one_fd fds[MAX_FDS];
@};
@end example
```

The following functions implement the I/O callback interface.

```
@example
gpgme_error_t
add_io_cb (void *data, int fd, int dir, gpgme_io_cb_t fnc, void *fnc_data,
 void **r_tag)
@{
 struct event_loop *loop = data;
 struct one_fd *fds = loop->fds;
 int i;
```

```

pthread_mutex_lock (&loop->lock);
for (i = 0; i < MAX_FDS; i++)
 @{
 if (fds[i].fd == -1)
 @{
 fds[i].fd = fd;
 fds[i].dir = dir;
 fds[i].fnc = fnc;
 fds[i].fnc_data = fnc_data;
 fds[i].loop = loop;
 break;
 @}
 @}
pthread_mutex_unlock (&loop->lock);
if (i == MAX_FDS)
 return gpg_error (GPG_ERR_GENERAL);
*r_tag = &fds[i];
return 0;
@}

void
remove_io_cb (void *tag)
@{
 struct one_fd *fd = tag;
 struct event_loop *loop = fd->loop;

 pthread_mutex_lock (&loop->lock);
 fd->fd = -1;
 pthread_mutex_unlock (&loop->lock);
@}

void
event_io_cb (void *data, gpgme_event_io_t type, void *type_data)
@{
 struct op_result *result = data;

 /* We don't support list operations here. */
 if (type == GPGME_EVENT_DONE)
 @{
 result->done = 1;
 result->err = *type_data;
 @}
@}
@end example

```

The final missing piece is the event loop, which will be presented next. We only support waiting for the success of a single operation.

```

@example
int
do_select (struct event_loop *loop)
@{
 fd_set rfds;
 fd_set wfds;
 int i, n;
 int any = 0;
 struct timeval tv;
 struct one_fd *fdlist = loop->fds;

 pthread_mutex_lock (&loop->lock);
 FD_ZERO (&rfds);
 FD_ZERO (&wfds);
 for (i = 0; i < MAX_FDS; i++)
 if (fdlist[i].fd != -1)
 FD_SET (fdlist[i].fd, fdlist[i].dir ? &rfds : &wfds);
 pthread_mutex_unlock (&loop->lock);

 tv.tv_sec = 0;
 tv.tv_usec = 1000;

 do
 @{
 n = select (FD_SETSIZE, &rfds, &wfds, NULL, &tv);
 @}
 while (n < 0 && errno == EINTR);

 if (n < 0)
 return n; /* Error or timeout. */

 pthread_mutex_lock (&loop->lock);
 for (i = 0; i < MAX_FDS && n; i++)
 @{
 if (fdlist[i].fd != -1)
 @{
 if (FD_ISSET (fdlist[i].fd, fdlist[i].dir ? &rfds : &wfds))
 @{
 assert (n);
 n--;
 any = 1;
 /* The I/O callback handler can register/remove callbacks,
 so we have to unlock the file descriptor list. */
 pthread_mutex_unlock (&loop->lock);
 (*fdlist[i].fnc) (fdlist[i].fnc_data, fdlist[i].fd);
 pthread_mutex_lock (&loop->lock);
 @}
 }
 }
}

```

```

@}
@}
pthread_mutex_unlock (&loop->lock);
return any;
@}

void
wait_for_op (struct event_loop *loop, struct op_result *result)
@{
int ret;

do
@{
ret = do_select (loop);
@}
while (ret >= 0 && !result->done);
@}
@end example

```

The main function shows how to put it all together.

```

@example
int
main (int argc, char *argv[])
@{
struct event_loop loop;
struct op_result result;
gpgme_ctx_t ctx;
gpgme_error_t err;
gpgme_data_t sig, text;
int i;
pthread_mutexattr_t attr;
struct gpgme_io_cbs io_cbs =
@{
add_io_cb,
&loop,
remove_io_cb,
event_io_cb,
&result
@};

init_gpgme ();

/* Initialize the loop structure. */

/* The mutex must be recursive, since remove_io_cb (which acquires a
lock) can be called while holding a lock acquired in do_select. */
pthread_mutexattr_init (&attr);

```

```

pthread_mutexattr_settype (&attr, PTHREAD_MUTEX_RECURSIVE);
pthread_mutex_init (&loop.lock, &attr);
pthread_mutexattr_destroy (&attr);

for (i = 0; i < MAX_FDS; i++)
 loop.fds[i].fd = -1;

/* Initialize the result structure. */
result.done = 0;

err = gpgme_data_new_from_file (&sig, "signature", 1);
if (!err)
 err = gpgme_data_new_from_file (&text, "text", 1);
if (!err)
 err = gpgme_new (&ctx);
if (!err)
 @{
 gpgme_set_io_cbs (ctx, &io_cbs);
 err = gpgme_op_verify_start (ctx, sig, text, NULL);
 @}
if (err)
 @{
 fprintf (stderr, "gpgme error: %s: %s\n",
 gpgme_strerror (err), gpgme_strerror (err));
 exit (1);
 @}

wait_for_op (&loop, &result);
if (!result.done)
 @{
 fprintf (stderr, "select error\n");
 exit (1);
 @}
if (!result.err)
 @{
 fprintf (stderr, "verification failed: %s: %s\n",
 gpgme_strerror (result.err), gpgme_strerror (result.err));
 exit (1);
 @}
/* Evaluate verify result. */
@dots{}
return 0;
@}
@end example

```

@node I/O Callback Example GTK+

@subsubsection I/O Callback Example GTK+

@cindex GTK+, using @acronym{GPGME} with

The I/O callback interface can be used to integrate @acronym{GPGME} with the GTK+ event loop. The following code snippets shows how this can be done using the appropriate register and remove I/O callback functions. In this example, the private data of the register I/O callback function is unused. The event notifications is missing because it does not require any GTK+ specific setup.

@example

```
#include <gtk/gtk.h>
```

```
struct my_gpgme_io_cb
```

```
@{
```

```
gpgme_io_cb_t fnc;
```

```
void *fnc_data;
```

```
guint input_handler_id
```

```
@};
```

```
void
```

```
my_gpgme_io_cb (gpointer data, gint source, GdkInputCondition condition)
```

```
@{
```

```
struct my_gpgme_io_cb *iocb = data;
```

```
((*iocb->fnc)) (iocb->data, source);
```

```
@}
```

```
void
```

```
my_gpgme_remove_io_cb (void *data)
```

```
@{
```

```
struct my_gpgme_io_cb *iocb = data;
```

```
gtk_input_remove (data->input_handler_id);
```

```
@}
```

```
void
```

```
my_gpgme_register_io_callback (void *data, int fd, int dir, gpgme_io_cb_t fnc,
```

```
void *fnc_data, void **tag)
```

```
@{
```

```
struct my_gpgme_io_cb *iocb = g_malloc (sizeof (struct my_gpgme_io_cb));
```

```
iocb->fnc = fnc;
```

```
iocb->data = fnc_data;
```

```
iocb->input_handler_id = gtk_input_add_full (fd, dir
```

```
 ? GDK_INPUT_READ
```

```
 : GDK_INPUT_WRITE,
```

```
 my_gpgme_io_callback,
```

```
 0, iocb, NULL);
```

```
*tag = iocb;
```



```

return 0;
@}
@end example

```

```

@node I/O Callback Example GDK
@subsection I/O Callback Example GDK
@cindex GDK, using @acronym{GPGME} with

```

The I/O callback interface can also be used to integrate @acronym{GPGME} with the GDK event loop. The following code snippets shows how this can be done using the appropriate register and remove I/O callback functions. In this example, the private data of the register I/O callback function is unused. The event notifications is missing because it does not require any GDK specific setup.

It is very similar to the GTK+ example in the previous section.

```

@example
#include <gdk/gdk.h>

struct my_gpgme_io_cb
@{
 gpgme_io_cb_t fnc;
 void *fnc_data;
 gint tag;
@};

void
my_gpgme_io_cb (gpointer data, gint source, GdkInputCondition condition)
@{
 struct my_gpgme_io_cb *iocb = data;
 (*(iocb->fnc)) (iocb->data, source);
@}

void
my_gpgme_remove_io_cb (void *data)
@{
 struct my_gpgme_io_cb
 *iocb = data;
 gdk_input_remove (data->tag);
@}

void
my_gpgme_register_io_callback (void *data, int fd, int dir, gpgme_io_cb_t fnc,
 void *fnc_data, void **tag)
@{
 struct my_gpgme_io_cb *iocb = g_malloc (sizeof (struct my_gpgme_io_cb));

```

```

iocb->fnc = fnc;
iocb->data = fnc_data;
iocb->tag = gtk_input_add_full (fd, dir ? GDK_INPUT_READ : GDK_INPUT_WRITE,
 my_gpgme_io_callback, iocb, NULL);
*tag = iocb;
return 0;
@}
@end example

```

@node I/O Callback Example Qt  
 @subsubsection I/O Callback Example Qt  
 @cindex Qt, using @acronym{GPGME} with

The I/O callback interface can also be used to integrate @acronym{GPGME} with the Qt event loop. The following code snippets show how this can be done using the appropriate register and remove I/O callback functions. In this example, the private data of the register I/O callback function is unused. The event notifications is missing because it does not require any Qt specific setup.

```

@example
#include <qsocketnotifier.h>
#include <qapplication.h>

struct IOCB @{
 IOCB(GpgmeIOCb f, void * d, QSocketNotifier * n)
 : func(f), data(d), notifier(n) @{}
 GpgmeIOCb func;
 void * data;
 QSocketNotifier * notifier;
@}

class MyApp : public QApplication @{

 // ...

 static void registerGpgmeIOCallback(void * data, int fd, int dir,
 GpgmeIOCb func, void * func_data,
 void ** tag) @{
 QSocketNotifier * n =
 new QSocketNotifier(fd, dir ? QSocketNotifier::Read
 : QSocketNotifier::Write);
 connect(n, SIGNAL(activated(int)),
 qApp, SLOT(slotGpgmeIOCallback(int)));
 qApp->mIOCBs.push_back(IOCB(func, func_data, n));
 tag = (void)n;
 }
}

```

@}

```
static void removeGpgmeIOCallback(void * tag) @{
 if (!tag) return;
 QSocketNotifier * n = static_cast<QSocketNotifier*>(tag);
 for (QValueList<IOCB>::iterator
it = qApp->mIOCBs.begin() ;
 it != qApp->mIOCBs.end() ; ++it)
 if (it->notifier == n) @{
 delete it->notifier;
 qApp->mIOCBs.erase(it);
 return;
 }
 @}
@}
```

public slots:

```
void slotGpgmeIOCallback(int fd) @{
 for (QValueList<IOCB>::const_iterator it = mIOCBs.begin() ;
 it != mIOCBs.end() ; ++it)
 if (it->notifier && it->notifier->socket() == fd)
 (*(it->func)) (it->func_data, fd);
 @}

```

// ...

private:

```
QValueList<IOCB> mIOCBs;
// ...
@};
@end example
```

@node Cancellation

@subsection Cancellation

@cindex cryptographic operation, aborting

@cindex cryptographic operation, cancelling

@cindex aborting operations

@cindex cancelling operations

Sometimes you do not want to wait for an operation to finish.

@acronym{GPGME} provides two different functions to achieve that. The function @code{gpgme\_cancel} takes effect immediately. When it returns, the operation is effectively canceled. However, it has some

limitations and can not be used with synchronous operations. In contrast, the function @code{gpgme\_cancel\_async} can be used with any context and from any thread, but it is not guaranteed to take effect immediately. Instead, cancellation occurs at the next possible time

(typically the next time I/O occurs in the target context).

```
@deftypefun gpgme_ctx_t gpgme_cancel (@w{gpgme_ctx_t @var{ctx}})
@since{0.4.5}
```

The function `gpgme_cancel` attempts to cancel a pending operation in the context `@var{ctx}`. This only works if you use the global event loop or your own event loop.

If you use the global event loop, you must not call `gpgme_wait` during cancellation. After successful cancellation, you can call `gpgme_wait` (optionally waiting on `@var{ctx}`), and the context `@var{ctx}` will appear as if it had finished with the error code `GPG_ERR_CANCEL`.

If you use an external event loop, you must ensure that no I/O callbacks are invoked for this context (for example by halting the event loop). On successful cancellation, all registered I/O callbacks for this context will be unregistered, and a `GPGME_EVENT_DONE` event with the error code `GPG_ERR_CANCEL` will be signalled.

The function returns an error code if the cancellation failed (in this case the state of `@var{ctx}` is not modified).

```
@end deftypefun
```

```
@deftypefun gpgme_ctx_t gpgme_cancel_async (@w{gpgme_ctx_t @var{ctx}})
@since{1.1.7}
```

The function `gpgme_cancel_async` attempts to cancel a pending operation in the context `@var{ctx}`. This can be called by any thread at any time after starting an operation on the context, but will not take effect immediately. The actual cancellation happens at the next time GPGME processes I/O in that context.

The function returns an error code if the cancellation failed (in this case the state of `@var{ctx}` is not modified).

```
@end deftypefun
```

```
@c *****
@c ***** Appendices *****
@c
@c *****
```

```
@include uiserver.texi
```

```
@node Debugging
```

@appendix How to solve problems

@cindex debug

@cindex GPGME\_DEBUG

Everyone knows that software often does not do what it should do and thus there is a need to track down problems. This is in particular true for applications using a complex library like @acronym{GPGME} and of course also for the library itself. Here we give a few hints on how to solve such problems.

First of all you should make sure that the keys you want to use are installed in the GnuPG engine and are usable. Thus the first test is to run the desired operation using @command{gpg} or @command{gpgsm} on the command line. If you can't figure out why things don't work, you may use @acronym{GPGME}'s built in trace feature. This feature is either enabled using the environment variable @code{GPGME\_DEBUG} or, if this is not possible, by calling the function @code{gpgme\_set\_global\_flag}. The value is the trace level and an optional file name. If no file name is given the trace output is printed to @code{stderr}.

@noindent

For example

@smallexample

```
GPGME_DEBUG=9:/home/user/mygpgme.log
```

@end smallexample

@noindent

(Note that under Windows you use a semicolon in place of the colon to separate the fields.)

A trace level of 9 is pretty verbose and thus you may want to start off with a lower level. The exact definition of the trace levels and the output format may change with any release; you need to check the source code for details. In any case the trace log should be helpful to understand what is going on. Warning: The trace log may reveal sensitive details like passphrases or other data you use in your application. If you are asked to send a log file, make sure that you run your tests only with play data.

@node Deprecated Functions

@appendix Deprecated Functions

@cindex deprecated

For backward compatibility @acronym{GPGME} has a number of functions, data types

and constants which are deprecated and should not be used anymore. We document here those which are really old to help understanding old code and to allow migration to their modern counterparts.

**Warning:** These interfaces will be removed in a future version of `GPGME`.

```
@deftypedef void gpgme_key_release (@w{gpgme_key_t @var{key}})
```

The function `gpgme_key_release` is equivalent to

```
@code{gpgme_key_unref}.
```

```
@end deftypedef
```

```
@deftypedef void gpgme_trust_item_release (@w{gpgme_trust_item_t @var{item}})
```

The function `gpgme_trust_item_release` is an alias for

```
@code{gpgme_trust_item_unref}.
```

```
@end deftypedef
```

```
@deftypedef gpgme_error_t gpgme_op_import_ext (@w{gpgme_ctx_t @var{ctx}}, @w{gpgme_data_t
@var{keydata}}, @w{int *@var{nr}})
@since{0.3.9}
```

The function `gpgme_op_import_ext` is equivalent to:

```
@example
```

```
gpgme_error_t err = gpgme_op_import (ctx, keydata);
```

```
if (!err)
```

```
 @{
```

```
 gpgme_import_result_t result = gpgme_op_import_result (ctx);
```

```
 *nr = result->considered;
```

```
 @}
```

```
@end example
```

```
@end deftypedef
```

```
@deftypedef {Data type} {gpgme_error_t (*gpgme_edit_cb_t) @
(@w{void *@var{handle}}, @
@w{gpgme_status_code_t @var{status}}, @
@w{const char *@var{args}}, @
@w{int @var{fd}})}
```

```
@tindex gpgme_edit_cb_t
```

The `gpgme_edit_cb_t` type is the type of functions which `GPGME` calls if it a key edit operation is on-going. The status code `@var{status}` and the argument line `@var{args}` are passed through by `GPGME` from the crypto engine. The file descriptor `@var{fd}` is -1 for normal status messages. If `@var{status}` indicates a command rather than a status message, the response to the

command should be written to `@var{fd}`. The `@var{handle}` is provided by the user at start of operation.

The function should return `@code{GPG_ERR_FALSE}` if it did not handle the status code, `@code{0}` for success, or any other error value.

`@end deftp`

```
@deftypefun gpgme_error_t gpgme_op_edit (@w{gpgme_ctx_t @var{ctx}}, @w{gpgme_key_t @var{key}},
 @w{gpgme_edit_cb_t @var{fnc}}, @w{void *@var{handle}}, @w{gpgme_data_t @var{out}})
@since{0.3.9}
```

Note: This function is deprecated, please use `@code{gpgme_op_interact}` instead.

The function `@code{gpgme_op_edit}` processes the key `@var{KEY}` interactively, using the edit callback function `@var{FNC}` with the handle `@var{HANDLE}`. The callback is invoked for every status and command request from the crypto engine. The output of the crypto engine is written to the data object `@var{out}`.

Note that the protocol between the callback function and the crypto engine is specific to the crypto engine and no further support in implementing this protocol correctly is provided by `@acronym{GPGME}`.

The function returns the error code `@code{GPG_ERR_NO_ERROR}` if the edit operation completes successfully, `@code{GPG_ERR_INV_VALUE}` if `@var{ctx}` or `@var{key}` is not a valid pointer, and any error returned by the crypto engine or the edit callback handler.

`@end deftypefun`

```
@deftypefun gpgme_error_t
gpgme_op_edit_start (@w{gpgme_ctx_t @var{ctx}}, @w{gpgme_key_t @var{key}}, @w{gpgme_edit_cb_t
@var{fnc}}, @w{void *@var{handle}}, @w{gpgme_data_t @var{out}})
```

`@since{0.3.9}`

Note: This function is deprecated, please use `@code{gpgme_op_interact_start}` instead.

The function `@code{gpgme_op_edit_start}` initiates a `@code{gpgme_op_edit}` operation. It can be completed by calling `@code{gpgme_wait}` on the context. `@xref{Waiting For Completion}`.

The function returns the error code `@code{GPG_ERR_NO_ERROR}` if the operation was started successfully, and `@code{GPG_ERR_INV_VALUE}` if `@var{ctx}` or `@var{key}` is not a valid pointer.

`@end deftypefun`

```
@deftypefun gpgme_error_t gpgme_op_card_edit (@w{gpgme_ctx_t @var{ctx}}, @w{gpgme_key_t
@var{key}}, @w{gpgme_edit_cb_t @var{fnc}}, @w{void *@var{handle}}, @w{gpgme_data_t @var{out}})
```

Note: This function is deprecated, please use `gpgme_op_interact` with the flag `GPGME_INTERACT_CARD` instead.

The function `gpgme_op_card_edit` is analogous to

`gpgme_op_edit`, but should be used to process the smart card corresponding to the key `key`.  
@end deftypefun

```
@deftypefun gpgme_error_t gpgme_op_card_edit_start (@w{gpgme_ctx_t @var{ctx}}, @w{gpgme_key_t
@var{key}}, @w{gpgme_edit_cb_t @var{fnc}}, @w{void *@var{handle}}, @w{gpgme_data_t @var{out}})
```

Note: This function is deprecated, please use `gpgme_op_interact_start` with the flag `GPGME_INTERACT_CARD` instead.

The function `gpgme_op_card_edit_start` initiates a `gpgme_op_card_edit` operation. It can be completed by calling `gpgme_wait` on the context. @xref{Waiting For Completion}.

The function returns the error code `GPG_ERR_NO_ERROR` if the operation was started successfully, and `GPG_ERR_INV_VALUE` if `ctx` or `key` is not a valid pointer.  
@end deftypefun

```
@deftypefun gpgme_error_t gpgme_data_new_with_read_cb (@w{gpgme_data_t *@var{dh}}, @w{int
(*@var{readfunc})} (@w{void *@var{hook}}, @w{char *@var{buffer}}, @w{size_t
@var{count}}, @w{size_t *@var{nread}}), @w{void *@var{hook_value}})
```

The function `gpgme_data_new_with_read_cb` creates a new `gpgme_data_t` object and uses the callback function `readfunc` to retrieve the data on demand. As the callback function can supply the data in any way it wants, this is the most flexible data type @acronym{GPGME} provides. However, it can not be used to write data.

The callback function receives `hook_value` as its first argument whenever it is invoked. It should return up to `count` bytes in `buffer`, and return the number of bytes actually read in `nread`. It may return `0` in `nread` if no data is currently available. To indicate `EOF` the function should return with an error code of `-1` and set `nread` to `0`. The callback function may support to reset its internal read pointer if it is invoked with `buffer` and `nread` being `NULL` and `count` being `0`.

The function



returns the error code `@code{GPG_ERR_NO_ERROR}` if the data object was successfully created, `@code{GPG_ERR_INV_VALUE}` if `@var{dh}` or `@var{readfunc}` is not a valid pointer, and `@code{GPG_ERR_ENOMEM}` if not enough memory is available.

@end deotypefun

@deotypefun gpgme\_error\_t gpgme\_data\_rewind (@w{gpgme\_data\_t @var{dh}})

The function `@code{gpgme_data_rewind}` is equivalent to:

@example  
return (gpgme\_data\_seek (dh, 0, SEEK\_SET) == -1)  
? gpgme\_error\_from\_errno (errno) : 0;  
@end example  
@end deotypefun

@deftp {Data type} gpgme\_attr\_t

The `@code{gpgme_attr_t}` type is used to specify a key or trust item attribute. The following attributes are defined:

@table @code  
@item GPGME\_ATTR\_KEYID  
This is the key ID of a sub key. It is representable as a string.

For trust items, the trust item refers to the key with this ID.

@item GPGME\_ATTR\_FPR  
This is the fingerprint of a sub key. It is representable as a string.

@item GPGME\_ATTR\_ALGO  
This is the crypto algorithm for which the sub key can be used. It is representable as a string and as a number. The numbers correspond to the `@code{enum gcry_pk_algos}` values in the gcrypt library.

@item GPGME\_ATTR\_LEN  
This is the key length of a sub key. It is representable as a number.

@item GPGME\_ATTR\_CREATED  
This is the timestamp at creation time of a sub key. It is representable as a number.

@item GPGME\_ATTR\_EXPIRE  
This is the expiration time of a sub key. It is representable as a number.

@item GPGME\_ATTR\_OTRUST  
XXX FIXME (also for trust items)

@item GPGME\_ATTR\_USERID  
This is a user ID. There can be more than one user IDs in a @var{gpgme\_key\_t} object. The first one (with index 0) is the primary user ID. The user ID is representable as a number.

For trust items, this is the user ID associated with this trust item.

@item GPGME\_ATTR\_NAME  
This is the name belonging to a user ID. It is representable as a string.

@item GPGME\_ATTR\_EMAIL  
This is the email address belonging to a user ID. It is representable as a string.

@item  
GPGME\_ATTR\_COMMENT  
This is the comment belonging to a user ID. It is representable as a string.

@item GPGME\_ATTR\_VALIDITY  
This is the validity belonging to a user ID. It is representable as a string and as a number. See below for a list of available validities.

For trust items, this is the validity that is associated with this trust item.

@item GPGME\_ATTR\_UID\_REVOKED  
This specifies if a user ID is revoked. It is representable as a number, and is @code{1} if the user ID is revoked, and @code{0} otherwise.

@item GPGME\_ATTR\_UID\_INVALID  
This specifies if a user ID is invalid. It is representable as a number, and is @code{1} if the user ID is invalid, and @code{0} otherwise.

@item GPGME\_ATTR\_LEVEL  
This is the trust level of a trust item.

@item GPGME\_ATTR\_TYPE  
This returns information about the type of key. For the string function this will either be "PGP" or "X.509". The integer function returns 0 for PGP and 1 for X.509. It is also used for the type of a trust item.

@item

#### GPGME\_ATTR\_IS\_SECRET

This specifies if the key is a secret key. It is representable as a number, and is @code{1} if the key is revoked, and @code{0} otherwise.

#### @item GPGME\_ATTR\_KEY\_REVOKED

This specifies if a sub key is revoked. It is representable as a number, and is @code{1} if the key is revoked, and @code{0} otherwise.

#### @item GPGME\_ATTR\_KEY\_INVALID

This specifies if a sub key is invalid. It is representable as a number, and is @code{1} if the key is invalid, and @code{0} otherwise.

#### @item GPGME\_ATTR\_KEY\_EXPIRED

This specifies if a sub key is expired. It is representable as a number, and is @code{1} if the key is expired, and @code{0} otherwise.

#### @item GPGME\_ATTR\_KEY\_DISABLED

This specifies if a sub key is disabled. It is representable as a number, and is @code{1} if the key is disabled, and @code{0} otherwise.

#### @item GPGME\_ATTR\_KEY\_CAPS

This is a description of the capabilities of a sub key. It is representable as a string. The string contains the letter ``e" if the key can be used for encryption, ``s" if the key can be used for signatures, and ``c" if the key can be used for certifications.

#### @item GPGME\_ATTR\_CAN\_ENCRYPT

This specifies if a sub key can be used for encryption. It is representable as a number, and is @code{1} if the sub key can be used for encryption, and @code{0} otherwise.

#### @item GPGME\_ATTR\_CAN\_SIGN

This specifies if a sub key can be used to create data signatures. It is representable as a number, and is @code{1} if the sub key can be used for signatures, and @code{0} otherwise.

#### @item GPGME\_ATTR\_CAN\_CERTIFY

This specifies if a sub key can be used to create key certificates. It is representable as a number, and is @code{1} if the sub key can be used for certifications, and @code{0} otherwise.

#### @item GPGME\_ATTR\_SERIAL

The X.509 issuer serial attribute of the key. It is representable as a string.

#### @item GPGME\_ATTR\_ISSUE

The X.509 issuer name attribute of the key. It is representable as a

string.

@item GPGME\_ATTR\_CHAINID

The

X.509 chain ID can be used to build the certification chain. It is representable as a string.

@end table

@end deftp

```
@deftypefun {const char *} gpgme_key_get_string_attr (@w{gpgme_key_t @var{key}}, @w{gpgme_attr_t @var{what}}, @w{const void *@var{reserved}}, @w{int @var{idx}})
```

The function @code{gpgme\_key\_get\_string\_attr} returns the value of the string-representable attribute @var{what} of key @var{key}. If the attribute is an attribute of a sub key or an user ID, @var{idx} specifies the sub key or user ID of which the attribute value is returned. The argument @var{reserved} is reserved for later use and should be @code{NULL}.

The string returned is only valid as long as the key is valid.

The function returns @code{0} if an attribute can't be returned as a string, @var{key} is not a valid pointer, @var{idx} out of range, or @var{reserved} not @code{NULL}.

@end deftypefun

```
@deftypefun {unsigned long} gpgme_key_get_ulong_attr (@w{gpgme_key_t @var{key}}, @w{gpgme_attr_t @var{what}}, @w{const void *@var{reserved}}, @w{int @var{idx}})
```

The function @code{gpgme\_key\_get\_ulong\_attr} returns the value of the number-representable attribute @var{what} of key @var{key}. If the attribute is an attribute of a sub key or an user ID, @var{idx} specifies the sub key or user ID of which the attribute value is returned. The argument @var{reserved} is reserved for later use and should be @code{NULL}.

The function returns @code{0} if the attribute can't be returned as a number, @var{key} is not a valid pointer, @var{idx} out of range, or @var{reserved} not @code{NULL}.

@end deftypefun

@c

@c Key Signatures

@c

The signatures on a key are only available if the key was retrieved via a listing operation with the @code{GPGME\_KEYLIST\_MODE\_SIGS} mode enabled, because it is expensive to retrieve all signatures of a key.

So, before using the below interfaces to retrieve the signatures on a key, you have to make sure that the key was listed with signatures enabled. One convenient, but blocking, way to do this is to use the function `@code{gpgme_get_key}`.

`@def`tp {Data type} `gpgme_attr_t`

The `@code{gpgme_attr_t}` type is used to specify a key signature attribute. The following attributes are defined:

`@table @code`

`@item GPGME_ATTR_KEYID`

This is the key ID of the key which was used for the signature. It is representable as a string.

`@item GPGME_ATTR_ALGO`

This is the crypto algorithm used to create the signature. It is representable as a string and as a number. The numbers correspond to the `@code{enum gcry_pk_algos}` values in the gcrypt library.

`@item GPGME_ATTR_CREATED`

This is the timestamp at creation time of the signature. It is representable as a number.

`@item GPGME_ATTR_EXPIRE`

This is the expiration time of the signature. It is representable as a number.

`@item GPGME_ATTR_USERID`

This is the user ID associated with the signing key. The user ID is representable as a number.

`@item GPGME_ATTR_NAME`

This is the name belonging to a user ID. It is representable as a string.

`@item GPGME_ATTR_EMAIL`

This is the email address belonging to a user ID. It is representable as a string.

`@item GPGME_ATTR_COMMENT`

This is the comment belonging to a user ID. It is representable as a string.

`@item GPGME_ATTR_KEY_REVOKED`

This specifies if a key signature is a revocation signature. It is representable as a number, and is `@code{1}` if the key is revoked, and `@code{0}` otherwise.

@c @item GPGME\_ATTR\_KEY\_EXPIRED

@c This specifies if a key signature is expired. It is representable as  
@c a number, and is @code{1} if the key is revoked, and @code{0}  
@c otherwise.

@c

@item GPGME\_ATTR\_SIG\_CLASS

This specifies the signature class of a key signature. It is  
representable as a number. The meaning is specific to the crypto  
engine.

@item GPGME\_ATTR\_SIG\_STATUS

This specifies the signature class of a key signature. It is  
representable as a number. The meaning is specific to the crypto  
engine.

@item GPGME\_ATTR\_SIG\_STATUS

This is the same value as returned by @code{gpgme\_get\_sig\_status}.

@end

table

@end deftp

@deftypefun {const char \*} gpgme\_key\_sig\_get\_string\_attr (@w{gpgme\_key\_t @var{key}}, @w{int  
@var{uid\_idx}}, @w{gpgme\_attr\_t @var{what}}, @w{const void \*@var{reserved}}, @w{int @var{idx}})

The function @code{gpgme\_key\_sig\_get\_string\_attr} returns the value of  
the string-representable attribute @var{what} of the signature  
@var{idx} on the user ID @var{uid\_idx} in the key @var{key}. The  
argument @var{reserved} is reserved for later use and should be  
@code{NULL}.

The string returned is only valid as long as the key is valid.

The function returns @code{0} if an attribute can't be returned as a  
string, @var{key} is not a valid pointer, @var{uid\_idx} or @var{idx}  
out of range, or @var{reserved} not @code{NULL}.

@end deftypefun

@deftypefun {unsigned long} gpgme\_key\_sig\_get\_ulong\_attr (@w{gpgme\_key\_t @var{key}}, @w{int  
@var{uid\_idx}}, @w{gpgme\_attr\_t @var{what}}, @w{const void \*@var{reserved}}, @w{int @var{idx}})

The function @code{gpgme\_key\_sig\_get\_ulong\_attr}  
returns the value of  
the number-representable attribute @var{what} of the signature  
@var{idx} on the user ID @var{uid\_idx} in the key @var{key}. The  
argument @var{reserved} is reserved for later use and should be  
@code{NULL}.

The function returns @code{0} if an attribute can't be returned as a  
string, @var{key} is not a valid pointer, @var{uid\_idx} or @var{idx}

out of range, or @var{reserved} not @code{NULL}.

@end deftpdefun

@c node Information About Trust Items

@c subsection Information About Trust Items

@c cindex trust item, information about

@c cindex trust item, attributes

@c cindex attributes, of a trust item

Trust items have attributes which can be queried using the interfaces below. The attribute identifiers are shared with those for key attributes. @xref{Information About Keys}.

```
@deftpdefun {const char *} gpgme_trust_item_get_string_attr (@w{gpgme_trust_item_t @var{item}},
@w{gpgme_attr_t @var{what}}, @w{const void *@var{reserved}}, @w{int @var{idx}})
```

The

function @code{gpgme\_trust\_item\_get\_string\_attr} returns the value of the string-representable attribute @var{what} of trust item @var{item}. The arguments @var{idx} and @var{reserved} are reserved for later use and should be @code{0} and @code{NULL} respectively.

The string returned is only valid as long as the key is valid.

The function returns @code{0} if an attribute can't be returned as a string, @var{key} is not a valid pointer, @var{idx} out of range, or @var{reserved} not @code{NULL}.

@end deftpdefun

```
@deftpdefun int gpgme_trust_item_get_int_attr (@w{gpgme_trust_item_t @var{item}}, @w{gpgme_attr_t
@var{what}}, @w{const void *@var{reserved}}, @w{int @var{idx}})
```

The function @code{gpgme\_trust\_item\_get\_int\_attr} returns the value of the number-representable attribute @var{what} of trust item @var{item}. If the attribute occurs more than once in the trust item, the index is specified by @var{idx}. However, currently no such attribute exists, so @var{idx} should be @code{0}.

The argument

@var{reserved} is reserved for later use and should be @code{NULL}.

The function returns @code{0} if the attribute can't be returned as a number, @var{key} is not a valid pointer, @var{idx} out of range, or @var{reserved} not @code{NULL}.

@end deftpdefun

```
@deftp {Data type} {enum gpgme_sig_stat_t}
```

```
@tindex gpgme_sig_stat_t
```

The @code{gpgme\_sig\_stat\_t} type holds the result of a signature check, or

the combined result of all signatures. The following results are possible:

@table @code

@item GPGME\_SIG\_STAT\_NONE

This status should not occur in normal operation.

@item GPGME\_SIG\_STAT\_GOOD

This status indicates that the signature is valid. For the combined result this status means that all signatures are valid.

@item GPGME\_SIG\_STAT\_GOOD\_EXP

This status indicates that the signature is valid but expired. For the combined result this status means that all signatures are valid and expired.

@item GPGME\_SIG\_STAT\_GOOD\_EXPKEY

This status indicates that the signature is valid but the key used to verify the signature has expired. For the combined result this status means that all signatures are valid and all keys are expired.

@item GPGME\_SIG\_STAT\_BAD

This status indicates that the signature is invalid. For the combined result this status means that all signatures are invalid.

@item GPGME\_SIG\_STAT\_NOKEY

This status indicates that the signature could not be verified due to a missing key. For the combined result this status means that all signatures could not be checked due to missing keys.

@item GPGME\_SIG\_STAT\_NOSIG

This status indicates that the signature data provided was not a real signature.

@item GPGME\_SIG\_STAT\_ERROR

This status indicates that there was some other error which prevented the signature verification.

@item GPGME\_SIG\_STAT\_DIFF

For the combined result this status means that at least two signatures have a different status. You can get each key's status with

@code{gpgme\_get\_sig\_status}.

@end table

@end deftp

@deftypefun {const char \*} gpgme\_get\_sig\_status



```
(@w{gpgme_ctx_t @var{ctx}}, @w{int @var{idx}}, @w{gpgme_sig_stat_t *@var{r_stat}}, @w{time_t
*@var{r_created}})
```

The function `@code{gpgme_get_sig_status}` is equivalent to:

@example

```
gpgme_verify_result_t result;
gpgme_signature_t sig;
```

```
result = gpgme_op_verify_result (ctx);
sig = result->signatures;
```

```
while (sig && idx)
```

```
 @{
 sig = sig->next;
 idx--;
 @}
```

```
if (!sig || idx)
 return NULL;
```

```
if (r_stat)
```

```
 @{
 switch (gpg_err_code (sig->status))
 @{
case GPG_ERR_NO_ERROR:
 *r_stat = GPGME_SIG_STAT_GOOD;
 break;
```

```
case GPG_ERR_BAD_SIGNATURE:
 *r_stat = GPGME_SIG_STAT_BAD;
 break;
```

```
case GPG_ERR_NO_PUBKEY:
 *r_stat = GPGME_SIG_STAT_NOKEY;
 break;
```

```
case GPG_ERR_NO_DATA:
 *r_stat = GPGME_SIG_STAT_NOSIG;
 break;
```

```
case GPG_ERR_SIG_EXPIRED:
 *r_stat = GPGME_SIG_STAT_GOOD_EXP;
 break;
```

```
case GPG_ERR_KEY_EXPIRED:
 *r_stat = GPGME_SIG_STAT_GOOD_EXPKEY;
 break;
```

```
default:
```

```

 *r_stat = GPGME_SIG_STAT_ERROR;
 break;
@}

```

```

 @}
 if (r_created)
 *r_created = sig->timestamp;
 return sig->fpr;
@end example
@end deftypefun

```

```

@deftypefun {const char *} gpgme_get_sig_string_attr (@w{gpgme_ctx_t @var{ctx}}, @w{int @var{idx}},
@w{gpgme_attr_t @var{what}}, @w{int @var{whatidx}})

```

The function @code{gpgme\_get\_sig\_string\_attr} is equivalent to:

```

@example
gpgme_verify_result_t result;
gpgme_signature_t sig;

result = gpgme_op_verify_result (ctx);
sig = result->signatures;

while (sig && idx)
 @{
 sig = sig->next;
 idx--;
 @}
if (!sig || idx)
 return NULL;

switch (what)
 @{
 case GPGME_ATTR_FPR:
 return sig->fpr;

 case GPGME_ATTR_ERRTOK:
 if (whatidx == 1)
 return sig->wrong_key_usage ? "Wrong_Key_Usage" : "";
 else
 return "";
 default:
 break;
 @}

return NULL;
@end example
@end deftypefun

```

```
@deftypefun {const char *} gpgme_get_sig_ulong_attr (@w{gpgme_ctx_t @var{ctx}}, @w{int @var{idx}},
@w{gpgme_attr_t @var{what}}, @w{int @var{whatidx}})
```

The

function @code{gpgme\_get\_sig\_ulong\_attr} is equivalent to:

```
@example
```

```
gpgme_verify_result_t result;
```

```
gpgme_signature_t sig;
```

```
result = gpgme_op_verify_result (ctx);
```

```
sig = result->signatures;
```

```
while (sig && idx)
```

```
 @{
```

```
 sig = sig->next;
```

```
 idx--;
```

```
 @}
```

```
if (!sig || idx)
```

```
 return 0;
```

```
switch (what)
```

```
 @{
```

```
 case GPGME_ATTR_CREATED:
```

```
 return sig->timestamp;
```

```
 case GPGME_ATTR_EXPIRE:
```

```
 return sig->exp_timestamp;
```

```
 case GPGME_ATTR_VALIDITY:
```

```
 return (unsigned long) sig->validity;
```

```
 case GPGME_ATTR_SIG_STATUS:
```

```
 switch (sig->status)
```

```
 @{
```

```
 case GPG_ERR_NO_ERROR:
```

```
 return GPGME_SIG_STAT_GOOD;
```

```
 case GPG_ERR_BAD_SIGNATURE:
```

```
 return GPGME_SIG_STAT_BAD;
```

```
 case GPG_ERR_NO_PUBKEY:
```

```
 return GPGME_SIG_STAT_NOKEY;
```

```
 case GPG_ERR_NO_DATA:
```

```
 return GPGME_SIG_STAT_NOSIG;
```

```
 case GPG_ERR_SIG_EXPIRED:
```

```
 return GPGME_SIG_STAT_GOOD_EXP;
```

```
case GPG_ERR_KEY_EXPIRED:
 return GPGME_SIG_STAT_GOOD_EXPKEY;
```

```
default:
 return GPGME_SIG_STAT_ERROR;
@}
```

```
case GPGME_ATTR_SIG_SUMMARY:
 return sig->summary;
```

```
default:
 break;
@}
return 0;
@end example
@end deftypefun
```

```
@deftypefun {const char *} gpgme_get_sig_key (@w{gpgme_ctx_t @var{ctx}}, @w{int @var{idx}},
@w{gpgme_key_t *@var{r_key}})
```

The function `@code{gpgme_get_sig_key}` is equivalent to:

```
@example
gpgme_verify_result_t result;
gpgme_signature_t sig;
```

```
result = gpgme_op_verify_result (ctx);
sig = result->signatures;
```

```
while (sig && idx)
@{
 sig = sig->next;
 idx--;
@}
if (!sig || idx)
 return gpg_error (GPG_ERR_EOF);

return gpgme_get_key (ctx, sig->fpr, r_key, 0);
@end example
@end deftypefun
```

```
@include lesser.texi
```

```
@include gpl.texi
```

@node Concept Index  
@unnumbered Concept Index

@printindex cp

@node Function and Data Index  
@unnumbered Function and Data Index

@printindex fn

@bye

(private-key

(oid.1.2.840.113549.1.1.1

(n

#00e0ce96f90b6c9e02f3922beada93fe50a875eac6bcc18bb9a9cf2e84965caa2d1ff95a7f542465c6c0c19d276e4526ce  
048868a7a914fd343cc3a87dd74291ffc565506d5bbb25cbac6a0e2dd1f8bcaab0d4a29c2f37c950f363484bf269f78914  
40464baf79827e03a36e70b814938eebdc63e964247be75dc58b014b7ea251#)

(e #010001#)

(d

#046129F2489D71579BE0A75FE029BD6CDB574EBF57EA8A5B0FDA942CAB943B117D7BB95E5D28875E0F  
9FC5FCC06A72F6D502464DABDED78EF6B716177B83D5BDC543DC5D3FED932E59F5897E92E6F58A0F334  
24106A3B6FA2CBF877510E4AC21C3EE47851E97D12996222AC3566D4CCB0B83D164074ABF7DE655FC244  
6DA1781#)

(p

#00e861b700e17e8afe6837e7512e35b6ca11d0ae47d8b85161c67baf64377213fe52d772f2035b3ca830af41d8a4120e  
1c1c70d12cc22f00d28d31dd48a8d424f1#)

(q

#00f7a7ca5367c661f8e62df34f0d05c10c88e5492348dd7bddc942c9a8f369f935a07785d2db805215ed786e4285df16  
58eed3ce84f469b81b50d358407b4ad361#)

(u

#304559a9ead56d2309d203811a641bb1a09626bc8eb36fffa23c968ec5bd891eebbafc73ae666e01ba7c8990bae06cc2  
bbe10b75e69fcacb353a6473079d8e9b#)

)

)

# libpgpme.vers - List of symbols to export.

# Copyright (C) 2002, 2004, 2005, 2009, 2012 g10 Code GmbH

#

# This file is part of GPGME.

#

# GPGME is free software; you can redistribute it and/or modify

# it under the terms of the GNU Lesser general Public License as

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# the License, or (at your option) any later version.

#

# GPGME is distributed in the hope that it will be useful,

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```

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GNU Lesser General Public License for more details.
#
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License along with this program; if not, see <https://www.gnu.org/licenses/>.

#-----
Please remember to add new functions also to gpgme.def
#-----

GPGME_1.1 {
global:
 gpgme_set_engine_info;

 gpgme_ctx_get_engine_info;
 gpgme_ctx_set_engine_info;

 gpgme_data_set_file_name;
 gpgme_data_get_file_name;
 gpgme_data_identify;

 gpgme_sig_notation_clear;
 gpgme_sig_notation_add;
 gpgme_sig_notation_get;

 gpgme_free;

 gpgme_op_getauditlog_start;
 gpgme_op_getauditlog;

 gpgme_conf_release;
 gpgme_conf_arg_new;
 gpgme_conf_arg_release;
 gpgme_conf_opt_change;
 gpgme_op_conf_load;
 gpgme_op_conf_save;
 gpgme_op_conf_dir;

 gpgme_cancel_async;

 gpgme_op_assuan_result;
 gpgme_op_assuan_transact;
 gpgme_op_assuan_transact_start;

 gpgme_check_version_internal;

 gpgme_io_read;
 gpgme_io_write;

```

gpgme\_result\_ref;  
gpgme\_result\_unref;

gpgme\_op\_import\_keys;  
gpgme\_op\_import\_keys\_start;  
gpgme\_op\_export\_keys;  
gpgme\_op\_export\_keys\_start;

gpgme\_op\_assuan\_transact\_ext;

gpgme\_wait\_ext;

gpgme\_op\_vfs\_mount\_result;  
gpgme\_op\_vfs\_mount;  
gpgme\_op\_vfs\_create;

gpgme\_key\_from\_uid;  
gpgme\_set\_sub\_protocol;  
gpgme\_get\_sub\_protocol;

gpgme\_op\_passwd\_start;  
gpgme\_op\_passwd;

gpgme\_set\_global\_flag;

gpgme\_io\_writen;

gpgme\_set\_pinentry\_mode;  
gpgme\_get\_pinentry\_mode;

gpgme\_get\_dirinfo;

gpgme\_op\_spawn\_start;  
gpgme\_op\_spawn;

gpgme\_set\_offline;  
gpgme\_get\_offline;

gpgme\_set\_status\_cb;  
gpgme\_get\_status\_cb;

gpgme\_pubkey\_algo\_string;  
gpgme\_set\_ctx\_flag;  
gpgme\_get\_ctx\_flag;  
gpgme\_data\_set\_flag;

gpgme\_op\_createkey\_start;

```

gpgme_op_createkey;
gpgme_op_createsubkey_start;
gpgme_op_createsubkey;
gpgme_op_adduid_start;
gpgme_op_adduid;
gpgme_op_revuid_start;
gpgme_op_revuid;
gpgme_op_keysign_start;
gpgme_op_keysign;
gpgme_op_tofu_policy_start;
gpgme_op_tofu_policy;
gpgme_op_interact_start;
gpgme_op_interact;

gpgme_addrspec_from_uid;

gpgme_set_sender;
gpgme_get_sender;

gpgme_op_query_swdb;
gpgme_op_query_swdb_result;

gpgme_op_set_uid_flag_start;
gpgme_op_set_uid_flag;

gpgme_op_decrypt_ext;
gpgme_op_decrypt_ext_start;

gpgme_data_new_from_estream;

};

```

```

GPGME_1.0 {
global:
 gpgme_check_version;
 gpgme_get_engine_info;
 gpgme_engine_check_version;

 gpgme_err_code_from_errno;
 gpgme_err_code_to_errno;
 gpgme_err_make_from_errno;
 gpgme_error_from_errno;
 gpgme_strerror;
 gpgme_strerror_r;
 gpgme_strsource;

 gpgme_data_get_encoding;

```



gpgme\_data\_new;  
gpgme\_data\_new\_from\_cbs;  
gpgme\_data\_new\_from\_fd;  
gpgme\_data\_new\_from\_file;  
gpgme\_data\_new\_from\_filepart;  
gpgme\_data\_new\_from\_mem;  
gpgme\_data\_new\_from\_stream;  
gpgme\_data\_read;  
gpgme\_data\_release;  
gpgme\_data\_release\_and\_get\_mem;  
gpgme\_data\_seek;  
gpgme\_data\_set\_encoding;  
gpgme\_data\_write;

gpgme\_get\_protocol\_name;  
gpgme\_hash\_algo\_name;  
gpgme\_pubkey\_algo\_name;

gpgme\_new;  
gpgme\_get\_armor;  
gpgme\_get\_include\_certs;  
gpgme\_get\_io\_cbs;  
gpgme\_get\_keylist\_mode;  
gpgme\_get\_passphrase\_cb;  
gpgme\_get\_progress\_cb;  
gpgme\_get\_protocol;  
gpgme\_get\_textmode;  
gpgme\_release;  
gpgme\_set\_armor;  
gpgme\_set\_include\_certs;  
gpgme\_set\_io\_cbs;  
gpgme\_set\_keylist\_mode;  
gpgme\_set\_locale;  
gpgme\_set\_passphrase\_cb;  
gpgme\_set\_progress\_cb;  
gpgme\_set\_protocol;  
gpgme\_set\_textmode;  
gpgme\_signers\_add;  
gpgme\_signers\_clear;  
gpgme\_signers\_count;  
gpgme\_signers\_enum;

gpgme\_key\_ref;  
gpgme\_key\_unref;  
gpgme\_key\_release;

gpgme\_trust\_item\_ref;  
gpgme\_trust\_item\_unref;

gpgme\_cancel;  
gpgme\_op\_card\_edit;  
gpgme\_op\_card\_edit\_start;  
gpgme\_op\_decrypt;  
gpgme\_op\_decrypt\_result;  
gpgme\_op\_decrypt\_start;  
gpgme\_op\_decrypt\_verify;  
gpgme\_op\_decrypt\_verify\_start;  
gpgme\_op\_delete;  
gpgme\_op\_delete\_start;  
gpgme\_op\_delete\_ext;  
gpgme\_op\_delete\_ext\_start;  
gpgme\_op\_edit;  
gpgme\_op\_edit\_start;  
gpgme\_op\_encrypt;  
gpgme\_op\_encrypt\_start;  
gpgme\_op\_encrypt\_ext;  
gpgme\_op\_encrypt\_ext\_start;  
gpgme\_op\_encrypt\_sign;  
gpgme\_op\_encrypt\_sign\_ext;  
gpgme\_op\_encrypt\_sign\_start;  
gpgme\_op\_encrypt\_sign\_ext\_start;  
gpgme\_op\_encrypt\_result;

gpgme\_op\_export;  
gpgme\_op\_export\_ext;  
gpgme\_op\_export\_ext\_start;  
gpgme\_op\_export\_start;  
gpgme\_op\_genkey;  
gpgme\_op\_genkey\_result;  
gpgme\_op\_genkey\_start;  
gpgme\_get\_key;  
gpgme\_op\_import;  
gpgme\_op\_import\_result;  
gpgme\_op\_import\_start;  
gpgme\_op\_keylist\_end;  
gpgme\_op\_keylist\_ext\_start;  
gpgme\_op\_keylist\_from\_data\_start;  
gpgme\_op\_keylist\_next;  
gpgme\_op\_keylist\_result;  
gpgme\_op\_keylist\_start;  
gpgme\_op\_sign;  
gpgme\_op\_sign\_result;  
gpgme\_op\_sign\_start;  
gpgme\_op\_trustlist\_end;  
gpgme\_op\_trustlist\_next;  
gpgme\_op\_trustlist\_start;

```

gpgme_op_verify;
gpgme_op_verify_result;
gpgme_op_verify_start;
gpgme_wait;

gpgme_data_new_with_read_cb;
gpgme_data_rewind;
gpgme_get_sig_status;
gpgme_get_sig_string_attr;
gpgme_get_sig_ulong_attr;
gpgme_get_sig_key;
gpgme_key_get_string_attr;
gpgme_key_get_ulong_attr;
gpgme_key_sig_get_string_attr;
gpgme_key_sig_get_ulong_attr;
gpgme_op_import_ext;
gpgme_trust_item_get_int_attr;
gpgme_trust_item_get_string_attr;
gpgme_trust_item_release;

gpgme_err_code_from_syserror;
gpgme_err_set_errno;

local:
 *;

};
;;; -*- Mode: lisp -*-

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;;;
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;;; License along with GPGME; if not, write to the Free
;;; Software Foundation, Inc., 59 Temple Place - Suite 330, Boston, MA
;;; 02111-1307, USA.

```

```
(defpackage #:gpgme-system
 (:use #:common-lisp #:asdf))
```

```
(in-package #:gpgme-system)
```

```
(defsystem gpgme
 :description "GnuPG Made Easy."
 :author "g10 Code GmbH"
 :version "1.13.1"
 :licence "GPL"
 :defsystem-depends-on ("cffi-grovel")
 :depends-on ("cffi" "gpg-error" "trivial-garbage")
 :components ((:file "gpgme-package")
 (:cffi-grovel-file "gpgme-grovel"
 :depends-on ("gpgme-package")))
 (:file "gpgme"
 :depends-on ("gpgme-package" "gpgme-grovel"))))
```

```
-----BEGIN PGP PRIVATE KEY BLOCK-----
```

```
lQOYBFrsKEkBCADKw4Wt8J6M/88qD8PO6lSMCxH1cpwH8iK0uPaFFYsJkkXo7kWf
PTAtrV+REqF/o80dvYcdLvRsV21pvncZz/HXLU1yQ18mC3XObrKokbdgrTTKA5XE
BZkNsqaMMJauT18H4hYkSg62/tTdO1cu/zWv/LFf7Xyn6+uA74ovXCJlO1s0N2c
PSht98QRzPMf2owgV37JnDNp4gGVDGHxSZOuUwxgYAZYN8SFc+c+3ZrQfY870
+O4j3Mz4p7yD13AwP4buQLBsb/icxekeQCqpRjLH9f7MdEcGXA1x36RcEkHdu+M
yJ392eMgD+dKNfRCtyTPhjZTxvbNELIBYICfABEBAAEAB/wLJ0gyMjs2fFfT83wM
5Lzz2yQIwV4t3bblBAujdHTqeN5Zmsm/oakFyjSokULK96Kv0R4ej9eoIgMFvxFk
HRkrngxTrbsNJ7I6QcKYHTPeIj318ykNL6fj0WJUcdPIENukXl5jbqNyk3/4D2y
TTDySyq6jHTgvMH4K4KJUSpglvSJpntTk9RhuFGHAF+sNR9atygdYctAaERMrtSg
LCoSt/AoX5GRMIQjXT9oqQjwSQoZyF4s8HMC8wdTFIE/E0L4IVdHVp8sz2UszNtT
W/evmCA+KVruKjRH/Fhrq4hHkEamW28+j4L6uAyagONP7BONs+S5Oo2zTT9+tV2R
ILTZBADdgLuAgF6C5Lu9jCF6DfFgaT/uafMyQNkEGNlxOHMWHTgLHe475V2eG9gA
amd4yXKYEFKU1PWnvlGuicQSGdzVcwmq61msvXgYD0FK3LP3yWzKnE4X1tzc9Vp
/uHJxKjewCuyt1f5in919v+T8TbUxBYKC0zX/qWtX+10cTx77QQA6leqhToJ95Yc
u4UBrKMEO+y2v8Svb3LG7yI5oY8tkw0EkJ/kpZ8xTAfZYCe6fXdvVE3PHg2lryxc
Wv/EU3QY/qA3G82mbXYeJ2jNZaTNYo4MylMrt4Mx25x4ke7JlsE8SVrQ+4CrHkqp
OjSIa7fppLrQ78uW980AtN8NNQGrLTsD/A9aoA60Igxy1Q3K2uSyDCyjLknv57ym
ZSBD3/t7m0l6Q6gdbfhNGosT+Hd4y3actqEqzXZHW2VG4dKZ/wRNkxtSm9adU9vs
EHyzxb6mKIH32zAG5TaFT20hC+NK6lsyHr9UE2ZrS6ma2sLxGW2O40hqNsdD+5m
NrqeBc2I/js1PMK0EHRlc3RAZXhhbXBsZS5vcmeJAVQEEwEIAD4WIQTUFzW5Ejb9
uIIejFojAWNe7/DLBQUcWuwoSQIbAwUJA8JnAAULCQgHAgYVCgkICwIEFgIDAQIe
AQIXgAAKCRAjAWNe7/DLBf9kB/wOQ/S60HGwFq07W9N01HWULyhHKoMmcHL6rfZ6
4oDqLxolPSasz7WAMW1jN4qtWJ0mFzwO83V6kaBe+wF6Kqir6udFSBW9rPcFg6/V
ZXPltT0a6uacIHq6DyQ5iMW4YQWbVy9OR2rNgkYo1JCBR0XdRJYCSX3yB4TWv/eX
nZ37/WjmiTOIZh35rjs+NuU/S5JPDfAp2/k70DevQeBsv+UjVXjWpNTZmPbvDnd9
95uSmC6UY4hzyP84ORYMYn9n1QAR0goxDN6UunOf9Rlp1oMzdxMool/d1MiCgx2h
3jheuhv7lgUF4KpvHOuEPXQ7UO417E0TYcDZ1J8Nsv87SZeEnQOYBFrsKEkBCADj
oEBHg/QPqZHg8VyoD1xYRAWGxyDjKX/GrS6yE+x2hk5FoQCajxKa/d4AVxOnJpd
whAfeXeSNaql5Ejgzax+Tdj9BV6vtGVJVv0pO7bgAiZxkA6RHxtNqhpPnPQoXvUz
```

kzprGpuL+Nj4yIg7z1ITH6KQH4u5SI9vd+j/8i9Taz67pdZwuJjac8qBuJHjzAo1  
bjYctFYUSG5pbmMQyNLySziNkFa4DajODlt3RuqVGP316Fk+Sy2+60tC/HIX8jg  
MyMONfOGBQx6jk8tvAphS/LAqrrNepnagIyLUGKU+L8cB2g1PGGp2biBFWqZbudZ  
oyRBet/0yH/zirBdQJw1ABEBAAEAB/4lN3gXOI4OuoOcsvHak4pebx61Mt0YP9cT  
qZASIBqxok5x8E28pFh/tYfkYdqRCtdNYZOnxcEoUWh5j6nfWZkEnJ9P/T8GPNk7  
pMKnKXmExi05b5uGHD8nU1rSbf/YkvAF0vpbxd4/RDxbbtQhbUwGzusSI+pBLM0w  
5TreEB+vRGC2gOvXXOtKLNEa7M9rH2EwbAkP3jOGGwgk6adxbQdBcRxq4merqHL  
YrVz73bCj8TDc0fsNjyIaZJZ++ejfBFYavsF1pvx9z7FNFf8rSXoiB3SBtaWGfhr  
bwNaMZrDc7TRIq/fgGaL6g//bzcWrr1YaHXZ10Bgx6UymDOIYkCpBADm0Hv46sPw  
07SO8+IACcaQliOto1pndOPwTimCeo58/7rf8I2a5uuJloGrnPwAX65bKDnUALp6  
X3lnXRNmhnB3Uewx4i00LQmjsxhJfQiGLpMv0j58tn64s7GqQzGVV1JKcQm992RV  
jFOdyjZ+K4LGWEOITG/bZrMEVNGCM+OnQQA/Haz8xN0NFSIq7tyfFc0pkx/TiCX  
xGfBqbO0wU2b5GMnZbY/06HENpidIzpa231VQaw5/nPTvfhlLKW1iGAkc148cX1q  
IL9w2ksXuaHR3LXud2VcfVTIdxU/7h7u1dD/85+c0+7jIGObD9cXKxlM6OjpIJz1  
l5/1h3C5S0TuxHkEAL/3BGihkhNfv1Xx0rWu0/732usX/nE/A9C26hGu41FUf3fp  
0ilonKpKZUEwWt5hWSEFCSrznNVekiO0rxvuu3RVegvzThPNU4Pf4JZtJpRVhvUQ  
d9ulxJw7V9rs75uNBatTNC0kXuGoXhehw4Bn93xa67gYGd3LfrH+oT0GCDpTSHCJ  
ATwEGAEIACYWIQTUFzW5Ejb9uIIEjFojAWNe7/DLBQUCWuwoSQIbDAUJA8JnAAAK  
CRAjAWNe7/DLBf0pCACPP5hBuUWngu2Hqvg+tNiujsiYzId3MffFxEk3CbXeHcJ  
5F32NDJ9PYCNra4L8wSv+NZt9gIa8lFwoFSFQCjzH7KE86XcV3MhfdJTNb/+9CR7  
Jq3e/4Iy0N5ip7PNYMCyakcAsxvsNCJKrSaDuYe/OAoTXRBtgRWE2uyT315em02L  
kr+2Cc/Qk6H+vINOHGRgnpl/OZZjnUuUfBUvMGHr1phW+y7aeymC9PnUGdViRdJe  
23nntMSDA+0/I7ESO9JsWvJbyBmuiZpu9JjScOjYH9xpQLqRNyw4WHpZriN69F0t  
9Mmd7bM1+UyPgbPER0iWMeyctYsuOLEUyQKMscDT

=hkUm

-----END

PGP PRIVATE KEY BLOCK-----

#+TITLE: Stuff To Do

#+LATEX\_COMPILER: xelatex

#+LATEX\_CLASS: article

#+LATEX\_CLASS\_OPTIONS: [12pt]

#+LATEX\_HEADER: \usepackage{xltextra}

#+LATEX\_HEADER: \usepackage[margin=1in]{geometry}

#+LATEX\_HEADER: \setmainfont[Ligatures={Common}]{Latin Modern Roman}

\* Project Task List

:PROPERTIES:

:CUSTOM\_ID: task-list

:END:

\*\* DONE Documentation default format

CLOSED: [2018-02-15 Thu 21:29]

:PROPERTIES:

:CUSTOM\_ID: todo-docs-default

:END:

Decide on a default file format for documentation. The two main  
contenders being Org Mode, the default for the GnuPG Project and

reStructuredText, the default for Python projects. A third option of DITA XML was considered due to a number of beneficial features it provides.

The decision was made to use Org Mode in order to fully integrate with the rest of the GPGME and GnuPG documentation. It is possible to produce reST versions via Pandoc and DITA XML can be reached through converting to either Markdown or XHTML first.

```
** TODO Documentation build systems
:PROPERTIES:
:CUSTOM_ID: todo-docs-build-systems
:END:
```

Though Org Mode is being used for the default documentation format, it still needs to end up as usable by end users. So the Org Mode files are used to produce the "source" files used by the two main contenders for documenting the bindings: Texinfo and ReStructuredText/Docutils.

```
*** TODO Texinfo documentation
:PROPERTIES:
:CUSTOM_ID: todo-docs-build-texinfo
:END:
```

Need to add all of Texinfo's ... special systems to make it do its things.

```
*** TODO ReStructuredText documentation
:PROPERTIES:
:CUSTOM_ID: todo-docs-build-docutils
:END:
```

Need to run Sphinx's quick start, add it to the requirements and tweak the index page for the rst files to point to the HOWTO and other files.

It might just be easier to do all that in Org Mode and convert the lot, then the Sphinx bits can be automated.

```
** STARTED Documentation HOWTO
:PROPERTIES:
:CUSTOM_ID: todo-docs-howto
:END:
```

- State "STARTED" from "TODO" [2018-03-08 Thu 13:59] \\\

Started yesterday.

Write a HOWTO style guide for the current Python bindings.

\*\*\* DONE Start python bindings HOWTO

CLOSED: [2018-03-07 Wed 18:14]

:PROPERTIES:

:CUSTOM\_ID: howto-start

:END:

\*\*\* STARTED Include certain specific instructions in the HOWTO

:PROPERTIES:

:CUSTOM\_ID: howto-requests

:END:

Note: moved the S/MIME bits out to their own section of the TODO list and may be served better by separate HOWTO documentation anyway.

- State "STARTED" from "TODO" [2018-03-09 Fri 15:27]

Some functions can be worked out from the handful of examples available, but many more can't and I've already begun receiving requests for certain functions to be explained.

\*\*\*\* DONE Standard scenarios

CLOSED: [2018-03-19 Mon 12:34]

:PROPERTIES:

:CUSTOM\_ID: howto-the-basics

:END:

- State "DONE" from "STARTED"

[2018-03-19 Mon 12:34] \\\

All four of those are done.

- State "STARTED" from "TODO" [2018-03-09 Fri 15:26] \\\

Began with the example code, now to add the text.

What everyone expects: encryption, decryption, signing and verifying.

\*\*\*\* STARTED Key control

:PROPERTIES:

:CUSTOM\_ID: howto-key-control

:END:

- State "STARTED" from "TODO" [2018-03-19 Mon 12:35] \\\

Generating keys and subkeys are done, but revocation is still to be done.

Generating keys, adding subkeys, revoking subkeys (and keeping

the cert key), adding and revoking UIDs, signing/certifying keys.

\*\*\*\* DONE More key control

CLOSED: [2018-03-19 Mon 12:36]

:PROPERTIES:

:CUSTOM\_ID: howto-key-selection

:END:

- State "DONE" from "TODO" [2018-03-19 Mon 12:36] \\

Key selection, searching, matching and counting is done.

Selecting keys to encrypt to or manipulate in other ways (e.g. as  
with key

control or the basics).

\*\* TODO Documentation SWIG

:PROPERTIES:

:CUSTOM\_ID: todo-docs-swig

:END:

Write documentation for the complete SWIG bindings demonstrating  
the correspondence with GPGME itself.

Note: it is likely that this will be more in the nature of  
something to be used in conjunction with the existing GPGME  
documentation which makes it easier for Python developers to use.

\*\* TODO GUI examples

:PROPERTIES:

:CUSTOM\_ID: todo-gui-examples

:END:

Create some examples of using Python bindings in a GUI application  
to either match or be similar to the old GTK2 examples available  
with PyME.

\*\* TODO Replace SWIG

:PROPERTIES:

:CUSTOM\_ID: todo-replace-swig

:END:

Selecting SWIG for this project in 2002 was understandable and  
effectively the only viable option. The options available now,  
however, are significantly improved and some of those would resolve  
a number of existing problems with using SWIG, particularly when



running code on both POSIX compliant and Windows platforms.

The long term goal is to replace SWIG by reimplementing the Python bindings using a more suitable means of interfacing with the GPGME C source code.

\*\*\* TODO Replacement for SWIG

```
:PROPERTIES:
:CUSTOM_ID: todo-replace-swig-replacement
:END:
```

Decide on a replacement for SWIG. Currently CFFI is looking like the most viable candidate, but some additional testing and checks are yet to be completed.

\*\* TODO API for an API

```
:PROPERTIES:
:CUSTOM_ID: todo-api-squared
:END:
```

A C API like GPGME is not what most modern developers think of when they hear the term API. Normally they think of something they can interact with like a RESTful web API. Though RESTful is unlikely given the nature of GPGME and the process of encryption, it may be possible to provide a more familiar interface which can be utilised by developers of other languages for which bindings are not available  
or for which it is too difficult to create proper bindings.

\*\* TODO S/MIME

```
:PROPERTIES:
:CUSTOM_ID: s-mime
:END:
```

Eventually add some of this, but the OpenPGP details are far more important at the moment.

\* Project Task Details

```
:PROPERTIES:
:CUSTOM_ID: detailed-tasks
:END:
```

\*\* Working examples

```
:PROPERTIES:
:CUSTOM_ID: working-examples
:END:
```

The old GUI examples were unable to be retained since they depended on GTK2 and Python 2's integration with GTK2.

Current GPGME examples so far only include command line tools or basic Python code for use with either Python 2.7 or Python 3.4 and above.

Future GUI examples ought to utilise available GUI modules and libraries supported by Python 3. This may include Qt frameworks, Tkinter, GTK3 or something else entirely.

**\*\* Documentation**

```
:PROPERTIES:
:CUSTOM_ID: documentation
:END:
```

The legacy documentation which no longer applies to the Python bindings has been removed.

Current and future documentation will adhere to the GnuPG standard of using Org Mode and not use the reStructuredText (reST) format more commonly associated with Python documentation. The reasons for this are that this project is best served as shipping with the rest of GPGME and the documentation ought to match that. There are also aspects of Org Mode's publishing features which are superior to the defaults of reST, including the capacity to generate fully validating strict XHTML output.

If reST files are required at a later point for future inclusion with other Python packages, then that format can be generated from the .org files with Pandoc before being leveraged by either Docutils, Sphinx or something else.

While there are some advanced typesetting features of reST which are not directly available to Org Mode, more often than not those features are best implemented with either HTML and CSS, with LaTeX to produce a PDF or via a number of XML solutions. Both reST and Org Mode have multiple paths by which to achieve all of these.

```
from __future__ import absolute_import
```

```
import cython
import gpg
```

```
c = pgp.Context()
seckey = c.keylist(pattern=None, secret=True)
pubkey = c.keylist(pattern=None, secret=False)
```

```
seclist = list(seckey)
secnum = len(seclist)
```

```
publist = list(pubkey)
pubnum = len(publist)
```

```
if cython.compiled is True:
 cc = "Powered by Cython compiled C code."
else:
 cc = "Powered by Python."
```

```
print("""
 Number of secret keys: {0}
 Number of public keys: {1}

 {2}
 """.format(secnum, pubnum, cc))
\input texinfo @c -*- texinfo -*-
@c %**start of header
@setfilename maintenance-mode.info
@settitle Maintenance Mode
@documentencoding utf-8
@documentlanguage en
@c %**end of header
```

```
@finalout
@titlepage
@title Maintenance Mode
@author Ben McGinnes
@end titlepage
```

```
@contents
```

```
@ifnottex
@node Top
@top Maintenance Mode
@end ifnottex
```

```
@menu
* Maintenance Mode from 2019::
```

```
@detailmenu
--- The Detailed Node Listing ---
```

Maintenance Mode from 2019

- \* Maintainer from 2019 onward::
- \* Using the Python Bindings from 2019 and beyond::
- \* Documentation formats::

Documentation formats

- \* Cautionary Notes regarding Sphinx and EPUB::

@end detailmenu

@end menu

@node Maintenance Mode from 2019

@chapter Maintenance Mode from 2019

@multitable {aaaaaaaaaaaaaa} {aaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaa}

@item Version:

@tab 0.0.1

@item GPGME Version:

@tab 1.13.0

@item Author:

@tab Ben McGinnes <ben@@gnupg.org>

@item Author GPG Key:

@tab DB4724E6FA4286C92B4E55C4321E4E2373590E5D

@item Language:

@tab Australian

English, British English

@item xml:lang:

@tab en-AU, en-GB, en

@end multitable

From the beginning of 2019 the Python bindings to GPGME will enter maintenance mode, meaning that new features will not be added and only bug fixes and security fixes will be made. This also means that documentation beyond that existing at the end of 2018 will not be developed further except to correct errors.

Though use of these bindings appears to have been quite well received, there has been no indication of what demand there is, if any for either financial backing of the current Python bindings development or support contracts with g10code GmbH citing the necessity of including the bindings.

@menu

- \* Maintainer from 2019 onward::
- \* Using the Python Bindings from 2019 and beyond::

\* Documentation formats::

@end menu

@node Maintainer from 2019 onward

@section Maintainer from 2019 onward

How does this affect the position of GnuPG Python Bindings Maintainer?

Well, I will remain as maintainer of the bindings; but without funding for that position, the amount of time I will be able to dedicate solely to this task will be limited and reduced to volunteered time. As with all volunteered time and effort in free software projects, this will be subject to numerous external imperatives.

@node Using the Python Bindings from 2019 and beyond

@section Using the Python Bindings from 2019 and beyond

For most, if not all, Python developers using these bindings; they will continue to just work the same as they always have. Expansions of GPGME itself are usually handled by SWIG with the existing code and thus bindings are generated properly when the bindings are installed alongside GPGME and when the latter is built from source.

In the rare circumstances where that is not enough to address some new addition to GPGME, then that is a bug and thus subject to the maintenance mode provisions (i.e. it will be fixed following a bug report being raised and your humble author will need to remember where the timesheet template was filed, depending on how many years off such an event is).

All the GPGME functionality will continue to be accessible via the lower level, dynamically generated methods which match the GPGME C documentation. While the more intuitively Pythonic higher level layer already covers the vast majority of functionality people require with key generation, signatures, certifications (key signing), encryption, decryption, verification, validation, trust levels and so on.

Any wanted features lacking in the Python bindings are usually lacking because they are missing from GPGME itself (e.g. revoking keys via the API) and in such cases they are usually deliberately excluded. More discussion of these issues can be found in the archives of the @uref{https://lists.gnupg.org/mailman/listinfo/gnupg-devel, gnupg-devel mailing list}.

Any features existing in the dynamically generated layer for which people want a specific, higher level function included to make it more Pythonic

(e.g. to avoid needing to learn or memorise cryptographic mode values or GnuPG status code numbers), would be a feature request and **not** a bug.

It is still worthwhile requesting it, but the addition of such a feature would not be guaranteed and provided on a purely volunteer basis. Expediting such a request would require funding that request.

Those with a commercial interest in expediting such a feature request already know how to <https://gnupg.org/cgi-bin/procdonate.cgi?mode=preset>, expedite it} (use the message field to state what feature is being requested).

@node Documentation formats  
@section Documentation formats

The documentation has been written in Org mode for GNU Emacs, with both Texinfo and reStructuredText formats generated from that. The Texinfo files are intended for use with the rest of the GnuPG documentation; while the reStructuredText files are intended for use with Docutils and Sphinx, as with other Python projects.

@menu  
\* Cautionary Notes  
regarding Sphinx and EPUB::  
@end menu

@node Cautionary Notes regarding Sphinx and EPUB  
@subsection Cautionary Notes regarding Sphinx and EPUB

Though Python's Docutils in conjunction with Sphinx is capable of generating some very useful HTML sites, as proven by <https://readthedocs.org/>, Read the Docs} and the <https://docs.python.org/>, Python documentation}, there are a number of output formats it does not handle well. At the top of the list of things it manages to break so atrociously as to be embarrassing is the <http://idpf.org/epub>, EPUB 3} format.

The automatically generated EPUB of the CPython documentation always contains hundreds of validation errors and even the modest amount of documentation here <https://files.au.adversary.org.s3.amazonaws.com/crypto/gpgme-python/rst/epub/GPGMEPythonBindings.epub>, produced a file} with approximately thirty validation errors. As the volume of documentation content increases, so does the induced errors. Whereas Texinfo doesn't produce EPUB output at all, nor does Org-mode.

Should there ever be genuine demand for this format, lodge a <https://dev.gnupg.org/maniphest/task/edit/form/4/>, feature request} case marked for <https://dev.gnupg.org/p/BenM/>, my} attention. The means of generating such

files flawlessly is already available, but is not yet part of the GnuPG build system. Nor is it integrated with a means of converting Org mode input files to the relevant base format automatically, as can already be done when converting Org to reStructuredText or Org to Texinfo. As a certain amount of work would be required to get it done, there would need to be clear demand for that work to be done.

@bye

000

\*H

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Deutsches Forschungsnetz10UDFN-PCA1.0,U%DFN Top Level Certification Authority1!0 \*H  
certify@pca.dfn.de0

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011230180000Z010 UDE1!0U

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certify@pca.dfn.de0"0

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+<[A|F)F%

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EYBmu tt[-%,R+n0j0U00U0U{upz\*D\

v0Ux0v09753http://www.pca.dfn.de/dfnpca/certify/ssl/dfnpca.crx09753http://www.pca.dfn.de/dfnpca/certify/ssl/dfn  
pca.crl0 `HB0) `HBhttps://mystic.pca.dfn.de/0A `HB42http://www.pca.dfn.de/dfnpca/policy/wwwpolicy.html0 `HB

This certificate was issued by the DFN-PCA, the Top  
Level Certification Authority of the German Research  
Network (Deutsches Forschungsnetz, DFN).

The key owner's identity was authenticated in

accordance with the DFN World Wide Web Policy, v1.00! `HBcgi/check-rev.cgi?0

\*H

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+ZYG| UCA|PzYFnTj@SA)/<HU+4t?@g?pb5w'Z;dqLi9\<(d=

,}h?c(MeM44=Qe/\_^^JyYN/61&jPFXifP&#;/KZ

1 xOK?ps

(21:protected-private-key(3:elg(1:p193:5\*n^f"Q'R0\_6<ymec \=c7S8u[5

ZF'xf5yi9F@T=KhZdU0(k5nZEI/ R|njVITPU\$W<xs-Yx)(1:g1:)(1:y192:O9GNR{?}Y\_W[FD\*zurmk%'R'>>e9pe  
eU)uS%VJ!5F)yH\*O

]l'7{ @wJmQP^jurx'V2H2j[G{q\_"80)(9:protected25:openpgp-s2k3-sha1-aes-cbc((4:sha18:o"%7:5242880)16:Hs\*}u  
)256:Gzk3%\Kb2=oOO@,}eBBI3F|OQP3eD%n,~L-6UH^=64i);l

e+sG"(mlH\_2sn\_BBO7hRcZUt(p6,{5|37C3m8EY9=gQ )(12:protected-at15:20101008T070148)))

-----BEGIN PGP PUBLIC KEY BLOCK-----

mQENBFsMHecBCACqdJgqa+CeNYwPCK+MpOwAV6uFVjDyO2LmOs6+XfDWRBU/Zjtz  
8zdYNKSbLjkWN4ujV5aiyA7MtEofszzYLEoKU1wiDSchMpW8qmEFDvI9g26MeAV  
rTno9D5KodHvEI8wnrqBs8ix0WLbh6J1Dtt8HQgIbN+v3gaRQrgBFe6z2ZYpHHx  
ZfOu3iFKlm2WE/NekRkvvFIo3ApGvRhGIYw6JMmugBlo7s5xosJK0I9dkPGIEtt  
aF1RkcMj8sWG9vHAXcjlGgFfXSN9YLppydXpkuZGm4+gjLB2a3rbQCZVFnxCyG4O

```
ybjkP8Jw6Udm89bK2ucYFfjdrnYn/nJqRxeNABEBAAG0I1Rlc3QgTm9Qcml2S2V5
IDxub2JvZHIhZlZlXhhbXBsZS5vcmc+iQFOBBMBCAA4FiEE4Fmh4IZtMa4TEXCITZou
EzBBU9EFAlsmHecCGwMFCwkIBwIGFQoJCAAsCBByCAwECHgECF4AACgkQTZouEzBB
U9F+qwf/SHj4uRnTWgyJ71FBxQDYCBq3jbi6e7hMkRPbJyJdnPIMAb2p0PJjBgjW
0pp4+kDPZans3UDHbma1u/SFI4/y6isJiK94Bk5xp5YliLGnUceTjgDFe6lBhfQ1
zVWZC/NF3tPgbziIxXQTNt34nS+9dbV/QFDLW0POcN7C0jR/hgkBjMEH2PezWhSj
mL/yLflUYAoxVpXjfC5aPJKqw0tR7m5ibznjCphE+FUMRg8EOmJcg6soeJ5QspU
k2dPN3+Y0zCTNRgAHEI+yIQbM6pio6v2c+UCtT1QhW4xSI38/kcEG8QiM55r1TUy
FcWAY5n5t1nNZtMxxse3LqEon3rKiLkBDQRbDB3nAQgAqfAjSjcngERtM+ZYOWn0
QF2v2FuEuMe8mhju7Met7SN2zGv1LnjhTNshEa9IABEfjZirE2Tqx4xCWDwDedK4
u1ToFvcnuAMnq2O47Sh+eTyps6WPFtPBWf6ctKY31hFXjgoyDBULBvl43XU/D9C
Mt7nsKDPYHVrrnge/qWPYVcb+cO0sSwNImMcwQSdTQ3VBq7MeNS9ZeBcXi+XCjhN
kjNum2AQqpkHHDQV7871yQ8RIILvZSSfkLb0/SNDU+bGaw2G3lcyKdIfZi2EWWZT
oCbH38I/+LV7nAEe4zFpHwW8X0Dkx2aLgxe6Ushz2fGv20RKaXCWki69fWw0BR
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caDFI4d6ZTmp5SY+pZyktZ4bg/vMH5VFxdIKgbLx9uVeTvOupvbAW0TNulYGUBQE
nm+S0zr3W18t64e4sS3oHse8zCqo1iiImpba6F1Oaw==
```

=y6DD

-----END

PGP PUBLIC KEY BLOCK-----

;;; gpgme.lisp

;;; Copyright (C) 2006 g10 Code GmbH

;;;

;;; This file is part of GPGME-CL.

;;;

;;; GPGME-CL is free software; you can redistribute it and/or modify it

;;; under the terms of the GNU General Public License as published by

;;; the Free Software Foundation; either version 2 of the License, or

;;; (at your option) any later version.

;;;

;;; GPGME-CL is distributed in the hope that it will be useful, but

;;; WITHOUT ANY WARRANTY; without even the implied warranty of

;;; MERCHANTABILITY or FITNESS FOR A PARTICULAR PURPOSE. See the GNU

;;; Lesser General Public License for more details.

;;;

;;; You should have received a copy of the GNU General Public License

;;; along with GPGME; if not, write to the Free Software Foundation,

;;; Inc., 59 Temple Place - Suite 330, Boston, MA 02111-1307, USA.

;;; TODO

;;; Set up the library.



```

(in-package :gpgme)

(deftype byte-array ()
 '(simple-array (unsigned-byte 8) (*)))

(deftype character-array ()
 '(simple-array character (*)))

;;;
Debugging.

(defvar *debug* nil "If debugging output should be given or not.")

;;; Load the foreign library.

(define-foreign-library libgpgme
 (:unix "libgpgme.so")
 (t (:default "libgpgme")))

(use-foreign-library libgpgme)

;;; System dependencies.

; Access to ERRNO.
(defcfun ("strerror" c-strerror) :string
 (err :int))

(defun get-errno ()
 errno)

(defun set-errno (errno)
 (setf *errno* errno))

(define-condition system-error (error)
 ((errno :initarg :errno :reader system-error-errno))
 (:report (lambda (c stream)
 (format stream "System error: ~A: ~A"
 (system-error-errno c)
 (c-strerror (system-error-errno c)))))
 (:documentation "Signalled when an errno is encountered.))

; Needed to write passphrases.
(defcfun ("write" c-write) ssize-t
 (fd :int)
 (buffer :string) ; Actually :pointer, but we only need string.
 (size size-t))

(defun system-write (fd buffer size)

```

```

(let ((res (c-write fd buffer size)))
 (when (< res 0) (error 'system-error
:errno (get-errno)))
 res))

;;;
;;; C Interface Definitions
;;;

;;; Data Type Interface

;;; Some new data types used for easier translation.

;;; The number of include certs. Translates to NIL for default.
(defctype cert-int-t
 (:wrapper :int
 :from-c translate-cert-int-t-from-foreign
 :to-c translate-cert-int-t-to-foreign))

;;; A string that may be NIL to indicate a null pointer.
(defctype string-or-nil-t
 (:wrapper :string
 :to-c translate-string-or-nil-t-to-foreign))

;;; Some opaque data types used by GPGME.

(defctype gpgme-ctx-t
 (:wrapper :pointer
 :to-c translate-gpgme-ctx-t-to-foreign)
 "The GPGME context type.")

(defctype gpgme-data-t
 (:wrapper :pointer
 :to-c translate-gpgme-data-t-to-foreign)
 "The GPGME data object type.")

;;; Wrappers for the libpgp-error library.

(defctype gpgme-error-t
 (:wrapper gpg-error::gpg-error-t
 :from-c translate-gpgme-error-t-from-foreign
 :to-c translate-gpgme-error-t-to-foreign)
 "The
GPGME error type.")

(defctype gpgme-error-no-signal-t
 (:wrapper gpg-error::gpg-error-t
 :from-c translate-gpgme-error-no-signal-t-from-foreign)

```

"The GPGME error type (this version does not signal conditions in translation.)"

```
(defctype gpgme-err-code-t gpg-error::gpg-err-code-t
"The GPGME error code type.")
```

```
(defctype gpgme-err-source-t gpg-error::gpg-err-source-t
"The GPGME error source type.")
```

```
(defun gpgme-err-make (source code)
"Construct an error value from an error code and source."
(gpg-err-make source code))
```

```
(defun gpgme-error (code)
"Construct an error value from an error code."
(gpgme-err-make :gpg-err-source-gpgme code))
```

```
(defun gpgme-err-code (err)
"Retrieve an error code from the error value ERR."
(gpg-err-code err))
```

```
(defun gpgme-err-source (err)
"Retrieve an error source from the error value ERR."
(gpg-err-source err))
```

```
(defun gpgme-strerror (err)
"Return a string containing a description of the error code."
(gpg-strerror err))
```

```
(defun
gpgme-strsource (err)
"Return a string containing a description of the error source."
(gpg-strsource err))
```

```
(defun gpgme-err-code-from-errno (err)
"Retrieve the error code for the system error. If the system error
is not mapped, :gpg-err-unknown-errno is returned."
(gpg-err-code-from-errno err))
```

```
(defun gpgme-err-code-to-errno (code)
"Retrieve the system error for the error code. If this is not a
system error, 0 is returned."
(gpg-err-code-to-errno code))
```

```
(defun gpgme-err-make-from-errno (source err)
(gpg-err-make-from-errno source err))
```

```
(defun gpgme-error-from-errno (err)
(gpg-error-from-errno err))
```

;;;

```
(defcenum gpgme-data-encoding-t
 "The possible encoding mode of gpgme-data-t objects."
 (:none 0)
 (:binary 1)
 (:base64 2)
 (:armor 3)
 (:url 4)
 (:urlesc 5)
 (:url0 6)
 (:mime 7))
```

;;;

```
(defcenum gpgme-pubkey-algo-t
 "Public key algorithms from libgcrypt."
 (:rsa 1)
 (:rsa-e 2)
 (:rsa-s 3)
 (:elg-e 16)
 (:dsa 17)
 (:ecc 18)
 (:elg 20)
 (:ecdsa 301)
 (:ecdh 302)
 (:eddsa 303))
```

```
(defcenum gpgme-hash-algo-t
 "Hash algorithms from libgcrypt."
 (:none 0)
 (:md5 1)
 (:sha1 2)
 (:rmd160 3)
 (:md2 5)
 (:tiger 6)
 (:haval 7)
 (:sha256 8)
 (:sha384 9)
 (:sha512 10)
 (:sha224 11)
 (:md4 301)
 (:crc32 302)
 (:crc32-rfc1510 303)
 (:crc24-rfc2440 304))
```

;;;

```

(defcenum gpgme-sig-mode-t
 "The available signature modes."
 (:none 0)
 (:detach 1)
 (:clear 2))

;;;

(defcenum gpgme-validity-t
 "The available validities for a trust item or key."
 (:unknown 0)
 (:undefined 1)
 (:never 2)
 (:marginal 3)
 (:full 4)
 (:ultimate 5))

;;;

(defcenum gpgme-protocol-t
 "The available protocols."
 (:openpgp 0)
 (:cms 1)
 (:gpgconf 2)
 (:assuan 3)
 (:g13 4)
 (:uiserver 5)
 (:spawn 6)
 (:default 254)
 (:unknown 255))

;;;

(defbitfield (gpgme-keylist-mode-t :unsigned-int)
 "The available keylist mode flags."
 (:local 1)
 (:extern 2)
 (:sigs 4)
 (:sig-notations)
 (:with-secret 16)
 (:with-tofu 32)
 (:ephemeral
 128)
 (:validate 256))

;;;

```

```
(defbitfield (gpgme-sig-notation-flags-t :unsigned-int)
 "The available signature notation flags."
 (:human-readable 1)
 (:critical 2))
```

```
(defctype gpgme-sig-notation-t
 (:wrapper :pointer
 :from-c translate-gpgme-sig-notation-t-from-foreign)
 "Signature notation pointer type.")
```

```
:: FIXME: Doesn't this depend on endianness?
(defbitfield (gpgme-sig-notation-bitfield :unsigned-int)
 (:human-readable 1)
 (:critical 2))
```

```
(defcstruct gpgme-sig-notation
 "Signature notations."
 (next gpgme-sig-notation-t)
 (name :pointer)
 (value :pointer)
 (name-len :int)
 (value-len :int)
 (flags gpgme-sig-notation-flags-t)
 (bitfield gpgme-sig-notation-bitfield))
```

```
:::
```

```
(defcenum gpgme-status-code-t
 "The possible status codes for the edit operation."
 (:eof 0)
 (:enter 1)
 (:leave 2)
 (:abort 3)
 (:goodsig 4)
 (:badsig 5)
 (:errsig 6)
 (:badarmor 7)
 (:rsa-or-idea 8)
 (:keyexpired 9)
 (:keyrevoked 10)
 (:trust-undefined 11)
 (:trust-never
 12)
 (:trust-marginal 13)
 (:trust-fully 14)
 (:trust-ultimate 15)
 (:shm-info 16)
 (:shm-get 17))
```

(:shm-get-bool 18)  
(:shm-get-hidden 19)  
(:need-passphrase 20)  
(:validsig 21)  
(:sig-id 22)  
(:enc-to 23)  
(:nodata 24)  
(:bad-passphrase 25)  
(:no-pubkey 26)  
(:no-seckey 27)  
(:need-passphrase-sym 28)  
(:decryption-failed 29)  
(:decryption-okay 30)  
(:missing-passphrase 31)  
(:good-passphrase 32)  
(:goodmdc 33)  
(:badmdc 34)  
(:errmdc 35)  
(:imported 36)  
(:import-ok 37)  
(:import-problem 38)  
(:import-res 39)  
(:file-start 40)  
(:file-done 41)  
(:file-error 42)  
(:begin-decryption 43)  
(:end-decryption 44)  
(:begin-encryption 45)  
(:end-encryption 46)  
(:delete-problem 47)  
(:get-bool 48)  
(:get-line 49)  
(:get-hidden 50)  
(:got-it 51)  
(:progress 52)  
(:sig-created 53)  
(:session-key 54)  
(:notation-name 55)  
(:notation-data 56)  
(:policy-url 57)  
(:begin-stream 58)  
(:end-stream 59)  
(:key-created 60)  
(:userid-hint 61)  
(:unexpected  
62)  
(:inv-recp 63)  
(:no-recp 64)

```

(:already-signed 65)
(:sigexpired 66)
(:expsig 67)
(:expkeysig 68)
(:truncated 69)
(:error 70)
(:newsig 71)
(:revkeysig 72)
(:sig-subpacket 73)
(:need-passphrase-pin 74)
(:sc-op-failure 75)
(:sc-op-success 76)
(:cardctrl 77)
(:backup-key-created 78)
(:pka-trust-bad 79)
(:pka-trust-good 80)
(:plaintext 81)
(:inv-sgnr 82)
(:no-sgnr 83)
(:success 84)
(:decryption-info 85)
(:plaintext-length 86)
(:mountpoint 87)
(:pinentry-launched 88)
(:attribute 89)
(:begin-signing 90)
(:key-not-created 91)
(:inquire-maxlen 92)
(:failure 93)
(:key-considered 94)
(:tofu-user 95)
(:tofu-stats 96)
(:tofu-stats-long 97)
(:notation-flags 98)
(:decryption-compliance-mode 99)
(:verification-compliance-mode 100))

```

```

;;;

```

```

(defctype gpgme-engine-info-t
 (:wrapper :pointer
 :from-c translate-gpgme-engine-info-t-to-foreign)
 "The engine information structure pointer type.")

```

```

(defcstruct gpgme-engine-info
 "Engine information."
 (next gpgme-engine-info-t)
 (protocol gpgme-protocol-t)

```



```

(file-name :string)
(version :string)
(req-version :string)
(home-dir :string))

;;;

(defctype gpgme-subkey-t
 (:wrapper :pointer
 :from-c translate-gpgme-subkey-t-from-foreign)
 "A subkey from a key.")

;; FIXME: Doesn't this depend on endianness?
(defbitfield (gpgme-subkey-bitfield :unsigned-int)
 "The subkey bitfield."
 (:revoked 1)
 (:expired 2)
 (:disabled 4)
 (:invalid 8)
 (:can-encrypt 16)
 (:can-sign 32)
 (:can-certify 64)
 (:secret 128)
 (:can-authenticate 256)
 (:is-qualified 512)
 (:is-cardkey 1024)
 (:is-de-vs 2048))

(defcstruct gpgme-subkey
 "Subkey from a key."
 (next gpgme-subkey-t)
 (bitfield gpgme-subkey-bitfield)
 (pubkey-algo gpgme-pubkey-algo-t)
 (length :unsigned-int)
 (keyid :string)
 (-keyid :char :count 17)
 (fpr :string)
 (timestamp :long)
 (expires :long))

(defctype gpgme-key-sig-t
 (:wrapper :pointer
 :from-c translate-gpgme-key-sig-t-from-foreign)
 "A signature on a user ID.")

;; FIXME: Doesn't this depend on endianness?
(defbitfield (gpgme-key-sig-bitfield :unsigned-int)

```

"The key signature bitfield."

(:revoked 1)

(:expired 2)

(:invalid 4)

(:exportable 16))

(defcstruct gpgme-key-sig

"A signature on a user ID."

(next gpgme-key-sig-t)

(bitfield gpgme-key-sig-bitfield)

(pubkey-algo gpgme-pubkey-algo-t)

(keyid :string)

(-keyid :char :count 17)

(timestamp :long)

(expires :long)

(status gpgme-error-no-signal-t)

(-class :unsigned-int)

(uid :string)

(name :string)

(email :string)

(comment :string)

(sig-class :unsigned-int))

(defctype gpgme-user-id-t

(:wrapper :pointer

:from-c translate-gpgme-user-id-t-from-foreign)

"A user ID from a key.")

:: FIXME: Doesn't this depend on endianness?

(defbitfield (gpgme-user-id-bitfield :unsigned-int)

"The user ID bitfield."

(:revoked 1)

(:invalid 2))

(defcstruct gpgme-user-id

"A user ID from a key."

(next

gpgme-user-id-t)

(bitfield gpgme-user-id-bitfield)

(validity gpgme-validity-t)

(uid :string)

(name :string)

(email :string)

(comment :string)

(signatures gpgme-key-sig-t)

(-last-keysig gpgme-key-sig-t))

```

(defctype gpgme-key-t
 (:wrapper :pointer
 :from-c translate-gpgme-key-t-from-foreign
 :to-c translate-gpgme-key-t-to-foreign)
 "A key from the keyring.")

;; FIXME: Doesn't this depend on endianness?
(defbitfield (gpgme-key-bitfield :unsigned-int)
 "The key bitfield."
 (:revoked 1)
 (:expired 2)
 (:disabled 4)
 (:invalid 8)
 (:can-encrypt 16)
 (:can-sign 32)
 (:can-certify 64)
 (:secret 128)
 (:can-authenticate 256)
 (:is-qualified 512))

(defcstruct gpgme-key
 "A signature on a user ID."
 (-refs :unsigned-int)
 (bitfield gpgme-key-bitfield)
 (protocol gpgme-protocol-t)
 (issuer-serial :string)
 (issuer-name :string)
 (chain-id :string)
 (owner-trust gpgme-validity-t)
 (subkeys gpgme-subkey-t)
 (uids gpgme-user-id-t)
 (-last-subkey gpgme-subkey-t)
 (-last-uid gpgme-user-id-t)
 (keylist-mode gpgme-keylist-mode-t))

;;;

;;; There is no support in CFFI to define callback C types and have
;;; automatic type checking with the callback definition.

(defctype gpgme-passphrase-cb-t :pointer)

(defctype gpgme-progress-cb-t :pointer)

(defctype gpgme-edit-cb-t :pointer)

```

```

;;;
;;; Function Interface
;;;

;;; Context management functions.

(defcfun ("gpgme_new" c-gpgme-new) gpgme-error-t
 (ctx :pointer))

(defcfun ("gpgme_release" c-gpgme-release) :void
 (ctx gpgme-ctx-t))

(defcfun ("gpgme_set_protocol" c-gpgme-set-protocol) gpgme-error-t
 (ctx gpgme-ctx-t)
 (proto gpgme-protocol-t))

(defcfun ("gpgme_get_protocol" c-gpgme-get-protocol) gpgme-protocol-t
 (ctx gpgme-ctx-t))

(defcfun ("gpgme_get_protocol_name" c-gpgme-get-protocol-name) :string
 (proto gpgme-protocol-t))

(defcfun ("gpgme_set_armor" c-gpgme-set-armor) :void
 (ctx gpgme-ctx-t)
 (yes :boolean))

(defcfun ("gpgme_get_armor" c-gpgme-get-armor) :boolean
 (ctx gpgme-ctx-t))

(defcfun ("gpgme_set_textmode" c-gpgme-set-textmode) :void
 (ctx gpgme-ctx-t)
 (yes :boolean))

(defcfun ("gpgme_get_textmode" c-gpgme-get-textmode) :boolean
 (ctx gpgme-ctx-t))

(defconstant +include-certs-default+ -256)

(defcfun ("gpgme_set_include_certs" c-gpgme-set-include-certs) :void
 (ctx gpgme-ctx-t)
 (nr-of-certs cert-int-t))

(defcfun ("gpgme_get_include_certs" c-gpgme-get-include-certs) cert-int-t
 (ctx gpgme-ctx-t))

(defcfun ("gpgme_set_keylist_mode" c-gpgme-set-keylist-mode) gpgme-error-t
 (ctx gpgme-ctx-t)
 (mode gpgme-keylist-mode-t))

```

```

(defcfun ("gpgme_get_keylist_mode" c-gpgme-get-keylist-mode)
 gpgme-keylist-mode-t
 (ctx gpgme-ctx-t))

(defcfun ("gpgme_set_passphrase_cb" c-gpgme-set-passphrase-cb) :void
 (ctx gpgme-ctx-t)
 (cb gpgme-passphrase-cb-t)
 (hook-value :pointer))

(defcfun ("gpgme_get_passphrase_cb" c-gpgme-get-passphrase-cb) :void
 (ctx gpgme-ctx-t)
 (cb-p :pointer)
 (hook-value-p :pointer))

(defcfun ("gpgme_set_progress_cb"
 c-gpgme-set-progress-cb) :void
 (ctx gpgme-ctx-t)
 (cb gpgme-progress-cb-t)
 (hook-value :pointer))

(defcfun ("gpgme_get_progress_cb" c-gpgme-get-progress-cb) :void
 (ctx gpgme-ctx-t)
 (cb-p :pointer)
 (hook-value-p :pointer))

(defcfun ("gpgme_set_locale" c-gpgme-set-locale) gpgme-error-t
 (ctx gpgme-ctx-t)
 (category :int)
 (value string-or-nil-t))

(defcfun ("gpgme_ctx_get_engine_info" c-gpgme-ctx-get-engine-info)
 gpgme-engine-info-t
 (ctx gpgme-ctx-t))

(defcfun ("gpgme_ctx_set_engine_info" c-gpgme-ctx-set-engine-info)
 gpgme-error-t
 (ctx gpgme-ctx-t)
 (proto gpgme-protocol-t)
 (file-name string-or-nil-t)
 (home-dir string-or-nil-t))

;;;

(defcfun ("gpgme_pubkey_algo_name" c-gpgme-pubkey-algo-name) :string
 (algo gpgme-pubkey-algo-t))

(defcfun ("gpgme_hash_algo_name" c-gpgme-hash-algo-name) :string

```

```

(algo gpgme-hash-algo-t))

;;;

(defcfun ("gpgme_signers_clear" c-gpgme-signers-clear) :void
 (ctx gpgme-ctx-t))

(defcfun ("gpgme_signers_add" c-gpgme-signers-add)
 gpgme-error-t
 (ctx gpgme-ctx-t)
 (key gpgme-key-t))

(defcfun ("gpgme_signers_enum" c-gpgme-signers-enum) gpgme-key-t
 (ctx gpgme-ctx-t)
 (seq :int))

;;;

(defcfun ("gpgme_sig_notation_clear" c-gpgme-sig-notation-clear) :void
 (ctx gpgme-ctx-t))

(defcfun ("gpgme_sig_notation_add" c-gpgme-sig-notation-add) gpgme-error-t
 (ctx gpgme-ctx-t)
 (name :string)
 (value string-or-nil-t)
 (flags gpgme-sig-notation-flags-t))

(defcfun ("gpgme_sig_notation_get" c-gpgme-sig-notation-get)
 gpgme-sig-notation-t
 (ctx gpgme-ctx-t))

;;; Run Control.

;;; There is no support in CFFI to define callback C types and have
;;; automatic type checking with the callback definition.

(defctype gpgme-io-cb-t :pointer)

(defctype gpgme-register-io-cb-t :pointer)

(defctype gpgme-remove-io-cb-t :pointer)

(defcenum gpgme-event-io-t
 "The possible events on I/O event callbacks."
 (:start 0)
 (:done 1)
 (:next-key 2)
 (:next-trustitem 3))

```

```

(defctype gpgme-event-io-cb-t :pointer)

(defcstruct
 gpgme-io-cbs
 "I/O callbacks."
 (add gpgme-register-io-cb-t)
 (add-priv :pointer)
 (remove gpgme-remove-io-cb-t)
 (event gpgme-event-io-cb-t)
 (event-priv :pointer))

(defctype gpgme-io-cbs-t :pointer)

(defcfun ("gpgme_set_io_cbs" c-gpgme-set-io-cbs) :void
 (ctx gpgme-ctx-t)
 (io-cbs gpgme-io-cbs-t))

(defcfun ("gpgme_get_io_cbs" c-gpgme-get-io-cbs) :void
 (ctx gpgme-ctx-t)
 (io-cbs gpgme-io-cbs-t))

(defcfun ("gpgme_wait" c-gpgme-wait) gpgme-ctx-t
 (ctx gpgme-ctx-t)
 (status-p :pointer)
 (hang :int))

;;; Functions to handle data objects.

;;; There is no support in CFFI to define callback C types and have
;;; automatic type checking with the callback definition.

(defctype gpgme-data-read-cb-t :pointer)
(defctype gpgme-data-write-cb-t :pointer)
(defctype gpgme-data-seek-cb-t :pointer)
(defctype gpgme-data-release-cb-t :pointer)

(defcstruct gpgme-data-cbs
 "Data callbacks."
 (read gpgme-data-read-cb-t)
 (write gpgme-data-write-cb-t)
 (seek gpgme-data-seek-cb-t)
 (release gpgme-data-release-cb-t))

(defctype gpgme-data-cbs-t :pointer
 "Data callbacks pointer.")

(defcfun ("gpgme_data_read" c-gpgme-data-read) ssize-t

```

```

(dh gpgme-data-t)
(buffer :pointer)
(size size-t))

(defcfun ("gpgme_data_write" c-gpgme-data-write) ssize-t
 (dh gpgme-data-t)
 (buffer :pointer)
 (size size-t))

(defcfun ("gpgme_data_seek" c-gpgme-data-seek) off-t
 (dh gpgme-data-t)
 (offset off-t)
 (whence :int))

(defcfun ("gpgme_data_new" c-gpgme-data-new) gpgme-error-t
 (dh-p :pointer))

(defcfun ("gpgme_data_release" c-gpgme-data-release) :void
 (dh gpgme-data-t))

(defcfun ("gpgme_data_new_from_mem" c-gpgme-data-new-from-mem) gpgme-error-t
 (dh-p :pointer)
 (buffer :pointer)
 (size size-t)
 (copy :int))

(defcfun ("gpgme_data_release_and_get_mem" c-gpgme-data-release-and-get-mem)
 :pointer
 (dh gpgme-data-t)
 (len-p :pointer))

(defcfun ("gpgme_data_new_from_cbs" c-gpgme-data-new-from-cbs) gpgme-error-t
 (dh-p :pointer)
 (cbs gpgme-data-cbs-t)
 (handle :pointer))

(defcfun ("gpgme_data_new_from_fd" c-gpgme-data-new-from-fd) gpgme-error-t
 (dh-p :pointer)
 (fd :int))

(defcfun ("gpgme_data_new_from_stream" c-gpgme-data-new-from-stream)
 gpgme-error-t
 (dh-p :pointer)
 (stream :pointer))

(defcfun ("gpgme_data_get_encoding" c-gpgme-data-get-encoding)
 gpgme-data-encoding-t
 (dh gpgme-data-t))

```



```

(defcfun ("gpgme_data_set_encoding" c-gpgme-data-set-encoding)
 gpgme-error-t
 (dh gpgme-data-t)
 (enc gpgme-data-encoding-t))

(defcfun ("gpgme_data_get_file_name" c-gpgme-data-get-file-name) :string
 (dh gpgme-data-t))

(defcfun ("gpgme_data_set_file_name" c-gpgme-data-set-file-name) gpgme-error-t
 (dh gpgme-data-t)
 (file-name string-or-nil-t))

(defcfun ("gpgme_data_new_from_file" c-gpgme-data-new-from-file) gpgme-error-t
 (dh-p :pointer)
 (fname :string)
 (copy :int))

(defcfun ("gpgme_data_new_from_filepart" c-gpgme-data-new-from-filepart)
 gpgme-error-t
 (dh-p :pointer)
 (fname :string)
 (fp
 :pointer)
 (offset off-t)
 (length size-t))

;;; Key and trust functions.

(defcfun ("gpgme_get_key" c-gpgme-get-key) gpgme-error-t
 (ctx gpgme-ctx-t)
 (fpr :string)
 (key-p :pointer)
 (secret :boolean))

(defcfun ("gpgme_key_ref" c-gpgme-key-ref) :void
 (key gpgme-key-t))

(defcfun ("gpgme_key_unref" c-gpgme-key-unref) :void
 (key gpgme-key-t))

;;; Crypto operations.

(defcfun ("gpgme_cancel" c-gpgme-cancel) gpgme-error-t
 (ctx gpgme-ctx-t))

;;;

```

```

(defctype gpgme-invalid-key-t
 (:wrapper :pointer
 :from-c translate-gpgme-invalid-key-t-from-foreign)
 "An invalid key structure.")

(defcstruct gpgme-invalid-key
 "An invalid key structure."
 (next gpgme-invalid-key-t)
 (fpr :string)
 (reason gpgme-error-no-signal-t))

;;; Encryption.

(defcstruct gpgme-op-encrypt-result
 "Encryption result structure."
 (invalid-recipients gpgme-invalid-key-t))

(defctype gpgme-op-encrypt-result-t
 (:wrapper :pointer
 :from-c translate-gpgme-op-encrypt-result-t-from-foreign)
 "An encryption result structure.")

(defcfun ("gpgme_op_encrypt_result" c-gpgme-op-encrypt-result)
 gpgme-op-encrypt-result-t
 (ctx gpgme-ctx-t))

(defbitfield gpgme-encrypt-flags-t
 (:always-trust 1)
 (:no-encrypt-to 2)
 (:prepare 4)
 (:expect-sign 8)
 (:no-compress 16)
 (:symmetric 32)
 (:throw-keyids 64)
 (:wrap 128)
 (:want-address 256))

(defcfun ("gpgme_op_encrypt_start" c-gpgme-op-encrypt-start) gpgme-error-t
 (ctx gpgme-ctx-t)
 (recp :pointer) ; Key array.
 (flags gpgme-encrypt-flags-t)
 (plain gpgme-data-t)
 (cipher gpgme-data-t))

(defcfun ("gpgme_op_encrypt" c-gpgme-op-encrypt) gpgme-error-t
 (ctx gpgme-ctx-t)
 (recp :pointer) ; Key array.
 (flags gpgme-encrypt-flags-t)

```

```

(plain gpgme-data-t)
(cipher gpgme-data-t))

(defcfun ("gpgme_op_encrypt_sign_start" c-gpgme-op-encrypt-sign-start)
 gpgme-error-t
 (ctx gpgme-ctx-t)
 (recp :pointer) ; Key array.
 (flags gpgme-encrypt-flags-t)
 (plain gpgme-data-t)
 (cipher gpgme-data-t))

(defcfun ("gpgme_op_encrypt_sign"
 c-gpgme-op-encrypt-sign) gpgme-error-t
 (ctx gpgme-ctx-t)
 (recp :pointer) ; Key array.
 (flags gpgme-encrypt-flags-t)
 (plain gpgme-data-t)
 (cipher gpgme-data-t))

;;; Decryption.

(defctype gpgme-recipient-t
 (:wrapper :pointer
 :from-c translate-gpgme-recipient-t-from-foreign)
 "A recipient structure.")

(defcstruct gpgme-recipient
 "Recipient structure."
 (next gpgme-recipient-t)
 (keyid :string)
 (-keyid :char :count 17)
 (pubkey-algo gpgme-pubkey-algo-t)
 (status gpgme-error-no-signal-t))

(defbitfield gpgme-op-decrypt-result-bitfield
 "Decryption result structure bitfield."
 (:wrong-key-usage 1)
 (:is-de-vs 2)
 (:is-mine 4))

(defcstruct gpgme-op-decrypt-result
 "Decryption result structure."
 (unsupported-algorithm :string)
 (bitfield gpgme-op-decrypt-result-bitfield)
 (recipients gpgme-recipient-t)
 (file-name :string))

(defctype gpgme-op-decrypt-result-t

```

```

(:wrapper :pointer
 :from-c translate-gpgme-op-decrypt-result-t-from-foreign)
"A decryption result structure.")

(defcfun ("gpgme_op_decrypt_result" c-gpgme-op-decrypt-result)
 gpgme-op-decrypt-result-t
 (ctx gpgme-ctx-t))

(defcfun ("gpgme_op_decrypt_start" c-gpgme-op-decrypt-start) gpgme-error-t
 (ctx gpgme-ctx-t)
 (cipher gpgme-data-t)
 (plain gpgme-data-t))

(defcfun ("gpgme_op_decrypt" c-gpgme-op-decrypt) gpgme-error-t
 (ctx gpgme-ctx-t)
 (cipher gpgme-data-t)
 (plain gpgme-data-t))

(defcfun ("gpgme_op_decrypt_verify_start" c-gpgme-op-decrypt-verify-start)
 gpgme-error-t
 (ctx gpgme-ctx-t)
 (cipher gpgme-data-t)
 (plain gpgme-data-t))

(defcfun ("gpgme_op_decrypt_verify" c-gpgme-op-decrypt-verify) gpgme-error-t
 (ctx gpgme-ctx-t)
 (cipher gpgme-data-t)
 (plain gpgme-data-t))

```

;;; Signing.

```

(defctype gpgme-new-signature-t
 (:wrapper :pointer
 :from-c translate-gpgme-new-signature-t-from-foreign)
 "A new signature structure.")

(defcstruct gpgme-new-signature
 "New signature structure."
 (next gpgme-new-signature-t)
 (type gpgme-sig-mode-t)
 (pubkey-algo gpgme-pubkey-algo-t)
 (hash-algo gpgme-hash-algo-t)
 (-obsolete-class :unsigned-long)
 (timestamp :long)
 (fpr :string)
 (-obsolete-class-2 :unsigned-int)
 (sig-class :unsigned-int))

```

```

(defcstruct gpgme-op-sign-result
 "Signing result structure."
 (invalid-signers gpgme-invalid-key-t)
 (signatures gpgme-new-signature-t))

(defctype gpgme-op-sign-result-t
 (:wrapper :pointer
 :from-c translate-gpgme-op-sign-result-t-from-foreign)
 "A signing result structure.")

(defcfun ("gpgme_op_sign_result" c-gpgme-op-sign-result)
 gpgme-op-sign-result-t
 (ctx gpgme-ctx-t))

(defcfun ("gpgme_op_sign_start" c-gpgme-op-sign-start) gpgme-error-t
 (ctx gpgme-ctx-t)
 (plain gpgme-data-t)
 (sig gpgme-data-t)
 (mode gpgme-sig-mode-t))

(defcfun ("gpgme_op_sign" c-gpgme-op-sign) gpgme-error-t
 (ctx gpgme-ctx-t)
 (plain gpgme-data-t)
 (sig gpgme-data-t)
 (mode gpgme-sig-mode-t))

;;; Verify.

(defbitfield (gpgme-sigsum-t :unsigned-int)
 "Flags
 used for the summary field in a gpgme-signature-t."
 (:valid #x0001)
 (:green #x0002)
 (:red #x0004)
 (:key-revoked #x0010)
 (:key-expired #x0020)
 (:sig-expired #x0040)
 (:key-missing #x0080)
 (:crl-missing #x0100)
 (:crl-too-old #x0200)
 (:bad-policy #x0400)
 (:sys-error #x0800)
 (:tofu-conflict #x1000))

(defctype gpgme-signature-t
 (:wrapper :pointer
 :from-c translate-gpgme-signature-t-from-foreign)
 "A signature structure.")

```

```

;; FIXME: Doesn't this depend on endianness?
(defbitfield (gpgme-signature-bitfield :unsigned-int)
 "The signature bitfield."
 (:wrong-key-usage 1)
 (:pka-trust 2)
 (:chain-model 4)
 (:is-de-vs 8))

(defcstruct gpgme-signature
 "Signature structure."
 (next gpgme-signature-t)
 (summary gpgme-sigsum-t)
 (fpr :string)
 (status gpgme-error-no-signal-t)
 (notations gpgme-sig-notation-t)
 (timestamp :unsigned-long)
 (exp-timestamp :unsigned-long)
 (bitfield gpgme-signature-bitfield)
 (validity gpgme-validity-t)
 (validity-reason
 gpgme-error-no-signal-t)
 (pubkey-algo gpgme-pubkey-algo-t)
 (hash-algo gpgme-hash-algo-t))

(defcstruct gpgme-op-verify-result
 "Verify result structure."
 (signatures gpgme-signature-t)
 (file-name :string))

(defctype gpgme-op-verify-result-t
 (:wrapper :pointer
 :from-c translate-gpgme-op-verify-result-t-from-foreign)
 "A verify result structure.")

(defcfun ("gpgme_op_verify_result" c-gpgme-op-verify-result)
 gpgme-op-verify-result-t
 (ctx gpgme-ctx-t))

(defcfun ("gpgme_op_verify_start" c-gpgme-op-verify-start) gpgme-error-t
 (ctx gpgme-ctx-t)
 (sig gpgme-data-t)
 (signed-text gpgme-data-t)
 (plaintext gpgme-data-t))

(defcfun ("gpgme_op_verify" c-gpgme-op-verify) gpgme-error-t
 (ctx gpgme-ctx-t)
 (sig gpgme-data-t)

```

```
(signed-text gpgme-data-t)
(plaintext gpgme-data-t))
```

```
;;; Import.
```

```
(defbitfield (gpgme-import-flags-t :unsigned-int)
 "Flags used for the import status field."
 (:new #x0001)
 (:uid #x0002)
 (:sig #x0004)
 (:subkey #x0008)
 (:secret
 #x0010))
```

```
(defctype gpgme-import-status-t
 (:wrapper :pointer
 :from-c translate-gpgme-import-status-t-from-foreign)
 "An import status structure.")
```

```
(defcstruct gpgme-import-status
 "New import status structure."
 (next gpgme-import-status-t)
 (fpr :string)
 (result gpgme-error-no-signal-t)
 (status :unsigned-int))
```

```
(defcstruct gpgme-op-import-result
 "Import result structure."
 (considered :int)
 (no-user-id :int)
 (imported :int)
 (imported-rsa :int)
 (unchanged :int)
 (new-user-ids :int)
 (new-sub-keys :int)
 (new-signatures :int)
 (new-revocations :int)
 (secret-read :int)
 (secret-imported :int)
 (secret-unchanged :int)
 (skipped-new-keys :int)
 (not-imported :int)
 (imports gpgme-import-status-t))
```

```
(defctype gpgme-op-import-result-t
 (:wrapper :pointer
 :from-c translate-gpgme-op-import-result-t-from-foreign)
 "An import status result structure.")
```

```

(defcfun ("gpgme_op_import_result" c-gpgme-op-import-result)
 gpgme-op-import-result-t
 (ctx gpgme-ctx-t))

(defcfun ("gpgme_op_import_start" c-gpgme-op-import-start) gpgme-error-t
 (ctx gpgme-ctx-t)
 (keydata gpgme-data-t))

(defcfun ("gpgme_op_import" c-gpgme-op-import) gpgme-error-t
 (ctx gpgme-ctx-t)
 (keydata gpgme-data-t))

;;; Export.

(defcfun ("gpgme_op_export_start" c-gpgme-op-export-start) gpgme-error-t
 (ctx gpgme-ctx-t)
 (pattern :string)
 (reserved :unsigned-int)
 (keydata gpgme-data-t))

(defcfun ("gpgme_op_export" c-gpgme-op-export) gpgme-error-t
 (ctx gpgme-ctx-t)
 (pattern :string)
 (reserved :unsigned-int)
 (keydata gpgme-data-t))

;;; FIXME: Extended export interfaces require array handling.

;;; Key generation.

(defbitfield (gpgme-genkey-flags-t :unsigned-int)
 "Flags used for the key generation result bitfield."
 (:primary #x0001)
 (:sub #x0002)
 (:uid #x0004))

(defcstruct gpgme-op-genkey-result
 "Key generation result structure."
 (bitfield gpgme-genkey-flags-t)
 (fpr :string))

(defctype gpgme-op-genkey-result-t :pointer
 "A
 key generation result structure.")

(defcfun ("gpgme_op_genkey_result" c-gpgme-op-genkey-result)
 gpgme-op-genkey-result-t

```



```

(ctx gpgme-ctx-t))

(defcfun ("gpgme_op_genkey_start" c-gpgme-op-genkey-start) gpgme-error-t
 (ctx gpgme-ctx-t)
 (parms :string)
 (pubkey gpgme-data-t)
 (seckey gpgme-data-t))

(defcfun ("gpgme_op_genkey" c-gpgme-op-genkey) gpgme-error-t
 (ctx gpgme-ctx-t)
 (parms :string)
 (pubkey gpgme-data-t)
 (seckey gpgme-data-t))

;;; Key deletion.

(defcfun ("gpgme_op_delete_start" c-gpgme-op-delete-start) gpgme-error-t
 (ctx gpgme-ctx-t)
 (key gpgme-key-t)
 (allow-secret :int))

(defcfun ("gpgme_op_delete" c-gpgme-op-delete) gpgme-error-t
 (ctx gpgme-ctx-t)
 (key gpgme-key-t)
 (allow-secret :int))

;;; FIXME: Add edit interfaces.

;;; Keylist interface.

(defbitfield (gpgme-keylist-flags-t :unsigned-int)
 "Flags used for the key listing result bitfield."
 (:truncated #x0001))

(defcstruct gpgme-op-keylist-result
 "Key listing result structure."
 (bitfield
 gpgme-keylist-flags-t))

(defctype gpgme-op-keylist-result-t :pointer
 "A key listing result structure.")

(defcfun ("gpgme_op_keylist_result" c-gpgme-op-keylist-result)
 gpgme-op-keylist-result-t
 (ctx gpgme-ctx-t))

(defcfun ("gpgme_op_keylist_start" c-gpgme-op-keylist-start) gpgme-error-t
 (ctx gpgme-ctx-t)

```

```
(pattern :string)
(secret_only :boolean))
```

```
;;; FIXME: Extended keylisting requires array handling.
```

```
(defcfun ("gpgme_op_keylist_next" c-gpgme-op-keylist-next) gpgme-error-t
 (ctx gpgme-ctx-t)
 (r-key :pointer))
```

```
(defcfun ("gpgme_op_keylist_end" c-gpgme-op-keylist-end) gpgme-error-t
 (ctx gpgme-ctx-t))
```

```
;;; Various functions.
```

```
(defcfun ("gpgme_check_version" c-gpgme-check-version) :string
 (req-version string-or-nil-t))
```

```
(defcfun ("gpgme_get_engine_info" c-gpgme-get-engine-info) gpgme-error-t
 (engine-info-p :pointer))
```

```
(defcfun ("gpgme_set_engine_info" c-gpgme-set-engine-info) gpgme-error-t
 (proto gpgme-protocol-t)
 (file-name string-or-nil-t)
 (home-dir
 string-or-nil-t))
```

```
(defcfun ("gpgme_engine_check_version" c-gpgme-engine-check-version)
 gpgme-error-t
 (proto gpgme-protocol-t))
```

```
;;;
;;; L I S P I N T E R F A C E
;;;
```

```
;;;
;;; Lisp type translators.
;;;
```

```
;;; Both directions.
```

```
;;; cert-int-t is a helper type that takes care of representing the
;;; default number of certs as NIL.
```

```
(defun translate-cert-int-t-from-foreign (value)
 (cond
 ((eql value +include-certs-default+) nil)
 (t value)))
```

```
(defun translate-cert-int-t-to-foreign (value)
 (cond
 (value value)
 (t +include-certs-default+)))
```

```
;;; string-or-nil-t translates a null pointer to NIL and vice versa.
;;; Translation from foreign null pointer already works as expected.
```

```
(defun translate-string-or-nil-t-to-foreign (value)
 (cond
 (value value)
 (t (null-pointer))))
```

```
;;; Output only.
```

```
;;; These type translators only convert from foreign type, because we
;;; never use these types in the other direction.
```

```
;;; Convert gpgme-engine-info-t linked lists into a
list of property
;;; lists. Note that this converter will automatically be invoked
;;; recursively.
;;;
;;; FIXME: Should we use a hash table (or struct, or clos) instead of
;;; property list, as recommended by the Lisp FAQ?
```

```
(defun translate-gpgme-engine-info-t-from-foreign (value)
 (cond
 ((null-pointer-p value) nil)
 (t (with-foreign-slots
 ((next protocol file-name version req-version home-dir)
 value (:struct gpgme-engine-info))
 (append (list protocol (list
 :file-name file-name
 :version version
 :req-version req-version
 :home-dir home-dir))
 next))))))
```

```
(defun translate-gpgme-invalid-key-t-from-foreign (value)
 (cond
 ((null-pointer-p value) nil)
 (t (with-foreign-slots
 ((next fpr reason)
 value (:struct gpgme-invalid-key))
 (append (list (list :fpr fpr
 :reason reason))
 next))))))
```

```
(defun translate-gpgme-op-encrypt-result-t-from-foreign (value)
 (cond
 ((null-pointer-p value) nil)
 (t (with-foreign-slots

 ((invalid-recipients)
 value (:struct gpgme-op-encrypt-result))
 (list :encrypt
 (list :invalid-recipients invalid-recipients))))))
```

```
(defun translate-gpgme-recipient-t-from-foreign (value)
 (cond
 ((null-pointer-p value) nil)
 (t (with-foreign-slots
 ((next keyid pubkey-algo status)
 value (:struct gpgme-recipient))
 (append (list (list :keyid keyid
 :pubkey-algo pubkey-algo
 :status status))
 next))))))
```

```
(defun translate-gpgme-op-decrypt-result-t-from-foreign (value)
 (cond
 ((null-pointer-p value) nil)
 (t (with-foreign-slots
 ((unsupported-algorithm bitfield recipients file-name)
 value (:struct gpgme-op-decrypt-result))
 (list :decrypt (list :unsupported-algorithm unsupported-algorithm
 :bitfield bitfield
 :recipients recipients
 :file-name file-name))))))
```

```
(defun translate-gpgme-new-signature-t-from-foreign (value)
 (cond
 ((null-pointer-p value) nil)
 (t (with-foreign-slots
 ((next
 type pubkey-algo hash-algo timestamp fpr sig-class)
 value (:struct gpgme-new-signature))
 (append (list (list :type type
 :pubkey-algo pubkey-algo
 :hash-algo hash-algo
 :timestamp timestamp
 :fpr fpr
 :sig-class sig-class))
 next))))))
```

```

(defun translate-gpgme-op-sign-result-t-from-foreign (value)
 (cond
 ((null-pointer-p value) nil)
 (t (with-foreign-slots
 ((invalid-signers signatures)
 value (:struct gpgme-op-sign-result))
 (list :sign (list :invalid-signers invalid-signers
 :signatures signatures))))))

(defun translate-gpgme-signature-t-from-foreign (value)
 (cond
 ((null-pointer-p value) nil)
 (t (with-foreign-slots
 ((next summary fpr status notations timestamp
 exp-timestamp bitfield validity validity-reason
 pubkey-algo hash-algo)
 value (:struct gpgme-signature))
 (append (list (list :summary summary
 :fpr fpr
 :status status
 :notations notations
 :timestamp timestamp

 :exp-timestamp exp-timestamp
 :bitfield bitfield
 :validity validity
 :validity-reason validity-reason
 :pubkey-algo pubkey-algo))
 next))))))

(defun translate-gpgme-op-verify-result-t-from-foreign (value)
 (cond
 ((null-pointer-p value) nil)
 (t (with-foreign-slots
 ((signatures file-name)
 value (:struct gpgme-op-verify-result))
 (list :verify (list :signatures signatures
 :file-name file-name))))))

(defun translate-gpgme-import-status-t-from-foreign (value)
 (cond
 ((null-pointer-p value) nil)
 (t (with-foreign-slots
 ((next fpr result status)
 value (:struct gpgme-import-status))
 (append (list (list :fpr fpr
 :result result
 :status status))
 next))))))

```

```

next))))))

(defun translate-gpgme-op-import-result-t-from-foreign (value)
 (cond
 ((null-pointer-p value) nil)
 (t (with-foreign-slots
 ((considered no-user-id imported imported-rsa unchanged
 new-user-ids new-sub-keys new-signatures
 new-revocations
 secret-read secret-imported
 secret-unchanged skipped-new-keys not-imported
 imports)
 value (:struct gpgme-op-import-result))
 (list :verify (list :considered considered
 :no-user-id no-user-id
 :imported imported
 :imported-rsa imported-rsa
 :unchanged unchanged
 :new-user-ids new-user-ids
 :new-sub-keys new-sub-keys
 :new-signatures new-signatures
 :new-revocations new-revocations
 :secret-read secret-read
 :secret-imported secret-imported
 :secret-unchanged secret-unchanged
 :skipped-new-keys skipped-new-keys
 :not-imported not-imported
 :imports imports)))))))

;;; Error handling.

;;; Use gpgme-error-no-signal-t to suppress automatic error handling
;;; at translation time.
;;;
;;; FIXME: Part of this probably should be in gpg-error!

(define-condition gpgme-error (error)
 ((value :initarg :gpgme-error :reader gpgme-error-value))
 (:report (lambda (c stream)
 (format stream "GPGME returned error: ~A (~A)"
 (gpgme-strerror (gpgme-error-value c))
 (gpgme-strsource (gpgme-error-value c))))))
(:documentation "Signalled when a GPGME function returns an error.")

(defun translate-gpgme-error-t-from-foreign (value)
 "Raise a GPGME-ERROR if VALUE is non-zero."
 (when (not (eql (gpgme-err-code value) :gpg-err-no-error))

```

```

(error 'gpgme-error :gpgme-error value))
(gpg-err-canonicalize value))

(defun translate-gpgme-error-t-to-foreign (value)
 "Canonicalize the error value."
 (if (eql (gpgme-err-code value) :gpg-err-no-error)
 0
 (gpg-err-as-value value)))

(defun translate-gpgme-error-no-signal-t-from-foreign (value)
 "Canonicalize the error value."
 (gpg-err-canonicalize value))

;;; *INTERNAL* Lispy Function Interface that is still close to the C
;;; interface.

;;; Passphrase callback management.

;;; Maybe: Instead, use subclassing, and provide a customizable
;;; default implementation for ease-of-use.

(defvar
 passphrase-handles (make-hash-table)
 "Hash table with GPGME context address as key and the corresponding
 passphrase callback object as value.")

(defcallback passphrase-cb gpgme-error-t ((handle :pointer)
 (uid-hint :string)
 (passphrase-info :string)
 (prev-was-bad :boolean)
 (fd :int))
 (handler-case
 (let* ((passphrase-cb
 (gethash (pointer-address handle) *passphrase-handles*))
 (passphrase
 (cond
 ((functionp passphrase-cb)
 (concatenate 'string
 (funcall passphrase-cb uid-hint passphrase-info
 prev-was-bad)
 '(\Newline))))
 (t (concatenate 'string passphrase-cb '(\Newline))))
 (passphrase-len (length passphrase))
 ;; FIXME: Could be more robust.
 (res (system-write fd passphrase passphrase-len)))
 (cond
 ((< res passphrase-len) ; FIXME: Blech. A weak attempt to be robust.

```

```

(gpgme-error :gpg-err-inval))
(t (gpgme-error :gpg-err-no-error))))
(gpgme-error (err)
(gpgme-error-value err))
(system-error (err) (gpgme-error-from-errno (system-error-errno err)))
;; FIXME: The original error gets lost here.
(condition (err) (progn
 (when *debug*
 (format t "DEBUG: passphrase-cb: Unexpressable: ~A~%"
 err))
 (gpgme-error :gpg-err-general))))))

```

;;; CTX is a C-pointer to the context.

```

(defun gpgme-set-passphrase-cb (ctx cb)
 "Set the passphrase callback for CTX."
 (let ((handle (pointer-address ctx)))
 (cond
 (cb (setf (gethash handle *passphrase-handles*) cb)
 (c-gpgme-set-passphrase-cb ctx (callback passphrase-cb) ctx))
 (t (c-gpgme-set-passphrase-cb ctx (null-pointer) (null-pointer))
 (remhash handle *passphrase-handles*))))))

```

;;; Progress callback management.

;;; Maybe: Instead, use subclassing, and provide a customizable  
 ;;; default implementation for ease-of-use.

```

(defvar *progress-handles* (make-hash-table)
 "Hash table with GPGME context address as key and the corresponding
 progress callback
 object as value.")

```

```

(defcallback progress-cb :void ((handle :pointer)
 (what :string)
 (type :int)
 (current :int)
 (total :int))
 (handler-case
 (let* ((progress-cb
 (gethash (pointer-address handle) *progress-handles*)))
 (funcall progress-cb what type current total))
 ;; FIXME: The original error gets lost here.
 (condition (err) (when *debug*
 (format t "DEBUG: progress-cb: Unexpressable: ~A~%"
 err))))))

```

;;; CTX is a C-pointer to the context.

```

(defun gpgme-set-progress-cb (ctx cb)

```



```

"Set the progress callback for CTX."
(let ((handle (pointer-address ctx)))
 (cond
 (cb (setf (gethash handle *progress-handles*) cb)
 (c-gpgme-set-progress-cb ctx (callback progress-cb) ctx))
 (t (c-gpgme-set-progress-cb ctx (null-pointer) (null-pointer))
 (remhash handle *progress-handles*))))))

;;; Context management.

(defun gpgme-new (&key (protocol :openpgp) armor textmode include-certs
 keylist-mode passphrase progress file-name
 home-dir)
 "Allocate a new GPGME context."
 (with-foreign-object (ctx-p 'gpgme-ctx-t)
 (c-gpgme-new ctx-p)
 (let ((ctx (mem-ref ctx-p 'gpgme-ctx-t)))
 ;; Set locale?
 (gpgme-set-protocol ctx protocol)
 (gpgme-set-armor ctx armor)
 (gpgme-set-textmode ctx textmode)
 (when include-certs (gpgme-set-include-certs ctx include-certs))
 (when keylist-mode (gpgme-set-keylist-mode ctx keylist-mode))
 (gpgme-set-passphrase-cb ctx passphrase)
 (gpgme-set-progress-cb ctx progress)
 (gpgme-set-engine-info ctx protocol
 :file-name file-name :home-dir home-dir)
 (when *debug* (format t "DEBUG: gpgme-new: ~A~%" ctx))
 ctx)))

(defun gpgme-release (ctx)
 "Release a GPGME context."
 (when *debug* (format t "DEBUG: gpgme-release: ~A~%" ctx))
 (c-gpgme-release ctx))

(defun gpgme-set-protocol (ctx proto)
 "Set the protocol to be used by CTX to PROTO."
 (c-gpgme-set-protocol ctx proto))

(defun gpgme-get-protocol (ctx)
 "Get
 the protocol used with CTX."
 (c-gpgme-get-protocol ctx))

;;; FIXME: How to do pretty printing?
;;;
;;; gpgme-get-protocol-name

```

```

(defun gpgme-set-armor (ctx armor)
 "If ARMOR is true, enable armor mode in CTX, disable it otherwise."
 (c-gpgme-set-armor ctx armor))

(defun gpgme-armor-p (ctx)
 "Return true if armor mode is set for CTX."
 (c-gpgme-get-armor ctx))

(defun gpgme-set-textmode (ctx textmode)
 "If TEXTMODE is true, enable text mode mode in CTX, disable it otherwise."
 (c-gpgme-set-textmode ctx textmode))

(defun gpgme-textmode-p (ctx)
 "Return true if text mode mode is set for CTX."
 (c-gpgme-get-textmode ctx))

(defun gpgme-set-include-certs (ctx &optional certs)
 "Include up to CERTS certificates in an S/MIME message."
 (c-gpgme-set-include-certs ctx certs))

(defun gpgme-get-include-certs (ctx)
 "Return the number of certs to include in an S/MIME message,
 or NIL if the default is used."
 (c-gpgme-get-include-certs ctx))

(defun gpgme-get-keylist-mode (ctx)
 "Get the keylist mode in CTX."
 (c-gpgme-get-keylist-mode ctx))

(defun gpgme-set-keylist-mode (ctx mode)
 "Set the keylist mode in CTX."
 (c-gpgme-set-keylist-mode ctx mode))

;;; FIXME: How to handle locale? cffi-grovel?

(defun gpgme-get-engine-info (&optional ctx)
 "Retrieve the engine info for CTX, or the default if CTX is omitted."
 (cond
 (ctx (c-gpgme-ctx-get-engine-info ctx))
 (t (with-foreign-object (info-p 'gpgme-engine-info-t)
 (c-gpgme-get-engine-info info-p)
 (mem-ref info-p 'gpgme-engine-info-t))))))

(defun gpgme-set-engine-info (ctx proto &key file-name home-dir)
 "Set the engine info for CTX, or the default if CTX is NIL."
 (cond
 (ctx (c-gpgme-ctx-set-engine-info ctx proto file-name home-dir))

```

```

(t (c-gpgme-set-engine-info proto file-name home-dir))))

;;; FIXME: How to do pretty printing?
;;;
;;; gpgme_pubkey_algo_name, gpgme_hash_algo_name

(defun gpgme-set-signers (ctx keys)
 "Set the signers for the context CTX."
 (c-gpgme-signers-clear ctx)
 (dolist (key keys) (c-gpgme-signers-add ctx key)))

;;;

(defun gpgme-set-sig-notation (ctx notations)
 "Set the sig notation for the context CTX."
 (c-gpgme-sig-notation-clear ctx)
 (dolist (notation notations)
 (c-gpgme-sig-notation-add
 ctx (first notation) (second notation) (third notation))))

(defun gpgme-get-sig-notation (ctx)
 "Get the signature notation data for the context CTX."
 (c-gpgme-sig-notation-get ctx))

;;; FIXME: Add I/O callback interface, for integration with clg.

;;; FIXME: Add gpgme_wait?

;;; Streams
;;; -----
;;;
;;; GPGME uses standard streams. You can define your own streams, or
;;; use the existing file or string streams.
;;;
;;; A stream-spec is either a stream, or a list with a stream as its
;;; first argument followed by keyword parameters: encoding,
;;; file-name.
;;;
;;; FIXME: Eventually, we should provide a class that can be mixed
;;; into stream classes and which provides accessors for encoding and
;;; file-names. This interface
;;; should be provided in addition to the
;;; above sleazy interface, because the sleazy interface is easier to
;;; use (less typing), and is quite sufficient in a number of cases.
;;;
;;; For best results, streams with element type (unsigned-byte 8)
;;; should be used. Character streams may work if armor mode is used.

```

```

;;; Do we need to provide access to GPGME data objects through streams
;;; as well? It seems to me that specific optimizations, like
;;; directly writing to file descriptors, is better done by extending
;;; the sleazy syntax (stream-spec) instead of customized streams.
;;; Customized streams do buffering, and this may mess up things. Mmh.

```

```

(defvar *data-handles* (make-hash-table)

```

```

 "Hash table with GPGME data user callback handle address as key
 and the corresponding stream as value.")

```

```

;;; The release callback removes the stream from the *data-handles*
;;; hash and releases the CBS structure that is used as the key in
;;; that hash. It is implicitly invoked (through
 GPGME) by
 gpgme-data-release.

```

```

(defcallback data-release-cb :void ((handle :pointer))
 (unwind-protect (remhash (pointer-address handle) *data-handles*)
 (when (not (null-pointer-p handle)) (foreign-free handle))))

```

```

(defcallback data-read-cb ssize-t ((handle :pointer) (buffer :pointer)
 (size size-t))
 (when *debug* (format t "DEBUG: gpgme-data-read-cb: want ~A~%" size))
 (let ((stream (gethash (pointer-address handle) *data-handles*)))
 (cond
 (stream
 (let* ((stream-type (stream-element-type stream))
 (seq (make-array size :element-type stream-type))
 (read (read-sequence seq stream)))
 (cond
 ((equal stream-type '(unsigned-byte 8))
 (dotimes (i read)
 (setf (mem-aref buffer :unsigned-char i)
 (aref (the byte-array seq) i))))
 ((eql stream-type 'character)
 (dotimes (i read)
 (setf (mem-aref buffer :unsigned-char
i)
 (char-code (aref (the character-array seq) i))))))
 (t
 (dotimes (i read)
 (setf (mem-aref buffer :unsigned-char i)
 (coerce (aref seq i) '(unsigned-byte 8))))))
 (when *debug* (format t "DEBUG: gpgme-data-read-cb: read ~A~%" read))
 read))
 (t
 (set-errno +ebadf+)
 -1))))

```

```

(defcallback data-write-cb ssize-t ((handle :pointer) (buffer :pointer)
 (size size-t))
 (when *debug* (format t "DEBUG: gpgme-data-write-cb: want ~A~%" size))
 (let ((stream (gethash (pointer-address handle) *data-handles*)))
 (cond
 (stream
 (let* ((stream-type (stream-element-type stream))
 (seq (make-array size :element-type stream-type)))
 (cond
 ((equal stream-type '(unsigned-byte 8))
 (dotimes (i size)
 (setf (aref (the byte-array seq) i)
 (mem-aref buffer :unsigned-char i))))
 ((eql stream-type 'character)
 (dotimes (i size)
 (setf (aref (the character-array seq) i)
 (code-char (mem-aref buffer :unsigned-char i))))))
 (t
 (dotimes (i size)
 (setf (aref seq i)
 (coerce (mem-aref buffer :unsigned-char i) stream-type))))))
 (write-sequence seq stream)
 size))
 (t
 (set-errno +ebadf+)
 -1))))

```

;;; This little helper macro allows us to swallow the cbs structure by  
 ;;; simply setting it to a null pointer, but still protect against  
 ;;; conditions.

```

(defmacro with-cbs-swallowed ((cbs) &body body)
 `(let ((cbs (foreign-alloc '(:struct gpgme-data-cbs))))
 (unwind-protect (progn ,@body)
 (when (not (null-pointer-p ,cbs)) (foreign-free ,cbs)))))

```

```

(defun gpgme-data-new (stream &key encoding file-name)
 "Allocate a new GPGME data object for STREAM."
 (with-foreign-object (dh-p 'gpgme-data-t)
 ;;; We allocate one CBS structure
 for each stream we wrap in a
 ;;; data object. Although we could also share all these
 ;;; structures, as they contain the very same callbacks, we need a
 ;;; unique C pointer as handle anyway to look up the stream in the
 ;;; callback. This is a convenient one to use.
 (with-cbs-swallowed (cbs)
 (setf (foreign-slot-value cbs '(:struct gpgme-data-cbs) 'read)
 (callback data-read-cb))
 (setf (foreign-slot-value cbs '(:struct gpgme-data-cbs) 'write)
 (callback data-write-cb))

```

```

 (callback data-write-cb))
 (setf (foreign-slot-value cbs '(:struct gpgme-data-cbs) 'seek)
 (null-pointer))
 (setf (foreign-slot-value cbs '(:struct gpgme-data-cbs) 'release)
 (callback data-release-cb))
 (c-gpgme-data-new-from-cbs dh-p cbs cbs)
 (let ((dh (mem-ref dh-p 'gpgme-data-t)))
 (when encoding (gpgme-data-set-encoding dh encoding))
 (when file-name (gpgme-data-set-file-name dh file-name))
 ;; Install the stream into the hash table and
 swallow the cbs
 ;; structure while protecting against any errors.
 (unwind-protect
 (progn
 (setf (gethash (pointer-address cbs) *data-handles*) stream)
 (setf cbs (null-pointer)))
 (when (not (null-pointer-p cbs)) (c-gpgme-data-release dh)))
 (when *debug* (format t "DEBUG: gpgme-data-new: ~A~%" dh)
 dh))))

;; This function releases a GPGME data object. It implicitly
;; invokes the data-release-cb function to clean up associated junk.
(defun gpgme-data-release (dh)
 "Release a GPGME data object."
 (when *debug* (format t "DEBUG: gpgme-data-release: ~A~%" dh))
 (c-gpgme-data-release dh))

(defclass data ()
 (c-data) ; The C data object pointer
 (:documentation "The GPGME data type.))

(defmethod initialize-instance :after ((data data) &key streamspec
 &allow-other-keys)
 (let ((c-data (if (listp streamspec)
 (apply #'gpgme-data-new streamspec)
 (gpgme-data-new streamspec))))
 (cleanup t))
 (unwind-protect
 (progn
 (setf (slot-value data 'c-data) c-data)
 (finalize data (lambda () (gpgme-data-release c-data)))
 (setf cleanup nil))
 (if cleanup (gpgme-data-release c-data))))

(defun translate-gpgme-data-t-to-foreign (value)
 ;; Allow a pointer to be passed directly for the finalizer to work.
 (cond
 ((null value) (null-pointer))

```

```

((pointerp value) value)
(t (slot-value value 'c-data))))

(defmacro with-gpgme-data ((dh streamspec) &body body)
 `(let ((,dh (make-instance 'data :streamspec ,streamspec)))
 ,@body))

(defun gpgme-data-get-encoding (dh)
 "Get the encoding associated with the data object DH."
 (c-gpgme-data-get-encoding dh))

(defun gpgme-data-set-encoding (dh encoding)
 "Set the encoding associated with the data object DH to ENCODING."
 (c-gpgme-data-set-encoding dh encoding))

(defun gpgme-data-get-file-name (dh)
 "Get the file name associated with the data object
 DH."
 (c-gpgme-data-get-file-name dh))

(defun gpgme-data-set-file-name (dh file-name)
 "Set the file name associated with the data object DH to FILE-NAME."
 (c-gpgme-data-set-file-name dh file-name))

;;; FIXME: Add key accessor interfaces.

(defun gpgme-get-key (ctx fpr &optional secret)
 "Get the key with the fingerprint FPR from the context CTX."
 (with-foreign-object (key-p 'gpgme-key-t)
 (c-gpgme-get-key ctx fpr key-p secret)
 (mem-ref key-p 'gpgme-key-t)))

(defun gpgme-key-ref (key)
 "Acquire an additional reference to the key KEY."
 (when *debug* (format t "DEBUG: gpgme-key-ref: ~A~%" key))
 (c-gpgme-key-ref key))

(defun gpgme-key-unref (key)
 "Release a reference to the key KEY."
 (when *debug* (format t "DEBUG: gpgme-key-unref: ~A~%" key))
 (c-gpgme-key-unref key))

;;; FIXME: We REALLY need pretty printing for keys and all the other
;;; big structs.

;;; Various interfaces.

(defun gpgme-check-version (&optional req-version)

```

```

(c-gpgme-check-version req-version))

;;;
;;;
The *EXPORTED* CLOS interface.
;;;

;;; The context type.

;;; We wrap the C context pointer into a class object to be able to
;;; stick a finalizer on it.

(defclass context ()
 (c-ctx ; The C context object pointer.
 signers ; The list of signers.
 sig-notation) ; The list of signers.
 (:documentation "The GPGME context type.))

(defmethod initialize-instance :after ((ctx context) &rest rest
 &key &allow-other-keys)
 (let ((c-ctx (apply #'gpgme-new rest))
 (cleanup t))
 (unwind-protect
 (progn (setf (slot-value ctx 'c-ctx) c-ctx)
 (finalize ctx (lambda () (gpgme-release c-ctx)))
 (setf cleanup nil))
 (if cleanup (gpgme-release c-ctx)))))

(defun translate-gpgme-ctx-t-to-foreign (value)
 ;; Allow a pointer to be passed directly for the finalizer to work.
 (if (pointerp value) value (slot-value value 'c-ctx)))

(defmacro context (&rest rest)
 "Create a new GPGME context."
 `(make-instance 'context ,@rest))

;;; The context type: Accessor
functions.

;;; The context type: Accessor functions: Protocol.

(defgeneric protocol (ctx)
 (:documentation "Get the protocol of CONTEXT.))

(defmethod protocol ((ctx context))
 (gpgme-get-protocol ctx))

(defgeneric (setf protocol) (protocol ctx)

```



```
(:documentation "Set the protocol of CONTEXT to PROTOCOL."))
```

```
;;; FIXME: Adjust translator to reject invalid protocols. Currently,
;;; specifying an invalid protocol throws a "NIL is not 32 signed int"
;;; error. This is suboptimal.
```

```
(defmethod (setf protocol) (protocol (ctx context))
 (gpgme-set-protocol ctx protocol))
```

```
;;; The context type: Accessor functions: Armor.
;;; FIXME: Is it good style to make foop setf-able? Or should it be
;;; foo/foop for set/get?
```

```
(defgeneric armorp (ctx)
 (:documentation "Get the armor flag of CONTEXT."))
```

```
(defmethod armorp ((ctx context))
 (gpgme-armor-p ctx))
```

```
(defgeneric (setf armorp) (armor ctx)
 (:documentation "Set the armor flag of CONTEXT to ARMOR."))
```

```
(defmethod (setf armorp) (armor (ctx
 context))
 (gpgme-set-armor ctx armor))
```

```
;;; The context type: Accessor functions: Textmode.
;;; FIXME: Is it good style to make foop setf-able? Or should it be
;;; foo/foop for set/get?
```

```
(defgeneric textmodep (ctx)
 (:documentation "Get the text mode flag of CONTEXT."))
```

```
(defmethod textmodep ((ctx context))
 (gpgme-textmode-p ctx))
```

```
(defgeneric (setf textmodep) (textmode ctx)
 (:documentation "Set the text mode flag of CONTEXT to TEXTMODE."))
```

```
(defmethod (setf textmodep) (textmode (ctx context))
 (gpgme-set-textmode ctx textmode))
```

```
;;; The context type: Accessor functions: Include Certs.
```

```
(defgeneric include-certs (ctx)
 (:documentation "Get the number of included certificates in an
 S/MIME message, or NIL if the default is used."))
```

```
(defmethod include-certs ((ctx context))
```

```
(gpgme-get-include-certs ctx))
```

```
(defgeneric (setf include-certs) (certs ctx)
 (:documentation "Return the number of certificates to include in an
 S/MIME message, or
 NIL if the default is used."))
```

```
(defmethod (setf include-certs) (certs (ctx context))
 (gpgme-set-include-certs ctx certs))
```

;;; The context type: Accessor functions: Engine info.

```
(defgeneric engine-info (ctx)
 (:documentation "Retrieve the engine info for CTX."))
```

```
(defmethod engine-info ((ctx context))
 (gpgme-get-engine-info ctx))
```

```
(defgeneric (setf engine-info) (info ctx)
 (:documentation "Set the engine info for CTX."))
```

```
(defmethod (setf engine-info) (info (ctx context))
 (dolist (proto '(:openpgp :cms))
 (let ((pinfo (getf info proto)))
 (when pinfo
 (gpgme-set-engine-info ctx proto :file-name (getf pinfo :file-name)
 :home-dir (getf pinfo :home-dir))))))
```

;;; The context type: Accessor functions: Keylist mode.

```
(defgeneric keylist-mode (ctx)
 (:documentation "Get the keylist mode of CTX."))
```

```
(defmethod keylist-mode ((ctx context))
 (gpgme-get-keylist-mode ctx))
```

```
(defgeneric (setf keylist-mode) (mode ctx)
 (:documentation "Set the keylist mode of CTX to MODE."))
```

```
(defmethod
 (setf keylist-mode) (mode (ctx context))
 (gpgme-set-keylist-mode ctx mode))
```

;;; The context type: Accessor functions: Signers.

```
(defgeneric signers (ctx)
 (:documentation "Get the signers of CTX."))
```

```

(defmethod signers ((ctx context))
 (slot-value ctx 'signers))

(defgeneric (setf signers) (signers ctx)
 (:documentation "Set the signers of CTX to SIGNERS."))

(defmethod (setf keylist-mode) (signers (ctx context))
 (gpgme-set-signers ctx signers)
 (setf (slot-value ctx 'signers) signers))

;;; The context type: Accessor functions: Sig notations.

(defgeneric sig-notations (ctx)
 (:documentation "Get the signature notations of CTX."))

(defmethod sig-notations ((ctx context))
 (slot-value ctx 'signers))

(defgeneric (setf sig-notations) (notations ctx)
 (:documentation "Set the signatire notations of CTX to NOTATIONS."))

(defmethod (setf sig-notations) (notations (ctx context))
 (gpgme-set-signers ctx notations)
 (setf (slot-value ctx 'notations) notations))

;;;
The context type: Support macros.

(defmacro with-context ((ctx &rest rest) &body body)
 `(let ((,ctx (make-instance 'context ,@rest)))
 ,@body))

;;; The key type.

(defclass key ()
 (c-key) ; The C key object pointer.
 (:documentation "The GPGME key type."))

;;; In the initializer, we swallow the c-key argument.
(defmethod initialize-instance :after ((key key) &key c-key
 &allow-other-keys)
 (setf (slot-value key 'c-key) c-key)
 (finalize key (lambda () (gpgme-key-unref c-key))))

(defun translate-gpgme-key-t-from-foreign (value)
 (when *debug* (format t "DEBUG: import key: ~A~%" value))
 (make-instance 'key :c-key value))

```

```
(defun translate-gpgme-key-t-to-foreign (value)
 ;; Allow a pointer to be passed directly for the finalizer to work.
 (if (pointerp value) value (slot-value value 'c-key)))
```

```
(defmethod print-object ((key key) stream)
 (print-unreadable-object (key stream :type t :identity t)
 (format stream "~s" (fpr key))))
```

;;; The key type:  
Accessor functions.

;;; FIXME: The bitfield and flags contain redundant information at  
;;; this point. FIXME: Deal nicer with zero-length name (policy url)  
;;; and zero length value (omit?) and human-readable (convert to string).  
;;; FIXME: Turn binary data into sequence or vector or what it should be.  
;;; FIXME: Turn the whole thing into a hash?

```
(defun translate-gpgme-sig-notation-t-from-foreign (value)
 (cond
 ((null-pointer-p value) nil)
 (t (with-foreign-slots
 ((next name value name-len value-len flags bitfield)
 value (:struct gpgme-sig-notation))
 (append (list (list
 :name name
 :value value
 :name-len name-len
 :value-len value-len
 :flags flags
 :bitfield bitfield))
 next))))))
```

;;; FIXME: Deal nicer with timestamps. bitfield field name?

```
(defun translate-gpgme-subkey-t-from-foreign (value)
 (cond
 ((null-pointer-p value) nil)
 (t (with-foreign-slots
 ((next bitfield pubkey-algo length keyid fpr timestamp expires)
 value (:struct gpgme-subkey))
```

```
 (append (list (list
 :bitfield bitfield
 :pubkey-algo pubkey-algo
 :length length
 :keyid keyid
 :fpr fpr
 :timestamp timestamp
 :expires expires))
 next))))))
```

```

(defun translate-gpgme-key-sig-t-from-foreign (value)
 (cond
 ((null-pointer-p value) nil)
 (t (with-foreign-slots
 ((next bitfield pubkey-algo keyid timestamp expires status
 uid name email comment sig-class)
 value (:struct gpgme-key-sig))
 (append (list (list
 :bitfield bitfield
 :pubkey-algo pubkey-algo
 :keyid keyid
 :timestamp timestamp
 :expires expires
 :status status
 :uid uid
 :name name
 :email email
 :comment comment
 :sig-class sig-class))
 next))))))

```

```

(defun translate-gpgme-user-id-t-from-foreign (value)
 (cond
 ((null-pointer-p value) nil)
 (t (with-foreign-slots
 ((next bitfield validity uid name email comment signatures)
 value (:struct gpgme-user-id))
 (append (list (list
 :bitfield bitfield
 :validity validity
 :uid uid
 :name
name
 :email email
 :comment comment
 :signatures signatures))
 next))))))

```

```

(defun key-data (key)
 (with-slots (c-key) key
 (with-foreign-slots
 ((bitfield protocol issuer-serial issuer-name chain-id
 owner-trust subkeys uids keylist-mode)
 c-key (:struct gpgme-key))
 (list
 :bitfield bitfield
 :protocol protocol

```

```

:issuer-serial issuer-serial
:issuer-name issuer-name
:chain-id chain-id
:owner-trust owner-trust
:subkeys subkeys
:uids uids
:keylist-mode keylist-mode))
))

```

```

(defgeneric fpr (key)
 (:documentation "Get the primary fingerprint of the key."))

```

```

(defmethod fpr ((key key))
 (getf (car (getf (key-data key) :subkeys)) :fpr))

```

;;; The context type: Crypto-Operations.

```

(defgeneric get-key (ctx fpr &optional secret)
 (:documentation "Get the (secret) key FPR from CTX."))

```

```

(defmethod get-key ((ctx context) fpr &optional secret)
 (gpgme-get-key ctx fpr secret))

```

;;; Encrypt.

```

(defgeneric
 op-encrypt (ctx recp plain cipher &key always-trust sign)
 (:documentation "Encrypt."))

```

```

(defmethod op-encrypt ((ctx context) recp plain cipher
 &key always-trust sign)
 (with-foreign-object (c-recp :pointer (+ 1 (length recp)))
 (dotimes (i (length recp))
 (setf (mem-aref c-recp 'gpgme-key-t i) (elt recp i)))
 (setf (mem-aref c-recp :pointer (length recp)) (null-pointer))
 (with-gpgme-data (in plain)
 (with-gpgme-data (out cipher)
 (let ((flags))
 (if always-trust (push :always-trust flags))
 (cond
 (sign
 (c-gpgme-op-encrypt-sign ctx c-recp flags in out)
 (append (c-gpgme-op-encrypt-result ctx)
 (c-gpgme-op-sign-result ctx)))
 (t
 (c-gpgme-op-encrypt ctx c-recp flags in out)

```

```
(c-gpgme-op-encrypt-result ctx)))))))))
```

;;; Decrypt.

```
(defgeneric op-decrypt (ctx cipher plain &key verify)
 (:documentation "Decrypt."))
```

```
(defmethod op-decrypt ((ctx context) cipher plain &key verify)
 (with-gpgme-data (in cipher)
 (with-gpgme-data
 (out plain)
 (cond
 (verify
 (c-gpgme-op-decrypt-verify ctx in out)
 (append (c-gpgme-op-decrypt-result ctx)
 (c-gpgme-op-verify-result ctx))))
 (t
 (c-gpgme-op-decrypt ctx in out)
 (c-gpgme-op-decrypt-result ctx))))))
```

;;; Signing.

```
(defgeneric op-sign (ctx plain sig &optional mode)
 (:documentation "Sign."))
```

```
(defmethod op-sign ((ctx context) plain sig &optional (mode :none))
 (with-gpgme-data (in plain)
 (with-gpgme-data (out sig)
 (c-gpgme-op-sign ctx in out mode)
 (c-gpgme-op-sign-result ctx))))
```

;;; Verify.

```
(defgeneric op-verify (ctx sig text &key detached)
 (:documentation "Verify."))
```

```
(defmethod op-verify ((ctx context) sig text &key detached)
 (with-gpgme-data (in sig)
 (with-gpgme-data (on text)
 (c-gpgme-op-verify ctx in (if detached on nil)
 (if detached nil on))
 (c-gpgme-op-verify-result ctx))))
```

;;; Import.

```
(defgeneric op-import (ctx keydata)
 (:documentation "Import."))
```

```
(defmethod op-import ((ctx context) keydata)
 (with-gpgme-data (in keydata)
 (c-gpgme-op-import ctx in)
 (c-gpgme-op-import-result ctx)))
```

;;; Export.

```
(defgeneric op-export (ctx pattern keydata)
 (:documentation "Export public key data matching PATTERN to the
 stream KEYDATA."))
```

```
(defmethod op-export ((ctx context) pattern keydata)
 (with-gpgme-data (dh keydata)
 (c-gpgme-op-export ctx pattern 0 dh)))
```

;;; Key generation.

```
;;;
;;; Initialization
;;;
```

```
(defun check-version (&optional req-version)
 "Check that the GPGME version requirement is satisfied."
 (gpgme-check-version req-version))
```

```
(defparameter *version* (check-version)
 "The version number of GPGME used.")
-*- mode: org -*-
#+TITLE: A Short History of the GPGME bindings for Python
#+LATEX_COMPILER: xelatex
#+LATEX_CLASS: article
#+LATEX_CLASS_OPTIONS: [12pt]
#+LATEX_HEADER: \usepackage{xltextra}
#+LATEX_HEADER: \usepackage[margin=1in]{geometry}
#+LATEX_HEADER: \setmainfont[Ligatures={Common}]{Times New Roman}
```

```
* Overview
:PROPERTIES:
:CUSTOM_ID: overview
:END:
```

```
Version:	0.0.1
GPGME Version:	1.13.0
Author:	Ben McGinnes <ben@gnupg.org>
Author GPG Key:	DB4724E6FA4286C92B4E55C4321E4E2373590E5D
Language:	Australian English, British English
xml:lang:	en-AU, en-GB, en
```



The GPGME Python bindings passed through many hands and numerous phases before, after a fifteen year journey, coming full circle to return to the source. This is a short explanation of that journey.

**\*\* In the beginning**

```
:PROPERTIES:
:CUSTOM_ID: in-the-beginning
:END:
```

In 2002 John Goerzen released PyME; Python bindings for the GPGME module which utilised the current release of Python of the time and SWIG.<sup>[fn:1]</sup> Shortly after creating it and ensuring it worked he stopped supporting it, though he left his work available on his Gopher site.

**\*\* Keeping the flame alive**

```
:PROPERTIES:
:CUSTOM_ID: keeping-the-flame-alive
:END:
```

A couple of years later the project was picked up by Igor Belyi and actively developed and maintained by him from 2004 to 2008. Igor's whereabouts at the time of this document's creation are unknown, but the current authors do hope he is well. We're assuming (or hoping) that life did what life does and made continuing untenable.

**\*\* Passing the torch**

```
:PROPERTIES:
:CUSTOM_ID: passing-the-torch
:END:
```

In 2014 Martin Albrecht wanted to patch a bug in the PyME code and discovered the absence of Igor. Following a discussion on the PyME mailing list he became the new maintainer for PyME, releasing version 0.9.0 in May of that year. He remains the maintainer of the original PyME release in Python 2.6 and 2.7 (available via PyPI).

**\*\* Coming full circle**

```
:PROPERTIES:
:CUSTOM_ID: ouroboros
:END:
```

In 2015 Ben McGinnes approached Martin about a Python 3 version, while investigating how complex a task this would be the task ended up being completed. A subsequent discussion with Werner Koch led to the decision to fold the Python 3 port back into the original GPGME release in the languages subdirectory for non-C bindings under the module name of `=pyme3=`.

In 2016 this PyME module was integrated back into the GPGME project by Justus Winter. During the course of this work Justus adjusted the port to restore limited support for Python 2, but not as many minor point releases as the original PyME package supports. During the course of this integration the package was renamed to more accurately reflect its status as a component of GPGME. The `=pyme3=` module was renamed to `=gpg=` and adopted by the upstream GnuPG team.

In 2017 Justus departed G10code and the GnuPG team. Following this Ben returned to maintain of `gpgme` Python bindings and continue building them from that point.

```
* Relics of the past
:PROPERTIES:
:CUSTOM_ID: relics-past
:END:
```

There are a few things, in addition to code specific factors, such as SWIG itself, which are worth noting here.

```
** The Annoyances of Git
:PROPERTIES:
:CUSTOM_ID: the-annoyances-of-git
:END:
```

As anyone who has ever worked with git knows, submodules are horrible way to deal with pretty much anything. In the interests of avoiding migraines, that was skipped with addition of the PyME code to GPGME.

Instead the files were added to a subdirectory of the `=lang=` directory, along with a copy of the entire git log up to that point as a separate file within the `=lang/python/docs/=` directory.[fn:2] As the log for PyME is nearly 100KB and the log for GPGME is approximately 1MB, this would cause considerable bloat, as well as some confusion, should the two be merged.

Hence the unfortunate, but necessary, step to simply move the files. A regular repository version has been maintained should it

be possible to implement this better in the future.

## **\*\* The Perils of PyPI**

:PROPERTIES:

:CUSTOM\_ID: the-perils-of-pypi

:END:

The early port of the Python 2 `=pyme=` module as `=pyme3=` was never added to PyPI while the focus remained on development and testing during 2015 and early 2016. Later in 2016, however, when Justus completed his major integration work and subsequently renamed the module from `=pyme3=` to `=gpg=`, some prior releases were also provided through PyPI.

Since these bindings require a matching release of the GPGME libraries in order to function, it was determined that there was little benefit in also providing a copy through PyPI since anyone obtaining the GPGME source code would obtain the Python bindings source code at the same time. Whereas there was the potential to sew confusion amongst Python users installing the module from PyPI, only to discover that without the relevant C files, header files or SWIG compiled binaries, the Python module did them little good.

There are only two files on PyPI which might turn up in a search for this module or a sample of its content:

1. `gpg` (1.8.0) - Python bindings for GPGME GnuPG cryptography library
2. `pyme` (0.9.0) - Python support for GPGME GnuPG cryptography library

## **\*\*\* GPG 180 - Python bindings for GPGME GnuPG cryptography library**

:PROPERTIES:

:CUSTOM\_ID: pypi-gpgme-180

:END:

This is the most recent version to reach PyPI and is the version of the official Python bindings which shipped with GPGME 1.8.0. If you have GPGME 1.8.0 installed and /only/ 1.8.0 installed, then it is probably safe to use this copy from PyPI.

As there have been a lot of changes since the release of GPGME 1.8.0, the GnuPG Project recommends not using this version of the module and instead installing the current version of GPGME along with the Python bindings included with that package.

\*\*\* PyME 090 - Python support for GPGME GnuPG cryptography library

:PROPERTIES:

:CUSTOM\_ID: pypi-gpgme-90

:END:

This is the last release of the PyME bindings maintained by Martin Albrecht and is only compatible with Python 2, it will not work with Python 3. This is the version of the software from which the port from Python 2 to Python 3 code was made in 2015.

Users of the more recent Python bindings will recognise numerous points of similarity, but also significant differences. It is likely that the more recent official bindings will feel "more pythonic."

For those using Python 2, there is essentially no harm in using this module, but it may lack a number of more recent features added to GPGME.

#### \* Footnotes

[fn:1] In all likelihood this would have been Python 2.2 or possibly Python 2.3.

[fn:2] The entire PyME git log and other preceding VCS logs are located in the =gpgme/lang/python/docs/old-commits.log= file.

# HACKING

-\*- org -\*-

#+TITLE: Hacking notes for GPGME

#+STARTUP: showall

#### \* How to contribute

#### \*\* No more ChangeLog files

Do not modify any of the ChangeLog files in GPGME. Starting on December 1st, 2011 we put change information only in the GIT commit log, and generate a top-level ChangeLog file from logs at "make dist" time. As such, there are strict requirements on the form of the commit log messages. The old ChangeLog files have all be renamed to ChangeLog-2011

#### \*\* Commit log requirements

Your commit log should always start with a one-line summary, the second line should be blank, and the remaining lines are usually ChangeLog-style entries for all affected files. However, it's fine

-- even recommended -- to write a few lines of prose describing the change, when the summary and ChangeLog entries don't give enough of the big picture. Omit the leading TABs that you're used to seeing in a "real" ChangeLog file, but keep the maximum line length at 72 or smaller, so that the generated ChangeLog lines, each with its leading TAB, will not exceed 80 columns. If you want to add text which shall not be copied to the ChangeLog, separate it by a line consisting of two dashes at the begin of a line.

Note that ./autogen.sh installs a git hook to do some basic syntax checking on the commit log message.

Typo fixes and documentation updates don't need a ChangeLog entry; thus you would use a commit message like

```
#+begin_example
Fix typo in a comment
```

```
--
```

```
#+end_example
```

The marker line here is important; without it the first line would appear in the ChangeLog.

If you exceptionally need to have longer lines in a commit log you may do this after this scissor line:

```
#+begin_example
----- >8 -----
#+end_example
```

(hash, blank, 24 dashes, blank, scissor, blank, 24 dashes).

Note that such a comment will be removed if the git commit option `--cleanup-scissor=` is used.

## **\*\* License policy**

GPGME is currently licensed under the LGPLv2.1+ with tools and the manual being under the GPLv3+. We may eventually update to a newer version of the licenses or a combination of them. It is thus important, that all contributed code allows for an update of the license; for example we can't accept code under the LGPLv2(only).

If you want to contribute code or documentation to GPGME you are asked to assert that the contribution is in accordance to the "GPGME Developer's Certificate of Origin" as found in the file "DCO".

Except for a slight wording change, this DCO is identical to the one used by the Linux kernel. Please take these simple steps:

- Decide which mail address you want to use. Please have your real name in the address and not a pseudonym. Anonymous contributions can only be done if you find a proxy who certifies for you.

- If your employer or school might claim ownership of code written by you; you need to talk to them to make sure that you have the right to contribute under the DCO.

- Send an OpenPGP signed mail to the `gnupg-devel@gnupg.org` public mailing list from your mail address. Include a copy of the DCO as found in the official master branch. Insert your name and email address into the DCO in the same way you want to use it later.

Example:

Signed-off-by: Joe R. Hacker <joe@example.org>

If you need it, you may perform simple transformations on the mail address: Replacing "@" by " at " or "." by " dot ".)

- That's it. From now on you only need to add a "Signed-off-by:" line with your name and mail address to the GIT commit message. It is recommended to send the patches using a PGP/MIME signed mail.

## \*\* Coding standards

Please follow the GNU coding standards. If you are in doubt consult the existing code as an example. Do not re-indent code without a need. If you really need to do it, use a separate commit for such a change.

- C99 syntax should not be used; stick to C90.
- Please do not use C++ `==` style comments.
- Try to fit lines into 80 columns.
- Ignore signed/unsigned pointer mismatches
- No arithmetic on void pointers; cast to `char*` first.

## \*\* Commit log keywords

- GnuPG-bug-id :: Values are comma or space delimited bug numbers from `bug.gnupg.org` pertaining to this commit.
- Debian-bug-id :: Same as above but from the Debian bug tracker.
- CVE-id :: CVE id number pertaining to this commit.
- Regression-due-to :: Commit id of the regression fixed by this commit.
- Fixes-commit :: Commit id this commit fixes.

- Reported-by :: Value is a name or mail address of a bug reporte.
- Suggested-by :: Value is a name or mail address of someone how suggested this change.
- Co-authored-by :: Name or mail address of a co-author
- Some-comments-by :: Name or mail address of the author of

additional comments (commit log or code).

- Proofread-by :: Sometimes used by translation commits.
- Signed-off-by :: Name or mail address of the developer

#### \* Debug hints

- Use gpgme-tool for manual tests.
- The envvar GPGME\_DEBUG enables debugging; see debug.[ch] for details.

Configuration files may go here. Note that config.h.in is auto-generated so that this file is not in git.

2011-12-02 Werner Koch <wk@g10code.com>

NB: ChangeLog files are no longer manually maintained. Starting on December 1st, 2011 we put change information only in the GIT commit log, and generate a top-level ChangeLog file from logs at "make dist". See doc/HACKING for details.

2011-04-06 Werner Koch <wk@g10code.com>

- \* gpg-error.m4: Update from current libgpg-error repo.

2010-05-07 Werner Koch <wk@g10code.com>

- \* libassuan.m4: Update from libassuan svn.

2009-11-10 Marcus Brinkmann <marcus@g10code.de>

- \* libassuan.m4: Fix LIBASSUAN\_VERSION.

2006-06-08 Marcus Brinkmann <marcus@g10code.de>

- \* pth.m4: Add --all to pth-config invocation.

2006-02-22 Marcus Brinkmann <marcus@g10code.de>

- \* pth.m4: Fix code generation (required for Max OS X). Submitted by Emanuele Giaquinta <exg@gentoo.org>.

2005-11-17 Marcus Brinkmann <marcus@g10code.de>

- \* glib-2.0.m4: New file.

2004-12-28 Werner Koch <wk@g10code.com>

\* pth.m4: Changed quoting for use with automake 1.9.

2004-09-14

Marcus Brinkmann <marcus@g10code.de>

\* pth.m4: Disable \_ac\_pth\_line, and don't fail if Pth is not found.

\* glibc21.m4: New file.

\* gpg-error.m4: New file.

\* pth.m4: New file.

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This file is distributed in the hope that it will be useful, but WITHOUT ANY WARRANTY, to the extent permitted by law; without even the implied warranty of MERCHANTABILITY or FITNESS FOR A PARTICULAR PURPOSE. GPGME Developer's Certificate of Origin. Version 1.0

=====

By making a contribution to the GPGME project, I certify that:

(a) The contribution was created in whole or in part by me and I have the right to submit it under the free software license indicated in the file; or

(b) The contribution is based upon previous work that, to the best of my knowledge, is covered under an appropriate free software license and I have the right under that license to submit that work with modifications, whether created in whole or in part by me, under the same free software license (unless I am permitted to submit under a different license), as indicated in the file; or

(c) The contribution was provided directly to me by some other person who certified (a), (b) or (c) and I have not modified it.

(d) I understand and agree that this project and the contribution are public and that a record of the contribution



(including  
all personal information I submit with it, including my  
sign-off) is maintained indefinitely and may be redistributed  
consistent with this project or the free software license(s)  
involved.

Signed-off-by: [Your name and mail address]

2011-12-02 Werner Koch <wk@g10code.com>

NB: ChangeLog files are no longer manually maintained. Starting  
on December 1st, 2011 we put change information only in the GIT  
commit log, and generate a top-level ChangeLog file from logs at  
"make dist". See doc/HACKING for details.

2008-11-08 Moritz <moritz@gnu.org>

\* gpgme.lisp (size-t): Wrong call to defctype: function accepts  
optional, not keyword argument.

(ssize-t): Likewise.

(off-t): Likewise.

(gpgme-data-t, gpgme-ctx-t): Likewise.

(gpgme-error-t): Likewise.

(gpgme-error-no-signal-t): Likewise.

(gpgme-err-code-t): Likewise.

(gpgme-err-source-t): Likewise.

(gpgme-sig-notation-t, gpgme-engine-info-t): Likewise.

(gpgme-subkey-t): Likewise.

(gpgme-key-sig-t): Likewise.

(gpgme-user-id-t): Likewise.

(gpgme-key-t): Likewise.

(gpgme-data-cbs-t): Likewise.

(gpgme-invalid-key-t): Likewise.

(gpgme-op-encrypt-result-t): Likewise.

(gpgme-recipient-t): Likewise.

(gpgme-op-decrypt-result-t): Likewise.

(gpgme-new-signature-t):

Likewise.

(gpgme-op-sign-result-t): Likewise.

(gpgme-signature-t): Likewise.

(gpgme-op-verify-result-t): Likewise.

(gpgme-import-status-t): Likewise.

(gpgme-op-import-result-t): Likewise.

(gpgme-op-genkey-result-t): Likewise.

(gpgme-op-keylist-result-t): Likewise.

2006-07-06 Marcus Brinkmann <marcus@g10code.de>

\* Initial release.

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Deutsches Forschungsnetz10UDFN-PCA1.0,U%DFN Top Level Certification Authority1!0 \*H  
certify@pca.dfn.de0

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011231180310Z010 UDE1!0U

Deutsches Forschungsnetz10UDFN-PCA1.0,U%DFN Top Level Certification Authority1!0 \*H  
certify@pca.dfn.de0"0

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nskvS2r#iA4H|\*/

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tD}L+~IWWD|eP&qH)

!1p%,1.tlsmnQ,g-W)@\\(t<kvm5j(d)9M\_KGQJ0:qTE 00 `HB0) `HBhttps://mystic.pca.dfn.de/0A

`HB42http://www.pca.dfn.de/dfnpca/policy/wwwpolicy.html08 `HB

+)The DFN Top Level Certification Authority0! `HBcgi/check-rev.cgi?0 `HB

dfnpca.crl0U00U0

\*H

`^[:8\\e7\*%QC?:/JVgwPUB

OgGqjGVxl50%<`Pb18 z;t~r0U<A%3#l'8b"<iX"V!k"\*Q8&hAPI"3 00KUb&Qq'46\_{D[JZ!i<=T  
/OF

\\input texinfo @c -\*- texinfo -\*-

@c %\*\*start of header

@setfilename gpgme-python-howto.info

@settitle GNU Privacy Guard (GnuPG) Made Easy Python Bindings HOWTO (English)

@documentencoding utf-8

@documentlanguage en

@c %\*\*end of header

@finalout

@titlepage

@title GNU Privacy Guard (GnuPG) Made Easy Python Bindings HOWTO (English)

@author Ben McGinnes

@end titlepage

@contents

@ifnottex  
@node Top  
@top GNU Privacy Guard (GnuPG) Made Easy Python Bindings HOWTO (English)  
@end ifnottex

@menu

- \* Introduction::
- \* GPGME Concepts::
- \* GPGME Python bindings installation::
- \* Fundamentals::
- \* Working with keys::
- \* Basic Functions::
- \* Creating keys and subkeys::
- \* Advanced or Experimental Use Cases::
- \* Miscellaneous extras and work-arounds::
- \* Copyright and Licensing::

@detailmenu

--- The Detailed Node Listing ---

## Introduction

- \* Python 2 versus Python 3::
- \* Examples::
- \* Unofficial Drafts::
- \* What's New::

## What's New

- \* New in GPGME 1130::
- \* New in GPGME 1120::

## GPGME Concepts

- \* A C API::
- \* Python bindings::
- \* Difference between the Python bindings and other GnuPG Python packages::

## Difference between the Python bindings and other GnuPG Python packages

- \* The python-gnupg package maintained by Vinay Sajip::
- \* The gnupg package created and maintained by Isis Lovecruft::
- \* The PyME package maintained by Martin Albrecht::

## GPGME Python bindings installation

- \* No PyPI::

- \* Requirements::

- \* Installation::

- \* Known Issues::

## Requirements

- \* Recommended Additions::

## Installation

- \* Installing GPGME::

## Known Issues

- \* Breaking Builds::

- \* Reinstalling Responsibly::

- \* Multiple installations::

- \* Won't Work With Windows::

- \* CFFI is the Best and GPGME should use it instead of SWIG::

- \* Virtualised Environments::

- \* Post installation::

## Fundamentals

- \* No REST::

- \* Context::

## Working with keys

- \* Key selection::

- \* Get key::

- \* Importing keys::

- \* Exporting keys::

## Key selection

- \* Counting keys::

## Importing keys

- \* Working with ProtonMail::

- \* Importing with HKP for Python::

- \* Importing from ProtonMail  
with HKP for Python::

## Exporting keys

- \* Exporting public keys::

- \* Exporting secret keys::
- \* Sending public keys to the SKS Keyservers::

## Basic Functions

- \* Encryption::
- \* Decryption::
- \* Signing text and files::
- \* Signature verification::

## Encryption

- \* Encrypting to one key::
- \* Encrypting to multiple keys::

## Signing text and files

- \* Signing key selection::
- \* Normal or default signing messages or files::
- \* Detached signing messages and files::
- \* Clearsigning messages or text::

## Creating keys and subkeys

- \* Primary key::
- \* Subkeys::
- \* User IDs::
- \* Key certification::

## User IDs

- \* Adding User IDs::
- \* Revoking User IDs::

## Key certification

- \* Verifying key certifications::

## Advanced or Experimental Use Cases

- \* C plus Python plus SWIG plus Cython::

## Miscellaneous extras and work-arounds

- \* Group lines::
- \* Keyserver access for Python::
- \* GPGME version checking::

Keyserver access for Python

\* Key import format::

Copyright and Licensing

\* Copyright::

\* Draft Editions of this HOWTO::

\*

License GPL compatible::

@end detailmenu

@end menu

@node Introduction

@chapter Introduction

@multitable {aaaaaaaaaaaaaa} {aaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaa}

@item Version:

@tab 0.1.5

@item GPGME Version:

@tab 1.13.0

@item Author:

@tab Ben McGinnes <ben@@gnupg.org>

@item Author GPG Key:

@tab DB4724E6FA4286C92B4E55C4321E4E2373590E5D

@item Language:

@tab Australian English, British English

@item Language codes:

@tab en-AU, en-GB, en

@end multitable

This document provides basic instruction in how to use the GPGME  
Python bindings to programmatically leverage the GPGME library.

@menu

\* Python 2 versus Python 3::

\* Examples::

\* Unofficial Drafts::

\* What's New::

@end menu

@node Python 2 versus Python 3

@section Python 2 versus Python 3

Though the GPGME Python bindings themselves provide support for both  
Python 2 and 3, the focus is unequivocally on Python 3 and  
specifically from Python 3.4 and above. As a consequence all the

examples and instructions in this guide use  
Python 3 code.

Much of it will work with Python 2, but much of it also deals with Python 3 byte literals, particularly when reading and writing data. Developers concentrating on Python 2.7, and possibly even 2.6, will need to make the appropriate modifications to support the older string and unicode types as opposed to bytes.

There are multiple reasons for concentrating on Python 3; some of which relate to the immediate integration of these bindings, some of which relate to longer term plans for both GPGME and the python bindings and some of which relate to the impending EOL period for Python 2.7. Essentially, though, there is little value in tying the bindings to a version of the language which is a dead end and the advantages offered by Python 3 over Python 2 make handling the data types with which GPGME deals considerably easier.

@node Examples  
@section Examples

All of the examples found in this document can be found as Python 3 scripts in the @samp{lang/python/examples/howto} directory.

@node Unofficial Drafts  
@section Unofficial Drafts

In addition to shipping with each release of GPGME, there is a section on locations to read or download @ref{Draft Editions of this HOWTO, , draft editions} of this document from at the end of it. These are unofficial versions produced in between major releases.

@node What's New  
@section What's New

Full details of what is new are now available in the @uref{what-is-new.org, What's New} file and archives of the preceding @emph{What's New} sections are available in the @uref{what-was-new, What Was New} file.

@menu  
\* New in GPGME 1130::  
\* New in GPGME 1120::  
@end menu

@node New in GPGME 1130  
@subsection New in GPGME 1130

See the [@uref{what-is-new#new-stuff-1-13-0, What's New}](#) document for what is new in version 1.13.0.

@node New in GPGME 1120

@subsection New in GPGME 1120

See the [@uref{what-was-new#new-stuff-1-12-0, What Was New}](#) document for what was new in version 1.12.0.

@node GPGME Concepts

@chapter GPGME Concepts

@menu

\*

A C API::

\* Python bindings::

\* Difference between the Python bindings and other GnuPG Python packages::

@end menu

@node A C API

@section A C API

Unlike many modern APIs with which programmers will be more familiar with these days, the GPGME API is a C API. The API is intended for use by C coders who would be able to access its features by including the `@samp{gpgme.h}` header file with their own C source code and then access its functions just as they would any other C headers.

This is a very effective method of gaining complete access to the API and in the most efficient manner possible. It does, however, have the drawback that it cannot be directly used by other languages without some means of providing an interface to those languages. This is where the need for bindings in various languages stems.

@node Python bindings

@section Python bindings

The Python bindings for GPGME provide a higher level means of accessing the complete feature set of GPGME itself. It also provides a more pythonic means of calling these API functions.

The bindings are generated dynamically with SWIG and the copy of `@samp{gpgme.h}` generated when GPGME is compiled.

This means that a version of the Python bindings is fundamentally tied to the exact same version of GPGME used to generate that copy of `@samp{gpgme.h}`.

@node Difference between the Python bindings and other GnuPG Python packages



There have been numerous attempts to add GnuPG support to Python over the years. Some of the most well known are listed here, along with what differentiates them.

@menu

- \* The python-gnupg package maintained by Vinay Sajip::
- \* The gnupg package created and maintained by Isis Lovecruft::
- \* The PyME package maintained by Martin Albrecht::

@end menu

@node The python-gnupg package maintained by Vinay Sajip

@subsection The python-gnupg package maintained by Vinay Sajip

This is arguably the most popular means of integrating GPG with Python. The package utilises the @samp{subprocess} module to implement wrappers for the @samp{gpg} and @samp{gpg2} executables normally invoked on the command line (@samp{gpg.exe} and @samp{gpg2.exe} on Windows).

The popularity of this package stemmed from its ease of use and capability in providing the most commonly required features.

Unfortunately it has been beset by a number of security issues in the past; most of which stemmed from using unsafe methods of accessing the command line via the @samp{subprocess} calls. While some effort has been made over the last two to three years (as of 2018) to mitigate this, particularly by no longer providing shell access through those subprocess calls, the wrapper is still somewhat limited in the scope of its GnuPG features coverage.

The python-gnupg package is available under the MIT license.

@node The gnupg package created and maintained by Isis Lovecruft

@subsection The gnupg package created and maintained by Isis Lovecruft

In 2015 Isis Lovecruft from the Tor Project forked and then re-implemented the python-gnupg package as just gnupg. This new package also relied on subprocess to call the @samp{gpg} or @samp{gpg2} binaries, but did so somewhat more securely.

The naming and version numbering selected for this package, however, resulted in conflicts with the original python-gnupg and since its functions were called in a different manner to python-gnupg, the release of this package also resulted in a great deal of consternation when people installed what they thought was an upgrade that

subsequently broke the code relying on it.

The gnupg package is available under the GNU General Public License version 3.0 (or any later version).

@node The PyME package maintained by Martin Albrecht

@subsection The PyME package maintained by Martin Albrecht

This package is the origin of these bindings, though they are somewhat different now. For details of when and how the PyME package was folded back

into GPGME itself see the @uref{short-history.org, Short History} document.@footnote{@samp{short-history} and/or @samp{short-history.html}.}

The PyME package was first released in 2002 and was also the first attempt to implement a low level binding to GPGME. In doing so it provided access to considerably more functionality than either the @samp{python-gnupg} or @samp{gnupg} packages.

The PyME package is only available for Python 2.6 and 2.7.

Porting the PyME package to Python 3.4 in 2015 is what resulted in it being folded into the GPGME project and the current bindings are the end result of that effort.

The PyME package is available under the same dual licensing as GPGME itself: the GNU General Public License version 2.0 (or any later version) and the GNU Lesser General Public License version 2.1 (or any later version).

@node GPGME Python bindings installation

@chapter GPGME Python bindings installation

@menu

\* No PyPI::

\* Requirements::

\* Installation::

\* Known Issues::

@end menu

@node

No PyPI

@section No PyPI

Most third-party Python packages and modules are available and distributed through the Python Package Installer, known as PyPI.

Due to the nature of what these bindings are and how they work, it is

infeasible to install the GPGME Python bindings in the same way.

This is because the bindings use SWIG to dynamically generate C bindings against `@samp{gpgme.h}` and `@samp{gpgme.h}` is generated from `@samp{gpgme.h.in}` at compile time when GPGME is built from source. Thus to include a package in PyPI which actually built correctly would require either statically built libraries for every architecture bundled with it or a full implementation of C for each architecture.

See the additional notes regarding `@ref{CFFI is the Best and GPGME should use it instead of SWIG, , CFFI and SWIG}` at the end of this section for further details.

`@node Requirements`

`@section Requirements`

The GPGME Python bindings only have three requirements:

`@enumerate`

`@item`

A suitable

version of Python 2 or Python 3. With Python 2 that means CPython 2.7 and with Python 3 that means CPython 3.4 or higher.

`@item`

`@uref{https://www.swig.org, SWIG}`.

`@item`

GPGME itself. Which also means that all of GPGME's dependencies must be installed too.

`@end enumerate`

`@menu`

\* Recommended Additions::

`@end menu`

`@node Recommended Additions`

`@subsection Recommended Additions`

Though none of the following are absolute requirements, they are all recommended for use with the Python bindings. In some cases these recommendations refer to which version(s) of CPython to use the bindings with, while others refer to third party modules which provide a significant advantage in some way.

`@enumerate`

`@item`

If possible, use Python 3 instead of 2.

`@item`

Favour a more recent version of Python since even 3.4 is due to reach EOL soon. In production systems and services, Python 3.6 should be robust enough to be relied on.

@item

If possible add the following Python modules which are not part of the standard

library: @uref{http://docs.python-requests.org/en/latest/index.html, Requests}, @uref{https://cython.org/, Cython}, @uref{https://pendulum.eustace.io/, Pendulum} and @uref{https://github.com/Selfnet/hkp4py, hkp4py}.

@end enumerate

Chances are quite high that at least the first one and maybe two of those will already be installed.

Note that, as with Cython, some of advanced use case scenarios will bring with them additional requirements. Most of these will be fairly well known and commonly installed ones, however, which are in many cases likely to have already been installed on many systems or be familiar to Python programmers.

@node Installation

@section Installation

Installing the Python bindings is effectively achieved by compiling and installing GPGME itself.

Once SWIG is installed with Python and all the dependencies for GPGME are installed you only need to confirm that the version(s) of Python you want the bindings installed for are in your @samp{\$PATH}.

By default GPGME

will attempt to install the bindings for the most recent or highest version number of Python 2 and Python 3 it detects in @samp{\$PATH}. It specifically checks for the @samp{python} and @samp{python3} executables first and then checks for specific version numbers.

For Python 2 it checks for these executables in this order: @samp{python}, @samp{python2} and @samp{python2.7}.

For Python 3 it checks for these executables in this order: @samp{python3}, @samp{python3.7}, @samp{python3.6}, @samp{python3.5} and @samp{python3.4}.@footnote{With no issues reported specific to Python 3.7, the release of Python 3.7.1 at around the same time as GPGME 1.12.0 and the testing with Python 3.7.1rc1, there is no reason to delay moving 3.7 ahead of 3.6 now. Production environments with more conservative requirements will always enforce their own policies anyway and installation to each supported minor release is quite possible too.}

On systems where @samp{python} is actually @samp{python3} and not

@samp{python2} it  
may be possible that @samp{python2} may be overlooked, but there have been  
no reports of that actually occurring as yet.

In the three months or so since the release of Python 3.7.0 there has  
been extensive testing and work with these bindings with no issues  
specifically relating to the new version of Python or any of the new  
features of either the language or the bindings. This has also been  
the case with Python 3.7.1rc1. With that in mind and given the  
release of Python 3.7.1 is scheduled for around the same time as GPGME  
1.12.0, the order of preferred Python versions has been changed to  
move Python 3.7 ahead of Python 3.6.

@menu  
\* Installing GPGME::  
@end menu

@node Installing GPGME  
@subsection Installing GPGME

See the GPGME @samp{README} file for details of how to install GPGME from  
source.

@node Known Issues  
@section Known Issues

There are a few known issues with the current build process and the  
Python bindings. For the most part these are easily addressed  
should  
they be encountered.

@menu  
\* Breaking Builds::  
\* Reinstalling Responsibly::  
\* Multiple installations::  
\* Won't Work With Windows::  
\* CFFI is the Best and GPGME should use it instead of SWIG::  
\* Virtualised Environments::  
\* Post installation::  
@end menu

@node Breaking Builds  
@subsection Breaking Builds

Occasionally when installing GPGME with the Python bindings included  
it may be observed that the @samp{make} portion of that process induces a  
large very number of warnings and, eventually errors which end that  
part of the build process. Yet following that with @samp{make check} and

@samp{make install} appears to work seamlessly.

The cause of this is related to the way SWIG needs to be called to dynamically generate the C bindings for GPGME in the first place. So the entire process will always produce @samp{lang/python/python2-gpg/} and @samp{lang/python/python3-gpg/} directories. These should contain the build output generated during compilation, including the complete bindings and module installed into @samp{site-packages}.

Occasionally the errors in the early part or some other conflict (e.g. not installing as @strong{@emph{root}} or @strong{@emph{su}}) may result in nothing being installed to the relevant @samp{site-packages} directory and the build directory missing a lot of expected files. Even when this occurs, the solution is actually quite simple and will always work.

That solution is simply to run the following commands as either the @strong{root} user or prepended with @samp{sudo -H}@footnote{Yes, even if you use virtualenv with everything you do in

Python. If you want to install this module as just your user account then you will need to manually configure, compile and install the @emph{entire} GnuPG stack as that user as well. This includes libraries which are not often installed that way. It can be done and there are circumstances under which it is worthwhile, but generally only on POSIX systems which utilise single user mode (some even require it).} in the @samp{lang/python/} directory:

```
@example
/path/to/pythonX.Y setup.py build
/path/to/pythonX.Y setup.py build
/path/to/pythonX.Y setup.py install
@end example
```

Yes, the build command does need to be run twice. Yes, you still need to run the potentially failing or incomplete steps during the @samp{configure}, @samp{make} and @samp{make install} steps with installing GPGME. This is because those steps generate a lot of essential files needed, both by and in order to create, the bindings (including both the @samp{setup.py} and @samp{gpgme.h} files).

```
@enumerate
@item
IMPORTANT Note
```

If specifying a selected number of languages to create bindings for, try to leave Python last. Currently the majority of the other

language bindings are also preceding Python of either version when listed alphabetically (not counting the Qt bindings).

If Python is set to precede one of the other languages then it is possible that the errors described here may interrupt the build process

before generating bindings for those other languages. In these cases it may be preferable to configure all preferred language bindings separately with alternative `@samp{configure}` steps for GPGME using the `@samp{--enable-languages=$LANGUAGE}` option.

Alternatively `@samp{make}` (or `@samp{gmake}`, depending on your platform) may be run with the `@samp{-k}` option, which tells make to keep going even if errors are encountered. In that case the failure of one language's set of bindings to build should not hamper another language's bindings to build.

@end enumerate

@node Reinstalling Responsibly

@subsection Reinstalling Responsibly

Regardless of whether you're installing for one version of Python or several, there will come a point where reinstallation is required.

With most Python module installations, the installed files go into the relevant site-packages directory and are then forgotten about. Then the module is upgraded, the new files are copied over the old and that's the end of the matter.

While the same is true of these bindings, there have been intermittent issues observed on some platforms which have benefited significantly from removing all the previous installations of the bindings before installing the updated versions.

Removing the previous version(s) is simply a matter of changing to the relevant `@samp{site-packages}` directory for the version of Python in question and removing the `@samp{gpg/}` directory and any accompanying egg-info files for that module.

In most cases this will require root or administration privileges on the system, but the same is true of installing the module in the first place.

@node Multiple installations

@subsection Multiple installations

For a variety of reasons it may be either necessary or just preferable to install the bindings to alternative installed Python versions which

meet the requirements of these bindings.

On POSIX systems this will generally be most simply achieved by running the manual installation commands (build, build, install) as described in the previous section for each Python installation the bindings need to be installed to.

As per the SWIG documentation: the compilers, libraries and runtime used to build GPGME and the Python Bindings `@strong{must}` match those used to compile Python itself, including the version number(s) (at least going by major version numbers and probably minor numbers too).

On most POSIX systems, including OS X, this will very likely be the case in most, if not all, cases.

Note that from GPGME `@uref{https://dev.gnupg.org/rMff6ff616aea6f59b7f2ce1176492850ecdf3851e, 1.12.1}` the default installation installs to each version of Python it can find first. That is that it will currently install for the first copies of Python versions 2.7, 3.4, 3.5, 3.6, 3.7 and 3.8 (dev branch) that it finds. Usually this will be in the same prefix as GPGME itself, but is dictated by the `@samp{$PATH}` when the installation is performed. The above instructions can still be performed on other python installations which the installer does not find, including alternative prefixes.

`@node` Won't Work With Windows

`@subsection` Won't Work With Windows

There are semi-regular reports of Windows users having considerable difficulty in installing and using the Python bindings at all. Very often, possibly even always, these reports come from Cygwin users and/or MinGW users and/or Msys2 users. Though not all of them have been confirmed, it appears that these reports have also come from people who installed Python using the Windows installer files from the `@uref{https://python.org, Python website}` (i.e. mostly MSI installers, sometimes self-extracting `@samp{.exe}` files).

The Windows versions of Python are not built using Cygwin, MinGW or Msys2; they're built using Microsoft Visual Studio. Furthermore the version used is `@emph{considerably}` more advanced than the version which MinGW obtained a small number of files from many years ago in order to be able to compile anything at all. Not only that, but there are changes to the version of Visual Studio between some micro releases, though that is particularly the case with Python 2.7, since it has been kept around far longer than it should have been.



There are two theoretical solutions to this issue:

@enumerate

@item

Compile and install the GnuPG stack, including GPGME and the Python bindings using the same version of Microsoft Visual Studio used by the Python Foundation to compile the version of Python installed.

If there are multiple versions of Python then this will need to be done with each different version of Visual Studio used for those versions of Python.

@item

Compile and install Python using the same tools used by choice, such as MinGW or Msys2.

@end enumerate

Do @strong{not} use the official Windows installer for Python unless following the first method.

In this type of situation it may even be for the best to accept that there are less limitations on permissive software than free software and simply opt to use a recent version of the Community Edition of Microsoft Visual Studio to compile and build all of it, no matter what.

Investigations into the extent or the limitations of this issue are ongoing.

The following table lists the version of Microsoft Visual Studio which needs to be used when compiling GPGME and the Python bindings with each version of the CPython binary released @uref{<https://www.python.org/downloads/windows/>, for Windows}:

@multitable {aaaaaaa} {aaaaaaaaaaaaaaaaaaaaa} {aaaaaaaaaaaaaaaaa}

@item CPython

@tab Microsoft product name

@tab runtime filename

@item 2.7.6

@tab Visual Studio 2008

@tab MSVCR90.DLL

@item 3.4.0

@tab Visual Studio 2010

@tab MSVCR100.DLL

@item 3.5.0

@tab Visual Studio 2015

@tab @strong{see below}  
@item 3.6.0  
@tab Visual Studio 2015  
@tab @strong{see below}  
@item 3.7.0  
@tab Visual Studio 2017\*  
@tab @strong{see below}  
@end multitable

It is important to note that MingW and Msys2 ship with the Visual C runtime from Microsoft

Visual Studio 2005 and are thus @strong{incompatible} with all the versions of CPython which can be used with the GPGME Python bindings.

It is also important to note that from CPython 3.5 onwards, the Python Foundation has adopted the reworking of the Visual C runtime which was performed for Visual Studio 2015 and aimed at resolving many of these kinds of issues. Much greater detail on these issues and the correct file(s) to link to are available from Matthew Brett's invaluable page, @uref{https://matthew-brett.github.io/pydagogue/python\_msvc.html, Using Microsoft Visual C with Python}. It is also worth reading the Microsoft Developer Network blog post on @uref{http://blogs.msdn.com/b/vcblog/archive/2015/03/03/introducing-the-universal-crt.aspx, the universal CRT} and Steve Dower's blog posts on Python extensions (@uref{http://stevedower.id.au/blog/building-for-python-3-5, part 1} and @uref{http://stevedower.id.au/blog/building-for-python-3-5-part-two, part 2}).

The second of those two posts by Steve Dower contains the details of specific configuration options required for compiling anything to be used with official CPython releases. In addition to those configuration and compiler settings to use, the versions of Visual Studio prior to Visual Studio 2015 did not support 64-bit systems by default. So compiling a 64-bit version of these bindings for a 64-bit version of CPython 2.7 or 3.4 requires additional work.

In addition to the blog posts, the @uref{https://wiki.python.org/moin/WindowsCompilers, Windows compilers} wiki page on the CPython wiki is another essential reference on the relevant versions of Visual Studio to use and the degree of compatibility with CPython releases.

Eventually someone will ask why there isn't an installable binary for Windows, which the GPGME of the licenses do not preclude as long as the source code is available in conjunction with such a release.

The sheer number of versions of Visual Studio in conjunction with differing configuration

options depending on the target Windows version and whether the architecture is 64-bit or 32-bit makes it difficult to provide a correct binary installer for Windows users. At the bare minimum doing so would require the GnuPG project compile ten different versions of the bindings with each release; both 32-bit and 64-bit versions for CPython 2.7 and 3.4, with 64-bit versions for both x86-64 (i.e. Intel and AMD) and ARM architectures for CPython 3.5, 3.6, 3.7 and later releases. That's the bare @strong{minimum}, it'd probably be higher.

Additionally, with only a binary installation used in conjunction with the CPython installer from @samp{python.org} the advanced options available which utilise @ref{C plus Python plus SWIG plus Cython, , Cython} will not be able to be used at all. Cython depends on being able to compile the C code it generates and that too would need to utilise a matching runtime to both the installed version of CPython and these bindings in order to work with the bindings.

Considering all of that, what do we recommend?

@enumerate

@item

Use a recent version of CPython; at least 3.5, but ideally 3.6 or later.

@item

Use Visual Studio 2015 or the standalone build tools for Visual Studio 2017 (or later).

@item

Compile both CPython and GPGME with these bindings using the tools selected in step 2.

@item

Ignore MingW, Msys2 and the official CPython binary installers.

@item

Be thankful the answer to this question wasn't simply to say something like, install Linux or install FreeBSD (or even Apple's OS X).

@end enumerate

@node CFFI is the Best and GPGME should use it instead of SWIG

@subsection CFFI is the Best and GPGME should use it instead of SWIG

There are many reasons for favouring @uref{https://cffi.readthedocs.io/en/latest/overview.html, CFFI} and proponents of it are

quite happy to repeat these things as if all it would take to switch

from SWIG to CFFI is repeating that list as if it were a new concept.

The fact is that there are things which Python's CFFI implementation cannot handle in the GPGME C code. Beyond that there are features of SWIG which are simply not available with CFFI at all. SWIG generates the bindings to Python using the `@samp{gpgme.h}` file, but that file is not a single version shipped with each release, it too is generated when GPGME is compiled.

CFFI is currently unable to adapt to such a potentially mutable codebase. If there were some means of applying SWIG's dynamic code generation to produce the Python/CFFI API modes of accessing the GPGME libraries (or the source source code directly), but such a thing does not exist yet either and it currently appears that work is needed in at least one of CFFI's dependencies before any of this can be addressed.

So if you're a massive fan of CFFI; that's great, but if you want this project to switch to CFFI then rather than just insisting that it should, I'd suggest you volunteer to bring CFFI up to the level this project needs.

If you're actually seriously considering doing so, then I'd suggest taking the `@samp{gpgme-tool.c}` file in the GPGME `@samp{src/}` directory and getting that to work with any of the CFFI API methods (not the ABI methods, they'll work with pretty much anything). When you start running into trouble with "ifdefs" then you'll know what sort of things are lacking. That doesn't even take into account the amount of work saved via SWIG's code generation techniques either.

@node Virtualised Environments

@subsection Virtualised Environments

It is fairly common practice amongst Python developers to, as much as possible, use packages like `virtualenv` to keep various things that are to be installed from interfering with each other. Given how much of the GPGME bindings is often at odds with the usual pythonic way of doing things, it stands to reason that this would be called into question too.

As it happens the answer as to whether or not the bindings can be used with `virtualenv`, the answer is both yes and no.

In general we recommend installing to the relevant path and matching prefix of GPGME itself. Which means that when GPGME, and ideally the

rest of the GnuPG stack, is installed to a prefix like `@samp{/usr/local}` or `@samp{/opt/local}` then the bindings would need to be installed to the main Python installation and not a virtualised abstraction. Attempts to separate the two in the past have been known to cause weird and intermittent errors ranging from minor annoyances to complete failures in the build process.

As a consequence we only recommend building with and installing to the main Python installations within the same prefix as GPGME is installed to or which are found by GPGME's configuration stage immediately prior to running the make commands. Which is exactly what the compiling and installing process of GPGME does by default.

Once that is done, however, it appears that a copy of the compiled module may be installed into a virtualenv of the same major and minor version matching the build. Alternatively it is possible to utilise a `@samp{sites.pth}` file in the `@samp{site-packages/}` directory of a virtualenv installation, which links back to the system installations corresponding directory in order to import anything installed system wide. This may or may not be appropriate on a case by case basis.

Though extensive testing of either of these options is not yet complete, preliminary testing of them indicates that both are viable as long as the main installation is complete. Which means that certain other options normally restricted to virtual environments are also available, including integration with pythonic test suites (e.g. [@uref{https://docs.pytest.org/en/latest/index.html}](https://docs.pytest.org/en/latest/index.html), `pytest`) and other large projects.

That said, it is worth reiterating the warning regarding non-standard installations. If one were to attempt to install the bindings only to a virtual environment without somehow also including the full GnuPG stack (or enough of it as to include GPGME) then it is highly likely that errors would be encountered at some point and more than a little likely that the build process itself would break.

If a degree of separation from the main operating system is still required in spite of these warnings, then consider other forms of virtualisation. Either a virtual machine (e.g. [@uref{https://www.virtualbox.org/}](https://www.virtualbox.org/), `VirtualBox`), a hardware emulation layer (e.g. [@uref{https://www.qemu.org/}](https://www.qemu.org/), `QEMU`) or an application container (e.g. [@uref{https://www.docker.com/why-docker}](https://www.docker.com/why-docker), `Docker`).

Finally it should be noted that the limited tests conducted thus far have been using the `@samp{virtualenv}` command in a new directory to create the virtual python environment. As opposed to the standard `@samp{python3 -m venv}` and it is possible that this will make a difference depending on the system and version of Python in use. Another option is to run

the command `@samp{python3 -m virtualenv /path/to/install/virtual/thingy}` instead.

@node Post installation

@subsection

Post installation

Following installation it is recommended to move the `@samp{post_installer.py}` script from the `@samp{lang/python/examples/howto/}` directory to the `@samp{lang/python/}` directory and run it. This will fix or restore files needed by Sphinx which may be removed during a distribution build for release. It will also generate reST files from Org mode files with Pandoc and generate Texinfo files from Org mode files with GNU Emacs and Org mode (in batch mode). Additionally it will fix the UTF-8 declaration line in the Texinfo files (Emacs expects "UTF-8" to be "utf-8").

@node Fundamentals

@chapter Fundamentals

Before we can get to the fun stuff, there are a few matters regarding GPGME's design which hold true whether you're dealing with the C code directly or these Python bindings.

@menu

\* No REST::

\* Context::

@end menu

@node No REST

@section No REST

The first part of which is or will be fairly blatantly obvious upon viewing the first example, but it's worth reiterating anyway. That being that this API is `@emph{@strong{not}}` a REST API. Nor indeed could it ever be one.

Most, if not all, Python programmers (and not just Python programmers) know how easy it is to work with a RESTful API. In fact they've become so popular that many other APIs attempt to emulate REST-like behaviour as much as they are able. Right down to the use of JSON formatted output to facilitate the use of their API without having to retrain developers.

This API does not do that. It would not be able to do that and also provide access to the entire C API on which it's built. It does, however, provide a very pythonic interface on top of the direct

bindings and it's this pythonic layer that this HOWTO deals with.

@node Context

@section Context

One of the reasons which prevents this API from being RESTful is that most operations require more than one instruction to the API to perform the task. Sure, there are certain functions which can be performed simultaneously, particularly if the result known or strongly anticipated (e.g. selecting and encrypting to a key known to be in the public keybox).

There are many more, however, which cannot be manipulated so readily: they must be performed in a specific sequence and the result of one operation has a direct bearing on the outcome of subsequent operations. Not merely by generating an error either.

When dealing with this type of persistent state on the web, full of both the RESTful and REST-like, it's most commonly referred to as a session. In GPGME, however, it is called a context and every operation type has one.

@node Working with keys

@chapter Working with keys

@menu

\* Key selection::

\* Get key::

\* Importing keys::

\* Exporting keys::

@end menu

@node Key selection

@section Key selection

Selecting keys to encrypt to or to sign with will be a common occurrence when working with GPGMe and the means available for doing so are quite simple.

They do depend on utilising a Context; however once the data is recorded in another variable, that Context does not need to be the same one which subsequent operations are performed.

The easiest way to select a specific key is by searching for that key's key ID or fingerprint, preferably the full fingerprint without any spaces in it. A long key ID will probably be okay, but is not

advised and short key IDs are already a problem with some being generated to match specific patterns. It does not matter whether the pattern is upper or lower case.

So this is the best method:

```
@example
import gpg

k = gpg.Context().keylist(pattern="258E88DCBD3CD44D8E7AB43F6ECB6AF0DEADBEEF")
keys = list(k)
@end example
```

This is passable and very likely to be common:

```
@example
import gpg

k = gpg.Context().keylist(pattern="0x6ECB6AF0DEADBEEF")
keys = list(k)
@end example
```

And this is a really bad idea:

```
@example
import gpg

k = gpg.Context().keylist(pattern="0xDEADBEEF")
keys = list(k)
@end example
```

Alternatively it may be that the intention is to create a list of keys which all match a particular search string. For instance all the addresses at a particular domain, like this:

```
@example
import gpg

ncsc = gpg.Context().keylist(pattern="ncsc.mil")
nsa = list(ncsc)
@end example
```

```
@menu
* Counting keys::
@end menu
```

```
@node Counting keys
```



## @subsection Counting keys

Counting the number of keys in your public keybox (@samp{pubring.kbx}), the format which has superseded the old keyring format (@samp{pubring.gpg} and @samp{secreg.gpg}), or the number of secret keys is a very simple task.

### @example

```
import gpg
```

```
c = gpg.Context()
seckey = c.keylist(pattern=None, secret=True)
pubkey = c.keylist(pattern=None, secret=False)
```

```
seclist = list(seckey)
secnum = len(seclist)
```

```
publist = list(pubkey)
pubnum = len(publist)
```

```
print("""
Number of secret keys: @{0@}
Number of public keys: @{1@}
""".format(secnum, pubnum))
@end example
```

NOTE: The @ref{C plus Python plus SWIG plus Cython, , Cython} introduction in the @ref{Advanced or Experimental Use Cases,

, Advanced and Experimental}

section uses this same key counting code with Cython to demonstrate some areas where Cython can improve performance even with the bindings. Users with large public keyrings or keyboxes, for instance, should consider these options if they are comfortable with using Cython.

### @node Get key

#### @section Get key

An alternative method of getting a single key via its fingerprint is available directly within a Context with @samp{Context().get\_key}. This is the preferred method of selecting a key in order to modify it, sign or certify it and for obtaining relevant data about a single key as a part of other functions; when verifying a signature made by that key, for instance.

By default this method will select public keys, but it can select secret keys as well.

This first example demonstrates selecting the current key of Werner

Koch, which is due to expire at the end of 2018:

```
@example
import gpg

fingerprint = "80615870F5BAD690333686D0F2AD85AC1E42B367"
key = gpg.Context().get_key(fingerprint)
@end
example
```

Whereas this example demonstrates selecting the author's current key with the `@samp{secret}` key word argument set to `@samp{True}`:

```
@example
import gpg

fingerprint = "DB4724E6FA4286C92B4E55C4321E4E2373590E5D"
key = gpg.Context().get_key(fingerprint, secret=True)
@end example
```

It is, of course, quite possible to select expired, disabled and revoked keys with this function, but only to effectively display information about those keys.

It is also possible to use both unicode or string literals and byte literals with the fingerprint when getting a key in this way.

```
@node Importing keys
@section Importing keys
```

Importing keys is possible with the `@samp{key_import()}` method and takes one argument which is a bytes literal object containing either the binary or ASCII armoured key data for one or more keys.

The following example retrieves one or more keys from the SKS keyserver via the web using the requests module. Since requests returns the

content as a bytes literal object, we can then use that directly to import the resulting data into our keybox.

```
@example
import gpg
import os.path
import requests

c = gpg.Context()
url = "https://sks-keyservers.net/pks/lookup"
pattern = input("Enter the pattern to search for key or user IDs: ")
```

```

payload = @{"op": "get", "search": pattern@}

r = requests.get(url, verify=True, params=payload)
result = c.key_import(r.content)

if result is not None and hasattr(result, "considered") is False:
 print(result)
elif result is not None and hasattr(result, "considered") is True:
 num_keys = len(result.imports)
 new_revs = result.new_revocations
 new_sigs = result.new_signatures
 new_subs = result.new_sub_keys
 new_uids = result.new_user_ids
 new_sctx = result.secret_imported
 nochange = result.unchanged
 print("""
The total number of keys considered for import was: @{0@}

 Number of keys revoked: @{1@}
 Number of new signatures: @{2@}
 Number of new subkeys:
 @{3@}
 Number of new user IDs: @{4@}
 Number of new secret keys: @{5@}
 Number of unchanged keys: @{6@}

The key IDs for all considered keys were:
""".format(num_keys, new_revs, new_sigs, new_subs, new_uids, new_sctx,
 nochange))
 for i in range(num_keys):
 print("@{0@}\n".format(result.imports[i].fpr))
else:
 pass
@end example

```

NOTE: When searching for a key ID of any length or a fingerprint (without spaces), the SKS servers require the the leading @samp{0x} indicative of hexadecimal be included. Also note that the old short key IDs (e.g. @samp{0xDEADBEEF}) should no longer be used due to the relative ease by which such key IDs can be reproduced, as demonstrated by the Evil32 Project in 2014 (which was subsequently exploited in 2016).

Testing for whether a string in any given search is or may be a hexadecimal value which may be missing the leading @samp{0x} is a simple matter of using a try/except statement which attempts to convert the string

as hex to an integer and then back to hex; then using that to search with. Raising a ValueError simply results in treating the string as a string. This is the method and logic utilised in the @samp{import-keys-hkp.py} script (see below).

@menu

\* Working with ProtonMail::

\* Importing with HKP for Python::

\* Importing from ProtonMail with HKP for Python::

@end menu

@node Working with ProtonMail

@subsection Working with ProtonMail

Here is a variation on the example above which checks the constrained ProtonMail keyserver for ProtonMail public keys.

@example

```
import gpg
```

```
import requests
```

```
import sys
```

```
print("""
```

```
This script searches the ProtonMail key server for the specified key and
imports it.
```

```
""")
```

```
c = gpg.Context(armor=True)
```

```
url = "https://api.protonmail.ch/pks/lookup"
```

```
ksearch = []
```

```
if len(sys.argv) >= 2:
```

```
 keyterm = sys.argv[1]
```

```
else:
```

```
 keyterm = input("Enter the key ID, UID or search string: ")
```

```
if keyterm.count("@@") == 2 and keyterm.startswith("@@") is True:
```

```
 ksearch.append(keyterm[1:])
```

```
 ksearch.append(keyterm[1:])
```

```
 ksearch.append(keyterm[1:])
```

```
elif keyterm.count("@@") == 1 and keyterm.startswith("@@") is True:
```

```
 ksearch.append("@{0}@@@protonmail.com".format(keyterm[1:]))
```

```
 ksearch.append("@{0}@@@protonmail.ch".format(keyterm[1:]))
```

```
 ksearch.append("@{0}@@@pm.me".format(keyterm[1:]))
```

```
elif keyterm.count("@@") == 0:
```

```
 ksearch.append("@{0}@@@protonmail.com".format(keyterm))
```

```
 ksearch.append("@{0}@@@protonmail.ch".format(keyterm))
```

```
 ksearch.append("@{0}@@@pm.me".format(keyterm))
```

```
elif keyterm.count("@@") == 2 and keyterm.startswith("@@") is False:
```

```
 uidlist = keyterm.split("@@")
```

```
 for uid in uidlist:
```

```
 ksearch.append("@{0@}@protonmail.com".format(uid))
```

```
 ksearch.append("@{0@}@protonmail.ch".format(uid))
```

```
 ksearch.append("@{0@}@pm.me".format(uid))
```

```
elif keyterm.count("@@") > 2:
```

```
 uidlist = keyterm.split("@@")
```

```
 for uid in uidlist:
```

```
 ksearch.append("@{0@}@protonmail.com".format(uid))
```

```
 ksearch.append("@{0@}@protonmail.ch".format(uid))
```

```
 ksearch.append("@{0@}@pm.me".format(uid))
```

```
else:
```

```
 ksearch.append(keyterm)
```

```
for k in ksearch:
```

```
 payload = @{"op": "get", "search": k@}
```

```
 try:
```

```
 r = requests.get(url, verify=True, params=payload)
```

```
 if r.ok is True:
```

```
 result = c.key_import(r.content)
```

```
 elif r.ok is False:
```

```
 result = r.content
```

```
except Exception as e:
```

```
 result = None
```

```
if result is not None and hasattr(result, "considered") is False:
```

```
 print("@{0@} for @{1@}".format(result.decode(), k))
```

```
elif result is not None and hasattr(result, "considered") is True:
```

```
 num_keys = len(result.imports)
```

```
 new_revs = result.new_revocations
```

```
 new_sigs = result.new_signatures
```

```
 new_subs = result.new_sub_keys
```

```
 new_uids = result.new_user_ids
```

```
 new_scri = result.secret_imported
```

```
 nochange = result.unchanged
```

```
 print("""
```

```
The total number of keys considered for import was: @{0@}
```

With UIDs wholly

or partially matching the following string:

```
@{1@}
```

```
Number of keys revoked: @{2@}
```

```
Number of new signatures: @{3@}
```

```
Number of new subkeys: @{4@}
```

```
Number of new user IDs: @{5@}
```

Number of new secret keys: @6@

Number of unchanged keys: @7@

The key IDs for all considered keys were:

```
"".format(num_keys, k, new_revs, new_sigs, new_subs, new_uids, new_sctx,
 nochange))
for i in range(num_keys):
 print(result.imports[i].fpr)
print("")
elif result is None:
 print(e)
@end example
```

Both the above example, @uref{../examples/howto/pmkey-import.py, pmkey-import.py}, and a version which prompts

for an alternative GnuPG home directory, @uref{../examples/howto/pmkey-import-alt.py, pmkey-import-alt.py}, are

available with the other examples and are executable scripts.

Note that while the ProtonMail servers are based on the SKS servers, their server is related more to their API and is not feature complete by comparison to the

servers in the SKS pool. One notable difference being that the ProtonMail server does not permit non ProtonMail users to update their own keys, which could be a vector for attacking ProtonMail users who may not receive a key's revocation if it had been compromised.

@node Importing with HKP for Python

@subsection Importing with HKP for Python

Performing the same tasks with the @uref{https://github.com/Selfnet/hkp4py, hkp4py module} (available via PyPI) is not too much different, but does provide a number of options of benefit to end users. Not least of which being the ability to perform some checks on a key before importing it or not. For instance it may be the policy of a site or project to only import keys which have not been revoked. The hkp4py module permits such checks prior to the importing of the keys found.

@example

```
import gpg
import hkp4py
import sys
```

```
c = gpg.Context()
server = hkp4py.KeyServer("hkps://hkps.pool.sks-keyservers.net")
results = []
keys = []
```

```

if len(sys.argv)
> 2:
 pattern = " ".join(sys.argv[1:])
elif len(sys.argv) == 2:
 pattern = sys.argv[1]
else:
 pattern = input("Enter the pattern to search for keys or user IDs: ")

```

```

if pattern is not None:
 try:
 key = server.search(hex(int(pattern, 16)))
 keyed = True
 except ValueError as ve:
 key = server.search(pattern)
 keyed = False

```

```

if key is not None:
 keys.append(key[0])
 if keyed is True:
 try:
 fob = server.search(pattern)
 except:
 fob = None
 if fob is not None:
 keys.append(fob[0])
 else:
 pass
else:
 pass

```

```

for logrus in pattern.split():
 try:
 key = server.search(hex(int(logrus, 16)))
 hexed = True
 except ValueError as ve:
 key = server.search(logrus)
 hexed = False

```

```

if key is not None:
 keys.append(key[0])
 if hexed is True:
 try:
 fob = server.search(logrus)
 except:
 fob = None
 if fob is not None:

```

```

 keys.append(fob[0])
 else:
 pass
else:
 pass

if len(keys) > 0:
 for key in keys:
 import_result = c.key_import(key.key_blob)
 results.append(import_result)

for result in results:
 if result is not None and hasattr(result, "considered") is False:
 print(result)
 elif result is not None and hasattr(result, "considered") is True:
 num_keys = len(result.imports)
 new_revs = result.new_revocations
 new_sigs = result.new_signatures
 new_subs = result.new_sub_keys
 new_uids = result.new_user_ids
 new_sctx = result.secret_imported
 nochange = result.unchanged
 print("""
The total number of keys considered for import was: @0@

Number of keys revoked: @1@
Number of new signatures:
@2@
Number of new subkeys: @3@
Number of new user IDs: @4@
Number of new secret keys: @5@
Number of unchanged keys: @6@

The key IDs for all considered keys were:
""".format(num_keys, new_revs, new_sigs, new_subs, new_uids, new_sctx,
nochange))
 for i in range(num_keys):
 print(result.imports[i].fpr)
 print("")
 else:
 pass
@end example

```

Since the hkp4py module handles multiple keys just as effectively as one (@samp{keys} is a list of responses per matching key), the example above is able to do a little bit more with the returned data before anything is actually imported.



@node Importing from ProtonMail with HKP for Python  
@subsection Importing from ProtonMail with HKP for Python

Though this can provide certain benefits even when working with ProtonMail, the scope is somewhat constrained there due to the limitations of the ProtonMail keyserver.

For instance, searching the SKS keyserver pool for the term "gnupg" produces hundreds of results from any time the word appears in any part of a user ID. Performing the same search on the ProtonMail keyserver returns zero results, even though there are at least two test accounts which include it as part of the username.

The cause of this discrepancy is the deliberate configuration of that server by ProtonMail to require an exact match of the full email address of the ProtonMail user whose key is being requested. Presumably this is intended to reduce breaches of privacy of their users as an email address must already be known before a key for that address can be obtained.

@enumerate  
@item  
Import from ProtonMail via HKP for Python Example no. 1

The following script is available with the rest of the examples under the somewhat less than original name, @samp{pmkey-import-hkp.py}.

```
@example
import gpg
import hkp4py
import os.path
import sys

print("""
This script searches the ProtonMail key server for the specified key and
imports it.

Usage: pmkey-import-hkp.py
[search strings]
""")

c = gpg.Context(armor=True)
server = hkp4py.KeyServer("hkps://api.protonmail.ch")
keyterms = []
ksearch = []
```

```

allkeys = []
results = []
paradox = []
homeless = None

if len(sys.argv) > 2:
 keyterms = sys.argv[1:]
elif len(sys.argv) == 2:
 keyterm = sys.argv[1]
 keyterms.append(keyterm)
else:
 key_term = input("Enter the key ID, UID or search string: ")
 keyterms = key_term.split()

for keyterm in keyterms:
 if keyterm.count("@@") == 2 and keyterm.startswith("@@") is True:
 ksearch.append(keyterm[1:])
 ksearch.append(keyterm[1:])
 ksearch.append(keyterm[1:])
 elif keyterm.count("@@") == 1 and keyterm.startswith("@@") is True:
 ksearch.append("@{0@}@@protonmail.com".format(keyterm[1:]))
 ksearch.append("@{0@}@@protonmail.ch".format(keyterm[1:]))
 ksearch.append("@{0@}@@pm.me".format(keyterm[1:]))
 elif keyterm.count("@@") == 0:
 ksearch.append("@{0@}@@protonmail.com".format(keyterm))
 ksearch.append("@{0@}@@protonmail.ch".format(keyterm))
 ksearch.append("@{0@}@@pm.me".format(keyterm))
 elif keyterm.count("@@") == 2 and keyterm.startswith("@@") is False:
 uidlist = keyterm.split("@@")
 for uid in uidlist:
 ksearch.append("@{0@}@@protonmail.com".format(uid))
 ksearch.append("@{0@}@@protonmail.ch".format(uid))
 ksearch.append("@{0@}@@pm.me".format(uid))
 elif keyterm.count("@@") > 2:
 uidlist = keyterm.split("@@")
 for uid in uidlist:
 ksearch.append("@{0@}@@protonmail.com".format(uid))
 ksearch.append("@{0@}@@protonmail.ch".format(uid))
 ksearch.append("@{0@}@@pm.me".format(uid))
 else:
 ksearch.append(keyterm)

for k in ksearch:
 print("Checking for key for: @{0@}".format(k))
 try:
 keys = server.search(k)
 if isinstance(keys, list) is True:
 for key in keys:

```

```

allkeys.append(key)

try:
 import_result = c.key_import(key.key_blob)
except Exception as e:
 import_result = c.key_import(key.key)
else:
 paradox.append(keys)
 import_result = None
except Exception as e:
 import_result = None
results.append(import_result)

for result in results:
 if result is not None and hasattr(result, "considered") is False:
 print("@{0@} for @{1@}".format(result.decode(), k))
 elif result is not None and hasattr(result, "considered") is True:
 num_keys = len(result.imports)
 new_revs = result.new_revocations
 new_sigs = result.new_signatures
 new_subs = result.new_sub_keys
 new_uids = result.new_user_ids
 new_sctr = result.secret_imported
 nochange = result.unchanged
 print("""
The total number of keys considered for import was: @{0@}

With UUIDs wholly or partially matching the following string:

 @{1@}

Number
of keys revoked: @{2@}
Number of new signatures: @{3@}
 Number of new subkeys: @{4@}
 Number of new user IDs: @{5@}
Number of new secret keys: @{6@}
Number of unchanged keys: @{7@}

The key IDs for all considered keys were:
""").format(num_keys, k, new_revs, new_sigs, new_subs, new_uids, new_sctr,
nochange))
 for i in range(num_keys):
 print(result.imports[i].fpr)
 print("")
 elif result is None:
 pass
@end example

```

@item

Import from ProtonMail via HKP for Python Example no. 2

Like its counterpart above, this script can also be found with the rest of the examples, by the name pmkey-import-hkp-alt.py.

With this script a modicum of effort has been made to treat anything passed as a @samp{homedir} which either does not exist or which is not a directory, as also being a possible user ID to check for. It's not guaranteed to pick up on all such cases, but it should cover most of them.

@example

```
import gpg
import hkp4py
import os.path
import
sys
```

```
print("""
```

```
This script searches the ProtonMail key server for the specified key and
imports it. Optionally enables specifying a different GnuPG home directory.
```

```
Usage: pmkey-import-hkp.py [homedir] [search string]
or: pmkey-import-hkp.py [search string]
""")
```

```
c = gpg.Context(armor=True)
server = hkp4py.KeyServer("hkps://api.protonmail.ch")
keyterms = []
ksearch = []
allkeys = []
results = []
paradox = []
homeless = None
```

```
if len(sys.argv) > 3:
 homedir = sys.argv[1]
 keyterms = sys.argv[2:]
elif len(sys.argv) == 3:
 homedir = sys.argv[1]
 keyterm = sys.argv[2]
 keyterms.append(keyterm)
elif len(sys.argv) == 2:
 homedir = ""
 keyterm = sys.argv[1]
```

```

 keyterms.append(keyterm)
else:
 keyterm = input("Enter the key ID, UID or search string: ")
 homedir = input("Enter the GPG configuration directory path (optional): ")
 keyterms.append(keyterm)

if len(homedir) == 0:
 homedir = None
 homeless = False

if homedir is not None:
 if
 homedir.startswith("~"):
 if os.path.exists(os.path.expanduser(homedir)) is True:
 if os.path.isdir(os.path.expanduser(homedir)) is True:
 c.home_dir = os.path.realpath(os.path.expanduser(homedir))
 else:
 homeless = True
 else:
 homeless = True
 elif os.path.exists(os.path.realpath(homedir)) is True:
 if os.path.isdir(os.path.realpath(homedir)) is True:
 c.home_dir = os.path.realpath(homedir)
 else:
 homeless = True
 else:
 homeless = True

First check to see if the homedir really is a homedir and if not, treat it as
a search string.
if homeless is True:
 keyterms.append(homedir)
 c.home_dir = None
else:
 pass

for keyterm in keyterms:
 if keyterm.count("@@") == 2 and keyterm.startswith("@@") is True:
 ksearch.append(keyterm[1:])
 ksearch.append(keyterm[1:])
 ksearch.append(keyterm[1:])
 elif keyterm.count("@@") == 1 and
 keyterm.startswith("@@") is True:
 ksearch.append("@{0}@@protonmail.com".format(keyterm[1:]))
 ksearch.append("@{0}@@protonmail.ch".format(keyterm[1:]))
 ksearch.append("@{0}@@pm.me".format(keyterm[1:]))
 elif keyterm.count("@@") == 0:
 ksearch.append("@{0}@@protonmail.com".format(keyterm))

```

```

ksearch.append("@{0@}@@protonmail.ch".format(keyterm))
ksearch.append("@{0@}@@pm.me".format(keyterm))
elif keyterm.count("@@") == 2 and keyterm.startswith("@@") is False:
 uidlist = keyterm.split("@@")
 for uid in uidlist:
 ksearch.append("@{0@}@@protonmail.com".format(uid))
 ksearch.append("@{0@}@@protonmail.ch".format(uid))
 ksearch.append("@{0@}@@pm.me".format(uid))
elif keyterm.count("@@") > 2:
 uidlist = keyterm.split("@@")
 for uid in uidlist:
 ksearch.append("@{0@}@@protonmail.com".format(uid))
 ksearch.append("@{0@}@@protonmail.ch".format(uid))

 ksearch.append("@{0@}@@pm.me".format(uid))
else:
 ksearch.append(keyterm)

for k in ksearch:
 print("Checking for key for: @{0@}".format(k))
 try:
 keys = server.search(k)
 if isinstance(keys, list) is True:
 for key in keys:
 allkeys.append(key)
 try:
 import_result = c.key_import(key.key_blob)
 except Exception as e:
 import_result = c.key_import(key.key)
 else:
 paradox.append(keys)
 import_result = None
 except Exception as e:
 import_result = None
 results.append(import_result)

for result in results:
 if result is not None and hasattr(result, "considered") is False:
 print("@{0@} for @{1@}".format(result.decode(), k))
 elif result is not None and hasattr(result, "considered") is True:
 num_keys = len(result.imports)
 new_revs = result.new_revocations
 new_sigs = result.new_signatures
 new_subs = result.new_sub_keys
 new_uids = result.new_user_ids
 new_scert = result.secret_imported
 nochange = result.unchanged
 print("""

```

The total number of keys considered for import was: @0@

With UIDs wholly or partially matching the following string:

@1@

Number of keys revoked: @2@

Number of new signatures: @3@

Number of new subkeys: @4@

Number of new user IDs: @5@

Number of new secret keys: @6@

Number of unchanged keys: @7@

The key IDs for all considered keys were:

```
"".format(num_keys, k, new_revs, new_sigs, new_subs, new_uids, new_scr,
 nochange))
for i in range(num_keys):
 print(result.imports[i].fpr)
print("")
elif result is None:
 pass
@end example
@end enumerate
```

@node Exporting keys

@section Exporting keys

Exporting keys remains a reasonably simple task, but has been separated into three different functions for the OpenPGP cryptographic engine.

Two of those functions are for exporting public keys and the third is for exporting secret keys.

@menu

\* Exporting public keys::

\* Exporting secret keys::

\* Sending public keys to the SKS Keyservers::

@end menu

@node Exporting public keys

@subsection Exporting public keys

There are two methods of exporting public keys, both of which are very similar to the other. The default method, @samp{key\_export()}, will export a public key or keys matching a specified pattern as normal. The alternative, the @samp{key\_export\_minimal()} method, will do the same thing except producing a minimised output with extra signatures and third party signatures or certifications removed.

```

@example
import gpg
import os.path
import sys

print("""
This script exports one or more public keys.
""")

c = gpg.Context(armor=True)

if len(sys.argv) >= 4:
 keyfile = sys.argv[1]
 logrus = sys.argv[2]
 homedir = sys.argv[3]
elif len(sys.argv) == 3:
 keyfile = sys.argv[1]
 logrus = sys.argv[2]
 homedir = input("Enter the GPG configuration directory path (optional): ")
elif len(sys.argv) == 2:
 keyfile = sys.argv[1]
 logrus = input("Enter the UID matching the key(s) to export: ")
 homedir = input("Enter the GPG configuration directory path (optional): ")
else:
 keyfile = input("Enter the path and filename to save the secret key to: ")
 logrus = input("Enter the UID matching the key(s) to export: ")
 homedir = input("Enter the GPG configuration directory path (optional): ")

if homedir.startswith("~"):
 if os.path.exists(os.path.expanduser(homedir)) is True:
 c.home_dir = os.path.expanduser(homedir)
 else:
 pass
elif os.path.exists(homedir) is True:
 c.home_dir = homedir
else:
 pass

try:
 result = c.key_export(pattern=logrus)
except:
 result = c.key_export(pattern=None)

if result is not None:
 with open(keyfile, "wb") as f:
 f.write(result)
else:

```



```
pass
@end example
```

It should be noted that the result will only return @samp{None} when a search pattern has been entered, but has not matched any keys. When the search pattern itself is set to @samp{None} this triggers the exporting of the entire public keybox.

```
@example
import gpg
import os.path
import sys

print("""
This script exports one or more public keys in minimised form.
""")

c = gpg.Context(armor=True)

if len(sys.argv) >= 4:
 keyfile = sys.argv[1]
 logrus = sys.argv[2]
 homedir = sys.argv[3]
elif len(sys.argv) == 3:
 keyfile = sys.argv[1]
 logrus = sys.argv[2]
 homedir = input("Enter the GPG configuration directory path (optional): ")
elif len(sys.argv) == 2:
 keyfile = sys.argv[1]
 logrus = input("Enter the UID matching the key(s) to export: ")
 homedir = input("Enter the GPG configuration directory path (optional): ")
else:
 keyfile = input("Enter the path and filename to save the secret key to: ")
 logrus = input("Enter the UID matching the key(s) to export: ")
 homedir = input("Enter the GPG
configuration directory path (optional): ")

if homedir.startswith("~"):
 if os.path.exists(os.path.expanduser(homedir)) is True:
 c.home_dir = os.path.expanduser(homedir)
 else:
 pass
elif os.path.exists(homedir) is True:
 c.home_dir = homedir
else:
 pass
```

```

try:
 result = c.key_export_minimal(pattern=logrus)
except:
 result = c.key_export_minimal(pattern=None)

if result is not None:
 with open(keyfile, "wb") as f:
 f.write(result)
else:
 pass
@end example

```

@node Exporting secret keys  
 @subsection Exporting secret keys

Exporting secret keys is, functionally, very similar to exporting public keys; save for the invocation of @samp{pinentry} via @samp{gpg-agent} in order to securely enter the key's passphrase and authorise the export.

The following example exports the secret key to a file which is then set with the same permissions as the output files created by the command line secret key export options.

```

@example
import gpg
import os
import
os.path
import sys

print("""
This script exports one or more secret keys.

```

The gpg-agent and pinentry are invoked to authorise the export.

```

""")

```

```

c = gpg.Context(armor=True)

if len(sys.argv) >= 4:
 keyfile = sys.argv[1]
 logrus = sys.argv[2]
 homedir = sys.argv[3]
elif len(sys.argv) == 3:
 keyfile = sys.argv[1]
 logrus = sys.argv[2]
 homedir = input("Enter the GPG configuration directory path (optional): ")
elif len(sys.argv) == 2:
 keyfile = sys.argv[1]

```

```

logrus = input("Enter the UID matching the secret key(s) to export: ")
homedir = input("Enter the GPG configuration directory path (optional): ")
else:
 keyfile = input("Enter the path and filename to save the secret key to: ")
 logrus = input("Enter the UID matching the secret key(s) to export: ")
 homedir = input("Enter the GPG configuration directory path (optional): ")

if len(homedir) == 0:
 homedir = None
elif homedir.startswith("~"):
 userdir = os.path.expanduser(homedir)
 if os.path.exists(userdir)
is True:
 homedir = os.path.realpath(userdir)
else:
 homedir = None
else:
 homedir = os.path.realpath(homedir)

if os.path.exists(homedir) is False:
 homedir = None
else:
 if os.path.isdir(homedir) is False:
 homedir = None
 else:
 pass

if homedir is not None:
 c.home_dir = homedir
else:
 pass

try:
 result = c.key_export_secret(pattern=logrus)
except:
 result = c.key_export_secret(pattern=None)

if result is not None:
 with open(keyfile, "wb") as f:
 f.write(result)
 os.chmod(keyfile, 0o600)
else:
 pass
@end example

```

Alternatively the approach of the following script can be used. This longer example saves the exported secret key(s) in files in the GnuPG home directory, in addition to setting the file permissions as only

readable and writable by the user. It also exports the secret key(s) twice in order to output both GPG binary (@samp{.gpg}) and ASCII armoured (@samp{.asc}) files.

@example

```
import
 gpg
import os
import os.path
import subprocess
import sys

print("""
This script exports one or more secret keys as both ASCII armored and binary
file formats, saved in files within the user's GPG home directory.
```

The gpg-agent and pinentry are invoked to authorise the export.

```
""")
```

```
if sys.platform == "win32":
 gpgconfcmd = "gpgconf.exe --list-dirs homedir"
else:
 gpgconfcmd = "gpgconf --list-dirs homedir"
```

```
a = gpg.Context(armor=True)
b = gpg.Context()
c = gpg.Context()
```

```
if len(sys.argv) >= 4:
 keyfile = sys.argv[1]
 logrus = sys.argv[2]
 homedir = sys.argv[3]
elif len(sys.argv) == 3:
 keyfile = sys.argv[1]
 logrus = sys.argv[2]
 homedir = input("Enter the GPG configuration directory path (optional): ")
elif len(sys.argv) == 2:
 keyfile = sys.argv[1]
 logrus = input("Enter the UID matching the secret key(s) to export: ")
 homedir = input("Enter the GPG configuration directory path (optional): ")
else:
 keyfile = input("Enter the filename to save
the secret key to: ")
 logrus = input("Enter the UID matching the secret key(s) to export: ")
 homedir = input("Enter the GPG configuration directory path (optional): ")

if len(homedir) == 0:
 homedir = None
```

```

elif homedir.startswith("~"):
 userdir = os.path.expanduser(homedir)
 if os.path.exists(userdir) is True:
 homedir = os.path.realpath(userdir)
 else:
 homedir = None
else:
 homedir = os.path.realpath(homedir)

if os.path.exists(homedir) is False:
 homedir = None
else:
 if os.path.isdir(homedir) is False:
 homedir = None
 else:
 pass

if homedir is not None:
 c.home_dir = homedir
else:
 pass

if c.home_dir is not None:
 if c.home_dir.endswith("/"):
 gpgfile = "@{0@}@{1@}.gpg".format(c.home_dir, keyfile)
 ascfile = "@{0@}@{1@}.asc".format(c.home_dir, keyfile)
 else:
 gpgfile = "@{0@}/{1@}.gpg".format(c.home_dir, keyfile)
 ascfile = "@{0@}/{1@}.asc".format(c.home_dir, keyfile)
else:
 if os.path.exists(os.environ["GNUPGHOME"]) is True:
 hd = os.environ["GNUPGHOME"]
 else:
 try:
 hd = subprocess.getoutput(gpgconfcmd)
 except:
 process = subprocess.Popen(gpgconfcmd.split(),
 stdout=subprocess.PIPE)
 procom = process.communicate()
 if sys.version_info[0] == 2:
 hd = procom[0].strip()
 else:
 hd = procom[0].decode().strip()
 gpgfile = "@{0@}/{1@}.gpg".format(hd, keyfile)
 ascfile = "@{0@}/{1@}.asc".format(hd, keyfile)

try:
 a_result = a.key_export_secret(pattern=logrus)

```

```

 b_result = b.key_export_secret(pattern=logrus)
except:
 a_result = a.key_export_secret(pattern=None)
 b_result = b.key_export_secret(pattern=None)

if a_result is not None:
 with open(ascfile, "wb") as f:
 f.write(a_result)
 os.chmod(ascfile, 0o600)
else:
 pass

if b_result is not None:
 with open(gpgfile, "wb") as f:
 f.write(b_result)
 os.chmod(gpgfile, 0o600)
else:
 pass
@end example

```

@node Sending public keys to the SKS Keyservers  
 @subsection Sending public keys to the SKS Keyservers

As with the previous section on importing keys, the @samp{hkp4py} module adds another option with exporting keys in order to send them to the public key servers.

The following example demonstrates how this may be done.

```

@example
import gpg
import hkp4py
import os.path
import sys

print("""
This script sends one or more public keys to the SKS key servers and is
essentially a slight variation on the export-key.py script.
""")

c = gpg.Context(armor=True)
server = hkp4py.KeyServer("hkps://hkps.pool.sks-keyservers.net")

if len(sys.argv) > 2:
 logrus = " ".join(sys.argv[1:])
elif len(sys.argv) == 2:
 logrus = sys.argv[1]

```

```

else:
 logrus = input("Enter the UID matching the key(s) to send: ")

if len(logrus) > 0:
 try:
 export_result = c.key_export(pattern=logrus)
 except Exception as e:
 print(e)
 export_result = None
else:
 export_result = c.key_export(pattern=None)

if export_result is not None:
 try:
 try:
 send_result = server.add(export_result)
 except:
 send_result = server.add(export_result.decode())
 if send_result is not None:
 print(send_result)
 else:
 pass
 except Exception as e:
 print(e)
else:
 pass
@end example

```

An expanded version of this script with additional functions for specifying an alternative homedir location is in the examples directory as @samp{send-key-to-keyserver.py}.

The @samp{hkp4py} module appears to handle both string and byte literal text data equally well, but the GPGME bindings deal primarily with byte literal data only and so this script sends in that format first, then tries the string literal form.

```

@node Basic Functions
@chapter Basic Functions

```

The most frequently called features of any cryptographic library will be the most fundamental tasks for encryption software. In this section we will look at how to programmatically encrypt data, decrypt it, sign it and verify signatures.

```

@menu
* Encryption::

```

```
* Decryption::
* Signing text and files::
* Signature verification::
@end menu
```

```
@node Encryption
@section Encryption
```

Encrypting is very straight forward. In the first example below the message, @samp{text}, is encrypted to a single recipient's key. In the second example the message will be encrypted to multiple recipients.

```
@menu
* Encrypting to one key::
* Encrypting to multiple keys::
@end menu
```

```
@node Encrypting to one key
@subsection Encrypting to one key
```

Once the the Context is set the main issues with encrypting data is essentially reduced to key selection and the keyword arguments specified in the @samp{gpg.Context().encrypt()} method.

Those keyword arguments are: @samp{recipients}, a list of keys encrypted to (covered in greater detail in the following section); @samp{sign}, whether or not to sign the plaintext data, see subsequent sections on signing and verifying signatures below (defaults to @samp{True}); @samp{sink}, to write results or partial results to a secure sink instead of returning it (defaults to @samp{None}); @samp{passphrase}, only used when utilising symmetric encryption (defaults to @samp{None}); @samp{always\_trust}, used to override the trust model settings for recipient keys (defaults to @samp{False}); @samp{add\_encrypt\_to}, utilises any preconfigured @samp{encrypt-to} or @samp{default-key} settings in the user's @samp{gpg.conf} file (defaults to @samp{False}); @samp{prepare}, prepare for encryption (defaults to @samp{False}); @samp{expect\_sign}, prepare for signing (defaults to @samp{False}); @samp{compress}, compresses the plaintext prior to encryption (defaults to @samp{True}).

```
@example
import gpg
```

```
a_key = "0x12345678DEADBEEF"
text = b""Some text to test with.
```

Since the text in this case must be bytes, it is most likely that the input form will be a



separate file which is opened with "rb"  
as this is the simplest method of obtaining the correct data format.  
""

```
c = pgp.Context(armor=True)
rkey = list(c.keylist(pattern=a_key, secret=False))
ciphertext, result, sign_result = c.encrypt(text, recipients=rkey, sign=False)

with open("secret_plans.txt.asc", "wb") as afile:
 afile.write(ciphertext)
@end example
```

Though this is even more likely to be used like this; with the  
plaintext input read from a file, the recipient keys used for  
encryption regardless of key trust status and the encrypted output  
also encrypted to any preconfigured keys set in the @samp{pgp.conf} file:

```
@example
import pgp

a_key = "0x12345678DEADBEEF"

with open("secret_plans.txt", "rb") as afile:
 text = afile.read()

c = pgp.Context(armor=True)
rkey = list(c.keylist(pattern=a_key, secret=False))
ciphertext, result, sign_result = c.encrypt(text, recipients=rkey, sign=True,
 always_trust=True,

 add_encrypt_to=True)

with open("secret_plans.txt.asc", "wb") as afile:
 afile.write(ciphertext)
@end example
```

If the @samp{recipients} parameter is empty then the plaintext is encrypted  
symmetrically. If no @samp{passphrase} is supplied as a parameter or via a  
callback registered with the @samp{Context()} then an out-of-band prompt  
for the passphrase via pinentry will be invoked.

@node Encrypting to multiple keys  
@subsection Encrypting to multiple keys

Encrypting to multiple keys essentially just expands upon the key  
selection process and the recipients from the previous examples.

The following example encrypts a message (@samp{text}) to everyone with an

email address on the @samp{gnupg.org} domain,@footnote{You probably don't really want to do this. Searching the  
keyservers for "gnupg.org" produces over 400 results, the majority of which aren't actually at the gnupg.org domain, but just included a comment regarding the project in their key somewhere.} but  
does @emph{not} encrypt  
to a default key or other key which is configured to normally encrypt  
to.

```
@example
import gpg
```

```
text = b""Oh look, another test message.
```

The same rules apply as with the previous example and more likely than not, the message will actually be drawn from reading the contents of a file or, maybe, from entering data at an input() prompt.

Since the text in this case must be bytes, it is most likely that the input form will be a separate file which is opened with "rb" as this is the simplest method of obtaining the correct data format.  
""

```
c = gpg.Context(armor=True)
rpattern = list(c.keylist(pattern="@@gnupg.org", secret=False))
logrus = []
```

```
for i in range(len(rpattern)):
 if rpattern[i].can_encrypt == 1:
 logrus.append(rpattern[i])
```

```
ciphertext, result, sign_result = c.encrypt(text, recipients=logrus,
 sign=False, always_trust=True)
```

```
with open("secret_plans.txt.asc", "wb") as afile:
 afile.write(ciphertext)
@end
example
```

All it would take to change the above example to sign the message and also encrypt the message to any configured default keys would be to change the @samp{c.encrypt} line to this:

```
@example
ciphertext, result, sign_result = c.encrypt(text, recipients=logrus,
 always_trust=True,
```

```
add_encrypt_to=True)
```

@end example

The only keyword arguments requiring modification are those for which the default values are changing. The default value of @samp{sign} is @samp{True}, the default of @samp{always\_trust} is @samp{False}, the default of @samp{add\_encrypt\_to} is @samp{False}.

If @samp{always\_trust} is not set to @samp{True} and any of the recipient keys are not trusted (e.g. not signed or locally signed) then the encryption will raise an error. It is possible to mitigate this somewhat with something more like this:

@example

```
import gpg
```

```
with open("secret_plans.txt.asc", "rb") as afile:
```

```
 text
```

```
 = afile.read()
```

```
c = gpg.Context(armor=True)
```

```
rpattern = list(c.keylist(pattern="@gnupg.org", secret=False))
```

```
logrus = []
```

```
for i in range(len(rpattern)):
```

```
 if rpattern[i].can_encrypt == 1:
```

```
 logrus.append(rpattern[i])
```

```
try:
```

```
 ciphertext, result, sign_result = c.encrypt(text, recipients=logrus,
 add_encrypt_to=True)
```

```
except gpg.errors.InvalidRecipients as e:
```

```
 for i in range(len(e.recipients)):
```

```
 for n in range(len(logrus)):
```

```
 if logrus[n].fpr == e.recipients[i].fpr:
```

```
 logrus.remove(logrus[n])
```

```
 else:
```

```
 pass
```

```
try:
```

```
 ciphertext, result, sign_result = c.encrypt(text,
 recipients=logrus,
 add_encrypt_to=True)
```

```
 with open("secret_plans.txt.asc", "wb") as afile:
```

```
 afile.write(ciphertext)
```

```
except:
```

```
 pass
```

@end example

This will attempt to encrypt to all the keys searched for, then remove invalid recipients if it fails and try again.

@node Decryption

@section Decryption

Decrypting something encrypted to a key in one's secret keyring is fairly straight forward.

In this example code, however, preconfiguring either @samp{gpg.Context()} or @samp{gpg.core.Context()} as @samp{c} is unnecessary because there is no need to modify the Context prior to conducting the decryption and since the Context is only used once, setting it to @samp{c} simply adds lines for no gain.

@example

```
import gpg
```

```
ciphertext = input("Enter path and filename of encrypted file: ")
newfile = input("Enter path and filename of file to save decrypted data to: ")
```

```
with open(ciphertext, "rb") as cfile:
```

```
 try:
```

```
 plaintext, result, verify_result = gpg.Context().decrypt(cfile)
```

```
 except gpg.errors.GPGMEError as e:
```

```
 plaintext = None
```

```
 print(e)
```

```
if plaintext is not None:
```

```
 with
```

```
open(newfile, "wb") as nfile:
```

```
 nfile.write(plaintext)
```

```
else:
```

```
 pass
```

@end example

The data available in @samp{plaintext} in this example is the decrypted content as a byte object, the recipient key IDs and algorithms in @samp{result} and the results of verifying any signatures of the data in @samp{verify\_result}.

If @samp{gpg.Context().decrypt(cfile, verify=False)} is called instead, then @samp{verify\_result} will be returned as @samp{None} and the rest remains as described here.

@node Signing text and files

@section Signing text and files

The following sections demonstrate how to specify keys to sign with.

@menu

- \* Signing key selection::
- \* Normal or default signing messages or files::
- \* Detached signing messages and files::
- \* Clearsigning messages or text::

@end menu

@node Signing key selection

@subsection Signing key selection

By default GPGME and the Python bindings will use the default key configured for the user invoking the GPGME API. If there is no default key specified and there is more than one secret key available it may be necessary to specify the key or keys with which to sign messages and files.

@example

```
import gpg
```

```
logrus = input("Enter the email address or string to match signing keys to: ")
hancock = gpg.Context().keylist(pattern=logrus, secret=True)
sig_src = list(hancock)
@end example
```

The signing examples in the following sections include the explicitly designated @samp{signers} parameter in two of the five examples; once where the resulting signature would be ASCII armoured and once where it would not be armoured.

While it would be possible to enter a key ID or fingerprint here to match a specific key, it is not possible to enter two fingerprints and match two keys since the patten expects a string, bytes or None and not a list. A string with two fingerprints won't match any single key.

@node Normal or default signing messages or files

@subsection Normal or default signing messages or files

The normal or default signing process is essentially the same as is most often invoked when also encrypting a message or file. So when the encryption component is not utilised, the result is to produce an encoded and signed output which may or may not be ASCII armoured and which may or may not also be compressed.

By default compression will be used unless GnuPG detects that the plaintext is already compressed. ASCII armouring will be determined according to the value of `@samp{gpg.Context().armor}`.

The compression algorithm is selected in much the same way as the symmetric encryption algorithm or the hash digest algorithm is when multiple keys are involved; from the preferences saved into the key itself or by comparison with the preferences with all other keys involved.

@example

```
import gpg
```

```
text0 = ""Declaration of ... something.
```

```
""
```

```
text = text0.encode()
```

```
c = gpg.Context(armor=True, signers=sig_src)
```

```
signed_data, result = c.sign(text, mode=gpg.constants.sig.mode.NORMAL)
```

```
with open("/path/to/statement.txt.asc",
```

```
"w") as afile:
```

```
 afile.write(signed_data.decode())
```

@end example

Though everything in this example is accurate, it is more likely that reading the input data from another file and writing the result to a new file will be performed more like the way it is done in the next example. Even if the output format is ASCII armoured.

@example

```
import gpg
```

```
with open("/path/to/statement.txt", "rb") as tfile:
```

```
 text = tfile.read()
```

```
c = gpg.Context()
```

```
signed_data, result = c.sign(text, mode=gpg.constants.sig.mode.NORMAL)
```

```
with open("/path/to/statement.txt.sig", "wb") as afile:
```

```
 afile.write(signed_data)
```

@end example

@node Detached signing messages and files

@subsection Detached signing messages and files

Detached signatures will often be needed in programmatic uses of GPGME, either for signing files (e.g. tarballs of code releases) or as a component of message signing (e.g. PGP/MIME encoded email).

@example

```
import gpg
```

```
text0 = """Declaration of ... something.
```

```
"""
```

```
text = text0.encode()
```

```
c
```

```
 = gpg.Context(armor=True)
```

```
signed_data, result = c.sign(text, mode=gpg.constants.sig.mode.DETACH)
```

```
with open("/path/to/statement.txt.asc", "w") as afile:
```

```
 afile.write(signed_data.decode())
```

@end example

As with normal signatures, detached signatures are best handled as byte literals, even when the output is ASCII armoured.

@example

```
import gpg
```

```
with open("/path/to/statement.txt", "rb") as tfile:
```

```
 text = tfile.read()
```

```
c = gpg.Context(signers=sig_src)
```

```
signed_data, result = c.sign(text, mode=gpg.constants.sig.mode.DETACH)
```

```
with open("/path/to/statement.txt.sig", "wb") as afile:
```

```
 afile.write(signed_data)
```

@end example

@node Clearsigning messages or text

@subsection Clearsigning messages or text

Though PGP/in-line messages are no longer encouraged in favour of PGP/MIME, there is still sometimes value in utilising in-line signatures. This is where clear-signed messages or text is of value.

@example

```
import gpg
```

```
text0 = """Declaration of ... something.
```

"""

```
text = text0.encode()
```

```
c
```

```
 = gpg.Context()
```

```
signed_data, result = c.sign(text, mode=gpg.constants.sig.mode.CLEAR)
```

```
with open("/path/to/statement.txt.asc", "w") as afile:
```

```
 afile.write(signed_data.decode())
```

```
@end example
```

In spite of the appearance of a clear-signed message, the data handled by GPGME in signing it must still be byte literals.

```
@example
```

```
import gpg
```

```
with open("/path/to/statement.txt", "rb") as tfile:
```

```
 text = tfile.read()
```

```
c = gpg.Context()
```

```
signed_data, result = c.sign(text, mode=gpg.constants.sig.mode.CLEAR)
```

```
with open("/path/to/statement.txt.asc", "wb") as afile:
```

```
 afile.write(signed_data)
```

```
@end example
```

```
@node Signature verification
```

```
@section Signature verification
```

Essentially there are two principal methods of verification of a signature. The first of these is for use with the normal or default signing method and for clear-signed messages. The second is for use with files and data with detached signatures.

The following example is intended for use with the default signing method where

the file was not ASCII armoured:

```
@example
```

```
import gpg
```

```
import time
```

```
filename = "statement.txt"
```

```
gpg_file = "statement.txt.gpg"
```

```
c = gpg.Context()
```



```

try:
 data, result = c.verify(open(gpg_file))
 verified = True
except gpg.errors.BadSignatures as e:
 verified = False
 print(e)

if verified is True:
 for i in range(len(result.signatures)):
 sign = result.signatures[i]
 print("""Good signature from:
@{0@}
with key @{1@}
made at @{2@}
""".format(c.get_key(sign.fpr).uids[0].uid, sign.fpr,
 time.ctime(sign.timestamp)))
 else:
 pass
@end example

```

Whereas this next example, which is almost identical would work with normal ASCII armoured files and with clear-signed files:

```

@example
import gpg
import time

filename = "statement.txt"
asc_file = "statement.txt.asc"

c = gpg.Context()

try:
 data, result = c.verify(open(asc_file))
 verified = True
except gpg.errors.BadSignatures as e:
 verified = False
 print(e)

if verified is True:
 for i in
range(len(result.signatures)):
 sign = result.signatures[i]
 print("""Good signature from:
@{0@}
with key @{1@}
made at @{2@}
""".format(c.get_key(sign.fpr).uids[0].uid, sign.fpr,

```

```

 time.ctime(sign.timestamp)))
else:
 pass
@end example

```

In both of the previous examples it is also possible to compare the original data that was signed against the signed data in `@samp{data}` to see if it matches with something like this:

```

@example
with open(filename, "rb") as afile:
 text = afile.read()

if text == data:
 print("Good signature.")
else:
 pass
@end example

```

The following two examples, however, deal with detached signatures. With his method of verification the data that was signed does not get returned since it is already being explicitly referenced in the first argument of `@samp{c.verify}`. So `@samp{data}` is `@samp{None}` and only the information in `@samp{result}` is available.

```

@example
import gpg
import time

filename = "statement.txt"
sig_file = "statement.txt.sig"

c
= gpg.Context()

try:
 data, result = c.verify(open(filename), open(sig_file))
 verified = True
except gpg.errors.BadSignatures as e:
 verified = False
 print(e)

if verified is True:
 for i in range(len(result.signatures)):
 sign = result.signatures[i]
 print("""Good signature from:
@{0@}
with key @{1@}

```

```

made at @{2@}
"""".format(c.get_key(sign.fpr).uids[0].uid, sign.fpr,
 time.ctime(sign.timestamp)))
else:
 pass
@end example

@example
import gpg
import time

filename = "statement.txt"
asc_file = "statement.txt.asc"

c = gpg.Context()

try:
 data, result = c.verify(open(filename), open(asc_file))
 verified = True
except gpg.errors.BadSignatures as e:
 verified = False
 print(e)

if verified is True:
 for i in range(len(result.signatures)):
 sign = result.signatures[i]
 print("""Good signature from:
@{0@}
with key @{1@}
made at @{2@}
"""".format(c.get_key(sign.fpr).uids[0].uid, sign.fpr,
 time.ctime(sign.timestamp)))
 else:
 pass
@end example

```

```

@node Creating keys and subkeys
@chapter Creating keys and subkeys

```

The one thing, aside from GnuPG itself, that GPGME depends on, of course, is the keys themselves. So it is necessary to be able to generate them and modify them by adding subkeys, revoking or disabling them, sometimes deleting them and doing the same for user IDs.

In the following examples a key will be created for the world's greatest secret agent, Danger Mouse. Since Danger Mouse is a secret agent he needs to be able to protect information to @samp{SECRET} level clearance, so his keys will be 3072-bit keys.

The pre-configured @samp{gpg.conf} file which sets cipher, digest and other preferences contains the following configuration parameters:

```
@example
expert
allow-freeform-uid
allow-secret-key-import
trust-model tofu+pgp
tofu-default-policy unknown
enable-large-rsa
enable-dsa2
cert-digest-algo SHA512
default-preference-list TWOFISH CAMELLIA256 AES256 CAMELLIA192
AES192 CAMELLIA128 AES BLOWFISH IDEA CAST5 3DES SHA512 SHA384 SHA256 SHA224
RIPEMD160 SHA1 ZLIB BZIP2 ZIP Uncompressed
personal-cipher-preferences TWOFISH CAMELLIA256 AES256 CAMELLIA192 AES192 CAMELLIA128 AES
BLOWFISH IDEA CAST5 3DES
personal-digest-preferences SHA512 SHA384 SHA256 SHA224 RIPEMD160 SHA1
personal-compress-preferences ZLIB BZIP2 ZIP Uncompressed
@end example
```

```
@menu
* Primary key::
* Subkeys::
* User IDs::
* Key certification::
@end menu
```

```
@node Primary key
@section Primary key
```

Generating a primary key uses the @samp{create\_key} method in a Context.

It contains multiple arguments and keyword arguments, including:

@samp{userid}, @samp{algorithm}, @samp{expires\_in}, @samp{expires}, @samp{sign}, @samp{encrypt}, @samp{certify}, @samp{authenticate}, @samp{passphrase} and @samp{force}. The defaults for all of those except @samp{userid}, @samp{algorithm}, @samp{expires\_in}, @samp{expires} and @samp{passphrase} is @samp{False}. The defaults for @samp{algorithm} and @samp{passphrase} is @samp{None}. The default for @samp{expires\_in} is @samp{0}. The default for @samp{expires} is @samp{True}. There is no default for @samp{userid}.

If @samp{passphrase} is left as @samp{None} then the key will not be generated with a passphrase, if @samp{passphrase} is set to a string then that will be the passphrase and if @samp{passphrase} is set to @samp{True} then gpg-agent will launch pinentry to prompt for a passphrase. For the sake of convenience, these examples will keep @samp{passphrase} set to @samp{None}.

```

@example
import gpg

c = gpg.Context()

c.home_dir = "~/gnupg-dm"
userid = "Danger Mouse <dm@@secret.example.net>"

dmkey = c.create_key(userid, algorithm="rsa3072", expires_in=31536000,
 sign=True, certify=True)
@end example

```

One thing to note here is the use of setting the `@samp{c.home_dir}` parameter. This enables generating the key or keys in a different location. In this case to keep the new key data created for this example in a separate location rather than adding it to existing and active key store data. As with the default directory, `@samp{~/gnupg}`, any temporary or separate directory needs the permissions set to only permit access by the directory owner. On posix systems this means setting the directory permissions to 700.

The `@samp{temp-homedir-config.py}` script in the HOWTO examples directory will create an alternative homedir with these configuration options already set and the correct directory and file permissions.

The successful generation of the key can be confirmed via the returned `@samp{GenkeyResult}` object, which includes the following data:

```

@example
print("""
Fingerprint: @ {0@}
Primary Key: @ {1@}
Public Key: @ {2@}
Secret Key: @ {3@}
Sub Key: @ {4@}
User IDs: @ {5@}
""").format(dmkey.fpr, dmkey.primary, dmkey.pubkey, dmkey.seckey, dmkey.sub,
 dmkey.uid))
@end example

```

Alternatively the information can be confirmed using the command line program:

```

@example
bash-4.4$ gpg --homedir
~/gnupg-dm -K
~/gnupg-dm/pubring.kbx

```

```

sec rsa3072 2018-03-15 [SC] [expires: 2019-03-15]
 177B7C25DB99745EE2EE13ED026D2F19E99E63AA
uid [ultimate] Danger Mouse <dm@@secret.example.net>
```

```
bash-4.4$
@end example
```

As with generating keys manually, to preconfigure expanded preferences for the cipher, digest and compression algorithms, the @samp{gpg.conf} file must contain those details in the home directory in which the new key is being generated. I used a cut down version of my own @samp{gpg.conf} file in order to be able to generate this:

```
@example
bash-4.4$ gpg --homedir ~/.gnupg-dm --edit-key 177B7C25DB99745EE2EE13ED026D2F19E99E63AA showpref
quit
Secret key is available.
```

```
sec rsa3072/026D2F19E99E63AA
 created: 2018-03-15 expires: 2019-03-15 usage: SC
 trust: ultimate validity: ultimate
[ultimate] (1). Danger Mouse <dm@@secret.example.net>
```

```
[ultimate] (1). Danger Mouse <dm@@secret.example.net>
 Cipher: TWOFISH, CAMELLIA256,
 AES256, CAMELLIA192, AES192, CAMELLIA128, AES, BLOWFISH, IDEA, CAST5, 3DES
 Digest: SHA512, SHA384, SHA256, SHA224, RIPEMD160, SHA1
 Compression: ZLIB, BZIP2, ZIP, Uncompressed
 Features: MDC, Keyserver no-modify
```

```
bash-4.4$
@end example
```

```
@node Subkeys
@section Subkeys
```

Adding subkeys to a primary key is fairly similar to creating the primary key with the @samp{create\_subkey} method. Most of the arguments are the same, but not quite all. Instead of the @samp{userid} argument there is now a @samp{key} argument for selecting which primary key to add the subkey to.

In the following example an encryption subkey will be added to the primary key. Since Danger Mouse is a security conscious secret agent, this subkey will only be valid for about six months, half the length of the primary key.

```

@example
import gpg

c = gpg.Context()
c.home_dir = "~/gnupg-dm"

key = c.get_key(dmkey.fpr, secret=True)
dmsub = c.create_subkey(key, algorithm="rsa3072", expires_in=15768000,

 encrypt=True)
@end example

```

As with the primary key, the results here can be checked with:

```

@example
print("""
Fingerprint: @{{0@}}
Primary Key: @{{1@}}
Public Key: @{{2@}}
Secret Key: @{{3@}}
Sub Key: @{{4@}}
User IDs: @{{5@}}
""").format(dmsub.fpr, dmsub.primary, dmsub.pubkey, dmsub.seckey, dmsub.sub,
 dmsub.uid))
@end example

```

As well as on the command line with:

```

@example
bash-4.4$ gpg --homedir ~/.gnupg-dm -K
~/.gnupg-dm/pubring.kbx

sec rsa3072 2018-03-15 [SC] [expires: 2019-03-15]
 177B7C25DB99745EE2EE13ED026D2F19E99E63AA
uid [ultimate] Danger Mouse <dm@@secret.example.net>
ssb rsa3072 2018-03-15 [E] [expires: 2018-09-13]

bash-4.4$
@end example

@node User IDs
@section User IDs

@menu
* Adding User IDs::
* Revoking User IDs::
@end menu

```

@node Adding User IDs

@subsection Adding User IDs

By comparison to creating primary keys and subkeys, adding a new user ID to an existing key is much simpler. The method used to do this is

@samp{key\_add\_uid} and the only arguments it takes are for the @samp{key} and the new @samp{uid}.

@example

```
import gpg
```

```
c = gpg.Context()
```

```
c.home_dir = "~/gnupg-dm"
```

```
dmfpr = "177B7C25DB99745EE2EE13ED026D2F19E99E63AA"
```

```
key = c.get_key(dmfpr, secret=True)
```

```
uid = "Danger Mouse <danger.mouse@@secret.example.net>"
```

```
c.key_add_uid(key, uid)
```

@end example

Unsurprisingly the result of this is:

@example

```
bash-4.4$ gpg --homedir ~/.gnupg-dm -K
```

```
~/.gnupg-dm/pubring.kbx
```

```

```

```
sec rsa3072 2018-03-15 [SC] [expires: 2019-03-15]
```

```
177B7C25DB99745EE2EE13ED026D2F19E99E63AA
```

```
uid [ultimate] Danger Mouse <danger.mouse@@secret.example.net>
```

```
uid [ultimate] Danger Mouse <dm@@secret.example.net>
```

```
ssb rsa3072 2018-03-15 [E] [expires: 2018-09-13]
```

```
bash-4.4$
```

@end example

@node Revoking User IDs

@subsection Revoking User IDs

Revoking a user ID is a fairly similar process, except that it uses the @samp{key\_revoke\_uid} method.

@example

```
import gpg
```

```
c = gpg.Context()
```

```
c.home_dir
```



```
= "~/gnupg-dm"
```

```
dmfpr = "177B7C25DB99745EE2EE13ED026D2F19E99E63AA"
key = c.get_key(dmfpr, secret=True)
uid = "Danger Mouse <danger.mouse@@secret.example.net>"
```

```
c.key_revoke_uid(key, uid)
@end example
```

```
@node Key certification
@section Key certification
```

Since key certification is more frequently referred to as key signing, the method used to perform this function is @samp{key\_sign}.

The @samp{key\_sign} method takes four arguments: @samp{key}, @samp{uids}, @samp{expires\_in} and @samp{local}. The default value of @samp{uids} is @samp{None} and which results in all user IDs being selected. The default value of both @samp{expires\_in} and @samp{local} is @samp{False}; which results in the signature never expiring and being able to be exported.

The @samp{key} is the key being signed rather than the key doing the signing. To change the key doing the signing refer to the signing key selection above for signing messages and files.

If the @samp{uids} value is not @samp{None} then it must either be a string to match a single user ID or a list of strings to match multiple user IDs. In this case the matching of those strings must be precise and it is case sensitive.

To sign Danger Mouse's key for just the initial user ID with a signature which will last a little over a month, do this:

```
@example
import gpg
```

```
c = gpg.Context()
uid = "Danger Mouse <dm@@secret.example.net>"
```

```
dmfpr = "177B7C25DB99745EE2EE13ED026D2F19E99E63AA"
key = c.get_key(dmfpr, secret=True)
c.key_sign(key, uids=uid, expires_in=2764800)
@end example
```

```
@menu
* Verifying key certifications::
@end menu
```

@node Verifying key certifications  
@subsection Verifying key certifications

@example

```
import gpg
import time
```

```
c = gpg.Context()
dmfpr = "177B7C25DB99745EE2EE13ED026D2F19E99E63AA"
keys = list(c.keylist(pattern=dmuid, mode=gpg.constants.keylist.mode.SIGS))
key = keys[0]
```

```
for user in key.uids:
 for sig in user.signatures:
 print("0x@{0@}".format(sig.keyid), "", time.ctime(sig.timestamp), "",
```

```
 sig.uid)
```

@end example

Which for Danger Mouse displays the following:

@example

```
0x92E3F6115435C65A Thu Mar 15 13:17:44 2018 Danger Mouse <dm@@secret.example.net>
0x321E4E2373590E5D Mon Nov 26 12:46:05 2018 Ben McGinnes <ben@@adversary.org>
```

@end example

The two key signatures listed are for the self-certification of Danger Mouse's key made when the key was created in March, 2018; and the second is a signature made by the author and set to expire at the end of the year. Note that the second signature was made with the following code (including the preceding code to display the output of the certifications or key signatures):

@example

```
import gpg
import math
import pendulum
import time
```

```
hd = "/home/dm/.gnupg"
c = gpg.Context()
d = gpg.Context(home_dir=hd)
dmfpr = "177B7C25DB99745EE2EE13ED026D2F19E99E63AA"
dmuid = "Danger Mouse <dm@@secret.example.net>"
dkeys = list(c.keylist(pattern=dmuid))
dmkey = dkeys[0]
```

```

c.key_import(d.key_export(pattern=None))

tp = pendulum.period(pendulum.now(tz="local"),
 pendulum.datetime(2019, 1, 1))
ts = tp.total_seconds()
total_secs = math.ceil(ts)
c.key_sign(dmkey, uids=dmuid, expires_in=total_secs)

d.key_import(c.key_export(pattern=dmuid))
keys = list(c.keylist(pattern=dmuid, mode=gpg.constants.keylist.mode.SIGS))
key = keys[0]

for user in key.uids:
 for sig in user.signatures:
 print("0x@{0@}".format(sig.keyid), "", time.ctime(sig.timestamp), "",
 sig.uid)
@end example

```

Note that this final code block includes the use of a module which is *not* part of Python's standard library, the [pendulum](https://pendulum.eustace.io/) module. Unlike the standard datetime module, pendulum makes working with dates and times significantly easier in Python; just as the requests module makes working with HTTP and HTTPS easier than the builtin modules do.

Though neither requests nor pendulum are required modules for using the GPGME Python bindings, they are both highly recommended more generally.

```

@node
Advanced or Experimental Use Cases
@chapter Advanced or Experimental Use Cases

@menu
* C plus Python plus SWIG plus Cython::
@end menu

```

```

@node C plus Python plus SWIG plus Cython
@section C plus Python plus SWIG plus Cython

```

In spite of the apparent incongruence of using Python bindings to a C interface only to generate more C from the Python; it is in fact quite possible to use the GPGME bindings with <http://docs.cython.org/en/latest/index.html>, Cython}. Though in many cases the benefits may not be obvious since the most computationally intensive work never leaves the level of the C code with which GPGME itself is interacting with.

Nevertheless, there are some situations where the benefits are

demonstrable. One of the better and easier examples being the one of the early examples in this HOWTO, the `@ref{Counting keys, , key counting}` code. Running that example as an executable Python script, `@samp{keycount.py}` (available in the `@samp{examples/howto/}` directory), will take a noticeable amount of time to run on most systems where the public keybox or keyring contains a few thousand public keys.

Earlier in the evening, prior to starting this section, I ran that script on my laptop; as I tend to do periodically and timed it using `@samp{time}` utility, with the following results:

```
@example
bash-4.4$ time keycount.py
```

```
Number of secret keys: 23
Number of public keys: 12112
```

```
real 11m52.945s
user 0m0.913s
sys 0m0.752s
```

```
bash-4.4$
@end example
```

Sometime after that I imported another key and followed it with a little test of Cython. This test was kept fairly basic, essentially lifting the material from the `@uref{http://docs.cython.org/en/latest/src/tutorial/cython_tutorial.html, Cython Basic Tutorial}` to demonstrate compiling Python code to C. The first step was to take the example key counting code quoted previously, essentially from the importing of the `@samp{gpg}` module to the end of the script:

```
@example
import gpg

c = gpg.Context()
seckeys
 = c.keylist(pattern=None, secret=True)
pubkeys = c.keylist(pattern=None, secret=False)

seclist = list(seckeys)
secnum = len(seclist)

publist = list(pubkeys)
pubnum = len(publist)
```

```
print("""
 Number of secret keys: @0@
 Number of public keys: @1@

""").format(secnum, pubnum))
@end example
```

Save that into a file called @samp{keycount.pyx} and then create a @samp{setup.py} file which contains this:

```
@example
from distutils.core import setup
from Cython.Build import cythonize

setup(
 ext_modules = cythonize("keycount.pyx")
)
@end example
```

Compile it:

```
@example
bash-4.4$ python setup.py build_ext --inplace
bash-4.4$
@end example
```

Then run it in a similar manner to @samp{keycount.py}:

```
@example
bash-4.4$ time python3.7 -c "import keycount"
```

```
Number of secret keys: 23
Number of public keys: 12113
```

```
real 6m47.905s
user 0m0.785s
sys 0m0.331s
```

```
bash-4.4$
@end example
```

Cython turned @samp{keycount.pyx} into an 81KB @samp{keycount.o} file in the @samp{build/} directory, a 24KB @samp{keycount.cpython-37m-darwin.so} file to be imported into Python 3.7 and a 113KB @samp{keycount.c} generated C source code file of nearly three thousand lines. Quite a bit bigger than the 314 bytes of the @samp{keycount.pyx} file or the full 1,452 bytes of the

full executable @samp{keycount.py} example script.

On the other hand it ran in nearly half the time; taking 6 minutes and 47.905 seconds to run. As opposed to the 11 minutes and 52.945 seconds which the CPython script alone took.

The @samp{keycount.pyx} and @samp{setup.py} files used to generate this example have been added to the @samp{examples/howto/advanced/cython/} directory. The example versions include some additional options to annotate the existing code and to detect Cython's use. The latter comes from the @uref{http://docs.cython.org/en/latest/src/tutorial/pure.html#magic-attributes-within-the-pxd, Magic Attributes} section of the Cython documentation.

@node Miscellaneous extras and work-arounds  
@chapter  
Miscellaneous extras and work-arounds

Most of the things in the following sections are here simply because there was no better place to put them, even though some are only peripherally related to the GPGME Python bindings. Some are also workarounds for functions not integrated with GPGME as yet. This is especially true of the first of these, dealing with @ref{Group lines, , group lines}.

@menu  
\* Group lines::  
\* Keyserver access for Python::  
\* GPGME version checking::  
@end menu

@node Group lines  
@section Group lines

There is not yet an easy way to access groups configured in the gpg.conf file from within GPGME. As a consequence these central groupings of keys cannot be shared amongst multiple programs, such as MUAs readily.

The following code, however, provides a work-around for obtaining this information in Python.

```
@example
import subprocess
import sys

if sys.platform == "win32":
 gpgconfcmd = "gpgconf.exe --list-options gpg"
else:
 gpgconfcmd = "gpgconf
```

```
--list-options gpg"
```

```
process = subprocess.Popen(gpgconfcmd.split(), stdout=subprocess.PIPE)
procom = process.communicate()
```

```
if sys.version_info[0] == 2:
 lines = procom[0].splitlines()
else:
 lines = procom[0].decode().splitlines()
```

```
for line in lines:
 if line.startswith("group") is True:
 break
```

```
groups = line.split(":")[-1].replace("'", "").split(',')
```

```
group_lines = []
group_lists = []
```

```
for group in groups:
 group_lines.append(group.split("="))
 group_lists.append(group.split("="))
```

```
for glist in group_lists:
 glist[1] = glist[1].split()
@end example
```

The result of that code is that `@samp{group_lines}` is a list of lists where `@samp{group_lines[i][0]}` is the name of the group and `@samp{group_lines[i][1]}` is the key IDs of the group as a string.

The `@samp{group_lists}` result is very similar in that it is a list of lists. The first part, `@samp{group_lists[i][0]}` matches `@samp{group_lines[i][0]}` as the name of the group, but `@samp{group_lists[i][1]}` is the key IDs of the group as a list.

A demonstration of using the `@samp{groups.py}` module is also available in the form of the executable `@samp{mutt-groups.py}` script. This second script reads all the group entries in a user's `@samp{gpg.conf}` file and converts them into crypt-hooks suitable for use with the Mutt and Neomutt mail clients.

```
@node Keyserver access for Python
@section Keyserver access for Python
```

The `@uref{https://github.com/Selfnet/hkp4py, hkp4py}` module by Marcel Fest was originally a port of the old `@uref{https://github.com/dgladkov/python-hkp, python-hkp}` module from Python 2 to Python 3 and updated to use

the  
@uref{http://docs.python-requests.org/en/latest/index.html, requests} module instead. It has since been modified to provide support for Python 2.7 as well and is available via PyPI.

Since it rewrites the @samp{hkp} protocol prefix as @samp{http} and @samp{hkps} as @samp{https}, the module is able to be used even with servers which do not support the full scope of keyserver functions.@footnote{Such as with ProtonMail servers. This also means that restricted servers which only advertise either HTTP or HTTPS end points and not HKP or HKPS end points must still be identified as HKP or HKPS within the Python Code. The @samp{hkp4py} module will rewrite these appropriately when the connection is made to the server.} It also works quite readily when incorporated into a @ref{C plus Python plus SWIG plus Cython, , Cython} generated and compiled version of any code.

@menu  
\* Key import format::  
@end menu

@node Key import format  
@subsection Key import format

The hkp4py module returns key data via requests as string literals (@samp{r.text}) instead of byte literals (@samp{r.content}). This means that the returned key data must be encoded to UTF-8 when importing that key material using a @samp{gpg.Context().key\_import()} method.

For this reason an alternative method has been added to the @samp{search} function of @samp{hkp4py.KeyServer()} which returns the key in the correct format as expected by @samp{key\_import}. When importing using this module, it is now possible to import with this:

@example  
for key in keys:  
 if key.revoked is False:  
 gpg.Context().key\_import(key.key\_blob)  
 else:  
 pass  
@end example

Without that recent addition it would have been necessary to encode the contents of each @samp{hkp4py.KeyServer().search()[i].key} in @samp{hkp4py.KeyServer().search()} before trying to import it.

An example of this is included in the @ref{Importing keys, , Importing Keys} section of this



HOWTO and the corresponding executable version of that example is available in the @samp{lang/python/examples/howto} directory as normal; the executable version is the @samp{import-keys-hkp.py} file.

@node GPGME version checking

@section GPGME version checking

For various reasons it may be necessary to check which version of GPGME the bindings have been built against; including whether a minimum required version of GPGME is in use.

For the most part the @samp{gpg.version.versionstr} and @samp{gpg.version.versionlist} methods have been quite sufficient. The former returns the same string as @samp{gpgme-config --version}, while the latter returns the major, minor and patch values in a list.

To check if the installed bindings have actually been built against the current installed libgpgme version, this check can be performed:

@example

```
import gpg
```

```
import subprocess
```

```
import sys
```

```
gpgme_version_call = subprocess.Popen(["gpgme-config", "--version"],
 stdout=subprocess.PIPE,
 stderr=subprocess.PIPE)
```

```
gpgme_version_str = gpgme_version_call.communicate()
```

```
if sys.version_info[0] == 2:
```

```
 gpgme_version = gpgme_version_str[0].strip()
```

```
elif sys.version_info[0] >= 3:
```

```
 gpgme_version = gpgme_version_str[0].decode().strip()
```

```
else:
```

```
 gpgme_version = None
```

```
if gpgme_version is not None:
```

```
 if gpgme_version == gpg.version.versionstr:
```

```
 print("The
```

```
GPGME Python bindings match libgpgme.")
```

```
 else:
```

```
 print("The GPGME Python bindings do NOT match libgpgme.")
```

```
else:
```

```
 print("Upgrade Python and reinstall the GPGME Python bindings.")
```

@end example

For many developers, however, the preferred checking means checking

for a minimum version or point release. This is now readily available via the `@samp{gpg.version.versionintlist}` method (added in version `@samp{1.12.1-beta79}`). It is also now possible to easily check whether the installed GPGME Python bindings were built from a development or beta branch of the GPGME source code.

The following code demonstrates how both of those methods may be used:

```
@example
import gpg

try:
 if gpg.version.is_beta is True:
 print("The installed GPGME Python bindings were built from beta code.")
 else:
 print("The installed GPGME Python bindings are a released version.")
except Exception as e:
 print(e)

try:
 if gpg.version.versionintlist[0] == 1:
 if gpg.version.versionintlist[1]
== 12:
 if gpg.version.versionintlist[2] == 1:
 print("This is the minimum version for using versionintlist.")
 elif gpg.version.versionintlist[2] > 1:
 print("The versionintlist method is available.")
 else:
 pass
 elif gpg.version.versionintlist[1] > 12:
 print("The versionintlist method is available.")
 else:
 pass
 elif gpg.version.versionintlist[0] > 1:
 print("The versionintlist method is available.")
 else:
 pass
except Exception as e:
 print(e)
@end example
```

The points where `@samp{pass}` is used in the above example will most likely also produce an `@samp{Exception}` error since those results should only occur in versions which do not have the `@samp{gpgme.version.is_beta}` and `@samp{gpgme.version.versionintlist}` methods available.

@node Copyright and Licensing  
@chapter Copyright and Licensing

@menu

\* Copyright::

\* Draft

Editions of this HOWTO::

\* License GPL compatible::

@end menu

@node Copyright

@section Copyright

Copyright The GnuPG Project, 2018.

@node Draft Editions of this HOWTO

@section Draft Editions of this HOWTO

Draft editions of this HOWTO may be periodically available directly from the author at any of the following URLs:

@itemize

@item

@uref{https://files.au.adversary.org/crypto/gpgme-python-howto.html, GPGME Python Bindings HOWTO draft (HTML single file, AWS S3 SSL)}

@item

@uref{http://files.au.adversary.org/crypto/gpgme-python-howto.html, GPGME Python Bindings HOWTO draft (HTML single file, AWS S3 no SSL)}

@item

@uref{https://files.au.adversary.org/crypto/gpgme-python-howto-split/index.html, GPGME Python Bindings HOWTO draft (HTML multiple files, AWS S3 SSL)}

@item

@uref{http://files.au.adversary.org/crypto/gpgme-python-howto/index.html, GPGME Python Bindings HOWTO draft (HTML multiple files, AWS S3 no SSL)}

@end itemize

These draft versions have been generated from this document via GNU

Emacs @uref{https://orgmode.org/, Org mode} to @samp{.texi} and @uref{https://www.gnu.org/software/texinfo/, GNU Texinfo} to HTML. Though it is

likely that the specific @uref{https://files.au.adversary.org/crypto/gpgme-python-howto, file}

@uref{http://files.au.adversary.org/crypto/gpgme-python-howto.org, version} used will be on the same server with the generated output formats. Occasionally I may include the Org mode generated XHTML versions:

@itemize

@item

@uref{https://files.au.adversary.org/crypto/gpgme-python-howto.xhtml, GPGME Python Bindings HOWTO draft (HTML single file, AWS S3 SSL)}

@item

@uref{http://files.au.adversary.org/crypto/gpgme-python-howto.xhtml, GPGME Python Bindings HOWTO draft (HTML single file, AWS S3 no SSL)}

@end itemize

That XHTML version, however, is exported in a way which inherits a colour scheme from @uref{https://github.com/holomorph/emacs-zenburn, the author's Emacs theme} (which is a higher contrast

version of @uref{http://kippura.org/zenburnpage/,

Zenburn} ported by @uref{https://github.com/holomorph, Holomorph}). So it's fine for people who prefer dark themed web pages, but not so great for everyone else.

The GNU Texinfo and reStructured Text versions ship with the software, while the GNU Emacs Info version is generated from the Texinfo version using GNU Texinfo or GNU Makeinfo. The Texinfo format is generated from the original Org mode source file in Org mode itself either within GNU Emacs or via the command line by invoking Emacs in batch mode:

@example

```
emacs gpgme-python-howto.org --batch -f org-texinfo-export-to-texinfo --kill
```

```
emacs gpgme-python-howto --batch -f org-texinfo-export-to-texinfo --kill
```

@end example

The reStructuredText format is also generated from the Org mode source file, except it is generated using @uref{https://pandoc.org, Pandoc} with either of the following commands (depending on the filename):

@example

```
pandoc -f org -t rst+smart -o gpgme-python-howto.rst gpgme-python-howto.org
```

```
pandoc -f org
```

```
-t rst+smart -o gpgme-python-howto.rst gpgme-python-howto
```

@end example

Note that the Org mode source files are identified as such via a mode line at the top of each file and have had their @samp{.org} file extensions dropped in order to make scripted generation of output formats easier and not require renaming files post-conversion.

Due to a bug in Org mode's texinfo conversion method, the recommended steps for generating the Texinfo files for all the files in the @samp{lang/python/doc/src/} directory are as follows:

@example

```
for x in * ; do
```

```
 emacs $x --batch -f org-texinfo-export-to-texinfo --kill
```

```
 cat $x.texi | sed -e 's/@@documentencoding UTF-8/@@documentencoding utf-8/g' > ../texinfo/$x.texi
```

```
 pandoc -f org -t rst+smart -o ../rst/$x.rst $x
```

```
done ;
```

```

rm -fv *.texi
cd ../texinfo
mkdir info
mkdir html
for x in *.texi ; do
 makeinfo -v $x
 makeinfo --html --no-split $x
done ;
mv *.info info/
mv *.html html/
@end example

```

This code snippet includes the generation of the reStructuredText files and would be expected to be run from the @samp{doc/src/} directory containing the Org mode source files. It also assumes that the commands are being run on POSIX compliant systems with basic tools like sed, the Bourne shell and GNU Emacs. Okay, Emacs might not necessarily qualify as a basic tool, but it is common enough that having it installed on a system isn't too great an expectation, nor is it difficult to add to most POSIX systems, even if the users of those systems do not personally use it.} available. The code snippet also includes the steps for generating the Emacs Info files and HTML files from the Texinfo files. Using reStructuredText files with Sphinx is best left for the documentation of that project.

In addition to these there is a significantly less frequently updated version as a HTML @uref{https://files.au.adversary.org/crypto/gpgme-python/dita/webhelp/index.html, WebHelp site} (AWS S3 SSL); generated from DITA XML source files, which can be found in @uref{https://dev.gnupg.org/source/gpgme/browse/ben%252Fhowto-dita/, an alternative branch} of the GPGME git repository.

Various generated output formats may occasionally be found in subdirectories of the @uref{https://s3.amazonaws.com/files.au.adversary.org/crypto/gpgme-python, gpgme-python} directory. In particular within the @uref{https://s3.amazonaws.com/files.au.adversary.org/crypto/gpgme-python/dita, DITA}, @uref{https://s3.amazonaws.com/files.au.adversary.org/crypto/gpgme-python/rst, reStructuredText} and @uref{https://s3.amazonaws.com/files.au.adversary.org/crypto/gpgme-python/texinfo, Texinfo} subdirectories. The @samp{rst} directory contains output files generated with Sphinx and may include a considerable number of its possible output formats, but there are no guarantees as to how recent these are or even if they are present.

These draft editions are not official documents and the version of documentation in the master branch or which ships with released versions

is the only official documentation. Nevertheless, these draft editions may occasionally be of use by providing more accessible web versions which are updated between releases. They are provided on the understanding that they may contain errors or may contain content subject to change prior to an official release.

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@bye

# -\*- mode: org -\*-

#+TITLE: What Was New in the GPGME Python Bindings and Documentation

#+AUTHOR: Ben McGinnes

#+LATEX\_COMPILER: xelatex

#+LATEX\_CLASS: article

#+LATEX\_CLASS\_OPTIONS: [12pt]

#+LATEX\_HEADER: \usepackage{xltextra}

#+LATEX\_HEADER: \usepackage[margin=1in]{geometry}

#+LATEX\_HEADER: \setmainfont[Ligatures={Common}]{Times New Roman}

#+LATEX\_HEADER: \author{Ben McGinnes <ben@gnupg.org>}

\* What Was New

:PROPERTIES:

:CUSTOM\_ID: new-stuff

:END:

| Version: | 0.0.1 |  
| GPGME Version: | 1.13.0 |  
| Author: | Ben McGinnes <ben@gnupg.org> |  
| Author GPG Key: | DB4724E6FA4286C92B4E55C4321E4E2373590E5D |  
| Language: | Australian English, British English |  
| xml:lang: | en-AU, en-GB, en |

The following are all the past /What's New/ sections for the Python Bindings HOWTO and other documentation.

\*\* What Was New in GPGME 1120

:PROPERTIES:

:CUSTOM\_ID: gpgme-1-12-0

:END:

The most obviously new point for those reading this guide is this section on other new things, but that's hardly important. Not given all the other things which spurred the need for adding this section and its subsections.

\*\*\* New in GPGME 1.12.0

:PROPERTIES:

:CUSTOM\_ID: new-stuff-1-12-0

:END:

There have been quite a number of additions to GPGME and the Python bindings to it since the last release of GPGME with versions 1.11.0 and 1.11.1 in April, 2018.

The bullet points of new additions are:

- an expanded section on [\[\[file:gpgme-python-howto#installation\]\[installing\]\]](#) and [\[\[file:gpgme-python-howto#snafu\]\[troubleshooting\]\]](#) the Python bindings.
- The release of Python 3.7.0; which appears to be working just fine with our bindings, in spite of intermittent reports of problems for many other Python projects with that new release.
- Python 3.7 has been moved to the head of the specified python versions list in the build process.
- In order to fix some other issues, there are certain underlying functions which are more exposed through the [\[\[file:gpgme-python-howto#howto-get-context\]\[gpg.Context\(\)\]\]](#), but ongoing documentation ought to clarify that or otherwise provide the best means of using the bindings. Some additions to `=gpg.core=` and the `=Context()=`, however, were intended (see below).
- Continuing work in identifying and confirming the cause of oft-reported [\[\[file:gpgme-python-howto#snafu-runtime-not-funtime\]\[problems installing the Python bindings on Windows\]\]](#).
- GSOC: Google's Surreptitiously Ordered Conscriptio... erm ... oh, right; Google's Summer of Code. Though there were two hopeful candidates this year; only one ended up involved with the GnuPG Project directly, the other concentrated on an unrelated third party project with closer ties to one of the GNU/Linux distributions than to the GnuPG Project. Thus the Python bindings benefited from GSOC participant Jacob Adams, who added the `key_import` function; building on prior work by Tobias Mueller.

- Several new methods functions were added to the `gpg.Context()`, including: `[[file:gpgme-python-howto#howto-import-key][key_import]]`, `[[file:gpgme-python-howto#howto-export-key][key_export]]`, `[[file:gpgme-python-howto#howto-export-public-key][key_export_minimal]]` and `[[file:gpgme-python-howto#howto-export-secret-key][key_export_secret]]`.
- Importing and exporting examples include versions integrated with Marcel Fest's recently released `[[https://github.com/Selfnet/hkp4py][HKP for Python]]` module. Some `[[file:gpgme-python-howto#hkp4py][additional notes on this module]]` are included at the end of the HOWTO.
- Instructions for dealing with semi-walled garden implementations like ProtonMail are also included. This is intended to make things a little easier when communicating with users of ProtonMail's services and should not be construed as an endorsement of said service. The GnuPG Project neither favours, nor disfavors ProtonMail and the majority of this deals with interacting with the ProtonMail keyserver.
- Semi-formalised the location where `[[file:gpgme-python-howto#draft-editions][draft versions]]` of this HOWTO may periodically be accessible. This is both for the reference of others and testing the publishing of the document itself. Renamed this file at around the same time.
- The Texinfo documentation build configuration has been replicated from the parent project in order to make to maintain consistency with that project (and actually ship with each release).
- a `reStructuredText` (`=.rst=`) version is also generated for Python developers more used to and comfortable with that format as it is the standard Python documentation format and Python developers may wish to use it with Sphinx. Please note that there has been no testing of the `reStructuredText` version with Sphinx at all. The `reST` file was generated by the simple expedient of using `[[https://pandoc.org/][Pandoc]]`.
- 
- Added a new section for `[[file:gpgme-python-howto#advanced-use][advanced or experimental use]]`.
- Began the advanced use cases with `[[file:gpgme-python-howto#cython][a section]]` on using the module with `[[https://cython.org/][Cython]]`.
- Added a number of new scripts to the `=example/howto/=` directory; some of which may be in advance of their planned sections of the HOWTO (and some are just there because it seemed like a good idea at the time).
- Cleaned up a lot of things under the hood.

#### 1.13.1

Wenn Sie dies lesen können, ist es wohl nicht geheim genug.

This is gpgme.info, produced by makeinfo version 6.3 from gpgme.texi.

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INFO-DIR-SECTION GNU Libraries

START-INFO-DIR-ENTRY

\* GPGME: (gpgme). Adding support for cryptography to your program.

END-INFO-DIR-ENTRY

This file documents the GPGME library.

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Indirect:

gpgme.info-1: 1689

gpgme.info-2: 301885

Tag Table:

(Indirect)

Node: Top1689

Node: Introduction9299

Node: Getting Started10089

Node: Features11550

Node: Overview12862

Node: Preparation13971

Node: Header14968

Node: Building the Source15715

Node: Largefile Support (LFS)17859

Node: Using Automake23275

Node: Using Libtool25828  
Node: Library Version  
Check26190  
Node: Signal Handling32250  
Node: Multi-Threading33520  
Ref: Multi-Threading-Footnote-134936  
Node: Protocols and Engines35359  
Node: Engine Version Check38110  
Node: Engine Information40633  
Node: Engine Configuration44493  
Node: OpenPGP45797  
Node: Cryptographic Message Syntax46137  
Node: Assuan46450  
Node: Algorithms46824  
Ref: Algorithms-Footnote-147303  
Node: Public Key Algorithms47431  
Node: Hash Algorithms50033  
Node: Error Handling51247  
Node: Error Values53121  
Node: Error Sources58324  
Node: Error Codes60764  
Node: Error Strings65557  
Node: Exchanging Data67364  
Node: Creating Data Buffers69249  
Node: Memory Based Data Buffers69765  
Node: File Based Data Buffers73198  
Node: Callback Based Data Buffers76311  
Node: Destroying Data Buffers80502  
Node: Manipulating Data Buffers82009  
Node: Data Buffer I/O Operations82501  
Node: Data Buffer Meta-Data84874  
Node: Data Buffer Convenience89393  
Node: Contexts91613  
Node: Creating Contexts92799  
Node: Destroying Contexts93646  
Node: Result Management93985  
Node:  
Context Attributes95566  
Node: Protocol Selection96733  
Node: Crypto Engine97779  
Node: Setting the Sender99668  
Node: ASCII Armor101181  
Node: Text Mode101810  
Node: Offline Mode102744  
Node: Pinentry Mode104242  
Node: Included Certificates106136  
Node: Key Listing Mode107582  
Node: Passphrase Callback112323

Node: Progress Meter Callback115885  
Node: Status Message Callback117870  
Node: Context Flags119635  
Node: Locale125684  
Node: Additional Logs127276  
Node: Key Management129474  
Node: Key objects130702  
Node: Listing Keys144926  
Node: Information About Keys153579  
Node: Manipulating Keys154887  
Node: Generating Keys155457  
Node: Signing Keys173777  
Node: Exporting Keys177410  
Node: Importing Keys184349  
Ref: Importing Keys-Footnote-1191752  
Node: Deleting Keys191880  
Node: Changing Passphrases194160  
Node: Changing TOFU Data195487  
Node: Advanced Key Editing197595  
Node: Trust Item Management200328  
Node: Listing Trust Items201364  
Node: Manipulating Trust Items203725  
Node: Crypto Operations204368  
Node:  
  Decrypt205632  
Node: Verify212946  
Node: Decrypt and Verify225666  
Node: Sign228521  
Node: Selecting Signers229085  
Node: Creating a Signature230491  
Node: Signature Notation Data235261  
Node: Encrypt237546  
Node: Encrypting a Plaintext237902  
Node: Miscellaneous252314  
Node: Running other Programs252726  
Node: Using the Assuan protocol254889  
Node: Checking for updates257687  
Node: Run Control262504  
Node: Waiting For Completion263248  
Node: Using External Event Loops265373  
Node: I/O Callback Interface267345  
Node: Registering I/O Callbacks272585  
Node: I/O Callback Example274624  
Node: I/O Callback Example GTK+281249  
Node: I/O Callback Example GDK283038  
Node: I/O Callback Example Qt284680  
Node: Cancellation286968  
Node: UI Server Protocol289276

Ref: UI Server Protocol-Footnote-1290711  
Node: UI Server Encrypt290830  
Node: UI Server Sign296188  
Node: UI Server Decrypt298541  
Node: UI Server Verify301885  
Node: UI Server Set Input Files305457  
Node: UI Server Sign/Encrypt Files306527  
Node: UI Server Verify/Decrypt  
Files308335  
Node: UI Server Import/Export Keys310211  
Node: UI Server Checksum Files311273  
Node: Miscellaneous UI Server Commands313491  
Ref: command SENDER315422  
Node: Debugging317124  
Node: Deprecated Functions318873  
Node: Library Copying344090  
Node: Copying372310  
Node: Concept Index410060  
Node: Function and Data Index425058

End Tag Table

Local Variables:

coding: utf-8

End:

hkp4py

requests

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File: gpgme.info, Node: Top, Next: Introduction, Up: (dir)

## Main Menu

\*\*\*\*\*

This is Edition 1.12.1-beta100, last updated 3 December 2018, of The GnuPG Made Easy Reference Manual, for Version 1.12.1-beta100 of the GPGME library.

### \* Menu:

- \* Introduction:: How to use this manual.
- \* Preparation:: What you should do before using the library.
- \* Protocols and Engines:: Supported crypto protocols.
- \* Algorithms:: Supported algorithms.
- \* Error Handling:: Error numbers and their meanings.
- \* Exchanging Data:: Passing data to and from GPGME.
- \* Contexts:: Handling GPGME contexts.

### Appendices

- \* UI Server Protocol:: The GnuPG UI Server Protocol.
- \* Debugging:: How to solve problems.
- \* Deprecated Functions:: Documentation of deprecated functions.
- \* Library Copying:: The GNU Lesser General Public License says how you can copy and share GnuPG Made Easy.
- \* Copying:: The GNU General Public License says how you

can copy and share this manual.

## Indices

- \* Concept Index:: Index of concepts and programs.
- \* Function and Data Index:: Index of functions, variables and data types.

## The Detailed Node Listing

## Introduction

- \* Getting Started:: Purpose of the manual, and how to use it.
- \* Features:: Reasons to install and use GPGME.
- \* Overview:: Basic architecture of the GPGME library.

## Preparation

- \* Header:: What header file you need to include.
- \* Building the Source:: Compiler options to be used.
- \* Largefile Support (LFS):: How to use GPGME with LFS.
- \* Using Automake:: Compiler options to be used the easy way.
- \* Using Libtool:: Avoiding compiler options entirely.
- \* Library Version Check:: Getting and verifying the library version.
- \* Signal Handling:: How GPGME affects signal handling.
- \* Multi-Threading:: How GPGME can be used in an MT environment.

## Protocols and Engines

- \* Engine Version Check:: Verifying the engine version.
- \* Engine Information:: Obtaining more information about the engines.
- \* Engine Configuration:: Changing the engine configuration.
- \* OpenPGP:: Support for the OpenPGP protocol.
- \* Cryptographic Message Syntax:: Support for the CMS.

## Algorithms

- \* Public Key Algorithms:: A list of all public key algorithms.
- \* Hash Algorithms:: A list of all hash algorithms.

## Error Handling

- \* Error Values:: The error value and what it means.
- \* Error Codes:: A list of important error codes.
- \* Error Sources:: A list of important error sources.
- \* Error Strings:: How to get a descriptive string from a value.

## Exchanging Data

- \* Creating Data Buffers:: Creating new data buffers.
- \* Destroying Data Buffers:: Releasing data buffers.
- \* Manipulating Data Buffers:: Operations on data buffers.

## Creating Data Buffers

- \* Memory Based Data Buffers:: Creating memory based data buffers.
- \* File Based Data Buffers:: Creating file based data buffers.
- \* Callback Based Data Buffers:: Creating callback based data buffers.

## Manipulating Data Buffers

- \* Data Buffer I/O Operations:: I/O operations on data buffers.
- \* Data Buffer Meta-Data:: Meta-data manipulation of data buffers.
- \* Data Buffer Convenience:: Convenience function for data buffers.

## Contexts

- \* Creating Contexts:: Creating new GPGME contexts.
- \* Destroying Contexts:: Releasing GPGME contexts.
- \* Result Management:: Managing the result of crypto operations.
- \* Context Attributes:: Setting properties of a context.
- \* Key Management:: Managing keys with GPGME.
- \* Trust Item Management:: Managing trust items with GPGME.
- \* Crypto Operations:: Using a context for cryptography.
- \* Miscellaneous:: Miscellaneous operations.
- \* Run Control:: Controlling how operations are run.

## Context Attributes

- \* Protocol Selection:: Selecting the protocol used by a context.
- \* Crypto Engine:: Configuring the crypto engine.
- \* Setting the Sender:: How to tell the engine the sender.
- \* ASCII Armor:: Requesting ASCII armored output.
- \* Text Mode:: Choosing canonical text mode.
- \* Offline Mode:: Choosing offline mode.
- \* Included Certificates:: Including a number of certificates.
- \* Key Listing Mode:: Selecting key listing mode.
- \* Passphrase Callback:: Getting the passphrase from the user.
- \* Progress Meter Callback:: Being informed about the progress.
- \* Status Message Callback:: Status messages received from gpg.
- \* Locale:: Setting the locale of a context.

## Key Management

- \* Key objects:: Description of the key structures.
- \* Listing Keys:: Browsing the list of available keys.
- \* Information About Keys:: Requesting detailed information about keys.
- \*
- Manipulating Keys:: Operations on keys.
- \* Generating Keys:: Creating new key pairs.
- \* Signing Keys:: Adding key signatures to public keys.
- \* Exporting Keys:: Retrieving key data from the key ring.
- \* Importing Keys:: Adding keys to the key ring.
- \* Deleting Keys:: Removing keys from the key ring.
- \* Changing Passphrases:: Change the passphrase of a key.
- \* Changing TOFU Data:: Changing data pertaining to TOFU.
- \* Advanced Key Editing:: Advanced key edit operation.

## Trust Item Management

- \* Listing Trust Items:: Browsing the list of available trust items.
- \* Manipulating Trust Items:: Operations on trust items.

## Crypto Operations

- \* Decrypt:: Decrypting a ciphertext.
- \* Verify:: Verifying a signature.
- \* Decrypt and Verify:: Decrypting a signed ciphertext.
- \* Sign:: Creating a signature.
- \*
- Encrypt:: Encrypting a plaintext.

## Sign

- \* Selecting Signers:: How to choose the keys to sign with.
- \* Creating a Signature:: How to create a signature.
- \* Signature Notation Data:: How to add notation data to a signature.

## Encrypt

- \* Encrypting a Plaintext:: How to encrypt a plaintext.

## Miscellaneous

- \* Running other Programs:: Running other Programs.
- \* Using the Assuan protocol:: Using the Assuan protocol.
- \* Checking for updates:: How to check for software updates.

## Run Control

- \* Waiting For Completion:: Waiting until an operation is completed.
- \* Using External Event Loops:: Advanced control over what happens when.



\* Cancellation::           How to end pending operations prematurely.

## Using External Event Loops

- \* I/O Callback Interface::    How I/O callbacks are registered.
- \* Registering I/O Callbacks::   How to use I/O callbacks for a context.
- \* I/O Callback Example::       An example how to use I/O callbacks.
- \* I/O Callback Example GTK+::   How to integrate GPGME in GTK+.
- \* I/O Callback Example GDK::    How to integrate GPGME in GDK.
- \* I/O Callback Example Qt::     How to integrate GPGME in Qt.

File: gpgme.info, Node: Introduction, Next: Preparation, Prev: Top, Up: Top

## 1 Introduction

\*\*\*\*\*

GnuPG Made Easy (GPGME) is a C language library that allows to add support for cryptography to a program. It is designed to make access to public key crypto engines like GnuPG or GpgSM easier for applications. GPGME provides a high-level crypto API for encryption, decryption, signing, signature verification and key management.

GPGME uses GnuPG and GpgSM as its backends to support OpenPGP and the Cryptographic Message Syntax (CMS).

### \* Menu:

- \* Getting Started::           Purpose of the manual, and how to use it.
- \* Features::                 Reasons to install and use GPGME.
- \* Overview::                 Basic architecture of the GPGME library.

File: gpgme.info, Node: Getting Started, Next: Features, Up: Introduction

## 1.1 Getting Started

=====

This manual documents the GPGME library programming interface. All functions and data types provided by the library are explained.

The reader is assumed to possess basic knowledge about cryptography in general, and public key cryptography in particular. The underlying cryptographic engines that are used by the library are not explained, but where necessary, special features or requirements by an engine are

mentioned as far as they are relevant to GPGME or its users.

This manual can be used in several ways. If read from the beginning to the end, it gives a good introduction into the library and how it can be used in an application. Forward references are included where necessary. Later on, the manual can be used as a reference manual to get just the information needed about any particular interface of the library. Experienced programmers might want to start looking at the examples at the end of the manual, and then only read up those parts of the interface which are unclear.

The documentation for the language bindings is currently not included in this manual. Those languages bindings follow the general programming model of GPGME but may provide some extra high level abstraction on top of the GPGME style API. For now please see the README files in the lang/ directory of the source distribution.

File: gpgme.info, Node: Features, Next: Overview, Prev: Getting Started, Up: Introduction

## 1.2 Features

=====

GPGME has a couple of advantages over other libraries doing a similar job, and over implementing support for GnuPG or other crypto engines into your application directly.

its free software

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its flexible

GPGME provides transparent support for several cryptographic protocols by different engines. Currently, GPGME supports the OpenPGP protocol using GnuPG as the backend, and the Cryptographic Message Syntax using GpgSM as the backend.

its easy

GPGME hides the differences between the protocols and engines from the programmer behind an easy-to-use interface. This way the programmer can focus on the other parts of the program, and still integrate strong cryptography in his application. Once support for GPGME has been added to a program, it is easy to add support for other crypto protocols once GPGME backends provide them.

its language friendly

GPGME comes with languages bindings for several common programming

languages: Common Lisp, C++, Python 2, and Python 3.

File: [gpgme.info](#), Node: Overview, Prev: Features, Up: Introduction

### 1.3 Overview

=====

GPGME provides a data abstraction that is used to pass data to the crypto engine, and receive returned data from it. Data can be read from memory or from files, but it can also be provided by a callback function.

The actual cryptographic operations are always set within a context. A context provides configuration parameters that define the behaviour of all operations performed within it. Only one operation per context is allowed at any time, but when one operation is finished, you can run the next operation in the same context. There can be more than one context, and all can run different operations at the same time.

Furthermore, GPGME has rich key management facilities including listing keys, querying their attributes, generating, importing, exporting and deleting keys, and acquiring information about the trust path.

With some precautions, GPGME can be used in a multi-threaded environment, although it is not completely thread safe and thus needs the support of the application.

File: [gpgme.info](#), Node: Preparation, Next: Protocols and Engines, Prev: Introduction, Up: Top

### 2 Preparation

\*\*\*\*\*

To use GPGME, you have to perform some changes to your sources and the build system. The necessary changes are small and explained in the following sections. At the end of this chapter, it is described how the library is initialized, and how the requirements of the library are verified.

\* Menu:

\* Header::                   What header file you need to include.

\* Building the Source::       Compiler options to be used.

\* Largefile Support (LFS)::   How to use GPGME with LFS.

- \* Using Automake::           Compiler options to be used the easy way.
- \* Using Libtool::           Avoiding compiler options entirely.
- \* Library Version Check::   Getting and verifying the library version.
- \* Signal Handling::         How GPGME affects signal handling.
- \* Multi-Threading::        How GPGME can be used in an MT environment.

File: gpgme.info, Node: Header, Next: Building the Source, Up: Preparation

## 2.1 Header

=====

All interfaces (data types and functions) of the library are defined in the header file `gpgme.h`. You must include this in all programs using the library, either directly or through some other header file, like this:

```
#include <gpgme.h>
```

The name space of GPGME is `gpgme_*` for function names and data types and `GPGME_*` for other symbols. Symbols internal to GPGME take the form `_gpgme_*` and `_GPGME_*`.

Because GPGME makes use of the GPG Error library, using GPGME will also use the `GPG_ERR_*` name space directly, and the `gpg_err*`, `gpg_str*`, and `gpgtrt_*` name space indirectly.

File: gpgme.info, Node: Building the Source, Next: Largefile Support (LFS), Prev: Header, Up: Preparation

## 2.2 Building the Source

=====

If you want to compile a source file including the `gpgme.h` header file, you must make sure that the compiler can find it in the directory hierarchy. This is accomplished by adding the path to the directory in which the header file is located to the compilers include file search path (via the `-I` option).

However, the path to the include file is determined at the time the source is configured. To solve this problem, `gpgme` ships with a small helper program `gpgme-config` that knows about the path to the include file and other configuration options. The options that need to be added to the compiler invocation at compile time are output by the `--cflags` option to `gpgme-config`. The following example shows how it can be used at the command line:

```
gcc -c foo.c `gpgme-config --cflags`
```

Adding the output of `gpgme-config --cflags` to the compiler command line will ensure that the compiler can find the GPGME header file.

A similar problem occurs when linking the program with the library. Again, the compiler has to find the library files. For this to work, the path to the library files has to be added to the library search path (via the `-L` option). For this, the option `--libs` to `gpgme-config` can be used. For convenience, this option also outputs all other options that are required to link the program with GPGME (in particular, the `-lgpgme` option). The example shows how to link `foo.o` with the GPGME library to a program `foo`.

```
gcc -o foo foo.o `gpgme-config --libs`
```

Of course you can also combine both examples to a single command by specifying both options to `gpgme-config`:

```
gcc -o foo foo.c `gpgme-config --cflags --libs`
```

If you need to detect the installed language bindings you can use list them using:

```
gpgme-config --print-lang
```

or test for the availability using

```
gpgme-config --have-lang=python && echo 'Bindings for Pythons available'
```

File: [gpgme.info](#), Node: [Largefile Support \(LFS\)](#), Next: [Using Automake](#), Prev: [Building the Source](#), Up: [Preparation](#)

## 2.3 Largefile Support (LFS)

=====

GPGME is compiled with largefile support by default, if it is available on the system. This means that GPGME supports files larger than two gigabyte in size, if the underlying operating system can. On some systems, largefile support is already the default. On such systems, nothing special is required. However, some systems provide only support for files up to two gigabyte in size by default. Support for larger file sizes has to be specifically enabled.

To make a difficult situation even more complex, such systems provide two different types of largefile support. You can either get all relevant functions replaced with alternatives that are largefile capable, or you can get new functions and data types for largefile support added. Those new functions have the same name as their smallfile counterparts, but with a suffix of 64.

An example: The data type `off_t` is 32 bit wide on GNU/Linux PC systems. To address offsets in large files, you can either enable largefile support add-on. Then a new data type `off64_t` is provided, which is 64 bit wide. Or you can replace the existing `off_t` data type with its 64 bit wide counterpart. All occurrences of `off_t` are then automagically replaced.

As if matters were not complex enough, there are also two different types of file descriptors in such systems. This is important because if file descriptors are exchanged between programs that use a different maximum file size, certain errors must be produced on some file descriptors to prevent subtle overflow bugs from occurring.

As you can see, supporting two different maximum file sizes at the same time is not at all an easy task. However, the maximum file size does matter for GPGME, because some data types it uses in its interfaces are affected by that. For example, the `off_t` data type is used in the `gpgme_data_seek` function, to match its POSIX counterpart. This affects the call-frame of the function, and thus the ABI of the library. Furthermore, file descriptors can be exchanged between GPGME and the application.

For you as the user of the library, this means that your program must be compiled in the same file size mode as the library. Luckily, there is absolutely no valid reason for new programs to not enable largefile support by default and just use that. The compatibility modes (small file sizes or dual mode) can be considered an historic artefact, only useful to allow for a transitional period.

On POSIX platforms GPGME is compiled using largefile support by default. This means that your application must do the same, at least as far as it is relevant for using the `gpgme.h` header file. All types in this header files refer to their largefile counterparts, if they are different from any default types on the system.

On 32 and 64 bit Windows platforms `off_t` is declared as 32 bit signed integer. There is no specific support for LFS in the C library. The recommendation from Microsoft is to use the native interface (`CreateFile` et al.) for large files. Released binary versions of

GPGME (libgpgme-11.dll) have always been build with a 32 bit `off_t`. To avoid an ABI break we stick to this convention for 32 bit Windows by using `long` there. GPGME versions for 64 bit Windows have never been released and thus we are able to use `int64_t` instead of `off_t` there. For easier migration the typedef `gpgme_off_t` has been defined. The reason we cannot use `off_t` directly is that some toolchains (e.g. mingw64) introduce a POSIX compatible hack for `off_t`. Some widely used toolkits make use of this hack and in turn GPGME would need to use it also. However, this would introduce an ABI break and existing software making use of libgpgme might suffer from a severe break. Thus with version 1.4.2 we redefined all functions using `off_t` to use `gpgme_off_t` which is defined as explained above. This way we keep the ABI well defined and independent of any toolchain hacks. The bottom line is that LFS support in GPGME is only available on 64 bit versions of Windows.

On POSIX platforms you can enable largefile support, if it is different from the default on the system the application is compiled on, by using the Autoconf macro `AC_SYS_LARGEFILE`. If you do this, then you don't need to worry about anything else: It will just work. In this case you might also want to use `AC_FUNC_FSEEKO` to take advantage of some new interfaces, and `AC_TYPE_OFF_T` (just in case).

If you do not use Autoconf, you can define the preprocessor symbol `_FILE_OFFSET_BITS` to 64 `_before_` including any header files, for example by specifying the option `-D_FILE_OFFSET_BITS=64` on the compiler command line. You will also want to define the preprocessor symbol `LARGEFILE_SOURCE` to 1 in this case, to take advantage of some new interfaces.

If you do not want to do either of the above, you probably know enough about the issue to invent your own solution. Just keep in mind that the GPGME header file expects that largefile support is enabled, if it is available. In particular, we do not support dual mode (`_LARGEFILE64_SOURCE`).

File: gpgme.info, Node: Using Automake, Next: Using Libtool, Prev: Largefile Support (LFS), Up: Preparation

## 2.4

### Using Automake

=====

It is much easier if you use GNU Automake instead of writing your own Makefiles. If you do that you do not have to worry about finding and invoking the `gpgme-config` script at all. GPGME provides an extension

to Automake that does all the work for you.

```
-- Macro: AM_PATH_GPGME ([MINIMUM-VERSION], [ACTION-IF-FOUND],
 [ACTION-IF-NOT-FOUND])
-- Macro: AM_PATH_GPGME_PTH ([MINIMUM-VERSION], [ACTION-IF-FOUND],
 [ACTION-IF-NOT-FOUND])
-- Macro: AM_PATH_GPGME_PTHREAD ([MINIMUM-VERSION], [ACTION-IF-FOUND],
 [ACTION-IF-NOT-FOUND])
```

Check whether GPGME (at least version MINIMUM-VERSION, if given) exists on the host system. If it is found, execute ACTION-IF-FOUND, otherwise do ACTION-IF-NOT-FOUND, if given.

Additionally, the function defines GPGME\_CFLAGS to the flags needed for compilation of the program to find the gpgme.h header file, and GPGME\_LIBS to the linker flags needed to link the

program to the GPGME library. If the used helper script does not match the target type you are building for a warning is printed and the string libgcrypt is appended to the variable gpg\_config\_script\_warn.

AM\_PATH\_GPGME\_PTH checks for the version of GPGME that can be used with GNU Pth, and defines GPGME\_PTH\_CFLAGS and GPGME\_PTH\_LIBS.

AM\_PATH\_GPGME\_PTHREAD checks for the version of GPGME that can be used with the native pthread implementation, and defines GPGME\_PTHREAD\_CFLAGS and GPGME\_PTHREAD\_LIBS. Since version 1.8.0 this is no longer required to GPGME\_PTHREAD as GPGME itself is thread safe.

This macro searches for gpgme-config along the PATH. If you are cross-compiling, it is useful to set the environment variable SYSROOT to the top directory of your target. The macro will then first look for the helper program in the bin directory below that top directory. An absolute directory name must be used for

SYSROOT. Finally, if the configure command line option --with-gpgme-prefix is used, only its value is used for the top directory below which the helper script is expected.

You can use the defined Autoconf variables like this in your Makefile.am:

```
AM_CPPFLAGS = $(GPGME_CFLAGS)
LDADD = $(GPGME_LIBS)
```



## 2.5 Using Libtool

=====

The easiest way is to just use GNU Libtool. If you use libtool, and link to libgpgme.la, libgpgme-pth.la or libgpgme-pthread.la respectively, everything will be done automatically by Libtool.

## 2.6 Library Version Check

=====

-- Function: `const char * gpgme_check_version`  
(`const char *REQUIRED_VERSION`)

The function `gpgme_check_version` has four purposes. It can be used to retrieve the version number of the library. In addition it can verify that the version number is higher than a certain required version number. In either case, the function initializes some sub-systems, and for this reason alone it must be invoked early in your program, before you make use of the other functions in GPGME. The last purpose is to run selftests.

As a side effect for W32 based systems, the socket layer will get initialized.

If `REQUIRED_VERSION` is `NULL`, the function returns a pointer to a statically allocated string containing the version number of the library.

If `REQUIRED_VERSION` is not `NULL`, it should point to a string containing a version number, and the function checks that the version of the library is at least as high as the version number provided. In this case, the function returns a pointer to a statically allocated string containing the version number of the library.

If `REQUIRED_VERSION` is not a valid version number, or if the version requirement is not met, the function returns `NULL`.

If you use a version of a library that is backwards compatible with older releases, but contains additional interfaces which your program uses, this function provides a run-time check if the necessary features are provided by the installed version of the library.

If a selftest fails, the function may still succeed. Selftest

errors are returned later when invoking `gpgme_new` or `gpgme_data_new`, so that a detailed error code can be returned (historically, `gpgme_check_version` does not return a detailed error code).

-- Function: `int gpgme_set_global_flag (const char *NAME, const char *VALUE)`

SINCE: 1.4.0

On some systems it is not easy to set environment variables and thus hard to use GPGMEs internal trace facility for debugging.

This function has been introduced as an alternative way to enable debugging and for a couple of other rarely used tweaks. It is important to assure that only one thread accesses GPGME functions between a call to this function and after the return from the call to `gpgme_check_version`.

All currently supported features require that this function is called as early as possible even before `gpgme_check_version`. The features are identified by the following values for NAME:

debug

To enable debugging use the string `debug` for NAME and VALUE identical to the value used with the environment variable `GPGME_DEBUG`.

disable-gpgconf

Using this feature with any VALUE disables the detection of the `gpgconf` program and thus forces GPGME to fallback into the simple OpenPGP only mode. It may be used to force the use of GnuPG-1 on systems which have both GPG versions installed. Note that in general the use of `gpgme_set_engine_info`

is a

better way to select a specific engine version.

gpgconf-name

gpg-name

Set the name of the `gpgconf` respective `gpg` binary. The defaults are `GNU/GnuPG/gpgconf` and `GNU/GnuPG/gpg`. Under Unix the leading directory part is ignored. Under Windows the leading directory part is used as the default installation directory; the `.exe` suffix is added by GPGME. Use forward slashed even under Windows.

require-gnupg

Set the minimum version of the required GnuPG engine. If that

version is not met, GPGME fails early instead of trying to use the existent version. The given version must be a string with major, minor, and micro number. Example: "2.1.0".

#### w32-inst-dir

On Windows GPGME needs to know its installation directory to find its spawn helper. This is in general no problem because a DLL has this information. Some applications however

#### link

statically to GPGME and thus GPGME can only figure out the installation directory of this application which may be wrong in certain cases. By supplying an installation directory as value to this flag, GPGME will assume that that directory is the installation directory. This flag has no effect on non-Windows platforms.

This function returns 0 on success. In contrast to other functions the non-zero return value on failure does not convey any error code. For setting debug the only possible error cause is an out of memory condition; which would exhibit itself later anyway. Thus the return value may be ignored.

After initializing GPGME, you should set the locale information to the locale required for your output terminal. This locale information is needed for example for the curses and Gtk pinentry. Here is an example of a complete initialization:

```
#include <locale.h>
#include
<gpgme.h>

void
init_gpgme (void)
{
 /* Initialize the locale environment. */
 setlocale (LC_ALL, "");
 gpgme_check_version (NULL);
 gpgme_set_locale (NULL, LC_CTYPE, setlocale (LC_CTYPE, NULL));
#ifdef LC_MESSAGES
 gpgme_set_locale (NULL, LC_MESSAGES, setlocale (LC_MESSAGES, NULL));
#endif
}
```

Note that you are highly recommended to initialize the locale settings like this. GPGME can not do this for you because it would not be thread safe. The conditional on LC\_MESSAGES is only necessary for portability to W32 systems.

## 2.7 Signal Handling

=====

The GPGME library communicates with child processes (the crypto engines). If a child process dies unexpectedly, for example due to a bug, or system problem, a SIGPIPE signal will be delivered to the application. The default action is to abort the program.

To protect against this, `gpgme_check_version` sets the SIGPIPE signal action to SIG\_IGN, which means that the signal will be ignored.

GPGME will only do that if the signal action for SIGPIPE is SIG\_DEF at the time `gpgme_check_version` is called. If it is something different, GPGME will take no action.

This means that if your application does not install any signal handler for SIGPIPE, you don't need to take any precautions. If you do install a signal handler for SIGPIPE, you must be prepared to handle any SIGPIPE events that occur due to GPGME writing to a defunct pipe. Furthermore, if your application is multi-threaded, and you install a signal action for SIGPIPE, you must make sure you do this either before `gpgme_check_version` is called or afterwards.

## 2.8 Multi-Threading

=====

The GPGME library is mostly thread-safe, and can be used in a multi-threaded environment but there are some requirements for multi-threaded use:

The function `gpgme_check_version` must be called before any other function in the library, because it initializes the thread support subsystem in GPGME. To achieve this in multi-threaded programs, you must synchronize the memory with respect to other threads that also want to use GPGME. For this, it is sufficient to call `gpgme_check_version` before creating the other threads using `GPGME(1)`.

Any `gpgme_data_t` and `gpgme_ctx_t` object must only be accessed by one thread at a time. If multiple threads want to deal with the same object, the caller has to make sure that operations on that

object are fully synchronized.

Only one thread at any time is allowed to call `gpgme_wait`. If multiple threads call this function, the caller must make sure that all invocations are fully synchronized. It is safe to start asynchronous operations while a thread is running in `gpgme_wait`.

The function `gpgme_strerror` is not thread safe. You have to use `gpgme_strerror_r` instead.

----- Footnotes -----

(1) At least this is true for POSIX threads, as `pthread_create` is a function that synchronizes memory with respects to other threads. There are many functions which have this property, a complete list can be found in POSIX, IEEE Std 1003.1-2003, Base Definitions, Issue 6, in the definition of the term Memory Synchronization. For other thread packages other, more relaxed or more strict rules may apply.

File: `gpgme.info`, Node: Protocols and Engines, Next: Algorithms, Prev: Preparation, Up: Top

### 3 Protocols and Engines

\*\*\*\*\*

GPGME supports several cryptographic protocols, however, it does not implement them. Rather it uses backends (also called engines) which implement the protocol. GPGME uses inter-process communication to pass data back and forth between the application and the backend, but the details of the communication protocol and invocation of the backend is completely hidden by the interface. All complexity is handled by GPGME. Where an exchange of information between the application and the backend is necessary, GPGME provides the necessary callback function hooks and further interfaces.

-- Data type: `enum gpgme_protocol_t`

The `gpgme_protocol_t` type specifies the set of possible protocol values that are supported by GPGME. The following protocols are supported:

`GPGME_PROTOCOL_OpenPGP`

`GPGME_PROTOCOL_OPENPGP`

This specifies the OpenPGP protocol.

`GPGME_PROTOCOL_CMS`

This specifies the Cryptographic Message Syntax.

#### GPGME\_PROTOCOL\_GPGCONF

Under development. Please ask on <gnupg-devel@gnupg.org> for help.

#### GPGME\_PROTOCOL\_ASSUAN

SINCE: 1.2.0

This specifies the raw Assuan protocol.

#### GPGME\_PROTOCOL\_G13

SINCE: 1.3.0

Under development. Please ask on <gnupg-devel@gnupg.org> for help.

#### GPGME\_PROTOCOL\_UISERVER

Under development. Please ask on <gnupg-devel@gnupg.org> for help.

#### GPGME\_PROTOCOL\_SPAWN

SINCE: 1.5.0

Special protocol for use with gpgme\_op\_spawn.

#### GPGME\_PROTOCOL\_UNKNOWN

Reserved for future extension. You may use this to indicate that the used protocol is not known to the application.

Currently, GPGME does not accept this value in any operation, though, except for gpgme\_get\_protocol\_name.

-- Function: const char \* gpgme\_get\_protocol\_name  
(gpgme\_protocol\_t PROTOCOL)

The function gpgme\_get\_protocol\_name returns a statically allocated string describing the protocol PROTOCOL, or NULL if the protocol number is not valid.

#### \* Menu:

- \* Engine Version Check:: Verifying the engine version.
- \* Engine Information:: Obtaining more information about the engines.
- \* Engine Configuration:: Changing the engine configuration.
- \* OpenPGP:: Support for the OpenPGP protocol.
- \* Cryptographic Message Syntax:: Support for the CMS.
- \* Assuan:: Support for the raw Assuan protocol.

### 3.1 Engine Version Check

=====

-- Function: `const char * gpgme_get_dirinfo (cons char *WHAT)`  
SINCE: 1.5.0

The function `gpgme_get_dirinfo` returns a statically allocated string with the value associated to `WHAT`. The returned values are the defaults and wont change even after `gpgme_set_engine_info` has been used to configure a different engine. `NULL` is returned if no value is available. Commonly supported values for `WHAT` are:

`homedir`

Return the default home directory.

`sysconfdir`

Return the name of the system configuration directory

`bindir`

Return the name of the directory  
with GnuPG program files.

`libdir`

Return the name of the directory with GnuPG related library  
files.

`libexecdir`

Return the name of the directory with GnuPG helper program  
files.

`datadir`

Return the name of the directory with GnuPG shared data.

`localedir`

Return the name of the directory with GnuPG locale data.

`agent-socket`

Return the name of the socket to connect to the `gpg-agent`.

`agent-ssh-socket`

Return the name of the socket to connect to the `ssh-agent`  
component of `gpg-agent`.

`dirmngr-socket`

Return the name of the socket to connect to the `dirmngr`.

uiserver-socket

Return the name of the socket to connect to the user interface server.

gpgconf-name

Return the file name of the engine configuration tool.

gpg-name

Return the file name of the OpenPGP engine.

gpgsm-name

Return the file name of the CMS engine.

g13-name

Return the name of the file container encryption engine.

gpg-wks-client-name

Return the name of the Web Key Service tool.

-- Function: `gpgme_error_t gpgme_engine_check_version(gpgme_protocol_t PROTOCOL)`

The function `gpgme_engine_check_version` verifies that the engine implementing the protocol `PROTOCOL` is installed in the expected path and meets the version requirement of GPGME.

This function returns the error code `GPG_ERR_NO_ERROR` if the engine is available and `GPG_ERR_INV_ENGINE` if it is not.

File: `gpgme.info`, Node: Engine Information, Next: Engine Configuration, Prev: Engine Version Check, Up: Protocols and Engines

### 3.2 Engine Information

=====

-- Data type: `gpgme_engine_info_t`

The `gpgme_engine_info_t` type specifies a pointer to a structure describing a crypto engine. The structure contains the following elements:

`gpgme_engine_info_t`

next

This is a pointer to the next engine info structure in the linked list, or `NULL` if this is the last element.

`gpgme_protocol_t` protocol

This is the protocol for which the crypto engine is used. You



can convert this to a string with `gpgme_get_protocol_name` for printing.

`const char *file_name`

This is a string holding the file name of the executable of the crypto engine. Currently, it is never NULL, but using NULL is reserved for future use, so always check before you use it.

`const char *home_dir`

This is a string holding the directory name of the crypto engines configuration directory. If it is NULL, then the default directory is used. See `gpgme_get_dirinfo` on how to get the default directory.

`const char *version`

This is a string containing the version number of the crypto engine. It might be NULL if the version number can not be determined, for example because the executable doesn't exist or is invalid.

`const char *req_version`

This is a string containing the minimum required version number of the crypto engine for GPGME to work correctly. This is the version number that `gpgme_engine_check_version` verifies against. Currently, it is never NULL, but using NULL is reserved for future use, so always check before you use it.

-- Function: `gpgme_error_t gpgme_get_engine_info`  
(`gpgme_engine_info_t *INFO`)

The function `gpgme_get_engine_info` returns a linked list of engine info structures in `INFO`. Each info structure describes the defaults of one configured backend.

The memory for the info structures is allocated the first time this function is invoked, and must not be freed by the caller.

This function returns the error code `GPG_ERR_NO_ERROR` if successful, and a system error if the memory could not be allocated.

Here is an example how you can provide more diagnostics if you receive an error message which indicates that the crypto engine is invalid.

```

gpgme_ctx_t ctx;
gpgme_error_t err;

[...]

if (gpgme_err_code (err) == GPG_ERR_INV_ENGINE)
{
 gpgme_engine_info_t info;
 err = gpgme_get_engine_info (&info);
 if (!err)
 {
 while (info && info->protocol != gpgme_get_protocol (ctx))
 info = info->next;
 if (!info)
 fprintf (stderr, "GPGME compiled without support for protocol %s",
 gpgme_get_protocol_name (info->protocol));
 else if (info->file_name && !info->version)
 fprintf (stderr, "Engine %s not installed properly",
 info->file_name);
 else if (info->file_name && info->version && info->req_version)
 fprintf (stderr, "Engine %s version
%s installed, "
 "but at least version %s required", info->file_name,
 info->version, info->req_version);
 else
 fprintf (stderr, "Unknown problem with engine for protocol %s",
 gpgme_get_protocol_name (info->protocol));
 }
}

```

File: gpgme.info, Node: Engine Configuration, Next: OpenPGP, Prev: Engine Information, Up: Protocols and Engines

### 3.3 Engine Configuration

=====

You can change the configuration of a backend engine, and thus change the executable program and configuration directory to be used. You can make these changes the default or set them for some contexts individually.

```

-- Function: gpgme_error_t gpgme_set_engine_info
(gpgme_protocol_t PROTO, const char *FILE_NAME,
const char *HOME_DIR)
SINCE: 1.1.0

```

The function `gpgme_set_engine_info` changes the default

configuration of the crypto engine implementing the protocol PROTO.

FILE\_NAME is the file name of the executable program implementing this protocol, and HOME\_DIR is the directory name of the configuration directory for this crypto engine. If HOME\_DIR is NULL, the engines default will be used.

The new defaults are not applied to already created GPGME contexts.

This function returns the error code GPG\_ERR\_NO\_ERROR if successful, or an error code on failure.

The functions gpgme\_ctx\_get\_engine\_info and gpgme\_ctx\_set\_engine\_info can be used to change the engine configuration per context. \*Note Crypto Engine::.

File: gpgme.info, Node: OpenPGP, Next: Cryptographic Message Syntax, Prev: Engine Configuration, Up: Protocols and Engines

### 3.4 OpenPGP

=====

OpenPGP is implemented by GnuPG, the GNU Privacy Guard. This is the first protocol that was supported by GPGME.

The OpenPGP protocol is specified by GPGME\_PROTOCOL\_OpenPGP.

File: gpgme.info, Node: Cryptographic Message Syntax,  
Next: Assuan, Prev: OpenPGP, Up: Protocols and Engines

### 3.5 Cryptographic Message Syntax

=====

CMS is implemented by GpgSM, the S/MIME implementation for GnuPG.

The CMS protocol is specified by GPGME\_PROTOCOL\_CMS.

File: gpgme.info, Node: Assuan, Prev: Cryptographic Message Syntax, Up: Protocols and Engines

### 3.6 Assuan

=====

Assuan is the RPC library used by the various GnuPG components. The Assuan protocol allows one to talk to arbitrary Assuan servers using

GPGME. \*Note Using the Assuan protocol::

The ASSUAN protocol is specified by GPGME\_PROTOCOL\_ASSUAN.

File: gpgme.info, Node: Algorithms, Next: Error Handling, Prev: Protocols and Engines, Up: Top

## 4 Algorithms

\*\*\*\*\*

The crypto backends support a variety of algorithms used in public key cryptography.(1) The following sections list the identifiers used to denote such an algorithm.

\* Menu:

\* Public Key Algorithms::      A list of all public key algorithms.

\*

Hash Algorithms::              A list of all hash algorithms.

----- Footnotes -----

(1) Some engines also provide symmetric only encryption; see the description of the encryption function on how to use this.

File: gpgme.info, Node: Public Key Algorithms, Next: Hash Algorithms, Up: Algorithms

### 4.1 Public Key Algorithms

=====

Public key algorithms are used for encryption, decryption, signing and verification of signatures.

-- Data type: enum gpgme\_pubkey\_algo\_t

The gpgme\_pubkey\_algo\_t type specifies the set of all public key algorithms that are supported by GPGME. Possible values are:

GPGME\_PK\_RSA

This value indicates the RSA (Rivest, Shamir, Adleman) algorithm.

GPGME\_PK\_RSA\_E

Deprecated. This value indicates the RSA (Rivest, Shamir, Adleman) algorithm for encryption and decryption only.

GPGME\_PK\_RSA\_S

Deprecated. This value indicates the RSA (Rivest, Shamir,

Adleman) algorithm for signing and verification only.

#### GPGME\_PK\_DSA

This value indicates DSA, the Digital Signature Algorithm.

#### GPGME\_PK\_ELG

This value indicates ElGamal.

#### GPGME\_PK\_ELG\_E

This value also indicates ElGamal and is used specifically in GnuPG.

#### GPGME\_PK\_ECC

SINCE: 1.5.0

This value is a generic indicator for elliptic curve algorithms.

#### GPGME\_PK\_ECDSA

SINCE: 1.3.0

This value indicates ECDSA, the Elliptic Curve Digital Signature Algorithm as defined by FIPS 186-2 and RFC-6637.

#### GPGME\_PK\_ECDH

SINCE: 1.3.0

This value indicates ECDH, the Elliptic Curve Diffie-Hellmann encryption algorithm as defined by RFC-6637.

#### GPGME\_PK\_EDDSA

SINCE: 1.7.0

This value indicates the EdDSA algorithm.

-- Function: const char \* gpgme\_pubkey\_algo\_name  
(gpgme\_pubkey\_algo\_t ALGO)

The function gpgme\_pubkey\_algo\_name returns a pointer to a statically allocated string containing a description of the public key algorithm ALGO. This string can be used to output the name of the public key algorithm to the user.

If ALGO is not a valid public key algorithm, NULL is returned.

-- Function: char \* gpgme\_pubkey\_algo\_string (gpgme\_subkey\_t KEY)

SINCE: 1.7.0

The function `gpgme_pubkey_algo_string` is a convenience function to build and return an algorithm string in the same way GnuPG does (e.g. `rsa2048` or `ed25519`). The caller must free the result using `gpgme_free`. On error (e.g. invalid argument or memory exhausted), the function returns `NULL` and sets `ERRNO`.

File: [gpgme.info](#), Node: Hash Algorithms, Prev: [Public Key Algorithms](#), Up: [Algorithms](#)

## 4.2 Hash Algorithms

=====

Hash (message digest) algorithms are used to compress a long message to make it suitable for public key cryptography.

-- Data type: `enum gpgme_hash_algo_t`

The `gpgme_hash_algo_t` type specifies the set of all hash algorithms that are supported by GPGME. Possible values are:

`GPGME_MD_MD5`  
`GPGME_MD_SHA1`  
`GPGME_MD_RMD160`  
`GPGME_MD_MD2`  
`GPGME_MD_TIGER`  
`GPGME_MD_HAVAL`  
`GPGME_MD_SHA256`  
`GPGME_MD_SHA384`  
`GPGME_MD_SHA512`  
`GPGME_MD_SHA224`  
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`GPGME_MD_MD4`  
`GPGME_MD_CRC32`  
`GPGME_MD_CRC32_RFC1510`  
`GPGME_MD_CRC24_RFC2440`

-- Function: `const char * gpgme_hash_algo_name (gpgme_hash_algo_t ALGO)`

The function `gpgme_hash_algo_name` returns a pointer to a statically allocated string containing a description of the hash algorithm `ALGO`. This string can be used to output the name of the hash algorithm to the user.

If `ALGO` is not a valid hash algorithm, `NULL` is returned.

File: [gpgme.info](#), Node: [Error Handling](#), Next: [Exchanging Data](#), Prev: [Algorithms](#), Up: [Top](#)

## 5 Error Handling

\*\*\*\*\*

Many functions in GPGME can return an error if they fail. For this reason, the application should always catch the error condition and take appropriate measures, for example by releasing the resources and passing the error up to the caller, or by displaying a descriptive message to the user and cancelling the operation.

Some error values do not indicate a system error or an error in the operation, but the result of an operation that failed properly. For example, if you try to decrypt a tempered message, the decryption will fail. Another error value actually means that the end of a data buffer or list has been reached. The following descriptions explain for many error codes what they mean usually. Some error values have specific meanings if returned by a certain functions. Such cases are described in the documentation of those functions.

GPGME uses the libgpg-error library. This allows to share the error codes with other components of the GnuPG system, and thus pass error values transparently from the crypto engine, or some helper application of the crypto engine, to the user. This way no information is lost. As a consequence, GPGME does not use its own identifiers for error codes, but uses those provided by libgpg-error. They usually start with GPG\_ERR\_.

However, GPGME does provide aliases for the functions defined in libgpg-error, which might be preferred for name space consistency.

\* Menu:

- \* Error Values::           The error value and what it means.
- \* Error Sources::         A list of important error sources.
- \* Error Codes::           A list of important error codes.
- \* Error Strings::         How to get a descriptive string from a value.

File: gpgme.info, Node: Error Values, Next: Error Sources, Up: Error Handling

### 5.1 Error Values

=====

-- Data type: gpgme\_err\_code\_t

The gpgme\_err\_code\_t type is an alias for the libgpg-error type gpg\_err\_code\_t. The error code indicates the type of an error, or the reason why an

operation failed.

A list of important error codes can be found in the next section.

-- Data type: `gpgme_err_source_t`

The `gpgme_err_source_t` type is an alias for the `libgpg-error` type `gpg_err_source_t`. The error source has not a precisely defined meaning. Sometimes it is the place where the error happened, sometimes it is the place where an error was encoded into an error value. Usually the error source will give an indication to where to look for the problem. This is not always true, but it is attempted to achieve this goal.

A list of important error sources can be found in the next section.

-- Data type: `gpgme_error_t`

The `gpgme_error_t` type is an alias for the `libgpg-error` type `gpg_error_t`. An error value like this has always two components, an error code and an error source. Both together form the error value.

Thus, the error value can not be directly compared against an error code, but the accessor functions described below must be used.

However, it is guaranteed that only 0 is used to indicate success (`GPG_ERR_NO_ERROR`), and that in this case all other parts of the error value are set to 0, too.

Note that in GPGME, the error source is used purely for diagnostical purposes. Only the error code should be checked to test for a certain outcome of a function. The manual only documents the error code part of an error value. The error source is left unspecified and might be anything.

-- Function: static inline `gpgme_err_code_t gpgme_err_code(gpgme_error_t ERR)`

The static inline function `gpgme_err_code` returns the `gpgme_err_code_t` component of the error value `ERR`. This function must be used to extract the error code from an error value in order to compare it with the `GPG_ERR_*` error code macros.

-- Function: static inline `gpgme_err_source_t gpgme_err_source(gpgme_error_t ERR)`

The static inline function `gpgme_err_source` returns the `gpgme_err_source_t` component of the error value `ERR`. This function must be used to extract the error source from an error value in order to compare it with the `GPG_ERR_SOURCE_*` error



source macros.

-- Function: static inline `gpgme_error_t gpgme_err_make`  
    (`gpgme_err_source_t SOURCE`, `gpgme_err_code_t CODE`)  
The static inline function `gpgme_err_make` returns the error value consisting of the error source `SOURCE` and the error code `CODE`.

This function can be used in callback functions to construct an error value to return it to the library.

-- Function: static inline `gpgme_error_t gpgme_error`  
    (`gpgme_err_code_t CODE`)  
The static inline function `gpgme_error` returns the error value consisting of the default error source and the error code `CODE`.

For GPGME applications, the default error source is `GPG_ERR_SOURCE_USER_1`. You can define `GPGME_ERR_SOURCE_DEFAULT` before including `gpgme.h` to change this default.

This function can be used in callback functions to construct an error value to return it to the library.

The libgpg-error library provides error codes for all system error numbers it knows about. If `ERR` is an unknown error number, the error code `GPG_ERR_UNKNOWN_ERRNO` is used. The following functions can be used to construct error values from system `errno` numbers.

-- Function: `gpgme_error_t gpgme_err_make_from_errno`  
    (`gpgme_err_source_t SOURCE`, `int ERR`)  
The function `gpgme_err_make_from_errno` is like `gpgme_err_make`, but it takes a system error like `errno` instead of a `gpgme_err_code_t` error code.

-- Function: `gpgme_error_t gpgme_error_from_errno (int ERR)`  
The function `gpgme_error_from_errno` is like `gpgme_error`, but it takes a system error like `errno` instead of a `gpgme_err_code_t` error code.

Sometimes you might want to map system error numbers to error codes directly, or map an error code representing a system error back to the system error number. The following functions can be used to do that.

-- Function: `gpgme_err_code_t gpgme_err_code_from_errno (int ERR)`  
The function `gpgme_err_code_from_errno` returns the error code for the system error `ERR`. If `ERR` is not a known system error, the function returns `GPG_ERR_UNKNOWN_ERRNO`.

-- Function: int gpgme\_err\_code\_to\_errno (gpgme\_err\_code\_t ERR)  
The function gpgme\_err\_code\_to\_errno returns the system error for the error code ERR. If ERR is not an error code representing a system error, or if this system error is not defined on this system, the function returns 0.

File: gpgme.info, Node: Error Sources, Next: Error Codes, Prev: Error Values, Up: Error Handling

## 5.2 Error Sources

=====

The library libgpg-error defines an error source for every component of the GnuPG system. The error source part of an error value is not well defined. As such it is mainly useful to improve the diagnostic error message for the user.

If the error code part of an error value is 0, the whole error value will be 0. In this case the error source part is of course GPG\_ERR\_SOURCE\_UNKNOWN.

The list of error sources that might occur in applications using GPGME is:

### GPG\_ERR\_SOURCE\_UNKNOWN

The error source is not known. The value of this error source is 0.

### GPG\_ERR\_SOURCE\_GPGME

The error source is GPGME itself. This is the default for errors that occur in the GPGME library.

### GPG\_ERR\_SOURCE\_GPG

The error source is GnuPG, which is the crypto engine used for the OpenPGP protocol.

### GPG\_ERR\_SOURCE\_GPGSM

The error source is GPGSM, which is the crypto engine used for the CMS protocol.

### GPG\_ERR\_SOURCE\_GCRYPT

The error source is libgcrypt, which is used by crypto engines to perform cryptographic operations.

### GPG\_ERR\_SOURCE\_GPGAGENT

The error source is gpg-agent, which is used by crypto engines to

perform operations  
with the secret key.

#### GPG\_ERR\_SOURCE\_PINENTRY

The error source is pinentry, which is used by gpg-agent to query the passphrase to unlock a secret key.

#### GPG\_ERR\_SOURCE\_SCD

The error source is the SmartCard Daemon, which is used by gpg-agent to delegate operations with the secret key to a SmartCard.

#### GPG\_ERR\_SOURCE\_KEYBOX

The error source is libkbx, a library used by the crypto engines to manage local keyrings.

#### GPG\_ERR\_SOURCE\_USER\_1

#### GPG\_ERR\_SOURCE\_USER\_2

#### GPG\_ERR\_SOURCE\_USER\_3

#### GPG\_ERR\_SOURCE\_USER\_4

These error sources are not used by any GnuPG component and can be used by other software. For example, applications using GPGME can use them to mark error values coming from callback handlers. Thus GPG\_ERR\_SOURCE\_USER\_1 is the default for errors created with gpgme\_error and gpgme\_error\_from\_errno, unless you define GPGME\_ERR\_SOURCE\_DEFAULT before including gpgme.h.

File: gpgme.info, Node: Error Codes, Next: Error Strings,  
Prev: Error Sources, Up: Error Handling

### 5.3 Error Codes

=====

The library libgpg-error defines many error values. Most of them are not used by GPGME directly, but might be returned by GPGME because it received them from the crypto engine. The below list only includes such error codes that have a specific meaning in GPGME, or which are so common that you should know about them.

#### GPG\_ERR\_EOF

This value indicates the end of a list, buffer or file.

#### GPG\_ERR\_NO\_ERROR

This value indicates success. The value of this error code is 0. Also, it is guaranteed that an error value made from the error code 0 will be 0 itself (as a whole). This means that the error source information is lost for this error code, however, as this

error code indicates that no error occurred, this is generally not a problem.

#### GPG\_ERR\_GENERAL

This value means that something went wrong, but either there is not enough information about the problem to return a more useful error value, or there is no separate error value for this type of problem.

#### GPG\_ERR\_ENOMEM

This value means that an out-of-memory condition occurred.

#### GPG\_ERR\_E...

System errors are mapped to GPG\_ERR\_FOO where FOO is the symbol for the system error.

#### GPG\_ERR\_INV\_VALUE

This value means that some user provided data was out of range. This can also refer to objects. For example, if an empty gpgme\_data\_t object was expected, but one containing data was provided, this error value is returned.

#### GPG\_ERR\_UNUSABLE\_PUBKEY

This value means that some recipients for a message were invalid.

#### GPG\_ERR\_UNUSABLE\_SECKEY

This value means that some signers were invalid.

#### GPG\_ERR\_NO\_DATA

This value means that a gpgme\_data\_t object which was expected to have content was found empty.

#### GPG\_ERR\_CONFLICT

This value means that a conflict of some sort occurred.

#### GPG\_ERR\_NOT\_IMPLEMENTED

This value indicates that the specific function (or operation) is not implemented. This error should never happen. It can only occur if you use certain values or configuration options which do not work, but for which we think that they should work at some later time.

#### GPG\_ERR\_DECRYPT\_FAILED

This value indicates that a decryption operation was unsuccessful.

#### GPG\_ERR\_BAD\_PASSPHRASE

This value means that the user did not provide a correct passphrase when requested.

#### GPG\_ERR\_CANCELED

This value means that the operation was canceled.

#### GPG\_ERR\_INV\_ENGINE

This value means that the engine that implements the desired protocol is currently not available. This can either be because the sources were configured to exclude support for this engine, or because the engine is not installed properly.

#### GPG\_ERR\_AMBIGUOUS\_NAME

This value indicates that a user ID or other specifier did not specify a unique key.

#### GPG\_ERR\_WRONG\_KEY\_USAGE

This value indicates that a key is not used appropriately.

#### GPG\_ERR\_CERT\_REVOKED

This value indicates that a key signature was revoked.

#### GPG\_ERR\_CERT\_EXPIRED

This value indicates that a key signature expired.

#### GPG\_ERR\_NO\_CRL\_KNOWN

This value indicates that no certificate revocation list is known for the certificate.

#### GPG\_ERR\_NO\_POLICY\_MATCH

This value indicates that a policy issue occurred.

#### GPG\_ERR\_NO\_SECKEY

This value indicates that no secret key for the user ID is available.

#### GPG\_ERR\_MISSING\_CERT

This value indicates that a key could not be imported because the issuer certificate is missing.

#### GPG\_ERR\_BAD\_CERT\_CHAIN

This value indicates that a key could not be imported because its certificate chain is not good, for example it could be too long.

#### GPG\_ERR\_UNSUPPORTED\_ALGORITHM

This value means a verification failed because the cryptographic algorithm is not supported by the crypto backend.

## GPG\_ERR\_BAD\_SIGNATURE

This value means a verification failed because the signature is bad.

## GPG\_ERR\_NO\_PUBKEY

This value means a verification failed because the public key is not available.

## GPG\_ERR\_USER\_1

## GPG\_ERR\_USER\_2

...

## GPG\_ERR\_USER\_16

These error codes are not used by any GnuPG component and can be freely used by other software. Applications using GPGME might use them to mark specific errors returned by callback handlers if no suitable error codes (including the system errors) for these errors exist already.

File: gpgme.info, Node: Error Strings, Prev: Error Codes, Up: Error Handling

## 5.4 Error Strings

=====

-- Function: `const char * gpgme_strerror (gpgme_error_t ERR)`

The function `gpgme_strerror` returns a pointer to a statically allocated string containing a description of the error code contained in the error value `ERR`. This string can be used to output a diagnostic message to the user.

This function is not thread safe. Use `gpgme_strerror_r` in multi-threaded programs.

-- Function: `int gpgme_strerror_r (gpgme_error_t ERR, char *BUF, size_t BUFLen)`

The function `gpgme_strerror_r` returns the error string for `ERR` in the user-supplied buffer `BUF` of size `BUFLen`. This function is, in contrast to `gpgme_strerror`, thread-safe if a thread-safe `strerror_r` function is provided by the system. If the function succeeds, 0 is returned and `BUF` contains the string describing the error. If the buffer was not large enough, `ERANGE` is returned and `BUF` contains as much of the beginning of the error string as fits into the buffer.

-- Function: `const char * gpgme_strsource (gpgme_error_t ERR)`

The function `gpgme_strerror` returns a pointer to a statically allocated string containing a description of the error source contained in the error value `ERR`. This string can be used to output a diagnostic message to the user.

The following example illustrates the use of `gpgme_strerror`:

```
gpgme_ctx_t ctx;
gpgme_error_t err = gpgme_new (&ctx);
if (err)
{
 fprintf (stderr, "%s: creating GpgME context failed: %s: %s\n",
 argv[0], gpgme_strerror (err), gpgme_strerror (err));
 exit (1);
}
```

File: `gpgme.info`, Node: Exchanging Data, Next: Contexts, Prev: Error Handling, Up: Top

## 6 Exchanging Data

\*\*\*\*\*

A lot of data has to be exchanged between the user and the crypto engine, like plaintext messages, ciphertext, signatures and information about the keys. The technical details about exchanging the data information are completely abstracted by GPGME. The user provides and receives the data via `gpgme_data_t` objects, regardless of the communication protocol between GPGME and the crypto engine in use.

-- Data type: `gpgme_data_t`

The `gpgme_data_t` type is a handle for a container for generic data, which is used by GPGME to exchange data with the user.

`gpgme_data_t` objects do not provide notifications on events. It is assumed that read and write operations are blocking until data is available. If this is undesirable, the application must ensure that all GPGME data operations always have data available, for example by using memory buffers or files rather than pipes or sockets. This might be relevant, for example, if the external event loop mechanism is used.

-- Data type: `gpgme_off_t`

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On POSIX platforms the `gpgme_off_t` type is an alias for `off_t`; it may be used interchangeably. On Windows platforms `gpgme_off_t` is defined as a long (i.e. 32 bit) for 32 bit Windows and as a 64 bit signed integer for 64 bit Windows.

-- Data type: `gpgme_ssize_t`

The `gpgme_ssize_t` type is an alias for `ssize_t`. It has only been introduced to overcome portability problems pertaining to the declaration of `ssize_t` by different toolchains.

\* Menu:

\* Creating Data Buffers::      Creating new data buffers.

\* Destroying Data Buffers::  
    Releasing data buffers.

\* Manipulating Data Buffers::    Operations on data buffers.

File: `gpgme.info`, Node: Creating Data Buffers, Next: Destroying Data Buffers, Up: Exchanging Data

## 6.1 Creating Data Buffers

=====

Data objects can be based on memory, files, or callback functions provided by the user. Not all operations are supported by all objects.

\* Menu:

\* Memory Based Data Buffers::    Creating memory based data buffers.

\* File Based Data Buffers::      Creating file based data buffers.

\* Callback Based Data Buffers::   Creating callback based data buffers.

File: `gpgme.info`, Node: Memory Based Data Buffers, Next: File Based Data Buffers, Up: Creating Data Buffers

### 6.1.1 Memory Based Data Buffers

-----

Memory based data objects store all data in allocated memory. This is convenient, but only practical for an amount of data that is a fraction of the available physical memory. The data has to be copied from its source

and to its destination, which can often be avoided by using one of the other data object

-- Function: `gpgme_error_t gpgme_data_new (gpgme_data_t *DH)`

The function `gpgme_data_new` creates a new `gpgme_data_t` object and returns a handle for it in `DH`. The data object is memory based and initially empty.

The function returns the error code `GPG_ERR_NO_ERROR` if the data object was successfully created, `GPG_ERR_INV_VALUE` if `DH` is not a



valid pointer, and GPG\_ERR\_ENOMEM if not enough memory is available.

-- Function: `gpgme_error_t gpgme_data_new_from_mem (gpgme_data_t *DH, const char *BUFFER, size_t SIZE, int COPY)`

The function `gpgme_data_new_from_mem` creates a new `gpgme_data_t` object and fills it with `SIZE` bytes starting from `BUFFER`.

If `COPY` is not zero, a private copy of the data is made. If `COPY` is zero, the data is taken from the specified buffer as needed, and the user has to ensure that the buffer remains

valid for the whole

life span of the data object.

The function returns the error code `GPG_ERR_NO_ERROR` if the data object was successfully created, `GPG_ERR_INV_VALUE` if `DH` or `BUFFER` is not a valid pointer, and `GPG_ERR_ENOMEM` if not enough memory is available.

-- Function: `gpgme_error_t gpgme_data_new_from_file (gpgme_data_t *DH, const char *FILENAME, int COPY)`

The function `gpgme_data_new_from_file` creates a new `gpgme_data_t` object and fills it with the content of the file `FILENAME`.

If `COPY` is not zero, the whole file is read in at initialization time and the file is not used anymore after that. This is the only mode supported currently. Later, a value of zero for `COPY` might cause all reads to be delayed until the data is needed, but this is not yet implemented.

The function returns the error code `GPG_ERR_NO_ERROR` if the data object was successfully created, `GPG_ERR_INV_VALUE` if `DH` or `FILENAME`

is not a valid pointer, `GPG_ERR_NOT_IMPLEMENTED` if `CODE`

is zero, and `GPG_ERR_ENOMEM` if not enough memory is available.

-- Function: `gpgme_error_t gpgme_data_new_from_filepart (gpgme_data_t *DH, const char *FILENAME, FILE *FP, off_t OFFSET, size_t LENGTH)`

The function `gpgme_data_new_from_filepart` creates a new `gpgme_data_t` object and fills it with a part of the file specified by `FILENAME` or `FP`.

Exactly one of `FILENAME` and `FP` must be non-zero, the other must be zero. The argument that is not zero specifies the file from which `LENGTH` bytes are read into the data object, starting from `OFFSET`.

The function returns the error code `GPG_ERR_NO_ERROR` if the data object was successfully created, `GPG_ERR_INV_VALUE` if `DH` and exactly one of `FILENAME` and `FP` is not a valid pointer, and `GPG_ERR_ENOMEM` if not enough memory is available.

File: `gpgme.info`, Node: File Based Data Buffers, Next: Callback Based Data Buffers,  
Prev: Memory Based Data Buffers, Up: Creating Data Buffers

### 6.1.2 File Based Data Buffers

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File based data objects operate directly on file descriptors or streams. Only a small amount of data is stored in core at any time, so the size of the data objects is not limited by GPGME.

-- Function: `gpgme_error_t gpgme_data_new_from_fd (gpgme_data_t *DH, int FD)`

The function `gpgme_data_new_from_fd` creates a new `gpgme_data_t` object and uses the file descriptor `FD` to read from (if used as an input data object) and write to (if used as an output data object).

When using the data object as an input buffer, the function might read a bit more from the file descriptor than is actually needed by the crypto engine in the desired operation because of internal buffering.

Note that GPGME assumes that the file descriptor is set to blocking mode. Errors during I/O operations, except for `EINTR`, are usually fatal for crypto operations.

The function returns the error code `GPG_ERR_NO_ERROR` if the data object was successfully created, and `GPG_ERR_ENOMEM` if not enough memory is available.

-- Function: `gpgme_error_t gpgme_data_new_from_stream (gpgme_data_t *DH, FILE *STREAM)`

The function `gpgme_data_new_from_stream` creates a new `gpgme_data_t` object and uses the I/O stream `STREAM` to read from (if used as an input data object) and write to (if used as an output data object).

When using the data object as an input buffer, the function might read a bit more from the stream than is actually needed by the crypto engine in the desired operation because of internal buffering.

Note that GPGME assumes that the stream is in blocking mode. Errors during I/O operations, except for EINTR, are usually fatal for crypto operations.

The function returns the error code GPG\_ERR\_NO\_ERROR if the data object was successfully created, and GPG\_ERR\_ENOMEM if not enough memory is available.

-- Function: `gpgme_error_t gpgme_data_new_from_estream`  
(`gpgme_data_t *DH`, `gpgmt_stream_t STREAM`)

The function `gpgme_data_new_from_estream` creates a new `gpgme_data_t` object and uses the `gpgmt` stream `STREAM` to read from (if used as an input data object) and write to (if used as an output data object).

When using the data object as an input buffer, the function might read a bit more from the stream than is actually needed by the crypto engine in the desired operation because of internal buffering.

Note that GPGME assumes that the stream is in blocking mode. Errors during I/O operations, except for EINTR, are usually fatal for crypto operations.

The function returns the error code GPG\_ERR\_NO\_ERROR if the data object was successfully created, and GPG\_ERR\_ENOMEM if not enough memory is available.

File: `gpgme.info`, Node: Callback Based Data

Buffers, Prev: File Based Data Buffers, Up: Creating Data Buffers

### 6.1.3 Callback Based Data Buffers

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If neither memory nor file based data objects are a good fit for your application, you can implement the functions a data object provides yourself and create a data object from these callback functions.

-- Data type: `ssize_t (*gpgme_data_read_cb_t) (void *HANDLE,`  
`void *BUFFER, size_t SIZE)`

The `gpgme_data_read_cb_t` type is the type of functions which GPGME calls if it wants to read data from a user-implemented data object. The function should read up to `SIZE` bytes from the current read position into the space starting at `BUFFER`. The `HANDLE` is provided by the user at data object creation time.

Note that GPGME assumes that the read blocks until data is available. Errors during I/O operations, except for EINTR, are usually fatal for crypto operations.

The function should return the number of bytes read, 0 on EOF, and -1 on error. If an error occurs, ERRNO should be set to describe the type of the error.

-- Data type: `ssize_t (*gpgme_data_write_cb_t) (void *HANDLE, const void *BUFFER, size_t SIZE)`  
The `gpgme_data_write_cb_t` type is the type of functions which GPGME calls if it wants to write data to a user-implemented data object. The function should write up to SIZE bytes to the current write position from the space starting at BUFFER. The HANDLE is provided by the user at data object creation time.

Note that GPGME assumes that the write blocks until data is available. Errors during I/O operations, except for EINTR, are usually fatal for crypto operations.

The function should return the number of bytes written, and -1 on error. If an error occurs, ERRNO should be set to describe the type of the error.

-- Data type: `off_t (*gpgme_data_seek_cb_t) (void *HANDLE, off_t OFFSET, int WHENCE)`  
The `gpgme_data_seek_cb_t` type is the type of functions which GPGME calls if it wants to change the current read/write position in a user-implemented data object, just like the `lseek` function.

The function should return the new read/write position, and -1 on error. If an error occurs, ERRNO should be set to describe the type of the error.

-- Data type: `void (*gpgme_data_release_cb_t) (void *HANDLE)`  
The `gpgme_data_release_cb_t` type is the type of functions which GPGME calls if it wants to destroy a user-implemented data object. The HANDLE is provided by the user at data object creation time.

-- Data type: `struct gpgme_data_cbs`  
This structure is used to store the data callback interface functions described above. It has the following members:

`gpgme_data_read_cb_t read`  
This is the function called by GPGME to read data from the data object. It is only required for input data object.

gpgme\_data\_write\_cb\_t

write

This is the function called by GPGME to write data to the data object. It is only required for output data object.

gpgme\_data\_seek\_cb\_t seek

This is the function called by GPGME to change the current read/write pointer in the data object (if available). It is optional.

gpgme\_data\_release\_cb\_t release

This is the function called by GPGME to release a data object. It is optional.

-- Function: gpgme\_error\_t gpgme\_data\_new\_from\_cbs (gpgme\_data\_t \*DH, gpgme\_data\_cbs\_t CBS, void \*HANDLE)

The function gpgme\_data\_new\_from\_cbs creates a new gpgme\_data\_t object and uses the user-provided callback functions to operate on the data object.

The handle HANDLE is passed as first argument to the callback functions. This can be used to identify this data object.

The function returns the error code GPG\_ERR\_NO\_ERROR if the data object was successfully created, and GPG\_ERR\_ENOMEM if not enough memory is available.

File: gpgme.info, Node: Destroying Data Buffers, Next: Manipulating Data Buffers, Prev: Creating Data Buffers, Up: Exchanging Data

## 6.2 Destroying Data Buffers

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-- Function: void gpgme\_data\_release (gpgme\_data\_t DH)

The function gpgme\_data\_release destroys the data object with the handle DH. It releases all associated resources that were not provided by the user in the first place.

-- Function: char \* gpgme\_data\_release\_and\_get\_mem (gpgme\_data\_t DH, size\_t \*LENGTH)

The function gpgme\_data\_release\_and\_get\_mem is like gpgme\_data\_release, except that it returns the data buffer and its length that was provided by the object.

The user has to release the buffer with gpgme\_free. In case the

user provided the data buffer in non-copy mode, a copy will be made for this purpose.

In case an error returns, or there is no suitable data buffer that can be returned to the user, the function will return NULL. In any case, the data object DH is destroyed.

-- Function: void gpgme\_free (void \*BUFFER)  
SINCE: 1.1.1

The function gpgme\_free releases the memory returned by gpgme\_data\_release\_and\_get\_mem and gpgme\_pubkey\_algo\_string. It should be used instead of the system libraries free function in case different allocators are used by a program. This is often the case if gpgme is used under Windows as a DLL.

File: gpgme.info, Node: Manipulating Data Buffers, Prev: Destroying Data Buffers, Up: Exchanging Data

## 6.3 Manipulating Data Buffers

=====

Data buffers contain data and meta-data. The following operations can be used to manipulate both.

\* Menu:

- \* Data Buffer I/O Operations:: I/O operations on data buffers.
- \* Data Buffer Meta-Data:: Meta-data manipulation of data buffers.
- \* Data Buffer Convenience:: Convenience function for data buffers.

File: gpgme.info, Node: Data Buffer I/O Operations, Next: Data Buffer Meta-Data, Up: Manipulating Data Buffers

### 6.3.1 Data Buffer I/O Operations

-----

-- Function: ssize\_t gpgme\_data\_read (gpgme\_data\_t DH, void \*BUFFER, size\_t LENGTH)

The function gpgme\_data\_read reads up to LENGTH bytes from the data object with the handle DH into the space starting at BUFFER.

If no error occurs, the actual amount read is returned. If the end of the data object is reached, the function returns 0.

In all other cases, the function returns -1 and sets `ERRNO`.

-- Function: `ssize_t gpgme_data_write (gpgme_data_t DH,  
const void *BUFFER, size_t SIZE)`

The function `gpgme_data_write` writes up to `SIZE` bytes starting from `BUFFER` into the data object with the handle `DH` at the current write position.

The function returns the number of bytes actually written, or -1 if an error occurs. If an error occurs, `ERRNO` is set.

-- Function: `off_t gpgme_data_seek (gpgme_data_t DH, off_t OFFSET,  
int WHENCE)`

The function `gpgme_data_seek` changes the current read/write position.

The `WHENCE` argument specifies how the `OFFSET` should be interpreted. It must be one of the following symbolic constants:

#### `SEEK_SET`

Specifies that `OFFSET` is a count of characters from the beginning of the data object.

#### `SEEK_CUR`

Specifies that `OFFSET` is a count of characters from the current file position. This count may be positive or negative.

#### `SEEK_END`

Specifies that `OFFSET` is a count of characters from the end of the data object. A negative count specifies a position within the current extent of the data object; a positive count specifies a position past the current end. If you set the position past the current end, and actually write data, you will extend the data object with zeros up to that position.

If successful, the function returns the resulting file position, measured in bytes from the beginning of the data object. You can use this feature together with `SEEK_CUR` to read the current read/write position.

If the function fails, -1 is returned and `ERRNO` is set.

File: `gpgme.info`, Node: Data Buffer Meta-Data, Next: Data Buffer Convenience, Prev: Data Buffer I/O Operations, Up: Manipulating Data Buffers

### 6.3.2 Data Buffer Meta-Data

-----

-- Function: `char * gpgme_data_get_file_name (gpgme_data_t DH)`  
SINCE: 1.1.0

The function `gpgme_data_get_file_name` returns a pointer to a string containing the file name associated with the data object. The file name will be stored in the output when encrypting or signing the data and will be returned to the user when decrypting or verifying the output data.

If no error occurs, the string containing the file name is returned. Otherwise, `NULL` will be returned.

-- Function: `gpgme_error_t gpgme_data_set_file_name (gpgme_data_t DH, const char *FILE_NAME)`  
SINCE: 1.1.0

The function `gpgme_data_set_file_name` sets the file name associated with the data object. The file name will be stored in the output when encrypting or signing the data and will be returned to the user when decrypting or verifying the output data.

The function returns the error code `GPG_ERR_INV_VALUE` if `DH` is not a valid pointer and `GPG_ERR_ENOMEM` if not enough memory is available.

-- Data type: `enum gpgme_data_encoding_t`

The `gpgme_data_encoding_t` type specifies the encoding of a `gpgme_data_t` object. For input data objects, the encoding is useful to give the backend a hint on the type of data. For output data objects, the encoding can specify the output data format on certain operations. Please note that not all backends support all encodings

on all operations. The following data types are available:

`GPGME_DATA_ENCODING_NONE`

This specifies that the encoding is not known. This is the default for a new data object. The backend will try its best to detect the encoding automatically.

`GPGME_DATA_ENCODING_BINARY`

This specifies that the data is encoding in binary form; i.e. there is no special encoding.



#### GPGME\_DATA\_ENCODING\_BASE64

This specifies that the data is encoded using the Base-64 encoding scheme as used by MIME and other protocols.

#### GPGME\_DATA\_ENCODING\_ARMOR

This specifies that the data is encoded in an armored form as used by OpenPGP and PEM.

#### GPGME\_DATA\_ENCODING\_MIME

SINCE: 1.7.0

This specifies that the data is encoded as a MIME part.

#### GPGME\_DATA\_ENCODING\_URL

SINCE: 1.2.0

The data is a list of linefeed delimited URLs. This is only useful with `gpgme_op_import`.

#### GPGME\_DATA\_ENCODING\_URL0

SINCE: 1.2.0

The data is a list of binary zero delimited URLs. This is only useful with `gpgme_op_import`.

#### GPGME\_DATA\_ENCODING URLESC

SINCE: 1.2.0

The data is a list of linefeed delimited URLs with all control and space characters percent escaped. This mode is not yet implemented.

-- Function: `gpgme_data_encoding_t gpgme_data_get_encoding(gpgme_data_t DH)`

The function `gpgme_data_get_encoding` returns the encoding of the data object with the handle `DH`. If `DH` is not a valid pointer (e.g. `NULL`) `GPGME_DATA_ENCODING_NONE` is returned.

-- Function: `gpgme_error_t gpgme_data_set_encoding(gpgme_data_t DH, gpgme_data_encoding_t ENC)`

The function `gpgme_data_set_encoding` changes the encoding of the data object with the handle `DH` to `ENC`.

-- Function: `gpgme_error_t gpgme_data_set_flag(gpgme_data_t DH, const`

char \*NAME, const char \*VALUE)

SINCE: 1.7.0

Some minor properties of the data object can be controlled with flags set by this function. The properties are identified by the following values for NAME:

#### size-hint

The value is a decimal number with the length gpgme shall assume for this data object. This is useful if the data is provided by callbacks or via file descriptors but the applications knows the total size of the data. If this is set the OpenPGP engine may use this to decide on buffer allocation strategies and to provide a total value for its progress information.

This function returns 0 on success.

File: gpgme.info, Node: Data Buffer Convenience, Prev: Data Buffer Meta-Data, Up: Manipulating Data Buffers

### 6.3.3 Data Buffer Convenience Functions

-----  
-- Data type: enum gpgme\_data\_type\_t  
SINCE: 1.4.3

The gpgme\_data\_type\_t type is used to return the detected type of the content of a data buffer.

#### GPGME\_DATA\_TYPE\_INVALID

This is returned by gpgme\_data\_identify if it was not possible to identify the data. Reasons for this might be a non-seekable stream or a memory problem. The value is 0.

#### GPGME\_DATA\_TYPE\_UNKNOWN

The type of the data is not known.

#### GPGME\_DATA\_TYPE\_PGP\_SIGNED

The data is an OpenPGP signed message. This may be a binary signature, a detached one or a cleartext signature.

#### GPGME\_DATA\_TYPE\_PGP\_ENCRYPTED

SINCE: 1.7.0

The data is an OpenPGP encrypted message.

#### GPGME\_DATA\_TYPE\_PGP\_SIGNATURE

SINCE: 1.7.0

The data is an OpenPGP detached signature.

GPGME\_DATA\_TYPE\_PGP\_OTHER

This is a generic OpenPGP message. In most cases this will be encrypted data.

GPGME\_DATA\_TYPE\_PGP\_KEY

This is an OpenPGP key (private or public).

GPGME\_DATA\_TYPE\_CMS\_SIGNED

This is a CMS signed message.

GPGME\_DATA\_TYPE\_CMS\_ENCRYPTED

This is a CMS encrypted  
(enveloped data) message.

GPGME\_DATA\_TYPE\_CMS\_OTHER

This is used for other CMS message types.

GPGME\_DATA\_TYPE\_X509\_CERT

The data is a X.509 certificate

GPGME\_DATA\_TYPE\_PKCS12

The data is a PKCS#12 message. This is commonly used to exchange private keys for X.509.

-- Function: `gpgme_data_type_t gpgme_data_identify (gpgme_data_t DH)`  
SINCE: 1.4.3

The function `gpgme_data_identify` returns the type of the data with the handle `DH`. If it is not possible to perform the identification, the function returns zero (`GPGME_DATA_TYPE_INVALID`). Note that depending on how the data object has been created the identification may not be possible or the data object may change its internal state (file pointer moved). For file or memory based data object, the state should not change.

File: `gpgme.info`, Node: Contexts, Next: UI Server Protocol, Prev: Exchanging Data, Up: Top

## 7 Contexts

\*\*\*\*\*

All cryptographic operations in GPGME are performed within a context, which contains the internal state of the operation as well as configuration parameters. By using several contexts you can run several cryptographic operations in parallel, with different configuration.

-- Data type: `gpgme_ctx_t`

The `gpgme_ctx_t` type is a handle for a GPGME context, which is used to hold the configuration, status and result of cryptographic operations.

\* Menu:

- \* Creating Contexts:: Creating new GPGME contexts.
- \* Destroying Contexts:: Releasing GPGME contexts.
- \* Result Management:: Managing the result of crypto operations.
- \* Context Attributes:: Setting properties of a context.
- \* Key Management:: Managing keys with GPGME.
- \* Trust Item Management:: Managing trust items with GPGME.
- \* Crypto Operations:: Using a context for cryptography.
- \* Miscellaneous:: Miscellaneous operations
- \* Run Control:: Controlling how operations are run.

File: gpgme.info, Node: Creating Contexts, Next: Destroying Contexts, Up: Contexts

## 7.1 Creating Contexts

=====

-- Function: `gpgme_error_t gpgme_new (gpgme_ctx_t *CTX)`

The function `gpgme_new` creates a new `gpgme_ctx_t` object and returns a handle for it in `CTX`.

The function returns the error code `GPG_ERR_NO_ERROR` if the context was successfully created, `GPG_ERR_INV_VALUE` if `CTX` is not a valid pointer, and `GPG_ERR_ENOMEM` if not enough memory is available. Also, it returns `GPG_ERR_NOT_OPERATIONAL` if `gpgme_check_version` was not called to initialize GPGME, and `GPG_ERR_SELFTEST_FAILED` if a selftest failed. Currently, the only selftest is for Windows MingW32 targets to see if `-mms-bitfields` was used (as required).

File: gpgme.info, Node: Destroying Contexts, Next: Result Management, Prev: Creating Contexts, Up: Contexts

## 7.2 Destroying Contexts

=====

-- Function: `void gpgme_release`

`(gpgme_ctx_t CTX)`

The function `gpgme_release` destroys the context with the handle `CTX` and releases all associated resources.

File: gpgme.info, Node: Result Management, Next: Context Attributes, Prev: Destroying Contexts, Up: Contexts

## 7.3 Result Management

=====

The detailed result of an operation is returned in operation-specific structures such as `gpgme_decrypt_result_t`. The corresponding retrieval functions such as `gpgme_op_decrypt_result` provide static access to the results after an operation completes. Those structures shall be considered read-only and an application must not allocate such a structure on its own. The following interfaces make it possible to detach a result structure from its associated context and give it a lifetime beyond that of the current operation or context.

-- Function: `void gpgme_result_ref (void *RESULT)`  
SINCE: 1.2.0

The function `gpgme_result_ref` acquires an additional reference for the result

`RESULT`, which may be of any type `gpgme_*_result_t`.

As long as the user holds a reference, the result structure is guaranteed to be valid and unmodified.

-- Function: `void gpgme_result_unref (void *RESULT)`  
SINCE: 1.2.0

The function `gpgme_result_unref` releases a reference for the result `RESULT`. If this was the last reference, the result structure will be destroyed and all resources associated to it will be released.

Note that a context may hold its own references to result structures, typically until the context is destroyed or the next operation is started. In fact, these references are accessed through the `gpgme_op_*_result` functions.

File: `gpgme.info`, Node: Context Attributes, Next: Key Management, Prev: Result Management, Up: Contexts

## 7.4 Context Attributes

=====

\* Menu:

\* Protocol Selection::      Selecting the protocol used by a context.

\* Crypto Engine::          Configuring the crypto engine.

\*

Setting the Sender::      How to tell the engine the sender.

\* ASCII Armor::          Requesting ASCII armored output.

\* Text Mode::            Choosing canonical text mode.

\* Offline Mode::        Choosing offline mode.

\* Pinentry Mode::        Choosing the pinentry mode.

\* Included Certificates::   Including a number of certificates.

- \* Key Listing Mode::       Selecting key listing mode.
- \* Passphrase Callback::    Getting the passphrase from the user.
- \* Progress Meter Callback::   Being informed about the progress.
- \* Status Message Callback::   Status messages received from gpg.
- \* Context Flags::         Additional flags for a context.
- \* Locale::                Setting the locale of a context.
- \* Additional Logs::        Additional logs of a context.

File: gpgme.info, Node: Protocol Selection, Next: Crypto Engine, Up: Context Attributes

#### 7.4.1 Protocol Selection

-----

-- Function: `gpgme_error_t gpgme_set_protocol (gpgme_ctx_t CTX, gpgme_protocol_t PROTO)`

The function `gpgme_set_protocol` sets the protocol used within the context `CTX` to `PROTO`. All crypto operations will be performed by the crypto engine configured for that protocol. \*Note Protocols and Engines::.

Setting the protocol with `gpgme_set_protocol` does intentionally not check if the crypto engine for that protocol is available and installed correctly. \*Note Engine Version Check::.

The function returns the error code `GPG_ERR_NO_ERROR` if the protocol could be set successfully, and `GPG_ERR_INV_VALUE` if `PROTOCOL` is not a valid protocol.

-- Function: `gpgme_protocol_t gpgme_get_protocol (gpgme_ctx_t CTX)`

The function `gpgme_get_protocol` retrieves the protocol currently use with the context `CTX`.

File: gpgme.info, Node: Crypto Engine, Next: Setting the Sender, Prev: Protocol Selection, Up: Context Attributes

#### 7.4.2 Crypto

##### Engine

-----

The following functions can be used to set and retrieve the configuration of the crypto engines of a specific context. The default can also be retrieved without any particular context. \*Note Engine Information::. The default can also be changed globally. \*Note Engine Configuration::.

-- Function: `gpgme_engine_info_t gpgme_ctx_get_engine_info`

(gpgme\_ctx\_t CTX)

SINCE: 1.1.0

The function `gpgme_ctx_get_engine_info` returns a linked list of engine info structures. Each info structure describes the configuration of one configured backend, as used by the context CTX.

The result is valid until the next invocation of `gpgme_ctx_set_engine_info` for this particular context.

This function can not fail.

-- Function: `gpgme_error_t gpgme_ctx_set_engine_info (gpgme_ctx_t CTX,  
gpgme_protocol_t PROTO, const char *FILE_NAME,  
const char *HOME_DIR)`  
SINCE: 1.1.0

The function `gpgme_ctx_set_engine_info` changes the configuration of the crypto engine implementing the protocol PROTO for the context CTX.

FILE\_NAME is the file name of the executable program implementing this protocol, and HOME\_DIR is the directory name of the configuration directory for this crypto engine. If HOME\_DIR is NULL, the engines default will be used.

Currently this function must be used before starting the first crypto operation. It is unspecified if and when the changes will take effect if the function is called after starting the first operation on the context CTX.

This function returns the error code `GPG_ERR_NO_ERROR` if successful, or an error code on failure.

File: `gpgme.info`, Node: Setting the Sender, Next: ASCII Armor, Prev: Crypto Engine, Up: Context Attributes

#### 7.4.3 How to tell the engine the sender.

-----

Some engines can make use of the senders address, for example to figure out

the best user id in certain trust models. For verification and signing of mails, it is thus suggested to let the engine know the sender ("From:") address. GPGME provides two functions to accomplish that.

Note that the esoteric use of multiple "From:" addresses is not

supported.

-- Function: `gpgme_error_t gpgme_set_sender (gpgme_ctx_t CTX,  
int ADDRESS)`

SINCE: 1.8.0

The function `gpgme_set_sender` specifies the sender address for use in sign and verify operations. `ADDRESS` is expected to be the `addr-spec` part of an address but may also be a complete mailbox address, in which case this function extracts the `addr-spec` from it. Using `NULL` for `ADDRESS` clears the sender address.

The function returns 0 on success or an error code on failure. The most likely failure is that no valid `addr-spec` was found in `ADDRESS`.

-- Function: `const char * gpgme_get_sender (gpgme_ctx_t CTX)`

SINCE: 1.8.0

The function `gpgme_get_sender` returns the current sender address from the context, or `NULL` if none was set. The returned value is valid as long as the `CTX` is valid and `gpgme_set_sender` has not been called again.

File: `gpgme.info`, Node: ASCII Armor, Next: Text Mode, Prev: Setting the Sender, Up: Context Attributes

#### 7.4.4 ASCII Armor

-----

-- Function: `void gpgme_set_armor (gpgme_ctx_t CTX, int YES)`

The function `gpgme_set_armor` specifies if the output should be ASCII armored. By default, output is not ASCII armored.

ASCII armored output is disabled if `YES` is zero, and enabled otherwise.

-- Function: `int gpgme_get_armor (gpgme_ctx_t CTX)`

The function `gpgme_get_armor` returns 1 if the output is ASCII armored, and 0 if it is not, or if `CTX` is not a valid pointer.

File: `gpgme.info`, Node: Text Mode, Next: Offline Mode, Prev: ASCII Armor, Up: Context Attributes

#### 7.4.5 Text Mode



-----  
-- Function: void gpgme\_set\_textmode (gpgme\_ctx\_t CTX, int YES)

The function gpgme\_set\_textmode specifies if canonical text mode should be used. By default, text mode is not used.

Text mode is for example used for the RFC2015 signatures; note that the updated RFC 3156 mandates that the mail user agent does some preparations so that text mode is not needed anymore.

This option is only relevant to the OpenPGP crypto engine, and ignored by all other engines.

Canonical text mode is disabled if YES is zero, and enabled otherwise.

-- Function: int gpgme\_get\_textmode (gpgme\_ctx\_t CTX)

The function gpgme\_get\_textmode returns 1 if canonical text mode is enabled, and 0 if it is not, or if CTX is not a valid pointer.

File: gpgme.info, Node: Offline Mode, Next: Pinentry Mode, Prev: Text Mode, Up: Context Attributes

#### 7.4.6 Offline Mode

-----

-- Function: void gpgme\_set\_offline (gpgme\_ctx\_t CTX, int YES)  
SINCE: 1.6.0

The function gpgme\_set\_offline specifies if offline mode should be used. Offline mode is disabled if YES is zero, and enabled otherwise. By default, offline mode is disabled.

The details of the offline mode depend on the used protocol and its backend engine. It may eventually be extended to be more stricter and for example completely disable the use of Dirmngr for any engine.

For the CMS protocol the offline mode specifies whether Dirmngr shall be used to do additional validation that might require connecting external services (e.g. CRL / OCSP checks). Here the offline mode only affects the keylist mode GPGME\_KEYLIST\_MODE\_VALIDATE.

For the OpenPGP protocol offline mode entirely disables the use of the Dirmngr and will thus guarantee that no network connections are

done as part of an operation on this context. It has only an effect with GnuPG versions 2.1.23 or later.

For all other protocols the offline mode is currently ignored.

-- Function:

```
int gpgme_get_offline (gpgme_ctx_t CTX)
 SINCE: 1.6.0
```

The function `gpgme_get_offline` returns 1 if offline mode is enabled, and 0 if it is not, or if CTX is not a valid pointer.

File: `gpgme.info`, Node: Pinentry Mode, Next: Included Certificates, Prev: Offline Mode, Up: Context Attributes

#### 7.4.7 Pinentry Mode

-----

-- Function: `gpgme_error_t gpgme_set_pinentry_mode (gpgme_ctx_t CTX, gpgme_pinentry_mode_t MODE)`

SINCE: 1.4.0

The function `gpgme_set_pinentry_mode` specifies the pinentry mode to be used.

For GnuPG  $\geq$  2.1 this option is required to be set to `GPGME_PINENTRY_MODE_LOOPBACK` to enable the passphrase callback mechanism in GPGME through `gpgme_set_passphrase_cb`.

-- Function: `gpgme_pinentry_mode_t gpgme_get_pinentry_mode (gpgme_ctx_t CTX)`  
SINCE: 1.4.0

The function `gpgme_get_pinentry_mode` returns the mode set for the context.

-- Data type: `enum gpgme_pinentry_mode_t`  
SINCE: 1.4.0

The `gpgme_minentry_mode_t` type specifies the set of possible pinentry modes that are supported by GPGME if GnuPG  $\geq$  2.1 is used. The following modes are supported:

`GPGME_PINENTRY_MODE_DEFAULT`  
SINCE: 1.4.0

Use the default of the agent, which is ask.

GPGME\_PINENTRY\_MODE\_ASK

SINCE: 1.4.0

Force the use of the Pinentry.

GPGME\_PINENTRY\_MODE\_CANCEL

SINCE: 1.4.0

Emulate use of Pinentrys cancel button.

GPGME\_PINENTRY\_MODE\_ERROR

SINCE: 1.4.0

Return a Pinentry error No Pinentry.

GPGME\_PINENTRY\_MODE\_LOOPBACK

SINCE: 1.4.0

Redirect Pinentry queries to the caller. This enables the use of `gpgme_set_passphrase_cb` because pinentry queries are redirected to `gpgme`.

Note: For 2.1.0 - 2.1.12 this mode requires `allow-loopback-pinentry` to be enabled in the `gpg-agent.conf` or an agent started with that option.

File:

`gpgme.info`, Node: Included Certificates, Next: Key Listing Mode, Prev: Pinentry Mode, Up: Context Attributes

#### 7.4.8 Included Certificates

-----

-- Function: `void gpgme_set_include_certs (gpgme_ctx_t CTX,  
int NR_OF_CERTS)`

The function `gpgme_set_include_certs` specifies how many certificates should be included in an S/MIME signed message. By default, only the senders certificate is included. The possible values of `NR_OF_CERTS` are:

GPGME\_INCLUDE\_CERTS\_DEFAULT

SINCE: 1.0.3

Fall back to the default of the crypto backend. This is the default for GPGME.

-2

Include all certificates except the root certificate.

-1

Include all certificates.

0

Include no certificates.

1

Include the senders certificate only.

n

Include the first n certificates of the certificates path,  
starting from the senders certificate. The number

n must

be positive.

Values of NR\_OF\_CERTS smaller than -2 are undefined.

This option is only relevant to the CMS crypto engine, and ignored  
by all other engines.

-- Function: int gpgme\_get\_include\_certs (gpgme\_ctx\_t CTX)

The function gpgme\_get\_include\_certs returns the number of  
certificates to include into an S/MIME signed message.

File: gpgme.info, Node: Key Listing Mode, Next: Passphrase Callback, Prev: Included Certificates, Up: Context  
Attributes

#### 7.4.9 Key Listing Mode

-----  
-- Function: gpgme\_error\_t gpgme\_set\_keylist\_mode (gpgme\_ctx\_t CTX,  
gpgme\_keylist\_mode\_t MODE)

The function gpgme\_set\_keylist\_mode changes the default behaviour  
of the key listing functions. The value in MODE is a bitwise-or  
combination of one or multiple of the following bit values:

##### GPGME\_KEYLIST\_MODE\_LOCAL

The GPGME\_KEYLIST\_MODE\_LOCAL symbol specifies that the local  
keyring should be searched  
for keys in the keylisting  
operation. This is the default.

Using only this option results in a --list-keys.

##### GPGME\_KEYLIST\_MODE\_EXTERN

The GPGME\_KEYLIST\_MODE\_EXTERN symbol specifies that an  
external source should be searched for keys in the keylisting  
operation. The type of external source is dependent on the  
crypto engine used and whether it is combined with  
GPGME\_KEYLIST\_MODE\_LOCAL. For example, it can be a remote

keyserver or LDAP certificate server.

Using only this option results in a `--search-keys` for `GPGME_PROTOCOL_OpenPGP` and something similar to `--list-external-keys` for `GPGME_PROTOCOL_CMS`.

#### `GPGME_KEYLIST_MODE_LOCATE`

This is a shortcut for the combination of `GPGME_KEYLIST_MODE_LOCAL` and `GPGME_KEYLIST_MODE_EXTERN`, which results in a `--locate-keys` for `GPGME_PROTOCOL_OpenPGP`.

#### `GPGME_KEYLIST_MODE_SIGS`

The `GPGME_KEYLIST_MODE_SIGS` symbol specifies that the key signatures should be included in the listed keys.

#### `GPGME_KEYLIST_MODE_SIG_NOTATIONS`

SINCE: 1.1.1

The `GPGME_KEYLIST_MODE_SIG_NOTATIONS` symbol specifies that the signature notations on key signatures should be included in the listed keys. This only works if `GPGME_KEYLIST_MODE_SIGS` is also enabled.

#### `GPGME_KEYLIST_MODE_WITH_TOFU`

SINCE: 1.7.0

The `GPGME_KEYLIST_MODE_WITH_TOFU` symbol specifies that information pertaining to the TOFU trust model should be included in the listed keys.

#### `GPGME_KEYLIST_MODE_WITH_SECRET`

SINCE: 1.5.1

The `GPGME_KEYLIST_MODE_WITH_SECRET` returns information about the presence of a corresponding secret key in a public key listing. A public key listing with this mode is slower than a standard listing but can be used instead of a second run to

list the secret keys. This is only supported for GnuPG versions `>= 2.1`.

#### `GPGME_KEYLIST_MODE_EPHEMERAL`

SINCE: 1.2.0

The `GPGME_KEYLIST_MODE_EPHEMERAL` symbol specifies that keys flagged as ephemeral are included in the listing.

## GPGME\_KEYLIST\_MODE\_VALIDATE

SINCE: 0.4.5

The GPGME\_KEYLIST\_MODE\_VALIDATE symbol specifies that the backend should do key or certificate validation and not just get the validity information from an internal cache. This might be an expensive operation and is in general not useful. Currently only implemented for the S/MIME backend and ignored for other backends.

At least one of GPGME\_KEYLIST\_MODE\_LOCAL and GPGME\_KEYLIST\_MODE\_EXTERN must be specified. For future binary compatibility, you should get the current mode with `gpgme_get_keylist_mode` and modify it by setting or clearing the appropriate bits, and then using that calculated value in the `gpgme_set_keylisting_mode` operation. This will leave all other bits in the mode value intact (in particular those that are not used in the current version of the library).

The function returns the error code `GPG_ERR_NO_ERROR` if the mode could be set correctly, and `GPG_ERR_INV_VALUE` if `CTX` is not a valid pointer or `MODE` is not a valid mode.

-- Function: `gpgme_keylist_mode_t gpgme_get_keylist_mode(gpgme_ctx_t CTX)`

The function `gpgme_get_keylist_mode` returns the current key listing mode of the context `CTX`. This value can then be modified and used in a subsequent `gpgme_set_keylist_mode` operation to only affect the desired bits (and leave all others intact).

The function returns 0 if `CTX` is not a valid pointer, and the current mode otherwise. Note that 0 is not a valid mode value.

File: `gpgme.info`, Node: `Passphrase Callback`, Next: `Progress Meter Callback`, Prev: `Key Listing Mode`, Up: `Context Attributes`

### 7.4.10 Passphrase Callback

-----

-- Data type: `gpgme_error_t (*gpgme_passphrase_cb_t)(void *HOOK, const char *UID_HINT, const char *PASSPHRASE_INFO, int PREV_WAS_BAD, int FD)`

The `gpgme_passphrase_cb_t` type is the type of functions usable as passphrase callback function.

The argument `UID_HINT` might contain a string that gives an indication for which user ID the passphrase is required. If this is not available, or not applicable (in the case of symmetric encryption, for example), `UID_HINT` will be `NULL`.

The argument `PASSPHRASE_INFO`, if not `NULL`, will give further information about the context in which the passphrase is required. This information is engine and operation specific.

If this is the repeated attempt to get the passphrase, because previous attempts failed, then `PREV_WAS_BAD` is 1, otherwise it will be 0.

The user must write the passphrase, followed by a newline character, to the file descriptor `FD`. The function `gpgme_io_writen` should be used for the write operation. Note that if the user returns 0 to indicate success, the user must at least write a newline character before returning from the callback.

If an error occurs, return the corresponding `gpgme_error_t` value. You can use the error code `GPG_ERR_CANCELED` to abort the operation. Otherwise, return 0.

Note: The `passphrase_cb` only works with GnuPG 1.x and 2.1.x and not with the 2.0.x series. See `gpgme_set_pinentry_mode` for more details on 2.1.x usage.

-- Function: `void gpgme_set_passphrase_cb (gpgme_ctx_t CTX, gpgme_passphrase_cb_t PASSFUNC, void *HOOK_VALUE)`  
The function `gpgme_set_passphrase_cb` sets the function that is used when a passphrase needs to be provided by the user to `PASSFUNC`. The function `PASSFUNC` needs to be implemented by the user, and whenever it is called, it is called with its first argument being `HOOK_VALUE`. By default, no passphrase callback function is set.

Not all crypto engines require this callback to retrieve the passphrase. It is better if the engine retrieves the passphrase from a trusted agent (a daemon process), rather than having each user to implement their own passphrase query. Some engines do not even support an external passphrase callback at all, in this case the error code `GPG_ERR_NOT_SUPPORTED` is returned.

For GnuPG  $\geq 2.1$  the pinentry mode has to be set to `GPGME_PINENTRY_MODE_LOOPBACK` to enable the passphrase callback. See `gpgme_set_pinentry_mode`.

The user can disable the use of a passphrase callback function by calling `gpgme_set_passphrase_cb` with `PASSFUNC` being `NULL`.

-- Function: `void gpgme_get_passphrase_cb (gpgme_ctx_t CTX, gpgme_passphrase_cb_t *PASSFUNC, void **HOOK_VALUE)`

The function `gpgme_get_passphrase_cb` returns the function that is used when a passphrase needs to be provided by the user in `*PASSFUNC`, and the first argument for this function in `*HOOK_VALUE`. If no passphrase callback is set, or `CTX` is not a valid pointer, `NULL` is returned in both variables.

`PASSFUNC` or `HOOK_VALUE` can be `NULL`. In this case, the corresponding value will not be returned.

File: `gpgme.info`, Node: Progress Meter Callback, Next: Status Message Callback, Prev: Passphrase Callback, Up: Context Attributes

#### 7.4.11 Progress Meter Callback

-----

-- Data type: `void (*gpgme_progress_cb_t)(void *HOOK, const char *WHAT, int TYPE, int CURRENT, int TOTAL)`

The `gpgme_progress_cb_t` type is the type of functions usable as progress callback function.

The arguments are specific to the crypto engine. More information about the progress information returned from the GnuPG engine can be found in the GnuPG source code in the file `doc/DETAILS` in the section

`PROGRESS`.

-- Function: `void gpgme_set_progress_cb (gpgme_ctx_t CTX, gpgme_progress_cb_t PROGFUNC, void *HOOK_VALUE)`

The function `gpgme_set_progress_cb` sets the function that is used when progress information about a cryptographic operation is available. The function `PROGFUNC` needs to be implemented by the user, and whenever it is called, it is called with its first argument being `HOOK_VALUE`. By default, no progress callback function is set.

Setting a callback function allows an interactive program to display progress information about a long operation to the user.

The user can disable the use of a progress callback function by calling `gpgme_set_progress_cb` with `PROGFUNC` being `NULL`.



-- Function: void gpgme\_get\_progress\_cb (gpgme\_ctx\_t CTX,  
gpgme\_progress\_cb\_t \*PROG\_FUNC, void \*\*HOOK\_VALUE)  
The function gpgme\_get\_progress\_cb returns the function that is  
used to inform the user about the progress made in  
\*PROG\_FUNC, and  
the first argument for this function in \*HOOK\_VALUE. If no  
progress callback is set, or CTX is not a valid pointer, NULL is  
returned in both variables.

PROG\_FUNC or HOOK\_VALUE can be NULL. In this case, the  
corresponding value will not be returned.

File: gpgme.info, Node: Status Message Callback, Next: Context Flags, Prev: Progress Meter Callback, Up:  
Context Attributes

#### 7.4.12 Status Message Callback

-----  
-- Data type: gpgme\_error\_t (\*gpgme\_status\_cb\_t)(void \*HOOK, const char  
\*KEYWORD, const char \*ARGS)  
The gpgme\_status\_cb\_t type is the type of function usable as a  
status message callback function.

The argument KEYWORD is the name of the status message while the  
ARGS argument contains any arguments for the status message.

If an error occurs, return the corresponding gpgme\_error\_t value.  
Otherwise, return 0.

-- Function: void gpgme\_set\_status\_cb (gpgme\_ctx\_t CTX,  
gpgme\_status\_cb\_t STATUS\_FUNC, void \*HOOK\_VALUE)  
SINCE: 1.6.0

The function gpgme\_set\_status\_cb sets the function that is used  
when a status message is received from gpg to STATUS\_FUNC. The  
function STATUS\_FUNC needs to be implemented by the user, and  
whenever it is called, it is called with its first argument being  
HOOK\_VALUE. By default, no status message callback function is  
set.

The user can disable the use of a status message callback function  
by calling gpgme\_set\_status\_cb with STATUS\_FUNC being NULL.

-- Function: void gpgme\_get\_status\_cb (gpgme\_ctx\_t CTX,  
gpgme\_status\_cb\_t \*STATUS\_FUNC, void \*\*HOOK\_VALUE)  
SINCE: 1.6.0

The function `gpgme_get_status_cb` returns the function that is used to process status messages from `gpg` in `*STATUSFUNC`, and the first argument for this function in `*HOOK_VALUE`. If no status message callback is set, or `CTX` is not a valid pointer, `NULL` is returned in both variables.

File:

`gpgme.info`, Node: Context Flags, Next: Locale, Prev: Status Message Callback, Up: Context Attributes

#### 7.4.13 Context Flags

-----

-- Function: `gpgme_error_t gpgme_set_ctx_flag (gpgme_ctx_t CTX, const char *NAME, const char *VALUE)`

SINCE: 1.7.0

Some minor properties of the context can be controlled with flags set by this function. The properties are identified by the following values for `NAME`:

"redraw"

This flag is normally not changed by the caller because GPGME sets and clears it automatically: The flag is cleared before an operation and set if an operation noticed that the engine has launched a Pinentry. A Curses based application may use this information to redraw the screen; for example:

```
err = gpgme_op_keylist_start (ctx, "foo@example.org", 0);
while (!err)
{
 err = gpgme_op_keylist_next
(ctx, &key);
 if (err)
 break;
 show_key (key);
 gpgme_key_release (key);
}
if ((s = gpgme_get_ctx_flag (ctx, "redraw")) && *s)
 redraw_screen ();
gpgme_release (ctx);
```

"full-status"

Using a `VALUE` of "1" the status callback set by `gpgme_set_status_cb` returns all status lines with the exception of `PROGRESS` lines. With the default of "0" the

status callback is only called in certain situations.

#### "raw-description"

Setting the VALUE to "1" returns human readable strings in a raw format. For example the non breaking space characters ("~") will not be removed from the description field of the `gpgme_tofu_info_t` object.

#### "export-session-key"

Using a VALUE of "1" specifies that the context should try to

export the symmetric session key when decrypting data. By default, or when using an empty string or "0" for VALUE, session keys are not exported.

#### "override-session-key"

The string given in VALUE is passed to the GnuPG engine to override the session key for decryption. The format of that session key is specific to GnuPG and can be retrieved during a decrypt operation when the context flag "export-session-key" is enabled. Please be aware that using this feature with GnuPG < 2.1.16 will leak the session key on many platforms via `ps(1)`.

#### "auto-key-retrieve"

Setting the VALUE to "1" asks the backend to automatically retrieve a key for signature verification if possible. Note that this option makes a "web bug" like behavior possible. Keyserver or Web Key Directory operators can see which keys you request, so by sending you a message signed

by a brand new

key (which you naturally will not have on your local keyring), the operator can tell both your IP address and the time when you verified the signature.

#### "request-origin"

The string given in VALUE is passed to the GnuPG engines to request restrictions based on the origin of the request.

Valid values are documented in the GnuPG manual and the `gpg` man page under the option `--request-origin`. Requires at least GnuPG 2.2.6 to have an effect.

#### "no-symkey-cache"

For OpenPGP disable the passphrase cache used for symmetrical en- and decryption. This cache is based on the message specific salt value. Requires at least GnuPG 2.2.7 to have an effect.

#### "ignore-mdc-error"

This flag passes the option `--ignore-mdc-error` to `gpg`. This can be used to force decryption of a message which failed due to a missing integrity check.

This flag must be used with

great caution and only if it is a known non-corrupted old message and the decryption result of the former try had the decryption result flag `legacy_cipher_nomdc` set. For failsafe reasons this flag is reset after each operation.

#### "auto-key-locate"

The string given in `VALUE` is passed to `gpg`. This can be used to change the behavior of a `GPGME_KEYLIST_MODE_LOCATE` keylisting. Valid values are documented in the GnuPG manual and the `gpg` man page under the option `--auto-key-locate`. Requires at least GnuPG 2.1.18.

Note: Keys retrieved through `auto-key-locate` are automatically imported in the keyring.

#### `trust-model`

SINCE: 1.11.2

Change the `trust-model` for all GnuPG engine operations. An empty string sets the `trust-model` back to the users default. If the `trust-model` is not supported by GnuPG the behavior

is

undefined and will likely cause all operations to fail. Example: `"tofu+pgp"`.

This options should be used carefully with a strict version requirement. In some versions of GnuPG setting the `trust-model` changes the default `trust-model` for future operations. A change in the `trust-model` also can have unintended side effects, like rebuilding the `trust-db`.

This function returns 0 on success.

-- Function: `const char * gpgme_get_ctx_flag (gpgme_ctx_t CTX, const char *NAME)`

SINCE: 1.8.0

The value of flags settable by `gpgme_set_ctx_flag` can be retrieved by this function. If `NAME` is unknown the function returns `NULL`. For boolean flags an empty string is returned for False and the string `"1"` is returned for True; either `atoi(3)` or a test for an empty string can be used to get the boolean value.

File: gpgme.info, Node: Locale, Next: Additional Logs, Prev: Context Flags,  
Up: Context Attributes

#### 7.4.14 Locale

-----

A locale setting can be associated with a context. This locale is passed to the crypto engine, and used for applications like the PIN entry, which is displayed to the user when entering a passphrase is required.

The default locale is used to initialize the locale setting of all contexts created afterwards.

```
-- Function: gpgme_error_t gpgme_set_locale (gpgme_ctx_t CTX,
 int CATEGORY, const char *VALUE)
SINCE: 0.4.3
```

The function `gpgme_set_locale` sets the locale of the context `CTX`, or the default locale if `CTX` is a null pointer.

The locale settings that should be changed are specified by `CATEGORY`. Supported categories are `LC_CTYPE`, `LC_MESSAGES`, and `LC_ALL`, which is a wildcard you can use if you want to change all the categories at once.

The value to be used for the locale setting is `VALUE`, which will be copied to GPGMEs internal data structures. `VALUE` can be a null pointer, which disables setting the locale, and will make PIN entry and other applications use their default setting, which is usually not what you want.

Note that the settings are only used if the application runs on a text terminal, and that the settings should fit the configuration of the output terminal. Normally, it is sufficient to initialize the default value at startup.

The function returns an error if not enough memory is available.

File: gpgme.info, Node: Additional Logs, Prev: Locale, Up: Context Attributes

#### 7.4.15 Additional Logs

-----

Additional logs can be associated with a context. These logs are engine

specific and can be obtained with `gpgme_op_getauditlog`.

-- Function: `gpgme_error_t gpgme_op_getauditlog (gpgme_ctx_t CTX,  
gpgme_data_t OUTPUT, unsigned int FLAGS)`  
SINCE: 1.1.1

The function `gpgme_op_getauditlog` is used to obtain additional logs as specified by `FLAGS` into the `OUTPUT` data. If

The function returns the error code `GPG_ERR_NO_ERROR` if a log could be queried from the engine, and `GPG_ERR_NOT_IMPLEMENTED` if the log specified in `FLAGS` is not available for this engine. If no log is available `GPG_ERR_NO_DATA` is returned.

The value in `FLAGS` is a bitwise-or combination of one or multiple of the following bit values:

`GPGME_AUDITLOG_DIAG`  
SINCE: 1.11.2

Obtain diagnostic output which would be written to `stderr` in interactive use of the engine. This can be used to provide additional diagnostic information in case of errors in other operations.

Note: If log-file has been set in the configuration the log will be empty and `GPG_ERR_NO_DATA` will be returned.

Implemented for: `GPGME_PROTOCOL_OpenPGP`

`GPGME_AUDITLOG_DEFAULT`  
SINCE: 1.11.2

This flag has the value 0 for compatibility reasons. Obtains additional information from the engine by issuing the `GETAUDITLOG` command. For `GPGME_PROTOCOL_CMS` this provides additional information about the X509 certificate chain.

Implemented for: `GPGME_PROTOCOL_CMS`

`GPGME_AUDITLOG_HTML`  
SINCE: 1.1.1

Same as `GPGME_AUDITLOG_DEFAULT` but in HTML.

Implemented for: `GPGME_PROTOCOL_CMS`

-- Function: `gpgme_error_t gpgme_op_getauditlog_start (gpgme_ctx_t CTX,  
gpgme_data_t OUTPUT, unsigned int FLAGS)`  
SINCE: 1.1.1

This is the asynchronous variant of `gpgme_op_getauditlog`.

File: `gpgme.info`, Node: Key Management, Next: Trust Item Management, Prev: Context Attributes, Up: Contexts

## 7.5 Key Management

=====

Some of the cryptographic operations require that recipients or signers are specified. This is always done by specifying the respective keys that should be used for the operation. The following section describes how such keys can be selected and manipulated.

\*

Menu:

- \* Key objects:: Description of the key structures.
- \* Listing Keys:: Browsing the list of available keys.
- \* Information About Keys:: Requesting detailed information about keys.
- \* Manipulating Keys:: Operations on keys.
- \* Generating Keys:: Creating new key pairs.
- \* Signing Keys:: Adding key signatures to public keys.
- \* Exporting Keys:: Retrieving key data from the key ring.
- \* Importing Keys:: Adding keys to the key ring.
- \* Deleting Keys:: Removing keys from the key ring.
- \* Changing Passphrases:: Change the passphrase of a key.
- \* Changing TOFU Data:: Changing data pertaining to TOFU.
- \* Advanced Key Editing:: Advanced key edit operation.

File: `gpgme.info`, Node: Key objects, Next: Listing Keys, Up: Key Management

### 7.5.1 Key objects

-----

The keys are represented in GPGME by structures which may only be read by the application but never be allocated or changed. They are valid as long as the key object itself is valid.

-- Data type: `gpgme_key_t`

The `gpgme_key_t` type is a pointer to a key object. It has the

following members:

gpgme\_keylist\_mode\_t keylist\_mode  
SINCE: 0.9.0

The keylist mode that was active when the key was retrieved.

unsigned int revoked : 1

This is true if the key is revoked.

unsigned int expired : 1

This is true if the key is expired.

unsigned int disabled : 1

This is true if the key is disabled.

unsigned int invalid : 1

This is true if the key is invalid. This might have several reasons, for a example for the S/MIME backend, it will be set during key listings if the key could not be validated due to missing certificates or unmatched policies.

unsigned int can\_encrypt : 1

This is true if the key (ie one of its subkeys) can be used  
for encryption.

unsigned int can\_sign : 1

This is true if the key (ie one of its subkeys) can be used to create data signatures.

unsigned int can\_certify : 1

This is true if the key (ie one of its subkeys) can be used to create key certificates.

unsigned int can\_authenticate : 1

SINCE: 0.4.5

This is true if the key (ie one of its subkeys) can be used for authentication.

unsigned int is\_qualified : 1

SINCE: 1.1.0

This is true if the key can be used for qualified signatures according to local government regulations.

unsigned int secret : 1



This is true if the key is a secret key. Note, that this will always be true even if the corresponding subkey flag may be false (offline/stub keys). This is only set if a listing of secret keys has been requested or if GPGME\_KEYLIST\_MODE\_WITH\_SECRET is active.

unsigned int origin : 5

SINCE: 1.8.0

Reserved for the origin of this key.

gpgme\_protocol\_t protocol

This is the protocol supported by this key.

char \*issuer\_serial

If protocol is GPGME\_PROTOCOL\_CMS, then this is the issuer serial.

char \*issuer\_name

If protocol is GPGME\_PROTOCOL\_CMS, then this is the issuer name.

char \*chain\_id

If protocol is GPGME\_PROTOCOL\_CMS, then this is the chain ID, which can be used to built the certificate chain.

gpgme\_validity\_t owner\_trust

If protocol is GPGME\_PROTOCOL\_OpenPGP, then this is the owner trust.

gpgme\_subkey\_t subkeys

This is a linked list with the subkeys of the key. The first subkey in the list is the primary key and usually available.

gpgme\_user\_id\_t uids

This is a linked list with the user IDs of the key. The first user ID in the list is the main (or primary) user ID.

char \*fpr

SINCE: 1.7.0

This field gives the fingerprint of the primary key. Note that this is a copy of the fingerprint of the first subkey. For an incomplete key (for example from a verification result) a subkey may be missing but this field may be set nevertheless.

unsigned long last\_update

SINCE: 1.8.0

Reserved for the time of the last update of this key.

-- Data type: gpgme\_subkey\_t

SINCE: 1.5.0

The gpgme\_subkey\_t type is a pointer to a subkey structure. Subkeys are one component of a gpgme\_key\_t object. In fact, subkeys are those parts that contains the real information about the individual cryptographic keys that belong to the same key object. One gpgme\_key\_t can contain several subkeys. The first subkey in the linked list is also called the primary key.

The subkey structure has the following members:

gpgme\_subkey\_t

next

This is a pointer to the next subkey structure in the linked list, or NULL if this is the last element.

unsigned int revoked : 1

This is true if the subkey is revoked.

unsigned int expired : 1

This is true if the subkey is expired.

unsigned int disabled : 1

This is true if the subkey is disabled.

unsigned int invalid : 1

This is true if the subkey is invalid.

unsigned int can\_encrypt : 1

This is true if the subkey can be used for encryption.

unsigned int can\_sign : 1

This is true if the subkey can be used to create data signatures.

unsigned int can\_certify : 1

This is true if the subkey can be used to create key certificates.

unsigned int can\_authenticate : 1

SINCE: 0.4.5

This is true if the subkey can be used for authentication.

unsigned int is\_qualified : 1

SINCE: 1.1.0

This is true if the subkey can be used for qualified signatures according to local government regulations.

unsigned int is\_de\_vs : 1

SINCE: 1.8.0

This is true if the subkey complies with the rules for classified information in Germany at the restricted level (VS-NfD). This are currently RSA keys of at least 2048 bits or ECDH/ECDSA keys using a Brainpool curve.

unsigned int secret : 1

This is true if the subkey is a secret key. Note that it will be false if the key is actually a stub key; i.e. a secret key operation is currently not possible (offline-key). This is only set if a listing of secret keys has been requested or if GPGME\_KEYLIST\_MODE\_WITH\_SECRET is active.

gpgme\_pubkey\_algo\_t pubkey\_algo

This is the public key algorithm supported by this subkey.

unsigned int length

This is the length of the subkey (in bits).

char

\*keyid

This is the key ID of the subkey in hexadecimal digits.

char \*fpr

This is the fingerprint of the subkey in hexadecimal digits, if available.

char \*keygrip

SINCE: 1.7.0

The keygrip of the subkey in hex digit form or NULL if not available.

long int timestamp

This is the creation timestamp of the subkey. This is -1 if the timestamp is invalid, and 0 if it is not available.

long int expires

This is the expiration timestamp of the subkey, or 0 if the subkey does not expire.

unsigned int is\_cardkey : 1

SINCE: 1.2.0

True if the secret key is stored on a smart card.

char \*card\_number

SINCE: 1.2.0

The serial number of a smart card holding this key or NULL.

char \*curve

For ECC algorithms the name of the curve.

-- Data type: gpgme\_user\_id\_t

A user ID is a component of a gpgme\_key\_t object.

One key can

have many user IDs. The first one in the list is the main (or primary) user ID.

The user ID structure has the following members.

gpgme\_user\_id\_t next

This is a pointer to the next user ID structure in the linked list, or NULL if this is the last element.

unsigned int revoked : 1

This is true if the user ID is revoked.

unsigned int invalid : 1

This is true if the user ID is invalid.

gpgme\_validity\_t validity

This specifies the validity of the user ID.

char \*uid

This is the user ID string.

char \*name

This is the name component of uid, if available.

char \*comment

This is the comment component of uid, if available.

char \*email

This is the email component of uid, if available.

char \*address;

The mail address (addr-spec from RFC-5322) of the user ID string. This is general the same as the email part

of this

structure but might be slightly different. If no mail address is available NULL is stored.

gpgme\_tofu\_info\_t tofu

SINCE: 1.7.0

If not NULL information from the TOFU database pertaining to this user id.

gpgme\_key\_sig\_t signatures

This is a linked list with the signatures on this user ID.

unsigned int origin : 5

SINCE: 1.8.0

Reserved for the origin of this user ID.

unsigned long last\_update

SINCE: 1.8.0

Reserved for the time of the last update of this user ID.

-- Data type: gpgme\_tofu\_info\_t

SINCE: 1.7.0

The gpgme\_tofu\_info\_t type is a pointer to a tofu info structure. Tofu info structures are one component of a gpgme\_user\_id\_t object, and provide information from the TOFU database pertaining to the user ID.

The tofu info structure has the following members:

gpgme\_key\_sig\_t next

This is a pointer to the next tofu info structure in the linked list, or NULL if this is the last element.

unsigned int validity : 3

This is the TOFU validity. It can have the following values:

0

The value 0 indicates a conflict.

1

The value 1 indicates a key without history.

2

The value 2 indicates a key with too little history.

3

The value 3 indicates a key with enough history for basic trust.

4

The value 4 indicates a key with a lot of history.

unsigned int policy : 4

This is the TOFU policy, see `gpgme_tofu_policy_t`.

unsigned short signcount

This is the number of signatures seen for this binding (or `USHRT_MAX` if there are more than that).

unsigned short encrcount

This is the number of encryptions done with this binding (or `USHRT_MAX` if there are more than that).

unsigned long signfirst

Number of seconds since Epoch when the first signature was seen with this binding.

unsigned long signlast

Number of seconds since Epoch when the last signature was seen with this binding.

unsigned long encrfirst

Number of seconds since Epoch when the first encryption was done with this binding.

unsigned long enclast

Number of seconds since Epoch when the last encryption was done with this binding.

char \*description

A human-readable string summarizing the TOFU data (or `NULL`).

-- Data type: `gpgme_key_sig_t`

The `gpgme_key_sig_t` type is a pointer to a key signature structure. Key signatures are one component of a `gpgme_key_t` object, and validate user IDs on the key in the OpenPGP protocol.

The signatures on a key are only available if the key was retrieved via a listing operation with the `GPGME_KEYLIST_MODE_SIGS` mode enabled, because it can be expensive to retrieve all signatures of a key.

The signature notations on a key signature are only available if the key was retrieved via a listing operation with the `GPGME_KEYLIST_MODE_SIG_NOTATIONS` mode enabled, because it can be expensive to retrieve all signature notations.

The key signature structure has the following members:

`gpgme_key_sig_t next`

This is a pointer to the next key signature structure in the linked list, or `NULL` if this is the last element.

`unsigned int revoked : 1`

This is true if the key signature is a revocation signature.

`unsigned int expired : 1`

This is true if the key signature is expired.

`unsigned int invalid : 1`

This is true if the key signature is invalid.

`unsigned int exportable : 1`

This is true if the key signature is exportable.

`gpgme_pubkey_algo_t pubkey_algo`

This is the public key algorithm used to create the signature.

`char *keyid`

This is the key ID of the key (in hexadecimal digits) used to create the signature.

`long int timestamp`

This is the creation timestamp of the key signature. This is -1 if the timestamp is invalid, and 0 if it is not available.

`long int expires`

This is the expiration timestamp of the key signature, or 0 if

the key signature does not expire.

`gpgme_error_t` status

This is the status of the signature and has the same meaning as the member of the same name in a `gpgme_signature_t` object.

`unsigned int` sig\_class

This specifies the signature class of the key signature. The meaning is specific to the crypto engine.

`char *`uid

This is the main user ID of the key used to create the signature.

`char *`name

This is the name component of uid, if available.

`char *`comment

This is the comment component of uid, if available.

`char *`email

This is the email component of uid, if available.

`gpgme_sig_notation_t` notations

This is a linked list with the notation data and policy URLs.

File: `gpgme.info`, Node: Listing Keys, Next: Information About Keys, Prev: Key objects, Up: Key Management

### 7.5.2 Listing Keys

-----

-- Function: `gpgme_error_t gpgme_op_keylist_start (gpgme_ctx_t CTX,  
const char *PATTERN, int SECRET_ONLY)`

The function `gpgme_op_keylist_start` initiates a key listing operation inside the context `CTX`. It sets everything up so that subsequent invocations of `gpgme_op_keylist_next` return the keys in the list.

If `PATTERN` is `NULL`, all available keys are returned. Otherwise, `PATTERN` contains an engine specific expression that is used to limit the list to all keys matching the pattern. Note that the total length of the pattern is restricted to an engine-specific maximum (a couple of hundred characters are usually accepted). The pattern should be used to restrict the search to a certain common



name or user, not to list many specific keys at once by listing their fingerprints or key IDs.

If SECRET\_ONLY is not 0, the list is restricted to secret keys only.

The context will be busy until either all keys are received (and gpgme\_op\_keylist\_next returns GPG\_ERR\_EOF), or gpgme\_op\_keylist\_end is called to finish the operation.

The function returns the error code GPG\_ERR\_INV\_VALUE if CTX is not a valid pointer, and passes through any errors that are reported by the crypto engine support routines.

```
-- Function: gpgme_error_t gpgme_op_keylist_ext_start (gpgme_ctx_t CTX,
 const char *PATTERN[], int SECRET_ONLY, int RESERVED)
```

The function gpgme\_op\_keylist\_ext\_start initiates an extended key listing operation inside the context CTX. It sets everything up so

that subsequent invocations of gpgme\_op\_keylist\_next return the keys in the list.

If PATTERN or \*PATTERN is NULL, all available keys are returned. Otherwise, PATTERN is a NULL terminated array of strings that are used to limit the list to all keys matching at least one of the patterns verbatim. Note that the total length of all patterns is restricted to an engine-specific maximum (the exact limit also depends on the number of patterns and amount of quoting required, but a couple of hundred characters are usually accepted). Patterns should be used to restrict the search to a certain common name or user, not to list many specific keys at once by listing their fingerprints or key IDs.

If SECRET\_ONLY is not 0, the list is restricted to secret keys only.

The value of RESERVED must be 0.

The context will be busy until either all keys are received (and gpgme\_op\_keylist\_next returns GPG\_ERR\_EOF), or gpgme\_op\_keylist\_end is called to finish the operation.

The function returns the error code GPG\_ERR\_INV\_VALUE if CTX is not a valid pointer, and passes through any errors that are reported by the crypto engine support routines.

-- Function: `gpgme_error_t gpgme_op_keylist_from_data_start`  
(`gpgme_ctx_t` CTX, `gpgme_data_t` DATA, `int` RESERVED)

SINCE: 1.8.0

The function `gpgme_op_keylist_from_data_start` initiates a key listing operation inside the context CTX. In contrast to the other key listing operation the keys are read from the supplied DATA and not from the local key database. The keys are also not imported into the local key database. The function sets everything up so that subsequent invocations of `gpgme_op_keylist_next` return the keys from DATA.

The value of RESERVED must be 0.

This function requires at least GnuPG version 2.1.14 and currently works only with OpenPGP keys.

The context will be busy until either all keys are received (and `gpgme_op_keylist_next` returns `GPG_ERR_EOF`), or `gpgme_op_keylist_end` is called to finish the operation. While the context is busy DATA may not be released.

The function returns the error code `GPG_ERR_INV_VALUE` if CTX is not a valid pointer, and passes through any errors that are reported by the crypto engine support routines.

-- Function: `gpgme_error_t gpgme_op_keylist_next` (`gpgme_ctx_t` CTX, `gpgme_key_t` \*R\_KEY)

The function `gpgme_op_keylist_next` returns the next key in the list created by a previous `gpgme_op_keylist_start` operation in the context CTX. The key will have one reference for the user.  
\*Note Manipulating Keys::.

This is the only way to get at `gpgme_key_t` objects in GPGME.

If the last key in the list has already been returned, `gpgme_op_keylist_next` returns `GPG_ERR_EOF`.

The function returns the error code `GPG_ERR_INV_VALUE` if CTX or R\_KEY is not a valid pointer, and `GPG_ERR_ENOMEM` if there is not enough memory for the operation.

-- Function: `gpgme_error_t gpgme_op_keylist_end` (`gpgme_ctx_t` CTX)

The function `gpgme_op_keylist_end` ends a pending key list operation in the context `CTX`.

After the operation completed successfully, the result of the key listing operation can be retrieved with `gpgme_op_keylist_result`.

The function returns the error code `GPG_ERR_INV_VALUE` if `CTX` is not a valid pointer, and `GPG_ERR_ENOMEM` if at some time during the operation there was not enough memory available.

The following example illustrates how all keys containing a certain string (`g10code`) can be listed with their key ID and the name and email address of the main user ID:

```
gpgme_ctx_t ctx;
gpgme_key_t key;
gpgme_error_t err = gpgme_new (&ctx);

if (!err)
{
 err = gpgme_op_keylist_start (ctx, "g10code", 0);
 while (!err)
 {
 err = gpgme_op_keylist_next
(ctx, &key);
 if (err)
 break;
 printf ("%s:", key->subkeys->keyid);
 if (key->uids && key->uids->name)
 printf (" %s", key->uids->name);
 if (key->uids && key->uids->email)
 printf (" <%s>", key->uids->email);
 putchar ('\n');
 gpgme_key_release (key);
 }
 gpgme_release (ctx);
}
if (gpg_err_code (err) != GPG_ERR_EOF)
{
 fprintf (stderr, "can not list keys: %s\n", gpgme_strerror (err));
 exit (1);
}
```

-- Data type: `gpgme_keylist_result_t`

This is a pointer to a structure used to store the result of a `gpgme_op_keylist_*` operation. After successfully ending a key listing operation, you can retrieve the pointer to the result with `gpgme_op_keylist_result`. The structure contains the following

member:

unsigned int truncated : 1

This is true if the crypto backend  
had to truncate the result,  
and less than the desired keys could be listed.

-- Function: gpgme\_keylist\_result\_t gpgme\_op\_keylist\_result  
(gpgme\_ctx\_t CTX)

The function gpgme\_op\_keylist\_result returns a  
gpgme\_keylist\_result\_t pointer to a structure holding the result  
of a gpgme\_op\_keylist\_\* operation. The pointer is only valid if  
the last operation on the context was a key listing operation, and  
if this operation finished successfully. The returned pointer is  
only valid until the next operation is started on the context.

In a simple program, for which a blocking operation is acceptable,  
the following function can be used to retrieve a single key.

-- Function: gpgme\_error\_t gpgme\_get\_key (gpgme\_ctx\_t CTX,  
const char \*FPR, gpgme\_key\_t \*R\_KEY, int SECRET)

The function gpgme\_get\_key gets the key with the fingerprint (or  
key ID) FPR from the crypto backend and return it in R\_KEY. If  
SECRET is true, get the

secret key. The currently active keylist

mode is used to retrieve the key. The key will have one reference  
for the user.

If the key is not found in the keyring, gpgme\_get\_key returns the  
error code GPG\_ERR\_EOF and \*R\_KEY will be set to NULL.

The function returns the error code GPG\_ERR\_INV\_VALUE if CTX or  
R\_KEY is not a valid pointer or FPR is not a fingerprint or key ID,  
GPG\_ERR\_AMBIGUOUS\_NAME if the key ID was not a unique specifier  
for a key, and GPG\_ERR\_ENOMEM if at some time during the  
operation there was not enough memory available.

File: gpgme.info, Node: Information About Keys, Next: Manipulating Keys, Prev: Listing Keys, Up: Key  
Management

### 7.5.3 Information About Keys

-----

Please see the beginning of this section for more information about  
gpgme\_key\_t objects.

-- Data type: gpgme\_validity\_t

The `gpgme_validity_t` type is used to specify the validity of a user ID in a key. The following validities are defined:

#### `GPGME_VALIDITY_UNKNOWN`

The user ID is of unknown validity. The string representation of this validity is `?`.

#### `GPGME_VALIDITY_UNDEFINED`

The validity of the user ID is undefined. The string representation of this validity is `q`.

#### `GPGME_VALIDITY_NEVER`

The user ID is never valid. The string representation of this validity is `n`.

#### `GPGME_VALIDITY_MARGINAL`

The user ID is marginally valid. The string representation of this validity is `m`.

#### `GPGME_VALIDITY_FULL`

The user ID is fully valid. The string representation of this validity is `f`.

#### `GPGME_VALIDITY_ULTIMATE`

The user ID is ultimately valid. The string representation of this validity is `u`.

File: `gpgme.info`, Node: Manipulating Keys, Next: Generating Keys, Prev: Information About Keys, Up: Key Management

### 7.5.4 Manipulating Keys

-- Function:

`void gpgme_key_ref (gpgme_key_t KEY)`

The function `gpgme_key_ref` acquires an additional reference for the key `KEY`.

-- Function: `void gpgme_key_unref (gpgme_key_t KEY)`

The function `gpgme_key_unref` releases a reference for the key `KEY`. If this was the last reference, the key will be destroyed and all resources associated to it will be released.

File: `gpgme.info`, Node: Generating Keys, Next: Signing Keys, Prev: Manipulating Keys, Up: Key Management

### 7.5.5 Generating Keys

-----

GPGME provides a set of functions to create public key pairs. Most of these functions require the use of GnuPG 2.1 and later; for older GnuPG versions the `gpgme_op_genkey` function can be used. Existing code which wants to update to the new functions or new code which shall supports older GnuPG versions may try the new functions first and provide a fallback to the old function if the error code `GPG_ERR_NOT_SUPPORTED` is received.

```
-- Function: gpgme_error_t gpgme_op_createkey
(gpgme_ctx_t CTX,
 const char *USERID, const char *ALGO, unsigned long RESERVED,
 unsigned long EXPIRES, gpgme_key_t EXTRAKEY,
 unsigned int FLAGS);
```

SINCE: 1.7.0

The function `gpgme_op_createkey` generates a new key for the protocol active in the context `CTX`. As of now this function does only work for OpenPGP and requires at least version 2.1.13 of GnuPG.

`USERID` is commonly the mail address associated with the key. GPGME does not require a specific syntax but if more than a mail address is given, RFC-822 style format is suggested. The value is expected to be in UTF-8 encoding (i.e. no IDN encoding for mail addresses). This is a required parameter.

`ALGO` specifies the algorithm for the new key (actually a keypair of public and private key). For a list of supported algorithms, see the GnuPG manual. If `ALGO` is `NULL` or the string "default", the key is generated using the default algorithm of the engine. If the string "future-default" is used the engine may use an algorithm which is planned to be the default in a future release of the engine; however existing implementation of the protocol may not be able to already handle such future algorithms. For the OpenPGP protocol, the specification of a default algorithm, without requesting a non-default usage via `FLAGS`, triggers the creation of a primary key plus a secondary key (subkey).

`RESERVED` must be set to zero.

`EXPIRES` specifies the expiration time in seconds. If you supply 0, a reasonable expiration time is chosen. Use the flag `GPGME_CREATE_NOEXPIRE` to create keys that do not expire. Note

that this parameter takes an unsigned long value and not a time\_t to avoid problems on systems which use a signed 32 bit time\_t. Note further that the OpenPGP protocol uses 32 bit values for timestamps and thus can only encode dates up to the year 2106.

EXTRAKEY is currently not used and must be set to NULL. A future version of GPGME may use this parameter to create X.509 keys.

FLAGS can be set to the bit-wise OR of the following flags:

GPGME\_CREATE\_SIGN  
GPGME\_CREATE\_ENCR  
GPGME\_CREATE\_CERT  
GPGME\_CREATE\_AUTH

SINCE: 1.7.0

Do not create the key with the default capabilities (key usage) of the requested algorithm but use those explicitly given by these flags: signing, encryption, certification, or authentication. The allowed combinations depend on the algorithm.

If any of these flags are set and a default algorithm has been selected only one key is created in the case of the OpenPGP protocol.

GPGME\_CREATE\_NOPASSWD

SINCE: 1.7.0

Request generation of the key without password protection.

GPGME\_CREATE\_SELFSIGNED

SINCE: 1.7.0

For an X.509 key do not create a CSR but a self-signed certificate. This has not yet been implemented.

GPGME\_CREATE\_NOSTORE

SINCE: 1.7.0

Do not store the created key in the local key database. This has not yet been implemented.

GPGME\_CREATE\_WANTPUB

GPGME\_CREATE\_WANTSEC

SINCE: 1.7.0

Return the public or secret key as part of the result structure. This has not yet been implemented.

#### GPGME\_CREATE\_FORCE

SINCE: 1.7.0

The engine does not allow the creation of a key with a user ID already existing in the local key database. This flag can be used to override this check.

#### GPGME\_CREATE\_NOEXPIRE

SINCE: 1.8.0

Request generation of keys that do not expire.

After the operation completed successfully, information about the created key can be retrieved with `gpgme_op_genkey_result`.

The function returns zero on success, `GPG_ERR_NOT_SUPPORTED` if the engine does not support the command, or a bunch of other error codes.

```
-- Function: gpgme_error_t gpgme_op_createkey_start (gpgme_ctx_t CTX,
 const char *USERID, const char *ALGO, unsigned long RESERVED,
 unsigned long EXPIRES, gpgme_key_t EXTRAKEY,
 unsigned int FLAGS);
```

SINCE: 1.7.0

The function `gpgme_op_createkey_start` initiates a `gpgme_op_createkey` operation; see there for details. It must be completed by calling `gpgme_wait` on the context. \*Note Waiting For Completion::.

```
-- Function: gpgme_error_t gpgme_op_createsubkey (gpgme_ctx_t CTX,
 gpgme_key_t KEY, const char *ALGO, unsigned long RESERVED,
 unsigned long EXPIRES, unsigned int FLAGS);
```

SINCE: 1.7.0

The function `gpgme_op_createsubkey` creates and adds a new subkey to the primary OpenPGP key given by `KEY`. The only allowed protocol in `CTX` is `GPGME_PROTOCOL_OPENPGP`. Subkeys (aka secondary keys) are a concept in the OpenPGP protocol to bind several keys to a primary key. As of now this function requires at least version 2.1.13 of GnuPG.



KEY specifies the key to operate on.

ALGO specifies the algorithm for the new subkey. For a list of supported algorithms, see the GnuPG manual. If ALGO is NULL or the string "default", the subkey is generated using the default algorithm for an encryption subkey of the engine. If the string "future-default" is used the engine may use an encryption algorithm which is planned to be the default in a future release of the engine; however existing implementation of the protocol may not be able to already handle such future algorithms.

RESERVED must be set to zero.

EXPIRES specifies the expiration time in seconds. If you supply 0, a reasonable expiration time is chosen. Use the flag GPGME\_CREATE\_NOEXPIRE to create keys that do not expire. Note that this parameter takes an unsigned long value and not a time\_t to avoid problems on systems which use a signed 32 bit time\_t. Note further that the OpenPGP protocol uses 32 bit values for timestamps and thus can only encode dates up to the year 2106.

FLAGS takes the same values as described above for gpgme\_op\_createkey.

After the operation completed successfully, information about the created key can be retrieved with gpgme\_op\_genkey\_result.

The function returns zero on success, GPG\_ERR\_NOT\_SUPPORTED if the engine does not support the command, or a bunch of other error codes.

```
-- Function: gpgme_error_t gpgme_op_createsubkey_start
(gpgme_ctx_t CTX, gpgme_key_t KEY, const char *ALGO,
 unsigned long RESERVED, unsigned long EXPIRES,
 unsigned int FLAGS);
```

SINCE: 1.7.0

The function gpgme\_op\_createsubkey\_start initiates a gpgme\_op\_createsubkey operation; see there for details. It must be completed by calling gpgme\_wait on the context. \*Note Waiting For Completion::.

```
-- Function: gpgme_error_t gpgme_op_adduid (gpgme_ctx_t CTX,
 gpgme_key_t KEY, const char *USERID, unsigned int FLAGS);
```

SINCE: 1.7.0

The function `gpgme_op_adduid` adds a new user ID to the OpenPGP key given by `KEY`. Adding additional user IDs after key creation is a feature of the OpenPGP protocol and thus the protocol for the context `CTX` must be set to OpenPGP. As of now this function requires at least version 2.1.13 of GnuPG.

`KEY` specifies the key to operate on.

`USERID` is the user ID to add to the key. A user ID is commonly the mail address to be associated with the key. GPGME does not require a specific syntax but if more than a mail address is given, RFC-822 style format is suggested. The value is expected to be in UTF-8 encoding (i.e. no IDN encoding for mail addresses). This is a required parameter.

`FLAGS` are currently not used and must be set to zero.

The function returns zero on success, `GPG_ERR_NOT_SUPPORTED` if the engine does not support the command, or a bunch of other error codes.

-- Function: `gpgme_error_t gpgme_op_adduid_start (gpgme_ctx_t CTX, gpgme_key_t KEY, const char *USERID, unsigned int FLAGS);`

SINCE: 1.7.0

The function `gpgme_op_adduid_start` initiates a `gpgme_op_adduid` operation; see there for details. It must be completed by calling `gpgme_wait` on the context. \*Note Waiting For Completion::.

-- Function: `gpgme_error_t gpgme_op_revuid (gpgme_ctx_t CTX, gpgme_key_t KEY, const char *USERID, unsigned int FLAGS);`

SINCE: 1.7.0

The function `gpgme_op_revuid` revokes a user ID from the OpenPGP key given by `KEY`. Revoking user IDs after key creation is a feature of the OpenPGP protocol and thus the protocol for the context `CTX` must be set to OpenPGP. As of now this function requires at least version 2.1.13 of GnuPG.

`KEY`  
specifies the key to operate on.

USERID is the user ID to be revoked from the key. The user ID must be given verbatim because the engine does an exact and case sensitive match. Thus the uid field from the user ID object (gpgme\_user\_id\_t) is to be used. This is a required parameter.

FLAGS are currently not used and must be set to zero.

Note that the engine won't allow to revoke the last valid user ID. To change a user ID is better to first add the new user ID, then revoke the old one, and finally publish the key.

The function returns zero on success, GPG\_ERR\_NOT\_SUPPORTED if the engine does not support the command, or a bunch of other error codes.

-- Function: gpgme\_error\_t gpgme\_op\_revuid\_start (gpgme\_ctx\_t CTX, gpgme\_key\_t KEY, const char \*USERID, unsigned int FLAGS);

SINCE: 1.7.0

The function gpgme\_op\_revuid\_start initiates a gpgme\_op\_revuid operation; see there for details. It must be completed by calling gpgme\_wait on the context. \*Note Waiting For Completion::.

-- Function: gpgme\_error\_t gpgme\_op\_set\_uid\_flag (gpgme\_ctx\_t CTX, gpgme\_key\_t KEY, const char \*USERID, const char \* NAME, const char \* VALUE);

SINCE: 1.8.0

The function gpgme\_op\_set\_uid\_flag is used to set flags on a user ID from the OpenPGP key given by KEY. Setting flags on user IDs after key creation is a feature of the OpenPGP protocol and thus the protocol for the context CTX must be set to OpenPGP.

KEY specifies the key to operate on. This parameter is required.

USERID is the user ID of the key to be manipulated. This user ID must be given verbatim because the engine does an exact and case sensitive match. Thus the uid field from the user ID object (gpgme\_user\_id\_t) is to be used. This is a required parameter.

NAME names the flag which is to be changed. The only currently supported flag is:

primary

This sets the primary key flag on the given user ID. All other primary key flag on other user IDs are removed. VALUE must be given as NULL. For technical reasons this functions bumps the creation timestamp of all affected self-signatures up by one second. At least GnuPG version 2.1.20 is required.

The function returns zero on success, GPG\_ERR\_NOT\_SUPPORTED if the engine does not support the command, or a bunch of other error codes.

```
-- Function: gpgme_error_t gpgme_op_set_uid_flag_start
(gpgme_ctx_t CTX, gpgme_key_t KEY, const char *USERID,
 cons char * NAME, cons char * VALUE);
```

SINCE: 1.8.0

The function gpgme\_op\_set\_uid\_flag\_start initiates a gpgme\_op\_set\_uid\_flag operation; see there for details. It must be completed by calling gpgme\_wait on the context. \*Note Waiting For Completion::.

```
-- Function: gpgme_error_t gpgme_op_genkey (gpgme_ctx_t CTX,
const char *PARMS,
gpgme_data_t PUBLIC, gpgme_data_t SECRET)
```

The function gpgme\_op\_genkey generates a new key pair in the context CTX. The meaning of PUBLIC and SECRET depends on the crypto backend.

GPG does not support PUBLIC and SECRET, they should be NULL. GnuPG will generate a key pair and add it to the standard key ring. The fingerprint of the generated key is available with gpgme\_op\_genkey\_result.

GpgSM requires PUBLIC to be a writable data object. GpgSM will generate a secret key (which will be stored by gpg-agent, and return a certificate request in PUBLIC, which then needs to be signed by the certification authority and imported before it can be used. GpgSM does not make the fingerprint available.

The argument PARMS specifies parameters for the key in an string that looks something like XML. The details about the format of PARMS are specific to the crypto engine used by CTX. The first line of the parameters must be <GnupgKeyParams format="internal"> and the last line must be </GnupgKeyParams>. Every line in between the first and last lines is treated as a Header: Value pair. In particular, no XML escaping is necessary if you need to

include the characters <, >, or &.

Here is an example for GnuPG as the crypto engine (all parameters of OpenPGP key generation are documented in the GPG manual):

```
<GnupgKeyParms format="internal">
Key-Type: default
Subkey-Type: default
Name-Real: Joe Tester
Name-Comment: with stupid passphrase
Name-Email: joe@foo.bar
Expire-Date: 0
Passphrase: abc
</GnupgKeyParms>
```

Here is an example for GpgSM as the crypto engine (all parameters of OpenPGP key generation are documented in the GPGSM manual):

```
<GnupgKeyParms format="internal">
Key-Type: RSA
Key-Length: 1024
Name-DN: C=de,O=g10 code,OU=Testlab,CN=Joe
2 Tester
Name-Email: joe@foo.bar
</GnupgKeyParms>
```

Strings should be given in UTF-8 encoding. The only format supported for now is internal. The content of the GnupgKeyParms container is passed verbatim to the crypto backend. Control statements are not allowed.

After the operation completed successfully, the result can be retrieved with `gpgme_op_genkey_result`.

The function returns the error code `GPG_ERR_NO_ERROR` if the operation could be started successfully, `GPG_ERR_INV_VALUE` if `PARMS` is not a well-formed string (e.g. does not have the expected tag-like headers and footers), `GPG_ERR_NOT_SUPPORTED` if `PUBLIC` or `SECRET` is not valid, and `GPG_ERR_GENERAL` if no key was created by the backend.

-- Function: `gpgme_error_t gpgme_op_genkey_start (gpgme_ctx_t CTX, const char *PARMS, gpgme_data_t PUBLIC, gpgme_data_t SECRET)`

The function `gpgme_op_genkey_start` initiates a `gpgme_op_genkey` operation. It can be completed by calling `gpgme_wait` on the context. \*Note Waiting For Completion::.

The function returns the error code `GPG_ERR_NO_ERROR` if the operation could be started successfully, `GPG_ERR_INV_VALUE` if `PARMS` is not a valid XML string, and `GPG_ERR_NOT_SUPPORTED` if `PUBLIC` or `SECRET` is not `NULL`.

-- Data type: `gpgme_genkey_result_t`

This is a pointer to a structure used to store the result of a `gpgme_op_genkey` operation. After successfully generating a key, you can retrieve the pointer to the result with `gpgme_op_genkey_result`. The structure contains the following members:

`unsigned int primary : 1`

This flag is set to 1 if a primary key was created and to 0 if not.

`unsigned int sub : 1`

This flag is set to 1 if a subkey was created and to 0 if not.

`unsigned int uid : 1`

This flag is set to 1 if a user ID was created and to 0 if not.

`char`

`*fpr`

This is the fingerprint of the key that was created. If both a primary and a subkey were generated, the fingerprint of the primary key will be returned. If the crypto engine does not provide the fingerprint, `fpr` will be a null pointer.

`gpgme_data_t pubkey`

SINCE: 1.7.0

This will eventually be used to return the public key. It is currently not used.

`gpgme_data_t seckey`

SINCE: 1.7.0

This will eventually be used to return the secret key. It is currently not used.

-- Function: `gpgme_genkey_result_t gpgme_op_genkey_result`  
(`gpgme_ctx_t CTX`)

The function `gpgme_op_genkey_result` returns a `gpgme_genkey_result_t` pointer to a structure holding the result

of a `gpgme_op_genkey` operation. The pointer is only valid if the last operation on the context was a `gpgme_op_genkey` or `gpgme_op_genkey_start` operation, and if this operation finished successfully. The returned pointer is only valid until the next operation is started on the context.

File: `gpgme.info`, Node: Signing Keys, Next: Exporting Keys, Prev: Generating Keys, Up: Key Management

### 7.5.6 Signing Keys

-----

Key signatures are a unique concept of the OpenPGP protocol. They can be used to certify the validity of a key and are used to create the Web-of-Trust (WoT). Instead of using the `gpgme_op_interact` function along with a finite state machine, GPGME provides a convenient function to create key signatures when using modern GnuPG versions.

-- Function: `gpgme_error_t gpgme_op_keysign (gpgme_ctx_t CTX, gpgme_key_t KEY, const char *USERID, unsigned long EXPIRES, unsigned int FLAGS);`

SINCE: 1.7.0

The function `gpgme_op_keysign` adds a new key signature to the public key `KEY`. This function requires at least version 2.1.12 of GnuPG.

`CTX` is the usual context which describes the protocol to use (which must be OpenPGP) and has also the list of signer keys to be used for the signature. The common case is to use the default key for signing other keys. If another key or more than one key shall be used for a key signature, `gpgme_signers_add` can be used. \*Note Selecting Signers::.

`KEY` specifies the key to operate on.

`USERID` selects the user ID or user IDs to be signed. If `USERID` is set to `NULL` all valid user IDs are signed. The user ID must be given verbatim because the engine does an exact and case sensitive match. Thus the `uid` field from the user ID object (`gpgme_user_id_t`) is to be used. To select more than one user ID put them all into one string separated by linefeeds characters (`\n`) and set the flag `GPGME_KEYSIGN_LFSEP`.

`EXPIRES` specifies the expiration time of the new signature in seconds. The common case is to use 0 to not set an expiration

date. However, if the configuration of the engine defines a default expiration for key signatures, that is still used unless the flag `GPGME_KEYSIGN_NOEXPIRE` is used. Note that this parameter takes an unsigned long value and not a `time_t` to avoid problems on systems which use a signed 32 bit `time_t`. Note further that the OpenPGP protocol uses 32 bit values for timestamps and thus can only encode dates up to the year 2106.

FLAGS can be set to the bit-wise OR of the following flags:

`GPGME_KEYSIGN_LOCAL`

SINCE: 1.7.0

Instead of creating an exportable key signature, create a key signature which is marked as non-exportable.

`GPGME_KEYSIGN_LFSEP`

SINCE: 1.7.0

Although linefeeds are uncommon in user IDs this flag is required to explicitly declare that `USERID` may contain several linefeed separated user IDs.

`GPGME_KEYSIGN_NOEXPIRE`

Force the creation of a key signature without an expiration date.

This overrides `EXPIRE` and any local configuration of the engine.

The function returns zero on success, `GPG_ERR_NOT_SUPPORTED` if the engine does not support the command, or a bunch of other error codes.

```
-- Function: gpgme_error_t gpgme_op_keysign_start (gpgme_ctx_t CTX,
 gpgme_key_t KEY, const char *USERID, unsigned long EXPIRES,
 unsigned int FLAGS);
```

SINCE: 1.7.0

The function `gpgme_op_keysign_start` initiates a `gpgme_op_keysign` operation; see there for details. It must be completed by calling `gpgme_wait` on the context. \*Note Waiting For Completion::.

File: `gpgme.info`, Node: Exporting Keys, Next: Importing Keys, Prev: Signing Keys, Up: Key Management



### 7.5.7 Exporting Keys

-----

Exporting keys means the same as running gpg with the command `--export`. However, a mode flag can be used to change the way the export works. The available mode flags are described below, they may be or-ed together.

#### GPGME\_EXPORT\_MODE\_EXTERN

If this bit is set, the output is send directly to the default keyserver. This is currently only allowed for OpenPGP keys. It is good practise to not send more than a few dozens key to a keyserver at one time. Using this flag requires that the KEYDATA argument of the export function is set to NULL.

#### GPGME\_EXPORT\_MODE\_MINIMAL

SINCE: 1.3.1

If this bit is set, the smallest possible key is exported. For OpenPGP keys it removes all signatures except for the latest self-signatures. For X.509 keys it has no effect.

#### GPGME\_EXPORT\_MODE\_SECRET

SINCE: 1.6.0

Instead of exporting the public key, the secret key is exported. This may not be combined with GPGME\_EXPORT\_MODE\_EXTERN. For X.509 the export format is PKCS#8.

#### GPGME\_EXPORT\_MODE\_RAW

SINCE: 1.6.0

If this flag is used with GPGME\_EXPORT\_MODE\_SECRET for an X.509 key the export format will be changed to PKCS#1. This flag may not

be used with OpenPGP.

#### GPGME\_EXPORT\_MODE\_PKCS12

SINCE: 1.6.0

If this flag is used with GPGME\_EXPORT\_MODE\_SECRET for an X.509 key the export format will be changed to PKCS#12 which also includes the certificate. This flag may not be used with OpenPGP.

#### GPGME\_EXPORT\_MODE\_NOUID

SINCE: 1.12.0 - experimental Do not export user ids. Works only with certain gpg version.

-- Function: `gpgme_error_t gpgme_op_export (gpgme_ctx_t CTX,  
const char *PATTERN, gpgme_export_mode_t MODE,  
gpgme_data_t KEYDATA)`

The function `gpgme_op_export` extracts public keys and returns them in the data buffer `KEYDATA`. The output format of the key data returned is determined by the ASCII armor attribute set for the context `CTX`, or, if that is not set, by the encoding specified for `KEYDATA`.

If `PATTERN` is `NULL`, all available keys are returned. Otherwise, `PATTERN` contains an engine specific expression that is used to limit the list to all keys matching the pattern.

`MODE` is usually 0; other values are described above.

The function returns the error code `GPG_ERR_NO_ERROR` if the operation completed successfully, `GPG_ERR_INV_VALUE` if `KEYDATA` is not a valid empty data buffer, and passes through any errors that are reported by the crypto engine support routines.

-- Function: `gpgme_error_t gpgme_op_export_start (gpgme_ctx_t CTX,  
const char *PATTERN, gpgme_export_mode_t MODE,  
gpgme_data_t KEYDATA)`

The function `gpgme_op_export_start` initiates a `gpgme_op_export` operation. It can be completed by calling `gpgme_wait` on the context. \*Note Waiting For Completion::.

The function returns the error code `GPG_ERR_NO_ERROR` if the operation could be started successfully, and `GPG_ERR_INV_VALUE` if `KEYDATA` is not a valid empty data buffer.

-- Function: `gpgme_error_t gpgme_op_export_ext (gpgme_ctx_t CTX,  
const char *PATTERN[], gpgme_export_mode_t  
MODE,  
gpgme_data_t KEYDATA)`

The function `gpgme_op_export_ext` extracts public keys and returns them in the data buffer `KEYDATA`. The output format of the key data returned is determined by the ASCII armor attribute set for the context `CTX`, or, if that is not set, by the encoding specified for `KEYDATA`.

If `PATTERN` or `*PATTERN` is `NULL`, all available keys are returned. Otherwise, `PATTERN` is a `NULL` terminated array of strings that are used to limit the list to all keys matching at least one of the patterns verbatim.

`MODE` is usually 0; other values are described above.

The function returns the error code GPG\_ERR\_NO\_ERROR if the operation completed successfully, GPG\_ERR\_INV\_VALUE if KEYDATA is not a valid empty data buffer, and passes through any errors that are reported by the crypto engine support routines.

-- Function: gpgme\_error\_t gpgme\_op\_export\_ext\_start (gpgme\_ctx\_t CTX,  
const char \*PATTERN[],  
gpgme\_export\_mode\_t MODE,  
gpgme\_data\_t KEYDATA)

The function gpgme\_op\_export\_ext\_start initiates a gpgme\_op\_export\_ext operation. It can be completed by calling gpgme\_wait on the context. \*Note Waiting For Completion::.

The function returns the error code GPG\_ERR\_NO\_ERROR if the operation could be started successfully, and GPG\_ERR\_INV\_VALUE if KEYDATA is not a valid empty data buffer.

-- Function: gpgme\_error\_t gpgme\_op\_export\_keys (gpgme\_ctx\_t CTX,  
gpgme\_key\_t keys[], gpgme\_export\_mode\_t MODE,  
gpgme\_data\_t KEYDATA)

SINCE: 1.2.0

The function gpgme\_op\_export\_keys extracts public keys and returns them in the data buffer KEYDATA. The output format of the key data returned is determined by the ASCII armor attribute set for the context CTX, or, if that is not set, by the encoding specified for KEYDATA.

The keys to export are taken from the NULL terminated array KEYS. Only keys of

the currently selected protocol of CTX which do have a fingerprint set are considered for export. Other keys specified by the KEYS are ignored. In particular OpenPGP keys retrieved via an external key listing are not included.

MODE is usually 0; other values are described above.

The function returns the error code GPG\_ERR\_NO\_ERROR if the operation completed successfully, GPG\_ERR\_INV\_VALUE if KEYDATA is not a valid empty data buffer, GPG\_ERR\_NO\_DATA if no useful keys are in KEYS and passes through any errors that are reported by the crypto engine support routines.

-- Function: gpgme\_error\_t gpgme\_op\_export\_keys\_start (gpgme\_ctx\_t CTX,  
gpgme\_key\_t KEYS[], gpgme\_export\_mode\_t MODE,  
gpgme\_data\_t KEYDATA)

SINCE: 1.2.0

The function `gpgme_op_export_keys_start` initiates a `gpgme_op_export_ext` operation. It can be completed by calling `gpgme_wait` on the context. \*Note Waiting For Completion::.

The function returns the error code `GPG_ERR_NO_ERROR` if the operation could be started successfully, `GPG_ERR_INV_VALUE` if `KEYDATA` is not a valid empty data buffer, `GPG_ERR_NO_DATA` if no useful keys are in `KEYS` and passes through any errors that are reported by the crypto engine support routines.

File: `gpgme.info`, Node: Importing Keys, Next: Deleting Keys, Prev: Exporting Keys, Up: Key Management

### 7.5.8 Importing Keys

-----

Importing keys means the same as running `gpg` with the command `--import`.

-- Function: `gpgme_error_t gpgme_op_import (gpgme_ctx_t CTX, gpgme_data_t KEYDATA)`

The function `gpgme_op_import` adds the keys in the data buffer `KEYDATA` to the key ring of the crypto engine used by `CTX`. The format of `KEYDATA` can be ASCII armored, for example, but the details are specific to the crypto engine.

After the operation completed successfully, the result can be retrieved with `gpgme_op_import_result`.

The function returns the error code `GPG_ERR_NO_ERROR` if the import was completed successfully, `GPG_ERR_INV_VALUE` if `KEYDATA` if `CTX` or `KEYDATA` is not a valid pointer, and `GPG_ERR_NO_DATA` if `KEYDATA` is an empty data buffer.

-- Function: `gpgme_error_t gpgme_op_import_start (gpgme_ctx_t CTX, gpgme_data_t KEYDATA)`

The function `gpgme_op_import_start` initiates a `gpgme_op_import` operation. It can be completed by calling `gpgme_wait` on the context. \*Note Waiting For Completion::.

The function returns the error code `GPG_ERR_NO_ERROR` if the import could be started successfully, `GPG_ERR_INV_VALUE` if `CTX` or `KEYDATA` is not a valid pointer, and `GPG_ERR_NO_DATA` if `KEYDATA` is an empty data buffer.

-- Function: `gpgme_error_t gpgme_op_import_keys (gpgme_ctx_t CTX,`

gpgme\_key\_t \*KEYS)

SINCE: 1.2.0

The function `gpgme_op_import_keys` adds the keys described by the NULL terminated array `KEYS` to the key ring of the crypto engine

used by `CTX`. It is used to actually import and make keys permanent which have been retrieved from an external source (i.e. using `GPGME_KEYLIST_MODE_EXTERN`) earlier. The external keylisting must have been made with the same context configuration (in particular the same home directory). (1) Note that for OpenPGP this may require another access to the keyserver over the network.

Only keys of the currently selected protocol of `CTX` are considered for import. Other keys specified by the `KEYS` are ignored. As of now all considered keys must have been retrieved using the same method, i.e. the used key listing mode must be identical.

After the operation completed successfully, the result can be retrieved with `gpgme_op_import_result`.

To move keys from one home directory to another, export and import the keydata using `gpgme_op_export` and `gpgme_op_import`.

The function returns the error code `GPG_ERR_NO_ERROR` if the

import was completed successfully, `GPG_ERR_INV_VALUE` if `CTX` is not a valid pointer, `GPG_ERR_CONFLICT` if the key listing mode does not match, and `GPG_ERR_NO_DATA` if no keys are considered for export.

-- Function: `gpgme_error_t gpgme_op_import_keys_start (gpgme_ctx_t CTX, gpgme_key_t *KEYS)`

SINCE: 1.2.0

The function `gpgme_op_import_keys_start` initiates a `gpgme_op_import_keys` operation. It can be completed by calling `gpgme_wait` on the context. \*Note Waiting For Completion::.

The function returns the error code `GPG_ERR_NO_ERROR` if the import was completed successfully, `GPG_ERR_INV_VALUE` if `KEYDATA` if `CTX` or `KEYDATA` is not a valid pointer, `GPG_ERR_CONFLICT` if the key listing mode does not match, and `GPG_ERR_NO_DATA` if no keys are considered for export.

-- Data type: `gpgme_import_status_t`

This is a pointer to a structure used to store a part of the result of a `gpgme_op_import` operation.

For each considered key one status is added that contains information about the result of the import. The structure contains the following members:

`gpgme_import_status_t next`

This is a pointer to the next status structure in the linked list, or NULL if this is the last element.

`char *fpr`

This is the fingerprint of the key that was considered.

`gpgme_error_t result`

If the import was not successful, this is the error value that caused the import to fail. Otherwise the error code is `GPG_ERR_NO_ERROR`.

`unsigned int status`

This is a bit-wise OR of the following flags that give more information about what part of the key was imported. If the key was already known, this might be 0.

`GPGME_IMPORT_NEW`

The key was new.

`GPGME_IMPORT_UID`

The key contained new user IDs.

`GPGME_IMPORT_SIG`

The key contained new signatures.

`GPGME_IMPORT_SUBKEY`

The key contained new sub keys.

`GPGME_IMPORT_SECRET`

The key contained a secret key.

-- Data type: `gpgme_import_result_t`

This is a pointer to a structure used to store the result of a `gpgme_op_import` operation. After a successful import operation, you can retrieve the pointer to the result with `gpgme_op_import_result`. The structure contains the following members:

`int considered`

The total number of considered keys.

`int no_user_id`

The number of keys without user ID.

int imported

The total number of imported keys.

int imported\_rsa

The number of imported RSA keys.

int unchanged

The number of unchanged keys.

int new\_user\_ids

The number of new user IDs.

int new\_sub\_keys

The number of new sub keys.

int new\_signatures

The number of new signatures.

int new\_revocations

The number of new revocations.

int secret\_read

The total number of secret keys read.

int secret\_imported

The number of imported secret keys.

int secret\_unchanged

The number of unchanged secret keys.

int not\_imported

The number of keys not imported.

gpgme\_import\_status\_t imports

A list of gpgme\_import\_status\_t objects which contain more information about the keys for which an import was attempted.

int skipped\_v3\_keys

For security reasons modern versions of GnuPG do not anymore support v3 keys (created with PGP 2.x) and ignores them on import. This counter provides the number of such skipped v3 keys.

-- Function: gpgme\_import\_result\_t gpgme\_op\_import\_result  
(gpgme\_ctx\_t CTX)

The function gpgme\_op\_import\_result returns a

gpgme\_import\_result\_t pointer to a structure holding the result of a gpgme\_op\_import operation. The pointer is only valid if the last operation on the context was a gpgme\_op\_import or gpgme\_op\_import\_start operation, and if this operation finished successfully. The returned pointer is only valid until the next operation is started on the context.

----- Footnotes -----

(1) Thus it is a replacement for the usual workaround of exporting and then importing a key to make an X.509 key permanent.

File: gpgme.info, Node: Deleting Keys, Next: Changing Passphrases, Prev: Importing Keys, Up: Key Management

### 7.5.9 Deleting Keys

-----

-- Function: gpgme\_error\_t gpgme\_op\_delete\_ext (gpgme\_ctx\_t CTX,  
const gpgme\_key\_t KEY, unsigned int FLAGS)  
SINCE: 1.9.1

The function gpgme\_op\_delete\_ext deletes the key KEY from the key ring of the crypto engine used by CTX.

FLAGS can be set to the bit-wise OR of the following flags:

GPGME\_DELETE\_ALLOW\_SECRET  
SINCE: 1.9.1

If not set, only public keys are deleted. If set, secret keys are deleted as well, if that is supported.

GPGME\_DELETE\_FORCE  
SINCE: 1.9.1

If set, the user is not asked to confirm the deletion.

The function returns the error code GPG\_ERR\_NO\_ERROR if the key was deleted successfully, GPG\_ERR\_INV\_VALUE if CTX or KEY is not a valid pointer, GPG\_ERR\_NO\_PUBKEY if KEY could not be found in the keyring, GPG\_ERR\_AMBIGUOUS\_NAME if the key was not specified unambiguously, and GPG\_ERR\_CONFLICT if the secret key for KEY is available, but ALLOW\_SECRET is zero.



-- Function: `gpgme_error_t gpgme_op_delete_ext_start (gpgme_ctx_t CTX,  
const gpgme_key_t KEY, unsigned int FLAGS)`  
SINCE: 1.9.1

The function `gpgme_op_delete_ext_start` initiates a `gpgme_op_delete` operation. It can be completed by calling `gpgme_wait` on the context. \*Note Waiting For Completion::.

The function returns the error code `GPG_ERR_NO_ERROR` if the operation was started successfully, and `GPG_ERR_INV_VALUE` if `CTX` or `KEY` is not a valid pointer.

The following functions allow only to use one particular flag.

-- Function: `gpgme_error_t gpgme_op_delete (gpgme_ctx_t CTX,  
const gpgme_key_t KEY, int ALLOW_SECRET)`  
Similar to `gpgme_op_delete_ext`, but only the flag `GPGME_DELETE_ALLOW_SECRET` can be provided.

-- Function: `gpgme_error_t gpgme_op_delete_start (gpgme_ctx_t CTX,  
const gpgme_key_t KEY, int ALLOW_SECRET)`  
Similar to `gpgme_op_delete_ext_start`, but only the flag `GPGME_DELETE_ALLOW_SECRET` can be provided.

File: `gpgme.info`, Node: Changing Passphrases, Next: Changing TOFU Data, Prev: Deleting Keys, Up: Key Management

#### 7.5.10 Changing Passphrases

-----  
-- Function: `gpgme_error_t gpgme_op_passwd (gpgme_ctx_t CTX,  
const gpgme_key_t KEY, unsigned int FLAGS)`

SINCE: 1.3.0

The function `gpgme_op_passwd` changes the passphrase of the private key associated with `KEY`. The only allowed value for `FLAGS` is 0. The backend engine will usually popup a window to ask for the old and the new passphrase. Thus this function is not useful in a server application (where passphrases are not required anyway).

Note that old `gpg` engines (before version 2.0.15) do not support this command and will silently ignore it.

-- Function: `gpgme_error_t gpgme_op_passwd_start (gpgme_ctx_t CTX,  
const gpgme_key_t KEY, unsigned int FLAGS)`

SINCE: 1.3.0

The function `gpgme_op_passwd_start` initiates a `gpgme_op_passwd` operation. It can be completed by calling `gpgme_wait` on the context. \*Note Waiting For Completion::.

The function returns 0 if the operation was started successfully, and an error code if one of the arguments is not valid or the operation could not be started.

File: `gpgme.info`, Node: Changing TOFU Data, Next: Advanced Key Editing,  
Prev: Changing Passphrases, Up: Key Management

#### 7.5.11 Changing TOFU Data

-----

The OpenPGP engine features a Trust-On-First-Use (TOFU) key validation model. For resolving conflicts it is necessary to declare the policy for a key. See the GnuPG manual for details on the TOFU implementation.

-- Data type: `enum gpgme_tofu_policy_t`  
SINCE: 1.7.0

The `gpgme_tofu_policy_t` type specifies the set of possible policy values that are supported by GPGME:

`GPGME_TOFU_POLICY_AUTO`

Set the policy to auto.

`GPGME_TOFU_POLICY_GOOD`

Set the policy to good.

`GPGME_TOFU_POLICY_BAD`

Set the policy to bad.

`GPGME_TOFU_POLICY_ASK`

Set the policy to ask.

`GPGME_TOFU_POLICY_UNKNOWN`

Set the policy to unknown.

To change the policy for a key the following functions can be used:

-- Function: `gpgme_error_t gpgme_op_tofu_policy (gpgme_ctx_t CTX,  
const gpgme_key_t KEY, gpgme_tofu_policy_t POLICY)`

SINCE: 1.7.0

The function `gpgme_op_tofu_policy` changes the TOFU policy of KEY. The valid values for POLICY are listed above. As of now this function does only work for OpenPGP and requires at least version 2.1.10 of GnuPG.

The function returns zero on success, `GPG_ERR_NOT_SUPPORTED` if the engine does not support the command, or a bunch of other error codes.

-- Function: `gpgme_error_t gpgme_op_tofu_policy_start (gpgme_ctx_t CTX, const gpgme_key_t KEY, gpgme_tofu_policy_t POLICY)`

SINCE: 1.7.0

The function `gpgme_op_tofu_policy_start` initiates a `gpgme_op_tofu_policy` operation. It can be completed by calling `gpgme_wait` on the context. \*Note Waiting For Completion::.

The function returns 0 if the operation was started successfully, and an error code if one of the arguments is not valid or the operation could not be started.

File: `gpgme.info`, Node: Advanced Key Editing, Prev: Changing TOFU Data, Up: Key Management

#### 7.5.12 Advanced Key Editing

-----

-- Data type: `gpgme_error_t (*gpgme_interact_cb_t) (void *HANDLE, const char *STATUS, const char *ARGS, int FD)`

SINCE: 1.7.0

The `gpgme_interact_cb_t` type is the type of functions which GPGME calls if it a key interact operation is on-going. The status keyword STATUS and the argument line ARGS are passed through by GPGME from the crypto engine. An empty string represents EOF. The file descriptor FD is -1 for normal status messages. If STATUS indicates a command rather than a status message, the response to the command should be written to FD. The HANDLE is provided by the user at start of operation.

The function should return `GPG_ERR_FALSE` if it did not handle the status code, 0 for success, or any other error value.

-- Function: `gpgme_error_t gpgme_op_interact (gpgme_ctx_t CTX, gpgme_key_t KEY, unsigned int FLAGS, gpgme_interact_cb_t`

FNC,  
void \*HANDLE, gpgme\_data\_t OUT)

SINCE: 1.7.0

The function `gpgme_op_interact` processes the key `KEY` interactively, using the interact callback function `FNC` with the handle `HANDLE`. The callback is invoked for every status and command request from the crypto engine. The output of the crypto engine is written to the data object `OUT`.

Note that the protocol between the callback function and the crypto engine is specific to the crypto engine and no further support in implementing this protocol correctly is provided by GPGME.

`FLAGS` modifies the behaviour of the function; the only defined bit value is:

`GPGME_INTERACT_CARD`

SINCE: 1.7.0

This is used for smartcard based keys and uses `gpgs --card-edit` command.

The function returns 0 if the edit operation completes successfully, `GPG_ERR_INV_VALUE` if `CTX` or `KEY` is not a valid pointer, and any error returned by the crypto engine or the edit callback handler.

-- Function: `gpgme_error_t gpgme_op_interact_start (gpgme_ctx_t CTX, gpgme_key_t KEY, unsigned int FLAGS, gpgme_interact_cb_t FNC, void *HANDLE, gpgme_data_t OUT)`

SINCE: 1.7.0

The function `gpgme_op_interact_start` initiates a `gpgme_op_interact` operation. It can be completed by calling `gpgme_wait` on the context. \*Note Waiting For Completion::.

The function returns 0 if the operation was started successfully, and `GPG_ERR_INV_VALUE` if `CTX` or `KEY` is not a valid pointer.

File: `gpgme.info`, Node: Trust Item Management, Next: Crypto Operations, Prev: Key Management, Up: Contexts

## 7.6 Trust Item Management

=====

\*Caution:\* The trust items interface is experimental.

-- Data type: `gpgme_trust_item_t`

The `gpgme_trust_item_t` type is a pointer to a trust item object.

It has the following members:

`char *keyid`

This is a string describing the  
key to which this trust items  
belongs.

`int type`

This is the type of the trust item. A value of 1 refers to a  
key, a value of 2 refers to a user ID.

`int level`

This is the trust level.

`char *owner_trust`

The owner trust if type is 1.

`char *validity`

The calculated validity.

`char *name`

The user name if type is 2.

\* Menu:

\* Listing Trust Items::        Browsing the list of available trust items.

\* Manipulating Trust Items::    Operations on trust items.

File: `gpgme.info`, Node: Listing Trust Items, Next: Manipulating Trust Items, Up: Trust Item Management

### 7.6.1 Listing Trust Items

-----

-- Function: `gpgme_error_t gpgme_op_trustlist_start (gpgme_ctx_t CTX,  
                  const char *PATTERN, int MAX_LEVEL)`

The function `gpgme_op_trustlist_start` initiates a trust item  
listing operation inside the context `CTX`. It sets everything up so  
that subsequent  
invocations of `gpgme_op_trustlist_next` return the  
trust items in the list.

The string `PATTERN` contains an engine specific expression that is

used to limit the list to all trust items matching the pattern. It can not be the empty string.

The argument MAX\_LEVEL is currently ignored.

The context will be busy until either all trust items are received (and gpgme\_op\_trustlist\_next returns GPG\_ERR\_EOF), or gpgme\_op\_trustlist\_end is called to finish the operation.

The function returns the error code GPG\_ERR\_INV\_VALUE if CTX is not a valid pointer, and passes through any errors that are reported by the crypto engine support routines.

-- Function: gpgme\_error\_t gpgme\_op\_trustlist\_next (gpgme\_ctx\_t CTX, gpgme\_trust\_item\_t \*R\_ITEM)

The function gpgme\_op\_trustlist\_next returns the next trust item in the list created by a previous gpgme\_op\_trustlist\_start operation in the context CTX. The trust item can be destroyed with

gpgme\_trust\_item\_release. \*Note Manipulating Trust Items::.

This is the only way to get at gpgme\_trust\_item\_t objects in GPGME.

If the last trust item in the list has already been returned, gpgme\_op\_trustlist\_next returns GPG\_ERR\_EOF.

The function returns the error code GPG\_ERR\_INV\_VALUE if CTX or R\_ITEM is not a valid pointer, and GPG\_ERR\_ENOMEM if there is not enough memory for the operation.

-- Function: gpgme\_error\_t gpgme\_op\_trustlist\_end (gpgme\_ctx\_t CTX)

The function gpgme\_op\_trustlist\_end ends a pending trust list operation in the context CTX.

The function returns the error code GPG\_ERR\_INV\_VALUE if CTX is not a valid pointer, and GPG\_ERR\_ENOMEM if at some time during the operation there was not enough memory available.

File: gpgme.info, Node: Manipulating Trust Items, Prev: Listing Trust Items, Up: Trust Item Management

## 7.6.2 Manipulating Trust Items

-----

-- Function:

void gpgme\_trust\_item\_ref (gpgme\_trust\_item\_t ITEM)

The function gpgme\_trust\_item\_ref acquires an additional

reference for the trust item ITEM.

-- Function: void gpgme\_trust\_item\_unref (gpgme\_trust\_item\_t ITEM)

The function gpgme\_trust\_item\_unref releases a reference for the trust item ITEM. If this was the last reference, the trust item will be destroyed and all resources associated to it will be released.

File: gpgme.info, Node: Crypto Operations, Next: Miscellaneous, Prev: Trust Item Management, Up: Contexts

## 7.7 Crypto Operations

=====

Sometimes, the result of a crypto operation returns a list of invalid keys encountered in processing the request. The following structure is used to hold information about such a key.

-- Data type: gpgme\_invalid\_key\_t

This is a pointer to a structure used to store a part of the result of a crypto operation which takes user IDs as one input parameter. The structure contains the following members:

gpgme\_invalid\_key\_t next

This is a pointer to the next invalid key structure in the linked list, or NULL if this is the last element.

char \*fpr

The fingerprint or key ID of the invalid key encountered.

gpgme\_error\_t reason

An error code describing the reason why the key was found invalid.

\* Menu:

- \* Decrypt::            Decrypting a ciphertext.
- \* Verify::            Verifying a signature.
- \* Decrypt and Verify::    Decrypting a signed ciphertext.
- \* Sign::              Creating a signature.
- \* Encrypt::            Encrypting a plaintext.

File: gpgme.info, Node: Decrypt, Next: Verify, Up: Crypto Operations

### 7.7.1 Decrypt

-----

-- Function: `gpgme_error_t gpgme_op_decrypt (gpgme_ctx_t CTX,  
gpgme_data_t CIPHER, gpgme_data_t PLAIN)`

The function `gpgme_op_decrypt` decrypts the ciphertext in the data object CIPHER and stores it into the data object PLAIN.

The function returns the error code `GPG_ERR_NO_ERROR` if the ciphertext could be decrypted successfully, `GPG_ERR_INV_VALUE` if CTX, CIPHER or PLAIN is not a valid pointer, `GPG_ERR_NO_DATA` if CIPHER does not contain any data to decrypt, `GPG_ERR_DECRYPT_FAILED` if CIPHER is not a valid cipher text, `GPG_ERR_BAD_PASSPHRASE` if the passphrase for the secret key could not be retrieved, and passes through some errors that are reported by the crypto engine support routines.

-- Function: `gpgme_error_t gpgme_op_decrypt_start (gpgme_ctx_t CTX,  
gpgme_data_t CIPHER, gpgme_data_t PLAIN)`

The function `gpgme_op_decrypt_start` initiates a `gpgme_op_decrypt` operation. It can be completed by calling `gpgme_wait` on the context. \*Note Waiting For Completion::.

The function returns the error code `GPG_ERR_NO_ERROR` if the operation could be started successfully, and `GPG_ERR_INV_VALUE` if CIPHER or PLAIN is not a valid pointer.

-- Function: `gpgme_error_t gpgme_op_decrypt_ext ( gpgme_ctx_t CTX,  
gpgme_decrypt_flags_t FLAGS, gpgme_data_t CIPHER,  
gpgme_data_t PLAIN)`

SINCE: 1.8.0

The function `gpgme_op_decrypt_ext` is the same as `gpgme_op_decrypt` but has an additional argument `FLAGS`. If `FLAGS` is 0 both function behave identically.

The value in `FLAGS` is a bitwise-or combination of one or multiple of the following bit values:

`GPGME_DECRYPT_VERIFY`

SINCE: 1.8.0

The `GPGME_DECRYPT_VERIFY` symbol specifies that this function shall exactly act as `gpgme_op_decrypt_verify`.

`GPGME_DECRYPT_UNWRAP`

SINCE: 1.8.0



The GPGME\_DECRYPT\_UNWRAP symbol specifies that the output shall be an OpenPGP message with only the encryption layer removed. This requires GnuPG 2.1.12 and works only for OpenPGP. This is the counterpart to GPGME\_ENCRYPT\_WRAP.

The function  
returns the error codes as described for  
gpgme\_op\_decrypt respective gpgme\_op\_encrypt.

-- Function: gpgme\_error\_t gpgme\_op\_decrypt\_ext\_start (  
gpgme\_ctx\_t CTX, gpgme\_decrypt\_flags\_t FLAGS,  
gpgme\_data\_t CIPHER, gpgme\_data\_t PLAIN)

SINCE: 1.8.0

The function gpgme\_op\_decrypt\_ext\_start initiates a  
gpgme\_op\_decrypt\_ext operation. It can be completed by calling  
gpgme\_wait on the context. \*Note Waiting For Completion::.

The function returns the error code GPG\_ERR\_NO\_ERROR if the  
operation could be started successfully, and GPG\_ERR\_INV\_VALUE if  
CIPHER or PLAIN is not a valid pointer.

-- Data type: gpgme\_recipient\_t  
SINCE: 1.1.0

This is a pointer to a structure used to store information about  
the recipient of an encrypted text which is decrypted in a  
gpgme\_op\_decrypt operation. This information (except for the  
status field) is even available before the operation finished  
successfully, for example  
in a passphrase callback. The structure  
contains the following members:

gpgme\_recipient\_t next

This is a pointer to the next recipient structure in the  
linked list, or NULL if this is the last element.

gpgme\_pubkey\_algo\_t

The public key algorithm used in the encryption.

char \*keyid

This is the key ID of the key (in hexadecimal digits) used as  
recipient.

gpgme\_error\_t status

This is an error number with the error code GPG\_ERR\_NO\_SECKEY

if the secret key for this recipient is not available, and 0 otherwise.

-- Data type: `gpgme_decrypt_result_t`

This is a pointer to a structure used to store the result of a `gpgme_op_decrypt` operation. After successfully decrypting data, you can retrieve the pointer to the result with `gpgme_op_decrypt_result`. As with all result structures, it this structure shall be considered read-only and an application must not allocate such a structure on its own. The structure contains the following members:

`char *unsupported_algorithm`

If an unsupported algorithm was encountered, this string describes the algorithm that is not supported.

`unsigned int wrong_key_usage : 1`

SINCE: 0.9.0 This is true if the key was not used according to its policy.

`unsigned int legacy_cipher_nomdc : 1`

SINCE: 1.11.2 The message was made by a legacy algorithm without any integrity protection. This might be an old but legitimate message.

`unsigned int is_mime : 1;`

SINCE: 1.11.0 The message claims that the content is a MIME object.

`unsigned int is_de_vs : 1;`

SINCE: 1.10.0 The message was encrypted in a VS-NfD compliant way. This is a specification in Germany for a restricted communication level.

`gpgme_recipient_t recipients`

SINCE: 1.1.0

This is a linked list of recipients to which this message was encrypted.

`char *file_name`

This is the filename of the original plaintext message file if it is known, otherwise this is a null pointer.

`char *session_key`

SINCE: 1.8.0

A textual representation (nul-terminated string) of the session key used in symmetric encryption of the message, if the context has been set to export session keys (see `gpgme_set_ctx_flag`, "export-session-key"), and a session key was available for the most recent decryption operation. Otherwise, this is a null pointer.

You must not try to access this member of the struct unless `gpgme_set_ctx_flag` (ctx, "export-session-key") returns success or `gpgme_get_ctx_flag` (ctx, "export-session-key") returns true (non-empty string).

char \*symkey\_algo  
SINCE: 1.11.0

A string with the symmetric encryption algorithm and mode using the format "<algo>.<mode>". Note that the deprecated non-MDC encryption mode of OpenPGP is given as "PGPCFB".

-- Function: `gpgme_decrypt_result_t gpgme_op_decrypt_result`  
(`gpgme_ctx_t` CTX)  
The function `gpgme_op_decrypt_result` returns a `gpgme_decrypt_result_t` pointer to a structure holding the result of a `gpgme_op_decrypt` operation. The pointer is only valid if the last operation on the context was a `gpgme_op_decrypt` or `gpgme_op_decrypt_start` operation. If the operation failed this might be a NULL pointer. The returned pointer is only valid until the next operation is started on the context.

File: `gpgme.info`, Node: Verify, Next: Decrypt and Verify, Prev: Decrypt, Up: Crypto Operations

### 7.7.2 Verify

-----

-- Function: `gpgme_error_t gpgme_op_verify` (`gpgme_ctx_t` CTX,  
    `gpgme_data_t` SIG, `gpgme_data_t` SIGNED\_TEXT,  
    `gpgme_data_t` PLAIN)  
The function `gpgme_op_verify` verifies that the signature in the data object SIG is a valid signature. If SIG is a detached signature, then the signed text should be provided in SIGNED\_TEXT and PLAIN should be a null pointer. Otherwise, if SIG is a normal (or cleartext) signature, SIGNED\_TEXT should be a null pointer and PLAIN should be a writable data object that will contain the plaintext after successful verification.

The results of the individual signature verifications can be retrieved with `gpgme_op_verify_result`.

The function returns the error code `GPG_ERR_NO_ERROR` if the operation could be completed successfully, `GPG_ERR_INV_VALUE` if `CTX`, `SIG` or `PLAIN` is not a valid pointer, `GPG_ERR_NO_DATA` if `SIG` does not contain any data to verify, and passes through any errors that are reported by the crypto engine support routines.

-- Function: `gpgme_error_t gpgme_op_verify_start (gpgme_ctx_t CTX, gpgme_data_t SIG, gpgme_data_t SIGNED_TEXT, gpgme_data_t PLAIN)`

The function `gpgme_op_verify_start` initiates a `gpgme_op_verify` operation. It can be completed by calling `gpgme_wait` on the context. \*Note Waiting For Completion::.

The function returns the error code `GPG_ERR_NO_ERROR` if the operation could be started successfully, `GPG_ERR_INV_VALUE` if `CTX`, `SIG` or `PLAIN` is not a valid pointer, and `GPG_ERR_NO_DATA` if `SIG` or `PLAIN` does not contain any data to verify.

-- Data type: `gpgme_sig_notation_t`

This is a pointer to a structure used to store a part of the result of a `gpgme_op_verify` operation. The structure contains the following members:

`gpgme_sig_notation_t next`

This is a pointer to the next new signature notation structure in the linked list, or `NULL` if this is the last element.

`char *name`

The name of the notation field. If this is `NULL`, then the member value will contain a policy URL.

`int name_len`

The length of the name field. For strings the length is counted without the trailing binary zero.

`char *value`

The value of the notation field. If `name` is `NULL`, then this is a policy URL.

`int value_len`

The length of the value field. For strings the length is counted without the trailing binary zero.

`gpgme_sig_notation_flags_t flags`

The accumulated flags field. This field contains the flags associated with the notation data in an accumulated form which can be used as an argument to the function `gpgme_sig_notation_add`. The value flags is a bitwise-or combination of one or multiple of the following bit values:

`GPGME_SIG_NOTATION_HUMAN_READABLE`  
SINCE: 1.1.0

The `GPGME_SIG_NOTATION_HUMAN_READABLE` symbol specifies that the notation data is in human readable form

`GPGME_SIG_NOTATION_CRITICAL`

SINCE: 1.1.0

The `GPGME_SIG_NOTATION_CRITICAL` symbol specifies that the notation data is critical.

unsigned int `human_readable` : 1

This is true if the `GPGME_SIG_NOTATION_HUMAN_READABLE` flag is set and false otherwise. This flag is only valid for notation data, not for policy URLs.

unsigned int `critical` : 1

This is true if the `GPGME_SIG_NOTATION_CRITICAL` flag is set and false otherwise. This flag is valid for notation data and policy URLs.

-- Data type: `gpgme_signature_t`

This is a pointer to a structure used to store a part of the result of a `gpgme_op_verify` operation. The structure contains the following members:

`gpgme_signature_t` `next`

This is a pointer to the next new signature structure in the linked list, or NULL if this is the last element.

`gpgme_sigsum_t` `summary`

This is a bit vector giving a summary of the signature status.

It provides an easy interface to a defined semantic of the signature status. Checking just one bit is sufficient to see whether a signature is valid without any restrictions. This means that you can check for `GPGME_SIGSUM_VALID` like this:

```
if ((sig.summary & GPGME_SIGSUM_VALID))
{
```

```

 ..do stuff if valid..
}
else
{
 ..do stuff if not fully valid..
}

```

The defined bits are:

GPGME\_SIGSUM\_VALID

The signature is fully valid.

GPGME\_SIGSUM\_GREEN

The signature is good but one might want to display some extra information. Check the other bits.

GPGME\_SIGSUM\_RED

The signature is bad. It might be useful to check other bits and display more information, i.e. a revoked certificate might not render a signature invalid when the message was received prior to the cause for the revocation.

GPGME\_SIGSUM\_KEY\_REVOKED

The key or at least one certificate has been revoked.

GPGME\_SIGSUM\_KEY\_EXPIRED

The key or one of the certificates has expired. It is probably a good idea to display the date of the expiration.

GPGME\_SIGSUM\_SIG\_EXPIRED

The signature has expired.

GPGME\_SIGSUM\_KEY\_MISSING

Cant verify due to a missing key or certificate.

GPGME\_SIGSUM\_CRL\_MISSING

The CRL (or an equivalent mechanism) is not available.

GPGME\_SIGSUM\_CRL\_TOO\_OLD

Available CRL is too old.

GPGME\_SIGSUM\_BAD\_POLICY

A policy requirement was not met.

GPGME\_SIGSUM\_SYS\_ERROR

A system error occurred.

## GPGME\_SIGSUM\_TOFU\_CONFLICT

A TOFU conflict  
was detected.

char \*fpr

This is the fingerprint or key ID of the signature.

gpgme\_error\_t status

This is the status of the signature. In particular, the following status codes are of interest:

### GPG\_ERR\_NO\_ERROR

This status indicates that the signature is valid. For the combined result this status means that all signatures are valid.

### GPG\_ERR\_SIG\_EXPIRED

This status indicates that the signature is valid but expired. For the combined result this status means that all signatures are valid and expired.

### GPG\_ERR\_KEY\_EXPIRED

This status indicates that the signature is valid but the key used to verify the signature has expired. For the combined result this status means that all signatures are valid and all keys are expired.

### GPG\_ERR\_CERT\_REVOKED

This status indicates that the signature is valid but the key used to verify the signature has been revoked. For the combined result this status means that all signatures are valid and all keys are revoked.

### GPG\_ERR\_BAD\_SIGNATURE

This status indicates that the signature is invalid. For the combined result this status means that all signatures are invalid.

### GPG\_ERR\_NO\_PUBKEY

This status indicates that the signature could not be verified due to a missing key. For the combined result this status means that all signatures could not be checked due to missing keys.

### GPG\_ERR\_GENERAL

This status indicates that there was some other error

which prevented the signature verification.

gpgme\_sig\_notation\_t notations

This is a linked list with the notation data and policy URLs.

unsigned long timestamp

The creation timestamp of this signature.

unsigned long exp\_timestamp

The expiration timestamp of this signature, or 0 if the signature does not expire.

unsigned int wrong\_key\_usage : 1

This is true if the key was not used according to its policy.

unsigned int pka\_trust : 2

This is set to the trust information gained by means of the PKA system. Values are:

0

No PKA information available or verification not possible.

1

PKA verification failed.

2

PKA verification succeeded.

3

Reserved for future use.

Depending on the configuration of the engine, this metric may also be reflected by the validity of the signature.

unsigned int chain\_model : 1

SINCE: 1.1.6

This is true if the validity of the signature has been checked using the chain model. In the chain model the time the signature has been created must be within the validity period of the certificate and the time the certificate itself has been created must be within the validity period of the issuing certificate. In contrast the default validation model checks the validity of signature as well at the entire certificate chain at the current time.

gpgme\_validity\_t validity

The validity of the signature.

gpgme\_error\_t validity\_reason

If a signature is not valid, this provides a reason why.



gpgme\_pubkey\_algo\_t

The public key algorithm used to create this signature.

gpgme\_hash\_algo\_t

The hash algorithm used to create this signature.

char \*pka\_address

The mailbox from the PKA information or NULL.

gpgme\_key\_t key

SINCE: 1.7.0

An object describing the key used to create the signature.

This key object may be incomplete in that it only conveys information available directly with a signature. It may also be NULL if such information is not readily available.

-- Data type: gpgme\_verify\_result\_t

This is a pointer to a structure used to store the result of a gpgme\_op\_verify operation. After verifying a signature, you can retrieve the pointer to the result with gpgme\_op\_verify\_result. If the operation failed this might be a NULL pointer. The structure contains the following member:

gpgme\_signature\_t signatures

A linked list with information about all signatures for which a verification was attempted.

char \*file\_name

This is the filename of the original plaintext message file if it is known, otherwise this is a null pointer. Warning: The filename is not covered by the signature.

unsigned int is\_mime : 1;

SINCE: 1.11.0

The message claims that the content is a MIME object.

Warning: This flag is not covered by the signature.

-- Function: gpgme\_verify\_result\_t gpgme\_op\_verify\_result  
(gpgme\_ctx\_t CTX)

The function gpgme\_op\_verify\_result returns a gpgme\_verify\_result\_t pointer to a structure holding the result of a gpgme\_op\_verify operation. The pointer is only valid if the last operation on the context was a gpgme\_op\_verify, gpgme\_op\_verify\_start, gpgme\_op\_decrypt\_verify or

gpgme\_op\_decrypt\_verify\_start operation, and if this operation finished successfully (for gpgme\_op\_decrypt\_verify and gpgme\_op\_decrypt\_verify\_start, the error code GPG\_ERR\_NO\_DATA counts as successful in this context). The returned pointer is only valid until the next operation is started on the context.

File: gpgme.info, Node: Decrypt and Verify, Next: Sign, Prev: Verify, Up: Crypto Operations

### 7.7.3 Decrypt and Verify

-----  
-- Function:

gpgme\_error\_t gpgme\_op\_decrypt\_verify (gpgme\_ctx\_t CTX,  
gpgme\_data\_t CIPHER, gpgme\_data\_t PLAIN)

The function gpgme\_op\_decrypt\_verify decrypts the ciphertext in the data object CIPHER and stores it into the data object PLAIN. If CIPHER contains signatures, they will be verified.

After the operation completed, gpgme\_op\_decrypt\_result and gpgme\_op\_verify\_result can be used to retrieve more information about the signatures.

If the error code GPG\_ERR\_NO\_DATA is returned, CIPHER does not contain any data to decrypt. However, it might still be signed. The information about detected signatures is available with gpgme\_op\_verify\_result in this case.

The function returns the error code GPG\_ERR\_NO\_ERROR if the ciphertext could be decrypted successfully, GPG\_ERR\_INV\_VALUE if CTX, CIPHER or PLAIN is not a valid pointer, GPG\_ERR\_NO\_DATA if CIPHER does not contain any data to decrypt, GPG\_ERR\_DECRYPT\_FAILED if CIPHER is not a valid cipher text, GPG\_ERR\_BAD\_PASSPHRASE if the passphrase for the secret key could not be retrieved, and passes through any errors that are reported by the crypto engine support routines.

-- Function: gpgme\_error\_t gpgme\_op\_decrypt\_verify\_start  
(gpgme\_ctx\_t CTX, gpgme\_data\_t CIPHER, gpgme\_data\_t PLAIN)  
The function gpgme\_op\_decrypt\_verify\_start initiates a gpgme\_op\_decrypt\_verify operation. It can be completed by calling gpgme\_wait on the context. \*Note Waiting For Completion::.

The function returns the error code GPG\_ERR\_NO\_ERROR if the operation could be started successfully, GPG\_ERR\_INV\_VALUE if CTX, CIPHER, PLAIN or R\_STAT is not a valid pointer, and

GPG\_ERR\_NO\_DATA if CIPHER does not contain any data to decrypt.

When processing mails it is sometimes useful to extract the actual mail address (the addr-spec) from a string. GPGME provides this helper function which uses the same semantics as the internal functions in GPGME and GnuPG:

-- Function: char \* gpgme\_addrspec\_from\_uid (const char \*UID)

SINCE: 1.7.1

Return the mail address (called addr-spec in RFC-5322) from the string UID which is assumed to be a user id (called address in RFC-5322). All plain ASCII characters (i.e. those with bit 7 cleared) in the result are converted to lowercase. Caller must free the result using gpgme\_free. Returns NULL if no valid address was found (in which case ERRNO is set to EINVAL) or for other errors.

File: gpgme.info, Node: Sign, Next: Encrypt, Prev: Decrypt and Verify, Up: Crypto Operations

#### 7.7.4 Sign

-----

A signature can contain signatures by one or more keys. The set of keys used to create a signatures is contained in a context, and is applied to all following signing operations in this context (until the set is changed).

\* Menu:

\* Selecting Signers::       How to choose the keys to sign with.

\* Creating a Signature::

    How to create a signature.

\* Signature Notation Data::   How to add notation data to a signature.

File: gpgme.info, Node: Selecting Signers, Next: Creating a Signature, Up: Sign

##### 7.7.4.1 Selecting Signers

.....

The key or the keys used to create a signature are stored in the context. The following functions can be used to manipulate this list.

If no signer has been set into the context a default key is used for signing.

-- Function: void gpgme\_signers\_clear (gpgme\_ctx\_t CTX)

The function gpgme\_signers\_clear releases a reference for each key on the signers list and removes the list of signers from the context CTX.

Every context starts with an empty list.

-- Function: gpgme\_error\_t gpgme\_signers\_add (gpgme\_ctx\_t CTX,  
const gpgme\_key\_t KEY)

The function gpgme\_signers\_add adds the key KEY to the list of signers in the context CTX.

Calling this function acquires an additional reference for the key.

-- Function: unsigned int gpgme\_signers\_count (const gpgme\_ctx\_t CTX)  
SINCE: 1.4.3

The function gpgme\_signers\_count returns the number of signer keys in the context CTX.

-- Function: gpgme\_key\_t gpgme\_signers\_enum (const gpgme\_ctx\_t CTX,  
int SEQ)

The function gpgme\_signers\_enum returns the SEQth key in the list of signers in the context CTX. An additional reference is acquired for the user.

If SEQ is out of range, NULL is returned.

File: gpgme.info, Node: Creating a Signature, Next: Signature Notation Data, Prev: Selecting Signers, Up: Sign

#### 7.7.4.2 Creating a Signature

.....

-- Data type: enum gpgme\_sig\_mode\_t

The gpgme\_sig\_mode\_t type is used to specify the desired type of a signature. The following modes are available:

GPGME\_SIG\_MODE\_NORMAL

A normal signature is made, the output includes the plaintext and the signature.

GPGME\_SIG\_MODE\_DETACH

A detached signature is made.

## GPGME\_SIG\_MODE\_CLEAR

A clear text signature is made. The ASCII armor and text mode settings of the context are ignored.

-- Function: `gpgme_error_t gpgme_op_sign (gpgme_ctx_t CTX,  
gpgme_data_t PLAIN, gpgme_data_t SIG, gpgme_sig_mode_t MODE)`

The function `gpgme_op_sign` creates a signature for the text in the data object `PLAIN` and returns it in the data object `SIG`. The type of the signature created is determined by the ASCII armor (or, if that is not set, by the encoding specified for `SIG`), the text mode attributes set for the context `CTX` and the requested signature mode `MODE`.

After the operation completed successfully, the result can be retrieved with `gpgme_op_sign_result`.

If an S/MIME signed message is created using the CMS crypto engine, the number of certificates to include in the message can be specified with `gpgme_set_include_certs`. \*Note Included Certificates::.

The function returns the error code `GPG_ERR_NO_ERROR` if the signature could be created successfully, `GPG_ERR_INV_VALUE` if `CTX`, `PLAIN` or `SIG` is not a valid pointer, `GPG_ERR_NO_DATA` if the signature could not be created, `GPG_ERR_BAD_PASSPHRASE` if the passphrase for the secret key could not be retrieved, `GPG_ERR_UNUSABLE_SECKEY` if there are invalid signers, and passes through any errors that are reported by the crypto engine support routines.

-- Function: `gpgme_error_t gpgme_op_sign_start (gpgme_ctx_t CTX,  
gpgme_data_t PLAIN, gpgme_data_t SIG, gpgme_sig_mode_t MODE)`

The function `gpgme_op_sign_start` initiates a `gpgme_op_sign` operation. It can be completed by calling `gpgme_wait` on the context. \*Note Waiting For Completion::.

The function returns the error code `GPG_ERR_NO_ERROR` if the operation could be started successfully, and `GPG_ERR_INV_VALUE` if `CTX`, `PLAIN` or `SIG` is not a valid pointer.

--

Data type: `gpgme_new_signature_t`

This is a pointer to a structure used to store a part of the result of a `gpgme_op_sign` operation. The structure contains the following members:

`gpgme_new_signature_t next`

This is a pointer to the next new signature structure in the

linked list, or NULL if this is the last element.

`gpgme_sig_mode_t` type

The type of this signature.

`gpgme_pubkey_algo_t` `pubkey_algo`

The public key algorithm used to create this signature.

`gpgme_hash_algo_t` `hash_algo`

The hash algorithm used to create this signature.

`unsigned int` `sig_class`

The signature class of this signature.

`long int` `timestamp`

The creation timestamp of this signature.

`char *fpr`

The fingerprint of the key which was used to create this signature.

-- Data type: `gpgme_sign_result_t`

This is a pointer to a structure used to store the result of a `gpgme_op_sign`

operation. After successfully generating a signature, you can retrieve the pointer to the result with `gpgme_op_sign_result`. The structure contains the following members:

`gpgme_invalid_key_t` `invalid_signers`

A linked list with information about all invalid keys for which a signature could not be created.

`gpgme_new_signature_t` `signatures`

A linked list with information about all signatures created.

-- Function: `gpgme_sign_result_t gpgme_op_sign_result (gpgme_ctx_t CTX)`

The function `gpgme_op_sign_result` returns a `gpgme_sign_result_t` pointer to a structure holding the result of a `gpgme_op_sign` operation. The pointer is only valid if the last operation on the context was a `gpgme_op_sign`, `gpgme_op_sign_start`, `gpgme_op_encrypt_sign` or `gpgme_op_encrypt_sign_start` operation. If that operation failed, the function might return a NULL pointer. The returned pointer is only valid until the next

operation is started on the context.

### 7.7.4.3 Signature Notation Data

.....

Using the following functions, you can attach arbitrary notation data to a signature. This information is then available to the user when the signature is verified.

-- Function: void `gpgme_sig_notation_clear` (`gpgme_ctx_t` CTX)  
SINCE: 1.1.0

The function `gpgme_sig_notation_clear` removes the notation data from the context CTX. Subsequent signing operations from this context will not include any notation data.

Every context starts with an empty notation data list.

-- Function: `gpgme_error_t` `gpgme_sig_notation_add` (`gpgme_ctx_t` CTX,  
const char \*NAME, const char \*VALUE,  
gpgme\_sig\_notation\_flags\_t FLAGS)  
SINCE: 1.1.0

The function `gpgme_sig_notation_add` adds the notation data with the name NAME and the value VALUE to the context CTX.

Subsequent signing operations will include this notation data, as well as any other notation data that was added since the creation of the context or the last `gpgme_sig_notation_clear` operation.

The arguments NAME and VALUE must be NUL-terminated strings in human-readable form. The flag `GPGME_SIG_NOTATION_HUMAN_READABLE` is implied (non-human-readable notation data is currently not supported). The strings must be in UTF-8 encoding.

If NAME is NULL, then VALUE should be a policy URL.

The function `gpgme_sig_notation_add` returns the error code `GPG_ERR_NO_ERROR` if the notation data could be added successfully, `GPG_ERR_INV_VALUE` if CTX is not a valid pointer, or if NAME, VALUE and FLAGS are an invalid combination. The function also passes through any errors that are reported by the crypto engine support routines.

-- Function: `gpgme_sig_notation_t` `gpgme_sig_notation_get`  
(const `gpgme_ctx_t` CTX)  
SINCE: 1.1.0

The function `gpgme_sig_notation_get` returns the linked list of notation data structures that are contained in the context `CTX`.

If `CTX` is not a valid pointer, or there is no notation data added for this context, `NULL` is returned.

File: `gpgme.info`, Node: Encrypt, Prev: Sign, Up: Crypto Operations

## 7.7.5 Encrypt

-----

One plaintext can be encrypted for several recipients at the same time. The list of recipients is created independently of any context, and then passed to the encryption operation.

\* Menu:

\* Encrypting a Plaintext::     How to encrypt a plaintext.

File: `gpgme.info`, Node: Encrypting a Plaintext, Up: Encrypt

### 7.7.5.1 Encrypting a Plaintext

.....

-- Function: `gpgme_error_t gpgme_op_encrypt (gpgme_ctx_t CTX, gpgme_key_t RECP[], gpgme_encrypt_flags_t FLAGS, gpgme_data_t PLAIN, gpgme_data_t CIPHER)`

The function `gpgme_op_encrypt` encrypts the plaintext in the data object `PLAIN` for the recipients `RECP` and stores the ciphertext in the data object `CIPHER`. The type of the ciphertext created is determined by the ASCII armor (or, if that is not set, by the encoding specified for `CIPHER`) and the text mode attributes set for the context `CTX`.

`RECP` must be a `NULL`-terminated array of keys. The user must keep references for all keys during the whole duration of the call (but see `gpgme_op_encrypt_start` for the requirements with the asynchronous variant).

The value in `FLAGS` is a bitwise-or combination of one or multiple of the following bit values:

`GPGME_ENCRYPT_ALWAYS_TRUST`

The `GPGME_ENCRYPT_ALWAYS_TRUST` symbol specifies that all the



recipients in RECP should be trusted, even if the keys do not have a high enough validity in the keyring. This flag should be used with care; in general it is not a good idea to use any untrusted keys.

#### GPGME\_ENCRYPT\_NO\_ENCRYPT\_TO

SINCE: 1.2.0

The GPGME\_ENCRYPT\_NO\_ENCRYPT\_TO symbol specifies that no default or hidden default recipients as configured in the crypto backend should be included. This can be useful for managing different user profiles.

#### GPGME\_ENCRYPT\_NO\_COMPRESS

SINCE: 1.5.0

The GPGME\_ENCRYPT\_NO\_COMPRESS symbol specifies that the plaintext shall not be compressed before it is encrypted. This is in some cases useful if the length of the encrypted message may reveal information about the plaintext.

#### GPGME\_ENCRYPT\_PREPARE

##### GPGME\_ENCRYPT\_EXPECT\_SIGN

The GPGME\_ENCRYPT\_PREPARE symbol is used with the UI Server protocol to prepare an encryption (i.e. sending the PREP\_ENCRYPT command). With the GPGME\_ENCRYPT\_EXPECT\_SIGN symbol the UI Server is advised to also expect a sign command.

#### GPGME\_ENCRYPT\_SYMMETRIC

SINCE: 1.7.0

The GPGME\_ENCRYPT\_SYMMETRIC symbol specifies that the output should be additionally encrypted symmetrically even if recipients are provided. This feature is only supported for the OpenPGP crypto engine.

#### GPGME\_ENCRYPT\_THROW\_KEYIDS

SINCE: 1.8.0

The GPGME\_ENCRYPT\_THROW\_KEYIDS symbols requests that the identifiers for the decryption keys are not included in the ciphertext. On the receiving side, the use of this flag may slow down the decryption process because all available secret keys must be tried. This flag is only honored for OpenPGP encryption.

#### GPGME\_ENCRYPT\_WRAP

SINCE: 1.8.0

The GPGME\_ENCRYPT\_WRAP symbol specifies that the input is an OpenPGP message and not a plain data. This is the counterpart to GPGME\_DECRYPT\_UNWRAP.

GPGME\_ENCRYPT\_WANT\_ADDRESS

SINCE: 1.11.0

The GPGME\_ENCRYPT\_WANT\_ADDRESS symbol requests that all

supplied keys or key specifications include a syntactically valid mail address. If this is not the case the operation is not even tried and the error code GPG\_ERR\_INV\_USER\_ID is returned. Only the address part of the key specification is conveyed to the backend. As of now the key must be specified using the RECPSTRING argument of the extended encrypt functions. This feature is currently only supported for the OpenPGP crypto engine.

If GPG\_ERR\_UNUSABLE\_PUBKEY is returned, some recipients in RECP are invalid, but not all. In this case the plaintext might be encrypted for all valid recipients and returned in CIPHER (if this happens depends on the crypto engine). More information about the invalid recipients is available with gpgme\_op\_encrypt\_result.

If RECP is NULL, symmetric rather than public key encryption is performed. Symmetrically encrypted cipher text can be deciphered

with gpgme\_op\_decrypt. Note that in this case the crypto backend needs to retrieve a passphrase from the user. Symmetric encryption is currently only supported for the OpenPGP crypto backend.

The function returns the error code GPG\_ERR\_NO\_ERROR if the ciphertext could be created successfully, GPG\_ERR\_INV\_VALUE if CTX, RECP, PLAIN or CIPHER is not a valid pointer, GPG\_ERR\_UNUSABLE\_PUBKEY if RECP contains some invalid recipients, GPG\_ERR\_BAD\_PASSPHRASE if the passphrase for the symmetric key could not be retrieved, and passes through any errors that are reported by the crypto engine support routines.

-- Function: gpgme\_error\_t gpgme\_op\_encrypt\_start (gpgme\_ctx\_t CTX,  
gpgme\_key\_t RECP[], gpgme\_encrypt\_flags\_t FLAGS,  
gpgme\_data\_t PLAIN, gpgme\_data\_t CIPHER)  
The function gpgme\_op\_encrypt\_start initiates a gpgme\_op\_encrypt operation. It can be completed by calling gpgme\_wait on the context.

\*Note Waiting For Completion::.

References to the keys only need to be held for the duration of this call. The user can release its references to the keys after this function returns, even if the operation is not yet finished.

The function returns the error code GPG\_ERR\_NO\_ERROR if the operation could be started successfully, GPG\_ERR\_INV\_VALUE if CTX, RSET, PLAIN or CIPHER is not a valid pointer, and GPG\_ERR\_UNUSABLE\_PUBKEY if RSET does not contain any valid recipients.

```
-- Function: gpgme_error_t gpgme_op_encrypt_ext (gpgme_ctx_t CTX,
 gpgme_key_t RECP[], const char *RECPSTRING,
 gpgme_encrypt_flags_t FLAGS, gpgme_data_t PLAIN,
 gpgme_data_t CIPHER)
```

SINCE: 1.11.0

This is an extended version of gpgme\_op\_encrypt with RECPSTRING as additional parameter. If RECP is NULL and RECPSTRING is not NULL, the latter is expected to be a linefeed delimited string with the set of key specifications.

In contrast to RECP the keys are given directly as strings and there is no need to first create key objects. Leading and trailing white space is removed from each line in RECPSTRING. The keys are then passed verbatim to the backend engine.

For the OpenPGP backend several special keywords are supported to modify the operation. These keywords are given instead of a key specification. The currently supported keywords are:

--hidden

--no-hidden

These keywords toggle between normal and hidden recipients for all following key specifications. When a hidden recipient is requested the gpg option -R (or -F in file mode) is used instead of -r (-f in file mode).

--file

--no-file

These keywords toggle between regular and file mode for all following key specification. In file mode the option -f or -F is passed to gpg. At least GnuPG version 2.1.14 is required

to handle these options. The

GPGME\_ENCRYPT\_WANT\_ADDRESS flag is ignored in file mode.

--

This keyword disables all keyword detection up to the end of the string. All keywords are treated as verbatim arguments.

To create a RECPSTRING it is often useful to employ a `strconcat` style function. For example this function creates a string to encrypt to two keys:

```
char *
xbuild_recpsring (const char *key1, const char *key2)
{
 char *result = gpgrt_strconcat ("--\n", key1, "\n", key2, NULL);
 if (!result)
 { perror ("strconcat failed"); exit (2); }
 return result;
}
```

Note the use of the double dash here; unless you want to specify a keyword, it is a good idea to avoid any possible trouble with key specifications starting with a double dash. The used `strconcat` function is available in Libgpg-error 1.28 and later; Libgpg-error

(aka Gpgmt) is a dependency of GPGME. The number of arguments to `gpgrt_strconcat` is limited to 47 but that should always be sufficient. In case a larger and non-fixed number of keys are to be supplied the following code can be used:

```
char *
xbuild_long_recpsring (void)
{
 gpgrt_stream_t memfp;
 const char *s;
 void *result;

 memfp = gpgrt_fopenmem (0, "w+b");
 if (!memfp)
 { perror ("fopenmem failed"); exit (2); }
 gpgrt_fputs ("--", memfp);
 while ((s = get_next_keyspec ()))
 {
 gpgrt_fputc ('\n', memfp);
 gpgrt_fputs (s, memfp);
 }
 gpgrt_fputc (0, memfp);
 if (gpgrt_ferror (memfp))
 { perror ("writing to memstream failed"); exit (2); }
 if (gpgrt_fclose_snatch (memfp, &result, NULL))
```

```

 { perror ("fclose_snatch failed"); exit (2); }
 return result;
}

```

In this example `get_next_keyspec` is expected to return the next key to be added to the string. Please take care: Encrypting to a large number of recipients is often questionable due to security reasons and also for the technicality that all keys are currently passed on the command line to `gpg` which has as a platform specific length limitation.

```

-- Function: gpgme_error_t gpgme_op_encrypt_ext_start (gpgme_ctx_t CTX,
 gpgme_key_t RECP[], const char *RECPSTRING,
 gpgme_encrypt_flags_t FLAGS, gpgme_data_t PLAIN,
 gpgme_data_t CIPHER)

```

SINCE: 1.11.0

This is an extended version of `gpgme_op_encrypt_start` with `RECPSTRING` as additional parameter. If `RECP` is `NULL` and `RECPSTRING` is not `NULL`, the latter is expected to be a linefeed delimited string with the set of key specifications. In contrast to `RECP` the keys are given directly as strings and there is no need to first create key objects. The keys are passed verbatim to the backend engine.

```

-- Data type: gpgme_encrypt_result_t

```

This is a pointer to a structure used to store the result of a `gpgme_op_encrypt` operation. After successfully encrypting data, you can retrieve the pointer to the result with `gpgme_op_encrypt_result`. The structure contains the following members:

```

gpgme_invalid_key_t invalid_recipients

```

A linked list with information about all invalid keys for which the data could not be encrypted.

```

-- Function: gpgme_encrypt_result_t gpgme_op_encrypt_result
 (gpgme_ctx_t CTX)

```

The function `gpgme_op_encrypt_result` returns a `gpgme_encrypt_result_t` pointer to a structure holding the result of a `gpgme_op_encrypt` operation. The pointer is only valid if the last operation on the context was a `gpgme_op_encrypt`, `gpgme_op_encrypt_start`, `gpgme_op_sign` or `gpgme_op_sign_start` operation. If this operation failed, this might be a `NULL` pointer. The returned pointer is only valid until the next operation is started on the context.

-- Function: `gpgme_error_t gpgme_op_encrypt_sign (gpgme_ctx_t CTX,  
gpgme_key_t RECP[], gpgme_encrypt_flags_t FLAGS,  
gpgme_data_t PLAIN, gpgme_data_t CIPHER)`

The function `gpgme_op_encrypt_sign` does a combined encrypt and sign operation. It is used like `gpgme_op_encrypt`, but the ciphertext also contains signatures for the signers listed in CTX.

The combined encrypt and sign operation is currently only available for the OpenPGP crypto engine.

-- Function: `gpgme_error_t gpgme_op_encrypt_sign_start  
(gpgme_ctx_t CTX, gpgme_key_t RECP[],  
gpgme_encrypt_flags_t FLAGS, gpgme_data_t PLAIN,  
gpgme_data_t CIPHER)`

The function `gpgme_op_encrypt_sign_start` initiates a `gpgme_op_encrypt_sign` operation. It can be completed by calling `gpgme_wait` on the context. \*Note Waiting

For Completion::.

The function returns the error code `GPG_ERR_NO_ERROR` if the operation could be started successfully, and `GPG_ERR_INV_VALUE` if CTX, RSET, PLAIN or CIPHER is not a valid pointer.

-- Function: `gpgme_error_t gpgme_op_encrypt_sign_ext (gpgme_ctx_t CTX,  
gpgme_key_t RECP[], const char *RECPSTRING,  
gpgme_encrypt_flags_t FLAGS, gpgme_data_t PLAIN,  
gpgme_data_t CIPHER)`

SINCE: 1.11.0

This is an extended version of `gpgme_op_encrypt_sign` with `RECPSTRING` as additional parameter. If `RECP` is NULL and `RECPSTRING` is not NULL, the latter is expected to be a linefeed delimited string with the set of key specifications. In contrast to `RECP` the keys are given directly as strings and there is no need to first create the key objects. The keys are passed verbatim to the backend engine.

-- Function: `gpgme_error_t gpgme_op_encrypt_sign_ext_start  
(gpgme_ctx_t CTX, gpgme_key_t RECP[], const  
char *RECPSTRING,  
gpgme_encrypt_flags_t FLAGS, gpgme_data_t PLAIN,  
gpgme_data_t CIPHER)`

SINCE: 1.11.0

This is an extended version of `gpgme_op_encrypt_sign_start` with

RECPSTRING as additional parameter. If RECP is NULL and RECPSTRING is not NULL, the latter is expected to be a linefeed delimited string with the set of key specifications. In contrast to RECP the keys are given directly as strings and there is no need to first create the key objects. The keys are passed verbatim to the backend engine.

File: gpgme.info, Node: Miscellaneous, Next: Run Control, Prev: Crypto Operations, Up: Contexts

## 7.8 Miscellaneous operations

=====

Here are some support functions which are sometimes useful.

\* Menu:

- \* Running other Programs::   Running other Programs
- \* Using the Assuan protocol::   Using the Assuan protocol
- \* Checking for updates::   How to check for software updates

File: gpgme.info,

Node: Running other Programs, Next: Using the Assuan protocol, Up: Miscellaneous

### 7.8.1 Running other Programs

-----

GPGME features an internal subsystem to run the actual backend engines. Along with data abstraction object this subsystem can be used to run arbitrary simple programs which even need not be related to cryptographic features. It may for example be used to run tools which are part of the GnuPG system but are not directly accessible with the GPGME API.

-- Function: gpgme\_error\_t gpgme\_op\_spawn (gpgme\_ctx\_t CTX,  
const char \*FILE, const char \*ARGV[], gpgme\_data\_t DATAIN,  
gpgme\_data\_t DATAOUT, gpgme\_data\_t DATAERR,  
unsigned int FLAGS)

SINCE: 1.5.0

The function gpgme\_op\_spawn runs the program FILE with the arguments taken from the NULL terminated array ARGV. If no arguments are required ARGV may be given as NULL. In the latter case or if argv[0] is the empty string, GPGME uses the basename of FILE for argv[0]. The file descriptors stdin, stdout, and stderr are connected to the data objects DATAIN, DATAOUT, and

DATAERR. If NULL is passed for one of these data objects the corresponding file descriptor is connected to /dev/null.

The value in FLAGS is a bitwise-or combination of one or multiple of the following bit values:

#### GPGME\_SPAWN\_DETACHED

SINCE: 1.5.0

Under Windows this flag inhibits the allocation of a new console for the program. This is useful for a GUI application which needs to call a command line helper tool.

#### GPGME\_SPAWN\_ALLOW\_SET\_FG

SINCE: 1.5.0

Under Windows this flag allows the called program to put itself into the foreground.

-- Function: `gpgme_error_t gpgme_op_spawn_start (gpgme_ctx_t CTX, const char *FILE, const char *ARGV[], gpgme_data_t DATAIN, gpgme_data_t DATAOUT, gpgme_data_t DATAERR, unsigned int FLAGS)`

SINCE: 1.5.0

This is the asynchronous variant of `gpgme_op_spawn`.

File: `gpgme.info`, Node: Using the Assuan protocol, Next: Checking for updates, Prev: Running other Programs, Up: Miscellaneous

### 7.8.2 Using the Assuan protocol

-----

The Assuan protocol can be used to talk to arbitrary Assuan servers. By default it is connected to the GnuPG agent, but it may be connected to arbitrary servers by using `gpgme_ctx_set_engine_info`, passing the location of the servers socket as `FILE_NAME` argument, and an empty string as `HOME_DIR` argument.

The Assuan protocol functions use three kinds of callbacks to transfer data:

-- Data type: `gpgme_error_t (*gpgme_assuan_data_cb_t) (void *OPAQUE, const void *DATA, size_t DATALEN)`

SINCE: 1.2.0



This callback receives any data sent by the server. OPAQUE is the pointer passed to `gpgme_op_assuan_transact_start`, DATA of length DATALEN refers to the data sent.

-- Data type: `gpgme_error_t`  
(`*gpgme_assuan_inquire_cb_t`) (void \*OPAQUE,  
    const char \*NAME, const char \*ARGS, `gpgme_data_t` \*R\_DATA)

SINCE: 1.2.0

This callback is used to provide additional data to the Assuan server. OPAQUE is the pointer passed to `gpgme_op_assuan_transact_start`, NAME and ARGS specify what kind of data the server requested, and R\_DATA is used to return the actual data.

Note: Returning data is currently not implemented in GPGME.

-- Data type: `gpgme_error_t` (`*gpgme_assuan_status_cb_t`) (void \*OPAQUE,  
    const char \*STATUS, const char \*ARGS)

SINCE: 1.2.0

This callback receives any status lines sent by the server. OPAQUE is the pointer passed to `gpgme_op_assuan_transact_start`, STATUS and ARGS denote the status update sent.

-- Function: `gpgme_error_t gpgme_op_assuan_transact_start`  
    (`gpgme_ctx_t` CTX, const char \*COMMAND,  
    `gpgme_assuan_data_cb_t` DATA\_CB, void \* DATA\_CB\_VALUE,  
    `gpgme_assuan_inquire_cb_t`  
INQUIRE\_CB, void \* INQUIRE\_CB\_VALUE,  
    `gpgme_assuan_status_cb_t` STATUS\_CB, void \* STATUS\_CB\_VALUE)

SINCE: 1.2.0

Send the Assuan COMMAND and return results via the callbacks. Any callback may be NULL. The result of the operation may be retrieved using `gpgme_wait_ext`.

Asynchronous variant.

-- Function: `gpgme_error_t gpgme_op_assuan_transact_ext`  
    (`gpgme_ctx_t` CTX, const char \*COMMAND,  
    `gpgme_assuan_data_cb_t` DATA\_CB, void \* DATA\_CB\_VALUE,  
    `gpgme_assuan_inquire_cb_t` INQUIRE\_CB, void \* INQUIRE\_CB\_VALUE,  
    `gpgme_assuan_status_cb_t` STATUS\_CB, void \* STATUS\_CB\_VALUE,

gpgme\_error\_t \*OP\_ERR)

Send the Assuan COMMAND and return results via the callbacks. The result of the operation is returned in OP\_ERR.

Synchronous variant.

File: gpgme.info, Node: Checking for updates, Prev: Using the Assuan protocol, Up: Miscellaneous

### 7.8.3 How to check for software updates

-----

The

GnuPG Project operates a server to query the current versions of software packages related to GnuPG. GPGME can be used to access this online database and check whether a new version of a software package is available.

-- Data type: gpgme\_query\_swdb\_result\_t  
SINCE: 1.8.0

This is a pointer to a structure used to store the result of a gpgme\_op\_query\_swdb operation. After success full call to that function, you can retrieve the pointer to the result with gpgme\_op\_query\_swdb\_result. The structure contains the following member:

name

This is the name of the package.

iversion

The currently installed version or an empty string. This value is either a copy of the argument given to gpgme\_op\_query\_swdb or the version of the installed software as figured out by GPGME or GnuPG.

created

This gives the date the file with the list of version numbers has originally be created by the GnuPG project.

retrieved

This gives the date the file was downloaded.

warning

If this flag is set either an error has occurred or some of the information in this structure are not properly set. For

example if the version number of the installed software could not be figured out, the update flag may not reflect a required update status.

update

If this flag is set an update of the software is available.

urgent

If this flag is set an available update is important.

noinfo

If this flag is set, no valid information could be retrieved.

unknown

If this flag is set the given name is not known.

toold

If this flag is set the available information is not fresh enough.

error

If this flag is set some other error has occurred.

version

The version string of the latest released version.

reldate

The release date of the latest released version.

-- Function: `gpgme_error_t gpgme_op_query_swdb (gpgme_ctx_t CTX,  
const char *NAME, const char *IVERSION, gpgme_data_t RESERVED)`

SINCE: 1.8.0

Query the software version database for software package NAME and check against the installed version given by IVERSION. If IVERSION is given as NULL a check is only done if GPGME can figure out the version by itself (for example when using "gpgme" or "gnupg"). If NULL is used for NAME the current gpgme version is checked. RESERVED must be set to 0.

-- Function: `gpgme_query_swdb_result_t gpgme_op_query_swdb_result  
(gpgme_ctx_t CTX)`

SINCE: 1.8.0

The function `gpgme_op_query_swdb_result` returns a `gpgme_query_swdb_result_t` pointer to a structure holding the

result of a `gpgme_op_query_swdb` operation. The pointer is only valid if the last operation on the context was a successful call to `gpgme_op_query_swdb`. If that call failed, the result might be a NULL pointer. The returned pointer is only valid until the next operation is started on the context CTX.

Here is an example on how to check whether GnuPG is current:

```
#include <gpgme.h>

int
main (void)
{
 gpg_error_t err;
 gpgme_ctx_t ctx;
 gpgme_query_swdb_result_t result;

 gpgme_check_version (NULL);
 err = gpgme_new (&ctx);
 if (err)
 fprintf (stderr, "error creating context: %s\n", gpg_strerror (err));
 else
 {
 gpgme_set_protocol (ctx, GPGME_PROTOCOL_GPGCONF);

 err = gpgme_op_query_swdb (ctx, "gnupg", NULL, 0);
 if (err)
 fprintf (stderr, "error querying swdb: %s\n", gpg_strerror (err));
 else
 {
 result = gpgme_op_query_swdb_result (ctx);
 if (!result)
 fprintf (stderr, "error querying swdb\n");
 if
(!result->warning && !result->update)
 printf ("GnuPG version %s is current\n",
 result->iversion);
 else if (!result->warning && result->update)
 printf ("GnuPG version %s can be updated to %s\n",
 result->iversion, result->version);
 else
 fprintf (stderr, "error finding the update status\n");
 }
 gpgme_release (ctx);
 }
 return 0;
}
```

## 7.9 Run Control

=====

GPGME supports running operations synchronously and asynchronously. You can use asynchronous operation to set up a context up to initiating the desired operation, but delay performing it to a later point.

Furthermore, you can use an external event loop to control exactly when GPGME runs. This ensures that GPGME only runs when necessary and also prevents it from blocking for a long time.

\* Menu:

- \* Waiting For Completion::     Waiting until an operation is completed.
- \* Using External Event Loops::   Advanced control over what happens when.
- \* Cancellation::                How to end pending operations prematurely.

File: gpgme.info, Node: Waiting For Completion, Next: Using External Event Loops, Up: Run Control

### 7.9.1 Waiting For Completion

-----

-- Function: `gpgme_ctx_t gpgme_wait (gpgme_ctx_t CTX,  
                                  gpgme_error_t *STATUS, int HANG)`

The function `gpgme_wait` continues the pending operation within the context `CTX`. In particular, it ensures the data exchange between GPGME and the crypto backend and watches over the run time status of the backend process.

If `HANG` is true, the function does not return until the operation is completed or cancelled. Otherwise the function will not block for a long time.

The error status of the finished operation is returned in `STATUS` if `gpgme_wait` does not return `NULL`.

The `CTX` argument can be `NULL`. In that case, `gpgme_wait` waits for any context to complete its operation.

`gpgme_wait` can be used only in conjunction with any context that has a pending operation initiated with one of the `gpgme_op_*_start` functions except `gpgme_op_keylist_start` and

`gpgme_op_trustlist_start` (for which you should use the corresponding `gpgme_op_*_next` functions). If `CTX` is `NULL`, all of such contexts are waited upon and possibly returned. Synchronous operations running in parallel, as well as key and trust item list operations, do not affect `gpgme_wait`.

In a multi-threaded environment, only one thread should ever call `gpgme_wait` at any time, regardless of whether `CTX` is specified or not. This means that all calls to this function should be fully synchronized by locking primitives. It is safe to start asynchronous operations while a thread is running in `gpgme_wait`.

The function returns the `CTX` of the context which has finished the operation. If `HANG` is false, and the timeout expires, `NULL` is returned and `*status` will be set to 0. If an error occurs, `NULL` is returned and the error is returned in `*status`.

File: `gpgme.info`, Node: Using External Event Loops, Next: Cancellation, Prev: Waiting For Completion, Up: Run Control

### 7.9.2 Using External Event Loops

-----

GPGME hides the complexity of the communication between the library and the crypto engine. The price of this convenience is that the calling thread can block arbitrary long waiting for the data returned by the crypto engine. In single-threaded programs, in particular if they are interactive, this is an unwanted side-effect. OTOH, if `gpgme_wait` is used without the `HANG` option being enabled, it might be called unnecessarily often, wasting CPU time that could be used otherwise.

The I/O callback interface described in this section lets the user take control over what happens when. GPGME will provide the user with the file descriptors that should be monitored, and the callback functions that should be invoked when a file descriptor is ready for reading or writing. It is then the users responsibility to decide when to check the file descriptors and when to invoke the callback functions. Usually this is done in an event loop, that also checks for events in other parts of the program. If the callback functions are only called when the file descriptors are ready, GPGME will never block. This gives the user more control over the program flow, and allows to perform other tasks when GPGME would block otherwise.

By using this advanced mechanism, GPGME can be integrated smoothly into GUI toolkits like GTK+ even for single-threaded programs.

\* Menu:

- \* I/O Callback Interface::     How I/O callbacks are registered.
- \* Registering I/O Callbacks::   How to use I/O callbacks for a context.
- \* I/O Callback Example::  
    An example how to use I/O callbacks.
- \* I/O Callback Example GTK+::   How to use GPGME with GTK+.
- \* I/O Callback Example GDK::    How to use GPGME with GDK.
- \* I/O Callback Example Qt::     How to use GPGME with Qt.

File: gpgme.info, Node: I/O Callback Interface, Next: Registering I/O Callbacks, Up: Using External Event Loops

### 7.9.2.1 I/O Callback Interface

.....

-- Data type: `gpgme_error_t (*gpgme_io_cb_t) (void *DATA, int FD)`

The `gpgme_io_cb_t` type is the type of functions which GPGME wants to register as I/O callback handlers using the `gpgme_register_io_cb_t` functions provided by the user.

DATA and FD are provided by GPGME when the I/O callback handler is registered, and should be passed through to the handler when it is invoked by the user because it noticed activity on the file descriptor FD.

The callback handler always returns 0, but you should consider the return value to be reserved for later use.

-- Data type: `gpgme_error_t (*gpgme_register_io_cb_t) (void *DATA, int FD, int DIR, gpgme_io_cb_t FNC, void *FNC_DATA, void **TAG)`

The `gpgme_register_io_cb_t` type is the type of functions which can be called by GPGME to register an I/O callback function FNC for the file descriptor FD with the user. FNC\_DATA should be passed as the first argument to FNC when the handler is invoked (the second argument should be FD). If DIR is 0, FNC should be called by the user when FD is ready for writing. If DIR is 1, FNC should be called when FD is ready for reading.

DATA was provided by the user when registering the `gpgme_register_io_cb_t` function with GPGME and will always be passed as the first argument when registering a callback function. For example, the user can use this to determine the event loop to which the file descriptor should be added.

GPGME will call this function when a crypto operation

is initiated

in a context for which the user has registered I/O callback handler functions with `gpgme_set_io_cbs`. It can also call this function when it is in an I/O callback handler for a file descriptor associated to this context.

The user should return a unique handle in TAG identifying this I/O callback registration, which will be passed to the `gpgme_register_io_cb_t` function without interpretation when the file descriptor should not be monitored anymore.

-- Data type: `void (*gpgme_remove_io_cb_t) (void *TAG)`

The `gpgme_remove_io_cb_t` type is the type of functions which can be called by GPGME to remove an I/O callback handler that was registered before. TAG is the handle that was returned by the `gpgme_register_io_cb_t` for this I/O callback.

GPGME can call this function when a crypto operation is in an I/O callback. It will also call this function when the context is destroyed while an operation is pending.

-- Data type: `enum gpgme_event_io_t`

The `gpgme_event_io_t` type specifies the type of an event that is reported to the user by GPGME as a consequence of an I/O operation. The following events are defined:

#### `GPGME_EVENT_START`

The operation is fully initialized now, and you can start to run the registered I/O callback handlers now. Note that registered I/O callback handlers must not be run before this event is signalled. `TYPE_DATA` is NULL and reserved for later use.

#### `GPGME_EVENT_DONE`

The operation is finished, the last I/O callback for this operation was removed. The accompanying `TYPE_DATA` points to a struct `gpgme_io_event_done_data` variable that contains the status of the operation that finished. This event is signalled after the last I/O callback has been removed.

#### `GPGME_EVENT_NEXT_KEY`

In a `gpgme_op_keylist_start` operation, the next key was received from the crypto engine. The accompanying `TYPE_DATA` is a `gpgme_key_t` variable that contains the key with one reference for the user.

#### `GPGME_EVENT_NEXT_TRUSTITEM`

In a `gpgme_op_trustlist_start` operation, the next trust item



was received from the crypto engine. The accompanying `TYPE_DATA` is a `gpgme_trust_item_t` variable that contains the trust item with one reference for the user.

-- Data type: `void (*gpgme_event_io_cb_t) (void *DATA, gpgme_event_io_t TYPE, void *TYPE_DATA)`

The `gpgme_event_io_cb_t` type is the type of functions which can be called by GPGME to signal an event for an operation running in a context which has I/O callback functions registered by the user.

`DATA` was provided by the user when registering the `gpgme_event_io_cb_t` function with GPGME and will always be passed as the first argument when registering a callback function. For example, the user can use this to determine the context in which this event has occurred.

`TYPE` will specify the type of event that has occurred. `TYPE_DATA` specifies the event further, as described in the above list of possible `gpgme_event_io_t` types.

GPGME can call this function in an I/O callback handler.

File: `gpgme.info`, Node: Registering I/O Callbacks, Next: I/O Callback Example, Prev: I/O Callback Interface, Up: Using External Event Loops

#### 7.9.2.2 Registering I/O Callbacks

.....

-- Data type: `struct gpgme_io_cbs`

This structure is used to store the I/O callback interface functions described in the previous section. It has the following members:

`gpgme_register_io_cb_t add`

This is the function called by GPGME to register an I/O callback handler. It must be specified.

`void *add_priv`

This is passed as the first argument to the `add` function when it is called by GPGME.

For example, it can be used to

determine the event loop to which the file descriptor should be added.

`gpgme_remove_io_cb_t remove`

This is the function called by GPGME to remove an I/O callback

handler. It must be specified.

`gpgme_event_io_cb_t` event

This is the function called by GPGME to signal an event for an operation. It must be specified, because at least the start event must be processed.

`void *event_priv`

This is passed as the first argument to the event function when it is called by GPGME. For example, it can be used to determine the context in which the event has occurred.

-- Function: `void gpgme_set_io_cbs (gpgme_ctx_t CTX,  
struct gpgme_io_cbs *IO_CBS)`

The function `gpgme_set_io_cbs` enables the I/O callback interface for the context `CTX`. The I/O callback functions are specified by `IO_CBS`.

If `IO_CBS->add` is `NULL`, the I/O callback interface is disabled for the context, and normal operation is restored.

-- Function: `void gpgme_get_io_cbs (gpgme_ctx_t CTX,  
struct gpgme_io_cbs *IO_CBS)`

The function `gpgme_get_io_cbs` returns the I/O callback functions set with `gpgme_set_io_cbs` in `IO_CBS`.

File: `gpgme.info`, Node: I/O Callback Example, Next: I/O Callback Example GTK+, Prev: Registering I/O Callbacks, Up: Using External Event Loops

### 7.9.2.3 I/O Callback Example

.....

To actually use an external event loop, you have to implement the I/O callback functions that are used by GPGME to register and unregister file descriptors. Furthermore, you have to actually monitor these file descriptors for activity and call the appropriate I/O callbacks.

The following example illustrates how to do that. The example uses locking to show in which way the callbacks and the event loop can run concurrently. For the event loop, we use a fixed array. For a real-world implementation, you should use a dynamically sized structure because the number of file descriptors needed for a crypto operation in GPGME is not predictable.

```
#include <assert.h>
```

```

#include <errno.h>
#include <stdlib.h>
#include <pthread.h>
#include <sys/types.h>
#include <gpgme.h>

/* The following structure holds the result of a crypto operation. */
struct op_result
{
 int done;
 gpgme_error_t err;
};

/* The following structure holds the data associated with one I/O
callback. */
struct one_fd
{
 int fd;
 int dir;
 gpgme_io_cb_t fnc;
 void *fnc_data;
 void *loop;
};

struct event_loop
{
 pthread_mutex_t lock;
#define MAX_FDS 32
 /* Unused slots are marked with FD being -1. */
 struct one_fd fds[MAX_FDS];
};

```

The following functions implement the I/O callback interface.

```

gpgme_error_t
add_io_cb (void *data, int fd, int dir,
gpgme_io_cb_t fnc, void *fnc_data,
 void **r_tag)
{
 struct event_loop *loop = data;
 struct one_fd *fds = loop->fds;
 int i;

 pthread_mutex_lock (&loop->lock);
 for (i = 0; i < MAX_FDS; i++)
 {
 if (fds[i].fd == -1)
 {

```

```

 fds[i].fd = fd;
 fds[i].dir = dir;
 fds[i].fnc = fnc;
 fds[i].fnc_data = fnc_data;
 fds[i].loop = loop;
 break;
}
}
pthread_mutex_unlock (&loop->lock);
if (i == MAX_FDS)
 return gpg_error (GPG_ERR_GENERAL);
*r_tag = &fds[i];
return 0;
}

void
remove_io_cb (void *tag)
{
 struct one_fd *fd = tag;
 struct event_loop *loop = fd->loop;

 pthread_mutex_lock (&loop->lock);
 fd->fd = -1;
 pthread_mutex_unlock (&loop->lock);
}

void
event_io_cb (void *data, gpgme_event_io_t type, void *type_data)
{
 struct op_result *result = data;

 /* We
don't support list operations here. */
 if (type == GPGME_EVENT_DONE)
 {
 result->done = 1;
 result->err = *type_data;
 }
}

```

The final missing piece is the event loop, which will be presented next. We only support waiting for the success of a single operation.

```

int
do_select (struct event_loop *loop)
{
 fd_set rfd;
 fd_set wfd;

```

```

int i, n;
int any = 0;
struct timeval tv;
struct one_fd *fdlist = loop->fds;

pthread_mutex_lock (&loop->lock);
FD_ZERO (&rfd);
FD_ZERO (&wfd);
for (i = 0; i < MAX_FDS; i++)
 if (fdlist[i].fd != -1)
 FD_SET (fdlist[i].fd, fdlist[i].dir ? &rfd : &wfd);
pthread_mutex_unlock (&loop->lock);

tv.tv_sec = 0;
tv.tv_usec = 1000;

do
{
 n = select (FD_SETSIZE, &rfd, &wfd, NULL, &tv);
}
while (n < 0 && errno == EINTR);

if (n < 0)
 return
n; /* Error or timeout. */

pthread_mutex_lock (&loop->lock);
for (i = 0; i < MAX_FDS && n; i++)
{
 if (fdlist[i].fd != -1)
 {
 if (FD_ISSET (fdlist[i].fd, fdlist[i].dir ? &rfd : &wfd))
 {
 assert (n);
 n--;
 any = 1;
 /* The I/O callback handler can register/remove callbacks,
 so we have to unlock the file descriptor list. */
 pthread_mutex_unlock (&loop->lock);
 (*fdlist[i].fnc) (fdlist[i].fnc_data, fdlist[i].fd);
 pthread_mutex_lock (&loop->lock);
 }
 }
}
pthread_mutex_unlock (&loop->lock);
return any;
}

```

```

void
wait_for_op (struct event_loop *loop, struct op_result *result)
{
 int ret;

 do
 {
 ret = do_select (loop);
 }
 while (ret >= 0 && !result->done);
}

```

The main function shows how to put it all together.

```

int
main (int argc, char *argv[])
{
 struct event_loop loop;
 struct op_result result;
 gpgme_ctx_t ctx;
 gpgme_error_t err;
 gpgme_data_t sig, text;
 int i;
 pthread_mutexattr_t attr;
 struct gpgme_io_cbs io_cbs =
 {
 add_io_cb,
 &loop,
 remove_io_cb,
 event_io_cb,
 &result
 };

 init_gpgme ();

 /* Initialize the loop structure. */

 /* The mutex must be recursive, since remove_io_cb (which acquires a
 lock) can be called while holding a lock acquired in do_select. */
 pthread_mutexattr_init (&attr);
 pthread_mutexattr_settype (&attr, PTHREAD_MUTEX_RECURSIVE);
 pthread_mutex_init (&loop.lock, &attr);
 pthread_mutexattr_destroy (&attr);

 for (i = 0; i < MAX_FDS; i++)
 loop.fds[i].fd = -1;
}

```

```

/* Initialize the result structure. */
result.done = 0;

err = gpgme_data_new_from_file
(&sig, "signature", 1);
if (!err)
 err = gpgme_data_new_from_file (&text, "text", 1);
if (!err)
 err = gpgme_new (&ctx);
if (!err)
{
 gpgme_set_io_cbs (ctx, &io_cbs);
 err = gpgme_op_verify_start (ctx, sig, text, NULL);
}
if (err)
{
 fprintf (stderr, "gpgme error: %s: %s\n",
 gpgme_strerror (err), gpgme_strerror (err));
 exit (1);
}

wait_for_op (&loop, &result);
if (!result.done)
{
 fprintf (stderr, "select error\n");
 exit (1);
}
if (!result.err)
{
 fprintf (stderr, "verification failed: %s: %s\n",
 gpgme_strerror (result.err), gpgme_strerror (result.err));
 exit (1);
}
/* Evaluate verify result. */
...
return 0;
}

```

File: gpgme.info, Node: I/O Callback Example GTK+, Next: I/O Callback Example GDK,  
Prev: I/O Callback Example, Up: Using External Event Loops

#### 7.9.2.4 I/O Callback Example GTK+

.....

The I/O callback interface can be used to integrate GPGME with the GTK+ event loop. The following code snippets shows how this can be done using the appropriate register and remove I/O callback functions. In

this example, the private data of the register I/O callback function is unused. The event notifications is missing because it does not require any GTK+ specific setup.

```
#include <gtk/gtk.h>

struct my_gpgme_io_cb
{
 gpgme_io_cb_t fnc;
 void *fnc_data;
 guint input_handler_id
};

void
my_gpgme_io_cb (gpointer data, gint source, GdkInputCondition condition)
{
 struct my_gpgme_io_cb *iocb = data;
 (*(iocb->fnc)) (iocb->data, source);
}

void
my_gpgme_remove_io_cb (void *data)
{
 struct my_gpgme_io_cb *iocb = data;
 gtk_input_remove (data->input_handler_id);
}

void
my_gpgme_register_io_callback (void *data, int fd, int dir, gpgme_io_cb_t fnc,
 void *fnc_data, void **tag)
{
 struct my_gpgme_io_cb *iocb = g_malloc (sizeof (struct my_gpgme_io_cb));
 iocb->fnc = fnc;
 iocb->data = fnc_data;
 iocb->input_handler_id = gtk_input_add_full (fd, dir
 ? GDK_INPUT_READ
 : GDK_INPUT_WRITE,
 my_gpgme_io_callback,
 0, iocb, NULL);

 *tag = iocb;
 return 0;
}
```

File: gpgme.info, Node: I/O Callback Example GDK, Next: I/O Callback Example Qt, Prev: I/O Callback Example GTK+, Up: Using External Event Loops

#### 7.9.2.5 I/O Callback Example GDK



.....

The I/O callback interface can also be used to integrate GPGME with the GDK

event loop. The following code snippets shows how this can be done using the appropriate register and remove I/O callback functions. In this example, the private data of the register I/O callback function is unused. The event notifications is missing because it does not require any GDK specific setup.

It is very similar to the GTK+ example in the previous section.

```
#include <gdk/gdk.h>

struct my_gpgme_io_cb
{
 gpgme_io_cb_t fnc;
 void *fnc_data;
 gint tag;
};

void
my_gpgme_io_cb (gpointer data, gint source, GdkInputCondition condition)
{
 struct my_gpgme_io_cb *iocb = data;
 (*(iocb->fnc)) (iocb->data, source);
}

void
my_gpgme_remove_io_cb (void *data)
{
 struct my_gpgme_io_cb *iocb = data;
 gdk_input_remove (data->tag);
}

void
my_gpgme_register_io_callback (void *data, int fd, int dir, gpgme_io_cb_t fnc,
 void *fnc_data, void **tag)
{
 struct my_gpgme_io_cb *iocb = g_malloc (sizeof (struct my_gpgme_io_cb));
 iocb->fnc = fnc;
 iocb->data = fnc_data;
 iocb->tag = gtk_input_add_full (fd, dir ? GDK_INPUT_READ : GDK_INPUT_WRITE,
 my_gpgme_io_callback, iocb, NULL);
 *tag = iocb;
 return 0;
}
```

#### 7.9.2.6 I/O Callback Example Qt

.....

The I/O callback interface can also be used to integrate GPGME with the Qt event loop. The following code snippets show how this can be done using the appropriate register and remove I/O callback functions. In this example, the private data of the register I/O callback function is unused. The event notifications is missing because it does not require any Qt specific setup.

```
#include <qsocketnotifier.h>
#include <qapplication.h>

struct IOCB {

IOCB(GpgmeIOCb f, void * d, QSocketNotifier * n)
 : func(f), data(d), notifier(n) {}
 GpgmeIOCb func;
 void * data;
 QSocketNotifier * notifier;
}

class MyApp : public QApplication {

// ...

static void registerGpgmeIOCallback(void * data, int fd, int dir,
 GpgmeIOCb func, void * func_data,
 void ** tag) {
 QSocketNotifier * n =
 new QSocketNotifier(fd, dir ? QSocketNotifier::Read
 : QSocketNotifier::Write);
 connect(n, SIGNAL(activated(int)),
 qApp, SLOT(slotGpgmeIOCallback(int)));
 qApp->mIOCBs.push_back(IOCB(func, func_data, n));
 tag = (void)n;
}

static void removeGpgmeIOCallback(void * tag) {
 if (!tag) return;
 QSocketNotifier * n = static_cast<QSocketNotifier*>(tag);
 for (QValueList<IOCB>::iterator
it = qApp->mIOCBs.begin() ;
 it != qApp->mIOCBs.end() ; ++it)
```

```

 if (it->notifier == n) {
 delete it->notifier;
 qApp->mIOCBs.erase(it);
 return;
 }
 }

public slots:
void slotGpgmeIOCallback(int fd) {
 for (QValueList<IOCB>::const_iterator it = mIOCBs.begin() ;
 it != mIOCBs.end() ; ++it)
 if (it->notifier && it->notifier->socket() == fd)
 (*(it->func)) (it->func_data, fd);
 }

 // ...

private:
 QValueList<IOCB> mIOCBs;
 // ...
};

```

File: gpgme.info, Node: Cancellation, Prev: Using External Event Loops, Up: Run Control

### 7.9.3 Cancellation

-----

Sometimes you do not want to wait for an operation to finish. GPGME provides two different functions to achieve that. The function `gpgme_cancel` takes effect immediately. When it returns, the operation is effectively canceled. However, it has some limitations and can not be used with synchronous operations. In contrast, the function `gpgme_cancel_async` can be used with any context and from any thread, but it is not guaranteed to take effect immediately. Instead, cancellation occurs at the next possible time (typically the next time I/O occurs in the target context).

-- Function: `gpgme_ctx_t gpgme_cancel (gpgme_ctx_t CTX)`  
 SINCE: 0.4.5

The function `gpgme_cancel` attempts to cancel a pending operation in the context `CTX`. This only works if you use the global event loop or your own event loop.

If you use the global event loop, you must not call `gpgme_wait` during cancellation. After successful cancellation, you can call

gpgme\_wait (optionally waiting on CTX), and the context CTX will appear as if it had finished with the error code GPG\_ERR\_CANCEL.

If you use an external event loop, you must ensure that no I/O callbacks are invoked for this context (for example by halting the event loop). On successful cancellation, all registered I/O callbacks for this context will be unregistered, and a GPGME\_EVENT\_DONE event with the error code GPG\_ERR\_CANCEL will be signalled.

The function returns an error code if the cancellation failed (in this case the state of CTX is not modified).

-- Function: gpgme\_ctx\_t gpgme\_cancel\_async (gpgme\_ctx\_t CTX)  
SINCE: 1.1.7

The function gpgme\_cancel\_async attempts to cancel a pending operation in the context CTX. This can be called by any thread at any time after starting an operation on the context, but will not take effect immediately. The actual cancellation happens at the next time GPGME processes I/O in that context.

The function returns an error code if the cancellation failed (in this case the state of CTX is not modified).

File: gpgme.info, Node: UI Server Protocol, Next: Debugging, Prev: Contexts, Up: Top

## Appendix A The GnuPG UI Server Protocol

\*\*\*\*\*

This section specifies the protocol used between clients and a User Interface Server (UI server). This protocol helps to build a system where all cryptographic operations are done by a server and the server is responsible for all dialogs. Although GPGME has no direct support for this protocol it is believed that servers will utilize the GPGME library; thus having the specification included in this manual is an appropriate choice. This protocol should be referenced as The GnuPG UI Server Protocol.

A server needs to implement these commands:(1)

\* Menu:

\* UI Server Encrypt::        Encrypt a message.

\* UI Server Sign::         Sign a message.

- \* UI Server Decrypt:: Decrypt a message.
- \* UI Server Verify:: Verify a message.
- \* UI Server Set Input Files:: Specifying the input files to operate on.
- \* UI Server Sign/Encrypt Files:: Encrypting and signing files.
- \* UI Server  
Verify/Decrypt Files:: Decrypting and verifying files.
- \* UI Server Import/Export Keys:: Managing certificates.
- \* UI Server Checksum Files:: Create and verify checksums for files.
- \* Miscellaneous UI Server Commands:: Commands not related to a specific operation.

----- Footnotes -----

(1) In all examples we assume that the connection has already been established; see the Assuan manual for details.

File: gpgme.info, Node: UI Server Encrypt, Next: UI Server Sign, Up: UI Server Protocol

## A.1 UI Server: Encrypt a Message

=====

Before encryption can be done the recipients must be set using the command:

-- Command: RECIPIENT STRING

Set the recipient for the encryption. STRING is an RFC-2822 recipient name ("mailbox" as per section 3.4). This command may or may not check the recipient for validity right away; if it does not all recipients are expected to be checked at the time of the ENCRYPT command.

All RECIPIENT commands are cumulative until a successful ENCRYPT command or until a RESET command. Linefeeds are obviously not allowed in STRING and should be folded into spaces (which are equivalent).

To tell the server the source and destination of the data, the next two commands are to be used:

-- Command: INPUT FD=N

Set the file descriptor for the message to be encrypted to N. The message send to the server is binary encoded.

GpgOL is a Windows only program, thus N is not a libc file descriptor but a regular system handle. Given that the Assuan connection works over a socket, it is not possible to use regular inheritance to make the file descriptor available to the server. Thus DuplicateHandle needs to be used to duplicate a handle to

the server process. This is the reason that the server needs to implement the GETINFO pid command. Sending this command a second time replaces the file descriptor set by the last one.

-- Command: OUTPUT FD=N [--binary]

Set the file descriptor to be used for the output (i.e. the encrypted message) to N. If the option --binary is given the output shall be in binary format; if not given, the output for OpenPGP needs to be ASCII armored and for CMS Base-64 encoded. For details on the file descriptor, see the INPUT command.

The setting of the recipients, the data source and destination may happen in any order, even intermixed. If this has been done the actual encryption operation is called using:

-- Command: ENCRYPT --protocol=NAME

This command reads the plaintext from the file descriptor set by the INPUT command, encrypts it and writes the ciphertext to the file descriptor set by the OUTPUT command. The server may (and should) overlap reading and writing. The recipients used for the encryption are all the recipients set so far. If any recipient is not usable the server should take appropriate

measures to notify

the user about the problem and may cancel the operation by returning an error code. The used file descriptors are void after this command; the recipient list is only cleared if the server returns success.

Because GpgOL uses a streaming mode of operation the server is not allowed to auto select the protocol and must obey to the mandatory PROTOCOL parameter:

OpenPGP

Use the OpenPGP protocol (RFC-2440).

CMS

Use the CMS (PKCS#7) protocol (RFC-3852).

To support automatically selection of the protocol depending on the selected keys, the server MAY implement the command:

-- Command: PREP\_ENCRYPT [--protocol=NAME] [--expect-sign]

This commands considers all recipients set so far and decides whether it is able to take input and start the actual encryption. This is kind of a dry-run ENCRYPT without requiring or using the input and output file descriptors. The server shall cache the

result of any user selection to avoid asking this again when the actual ENCRYPT command is send. The --protocol option is optional; if it is not given, the server should allow the user to select the protocol to be used based on the recipients given or by any other means.

If --expect-sign is given the server should expect that the message will also be signed and use this hint to present a unified recipient and signer selection dialog if possible and desired. A selected signer should then be cached for the expected SIGN command (which is expected in the same session but possible on another connection).

If this command is given again before a successful ENCRYPT command, the second one takes effect.

Before sending the OK response the server shall tell the client the protocol to be used (either the one given by the argument or the one selected by the user) by means of a status line:

-- Status line: PROTOCOL  
NAME

Advise the client to use the protocol NAME for the ENCRYPT command. The valid protocol names are listed under the description of the ENCRYPT command. The server shall emit exactly one PROTOCOL status line.

Here is an example of a complete encryption sequence; client lines are indicated by a C:, server responses by C::

```
C: RESET
S: OK
C: RECIPIENT foo@example.net
S: OK
C: RECIPIENT bar@example.com
S: OK
C: PREP_ENCRYPT
S: S PROTOCOL OpenPGP
S: OK
C: INPUT FD=17
S: OK
C: OUTPUT FD=18
S: OK
C: ENCRYPT
S: OK
```

File: gpgme.info, Node: UI Server Sign, Next: UI Server Decrypt, Prev: UI Server Encrypt, Up: UI Server

## Protocol

### A.2 UI Server: Sign a Message

=====

The server needs to implement opaque signing as well as detached signing. Due to the nature of OpenPGP messages it is always required to send

the entire message to the server; sending just the hash is not possible. The following two commands are required to set the input and output file descriptors:

-- Command: INPUT FD=N

Set the file descriptor for the message to be signed to N. The message sent to the server is binary encoded. For details on the file descriptor, see the description of INPUT in the ENCRYPT section.

-- Command: OUTPUT FD=N [--binary]

Set the file descriptor to be used for the output. The output is either the complete signed message or in case of a detached signature just that detached signature. If the option --binary is given the output shall be in binary format; if not given, the output for OpenPGP needs to be ASCII armored and for CMS Base-64 encoded. For details on the file descriptor, see the INPUT command.

To allow the server the selection of a non-default signing key the client may optionally use the SENDER command, see \*note command SENDER::.

The

signing operation is then initiated by:

-- Command: SIGN --protocol=NAME [--detached]

Sign the data set with the INPUT command and write it to the sink set by OUTPUT. NAME is the signing protocol used for the message. For a description of the allowed protocols see the ENCRYPT command. With option --detached given, a detached signature is created; this is actually the usual way the command is used.

The client expects the server to send at least this status information before the final OK response:

-- Status line: MICALG STRING

The STRING represents the hash algorithm used to create the signature. It is used with RFC-1847 style signature messages and defined by PGP/MIME (RFC-3156) and S/MIME (RFC-3851). The GPGME



library has a supporting function `gpgme_hash_algo_name` to return the algorithm name as a string. This string needs to be lowercased and for OpenPGP prefixed with "pgp-".

File: `gpgme.info`, Node: UI Server

Decrypt, Next: UI Server Verify, Prev: UI Server Sign, Up: UI Server Protocol

### A.3 UI Server: Decrypt a Message

=====

Decryption may include the verification of OpenPGP messages. This is due to the often used combined signing/encryption modus of OpenPGP. The client may pass an option to the server to inhibit the signature verification. The following two commands are required to set the input and output file descriptors:

-- Command: INPUT FD=N

Set the file descriptor for the message to be decrypted to N. The message send to the server is either binary encoded or in the case of OpenPGP ASCII armored. For details on the file descriptor, see the description of INPUT in the ENCRYPT section.

-- Command: OUTPUT FD=N

Set the file descriptor to be used for the output. The output is binary encoded. For details on the file descriptor, see the description of INPUT in the ENCRYPT section.

The decryption is started  
with the command:

-- Command: DECRYPT --protocol=NAME [--no-verify]  
          [--export-session-key]

NAME is the encryption protocol used for the message. For a description of the allowed protocols see the ENCRYPT command.

This argument is mandatory. If the option --no-verify is given, the server should not try to verify a signature, in case the input data is an OpenPGP combined message. If the option --export-session-key is given and the underlying engine knows how to export the session key, it will appear on a status line

\input texinfo @c \*- texinfo \*-

@c %\*\*start of header

@setfilename what-was-new.info

@settitle What Was New in the GPGME Python Bindings and Documentation

@documentencoding utf-8

@documentlanguage en

@c %\*\*end of header

```

@finalout
@titlepage
@title What Was New in the GPGME Python Bindings and Documentation
@author Ben McGinnes
@end titlepage

@contents

@ifnottex
@node Top
@top What Was New in the GPGME Python Bindings and Documentation
@end ifnottex

@menu
* What Was New::

@detailmenu
--- The Detailed Node Listing ---

What Was New

* What Was New in GPGME 1120::

What Was New in GPGME 1120

* New in GPGME 1120::

@end detailmenu
@end menu

@node What Was New
@chapter What Was New

@multitable {aaaaaaaaaaaaaa} {aaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaa}
@item Version:
@tab 0.0.1
@item GPGME Version:
@tab 1.13.0
@item Author:
@tab Ben McGinnes <ben@@gnupg.org>
@item Author GPG Key:
@tab DB4724E6FA4286C92B4E55C4321E4E2373590E5D
@item Language:
@tab Australian English, British English
@item
xml:lang:
@tab en-AU, en-GB, en

```

@end multitable

The following are all the past @emph{What's New} sections for the Python Bindings HOWTO and other documentation.

@menu

\* What Was New in GPGME 1.12.0::

@end menu

@node What Was New in GPGME 1.12.0

@section What Was New in GPGME 1.12.0

The most obviously new point for those reading this guide is this section on other new things, but that's hardly important. Not given all the other things which spurred the need for adding this section and its subsections.

@menu

\* New in GPGME 1.12.0::

@end menu

@node New in GPGME 1.12.0

@subsection New in GPGME 1.12.0

There have been quite a number of additions to GPGME and the Python bindings to it since the last release of GPGME with versions 1.11.0 and 1.11.1 in April, 2018.

The bullet points of new additions are:

@itemize

@item

an expanded section on @uref{gpgme-python-howto#installation, installing} and @uref{gpgme-python-howto#snafu, troubleshooting} the Python bindings.

@item

The release of Python 3.7.0; which appears to be working just fine with our bindings, in spite of intermittent reports of problems for many other Python projects with that new release.

@item

Python 3.7 has been moved to the head of the specified python versions list in the build process.

@item

In order to fix some other issues, there are certain underlying functions which are more exposed through the @uref{gpgme-python-howto#howto-get-context, gpg.Context()}, but ongoing documentation ought to clarify that or otherwise provide the best means of using the bindings. Some additions to @samp{gpg.core} and

the `@samp{Context()}`, however, were intended (see below).

@item

Continuing work in identifying and confirming the cause of oft-reported `@uref{gpgme-python-howto#snafu-runtime-not-funtime}`, problems installing the Python bindings on Windows}.

@item

GSOC: Google's Surreptitiously Ordered Conscription `@dots{}` erm `@dots{}` oh, right; Google's Summer of Code. Though there were two hopeful candidates this year;

only one ended up involved with the GnuPG

Project directly, the other concentrated on an unrelated third party project with closer ties to one of the GNU/Linux distributions than to the GnuPG Project. Thus the Python bindings benefited from GSOC participant Jacob Adams, who added the `key@math{_import}` function; building on prior work by Tobias Mueller.

@item

Several new methods functions were added to the `gpg.Context()`, including: `@uref{gpgme-python-howto#howto-import-key}`, `key@math{_import}`, `@uref{gpgme-python-howto#howto-export-key}`, `key@math{_export}`, `@uref{gpgme-python-howto#howto-export-public-key}`, `key@math{_export}@math{_minimal}` and `@uref{gpgme-python-howto#howto-export-secret-key}`, `key@math{_export}@math{_secret}`.

@item

Importing and exporting examples include versions integrated with Marcel Fest's recently released `@uref{https://github.com/Selfnet/hkp4py}`, HKP for Python} module. Some `@uref{gpgme-python-howto#hkp4py}`, additional notes on this module} are included at the end of the HOWTO.

@item

Instructions for dealing with semi-walled garden implementations like ProtonMail are also included. This is intended to make things a little easier when communicating with users of ProtonMail's services and should not be construed as an endorsement of said service. The GnuPG Project neither favours, nor disfavors ProtonMail and the majority of this deals with interacting with the ProtonMail keyserver.

@item

Semi-formalised the location where `@uref{gpgme-python-howto#draft-editions}`, draft versions} of this HOWTO may periodically be accessible. This is both for the reference of others and testing the publishing of the document itself. Renamed this file at around the same time.

@item

The Texinfo documentation build configuration has been replicated from the parent project in order to make to maintain consistency with that project (and actually ship with each release).

@item

a reStructuredText (`@samp{.rst}`) version is also generated for Python developers more used

to and comfortable with that format as it is the standard Python documentation format and Python developers may wish to use it with Sphinx. Please note that there has been no testing of the reStructuredText version with Sphinx at all. The reST file was generated by the simple expedient of using [@uref{https://pandoc.org/}](https://pandoc.org/), Pandoc}.

@item

Added a new section for [@uref{gpgme-python-howto#advanced-use}](https://pandoc.org/), advanced or experimental use}.

@item

Began the advanced use cases with [@uref{gpgme-python-howto#cython}](https://pandoc.org/), a section} on using the module with [@uref{https://cython.org/}](https://pandoc.org/), Cython}.

@item

Added a number of new scripts to the [@samp{example/howto/}](https://pandoc.org/) directory; some of which may be in advance of their planned sections of the HOWTO (and some are just there because it seemed like a good idea at the time).

@item

Cleaned up a lot of things under the hood.

@end itemize

@bye

Additional license notices for GPGME.                      -\*- org -\*-

This file contains the copying permission notices for various files in the GPGME distribution which are not covered by the GNU Lesser General Public License (LGPL) or the GNU General Public License (GPL).

These notices all require that a copy of the notice be included in the accompanying documentation and be distributed with binary distributions of the code, so be sure to include this file along with any binary distributions derived from the GNU C Library.

\* MIT License

For files:

- cJSON.c, cJSON.h

#+begin\_quote

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#+end\_quote

# -\*- mode: org -\*-

#+TITLE: Maintenance Mode

#+AUTHOR: Ben McGinnes

#+LATEX\_COMPILER: xelatex

#+LATEX\_CLASS: article

#+LATEX\_CLASS\_OPTIONS: [12pt]

#+LATEX\_HEADER: \usepackage{xltextra}

#+LATEX\_HEADER: \usepackage[margin=1in]{geometry}

#+LATEX\_HEADER: \setmainfont[Ligatures={Common}]{Times New Roman}

#+LATEX\_HEADER: \author{Ben McGinnes <ben@gnupg.org>}

\* Maintenance Mode from 2019

:PROPERTIES:

:CUSTOM\_ID: maintenance-mode

:END:

| Version: | 0.0.1 |  
| GPGME Version: | 1.13.0 |  
| Author: | Ben McGinnes <ben@gnupg.org> |  
| Author GPG Key: | DB4724E6FA4286C92B4E55C4321E4E2373590E5D |  
| Language: | Australian English, British English |  
| xml:lang: | en-AU, en-GB, en |

From the beginning of 2019 the Python bindings to GPGME will enter maintenance mode, meaning that new features will not be added and only bug fixes and security fixes will be made.

This also means that

documentation beyond that existing at the end of 2018 will not be developed further except to correct errors.

Though use of these bindings appears to have been quite well received, there has been no indication of what demand there is, if any for either financial backing of the current Python bindings development or support contracts with g10code GmbH citing the necessity of including the bindings.

```
** Maintainer from 2019 onward
:PROPERTIES:
:CUSTOM_ID: maintenance-mode-bm
:END:
```

How does this affect the position of GnuPG Python Bindings Maintainer?

Well, I will remain as maintainer of the bindings; but without funding for that position, the amount of time I will be able to dedicate solely to this task will be limited and reduced to volunteered time. As with all volunteered time and effort in free software projects, this will be subject to numerous external imperatives.

```
** Using the Python Bindings from 2019 and beyond
:PROPERTIES:
:CUSTOM_ID:
maintenance-mode-blade-runner
:END:
```

For most, if not all, Python developers using these bindings; they will continue to just work the same as they always have. Expansions of GPGME itself are usually handled by SWIG with the existing code and thus bindings are generated properly when the bindings are installed alongside GPGME and when the latter is built from source.

In the rare circumstances where that is not enough to address some new addition to GPGME, then that is a bug and thus subject to the maintenance mode provisions (i.e. it will be fixed following a bug report being raised and your humble author will need to remember where the timesheet template was filed, depending on how many years off such an event is).

All the GPGME functionality will continue to be accessible via the lower level, dynamically generated methods which match the GPGME C documentation. While the more intuitively Pythonic higher level layer already covers the vast majority of functionality people require with key generation, signatures, certifications (key signing), encryption, decryption, verification, validation, trust levels and so on.

Any wanted features lacking in the Python bindings are usually lacking because they are missing from GPGME itself (e.g. revoking keys via the API) and in such cases they are usually deliberately excluded. More discussion of these issues can be found in the archives of the [\[\[https://lists.gnupg.org/mailman/listinfo/gnupg-devel\]\]](https://lists.gnupg.org/mailman/listinfo/gnupg-devel) [\[gnupg-devel mailing list\]](#)].

Any features existing in the dynamically generated layer for which people want a specific, higher level function included to make it more Pythonic (e.g. to avoid needing to learn or memorise cryptographic mode values or GnuPG status code numbers), would be a feature request and /not/ a bug.

It is still worthwhile requesting it, but the addition of such a feature would not be guaranteed and provided on a purely volunteer basis. Expediting such a request would require funding that request.

Those with a commercial interest in expediting such a feature request already know how to [[<https://gnupg.org/cgi-bin/procdonate.cgi?mode=preset>][expedite it]] (use the message field to state what feature is being requested).

**\*\* Documentation formats**

:PROPERTIES:

:CUSTOM\_ID: docs

:END:

The documentation has been written in Org mode for GNU Emacs, with both Texinfo and reStructuredText formats generated from that. The Texinfo files are intended for use with the rest of the GnuPG documentation; while the reStructuredText files are intended for use with Docutils and Sphinx, as with other Python projects.

**\*\*\* Cautionary Notes regarding Sphinx and EPUB**

:PROPERTIES:

:CUSTOM\_ID: sphinx-made-epubs-suck

:END:

Though Python's Docutils in conjunction with Sphinx is capable of generating some very useful HTML sites, as proven by [[<https://readthedocs.org/>][Read the Docs]] and the [[<https://docs.python.org/>][Python documentation]], there are a number of output formats it does not handle well. At the top of the list of things it manages to break so atrociously as to be embarrassing is the [[<http://idpf.org/epub/>][EPUB 3]] format.

The automatically generated EPUB of the CPython documentation always contains hundreds of validation errors and even the modest amount of documentation here [[<https://files.au.adversary.org.s3.amazonaws.com/crypto/gpgme-python/rst/epub/GPGMEPythonBindings.epub>][produced a file]] with approximately thirty validation errors. As the volume of documentation content increases, so does the induced errors. Whereas Texinfo doesn't produce EPUB output at all, nor does Org-mode.



Should there ever be genuine demand for this format, lodge a  
[[<https://dev.gnupg.org/maniphest/task/edit/form/4/>][feature  
request]] case marked for [[<https://dev.gnupg.org/p/BenM/>][my]] attention. The means of generating such  
files flawlessly is already available, but is not yet part of the  
GnuPG build system. Nor is it integrated with a means of converting  
Org

mode input files to the relevant base format automatically, as can  
already be done when converting Org to reStructuredText or Org to  
Texinfo. As a certain amount of work would be required to get it  
done, there would need to be clear demand for that work to be done.  
Just GNU it!

This is gpgme.info, produced by makeinfo version 6.3 from gpgme.texi.

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INFO-DIR-SECTION GNU Libraries

START-INFO-DIR-ENTRY

\* GPGME: (gpgme). Adding support for cryptography to your program.

END-INFO-DIR-ENTRY

This file documents the GPGME library.

This is Edition 1.12.1-beta100, last updated 3 December 2018, of The  
GnuPG Made Easy Reference Manual, for Version  
1.12.1-beta100.

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File: gpgme.info, Node: UI Server Verify, Next: UI Server Set Input Files, Prev: UI Server Decrypt, Up: UI Server Protocol

#### A.4 UI Server: Verify a Message

=====

The server needs to support the verification of opaque signatures as well as detached signatures. The kind of input sources controls what kind message is to be verified.

-- Command: MESSAGE FD=N

This command is used with detached signatures to set the file descriptor for the signed data to N. The data is binary encoded (used verbatim). For details on the file descriptor, see the description of INPUT in the ENCRYPT section.

-- Command: INPUT FD=N

Set the file descriptor for the opaque message or the signature part of a detached signature to N. The message send to the server is either binary encoded or in the case of OpenPGP ASCII armored. For details on the file descriptor, see the description of INPUT in the ENCRYPT section.

-- Command: OUTPUT FD=N

Set the file descriptor to be used for the output. The output is binary encoded and only used for opaque signatures. For details on the file descriptor, see the description of INPUT in the ENCRYPT section.

The verification is then started using:

-- Command: VERIFY --protocol=NAME [--silent]

NAME is the signing protocol used for the message. For a description of the allowed protocols see the ENCRYPT command. This argument is mandatory. Depending on the combination of MESSAGE INPUT and OUTPUT commands, the server needs to select the appropriate verification mode:

MESSAGE and INPUT

This indicates a detached signature. Output data is not applicable.

INPUT

This indicates an opaque signature. As no output command has

been given, the server is only required to check the signature.

#### INPUT and OUTPUT

This indicates an opaque signature. The server shall write the signed data to the file descriptor set by the output command. This data shall even be written if the signatures cant be verified.

With --silent the server shall not display any dialog; this is for example used by the client to get the content of opaque signed messages. The client expects the server to send at least this status information before the final OK response:

#### -- Status line: SIGSTATUS FLAG DISPLAYSTRING

Returns the status for the signature and a short string explaining the status. Valid values for FLAG are:

none

The message has a signature but it could not not be verified due to a missing key.

green

The signature is fully valid.

yellow

The signature is valid but additional information was shown regarding the validity of the key.

red

The signature is not valid.

DISPLAYSTRING is a percent-and-plus-encoded string with a short human readable description of the status. For example

S SIGSTATUS green Good+signature+from+Keith+Moon+<keith@example.net>

Note that this string needs to fit into an Assuan line and should be short enough to be displayed as short one-liner on the clients window. As usual the encoding of this string is UTF-8 and it should be send in its translated form.

The server shall send one status line for every signature found on the message.

File: gpgme.info, Node: UI Server Set Input Files, Next: UI Server Sign/Encrypt Files, Prev: UI Server Verify, Up: UI Server Protocol

A.5 UI Server: Specifying the input files to operate on.

=====

All file related UI server commands operate on a number of input files or directories, specified by one or more FILE commands:

-- Command: FILE [--clear] NAME

Add the file or directory NAME to the list of pathnames to be processed by the server. The parameter NAME must be an absolute path name (including the drive letter) and is percent escaped (in particular, the characters %, = and white space characters are always escaped). If the option --clear is given, the list of files is cleared before adding NAME.

Historical note: The original spec did not define --clear but the keyword

--continued after the file name to indicate that more files are to be expected. However, this has never been used and thus removed from the specs.

File: gpgme.info, Node: UI Server Sign/Encrypt Files, Next: UI Server Verify/Decrypt Files, Prev: UI Server Set Input Files, Up: UI Server Protocol

#### A.6 UI Server: Encrypting and signing files.

=====

First, the input files need to be specified by one or more FILE commands. Afterwards, the actual operation is requested:

-- Command: ENCRYPT\_FILES --nohup

-- Command: SIGN\_FILES --nohup

-- Command: ENCRYPT\_SIGN\_FILES --nohup

Request that the files specified by FILE are encrypted and/or signed. The command selects the default action. The UI server may allow the user to change this default afterwards interactively, and even abort the operation or complete it only on some of the selected files and directories.

What it means to encrypt or sign a file or directory is specific to

the preferences of the user, the functionality the UI server provides, and the selected protocol. Typically, for each input file a new file is created under the original filename plus a protocol specific extension (like .gpg or .sig), which contain the encrypted/signed file or a detached signature. For directories, the server may offer multiple options to the user (for example ignore or process recursively).

The ENCRYPT\_SIGN\_FILES command requests a combined sign and encrypt operation. It may not be available for all protocols (for example, it is available for OpenPGP but not for CMS).

The option --nohup is mandatory. It is currently unspecified what should happen if --nohup is not present. Because --nohup is present, the server always returns OK promptly, and completes the operation asynchronously.

File: gpgme.info, Node: UI Server Verify/Decrypt Files, Next: UI Server Import/Export Keys, Prev: UI Server Sign/Encrypt Files, Up: UI Server Protocol

#### A.7 UI Server: Decrypting and verifying files.

=====

First, the input files need to be specified by one or more FILE commands. Afterwards, the actual operation is requested:

-- Command: DECRYPT\_FILES --nohup

-- Command: VERIFY\_FILES --nohup

-- Command: DECRYPT\_VERIFY\_FILES --nohup

Request that the files specified by FILE are decrypted and/or verified. The command selects the default action. The UI server may allow the user to change this default afterwards interactively, and even abort the operation or complete it only on some of the selected files and directories.

What it means to decrypt or verify a file or directory is specific to the preferences of the user, the functionality the UI server provides, and the selected protocol. Typically, for decryption, a new file is created for each input file under the original filename minus a protocol specific extension (like .gpg) which contains the original plaintext. For verification a status is displayed for each signed input file, indicating if it is signed, and if yes, if the signature is valid. For files that are signed and encrypted, the VERIFY command transiently decrypts the file to verify the enclosed signature. For directories, the server may offer multiple options to the user (for example ignore or process recursively).

The option --nohup is mandatory. It is currently unspecified what should happen if --nohup is not present. Because --nohup is present, the server always returns OK promptly, and completes the operation asynchronously.

File: gpgme.info, Node: UI Server Import/Export Keys, Next: UI Server Checksum Files, Prev: UI Server Verify/Decrypt Files, Up: UI Server Protocol

## A.8 UI Server: Managing certificates.

=====

First, the input files need to be specified by one or more FILE commands. Afterwards, the actual operation is requested:

-- Command: IMPORT\_FILES --nohup  
Request that the certificates contained in the files specified by FILE are imported into the local certificate databases.

For directories, the server may offer multiple options to the user (for example ignore or process recursively).

The option --nohup is mandatory. It is currently unspecified what should happen if --nohup is not present. Because --nohup is present, the server always returns OK promptly, and completes the operation asynchronously.

FIXME: It may be nice to support an EXPORT command as well, which is enabled by the context menu of the background of a directory.

File: gpgme.info, Node: UI Server Checksum Files, Next: Miscellaneous UI Server Commands, Prev: UI Server Import/Export Keys, Up: UI Server Protocol

## A.9 UI Server: Create and verify checksums for files.

=====

First, the input files need to be specified by one or more FILE commands. Afterwards, the actual operation is requested:

-- Command: CHECKSUM\_CREATE\_FILES --nohup  
Request that checksums are created for the files specified by FILE. The choice of checksum algorithm and the destination storage and format for the created checksums depend on the preferences of the user and the functionality provided by the UI server. For directories, the server may offer multiple options to the user (for example ignore or process recursively).

The option --nohup is mandatory. It is currently unspecified what should happen if --nohup is not present. Because --nohup is present, the server always returns OK promptly, and completes the operation asynchronously.

-- Command: CHECKSUM\_VERIFY\_FILES --nohup

Request that checksums are created for the files specified by FILE and verified against previously created and stored checksums. The choice of checksum algorithm and the source storage and format for previously created checksums depend on the preferences of the user and the functionality provided by the UI server. For directories, the server may offer multiple options to the user (for example ignore or process recursively).

If the source storage of previously created checksums is available to the user through the Windows shell, this command may also accept such checksum files as FILE arguments. In this case, the UI server should instead verify the checksum of the referenced files as if they were given as INPUT files.

The option --nohup is mandatory. It is currently unspecified what should happen if --nohup is not present. Because --nohup is present, the server always returns OK promptly, and completes the operation asynchronously.

File: gpgme.info, Node: Miscellaneous UI Server Commands, Prev: UI Server Checksum Files,  
Up: UI Server Protocol

#### A.10 Miscellaneous UI Server Commands

=====

The server needs to implement the following commands which are not related to a specific command:

-- Command: GETINFO WHAT

This is a multi purpose command, commonly used to return a variety of information. The required subcommands as described by the WHAT parameter are:

pid

Return the process id of the server in decimal notation using an Assuan data line.

To allow the server to pop up the windows in the correct relation to the client, the client is advised to tell the server by sending the option:

-- Command option: window-id NUMBER

The NUMBER represents the native window ID of the clients current window. On Windows systems this is a windows handle (HWND) and on X11 systems it is the X Window ID. The number needs to be given as a hexadecimal value so that it is easier to convey pointer values (e.g. HWND).

A client

may want to fire up the certificate manager of the server. To do this it uses the Assuan command:

-- Command: START\_KEYMANAGER

The server shall pop up the main window of the key manager (aka certificate manager). The client expects that the key manager is brought into the foreground and that this command immediately returns (does not wait until the key manager has been fully brought up).

A client may want to fire up the configuration dialog of the server. To do this it uses the Assuan command:

-- Command: START\_CONFDIALOG

The server shall pop up its configuration dialog. The client expects that this dialog is brought into the foreground and that this command immediately returns (i.e. it does not wait until the dialog has been fully brought up).

When doing an operation on a mail, it is useful to let the server know the address of the sender:

-- Command: SENDER [--info] [--protocol=NAME] EMAIL

EMAIL is the plain ASCII encoded address ("addr-spec" as per

RFC-2822) enclosed in angle brackets. The address set with this command is valid until a successful completion of the operation or until a RESET command. A second command overrides the effect of the first one; if EMAIL is not given and --info is not used, the server shall use the default signing key.

If option --info is not given, the server shall also suggest a protocol to use for signing. The client may use this suggested protocol on its own discretion. The same status line as with PREP\_ENCRYPT is used for this.

The option --protocol may be used to give the server a hint on which signing protocol should be preferred.

To allow the UI-server to visually identify a running operation or to associate operations the server MAY support the command:

-- Command: SESSION NUMBER [STRING]

The NUMBER is an arbitrary value, a server may use to associate simultaneous running sessions. It is a 32 bit unsigned integer with 0 as a special value indicating that no session association



shall be done.

If STRING is given, the server may use this as the title of a window or, in the case of an email operation, to extract the senders address. The string may contain spaces; thus no plus-escaping is used.

This command may be used at any time and overrides the effect of the last command. A RESET undoes the effect of this command.

File: gpgme.info, Node: Debugging, Next: Deprecated Functions, Prev: UI Server Protocol, Up: Top

## Appendix B How to solve problems

\*\*\*\*\*

Everyone knows that software often does not do what it should do and thus there is a need to track down problems. This is in particular true for applications using a complex library like GPGME and of course also for the library itself. Here we give a few hints on how to solve such problems.

First of all you should make sure that the keys you want to use are installed in the GnuPG engine and are usable. Thus the first test is to run the desired operation using gpg or gpgsm on the command line. If you cant figure out why things dont work, you may use GPGMEs built in trace feature. This feature is either enabled using the environment variable GPGME\_DEBUG or, if this is not possible, by calling the function gpgme\_set\_global\_flag. The value is the trace level and an optional file name. If no file name is given the trace output is printed to stderr.

For example

```
GPGME_DEBUG=9:/home/user/mygpgme.log
```

(Note that under Windows you use a semicolon in place of the colon to separate the fields.)

A trace level of 9 is pretty verbose and thus you may want to start off with a lower level. The exact definition of the trace levels and the output format may change with any release; you need to check the source code for details. In any case the trace log should be helpful to understand what is going going on. Warning: The trace log may reveal sensitive details like passphrases or other data you use in your application. If you are asked to send a log file, make sure that you run your tests only with play data.

## Appendix C Deprecated Functions

\*\*\*\*\*

For backward compatibility GPGME has a number of functions, data types and constants which are deprecated and should not be used anymore. We document here those which are really old to help understanding old code and to allow migration to their modern counterparts.

**\*Warning:** These interfaces will be removed in a future version of GPGME.

-- Function: void gpgme\_key\_release (gpgme\_key\_t KEY)

The function gpgme\_key\_release is equivalent to gpgme\_key\_unref.

-- Function: void gpgme\_trust\_item\_release (gpgme\_trust\_item\_t ITEM)

The function gpgme\_trust\_item\_release is an alias for gpgme\_trust\_item\_unref.

-- Function:

gpgme\_error\_t gpgme\_op\_import\_ext (gpgme\_ctx\_t CTX,  
gpgme\_data\_t KEYDATA, int \*NR)  
SINCE: 0.3.9

The function gpgme\_op\_import\_ext is equivalent to:

```
gpgme_error_t err = gpgme_op_import (ctx, keydata);
if (!err)
{
 gpgme_import_result_t result = gpgme_op_import_result (ctx);
 *nr = result->considered;
}
```

-- Data type: gpgme\_error\_t (\*gpgme\_edit\_cb\_t) (void \*HANDLE,  
gpgme\_status\_code\_t STATUS, const char \*ARGS, int FD)

The gpgme\_edit\_cb\_t type is the type of functions which GPGME calls if it a key edit operation is on-going. The status code STATUS and the argument line ARGS are passed through by GPGME from the crypto engine. The file descriptor FD is -1 for normal status messages. If STATUS indicates a command rather than a status message, the response to the command should be written to FD. The HANDLE is provided by the user at start of operation.

The function should return GPG\_ERR\_FALSE if it did not handle the

status code, 0 for success, or any other error value.

-- Function: `gpgme_error_t gpgme_op_edit (gpgme_ctx_t CTX,  
gpgme_key_t KEY, gpgme_edit_cb_t FNC, void *HANDLE,  
gpgme_data_t OUT)`  
SINCE: 0.3.9

Note: This function is deprecated, please use `gpgme_op_interact` instead.

The function `gpgme_op_edit` processes the key `KEY` interactively, using the edit callback function `FNC` with the handle `HANDLE`. The callback is invoked for every status and command request from the crypto engine. The output of the crypto engine is written to the data object `OUT`.

Note that the protocol between the callback function and the crypto engine is specific to the crypto engine and no further support in implementing this protocol correctly is provided by GPGME.

The function returns the error code `GPG_ERR_NO_ERROR` if the edit operation completes successfully, `GPG_ERR_INV_VALUE` if `CTX` or `KEY` is not a valid pointer, and any error returned by the crypto engine or the edit callback handler.

-- Function: `gpgme_error_t gpgme_op_edit_start (gpgme_ctx_t CTX,  
gpgme_key_t KEY, gpgme_edit_cb_t FNC, void *HANDLE,  
gpgme_data_t OUT)`

SINCE: 0.3.9

Note: This function is deprecated, please use `gpgme_op_interact_start` instead.

The function `gpgme_op_edit_start` initiates a `gpgme_op_edit` operation. It can be completed by calling `gpgme_wait` on the context. \*Note Waiting For Completion::.

The function returns the error code `GPG_ERR_NO_ERROR` if the operation was started successfully, and `GPG_ERR_INV_VALUE` if `CTX` or `KEY` is not a valid pointer.

-- Function: `gpgme_error_t gpgme_op_card_edit (gpgme_ctx_t CTX,  
gpgme_key_t KEY, gpgme_edit_cb_t FNC, void *HANDLE,  
gpgme_data_t OUT)`

Note: This function is deprecated, please use `gpgme_op_interact`

with the flag GPGME\_INTERACT\_CARD instead.

The function `gpgme_op_card_edit` is analogous to `gpgme_op_edit`, but should be used to process the smart card corresponding to the key `KEY`.

-- Function: `gpgme_error_t gpgme_op_card_edit_start (gpgme_ctx_t CTX, gpgme_key_t KEY, gpgme_edit_cb_t FNC, void *HANDLE, gpgme_data_t OUT)`

Note: This function is deprecated, please use `gpgme_op_interact_start` with the flag `GPGME_INTERACT_CARD` instead.

The function `gpgme_op_card_edit_start` initiates a `gpgme_op_card_edit` operation. It can be completed by calling `gpgme_wait` on the context. \*Note Waiting For Completion::.

The function returns the error code `GPG_ERR_NO_ERROR` if the operation was started successfully, and `GPG_ERR_INV_VALUE` if `CTX` or `KEY` is not a valid pointer.

-- Function: `gpgme_error_t gpgme_data_new_with_read_cb (gpgme_data_t *DH, int (*READFUNC) (void *HOOK, char *BUFFER, size_t COUNT, size_t *NREAD), void *HOOK_VALUE)`

The function `gpgme_data_new_with_read_cb` creates a new `gpgme_data_t` object and uses the callback function `READFUNC` to retrieve the data on demand. As the callback function can supply the data in any way it wants, this is the most flexible data type GPGME provides. However, it can not be used to write data.

The callback function receives `HOOK_VALUE` as its first argument whenever it is invoked. It should return up to `COUNT` bytes in `BUFFER`, and return the number of bytes actually read in `NREAD`. It may return 0 in `NREAD` if no data is currently available. To indicate EOF the function should return with an error code of -1 and set `NREAD` to 0. The callback function may support to reset its internal read pointer if it is invoked with `BUFFER` and `NREAD` being `NULL` and `COUNT` being 0.

The function returns the error code `GPG_ERR_NO_ERROR` if the data object was successfully created, `GPG_ERR_INV_VALUE` if `DH` or `READFUNC` is not a valid pointer, and `GPG_ERR_ENOMEM` if not enough memory is available.

-- Function: `gpgme_error_t gpgme_data_rewind (gpgme_data_t DH)`

The function `gpgme_data_rewind` is equivalent to:

```
return (gpgme_data_seek (dh, 0, SEEK_SET) == -1)
? gpgme_error_from_errno (errno) : 0;
```

-- Data type: `gpgme_attr_t`

The `gpgme_attr_t` type is used to specify a key or trust item attribute. The following attributes are defined:

#### `GPGME_ATTR_KEYID`

This is the key ID of a sub key. It is representable as a string.

For trust items, the trust item refers to the key with this ID.

#### `GPGME_ATTR_FPR`

This is the fingerprint of a sub key. It is representable as a string.

#### `GPGME_ATTR_ALGO`

This is the crypto algorithm for which the sub key can be used. It is representable as a string and as a number. The numbers correspond to the enum `gcry_pk_algos` values in the `gcrypt` library.

#### `GPGME_ATTR_LEN`

This is the key length of a sub key. It is representable as a number.

#### `GPGME_ATTR_CREATED`

This is the timestamp at creation time of a sub key. It is representable as a number.

#### `GPGME_ATTR_EXPIRE`

This is the expiration time of a sub key. It is representable as a number.

#### `GPGME_ATTR_OTRUST`

XXX FIXME (also for trust items)

#### `GPGME_ATTR_USERID`

This is a user ID. There can be more than one user IDs in a `GPGME_KEY_T` object. The first one (with index 0) is the primary user ID. The user ID is representable as a number.

For trust items, this is the user ID associated with this trust item.

#### GPGME\_ATTR\_NAME

This is the name belonging to a user ID. It is representable as a string.

#### GPGME\_ATTR\_EMAIL

This is the email address belonging to a user ID. It is representable as a string.

#### GPGME\_ATTR\_COMMENT

This is the comment belonging to a user ID. It is representable as a string.

#### GPGME\_ATTR\_VALIDITY

This is the validity belonging to a user ID. It is representable as a string and as a number. See below for a list of available validities.

For trust items, this is the validity that is associated with this trust item.

#### GPGME\_ATTR\_UID\_REVOKED

This specifies if a user ID is revoked. It is representable as a number, and is 1 if the user ID is revoked, and 0 otherwise.

#### GPGME\_ATTR\_UID\_INVALID

This specifies if a user ID is invalid. It is representable as a number, and is 1 if the user ID is invalid, and 0 otherwise.

#### GPGME\_ATTR\_LEVEL

This is the trust level of a trust item.

#### GPGME\_ATTR\_TYPE

This returns information about the type of key. For the string function this will either be "PGP" or "X.509". The integer function returns 0 for PGP and 1 for X.509. It is also used for the type of a trust item.

#### GPGME\_ATTR\_IS\_SECRET

This specifies if the key is a secret key. It is representable as a number, and is 1 if the key is revoked, and 0 otherwise.

#### GPGME\_ATTR\_KEY\_REVOKED

This specifies if a sub key is revoked. It is representable as a number, and is 1 if the key is revoked, and 0 otherwise.

#### GPGME\_ATTR\_KEY\_INVALID

This specifies if a sub key is invalid. It is representable as a number, and is 1 if the key is invalid, and 0 otherwise.

#### GPGME\_ATTR\_KEY\_EXPIRED

This specifies if a sub key is expired. It is representable as a number, and is 1 if the key is expired, and 0 otherwise.

#### GPGME\_ATTR\_KEY\_DISABLED

This specifies if a sub key is disabled. It is representable as a number, and is 1 if the key is disabled, and 0 otherwise.

#### GPGME\_ATTR\_KEY\_CAPS

This is a description of the capabilities of a sub key. It is representable as a string. The string contains the letter e if the key can be used for encryption, s if the key can be used for signatures, and c if the key can be used for certifications.

#### GPGME\_ATTR\_CAN\_ENCRYPT

This specifies if a sub key can be used for encryption. It is representable as a number, and is 1 if the sub key can be used for encryption, and 0 otherwise.

#### GPGME\_ATTR\_CAN\_SIGN

This specifies if a sub key can be used to create data signatures. It is representable as a number, and is 1 if the sub key can be used for signatures, and 0 otherwise.

#### GPGME\_ATTR\_CAN\_CERTIFY

This specifies if a sub key can be used to create key certificates. It is representable as a number, and is 1 if the sub key can be used for certifications, and 0 otherwise.

#### GPGME\_ATTR\_SERIAL

The X.509 issuer serial attribute of the key. It is representable as a string.

#### GPGME\_ATTR\_ISSUE

The X.509 issuer name attribute of the key. It is representable as a string.

#### GPGME\_ATTR\_CHAINID

The X.509 chain ID can be used to build the certification chain. It is representable as a string.

-- Function: `const char * gpgme_key_get_string_attr (gpgme_key_t KEY, gpgme_attr_t WHAT, const void *RESERVED, int IDX)`

The function `gpgme_key_get_string_attr` returns the value of the string-representable attribute `WHAT` of key `KEY`. If the attribute is an attribute of a sub key or an user ID, `IDX` specifies the sub key or user ID of which the attribute value is returned. The argument `RESERVED` is reserved for later use and should be `NULL`.

The string returned is only valid as long as the key is valid.

The function returns 0 if an attribute can't be returned as a string, `KEY` is not a valid pointer, `IDX` out of range, or `RESERVED` not `NULL`.

-- Function: `unsigned long gpgme_key_get_ulong_attr (gpgme_key_t KEY, gpgme_attr_t WHAT, const void *RESERVED, int IDX)`

The function `gpgme_key_get_ulong_attr` returns the value of the number-representable attribute `WHAT` of key `KEY`. If the attribute is an attribute of a sub key or an user ID, `IDX` specifies the sub key or user ID of which the attribute value is returned. The argument `RESERVED` is reserved for later use and should be `NULL`.

The function returns 0 if the attribute can't be returned as a number, `KEY` is not a valid pointer, `IDX` out of range, or `RESERVED` not `NULL`.

The signatures on a key are only available if the key was retrieved via a listing operation with the `GPGME_KEYLIST_MODE_SIGS` mode enabled, because it is expensive to retrieve all signatures of a key.

So, before using the below interfaces to retrieve the signatures on a key, you have to make sure that the key was listed with signatures enabled. One convenient, but blocking, way to do this is to use the function `gpgme_get_key`.

-- Data type: `gpgme_attr_t`

The `gpgme_attr_t` type is used to specify a key signature attribute. The following attributes are defined:

#### GPGME\_ATTR\_KEYID



This is the key ID of the key which was used for the signature. It is representable as a string.

#### GPGME\_ATTR\_ALGO

This is the crypto algorithm used to create the signature. It is representable as a string and as a number. The numbers correspond to the enum `gcry_pk_algos` values in the `gcrypt` library.

#### GPGME\_ATTR\_CREATED

This is the timestamp at creation time of the signature. It is representable as a number.

#### GPGME\_ATTR\_EXPIRE

This is the expiration time of the signature. It is representable as a number.

#### GPGME\_ATTR\_USERID

This is the user ID associated with the signing key. The user ID is representable as a number.

#### GPGME\_ATTR\_NAME

This is the name belonging to a user ID. It is representable as a string.

#### GPGME\_ATTR\_EMAIL

This is the email address belonging to a user ID. It is representable as a string.

#### GPGME\_ATTR\_COMMENT

This is the comment belonging to a user ID. It is representable as a string.

#### GPGME\_ATTR\_KEY\_REVOKED

This specifies if a key signature is a revocation signature. It is representable as a number, and is 1 if the key is revoked, and 0 otherwise.

#### GPGME\_ATTR\_SIG\_CLASS

This specifies the signature class of a key signature. It is representable as a number. The meaning is specific to the crypto engine.

#### GPGME\_ATTR\_SIG\_CLASS

This specifies the signature class of a key signature. It is representable as a number. The meaning is specific to the crypto engine.

## GPGME\_ATTR\_SIG\_STATUS

This is the same value as returned by `gpgme_get_sig_status`.

```
-- Function: const char * gpgme_key_sig_get_string_attr
(gpgme_key_t KEY, int UID_IDX, gpgme_attr_t WHAT,
const void *RESERVED, int IDX)
```

The function `gpgme_key_sig_get_string_attr` returns the value of the string-representable attribute `WHAT` of the signature `IDX` on the user ID `UID_IDX` in the key `KEY`. The argument `RESERVED` is reserved for later use and should be `NULL`.

The string returned is only valid as long as the key is valid.

The function returns 0 if an attribute can't be returned as a string, `KEY` is not a valid pointer, `UID_IDX` or `IDX` out of range, or `RESERVED` not `NULL`.

```
-- Function: unsigned long gpgme_key_sig_get_ulong_attr
(gpgme_key_t
KEY, int UID_IDX, gpgme_attr_t WHAT,
const void *RESERVED, int IDX)
```

The function `gpgme_key_sig_get_ulong_attr` returns the value of the number-representable attribute `WHAT` of the signature `IDX` on the user ID `UID_IDX` in the key `KEY`. The argument `RESERVED` is reserved for later use and should be `NULL`.

The function returns 0 if an attribute can't be returned as a string, `KEY` is not a valid pointer, `UID_IDX` or `IDX` out of range, or `RESERVED` not `NULL`.

Trust items have attributes which can be queried using the interfaces below. The attribute identifiers are shared with those for key attributes. \*Note Information About Keys::.

```
-- Function: const char * gpgme_trust_item_get_string_attr
(gpgme_trust_item_t ITEM, gpgme_attr_t WHAT,
const void *RESERVED, int IDX)
```

The function `gpgme_trust_item_get_string_attr` returns the value of the string-representable attribute `WHAT` of trust item `ITEM`. The arguments `IDX` and `RESERVED` are reserved for later use and should be 0 and `NULL` respectively.

The string returned is only valid as long as the key is valid.

The function returns 0 if an attribute can't be returned as a string, `KEY` is not a valid pointer, `IDX` out of range, or `RESERVED`

not NULL.

```
-- Function: int gpgme_trust_item_get_int_attr
 (gpgme_trust_item_t ITEM, gpgme_attr_t WHAT,
 const void *RESERVED, int IDX)
```

The function `gpgme_trust_item_get_int_attr` returns the value of the number-representable attribute `WHAT` of trust item `ITEM`. If the attribute occurs more than once in the trust item, the index is specified by `IDX`. However, currently no such attribute exists, so `IDX` should be 0. The argument `RESERVED` is reserved for later use and should be NULL.

The function returns 0 if the attribute can't be returned as a number, `KEY` is not a valid pointer, `IDX` out of range, or `RESERVED` not NULL.

```
-- Data type:
enum gpgme_sig_stat_t
```

The `gpgme_sig_stat_t` type holds the result of a signature check, or the combined result of all signatures. The following results are possible:

`GPGME_SIG_STAT_NONE`

This status should not occur in normal operation.

`GPGME_SIG_STAT_GOOD`

This status indicates that the signature is valid. For the combined result this status means that all signatures are valid.

`GPGME_SIG_STAT_GOOD_EXP`

This status indicates that the signature is valid but expired. For the combined result this status means that all signatures are valid and expired.

`GPGME_SIG_STAT_GOOD_EXPKEY`

This status indicates that the signature is valid but the key used to verify the signature has expired. For the combined result this status means that all signatures are valid and all keys are expired.

`GPGME_SIG_STAT_BAD`

This status indicates that the signature is invalid. For the combined result this status means that all signatures are invalid.

`GPGME_SIG_STAT_NOKEY`

This status indicates that the signature could not be verified due to a missing key. For the combined result this status means that all signatures could not be checked due to missing keys.

#### GPGME\_SIG\_STAT\_NOSIG

This status indicates that the signature data provided was not a real signature.

#### GPGME\_SIG\_STAT\_ERROR

This status indicates that there was some other error which prevented the signature verification.

#### GPGME\_SIG\_STAT\_DIFF

For the combined result this status means that at least two signatures have a different status. You can get each keys status with `gpgme_get_sig_status`.

-- Function: `const char * gpgme_get_sig_status (gpgme_ctx_t CTX, int IDX, gpgme_sig_stat_t *R_STAT, time_t *R_CREATED)`

The function

`gpgme_get_sig_status` is equivalent to:

```
gpgme_verify_result_t result;
gpgme_signature_t sig;

result = gpgme_op_verify_result (ctx);
sig = result->signatures;

while (sig && idx)
{
 sig = sig->next;
 idx--;
}
if (!sig || idx)
 return NULL;

if (r_stat)
{
 switch (gpg_err_code (sig->status))
 {
case GPG_ERR_NO_ERROR:
 *r_stat = GPGME_SIG_STAT_GOOD;
 break;

case GPG_ERR_BAD_SIGNATURE:
 *r_stat = GPGME_SIG_STAT_BAD;
 break;
```

```

case GPG_ERR_NO_PUBKEY:
 *r_stat = GPGME_SIG_STAT_NOKEY;
 break;

case GPG_ERR_NO_DATA:
 *r_stat = GPGME_SIG_STAT_NOSIG;
 break;

case GPG_ERR_SIG_EXPIRED:
 *r_stat = GPGME_SIG_STAT_GOOD_EXP;
 break;

case GPG_ERR_KEY_EXPIRED:
 *r_stat = GPGME_SIG_STAT_GOOD_EXPKEY;
 break;

default:
 *r_stat = GPGME_SIG_STAT_ERROR;
 break;
}
}
if (r_created)
 *r_created = sig->timestamp;
return sig->fpr;

```

-- Function: const char \* gpgme\_get\_sig\_string\_attr (gpgme\_ctx\_t CTX,  
int IDX, gpgme\_attr\_t WHAT, int WHATIDX)

The function gpgme\_get\_sig\_string\_attr is equivalent to:

```

gpgme_verify_result_t result;
gpgme_signature_t sig;

result = gpgme_op_verify_result (ctx);
sig = result->signatures;

while (sig && idx)
{
 sig = sig->next;
 idx--;
}
if (!sig || idx)
 return NULL;

switch (what)
{
case GPGME_ATTR_FPR:
 return sig->fpr;

```

```

 case GPGME_ATTR_ERRTOK:
 if (whatidx == 1)
 return sig->wrong_key_usage ? "Wrong_Key_Usage" : "";
 else
 return "";
 default:
 break;
 }

 return NULL;

-- Function: const char * gpgme_get_sig_ulong_attr (gpgme_ctx_t CTX,
 int IDX, gpgme_attr_t WHAT, int WHATIDX)
The function gpgme_get_sig_ulong_attr is equivalent to:

 gpgme_verify_result_t result;
 gpgme_signature_t sig;

 result = gpgme_op_verify_result (ctx);
 sig = result->signatures;

 while (sig && idx)
 {
 sig = sig->next;
 idx--;
 }
 if (!sig || idx)
 return 0;

 switch (what)
 {
 case GPGME_ATTR_CREATED:
 return sig->timestamp;

 case GPGME_ATTR_EXPIRE:
 return sig->exp_timestamp;

 case GPGME_ATTR_VALIDITY:
 return (unsigned long) sig->validity;

 case GPGME_ATTR_SIG_STATUS:
 switch (sig->status)
 {
 case GPG_ERR_NO_ERROR:
 return GPGME_SIG_STAT_GOOD;

 case GPG_ERR_BAD_SIGNATURE:

```

```

return GPGME_SIG_STAT_BAD;

case GPG_ERR_NO_PUBKEY:
return GPGME_SIG_STAT_NOKEY;

case GPG_ERR_NO_DATA:
return GPGME_SIG_STAT_NOSIG;

case GPG_ERR_SIG_EXPIRED:
return GPGME_SIG_STAT_GOOD_EXP;

case GPG_ERR_KEY_EXPIRED:
return GPGME_SIG_STAT_GOOD_EXPKEY;

default:
return GPGME_SIG_STAT_ERROR;
}

case GPGME_ATTR_SIG_SUMMARY:
return sig->summary;

default:
break;
}
return 0;

```

-- Function: const char \* gpgme\_get\_sig\_key (gpgme\_ctx\_t CTX, int IDX,  
gpgme\_key\_t \*R\_KEY)

The function gpgme\_get\_sig\_key  
is equivalent to:

```

gpgme_verify_result_t result;
gpgme_signature_t sig;

result = gpgme_op_verify_result (ctx);
sig = result->signatures;

while (sig && idx)
{
sig = sig->next;
idx--;
}
if (!sig || idx)
return gpg_error (GPG_ERR_EOF);

return gpgme_get_key (ctx, sig->fpr, r_key, 0);

```

## GNU Lesser General Public License

\*\*\*\*\*

Version 2.1, February 1999

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### Preamble

=====

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Version 3, 29 June 2007

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## Concept Index

\*\*\*\*\*

[index]

\* Menu:

- \* aborting operations: Cancellation. (line 6)
- \* algorithms: Algorithms. (line 6)
- \* algorithms, hash: Hash Algorithms. (line 6)
- \* algorithms, message digest: Hash Algorithms. (line 6)
- \* algorithms, public key: Public Key Algorithms. (line 6)
- \* armor mode: ASCII Armor. (line 6)
- \* ASCII armor: ASCII Armor. (line 6)
- \* ASSUAN: Assuan. (line 6)
- \* attributes, of a key: Information About Keys.  
(line 6)
- \* auditlog: Additional Logs. (line 6)
- \* auditlog, of the engine: Additional Logs. (line 6)
- \* autoconf: Using Automake.  
(line 6)
- \* automake: Using Automake. (line 6)
- \* backend: Protocols and Engines. (line 6)
- \* callback, passphrase: Passphrase Callback. (line 6)
- \* callback, progress meter: Progress Meter Callback.  
(line 6)
- \* callback, status message: Status Message Callback.  
(line 6)
- \* cancelling operations: Cancellation. (line 6)
- \* canonical text mode: Text Mode. (line 6)
- \* certificates, included: Included Certificates. (line 6)
- \* CMS: Cryptographic Message Syntax.  
(line 6)
- \* compiler flags: Building the Source. (line 6)
- \* compiler options: Building the  
Source. (line 6)
- \* configuration of crypto backend: Engine Configuration. (line 6)
- \* context: Contexts. (line 6)
- \* context, armor mode: ASCII Armor. (line 6)
- \* context, attributes: Context Attributes. (line 6)
- \* context, configuring engine: Crypto Engine. (line 6)
- \* context, creation: Creating Contexts. (line 6)
- \* context, destruction: Destroying Contexts. (line 6)
- \* context, offline mode: Offline Mode. (line 6)
- \* context, pinentry mode: Pinentry Mode. (line 6)

- \* context, result of operation: Result Management. (line 6)
- \* context, selecting protocol: Protocol Selection. (line 6)
- \* context, sender: Setting the Sender. (line 6)
- \* context, text mode: Text Mode. (line 6)
- \* crypto backend:
  - Protocols and Engines. (line 6)
- \* crypto engine: Protocols and Engines. (line 6)
- \* cryptographic message syntax: Cryptographic Message Syntax. (line 6)
- \* cryptographic operation: Crypto Operations. (line 6)
- \* cryptographic operation, aborting: Cancellation. (line 6)
- \* cryptographic operation, cancelling: Cancellation. (line 6)
- \* cryptographic operation, decryption: Decrypt. (line 6)
- \* cryptographic operation, decryption and verification: Decrypt and Verify. (line 6)
- \* cryptographic operation, encryption: Encrypt. (line 6)
- \* cryptographic operation, running: Run Control. (line 6)
- \* cryptographic operation, signature check: Verify. (line 6)
- \* cryptographic operation, signing: Sign. (line 6)
- \* cryptographic operation, verification: Verify. (line 6)
- \* cryptographic operation, wait for: Waiting For Completion. (line 6)
- \* data buffer, convenience: Data Buffer Convenience. (line 6)
- \* data buffer, creation: Creating Data Buffers. (line 6)
- \* data buffer, destruction: Destroying Data Buffers. (line 6)
- \* data buffer, encoding: Data Buffer Meta-Data. (line 6)
- \* data buffer, file name: Data Buffer Meta-Data. (line 6)
- \* data buffer, I/O operations: Data Buffer I/O Operations. (line 6)
- \* data buffer, manipulation: Manipulating Data Buffers. (line 6)
- \* data buffer, meta-data: Data Buffer Meta-Data. (line 6)
- \* data buffer, read: Data Buffer I/O Operations. (line 6)
- \* data buffer, seek: Data Buffer I/O Operations. (line 6)
- \* data buffer, write: Data Buffer I/O Operations. (line 6)
- \* data, exchanging: Exchanging Data. (line 6)
- \* debug: Debugging. (line 6)
- \* decryption: Decrypt. (line 6)
- \* decryption and verification: Decrypt and Verify. (line 6)
- \* deprecated: Deprecated Functions. (line 6)
- \* encryption: Encrypt. (line 6)

- \* engine: Protocols and Engines. (line 6)
- \* engine, ASSUAN: Assuan. (line 6)
- \* engine, configuration of: Engine Configuration. (line 6)
- \* engine, configuration per context: Crypto Engine. (line 6)
- \* engine, GnuPG: OpenPGP. (line 6)
- \* engine, GpgSM: Cryptographic Message Syntax. (line 6)
- \* engine, information about: Engine Information. (line 6)
- \* error codes: Error Values. (line 6)
- \* error codes, list of: Error Sources. (line 6)
- \* error codes, list of <1>: Error Codes. (line 6)
- \* error codes, printing of: Error Strings. (line 6)
- \* error handling: Error Handling. (line 6)
- \* error sources: Error Values. (line 6)
- \* error sources, printing of: Error Strings. (line 6)
- \* error strings: Error Strings. (line 6)
- \* error values: Error Values. (line 6)
- \* error values, printing of: Error Strings. (line 6)
- \* event loop, external: Using External Event Loops. (line 6)
- \* flags, of a context: Context Flags. (line 6)
- \* From:: Setting the Sender. (line 6)
- \* GDK, using GPGME with: I/O Callback Example GDK. (line 6)
- \* GnuPG: OpenPGP. (line 6)
- \* GPGME\_DEBUG: Debugging. (line 6)
- \* GpgSM: Cryptographic Message Syntax. (line 6)
- \* GTK+, using GPGME with: I/O Callback Example GTK+. (line 6)
- \* hash algorithms: Hash Algorithms. (line 6)
- \* header file: Header. (line 6)
- \* identify: Data Buffer Convenience. (line 6)
- \* include file: Header. (line 6)
- \* key listing: Listing Keys. (line 6)
- \* key listing mode: Key Listing Mode. (line 6)
- \* key listing, mode of: Key Listing Mode. (line 6)
- \* key listing, start: Listing Keys. (line 6)
- \* key management: Key Management. (line 6)
- \* key ring, add: Generating Keys. (line 6)
- \* key ring, delete from: Deleting Keys. (line 6)
- \* key ring, export from: Exporting Keys. (line 6)
- \* key ring, import to: Importing Keys. (line 6)

|                                                             |                               |          |
|-------------------------------------------------------------|-------------------------------|----------|
| * key ring, list:                                           | Listing Keys.                 | (line 6) |
| * key ring, search:                                         | Listing Keys.                 | (line 6) |
| * key, attributes:                                          | Information About Keys.       | (line 6) |
| * key, creation:                                            | Generating Keys.              | (line 6) |
| * key, delete:                                              | Deleting Keys.                | (line 6) |
| * key, edit:                                                | Advanced Key Editing.         | (line 6) |
| * key, export:                                              | Exporting Keys.               | (line 6) |
| * key, import:                                              | Importing Keys.               | (line 6) |
| * key, information about:                                   | Information About Keys.       | (line 6) |
| * key, manipulation:                                        | Manipulating Keys.            | (line 6) |
| * key, signing:                                             | Signing Keys.                 | (line 6) |
| * largefile support:                                        | Largefile Support (LFS).      | (line 6) |
| * LFS:                                                      | Largefile Support (LFS).      | (line 6) |
| * LGPL, GNU Lesser General Public License: Library Copying. |                               | (line 6) |
| * libtool:                                                  | Using Libtool.                | (line 6) |
| * listing keys:                                             | Listing Keys.                 | (line 6) |
| * locale, default:                                          | Locale.                       | (line 6) |
| * locale, of a context:                                     | Locale.                       | (line 6) |
| * message digest algorithms:                                | Hash Algorithms.              | (line 6) |
| * multi-threading:                                          | Multi-Threading.              | (line 6) |
| * notation data:                                            | Verify.                       | (line 6) |
| * notation data <1>:                                        | Signature Notation Data.      | (line 6) |
| * offline mode:                                             | Offline Mode.                 | (line 6) |
| * OpenPGP:                                                  | OpenPGP.                      | (line 6) |
| * passphrase callback:                                      | Passphrase Callback.          | (line 6) |
| * passphrase, change:                                       | Changing Passphrases.         | (line 6) |
| * pinentry mode:                                            | Pinentry Mode.                | (line 6) |
| * policy URL:                                               | Signature Notation Data.      | (line 6) |
| * progress meter callback:                                  | Progress Meter Callback.      | (line 6) |
| * protocol:                                                 | Protocols and Engines.        | (line 6) |
| * protocol, ASSUAN:                                         | Assuan.                       | (line 6) |
| * protocol, CMS:                                            | Cryptographic Message Syntax. | (line 6) |
| * protocol, GnuPG:                                          | OpenPGP.                      | (line 6) |
| * protocol, S/MIME:                                         | Cryptographic Message Syntax. | (line 6) |
| * protocol, selecting:                                      | Protocol Selection.           | (line 6) |
| * public key algorithms:                                    | Public Key Algorithms.        | (line 6) |

- \* Qt, using GPGME with: I/O Callback Example Qt.  
(line 6)
- \* run control: Run Control. (line 6)
- \* S/MIME: Cryptographic Message Syntax.  
(line 6)
- \* sender: Setting the Sender. (line 6)
- \* sign: Sign. (line 6)
- \* signal handling: Signal Handling. (line 6)
- \* signals: Signal Handling. (line 6)
- \* signature check: Decrypt and Verify. (line 6)
- \* signature notation data: Verify. (line 6)
- \* signature notation data <1>: Signature Notation Data.  
(line 6)
- \* signature, creation: Sign. (line 6)
- \* signature, selecting signers: Selecting Signers. (line 6)
- \* signature, verification: Verify. (line 6)
- \* signers, selecting: Selecting Signers. (line 6)
- \* status message callback: Status Message Callback.  
(line 6)
- \* text mode: Text Mode. (line 6)
- \* thread-safeness: Multi-Threading. (line 6)
- \* trust item: Trust Item Management. (line 6)
- \* trust item list: Listing Trust Items. (line 6)
- \* trust item, manipulation: Manipulating Trust Items.  
(line 6)
- \* type of data: Data Buffer Convenience.  
(line 6)
- \* UI server: UI Server Protocol. (line 6)
- \* user interface server: UI Server Protocol. (line 6)
- \* validity, TOFU: Changing TOFU Data. (line 6)
- \* verification: Verify. (line 6)
- \* verification and decryption: Decrypt and Verify. (line 6)
- \* version check, of the engines: Engine Version Check. (line 6)
- \* version check, of the library: Library Version Check. (line 6)
- \* wait for completion: Waiting For Completion.  
(line 6)

File: gpgme.info, Node: Function and Data Index, Prev: Concept Index, Up: Top

Function and Data Index

\*\*\*\*\*

[index]

\* Menu:

\* AM\_PATH\_GPGME: Using Automake. (line 11)  
 \* AM\_PATH\_GPGME\_PTH: Using Automake. (line 13)  
 \* AM\_PATH\_GPGME\_PTHREAD: Using Automake. (line 15)  
 \* CHECKSUM\_CREATE\_FILES: UI Server Checksum Files.  
 (line 9)  
 \* CHECKSUM\_VERIFY\_FILES: UI Server Checksum Files.  
 (line 22)  
 \* DECRYPT: UI Server Decrypt. (line 26)  
 \* DECRYPT\_FILES: UI Server Verify/Decrypt Files.  
 (line 9)  
 \* DECRYPT\_VERIFY\_FILES: UI Server Verify/Decrypt Files.  
 (line 11)  
 \* ENCRYPT: UI Server Encrypt. (line 47)  
 \* ENCRYPT\_FILES: UI Server Sign/Encrypt Files.  
 (line 9)  
 \* ENCRYPT\_SIGN\_FILES: UI Server Sign/Encrypt Files.  
 (line 11)  
 \* enum gpgme\_data\_encoding\_t: Data Buffer Meta-Data.  
 (line 31)  
 \* enum gpgme\_data\_type\_t: Data Buffer Convenience.  
 (line 6)  
 \* enum gpgme\_event\_io\_t: I/O Callback Interface.  
 (line 58)  
 \* enum gpgme\_hash\_algo\_t: Hash Algorithms. (line 9)  
 \* enum gpgme\_pinentry\_mode\_t: Pinentry Mode. (line 25)  
 \* enum gpgme\_protocol\_t: Protocols and Engines.  
 (line 16)  
 \* enum  
 gpgme\_pubkey\_algo\_t: Public Key Algorithms.  
 (line 9)  
 \* enum gpgme\_sig\_mode\_t: Creating a Signature.  
 (line 6)  
 \* enum gpgme\_sig\_stat\_t: Deprecated Functions.  
 (line 441)  
 \* enum gpgme\_tofu\_policy\_t: Changing TOFU Data. (line 10)  
 \* FILE: UI Server Set Input Files.  
 (line 9)  
 \* GETINFO: Miscellaneous UI Server Commands.  
 (line 9)  
 \* gpgme\_addrspec\_from\_uid: Decrypt and Verify. (line 48)  
 \* gpgme\_attr\_t: Deprecated Functions.  
 (line 144)  
 \* gpgme\_attr\_t <1>:  
 Deprecated Functions.  
 (line 321)  
 \* gpgme\_cancel: Cancellation. (line 16)



|                                   |                                           |
|-----------------------------------|-------------------------------------------|
| * gpgme_cancel_async:             | Cancellation. (line 38)                   |
| * gpgme_check_version:            | Library Version Check.<br>(line 6)        |
| * gpgme_ctx_get_engine_info:      | Crypto Engine. (line 12)                  |
| * gpgme_ctx_set_engine_info:      | Crypto Engine. (line 26)                  |
| * gpgme_ctx_t:                    | Contexts. (line 11)                       |
| * gpgme_data_encoding_t:          | Data Buffer Meta-Data.<br>(line 32)       |
| * gpgme_data_get_encoding:        | Data Buffer Meta-Data.<br>(line 81)       |
| * gpgme_data_get_file_name:       | Data Buffer Meta-Data.                    |
| (line 6)                          |                                           |
| * gpgme_data_identify:            | Data Buffer Convenience.<br>(line 46)     |
| * gpgme_data_new:                 | Memory Based Data Buffers.<br>(line 12)   |
| * gpgme_data_new_from_cbs:        | Callback Based Data Buffers.<br>(line 80) |
| * gpgme_data_new_from_estream:    | File Based Data Buffers.<br>(line 49)     |
| * gpgme_data_new_from_fd:         | File Based Data Buffers.<br>(line 10)     |
| * gpgme_data_new_from_file:       | Memory Based Data Buffers.<br>(line 37)   |
| * gpgme_data_new_from_filepart:   | Memory Based Data Buffers.<br>(line 54)   |
| * gpgme_data_new_from_mem:        | Memory Based Data Buffers.<br>(line 22)   |
| * gpgme_data_new_from_stream:     | File Based Data Buffers.<br>(line 29)     |
| * gpgme_data_new_with_read_cb:    | Deprecated Functions.<br>(line 114)       |
| * gpgme_data_read:                | Data Buffer I/O Operations.<br>(line 6)   |
| * gpgme_data_read_cb_t:           | Callback Based Data Buffers.<br>(line 13) |
| * gpgme_data_release:             | Destroying Data Buffers.<br>(line 6)      |
| * gpgme_data_release_and_get_mem: | Destroying Data Buffers.<br>(line 11)     |
| * gpgme_data_release_cb_t:        | Callback Based Data Buffers.<br>(line 55) |
| * gpgme_data_rewind:              | Deprecated Functions.<br>(line 138)       |
| * gpgme_data_seek:                | Data Buffer I/O Operations.               |

(line 26)

\* `gpgme_data_seek_cb_t`: Callback Based Data Buffers.  
(line 46)

\* `gpgme_data_set_encoding`: Data Buffer Meta-Data.  
(line 87)

\* `gpgme_data_set_file_name`: Data Buffer Meta-Data.  
(line 18)

\* `gpgme_data_set_flag`: Data Buffer Meta-Data.  
(line 92)

\* `gpgme_data_t`:  
Exchanging Data. (line 13)

\* `gpgme_data_type_t`: Data Buffer Convenience.  
(line 7)

\* `gpgme_data_write`: Data Buffer I/O Operations.  
(line 16)

\* `gpgme_data_write_cb_t`: Callback Based Data Buffers.  
(line 29)

\* `gpgme_decrypt_result_t`: Decrypt. (line 101)

\* `gpgme_edit_cb_t`: Deprecated Functions.  
(line 37)

\* `gpgme_encrypt_result_t`: Encrypting a Plaintext.  
(line 241)

\* `gpgme_engine_check_version`: Engine Version Check.  
(line 67)

\* `gpgme_engine_info_t`: Engine Information.  
(line 6)

\* `gpgme_error`: Error Values. (line 65)

\* `gpgme_error_from_errno`: Error Values. (line 89)

\* `gpgme_error_t`: Error Values. (line 24)

\* `gpgme_error_t (*gpgme_assuan_data_cb_t) (void *OPAQUE, const void *DATA, size_t DATALEN)`: Using the Assuan protocol.  
(line 15)

\* `gpgme_error_t (*gpgme_assuan_inquire_cb_t) (void *OPAQUE, const char *NAME, const char *ARGS, gpgme_data_t *R_DATA)`: Using the Assuan protocol.  
(line 24)

\* `gpgme_error_t (*gpgme_assuan_status_cb_t) (void *OPAQUE, const char *STATUS, const char *ARGS)`: Using the Assuan protocol.  
(line 38)

\* `gpgme_error_t (*gpgme_edit_cb_t) (void *HANDLE, gpgme_status_code_t STATUS, const char *ARGS, int FD)`: Deprecated Functions.  
(line 35)

\* `gpgme_error_t (*gpgme_interact_cb_t) (void *HANDLE, const char *STATUS, const char *ARGS, int FD)`: Advanced Key Editing.  
(line 6)

\* `gpgme_error_t (*gpgme_io_cb_t) (void *DATA, int FD)`: I/O Callback Interface.  
(line 6)

\* `gpgme_error_t (*gpgme_passphrase_cb_t) (void *HOOK, const char *UID_HINT, const char`

\*PASSPHRASE\_INFO, int PREV\_WAS\_BAD, int FD): Passphrase Callback.

(line 6)

\* gpgme\_error\_t (\*gpgme\_register\_io\_cb\_t) (void \*DATA, int FD, int DIR, gpgme\_io\_cb\_t FNC, void \*FNC\_DATA, void \*\*TAG): I/O Callback Interface.

(line 19)

\* gpgme\_error\_t (\*gpgme\_status\_cb\_t)(void \*HOOK, const char \*KEYWORD, const char \*ARGS): Status Message Callback.

(line 6)

\* gpgme\_err\_code: Error Values. (line 42)

\* gpgme\_err\_code\_from\_errno: Error Values. (line 98)

\* gpgme\_err\_code\_t: Error Values. (line 6)

\* gpgme\_err\_code\_to\_errno: Error Values. (line 103)

\* gpgme\_err\_make: Error Values. (line 57)

\* gpgme\_err\_make\_from\_errno: Error Values. (line 83)

\* gpgme\_err\_source: Error Values. (line 49)

\* gpgme\_err\_source\_t: Error Values. (line 13)

\* gpgme\_event\_io\_t: I/O Callback Interface.

(line 59)

\* gpgme\_event\_io\_t <1>: Registering I/O Callbacks.

(line 7)

\* gpgme\_free: Destroying Data Buffers.

(line 25)

\* gpgme\_genkey\_result\_t: Generating Keys. (line 381)

\* gpgme\_get\_armor: ASCII Armor. (line 13)

\* gpgme\_get\_ctx\_flag: Context Flags. (line 121)

\* gpgme\_get\_dirinfo: Engine Version Check.

(line 6)

\* gpgme\_get\_engine\_info: Engine Information. (line 46)

\* gpgme\_get\_include\_certs: Included Certificates.

(line 37)

\* gpgme\_get\_io\_cbs: Registering I/O Callbacks.

(line 44)

\* gpgme\_get\_key: Listing Keys. (line 178)

\* gpgme\_get\_keylist\_mode: Key Listing Mode. (line 95)

\* gpgme\_get\_offline: Offline Mode. (line 31)

\* gpgme\_get\_passphrase\_cb: Passphrase Callback.

(line 63)

\* gpgme\_get\_pinentry\_mode: Pinentry Mode. (line 18)

\* gpgme\_get\_progress\_cb: Progress Meter Callback.

(line 31)

\* gpgme\_get\_protocol: Protocol Selection. (line 21)

\* gpgme\_get\_protocol\_name: Protocols and Engines.

(line 58)

\* gpgme\_get\_sender: Setting the Sender. (line 29)

\* gpgme\_get\_sig\_key: Deprecated Functions.

(line 641)

|                                   |                                         |
|-----------------------------------|-----------------------------------------|
| * gpgme_get_sig_status:           | Deprecated Functions.<br>(line 489)     |
| * gpgme_get_sig_string_attr:      | Deprecated Functions.<br>(line 545)     |
| * gpgme_get_sig_ulong_attr:       | Deprecated Functions.<br>(line 579)     |
| * gpgme_get_status_cb:            | Status Message Callback.<br>(line 31)   |
| * gpgme_get_textmode:             | Text Mode. (line 20)                    |
| * gpgme_hash_algo_name:           | Hash Algorithms. (line 30)              |
| * gpgme_hash_algo_t:              | Hash Algorithms. (line 10)              |
| * gpgme_import_result_t:          | Importing Keys. (line 118)              |
| * gpgme_import_status_t:          | Importing Keys. (line 80)               |
| * gpgme_interact_cb_t:            | Advanced Key Editing.<br>(line 11)      |
| * gpgme_invalid_key_t:            | Crypto Operations. (line 10)            |
| * gpgme_io_cb_t:                  | I/O Callback Interface.<br>(line 7)     |
| * gpgme_keylist_result_t:         | Listing Keys. (line 155)                |
| * gpgme_key_get_string_attr:      | Deprecated Functions.<br>(line 286)     |
| * gpgme_key_get_ulong_attr:       | Deprecated Functions.<br>(line 300)     |
| * gpgme_key_ref:                  | Manipulating Keys. (line 6)             |
| * gpgme_key_release:              | Deprecated Functions.<br>(line 14)      |
| * gpgme_key_sig_get_string_attr:  | Deprecated Functions.<br>(line 377)     |
| * gpgme_key_sig_get_ulong_attr:   | Deprecated Functions.<br>(line 393)     |
| * gpgme_key_sig_t:                | Key objects. (line 339)                 |
| * gpgme_key_t:                    | Key objects. (line 10)                  |
| * gpgme_key_unref:                | Manipulating Keys. (line 10)            |
| * gpgme_new:                      | Creating<br>Contexts. (line 6)          |
| * gpgme_new_signature_t:          | Creating a Signature.<br>(line 57)      |
| * gpgme_off_t:                    | Exchanging Data. (line 24)              |
| * gpgme_op_adduid:                | Generating Keys. (line 189)             |
| * gpgme_op_adduid_start:          | Generating Keys. (line 215)             |
| * gpgme_op_assuan_transact_ext:   | Using the Assuan protocol.<br>(line 64) |
| * gpgme_op_assuan_transact_start: | Using the Assuan protocol.<br>(line 47) |
| * gpgme_op_card_edit:             | Deprecated Functions.<br>(line 89)      |

|                                    |                                       |
|------------------------------------|---------------------------------------|
| * gpgme_op_card_edit_start:        | Deprecated Functions.<br>(line 99)    |
| * gpgme_op_createkey:              | Generating Keys. (line 14)            |
| * gpgme_op_createkey_start:        | Generating Keys. (line 119)           |
| * gpgme_op_createsubkey:           | Generating Keys. (line 132)           |
| * gpgme_op_createsubkey_start:     | Generating Keys. (line 176)           |
| * gpgme_op_decrypt:                | Decrypt. (line 6)                     |
| * gpgme_op_decrypt_ext:            | Decrypt. (line 30)                    |
| * gpgme_op_decrypt_ext_start:      | Decrypt. (line 60)                    |
| * gpgme_op_decrypt_result:         | Decrypt. (line 164)                   |
| * gpgme_op_decrypt_start:          | Decrypt. (line 20)                    |
| * gpgme_op_decrypt_verify:         | Decrypt and Verify. (line 6)          |
| * gpgme_op_decrypt_verify_start:   | Decrypt and Verify. (line 30)         |
| * gpgme_op_delete:                 | Deleting Keys. (line 47)              |
| * gpgme_op_delete_ext:             | Deleting Keys. (line 6)               |
| * gpgme_op_delete_ext_start:       | Deleting Keys. (line 33)              |
| * gpgme_op_delete_start:           | Deleting Keys. (line 52)              |
| * gpgme_op_edit:                   | Deprecated Functions.<br>(line 48)    |
| * gpgme_op_edit_start:             | Deprecated Functions.<br>(line 72)    |
| * gpgme_op_encrypt:                | Encrypting a Plaintext.<br>(line 6)   |
| * gpgme_op_encrypt_ext:            | Encrypting a Plaintext.<br>(line 131) |
| * gpgme_op_encrypt_ext_start:      | Encrypting a Plaintext.<br>(line 224) |
| * gpgme_op_encrypt_result:         | Encrypting a Plaintext.<br>(line 252) |
| * gpgme_op_encrypt_sign:           | Encrypting a Plaintext.<br>(line 263) |
| * gpgme_op_encrypt_sign_ext:       | Encrypting a Plaintext.<br>(line 288) |
| * gpgme_op_encrypt_sign_ext_start: | Encrypting a Plaintext.<br>(line 304) |
| * gpgme_op_encrypt_sign_start:     | Encrypting a Plaintext.<br>(line 274) |
| * gpgme_op_encrypt_start:          | Encrypting a Plaintext.<br>(line 113) |
| * gpgme_op_export:                 | Exporting Keys. (line 50)             |
| * gpgme_op_export_ext:             | Exporting Keys. (line 83)             |
| * gpgme_op_export_ext_start:       | Exporting Keys. (line 105)            |
| * gpgme_op_export_keys:            | Exporting Keys. (line 117)            |
| * gpgme_op_export_keys_start:      | Exporting Keys. (line 144)            |
| * gpgme_op_export_start:           | Exporting Keys. (line 71)             |



|                               |                                         |
|-------------------------------|-----------------------------------------|
| * gpgme_op_spawn_start:       | Running other Programs.<br>(line 45)    |
| * gpgme_op_tofu_policy:       | Changing TOFU Data. (line 29)           |
| * gpgme_op_tofu_policy_start: | Changing TOFU Data. (line 43)           |
| * gpgme_op_trustlist_end:     | Listing Trust Items. (line 44)          |
| * gpgme_op_trustlist_next:    | Listing Trust Items. (line 27)          |
| * gpgme_op_trustlist_start:   | Listing Trust Items. (line 6)           |
| * gpgme_op_verify:            | Verify. (line 6)                        |
| * gpgme_op_verify_result:     | Verify. (line 290)                      |
| * gpgme_op_verify_start:      | Verify. (line 26)                       |
| * gpgme_passphrase_cb_t:      | Passphrase Callback. (line 10)          |
| * gpgme_pinentry_mode_t:      | Pinentry Mode. (line 26)                |
| * gpgme_progress_cb_t:        | Progress<br>Meter Callback.<br>(line 8) |
| * gpgme_protocol_t:           | Protocols and Engines.<br>(line 17)     |
| * gpgme_protocol_t <1>:       | Engine Information. (line 7)            |
| * gpgme_pubkey_algo_name:     | Public Key Algorithms.<br>(line 58)     |
| * gpgme_pubkey_algo_string:   | Public Key Algorithms.<br>(line 68)     |
| * gpgme_pubkey_algo_t:        | Public Key Algorithms.<br>(line 10)     |
| * gpgme_query_swdb_result_t:  | Checking for updates.<br>(line 11)      |
| * gpgme_recipient_t:          | Decrypt. (line 75)                      |
| * gpgme_register_io_cb_t:     | I/O Callback Interface.<br>(line 23)    |
| * gpgme_release:              | Destroying Contexts. (line 6)           |
| * gpgme_result_ref:           | Result Management. (line 15)            |
| * gpgme_result_unref:         | Result Management. (line 23)            |
| * gpgme_set_armor:            | ASCII Armor. (line 6)                   |
| * gpgme_set_ctx_flag:         | Context Flags. (line 6)                 |
| * gpgme_set_engine_info:      | Engine Configuration.<br>(line 11)      |
| * gpgme_set_global_flag:      | Library Version Check.<br>(line 44)     |
| * gpgme_set_include_certs:    | Included Certificates.<br>(line 6)      |
| * gpgme_set_io_cbs:           | Registering I/O Callbacks.<br>(line 35) |
| * gpgme_set_keylist_mode:     | Key Listing Mode. (line 6)              |
| * gpgme_set_locale:           | Locale. (line 14)                       |
| * gpgme_set_offline:          | Offline Mode. (line 6)                  |
| * gpgme_set_passphrase_cb:    | Passphrase Callback. (line 40)          |

|                                     |                                       |
|-------------------------------------|---------------------------------------|
| * gpgme_set_pinentry_mode:          | Pinentry Mode. (line 6)               |
| * gpgme_set_progress_cb:            | Progress Meter Callback.<br>(line 16) |
| * gpgme_set_protocol:               | Protocol Selection. (line 6)          |
| * gpgme_set_sender:                 | Setting the Sender. (line 13)         |
| * gpgme_set_status_cb:              | Status Message Callback.<br>(line 17) |
| * gpgme_set_textmode:               | Text Mode. (line 6)                   |
| * gpgme_signature_t:                | Verify. (line 92)                     |
| * gpgme_signers_add:                | Selecting Signers. (line 18)          |
| * gpgme_signers_clear:              | Selecting Signers. (line 11)          |
| * gpgme_signers_count:              | Selecting Signers. (line 25)          |
| * gpgme_signers_enum:               | Selecting Signers. (line 31)          |
| * gpgme_sign_result_t:              | Creating a Signature.<br>(line 85)    |
| * gpgme_sig_mode_t:                 | Creating a Signature.<br>(line 7)     |
| * gpgme_sig_notation_add:           | Signature Notation Data.<br>(line 19) |
| * gpgme_sig_notation_clear:         | Signature Notation Data.<br>(line 10) |
| * gpgme_sig_notation_get:           | Signature Notation Data.<br>(line 45) |
| * gpgme_sig_notation_t:             | Verify. (line 38)                     |
| * gpgme_sig_stat_t:                 | Deprecated Functions.<br>(line 442)   |
| * gpgme_ssize_t:                    | Exchanging Data. (line 32)            |
| * gpgme_status_cb_t:                | Status Message Callback.<br>(line 8)  |
| * gpgme_strerror:                   | Error Strings. (line 6)               |
| * gpgme_strerror_r:                 | Error Strings. (line 15)              |
| * gpgme_strerror:                   | Error Strings. (line 26)              |
| * gpgme_subkey_t:                   | Key objects. (line 112)               |
| * gpgme_tofu_info_t:                | Key objects. (line 275)               |
| * gpgme_tofu_policy_t:              | Changing TOFU Data. (line 13)         |
| * gpgme_trust_item_get_int_attr:    | Deprecated Functions.<br>(line 426)   |
| * gpgme_trust_item_get_string_attr: | Deprecated Functions.<br>(line 411)   |
| * gpgme_trust_item_ref:             | Manipulating Trust Items.<br>(line 6) |
| * gpgme_trust_item_release:         | Deprecated Functions.<br>(line 18)    |
| * gpgme_trust_item_t:               | Trust Item Management.<br>(line 8)    |



\* `gpgme_trust_item_unref`: Manipulating Trust Items.  
(line 10)

\* `gpgme_user_id_t`: Key objects. (line 217)

\* `gpgme_validity_t`: Information About Keys.  
(line 9)

\* `gpgme_verify_result_t`: Verify. (line 268)

\* `gpgme_wait`: Waiting For Completion.  
(line 6)

\*

`IMPORT_FILES`: UI Server Import/Export Keys.  
(line 9)

\* `INPUT`: UI Server Encrypt. (line 23)

\* `INPUT <1>`: UI Server Sign. (line 12)

\* `INPUT <2>`: UI Server Decrypt. (line 12)

\* `INPUT <3>`: UI Server Verify. (line 16)

\* `MESSAGE`: UI Server Verify. (line 10)

\* `MICALG`: UI Server Sign. (line 43)

\* `off_t (*gpgme_data_seek_cb_t) (void *HANDLE, off_t OFFSET, int WHENCE)`: Callback Based Data Buffers.  
(line 43)

\* `OUTPUT`: UI Server Encrypt. (line 36)

\* `OUTPUT <1>`: UI Server Sign. (line 18)

\* `OUTPUT <2>`: UI Server Decrypt. (line 19)

\* `OUTPUT <3>`:  
UI Server Verify. (line 23)

\* `PREP_ENCRYPT`: UI Server Encrypt. (line 72)

\* `PROTOCOL`: UI Server Encrypt. (line 98)

\* `RECIPIENT`: UI Server Encrypt. (line 9)

\* `SENDER`: Miscellaneous UI Server Commands.  
(line 50)

\* `SESSION`: Miscellaneous UI Server Commands.  
(line 69)

\* `SIGN`: UI Server Sign. (line 33)

\* `SIGN_FILES`: UI Server Sign/Encrypt Files.  
(line 10)

\* `SIGSTATUS`: UI Server Verify. (line 56)

\* `ssize_t (*gpgme_data_read_cb_t) (void *HANDLE, void *BUFFER, size_t SIZE)`: Callback Based Data Buffers.  
(line 10)

\* `ssize_t (*gpgme_data_write_cb_t) (void *HANDLE, const void *BUFFER, size_t SIZE)`: Callback Based Data Buffers.  
(line 27)

\* `START_CONFDIALOG`: Miscellaneous UI Server Commands.  
(line 41)

\* `START_KEYMANAGER`: Miscellaneous UI Server Commands.  
(line 31)

\* `struct gpgme_data_cbs`: Callback Based Data Buffers.  
(line 59)

\* `struct gpgme_io_cbs`: Registering I/O Callbacks.

(line 6)  
\* VERIFY: UI Server Verify. (line 31)  
\* VERIFY\_FILES: UI Server Verify/Decrypt Files.

(line 10)  
\* void (\*gpgme\_data\_release\_cb\_t) (void \*HANDLE): Callback Based Data Buffers.  
(line 54)  
\* void (\*gpgme\_event\_io\_cb\_t) (void \*DATA, gpgme\_event\_io\_t TYPE, void \*TYPE\_DATA): I/O Callback Interface.

(line 89)  
\* void (\*gpgme\_progress\_cb\_t)(void \*HOOK, const char \*WHAT, int TYPE, int CURRENT, int TOTAL): Progress Meter Callback.

(line 6)  
\* void (\*gpgme\_remove\_io\_cb\_t) (void \*TAG): I/O Callback Interface.

(line 48)  
\* window-id: Miscellaneous UI Server Commands.

(line 21)  
2011-12-02 Werner Koch <wk@g10code.com>

NB: ChangeLog files are no longer manually maintained. Starting on December 1st, 2011 we put change information only in the GIT commit log, and generate a top-level ChangeLog file from logs at "make dist". See doc/HACKING for details.

2011-10-25 Marcus Brinkmann <marcus@g10code.com>

\* m4/pth.m4: Removed.  
\* configure.ac: Remove check for pth and automake conditional HAVE\_PTH.

2011-06-16 Marcus Brinkmann <marcus@g10code.com>

Release 1.3.1

\* configure.ac: Set LT version to C19/A8/R0.

2011-05-06 Marcus Brinkmann <marcus@g10code.com>

\* Makefile.am (SUBDIRS): Remove complus.  
  
\* configure.ac (AC\_CONFIG\_FILES): Remove complus/Makefile.  
(BUILD\_COMPLUS): Remove AM\_CONDITIONAL.  
\* complus/: Remove very old and stale component.  
  
\* acinclude.m4 (GNUPG\_FIX\_HDR\_VERSION): Remove.

2011-04-14 Werner Koch <wk@g10code.com>

\* configure.ac: Require automake 1.11.

2011-04-06 Werner Koch <wk@g10code.com>

\* autogen.sh (--build-w32):

Support option --build-w64.

\* configure.ac (HAVE\_W64\_SYSTEM): Define.

(INSERT\_TYPEDEFS\_FOR\_GPGME\_H): New.

(GPGME\_CONFIG\_HOST): New.

2011-02-02 Marcus Brinkmann <mb@g10code.com>

\* configure.ac (NEED\_LIBASSUAN\_VERSION): Bump to 2.0.2 for system hooks.

2010-12-30 Werner Koch <wk@g10code.com>

\* configure.ac: Support a git revision.

2010-11-03 Werner Koch <wk@g10code.com>

\* configure.ac (AC\_CHECK\_HEADERS): Check for sys/types.h and  
sys.stat.h.

2010-11-02 Werner Koch <wk@g10code.com>

\* configure.ac (AC\_CHECK\_HEADERS): Check for sys.time.h.

2010-08-19 Werner Koch <wk@g10code.com>

\* configure.ac (AH\_BOTTOM): Define GPG\_ERR\_ENABLE\_ERRNO\_MACROS.

2010-05-12 Marcus Brinkmann <marcus@g10code.de>

\* configure.ac: Check for setlocale.

2010-05-07 Werner Koch <wk@g10code.com>

\* configure.ac: Change checks to always require libassuan.

2010-05-07 Marcus Brinkmann <marcus@g10code.de>

\* autogen.sh: Update the thing.

\* configure.ac: Check for locale.h.

2010-05-06

Marcus Brinkmann <marcus@g10code.de>

\* configure.ac: Detect Windows CE.  
(HAVE\_W32CE\_SYSTEM): New symbol and automake conditional.  
\* ltmain.sh, m4/libtool.m4: Patch so that it works for Windows CE.

\* configure.ac: Require libgpg-error 1.8.

2010-03-15 Werner Koch <wk@g10code.com>

\* configure.ac (emacs\_local\_vars\_begin)  
(emacs\_local\_vars\_read\_only, emacs\_local\_vars\_end): New.

2010-01-22 Werner Koch <wk@g10code.com>

\* autogen.sh (--build-w32): Add --with-libassuan-prefix.

2010-01-11 Marcus Brinkmann <marcus@g10code.de>

Release 1.3.0.

2009-12-22 Marcus Brinkmann <marcus@g10code.de>

\* configure.ac: Do not use echo -n. Test for \_\_thread.

2009-12-17 Marcus Brinkmann <marcus@g10code.de>

\* configure.ac: Make largefile check more robust.

2009-12-10 Werner Koch <wk@g10code.com>

\* configure.ac: Check for getgid and getegid.

2009-12-08 Marcus Brinkmann <marcus@g10code.de>

Update to libtool 2.2.6a.

\* configure.ac: Invoke AC\_CONFIG\_MACRO\_DIR.

(AC\_LIBTOOL\_WIN32\_DLL,

AC\_LIBTOOL\_RC): Replace by ...

(LT\_PREREQ, LT\_INIT, LT\_LANG): ... these.

\* config.guess, config.sub, install-sh, ltmain.sh, m4/libtool.m4:

Updated to libtool 2.2.6a.

\* m4/ltoptions.m4, m4/ltsugar.m4, m4/ltversion.m4,

m4/lt~obsolete.m4: New files from libtool 2.2.6a.

2009-11-10 Marcus Brinkmann <marcus@g10code.de>

\* configure.ac: Activate UIServer if FD passing is enabled and  
Assuan is available.

2009-10-30 Marcus Brinkmann <marcus@g10code.de>

\* configure.ac: Check for argp.h and error\_t.

2009-10-26 Marcus Brinkmann <marcus@g10code.de>

\* configure.ac (NEED\_GPG\_VERSION\_DEFAULT): Bump to 1.4.0 as 1.3.0 was development versions only.

2009-10-22 Marcus Brinkmann <marcus@g10code.de>

\* configure.ac: Add support for G13.

2009-10-20 Marcus Brinkmann <marcus@g10code.de>

\* configure.ac (AC\_CONFIG\_FILES): Remove assuan/Makefile.

2009-10-20 Marcus Brinkmann <marcus@g10code.de>

\* configure.ac: Replace internal libassuan by external libassuan.

\* m4/libassuan.m4:

New file.

\* Makefile.am (assuan): Remove variable.

(SUBDIRS): Remove \${assuan}.

\* assuan/: Removed.

2009-06-22 Marcus Brinkmann <marcus@g10code.de>

\* configure.ac: Add AC\_TYPE\_UINTPTR\_T.

\* assuan/assuan.h [\_ASSUAN\_IN\_GPGME\_BUILD\_ASSUAN]: Declare \_gpgme\_io\_connect.

2009-06-18 Marcus Brinkmann <marcus@g10code.de>

Released GPGME 1.2.0.

\* configure.ac (my\_version): Set to 1.2.0.

(LIBGPGME\_LT\_CURRENT, LIBGPGME\_LT\_AGE): Bump.

(LIBGPGME\_LT\_REVISION): Reset.

2009-05-05 Marcus Brinkmann <marcus@g10code.de>

\* configure.ac: Add infrastructure for compile time check of \_FILE\_OFFSET\_BITS.

2009-04-19 Moritz <moritz@gnu.org>

\* Makefile.am (DISTCHECK\_CONFIGURE\_FLAGS): Specify --with-gpg.

2009-03-06 Marcus Brinkmann <marcus@g10code.de>

\* assuan/: Update to libassuan SVN 2009-03-06.

2009-01-26 Werner Koch <wk@g10code.com>

\* configure.ac (AC\_CONFIG\_FILES): Add tests/opassuan/Makefile.

2008-12-08 Marcus Brinkmann <marcus@g10code.de>

Release GPGME

1.1.8.

\* configure.ac: Bump API revision.

2008-11-03 Marcus Brinkmann <marcus@g10code.com>

\* configure.ac: Replace gpgme paths with src.

\* gpgme: Move to ...

\* src: ... this new directory.

2008-10-20 Werner Koch <wk@g10code.com>

\* configure.ac (AC\_CONFIG\_FILES): Add gpgme.h.

(GNUPG\_FIX\_HDR\_VERSION): Remove.

2008-10-17 Marcus Brinkmann <marcus@g10code.com>

Release GPGME 1.1.7.

\* configure.ac (LIBGPGME\_LT\_REVISION): Bump for release.

2008-09-19 Moritz <moritz@gnu.org>

\* configure.ac: Remove bogus "esac".

2008-09-16 Marcus Brinkmann <marcus@g10code.com>

\* configure.ac (\_XOPEN\_SOURCE) [apple-darwin]: Define it.

2008-07-04 Werner Koch <wk@g10code.com>

\* config.guess, config.sub: Update to 2007-11-19. Also update missing et al scripts.

2008-04-01 Werner Koch <wk@g10code.com>

\* configure.ac (AC\_INIT): Fix quoting.

2008-01-30 Marcus Brinkmann <marcus@g10code.de>

\* configure.ac: Bump required version of automake up to 1.10.

\* autogen.sh: Fix

aclocal check.

2008-01-04 Marcus Brinkmann <marcus@g10code.de>

Release GPGME 1.1.6.

\* configure.ac: Support gpgconf.

2007-09-27 Marcus Brinkmann <marcus@g10code.de>

\* assuan-pipe-connect.c (pipe\_connect\_gpgme): Do not close process handle here. Use this function also on Unix systems.

\* assuan-pipe-connect.c (pipe\_connect\_gpgme): Fix last change.

\* assuan-pipe-connect.c (pipe\_connect\_gpgme): New function, use it if \_ASSUAN\_IN\_GPGME\_BUILD\_ASSUAN.

2007-09-17 Werner Koch <wk@g10code.com>

\* configure.ac: Use the svn version magic.

2007-09-07 Marcus Brinkmann <marcus@g10code.de>

\* configure.ac: Check for C++, Qt and support --enable-w32-qt.

\* m4/pkg.m4: New file.

2007-08-21 Marcus Brinkmann <marcus@g10code.de>

\* configure.ac (--enable-w32-glib): Use --enableval, not --withval.

2007-07-16 Marcus Brinkmann <marcus@g10code.de>

\* assuan/assuan-socket.c (\_assuan\_close): Always use close().

\* assuan/assuan.h (\_gpgme\_io\_close): New prototype.

(close): New

macro, define as \_gpgme\_io\_close.

2007-07-13 Marcus Brinkmann <marcus@g10code.de>

\* assuan/assuan-io.c (\_assuan\_simple\_read, \_assuan\_simple\_write):  
Always use read/write (which means \_gpgme\_io\_read and  
\_gpgme\_io\_write).

2007-07-09 Marcus Brinkmann <marcus@g10code.de>

Released 1.1.5.

\* configure.ac (LIBGPGME\_LT\_REVISION): Bump for release.

2007-07-08 Marcus Brinkmann <marcus@g10code.de>

\* configure.ac (GPGSM\_DEFAULT) [\*-mingw32\*]: Initialize it.  
(HAVE\_ASSUAN\_H): Set to 1 if we have it.  
(funopen): Use AC\_REPLACE\_FUNCS.  
(USE\_DESCRIPTOR\_PASSING): Define to 1 if we have it. Do not  
define it at all if we don't.  
(NETLIBS) [have\_w32\_system]: Add -lws2\_32.  
(DIRSEP\_C, DIRSEP\_S, EXPSEP\_C, EXPSEP\_S, PATHSEP\_S)  
[HAVE\_DOSISH\_SYSTEM]: Remove definitions.

\* assuan/assuan.h (\_assuan\_funopen): Define to \_gpgme\_funopen.  
\* assuan/funopen.c: Move to ../gpgme/funopen.c.  
\* assuan/Makefile.am (libassuan\_la\_SOURCES): Remove funopen.c.

2007-07-04 Marcus Brinkmann <marcus@g10code.de>

\*  
assuan/Makefile.am (INCLUDES): Include \$(top\_srcdir)/gpgme.  
\* assuan/assuan.h: Include <ath.h> instead of trying to duplicate  
the definitions.

\* assuan/: Update files to 2007-07-04 version of assuan.

\* autogen.sh: Use = not == in test.

2007-03-05 Werner Koch <wk@g10code.com>

Released 1.1.4.

\* configure.ac (LIBGPGME\_LT\_REVISION): Bump for release.

\* autogen.sh: New option --force.

2007-01-29 Marcus Brinkmann <marcus@g10code.de>

Released 1.1.3.



\* configure.ac (LIBGPGME\_LT\_REVISION): Bump for release.

2007-01-26 Werner Koch <wk@g10code.com>

\* configure.ac: Changed gpg and gpgsm version checks to work with arbitrary names of the gpg binary. New option --disable-gpg-test and --disable-gpgsm-test.

2007-01-09 Werner Koch <wk@g10code.com>

\* configure.ac (NEED\_GPG\_VERSION, NEED\_GPGSM\_VERSION): Must define after it may have been changed by an option.

2007-01-08 Werner Koch <wk@g10code.com>

\* configure.ac: Require gpg-error 1.4 due to the use of gpg\_error\_from\_syserror.  
(HAVE\_ASSUAN\_H):  
New.

2007-01-05 Marcus Brinkmann <marcus@g10code.de>

\* configure.ac: Add options --with-gpg-version and --with-gpgsm-version to allow overriding the minimum version requirements.

2006-12-17 Marcus Brinkmann <marcus@g10code.de>

\* configure.ac: Fix two typos in last change.

2006-12-03 Marcus Brinkmann <marcus@g10code.de>

\* configure.ac: Use descriptor passing only if --enable-fd-passing is provided.

\* configure.ac: Add check for use of descriptor passing.

2006-11-29 Marcus Brinkmann <marcus@g10code.de>

\* configure.ac (NEED\_GPG\_VERSION): Bump to 1.3.0.

2006-09-19 Marcus Brinkmann <marcus@g10code.de>

\* configure.ac: Turn stpcpy into a replacement function.  
Check for unistd.h and add setenv as replacement function.

2006-07-29 Marcus Brinkmann <marcus@g10code.de>

\* configure.ac: Check for network libraries and set NETLIBS.

2006-07-06 Marcus Brinkmann <marcus@g10code.de>

\* lang, lang/cl: New subdirectories.

\*

lang/Makefile.am, lang/README: New files.

\* configure.ac (AC\_CONFIG\_FILES): Add lang/Makefile,  
lang/cl/Makefile and lang/cl/gpgme.asd.

\* Makefile.am (SUBDIRS): Add lang.

2006-03-02 Marcus Brinkmann <marcus@g10code.de>

\* configure.ac (LIBGPGME\_LT\_REVISION): Bump for release.

2006-02-22 Marcus Brinkmann <marcus@g10code.de>

Released 1.1.1.

\* configure.ac (LIBGPGME\_LT\_CURRENT, LIBGPGME\_LT\_AGE): Bump for  
release.

(LIBGPGME\_LT\_REVISION): Reset to 0 for release.

2006-01-05 Werner Koch <wk@g10code.com>

\* configure.ac: Test for inline feature.

(AH\_BOTTOM): New to define the pure attribute.

2006-01-03 Werner Koch <wk@g10code.com>

\* configure.ac: Append SVN revision to the version.

2005-11-18 Werner Koch <wk@g10code.com>

\* configure.ac (BUILD\_REVISION): New.

2005-11-17 Marcus Brinkmann <marcus@g10code.de>

\* configure.ac: Add support for --enable-w32-glib (disabled by  
default). Invoke AM\_PATH\_GLIB\_2\_0.

2005-11-16 Werner Koch <wk@g10code.com>

\* configure.ac

(CFLAGS) [W32]: Make sure that -mms-bitfields are used.

2005-11-15 Werner Koch <wk@g10code.com>

\* configure.ac: Create BUILD\_FILEVERSION from SVN Revision.

\* autogen.sh [W32]: Build shared and static versions of the library.

2005-10-20 Marcus Brinkmann <marcus@g10code.de>

\* w32-dll/ChangeLog, w32-dll/build-dll, w32-dll/gpgme.def: Remove files.

\* configure.ac: Instead checking for windres and dlltool, invoke AC\_LIBTOOL\_WIN32\_DLL and AC\_LIBTOOL\_RC.

\* src/Makefile.am [HAVE\_W32\_SYSTEM]: Use libtool, which simplifies the rules.

2005-10-01 Marcus Brinkmann <marcus@g10code.de>

Released 1.1.0.

\* configure.ac (LIBGPGME\_LT\_CURRENT, LIBGPGME\_LT\_AGE): Bump for release.

(LIBGPGME\_LT\_REVISION): Reset to 0 for release.

2005-09-12 Marcus Brinkmann <marcus@g10code.de>

\* configure.ac (HAVE\_PTH): Don't add \$PTH\_CFLAGS to \$CFLAGS here.

2005-08-26 Werner Koch <wk@g10code.com>

\* configure.ac (SEPCONSTANTS): New to define DIRSEP\_C et al.

2005-08-19 Werner Koch <wk@g10code.com>

\*

configure.ac [W32]: Create values for versioninfo.rc and list substitute versioninfo.rc.

\* configure.ac: Define ENABLE\_GPGSM.

2005-08-08 Werner Koch <wk@g10code.com>

\* configure.ac (stpcpy): Changed from replace to test.

2005-03-24 Marcus Brinkmann <marcus@g10code.de>

\* configure.ac (AH\_BOTTOM): Removed.

2005-03-09 Werner Koch <wk@g10code.com>

\* acinclude.m4 (GNUPG\_CHECK\_VA\_COPY): Assume no when cross-compiling.

- \* Makefile.am (EXTRA\_DIST): Include autogen.sh
- \* autogen.sh: Added the usual code to build for W32 (--build-w32).
- \* configure.ac: Fixed the mingw32 host string, removed OS/2 stuff.  
(HAVE\_DRIVE\_LETTERS): Removed.  
(HAVE\_W32\_SYSTEM): Added.  
(AC\_GNU\_SOURCE): New to replace the identical AH\_VERBATIM.  
(AH\_BOTTOM): Added.

2004-12-28 Werner Koch <wk@g10code.com>

Released 1.0.2.

- \* Makefile.am (AUTOMAKE\_OPTIONS): Build bzip 2 version.  
(ACLOCAL\_AMFLAGS): Add -I m4.
- \* configure.ac: Require automake 1.9.3 and autoconf 2.59.
- \* acinclude.m4:  
Changed quoting for automake 1.9.
- \* README: Use SHA1 instead of MD5.

2004-12-11 Marcus Brinkmann <marcus@g10code.de>

- \* configure.ac: Replace ttyname\_r if it doesn't exist (and warn in that case).

2004-12-07 Marcus Brinkmann <marcus@g10code.de>

- \* README: Refer to COPYING.LESSER and "each file" instead of COPYING.
- \* COPYING.LESSER: New file.
- \* gpgme.spec.in (%doc): Add COPYING.LESSER.
- \* acinclude.m4, configure.ac, Makefile.am: Change license to LGPL 2.1 or later.
- \* TODO: Add copyright notice.
- \* README.CVS: Likewise.
- \* configure.ac (GPGSM\_VERSION): Fix filter to get it.

2004-10-22 Marcus Brinkmann <marcus@g10code.de>

Released 1.0.1.

- \* configure.ac (LIBGPGME\_LT\_REVISION): Bump up to 2.  
(AC\_INIT): Set version to 1.0.1.
- \* configure.ac: Set HAVE\_GPGSM to true only if \$GPGSM is not "no".

2004-09-30 Marcus Brinkmann <marcus@g10code.de>

Released 1.0.0.

\* configure.ac (LIBGPGME\_LT\_REVISION): Bump up to 1.  
(AC\_INIT): Set version to 1.0.0.

\* Makefile.am  
(EXTRA\_DIST): Remove README-alpha.  
\* README-alpha: Remove file.

2004-09-17 Marcus Brinkmann <marcus@g10code.de>

\* configure.ac: Disable AC\_CONFIG\_MACRO\_DIR for now.

2004-09-14 Marcus Brinkmann <marcus@g10code.de>

\* configure.ac: Improve diagnostics with version check.

\* configure.ac: Print diagnostics about found thread libraries at  
the end. Check for the versions of GPG and GPGSM and print the  
found versions at the end.

(HAVE\_GPGSM): Do not require GPGSM to exist and be readable.

(AC\_CONFIG\_MACRO\_DIR): Invoke with argument m4.

\* acinclude.m4: Add copyright notice.

(jm\_GLIBC21, AM\_PATH\_GPG\_ERROR, \_AC\_PTH\_ERROR, \_AC\_PTH\_VERBOSE,  
AC\_CHECK\_PTH): Removed.

2004-06-23 Marcus Brinkmann <marcus@g10code.de>

\* configure.ac: Check for <sys/uio.h>.

2004-06-08 Marcus Brinkmann <marcus@g10code.de>

Released 0.9.0.

\* configure.ac (AC\_INIT): Set version number to 0.9.0.  
(LIBGPGME\_LT\_CURRENT, LIBGPGME\_LT\_AGE): Bump up by one.  
(LIBGPGME\_LT\_REVISION): Reset to zero.

2004-05-21

Marcus Brinkmann <marcus@g10code.de>

\* configure.ac (GPGME\_CONFIG\_API\_VERSION): New variable,  
substitute it.

2004-04-29 Marcus Brinkmann <marcus@g10code.de>

Released 0.4.7.

\* configure.ac (LIBGPGME\_LT\_REVISION): Bump it up.

2004-04-02 Thomas Schwinge <schwinge@nic-nac-project.de>

\* autogen.sh: Added ACLOCAL\_FLAGS.

2004-04-06 Werner Koch <wk@gnupg.org>

Released 0.4.6.

\* config.guess, config.sub, ltmain.sh: Updated to those from libtools 1.5.4.

2004-03-07 Marcus Brinkmann <marcus@g10code.de>

Released 0.4.5.

\* configure.ac (NEED\_GPGSM\_VERSION): Bump up to 1.9.6.

\* Makefile.am (EXTRA\_DIST): Remove autogen.sh and README.CVS.

2004-02-18 Werner Koch <wk@gnupg.org>

\* configure.ac: Make the check for funopen fail with just a warning.

2004-02-11 Werner Koch <wk@gnupg.org>

\* autogen.sh (check\_version): Removed bashism and simplified.

2004-02-10 Werner Koch <wk@gnupg.org>

\* configure.ac: Fixed funopen test change.

2004-02-06 Moritz Schulte  
<mo@g10code.com>

\* configure.ac: Fix funopen replacement mechanism.

2004-01-31 Marcus Brinkmann <marcus@g10code.de>

\* configure.ac: Add invocation of AC\_SYS\_LARGEFILE, AC\_TYPE\_OFF\_T and AC\_FUNC\_FSEEKO.

2004-01-12 Werner Koch <wk@gnupg.org>

Released 0.4.4.

- \* configure.ac: Bumbed LT\_Revision; now at C12/A1/R1.
- (NEED\_GPGSM\_VERSION): Set to 1.9.3.
- (min\_automake\_version): Added.
- \* README.CVS: New.
- \* Makefile.am (EXTRA\_DIST): Added README.CVS.
- \* autogen.sh: Updated.

2003-11-19 Werner Koch <wk@gnupg.org>

- \* acinclude.m4: Add AM\_PATH\_GPG\_ERROR.
- \* configure.ac: Check for timegm. Made warning messages more prominent.

2003-10-06 Marcus Brinkmann <marcus@g10code.de>

Released 0.4.3.

- \* configure.ac (LIBGPGME\_LT\_CURRENT, LIBGPGME\_LT\_AGE): Bump up by 1.
- (LIBGPGME\_LT\_REVISION): Set to 0.

2003-09-13 Marcus Brinkmann <marcus@g10code.de>

- \* configure.ac: Require libgpg-error 0.5.
- \* acinclude.m4: Remove libtool cruft, add jm\_GLIBC21.
- \* configure.ac: Add check for getenv\_r, and call jm\_GLIBC21.
- Define HAVE\_THREAD\_SAFE\_GETENV if appropriate.

2003-09-03 Marcus Brinkmann <marcus@g10code.de>

- \* configure.ac: Remove GPGME\_CONFIG\_LIBS and GPGME\_CONFIG\_CFLAGS.

2003-09-02 Marcus Brinkmann <marcus@g10code.de>

- \* configure.ac: Move invocation of AC\_CANONICAL\_HOST up to suppress warning by autoconf.

2003-08-30 Robert Schiele <rschiele@uni-mannheim.de>

- \* gpgme.spec.in: %{\_infodir}/dir is not packaged, remove to prevent checking failure.

2003-08-18 Marcus Brinkmann <marcus@g10code.de>

\* configure.ac: If building Assuan, check for funopen and fopencookie, and make isascii, putc\_unlocked and memrchr replacement functions.  
(AM\_PATH\_GPG\_ERROR); Require 0.3.

2003-07-31 Marcus Brinkmann <marcus@g10code.de>

\* configure.ac (AC\_INIT): Bump version to 0.4.3.

2003-07-30 Marcus Brinkmann <marcus@g10code.de>

\* configure.ac (LIBGPGME\_LT\_REVISION): Bump up to 1.

Released 0.4.2.

2003-07-08 Marcus Brinkmann <marcus@g10code.de>

\* configure.ac:  
Complain if libgpg-error is not found.

2003-06-22 Marcus Brinkmann <marcus@g10code.de>

\* configure.ac (AC\_INIT): Bump version to 0.4.2.

2003-06-06 Marcus Brinkmann <marcus@g10code.de>

\* configure.ac (LIBGPGME\_LT\_CURRENT): Bump up to 11.

\* configure.ac: Use AM\_PATH\_GPG\_ERROR.

\* configure.ac: Check for libgpg-error. Define  
GPG\_ERR\_SOURCE\_DEFAULT.

2003-05-26 Marcus Brinkmann <marcus@g10code.de>

\* configure.ac (NEED\_GPG\_VERSION): Bump up to 1.2.2.

2003-05-18 Marcus Brinkmann <marcus@g10code.de>

In all files, replace the Gpgme\* type names with the new gpgme\_\*  
type names.

2003-02-01 Marcus Brinkmann <marcus@g10code.de>

\* assuan/: Update files to 2002-11-10 version of assuan.

2003-01-29 Marcus Brinkmann <marcus@g10code.de>



\* bonobo/gpgme.c, bonobo/main.c, bonobo/main.h, bonobo/Makefile, bonobo/Makefile.am, bonobo/Makefile.in: Dead files removed.

\* configure.ac: Remove automake conditional BUILD\_BONOBO (AC\_CONFIG\_FILES): Remove bonobo/Makefile.

\*

Makefile.am (bonobo): Remove variable.

(SUBDIRS): Remove \${bonobo}.

\* configure.ac: Remove all uses of GNUPG\_CHECK\_TYPEDEF, for byte, ushort, ulong, u16 and u32.

\* acinclude.m4 (GNUPG\_CHECK\_TYPEDEF): Remove macro.

2002-12-24 Marcus Brinkmann <marcus@g10code.de>

\* configure.ac: New conditional HAVE\_LD\_VERSION\_SCRIPT.  
Call AC\_CANONICAL\_HOST, use host instead target.

2002-12-23 Marcus Brinkmann <marcus@g10code.de>

\* configure.ac: Bump up to 0.4.1.

Released 0.4.0.

2002-12-23 Marcus Brinkmann <marcus@g10code.de>

\* autogen.sh (automake\_vers): Require 1.7 (really 1.7.1) for the conditional source distribution bug fix.

2002-12-08 Marcus Brinkmann <marcus@g10code.de>

\* configure.ac (LIBGPGME\_LT\_CURRENT): Increase by one.  
(LIBGPGME\_LT\_AGE, LIBGPGME\_LT\_REVISION): Set to 0.

2002-11-28 Marcus Brinkmann <marcus@g10code.de>

\* NEWS: Add note about moving "gpgmeplug" to the "cryptplug" package.

\* README: Remove instructions related to "gpgmeplug".

\* configure.ac:

Remove enable option "gpgmeplug" and automake conditional BUILD\_GPGMEPLUG, as well as the status info about it.  
(GPGMEPLUG): Remove variable.

\* Makefile.am (gpgmeplug): Remove variable.

(SUBDIRS): Remove \${gpgmeplug}.

\* cryptplug.h, gpgme-openpgp.c, gpgmeplug.dox, gpgme-smime.c, Makefile.am, gpgmeplug.c, ChangeLog: Files removed.

2002-11-22 Marcus Brinkmann <marcus@g10code.de>

\* configure.ac: Disable GPGSM for all dosish systems.

2002-10-12 Marcus Brinkmann <marcus@g10code.de>

\* configure.ac: Add automake conditional HAVE\_GPGSM.

2002-10-08 Marcus Brinkmann <marcus@g10code.de>

\* configure.ac (AC\_INIT): Bump version up to 0.4.0.

(NEED\_GPG\_VERSION): Bump up to 1.2.0.

(NEED\_GPGSM\_VERSION): Bump up to 0.9.0.

\* README: Update version numbers.

\* NEWS: Start entry for 0.4.0.

2002-09-20 Werner Koch <wk@gnupg.org>

Released 0.3.11.

\* configure.ac: Bump up LIBGPGME\_LT\_REVISION.

\* configure.ac (AC\_CHECK\_HEADERS): Check for sys/select.h.

2002-09-04 Marcus Brinkmann

<marcus@g10code.de>

\* autogen.sh (autoconf\_vers): Bump up to 2.53 to get the @&t@  
quadrigraph. Always cutting the edge!

2002-09-02 Marcus Brinkmann <marcus@g10code.de>

\* configure.ac: Create and substitute LTLIBOBJS.

2002-09-02 Marcus Brinkmann <marcus@g10code.de>

Released 0.3.10.

\* NEWS: Update for 0.3.9 release.

\* configure.ac: Bump up LIBGPGME\_LT\_REVISION.

2002-08-29 Marcus Brinkmann <marcus@g10code.de>

\* gpgme.spec.in: Changed user name in Wojciech Polak's email  
address from ghostface to polak per request by himself.

2002-08-28 Werner Koch <wk@gnupg.org>

\* acinclude.m4 (GNUPG\_CHECK\_VA\_COPY): New.

\* configure.ac: Use it.

2002-08-23 Werner Koch <wk@gnupg.org>

\* configure.ac (GPGME\_CONFIG\_CFLAGS): Renamed from GPGME\_CFLAGS and removed the libpath because it is set by the config script.

2002-08-21 Marcus Brinkmann <marcus@g10code.de>

\* configure.ac: Bump version number to 0.3.10.

\* NEWS: Add template for development version.

2002-08-21

Marcus Brinkmann <marcus@g10code.de>

Released 0.3.9.

\* NEWS: Update for 0.3.9 release.

\* Makefile.am (EXTRA\_DIST): Add gpgme.spec.in.

2002-08-21 Marcus Brinkmann <marcus@g10code.de>

\* jnlib/argparse.c, jnlib/argparse.h, jnlib/ChangeLog, jnlib/dotlock.c, jnlib/dotlock.h, jnlib/libjnlib-config.h, jnlib/logging.c, jnlib/logging.h, jnlib/Makefile.am, jnlib/mischelp.h, jnlib/README, jnlib/stringhelp.c, jnlib/stringhelp.h, jnlib/strlist.c, jnlib/strlist.h, jnlib/types.h, jnlib/xmalloc.c, jnlib/xmalloc.h: Remove files.

2002-08-21 Marcus Brinkmann <marcus@g10code.de>

\* Makefile.am (SUBDIRS): Remove jnlib.

\* configure.ac: Don't check for unsigned short or unsigned long.

Don't check for memicmp, strlwr, strtoul, memmove, stricmp.

Make stpcpy a replaced function.

Don't define HAVE\_JNLIB\_LOGGING.

Don't generate jnlib/Makefile.

2002-07-02 Werner Koch <wk@gnupg.org>

\* configure.ac: Bumped version number to 0.3.9; add a comment on when to change it.

\* gpgme.spec.in:

New. Contributed by Wojciech Polak.

\* Makefile.am (dist-hook): New.

\* AUTHORS: Added Wojciech and bug reporting addresses.

2002-06-25 Werner Koch <wk@gnupg.org>

Released 0.3.8.

\* configure.ac: Bumbed LT version to 9/3/0.

(NEED\_GPGSM\_VERSION): Need 0.3.8 due to fixed export command.

2002-06-04 Marcus Brinkmann <marcus@g10code.de>

Released 0.3.7.

\* configure.ac (AC\_INIT): Set version to 0.3.7.

(LIBGPGME\_LT\_REVISION): Add one.

\* README: Document version requirement correctly.

2002-06-02 Marcus Brinkmann <marcus@g10code.de>

\* acinclude.m4: Fix Pth check so that it doesn't error out if pth is not found.

2002-06-02 Marcus Brinkmann <marcus@g10code.de>

\* configure.ac: Add checks for Pth and pthreads.

\* acinclude.m4: Add slightly hacked check for pth (seems to be an autoconf version problem).

2002-05-21 Werner Koch <wk@gnupg.org>

\* configure.ac (NEED\_GPGSM\_VERSION): We need gpgsm 0.3.7.

2002-05-03 Werner Koch <wk@gnupg.org>

Released 0.3.6.

2002-04-05

Marcus Brinkmann <marcus@g10code.de>

\* acconfig.h: File removed.

\* configure.ac (NEED\_GPG\_VERSION): Add description.

(NEED\_GPGSM\_VERSION): Likewise.

(HAVE\_DOSISH\_SYSTEM): Likewise.

(HAVE\_DRIVE\_LETTERS): Likewise.

(GPG\_PATH): Likewise.

(GPGSM\_PATH): Likewise.

\* acinclude.m4 (GNUPG\_CHECK\_TYPEDEF): Likewise.

2002-04-01 Werner Koch <wk@gnupg.org>

Released 0.3.5.

2002-03-17 Marcus Brinkmann <marcus@g10code.de>

\* configure.ac: Add automake conditional HAVE\_DOSISH\_SYSTEM.

2002-03-04 Werner Koch <wk@gnupg.org>

\* configure.ac: Bumbed version to 0.3.4-cvs to continue development.

Released 0.3.4.

\* configure.ac: Bumbed LT version numbers to (7,1,0), requires  
gpgsm 0.3.1.

2002-03-03 Marcus Brinkmann <marcus@g10code.de>

\* configure.ac (AC\_INIT): Change version number to snapshot CVS  
version.

2002-02-13 Werner Koch <wk@gnupg.org>

\* configure.ac (vasprintf,fopencookie): Add checks.

2002-02-12 Marcus Brinkmann <marcus@g10code.de>

\* configure.ac (AC\_INIT):

Bump version to 0.3.3.

\* jnlib/Makefile.am: Revert to older version that includes xmalloc  
but not dotlock and some other files. Reported by Stphane  
Corthsy.

2002-02-10 Marcus Brinkmann <marcus@g10code.de>

\* Released 0.3.2.

\* configure.ac (AC\_INIT): Bump version to 0.3.2.

\* jnlib/libjnlibconfig.h: Revert to older version that doesn't  
expect libgcrypt. Reported by Jose Carlos Garcia Sogo  
<jsogo@debian.org>.

2002-02-09 Marcus Brinkmann <marcus@g10code.de>

\* Released 0.3.1.

\* configure.ac (LIBGPGME\_LT\_CURRENT): Bump it up to 6!  
(NEED\_GPGSM\_VERSION): Bump it up to 0.3.0!  
(AC\_INIT): Bump version to 0.3.1

2002-01-22 Marcus Brinkmann <marcus@g10code.de>

\* configure.ac (HAVE\_JNLIB\_LOGGING): Define always for assuan.

2001-12-19 Werner Koch <wk@gnupg.org>

\* configure.ac (VERSION,PACKAGE): Defined and subst. Used for  
AM\_INIT\_AUTOMAKE and moved all version number more to the top.

2001-12-18 Marcus Brinkmann <marcus@g10code.de>

\* autogen.sh (libtool\_vers):  
Bump to 1.4.

\* configure.ac (LIBGPGME\_LT\_CURRENT): Increment.  
(LIBGPGME\_LT\_AGE): Reset.  
Improve comment.  
Fix wrong comment character.

2001-12-18 Werner Koch <wk@gnupg.org>

\* acinclude.m4 (GNUPG\_FIX\_HDR\_VERSION): Fixed for new automake.

2001-12-14 Marcus Brinkmann <marcus@g10code.de>

\* configure.ac (GPG): Substitute this variable.  
(GPGSM): Likewise.

2001-11-22 Marcus Brinkmann <marcus@g10code.de>

\* configure.ac (AC\_CONFIG\_FILES): Add tests/gpg/Makefile and  
tests/gpgsm/Makefile.

2001-11-21 Marcus Brinkmann <marcus@g10code.de>

\* Makefile.am (gpgmeplug): New variable, set to gpgmeplug if  
[BUILD\_GPGMEPLUG].  
\* configure.ac (AC\_CONFIG\_FILES): Add gpgmeplug/Makefile.  
Support --enable-gpgmeplug.

2001-11-21 Marcus Brinkmann <marcus@g10code.de>

\* autogen.sh: Tighten version dependencies.

2001-11-20 Marcus Brinkmann <marcus@g10code.de>

- \* Makefile.am (SUBDIRS): Support building the assuan library (currently if GPGSM\_PATH is set)..
- \* configure.ac: Support building the assuan library.
- \* assuan: New directory, populated with the Assuan library (copied from the newpg repository).

2001-11-20 Marcus Brinkmann <marcus@g10code.de>

- \* configure.ac (NEED\_GPGSM\_VERSION): New variable. Treat it similarly to NEED\_GPG\_VERSION.
- \* acconfig.h: Likewise.

2001-11-18 Marcus Brinkmann <marcus@g10code.de>

- \* configure.in: Renamed to ...
- \* configure.ac: ... this. Update to autoconf 2.52. Lots of small changes in the transition. Support --with-gpg=PATH and --with-gpgsm=PATH options. Check if test suites can be run.
- \* acconfig.h: Add GPGSM\_PATH.
- \* Makefile.am: New variable `tests', set to `tests' if RUN\_GPG\_TESTS.
- (SUBDIRS): Replace string `tests' with variable `tests'.

2001-10-22 Marcus Brinkmann <marcus@g10code.de>

- \* autogen.sh: Invoke automake with `-a' (add missing files). Do not invoke configure.

2001-09-17 Werner Koch <wk@gnupg.org>

Released 0.2.3.

- \* configure.in (NEED\_GPG\_VERSION): Set to 1.0.6. Incremented LT current and age.
- \* Makefile.am (SUBDIRS): Add doc

2001-06-12 Werner Koch <wk@gnupg.org>

Released 0.2.2.

2001-04-05 Werner Koch <wk@gnupg.org>

\* configure.in (NEED\_GPG\_VERSION): Set to 1.0.4g

2001-04-02 Werner Koch <wk@gnupg.org>

Released 0.2.1.

Changed the copyright notices all over the place.

2001-02-28 Werner Koch <wk@gnupg.org>

Released 0.2.0.

2001-01-18 Werner Koch <wk@gnupg.org>

\* autogen.sh: Added option --build-w32.

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2011-12-02 Werner Koch <wk@g10code.com>

NB: ChangeLog files are no longer manually maintained. Starting  
on December 1st, 2011 we put change information only in the GIT  
commit log, and generate a top-level ChangeLog file from logs at  
"make dist". See doc/HACKING for details.

2011-05-11 Marcus Brinkmann <marcus@g10code.com>

\* gpgsm/Makefile.am (DISTCLEANFILES): Move to ...  
(CLEANFILES): ... here.  
(clean-local): New rule.  
\* gpg/Makefile.am (DISTCLEANFILES): Move to ...  
(CLEANFILES): ... here.

2011-05-05 Marcus Brinkmann <marcus@g10code.com>

\* gpg/Makefile.am: Unset GPG\_AGENT\_INFO when setting up local  
configuration.  
(clean-local): Shut down local gpg-agent.



2011-05-04 Marcus Brinkmann <marcus@g10code.com>

\* gpg/t-import.c (check\_result): Complete secret key pair counting and disable status check, as GPG 2.1 currently emits two IMPORT\_OK lines and we only look at the first.

2011-04-27 Marcus Brinkmann <marcus@g10code.com>

\* gpg/Makefile.am (DISTCLEANFILES):  
Add S.gpg-agent.  
(mkdmodirs, ./Alpha/Secret.gpg): Remove targets.  
(GNUPGHOME): Export as absolute build directory (for gpg-agent).  
(./pubring.gpg): Remove --homedir option, import secdemo.asc.  
(clean-local): Rewrite.  
\* gpg/secdemo.asc: New file.  
\* gpg/pubkey-1.asc, gpg/seckey-1.asc: Change passphrase to "abc" (now needed as GnuPG 2.1 asks for secret key passphrase on import).  
\* gpg/t-keylist.c (keys): Update key info for Joe Random Hacker.  
(main): Disable check for can\_encrypt, as this is now in a different subkey.  
\* gpg/t-encrypt-sign.c (check\_result): Allow RMD160 hash algorithm.  
\* gpg/t-import.c (check\_result): One secret key pair now counts as two secret keys, allow that.

2009-11-03 Werner Koch <wk@g10code.com>

\* run-support.h (fail\_if\_err): Include program name.

\* run-sign.c (main): Add option --uiserver.

2009-10-26 Marcus Brinkmann <marcus@g10code.de>

\* opassuan/t-command.c: Update to new interface.

2009-10-15 Werner Koch <wk@g10code.com>

\* run-verify.c:  
New.

2009-08-06 Werner Koch <wk@g10code.com>

\* run-sign.c: New.

2009-07-07 Werner Koch <wk@g10code.com>

\* run-keylist.c (main): Add options --cms and --openpgp.

- \* gpg/pgp-keylist.c: Rename to ...
- \* run-keylist.c: ... this.
- \* gpg/pgp-import.c: Rename to ...
- \* run-import.c: ... this.
- \* gpg/pgp-export.c: Rename to ...
- \* run-export.c: ... this.
- \* run-support.h: New. Copied from gpg/t-support.h.
- \* gpg/Makefile.am (noinst\_PROGRAMS): Remove them.
- \* Makefile.am (noinst\_PROGRAMS): Add them.
- (noinst\_HEADERS): New.

2009-06-22 Marcus Brinkmann <marcus@g10code.de>

- \* gpg/t-support.h (passphrase\_cb): Implement write() according to the book to silence compiler warning.
- \* gpgsm/t-support.h (passphrase\_cb): Likewise.

2009-06-16 Werner Koch <wk@g10code.com>

- \* gpg/pgp-import.c: New.
- \* gpg/t-support.h (print\_import\_result, nonnull): Factored out from other tools.
- \* gpg/pgp-export.c, gpg/pgp-keylist.c: New.

2009-06-09 Werner Koch <wk@g10code.com>

- \* gpg/Makefile.am
- (./pubring.gpg): Ignore errors in case of already imported keys. Add --no-permission-warning and remove obsolete --allow-secret-key-import.
- \* gpg/mkdemodirs.in (GPG): Add --no-permission-warning.
- \* gpg/t-edit.c (edit\_fnc): Use gpgme\_io\_write.

2009-04-19 Moritz <moritz@gnu.org>

- \* gpg/Makefile.am (EXTRA\_DIST): Replaced mkdemodirs with mkdemodirs.in.
- (mkdemodirs): New target.
- (clean-local): Added command for removing mkdemodirs script.
- (./Alpha/Secret.gpg): Added dependency on mkdemodirs.
- \* gpg/mkdemodirs: Renamed to ...
- \* gpg/mkdemodirs.in: ... here.
- \* gpg/mkdemodirs.in (GPG): Derive value from @GPG@ instead of hard-coding "gpg".

2009-02-24 Werner Koch <wk@g10code.com>

- \* opassuan/t-command.c: Adjust for changed new op\_assuan interface.

2009-02-03 Werner Koch <wk@g10code.com>

- \* gpg/t-keylist.c (main): Check that new fields is\_cardkey and card\_number are not set.

2009-01-26 Werner Koch <wk@g10code.com>

- \* opassuan/: New.
- \* opassuan/Makefile.am: New.
- \* opassuan/t-command.c: New.

2008-12-03 Marcus Brinkmann <marcus@g10code.de>

- \* Makefile.am (INCLUDES): Fix path to include file.
- \* gpg/Makefile.am (INCLUDES), gpgsm/Makefile.am (INCLUDES): Likewise.

2008-11-18 Werner Koch <wk@g10code.com>

- \* gpgsm/cms-decrypt.c: New.

2008-11-03 Marcus Brinkmann <marcus@g10code.com>

- \* gpgsm/Makefile.am (INCLUDES, LDADD): Replace gpgme path with src.
- \* gpg/Makefile.am (INCLUDES, LDADD, t\_thread1\_LDADD): Likewise.
- \* Makefile.am (LDADD): Likewise.

2008-10-30 Werner Koch <wk@g10code.com>

- \* gpgsm/cms-keylist.c: New.

2008-06-19 Werner Koch <wk@g10code.com>

- \* gpg/t-gpgconf.c (dump\_arg): Add new types. Print strings in quotes.

2008-01-28 Marcus Brinkmann <marcus@g10code.de>

- \* gpg/Makefile.am (DISTCLEANFILES): Add pubring.kbx~.

2008-01-10 Marcus Brinkmann <marcus@g10code.de>

- \* gpg/t-gpgconf.c (main): Allow for dirmngr not to be available.

\* gpg/Makefile.am (./gpg-agent.conf): Correct pinentry path.

\* gpg/pinentry:

New file.

\* gpg/Makefile.am (DISTCLEANFILES, all-local): Add gpg-agent.conf

(./gpg-agent.conf): New target.

(EXTRA\_DIST): Add pinentry.

\* gpg/t-gpgconf.c (main): Exit early if compiled without gpgconf.

2008-01-04 Marcus Brinkmann <marcus@g10code.de>

\* gpg/Makefile.am (CLEANFILES): Add pubring.kbx and dirmngr.conf.

\* Makefile.am (TESTS\_ENVIRONMENT): Use absolute path for GNUPGHOME.

\* gpg/Makefile.am (TESTS\_ENVIRONMENT): Use absolute path for GNUPGHOME.

\* gpgsm/Makefile.am (TESTS\_ENVIRONMENT): Use absolute path for GNUPGHOME.

\* gpg/Makefile.am (TESTS): Add t-gpgconf.

t-gpgconf.c: New file.

2007-11-23 Marcus Brinkmann <marcus@g10code.de>

\* gpgsm/t-verify.c (show\_auditlog): Check for GPG\_ERR\_ASS\_UNKNOWN\_CMD.

2007-11-23 Werner Koch <wk@g10code.com>

\* gpgsm/t-verify.c (check\_result): Don't exit on error but set a flag.

(main): Consult flag for return value.

(show\_auditlog): New.

(main): Use it.

2007-09-27 Marcus Brinkmann <marcus@g10code.de>

\* t-engine-info.c

(check\_engine\_info): Fix debug output.

\* gpg/Makefile.am (tests\_unix): New variable.

(TESTS): Use it.

\* gpg/t-support.h (passphrase\_cb) [HAVE\_W32\_SYSTEM]: Use WriteFile instead of write.

\* gpg/t-wait.c [HAVE\_W32\_SYSTEM]: Define sleep as \_sleep.

2007-09-14 Marcus Brinkmann <marcus@g10code.de>

\* gpgsm/t-verify.c (main): Release TEXT and SIG.

2007-07-12 Marcus Brinkmann <marcus@g10code.de>

\* gpgsm/Makefile.am (key\_id): Change := into =.

2007-07-12 Werner Koch <wk@g10code.com>

\* gpgsm/t-support.h (init\_gpgme) [W32]: Do not init the locales as the constants are not available.

2007-02-26 Werner Koch <wk@g10code.com>

\* gpg/t-verify.c (double\_plaintext\_sig): New.  
(main): Check it.

2006-12-02 Marcus Brinkmann <marcus@g10code.de>

\* gpgsm/t-keylist.c (main): Skip unknown keys. Newer versions of GPGSM import more keys than older ones.

2005-12-06 Werner Koch <wk@g10code.com>

\* gpg/t-keylist.c (main): Changed for that secondary keys now have a fingerprint.

\*

gpg/t-keylist-sig.c (main): Ditto.

\* gpgsm/t-keylist.c (main): Ditto. The test used to be wrong.

2005-10-18 Werner Koch <wk@g10code.com>

\* gpg/pubdemo.asc, gpg/secdemo.asc: Add 2 expired subkeys to Whisky.

\* gpg/t-keylist.c: Reordered list to match new demo keyring. Add arg for number of subkeys and for extra checking function.

(main): Enhanced a few error outputs. Changed subkey counting. Call extra checking function.

(check\_whisky): New.

2005-10-07 Marcus Brinkmann <marcus@g10code.de>

\* gpgsm/t-keylist.c (main): Allow for an email address as a second uid.

\* gpg/t-sig-notation.c: Change critical notation to something GnuPG understands.

2005-10-01 Marcus Brinkmann <marcus@g10code.de>

\* gpg/Makefile.am (EXTRA\_DIST): Remove gpg.conf.  
(DISTCLEANFILES): Add gpg.conf.

(all-local): Add gpg.conf.  
(/gpg.conf): New target.  
\* gpg/gpg.conf: Remove file.

\* gpg/Makefile.am (EXTRA\_DIST): Add gpg.conf.

\* gpg/Makefile.am (TESTS): Add t-sig-notation.  
\* gpg/t-sig-notation.c  
(check\_result): New file.  
\* gpg/t-verify.c (check\_result): Also check the length of the  
notation data.  
\* gpg/gpg.conf: New file.

2005-09-30 Marcus Brinkmann <marcus@g10code.de>

\* gpg/Makefile.am (TESTS): Add t-filename.  
\* gpg/t-filename.c: New file.

2005-09-23 Werner Koch <wk@g10code.com>

\* gpg/t-support.h (init\_gpgme) [W32]: Don't use LC\_MESSAGES.  
  
\* gpg/t-encrypt-large.c: New test.  
\* gpg/Makefile.am (TESTS): Add t-encrypt-large.

2005-06-03 Marcus Brinkmann <marcus@g10code.de>

\* gpg/Makefile.am (TESTS): Add t-wait.  
\* gpg/t-wait.c (main): New test.

2004-12-07 Marcus Brinkmann <marcus@g10code.de>

\* gpg/mkdemodirs: Add copyright notice.  
  
\* gpgsm/Makefile.am, gpgsm/t-support.h, gpgsm/t-decrypt.c,  
gpgsm/t-encrypt.c, gpgsm/t-export.c, gpgsm/t-genkey.c,  
gpgsm/t-import.c, gpgsm/t-keylist.c, gpgsm/t-sign.c,  
gpgsm/t-verify.c, gpg/Makefile.am, gpg/t-decrypt.c,  
gpg/t-decrypt-verify.c, gpg/t-edit.c, gpg/t-encrypt.c,  
gpg/t-encrypt-sign.c, gpg/t-encrypt-sym.c,  
gpg/t-eventloop.c,  
gpg/t-export.c, gpg/t-genkey.c, gpg/t-import.c, gpg/t-keylist.c,  
gpg/t-keylist-sig.c, gpg/t-sign.c, gpg/t-signers.c,  
gpg/t-support.h, gpg/t-thread1.c, gpg/t-trustlist.c,  
gpg/t-verify.c, Makefile.am, t-data.c, t-engine-info.c,  
t-version.c: Change license to LGPL.

2004-08-17 Marcus Brinkmann <marcus@g10code.de>

\* gpgsm/t-keylist.c (struct): Add new fields VALIDITY and KEY\_LENGTH.

(main): Use them.

\* gpgsm/t-import.c (check\_result): New argument total\_stat.

(main): Pass this argument. Reduce number of total considered keys to 1 for the second test.

2004-04-05 Werner Koch <wk@gnupg.org>

\* gpgsm/Makefile.am: Changed the faked system time to 20011213T12000.

2004-03-07 Marcus Brinkmann <marcus@g10code.de>

\* gpgsm/t-keylist.c: Add chain IDs.

2004-03-03 Werner Koch <wk@gnupg.org>

\* gpgsm/t-export.c (main): Also check exporting 2 certificates.

2004-02-17 Werner Koch <wk@gnupg.org>

\* gpgsm/t-import.c (check\_result): gpgsm does now return info in the result->imports; adjust for that.

\* gpgsm/Makefile.am (TESTS\_ENVIRONMENT): Reset the GPG\_AGENT\_INFO.

Include config.h at the top of each C source. This is required due to LFS support.

\* gpg/t-keylist-sig.c (main): s/class/sig\_class/.

\* gpg/t-signers.c (check\_result): Ditto.

\* gpg/t-sign.c (check\_result): Ditto.

\* gpg/t-encrypt-sign.c (check\_result): Ditto.

\* gpgsm/t-sign.c (check\_result): Ditto.

2004-01-12 Werner Koch <wk@gnupg.org>

\* gpg/t-keylist-sig.c (main): Temporary disabled one test due top gpg 1.3.4 problems.

\* gpg/t-import.c (check\_result): Likewise.

2003-11-19 Werner Koch <wk@gnupg.org>

\* gpg/t-support.h (DIM): Added.

\* gpg/t-verify.c (check\_result): Rewrote test for notations

because the order of notations is not guaranteed.

\* gpgsm/t-support.h (fail\_if\_err): Also print the numeric values.

2003-10-06 Marcus Brinkmann <marcus@g10code.de>

\* gpg/t-eventloop.c: Include <sys/types.h> for old systems.

\* gpgsm/Makefile.am

(DISTCLEANFILES): Add random\_seed.

\* gpg/t-thread1.c (thread\_one): Do not call initialize\_gpgme.  
Likewise.

2003-09-14 Marcus Brinkmann <marcus@g10code.de>

\* gpg/t-thread1.c (main): Call init\_gpgme here.  
(initialize\_gpgme): Function removed.

\* gpg/t-thread1.c: New file.

\* gpg/Makefile.am (TESTS): Add t-thread1.c.

(t\_thread1\_LDADD): New variable.

(LDADD): Remove GPG Error lib.

\* gpgsm/Makefile.am (LDADD): Likewise.

\* gpg/t-import.c (main): Likewise.

\* gpg/t-keylist-sig.c (main): Likewise.

\* gpg/t-keylist.c (main): Likewise.

\* gpg/t-sign.c (main): Likewise.

\* gpg/t-signers.c (main): Likewise.

\* gpg/t-trustlist.c (main): Likewise.

\* gpgsm/t-support.h: Include <stdlib.h> and <locale.h>.

(init\_gpgme): New function.

\* gpg/t-support.h: Likewise.

\* gpgsm/t-verify.c (main): Call init\_gpgme.

\* gpgsm/t-decrypt.c (main): Likewise.

\* gpgsm/t-encrypt.c (main): Likewise.

\* gpgsm/t-export.c (main): Likewise.

\* gpgsm/t-genkey.c (main): Likewise.

\* gpgsm/t-import.c (main):

Likewise.

\* gpgsm/t-keylist.c (main): Likewise.

\* gpgsm/t-sign.c (main): Likewise.

\* gpg/t-verify.c (main): Call init\_gpgme.

\* gpg/t-decrypt-verify.c (main): Likewise.

\* gpg/t-decrypt.c (main): Likewise.

\* gpg/t-edit.c (main): Likewise.

\* gpg/t-encrypt-sign.c (main): Likewise.



- \* gpg/t-encrypt-sym.c (main): Likewise.
- \* gpg/t-encrypt.c (main): Likewise.
- \* gpg/t-eventloop.c (main): Likewise.
- \* gpg/t-export.c (main): Likewise.
- \* gpg/t-genkey.c (main): Likewise.

2003-08-14 Marcus Brinkmann <marcus@g10code.de>

- \* gpg/t-sign.c (check\_result): Change output format for signature class to unsigned int.
- \* gpg/t-signers.c (check\_result): Likewise.
- \* gpg/t-encrypt-sign.c (check\_result): Likewise.
- \* gpgsm/t-sign.c (check\_result): Likewise.

2003-07-31 Marcus Brinkmann <marcus@g10code.de>

- \* gpg/t-verify.c (check\_result): Change type of SUMMARY to unsigned int.
- \* gpg/t-decrypt-verify.c (check\_verify\_result): Likewise.
- \* gpg/t-keylist-sig.c (keys): Change type of member CLASS to unsigned int.
- \* t-data.c (read\_cb): Change type of AMOUNT to unsigned int.
- \* t-version.c (version): Remove unused variable.

2003-07-22 Marcus Brinkmann <marcus@g10code.de>

- \* Makefile.am (AM\_CPPFLAGS): New variable.  
(LDADD): Add @GPG\_ERROR\_LIBS@.
- \* gpg/Makefile.am (AM\_CPPFLAGS): New variable.  
(LDADD): Add @GPG\_ERROR\_LIBS@.
- \* gpgsm/Makefile.am (AM\_CPPFLAGS): New variable.  
(LDADD): Add @GPG\_ERROR\_LIBS@.

2003-06-06 Marcus Brinkmann <marcus@g10code.de>

Everywhere: Use libgpg-error error codes.

- \* gpg/Makefile.am (noinst\_HEADERS): New variable.
- \* gpg/t-support.h: New file.
- \* gpgsm/Makefile.am (noinst\_HEADERS): New variable.
- \* gpgsm/t-support.h: New file.

2003-05-29 Marcus Brinkmann <marcus@g10code.de>

- \* gpg/t-encrypt-sym.c (main): Adapt to new syntax.
- \* gpg/t-encrypt.c (main): Likewise.
- \* gpg/t-eventloop.c (main): Likewise.

- \* gpg/t-encrypt-sign.c (main): Likewise.
- \* gpgsm/t-export.c (main): Likewise.
- \* gpgsm/t-encrypt.c (main): Likewise.

2003-05-28 Marcus

Brinkmann <marcus@g10code.de>

- \* gpg/t-eventloop.c (main): Rewrite recipient management.
- \* gpg/t-encrypt-sign.c (main): Likewise.
- \* gpg/t-encrypt.c (main): Likewise.
- \* gpg/t-export.c (main): Likewise.
- \* gpgsm/t-encrypt.c (main): Likewise.
- \* gpgsm/t-export.c (main): Likewise.

2003-05-27 Marcus Brinkmann <marcus@g10code.de>

- \* gpg/Makefile.am (TESTS): Order t-keylist and t-keylist-sig after t-import.
- \* gpg/t-edit.c (edit\_fnc): Fix primary UID for keylisting tests.
- \* gpg/t-keylist.c: Change order of user IDs.
- \* gpg/t-keylist-sig.c: Likewise.
- \* gpg/t-import.c: Add support for gpg in CVS.

2003-05-27 Marcus Brinkmann <marcus@g10code.de>

- \* t-data.c: Remove TEST\_OUT\_CB.
- (main): Likewise.
- \* gpg/t-trustlist.c (main): Access ITEM directly.
- \* (t-decrypt-verify.c, t-decrypt.c, t-edit.c, t-encrypt-sign.c, t-encrypt-sym.c, t-sign.c, t-signers.c): Include <unistd.h>.
- (passphrase\_cb): Rewritten.
- \* t-edit.c (edit\_fnc): Rewritten.

2003-05-04 Marcus Brinkmann <marcus@g10code.de>

- \*
- gpg/t-keylist-sig.c (main): Remove timestamp check.
- \* gpgsm/t-keylist.c: Add check for timestamp.
- \* gpg/Makefile.am (TESTS): Add t-keylist-sig.
- \* gpg/t-keylist-sig.c: New file.

2003-04-30 Marcus Brinkmann <marcus@g10code.de>

- \* gpg/t-eventloop.c (main): Do not call print\_op\_info.
- (print\_op\_info): Function removed.

- \* gpg/t-keylist.c: Rewritten.
- \* gpgsm/t-keylist.c (main): Rewritten.
- \* gpg/t-edit.c (main): Do not use gpgme\_key\_get\_as\_xml. Use gpgme\_key\_unref instead gpgme\_key\_release.
- \* gpg/t-signers.c (main): Use gpgme\_key\_unref instead gpgme\_key\_release.

2003-04-29 Marcus Brinkmann <marcus@g10code.de>

- \* gpg/t-trustlist.c: Rewritten.
- \* gpg/t-verify.c (main): Rewritten.
- \* gpg/t-decrypt-verify.c: Rewritten.
- \* gpgsm/t-verify.c (main): Rewritten.

2003-04-28 Marcus Brinkmann <marcus@g10code.de>

- \* gpgsm/t-decrypt.c (main): Rewritten.
- \* gpg/t-decrypt.c: Rewritten.
- \* gpg/t-signers.c: Rewritten.

2003-04-27 Marcus Brinkmann <marcus@g10code.de>

- \*
- gpg/t-encrypt-sign.c (check\_result): Rewritten.
- \* gpg/t-sign.c: Rewritten.
- \* gpgsm/t-sign.c: Rewritten.
- \* gpg/t-encrypt.c: Check for invalid recipients.
- \* gpgsm/t-encrypt.c: Likewise.
- \* gpg/t-import.c (check\_result): Really use FPR.
- \* gpgsm/t-import.c (check\_result): Rewritten.

2003-04-25 Marcus Brinkmann <marcus@g10code.de>

- \* gpg/t-import.c: Rewritten.
- \* gpgsm/t-genkey.c: Rewritten.
- \* gpgsm/Makefile.am (noinst\_PROGRAMS): Add t-genkey.
- \* gpg/t-genkey.c: Include <stdlib.h>.
- (main): Check result->fpr before checking its length.

2003-04-24 Marcus Brinkmann <marcus@g10code.de>

\* gpg/t-genkey.c: Rewritten to match new semantics.

2003-02-06 Marcus Brinkmann <marcus@g10code.de>

\* gpg/t-decrypt.c (passphrase\_cb): Fix to new prototype.

\* gpg/t-decrypt-verify.c (passphrase\_cb): Likewise.

\* gpg/t-edit.c (passphrase\_cb): Likewise.

\* gpg/t-encrypt-sign.c (passphrase\_cb): Likewise.

\* gpg/t-encrypt-sym.c (passphrase\_cb): Likewise.

\* gpg/t-sign.c (passphrase\_cb): Likewise.

\*

gpg/t-signers.c (passphrase\_cb): Likewise.

2003-01-30 Marcus Brinkmann <marcus@g10code.de>

\* t-engine-info.c: Use file\_name instead path throughout.

\* Makefile.am (TESTS): Add t-engine-info.

\* t-engine-info.c: New file.

\* gpg/t-encrypt.c (main): Don't print engine info.

\* gpg/t-eventloop.c (main): Likewise.

\* gpg/t-encrypt-sign.c (main): Likewise.

\* gpgsm/t-encrypt.c (main): Likewise.

2002-12-24 Marcus Brinkmann <marcus@g10code.de>

\* gpgsm/t-verify.c (main): Adjust caller of gpgme\_op\_verify.

\* gpg/t-verify.c (main): Likewise.

\* gpg/t-decrypt-verify.c (main): Likewise for  
gpgme\_op\_decrypt\_verify.

2002-12-23 Marcus Brinkmann <marcus@g10code.de>

\* gpgsm/Makefile.am (./gpgsm.conf): Add a faked system time to  
avoid certification's expiry.

\* gpgsm/t-encrypt.c (main): Use the short certification name.

2002-11-19 Marcus Brinkmann <marcus@g10code.de>

\* gpg/t-genkey.c (main): Add missing argument to gpgme\_op\_genkey  
invocation.

2002-10-09 Marcus Brinkmann

<marcus@g10code.de>

\* gpg/t-decrypt.c (print\_data): Update to new gpgme\_data\_read  
interface, and use gpgme\_engine\_check\_version instead  
gpgme\_check\_version.

- \* gpg/t-decrypt-verify.c (print\_data): Likewise.
- \* gpg/t-edit.c (main): Likewise.
- \* gpg/t-encrypt.c (print\_data): Likewise.
- \* gpg/t-encrypt-sign.c (print\_data): Likewise.
- \* gpg/t-encrypt-sym.c (print\_data): Likewise.
- \* gpg/t-eventloop.c (print\_data): Likewise.
- \* gpg/t-export.c (print\_data): Likewise.
- \* gpg/t-sign.c (print\_data): Likewise.
- \* gpg/t-signers.c (print\_data): Likewise.
- \* gpgsm/t-decrypt.c (print\_data): Likewise.
- \* gpgsm/t-encrypt.c (print\_data): Likewise.
- \* gpgsm/t-export.c (print\_data): Likewise.
- \* gpgsm/t-sign.c (print\_data): Likewise.
- \* gpg/t-verify.c (main): Likewise for gpgme\_op\_verify.
- \* gpgsm/t-verify.c (main): Likewise for gpgme\_op\_verify.
- \* t-data.c (read\_once\_test): Likewise.
- (write\_test): Update for new behaviour of data objects.
- (main): Remove type test.

2002-09-30 Werner Koch <wk@gnupg.org>

- \*
- gpgsm/t-keylist.c (doit): Add arg SECRET.
- (main): Add option --secret.

2002-09-28 Marcus Brinkmann <marcus@g10code.de>

- \* t-version.c: Include <string.h>. Reported by Stphane Corthsy.

2002-09-02 Marcus Brinkmann <marcus@g10code.de>

- \* gpg/t-keylist.c (main): Test PATTERN for NULL before printing.
- Reported by Dr. Stefan Dalibor <Dr.Stefan.Dalibor@bfa.de>.

2002-08-01 Marcus Brinkmann <marcus@g10code.de>

- \* gpg/t-edit.c: Also add a test for the expire command (testing the passphrase callback).

2002-07-28 Marcus Brinkmann <marcus@g10code.de>

- \* gpg/t-edit.c: New file.
- \* gpg/Makefile (TESTS): Add t-edit.

2002-07-25 Marcus Brinkmann <marcus@g10code.de>

- \* gpg/t-encrypt-sym.c (main): Change type of I to size\_t and rename to LEN.

\* gpg/t-verify.c (main): Likewise. Submitted by Stphane Corthsy.

2002-07-03 Marcus Brinkmann <marcus@g10code.de>

\* gpg/t-eventloop.c: New file.  
\* gpg/Makefile (TESTS): Add t-eventloop.

2002-06-26 Werner Koch <wk@gnupg.org>

\*  
gpgsm/t-import.c (print\_op\_info): New.  
(main): Print operation info.

2002-06-25 Werner Koch <wk@gnupg.org>

\* gpgsm/Makefile.am (DISTCLEANFILES): new.

2002-06-25 Marcus Brinkmann <marcus@g10code.de>

\* gpgsm/Makefile.am (TESTS): Add t-export.  
gpgsm/t-export.c: New file.

2002-06-20 Werner Koch <wk@gnupg.org>

\* gpgsm/t-sign.c (main): Also test a normal signature.  
  
\* gpg/Makefile (TESTS\_ENVIRONMENT): Set GPG\_AGENT\_INFO empty.  
\* gpg/t-signers.c, gpg/t-sign.c, gpg/t-encrypt-sym.c  
\* gpg/t-encrypt-sign.c, gpg/t-decrypt.c  
\* gpg/t-decrypt-verify.c (main): Changed the GPG\_AGENT\_INFO check to  
match the one in ../../gpgme/runpg.c.

2002-06-12 Werner Koch <wk@gnupg.org>

\* gpgsm/t-keylist.c (doit): Print operation info if available.

2002-06-10 Werner Koch <wk@gnupg.org>

\* gpgsm/t-verify.c (print\_sig\_stat): Print the error token.

2002-06-04 Werner Koch <wk@gnupg.org>

\* gpgsm/t-encrypt.c (main): Add a simple option parser and allow  
to specify an encryption  
key.

2002-05-26 Marcus Brinkmann <marcus@g10code.de>

\* gpg/Makefile.am (all-local): Remove dependency on ./secring.gpg.  
(./secring.gpg): Remove target, and move all rules for this target  
to ...  
(./pubring.gpg): ... here. This was necessary because GnuPG 1.0.7  
does create an empty secring.gpg file when importing public keys.

2002-05-08 Marcus Brinkmann <marcus@g10code.de>

\* gpgsm/t-verify.c (validity\_string): New.  
(print\_sig\_stat): Print expire time and validity.  
(status\_string): Add new expired stati.

2002-05-03 Werner Koch <wk@gnupg.org>

\* gpg/t-verify.c (validity\_string): New.  
(print\_sig\_stat): Print expire time and validity.  
(status\_string): Add new expired stati.

2002-04-05 Marcus Brinkmann <marcus@g10code.de>

\* gpgsm/Makefile.am (./trustlist.txt): Put more into this file to  
prevent use of gpg-agent.  
(./gpg-agent.conf): Remove target.  
(all-local): Remove ./gpg-agent.conf.

2002-04-05 Marcus Brinkmann <marcus@g10code.de>

\* gpgsm/t-keylist.c  
(main): Use gpgme\_engine\_check\_version instead  
gpgme\_check\_engine.  
\* gpgsm/t-encrypt.c (main): Likewise.

2002-03-06 Marcus Brinkmann <marcus@g10code.de>

\* gpg/t-encrypt-sym.c: New file.  
\* gpg/Makefile.am (TESTS): Add t-encrypt-sym.

2002-03-05 Marcus Brinkmann <marcus@g10code.de>

\* gpg/Makefile.am (CLEANFILES): Remove random\_seed, which is now  
in DISTCLEANFILES.

2002-03-04 Werner Koch <wk@gnupg.org>

\* gpg/Makefile.am (DISTCLEANFILES): Added.

2002-03-03 Marcus Brinkmann <marcus@g10code.de>

\* gpg/t-verify.c (main): Add a few more sanity checks, and a check for normal signatures.

2002-02-26 Marcus Brinkmann <marcus@g10code.de>

\* gpg/t-encrypt-sign.c: New file.  
\* gpg/Makefile.am (TESTS): Add t-encrypt-sign.

2002-02-13 Werner Koch <wk@gnupg.org>

\* gpgsm/Makefile.am (private-keys-v1.d): Don't fail when the directory already exists.

2002-02-12 Marcus Brinkmann <marcus@g10code.de>

\* gpg/Makefile.am (CLEANFILES): New target.  
(distclean-local): Rename to  
...  
(clean-local): ... this.

2002-02-09 Marcus Brinkmann <marcus@g10code.de>

\* gpgsm/Makefile.am (./private-keys-v1.d/\$(key\_id).key): Fix rule.

2002-02-09 Marcus Brinkmann <marcus@g10code.de>

\* gpgsm/t-genkey.c: New file (not added to Makefile.am because of gpg-agent bug).

2002-02-08 Marcus Brinkmann <marcus@g10code.de>

\* gpgsm/Makefile.am (key\_id): Update value.  
(all-local): Add .key to keyid filename.  
(./private-keys-v1.d/\$(key\_id)): Renamed to ...  
(./private-keys-v1.d/\$(key\_id).key): ... this.  
(all-local): Add ./gpgsm.conf, ./trustlist.txt.  
(./gpgsm.conf, ./trustlist.txt): New target.  
\* gpgsm/567064FE6D14A17B2D811ABB407728BC558AA455: Renamed to ...  
\* gpgsm/32100C27173EF6E9C4E9A25D3D69F86D37A4F939: ... this.

2002-01-30 Marcus Brinkmann <marcus@g10code.de>

\* gpg/t-import.c (print\_op\_info): New function.  
(main): Use it.

2002-01-22 Marcus Brinkmann <marcus@g10code.de>



\* gpg/t-signers.c (passphrase\_cb): Change type of r\_hd to void\*\*.  
\* gpg/t-sign.c (passphrase\_cb):  
Likewise.  
\* gpg/t-decrypt-verify.c (passphrase\_cb): Likewise.  
\* gpg/t-decrypt.c (passphrase\_cb): Likewise.

2001-12-19 Marcus Brinkmann <marcus@g10code.de>

\* gpg/t-decrypt-verify.c: Don't include 'mcheck.h'. Reported by  
Stphane Corthsy.

2001-12-19 Marcus Brinkmann <marcus@g10code.de>

\* gpg/Makefile.am (EXTRA\_DIST): Add missing line continuation.

2001-12-19 Marcus Brinkmann <marcus@g10code.de>

\* gpgsm/Makefile.am (EXTRA\_DIST): Add \$(key\_id).

2001-12-16 Marcus Brinkmann <marcus@g10code.de>

\* gpgsm/Makefile: Rename 'pubcerts.kbx' to 'pubring.kbx'.

2001-12-15 Marcus Brinkmann <marcus@g10code.de>

\* gpgsm/t-keylist.c (check\_two\_contexts): Set protocols.

2001-12-14 Marcus Brinkmann <marcus@g10code.de>

\* gpgsm/t-sign.c: New file.  
\* gpgsm/Makefile.am (TESTS): Add t-sign.

2001-12-14 Marcus Brinkmann <marcus@g10code.de>

\* gpgsm/t-decrypt.c: New file.  
\* gpgsm/567064FE6D14A17B2D811ABB407728BC558AA455: Likewise.  
\* gpgsm/Makefile.am (TESTS): Add  
t-decrypt.  
(key\_id): New variable.  
(all-local): New target ./private-keys-v1.d/\$(key\_id) added.  
(./private-keys-v1.d/\$(key\_id)): New target.

2001-12-14 Marcus Brinkmann <marcus@g10code.de>

\* gpgsm/t-verify.c: New file.  
\* gpgsm/Makefile.am (TESTS): Add t-verify.

2001-12-14 Marcus Brinkmann <marcus@g10code.de>

- \* gpg/Makefile.am (GPG): Set to @GPG\_PATH@.
- (./pubring.gpg): Use \$(GPG) instead gpg.
- (./secring.gpg): Likewise.

- \* gpgsm/t-import.c (main): Remove third test case.
- \* gpgsm/Makefile.am (GPGSM): Set to @GPGSM@.
- (all-local): New target.
- (./pubcerts.kbx): Likewise.
- \* gpgsm/t-encrypt.c: New file.
- \* gpgsm/Makefile.am (TESTS): Add t-encrypt.

2001-12-14 Marcus Brinkmann <marcus@g10code.de>

- \* gpgsm/t-keylist.c: New file.
- \* gpgsm/Makefile.am (TESTS): Add t-keylist.

2001-12-13 Marcus Brinkmann <marcus@g10code.de>

- \* gpgsm/cert\_dfn\_pca01.der: New file.
- \* gpgsm/cert\_dfn\_pca15.der: Likewise.
- \* gpgsm/cert\_g10code\_test1.der: Likewise.
- \* gpgsm/t-import.c: Likewise.
- \*

gpgsm/Makefile.am (EXTRADIST): Add new files.  
(TESTS): Add t-import.

2001-11-22 Marcus Brinkmann <marcus@g10code.de>

- \* gpg/: New directory.
- \* Makefile.am, t-verify.c, t-encrypt.c, t-signers.c, t-trustlist.c, t-sign.c, t-keylist.c, t-import.c, t-genkey.c, t-export.c, t-decrypt-verify.c, t-decrypt.c, t-version.c, t-data.c, mkdemodirs. cipher-1.asc, cipher-2.asc, geheim.txt, pubdemo.asc, pubkey-1.asc, secdemo.asc, seckey-1.asc): Move to sub directory gpg/.
- \* gpg/Makefile.am (INCLUDES): Include gpgme/, not include/ and intl/.
- (LDD): Correct relative path to gpgme library.
- (TESTS): Remove t-version and t-data.
- \* gpg/t-verify.c, gpg/t-encrypt.c, gpg/t-signers.c, gpg/t-trustlist.c, gpg/t-sign.c, gpg/t-keylist.c, gpg/t-import.c, gpg/t-genkey.c, gpg/t-export.c, gpg/t-decrypt-verify.c, gpg/t-decrypt.c, t-version.c, t-data.c): Include gpgme.h, not "../gpgme/gpgme.h".
- \* Makefile.am: New file.
- \* gpgsm/: New directory.
- \* gpgsm/Makefile.am: New file.

2001-11-16 Marcus  
Brinkmann <marcus@g10code.de>

- \* Makefile.am (TESTS): Add t-decrypt-verify.
- \* t-decrypt-verify.c: New file.
- \* cipher-2.asc: Likewise.

2001-11-02 Marcus Brinkmann <marcus@g10code.de>

- \* t-data.c: Include stddef.h.
- (read\_once\_test): Change type of READ to size\_t.
- (read\_test): Likewise.
- (write\_test): Likewise.

2001-10-29 Marcus Brinkmann <marcus@g10code.de>

- \* t-signers.c: New file.
- \* Makefile.am (TESTS): Add t-signers.

2001-10-22 Marcus Brinkmann <marcus@g10code.de>

- \* Makefile.am (TEST\_ENVIRONMENT): Revert last change.

2001-10-22 Marcus Brinkmann <marcus@g10code.de>

- \* Makefile.am (TEST\_ENVIRONMENT): Set environment to \$(srcdir), not current directory.

2001-10-22 Marcus Brinkmann <marcus@g10code.de>

- \* t-data.c (write\_test): New function.
- (main): Invoke write\_test for all rounds except TEST\_OUT\_CB.

2001-10-22 Marcus Brinkmann <marcus@g10code.de>

- \* Makefile.am (INCLUDES): Remove spurious duplicate to silence automake.

2001-10-16 Marcus Brinkmann <marcus@g10code.de>

- \*
- t-version.c: New file.
- \* t-data.c: Likewise.
- \* t-data-1.txt: Likewise.
- \* t-data-2.txt: Likewise.
- \* Makefile.am (TESTS): Add t-version, t-data.

2001-09-17 Werner Koch <wk@gnupg.org>

\* t-keylist.c (check\_two\_contexts): New.

2001-09-03 Werner Koch <wk@gnupg.org>

\* t-encrypt.c (print\_op\_info): New and use it after each operation.

2001-08-28 Werner Koch <wk@gnupg.org>

\* t-sign.c (print\_op\_info): New and use it after each operation.

2001-03-15 Werner Koch <wk@gnupg.org>

\* t-keylist.c (doit): List subkeys too, show caps.

2001-02-13 Werner Koch <wk@gnupg.org>

\* t-verify.c (print\_sig\_stat): Repaled ulong by unsigned long  
because we don't use the config stuff here.

2001-02-12 Werner Koch <wk@gnupg.org>

\* tests/t-verify.c (print\_sig\_stat): Print info about the keys.

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(11:private-key(3:dsa(1:p129:eC\_L&\$2,6tx.gh1VirlqI9  
,^g3.\$DveUvX1'oIj)(1:q21: #UfK2z(tuVG)(1:g128:zu^Rab;qeQQA B?/6/aspfE/  
gx!Mr0YY\*oMrJc2xWG:.r6)(1:y128:Ufj^@oEn4j#QrRq" RcEa E/}4C[3A  
5+~~.#!+

)W&5dij)(1:x21:` )))

# \*- mode: org \*-

#+TITLE: What's New in the GPGME Python Bindings and Documentation

#+AUTHOR: Ben McGinnes

#+LATEX\_COMPILER: xelatex

#+LATEX\_CLASS: article

#+LATEX\_CLASS\_OPTIONS: [12pt]

```

#+LATEX_HEADER: \usepackage{xltextra}
#+LATEX_HEADER: \usepackage[margin=1in]{geometry}
#+LATEX_HEADER: \setmainfont[Ligatures={Common}]{Times New Roman}
#+LATEX_HEADER: \author{Ben McGinnes <ben@gnupg.org>}

```

\* What's New

:PROPERTIES:

:CUSTOM\_ID: new-stuff

:END:

```

Version:	0.0.1
GPGME Version:	1.13.0
Author:	Ben McGinnes <ben@gnupg.org>
Author GPG Key:	DB4724E6FA4286C92B4E55C4321E4E2373590E5D
Language:	Australian English, British English
xml:lang:	en-AU, en-GB, en

```

Last time the most obviously new thing was adding the /What's New/ section to the HOWTO. Now it's moving it out of the HOWTO.

\*\* New in GPGME 1130

:PROPERTIES:

:CUSTOM\_ID: new-stuff-1-13-0

:END:

Additions since GPGME 1.12.0 include:

- Moving the /What's New/ section out of the basic [[file:gpgme-python-howto.org][HOWTO]] document and into its own file so as to more readily include other documents beyond that HOWTO.
- Moving the preceding, archival, segments into [[file:what-was-new.org][another file]].
- Added =gpg.version.versionintlist= to make it easier for Python developers to check for a specific version number, even with beta versions (it will drop the "-betaN" part).
- Added expanded detail on issues pertaining to installing for Windows users.
- Bindings enter [[file:maintenance-mode][maintenance mode]] from January, 2019.
- Added documentation on maintenance mode and what changes can be made to the code when in that status. Essentially that boils down to bug fixes only and no feature requests.
- The import-keys-hkp.py example script, which uses the =hkp4py= module to search the SKS servers for a key, has been tightened up to search for both hexadecimal key IDs and user ID strings with reduced chance of unnecessary repetition. There may still be some repetition if a key includes a user ID matching the hexadecimal

value of a key ID.

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Version 2.1, February 1999

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^L

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^L

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to most

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

<signature of Ty Coon>, 1 April 1990  
Ty Coon, President of Vice

That's all there is to it!  
1543830060  
##Sketch 1 2  
document()  
layout('A4',1)  
fp((0,0,0))  
ft(1)  
Fn('Helvetica-Bold')  
Fs(18)  
dstyle('Text')  
fp((0,1,0.498))  
ft(1)  
lp((0,0,0))  
lw(0.283465)  
lc(1)  
lj(0)  
ld()  
la1()  
la2()  
dstyle('Application Box')  
layer('Layer 1',1,1,0,0,(0,0,0))  
lw(1)  
r(0,0,0,0,688.145,44.1554)  
lw(1)  
r(0,0,0,0,682.363,85.0359)  
lp((0.392,0.584,0.929))  
lw(4.25197)  
b()  
bs(605.383,329.758,0)  
bs(605.383,230.546,0)  
lw(1)  
r(0,0,0,0,807.414,53.6148)  
lp((0.392,0.584,0.929))  
lw(4.25)  
b()  
bs(480.134,240.945,0)  
bs(480.358,325.277,0)  
lp((0.392,0.584,0.929))  
lw(3.25)  
ld((1, 1))  
la2([( (-4.0, 3.0), (2.0, 0.0), (-4.0, -3.0), (-4.0, 3.0)], 1))  
b()

```

bs(474.803,432.284,0)
bs(475.334,360.243,0)
lw(3.25)
ld((1, 1))
la2([((-4.0, 3.0), (2.0, 0.0), (-4.0, -3.0), (-4.0, 3.0)], 1))
b()
bs(354.331,432.284,0)
bs(352.806,361.417,0)
lp((0.392,0.584,0.929))
lw(3.25)
ld((1, 1))
la2([((-4.0, 3.0), (2.0, 0.0), (-4.0, -3.0), (-4.0, 3.0)], 1))
b()
bs(212.598,432.284,0)
bs(212.598,361.417,0)
fp((0.999,1,0.4))
lw(0.283465)
r(70.5968,0,0,-56.6929,191.608,488.976,0.0603744,0.151107)
lw(1)
r(0,0,0,0,88.5492,390.805)
lp((0.392,0.584,0.929))
lw(4.25197)
b()
bs(226.772,524.409,0)
bs(226.772,488.976,0)
lp((0.392,0.584,0.929))
lw(4.25)
b()
bs(403.937,528.718,0)
bs(403.937,488.976,0)
lp((0.392,0.584,0.929))
lw(3.25)
ld((1,
1))
la2([((-4.0, 3.0), (2.0, 0.0), (-4.0, -3.0), (-4.0, 3.0)], 1))
b()
bs(240.945,432.284,0)
bs(240.574,394.994,0)
bs(595.276,396.85,0)
bs(595.276,361.417,0)
lp((0.392,0.584,0.929))
lw(3.25)
ld((1, 1))
la2([((-4.0, 3.0), (2.0, 0.0), (-4.0, -3.0), (-4.0, 3.0)], 1))
b()
bs(333.071,432.284,0)
bs(333.07,425.196,0)
bs(333.07,382.677,0)

```

```

bs(240.945,382.677,0)
bs(240.945,361.417,0)
G()
fp((0.999,1,0.4))
lw(0.283465)
r(70.5589,0,0,-28.347,318.897,354.331,0.0670228,0.151107)
fp((0,0,0))
le()
lw(1)
Fn('Helvetica-Bold')
Fs(10)
txt('GPG',(1,0,0,0.905764,344.004,335.686))
G_()
G()
fp((0.999,1,0.4))
lw(0.283465)
r(70.5589,0,0,-28.3464,446.763,354.33,0.0670228,0.151107)
fp((0,0,0))
le()
lw(1)
Fn('Helvetica')
Fs(14)
style('Text')
txt('GpgConf',(0.552654,0,0,0.500564,481.802,340.184),1,1)
G_()
G()
fp((0.999,1,0.4))
lw(0.283465)
r(70.5589,0,0,-28.347,191.338,354.331,0.0670228,0.151107)
fp((0,0,0))
le()
lw(1)
Fn('Helvetica')
Fs(14)
style('Text')
txt('GpgSM',(0.552654,0,0,0.500574,226.376,340.185),1,1)
G_()
lp((0.392,0.584,0.929))
lw(4.25)
b()
bs(347.244,325.984,0)
bs(347.244,325.984,0)
bs(347.244,255.118,0)
bs(304.724,255.118,0)
bs(304.724,226.771,0)
lp((0.392,0.584,0.929))
lw(4.25)
b()

```

```

bs(233.858,325.984,0)
bs(233.858,255.118,0)
bs(276.378,255.118,0)
bs(276.378,226.771,0)
fp((0,0,0))
le()
lw(1)
Fn('Palatino-Roman')
txt('2008-07-17',(0.608301,0,0,0.608301,708.661,65.8308))
lw(1)
r(0,0,0,0,750.427,153.265)
lp((0.392,0.584,0.929))
lw(3.25)
ld((1,
1))
la2([((-4.0, 3.0), (2.0, 0.0), (-4.0, -3.0), (-4.0, 3.0)], 1))
b()
bs(219.685,325.984,0)
bs(219.685,198.425,0)
bs(219.685,162.992,0)
G()
fp((1,1,1))
lw(0.283465)
r(113.386,0,0,-42.5196,35.4333,162.992,0.0670228,0.151107)
fp((0,0,0))
lw(0.283465)
Fn('Helvetica')
Fs(14)
style('Text')
Fn('Helvetica-Bold')
Fs(18)
txt('LDAP
Server',(0.552654,0,0,0.552654,92.1261,148.819),1,1)
fp((0,0,0))
lw(0.283465)
Fn('Helvetica')
Fs(14)
style('Text')
Fn('Helvetica-Bold')
Fs(18)
txt('(CRLs, Certificates)',(0.552654,0,0,0.552654,92.1261,134.646),1,1)
G_()
G()
fp((1,1,1))
lw(0.283465)
r(113.386,0,0,-42.5196,35.4331,99.2125,0.0670228,0.151107)
fp((0,0,0))
lw(0.283465)

```

Fn('Helvetica')  
 Fs(14)  
 style('Text')  
 Fn('Helvetica-Bold')  
 Fs(18)  
 txt('HTTP Server',(0.552654,0,0,0.552654,92.1259,85.0394),1,1)  
 fp((0,0,0))  
 lw(0.283465)  
 Fn('Helvetica')  
 Fs(14)  
 style('Text')  
 Fn('Helvetica-Bold')  
 Fs(18)  
 txt('(CRLs)',(0.552654,0,0,0.552654,92.1259,70.8662),1,1)  
 G\_()  
 G()  
 fp((0.999,1,0.4))  
 lw(0.283465)  
 r(70.866,0,0,-31.2962,191.338,158.855,0.0670228,0.151107)  
 fp((0,0,0))  
 le()  
 lw(1)  
 Fn('Helvetica')  
 Fs(14)  
 style('Text')  
 txt('DirMgr',(0.552654,0,0,0.552654,224.02,142.978),1,1)  
 G\_()  
 lw(2)  
 ld((1, 1))  
 la2([( (-4.0, 3.0), (2.0, 0.0), (-4.0, -3.0), (-4.0, 3.0) ], 1))  
 b()  
 bs(219.15,126.18,0)  
 bs(219.685,77.9528,0)  
 bs(155.906,77.9528,0)  
 lp((0.392,0.584,0.929))  
 lw(3)  
 b()  
 bs(233.858,127.559,0)  
 bs(233.858,99.2125,0)  
 bs(276.378,99.2125,0)  
 bs(276.378,85.0393,0)  
 lp((0.392,0.584,0.929))  
 lw(3)  
 b()  
 bs(248.031,127.559,0)  
 bs(248.031,113.386,0)  
 bs(375.59,113.386,0)  
 bs(375.59,85.0393,0)

G()  
 fp((1,0.647,0.31))  
 lw(0.283465)  
 r(99.2124,0,0,-28.3464,333.07,85.0393,0.0670228,0.151107)  
 fp((0,0,0))  
 le()  
 lw(1)  
 Fn('Helvetica')  
 Fs(14)  
 style('Text')  
 Fn('Helvetica-Bold')  
 Fs(18)  
 txt('Certificate  
 Cache',(0.552654,0,0,0.552654,382.606,69.8548),1,1)  
 fp((1,0.647,0.31))  
 lw(0.283465)  
 r(70.5589,0,0,-28.3464,248.031,85.0393,0.0670228,0.151107)  
 fp((0,0,0))  
 le()  
 lw(1)  
 Fn('Helvetica')  
 Fs(14)  
 style('Text')  
 txt('CRL Cache',(0.552654,0,0,0.552654,284.147,70.6936),1,1)  
 G\_  
 lw(1)  
 la2([( (-4.0, 3.0), (2.0, 0.0), (-4.0, -3.0), (-4.0, 3.0)], 1))  
 b()  
 bs(503.149,240.945,0)  
 bs(503.149,283.464,0)  
 bs(588.189,283.465,0)  
 bs(588.189,325.984,0)  
 lw(1)  
 la2([( (-4.0, 3.0), (2.0, 0.0), (-4.0, -3.0), (-4.0, 3.0)], 1))  
 b()  
 bs(503.149,283.464,0)  
 bs(503.149,283.464,0)  
 bs(361.417,283.464,0)  
 bs(361.417,325.984,0)  
 lw(1)  
 la2([( (-4.0, 3.0), (2.0, 0.0), (-4.0, -3.0), (-4.0, 3.0)], 1))  
 b()  
 bs(361.417,283.464,0)  
 bs(205.512,283.465,0)  
 bs(205.512,325.984,0)  
 lw(1)  
 la2([( (-4.0, 3.0), (2.0, 0.0), (-4.0, -3.0), (-4.0, 3.0)], 1))

```

b()
bs(574.015,85.0393,0)
bs(574.015,141.732,0)
bs(262.204,141.732,0)
lw(1)
la2([((-4.0, 3.0), (2.0, 0.0), (-4.0, -3.0), (-4.0, 3.0)], 1))
b()
bs(602.361,85.0393,0)
bs(602.361,170.079,0)
bs(439.37,170.079,0)
bs(439.37,311.811,0)
bs(460.629,311.811,0)
bs(460.629,325.984,0)
lw(1)
ld((5, 1))
la2([((-4.0, 3.0), (2.0, 0.0), (-4.0, -3.0), (-4.0, 3.0)], 1))
b()
bs(389.763,240.945,0)
bs(389.763,269.291,0)
bs(290.551,269.291,0)
bs(290.551,340.157,0)
bs(262.204,340.157,0)
lw(1)
ld((5, 1))
la2([((-4.0, 3.0), (2.0, 0.0), (-4.0, -3.0), (-4.0, 3.0)], 1))
b()
bs(389.763,269.291,0)
bs(559.843,269.291,0)
bs(559.843,333.071,0)
bs(574.016,333.071,0)
lw(1)
ld((5, 1))
la2([((-4.0, 3.0), (2.0, 0.0), (-4.0, -3.0), (-4.0, 3.0)], 1))
b()
bs(488.976,85.0393,0)
bs(488.976,127.559,0)
bs(389.763,127.559,0)
bs(389.763,212.598,0)
lw(2)
ld((1,
1))
la2([((-4.0, 3.0), (2.0, 0.0), (-4.0, -3.0), (-4.0, 3.0)], 1))
b()
bs(205.512,127.559,0)
bs(205.512,113.386,0)
bs(170.079,113.386,0)
bs(170.079,141.732,0)
bs(155.906,141.732,0)

```

```

lp((0.392,0.584,0.929))
lw(3.25)
ld((1, 1))
la2([((-4.0, 3.0), (2.0, 0.0), (-4.0, -3.0), (-4.0, 3.0)], 1))
b()
bs(622.961,356.76,0)
bs(622.961,518.503,0)
G()
fp((0.999,1,0.4))
lw(0.283465)
r(70.5589,0,0,-28.3459,573.199,354.33,0.0670228,0.151107)
fp((0,0,0))
le()
lw(1)
Fn('Helvetica')
Fs(14)
style('Text')
txt('GpgAgent',(0.552654,0,0,0.500554,608.238,340.185),1,1)
G_()
lp((0.392,0.584,0.929))
lw(4.25)
b()
bs(721.712,467.717,0)
bs(721.712,297.838,0)
G()
fp((0.999,1,0.4))
lw(0.283465)
r(70.5589,0,0,-28.3464,686.278,297.637,0.0670228,0.151107)
fp((0,0,0))
le()
lw(1)
Fn('Helvetica')
Fs(14)
style('Text')
txt('SCdaemon',(0.552654,0,0,0.500564,721.316,283.492),1,1)
G_()
fp((1,0.647,0.31))
lw(0.283465)
lj(1)
r(86.162,0,0,-117.493,679.192,566.929,0.181818,0.333333)
G()
fp((0,0,0))
le()
lw(1)
Fn('Helvetica-Bold')
Fs(18)
txt('Smartcard',(0.552654,0,0,0.552654,698.127,491.036))
fp((0.999,1,0.4))

```



```

lw(0.283465)
r(70.5589,0,0,-31.2962,686.279,557.593,0.0670228,0.151107)
fp((0,0,0))
le()
lw(1)
Fn('Helvetica')
Fs(14)
style('Text')
txt('Card
Reader',(0.552654,0,0,0.552654,721.318,541.975),1,1)
G_()
G()
fp((0.999,1,0.4))
lw(0.283465)
r(73.6353,0,0,-41.2944,587.066,565.703,0.0670228,0.151107)
fp((0,0,0))
le()
lw(1)
Fn('Helvetica')
Fs(14)
style('Text')
txt('PIN Entry',(0.57675,0,0,0.729211,623.632,545.097),1,1)
G_()
lp((0.392,0.584,0.929))
lw(3.25)
ld((1, 1))
la2([((-4.0, 3.0), (2.0, 0.0), (-4.0, -3.0), (-4.0, 3.0)], 1))
b()
bs(643.758,340.157,0)
bs(643.758,340.157,0)
bs(707.539,340.158,0)
bs(707.539,304.724,0)
lw(1)
la2([((-4.0, 3.0), (2.0, 0.0), (-4.0, -3.0), (-4.0, 3.0)], 1))
b()
bs(574.016,283.465,0)
bs(587.066,283.464,0)
bs(686.278,283.464,0)
G()
lp((0.392,0.584,0.929))
lw(4.25197)
b()
bs(98.9053,325.985,0)
bs(98.9053,240.945,0)
G()
fp((0.999,1,0.4))
lw(0.283465)
r(70.5589,0,0,-28.3464,63.7795,354.331,0.0670228,0.151107)

```

```

fp((0,0,0))
le()
lw(1)
Fn('Helvetica')
Fs(14)
style('Text')
txt('WatchGnuPG',(0.552654,0,0,0.552654,98.8185,338.713),1,1)
G_()
G()
fp((1,0.647,0.31))
lw(0.283465)
r(70.5589,0,0,-28.1194,63.7795,240.718,0.0670228,0.168178)
fp((0,0,0))
le()
lw(1)
Fn('Helvetica')
Fs(14)
style('Text')
txt('Log
Socket',(0.552654,0,0,0.552654,98.8175,225.1),1,1)
G_()
G_()
G()
fp((1,0.647,0.31))
lw(0.283465)
r(85.0392,0,0,-28.3464,446.457,240.945,0.0670228,0.151107)
fp((0,0,0))
le()
lw(1)
Fn('Helvetica')
Fs(14)
style('Text')
Fn('Helvetica-Bold')
Fs(18)
txt('Config Files',(0.552654,0,0,0.552654,485.621,226.772),1,1)
G_()
G()
fp((1,0.647,0.31))
lw(0.283465)
r(85.0392,0,0,-28.3464,545.669,85.0394,0.0670228,0.151107)
fp((0,0,0))
le()
lw(1)
Fn('Helvetica')
Fs(14)
style('Text')
Fn('Helvetica-Bold')
Fs(18)

```

```

txt('Config Files',(0.552654,0,0,0.552654,584.834,70.8662),1,1)
G_()
G()
fp((1,0.647,0.31))
lw(0.283465)
r(84.6546,0,0,-27.3609,347.245,239.959,0.0670228,0.151107)
fp((0,0,0))
le()
lw(1)
Fn('Helvetica')
Fs(14)
style('Text')
Fn('Helvetica-Bold')
Fs(18)
txt('Help
Files',(0.552654,0,0,0.552654,388.252,224.705),1,1)
G_()
G()
fp((1,0.647,0.31))
lw(0.283465)
r(84.6546,0,0,-27.3609,446.457,85.0394,0.0670228,0.151107)
fp((0,0,0))
le()
lw(1)
Fn('Helvetica')
Fs(14)
style('Text')
Fn('Helvetica-Bold')
Fs(18)
txt('Help Files',(0.552654,0,0,0.552654,487.464,69.7854),1,1)
G_()
G()
fp((1,0.647,0.31))
lw(0.283465)
r(85.0392,0,0,-28.3464,248.032,240.945,0.0670228,0.151107)
fp((0,0,0))
le()
lw(1)
Fn('Helvetica')
Fs(14)
style('Text')
Fn('Helvetica-Bold')
Fs(18)
txt('Keybox Files',(0.552654,0,0,0.552654,289.59,226.322),1,1)
G_()
G()
fp((1,0.647,0.31))
lw(0.283465)

```

r(70.866,0,0,-28.3464,574.016,240.945,0.0670228,0.151107)  
fp((0,0,0))  
le()  
lw(1)  
Fn('Helvetica')  
Fs(14)  
style('Text')  
Fn('Helvetica-Bold')  
Fs(18)  
txt('Private Keys',(0.552654,0,0,0.552654,609.449,226.772),1,1)  
G\_  
G()  
fp((0,0,0))  
le()  
lw(1)  
Fn('Helvetica')  
Fs(14)  
style('Text')  
Fn('Helvetica-Bold')  
Fs(24)  
txt('Scute',(0.552654,0,0,0.599958,224.978,465.775),1,1)  
fp((0,0,0))  
le()  
lw(1)  
Fn('Times-Roman')  
Fs(10)  
txt('(pkcs#11)',(1,0,0,1.08559,206.081,445.011))  
G\_  
G()  
fp((0.999,1,0.4))  
lw(0.283465)  
r(198.827,0,0,-56.6929,304.322,488.976,0.0603744,0.151107)  
fp((0,0,0))  
le()  
lw(1)  
Fn('Helvetica')  
Fs(14)  
style('Text')  
Fn('Helvetica-Bold')  
Fs(36)  
txt('GPGME  
Library',(0.552654,0,0,0.552654,404.952,457.853),1,1)  
G\_  
G()  
lw(1)  
style('Application Box')  
r(197.598,0,0,-42.5187,304.724,566.928,0.0152672,0.0677968)  
fp((0,0,0))

```

le()
lw(1)
Fn('Helvetica')
txt('GPGME aware Application',(0.98062,0,0,0.937018,334.892,540.985))
G_()
G()
lw(1)
style('Application Box')
r(127.829,0,0,-41.7496,162.992,566.159,0.0152672,0.0677968)
fp((0,0,0))
le()
lw(1)
Fn('Helvetica')
txt('Legacy Application',(174.688,540.01))
G_()
G()
G()
lp((0.392,0.584,0.929))
lw(4.25197)
b()
bs(749.296,162.296,0)
bs(705.89,162.296,0)
lw(3.25)
ld((1, 1))
la2([((-4.0, 3.0), (2.0, 0.0), (-4.0,
-3.0), (-4.0, 3.0)], 1))
b()
bs(705.89,100.083,0)
bs(744.472,100.083,0)
lp((0.392,0.584,0.929))
lw(3.25)
ld((1, 1))
la2([((-4.0, 3.0), (2.0, 0.0), (-4.0, -3.0), (-4.0, 3.0)], 1))
b()
bs(705.89,131.189,0)
bs(744.472,131.189,0)
fp((0,0,0))
le()
lw(1)
Fn('Helvetica')
Fs(14)
style('Text')
txt('execute/access',(0.31891,0,0,0.280771,726.951,87.3768),1,1)
fp((0,0,0))
le()
lw(1)
Fn('Helvetica')
Fs(14)

```

```

style('Text')
txt('closely linked',(0.31891,0,0,0.280771,724.715,149.589),1,1)
fp((0,0,0))
le()
lw(1)
Fn('Helvetica')
Fs(14)
style('Text')
txt('Assuan protocol',(0.31891,0,0,0.280771,728.535,118.483),1,1)
G_()
lw(1)
r(56.6929,0,0,-92.126,701.575,170.079)
G_()
lp((0.392,0.584,0.929))
lw(3.25)
ld((1, 1))
la2([((-4.0, 3.0), (2.0, 0.0), (-4.0, -3.0), (-4.0, 3.0)], 1))
b()
bs(248.031,325.984,0)
bs(248.031,297.638,0)
bs(538.583,297.638,0)
bs(538.583,340.157,0)
bs(566.929,340.157,0)
lp((0.392,0.584,0.929))
lw(3.25)
ld((1, 1))
la2([((-4.0, 3.0), (2.0, 0.0), (-4.0, -3.0), (-4.0, 3.0)], 1))
b()
bs(375.591,325.984,0)
bs(375.591,304.724,0)
bs(531.496,304.724,0)
bs(531.496,347.244,0)
bs(566.929,347.244,0)
guidelayer('Guide
 Lines',1,0,0,1,(0,0,1))
grid((0,0,7.08661,7.08661),1,(0,0,1),'Grid')
00~0
 *H
0k10 UDE10U
Dsseldorf10U

g10 Code GmbH10UAegypten Project10Utest cert 10
011203093638Z
021203093638Z0k10 UDE10U
Dsseldorf10U

g10 Code GmbH10UAegypten Project10Utest cert 100
 *H

```

0l+Pu.\-ZT\$e'nE&h4<}BePm[%j-/-7PcHKi@FKy~npCd\${}K~Q00U37Tq8\_eK40U#037Tq8\_eK40m0k10 UDE10U  
Dsseldorf10U

g10 Code GmbH10UAegypten Project10Utest cert 10U00

\*H

l8gD Z

wYL,M'j

pk2pf[L ;Rl}#h\$~O!9;3e\A'v&P^\$'Oc.-TS~A>:fQY<

2011-12-02 Werner Koch <wk@g10code.com>

NB: ChangeLog files are no longer manually maintained. Starting on December 1st, 2011 we put change information only in the GIT commit log, and generate a top-level ChangeLog file from logs at "make dist". See doc/HACKING for details.

2011-10-25 Marcus Brinkmann <marcus@g10code.com>

\* Makefile.am: Remove build rules for libgpgme-pth.

\* gpgme.m4: Remove support for libgpgme-pth.

2011-05-26 Marcus Brinkmann <marcus@g10code.com>

\* decrypt.c (gpgme\_op\_decrypt\_start, gpgme\_op\_decrypt): Check CTX.

\* decrypt-verify.c (gpgme\_op\_decrypt\_verify\_start)

(gpgme\_op\_decrypt\_verify): Likewise.

\* delete.c (gpgme\_op\_delete\_start, gpgme\_op\_delete): Likewise.

\* edit.c (gpgme\_op\_edit\_start, gpgme\_op\_edit)

(gpgme\_op\_card\_edit\_start, gpgme\_op\_card\_edit): Likewise.

\* encrypt.c (gpgme\_op\_encrypt\_start, gpgme\_op\_encrypt): Likewise.

\* encrypt-sign.c (gpgme\_op\_encrypt\_sign\_start)

(gpgme\_op\_encrypt\_sign): Likewise.

\* export.c (gpgme\_op\_export\_start,

gpgme\_op\_export)

(gpgme\_op\_export\_ext\_start, gpgme\_op\_export\_ext)

(gpgme\_op\_export\_keys\_start, gpgme\_op\_export\_keys): Likewise.

\* genkey.c (gpgme\_op\_genkey\_start, gpgme\_op\_genkey): Likewise.

\* getauditlog.c (gpgme\_op\_getauditlog\_start)

(gpgme\_op\_getauditlog): Likewise.

\* gpgconf.c (gpgme\_op\_conf\_load, gpgme\_op\_conf\_save): Likewise.

\* import.c (gpgme\_op\_import\_start, gpgme\_op\_import\_keys\_start)

(gpgme\_op\_import\_keys, gpgme\_op\_import): Likewise.

\* keylist.c (gpgme\_op\_keylist\_start, gpgme\_op\_keylist\_ext\_start):

Likewise.

\* opassuan.c (gpgme\_op\_assuan\_transact\_start)

(gpgme\_op\_assuan\_transact\_ext): Likewise.

\* passwd.c (gpgme\_op\_passwd\_start, gpgme\_op\_passwd): Likewise.

\* sign.c (gpgme\_op\_sign\_start, gpgme\_op\_sign): Likewise.

\* trustlist.c (gpgme\_op\_trustlist\_start)

(gpgme\_op\_trustlist\_next): Likewise.  
 \* verify.c (gpgme\_op\_verify\_start, gpgme\_get\_sig\_key): Likewise.  
 \* op-support.c (\_gpgme\_op\_data\_lookup): Likewise.  
 \* vfs-create.c (gpgme\_op\_vfs\_transact, gpgme\_op\_vfs\_create):  
 Likewise.  
 \* vfs-mount.c (gpgme\_op\_vfs\_mount, gpgme\_op\_vfs\_transact): Likewise.  
 \* gpgme.c (gpgme\_set\_protocol)  
 (gpgme\_set\_sub\_protocol)  
 (gpgme\_set\_armor, gpgme\_set\_include\_certs)  
 (gpgme\_set\_keylist\_mode, gpgme\_set\_passphrase\_cb)  
 (gpgme\_set\_progress\_cb, gpgme\_set\_io\_cbs, gpgme\_set\_locale)  
 (gpgme\_ctx\_set\_engine\_info, gpgme\_sig\_notation\_clear): Likewise.  
 \* gpgme.c (gpgme\_new): Check for valid R\_CTX.  
 (gpgme\_cancel, gpgme\_cancel\_async, gpgme\_release): Likewise.

2011-04-06 Werner Koch <wk@g10code.com>

\* gpgme-config.in: Add option --host. Change options --cflags and  
 --libs to collapse duplicate include and lib dirs. Try to put  
 extra libs at the end.  
  
 \* gpgme.h.in: Use INSERT\_\_TYPEDEFS\_FOR\_GPGME\_H to include platform  
 specific typedefs.

2011-02-03 Werner Koch <wk@g10code.com>

\* extra-stati.h: New.  
 \* mkstatus: Extend to also process extra-stati.h  
 \* Makefile.am (main\_sources): Add extra-stati.h  
 (status-table.h): Depend on extra-stati.h and adjust rule.

2011-02-03

Marcus Brinkmann <marcus@g10code.com>

\* w32-io.c (\_gpgme\_io\_socket): Return fd, not res.

2011-02-02 Marcus Brinkmann <mb@g10code.com>

\* assuan-support.c (my\_socket, my\_connect): New functions.  
 (\_gpgme\_assuan\_system\_hooks): Add my\_Socket, my\_connect.  
 \* priv-io.h (\_gpgme\_io\_socket): New prototype.  
 \* w32-io.c (pid\_to\_handle, handle\_to\_oid, fd\_to\_handle): Remove macros.  
 (is\_socket): Remove function.  
 (\_gpgme\_io\_spawn) [HAVE\_W32CE\_SYSTEM]: Remove some dead code.  
 (\_gpgme\_io\_spawn): Translate handles before DuplicateHandle them.

2011-02-02 Marcus Brinkmann <mb@g10code.com>



\* w32-util.c (mkstemp): Don't use CreateFile instead of open (the function is not used on Windows CE, and the callers were not adjusted).

2011-01-21 Marcus Brinkmann <mb@g10code.com>

\* engine-gpgconf.c (\_gpgme\_conf\_opt\_change): Fix the case that is not self-assignment.

2010-12-08 Werner Koch <wk@g10code.com>

\* gpgme-tool.c (strcpy\_escaped\_plus): New.  
(DIM, xtoi\_1, xtoi\_2): New.  
(cmd\_keylist):  
Allow for multiple patterns.

2010-11-23 Marcus Brinkmann <mb@g10code.com>

\* w32-io.c (create\_reader, create\_writer): Use small stack size on Windows CE.

2010-11-23 Marcus Brinkmann <mb@g10code.com>

\* gpgme.h.in (gpgme\_conf\_arg\_new): Make VALUE arg const void \*.  
\* gpgconf.c (\_gpgme\_conf\_arg\_new): Likewise.  
(gpgme\_conf\_arg\_new): Likewise.  
\* engine-gpgconf.c (\_gpgme\_conf\_arg\_new): Likewise.  
(gpgconf\_write): Remove debug hack.

2010-11-19 Marcus Brinkmann <mb@g10code.com>

\* engine-gpgconf.c (\_gpgme\_conf\_opt\_change): Support self-assignment. Requested by Marc Mutz.

2010-11-17 Marcus Brinkmann <mb@g10code.com>

\* vasprintf.c (int\_vasprintf) [HAVE\_W32CE\_SYSTEM]: Just use a fixed size buffer, as va\_copy is not easy to fake.

2010-11-15 Marcus Brinkmann <mb@g10code.com>

\* w32-ce.h (strcasecmp, strdup) [\_MSC\_VER]: Define.  
\* genkey.c, passphrase.c: Include util.h.  
\* w32-util.c (\_gpgme\_w32ce\_get\_debug\_envvar): Fix return value.

2010-11-15 Werner Koch <wk@g10code.com>

\*

data-compat.c (gpgme\_data\_new\_from\_filepart)  
(gpgme\_data\_new\_from\_file) [W32CE && \_MSC\_VER]: Return not  
GPG\_ERR\_NOT\_IMPLEMENTED.

\* w32-ce.h (HKEY\_PERFORMANCE\_DATA, HKEY\_CURRENT\_CONFIG, \_IOLBF)  
(abort) [\_MSC\_VER]: Provide these macros.

\* ath.h [W32CE && \_MSC\_VER]: Include winsock2.h.

\* ath.c (ath\_read, ath\_write) [W32CE && \_MSC\_VER]: Do not call  
non-available functions.

2010-11-04 Werner Koch <wk@g10code.com>

\* w32-ce.h [\_MSC\_VER && W32CE]: Undef leave.

\* export.c: Include util.h so that we get the above undef.

\* memrchr.c: Remove. Used to be a replacement function required  
by the formerly included assuan code.

2010-11-03 Werner Koch <wk@g10code.com>

\* debug.c (\_gpgme\_debug) [W32CE]: Replace localtime by GetLocalTime.

\* signers.c (gpgme\_signers\_clear): Remove useless return.  
Reported by Patrick Spendrin.

\* w32-util.c: s/\_\_\_inline\_\_\_/GPG\_ERR\_INLINE/

\* setenv.c: Include string.h due to our strerror replacement.

\* w32-ce.h (access, bsearch):

New macros.

\* w32-ce.c (\_gpgme\_wince\_access): New.

(RegQueryValueExA): Change DATA to a void\*.

(\_gpgme\_wince\_bsearch): New. Taken from glibc 2.6.

Guard include of sys/stat.h and sys/types.h.

2010-11-02 Werner Koch <wk@g10code.com>

\* data-fd.c (read, write, lseek) [W32CE && ! \_\_MINGW32CE\_\_]: New.  
Taken from Pedro Alves Public Domain code.

\* w32-ce.h (SHGetSpecialFolderPath): Remove our defines and  
prototypes. We use the system provided prototypes now.

\* w32-ce.c: Include shlobj.h

(\_WIN32\_IE): Define to 0x0400  
(CreateFileA): New.  
\* w32-util.c: Explicitly include windows headers before util.h.  
(\_gpgme\_w32ce\_get\_debug\_envvar): Do not use wchar\_t strings for read\_w32\_registry\_string.  
(mkstemp): Use CreateFile instead of open.

\* w32-io.c (handle\_to\_fd, fd\_tohandle): Add. We need them for W32.  
\* w32-util.c (\_WIN32\_IE): Define to 0x0400.

\* util.h [W32]: Include windows.h.  
\* w32-sema.c: Do not include windows.h directly.  
\* ath.c (ssize\_t, pid\_t)[\_MSC\_VER]: Add new types.  
\* gpgme.c (gpgme\_result\_ref, gpgme\_result\_unref): Do not use a void pointer in pointer arithmetic.  
\* w32-util.c: Include util.h prior to ath.h. Don't include windows.h directly.  
(F\_OK): Define if not defined.  
\* w32-ce.c: Include string.h.  
(RegQueryValueExA): Use WINAPI modifier to match the declaration.  
\* vfs-create.c: Include string.h because under W32CE with MSC we get a warning related to our strerror replacement.  
\* encrypt-sign.c: Include stdlib.h, string.h and errno.h.  
\* priv-io.h [W32CE]: Include w32-ce.h  
\* w32-ce.h: Include winsock2.h and ws2tcpip.h.  
(\_MSV\_VER): Remove useless macro.  
(pid\_t): Add typedef.

Guard all includes of unistd.h and sys/time.h.

2010-10-28 Marcus Brinkmann <marcus@g10code.com>

\* opassuan.c (gpgme\_op\_assuan\_transact\_ext): Fix uninitialized value use. Reported by Marc Mutz.

2010-10-07 Werner Koch <wk@g10code.com>

\* gpgme-tool.c (ARGP\_ERR\_UNKNOWN): Use EDEADLK if available.  
\* w32-util.c (\_gpgme\_w32ce\_get\_debug\_envvar) [W32CE]: New.  
\* debug.c (debug\_init) [W32CE]: Use new function.

2010-09-16 Werner Koch <wk@g10code.com>

\* import.c: Include "util.h".  
(parse\_import): Return GPG\_ERR\_MISSING\_ISSUER\_CERT.

\* util.h: Add fallback define for GPG\_ERR\_MISSING\_ISSUER\_CERT.  
\* op-support.c: Include "util.h".  
(\_gpgme\_parse\_inv\_recv): Handle new code 12.

2010-09-02 Marcus Brinkmann <marcus@g10code.de>

\* error.c (gpgme\_err\_code\_to\_errno): Fix cut and paste bug (thanks to Marc Mutz).

2010-09-01 Marcus Brinkmann <marcus@g10code.de>

\* w32-io.c: Revert change from 2009-06-18, as it created a race condition.

2010-08-18 Marcus Brinkmann <marcus@g10code.de>

\* gpgme.def: Add gpgme\_err\_code\_from\_syserror and gpgme\_err\_set\_errno.  
\* libgpgme.vers: Likewise.  
\* gpgme.h.in (gpgme\_error\_from\_errno): Fix return type to gpgme\_error\_t.  
(gpgme\_err\_code\_from\_syserror, gpgme\_err\_set\_errno): New prototype.  
(gpgme\_error\_from\_syserror): New inline function (why are gpgme\_err\_make\_from\_errno and gpgme\_error\_from\_errno not inline functions?).  
\* error.c (gpgme\_error\_from\_errno): Fix return type to gpgme\_error\_t.  
(gpgme\_err\_set\_errno, gpgme\_err\_code\_from\_syserror): New functions.

2010-08-03 Marcus Brinkmann <marcus@g10code.de>

\* gpgme-tool.c (result\_encrypt\_to\_xml, result\_sign\_to\_xml)  
(result\_verify\_to\_xml, result\_import\_to\_xml)  
(result\_genkey\_to\_xml): Check vigorously for null pointers.  
\* w32-io.c (GPGCEDEV\_IOCTL\_ASSIGN\_RVID): New macro.  
(\_gpgme\_io\_spawn): Use ASSIGN\_RVID.

2010-06-11 Marcus Brinkmann <marcus@g10code.de>

\* w32-io.c (\_gpgme\_io\_spawn): Remove debug printf.

2010-06-10 Marcus Brinkmann <marcus@g10code.de>

\* gpgme-tool.c (gpgme\_server): Use special hack for Windows CE to get at stdin and stdout.

\* engine-gpgsm.c (gpgsm\_new): Translate returned achild\_fds back

to child\_fds.

\* debug.h (TRACE\_SUC6): New macro.

\* w32-io.c (MAX\_SLAFD): New macro.

(fd\_table): New static variable.

(new\_fd, release\_fd): New functions.

(fd\_to\_handle, handle\_to\_fd, handle\_to\_socket):

Remove macros.

(MAX\_READERS, MAX\_WRITERS): Increase to 64.

(notify\_table): Increase to MAX\_SLAFD.

(struct reader\_context\_s, struct writer\_context\_s): Add member file\_sock.

(reader, writer): Use file\_hd vs file\_sock to decide if socket operations to use. Remove auto-detect mode.

(create\_reader, create\_writer): Set file\_sock. Unblock pending thread only if this is a pipe fd.

(\_gpgme\_io\_pipe): Allocate fds from table and return slot indices instead of windows handles. This allows to properly handle RVIDs.

(\_gpgme\_io\_close): Handle dup'ed file descriptors.

(build\_commandline) [HAVE\_W32\_SYSTEM]: Use RVID from fd table now.

(\_gpgme\_io\_spawn): Use fd table now.

(\_gpgme\_io\_fd2str): Use RVID from fd table now.

(\_gpgme\_io\_dup): Implement using fd table.

(\_gpgme\_io\_socket): Allocate fds from table.

(\_gpgme\_io\_connect): Use fd from table.

\* w32-glib-io.c (find\_channel): Check that the slot is used.

2010-06-09 Marcus Brinkmann <marcus@g10code.de>

\* w32-io.c [HAVE\_W32CE\_SYSTEM]:

Include assuan.h and winioctl.h.

(GPGCEDEV\_IOCTL\_UNBLOCK) [HAVE\_W32CE\_SYSTEM]: Define.

(set\_synchronize) [HAVE\_W32CE\_SYSTEM]: Stub it out.

(is\_socket): Allow to return -1 for auto-detect (old behaviour).

(is\_socket) [HAVE\_W32CE\_SYSTEM]: Return -1.

(reader): Handle auto-detect case. Handle ctx->stop\_me before checking for EOF.

(destroy\_reader) [HAVE\_W32CE\_SYSTEM]: Unblock a pending reader.

(writer): Handle auto-detect case. Handle ctx->stop\_me with ERROR\_BUSY.

(destroy\_writer) [HAVE\_W32CE\_SYSTEM]: Unblock a pending writer.

(\_gpgme\_io\_pipe) [HAVE\_W32CE\_SYSTEM]: Implement in terms of a half-pipe.

(build\_commandline) [HAVE\_W32CE\_SYSTEM]: New function.

(\_gpgme\_io\_spawn) [HAVE\_W32CE\_SYSTEM]: Implement it differently for this platform.

(\_gpgme\_io\_fd2str) [HAVE\_W32CE\_SYSTEM]: Implement it for RVIDs.

(\_gpgme\_io\_dup) [HAVE\_W32CE\_SYSTEM]: Stub it out.

\* gpgme-tool.c (result\_add\_timestamp): Add missing NULL argument.

(result\_sign\_to\_xml): Protect against NULL fingerprint.

(struct server): New members input\_fd, input\_filename, input\_stream output\_fd, output\_filename, output\_stream, message\_filename, message\_stream.

(server\_reset\_fds): Deallocate those.

(server\_parse\_fd): New function.

(server\_data\_obj): Take optional filename argument and direction argument. Also take new argument to return a filestream that needs to be closed after destroying the data object.

Change all callers, too.

(input\_notify, output\_notify): Removed.

(cmd\_input, cmd\_output): New functions.

(gpgme\_server): Do not register input and output notifier.

(register\_commands): Use cmd\_input and cmd\_output.

(cmd\_message): Rewritten to use server\_parse\_fd.

(cmd\_delete, cmd\_keylist): Fix inverted option check.

(main) [HAVE\_W32CE\_SYSTEM]: Sleep a bit to work around bug in ssh.

\* genkey.c (gpgme\_op\_genkey): Return err with TRACE\_ERR.

2010-05-12 Marcus Brinkmann <marcus@g10code.de>

\* conversion.c (\_gpgme\_timegm) [HAVE\_W32\_SYSTEM]: New static function.

(\_gpgme\_parse\_timestamp)

[HAVE\_W32\_SYSTEM]: Use it.

\* gpgme-tool.c (main): Protect call to setlocale with HAVE\_SETLOCALE.

\* Makefile.am (system\_components): Remove custom cppflags from RCCOMPILER (because gpg-error adds -idirafter that makes RC bail.

[HAVE\_W32CE\_SYSTEM]: Add w32-ce.h and w32-ce.c, clear libexec\_PROGRAMS.

\* w32-ce.h, w32-ce.c: New files.

\* priv-io.h: Include <sys/types.h>

\* util.h: Likewise.

2010-05-11 Marcus Brinkmann <marcus@g10code.de>

\* w32-util.c: Include ath.h

(HAVE\_ALLOW\_SET\_FOREGROUND\_WINDOW) [!HAVE\_W32CE\_SYSTEM]: Define it.

(RTLD\_LAZY, dlopen, dlsym, dlclose) [!HAVE\_ALLOW\_SET\_FORGROUND\_WINDOW]: Don't define anymore.  
 (\_gpgme\_allow\_set\_foreground\_window) [!HAVE\_ALLOW\_SET\_FOREGROUND\_WINDOW]:  
 Make it a stub.  
 (read\_w32\_registry\_string): Use FooA variants of Windows functions instead of Foo (which dispatches depending on UNICODE).  
 [!HAVE\_W32CE\_SYSTEM]: Don't check environment.  
 (w32\_shgetfolderpath): Remove.  
 (find\_program\_at\_standard\_place): Call SHGetSpecialFolderPath (which is available on all Windows systems and also Windows CE).  
 (mkstemp): Use ath\_self instead of getpid.  
 (\_gpgme\_mkstemp): Use GetTempPathA instead of GetTempPath.

\* gpgme.h.in: Use \_WIN32 instead of \_MSC\_VER. Include time.h for time\_t.

2010-05-07 Marcus Brinkmann <marcus@g10code.de>

\* engine-g13.c, gpgme.c, engine-gpgsm.c, engine-gpg.c, op-support.c, engine-assuan.c, gpgme-tool.c: Include <locale.h> only if available with HAVE\_LOCALE\_H and conditionalize use of LC\_CTYPE on its definition.  
 \* engine-gpgconf.c: Do not include <locale.h>.

\* engine-gpgsm.c (gpgsm\_new, start): Cast between int and assuan\_fd\_t.  
 \* assuan-support.c (my\_pipe, my\_close, my\_read, my\_write): Likewise.  
 \* gpgme-tool.c (server\_data\_obj, server\_reset\_fds, gpgme\_server), (my\_recvmmsg, my\_sendmsg, my\_spawn): Likewise.  
 \* engine-assuan.c (start): Likewise.  
 \* engine-g13.c (start): Likewise.

2010-05-06 Marcus Brinkmann <marcus@g10code.de>

\* w32-glib-io.c, w32-io.c, w32-qt-io.cpp, w32-sema.c, w32-util.c:  
 Do not include <signal.h>.

\* sign.c, data-user.c, conversion.c, debug.c, verify.c, data.c, decrypt.c, delete.c, assuan-support.c, import.c, engine-gpgsm.c, data-mem.c, op-support.c, w32-io.c, w32-util.c, data-compat.c: Use gpg\_error\_from\_syserror instead gpg\_error\_from\_errno, and use gpg\_err\_set\_errno to set error number.  
 \* setenv.c: Include <gpg-error.h> and define \_\_set\_errno to use gpg\_err\_set\_errno.  
 \* gpgme-tool.c (ARGP\_ERR\_UNKNOWN): Define to EDEADLOCK (which is

mapped in Windows CE) instead of E2BIG (which is not).  
(gt\_import\_keys): Initialize err.

2010-04-19 Marcus Brinkmann <marcus@g10code.de>

- \* assuan-support.c (my\_spawn): Cast to avoid warning.
- \* engine-g13.c (g13\_new): Make ARGV array of pointer to const char.
- (g13\_assuan\_simple\_command) [!USE\_DESCRIPTOR\_FUNCTION]: Don't define.
- \* ops.h (\_gpgme\_key\_append\_name): Same in prototype.
- \* key.c (\_gpgme\_key\_append\_name): Make SRC argument pointer to const char.
- \* posix-util.c
- (\_gpgme\_get\_uiserver\_socket\_path): Make HOMEDIR const.
- \* vfs-mount.c (gpgme\_op\_vfs\_transact\_start): Never define this potentially useful but currently unused function.
- \* vfs-create.c (gpgme\_op\_vfs\_transact\_start): Likewise.

2010-04-16 Werner Koch <wk@g10code.com>

- \* w32-io.c (is\_socket): New.
- (reader, writer): Use it to figure out the API to use.

2010-03-15 Werner Koch <wk@g10code.com>

- \* gpgme.h.in: Add autoconf template to set generated file to read-only in an emacs buffer.

2010-03-12 Werner Koch <wk@g10code.com>

- \* gpgme.h.in (GPGME\_STATUS\_SUCCESS): Use the right file for the change; see below.
- \* passwd.c (op\_data\_t): New.
- (passwd\_start): Setup OPD.
- (passwd\_status\_handler): Return GPG\_ERR\_NOT\_SUPPORTED if needed.
- \* context.h (OPDATA\_PASSWD): New.
- \* gpgme.h (GPGME\_STATUS\_SUCCESS): New.

2010-03-09 Werner Koch <wk@g10code.com>

- \* engine-gpgsm.c (gpgsm\_keylist): Try to start the agent.

2010-02-17 Werner Koch <wk@g10code.com>

- \* posix-io.c (notify\_table):



Change implementation.

(notify\_table\_item\_t, notify\_table\_size, notify\_table\_lock): New.

(\_gpgme\_io\_close, \_gpgme\_io\_set\_close\_notify): Adjust for new implementation.

2010-02-16 Werner Koch <wk@g10code.com>

\* gpgme-tool.c (spacep, has\_option, skip\_options): New.

(cmd\_export): Implement option --minimal.

\* gpgme.h.in (GPGME\_EXPORT\_MODE\_MINIMAL): New.

\* export.c (export\_start, export\_ext\_start): Implement it.

\* engine-gpg.c (export\_common): Ditto.

2010-01-25 Werner Koch <wk@g10code.com>

\* w32-io.c (\_gpgme\_io\_connect): Fix return code check to make it work.

\* version.c (do\_subsystem\_inits): Remove superfluous second WSAStartup.

2010-01-22 Werner Koch <wk@g10code.com>

\* w32-io.c (writer): Try to use send first.

(reader): Try to use recv first.

2010-01-08 Werner Koch <wk@g10code.com>

\* engine-gpg.c (gpg\_passwd): New.

(\_gpgme\_engine\_ops\_gpg): Register.

\* passwd.c (parse\_error): New.

(passwd\_status\_handler): Use it.

2010-01-07 Marcus Brinkmann <marcus@g10code.de>

\*

gpgme-tool.c (result\_xml\_write\_cb\_t, struct result\_xml\_state):  
New types.

(MAX\_TAGS): New macro.

(result\_init, result\_xml\_indent, result\_xml\_tag\_start)

(result\_xml\_tag\_data, result\_xml\_tag\_end, result\_add\_error)

(result\_add\_pubkey\_algo, result\_add\_hash\_algo, result\_add\_keyid)

(result\_add\_fpr, result\_add\_timestamp, result\_add\_sig\_mode)

(result\_add\_value, result\_add\_string, result\_encrypt\_to\_xml)

(result\_decrypt\_to\_xml, result\_sign\_to\_xml)

(result\_verify\_to\_xml, result\_import\_to\_xml)

(result\_genkey\_to\_xml, result\_keylist\_to\_xml)

(result\_vfs\_mount\_to\_xml): New functions.

(gt\_result): Rewritten.

2010-01-05 Werner Koch <wk@g10code.com>

- \* gpgme-tool.c (gt\_passwd, cmd\_passwd): New.
- (register\_commands): Register.
  
- \* gpgme.h.in (gpgme\_op\_passwd\_start, gpgme\_op\_passwd): New.
- \* libgpgme.vers, gpgme.def: Add new functions.
- \* passwd.c: New.
- \* Makefile.am (main\_sources): Add passwd.c
- \* engine.c, engine.h (\_gpgme\_engine\_op\_passwd): New.
- \* engine-backend.h (struct engine\_ops): Add PASSWD.
- \* engine-gpgsm.c (gpgsm\_passwd): New.
- (\_gpgme\_engine\_ops\_gpgsm): Register.
- (gpgsm\_reset): Reset only if we have a connection.
  
- \* gpgme.h.in (GPGME\_PK\_ECDSA, GPGME\_PK\_ECDH): New.
- \* gpgme.c (gpgme\_pubkey\_algo\_name): Add them.

2009-12-22 Marcus Brinkmann <marcus@g10code.de>

- \* debug.c: Test for TLS, not \_\_GNUC\_\_

2009-12-15 Marcus Brinkmann <marcus@g10code.de>

- \* assuan-support.c (my\_spawn): Calloc, not malloc, the fd\_items.

2009-12-10 Werner Koch <wk@g10code.com>

- \* debug.c (debug\_init): Test on sgid process.

2009-12-08 Marcus Brinkmann <marcus@g10code.de>

- \* Makefile.am (LTRCCOMPILER): Refactor with ...
- (RCCOMPILER): ... this new macro.
- (SUFFIXES): Add .lo.
- (gpgme\_res\_ldflag): Removed.
- (gpgme\_res): Use libtool object file name here.
- (libgpgme\_la\_LDFLAGS): Remove gpgme\_res\_ldflag usage.
- (libgpgme\_la\_LIBADD): Add gpgme\_res.
  
- \* ath.c (ath\_self) [HAVE\_W32\_SYSTEM]: Fix typo.

2009-12-02 Werner Koch <wk@g10code.com>

- \* gpgconf.c (gpgme\_conf\_arg\_release):

No return in a function  
returning void. Reported by Wyllys Ingersoll.

2009-12-01 Werner Koch <wk@g10code.com>

- \* gpgme-tool.c (cmd\_getauditlog): Add flag --html.
- (hlp\_getauditlog): New.
- \* gpgme-tool.c (GT\_GCC\_A\_SENTINEL, GT\_GCC\_A\_PRINTF): New.
- (gt\_write\_status): Use sentinel.
- (argp\_error, log\_error): Use printf attribute.
- (argp\_parse): Remove extra argument to argp\_error.
- (\_gt\_progress\_cb, gt\_get\_engine\_info, gt\_get\_keylist\_mode)
- (gt\_result): Add NULL arg.

2009-11-26 Marcus Brinkmann <marcus@g10code.de>

- \* opassuan.c (opassuan\_start): Allocate result structure before beginning operation.

2009-11-25 Marcus Brinkmann <marcus@g10code.de>

- \* gpgme-tool.c (gpgme\_server): Use assuan\_fd\_t and assuan\_fdopen on fds.

2009-11-13 <wk@g10code.com>

- \* sign.c (\_gpgme\_sign\_status\_handler): Handle SIG\_CREATED\_SEEN.
- \* engine-uiserver.c (uiserver\_sign): Make sending SENDER optional.

2009-11-10 Marcus Brinkmann <marcus@g10code.de>

- \* op-support.c (\_gpgme\_op\_reset):  
Instead of last change, only set  
sub protocol if it is not the default.

2009-11-10 Werner Koch <wk@g10code.com>

- \* op-support.c (\_gpgme\_op\_reset): Ignore GPG\_ERR\_NOT\_IMPLEMENTED while setting the sub protocol.
- \* engine-uiserver.c (uiserver\_new): Pass fdpassing flag to assuan\_socket\_connect.
- (set\_recipients): Replace fingerprint by user id.
- \* engine-gpgsm.c (set\_recipients): Fix non-terminating loop in case of a missing key.

2009-11-10 Marcus Brinkmann <marcus@g10code.de>

- \* gpgme.c (gpgme\_new): Set default sub protocol.
- \* gpgme-tool.c: Implement get sub protocol.
  
- \* gpgme.h.in (gpgme\_get\_sub\_protocol): Add prototype.
- \* gpgme.def, libgpgme.vers: Add gpgme\_get\_sub\_protocol.
- \* context.h (struct gpgme\_context): New member sub\_protocol.
- \* gpgme.c (gpgme\_set\_sub\_protocol): Set CTX->sub\_protocol.
- (gpgme\_get\_sub\_protocol): New function.
- \* op-support.c (\_gpgme\_op\_reset): Set sub protocol.
  
- \* Makefile.am (uiserver\_components): New variable.
- (main\_sources):  
Add it.
- \* ops.h, key.c (\_gpgme\_key\_append\_name): Take CONVERT argument,  
implement it. Adjust callers.
- (gpgme\_key\_from\_uid): New function.
- \* gpgme.h.in (gpgme\_protocol\_t): Add GPGME\_PROTOCOL\_DEFAULT.
- (gpgme\_encrypt\_flags\_t): Add GPGME\_ENCRYPT\_PREPARE,  
GPGME\_ENCRYPT\_EXPECT\_SIGN.
- (gpgme\_set\_sub\_protocol, gpgme\_key\_from\_uid): New functions.
- \* libgpgme.vers, gpgme.def: Add new functions.
- \* gpgme.c (gpgme\_set\_protocol): Add UIServer protocol.
- (gpgme\_set\_sub\_protocol): New function.
- (gpgme\_get\_protocol\_name): Add UIServer and default protocol.
- \* assuan-support.c: Return correct error values, implement  
socketpair for POSIX.
- \* priv-io.h, posix-io.c, w32-io.c, w32-glib-io.c,  
w32-qt-io.cpp (\_gpgme\_io\_spawn): Add ATFORK and ATFORKVALUE  
arguments. Implement it for POSIX. Adjust all callers.
- \* engine.h, engine-backend.h (\_gpgme\_engine\_set\_protocol)  
(\_gpgme\_engine\_op\_decrypt\_verify): New prototypes. Adjust all  
users.
- \* engine.c (engine\_ops, gpgme\_get\_engine\_info): Add UIServer  
engine.
- (\_gpgme\_engine\_set\_protocol,  
\_gpgme\_engine\_op\_decrypt\_verify): New  
function.
- \* decrypt-verify.c (decrypt\_verify\_start): Call  
\_gpgme\_engine\_op\_decrypt\_verify.
- \* util.h, posix-util.c,  
w32-util.c (\_gpgme\_get\_uiserver\_socket\_path): New function.
- \* engine-gpgsm.c (gpgsm\_set\_fd): Fix \_gpgme\_io\_pipe invocation.
- \* gpgme-tool.c: Some support for UIServer protocol.
- \* engine-uiserver.c: New file.

2009-11-09 Marcus Brinkmann <marcus@g10code.de>

\* engine-gpgsm.c (gpgsm\_new): Close server side FDs.

2009-11-06 Marcus Brinkmann <marcus@g10code.de>

\* gpgme-tool.c (struct gpgme\_tool): New members write\_data and write\_data\_hook.

(gt\_write\_data): New function.

(gt\_result): Output vfs\_mount result.

(server\_write\_data): New function.

(gpgme\_server): Initialize write\_data members.

2009-11-05 Marcus Brinkmann <marcus@g10code.de>

\* engine-g13.c (struct engine\_g13): Remove members RESULT\_CB and RESULT\_CB\_VALUE.

(g13\_assuan\_simple\_command, status\_handler): Don't use those anymore.

(g13\_transact): Remove them from argument list, too.

\* vfs-mount.c (\_gpgme\_vfs\_mount\_status\_handler): New function.

(\_gpgme\_op\_vfs\_mount): Pass it to transact.

\* engine-assuan.c (lass\_new): Update use of assuan\_socket\_connect.

\* engine-gpgsm.c (gpgsm\_new): Update use of assuan\_pipe\_connect.

\* engine-g13.c (g13\_new): Likewise.

\* priv-io.h (IOSPAWN\_FLAG\_NOCLOSE): New flag.

\* w32-io.c (\_gpgme\_io\_spawn): Implement this flag.

\* posix-io.c (\_gpgme\_io\_spawn): Likewise.

\* w32-glib-io.c (\_gpgme\_io\_spawn): Likewise.

\* assuan-support.c (my\_spawn): Set this flag.

\* decrypt.c (gpgme\_op\_decrypt\_start): Fix use of debug macro.

\* decrypt-verify.c (gpgme\_op\_decrypt\_verify\_start): Likewise.

\* delete.c (gpgme\_op\_delete\_start): Likewise.

\* edit.c (gpgme\_op\_edit\_start, gpgme\_op\_card\_edit\_start):  
Likewise.

\* encrypt.c (gpgme\_op\_encrypt\_start): Likewise.

\* encrypt-sign.c (gpgme\_op\_encrypt\_sign\_start): Likewise.

\* export.c (gpgme\_op\_export\_start, gpgme\_op\_export\_ext\_start)  
(gpgme\_op\_export\_keys\_start,  
gpgme\_op\_export\_keys): Likewise.

\* genkey.c (gpgme\_op\_genkey\_start): Likewise.

\* getauditlog.c (gpgme\_op\_getauditlog\_start): Likewise.

\* import.c (gpgme\_op\_import\_start, gpgme\_op\_import\_keys\_start):  
Likewise.

\* opassuan.c (gpgme\_op\_assuan\_transact\_start): Likewise.

\* sign.c (gpgme\_op\_sign\_start): Likewise.

- \* verify.c (gpgme\_op\_verify\_start): Likewise.
- \* vfs-create.c (gpgme\_op\_vfs\_create): Likewise.
- \* vfs-mount.c (gpgme\_op\_vfs\_mount): Likewise.

2009-11-04 Marcus Brinkmann <marcus@g10code.de>

- \* ath.h (ath\_self): New prototype. Include <stdint.h>
- \* ath.c, ath-pth.c, ath-pthread.c (ath\_self): New function.
- \* debug.h: Rewrite most macros to beautify debug output.
- (\_gpgme\_debug\_buffer): Remove tagname and tag argument.
- (\_gpgme\_debug\_frame\_begin, \_gpgme\_debug\_frame\_end): New prototypes.
- \* debug.c: Include <time.h>. Don't include assuan.h.
- (frame\_nr, FRAME\_NR): New thread-specific variable and macro.
- (debug\_init): Do not initialize assuan.
- Call \_gpgme\_debug after initialization instead using printf directly.
- (\_gpgme\_debug): Do not call debug\_init (we now ensure proper initialization by user). Add timestamp and thread/process ID.
- (\_gpgme\_debug\_buffer): Do not take tagname and tag argument.
- (\_gpgme\_debug\_frame\_begin, \_gpgme\_debug\_frame\_end): New functions.
- \* version.c (gpgme\_check\_version\_internal, gpgme\_check\_version): Fix debug string. Do not initialize assuan.
- \* posix-io.c (get\_max\_fds): Use 0 not NULL (nicer debug output).

2009-11-04 Werner Koch <wk@g10code.com>

- \* gpgme-tool.c (register\_commands): Add HELP feature.

2009-11-03 Werner Koch <wk@g10code.com>

- \* gpgme.h.in (GPGME\_PROTOCOL\_UISERVER): New.

2009-11-03 Marcus Brinkmann <marcus@g10code.de>

- \* Makefile.am (main\_sources): Change g13.c to vfs-mount.c. Add vfs-create.c
- \* vfs-create.c: New file.
- \* g13.c: Renamed to ...
- \* vfs-mount.c: ... this new file.
- \* gpgme.h.in (gpgme\_op\_vfs\_create): New prototype.
- \* gpgme.def, libgpgme.vers: Add gpgme\_op\_vfs\_create.
- \*
- gpgme-tool.c (gt\_vfs\_create, cmd\_vfs\_create): New functions.
- (register\_commands): Add VFS\_CREATE and CREAET.

2009-11-02 Marcus Brinkmann <marcus@g10code.de>

- \* debug.h (\_gpgme\_debug\_buffer): Make TAG argument const.

- \* debug.c (\_gpgme\_debug\_buffer): Likewise.
- \* gpgme-tool.c (input\_notify, output\_notify): Adjust type to new assuan interface.
- \* decrypt.c (gpgme\_op\_decrypt\_result): Remove unused variable.
- \* opassuan.c (gpgme\_op\_assuan\_transact): Fix return value.

2009-10-30 Marcus Brinkmann <marcus@g10code.de>

- \* Makefile.am (noinst\_PROGRAMS): New target gpgme-tool.
- (gpgme\_tool\_LDADD): New variable.
- \* gpgme-tool.c: New file.
- \* ops.h (\_gpgme\_sig\_notation\_clearm \_gpgme\_signers\_clear): New prototypes.
- \* gpgme.c (gpgme\_set\_protocol): Allow GPGME\_PROTOCOL\_GPGCONF (when had that gone missing?).
- (\_gpgme\_sig\_notation\_clear): New function without debug output.
- (gpgme\_release): Call it and \_gpgme\_signers\_clear.
- \* signers.c (\_gpgme\_signers\_clear): New function without debug output.
- \* g13.c (gpgme\_op\_vfs\_mount): Add debug output.
- \* assuan-support.c (my\_spawn): Allow fd\_child\_list to be NULL.
- \* conversion.c (\_gpgme\_encode\_percent\_string): Fix infinite loop.
- \* debug.h: Put tag in front of debug lines, should make for nicer output.
- \* engine-assuan.c (lass\_new): Use our new system hooks for libassuan.
- \* engine-g13.c (g13\_new): Remove redundant assuan context allocation.
- \* version.c (gpgme\_check\_version\_internal): Delay debug output until after gpgme\_check\_version was called.

2009-10-28 Marcus Brinkmann <marcus@g10code.de>

- \* signers.c, encrypt-sign.c, encrypt.c, delete.c, keylist.c, edit.c, import.c, export.c: Fix last change in debug output.

2009-10-27 Marcus Brinkmann <marcus@g10code.de>

- \* edit.c (gpgme\_op\_edit\_start, gpgme\_op\_edit)
- (gpgme\_op\_card\_edit\_start, gpgme\_op\_card\_edit): Add debug output.
- \* encrypt-sign.c (gpgme\_op\_encrypt\_sign\_start)
- (gpgme\_op\_encrypt\_sign): Likewise.
- \* encrypt.c (gpgme\_op\_encrypt\_start,
- gpgme\_op\_encrypt)
- (gpgme\_op\_encrypt\_result): Likewise.
- \* export.c (gpgme\_op\_export\_start, gpgme\_op\_export)
- (gpgme\_op\_export\_ext\_start, gpgme\_op\_export\_ext)
- (gpgme\_op\_export\_keys\_start, gpgme\_op\_export\_keys): Likewise.
- \* genkey.c (gpgme\_op\_genkey\_start, gpgme\_op\_genkey)
- (gpgme\_op\_genkey\_result): Likewise.

- \* getauditlog.c (gpgme\_op\_getauditlog\_start)  
(gpgme\_op\_getauditlog): Likewise.
- \* import.c (gpgme\_op\_import\_result, gpgme\_op\_import\_start)  
(gpgme\_op\_import): Likewise.
- \* keylist.c (gpgme\_op\_keylist\_result, keylist\_colon\_handler)  
(gpgme\_op\_keylist\_start, gpgme\_op\_keylist\_ext\_start)  
(gpgme\_op\_keylist\_next, gpgme\_op\_keylist\_end, gpgme\_get\_key): Likewise.
- \* opassuan.c (gpgme\_op\_assuan\_transact\_start)  
(gpgme\_op\_assuan\_transact\_ext, gpgme\_op\_assuan\_result)  
(gpgme\_op\_assuan\_transact): Likewise.
- \* signers.c (gpgme\_signers\_add, gpgme\_signers\_clear): Likewise.
- \* trustlist.c (gpgme\_op\_trustlist\_start)  
(gpgme\_op\_trustlist\_next, gpgme\_op\_trustlist\_end): Likewise.
- \* verify.c (gpgme\_op\_verify\_start,  
gpgme\_op\_verify)  
(gpgme\_op\_verify\_result): Likewise.

2009-10-26 Marcus Brinkmann <marcus@g10code.de>

- \* gpgme.h.in (struct gpgme\_io\_event\_done\_data)  
(gpgme\_io\_event\_done\_data\_t): New types.
- (struct \_gpgme\_op\_assuan\_result): Deprecate the err member.
- (gpgme\_op\_assuan\_result): Deprecate (for now).
- (gpgme\_op\_assuan\_transact\_ext): New prototype.
- (gpgme\_op\_assuan\_transact): Deprecate.
- (struct \_gpgme\_op\_g13\_result): Replace with ...
- (struct \_gpgme\_op\_vfs\_mount\_result): ... this.
- (gpgme\_op\_g13\_mount): Replace with ...
- (gpgme\_op\_vfs\_mount): ... this.
- \* gpgme.def (gpgme\_op\_assuan\_transact\_ext, gpgme\_wait\_ext)  
(gpgme\_op\_vfs\_mount\_result, gpgme\_op\_vfs\_mount): New.
- (gpgme\_op\_g13\_mount): Remove.
- \* libgpgme.vers: Likewise.
- \* engine-backend.h (struct engine\_ops): Remove RESULT\_CB and  
RESULT\_CB\_VALUE args in opassuan\_transact member. Add CANCEL\_OP  
member.
- \* ops.h (\_gpgme\_cancel\_with\_err, \_gpgme\_wait\_on\_condition): Add  
OP\_ERR argument.
- (\_gpgme\_wait\_one\_ext):  
New prototype.
- \* context.h (ctx\_op\_data\_id\_t): Add OPDATA\_VFS\_MOUNT.
- \* engine-g13.c (g13\_cancel\_op): New function.
- (parse\_status): Remove declaration.
- (g13\_assuan\_simple\_command): Do nothing with status lines for now.
- (status\_handler): Update opaque value access.
- (\_gpgme\_engine\_ops\_g13): Add new cancel\_op member.
- \* gpgme.c (\_gpgme\_cancel\_with\_err): Add new parameter OP\_ERR.  
Handle operational errors.



(gpgme\_cancel, gpgme\_io\_read, gpgme\_io\_write): Add debug output.

- \* data.c (\_gpgme\_data\_inbound\_handler)
- (\_gpgme\_data\_outbound\_handler): Adjust opaque value access.
- \* engine-gpg.c (command\_handler, status\_handler)
- (colon\_line\_handler): Likewise.
- \* engine-gpgsm.c (status\_handler): Likewise.
- \* engine-gpg.c (\_gpgme\_engine\_ops\_gpg): Add cancel\_op member.
- \* engine-gpgsm.c (\_gpgme\_engine\_ops\_gpgsm): Likewise.
- \* g13.c: Rewritten (and will be rewritten again).
- \* engine.h (\_gpgme\_engine\_op\_assuan\_transact): Remove result\_cb and result\_cb\_value parameters from prototype.
- (\_gpgme\_engine\_cancel\_op):
- New prototype.
- \* engine.c (engine\_ops) [ENABLE\_ASSUAN]: Add missing comma.
- (\_gpgme\_engine\_op\_assuan\_transact): Remove result\_cb and result\_cb\_value parameter.
- (\_gpgme\_engine\_cancel\_op): New function.
- \* wait.h (\_gpgme\_run\_io\_cb): Add new argument OP\_ERR.
- (struct io\_cb\_data): New struct to pass opaque data and get a op\_err return value. Needed because we can't modify I/O callback handler signature because it is exposed to the user.
- \* wait.c (\_gpgme\_run\_io\_cb): Add OP\_ERR parameter. Handle operational errors.
- \* wait-user.c (\_gpgme\_user\_io\_cb\_handler): Handle operational errors.
- \* wait-private.c (\_gpgme\_wait\_on\_condition): New argument to retrieve the operational result. Handle operational errors in session based protocols.
- (\_gpgme\_wait\_one\_ext): New function.
- (\_gpgme\_wait\_one): Pass argument in invocation of \_gpgme\_wait\_on\_condition.
- \* wait-global.c (struct ctx\_list\_item): Add member OP\_ERR.
- (ctx\_done): New argument OP\_ERR.
- (ctx\_wait): New argument OP\_ERR.
- (gpgme\_wait\_ext): New function based on gpgme\_wait but handling operational errors.
- (gpgme\_wait): Implement in term of gpgme\_wait\_ext.
- \* keylist.c (gpgme\_op\_keylist\_next): Pass argument in invocation of \_gpgme\_wait\_on\_condition.
- \* trustlist.c (gpgme\_op\_trustlist\_next): Pass argument in invocation of \_gpgme\_wait\_on\_condition.
- \* engine-assuan.c (struct engine\_llass): Replace members RESULT\_CB and RESULT\_CB\_VALUE by LAST\_OP\_ERR.
- (\_gpgme\_engine\_assuan\_last\_op\_err): Add this hack function.
- (llass\_cancel\_op): New function.
- (\_gpgme\_engine\_llass\_ops): Add cancel\_op member.
- (llass\_status\_handler): Update opaque value access.

(llass\_transact): Remove RESULT\_CB and RESULT\_CB\_VALUE arguments.

\* opassuan.c: Move compat hacks to the end of file.

(opassuan\_start): Do not set OPD->result.err.

Do not pass RESULT\_Cb and CTX to \_gpgme\_engine\_op\_assuan\_transact.

(gpgme\_op\_assuan\_transact\_ext): New function.

\* debug.h (DEBUG\_GLOBAL): New debug level.

\* conversion.c (gnupg\_errors,  
\_gpgme\_map\_gnupg\_error): Removed.

\* data-user.c (gpgme\_data\_new\_from\_cbs): Add debug output.

\* data-fd.c (gpgme\_data\_new\_from\_fd): Likewise.

\* data-stream.c (gpgme\_data\_new\_from\_stream): Likewise.

\* decrypt.c (gpgme\_op\_decrypt\_result, gpgme\_op\_decrypt\_start)  
(gpgme\_op\_decrypt): Likewise.

\* delete.c (gpgme\_op\_delete\_start, gpgme\_op\_delete): Likewise.

\* decrypt-verify.c (gpgme\_op\_decrypt\_verify\_start)  
(gpgme\_op\_decrypt\_verify): Likewise.

\* sign.c (gpgme\_op\_sign\_result): Fix debug message.

\* data-mem.c (gpgme\_data\_new): Improve debug output.

\* verify.c (parse\_trust): Use atoi instead of  
\_gpgme\_map\_gnupg\_error.

\* decrypt.c (\_gpgme\_decrypt\_status\_handler): Likewise.

2009-10-22 Marcus Brinkmann <marcus@g10code.de>

\* Makefile.am: Remove @NETLIBS@ from LIBADDs.

(g13\_components): New variable.

(main\_sources): Add \$(g13\_components).

\* g13.c, engine-g13.c: New files.

\* engine.c (engine\_ops): Check for assuan for assuan engine, add  
g13 engine.

\* util.h (\_gpgme\_get\_g13\_path,  
\_gpgme\_encode\_percent\_string): New  
prototypes.

\* conversion.c (\_gpgme\_encode\_percent\_string): New function.

\* gpgme.h.in (gpgme\_protocol\_t): Add GPGME\_PROTOCOL\_G13.

(struct \_gpgme\_op\_g13\_result, gpgme\_g13\_result\_t): New types.

(gpgme\_op\_g13\_mount): New function.

\* gpgme.def, libgpgme.vers: Add gpgme\_op\_g13\_mount.

\* gpgme.c (gpgme\_set\_protocol): Allow GPGME\_PROTOCOL\_G13.

(gpgme\_get\_protocol\_name): Add GPGME\_PROTOCOL\_G13.

\* posix-util.c (\_gpgme\_get\_g13\_path): New function.

\* w32-util.c (\_gpgme\_get\_g13\_path): New function.

\* engine-backend.h (\_gpgme\_engine\_ops\_g13): New declaration.

2009-10-20 Marcus Brinkmann <marcus@g10code.de>

\* gpgme-config.in (netlibs): Remove.

(assuan\_cflags, assuan\_libs): Add.

\* Makefile.am (assuan\_cppflags, assuan\_libobjs): Removed.

(gpgsm\_components): Move engine-assuan.c to ...

(assuan\_components): ... this new variable.

(main\_sources): Add this new variable.

(AM\_CPPFLAGS): Remove \$(assuan\_cppflags).

(AM\_CFLAGS): Add @LIBASSUAN\_CFLAGS@.

(libgpgme\_la\_DEPENDENCIES,

libgpgme\_pth\_la\_DEPENDENCIES)

(libgpgme\_glib\_la\_DEPENDENCIES, libgpgme\_qt\_la\_DEPENDENCIES)

(libgpgme\_pthread\_la\_DEPENDENCIES): Remove \$(assuan\_libobjs).

(libgpgme\_la\_LIBADD, libgpgme\_pth\_la\_LIBADD)

(libgpgme\_glib\_la\_LIBADD, libgpgme\_qt\_la\_LIBADD))

(libgpgme\_pthread\_la\_LIBADD): Replace \$(assuan\_libobjs) by

@LIBASSUAN\_LIBS@.

\* priv-io.h [HAVE\_W32\_SYSTEM]: Declare \_gpgme\_io\_recvmsg,

\_gpgme\_io\_sendmsg, \_gpgme\_io\_waitpid.

\* engine-backend.h: Define with [ENABLE\_ASSUAN] instead  
of [ENABLE\_GPGSM].

\* posix-io.c (\_gpgme\_io\_waitpid): Make non-static.

\* util.h (ENABLE\_ASSUAN): Declare \_gpgme\_assuan\_system\_hooks,  
\_gpgme\_assuan\_malloc\_hooks, \_gpgme\_assuan\_log\_cb.

\* engine-gpgsm.c: Don't map assuan error codes. Use

assuan\_release instead of assuan\_disconnect.

(map\_assuan\_error): Remove function.

(gpgsm\_new): Use new assuan context interface.

\* engine-assuan.c: Use assuan\_release instead of  
assuan\_disconnect.

(llass\_new): Use new assuan context  
interface.

2009-10-07 <wk@g10code.com>

\* priv-io.h [W32]: Include windows.h instead of sys/socket.h.

2009-08-06 Werner Koch <wk@g10code.com>

\* op-support.c (\_gpgme\_parse\_inv\_recp): Allow for no fingerprint.

\* engine-gpgsm.c (gpgsm\_sign): Hook up the status func for the  
SIGNER command.

\* gpgme.h.in (GPGME\_STATUS\_INV\_SGMR, GPGME\_STATUS\_NO\_SGMR): New.

\* sign.c (op\_data\_t): Add fields IGNORE\_INV\_RECP and INV\_SGMR\_SEEN.

(\_gpgme\_op\_sign\_init\_result): Factor code out to ...

(sign\_init\_result): .. new. Init new fields.

(sign\_start): Use sign\_init\_result.

(\_gpgme\_sign\_status\_handler): Take care of the new INV\_SGMR.

Return an error if no signature has been created.

2009-07-07 Werner Koch <wk@g10code.com>

\* engine-gpgsm.c (struct engine\_gpgsm): Add fields  
input\_helper\_data and input\_helper\_memory.  
(close\_notify\_handler): Release these new fields.  
(gpgsm\_import): Implement the keyarray feature.

\* engine-gpg.c (gpg\_import): Actually return GPG\_ERR\_INV\_VALUE.

\*

engine-gpgsm.c (gpgsm\_import): Return an error for unknown data  
encodings.

2009-06-22 Marcus Brinkmann <marcus@g10code.de>

\* debug.h: Everywhere, use %p instead of 0x%x to print pointer.  
[HAVE\_STDINT\_H]: Include <stdint.h>.  
(\_TRACE, TRACE, TRACE0, TRACE1, TRACE2, TRACE3, TRACE6): Cast tag  
to (uintptr\_t) before casting it to (void\*) to silence GCC  
warning.

\* gpgme.h.in (\_GPGME\_DEPRECATED\_OUTSIDE\_GPGME): New macro.

\* sign.c (\_GPGME\_IN\_GPGME): Define it.

\* keylist.c (\_GPGME\_IN\_GPGME): Define it.

\* debug.c (\_gpgme\_debug\_begin, \_gpgme\_debug\_add): Handle error in  
vasprintf and asprintf.

\* priv-io.h: Include <sys/socket.h>. Declare \_gpgme\_io\_connect.

2009-06-18 Marcus Brinkmann <marcus@g10code.de>

\* gpgme.h.in (GPGME\_CONF\_PATHNAME): Revert last change, it's  
back! (GPA still uses it...).

\* gpgme.def: Fix stupid typo.

\* w32-io.c (\_gpgme\_io\_pipe): Add missing declaration.

\* gpgme.h.in (GPGME\_CONF\_PATHNAME): Remove obsolete macro.

\* w32-io.c (\_gpgme\_io\_pipe): Allocate  
reader/writer thread right  
away.  
(\_gpgme\_io\_read, \_gpgme\_io\_write, \_gpgme\_io\_select)  
(\_gpgme\_io\_dup): Never allocate threads here.  
(find\_writer, find\_reader): Check return value of thread creation

function.

- \* context.h (CTX\_OP\_DATA\_MAGIC): New macro.
- (struct ctx\_op\_data): New member MAGIC.
- \* op-support.c (\_gpgme\_op\_data\_lookup): Initialize magic.
- \* gpgme.c (gpgme\_result\_unref, gpgme\_result\_ref): Check magic.

2009-06-16 Marcus Brinkmann <marcus@g10code.de>

- \* gpgme.c (gpgme\_result\_unref): Hot fix to release a lock.
- \* gpgme.c (result\_ref\_lock): New global variable.
- (gpgme\_result\_ref, gpgme\_result\_unref): use it.

2009-06-16 Werner Koch <wk@g10code.com>

- \* version.c: Include stdlib.h.
- \* gpgme.h.in (gpgme\_data\_encoding\_t): Add GPGME\_DATA\_ENCODING\_URL, GPGME\_DATA\_ENCODING URLESC, GPGME\_DATA\_ENCODING\_URL0.
- \* data.c (gpgme\_data\_set\_encoding): Adjust for new values.
- \* engine-gpg.c (string\_from\_data): New.
- (gpg\_import): Implement --fetch-key feature.
- \* gpgme.h.in
- (gpgme\_op\_export\_keys\_start, gpgme\_op\_export\_keys): New.
- \* gpgme.def, libgpgme.vers: Add them.
- \* export.c (gpgme\_op\_export\_keys\_start, gpgme\_op\_export\_keys): New.
- (export\_keys\_start): New.
- \* gpgme.h.in (gpgme\_export\_mode\_t, GPGME\_EXPORT\_MODE\_EXTERN): New.
- (gpgme\_op\_export\_start, gpgme\_op\_export, gpgme\_op\_export\_ext\_start)
- (gpgme\_op\_export\_ext): Change arg RESERVED to MODE of new compatible type.
- \* export.c (gpgme\_export\_ext\_start, gpgme\_op\_export)
- (gpgme\_op\_export\_ext\_start, gpgme\_op\_export\_ext): Ditto.
- (export\_start): Ditto.
- \* engine.c (\_gpgme\_engine\_op\_export): Ditto.
- \* engine-backend.h (struct engine\_ops): Ditto.
- \* engine-gpgsm.c (gpgsm\_export, gpgsm\_export\_ext): Ditto.
- \* engine-gpg.c (gpg\_export, gpg\_export\_ext): Ditto. Implement mode EXTERN.
- (gpg\_export, gpg\_export\_ext): Factor common code out to ..
- (export\_common): .. this.
- \* gpgme.h.in (gpgme\_op\_import\_keys\_start, gpgme\_op\_import\_keys): New.
- \* gpgme.def, libgpgme.vers: Add them.
- \* import.c (gpgme\_op\_import\_keys\_start,

gpgme\_op\_import\_keys): New.  
(\_gpgme\_op\_import\_keys\_start): New.  
\* engine.c (\_gpgme\_engine\_op\_import): Add arg KEYARRAY.  
\* engine-backend.h (struct engine\_ops): Ditto.  
\* engine-gpgsm.c (gpgsm\_import): Ditto. Not functional.  
\* engine-gpg.c (gpg\_import): Ditto. Implement it.

2009-06-15 Marcus Brinkmann <marcus@g10code.de>

\* gpgme.h.in (gpgme\_result\_ref, gpgme\_result\_unref): Add prototypes.  
\* gpgme.def, libgpgme.vers (gpgme\_result\_ref, gpgme\_result\_unref): Add these.  
\* context.h (struct ctx\_op\_data): Add member "references".  
\* gpgme.c (gpgme\_result\_ref, gpgme\_result\_unref): New functions. (\_gpgme\_release\_result): Use gpgme\_result\_unref.  
\* op-support.c (\_gpgme\_op\_data\_lookup): Initialize references.

2009-06-12 Werner Koch <wk@g10code.com>

\* gpgme-w32spawn.c (translate\_get\_from\_file): Parse optional spawn flags. Add new arg R\_FLAGS. Fix segv on file w/o LF.  
(translate\_handles): Add new arg R\_FLAGS. Avoid possible segv.  
(main): Pass flags for my\_spawn.  
(my\_spawn):  
Add arg FLAGS and implement AllowSetForegroundWindow.

\* priv-io.h (IOSPAWN\_FLAG\_ALLOW\_SET\_FG): New.  
\* w32-io.c (\_gpgme\_io\_spawn): Add arg FLAGS and implement it.  
\* w32-glib-io.c (\_gpgme\_io\_spawn): Ditto.  
\* w32-qt-io.cpp (\_gpgme\_io\_spawn): Ditto.  
\* posix-io.c (\_gpgme\_io\_spawn): Add dummy arg FLAGS.  
\* engine-gpg.c (start): Call spawn with new flag.

\* w32-util.c (\_gpgme\_allow\_set\_foreground\_window): Rename to \_gpgme\_allow\_set\_foreground\_window. Change all callers.  
\* posix-util.c (\_gpgme\_allow\_set\_foreground\_window): Ditto.

2009-06-10 Werner Koch <wk@g10code.com>

\* w32-util.c (\_gpgme\_allow\_set\_foreground\_window): Add trace support.

2009-06-09 Werner Koch <wk@g10code.com>

\* engine-gpg.c (gpg\_io\_event): Test for cmd.fd.  
\* version.c (gpgme\_check\_version\_internal): Make result const.

\* gpgme.c: Include priv-io.h.  
(gpgme\_io\_read, gpgme\_io\_write): New.  
\* libgpgme.vers (GPGME\_1.1): Add them.  
\* gpgme.def: Ditto.

\* Makefile.am (main\_sources): Remove gpgme.h.  
(include\_HEADERS):  
Rename to nodist\_include\_HEADERS so that a  
VPATH build won't use the distributed one.

\* util.h (GPG\_ERR\_NOT\_OPERATIONAL): Define.

2009-05-28 Marcus Brinkmann <marcus@g10code.de>

\* gpgme.h.in (gpgme\_check\_version\_internal): New prototype.  
(gpgme\_check\_version): New macro, overriding function of the same  
name.  
\* libgpgme.vers, gpgme.def: Add gpgme\_check\_version\_internal.o  
\* context.h (\_gpgme\_selftest): New variable declaration.  
\* version.c: Include "context.h".  
(gpgme\_check\_version): Set \_gpgme\_selftest on success.  
(gpgme\_check\_version\_internal): New function.  
\* gpgme.c (\_gpgme\_selftest): Define it.  
(gpgme\_new): Check the selftest result.

2009-05-18 Marcus Brinkmann <marcus@g10code.de>

\* gpgme.h.in (gpgme\_encrypt\_flags\_t): Add  
GPGME\_ENCRYPT\_NO\_ENCRYPT\_TO.  
\* engine-gpg.c (gpg\_encrypt): Pass --no-encrypt-to to gpg if  
GPGME\_ENCRYPT\_NO\_ENCRYPT\_TO flag is set.

2009-05-14 Werner Koch <wk@g10code.com>

\* gpgme.h.in (gpgme\_status\_code\_t):  
Explicitly initialize for  
better maintainability and to help debugging.

2009-05-05 Marcus Brinkmann <marcus@g10code.de>

\* gpgme.h.in: Add compile time check for \_FILE\_OFFSET\_BITS.

2009-04-15 Marcus Brinkmann <marcus@g10code.de>

\* posix-io.c (\_gpgme\_io\_socket, \_gpgme\_io\_connect): New functions.  
\* w32-io.c (\_gpgme\_io\_connect): Fix stupid error.

2009-04-08 Marcus Brinkmann <marcus@g10code.de>

- \* w32-glib-io.c (giochannel\_table): New members used, fd, socket.
- (find\_channel): Drop CREATE argument.
- (new\_dummy\_channel\_from\_fd, new\_channel\_from\_fd)
- (new\_channel\_from\_socket): New functions.
- (\_gpgm\_io\_fd2str): Implement for sockets.
- (\_gpgme\_io\_write, \_gpgme\_io\_read): Translate EAGAIN errors correctly.
- (\_gpgme\_io\_pipe): Fix for new channel bookkeeping.
- (\_gpgme\_io\_close, \_gpgme\_io\_dup): Likewise.
- (wsa2errno, \_gpgme\_io\_socket, \_gpgme\_io\_connect): New.
- \* w32-io.c (MAX\_READERS, MAX\_WRITERS): Bump up to 40.
- (wsa2errno, \_gpgme\_io\_socket, \_gpgme\_io\_connect): New.
- \* w32-qt-io.cpp
- (\_gpgme\_io\_socket, \_gpgme\_io\_connect): New stubs.
- \* version.c [HAVE\_W32\_SYSTEM]: Include "windows.h.
- (do\_subsystem\_inits) [HAVE\_W32\_SYSTEM]: Call WSASStartup.
- \* engine-assuan.c (lass\_status\_handler): Ignore EAGAIN errors.

2009-03-18 Werner Koch <wk@g10code.com>

- \* gpgme.h.in (GPGME\_KEYLIST\_MODE\_EPHEMERAL): New.
- \* engine-gpgsm.c (gpgsm\_keylist): Send new option.

2009-03-13 Werner Koch <wk@g10code.com>

- \* gpgme-config.in: Make sure locale is set to C.

2009-02-24 Werner Koch <wk@g10code.com>

- \* gpgme.h.in (struct \_gpgme\_op\_assuan\_result): New.
- (gpgme\_assuan\_result\_t): New.
- (gpgme\_op\_assuan\_result): Change return type.
- (struct \_gpgme\_assuan\_sendfnc\_ctx)
- (gpgme\_assuan\_sendfnc\_ctx\_t, gpgme\_assuan\_sendfnc\_t): Remove.
- (gpgme\_assuan\_inquire\_cb\_t): Changed.
- \* opassuan.c (op\_data\_t): Make use of a result structure.
- (gpgme\_op\_assuan\_result): Change return type.
- (opassuan\_start): Use result structure.
- (result\_cb): Ditto.
- \* engine-assuan.c (struct \_gpgme\_assuan\_sendfnc\_ctx):
- Remove.
- (inquire\_cb\_sendfnc): Remove.
- (inquire\_cb): Change for new callback scheme. Not yet finished.
- (lass\_status\_handler): Allow sending a CANCEL from the inquire CB.

2009-02-04 Werner Koch <wk@g10code.com>



- \* w32-glib-io.c (\_gpgme\_io\_spawn): Make ARGV argument const to match prototype.
- \* w32-qt-io.cpp (\_gpgme\_io\_spawn): Ditto.

2009-02-03 Werner Koch <wk@g10code.com>

- \* gpgme.h.in (struct \_gpgme\_subkey): Add fields IS\_CARDKEY and CARD\_NUMBER..
- \* key.c (gpgme\_key\_unref): Release field CARD\_NUMBER.
- \* keylist.c (keylist\_colon\_handler): Factor common code out to ... (parse\_sec\_field15): New. Set card number.

2009-01-26 Werner Koch <wk@g10code.com>

- \* opassuan.c, dirinfo.c, engine-assuan.c: New.
- \* Makefile.am: Add them.
- \* engine-backend.h: Add \_gpgme\_engine\_ops\_assuan. (struct engine\_ops): Add field OPASSUAN\_TRANSACT. Update all engine initializers.
- \* Makefile.am (gpgsm\_components): Add engine-assuan.c.
- \* gpgme.h.in (gpgme\_protocol\_t): Add GPGME\_PROTOCOL\_ASSUAN. (gpgme\_assuan\_data\_cb\_t, gpgme\_assuan\_sendfnc\_ctx\_t) (gpgme\_assuan\_inquire\_cb\_t, gpgme\_assuan\_status\_cb\_t): New. (gpgme\_op\_assuan\_transact\_start, gpgme\_op\_assuan\_transact): New.
- \* gpgme.c (gpgme\_get\_protocol\_name): Ditto. (gpgme\_set\_protocol): Support it.
- \* engine.c (gpgme\_get\_engine\_info): Ditto. (engine\_ops): Register it. (\_gpgme\_engine\_op\_assuan\_transact): New.
- \* libgpgme.vers (gpgme\_op\_assuan\_transact\_start) (gpgme\_op\_assuan\_transact): New.
- \* gpgme.def (gpgme\_op\_assuan\_transact\_start) (gpgme\_op\_assuan\_transact): New.
- \* engine-backend.h (struct engine\_ops): Add GET\_HOME\_DIR and initialize to NULL for all engines.
- \* engine.c (engine\_get\_home\_dir): New. (gpgme\_get\_engine\_info): Use it. (\_gpgme\_set\_engine\_info): Use it.
- \* engine.h (engine\_assuan\_result\_cb\_t): New.
- \* context.h (ctx\_op\_data\_id\_t): Add OPDATA\_ASSUAN.
- \* util.h (GPG\_ERR\_UNFINISHED): Define if not yet defined.
- \* version.c (gpgme\_check\_version): Protect trace arg against NULL.

2009-01-19 Werner

Koch <wk@g10code.com>

- \* `runpgg.c`: Rename to `engine-gpg.c`
- \* `Makefile.am` (`main_sources`): Ditto.

2008-12-03 Marcus Brinkmann <marcus@g10code.de>

- \* `Makefile.am` (`status-table.h`): Use `$(builddir)` to find `gpgme.h`.

2008-11-18 Werner Koch <wk@g10code.com>

- \* `version.c` (`do_subsystem_inits`): Always initialize I/O subsystem. Fixes regression from 2007-08-02.
- \* `decrypt.c` (`_gpgme_decrypt_status_handler`): Use `_gpgme_map_gnupg_error` to parse the error code for `decrypt.algorithm`.

2008-10-30 Marcus Brinkmann <marcus@g10code.de>

- \* `wait-private.c` (`_gpgme_wait_on_condition`): Remove unused variable `IDX`.
- \* `wait-global.c`: Include `ops.h` to silence gcc warning.  
(`_gpgme_wait_global_event_cb`): Pass error value directly.
- \* `wait-user.c`: Include `ops.h` to silence gcc warning.
- \* `posix-io.c` (`_gpgme_io_spawn`): Make `ARGV` argument `const` to silence gcc warning. Cast argument to `execv` to silence warning.
- \* `w32-io.c` (`_gpgme_io_spawn`): Likewise.
- \* `priv-io.h` (`_gpgme_io_spawn`): Likewise for prototype.

2008-10-24 Werner Koch <wk@g10code.com>

- \* `runpgg.c` (`gpg_keylist_preprocess`): Escape backslashes too.

2008-10-23 Marcus Brinkmann <marcus@g10code.de>

- \* `runpgg.c` (`gpg_keylist_preprocess`): Convert percent escaped string to C coded string.

2008-10-20 Werner Koch <wk@g10code.com>

- \* `Makefile.am` (`EXTRA_DIST`): Add `gpgme.h.in`.
- \* `gpgme.h`: Rename to `gpgme.h.in`.
- \* `gpgme.h.in` (`GPGME_VERSION`): Use `autoconf` substitution.
- \* `posix-io.c`: Include `sys/uio.h`. Fixes bug #818.

2008-10-18 Marcus Brinkmann <marcus@g10code.com>

\* w32-util.c (find\_program\_in\_registry): Don't define.  
(\_gpgme\_get\_gpg\_path, \_gpgme\_get\_gpgsm\_path)  
(\_gpgme\_get\_gpgconf\_path): Do not check for fooProgram in the  
registry anymore. It is now no longer possible to overwrite the  
default location in that way.

2008-10-17 Werner Koch <wk@g10code.com>

\* w32-glib-io.c (\_gpgme\_io\_fd2str): Use "%d" and not "%ld" to work  
around a bug in mingw32.

2008-09-23 Marcus Brinkmann <marcus@g10code.com>

\*  
gpgme.c (gpgme\_sig\_notation\_clear): Clear CTX->sig\_notations.  
Submitted by "Daniel Mueller" <daniel@danm.de>

2008-09-16 Marcus Brinkmann <marcus@g10code.com>

\* runpgg.c (gpg\_new): Don't use errno with ttyname\_r.

2008-08-11 Marcus Brinkmann <marcus@g10code.com>

\* runpgg.c (gpg\_cancel): Remove cmd fd before status fd.  
\* gpgme.c (\_gpgme\_cancel\_with\_err): New function.  
(gpgme\_cancel): Reimplement in terms of \_gpgme\_cancel\_with\_err.  
\* wait-private.c (\_gpgme\_wait\_on\_condition): Use  
\_gpgme\_cancel\_with\_err.  
\* wait-user.c (\_gpgme\_user\_io\_cb\_handler): Likewise.  
\* wait-global.c (\_gpgme\_wait\_global\_event\_cb, gpgme\_wait): Likewise.

2008-08-08 Marcus Brinkmann <marcus@g10code.com>

\* runpgg.c (command\_handler): Remove I/O callback on error, too.

2008-06-29 Marcus Brinkmann <marcus@g10code.com>

\* gpgme.c (gpgme\_cancel\_async): Remove unused variable.

2008-06-27 Marcus Brinkmann <marcus@g10code.de>

\* libgpgme.vers: Add gpgme\_cancel\_async.  
\* gpgme.def: Likewise.

\* context.h:

Include "sema.h".

(struct gpgme\_context): New members lock and canceled.

\* gpgme.c (gpgme\_new): Initialize lock.

(gpgme\_release): Destroy lock.

(gpgme\_cancel\_async): New function.

\* op-support.c (\_gpgme\_op\_reset): Reset the canceled flag.

\* wait-global.c (gpgme\_wait): Check cancel flag before processing any I/O callbacks.

\* wait-private.c (\_gpgme\_wait\_on\_condition): Likewise.

\* wait-user.c (\_gpgme\_user\_io\_cb\_handler): Likewise.

2008-06-26 Werner Koch <wk@g10code.com>

\* w32-util.c (\_gpgme\_mkstemp): Replace sprint by stpcpy.

(mkstemp): Need to use GetSystemTimeAsFileTime for better compatibility.

2008-06-25 Marcus Brinkmann <marcus@g10code.de>

\* gpgme-w32spawn.c: New file.

\* Makefile.am (libexec\_PROGRAMS) [HAVE\_W32\_SYSTEM]: New variable with gpgme-w32spawn.

\* engine-gpgsm.c (gpgsm\_new): Use server translated handles.

(gpgsm\_set\_locale): Return early if locale value is NULL.

\* util.h (\_gpgme\_mkstemp)

(\_gpgme\_get\_w32spawn\_path) [HAVE\_W32\_SYSTEM]: New function prototypes.

\*

w32-util.c: Include <stdint.h>, <sys/stat.h> and <unistd.h>.

(letters, mkstemp, \_gpgme\_mkstemp, \_gpgme\_get\_w32spawn\_path): New functions.

\* runpg.c (gpg\_decrypt, gpg\_encrypt, gpg\_encrypt\_sign)

(gpg\_genkey, gpg\_import, gpg\_verify, gpg\_sign): Pass data over special filename FD rather than stdin.

(struct arg\_and\_data\_s): Add member ARG\_LOCP.

(struct fd\_data\_map\_s): Add member ARG\_LOC.

(struct engine\_gpg): Add member ARG\_LOC to status and colon.

(\_add\_arg, add\_arg\_with\_locp): New function.

(add\_arg\_ext): Reimplement in terms of \_add\_arg.

(gpg\_new): Remember argument location for status FD.

(build\_argv): Set argument location if requested. Also set argument location of fd\_data\_map for data items.

(start): Adjust caller of \_gpgme\_io\_spawn.

\* priv-io.h (struct spawn\_fd\_item\_s): Add members peer\_name and arg\_loc.

(\_gpgme\_io\_spawn): Remove parent fd list argument.

\* posix-io.c (get\_max\_fds): New function.

(\_gpgme\_io\_dup): Add tracing.

(\_gpgme\_io\_spawn):

Remove parent fd list. Change meaning of child fd list to contain all child fds that should be inherited. Close all other file descriptors after fork.

\* w32-io.c, w32-glib-io.c, w32-qt-io.c(\_gpgme\_io\_spawn): Remove parent fd list. Change meaning of child fd list to contain all child fds that should be inherited. Do not inherit any file descriptors, but DuplicateHandle them. Spawn process through wrapper process. Provide wrapper process with a temporary file containing handle translation data. Return translated handle names.

\* w32-io.c (reader): Add more tracing output.

(\_gpgme\_io\_read): Likewise.

\* engine-gpgconf.c (gpgconf\_read): Adjust caller of \_gpgme\_io\_spawn.

\* version.c (\_gpgme\_get\_program\_version): Likewise.

2008-06-20 Werner Koch <wk@g10code.com>

\* engine-gpgconf.c (gpgconf\_read): Change ARGV initialization for compatibility with old compilers. Fix amount of memmove. Fix CR removal.

2008-06-19 Werner Koch <wk@g10code.com>

\* gpgme.h (GPGME\_CONF\_PATHNAME):

Replace by GPGME\_CONF\_FILENAME, change all callers and provide compatibility macro.

(gpgme\_conf\_type\_t): Add complex types 34..37.

\* engine-gpgconf.c (gpgconf\_parse\_option, arg\_to\_data)

(\_gpgme\_conf\_arg\_new, \_gpgme\_conf\_arg\_release): Add new types.

2008-06-19 Marcus Brinkmann <marcus@g10code.de>

\* engine-gpgconf.c (gpgconf\_parse\_option): Fix comma detection.

2008-05-09 Werner Koch <wk@g10code.com>

\* engine-gpgconf.c (gpgconf\_read): Do not pass empty lines to the callback.

2008-05-07 Werner Koch <wk@g10code.com>

\* engine-gpgconf.c (gpgconf\_write): Change argv[0] to a self-explaining string. Needs a proper fix, though.

\* runpgg.c (gpg\_keylist, gpg\_keylist\_ext): Factor common code out to ..

(gpg\_build\_keylist\_options): .. new. Allow combination of extern and intern mode.  
(gpg\_new): DFT\_TTYNAME is an array, thus check the first character.

2008-05-06 Werner Koch <wk@g10code.com>

\* version.c (extract\_version\_string): New.  
(\_gpgme\_get\_program\_version):  
Use it to allow for suffixes in the  
version line.

2008-04-28 Werner Koch <wk@g10code.com>

\* engine-gpgconf.c (gpgconf\_read): Fixed segv. Avoid memmove for each line.

2008-04-22 Marcus Brinkmann <marcus@g10code.de>

\* w32-qt-io.cpp, kdpipelineio.cpp: New versions from Frank Osterfeld, implement blocking select.

2008-03-11 Marcus Brinkmann <marcus@g10code.de>

\* data.c (gpgme\_data\_read, gpgme\_data\_write): Retry on EINTR.

2008-03-06 Marcus Brinkmann <marcus@g10code.de>

\* key.c (\_gpgme\_key\_add\_sig): Terminate UID in case SRC is NULL.  
Reported by Marc Mutz.

2008-03-05 Marcus Brinkmann <marcus@g10code.de>

\* decrypt.c (release\_op\_data): Release OPD->result.recipients.  
\* encrypt.c (release\_op\_data): Release invalid\_recipient.

2008-02-15 Marcus Brinkmann <marcus@g10code.de>

\* engine-gpgconf.c (gpgconf\_read): Fix end-of-line handline.

2008-02-14 Werner Koch <wk@g10code.com>

\* w32-io.c (\_gpgme\_io\_spawn): Add arg R\_PID to return the pid.  
\* posix-io.c  
(\_gpgme\_io\_spawn): Ditto.  
\* w32-glib-io.c (\_gpgme\_io\_spawn): Ditto.  
\* w32-qt-io.cpp (\_gpgme\_io\_spawn): Ditto.  
\* priv-io.h (\_gpgme\_io\_spawn): Adjust prototyp and change all callers.  
\* runpgg.c (start): Call \_gpgme\_allow\_set\_foreground\_window.

\* w32-util.c (\_gpgme\_allow\_set\_foreground\_window): New.  
\* posix-util.c (\_gpgme\_allow\_set\_foreground\_window): New.  
\* engine-gpgsm.c (default\_inq\_cb): New.  
(gpgsm\_new) [W32]: Enable pinentry notifications.  
(status\_handler): Handle inquiries.

2008-01-30 Marcus Brinkmann <marcus@g10code.de>

\* kdpipelinedevice.cpp: New version by Frank Osterfeld, fixes race condition.

2008-01-28 Marcus Brinkmann <marcus@g10code.de>

\* engine-gpgsm.c (map\_input\_enc): Rename to ...  
(map\_data\_enc): ... this. Also change all callers.  
(gpgsm\_encrypt, gpgsm\_export, gpgsm\_export\_ext, gpgsm\_genkey)  
(gpgsm\_sign): Set encoding for output.

2008-01-28 Werner Koch <wk@g10code.com>

\* keylist.c (gpgme\_get\_key): Skip duplicated keys. Fixes bug 876.

2008-01-14

Marcus Brinkmann <marcus@g10code.de>

\* engine-gpgconf.c (gpgconf\_config\_load\_cb): Fix program\_name field.

2008-01-10 Marcus Brinkmann <marcus@g10code.de>

\* kdpipelinedevice.cpp: New version from Frank Osterfeld.

\* engine-gpgconf.c (gpgconf\_config\_load\_cb2): Handle the flag NO\_ARG\_DESC.

2008-01-04 Marcus Brinkmann <marcus@g10code.de>

\* Makefile.am (gpgconf\_components): New variable.  
(main\_sources): Add gpgconf.c.  
\* gpgme.h (gpgme\_protocol\_t): New protocol GPGME\_PROTOCOL\_GPGCONF.  
(gpgme\_conf\_level\_t, gpgme\_conf\_type\_t, gpgme\_conf\_arg\_t)  
(gpgme\_conf\_opt\_t, gpgme\_conf\_comp\_t, gpgme\_conf\_arg\_new)  
(gpgme\_conf\_arg\_release, gpgme\_conf\_opt\_change)  
(gpgme\_conf\_release, gpgme\_op\_conf\_load, gpgme\_op\_conf\_save): New types.  
\* gpgconf.c, engine-gpgconf.c: New files.  
\* engine.h: (\_gpgme\_engine\_op\_conf\_load,

(\_gpgme\_engine\_op\_conf\_save): New prototypes.  
 \* op-support.c (\_gpgme\_op\_reset): Ignore not implemented locale function.  
 \* posix-util.c (\_gpgme\_get\_gpgconf\_path): New function.  
 \* w32-util.c (\_gpgme\_get\_gpgconf\_path): New function.  
 \* engine-gpgsm.c:  
 (\_gpgme\_engine\_ops\_gpgsm): Add stubs for conf\_load and conf\_save.  
 \* runpgg.c:  
 (\_gpgme\_engine\_ops\_gpg): Add stubs for conf\_load and conf\_save.  
 \* gpgme.def: Add new gpgconf related interfaces.  
 \* libgpgme.vers: Likewise.  
 \* util.h (\_gpgme\_get\_gpgconf\_path): New prototype.  
 \* gpgme.h (gpgme\_protocol\_t): Add GPGME\_PROTOCOL\_GPGCONF.  
 \* engine-backend.h (\_gpgme\_engine\_ops\_gpgconf): New prototype.  
 (struct engine\_ops): Add members for conf\_load and conf\_save.  
 \* engine.c (engine\_ops): Add \_gpgme\_engine\_ops\_gpgconf.  
 (\_gpgme\_engine\_op\_conf\_load,  
 \_gpgme\_engine\_op\_conf\_save): New functions.  
 (gpgme\_get\_engine\_info): Allow protocol GPGME\_PROTOCOL\_GPGCONF.

2007-11-28 Marcus Brinkmann <marcus@g10code.de>

\* w32-util.c (\_gpgme\_get\_gpg\_path, \_gpgme\_get\_gpgsm\_path): Search for installation directory. Remove old fallback default.  
 (find\_program\_in\_inst\_dir): New function.

2007-11-26 Werner Koch <wk@g10code.com>

\*  
 engine-gpgsm.c (struct engine\_gpgsm): Add field INLINE\_DATA and always reset it before calling start.  
 (gpgsm\_new): Clear it.  
 (status\_handler): Implement it.  
 (gpgsm\_getauditlog) [USE\_DESCRIPTOR\_PASSING]: Use INLINE\_DATA.

2007-11-23 Werner Koch <wk@g10code.com>

\* op-support.c (\_gpgme\_op\_reset): Implement a no-reset flag.  
 \* getauditlog.c (getauditlog\_start): Use that flag.

2007-11-20 Werner Koch <wk@g10code.com>

\* op-support.c (\_gpgme\_parse\_inv\_recv): Add new reason code 11.

2007-11-22 Werner Koch <wk@g10code.com>

\* gpgme.h (gpgme\_op\_getauditlog\_start, gpgme\_op\_getauditlog): New.



- \* libpgpme.vers: Ditto.
- \* pgpme.def: Ditto.
- \* getauditlog.c: New.
- \* engine-backend.h (struct engine\_ops): Add member GETAUDITLOG.
- \* engine-gpgsm.c (gpgsm\_getauditlog): New.
- (\_pgpme\_engine\_ops\_gpgsm): Insert new function.
- (gpgsm\_new): Try to enable audit log support.
- \* runpgp.c (\_pgpme\_engine\_ops\_gpg): Insert dummy entry.

2007-11-12 Marcus Brinkmann <marcus@g10code.de>

\*

kpipeiodevice.cpp: New version from Frank Osterfeld.

2007-10-11 Marcus Brinkmann <marcus@g10code.de>

\* kpipeiodevice.cpp: New version from Frank Osterfeld.

2007-10-09 Marcus Brinkmann <marcus@g10code.de>

\* kpipeiodevice.cpp: New version from Frank Osterfeld and Marc Mutz.

2007-10-05 Marcus Brinkmann <marcus@g10code.de>

\* kpipeiodevice.cpp, w32-qt-io.cpp: New versions from Frank Osterfeld.

2007-10-04 Marcus Brinkmann <marcus@g10code.de>

\* kpipeiodevice.h, kpipeiodevice.cpp, kpipeiodevice.moc, w32-qt-io.cpp: New versions from Frank Osterfeld.

2007-10-02 Marcus Brinkmann <marcus@g10code.de>

\* kpipeiodevice.cpp, kpipeiodevice.moc: New versions.  
\* w32-qt-io.cpp (\_pgpme\_io\_fd2str): Print actual\_fd if available.  
(\_pgpme\_io\_dup): Only acquire a reference, do not actually dup.  
Submitted by Frank Osterfeld.

\* priv-io.h, engine-gpgsm.c: Add comments.  
\* w32-qt-io.cpp (\_pgpme\_io\_select): Remove code handling frozen FDs.  
\* w32-glib-io.c (\_pgpme\_io\_close):  
Always dereference the channel,  
even if not primary.  
(\_pgpme\_io\_dup): Acquire a reference. Replace unused  
implementation by assertion.

2007-09-28 Werner Koch <wk@g10code.com>

- \* engine-gpgsm.c (iocb\_data\_t): Add SERVER\_FD\_STR.  
(gpgsm\_new): Set it.  
(gpgsm\_set\_fd): Use it.
- \* w32-glib-io.c (find\_channel): Add a new primary flag.  
(\_gpgme\_io\_close): Close channel only if primary.  
(\_gpgme\_io\_dup): Put newfd into the table as shallow copy.
- \* priv-io.h (struct io\_select\_fd\_s): Remove member FROZEN.
- \* w32-io.c (\_gpgme\_io\_select): Ditto.
- \* w32-glib-io.c (\_gpgme\_io\_select): Ditto.
- \* posix-io.c (\_gpgme\_io\_select): Ditto.
- \* runpgg.c (read\_status): Ditto.
- \* wait.c (fd\_table\_put): Ditto.
- \* runpgg.c (gpg\_io\_event): Add tracing.  
(start): Use gpg\_io\_event for sending the start event.
- \* engine-gpgsm.c (gpgsm\_io\_event): Add tracing.  
(start): Use gpgsm\_io\_event for sending the start event.
- \* wait.c (\_gpgme\_add\_io\_cb, \_gpgme\_run\_io\_cb): Add tracing.

2007-09-28 Marcus Brinkmann

<marcus@g10code.de>

- \* kdpipelinedevice.moc, w32-qt-io.cpp, kdpipelinedevice.cpp: New versions from Frank Osterfeld.

2007-09-27 Marcus Brinkmann <marcus@g10code.de>

- \* w32-glib-io.c (\_gpgme\_io\_spawn),  
w32-qt-io.cpp (\_gpgme\_io\_spawn), w32-io.c (\_gpgme\_io\_spawn): Close the process handle, return 0.
- \* gpgme.h (gpgme\_protocol\_t): Add GPGME\_PROTOCOL\_UNKNOWN.
- \* gpgme.c (gpgme\_get\_protocol\_name): Implement support for GPGME\_PROTOCOL\_UNKNOWN.
- \* kdpipelinedevice.h: Fix last change.
- \* w32-glib-io.c (\_gpgme\_io\_pipe), w32-qt-io.c (\_gpgme\_io\_pipe),  
w32-io.c (\_gpgme\_io\_pipe), posix-io.c (\_gpgme\_io\_pipe): Fix debug output.

2007-09-25 Marcus Brinkmann <marcus@g10code.de>

\* conversion.c, keylist.c: Include <sys/types.h>.

\* kdpipelineio.h: Use namespace \_gpgme\_.

\* kdpipelineio.cpp: Use namespace \_gpgme\_.

[Q\_OS\_WIN32 && NOMINMAX]: Do not define NOMINMAX again.

\* w32-qt-io.cpp: Change namespace of KDPipelineIODevice to \_gpgme\_::KDPipelineIODevice.

2007-09-17 Werner Koch <wk@g10code.com>

\*

rungpg.c (gpg\_new): Make robust against undefined ttyname or ttytype.

2007-09-14 Werner Koch <wk@g10code.com>

\* data-mem.c (gpgme\_data\_release\_and\_get\_mem): Fix tracing bug.

2007-09-14 Marcus Brinkmann <marcus@g10code.de>

\* gpgme.c (gpgme\_release): Call gpgme\_sig\_notation\_clear.

2007-09-13 Marcus Brinkmann <marcus@g10code.de>

\* rungpg.c (gpg\_new): Handle return value of \_gpgme\_getenv (fixes small memory leak).

2007-09-07 Marcus Brinkmann <marcus@g10code.de>

\* Makefile.am (libgpgme\_qt\_la\_SOURCES): Move moc\_kdpipelineio.cpp to EXTRA\_DIST, as this is only included by another file (it's more like a header file than a cpp file, but automake doesn't know that).

\* w32-qt-io.cpp (\_gpgme\_io\_spawn): Fix several cast errors and typos.

\* w32-io.c (\_gpgme\_io\_write): Use TRACE\_SYSRES instead of TRACE\_SYS.  
(libgpgme\_qt\_la\_LIBADD): Add QT4\_CORE\_LIBS, not QT4\_CORE\_LIB.

\* kdpipelineio.h, kdpipelineio.cpp, moc\_kdpipelineio.cpp,  
kdpipelineio.moc, w32-qt-io.c:  
New files.

\* Makefile.am (ltlib\_gpgme\_extra): Rename to ltlib\_gpgme\_glib.  
(ltlib\_gpgme\_qt): New variable.

(lib\_LTLIBRARIES): Add \$(ltlib\_gpgme\_qt).

(libgpgme\_qt\_la\_SOURCES): New variable.

(AM\_CPPFLAGS): Add @QT4\_CORE\_INCLUDES@

(AM\_CFLAGS): Add @QT4\_CORE\_CFLAGS@.

(libgpgme\_qt\_la\_LDFLAGS, libgpgme\_qt\_la\_DEPENDENCIES)

(libpgpme\_qt\_la\_LIBADD): New variables.

- \* sema.h (struct critsect\_s): Rename "private" to "priv" to make C++ users happy. Change users.
- \* posix-sema.c (\_gpgme\_sema\_cs\_enter, \_gpgme\_sema\_cs\_leave) (\_gpgme\_sema\_cs\_destroy): Likewise.
- \* w32-sema.c (critsect\_init, \_gpgme\_sema\_cs\_enter) (\_gpgme\_sema\_cs\_leave, \_gpgme\_sema\_cs\_destroy): Likewise.
- \* w32-glib-io.c (gpgme\_get\_giochannel): Change return type to void\*.
- (gpgme\_get\_fdptr): New function.
- \* w32-io.c (gpgme\_get\_fdptr): New function
- \* gpgme.def: Add gpgme\_get\_fdptr.

2007-08-22 Marcus Brinkmann <marcus@g10code.de>

- \* w32-io.c (\_gpgme\_io\_write): Return early if COUNT is zero.
- (writer): Remove superfluous check.

2007-08-20 Marcus Brinkmann <marcus@g10code.de>

- \* gpgme.h: Move include of gpg-error.h out of extern "C".

2007-08-07 Werner Koch <wk@g10code.com>

- \* gpgme.h (struct \_gpgme\_signature): Add member CHAIN\_MODEL.
- \* verify.c (parse\_trust): Set Chain\_MODEL.

2007-08-02 Werner Koch <wk@g10code.com>

- \* w32-glib-io.c (\_gpgme\_io\_spawn): Use DETACHED\_PROCESS flag.
- \* w32-io.c (\_gpgme\_io\_spawn): Ditto.
- (\_gpgme\_io\_write): Map ERROR\_NO\_DATA to EPIPE.
- \* debug.c (\_gpgme\_debug): Enable assuan logging.
- (\_gpgme\_debug\_subsystem\_init): New.
- \* version.c (do\_subsystem\_inits): Disable assuan logging and initialize the debug system.
- (gpgme\_check\_version): Do not trace before the subsystems are initialized.

2007-07-17 Marcus Brinkmann <marcus@g10code.de>

- \* debug.c: Include <errno.h> and "debug.h".
- (\_gpgme\_debug): Save and restore ERRNO.
- (TOHEX): New macro.
- (\_gpgme\_debug\_buffer): New function.
- \* conversion.c, data-compat.c, data-mem.c, data.c, engine-gpgsm.c,

gpgme.c,  
keylist.c, posix-io.c, runpgg.c, sign.c, version.c,  
w32-io.c, wait.c: Replace DEBUG macros by TRACE\_\* variants. In  
most of these files, add many more tracepoints.

2007-07-16 Marcus Brinkmann <marcus@g10code.de>

- \* engine-gpgsm.c (status\_handler): Do not send BYE here.
- \* w32-io.c (struct reader\_context\_s, struct writer\_context\_s): New  
members REFCOUNT.  
(create\_reader, create\_writer): Initialize C->refcount to 1.  
(destroy\_reader, destroy\_writer): Only destroy if C->refcount  
drops to 0.  
(find\_reader, find\_writer, kill\_reader, kill\_writer): Beautify.
- \* priv-io.h (\_gpgme\_io\_dup): New prototype.
- \* posix-io.c (\_gpgme\_io\_dup): New function.
- \* w32-io.c (\_gpgme\_io\_dup): Likewise.
- \* w32-glib-io.c (\_gpgme\_io\_dup): Likewise.
- \* engine-gpgsm.c (start): Reverting to version 2007-07-10.

2007-07-13 Marcus Brinkmann <marcus@g10code.de>

- \* data-user.c (user\_read, user\_write, user\_seek): Set errno and  
return -1 instead returning the error code directly.
- \* data-compat.c (old\_user\_seek):  
Likewise.
- \* gpgme.c (gpgme\_sig\_notation\_add): Return error properly.
- \* Revert the "close\_notify\_handler" returns int stuff. Always  
close in the \_gpgme\_io\_close implementations.
- \* engine-gpgsm.c (status\_handler): Try to terminate the connection  
in case of error.
- \* w32-io.c (\_gpgme\_io\_read): Return C->error\_code in ERRNO.  
(\_gpgme\_io\_write): Likewise.
- \* priv-io.h (\_gpgme\_io\_set\_close\_notify): Change type of HANDLER  
to \_gpgme\_close\_notify\_handler.  
(\_gpgme\_close\_notify\_handler): New type.  
(\_gpgme\_io\_dup): Remove prototype.
- \* posix-io.c (notify\_table, \_gpgme\_io\_set\_close\_notify): Change  
type of HANDLER to \_gpgme\_close\_notify\_handler\_t.  
(\_gpgme\_io\_close): Do not close the FD if handler returns 0.  
(\_gpgme\_io\_dup): Remove function.
- \* w32-io.c (notify\_table, \_gpgme\_io\_set\_close\_notify,  
\_gpgme\_io\_close): Change type of HANDLER to  
\_gpgme\_close\_notify\_handler\_t.  
(\_gpgme\_io\_close): Do not close the FD if handler returns 0.

(`_gpgme_io_dup`): Remove function.  
\* `w32-glib-io.c`  
(`_gpgme_io_dup`): Remove function.  
(`_gpgme_io_set_close_notify`, `notify_table`): Change type of HANDLER to `_gpgme_close_notify_handler_t`.  
(`_gpgme_io_close`): Do not close the FD if handler returns 0.  
\* `runpgg.c` (`close_notify_handler`): Change return type to `int`, return 1.  
\* `engine-gpgsm.c` (`close_notify_handler`): Change return type to `int`, return 0 for status FD and 1 for all other FDs.  
(`start`): Do not duplicate the status FD.

2007-07-12 Marcus Brinkmann <marcus@g10code.de>

\* `Makefile.am`: Replace implicit rule by suffix rule. Add SUFFIXES for that.

2007-07-12 Werner Koch <wk@g10code.com>

\* `version.c` (`do_subsystem_inits`) [W32]: Make sure that the socket system has been started.

2007-07-10 Marcus Brinkmann <marcus@g10code.de>

\* `priv-io.h` (`_gpgme_io_dup`): New prototype.  
\* `posix-io.c` (`_gpgme_io_dup`): New function.  
\* `w32-io.c` (`_gpgme_io_dup`): Likewise.  
\* `w32-glib-io.c` (`_gpgme_io_dup`): Likewise.  
\* `engine-gpgsm.c` (`start`): Use `_gpgme_dup()` instead of `dup()`.

2007-07-08

Marcus Brinkmann <marcus@g10code.de>

\* `engine-gpgsm.c` [HAVE\_W32\_SYSTEM]: Enable the bunch of the file.  
\* `funopen.c` (`funopen`): Rename to `_gpgme_funopen`.

2007-04-30 Marcus Brinkmann <marcus@g10code.de>

\* `engine-gpgsm.c` (`gpgsm_new`): Fix error handling for `ttyname_r`.  
\* `runpgg.c` (`gpg_new`): Likewise.  
Submitted by Stephen Tether.

2007-02-26 Werner Koch <wk@g10code.com>

\* `verify.c` (`op_data_t`): New element PLAINTEXT\_SEEN.  
(`_gpgme_verify_status_handler`): Return an error if more than one plaintext has been seen.  
(`parse_error`): New arg SET\_STATUS. Also detect it based on an

ERROR status (gpg > 1.4.6).

2007-01-26 Werner Koch <wk@g10code.com>

- \* w32-io.c (build\_commandline): Fixed stupid quoting bug.
- \* w32-glib-io.c (build\_commandline): Ditto.
- \* runpgg.c (gpg\_set\_locale): Avoid dangling pointer after free.
- \* gpgme-config.in: New options --get-gpg and --get-gpgsm.

2007-01-18 Marcus Brinkmann <marcus@g10code.de>

- \* data.h (\_gpgme\_data\_get\_fd): Add prototype.
- (gpgme\_data\_get\_fd\_cb):  
New type.
- (struct \_gpgme\_data\_cbs): New member get\_fd.
- \* data.c (\_gpgme\_data\_get\_fd): New function.
- \* data-fd.c (fd\_get\_fd): New function.
- (fd\_cbs): Add fd\_get\_fd.
- \* data-stream.c (stream\_get\_fd): New function.
- (stream\_cbs): Add stream\_get\_fd.
- \* data-mem.c (mem\_cbs): Add NULL for get\_fd callback.
- \* data-user.c (user\_cbs): Likewise.
- \* engine-gpgsm.c (gpgsm\_set\_fd) [USE\_DESCRIPTOR\_PASSING]: Try to short-cut by passing the data descriptor directly.

2007-01-17 Marcus Brinkmann <marcus@g10code.de>

- \* w32-io.c (build\_commandline): Quote all command line arguments.
- \* w32-glib-io.c (build\_commandline): Likewise.

2007-01-10 Werner Koch <wk@g10code.com>

- \* ttyname\_r.c (ttyname\_r) [W32]: Return a dummy name.

2007-01-08 Werner Koch <wk@g10code.com>

- \* version.c (do\_subsystem\_inits): Do assuan init only if building with Assuan.
- \* setenv.c: Include assuan-def.h only if building with Assuan support.
- \* op-support.c (\_gpgme\_op\_reset): Set LC\_MESSAGES only if defined.
- \* engine-gpgsm.c (gpgsm\_set\_locale): Ditto.
- \* runpgg.c (gpg\_set\_locale): Ditto.

2006-12-17 Marcus Brinkmann <marcus@g10code.de>

- \* gpgme.c (gpgme\_set\_protocol): Shut down the engine when switching protocols.
- (gpgme\_ctx\_set\_engine\_info): Likewise for engine info.
- \* engine.h (\_gpgme\_engine\_reset): New function prototype.
- \* engine.c (\_gpgme\_engine\_reset): New function.
- \* engine-backend.h (struct engine\_ops): New member RESET.
- \* runpgg.c (\_gpgme\_engine\_ops\_gpg): Add NULL for reset function.
- \* engine-gpgsm.c (\_gpgme\_engine\_ops\_gpgsm)
- [USE\_DESCRIPTOR\_PASSING]: Add gpgsm\_reset for reset.
- (\_gpgme\_engine\_ops\_gpgsm) [!USE\_DESCRIPTOR\_PASSING]: Add NULL for reset function.
- (gpgsm\_reset) [USE\_DESCRIPTOR\_PASSING]: New function.
- \* op-support.c (\_gpgme\_op\_reset): Try to use the engine's reset function if available.
- \* engine-gpgsm.c (gpgsm\_new): Move code to dup status\_fd to ... (start): ... here.
- \* posix-io.c (\_gpgme\_io\_recvmsg, \_gpgme\_io\_sendmsg): New functions.
- 
- \* engine.h (\_gpgme\_engine\_new): Remove arguments lc\_ctype and lc\_messages from prototype.
- (\_gpgme\_engine\_set\_locale): New prototype.
- \* engine.c (\_gpgme\_engine\_set\_locale): New function.
- \* op-support.c (\_gpgme\_op\_reset): Call \_gpgme\_engine\_set\_locale.
- \* engine-backend.h (struct engine\_ops): Add new member SET\_LOCALE.
- Remove arguments lc\_messages and lc\_ctype from member NEW.
- \* engine-gpgsm.c (struct engine\_gpgsm): New members lc\_ctype\_set and lc\_messages\_set.
- (gpgsm\_new): Remove lc\_messages and lc\_ctype arguments.
- (gpgsm\_set\_locale): New function.
- (\_gpgme\_engine\_ops\_gpgsm): Add gpgsm\_set\_locale.
- \* runpgg.c (struct engine\_gpg): Add new members lc\_messages and lc\_ctype.
- (gpg\_release): Release lc\_messages and lc\_ctype if set.
- (gpg\_new): Remove lc\_messages and lc\_ctype arguments.
- (gpg\_set\_locale): New function.
- (\_gpgme\_engine\_ops\_gpg): Add gpg\_set\_locale.
- (add\_arg): Implement in terms of:
- (add\_arg\_ext): New function.
- (start): Set lc-messages and lc-ctype arguments here.

2006-12-03

Marcus Brinkmann <marcus@g10code.de>



\* engine-gpgsm.c (struct engine\_gpgsm): Move members input\_fd\_server, output\_fd\_server, message\_fd\_server to ... (iocb\_data): ... here (as server\_fd).  
(close\_notify\_handler): Reset tags as well.  
(gpgsm\_new): Implement support for descriptor passing.  
(fd\_type\_t): New type.  
(gpgsm\_clear\_fd): New function. Use it instead of \_gpgsm\_io\_close for unused communication channels.  
(gpgsm\_set\_fd): Rewritten to support descriptor passing. All relevant callers adjusted as well (previously of \_gpgme\_io\_close).

2006-12-02 Marcus Brinkmann <marcus@g10code.de>

\* version.c: Include "assuan.h".  
(do\_subsystem\_inits): Call assuan\_set\_assuan\_err\_source.

2006-12-01 Marcus Brinkmann <marcus@g10code.de>

\* Makefile.am (libgpgme\_real\_la\_SOURCES): Rename to main\_sources.  
(libgpgme\_la\_SOURCES, libgpgme\_pthread\_la\_SOURCES, libgpgme\_glib\_la\_SOURCES, libgpgme\_pth\_la\_SOURCES): Add \$(main\_sources).  
(libgpgme\_la\_DEPENDENCIES, libgpgme\_la\_LIBADD, libgpgme\_pthread\_la\_DEPENDENCIES, libgpgme\_pthread\_la\_LIBADD, libgpgme\_pth\_la\_DEPENDENCIES, libgpgme\_pth\_la\_LIBADD, libgpgme\_glib\_la\_DEPENDENCIES, libgpgme\_glib\_la\_LIBADD): Remove libgpgme-real.la.  
(noinst\_LTLIBRARIES): Removed.  
(libgpgme\_glib\_la\_CFLAGS, libgpgme\_pth\_la\_CFLAGS): Removed.  
(AM\_CFLAGS): New variable.

2006-11-30 Marcus Brinkmann <marcus@g10code.de>

\* engine-gpgsm.c: Replace AssuanError with gpg\_error\_t and ASSUAN\_CONTEXT with assuan\_context\_t.

2006-11-29 Marcus Brinkmann <marcus@g10code.de>

\* engine-gpgsm.c (gpgsm\_new): Check return value of assuan\_pipe\_connect.

\* runpg.c: Include <unistd.h>.  
(gpg\_new): Support --display, --ttyname, --ttytype, --lc-ctype and --lc-messages. Fixes issue 734.

2006-10-24 Marcus Brinkmann <marcus@g10code.de>

\* trustlist.c (gpgme\_op\_trustlist\_next): Return error if OPD is NULL.

2006-10-23 Marcus Brinkmann <marcus@g10code.de>

\* wait-global.c (gpgme\_wait): Unlock CTX\_LIST\_LOCK while calling \_gpgme\_engine\_io\_event().

\*

keylist.c (gpgme\_op\_keylist\_next): Return error if OPD is NULL.

2006-09-25 Marcus Brinkmann <marcus@g10code.de>

\* data-mem.c (gpgme\_data\_release\_and\_get\_mem): Release the data object properly.

2006-09-22 Marcus Brinkmann <marcus@g10code.de>

\* keylist.c (keylist\_colon\_handler): Move debug output after initialising KEY.

2006-07-29 Marcus Brinkmann <marcus@g10code.de>

\* gpgme-config.in (Options): Add NETLIBS.

\* Makefile.am (libgpgme\_la\_LIBADD, libgpgme\_pthread\_la\_LIBADD, libgpgme\_pth\_la\_LIBADD, libgpgme\_glib\_la\_LIBADD): Add NETLIBS.

\* runpgg.c (read\_status): Fix comparison disguising as an assignment.

2005-03-24 Marcus Brinkmann <marcus@g10code.de>

\* gpgme.c (gpgme\_set\_locale): Remove conditional on HAVE\_W32\_SYSTEM, and just check for LC\_MESSAGES.

2006-07-16 Marcus Brinkmann <marcus@g10code.de>

\* runpgg.c (read\_status): Strip potential carriage return.

\* genkey.c (get\_key\_parameter): Skip potential carriage return.

\* version.c (\_gpgme\_get\_program\_version):

Strip potential carriage  
return.

\* data.c (gpgme\_data\_set\_file\_name): Allow to clear the file name by passing NULL.

2006-06-22 Marcus Brinkmann <marcus@g10code.de>

\* keylist.c (gpgme\_get\_key): Also clone the engine info.

2006-03-06 Marcus Brinkmann <marcus@g10code.de>

\* gpgme-config.in (cflags\_pth): Revert accidental removal of pthread support with last change.

2006-02-28 Marcus Brinkmann <marcus@g10code.de>

\* w32-glib-io.c (O\_BINARY) [!O\_BINARY]: New macro. (\_gpgme\_io\_pipe): Open pipes in binary mode.

2006-02-22 Marcus Brinkmann <marcus@g10code.de>

\* engine.c (gpgme\_engine\_check\_version): Reimplemented to allow checking the version correctly even after changing the engine information. Bug reported by Stphane Corthsy.

\* runpg.c (read\_colon\_line): Invoke colon preprocess handler if it is set.

(colon\_preprocessor\_t): New type.

(struct engine\_gpg): New member colon.preprocess\_fnc.

(gpg\_keylist\_preprocess): New function.

\* keylist.c

(keylist\_colon\_handler): Allow short key IDs.

2006-02-15 Marcus Brinkmann <marcus@g10code.de>

\* w32-io.c (create\_writer): Make C->have\_data a manually reset event.

(writer): Move code from end of if block to beginning, so it is also run the first time.

(\_gpgme\_io\_write): Move assert check after error check. Reset the is\_empty event, and also do it eagerly.

(\_gpgme\_io\_select): Unconditionally wait for the is\_empty event.

2006-01-26 Werner Koch <wk@g10code.com>

\* w32-util.c (\_gpgme\_get\_conf\_int): New.

\* posix-util.c (\_gpgme\_get\_conf\_int): New.

\* w32-io.c (get\_desired\_thread\_priority): New.

(create\_reader, create\_writer): Use it here.

2006-01-04 Werner Koch <wk@g10code.com>

\* debug.h (\_gpgme\_debug\_srcname): New. Use it with the debug macros.

\* w32-glib-io.c (`_gpgme_io_set_nonblocking`): Add debug statements. Disable error return for failed nonblocking call.

2006-01-03 Marcus Brinkmann <marcus@g10code.de>

\* w32-glib-io.c (`_gpgme_io_close`): Only close fd if there is no channel for it.

2005-12-31 Marcus Brinkmann <marcus@g10code.de>

\* w32-glib-io.c (`find_channel`): Set channel to unbuffered.  
(`_gpgme_io_select`): Fix debug output.

2005-12-23 Werner Koch <wk@g10code.com>

\* `gpgme.h` (`struct _gpgme_signature`): Append field `PKA_ADDRESS`.  
\* `verify.c` (`release_op_data`, `_gpgme_verify_status_handler`): Set this field.

2005-12-20 Werner Koch <wk@g10code.com>

\* `gpgme.h` (`gpgme_status_code_t`): Added `GPGME_STATUS_PKA_TRUST_BAD` and `GPGME_STATUS_PKA_TRUST_GOOD`.  
(`struct _gpgme_signature`): New field `pka_trust`.  
\* `verify.c` (`_gpgme_verify_status_handler`): Set `pka_trust`.

2005-12-06 Werner Koch <wk@g10code.com>

\* `keylist.c` (`keylist_colon_handler`): Store fingerprints of the subkeys. Reset the secret flag of subkeys for stub secret keys.  
(`NR_FIELDS`): Bumped up to 16

2005-11-27 Marcus Brinkmann <marcus@g10code.de>

\* `engine.c` (`_gpgme_set_engine_info`): Use `new_file_name` in `engine_get_version` invocation. Reported by Stphane Corthsy.

2005-11-24

Marcus Brinkmann <marcus@g10code.de>

\* w32-glib-io.c (`_gpgme_io_fd2str`): Remove debug printf.

2005-11-18 Werner Koch <wk@g10code.com>

\* w32-glib-io.c: Include `glib.h` before windows to avoid a symbol shadowing warning.  
(`find_channel`): Better use `g_io_channel_win32_new_fd` instead of

the autodetection function `g_io_channel_unix_new`.  
(`_gpgme_io_select`): Rewritten. It is now a fully working select implementation.

2005-11-18 Marcus Brinkmann <marcus@g10code.de>

- \* `priv-io.h` (`_gpgme_io_fd2str`): New prototype.
- \* `posix-io.c` (`_gpgme_io_fd2str`): New function.
- \* `w32-io.c` (`_gpgme_io_fd2str`): New function.
- \* `runpgg.c`: Use this new function.
- \* `w32-glib-io.c` (`_gpgme_io_fd2str`): Rewrote the file handle code again. Two's company, three's the musketeers.

- \* `w32-glib-io.c`: Rewrote the file handle code. We don't create system fds for every handle (doesn't work for inherited handles), but we create pseudo fds in a private namespace that designate a handle and potentially a giochannel.

2005-11-18 Werner Koch <wk@g10code.com>

- \* `versioninfo.rc.in`: Set file version to LT-version + Svn-revision.

2005-11-17 Marcus Brinkmann <marcus@g10code.de>

- \* `w32-glib-io.c`: New file.
- \* `gpgme.def` (`gpgme_get_giochannel`): Add symbol.
- \* `Makefile.am` (`system_components`) [`HAVE_DOSISH_SYSTEM`]: Remove `w32-io.c`.
- (`ltlib_gpgme_extra`): New variable.
- (`lib_LTLIBRARIES`): Add `$(ltlib_gpgme_extra)`.
- (`system_components_not_extra`): New variable.
- (`libgpgme_la_SOURCES`, `libgpgme_pthread_la_SOURCES`, `libgpgme_pth_la_SOURCES`): Add `$(system_components_not_extra)`.
- (`libgpgme_glib_la_LDFLAGS`, `libgpgme_glib_la_DEPENDENCIES`, `libgpgme_glib_la_LIBADD`, `libgpgme_glib_la_CFLAGS`) [`BUILD_W32_GLIB`]: New variables.
- \* `gpgme-config.in` (`glib`): New option.
- \* `gpgme.m4` (`AM_PATH_GPGME_GLIB`): New macro.

2005-11-17 Marcus Brinkmann <marcus@g10code.de>

- \* `priv-io.h` (`_gpgme_io_waitpid`, `_gpgme_io_kill`): Removed.
- \* `w32-io.c` (`_gpgme_io_waitpid`, `_gpgme_io_kill`): Removed.
- \* `posix-io.c` (`_gpgme_io_kill`): Removed.
- (`_gpgme_io_waitpid`): Declare static.

2005-10-24 Marcus Brinkmann <marcus@g10code.de>

- \* w32-io.c (\_gpgme\_io\_spawn): Don't minimize window, hide it.

2005-10-21 Werner Koch <wk@g10code.com>

- \* Makefile.am: Fixed cut+paste problem

2005-10-20 Marcus Brinkmann <marcus@g10code.de>

- \* Makefile.am: Build versioninfo.lo, not versioninfo.o. Also, fix the whole mess.

2005-10-16 Marcus Brinkmann <marcus@g10code.de>

- \* runpgg.c (gpg\_edit): Don't add a key argument if in card edit mode.

2005-10-06 Marcus Brinkmann <marcus@g10code.de>

- \* Makefile.am (gpgme.dll gpgme.dll.a): Use \$(srcdir) for gpgme.def.

- \* gpgme.h (gpgme\_free): New prototype.

- \* data-mem.c (gpgme\_free): New function.

- \* libgpgme.vers (GPGME\_1.1): Add gpgme\_free.

- \* gpgme.def: Add gpgme\_free.

2005-10-02 Marcus Brinkmann <marcus@g10code.de>

- \* util.h (\_gpgme\_decode\_percent\_string): Add new argument BINARY to prototype.

- \* verify.c (parse\_notation): Likewise for invocation.

- \* conversion.c (\_gpgme\_decode\_percent\_string):

Likewise to

declaration. If set, do not replace '\0' characters with a printable string.

- \* gpgme.h (struct \_gpgme\_key\_sig): New field notations.

- \* ops.h (\_gpgme\_parse\_notation): New prototype.

- \* sig-notation.c (\_gpgme\_parse\_notation): New function.

- \* key.c (gpgme\_key\_unref): Free all signature notations.

- \* keylist.c (op\_data\_t): New member tmp\_keysig.

(finish\_key): Clear OPD->tmp\_keysig.

- \* gpgme.c (gpgme\_set\_keylist\_mode): Remove check.

- \* runpgg.c (gpg\_keylist): Support listing signature notations.

(gpg\_keylist\_ext): Likewise.

2005-10-01 Marcus Brinkmann <marcus@g10code.de>

- \* engine.h (\_gpgme\_set\_engine\_info): Add prototype.
- \* engine-backend.h (struct engine\_ops): Change return type of get\_file\_name() to const char \* to silence gcc warning.
- \* engine.c (engine\_get\_file\_name): Change return type to const char \* to silence gcc warning.
- (gpgme\_get\_engine\_info): Use transitional variable to go from const char \* to char \* to silence gcc warning.
- (\_gpgme\_set\_engine\_info): Likewise.
- \* engine-gpgsm.c (struct engine\_gpgsm): Change type of LINE to char \* to silence gcc warning.
- (gpgsm\_new): Make ARGV a pointer to const char.
- (status\_handler): Change type of SRC, END, DST, ALINE and NEWLINE to char \* to silence gcc warning.

- \* gpgme.def: Add gpgme\_data\_set\_file\_name, gpgme\_data\_get\_file\_name, gpgme\_sig\_notation\_clear, gpgme\_sig\_notation\_add and gpgme\_sig\_notation\_get.
- \* libgpgme.vers: Add gpgme\_sig\_notation\_clear, gpgme\_sig\_notation\_add and gpgme\_sig\_notation\_get.
- \* Makefile.am (libgpgme\_real\_la\_SOURCES): Add sig-notation.c.
- \* context.h (struct gpgme\_context): New field sig\_notations.
- \* gpgme.h (struct \_gpgme\_sig\_notation): New member value\_len and critical.
- (GPGME\_SIG\_NOTATION\_CRITICAL): New symbol.
- (gpgme\_sig\_notation\_flags\_t): New type.
- (gpgme\_sig\_notation\_add, gpgme\_sig\_notation\_clear, gpgme\_sig\_notation\_get): New prototypes.
- \* ops.h (\_gpgme\_sig\_notation\_create, \_gpgme\_sig\_notation\_free): New prototypes.
- \*
- sig-notation.c (\_gpgme\_sig\_notation\_free): New file.
- \* verify.c (parse\_notation): Use support functions.
- (release\_op\_data): Likewise.
- \* runpgg.c (append\_args\_from\_sig\_notations): New function.
- (gpg\_encrypt\_sign, gpg\_sign): Call it.

2005-09-30 Marcus Brinkmann <marcus@g10code.de>

- \* data.h (struct gpgme\_data): New member file\_name.
- \* data.c (gpgme\_data\_set\_filename): New function.
- (\_gpgme\_data\_release): Free DH->filename if necessary.
- (gpgme\_data\_get\_filename): New function.
- \* runpgg.c (gpg\_encrypt): Set filename option.
- (gpg\_encrypt\_sign): Likewise.
- (gpg\_sign): Likewise.
- \* libgpgme.vers (GPGME\_1.1): Add gpgme\_data\_set\_file\_name and

gpgme\_data\_get\_file\_name.

\* decrypt.c, verify.c, gpgme.h: Replace plaintext\_filename with file\_name.

2005-09-29 Marcus Brinkmann <marcus@g10code.de>

\* gpgme.h (struct \_gpgme\_key): Add field is\_qualified.  
(struct \_gpgme\_subkey): Likewise.  
\* keylist.c (set\_subkey\_capability, set\_mainkey\_capability): Set field is\_qualified.

2005-09-23

Werner Koch <wk@g10code.com>

\* w32-io.c (\_gpgme\_io\_pipe): Removed use of environment variable again.  
(create\_reader, create\_writer): Set thread priority higher.

2005-09-19 Werner Koch <wk@g10code.com>

\* w32-io.c (\_gpgme\_io\_pipe): New environment variable to change the size of the pipe buffer.

2005-09-13 Werner Koch <wk@g10code.com>

\* ath.c: Changes to make it work under W32.

2005-09-12 Marcus Brinkmann <marcus@g10code.de>

\* Makefile.am (libgpgme\_la\_SOURCES): Set to ath.h and ath.c.  
(ath\_pth\_src, ath\_pthread\_src): Removed.  
(w32\_o\_files): Replace ath-compat.o with ath.o.  
(libgpgme\_pth\_la\_CFLAGS): New variable.  
\* ath-compat.c, ath-pthread-compat.c, ath-pth-compat.c: Removed.  
\* ath.h (ath\_pthread\_available, ath\_pth\_available): Removed.  
(ath\_init) [!\_ATH\_EXT\_SYM\_PREFIX]: Do not define macro.  
(struct ath\_ops, ath\_init) [\_ATH\_COMPAT]: Removed.  
(\_ATH\_COMPAT): Macro removed.  
\* posix-sema.c (\_gpgme\_sema\_subsystem\_init): Do not call \_gpgme\_ath\_init.

2005-09-12

Marcus Brinkmann <marcus@g10code.de>

\* keylist.c (release\_op\_data): Do not free opd->tmp\_uid.

2005-09-07 Werner Koch <wk@g10code.com>



\* w32-io.c (build\_commandline): Quote argv[0].

2005-08-26 Marcus Brinkmann <marcus@g10code.de>

\* runpgg.c (command\_handler): Use \_gpgme\_io\_write instead of write.

\* edit.c (command\_handler): Do not depend on PROCESSED being available.

\* engine.h (engine\_command\_handler\_t): Add new argument processed.

\* ops.h (\_gpgme\_passphrase\_command\_handler\_internal): Rename prototype to ...

(\_gpgme\_passphrase\_command\_handler): ... this one.

\* passphrase.c (\_gpgme\_passphrase\_command\_handler\_internal):

Rename to ...

(\_gpgme\_passphrase\_command\_handler): ... this one.

\* edit.c (command\_handler): Add new argument processed. Remove local variable with the same name. Always return processed as true.

\* runpgg.c (command\_handler): Send a newline character if the handler did not.

2005-08-26 Werner Koch <wk@g10code.com>

\* w32-util.c (read\_w32\_registry\_string):

Updated from code used by

GnuPG. This allows for expanding strings and features the implicit fallback key.

(w32\_shgetfolderpath, find\_program\_at\_standard\_place): New.

(\_gpgme\_get\_gpg\_path, \_gpgme\_get\_gpgsm\_path): With no registry entry, locate the programs at the standard place.

(dlopen, dlsym, dlclose): New, so that we can keep on using what we are accustomed to.

\* debug.c (debug\_init): Use PATHSEP\_C so that under W32 a semicolon is used which allows us to create files with drive letters.

\* w32-io.c (\_gpgme\_io\_read, \_gpgme\_io\_write): Print content in debug mode too.

2005-07-27 Marcus Brinkmann <marcus@g10code.de>

\* gpgme.h (gpgme\_status\_code\_t): Add GPGME\_STATUS\_PLAINTEXT.

(struct \_gpgme\_op\_decrypt\_result): New member plaintext\_filename.

(struct \_gpgme\_op\_verify\_result): Likewise.

\* ops.h (\_gpgme\_parse\_plaintext): Add prototype.

\* op-support.c (\_gpgme\_parse\_plaintext): New function.  
\* decrypt.c (release\_op\_data): Release  
OPD->result.plaintext\_filename.  
(\_gpgme\_decrypt\_status\_handler):  
Handle GPGME\_STATUS\_PLAINTEXT.  
\* verify.c (release\_op\_data): Release  
OPD->result.plaintext\_filename.  
(\_gpgme\_verify\_status\_handler): Handle GPGME\_STATUS\_PLAINTEXT.

2005-08-08 Werner Koch <wk@g10code.com>

\* util.h (stpcpy): Renamed to ..  
(\_gpgme\_stpcpy): .. this and made inline. This avoids duplicate  
definitions when linking statically.  
\* stpcpy.c: Removed.

2005-08-19 Werner Koch <wk@g10code.com>

\* gpgme.def: New.  
\* versioninfo.rc.in: New.  
\* Makefile.am: Adds support for building a W32 DLL.  
  
\* ttyname\_r.c (ttyname\_r) [W32]: Return error.  
\* ath-compat.c [W32]: select and co are not yet supported; return  
error.  
\* data-stream.c (stream\_seek): Use ftell if ftello is not available.

2005-07-26 Marcus Brinkmann <marcus@g10code.de>

\* keylist.c (gpgme\_get\_key): Allow key IDs.

2005-06-20 Marcus Brinkmann <marcus@g10code.de>

\* gpgme.m4: Only call GPGME\_CONFIG if found.

2005-06-03 Marcus Brinkmann <marcus@g10code.de>

\*  
gpgme.h (struct \_gpgme\_signature): New members pubkey\_algo and  
hash\_algo.  
\* verify.c (parse\_valid\_sig): Parse pubkey and hash algo numbers.  
(parse\_new\_sig): Parse pubkey, hash algo and timestamp for ERRSIG.  
  
(\_gpgme\_decrypt\_status\_handler): Fix last change.  
  
\* gpgme.h (struct \_gpgme\_recipient): New structure.  
(gpgme\_recipient\_t): New type.  
(struct \_gpgme\_op\_decrypt\_result): Add member recipients.

\* decrypt.c (op\_data\_t): New member last\_recipient\_p.  
(\_gpgme\_op\_decrypt\_init\_result): Initialize last\_recipient\_p.  
(parse\_enc\_to): New function.  
(\_gpgme\_decrypt\_status\_handler): Handle status ENC\_TO and  
NO\_SECKEY.

\* wait-global.c (gpgme\_wait): Break out of the fd processing loop  
after an error.

Reported by Igor Belyi <gpgme@katehok.ac93.org>.

2005-06-02 Marcus Brinkmann <marcus@g10code.de>

\* wait.h (\_gpgme\_run\_io\_cb): New prototype.  
\* wait.c (\_gpgme\_run\_io\_cb): New function.  
\* wait-global.c (gpgme\_wait): Call it.  
\* wait-user.c (\_gpgme\_user\_io\_cb\_handler): Likewise.  
\*  
wait-private.c (\_gpgme\_wait\_on\_condition): Likewise.

2005-06-02 Werner Koch <wk@g10code.com>

\* passphrase.c (\_gpgme\_passphrase\_status\_handler): Take care of  
GPGME\_STATUS\_NEED\_PASSPHRASE\_PIN.  
(\_gpgme\_passphrase\_command\_handler\_internal): Also act on the key  
"passphrase.pin.ask".

\* gpgme.h: Added status codes GPGME\_STATUS\_SIG\_SUBPACKET,  
GPGME\_STATUS\_NEED\_PASSPHRASE\_PIN, GPGME\_STATUS\_SC\_OP\_FAILURE,  
GPGME\_STATUS\_SC\_OP\_SUCCESS, GPGME\_STATUS\_CARDCTRL,  
GPGME\_STATUS\_BACKUP\_KEY\_CREATED.

2005-05-28 Marcus Brinkmann <marcus@g10code.de>

\* data-user.c: Include <errno.h>.

2005-05-17 Marcus Brinkmann <marcus@g10code.de>

\* gpgme.c (gpgme\_new): Set the CTX->include\_certs default to the  
default.

2005-05-11 Marcus Brinkmann <marcus@g10code.de>

\* w32-io.c (\_gpgme\_io\_select): Fix loop increment.

2005-05-05 Marcus Brinkmann <marcus@g10code.de>

\* data-user.c (user\_release): Only call user hook if provided.  
(user\_seek): Return EBADF if no user hook is provided.

(user\_read):  
Likewise.  
(user\_write): Likewise.

2005-04-28 Marcus Brinkmann <marcus@g10code.de>

- \* gpgme.h (GPGME\_INCLUDE\_CERTS\_DEFAULT): New macro.
- \* engine-gpgsm.c (gpgsm\_sign): Send the include-certs option after the reset, just for cleanliness, and do not sent it at all if the default is requested.
- \* gpgme.c (gpgme\_set\_include\_certs): Allow to use GPGME\_INCLUDE\_CERTS\_DEFAULT.

2005-04-21 Werner Koch <wk@g10code.com>

- \* verify.c (calc\_sig\_summary): Set the key revoked bit.

2005-04-14 Marcus Brinkmann <marcus@g10code.de>

- \* wait-global.c (gpgme\_wait): Use LI->ctx when checking a context in the list, not the user-provided CTX.  
Reported by Igor Belyi <gpgme@katehok.ac93.org>.
- \* wait-global.c (gpgme\_wait): If no context is found, and we should not hang, set \*status to 0 and return NULL.  
Reported by Igor Belyi <gpgme@katehok.ac93.org>.

2005-03-24 Marcus Brinkmann <marcus@g10code.de>

- \* data.h (EOPNOTSUPP) [\_WIN32]: Remove definition.
- \* data.c (EOPNOTSUPP) [HAVE\_W32\_SYSTEM]:  
Remove definition.  
(gpgme\_data\_read, gpgme\_data\_write, gpgme\_data\_seek): Return ENOSYS instead EOPNOTSUPP.
- \* data-compat.c (EOPNOTSUPP) [HAVE\_W32\_SYSTEM]: Remove definition.  
(gpgme\_error\_to\_errno): Map GPG\_ERR\_NOT\_SUPPORTED to ENOSYS.

2005-03-24 Marcus Brinkmann <marcus@g10code.de>

- \* io.h: Rename to ...
- \* priv-io.h: ... this.
- \* Makefile.am (libgpgme\_real\_la\_SOURCES): Change io.h to priv-io.h.
- \* data.c, engine-gpgsm.c, posix-io.c, runpgg.c, version.c, w32-io.c, wait-private.c, wait-global.c, wait-user.c, wait.c:  
Change all includes of "io.h" to "priv-io.h"

2005-03-09 Werner Koch <wk@g10code.com>

\* w32-util.c (`_gpgme_get_gpg_path`, `_gpgme_get_gpgsm_path`): Do not cast away type checks.

\* io.h [W32]: Do not include `stdio.h`. If it is needed do it at the right place.

\* data.h [W32]: Removed kludge for EOPNOTSUP.

\* data.c, data-compat.c [W32]: Explicitly test for it here.

Replaced use of `_WIN32` by `HAVE_W32_SYSTEM` except for public header files.

2005-03-07

Timo Schulz <twoaday@g10code.de>

- \* gpgme.h: [`_WIN32`] Removed `ssize_t` typedef.
- \* ath.h: [`_WIN32`] Added some (dummy) types.
- \* io.h: [`_WIN32`] include `stdio.h`.
- \* data.h: [`_WIN32`] Define `EOPNOTSUPP`.
- \* w32-io.c [`_WIN32`] (`_gpgme_io_subsystem_init`): New.
- \* gpgme.c [`_WIN32`] (`gpgme_set_locale`): Disabled.

2004-12-12 Marcus Brinkmann <marcus@g10code.de>

\* engine.c (`_gpgme_set_engine_info`): Fix assertion.

2004-12-11 Marcus Brinkmann <marcus@g10code.de>

- \* util.h [`HAVE_CONFIG_H` && `HAVE_TTYNAME_R`] (`ttyname_r`): Define prototype.
- \* ttyname\_r.c: New file.

2004-12-07 Marcus Brinkmann <marcus@g10code.de>

- \* `putc_unlocked.c`, `funopen.c`: I just claim copyright on these files and change their license to LGPL, because they are totally trivial wrapper functions.
- \* `isascii.c`: Change copyright notice to the one from `ctype/ctype.h` in the GNU C Library (CVS Head 2004-10-10), where `isascii` is defined as a macro doing exactly the same as the function in this file.
- \* `memchr.c`: Update from the GNU C Library (CVS Head 2001-07-06).
- \* `stpcpy.c`: Update from the GNU C Library (CVS Head 2004-10-10).
- \* `ath.c`, `ath-compat.c`, `ath.h`, `ath-pth.c`, `ath-pth-compat.c`, `ath-pthread.c`, `ath-pthread-compat.c`, `context.h`, `conversion.c`, `data.c`, `data-compat.c`, `data-fd.c`, `data.h`, `data-mem.c`,

data-stream.c, data-user.c, debug.c, debug.h, decrypt.c,  
decrypt-verify.c, delete.c, edit.c, encrypt.c, encrypt-sign.c,  
engine-backend.h, engine.c, engine-gpgsm.c, engine.h, error.c,  
export.c, genkey.c, get-env.c, gpgme.c, gpgme.h, import.c, io.h,  
key.c, keylist.c, mkstatus, Makefile.am, ops.h, op-support.c,  
passphrase.c, posix-io.c, posix-sema.c, posix-util.c, progress.c,  
runggpg.c, sema.h, sign.c, signers.c, trust-item.c, trustlist.c,  
util.h, verify.c, version.c, w32-io.c, w32-sema.c, w32-util.c,  
wait.c, wait-global.c, wait.h, wait-private.c, wait-user.c: Change  
license to LGPL.

2004-12-07 Marcus Brinkmann <marcus@g10code.de>

\* libgpgme.vers  
(GPGME\_1.1): New version.  
\* engine-backend.h (struct engine\_ops): Add argument FILE\_NAME to  
member get\_version(). Add arguments FILE\_NAME and HOME\_DIR to  
member new(). Change return type of get\_file\_name and get\_version  
to char \*.  
\* engine-gpgsm.c (gpgsm\_get\_version): Change return type to char  
pointer. Do not cache result.  
(gpgsm\_new): Add file\_name and home\_dir argument, and use them  
instead of the defaults, if set.  
\* runpgg.c (struct engine\_gpg): New member file\_name.  
(gpg\_get\_version): Change return type to char pointer, and do not  
cache result.  
(gpg\_release): Free gpg->file\_name.  
(gpg\_new): Take new arguments file\_name and home\_dir. Set the  
--homedir argument if HOME\_DIR is not NULL. Set gpg->file\_name.  
(start): Use gpg->file\_name instead \_gpgme\_get\_gpg\_path, if set.  
\* engine.h (\_gpgme\_engine\_info\_copy, \_gpgme\_engine\_info\_release):  
New prototypes.  
(\_gpgme\_engine\_new): Change first argument to gpgme\_engine\_info\_t  
info.  
\* engine.c: Include <assert.h>.  
(gpgme\_get\_engine\_info):  
Set \*INFO within the lock. Move  
ENGINE\_INFO and ENGINE\_INFO\_LOCK to ....  
(engine\_info, engine\_info\_lock): ... here. New static variables.  
(engine\_get\_version): Add file\_name argument to  
get\_version invocation. Change return type to char pointer.  
(gpgme\_engine\_check\_version): Rewritten to free() the return value  
of engine\_get\_version after using it.  
(\_gpgme\_engine\_info\_release): New function.  
(gpgme\_get\_engine\_info): Rewritten.  
(\_gpgme\_engine\_info\_copy): New function.  
(\_gpgme\_set\_engine\_info): New function.  
(gpgme\_set\_engine\_info): New function.

(`_gpgme_engine_new`): Change first argument to `gpgme_engine_info_t` info, and use that.

\* `gpgme.h` (struct `_gpgme_engine_info`): Change type of `file_name` and `version` to `char *` (remove the `const`). New member `home_dir`.

(`gpgme_set_engine_info`, `gpgme_ctx_get_engine_info`, `gpgme_ctx_set_engine_info`): New prototypes.

\* `context.h` (struct `gpgme_context`): New member `engine_info`.

\* `gpgme.c` (`gpgme_new`): Allocate `CTX->engine_info`.

(`gpgme_release`):

Deallocate `CTX->engine_info`.

(`gpgme_ctx_get_engine_info`, `gpgme_ctx_set_engine_info`): New functions.

\* `op-support.c` (`_gpgme_op_reset`): Look for correct engine info and pass it to `_gpgme_engine_new`.

\* `version.c` (`gpgme_check_version`): Adjust to

`_gpgme_compare_versions` returning an `int`.

(`_gpgme_compare_versions`): Return an `int` value, not a `const char` pointer.

\* `ops.h` (`_gpgme_compare_versions`): Same for prototype.

2004-10-03 Marcus Brinkmann <marcus@g10code.de>

\* `verify.c` (`parse_trust`): If no reason is provided, set

`SIG->validity_reason` to 0.

(`calc_sig_summary`): Set `GPGME_SIGSUM_CRL_TOO_OLD` if appropriate.

2004-10-22 Marcus Brinkmann <marcus@g10code.de>

\* `engine-gpgsm.c` (`map_assuan_error`): Return 0 if `ERR` is 0.

(`start`): Call `map_assuan_error` on return value of `assuan_write_line`.

2004-10-05 Marcus Brinkmann <marcus@g10code.de>

\* `op-support.c` (`_gpgme_op_data_lookup`): Use `char` pointer for pointer arithmetic.

2004-09-30 Marcus Brinkmann

<marcus@g10code.de>

\* `gpgme.m4`: Implement the `--api-version` check.

\* `rungpg.c` (`read_status`): Move the polling of the output data pipe to just before removing the command `fd`, from just before adding it. This avoids buffering problems.

\* `data.c` (`_gpgme_data_inbound_handler`): Use `_gpgme_io_read`, not `read`, to improve debug output.

2004-09-29 Marcus Brinkmann <marcus@g10code.de>

\* gpgme.h (GPGME\_IMPORT\_NEW, GPGME\_IMPORT\_UID, GPGME\_IMPORT\_SIG, GPGME\_IMPORT\_SUBKEY, GPGME\_IMPORT\_SECRET, (GPGME\_KEYLIST\_MODE\_LOCAL, GPGME\_KEYLIST\_MODERN\_EXTERN, GPGME\_KEYLIST\_MODE\_SIGS, GPGME\_KEYLIST\_MODE\_VALIDATE): Change from enum to macros.  
(gpgme\_keylist\_mode\_t): Define as unsigned int.  
(gpgme\_key\_t): Change type of keylist\_mode to gpgme\_keylist\_mode\_t.

2004-09-23 Marcus Brinkmann <marcus@g10code.de>

\* data.c (\_gpgme\_data\_outbound\_handler): Close the file descriptor if we get an EPIPE.

\* data-stream.c (stream\_seek): Call ftello and return the current offset.

\* data.h (struct gpgme\_data): Change type of data.mem.offset to off\_t.

\* data.c (gpgme\_data\_seek): Check dh->cbs->seek callback, not read callback. If SEEK\_CUR, adjust the offset by the pending buffer size. Clear pending buffer on success.

2004-09-14 Marcus Brinkmann <marcus@g10code.de>

\* gpgme.m4: Add copyright notice.

2004-08-18 Marcus Brinkmann <marcus@g10code.de>

\* passphrase.c (\_gpgme\_passphrase\_status\_handler): Always run the status handler.

2004-08-17 Marcus Brinkmann <marcus@g10code.de>

\* runpgp.c (build\_argv): Use --no-sk-comment, not --no-comment.

2004-06-23 Marcus Brinkmann <marcus@g10code.de>

\* key.c (\_gpgme\_key\_append\_name): Make sure tail points to the byte following the uid.  
(\_gpgme\_key\_add\_sig): Likewise. Don't use calloc, but malloc and memset.

2004-06-02 Marcus Brinkmann <marcus@g10code.de>



\* libpgpgme.vers: Remove C-style comment, which is not supported by older binutils.

2004-05-21 Marcus Brinkmann <marcus@g10code.de>

\* gpgme-config.in (Options):  
Support --api-version.

\* libpgpgme.vers: List all gpgme symbols under version GPGME\_1.0.

\* decrypt.c (\_gpgme\_decrypt\_status\_handler): Fix last change.

\* verify.c (parse\_error): Likewise.

\* verify.c (parse\_error): Do not skip location of where token.

\* gpgme.h (gpgme\_status\_code\_t): Add GPGME\_STATUS\_REVKEYSIG.

\* verify.c (\_gpgme\_verify\_status\_handler): Add handling of  
GPGME\_STATUS\_REVKEYSIG.  
(parse\_trust): Likewise.

2004-05-21 Marcus Brinkmann <marcus@g10code.de>

\* gpgme.h (struct \_gpgme\_decrypt\_result): New fields  
wrong\_key\_usage and \_unused.

\* decrypt.c (\_gpgme\_decrypt\_status\_handler): Don't skip over  
character after a matched string, as in a protocol error this  
could skip over the trailing binary zero.  
Handle decrypt.keyusage error notifications.

\* gpgme.h (struct \_gpgme\_key): New member keylist\_mode.

\* keylist.c (keylist\_colon\_handler): Set the keylist\_mode of KEY.

2004-04-29 Marcus Brinkmann <marcus@g10code.de>

\* gpgme.h (struct \_gpgme\_signature):  
Change member WRONG\_KEY\_USAGE  
to unsigned int. Same for member \_unused.

\* keylist.c (set\_mainkey\_trust\_info): Rewritten.  
(set\_subkey\_capability): Handle 'd' (disabled).  
(set\_mainkey\_capability): Rewritten.

2004-04-22 Marcus Brinkmann <marcus@g10code.de>

\* gpgme.m4: Quote first argument to AC\_DEFUN.

2004-04-21 Werner Koch <wk@gnupg.org>

\* key.c (gpgme\_key\_unref): Allow passing NULL like free does.  
The rule of least surprise.

2004-04-15 Werner Koch <wk@gnupg.org>

\* verify.c (prepare\_new\_sig, \_gpgme\_verify\_status\_handler): Remove  
unused result.signatures items.

\* keylist.c (gpgme\_get\_key): Return an error if FPR is NULL.

2004-04-08 Werner Koch <wk@gnupg.org>

\* verify.c (\_gpgme\_verify\_status\_handler): Ignore the error status  
if we can't process it.

\* decrypt-verify.c (decrypt\_verify\_status\_handler): Backed out  
yesterday's hack. It is not any longer required.

2004-04-07 Werner Koch <wk@gnupg.org>

\* decrypt-verify.c (decrypt\_verify\_status\_handler):  
Hack to cope  
with meaningless error codes from the verify status function.

2004-04-05 Werner Koch <wk@gnupg.org>

\* gpgme.h: Add GPGME\_STATUS\_NEWSIG.

\* verify.c (parse\_error): Compare only the last part of the where  
token.

(prepare\_new\_sig): New.

(parse\_new\_sig): Use prepare\_new\_sig when required.

(\_gpgme\_verify\_status\_handler): Handle STATUS\_NEWSIG.

\* engine-gpgsm.c (gpgsm\_keylist\_ext): Send with-validation  
option. Fixed pattern construction.

(status\_handler): Add debugging output.

2004-03-23 Marcus Brinkmann <marcus@g10code.de>

\* engine-gpgsm.c (gpgsm\_new): Protect \_only\_ tty related code with  
isatty(). Submitted by Bernhard Herzog.

2004-03-11 Marcus Brinkmann <marcus@g10code.de>

\* engine-gpgsm.c (gpgsm\_new): Protect all tty related code with  
isatty().

\* `runpgp.c` (`gpg_cancel`): Set `GPG->fd_data_map` to `NULL` after releasing it.  
\* `engine-gpgsm.c` (`gpgsm_cancel`): Only call `assuan_disconnect` if `GPGSM->assuan_ctx` is not `NULL`. Set it to `NULL` afterwards.

2004-03-07

Marcus Brinkmann <marcus@g10code.de>

\* `gpgme-config.in`: Do not emit include and lib directory for prefix `"/usr"` or `""`.

2004-03-03 Werner Koch <wk@gnupg.org>

\* `engine-gpgsm.c` (`gpgsm_export_ext`): Properly insert a space between patterns.

2004-02-18 Werner Koch <wk@gnupg.org>

\* `gpgme-config.in`: Ignore setting of `--prefix`.

2004-02-25 Marcus Brinkmann <marcus@g10code.de>

\* `runpgp.c` (`gpg_cancel`): New function.  
(`gpg_release`): Call it here.  
(`_gpgme_engine_ops_gpg`): Add it here.  
\* `engine-gpgsm.c` (`gpgsm_cancel`): Fix last change.

2004-02-24 Marcus Brinkmann <marcus@g10code.de>

\* `gpgme.c` (`gpgme_cancel`): New function.  
\* `engine-backend.h` (`struct engine_ops`): New member `cancel`.  
\* `engine.h` (`_gpgme_engine_cancel`): New prototype.  
\* `engine.c` (`_gpgme_engine_cancel`): New function.  
\* `engine-gpgsm.c` (`_gpgme_engine_ops_gpgsm`): Add new member `cancel`.  
(`gpgsm_cancel`): New function.  
(`gpgsm_release`): Use it.  
\* `runpgp.c` (`_gpgme_engine_ops_gpg`): Add new member `cancel`.

2004-02-17

Werner Koch <wk@gnupg.org>

\* `gpgme.h`: Add `GPGME_KEYLIST_MODE_VALIDATE`.  
\* `engine-gpgsm.c` (`gpgsm_keylist`): Send this to `gpgsm`.

2004-02-15 Werner Koch <wk@gnupg.org>

\* `memrchr.c` (`memrchr`): Fixed implementation. Problem pointed out by Adriaan de Groot.

2004-02-01 Marcus Brinkmann <marcus@g10code.de>

\* `rungpg.c` (`build_argv`): Use `--no-comment`, not `--comment ""`.

\* `data-compat.c` (`gpgme_data_new_from_filepart`): Call `fseeko` if available.

\* `data-stream.c` (`stream_seek`): Likewise.

2004-01-16 Werner Koch <wk@gnupg.org>

\* `conversion.c` (`_gpgme_map_gnupg_error`): Handle numerical codes as used by GnuPG 1.9.x

2004-01-13 Marcus Brinkmann <marcus@g10code.de>

\* `gpgme.h` (`struct _gpgme_key_sig`): Fix comment on REVOKED.

2004-01-12 Werner Koch <wk@gnupg.org>

\* `sign.c`: Include `util.h` for prototype of `_gpgme_parse_timestamp`.

2003-12-25 Marcus Brinkmann <marcus@g10code.de>

\* `gpgme.h` (`_GPGME_D_CLASS`): Revert this change.

(`struct _gpgme_key_sig`): For C++ compilers, rename class

member to `_obsolete_class`. Add new member `sig_class`.

(`struct _gpgme_new_signature`): Same here.

\* `key.c` (`gpgme_key_sig_get_ulong_attr`): Use `CERTSIG->sig_class`, not `CERTSIG->class`.

\* `keylist.c` (`keylist_colon_handler`): Likewise for `KEYSIG`, but keep setting `KEYSIG->class`, too. Rename variable `CLASS` to `SIG_CLASS`.

\* `sign.c` (`parse_sig_created`): Set `SIG->sig_class`.

2003-12-22 Werner Koch <wk@gnupg.org>

\* `gpgme.h` (`_GPGME_D_CLASS`): Kludge for C++ compatibility without changing the C API.

2003-11-19 Werner Koch <wk@gnupg.org>

\* `conversion.c` (`_gpgme_parse_timestamp`): New.

(`atoi_1`, `atoi_2`, `atoi_4`): New.

\* `keylist.c` (`parse_timestamp`): Removed. Changed all callers to use the new function.

\* `verify.c` (`parse_valid_sig`): Ditto. Repalced the `errno` check.

\* `sign.c` (`parse_sig_created`): Ditto.

2003-10-31 Werner Koch <wk@gnupg.org>

\* keylist.c (parse\_timestamp): Detect ISO 8601 timestamps and try to convert them.

2003-10-10 Marcus Brinkmann <marcus@g10code.de>

\*

genkey.c (get\_key\_parameter): Make a copy of the key parameters.  
Submitted by Miguel Coca <e970095@zipi.fi.upm.es>.

2003-10-06 Marcus Brinkmann <marcus@g10code.de>

\* data-compat.c: Include <sys/time.h> before <sys/stat.h> for broken systems.

\* engine-gpgsm.c (map\_assuan\_error): If ERR is -1, return sensible error.

\* io.h (\_gpgme\_io\_subsystem\_init): New prototype.

\* posix-io.c (\_gpgme\_io\_subsystem\_init): Add function.

(\_gpgme\_io\_spawn): Do not fixup signal handler here.

\* version.c (do\_subsystem\_inits): Call \_gpgme\_io\_subsystem\_init.

\* debug.c (debug\_init): Drop const qualifier from E.

\* ath.h (struct ath\_ops): Make ADDR argument of CONNECT prototype const.

(ath\_connect): Make ADDR argument const.

\* ath-pthread.c (ath\_connect): Likewise.

\* ath-pth.c (ath\_connect): Likewise.

\* ath-compat.c (ath\_connect): Likewise.

\* ath.c (ath\_connect): Likewise.

\* ath.h [HAVE\_SYS\_SELECT\_H]: Include <sys/select.h> for fd\_set.

[!HAVE\_SYS\_SELECT\_H]: Include <sys/time.h>.

\*

conversion.c (\_gpgme\_hextobyte): Drop "unsigned" from type of SRC argument.

\* util.h (\_gpgme\_hextobyte): Likewise for prototype.

\* gpgme.h: Remove trailing comma in enum.

\* runpgg.c: Do not include <time.h>, <sys/time.h>, <sys/types.h>, <signal.h>, <fcntl.h>, or "unistd.h".

2003-10-02 Marcus Brinkmann <marcus@g10code.de>

- \* engine-backend.h (struct engine\_ops): Add argument TYPE.
- \* engine.c (\_gpgme\_engine\_op\_edit): Likewise.
- \* engine.h: Likewise.
- \* runpgg.c (gpg\_edit): Likewise. Use it.
- \* edit.c (edit\_start): Likewise. Pass it on.
- (gpgme\_op\_edit\_start, gpgme\_op\_edit): Likewise.
- (gpgme\_op\_card\_edit\_start, gpgme\_op\_card\_edit): New functions.

2003-09-30 Marcus Brinkmann <marcus@g10code.de>

- \* gpgme.h (gpg\_strerror\_r): Change prototype to match gpg\_strerror\_r change.
- \* error.c (gpg\_strerror\_r): Likewise, also update implementation.
- \* gpgme.c (gpgme\_hash\_algo\_name): Change name of RMD160 to RIPEMD160, name of TIGER to TIGER192, name of CRC32-RFC1510 to CRC32RFC1510, and name of CRC24-RFC2440 to CRC24RFC2440.

2003-09-14 Marcus Brinkmann <marcus@g10code.de>

- \* gpgme.h: Add prototype for gpgme\_set\_locale.
- \* gpgme.h: Define macro \_GPGME\_INLINE depending on the compiler characteristics and use that instead \_\_inline\_\_.
- \* context.h (struct gpgme\_context): New members lc\_ctype and lc\_messages.
- \* gpgme.c: Include <locale.h>.
- (def\_lc\_lock, def\_lc\_ctype, def\_lc\_messages): New static variables.
- (gpgme\_set\_locale): New function.
- \* engine.c (\_gpgme\_engine\_new): Add arguments lc\_ctype and lc\_messages.
- \* engine.h (\_gpgme\_engine\_new): Likewise.
- \* engine-gpgsm.c (gpgsm\_new): Likewise.
- \* runpgg.c (gpg\_new): Likewise.
- \* engine-backend.h (struct engine\_ops): Likewise to NEW.
- \* op-support.c (\_gpgme\_op\_reset): Likewise to invocation of \_gpgme\_engine\_new.

2003-09-13 Marcus Brinkmann <marcus@g10code.de>

- \* gpgme.h (gpgme\_strerror\_r): New prototype.
- \* error.c (gpgme\_strerror\_r): New function.

- \* get-env.c: New file.
- \* util.h (`_gpgme_getenv`):  
Add prototype.
- \* Makefile.am (`libgpgme_real_la_SOURCES`): Add get-env.c.
- \* runpgg.c (`build_argv`): Use `_gpgme_getenv`.
- \* debug.c (`debug_init`): Likewise.
- \* engine-gpgsm.c (`gpgsm_new`): Likewise.  
(`gpgsm_new`): Use `ttname_r`.
- \* w32-io.c (`_gpgme_io_spawn`): Disable debugging for now.

2003-09-03 Marcus Brinkmann <marcus@g10code.de>

- \* gpgme-config.in: Use `$libdir`, not `@libdir@`, for the echo command.

- \* gpgme-config.in: Rewritten.
- \* gpgme.m4: Rewritten.

2003-08-19 Marcus Brinkmann <marcus@g10code.de>

The ath files (`ath.h`, `ath.c`, `ath-pth.c`, `ath-pthread.c`, `ath-compat.c`, `ath-pth-compat.c` and `ath-pthread-compat.c`) have been updated to have better thread support, and the Makefile.am was changed to reflect that.

- \* util.h [`!HAVE_FOPENCOOKIE`]: Remove `fopencookie` declaration.
- \* engine-gpgsm.c (`gpgsm_assuan_simple_command`): Set `ERR` to return value of `status_fnc`.
- \* runpgg.c (`start`): Return `SAVED_ERRNO`, not `errno`.

2003-08-18 Marcus Brinkmann <marcus@g10code.de>

- \* runpgg.c (`start`):  
Use `saved_errno` instead `errno`.

2003-08-18 Marcus Brinkmann <marcus@g10code.de>

- \* `funopen.c`, `putc_unlocked.c`, `isascii.c`, `memrchr.c`: New files.
- \* `fopencookie.c`: File removed.

2003-08-15 Marcus Brinkmann <marcus@g10code.de>

- \* gpgme-config.in: Put `gpg-error` related flags after `gpgme's`.

2003-08-14 Marcus Brinkmann <marcus@g10code.de>

- \* gpgme.h (`struct _gpgme_new_signature`): Rename member `CLASS` to `_OBSOLETE_CLASS`, add member `CLASS` with type `unsigned int`.

\* sign.c (parse\_sig\_created): Also set SIG->\_unused\_class for backward compatibility.

2003-08-04 Marcus Brinkmann <marcus@g10code.de>

\* verify.c (parse\_new\_sig): Fix status parsing case.

2003-07-31 Marcus Brinkmann <marcus@g10code.de>

\* gpgme.h (struct \_gpgme\_subkey): Add flag CAN\_AUTHENTICATE. Lower \_UNUSED to 23 bits.

(struct \_gpgme\_key): Likewise.

\* keylist.c (set\_mainkey\_capability): Support 'a' and 'A'.

(set\_subkey\_capability): Support 'a'.

\* keylist.c (gpgme\_get\_key): Check if there is more than one key listed, and return GPG\_ERR\_AMBIGUOUS\_NAME in that case.

\* util.h (\_gpgme\_decode\_c\_string): Change type of LEN argument to size\_t.

(\_gpgme\_decode\_percent\_string): Likewise.

\* conversion.c (\_gpgme\_decode\_c\_string): Likewise.

(\_gpgme\_decode\_percent\_string): Likewise.

(\_gpgme\_map\_gnupg\_error): Change type of I to unsigned int.

\* signers.c (gpgme\_signers\_clear): Likewise.

(gpgme\_signers\_enum): New unsigned variable SEQNO, set to SEQ. Use SEQNO instead SEQ.

\* wait.c (fd\_table\_put): Change type of I and J to unsigned int.

\* wait-global.c (\_gpgme\_wait\_global\_event\_cb): Change type of IDX to unsigned int.

(gpgme\_wait): Change type of I and IDX to unsigned int.

\* wait-private.c (\_gpgme\_wait\_on\_condition): Change type of IDX and I to unsigned int.

\* posix-io.c (\_gpgme\_io\_close): Cast return value of macro DIM to int to suppress gcc warning.

(\_gpgme\_io\_set\_close\_notify): Likewise.

(\_gpgme\_io\_select): Change type of I to unsigned int.

\* engine.c (gpgme\_get\_engine\_info):

Change type of PROTO to unsigned int.

\* wait-user.c (\_gpgme\_user\_io\_cb\_handler): Change type of IDX and I to unsigned int.

2003-07-29 Marcus Brinkmann <marcus@g10code.de>

\* decrypt-verify.c (decrypt\_verify\_status\_handler): Expand silly and wrong expression.



- \* encrypt-sign.c (encrypt\_sign\_status\_handler): Likewise.
- \* encrypt.c (encrypt\_sym\_status\_handler): Likewise.
- \* sign.c (sign\_status\_handler): Likewise.
- \* verify.c (verify\_status\_handler): Likewise.
- \* decrypt.c (decrypt\_status\_handler): Likewise.

- \* engine.c (gpgme\_get\_engine\_info): Initialize NULL.

2003-07-23 Marcus Brinkmann <marcus@g10code.de>

- \* gpgme-config.in (gpg\_error\_libs): Quote GPG\_ERROR\_CFLAGS and GPG\_ERROR\_LIBS when setting the corresponding variables.

Reported by Stphane Corthsy.

2003-07-22 Marcus Brinkmann <marcus@g10code.de>

- \* engine-gpgsm.c (set\_recipients): Move declaration of NEWLEN to the beginning of the block.

2003-06-22 Marcus Brinkmann <marcus@g10code.de>

- \* data-mem.c (mem\_write):  
Copy original buffer content.

2003-06-22 Marcus Brinkmann <marcus@g10code.de>

- \* gpgme.h (gpgme\_user\_ids\_release, gpgme\_user\_ids\_append): Remove prototypes.

2003-06-06 Marcus Brinkmann <marcus@g10code.de>

- \* Makefile.am (AM\_CPPFLAGS): Add @GPG\_ERROR\_CFLAGS@.
- \* gpgme-config.in (gpg\_error\_libs, gpg\_error\_cflags): New variables. Print them.

- \* op-support.c (\_gpgme\_parse\_inv\_userid): Rename to \_gpgme\_parse\_inv\_recp and change to new datatype.
- \* ops.h (\_gpgme\_parse\_inv\_key): Fix prototype.
- \* gpgme.h (struct \_gpgme\_invalid\_user\_id): Rename to \_\_gpgme\_invalid\_key. Rename field ID to KEY.
- (gpgme\_invalid\_user\_id\_t): Rename to gpgme\_invalid\_key\_t.
- (struct \_gpgme\_op\_encrypt\_result): Here, too.
- (struct \_gpgme\_op\_sign\_result): Likewise.
- \* encrypt.c (struct op\_data): Likewise.
- (release\_op\_data): Likewise.
- \* sign.c (struct op\_data): Likewise.
- (release\_op\_data): Likewise.

\* posix-io.c (`_gpgme_io_read`): Save `errno` across debug calls.  
(`_gpgme_io_write`): Likewise.  
(`_gpgme_io_pipe`):  
Likewise.  
(`_gpgme_io_select`): Likewise.

\* `runpgg.c` (struct `engine_gpg`): Remove `arg_error`.  
(`add_arg`): Don't set `arg_error`.  
(`add_data`): Likewise.  
(`start`): Don't check `arg_error`.  
(`gpg_new`): Check return value of `add_arg`.  
\* `verify.c` (`parse_notation`): Free allocated memory at error.

2003-06-05 Marcus Brinkmann <marcus@g10code.de>

Everywhere: Use `libgpg-error` error codes.

\* `Makefile.am` (`EXTRA_DIST`): Remove `mkerrors`.  
(`BUILT_SOURCES`): Remove `errors.c`.  
(`MOSTLYCLEANFILES`): Likewise.  
(`libgpgme_la_SOURCES`): Likewise. Add `error.c`.  
(`errors.c`): Remove target.  
\* `mkerrors`: File removed.  
\* `error.c`: New file.  
  
\* `gpgme.h` (`gpgme_error_t`): Change to type `gpg_error_t`.  
(`gpgme_err_code_t`, `gpgme_err_source_t`): New types.  
(`gpgme_err_code`, `gpgme_err_source`, `gpgme_error`, `gpgme_err_make`):  
New static inline functions.  
(`gpgme_strerror`, `gpgme_err_code_from_errno`,  
`gpgme_err_code_to_errno`, `gpgme_err_make_from_errno`,  
`gpgme_error_from_errno`): New prototypes.

2003-05-29 Marcus  
Brinkmann <marcus@g10code.de>

\* `gpgme.h` (`gpgme_op_export_start`): Change second arg to `const char *`.  
(`gpgme_op_export`): Likewise.  
(`gpgme_op_export_ext_start`): New prototype.  
(`gpgme_op_export_ext`): Likewise.  
\* `engine.h`: Likewise for `_gpgme_engine_op_export` and  
`_gpgme_engine_op_export_ext`.  
\* `engine-backend.h` (struct `engine_ops`): Change second argument of  
prototype of `export` to `const char *`, and add reserved `int` as  
third argument. Add prototype for `export_ext`.  
\* `engine.c` (`_gpgme_engine_op_export_ext`): New function.  
(`_gpgme_engine_op_export`): Change second argument of prototype of  
`export` to `const char *`, and add reserved `int` as third argument.

\* `runpgg.c` (`gpg_export`): Change second argument of prototype of `export` to `const char *`, and add reserved `int` as third argument.

(`gpg_export_ext`): New function.

(`gpg_keylist_ext`): Break loop at error.

(`_gpgme_engine_ops_gpg`): Add `gpg_export_ext`.

\* `engine-gpgsm.c` (`gpgsm_export`): Change second argument of prototype of `export` to `const char *`, and add reserved `int` as third argument.

(`gpgsm_export_ext`): New function.

(`_gpgme_engine_ops_gpgsm`): Add `gpgsm_export_ext`.

\* `export.c` (`export_start`): Change second argument of prototype of `export` to `const char *`, and add reserved `int` as third argument.

(`gpgme_op_export_start`): Likewise.

(`export_ext_start`): New function.

(`gpgme_op_export_ext_start`): Likewise.

(`gpgme_op_export_ext`): Likewise.

  

\* `gpgme.h` (`gpgme_keylist_mode_t`): New type for anonymous enum.

(`gpgme_sigsum_t`): New type for anonymous enum.

  

\* `encrypt-sign.c` (`encrypt_sign_start`): Check for errors earlier, and return an error if RECP is not set.

  

\* `Makefile.am` (`libgpgme_la_SOURCES`): Remove `user-id.c`.

\* `user-id.c`: Remove file.

\* `ops.h`: Remove prototype for `_gpgme_user_ids_all_valid`.

\* `gpgme.h` (`gpgme_encrypt_flags_t`): New type.

(`gpgme_op_encrypt_start`): Change second parameter to type `gpgme_key_t[]`, and add third parameter.

(`gpgme_op_encrypt`): Likewise.

(`gpgme_op_encrypt_sign_start`): Likewise.

(`gpgme_op_encrypt_sign`): Likewise.

\* `encrypt.c` (`encrypt_start`): Likewise.

(`gpgme_op_encrypt_start`): Likewise.

(`gpgme_op_encrypt`): Likewise. Pass flags to engine.

\* `encrypt-sign.c` (`encrypt_sign_start`): Likewise.

(`gpgme_op_encrypt_sign_start`): Likewise.

(`gpgme_op_encrypt_sign`): Likewise.

\* `engine-backend.h` (`struct engine_ops`): Likewise for prototypes of `encrypt` and `encrypt_sign`.

\* `engine.h`: Likewise for prototypes of `_gpgme_engine_op_encrypt` and `_gpgme_engine_op_encrypt_sign`.

\* `engine.c` (`_gpgme_engine_op_encrypt`): Likewise.

(`_gpgme_engine_op_encrypt_sign`): Likewise.

\* `runpgg.c` (`gpg_encrypt`): Likewise.

(`gpg_encrypt_sign`): Likewise.

- \* `runpgg.c` (`gpg_encrypt`): Check flags for always trust option.
- \* `engine-gpgsm.c` (`gpgsm_encrypt`): Likewise.
- (`set_recipients`): Rewritten to use keys instead user IDs.
- \* `runpgg.c` (`append_args_from_recipients`): Rewritten to use keys instead user IDs.
- \* `encrypt.c` (`_gpgme_encrypt_status_handler`): Change errors returned to `GPGME_Invalid_Key` and `GPGME_General_Error`.

2003-05-28

Marcus Brinkmann <marcus@g10code.de>

- \* `engine-gpgsm.c`: Rename `GpgsmObject` to `engine_gpgsm_t`.
- (`struct gpgsm_object_s`): Rename to `struct engine_gpgsm`.
- \* `runpgg.c`: Rename `GpgObject` to `engine_gpg_t`.
- (`struct gpg_object_s`): Rename to `struct engine_gpg`.
  
- \* `context.h` (`struct gpgme_context`): Change `EngineObject` to `engine_object_t`.
- (`enum ctx_op_data_type`): Rename to `ctx_op_data_id_t`.
- (`ctx_op_data_t`): New type.
- (`struct gpgme_context`): Use it.
- \* `ops.h` (`_gpgme_op_data_lookup`): Use new type name.
- \* `op-support.c` (`_gpgme_op_data_lookup`): Likewise.
- \* `engine.c`: Rename `EngineObject` to `engine_t` in the file. Also `EngineStatusHandler` to `engine_status_handler_t`, `EngineCommandHandler` to `engine_command_handler_t` and `EngineColonLineHandler` to `engine_colon_line_handler`.
- \* `runpgg.c` (`start`): Likewise.
- \* `engine-gpgsm.c`: Likewise.
- \* `engine-backend.h` (`struct engine_ops`): Likewise
- \* `engine.h` (`struct engine_object_s`): Rename to `struct engine`.
- (`EngineObject`): Rename to `engine_t`. Also everywhere else in the file.
- (`EngineStatusHandler`): Rename to `engine_status_handler_t`.
- (`EngineColonLineHandler`): Rename to `engine_colon_line_handler_t`.
- (`EngineCommandHandler`): Rename to `engine_command_handler_t`.
  
- \* `engine-gpgsm.c` (`gpgsm_export`): Fix bug in last change.
  
- \* `Makefile.am` (`libgpgme_la_SOURCES`): Remove `recipient.c`, add `user-id.c`.
- \* `gpgme.h` (`gpgme_recipients_t`): Removed.
- (`gpgme_recipients_new`, `gpgme_recipients_release`, `gpgme_recipients_add_name`, `gpgme_recipients_add_name_with_validity`, `gpgme_recipients_count`, `gpgme_recipients_enum_open`, `gpgme_recipients_enum_read`, `gpgme_recipients_enum_close`): Removed.

(gpgme\_op\_encrypt, gpgme\_op\_encrypt\_start, gpgme\_op\_encrypt\_sign,  
 gpgme\_op\_encrypt\_sign\_start, gpgme\_op\_export\_start,  
 gpgme\_op\_export): Change second argument to gpgme\_user\_id\_t.  
 (gpgme\_user\_ids\_release): New prototype.  
 (gpgme\_user\_ids\_append): Likewise.  
 \* ops.h (\_gpgme\_recipients\_all\_valid): Remove.  
 (\_gpgme\_user\_ids\_all\_valid): Add.  
 \* context.h  
 (struct gpgme\_recipients): Removed.  
 \* user-id.c: New file.  
 \* recipient.c: Removed file.  
 \* runpgg.c (append\_args\_from\_recipients): Change last arg to  
 gpgme\_user\_id\_t. Reimplement.  
 (gpg\_encrypt): Change second arg to gpgme\_user\_id\_t.  
 (gpg\_encrypt\_sign): Likewise.  
 (gpg\_export): Likewise. Rewrite user ID list code.  
 \* engine.c (\_gpgme\_engine\_op\_encrypt): Change second arg to  
 gpgme\_user\_id\_t.  
 (\_gpgme\_engine\_op\_encrypt\_sign): Likewise.  
 (\_gpgme\_engine\_op\_export): Likewise.  
 \* engine.h (\_gpgme\_engine\_op\_encrypt, \_gpgme\_engine\_op\_encrypt\_sign,  
 \_gpgme\_engine\_op\_export): Likewise.  
 \* engine-gpgsm.c (set\_recipients): Likewise. Rewrite loop code.  
 (gpgsm\_encrypt): Likewise.  
 (gpgsm\_export): Likewise.  
 \* engine-backend.h (struct engine\_ops): Likewise for members  
 ENCRYPT, ENCRYPT\_SIGN and EXPORT.  
 \* export.c (export\_start, gpgme\_op\_export\_start, gpgme\_op\_export):  
 Likewise.  
 \* encrypt.c (encrypt\_start): Likewise. Don't check for count of  
 recipients.  
 (gpgme\_op\_encrypt\_start): Likewise.  
 (gpgme\_op\_encrypt):  
 Likewise.  
 \* encrypt-sign.c (encrypt\_sign\_start): Likewise.  
 (gpgme\_op\_encrypt\_sign): Likewise.  
 (gpgme\_op\_encrypt\_sign\_start): Likewise.

2003-05-27 Marcus Brinkmann <marcus@g10code.de>

\* gpgme.h (struct \_gpgme\_op\_import\_result): Add skipped\_new\_keys.  
 \* import.c (parse\_import\_res): Add skipped\_new\_keys parser.  
  
 \* op-support.c (\_gpgme\_parse\_inv\_userid): Add missing break  
 statements.  
 \* encrypt.c (gpgme\_op\_encrypt): Use gpgme\_error\_t instead of int.

2003-05-27 Marcus Brinkmann <marcus@g10code.de>

- \* encrypt.c (gpgme\_op\_encrypt\_result): Use intermediate variable  
HOOK to avoid compiler warning. Don't ask, you don't want to know.
- (\_gpgme\_encrypt\_status\_handler): Likewise.
- (\_gpgme\_op\_encrypt\_init\_result): Likewise.
- \* decrypt.c (gpgme\_op\_decrypt\_result): Likewise.
- (\_gpgme\_decrypt\_status\_handler): Likewise.
- (\_gpgme\_op\_decrypt\_init\_result): Likewise.
- \* verify.c (gpgme\_op\_verify\_result): Likewise.
- (\_gpgme\_verify\_status\_handler): Likewise.
- (\_gpgme\_op\_verify\_init\_result):  
Likewise.
- \* edit.c (edit\_status\_handler): Likewise.
- (command\_handler): Likewise.
- (edit\_start): Likewise.
- \* genkey.c (gpgme\_op\_genkey\_result): Likewise.
- (genkey\_status\_handler): Likewise.
- (genkey\_start): Likewise.
- \* import.c (gpgme\_op\_import\_result): Likewise.
- (import\_status\_handler): Likewise.
- (\_gpgme\_op\_import\_start): Likewise.
- \* trustlist.c (gpgme\_op\_trustlist\_next): Likewise.
- (\_gpgme\_op\_trustlist\_event\_cb): Likewise.
- (gpgme\_op\_trustlist\_start): Likewise.
- \* keylist.c (gpgme\_op\_keylist\_result): Likewise.
- (keylist\_colon\_handler): Likewise.
- (keylist\_status\_handler): Likewise.
- (\_gpgme\_op\_keylist\_event\_cb): Likewise.
- (gpgme\_op\_keylist\_start): Likewise.
- (gpgme\_op\_keylist\_ext\_start): Likewise.
- (gpgme\_op\_keylist\_next): Likewise.
- \* passphrase.c (\_gpgme\_passphrase\_status\_handler): Likewise.
- (\_gpgme\_passphrase\_command\_handler\_internal): Likewise.
- \* sign.c (gpgme\_op\_sign\_result): Likewise.
- (\_gpgme\_sign\_status\_handler): Likewise.
- (\_gpgme\_op\_sign\_init\_result):  
Likewise.
  
- \* passphrase.c (\_gpgme\_passphrase\_command\_handler\_internal): Fix  
access to pointer type.

2003-05-26 Marcus Brinkmann <marcus@g10code.de>

- \* engine.h (EngineCommandHandler): Change last argument to int fd.
- \* gpgme.h (gpgme\_passphrase\_cb\_t): Rewritten to take parts of the  
description and fd.
- (gpgme\_edit\_cb\_t): Change last argument to int fd.
- \* ops.h (\_gpgme\_passphrase\_command\_handler\_internal): New prototype.

\* passphrase.c: Include <assert.h>.

(op\_data\_t): Rename userid\_hint to uid\_hint, remove last\_pw\_handle.

(release\_op\_data): Check values before calling free.

(\_gpgme\_passphrase\_status\_handler): Likewise.

(\_gpgme\_passphrase\_command\_handler\_internal): New function.

(\_gpgme\_passphrase\_command\_handler): Rewritten.

\* edit.c (edit\_status\_handler): Pass -1 as fd argument.

(command\_handler): Update prototype. New variable processed. Use it to store return value of \_gpgme\_passphrase\_command\_handler\_internal which is now used instead \_gpgme\_passphrase\_command\_handler.

Use it also to check if we should call the user's edit function. Pass fd to user's edit function.

\* runpgg.c (struct gpg\_object\_s): Change type of cmd.cb\_data to void \*.

(gpg\_release): Check value before calling free. Do not release cmd.cb\_data.

(command\_cb): Function removed.

(command\_handler): New function. Thus we don't use a data object for command handler stuff anymore, but handle it directly. This allows proper error reporting (cancel of passphrase requests, for example). Also all callbacks work via direct writes to the file descriptor (so that passphrases are not kept in insecure memory).

(gpg\_set\_command\_handler): Rewritten to use even more ugly hacks.

(read\_status): Check cmd.keyword before calling free. Install command\_handler as the I/O callback handler with GPG as private data.

\* runpgg.c (gpg\_new): Add --enable-progress-filter to gpg invocation.

\* decrypt-verify.c (\_gpgme\_op\_decrypt\_verify\_start): Rename to decrypt\_verify\_start.

(gpgme\_op\_decrypt\_verify\_start): Call decrypt\_verify\_start.

(gpgme\_op\_decrypt\_verify): Likewise.

\* verify.c (verify\_status\_handler): New function that also calls progress status handler.

(\_gpgme\_op\_verify\_start): Set status handler to verify\_status\_handler. Rename to (verify\_start).

(gpgme\_op\_verify\_start): Call verify\_start.

(gpgme\_op\_verify): Likewise.

\* encrypt.c (encrypt\_status\_handler): New function.

(\_gpgme\_encrypt\_sym\_status\_handler): Call progress status handler. Make static. Rename to encrypt\_sym\_status\_handler.

(encrypt\_start): Set status handler to encrypt\_sym\_status\_handler or encrypt\_status\_handler.

\* sign.c (sign\_status\_handler): New function.

(sign\_start): Set status handler to sign\_status\_handler.  
\* decrypt.c (decrypt\_status\_handler): New function that also calls progress status handler.  
(decrypt\_start): Set status handler to decrypt\_status\_handler.  
\* encrypt-sign.c (encrypt\_sign\_status\_handler): Likewise.  
\* decrypt-verify.c (decrypt\_verify\_status\_handler):  
Call  
\_gpgme\_progress\_status\_handler.  
  
\* conversion.c (\_gpgme\_decode\_c\_string): Add missing break statement.  
  
\* recipient.c (gpgme\_recipients\_add\_name\_with\_validity): Add one to buffer to allocate.

2003-05-19 Marcus Brinkmann <marcus@g10code.de>

\* verify.c (parse\_new\_sig): Fix ERRSIG case.  
Submitted by Benjamin Lee <benjaminlee@users.sf.net>.

2003-05-18 Marcus Brinkmann <marcus@g10code.de>

\* gpgme.h: The following types are renamed. The old name is kept as a deprecated typedef.  
(GpgmeCtx): Rename to gpgme\_ctx\_t.  
(GpgmeData): Rename to gpgme\_data\_t.  
(GpgmeRecipients): Rename to gpgme\_recipients\_t.  
(GpgmeError): Rename to gpgme\_error\_t.  
(GpgmeDataEncoding): Rename to gpgme\_data\_encoding\_t.  
(GpgmePubKeyAlgo): Rename to gpgme\_pubkey\_algo\_t.  
(GpgmeHashAlgo): Rename to gpgme\_hash\_algo\_t.  
(GpgmeSigStat): Rename to gpgme\_sig\_stat\_t.  
(GpgmeSigMode): Rename to gpgme\_sig\_mode\_t.  
(GpgmeAttr): Rename to gpgme\_attr\_t.  
(GpgmeValidity): Rename to gpgme\_validity\_t.  
(GpgmeProtocol):  
Rename to gpgme\_protocol\_t.  
(GpgmeStatusCode): Rename to gpgme\_status\_code\_t.  
(GpgmeEngineInfo): Rename to gpgme\_engine\_info\_t.  
(GpgmeSubkey): Rename to gpgme\_subkey\_t.  
(GpgmeKeySig): Rename to gpgme\_keysig\_t.  
(GpgmeUserID): Rename to gpgme\_user\_id\_t.  
(GpgmePassphraseCb): Rename to gpgme\_passphrase\_cb\_t.  
(GpgmeProgressCb): Rename to gpgme\_progress\_cb\_t.  
(GpgmeEditCb): Rename to gpgme\_edit\_cb\_t.  
(GpgmeIOCb): Rename to gpgme\_io\_cb\_t.  
(GpgmeRegisterIOCb): Rename to gpgme\_register\_io\_cb\_t.  
(GpgmeRemoveIOCb): Rename to gpgme\_remove\_io\_cb\_t.



(GpgmeEventIO): Rename to gpgme\_event\_io\_t.  
 (GpgmeEventIOCb): Rename to gpgme\_event\_io\_cb\_t.  
 (GpgmeIOCbs): Rename to gpgme\_io\_cbs.  
 (gpgme\_io\_cbs\_t): New type.  
 (GpgmeDataReadCb): Rename to gpgme\_data\_read\_cb\_t.  
 (GpgmeDataWriteCb): Rename to gpgme\_data\_write\_cb\_t.  
 (GpgmeDataSeekCb): Rename to gpgme\_data\_seek\_cb\_t.  
 (GpgmeDataReleaseCb): Rename to gpgme\_data\_release\_cb\_t.  
 (GpgmeDataCbs): Rename to gpgme\_data\_cbs.  
 (gpgme\_data\_cbs\_t):  
 New type.  
 (GpgmeInvalidUserID): Rename to gpgme\_invalid\_user\_id\_t.  
 (GpgmeEncryptResult): Rename to gpgme\_encrypt\_result\_t.  
 (GpgmeDecryptResult): Rename to gpgme\_decrypt\_result\_t.  
 (GpgmeNewSignature): Rename to gpgme\_new\_signature\_t.  
 (GpgmeSignResult): Rename to gpgme\_sign\_result\_t.  
 (GpgmeSigNotation): Rename to gpgme\_sig\_notation\_t.  
 (GpgmeSignature): Rename to gpgme\_signature\_t.  
 (GpgmeVerifyResult): Rename to gpgme\_verify\_result\_t.  
 (GpgmeImportStatus): Rename to gpgme\_import\_status\_t.  
 (GpgmeImportResult): Rename to gpgme\_import\_result\_t.  
 (GpgmeGenKeyResult): Rename to gpgme\_genkey\_result\_t.  
 (GpgmeKeyListResult): Rename to gpgme\_keylist\_result\_t.  
 (GpgmeTrustItem): Rename to gpgme\_trust\_item\_t.  
 \* gpgme.h (gpgme\_deprecated\_error\_t): New type, swallowing macros  
 GPGME\_No\_Recipients, GPGME\_Invalid\_Recipient and  
 GPGME\_No\_Passphrase.  
 \* data.h (struct gpgme\_data\_s): Rename to struct gpgme\_data.  
 \* context.h (struct gpgme\_context\_s): Rename to struct  
 gpgme\_context.  
 (struct  
 gpgme\_recipients\_s): Rename to gpgme\_recipients.

2003-05-18 Marcus Brinkmann <marcus@g10code.de>

\* keylist.c (finish\_key): Clear OPD->tmp\_uid.

2003-05-18 Marcus Brinkmann <marcus@g10code.de>

\* verify.c (\_gpgme\_verify\_status\_handler): Return GPGME\_No\_Data  
 for NODATA status without signatures.

2003-05-05 Marcus Brinkmann <marcus@g10code.de>

\* key.c (\_gpgme\_key\_append\_name): Use decoded string to parse user id.  
 (\_gpgme\_key\_add\_sig): Likewise.

2003-05-04 Marcus Brinkmann <marcus@g10code.de>

\* context.h (struct gpgme\_context\_s): Remove member op\_info.

\* key.c (\_gpgme\_key\_add\_sig): Initialize SIG->uid.

\* gpgme.h (GpgmeError): Add deprecated values for GPGME\_Invalid\_Type and GPGME\_Invalid\_Mode.

2003-04-30 Marcus Brinkmann <marcus@g10code.de>

\* gpgme.h (gpgme\_get\_op\_info): Remove prototype.

\* ops.h (\_gpgme\_set\_op\_info,  
\_gpgme\_data\_release\_and\_return\_string, \_gpgme\_data\_get\_as\_string,  
\_gpgme\_data\_append, \_gpgme\_data\_append\_string,  
\_gpgme\_data\_append\_string\_for\_xml,  
\_gpgme\_data\_append\_for\_xml,  
\_gpgme\_data\_append\_percentstring\_for\_xml): Likewise.  
(\_gpgme\_progress\_status\_handler): Change first arg to void \*.

\* progress.c (\_gpgme\_progress\_status\_handler): Likewise.

\* conversion.c: Do not include <string.h>, <errno.h>, <ctype.h>,  
and <sys/types.h>, but <string.h>.

(\_gpgme\_data\_append): Remove function.

(\_gpgme\_data\_append\_string): Likewise.

(\_gpgme\_data\_append\_for\_xml): Likewise.

(\_gpgme\_data\_append\_string\_for\_xml): Likewise.

(\_gpgme\_data\_append\_percentstring\_for\_xml): Likewise.

\* data-mem.c (\_gpgme\_data\_get\_as\_string): Likewise.

(\_gpgme\_data\_release\_and\_return\_string): Likewise.

\* gpgme.c (gpgme\_get\_op\_info): Likewise.

(\_gpgme\_set\_op\_info): Likewise.

\* gpgme.h (struct \_gpgme\_key): New structure.

(GpgmeKey): Define using \_gpgme\_key.

(struct \_gpgme\_subkey): New structure.

(GpgmeSubKey): New type.

(struct \_gpgme\_key\_sig): New structure.

(GpgmeKeySig): New type.

(struct \_gpgme\_user\_id): New structure.

(GpgmeUserID):

New type.

(struct \_gpgme\_op\_keylist\_result): New structure.

(GpgmeKeyListResult): New type.

(gpgme\_op\_keylist\_result): New function.

(gpgme\_key\_get\_as\_xml): Remove prototype.

\* context.h (struct gpgme\_context\_s): Remove members tmp\_key,  
tmp\_uid, key\_cond and key\_queue.

(struct key\_queue\_item\_s): Remove structure.

(struct user\_id\_s): Remove structure.

(struct gpgme\_recipients\_s): Replace with simple GpgmeUserID list.

- \* gpgme.c (gpgme\_release): Do not release CTX->tmp\_key.
- \* ops.h (\_gpgme\_key\_add\_subkey, \_gpgme\_key\_append\_name, \_gpgme\_key\_add\_sig, \_gpgme\_trust\_item\_new): New prototypes.
- \* runpg.c (command\_cb): Return GpgmeError instead int.

New variable ERR. Use it to hold return value of cmd handler.

(gpg\_delete): Access fingerprint of key directly.

(append\_args\_from\_signers): Likewise.

(gpg\_edit): Likewise.

(append\_args\_from\_recipients): Use GpgmeUserID for recipient list.

- \* engine-gpgsm.c: Do not include "key.h".

(gpgsm\_delete): Access fingerprint of key directly.

(gpgsm\_sign): Likewise.

(set\_recipients): Use GpgmeUserID for recipients. Invert invalid user ID flag.

- \* key.h: File removed.
- \* key.c: Completely reworked to use exposed GpgmeKey data types.
- \* keylist.c: Likewise.
- \* recipient.c: Completely reworked to use GpgmeUserID.

2003-04-29 Marcus Brinkmann <marcus@g10code.de>

- \* gpgme.h (gpgme\_get\_key): Remove force\_update argument.
- \* key-cache.c: File removed.
- \* Makefile.am (libgpgme\_la\_SOURCES): Remove key-cache.c.
- \* ops.h (\_gpgme\_key\_cache\_add, \_gpgme\_key\_cache\_get): Remove prototypes.
- \* keylist.c (\_gpgme\_op\_keylist\_event\_cb): Don't call \_gpgme\_key\_cache\_add.

(gpgme\_get\_key): New function.

- \* verify.c (gpgme\_get\_sig\_key): Remove last argument to gpgme\_get\_key invocation.

  

- \* gpgme.h (struct \_gpgme\_trust\_item): New structure.

(GpgmeTrustItem): New type.

(gpgme\_trust\_item\_ref, gpgme\_trust\_item\_unref): New prototypes.

- \* context.h (struct trust\_queue\_item\_s): Remove structure.

(struct gpgme\_context\_s): Remove trust\_queue member.

- \* Makefile.am (libgpgme\_la\_SOURCES): Add trust-item.c.
- \* trust-item.c: New file.
- \* trustlist.c: Do not include <stdio.h> or <time.h>, but "gpgme.h".

(struct trust\_queue\_item\_s): Change to new type op\_data\_t.

(trust\_status\_handler): Change first argument to void \*.

(trust\_colon\_handler): Likewise.

(\_gpgme\_op\_trustlist\_event\_cb): Use op\_data\_t type.  
 (gpgme\_op\_trustlist\_start): Use op\_data\_t and rework error handling.  
 (gpgme\_op\_trustlist\_next): Use op\_data\_t.  
 (gpgme\_trust\_item\_release): Remove function.  
 (gpgme\_trust\_item\_get\_string\_attr): Likewise.  
 (gpgme\_trust\_item\_get\_int\_attr): Likewise.

\* verify.c (calc\_sig\_summary): Do not set GPGME\_SIGSUM\_SYS\_ERROR for bad signatures.

2003-04-28 Marcus Brinkmann <marcus@g10code.de>

\* context.h: Remove OPDATA\_VERIFY\_COLLECTING.  
 (struct gpgme\_context\_s): Remove member notation.  
 \* gpgme.h: Make enum for GPGME\_KEYLIST\_MODE\_\* values.

\* gpgme.h (struct \_gpgme\_sig\_notation): New structure.  
 (GpgmeSigNotation): New type.  
 (struct \_gpgme\_signature): New structure.  
 (GpgmeSignature): New type.  
 (struct \_gpgme\_op\_verify\_result): New structure.  
 (GpgmeVerifyResult): New type.  
 (gpgme\_op\_verify\_result): New prototype.  
 (gpgme\_get\_notation): Remove prototype.  
 \* ops.h (\_gpgme\_op\_verify\_init\_result): New prototype.  
 (\_gpgme\_verify\_status\_handler): Change first argument to void \*.  
 \* util.h (\_gpgme\_decode\_percent\_string, \_gpgme\_map\_gnupg\_error):  
 New prototypes.  
 \* conversion.c (\_gpgme\_decode\_percent\_string): New function.  
 (gnupg\_errors): New static global.  
 (\_gpgme\_map\_gnupg\_error): New function.  
 \* gpgme.c (gpgme\_release): Don't release CTX->notation.  
 (gpgme\_get\_notation): Remove function.  
 \* decrypt-verify.c (\_gpgme\_op\_decrypt\_verify\_start): Call \_gpgme\_op\_verify\_init\_result.  
 \* verify.c: Do not include <stdio.h>, <assert.h> and "key.h", but do include "gpgme.h".  
 (struct verify\_result): Replace with ...  
 (op\_data\_t): ... this type.  
 (release\_verify\_result): Remove function.  
 (release\_op\_data):  
 New function.  
 (is\_token): Remove function.  
 (skip\_token): Remove function.  
 (copy\_token): Remove function.  
 (gpgme\_op\_verify\_result): New function.

(calc\_sig\_summary): Rewritten.  
 (finish\_sig): Remove function.  
 (parse\_new\_sig): New function.  
 (parse\_valid\_sig): New function.  
 (parse\_notation): New function.  
 (parse\_trust): New function.  
 (parse\_error): New function.  
 (\_gpgme\_verify\_status\_handler): Rewritten. Change first argument to void \*.  
 (\_gpgme\_op\_verify\_start): Rework error handling. Call \_gpgme\_op\_verify\_init\_result.  
 (gpgme\_op\_verify): Do not release or clear CTX->notation.  
 (gpgme\_get\_sig\_status): Rewritten.  
 (gpgme\_get\_sig\_string\_attr): Likewise.  
 (gpgme\_get\_sig\_ulong\_attr): Likewise.  
 (gpgme\_get\_sig\_key): Likewise.

\* gpgme.h (struct \_gpgme\_op\_decrypt\_result): New structure.  
 (GpgmeDecryptResult): New type.  
 (gpgme\_op\_decrypt\_result): New prototype.  
 \* ops.h (\_gpgme\_op\_decrypt\_init\_result): New prototype.  
 (\_gpgme\_decrypt\_status\_handler): Fix prototype.  
 (\_gpgme\_decrypt\_start):  
 Remove prototype.  
 \* decrypt-verify.c: Do not include <stdio.h>, <stdlib.h>, <string.h> and <assert.h>, "util.h" and "context.h", but "gpgme.h".  
 (decrypt\_verify\_status\_handler): Change first argument to void \*, and rework error handling.  
 (\_gpgme\_op\_decrypt\_verify\_start): New function.  
 (gpgme\_op\_decrypt\_verify\_start): Rewrite using \_gpgme\_op\_decrypt\_verify\_start.  
 (gpgme\_op\_decrypt\_verify): Likewise.  
 \* decrypt.c: Include <string.h>, "gpgme.h" and "util.h".  
 (struct decrypt\_result): Change to typedef op\_data\_t, rewritten.  
 (is\_token): Remove function.  
 (release\_op\_data): New function.  
 (skip\_token): Remove function.  
 (gpgme\_op\_decrypt\_result): New function.  
 (\_gpgme\_decrypt\_status\_handler): Change first argument to void \*. Rework error handling.  
 (\_gpgme\_decrypt\_start): Rename to ...  
 (decrypt\_start): ... this. Call \_gpgme\_op\_decrypt\_init\_result.  
 (\_gpgme\_op\_decrypt\_init\_result): New function.  
 (gpgme\_op\_decrypt\_start): Use decrypt\_start.  
 (gpgme\_op\_decrypt): Likewise.

2003-04-27

\* encrypt-sign.c: Do not include <stddef.h>, <stdio.h>, <stdlib.h>, <string.h>, <assert.h> and "util.h", but "gpgme.h".  
(\_gpgme\_op\_encrypt\_sign\_start): Rename to ...  
(encrypt\_sign\_start): ... this.  
(gpgme\_op\_encrypt\_sign\_start): Use encrypt\_sign\_start, not \_gpgme\_op\_encrypt\_sign\_start.  
(gpgme\_op\_encrypt\_sign): Likewise.

\* gpgme.h (GpgmeEncryptResult): New data type.  
(gpgme\_op\_encrypt\_result): New prototype.  
\* ops.h (\_gpgme\_op\_encrypt\_init\_result): New prototype.  
(\_gpgme\_op\_encrypt\_status\_handler): Fix prototype.  
\* encrypt-sign.c (\_gpgme\_op\_encrypt\_sign\_start): Call \_gpgme\_op\_encrypt\_init\_result.  
\* encrypt.c: Do not include <stdio.h>, <assert.h>, "util.h" and "wait.h". Include <errno.h> and "gpgme.h".  
(SKIP\_TOKEN\_OR\_RETURN): Remove macro.  
(struct encrypt\_result): Rename to ...  
(op\_data\_t): ... new data type. Rewrite for user result data.  
(append\_xml\_encinfo): Remove function.  
(release\_op\_data): New function.  
(gpgme\_op\_encrypt\_result):  
New function.  
(\_gpgme\_op\_encrypt\_status\_handler): Change first argument to void \*.  
Rewrite result parsing.  
(\_gpgme\_op\_encrypt\_sym\_status\_handler): Change first argument to void \*.  
(\_gpgme\_op\_encrypt\_init\_result): New function.  
(\_gpgme\_op\_encrypt\_start): Rename to ...  
(encrypt\_start): ... this.  
(gpgme\_op\_encrypt\_start): Use encrypt\_start, not gpgme\_op\_encrypt\_start.  
(gpgme\_op\_encrypt): Likewise.

\* gpgme.h (GpgmePubKeyAlgo, GpgmeHashAlgo, GpgmeInvalidUserID, GpgmeNewSignature, GpgmeSignResult): New data types.  
(gpgme\_op\_sign\_result, gpgme\_pubkey\_algo\_name, gpgme\_hash\_algo\_name): New prototypes.  
\* gpgme.c (gpgme\_pubkey\_algo\_name): New function.  
(gpgme\_hash\_algo\_name): Likewise.  
\* ops.h (\_gpgme\_parse\_inv\_userid, \_gpgme\_op\_sign\_init\_result): New prototype.  
(\_gpgme\_op\_sign\_status\_handler): Fix prototype.  
\* op-support.c: Include <errno.h> and <string.h>.  
(\_gpgme\_parse\_inv\_userid): New function.  
\* sign.c: Include <errno.h> and "gpgme.h", but

not <stdio.h>,  
<assert.h> and "util.h".  
(SKIP\_TOKEN\_OR\_RETURN): Remove macro.  
(struct sign\_result): Change to op\_data\_t type and rework it.  
(release\_sign\_result): Rename to ...  
(release\_op\_data): ... this and rewrite it.  
(append\_xml\_info): Remove function.  
(gpgme\_op\_sign\_result): New function.  
(parse\_sig\_created): New function.  
(\_gpgme\_sign\_status\_handler): Change first argument to void \*.  
Rewrite the function to use the new result structure and functions.  
(\_gpgme\_op\_sign\_init\_result): New function.  
(\_gpgme\_op\_sign\_start): Rename to ...  
(sign\_start): ... this. Call \_gpgme\_op\_sign\_init\_result.  
(gpgme\_op\_sign\_start): Use sign\_start instead \_gpgme\_op\_sign\_start.  
(gpgme\_op\_sign): Likewise.  
\* encrypt-sign.c (\_gpgme\_op\_encrypt\_sign\_start): Call  
\_gpgme\_op\_sign\_init\_result.

\* delete.c: Include <errno.h> and "gpgme.h", but not "util.h" or  
"key.h".  
(enum delete\_problem): Move into function delete\_status\_handler.  
(delete\_status\_handler): Change first argument to void \*. Parse  
delete  
problem with strtol instead atoi. Return better error  
values.  
(\_gpgme\_op\_delete\_start): Rename to ...  
(delete\_start): ... this. Rework error handling.  
(gpgme\_op\_delete\_start): Use delete\_start instead  
\_gpgme\_op\_delete\_start.  
(gpgme\_op\_delete): Likewise.  
\* gpgme.h (GpgmeDataType): Removed.

2003-04-25 Marcus Brinkmann <marcus@g10code.de>

\* gpgme.h: Change GPGME\_IMPORT\_PRIVATE to GPGME\_IMPORT\_SECRET.  
\* import.c (parse\_import\_res): Parse unchanged field.

\* gpgme.h: New enum for GPGME\_IMPORT\_NEW, GPGME\_IMPORT\_UID,  
GPGME\_IMPORT\_SIG, GPGME\_IMPORT\_SUBKEY, GPGME\_IMPORT\_PRIVATE.  
(GpgmeError): GPGME\_Unknown\_Reason, GPGME\_Not\_Found,  
GPGME\_Ambiguous\_Specification, GPGME\_Wrong\_Key\_Usage,  
GPGME\_Key\_Revoked, GPGME\_Key\_Expired, GPGME\_No\_CRL\_Known,  
GPGME\_CRL\_Too\_Old, GPGME\_Policy\_Mismatch, GPGME\_No\_Secret\_Key,  
GPGME\_Key\_Not\_Trusted, GPGME\_Issuer\_Missing, GPGME\_Chain\_Too\_Long,  
GPGME\_Unsupported\_Algorithm, GPGME\_Sig\_Expired,  
GPGME\_Bad\_Signature, GPGME\_No\_Public\_Key added

as new error codes.

(struct \_gpgme\_import\_status): New structure.

(GpgmeImportStatus): New type.

(struct \_gpgme\_op\_import\_result): New structure.

(GpgmeImportResult): New type.

(gpgme\_op\_import\_result): New function.

\* import.c: Include <errno.h> and "gpgme.h", but not "util.h".

(struct import\_result): Change to type op\_data\_t.

(release\_import\_result): Rename to ...

(release\_op\_data): ... this.

(append\_xml\_impinfo): Function removed.

(gpgme\_op\_import\_result): New function.

(parse\_import): New function.

(parse\_import\_res): Likewise.

(import\_status\_handler): Change first argument to void \*. Rewrite to use new functions.

(\_gpgme\_op\_import\_start): Rework error handling.

\* edit.c: Do not include <assert.h>, "util.h", but "gpgme.h".

(edit\_resut): Change to typedef for op\_data\_t.

(edit\_status\_handler): Change first argument to void \*.

Rework error handling.

(command\_handler): Rework error handling.

(\_gpgme\_op\_edit\_start): Rename to ...

(edit\_start): ... this. Rework error handling.

(gpgme\_op\_edit\_start): Rewrite using edit\_start.

(gpgme\_op\_edit): Likewise.

\* ops.h (\_gpgme\_passphrase\_start): Remove prototype.

\* passphrase.c: Do not include <assert.h>, "util.h" or "debug.h", but "gpgme.h".

(struct passphrase\_result): Change to typedef for op\_data\_t.

(release\_passphrase\_result): Rename to release\_op\_data.

(\_gpgme\_passphrase\_status\_handler): Change first argument to void \*.

Use new op\_data\_t type.

(\_gpgme\_passphrase\_command\_handler): Use new op\_data\_t type.

(\_gpgme\_passphrase\_start): Remove function.

\* decrypt.c (\_gpgme\_decrypt\_start): Rewrite error handling. Do not call \_gpgme\_passphrase\_start, but install command handler.

\* encrypt.c (\_gpgme\_op\_encrypt\_start): Likewise.

\* encrypt-sign.c (\_gpgme\_op\_encrypt\_sign\_start): Likewise.

\* sign.c (\_gpgme\_op\_sign\_start): Likewise.

\* context.h (struct gpgme\_context\_s): Remove member initialized, use cms and help\_data\_1. Add member protocol. Make use\_armor and use\_textmode bit flags.



Make keylist\_mode, include\_certs,  
 signers\_len and signers\_size unsigned.

\* gpgme.c (gpgme\_new): Initialize CTX->protocol.  
 (gpgme\_set\_protocol): Do not check CTX. Use CTX->protocol.  
 (gpgme\_get\_protocol): Likewise.  
 (gpgme\_release): Do not release CTX->help\_data\_1.

\* op-support.c (\_gpgme\_op\_reset): Use CTX->protocol.

\* wait-private.c (\_gpgme\_wait\_private\_event\_cb): Remove variable CTX.

\* data.c: Do not include <assert.h>, but "gpgme.h".  
 (\_gpgme\_data\_inbound\_handler): Expand \_gpgme\_data\_append, because  
 it will go. Do not assert DH.  
 (\_gpgme\_data\_outbound\_handler): Do not assert DH.

\* export.c: Do not include <stdlib.h>, "debug.h" and "util.h", but  
 "gpgme.h".  
 (export\_status\_handler): Change type of first argument to void \*.  
 (\_gpgme\_op\_export\_start): Rename to ...  
 (export\_start): ... this. Rework error handling.  
 (gpgme\_op\_export\_start): Rewritten to use export\_start instead  
 \_gpgme\_op\_export\_start.  
 (gpgme\_op\_export): Likewise.

\* gpgme.h (GpgmeError): Add GPGME\_Busy,  
 GPGME\_No\_Request.  
 (GPGME\_No\_Recipients, GPGME\_Invalid\_Recipient,  
 GPGME\_No\_Passphrase): New macros.

\* key.c (gpgme\_key\_get\_string\_attr): Fix validity attribute.

2003-04-24 Marcus Brinkmann <marcus@g10code.de>

\* gpgme.h (struct \_gpgme\_op\_genkey\_result): New structure.  
 (GpgmeGenKeyResult): New type.  
 (gpgme\_op\_genkey): Drop last argument.  
 (gpgme\_op\_genkey\_result): New function.

\* genkey.c: Do not include "util.h", but "gpgme.h".  
 (struct genkey\_result): Replace with ...  
 (op\_data\_t): ... this new type.  
 (release\_genkey\_result): Replace with ...  
 (release\_op\_data): ... this new function.  
 (gpgme\_op\_genkey\_result): New function.  
 (genkey\_status\_handler): Rewritten using new op\_data\_t type.  
 (get\_key\_parameter): New function.  
 (\_gpgme\_op\_genkey\_start): Renamed to  
 (genkey\_start): ... this and rewritten.  
 (gpgme\_op\_genkey\_start): Use genkey\_start instead

`_gpgme_op_genkey_start`.  
`(gpgme_op_genkey)`: Rewritten. Remove FPR argument.

\* `context.h` (`struct gpgme_context_s`): Remove member `verbosity`.  
 \* `gpgme.c` (`gpgme_new`): Do not set member `verbosity`.  
 \* `engine.h` (`_gpgme_engine_set_verbosity`): Remove prototype.  
 \* `engine.c` (`_gpgme_engine_set_verbosity`): Remove function.  
 \* `engine-backend.h` (`struct engine_ops`): Remove `set_verbosity`.  
 \* `engine-gpgsm.c` (`_gpgme_engine_ops_gpgsm`): Remove `set_verbosity` member.  
 \* `runpgg.c` (`_gpgme_engine_ops_gpg`): Likewise.  
`(gpg_set_verbosity)`: Remove function.  
 \* `decrypt.c` (`_gpgme_decrypt_start`): Don't call `_gpgme_engine_set_verbosity`.  
 \* `delete.c` (`_gpgme_op_delete_start`): Likewise.  
 \* `edit.c` (`_gpgme_op_edit_start`): Likewise.  
 \* `encrypt.c` (`_gpgme_op_encrypt_start`): Likewise.  
 \* `encrypt-sign.c` (`_gpgme_op_encrypt_sign_start`): Likewise.  
 \* `export.c` (`_gpgme_op_export_start`): Likewise.  
 \* `genkey.c` (`_gpgme_op_genkey_start`): Likewise.  
 \* `import.c` (`_gpgme_op_import_start`): Likewise.  
 \* `keylist.c` (`gpgme_op_keylist_start`): Likewise.  
`(gpgme_op_keylist_ext_start)`: Likewise.  
 \* `sign.c` (`_gpgme_op_sign_start`): Likewise.  
 \* `verify.c` (`_gpgme_op_verify_start`):  
 Likewise.

\* `Makefile.am` (`libgpgme_la_SOURCES`): Add `key-cache.c`.  
 \* `key.c` (`key_cache_initialized`, `key_cache_size`,  
`key_cache_max_chain_length`, ): Removed.  
`(struct key_cache_item_s, key_cache_lock, key_cache,`  
`key_cache_unused_items, hash_key, _gpgme_key_cache_add,`  
`_gpgme_key_cache_get, gpgme_get_key)`: Moved to ...  
 \* `key-cache.c`: ... here. New file.  
 \* `key.h` (`_gpgme_key_cache_init`): Remove prototypes.  
`(_gpgme_key_cache_add, _gpgme_key_cache_get)`: Move to ...  
 \* `ops.h`: ... here.  
 \* `version.c`: Do not include "key.h".  
`(do_subsystem_inits)`: Do not call `_gpgme_key_cache_init`.

\* `mkstatus`: Strip trailing comma.  
 \* `gpgme.h` (`GpgmeStatus`): Pretty print.

\* `gpgme.h` (`GpgmeError`): Rename `GPGME_No_Passphrase` to  
`GPGME_Bad_Passphrase`.  
 \* `passphrase.c` (`_gpgme_passphrase_status_handler`): Use  
`GPGME_Bad_Passphrase` instead `GPGME_No_Passphrase`.

- \* gpgme.h (GpgmeError): Rename GPGME\_No\_Recipients to GPGME\_No\_UserID and GPGME\_Invalid\_Recipient to GPGME\_Invalid\_UserID.
- \* encrypt.c (\_gpgme\_encrypt\_status\_handler):  
Use GPGME\_No\_UserID  
instead GPGME\_No\_Recipients and GPGME\_Invalid\_UserID instead GPGME\_Invalid\_Recipient.  
(\_gpgme\_op\_encrypt\_start): Likewise.
- \* gpgme.h (GpgmeError): Remove GPGME\_Busy and GPGME\_No\_Request.
- \* wait-user.c (\_gpgme\_wait\_user\_event\_cb): Don't clear CTX->pending.
- \* wait-private.c (\_gpgme\_wait\_private\_event\_cb): Likewise.
- \* wait-global.c (gpgme\_wait): Likewise.
- \* verify.c (\_gpgme\_op\_verify\_start): Likewise.  
(gpgme\_get\_sig\_status): Don't check pending flag.  
(gpgme\_get\_sig\_string\_attr): Likewise.  
(gpgme\_get\_sig\_ulong\_attr): Likewise.  
(gpgme\_get\_sig\_key): Likewise.
- \* op-support.c (\_gpgme\_op\_reset): Likewise.
- \* trustlist.c (gpgme\_op\_trustlist\_start): Don't clear pending flag.  
(gpgme\_op\_trustlist\_next): Don't check or clear pending flag.  
(gpgme\_op\_trustlist\_end): Likewise.
- \* sign.c (\_gpgme\_op\_sign\_start): Likewise.
- \* context.h (struct gpgme\_context\_s): Remove member PENDING.
- \* decrypt.c (\_gpgme\_decrypt\_start): Likewise.
- \* delete.c (\_gpgme\_op\_delete\_start):  
Likewise.
- \* edit.c (\_gpgme\_op\_edit\_start): Likewise.
- \* encrypt.c (\_gpgme\_op\_encrypt\_start): Likewise.
- \* encrypt-sign.c (\_gpgme\_op\_encrypt\_sign\_start): Likewise.
- \* export.c (\_gpgme\_op\_export\_start): Likewise.
- \* genkey.c (\_gpgme\_op\_genkey\_start): Likewise.
- \* import.c (\_gpgme\_op\_import\_start): Likewise.
- \* key.c (gpgme\_get\_key): Likewise.
- \* keylist.c (gpgme\_op\_keylist\_start): Likewise.  
(gpgme\_op\_keylist\_ext\_start): Likewise.  
(gpgme\_op\_keylist\_next): Likewise.  
(gpgme\_op\_keylist\_end): Likewise.
- \* data-compat.c (gpgme\_error\_to\_errno): Don't convert EBUSY.

2003-02-06 Marcus Brinkmann <marcus@g10code.de>

- \* gpgme.h (GpgmePassphraseCb): Change type to return GpgmeError,  
and add argument for returning the result string.  
(gpgme\_cancel): Remove prototype.
- \* gpgme.c (gpgme\_cancel): Remove function.
- \* context.h (struct gpgme\_context\_s): Remove member cancel.
- \* passphrase.c (\_gpgme\_passphrase\_command\_handler): Call the

passphrase callback in the new way.

2003-01-30

Marcus Brinkmann <marcus@g10code.de>

\* edit.c (\_gpgme\_edit\_status\_handler): Call the progress status handler.

2003-02-05 Marcus Brinkmann <marcus@g10code.de>

\* wait-user.c (\_gpgme\_wait\_user\_remove\_io\_cb): Move check for no I/O handlers left to ...  
(\_gpgme\_user\_io\_cb\_handler): ... here.

2003-02-04 Marcus Brinkmann <marcus@g10code.de>

\* trustlist.c (trustlist\_colon\_handler): Release ITEM if name could not be allocated.  
(gpgme\_trust\_item\_release): Only release name if it is allocated.  
Reported by Marc Mutz <Marc.Mutz@uni-bielefeld.de>.

2003-02-04 Marcus Brinkmann <marcus@g10code.de>

\* runpgg.c (read\_status): If the status handler returns an error, return it.  
(status\_handler): If read\_status fails, just return the error.

2003-02-01 Marcus Brinkmann <marcus@g10code.de>

\* engine-gpgsm.c (start): Handle all errors, not only most of them.  
(xtoi\_1, xtoi\_2): Remove macro.  
(status\_handler): Replace use of xtoi\_2 with \_gpgme\_hextobyte.

2003-02-01 Marcus

Brinkmann <marcus@g10code.de>

\* engine-gpgsm.c (map\_assuan\_error): Replace  
ASSUAN\_Bad\_Certificate\_Path with ASSUAN\_Bad\_Certificate\_Chain.  
(gpgsm\_new): Use assuan\_pipe\_connect instead assuan\_pipe\_connect2.

\* util.h (DIMof): Remove macro.

\* ops.h (\_gpgme\_op\_event\_cb, \_gpgme\_op\_event\_cb\_user,  
\_gpgme\_data\_unread): Prototypes removed.

2003-01-30 Marcus Brinkmann <marcus@g10code.de>

- \* types.h: File removed.
- \* Makefile.am (libpgpgme\_la\_SOURCES): Remove types.h.
- \* io.h (struct spawn\_fd\_item\_s): Do not include "types.h".
- \* key.h: Likewise.
- \* context.h: Likewise.
- \* engine-gpgsm.h: Likewise.
- \* engine.h: Include "gpgme.h" instead "types.h". Add prototypes for EngineStatusHandler, EngineColonLineHandler and EngineCommandHandler.
- (\_gpgme\_engine\_set\_status\_handler): Change parameter type from GpgmeStatusHandler to EngineStatusHandler.
- (\_gpgme\_engine\_set\_command\_handler): Change parameter type from GpgmeCommandHandler to EngineCommandHandler.
- (\_gpgme\_engine\_set\_colon\_line\_handler): Change parameter type from GpgmeColonLineHandler to EngineColonLineHandler.
- \* engine-backend.h: Include "engine.h" instead "types.h".
- (struct engine\_ops): Change Gpgme\*Handler parameters in members set\_command\_handler, set\_colon\_line\_handler and set\_status\_handler to Engine\*Handler.
- \* engine.c (\_gpgme\_engine\_set\_status\_handler): Change parameter type from GpgmeStatusHandler to EngineStatusHandler.
- (\_gpgme\_engine\_set\_command\_handler): Change parameter type from GpgmeCommandHandler to EngineCommandHandler.
- (\_gpgme\_engine\_set\_colon\_line\_handler): Change parameter type from GpgmeColonLineHandler to EngineColonLineHandler.
- \* runpgg.c (struct gpg\_object\_s): Change type of member status.fnc from GpgmeStatusHandler to EngineStatusHandler. Change type of member colon.fnc from GpgmeColonLineHandler to EngineColonLineHandler. Change type of member cmd.fnc from GpgmeCommandHandler to EngineCommandHandler.
- \* engine-gpgsm.c (struct gpgsm\_object\_s): Likewise.
- \* runpgg.c
- (gpg\_set\_status\_handler): Change parameter type from GpgmeStatusHandler to EngineStatusHandler.
- \* engine-gpgsm.c (gpgsm\_set\_status\_handler): Likewise.
- (assuan\_simple\_command): Likewise.
- \* runpgg.c (gpg\_set\_colon\_line\_handler): Change parameter type from GpgmeColonLineHandler to EngineColonLineHandler.
- \* engine-gpgsm.c (gpgsm\_set\_colon\_line\_handler): Likewise.
- \* runpgg.c (gpg\_set\_command\_handler): Change parameter type from GpgmeCommandHandler to EngineCommandHandler.
  
- \* engine-gpgsm.c (status\_handler): Do not close status fd at end of function.
  
- \* ops.h (\_gpgme\_op\_data\_lookup): Add prototype.
- \* op-support.c: Include <stdlib.h>.

(`_gpgme_op_data_lookup`): New function.

\* `decrypt.c` (`_gpgme_release_decrypt_result`): Function removed.

(`struct decrypt_result_s`): Rename to ...

(`struct decrypt_resul`): ... this.

(`DecryptResult`): New type.

(`_gpgme_decrypt_status_handler`): Don't use `test_and_allocate_result`, but use `_gpgme_op_data_lookup` to retrieve result data object.

\* `sign.c`

(`_gpgme_release_sign_result`): Function removed.

(`release_sign_result`): New function.

(`struct sign_result_s`): Rename to ...

(`struct sign_result`): ... this.

(`SignResult`): New type.

(`_gpgme_sign_status_handler`): Don't use `test_and_allocate_result`, but use `_gpgme_op_data_lookup` to retrieve result data object.

\* `encrypt.c` (`struct encrypt_result_s`): Rename to ...

(`struct encrypt_result`): ... this.

(`_gpgme_release_encrypt_result`): Function removed.

(`release_encrypt_result`): New function.

(`_gpgme_encrypt_status_handler`): Don't use `test_and_allocate_result`, but use `_gpgme_op_data_lookup` to retrieve result data object.

\* `verify.c` (`struct verify_result_s`): Rename to ...

(`struct verify_result`): ... this. Remove member `next`.

(`VerifyResult`): New type.

(`_gpgme_release_verify_result`): Function removed.

(`release_verify_result`): New function.

(`finish_sig`): Change first argument to type `VerifyResult`. Diddle the type of the `op_data` structure.

(`add_notation`): Change first argument to type `VerifyResult`.

(`_gpgme_verify_status_handler`): Don't use `test_and_allocate_result`, but use `_gpgme_op_data_lookup` to retrieve result data object.

\* `passphrase.c` (`struct passphrase_result_s`): Rename to ...

(`struct passphrase_result`): ... this. Remove member `next`.

(`PassphraseResult`): New type.

(`_gpgme_release_passphrase_result`): Function removed.

(`release_passphrase_result`): New function.

(`_gpgme_passphrase_status_handler`): Don't use `test_and_allocate_result`, but use `_gpgme_op_data_lookup` to retrieve result data object.

(`_gpgme_passphrase_command_handler`): Likewise.

\* `keylist.c` (`struct keylist_result_s`): Rename to ...

(`struct keylist_result`): ... this. Remove member `next`.

(`KeylistResult`): New type.

(\_gpgme\_release\_keylist\_result): Function removed.  
 (release\_keylist\_result): New function.  
 (keylist\_status\_handler): Don't use  
 test\_and\_allocate\_result, but use \_gpgme\_op\_data\_lookup to  
 retrieve result data object.  
 \* edit.c (struct edit\_result\_s): Rename to ...  
 (struct  
 edit\_result): ... this. Remove member next.  
 (EditResult): New type.  
 (\_gpgme\_release\_edit\_result): Function removed.  
 (release\_edit\_result): New function.  
 (edit\_status\_handler): Don't use  
 test\_and\_allocate\_result, but use \_gpgme\_op\_data\_lookup to  
 retrieve result data object.  
 (command\_handler): Likewise.  
 \* types.h (DecryptResult, SignResult, EncryptResult,  
 PassphraseResult, ImportResult, DeleteResult, GenKeyResult,  
 KeylistResult, EditResult): Types removed.  
 \* ops.h: Don't include "types.h", but "gpgme.h" and "context.h".  
 (test\_and\_allocate\_result): Remove macro.  
 (\_gpgme\_release\_decrypt\_result): Remove prototype.  
 (\_gpgme\_decrypt\_result): Remove prototype.  
 (\_gpgme\_release\_sign\_result): Remove prototype.  
 (\_gpgme\_release\_encrypt\_result): Remove prototype.  
 (\_gpgme\_release\_passphrase\_result): Remove prototype.  
 (\_gpgme\_release\_import\_result): Remove prototype.  
 (\_gpgme\_release\_delete\_result): Remove prototype.  
 (\_gpgme\_release\_genkey\_result): Remove prototype.  
 (\_gpgme\_release\_keylist\_result):  
 Remove prototype.  
 (\_gpgme\_release\_edit\_result): Remove prototype.  
 (\_gpgme\_release\_verify\_result): Remove prototype.  
 \* gpgme.c (\_gpgme\_release\_result): Rewritten.  
 \* context.h (enum ctx\_op\_data\_type): New enum.  
 (struct ctx\_op\_data): New structure.  
 (struct gpgme\_context\_s): Replace the member result with a member  
 op\_data.  
 (fail\_on\_pending\_request): Remove macro.  
 \* op-support.c (\_gpgme\_op\_reset): Expand macro  
 fail\_on\_pending\_request.  
 \* util.h: Don't include "types.h" or "debug.h", but include "gpgme.h".

2003-01-19 Marcus Brinkmann <marcus@g10code.de>

\* runpgg.c (\_gpgme\_engine\_ops\_gpg): Remove gpg\_start.  
 (gpg\_start): Rename to ...  
 (start): ... this function. Change arguments to GpgObject.  
 (gpg\_decrypt): Call start.

(gpg\_edit): Likewise.  
 (gpg\_encrypt): Likewise.  
 (gpg\_encrypt\_sign): Likewise.  
 (gpg\_export): Likewise.  
 (gpg\_import): Likewise.  
 (gpg\_keylist): Likewise.  
 (gpg\_keylist\_ext): Likewise.  
 (gpg\_trustlist): Likewise.  
 (gpg\_verify): Likewise.

\*

engine-gpgsm.c (\_gpgme\_engine\_ops\_encrypt): Remove gpgsm\_start.  
 (gpgsm\_start): Rename to ...  
 (struct gpgsm\_object\_s): Remove member command.  
 (gpgsm\_release): Don't free command.  
 (start): ... this function. Change arguments to GpgsmObject and const char \*.  
 (gpgsm\_decrypt): Call start.  
 (gpgsm\_delete): Likewise.  
 (gpgsm\_encrypt): Likewise.  
 (gpgsm\_export): Likewise.  
 (gpgsm\_genkey): Likewise.  
 (gpgsm\_import): Likewise.  
 (gpgsm\_keylist): Likewise.  
 (gpgsm\_keylist\_ext): Likewise.  
 (gpgsm\_verify): Likewise.

\* decrypt.c (\_gpgme\_decrypt\_start): Don't call \_gpgme\_engine\_start.  
 \* delete.c (\_gpgme\_op\_delete\_start): Likewise.  
 \* edit.c (\_gpgme\_op\_edit\_start): Likewise.  
 \* encrypt.c (\_gpgme\_op\_encrypt\_start):  
 \* encrypt-sign.c (\_gpgme\_op\_encrypt\_sign\_start):  
 \* export.c (\_gpgme\_op\_export\_start): Likewise.  
 \* genkey.c (\_gpgme\_op\_genkey\_start): Likewise.  
 \* import.c (\_gpgme\_op\_import\_start): Likewise.  
 \* keylist.c (gpgme\_op\_keylist\_ext\_start): Likewise.  
 (gpgme\_op\_keylist\_start):  
 Likewise.  
 \* sign.c (\_gpgme\_op\_sign\_start): Likewise.  
 \* trustlist.c (gpgme\_op\_trustlist\_start): Likewise.  
 \* verify.c (\_gpgme\_op\_verify\_start): Likewise.

\* engine-backend.h (struct engine\_ops): Remove member start.

\* engine.h (\_gpgme\_engine\_start): Remove prototype.  
 \* engine.c (\_gpgme\_engine\_start): Remove function.



2003-01-19 Miguel Coca <mcoca@gnu.org>

- \* w32-io.c (`_gpgme_io_select`): Add missing argument in calls to `DEBUG_BEGIN`.
- \* w32-util.c: Include "sema.h".
- (`find_program_in_registry`): Change `DEBUG1` to `DEBUG2`, fixes compilation error.

2003-01-29 Marcus Brinkmann <marcus@g10code.de>

- \* types.h: Remove byte and ulong types.
- \* util.h (`_gpgme_hextobyte`): Change prototype to unsigned char instead byte.
- \* conversion.c (`_gpgme_hextobyte`): Change argument to unsigned char instead byte.
- (`_gpgme_decode_c_string`): Likewise, and beautify. Also support a few more escaped characters. Be more strict about buffer size.
- (`_gpgme_data_append_percentstring_for_xml`): Change type of `SRC`, `BUF` and `DST` to unsigned char instead byte.
- \* progress.c (`_gpgme_progress_status_handler`): Use unsigned char instead byte.
- \* debug.c (`trim_spaces`): Likewise.
  
- \* util.h (`mk_error`): Remove macro.
- \* conversion.c, data.c, data-compat.c, decrypt.c, delete.c, edit.c, encrypt.c, encrypt-sign.c, engine.c, engine-gpgsm.c, export.c, genkey.c, gpgme.c, import.c, key.c, keylist.c, passphrase.c, progress.c, recipient.c, runpg.c, sign.c, signers.c, trustlist.c, verify.c, wait.c, wait-global.c, wait-private (literally everywhere): Expand the `mk_error` macro.
  
- \* context.h (`wait_on_request_or_fail`): Remove macro.
  
- \* context.h (`gpgme_context_s`): Remove member `ERROR`.
- \* types.h (`GpgmeStatusHandler`): Change return type to `GpgmeError`.
- (`GpgmeCommandHandler`): Change return type to `GpgmeError` and add new argument `RESULT`.
- \* gpgme.h (`GpgmeIOCb`): Change return type to `GpgmeError`.
- (`GpgmeEventIO`): New event `GPGME_EVENT_START`.
- (`GpgmeIdleFunc`): Remove type.
- (`gpgme_register_idle`): Remove prototype.
- \* data.c: Include <assert.h>.
- (`_gpgme_data_inbound_handler`): Change return type to `GpgmeError`. Return any error instead ignoring it, don't close file descriptor on error.
- (`_gpgme_data_outbound_handler`): Likewise.

\* decrypt.c: Do not include <stdio.h>, <string.h> and <assert.h>.  
 (\_gpgme\_decrypt\_status\_handler): Change return type to GpgmeError.  
 Return error instead setting ctx->error. Return success at end of  
 function.

(gpgme\_op\_decrypt): Don't work around the old kludge anymore.

\* decrypt-verify.c (decrypt\_verify\_status\_handler): Change return  
 type to GpgmeError. Return possible errors.

\* delete.c: Do not include <stdio.h>, <string.h>, <time.h> and  
 <assert.h>.

(delete\_status\_handler): Change return type to GpgmeError. Return  
 error instead setting ctx->error. Return success at end of  
 function.

\* edit.c: Do not include <stdio.h> and <string.h>.

(\_gpgme\_edit\_status\_handler): Change type to GpgmeError,  
 make static and rename to ...

(edit\_status\_handler):  
 ... this. Return error directly.

(command\_handler): Change return type to GpgmeError, add result  
 argument. Return error directly.

\* encrypt.c (status\_handler\_finish): Remove function.

(\_gpgme\_encrypt\_status\_handler): Change return type to GpgmeError.  
 Return error directly.

(\_gpgme\_encrypt\_sym\_status\_handler): Likewise.

\* encrypt-sign.c (encrypt\_sign\_status\_handler): Likewise.

\* engine-gpgsm.c (close\_notify\_handler): Do not signal done event  
 anymore.

(status\_handler): Change return type to GpgmeError. Diddle things  
 around a bit to return errors directly.

(start): Send start event.

\* export.c: Do not include <stdio.h>, <string.h> and <assert.h>.

(export\_status\_handler): Change return type to GpgmeError. Don't  
 check ctx->error.

\* genkey.c: Do not include <stdio.h> and <assert.h>.

(genkey\_status\_handler): Change return type to GpgmeError. Don't  
 check ctx->error. Return errors directly.

\* gpgme.c (\_gpgme\_release\_result): Do not initialize ctx->error.

(\_gpgme\_op\_event\_cb):  
 Function removed.

(\_gpgme\_op\_event\_cb\_user): Likewise.

\* import.c: Do not include <stdio.h>, <string.h> and <assert.h>.

(import\_status\_handler): Change return type to GpgmeError. Don't  
 check ctx->error.

\* keylist.c (keylist\_colon\_handler, keylist\_status\_handler, finish\_key):  
 Change return type to GpgmeError, return error directly.

\* Makefile (libgpgme\_la\_SOURCES): Add wait-global.c,  
 wait-private.c and wait-user.c

\* ops.h (test\_and\_allocate\_result): Return error instead setting  
 ctx->error.

(\_gpgme\_data\_inbound\_handler, \_gpgme\_data\_outbound\_handler,  
 \_gpgme\_verify\_status\_handler, \_gpgme\_decrypt\_status\_handler,  
 \_gpgme\_sign\_status\_handler, \_gpgme\_encrypt\_status\_handler,  
 \_gpgme\_passphrase\_status\_handler, \_gpgme\_progress\_status\_handler):  
 Change return type to GpgmeError.

(\_gpgme\_passphrase\_command\_handler): Change return type to  
 GpgmeError and add new argument RESULT.

\* op-support.c: Use new callback functions, and change private  
 data to ctx everywhere.

\* passphrase.c

(\_gpgme\_passphrase\_status\_handler): Change return  
 type to GpgmeError, return error directly.

(\_gpgme\_passphrase\_command\_handler): Change return type to  
 GpgmeError, add result argument. Return results accordingly.

\* progress.c (\_gpgme\_progress\_status\_handler): Change return type  
 to GpgmeError, return errors directly.

\* runpgg.c (status\_handler): Change return type to GpgmeError.  
 Return error directly.

(close\_notify\_handler): Don't send done event.

(colon\_line\_handler): Change return type to GpgmeError, return  
 errors directly.

\* runpgg.c (start): Send start event.

\* sign.c (\_gpgme\_sign\_status\_handler): Change return type to  
 GpgmeError, return errors directly.

\* trustlist.c (trustlist\_status\_handler): Change return type to  
 GpgmeError. Return 0.

(trustlist\_colon\_handler): Change return type GpgmeError. Return  
 errors directly.

\* verify.c (add\_notation): Change return type to GpgmeError,  
 return errors directly.

(\_gpgme\_verify\_status\_handler): Likewise.

\* wait.h

(struct fd\_table): Remove lock member.

(struct wait\_item\_s): Moved here from wait.c.

(struct tag): New structure.

(\_gpgme\_wait\_event\_cb): Remove prototype.

(\_gpgme\_wait\_private\_event\_cb, \_gpgme\_wait\_global\_event\_cb,  
 \_gpgme\_wait\_user\_add\_io\_cb, \_gpgme\_wait\_user\_remove\_io\_cb,  
 \_gpgme\_wait\_user\_event\_io\_cb): New prototypes.

\* wait.c: Don't include <stdio.h>.

(ftd\_global, ctx\_done\_list, ctx\_done\_list\_size,  
 ctx\_done\_list\_length, ctx\_done\_list\_lock, idle\_function): Remove  
 global variable.

(gpgme\_register\_idle, do\_select, \_gpgme\_wait\_event\_cb): Remove  
 function.

(gpgme\_wait): Move to file wait-global.c.

(\_gpgme\_add\_io\_cb): Take ctx as private argument, initialize ctx  
 member in wait item and tag.

(\_gpgme\_remove\_io\_cb): Take ctx from tag. Don't use FDT lock.  
 (\_gpgme\_wait\_one, \_gpgme\_wait\_on\_condition): Move to wait-private.c.  
 (gpgme\_fd\_table\_init): Don't initialize FDT->lock.  
 (gpgme\_fd\_table\_deinit): Don't destroy FDT->lock.  
 (\_gpgme\_fd\_table\_put): Make static and rename to ...  
 (fd\_table\_put): ... this function. Don't use FDT->lock.  
 (struct wait\_item\_s): Move to wait.h.  
 \* wait-global.c: New file.  
 \* wait-private.c: New file.  
 \* wait-user.c: New file.  
  
 \* key.c (gpgme\_key\_sig\_get\_string\_attr): Use validity\_to\_string instead of trust\_to\_string to calculate validity.

2003-01-30 Marcus Brinkmann <marcus@g10code.de>

\* types.h (EngineObject): Move typedef to ...  
 \* engine.h: ... here.  
 \* types.h (GpgObject): Move typedef to ...  
 \* runpgg.c: ... here.  
 \* types.h (GpgsmObject): Move typedef to ...  
 \* engine-gpgsm.c: ... here.  
  
 \* util.h (return\_if\_fail, return\_null\_if\_fail, return\_val\_if\_fail): Remove macro.  
 \* gpgme.c (gpgme\_cancel): Don't use return\_if\_fail.  
 \* key.c (gpgme\_key\_ref): Likewise.  
 \* signers.c (gpgme\_signers\_enum): Likewise.  
 (gpgme\_signers\_clear): Likewise.  
  
 \* engine-backend.h (struct engine\_ops): Rename get\_path to get\_file\_name.  
 \* gpgme.h (struct \_gpgme\_engine\_info): Rename member path to file\_name.  
 \* version.c: Do not include <stdio.h>, <stdlib.h>, context.h and util.h. Other clean ups.  
 (parse\_version\_number): Protect more seriously against overflow.  
 (gpgme\_get\_engine\_info): Move to ...  
 \* engine.c (gpgme\_get\_engine\_info): ... here.  
 (\_gpgme\_engine\_get\_info): Function removed.  
 (\_gpgme\_engine\_get\_path): Make static and rename to ...  
 (engine\_get\_file\_name): .. this.  
 (\_gpgme\_engine\_get\_version): Make static and rename to ...  
 (engine\_get\_version): ... this.

(\_gpgme\_engine\_get\_req\_version): Make static and rename to ...  
(engine\_get\_req\_version): ... this.  
\* engine.h (\_gpgme\_engine\_get\_path, \_gpgme\_engine\_get\_version, \_gpgme\_engine\_req\_version, \_gpgme\_engine\_get\_info.): Remove prototypes.  
  
\* gpgme.h (enum GpgmeProtocol): Remove GPGME\_PROTOCOL\_AUTO.  
\* gpgme.c (gpgme\_set\_protocol): Don't handle GPGME\_PROTOCOL\_AUTO.  
(gpgme\_get\_protocol\_name): New function.  
  
\* engine-backend.h (struct engine\_ops): New member get\_req\_version, remove member check\_version.  
\* engine.h (\_gpgme\_Engine\_get\_version): New prototype.  
\*  
runggpg.c (gpg\_get\_req\_version): New function.  
(gpg\_check\_version): Function removed.  
(\_gpgme\_engine\_ops\_gpg): Add gpg\_get\_req\_version, remove gpg\_check\_version.  
\* engine-gpgsm.c (gpgsm\_get\_req\_version): New function.  
(gpgsm\_check\_version): Function removed.  
(\_gpgme\_engine\_ops\_gpgsm): Add gpgsm\_get\_req\_version, remove gpgsm\_check\_version.  
\* engine.c: Include ops.h.  
(\_gpgme\_engine\_get\_req\_version): New function.  
(gpgme\_engine\_check\_version): Rewritten.  
\* version.c (gpgme\_get\_engine\_info): Rewritten.  
\* gpgme.h (gpgme\_engine\_info): New structure.  
(GpgmeEngineInfo): New type.

2003-01-06 Werner Koch <wk@gnupg.org>

\* keylist.c (set\_mainkey\_capability): Handle 'd' and 'D' used since gpg 1.3 to denote disabled keys.

2003-01-06 Marcus Brinkmann <marcus@g10code.de>

\* data-mem.c: Include <string.h>.  
\* engine.c: Likewise.

2003-01-06 Marcus Brinkmann <marcus@g10code.de>

\* Makefile.am (libgpgme\_la\_DEPENDENCIES): Correct bug in last change.

2002-12-24 Marcus  
Brinkmann <marcus@g10code.de>

\* gpgme.h (gpgme\_op\_verify, gpgme\_op\_decrypt\_verify): Drop R\_STAT argument.

- \* decrypt-verify.c (gpgme\_op\_decrypt\_verify): Drop R\_STAT argument.
- \* verify.c (gpgme\_op\_verify): Drop R\_STAT argument.
- (\_gpgme\_intersect\_stati): Function removed.
- \* ops.h (\_gpgme\_intersect\_stati): Remove prototype.

2002-12-24 Marcus Brinkmann <marcus@g10code.de>

- \* libgpgme.vers: New file.
- \* Makefile.am (EXTRA\_DIST): Add libgpgme.vers.
- (libgpgme\_version\_script\_cmd): New variable.
- (libgpgme\_la\_LDFLAGS): Add libgpgme\_version\_script\_cmd here.
- (libgpgme\_la\_DEPENDENCIES): New variable.

2002-12-23 Marcus Brinkmann <marcus@g10code.de>

- \* key.c (gpgme\_key\_get\_string\_attr): Don't accept GPGME\_ATTR\_IS\_SECRET.
- (otrust\_to\_string): New function.
- (gpgme\_key\_get\_as\_xml): Use it.
- (validity\_to\_string): New function.
- (gpgme\_key\_get\_string\_attr): Beautify using above functions.
- (gpgme\_key\_get\_ulong\_attr): Likewise.

2002-12-23 Marcus Brinkmann <marcus@g10code.de>

- \* data-mem.c
- (mem\_release): Fix gcc warning.
- \* data-user.c (user\_release): Likewise.

2002-12-06 Marcus Brinkmann <marcus@g10code.de>

- \* data.h (gpgme\_data\_release\_cb): Change return type to void.
- (gpgme\_data\_read\_cb): Change return type to ssize\_t.
- \* data.c (gpgme\_data\_read): Likewise.
- \* data-stream.c (stream\_read): Likewise.
- \* data-fd.c (fd\_read): Likewise.
- \* data-mem.c (mem\_read): Likewise.
- (mem\_release): Change return type to void.
- \* data-user.c (user\_read): Change return type to ssize\_t.
- (user\_release): Change return type to void.
- \* data-compat.c (old\_user\_read): Change return type to ssize\_t.
- \* gpgme.h (GpgmeDataReadCb): Likewise.
- (gpgme\_data\_read): Likewise.
- (GpgmeDataSeekCb): Change return type to off\_t.

2002-12-04 Marcus Brinkmann <marcus@g10code.de>

- \* gpgme.h: Add prototype for gpgme\_get\_key.

- \* key.c (gpgme\_get\_key): New function.
- \* verify.c (gpgme\_get\_sig\_key): Rewrite using gpgme\_get\_key.
  
- \* gpgme.h: Add prototypes for new interfaces  
gpgme\_key\_sig\_get\_string\_attr  
and gpgme\_key\_get\_ulong\_attr.  
(enum GpgmeAttr): New attribute GPGME\_ATTR\_SIG\_CLASS.
- \* gpgme.c (gpgme\_set\_keylist\_mode): Allow GPGME\_KEYLIST\_MODE\_SIGS.
- \* key.h (struct certsigs): New members ALGO, NAME\_PART,  
EMAIL\_PART, COMMENT\_PART, NAME, SIG\_STAT and SIG\_CLASS.
  
- \* conversion.c (\_gpgme\_decode\_c\_string): Add new parameter LEN.  
Use that to determine if allocation is desired or not.
- \* util.h: Adjust prototype of \_gpgme\_decode\_c\_string.
- \* keylist.c (keylist\_colon\_handler): Adjust caller of  
\_gpgme\_decode\_c\_string.
  
- \* key.h (struct gpgme\_key\_s): New member last\_uid.
- \* key.c (\_gpgme\_key\_append\_name): Rewritten using  
\_gpgme\_decode\_c\_string and the last\_uid pointer.  
(my\_isdigit): Macro removed.  
(ALLOC\_CHUNK): Likewise.
- \* keylist.c (set\_userid\_flags): Use last\_uid member of KEY.
  
- \* context.h (struct user\_id\_s): New member last\_certsig.
- \* key.h: Add prototype for \_gpgme\_key\_add\_certsig.
- \* key.c (\_gpgme\_key\_add\_certsig): New function.  
(set\_user\_id\_part): Move function  
before \_gpgme\_key\_add\_certsig.  
(parse\_user\_id): Change first argument to SRC, add new arguments  
NAME, EMAIL and COMMENT. Change code to use these arguments  
instead going through UID. Move function before  
\_gpgme\_add\_certsig.  
(parse\_x509\_user\_id): Likewise.
- (\_gpgme\_key\_append\_name): Adjust arguments to parse\_x509\_user\_id  
and parse\_user\_id invocation.
- (one\_certsig\_as\_xml): New function.
- (one\_uid\_as\_xml): Print signatures.
- \* context.h (struct gpgme\_context\_s): New member TMP\_UID.
- \* keylist.c (keylist\_colon\_handler): Rewritten, implement "sig"  
record entries.
  
- \* key.c (get\_certsig): New function.  
(gpgme\_key\_sig\_get\_string\_attr): Likewise.  
(gpgme\_key\_sig\_get\_ulong\_attr): Likewise.
  
- \* keylist.c: Include <ctype.h>.  
(my\_isdigit): Macro removed.

(set\_mainkey\_trust\_info): Use isdigit, not my\_isdigit.  
(set\_userid\_flags): Likewise.  
(set\_subkey\_trust\_info): Likewise.  
(set\_ownertrust): Likewise.  
(finish\_key): Move function up a bit and remove prototype.

\* runpgg.c (gpg\_keylist\_ext):  
Correct precedence of signature  
listing mode.  
(gpg\_keylist\_ext): Implement signature listing mode.

2002-11-25 Marcus Brinkmann <marcus@g10code.de>

\* runpgg.c (\_gpgme\_gpg\_spawn): Do not set parent fds to -1.  
\* posix-io.c (\_gpgme\_io\_spawn): Call \_gpgme\_io\_close instead close  
for parent fds.  
\* w32-io.c (\_gpgme\_io\_spawn): Call \_gpgme\_io\_close instead  
CloseHandle for parent fds.

2002-11-22 Marcus Brinkmann <marcus@g10code.de>

\* gpgme.h [\_MSC\_VER]: Define ssize\_t as long.

2002-11-22 Werner Koch <wk@gnupg.org>

\* engine-gpgsm.c (\_gpgme\_gpgsm\_new): Save the result of a first  
setlocale before doing another setlocale.

2002-11-21 Marcus Brinkmann <marcus@g10code.de>

\* decrypt.c: Some beautyfication.  
  
\* verify.c (\_gpgme\_verify\_status\_handler): Treat  
GPGME\_STATUS\_UNEXPECTED like GPGME\_STATUS\_NODATA.  
Reported by Miguel Coca <e970095@zipi.fi.upm.es>.

2002-11-19 Marcus Brinkmann <marcus@g10code.de>

\* genkey.c: Only include <config.h> if [HAVE\_CONFIG\_H].  
(struct  
genkey\_result\_s): Add new member FPR.  
(\_gpgme\_release\_genkey\_result): Free RESULT->fpr if set.  
(genkey\_status\_handler): Extract the fingerprint from the status  
line.  
(gpgme\_op\_genkey): Add new argument FPR and return the fingerprint  
in it.  
\* gpgme.h: Adjust prototype of gpgme\_op\_genkey.



2002-11-19 Marcus Brinkmann <marcus@g10code.de>

\* `rungpg.c` (`gpg_keylist`): Add `--with-fingerprint` to `gpg` invocation twice, to get fingerprints on subkeys. Suggested by Timo Schulz <twoaday@freakmail.de>.  
(`gpg_keylist_ext`): Likewise.

2002-11-05 Marcus Brinkmann <marcus@g10code.de>

\* `import.c` (`append_xml_impinfo`): Use `_gpgme_data_append_string_for_xml` rather than `_gpgme_data_append_string` for the field content.  
Submitted by Miguel Coca <e970095@zipi.fi.upm.es>.

2002-10-10 Marcus Brinkmann <marcus@g10code.de>

\* `rungpg.h`, `engine-gpgsm.h`: File removed.  
\* `engine-backend.h`: New file.  
\* `Makefile.am` (`gpgsm_components`): New variable, set depending on automake conditional `HAVE_GPGSM`.  
(`libgpgme_la_SOURCES`):  
Add `engine-backend.h`, remove `rungpg.h` and `engine-gpgsm.h`. Replace `engine-gpgsm.c` with `${gpgsm_components}`.  
(`status-table.h`): Depend on `gpgme.h`, not `rungpg.h`.  
\* `conversion.c`: Include `<stdlib.h>`.  
\* `engine-gpgsm.c`: Do not set `ENABLE_GPGSM` here. Include `"engine-backend.h"` instead `"engine-gpgsm.h"`. Reorder some functions and remove all function prototypes.  
(`_gpgme_gpgsm_get_version`): Make static and rename to ...  
(`gpgsm_get_version`): ... this.  
(`_gpgme_gpgsm_check_version`): Make static and rename to ...  
(`gpgsm_check_version`): ... this.  
(`_gpgme_gpgsm_new`): Make static. Change argument type from `GpgsmObject *` to `void **`. Call `gpgsm_release` instead `_gpgme_gpgsm_release`.  
(`_gpgme_gpgsm_op_decrypt`): Make static and rename to ...  
(`gpgsm_check_decrypt`): ... this.  
(`_gpgme_gpgsm_op_delete`): Make static and rename to ...  
(`gpgsm_check_delete`): ... this.  
(`_gpgme_gpgsm_set_recipients`): Make static and rename to ...  
(`gpgsm_check_set_recipients`): ... this.  
(`_gpgme_gpgsm_op_encrypt`):  
Make static and rename to ...  
(`gpgsm_encrypt`): ... this.  
(`_gpgme_gpgsm_op_export`): Make static and rename to ...  
(`gpgsm_export`): ... this.  
(`_gpgme_gpgsm_op_genkey`): Make static and rename to ...  
(`gpgsm_genkey`): ... this.

(\_gpgme\_gpgsm\_op\_import): Make static and rename to ...  
 (gpgsm\_import): ... this.  
 (\_gpgme\_gpgsm\_op\_keylist): Make static and rename to ...  
 (gpgsm\_keylist): ... this.  
 (\_gpgme\_gpgsm\_op\_keylist\_ext): Make static and rename to ...  
 (gpgsm\_keylist\_ext): ... this.  
 (\_gpgme\_gpgsm\_op\_sign): Make static and rename to ...  
 (gpgsm\_sign): ... this.  
 (\_gpgme\_gpgsm\_op\_trustlist): Make static and rename to ...  
 (gpgsm\_trustlist): ... this.  
 (\_gpgme\_gpgsm\_op\_verify): Make static and rename to ...  
 (gpgsm\_verify): ... this.  
 (gpgsm\_status\_handler): Rename to ...  
 (status\_handler): ... this.  
 (\_gpgme\_gpgsm\_set\_status\_handler): Make static and rename to ...  
 (gpgsm\_set\_status\_handler): ... this.  
 (\_gpgme\_gpgsm\_set\_colon\_line\_handler): Make static  
 and rename to ...  
 (gpgsm\_set\_colon\_line\_handler): ... this.  
 (\_gpgme\_gpgsm\_add\_io\_cb): Rename to ...  
 (add\_io\_cb): ... this.  
 (\_gpgme\_gpgsm\_start): Make static and rename to ...  
 (gpgsm\_start): ... this.  
 (\_gpgme\_gpgsm\_set\_io\_cb): Make static and rename to ...  
 (gpgsm\_set\_io\_cb): ... this.  
 (\_gpgme\_gpgsm\_io\_event): Make static and rename to ...  
 (gpgsm\_io\_event): ... this.  
 (struct \_gpgme\_engine\_ops\_gpgsm): New variable.  
 [!ENABLE\_GPGSM]: Removed.  
 \* engine.c: Do not include <time.h>, <sys/types.h>, <string.h>, <assert.h>, "io.h", "runpg.h" and "engine-gpgsm.h". Include <stdlib.h> and "engine-backend.h".  
 (struct engine\_object\_s): Rewritten.  
 (engine\_ops): New variable.  
 \* engine.c (\_gpgme\_engine\_get\_path, \_gpgme\_engine\_get\_version, \_gpgme\_engine\_check\_version, \_gpgme\_engine\_new, \_gpgme\_engine\_release, \_gpgme\_engine\_set\_verbosity, \_gpgme\_engine\_set\_status\_handler, \_gpgme\_engine\_set\_command\_handler, \_gpgme\_engine\_set\_colon\_line\_handler, \_gpgme\_engine\_op\_decrypt, \_gpgme\_engine\_op\_delete, \_gpgme\_engine\_op\_edit, \_gpgme\_engine\_op\_encrypt, \_gpgme\_engine\_op\_encrypt\_sign, \_gpgme\_engine\_op\_export, \_gpgme\_engine\_op\_genkey, \_gpgme\_engine\_op\_import, \_gpgme\_engine\_op\_keylist, \_gpgme\_engine\_op\_keylist\_ext, \_gpgme\_engine\_op\_sign, \_gpgme\_engine\_op\_trustlist, \_gpgme\_engine\_op\_verify, \_gpgme\_engine\_start, \_gpgme\_engine\_set\_io\_cbs,

\_gpgme\_engine\_io\_event): Reimplement.  
 \* engine.h: Fix a few comments and a variable name in a prototype.  
 \* ops.h: Do not include "runggpg.h".  
 \* passphrase.c: Include config.h only if [HAVE\_CONFIG\_H]. Do not include "runggpg.h".  
 \* recipient.c: Likewise.  
 \* signers.c: Likewise.  
 \* version.c: Likewise.  
 \* runggpg.c: Likewise. Include "engine-backend.h". Reorder functions and remove prototypes.  
 (\_gpgme\_gpg\_get\_version): Make static and rename to ...  
 (gpg\_get\_version): ... this.  
 (\_gpgme\_gpg\_check\_version): Make static and rename to ...  
 (gpg\_check\_version): ... this.  
 (\_gpgme\_gpg\_new): Make static. Change argument type from GpgObject  
 \* to void \*\*. Call gpg\_release instead  
 \_gpgme\_gpg\_release.  
 (\_gpgme\_gpg\_op\_decrypt): Make static and rename to ...  
 (gpg\_check\_decrypt): ... this.  
 (\_gpgme\_gpg\_op\_delete): Make static and rename to ...  
 (gpg\_check\_delete): ... this.  
 (\_gpgme\_gpg\_set\_recipients): Make static and rename to ...  
 (gpg\_check\_set\_recipients): ... this.  
 (\_gpgme\_gpg\_op\_encrypt): Make static and rename to ...  
 (gpg\_encrypt): ... this.  
 (\_gpgme\_gpg\_op\_export): Make static and rename to ...  
 (gpg\_export): ... this.  
 (\_gpgme\_gpg\_op\_genkey): Make static and rename to ...  
 (gpg\_genkey): ... this.  
 (\_gpgme\_gpg\_op\_import): Make static and rename to ...  
 (gpg\_import): ... this.  
 (\_gpgme\_gpg\_op\_keylist): Make static and rename to ...  
 (gpg\_keylist): ... this.  
 (\_gpgme\_gpg\_op\_keylist\_ext): Make static and rename to ...  
 (gpg\_keylist\_ext): ... this.  
 (\_gpgme\_gpg\_op\_sign): Make static and rename to ...  
 (gpg\_sign): ... this.  
 (\_gpgme\_gpg\_op\_trustlist): Make static and rename to ...  
 (gpg\_trustlist): ... this.  
 (\_gpgme\_gpg\_op\_verify):  
 Make static and rename to ...  
 (gpg\_verify): ... this.  
 (gpg\_status\_handler): Rename to ...  
 (status\_handler): ... this.  
 (\_gpgme\_gpg\_set\_status\_handler): Make static and rename to ...  
 (gpg\_set\_status\_handler): ... this.  
 (\_gpgme\_gpg\_set\_colon\_line\_handler): Make static and rename to ...

(gpg\_set\_colon\_line\_handler): ... this.  
(gpgme\_gpg\_add\_io\_cb): Rename to ...  
(add\_io\_cb): ... this.  
(\_gpgme\_gpg\_start): Make static and rename to ...  
(gpg\_start): ... this.  
(\_gpgme\_gpg\_set\_io\_cb): Make static and rename to ...  
(gpg\_set\_io\_cb): ... this.  
(\_gpgme\_gpg\_io\_event): Make static and rename to ...  
(gpg\_io\_event): ... this.  
(struct\_gpgme\_engine\_ops\_gpg): New variable.

2002-10-10 Marcus Brinkmann <marcus@g10code.de>

\* engine-gpgsm.c (\_gpgme\_gpgsm\_op\_verify) [ENABLE\_GPGSM]: Add missing argument.

2002-10-09 Marcus Brinkmann <marcus@g10code.de>

\* data.h, data-user.c, data-stream.c, data-mem.c, data-fd.c, data-compat.c: New file. Really check them in this time, completes  
2002-10-08 change.

\* runpgg.h (GpgStatusHandler): Rename type to GpgmeStatusHandler and move to ...  
\* types.h (GpgmeStatusHandler): ... here.  
\* runpgg.h (GpgColonLineHandler): Rename type to GpgmeColonLineHandler. and move to ...  
\* types.h (GpgmeColonLineHandler): ... here.  
\* runpgg.h (GpgCommandHandler): Rename type to GpgmeCommandHandler. and move to ...  
\* types.h (GpgmeCommandHandler): ... here.  
\* engine.h: Don't include "runpgg.h".  
(\_gpgme\_engine\_set\_status\_handler): Change type of argument from GpgStatusHandler to GpgmeStatusHandler.  
(\_gpgme\_engine\_set\_colon\_line\_handler): Change type of argument from GpgColonLineHandler to GpgmeColonLineHandler.  
(\_gpgme\_engine\_set\_command\_handler): Change type of argument from GpgCommandHandler to GpgmeCommandHandler.  
\* engine-gpgsm.h: Don't include "runpgg.h".  
(\_gpgme\_gpgsm\_set\_status\_handler): Change type of argument from GpgStatusHandler to GpgmeStatusHandler.  
(\_gpgme\_gpgsm\_set\_colon\_line\_handler): Change type of argument from GpgColonLineHandler to GpgmeColonLineHandler.  
\* engine-gpgsm.c: Do not include "runpgg.h".  
(struct\_gpgsm\_object\_s): Change type of status.fnc to GpgmeStatusHandler. Change type of colon.fnc to

GpgmeColonLineHandler.  
(gpgsm\_assuan\_simple\_command): Change type of argument from  
GpgStatusHandler to GpgmeStatusHandler.  
(\_gpgme\_gpgsm\_set\_status\_handler): Likewise.  
(\_gpgme\_gpgsm\_set\_colon\_line\_handler): Change type of argument from  
GpgColonLineHandler to GpgmeColonLineHandler.  
\* runpgg.h (\_gpgme\_gpg\_set\_status\_handler): Change type of  
argument from GpgStatusHandler to GpgmeStatusHandler.  
(\_gpgme\_gpg\_set\_colon\_line\_handler): Change type of  
argument from GpgColonLineHandler to GpgmeColonLineHandler.  
(\_gpgme\_gpg\_set\_command\_handler): Change type of  
argument from GpgCommandHandler to GpgmeCommandHandler.  
\* runpgg.c (struct gpg\_object\_s): Change type of status.fnc to  
GpgmeStatusHandler. Change type of colon.fnc to  
GpgmeColonLineHandler. Change type of cmd.fnc  
to  
GpgmeCommandLineHandler.  
(\_gpgme\_gpg\_set\_status\_handler): Change type of argument FNC to  
GpgmeStatusHandler.  
(\_gpgme\_gpg\_set\_colon\_line\_handler): Change type of argument FNC  
to GpgmeColonLineHandler.  
(\_gpgme\_gpg\_set\_command\_handler): Change type of argument FNC to  
GpgmeCommandHandler.  
\* engine.c (\_gpgme\_engine\_set\_status\_handler): Change type of  
argument FNC to GpgmeStatusHandler.  
(\_gpgme\_engine\_set\_colon\_line\_handler): Change type of argument FNC  
to GpgmeColonLineHandler.  
(\_gpgme\_engine\_set\_command\_handler): Change type of argument FNC to  
GpgmeCommandHandler.

\* runpgg.h (\_gpgme\_gpg\_enable\_pipemode): Remove prototype.  
\* runpgg.c (struct gpg\_object\_s): Remove PM.  
(pipemode\_cb): Prototype removed.  
(add\_pm\_data): Function removed.  
(\_gpgme\_gpg\_enable\_pipemode): Likewise.  
(pipemode\_copy): Likewise.  
(pipemode\_cb): Likewise.  
(add\_arg): Don't check for pipemode.  
(add\_data): Likewise.  
(\_gpgme\_gpg\_set\_status\_handler): Likewise.  
(\_gpgme\_gpg\_set\_colon\_line\_handler):  
Likewise.  
(\_gpgme\_gpg\_set\_command\_handler): Likewise.  
(\_gpgme\_gpg\_spawn): Likewise.  
(\_gpgme\_gpg\_spawn): Don't set PM.active.  
(\_gpgme\_gpg\_op\_verify): Remove pipemode case.  
\* verify.c (\_gpgme\_op\_verify\_start): Remove pipemode case.

\* `runpgg.h` (`_gpgme_gpg_add_arg`, `_gpgme_gpg_add_data`,  
`_gpgme_gpg_add_pm_data`, `_gpgme_gpg_housecleaning`,  
`_gpgme_gpg_set_simple_line_handler`): Prototype removed.  
(`_gpgme_gpg_set_verbosity`): New prototype.

\* `runpgg.c` (`_gpgme_gpg_add_data`): Make static and rename to ...  
(`add_data`): ... this.

(`_gpgme_gpg_add_pm_data`): Call `add_data`, not `_gpgme_gpg_add_data`.

(`_gpgme_gpg_set_command_handler`): Likewise.

(`_gpgme_gpg_op_decrypt`, `_gpgme_gpg_op_edit`, `_gpgme_gpg_op_encrypt`,  
`_gpgme_gpg_op_encrypt_sign`, `_gpgme_gpg_op_export`,  
`_gpgme_gpg_op_genkey`, `_gpgme_gpg_op_import`, `_gpgme_gpg_op_sign`,  
`_gpgme_gpg_op_verify`): Likewise.

(`_gpgme_gpg_add_pm_data`): Rename to ...  
(`add_pm_data`): ... this.

(`_gpgme_gpg_op_verify`): Call `add_pm_data`, not  
`_gpgme_gpg_add_pm_data`.

(`_gpgme_gpg_add_arg`):  
Make static and rename to ...  
(`add_arg`): ... this.

(`_gpgme_gpg_set_command_handler`, `_gpgme_gpg_new`,  
`_gpgme_gpg_op_decrypt`, `_gpgme_gpg_op_delete`,  
`_gpgme_append_gpg_args_from_signers`, `_gpgme_gpg_op_edit`,  
`_gpgme_append_gpg_args_from_recipients`, `_gpgme_gpg_op_encrypt`,  
`_gpgme_gpg_op_encrypt_sign`, `_gpgme_gpg_op_export`,  
`_gpgme_gpg_op_genkey`, `_gpgme_gpg_op_import`, `_gpgme_gpg_op_keylist`,  
`_gpgme_gpg_op_keylist_ext`, `_gpgme_gpg_op_trustlist`,  
`_gpgme_gpg_op_sign`, `_gpgme_gpg_op_verify`): Use `add_arg`, not  
`_gpgme_gpg_add_arg`.

(`_gpgme_gpg_set_verbosity`): New function.

(`struct gpg_object_s`): Remove member `simple` from colon.

(`_gpgme_gpg_set_colon_line_handler`): Don't initialize `simple`.

(`_gpgme_gpg_set_simple_line_handler`): Removed function.

(`read_colon_line`): Don't check the GPG->colon.simple.

\* `engine.c` (`_gpgme_engine_set_verbosity`): Call  
`_gpgme_gpg_set_verbosity` instead `_gpgme_gpg_add_arg`.

2002-10-08 Marcus Brinkmann <marcus@g10code.de>

\* `util.h` (`_gpgme_malloc`,  
`_gpgme_realloc`, `_gpgme_calloc`,  
`_gpgme_strdup`, `_gpgme_free`): Remove prototypes.

(`xtrymalloc`, `xtrycalloc`, `xtryrealloc`, `xtrystrdup`, `xfree`): Remove  
macros.

\* `util.c`: File removed.

\* `Makefile.am` (`libgpgme_la_SOURCES`): Remove `util.h`.

\* `conversion.c` (`_gpgme_decode_c_string`): Use `malloc` instead of  
`xtrymalloc`, `realloc` instead of `xtryrealloc`, `calloc` instead of  
`xtrycalloc`, `free` instead of `xfree`.

(\_gpgme\_data\_append\_percentstring\_for\_xml): Likewise.  
 \* data.c (\_gpgme\_data\_new, \_gpgme\_data\_release): Likewise.  
 \* data-compat.c (gpgme\_data\_new\_from\_filepart): Likewise.  
 \* data-mem.c (mem\_write, mem\_release, gpgme\_data\_new\_from\_mem, \_gpgme\_data\_get\_as\_string): Likewise.  
 \* debug.c (debug\_init): Likewise.  
 \* decrypt.c (\_gpgme\_release\_decrypt\_result): Likewise.  
 \* delete.c (\_gpgme\_release\_delete\_result): Likewise.  
 \* edit.c (\_gpgme\_release\_edit\_result, \_gpgme\_op\_edit\_start): Likewise.  
 \* encrypt.c (\_gpgme\_release\_encrypt\_result): Likewise.  
 \* engine.c (\_gpgme\_engine\_get\_info, \_gpgme\_engine\_new, \_gpgme\_engine\_release): Likewise.  
 \* engine-gpgsm.c (\_gpgme\_gpgsm\_new, \_gpgme\_gpgsm\_release, \_gpgme\_gpgsm\_op\_decrypt, \_gpgme\_gpgsm\_op\_delete, gpgsm\_set\_recipients, \_gpgme\_gpgsm\_op\_encrypt, \_gpgme\_gpgsm\_op\_export, \_gpgme\_gpgsm\_op\_genkey, \_gpgme\_gpgsm\_op\_import, \_gpgme\_gpgsm\_op\_keylist, \_gpgme\_gpgsm\_op\_keylist\_ext, \_gpgme\_gpgsm\_op\_sign, \_gpgme\_gpgsm\_op\_verify, gpgsm\_status\_handler): Likewise.  
 \* genkey.c (\_gpgme\_release\_genkey\_result): Likewise.  
 \* gpgme.c (gpgme\_new, gpgme\_release): Likewise.  
 \* import.c (\_gpgme\_release\_import\_result): Likewise.  
 \* key.c (\_gpgme\_key\_cache\_init, \_gpgme\_key\_cache\_add, key\_new, add\_subkey, gpgme\_key\_release, \_gpgme\_key\_append\_name): Likewise.  
 \* keylist.c (\_gpgme\_release\_keylist\_result, keylist\_colon\_handler, \_gpgme\_op\_keylist\_event\_cb, gpgme\_op\_keylist\_next): Likewise.  
 \* ops.h (test\_and\_allocate\_result): Likewise.  
 \* passphrase.c (\_gpgme\_release\_passphrase\_result, \_gpgme\_passphrase\_status\_handler, \_gpgme\_passphrase\_command\_handler): Likewise.  
 \*  
 progress.c (\_gpgme\_progress\_status\_handler): Likewise.  
 \* recipient.c (gpgme\_recipients\_new, gpgme\_recipients\_release, gpgme\_recipients\_add\_name\_with\_validity): Likewise.  
 \* runpgg.c (\_gpgme\_gpg\_new, \_gpgme\_gpg\_release, \_gpgme\_gpg\_add\_arg, \_gpgme\_gpg\_add\_data, \_gpgme\_gpg\_set\_colon\_line\_handler, free\_argv, free\_fd\_data\_map, build\_argv, \_gpgme\_gpg\_spawn, read\_status, read\_colon\_line): Likewise.  
 \* sign.c (\_gpgme\_release\_sign\_result): Likewise.  
 \* signers.c (\_gpgme\_signers\_add): Likewise.  
 \* trustlist.c (trust\_item\_new, trustlist\_colon\_handler, \_gpgme\_op\_trustlist\_event\_cb, gpgme\_op\_trustlist\_next, gpgme\_trustitem\_release): Likewise.  
 \* verify.c (\_gpgme\_release\_verify\_result, finish\_sig): Likewise.  
 \* version.c (gpgme\_get\_engine\_info, \_gpgme\_get\_program\_version):

Likewise.

\* w32-io.c (create\_reader, create\_writer, destroy\_reader, destroy\_writer, build\_commandline, \_gpgme\_io\_spawn): Likewise.

\* w32-sema.c (critsect\_init, \_gpgme\_sema\_cs\_destroy): Likewise.

\* w32-util.c (read\_w32\_registry\_string):

Likewise.

\* wait.c (\_gpgme\_fd\_table\_deinit, \_gpgme\_fd\_table\_put, \_gpgme\_wait\_event\_cb, \_gpgme\_add\_io\_cb, \_gpgme\_remove\_io\_cb)

\* data-compat.c: Include <stdlib.h>.

2002-10-08 Marcus Brinkmann <marcus@g10code.de>

New data object component:

\* gpgme.h (GpgmeDataReadCb, GpgmeDataWriteCb, GpgmeDataSeekCb, GpgmeDataReleaseCb): New types.

(struct GpgmeDataCbs): New structure.

(gpgme\_data\_read): Changed prototype to match that of read() closely.

(gpgme\_data\_write): Similar for write().

(gpgme\_data\_seek, gpgme\_data\_new\_from\_cbs, gpgme\_data\_new\_from\_fd,

gpgme\_data\_new\_from\_stream): New prototypes.

(gpgme\_data\_get\_type, gpgme\_check\_engine): Prototype removed.

\* Makefile.am (libgpgme\_la\_SOURCES): Add data.h, data-fd.c, data-stream.c, data-mem.c, data-user.c and data-compat.c.

\* data.c: Reimplemented from scratch.

\* (data-compat.c, data-fd.c, data.h, data-mem.c, data-stream.c, data-user.c): New file.

\* context.h (struct gpgme\_data\_s): Removed.

\* conversion.c:

Include <errno.h> and <sys/types.h>.

(\_gpgme\_data\_append): New function.

\* data.c (\_gpgme\_data\_append\_string): Move to ...

\* conversion.c (\_gpgme\_data\_append\_string): ... here.

\* data.c (\_gpgme\_data\_append\_for\_xml): Move to ...

\* conversion.c (\_gpgme\_data\_append\_for\_xml): ... here.

\* data.c (\_gpgme\_data\_append\_string\_for\_xml): Move to ...

\* conversion.c (\_gpgme\_data\_append\_string\_for\_xml): ... here.

\* data.c (\_gpgme\_data\_append\_percentstring\_for\_xml): Move to ...

\* conversion.c (\_gpgme\_data\_append\_percentstring\_for\_xml): ... here.

\* ops.h (\_gpgme\_data\_get\_mode, \_gpgme\_data\_set\_mode): Prototype removed.

\* types.h (GpgmeDataMode): Type removed.

\* decrypt.c (\_gpgme\_decrypt\_start): Don't check data type or mode.

\* edit.c (\_gpgme\_op\_edit\_start): Likewise.

\* encrypt.c (\_gpgme\_op\_encrypt\_start): Likewise.



- \* encrypt-sign.c (\_gpgme\_op\_encrypt\_sign\_start): Likewise.
- \* encrypt-sign.c (\_gpgme\_op\_encrypt\_sign\_start): Likewise.
- \* export.c (\_gpgme\_op\_export\_start): Likewise.
- \*
- genkey.c (\_gpgme\_op\_genkey\_start): Likewise.
- \* import.c (\_gpgme\_op\_import\_start): Likewise.
- \* sign.c (\_gpgme\_op\_sign\_start): Likewise.
- \* verify.c (\_gpgme\_op\_verify\_start): Likewise.

  

- \* encrypt.c (gpgme\_op\_encrypt): Remove hack that returns invalid no recipient if no data was returned.
- \* encrypt-sign.c (gpgme\_op\_encrypt\_sign): Remove hack that returns no recipient if no data was returned.
- \* encrypt-sign.c (gpgme\_op\_encrypt\_sign): Remove hack that returns no recipient if no data was returned.

  

- \* engine.c (\_gpgme\_engine\_op\_verify): Add new argument to differentiate detached from normal signatures.
- \* engine.h (\_gpgme\_engine\_op\_verify): Likewise for prototype.
- \* engine-gpgsm.c (\_gpgme\_gpgsm\_op\_verify): Likewise. Don't check mode of data argument.
- \* engine-gpgsm.h (\_gpgme\_gpgsm\_op\_verify): Likewise for prototype.
- \* gpgme.h (gpgme\_op\_verify\_start): Likewise for prototype.
- (gpgme\_op\_verify): Likewise for prototype.
- \* runpgg.c (\_gpgme\_gpg\_op\_verify): Likewise.
- \* runpgg.h
- (\_gpgme\_gpg\_op\_verify): Likewise for prototype.
- \* verify.c (\_gpgme\_op\_verify\_start): Likewise.
- (gpgme\_op\_verify\_start): Likewise.
- (gpgme\_op\_verify): Likewise.

  

- \* runpgg.c (struct arg\_and\_data\_s): New member INBOUND to hold direction of data object.
- (\_gpgme\_gpg\_add\_data): Add new argument INBOUND. Use it to determine direction of data object.
- (\_gpgme\_gpg\_add\_pm\_data, \_gpgme\_gpg\_set\_command\_handler, \_gpgme\_gpg\_op\_decrypt, \_gpgme\_gpg\_op\_edit, \_gpgme\_gpg\_op\_encrypt, \_gpgme\_gpg\_op\_encrypt\_sign, \_gpgme\_gpg\_op\_export, \_gpgme\_gpg\_op\_genkey, \_gpgme\_gpg\_op\_import, \_gpgme\_gpg\_op\_sign, \_gpgme\_gpg\_op\_verify): Add new argument to \_gpgme\_gpg\_add\_data invocation.
- (build\_argv): Use new member INBOUND to determine direction of file descriptor. Don't check the data type.
- \* runpgg.h (\_gpgme\_gpg\_add\_data): Add new argument to prototype.

  

- \* gpgme.c (gpgme\_get\_op\_info): Don't call \_gpgme\_data\_get\_as\_string if CTX->op\_info is NULL.

\* version.c (gpgme\_check\_engine): Function removed.

2002-09-30

Werner Koch <wk@gnupg.org>

\* keylist.c (keylist\_colon\_handler): Take care when printing a NULL with the DEBUG.

\* engine-gpgsm.c (struct gpgsm\_object\_s): New member ANY.  
(gpgsm\_status\_handler): Run the colon function to indicate EOF.  
(\_gpgme\_gpgsm\_set\_colon\_line\_handler): Better reset ANY here.

2002-09-28 Marcus Brinkmann <marcus@g10code.de>

\* conversion.c (\_gpgme\_hextobyte): Prevent superfluous multiplication with base. Reported by Stphane Corthsy.

\* keylist.c (gpgme\_op\_keylist\_ext\_start): Use private asynchronous operation type in invocation of \_gpgme\_op\_reset.

2002-09-20 Werner Koch <wk@gnupg.org>

\* ath.c: Include sys/time.h if sys/select.h is not available.

2002-09-13 Marcus Brinkmann <marcus@g10code.de>

\* keylist.c (keylist\_status\_handler): Do not call finish\_key() here.  
(gpgme\_op\_keylist\_ext\_start): Set CTX->tmp\_key to NULL.

2002-09-03 Marcus Brinkmann <marcus@g10code.de>

\* Makefile.am (assuan\_libobjs): Remove @LTLIBOBJ@ as we link them into gpgme unconditionally.  
(libgpgme\_la\_LIBADD): Change @LIBOBJ@ into @LTLIBOBJ@.

2002-09-02 Marcus Brinkmann <marcus@g10code.de>

\* Makefile.am (assuan\_libobjs): Use @LTLIBOBJ@ instead @LIBOBJ@.

2002-09-02 Marcus Brinkmann <marcus@g10code.de>

\* debug.c (\_gpgme\_debug\_add): Test \*LINE, not LINE.  
(\_gpgme\_debug\_end): Likewise.  
Reported by Dr. Stefan Dalibor <Dr.Stefan.Dalibor@bfa.de>.

2002-09-02 Marcus Brinkmann <marcus@g10code.de>

\* posix-io.c (\_gpgme\_io\_select): Don't use a non-constant struct initializer.

\* version.c (\_gpgme\_get\_program\_version): Likewise.

Reported by Dr. Stefan Dalibor <Dr.Stefan.Dalibor@bfa.de>.

2002-09-02 Marcus Brinkmann <marcus@g10code.de>

\* conversion.c (\_gpgme\_decode\_c\_string): Set DESTP before modifying DEST.

\* conversion.c (\_gpgme\_decode\_c\_string): Fix off by one error in last change.

\* runpgg.c (\_gpgme\_append\_gpg\_args\_from\_signers): Move before \_gpgme\_op\_edit so its prototype is known early on.

\* conversion.c: New file.

\* util.h: Add prototypes for \_gpgme\_decode\_c\_string and \_gpgme\_hextobyte.

\* keylist.c (keylist\_colon\_handler): Call \_gpgme\_decode\_c\_string on issuer name.

\* Makefile.am (libgpgme\_la\_SOURCES): Add conversion.c

\* key.c (\_gpgme\_key\_append\_name): Replace calls to hextobyte by calls to \_gpgme\_hextobyte.

(hash\_key): Likewise.

2002-09-01 Marcus Brinkmann <marcus@g10code.de>

\* op-support.c (\_gpgme\_op\_reset): Set CTX->pending after calling \_gpgme\_engine\_release, as this will reset pending to zero in the event done callback on cancelled operations.

2002-08-30 Marcus Brinkmann <marcus@g10code.de>

\* runpgg.c (\_gpgme\_gpg\_op\_edit): Add args from signers.

Suggested by Miguel Coca <e970095@zipi.fi.upm.es>.

\* runpgg.c (\_gpgme\_gpg\_op\_edit): Add bogus ctx argument.

\* runpgg.h: Also to prototype.

\* engine.c (\_gpgme\_engine\_op\_edit): Likewise.

\* engine.h: Likewise.

\* edit.c (\_gpgme\_op\_edit\_start): Likewise.

2002-08-29 Werner Koch <wk@gnupg.org>

\* engine-gpgsm.c (\_gpgme\_gpgsm\_op\_sign):

Implement signer

selection.

\* vasprintf.c (va\_copy): Define macro if not yet defined.

2002-08-29 Marcus Brinkmann <marcus@g10code.de>

\* passphrase.c (\_gpgme\_passphrase\_status\_handler): Reset CTX->result.passphrase->no\_passphrase if passphrase is given (good or bad). Submitted by Jean DIRAISON <jean.diraison@free.fr>.

2002-08-28 Marcus Brinkmann <marcus@g10code.de>

\* posix-io.c (\_gpgme\_io\_spawn): Use a double-fork approach. Return 0 on success, -1 on error.  
\* version.c (\_gpgme\_get\_program\_version): Don't wait for the child.  
\* engine.c (\_gpgme\_engine\_housecleaning): Function removed. (do\_reaping): Likewise. (\_gpgme\_engine\_add\_child\_to\_reap\_list): Likewise. (struct reap\_s): Removed. (reap\_list): Likewise. (reap\_list\_lock): Likewise.  
\* engine.h (\_gpgme\_engine\_io\_event): Remove prototypes for \_gpgme\_engine\_housecleaning and \_gpgme\_engine\_add\_child\_to\_reap\_list.  
\* runpgp.c (\_gpgme\_gpg\_release): Don't add child to reap list. (struct gpg\_object\_s): Remove PID member. (\_gpgme\_gpg\_new): Don't initialize GPG->pid. (\_gpgme\_gpg\_spawn): Don't set GPG->pid.  
\* wait.c (run\_idle): Removed. (gpgme\_wait): Run idle\_function directly.

2002-08-21 Marcus Brinkmann <marcus@g10code.de>

\* encrypt-sign.c (encrypt\_sign\_status\_handler): Remove dead variables encrypt\_info and encrypt\_info\_len.  
\* trustlist.c (gpgme\_op\_trustlist\_start): Set colon line handler.  
\* posix-sema.c (sema\_fatal): Remove function.  
All these reported by Stphane Corthsy.

2002-08-23 Werner Koch <wk@gnupg.org>

\* gpgme-config.in: Made --prefix work for --libs.

2002-08-21 Marcus Brinkmann <marcus@g10code.de>

\* ath.h: Update list of symbols that get a prefix: Rename the ath\_mutex\_\*\_available symbols to ath\_\*\_available.

2002-08-21 Marcus Brinkmann <marcus@g10code.de>

- \* stpcpy.c: New file from gnuilib.
- \* Makefile.am (assuan\_libobjs): Remove jnlib.

2002-08-20 Marcus Brinkmann <marcus@g10code.de>

- \* gpgme.h: Add prototype for gpgme\_op\_import\_ext.
- \* import.c
- (struct import\_result\_s): New member `nr\_considered'.
- Rename `any\_imported' to `nr\_imported'.
- (import\_status\_handler): Increment nr\_imported. Set nr\_considered if appropriate.
- (gpgme\_op\_import\_ext): New function.
- (gpgme\_op\_import): Implement in terms of gpgme\_op\_import\_ext.

2002-08-20 Werner Koch <wk@gnupg.org>

- \* gpgme.m4: Replaced with a new and faster version. This does not anymore try to build test programs. If we really need test programs, we should add an option to gpgme-config to do so.
- \* vasprintf.c (int\_vasprintf): Hack to handle NULL passed for %s.

2002-08-20 Marcus Brinkmann <marcus@g10code.de>

- \* gpgme.c (\_gpgme\_set\_op\_info): Append data on subsequent calls.
- \* encrypt-sign.c (encrypt\_sign\_status\_handler): Remove op\_info handling.

2002-08-19 Werner Koch <wk@gnupg.org>

- \* decrypt.c (is\_token, skip\_token): Duplicated from verify.c
- (gpgme\_op\_decrypt): Hack to properly return Decryption\_Failed..
- (\_gpgme\_decrypt\_status\_handler): Create an operation info.

2002-08-14

Werner Koch <wk@gnupg.org>

- \* key.h (struct certsig\_s): New. Use it in gpgme\_key\_s.
- \* key.c (gpgme\_key\_release): Release it. We need to add more code of course.
- (\_gpgme\_key\_append\_name): Use memset to initialize the struct.
- \* gpgme.h (GPGME\_KEYLIST\_MODE\_SIGS): New.
- \* runpgp.c (\_gpgme\_gpg\_op\_keylist): Include sigs in listing depending non the list mode.
- \* key.c (gpgme\_key\_get\_string\_attr): Use GPGME\_ATTR\_TYPE to return information about the key type (PGP or X.509).

(gpgme\_key\_get\_ulong\_attr): Likewise.

\* keylist.c (keylist\_colon\_handler): Include 1 in the check for valid algorithms so that RSA is usable. Store the issuer name and serial number also for "crs" records. Parse the expire date for subkeys.

(set\_userid\_flags): Put them onto the last appended key.

2002-07-29 Marcus Brinkmann <marcus@g10code.de>

\* runpgg.c (\_gpgme\_gpg\_op\_edit): Use --with-colons.

2002-07-28 Marcus Brinkmann <marcus@g10code.de>

\* data.c (gpgme\_data\_read): For GPGME\_DATA\_TYPE\_NONE, return EOF instead an error.

The following changes make it possible to flush an inbound data pipe before invoking a command handler:

\* posix-io.c (\_gpgme\_io\_select): Accept new argument NONBLOCK to \_gpgme\_io\_select. Set timeout of 0 if this is set.

\* w32-io.c (\_gpgme\_io\_select): Likewise.

\* io.h: Add new argument NONBLOCK to \_gpgme\_io\_select prototype.

\* wait.c (do\_select): Add new argument to \_gpgme\_io\_select invocation.

\* runpgg.h (\_gpgme\_gpg\_set\_command\_handler): Add new argument linked\_data to prototype.

\* engine.h (\_gpgme\_engine\_set\_command\_handler): Likewise.

\* engine.c (\_gpgme\_engine\_set\_command\_handler): Likewise.

\* passphrase.c (\_gpgme\_passphrase\_start): Pass NULL as linked\_data argument to \_gpgme\_engine\_set\_command\_handler.

\* runpgg.c (struct gpg\_object\_s): New members linked\_data and linked\_idx in CMD.

(\_gpgme\_gpg\_new): Initialize those new members.

(\_gpgme\_gpg\_set\_command\_handler): Accept new argument linked\_data.

(build\_argv): Handle linked\_data

in the same hack as cb\_data.

(read\_status): If linked\_data is in use, flush the pipe before activating the command handler.

\* gpgme.h: Add prototypes for gpgme\_op\_edit\_start and gpgme\_op\_edit.

The next changes export the status codes to the user:

\* decrypt.c (\_gpgme\_decrypt\_status\_handler): Likewise, also prefix all STATUS\_ with GPGME\_.

- \* delete.c (delete\_status\_handler): Likewise.
- \* decrypt-verify.c (decrypt\_verify\_status\_handler): Likewise.
- \* encrypt.c (\_gpgme\_encrypt\_status\_handler): Likewise.
- (\_gpgme\_encrypt\_sym\_status\_handler): Likewise.
- \* encrypt-sign.c (encrypt\_sign\_status\_handler): Likewise.
- \* engine-gpgsm.c (parse\_status): Likewise.
- (gpgsm\_status\_handler): Likewise.
- (gpgsm\_set\_recipients): Likewise.
- \* export.c (export\_status\_handler): Likewise.
- \* genkey.c (genkey\_status\_handler): Likewise.
- \* import.c (append\_xml\_impinfo): Likewise.
- (import\_status\_handler): Likewise.
- \* keylist.c (keylist\_status\_handler): Likewise.
- \* passphrase.c (\_gpgme\_passphrase\_status\_handler):
- Likewise.
- (command\_handler): Likewise.
- \* progress.c (\_gpgme\_progress\_status\_handler): Likewise.
- \* sign.c (\_gpgme\_sign\_status\_handler): Likewise.
- \* trustlist.c (trustlist\_status\_handler): Likewise.
- \* verify.c (\_gpgme\_verify\_status\_handler): Likewise.
- \* gpgme.h (GpgmeEditCb): New type.
- \* runpgg.h (GpgStatusCode): Rename and move to ...
- \* gpgme.h (GpgmeStatusCode): ... this and here.
- \* Makefile.am (status-table.h): Run mkstatus on gpgme.h, not runpgg.h.
- \* mkstatus: Prefix STATUS with GPGME\_.
- \* runpgg.h (GpgStatusHandler, GpgCommandHandler): Change type accordingly.
- \* ops.h (\_gpgme\_verify\_status\_handler,
- \_gpgme\_decrypt\_status\_handler, \_gpgme\_sign\_status\_handler,
- \_gpgme\_encrypt\_status\_handler, \_gpgme\_passphrase\_status\_handler,
- \_gpgme\_progress\_status\_handler): Likewise.
- \* runpgg.c (struct gpg\_object\_s): Likewise for CMD.code.

These changes add an edit operation to GPGME:

- \* context.h (struct gpgme\_context\_s): New member RESULT.edit. \*
- ops.h: Add prototype
- for \_gpgme\_release\_edit\_result and
- \_gpgme\_passphrase\_command\_handler.
- \* passphrase.c (command\_handler): Make non-static and rename to ...
- (\_gpgme\_passphrase\_command\_handler): ... this.
- (\_gpgme\_passphrase\_start): Use new name for command handler.
- \* types.h: Add EditResult type.
- \* gpgme.c (\_gpgme\_release\_result): Release EDIT result.
- \* edit.c: New file.
- \* Makefile.am (libgpgme\_la\_SOURCES): Add edit.c.
- (libgpgme\_la\_LDADD): Rename to libgpgme\_la\_LIBADD, and include
- assuan\_libobjs.

(assuan\_libobjs): New variable, set this instead

libpgpgme\_la\_LIBADD.

\* engine.h (\_gpgme\_engine\_op\_edit): New prototype.

\* engine.c (\_gpgme\_engine\_op\_edit): New function.

\* runpgg.h (\_gpgme\_gpg\_op\_edit): New prototype.

\* runpgg.c (\_gpgme\_gpg\_op\_edit): New function.

2002-07-27 Marcus Brinkmann <marcus@g10code.de>

\* delete.c (delete\_problem): New case ambiguous specification.

(delete\_status\_handler): Handle new case (poorly).

2002-07-25 Marcus Brinkmann <marcus@g10code.de>

\* engine-gpgsm.c

(\_gpgme\_gpgsm\_op\_delete): Implement this.

2002-07-25 Marcus Brinkmann <marcus@g10code.de>

\* Makefile.am (libpgpgme\_la\_LDADD): Add @LIBOBJS@ for vasprintf and fopencookie.

\* vasprintf.c: Update to more recent libiberty version.

\* debug.h: Replace #elseif with #elif.

Submitted by Stphane Corthsy:

\* util.h (vasprintf): Correct prototype.

\* encrypt-sign.c: Include <stddef.h>.

(encrypt\_sign\_status\_handler): Change type of ENCRYPT\_INFO\_LEN to size\_t.

\* ath-pthread.c: Include <stdlib.h>, not <malloc.h>.

\* ath-pth.c: Likewise.

2002-07-25 Marcus Brinkmann <marcus@g10code.de>

\* wait.c (fdt\_global): Make static. Reported by Stphane Corthsy.

\* runpgg.c (\_gpgme\_gpg\_op\_keylist\_ext): Skip empty string patterns. Reported by Stphane Corthsy.

\* key.c (gpgme\_key\_get\_as\_xml): Add OTRUST attribute. Requested by Stphane Corthsy.

(gpgme\_key\_get\_string\_attr): Add GPGME\_ATTR\_SIG\_SUMMARY case to silence gcc warning.

\* runpgg.c (\_gpgme\_gpg\_new): Always set utf8 as charset.

2002-07-03



Marcus Brinkmann <marcus@g10code.de>

- \* gpgme.c (gpgme\_set\_io\_cbs): Deal with CTX being NULL.
- \* gpgme.c (\_gpgme\_op\_event\_cb\_user): New function.
- \* op-support.c (\_gpgme\_op\_reset): Support a new mode of operation for private or user event loop. Use new user event callback wrapper.
- \* trustlist.c (gpgme\_op\_trustlist\_start): Use this new mode.
- \* keylist.c (gpgme\_op\_keylist\_start): Likewise.
- \* runpgg.c (\_gpgme\_gpg\_io\_event): New function.
- \* runpgg.h (\_gpgme\_gpg\_io\_event): New prototype.
- \* engine-gpgsm.c (\_gpgme\_gpg\_io\_event): New function.
- \* engine-gpgsm.h (\_gpgme\_gpgsm\_io\_event): New prototype.
- \* engine.c (\_gpgme\_engine\_io\_event): New function.
- \* engine.h (\_gpgme\_engine\_io\_event): New prototype.
- \* keylist.c (finish\_key): Call \_gpgme\_engine\_io\_event, and move the real work for the default IO callback routines to ...
- (\_gpgme\_op\_keylist\_event\_cb): ... here. New function.
- \* trustlist.c (trustlist\_colon\_handler): Signal GPGME\_EVENT\_NEXT\_TRUSTITEM. Move queue manipulation to ...
- (\_gpgme\_op\_trustlist\_event\_cb): ... here. New function.
- \* gpgme.c (\_gpgme\_op\_event\_cb): Call \_gpgme\_op\_keylist\_event\_cb and \_gpgme\_op\_trustlist\_event\_cb when appropriate.
- \* ops.h (\_gpgme\_op\_keylist\_event\_cb): New prototype.
- (\_gpgme\_op\_trustlist\_event\_cb): Likewise.
- \* op-support.c (\_gpgme\_op\_reset): Add comment why we don't use the user provided event handler directly.
- \* gpgme.h (GpgmeRegisterIOCb): Return GpgmeError value, and TAG in a pointer argument.
- \* wait.c (\_gpgme\_add\_io\_cb): Likewise.
- \* wait.h (\_gpgme\_add\_io\_cb): Likewise for prototype.
- \* runpgg.c (\_gpgme\_gpg\_add\_io\_cb): Call IO\_CBS->add with new argument. Fix up error handling.
- \* engine-gpgsm.c (\_gpgme\_gpgsm\_add\_io\_cb): Call IO\_CBS->add with new argument, fix up error handling.

2002-07-03 Werner Koch <wk@gnupg.org>

- \* encrypt.c (status\_handler\_finish): New.
- (\_gpgme\_encrypt\_status\_handler): Moved some code out to the new function and call this function also in case we get into the status handler with an error which might happen due to a kludge in engine-gpgsm.c

2002-06-28 Marcus Brinkmann <marcus@g10code.de>

\* keylist.c (gpgme\_op\_keylist\_ext\_start): Always use our own FD table (eg use synchronous mode).

2002-06-27 Marcus Brinkmann <marcus@g10code.de>

\* gpgme.h: Fix documentation of key attribute retrieval functions.

2002-06-28 Marcus Brinkmann <marcus@g10code.de>

\* ops.h (\_gpgme\_wait\_on\_condition): Remove HANG argument from prototype and change return type to GpgmeError.

(\_gpgme\_wait\_one): New prototype.

\* wait.c (gpgme\_wait): Replace with the meat from \_gpgme\_wait\_on\_condition here, and remove the support for conditions.

(\_gpgme\_wait\_on\_condition): Remove HANG argument from prototype and change return type to GpgmeError. Replace with meat from \_gpgme\_wait\_one and add support for conditions.

(\_gpgme\_wait\_one): Just call \_gpgme\_wait\_on\_condition without condition.

\* keylist.c (gpgme\_op\_keylist\_ext\_start): Always use our own FD table (eg use synchronous mode).

(gpgme\_op\_keylist\_next): Remove HANG argument from \_gpgme\_wait\_on\_condition. Check its return value.

\* trustlist.c (gpgme\_op\_trustlist\_start): Always use our own FD table (eg use synchronous mode).

(gpgme\_op\_trustlist\_next): Remove HANG argument from \_gpgme\_wait\_on\_condition. Check its return value.

2002-06-26 Werner Koch <wk@gnupg.org>

\* engine-gpgsm.c (map\_assuan\_error): Map No\_Data\_Available to EOF.

\* import.c (append\_xml\_impinfo): Kludge to print fingerprint instead of keyid for use with gpgsm.

(import\_status\_handler): Set a flag to know whether any import occurred.

(gpgme\_op\_import): Return -1 if no certificate was imported.

2002-06-25 Werner Koch <wk@gnupg.org>

\* engine-gpgsm.c (\_gpgme\_gpgsm\_set\_io\_cbs) [ENABLE\_GPGSM]: Fixed function arguments.

2002-06-25 Marcus Brinkmann <marcus@g10code.de>

\* engine-gpgsm.c (\_gpgme\_gpgsm\_op\_export): Only export the keys listed in RECP.  
\* export.c (gpgme\_op\_export): If no data was returned, return GPGME\_No\_Recipients.

2002-06-25 Marcus Brinkmann <marcus@g10code.de>

\* engine-gpgsm.c (\_gpgme\_gpgsm\_op\_export): Implement.

2002-06-21 Marcus Brinkmann <marcus@g10code.de>

\* engine-gpgsm.c (gpgsm\_assuan\_simple\_command): Return ERR.  
(parse\_status): New function.  
(gpgsm\_status\_handler): Use parse\_status.  
(gpgsm\_assuan\_simple\_command): Accept new arguments STATUS\_FNC and STATUS\_FNC\_VALUE and process status messages.  
(gpgsm\_set\_recipients): Pass new arguments to gpgsm\_assuan\_simple\_command.  
(gpgsm\_set\_fd): Likewise.  
(\_gpgme\_gpgsm\_op\_keylist): Likewise.  
(\_gpgme\_gpgsm\_op\_keylist\_ext): Likewise.  
(\_gpgme\_gpgsm\_op\_sign): Likewise.

2002-06-21 Marcus Brinkmann <marcus@g10code.de>

\* wait.c (\_gpgme\_remove\_io\_cb): Unlock FDT->lock.

2002-06-20 Werner Koch <wk@gnupg.org>

\* runpgp.c (build\_argv): Ignore GPG\_AGENT\_INFO if set but empty.  
\* verify.c (calc\_sig\_summary): Set bad policy for wrong key usage.  
(skip\_token): New.  
(\_gpgme\_verify\_status\_handler): Watch out for wrong key usage.  
(gpgme\_get\_sig\_string\_attr): Hack to return info on the key usage. Does now make use of the former RESERVED argument which has been renamed to WHATIDX.  
(gpgme\_get\_sig\_ulong\_attr): Renamed RESERVED to WHATIDX.

2002-06-14 Marcus Brinkmann <marcus@g10code.de>

\* wait.c (do\_select): Return -1 on error, and 0 if nothing to run.  
(\_gpgme\_wait\_one): Only set HANG to zero if do\_select returned an error, or there are no more file descriptors to wait on.  
(\_gpgme\_wait\_on\_condition): Ignore return value from do\_select for now.

2002-06-13 Werner Koch <wk@gnupg.org>

\* verify.c (gpgme\_op\_verify): Make sure that we never access an uninitialized result structure.

2002-06-12 Werner Koch <wk@gnupg.org>

\* keylist.c (struct keylist\_result\_s): New.  
(\_gpgme\_release\_keylist\_result): Release it here  
(keylist\_status\_handler): Handle truncated.  
(append\_xml\_keylistinfo): New.  
\* gpgme.c (\_gpgme\_release\_result): and use it here.  
\* types.h: Declare the new type here.  
\*  
context.h (struct gpgme\_context\_s): Use it here.

2002-06-11 Marcus Brinkmann <marcus@g10code.de>

\* engine-gpgsm.c (\_gpgme\_gpgsm\_release): Close status\_cb.fd.  
(\_gpgme\_gpgsm\_new): Duplicate status file descriptor, so we can use our own close notification mechanism without interfering with assuan.

2002-06-11 Werner Koch <wk@gnupg.org>

\* gpgme.h: Add GPGME\_ATTR\_SIG\_SUMMARY and the GPGME\_SIGSUM\_ constants.  
\* verify.c (calc\_sig\_summary): New.  
(gpgme\_get\_sig\_ulong\_attr): And use it here.

2002-06-10 Werner Koch <wk@gnupg.org>

\* runpgg.h: Add new status codes TRUNCATED and ERROR.  
\* verify.c (is\_token, copy\_token): New.  
(\_gpgme\_verify\_status\_handler): Use copy\_token, handle the new ERROR status and store the errorcode used withgpgsm and trust status codes.  
\* gpgme.h: New attribute ERRTOK.  
\* key.c (gpgme\_key\_get\_string\_attr): Add dummy case for it.  
(gpgme\_get\_sig\_string\_attr): Use it here to return the last error.

2002-06-10 Marcus Brinkmann <marcus@g10code.de>

\*  
engine-gpgsm.c (\_gpgme\_gpgsm\_start): Move the code that sets the close notification for the status fd to ...  
(\_gpgme\_gpgsm\_new): ... here.

\* wait.h: Include "sema.h". Remove prototypes of  
\_gpgme\_remove\_proc\_from\_wait\_queue and  
\_gpgme\_register\_pipe\_handler. Add prototypes of  
\_gpgme\_fd\_table\_init, \_gpgme\_fd\_table\_deinit, \_gpgme\_fd\_table\_put,  
\_gpgme\_add\_io\_cb, \_gpgme\_remove\_io\_cb, \_gpgme\_wait\_event\_cb and  
\_gpgme\_wait\_one..

\* wait.c: Remove global variables PROC\_QUEUE, PROC\_QUEUE\_LOCK,  
FD\_TABLE\_SIZE, FD\_TABLE, FD\_TABLE\_LOCK. New global variables  
FDT\_GLOBAL, CTX\_DONE\_LIST, CTX\_DONE\_LIST\_SIZE,  
CTX\_DONE\_LIST\_LENGTH and CTX\_DONE\_LIST\_LOCK. Remove struct  
proc\_s. Replace struct wait\_item\_s.  
(\_gpgme\_fd\_table\_init): New function.  
(\_gpgme\_fd\_table\_deinit): Likewise.  
(\_gpgme\_fd\_table\_put): Likewise.  
(set\_process\_done): Remove function.  
(do\_select): Take argument FDT. Use that to decide which fds to  
select on.  
(\_gpgme\_remove\_proc\_from\_wait\_queue): Remove function.  
(\_gpgme\_wait\_event\_cb):  
New function.  
(\_gpgme\_wait\_one): Likewise.  
(\_gpgme\_register\_pipe\_handler): Remove function.  
(\_gpgme\_add\_io\_cb): New function.  
(\_gpgme\_remove\_io\_cb): Likewise.  
(\_gpgme\_freeze\_fd): Remove function.  
(\_gpgme\_thaw\_fd): Remove function.

\* runpgg.c (struct fd\_data\_map\_s): Add new member TAG.  
(struct gpg\_object\_s): Likewise for STATUS and COLON. Add member  
IDX to CMD. Add new member IO\_CBS.  
(close\_notify\_handler): New variables POSSIBLY\_DONE and NOT\_DONE.  
For each I/O callback, check if it should be unregistered. If all  
callbacks have been unregistered, trigger GPGME\_EVENT\_DONE.  
Remove member RUNNING.  
(\_gpgme\_gpg\_new): Initialize new members.  
(\_gpgme\_gpg\_release): Check PID not RUNNING. Don't call  
\_gpgme\_remove\_proc\_from\_wait\_queue. Close GPG->CMD.FD if set.  
(build\_argv): Store away the index instead the file descriptor for  
CMD.  
(\_gpgme\_gpg\_add\_io\_cb): New function.  
(\_gpgme\_gpg\_spawn): Use \_gpgme\_gpg\_add\_io\_cb to register IO  
callbacks.  
(gpg\_status\_handler):  
Change return type to void, remove PID  
argument, close filedescriptor if EOF or error occurs.  
(read\_status): Use \_gpgme\_gpg\_add\_io\_cb instead \_gpgme\_thaw\_fd.  
Use IO\_CBS->remove instead \_gpgme\_freeze\_fd.  
(gpg\_colon\_line\_handler): Change return type to void, remove PID  
argument, close filedescriptor if EOF or error occurs.

(command\_cb): Use IO\_CBS->remove instead \_gpgme\_freeze\_fd.  
 (\_gpgme\_gpg\_set\_io\_cbs): New function.  
 \* runpgg.h (\_gpgme\_gpg\_set\_io\_cbs): Prototype for  
 \_gpgme\_gpg\_set\_io\_cbs.  
 \* gpgme.h (GpgmeIOCb): New type.  
 (GpgmeRegisterIOCb): Likewise.  
 (GpgmeRemoveIOCb): Likewise.  
 (GpgmeEventIO): Likewise.  
 (GpgmeEventIOCb): Likewise.  
 (struct GpgmeIOCs): New structure to hold I/O callbacks.  
 (gpgme\_set\_op\_io\_cbs): New prototype.  
 (gpgme\_get\_op\_io\_cbs): Likewise.  
 \* ops.h: New prototype for \_gpgme\_op\_event\_cb. Remove prototypes  
 for \_gpgme\_freeze\_fd and \_gpgme\_thaw\_fd. Remove PID argument from  
 \_gpgme\_data\_inbound\_handler and \_gpgme\_data\_outbound\_handler  
 prototype.  
 Add prototype for \_gpgme\_op\_reset.  
 Add synchronous argument to \_gpgme\_decrypt\_start prototype.  
 \* io.h: Beautification.  
 \* gpgme.c: Include "wait.h".  
 (gpgme\_new): Initialize FDT.  
 (gpgme\_set\_io\_cbs): New function.  
 (gpgme\_get\_io\_cbs): Likewise.  
 (\_gpgme\_op\_event\_cb): Likewise.  
 \* data.c (\_gpgme\_data\_inbound\_handler): Change return type to  
 void. Drop PID argument. Close FD on error and EOF.  
 (write\_mem\_data): Don't close FD here ...  
 (write\_cb\_data): ... or here ...  
 (\_gpgme\_data\_outbound\_handler): ... but here. Change return type  
 to void. Drop PID argument.  
 \* context.h: Include "wait.h".  
 (struct gpgme\_context\_s): New members FDT and IO\_CBS.  
 \* op-support.c: New file.  
 \* Makefile.am (libgpgme\_la\_SOURCES): Add op-support.c.  
 \* ops.h: Add prototype for \_gpgme\_op\_reset().  
 \* decrypt.c (\_gpgme\_decrypt\_start): New argument SYNCHRONOUS. Use  
 \_gpgme\_op\_reset.  
 (gpgme\_op\_decrypt\_start): Add synchronous argument.  
 (gpgme\_op\_decrypt): Likewise. Use \_gpgme\_wait\_one instead  
 gpgme\_wait.  
 \*  
 delete.c (gpgme\_op\_delete\_start): Rename to ...  
 (\_gpgme\_op\_delete\_start): ... this. New argument SYNCHRONOUS.  
 Use \_gpgme\_op\_reset. Make function static.  
 (gpgme\_op\_delete\_start): Just a wrapper around  
 \_gpgme\_op\_delete\_start now.  
 (gpgme\_op\_delete): Add synchronous argument. Use \_gpgme\_wait\_one  
 instead gpgme\_wait.

\* encrypt.c: Include "wait.h".  
(gpggme\_op\_encrypt\_start): Rename to ...  
(\_gpggme\_op\_encrypt\_start): ... this. New argument SYNCHRONOUS.  
Use \_gpggme\_op\_reset. Make function static.  
(gpggme\_op\_encrypt\_start): Just a wrapper around  
\_gpggme\_op\_encrypt\_start now.  
(gpggme\_op\_encrypt): Add synchronous argument. Use \_gpggme\_wait\_one  
instead gpggme\_wait.

\* encrypt\_sign.c (gpggme\_op\_encrypt\_sign\_start): Rename to ...  
(\_gpggme\_op\_encrypt\_sign\_start): ... this. New argument  
SYNCHRONOUS. Use \_gpggme\_op\_reset. Make function static.  
(gpggme\_op\_encrypt\_sign\_start): Just a wrapper around  
\_gpggme\_op\_encrypt\_sign\_start now.  
(gpggme\_op\_encrypt\_sign): Add synchronous argument.  
Use  
\_gpggme\_wait\_one instead gpggme\_wait.

\* export.c (gpggme\_op\_export\_start): Rename to ...  
(\_gpggme\_op\_export\_start): ... this. New argument SYNCHRONOUS.  
Use \_gpggme\_op\_reset. Make function static.  
(gpggme\_op\_export\_start): Just a wrapper around  
\_gpggme\_op\_export\_start now.  
(gpggme\_op\_export): Add synchronous argument. Use \_gpggme\_wait\_one  
instead gpggme\_wait.

\* genkey.c (gpggme\_op\_genkey\_start): Rename to ...  
(\_gpggme\_op\_genkey\_start): ... this. New argument SYNCHRONOUS.  
Use \_gpggme\_op\_reset. Make function static.  
(gpggme\_op\_genkey\_start): Just a wrapper around  
\_gpggme\_op\_genkey\_start now.  
(gpggme\_op\_genkey): Add synchronous argument. Use \_gpggme\_wait\_one  
instead gpggme\_wait.

\* import.c (gpggme\_op\_import\_start): Rename to ...  
(\_gpggme\_op\_import\_start): ... this. New argument SYNCHRONOUS.  
Use \_gpggme\_op\_reset. Make function static.  
(gpggme\_op\_import\_start): Just a wrapper around  
\_gpggme\_op\_import\_start now.  
(gpggme\_op\_import): Add synchronous argument. Use \_gpggme\_wait\_one  
instead  
gpggme\_wait.

\* keylist.c (gpggme\_op\_keylist\_start): Use \_gpggme\_op\_reset.  
(gpggme\_op\_keylist\_ext\_start): Likewise.

\* sign.c (gpggme\_op\_sign\_start): Rename to ...  
(\_gpggme\_op\_sign\_start): ... this. New argument SYNCHRONOUS. Use  
\_gpggme\_op\_reset. Make function static.  
(gpggme\_op\_sign\_start): Just a wrapper around \_gpggme\_op\_sign\_start  
now.  
(gpggme\_op\_sign): Add synchronous argument. Use \_gpggme\_wait\_one  
instead gpggme\_wait.

\* trustlist.c (gpggme\_op\_trustlist\_start): Use \_gpggme\_op\_reset.

\* verify.c (gpgme\_op\_verify\_start): Rename to ...  
 (\_gpgme\_op\_verify\_start): ... this. New argument SYNCHRONOUS.  
 Use \_gpgme\_op\_reset. Make function static.  
 (gpgme\_op\_verify\_start): Just a wrapper around  
 \_gpgme\_op\_verify\_start now.  
 (gpgme\_op\_verify): Add synchronous argument. Use \_gpgme\_wait\_one  
 instead gpgme\_wait.  
 \* engine-gpgsm.c (iocb\_data\_t): New type.  
 (struct gpgsm\_object\_s): New member status\_cb. Replace input\_fd  
 and input\_data with input\_cb. Replace output\_fd and output\_data  
 with  
 output\_cb. Replace message\_fd and message\_data with  
 message\_cb. New member io\_cbs.  
 (\_gpgme\_gpgsm\_new): Initialize all new members (and drop the old  
 ones).  
 (close\_notify\_handler): New variable POSSIBLY\_DONE. For each I/O  
 callback, check if it should be unregistered. If all callbacks  
 have been unregistered, trigger GPGME\_EVENT\_DONE.  
 (\_gpgme\_gpgsm\_release): Remove variable PID. Use new variable  
 names to close the file descriptors.  
 (\_gpgme\_gpgsm\_op\_decrypt): Use new variable names,  
 (\_gpgme\_gpgsm\_op\_encrypt): Likewise.  
 (\_gpgme\_gpgsm\_op\_genkey): Likewise.  
 (\_gpgme\_gpgsm\_op\_import): Likewise.  
 (\_gpgme\_gpgsm\_op\_keylist): Likewise.  
 (\_gpgme\_gpgsm\_op\_keylist\_ext): Likewise.  
 (\_gpgme\_gpgsm\_op\_sign): Likewise.  
 (\_gpgme\_gpgsm\_op\_verify): Likewise.  
 (gpgsm\_status\_handler): Drop argument PID. Change return type to  
 void. Close status pipe before returning because of EOF or error.  
 (\_gpgme\_gpgsm\_add\_io\_cb): New function.  
 (\_gpgme\_gpgsm\_start): Use \_gpgme\_gpgsm\_add\_io\_cb to register  
 callback  
 function.  
 (\_gpgme\_gpgsm\_set\_io\_cbs): New function.  
 \* engine-gpgsm.h: New prototype for \_gpgme\_gpgsm\_set\_io\_cbs.  
 \* engine.c (\_gpgme\_engine\_set\_io\_cbs): New function.  
 \* engine.h: New prototype for \_gpgme\_engine\_set\_io\_cbs.

2002-06-04 Marcus Brinkmann <marcus@g10code.de>

\* Makefile.am (libgpgme\_la\_SOURCES): Remove mutex.h.

2002-06-03 Marcus Brinkmann <marcus@g10code.de>

\* key.c: Include <ctype.h>.  
 (\_gpgme\_key\_append\_name): Skip one more char when  
 processing escaped char. Submitted by Marc Mutz <mutz@kde.org>.



Handle hexadecimal encodings. Also reported by Marc. Thanks!

2002-06-02 Marcus Brinkmann <marcus@g10code.de>

- \* ath.h: Enable the `_gpgme_` prefix. Fix all those prefix macros.
- \* posix-sema.c: Use that prefix here.
- \* posix-io.c: Include "ath.h".
- (`_gpgme_io_read`): Use `_gpgme_ath_read` instead read.
- (`_gpgme_io_write`): Use `_gpgme_ath_write` instead write.
- (`_gpgme_io_waitpid`): Use `_gpgme_ath_waitpid` instead waitpid.
- (`_gpgme_io_select`): Use `_gpgme_ath_select` instead select.

2002-06-02 Marcus Brinkmann <marcus@g10code.de>

- \* Makefile.am (`ath_components`): New variable.
- (`ath_components_pthread`): Likewise.
- (`ath_components_pth`): Likewise.
- (`system_components`): Add `ath_componentes`.
- \* ath.h: New file.
- \* ath.c: Likewise.
- \* ath-pthread.c: Likewise.
- \* ath-pth.c: Likewise.
- \* posix-sema.c (`_gpgme_sema_cs_enter`): Rework to use the ATH interface.
- \* mutex.h: Remove file.

2002-05-30 Werner Koch <wk@gnupg.org>

- \* key.c (`gpgme_key_get_string_attr`): Return NULL when asking for an issuer with `IDX > 0`. We don't support `altIssuerNames` for now.

2002-05-22 Werner Koch <wk@gnupg.org>

- \* engine-gpgsm.c (`_gpgme_gpgsm_op_keylist_ext`): Aehmm, added missing variable definition. Oohh - Marcus was faster.

2002-05-22 Marcus Brinkmann <marcus@gnu.org>

- \* engine-gpgsm.c (`_gpgme_gpgsm_op_keylist_ext`): Fix last change.

2002-05-21 Werner Koch <wk@gnupg.org>

- \* engine-gpgsm.c (`_gpgme_gpgsm_op_keylist`)  
(`_gpgme_gpgsm_op_keylist_ext`):  
Pass the keylist mode to gpgsm.

2002-05-10 Werner Koch <wk@gnupg.org>

- \* key.h (gpgme\_key\_s): Add OTRUST.
- \* keylist.c (set\_ownertrust): New.
- (keylist\_colon\_handler): Get the ownertrust value
- \* key.c (gpgme\_key\_get\_string\_attr,gpgme\_key\_get\_ulong\_attr):
- Return that value.

2002-05-08 Marcus Brinkmann <marcus@g10code.de>

- \* w32-util.c: New static variable GET\_PATH\_LOCK.
- (\_gpgme\_get\_gpg\_path): Remove superfluous NULL initializer.
- Take lock while determining path.
- (\_gpgme\_get\_gpgsm\_path): Likewise.
- \* version.c (do\_subsystem\_inits): Set DONE to 1 after
- initialization.
- (gpgme\_get\_engine\_info): New variable ENGINE\_INFO\_LOCK. Take lock
- while determining engine info.
- \* runpgp.c (\_gpgme\_gpg\_get\_version): New variable
- GPG\_VERSION\_LOCK. Take the lock while determining the program
- version.
- \* posix-io.c: Include "sema.h".
- (\_gpgme\_io\_spawn): New variable FIXED\_SIGNALS\_LOCK. Take the lock
- while fixing the signals.
- (\_gpgme\_io\_select): Make READFDS and WRITEFDS non-static.
- \*
- key.c: Include "sema.h". New globals KEY\_CACHE\_LOCK and
- KEY\_REF\_LOCK.
- (capabilities\_to\_string): Make STRINGS very const.
- (\_gpgme\_key\_cache\_add): Lock the key cache.
- (\_gpgme\_key\_cache\_get): Likewise.
- (gpgme\_key\_ref, gpgme\_key\_release): Lock the key\_ref\_lock.
- \* import.c (append\_xml\_impinfo): Make IMPORTED\_FIELDS and
- IMPORT\_RES\_FIELDS very const. Make FIELD and FIELD\_NAME a little
- const.
- \* engine.c (\_gpgme\_engine\_get\_info): New variable
- ENGINE\_INFO\_LOCK. Take lock while determining engine info.
- \* engine-gpgsm.c: Include "sema.h".
- (\_gpgme\_gpgsm\_get\_version): New variable GPGSM\_VERSION\_LOCK. Take
- lock while getting program version.

2002-05-08 Marcus Brinkmann <marcus@g10code.de>

- \* debug.h: New file.
- \* Makefile.am (libgpgme\_la\_SOURCES): Add debug.h.
- \* util.h: Removed all prototypes and declarations related to
- debugging. Include "debug.h".

\* debug.c (debug\_level): Comment variable and remove superfluous zero initializer.  
(errfp): Likewise.  
(\_gpgme\_debug\_enabled):  
Function removed.  
(struct debug\_control\_s): Definition removed.  
(\_gpgme\_debug\_level): Function removed.  
(\_gpgme\_debug\_begin): Rewritten to use vasprintf. Accept a printf-style format specification and a variable number of arguments.  
(\_gpgme\_debug\_add): Rewritten using vasprintf. Expect that format starts out with "%s" for simplicity.  
(\_gpgme\_debug\_end): Rewritten using vasprintf. Do not accept a TEXT argument anymore.

\* posix-io.c (\_gpgme\_io\_select): Use new level argument for DEBUG\_BEGIN instead explicit if construct.

\* debug.c (debug\_init): Remove superfluous zero initializer, remove volatile flag of INITIALIZED. Do not use the double-checked locking algorithm, it is fundamentally flawed and will empty your fridge (on a more serious note, despite the volatile flag it doesn't give you the guarantee you would expect, for example on a DEC Alpha or an SMP machine. The volatile only serializes accesses to the volatile variable, but not to the other variables).

2002-05-03

Werner Koch <wk@gnupg.org>

\* engine-gpgsm.c (\_gpgme\_gpgsm\_new): Redirect any gpgsm error output to /dev/null.

\* verify.c (gpgme\_get\_sig\_key): Set the protocol of the listctx.  
\* gpgme.c (gpgme\_get\_protocol): New.

\* data.c (gpgme\_data\_write): Changed type of BUFFER to void\*.  
(gpgme\_data\_read): Ditto.

\* verify.c (\_gpgme\_verify\_status\_handler): Handle TRUST\_\* status lines so that a claim can be made without looking up the key.  
(gpgme\_get\_sig\_string\_attr): New.  
(gpgme\_get\_sig\_ulong\_attr): New.

\* gpgme.h (GpgmeAttr): Added GPGME\_ATTR\_SIG\_STATUS.

\* runpgg.h: Add new status codes from gpg 1.0.7 and formatted the list to align with the status.h file from gnupg.

\* gpgme.h (GpgmeSigStat): Add \_GOOD\_EXP and \_GOOD\_EXPKEY.  
\* verify.c (\_gpgme\_verify\_status\_handler, finish\_sig): Handle these new status codes. Store the expiration time

2002-04-27 Werner Koch <wk@gnupg.org>

\* gpgme.h (GpgmeData\_Encoding): New.  
\* data.c (gpgme\_data\_get\_encoding, gpgme\_data\_set\_encoding): New.  
\* engine-gpgsm.c (map\_input\_enc): New. Use it in all local functions where the INPUT command gets send.

2002-04-27 Marcus Brinkmann <marcus@g10code.de>

\* engine-gpgsm.c (\_gpgme\_gpgsm\_op\_verify): Close the output descriptor only when we don't need it anymore. Close the message descriptor if we don't need it.

2002-04-26 Werner Koch <wk@gnupg.org>

\* Makefile.am (libgpgme\_la\_LIBADD): Use libtool libraries.

2002-04-25 Marcus Brinkmann <marcus@g10code.de>

\* runpg.c (\_gpgme\_gpg\_release): Call gpgme\_data\_release on GPG->cmd.cb\_data, not xfree.

2002-04-25 Marcus Brinkmann <marcus@g10code.de>

\* engine-gpgsm.c (\_gpgme\_gpgsm\_new): Set the display, ttyname, ttytype, lc\_ctype and lc\_messages options in the server.

2002-04-24 Marcus Brinkmann <marcus@g10code.de>

\* engine-gpgsm.c (map\_assuan\_error): Add new error codes.

2002-04-23 Werner Koch <wk@gnupg.org>

\* key.c (gpgme\_key\_get\_ulong\_attr): Swapped use of can\_encrypt and can\_certify to return the requested values.

2002-04-23 Marcus Brinkmann <marcus@g10code.de>

\* gpgme.c (gpgme\_get\_progress\_cb): Allow either return parameter to be NULL.  
(gpgme\_get\_passphrase\_cb): Likewise.

2002-04-22 Marcus Brinkmann <marcus@g10code.de>

- \* gpgme.c (gpgme\_get\_passphrase\_cb): New function.
- (gpgme\_get\_progress\_cb): New function.
- \* gpgme.h: Add new prototypes for gpgme\_get\_passphrase\_cb and gpgme\_get\_progress\_cb.

2002-03-28 Werner Koch <wk@gnupg.org>

- \* gpgme.h (GpgmeAttr): Add values for issuer and chaining.
- \* key.h (gpgme\_key\_s): Add issuer and chaining elements for X509.
- \* keylist.c (keylist\_colon\_handler): Store them.
- \* key.c (gpgme\_key\_release): Free them.
- (gpgme\_key\_get\_as\_xml, gpgme\_key\_get\_string\_attr): Print them.

2002-03-26 Werner Koch <wk@gnupg.org>

- \* Makefile.am (libgpgme\_la\_SOURCES): Add mutex.h

2002-03-21 Werner Koch <wk@gnupg.org>

- \* util.h [!HAVE\_FOPENCOOKIE]: Make sure off\_t and ssize\_t are defined.

2002-03-18 Marcus Brinkmann <marcus@g10code.de>

- \*
- Makefile.am (system\_components): New variable, set depending on HAVE\_DOSISH\_SYSTEM.
- (libgpgme\_la\_SOURCES): Use system\_components. Remove `syshdr.h'.
- \* syshdr.h: File removed.
- \* posix-io.c: Remove !HAVE\_DOSISH\_SYSTEM safeguard. Clean up source.
- \* posix-sema.c: Likewise.
- \* posix-util.c: Likewise.
- \* w32-io.c: Remove HAVE\_DOSISH\_SYSTEM safeguard.
- \* w32-sema.c: Likewise.
- \* w32-util.c: Likewise.
- \* posix-io.c: Include `unistd.h', do not include `syshdr.h'.
- \* posix-sema.c: Likewise.
- \* w32-io.c: Include `io.h', do not include `syshdr.h'
- \* w32-sema.c: Likewise.
- \* w32-util.c: Likewise.
- \* data.c: Do not include `syshdr.h'.
- \* wait.c: Likewise.

\* wait.h: Code cleanup.

\* mutex.h: New file.

\* posix-sema.c: Implement.

2002-03-08 Werner Koch <wk@gnupg.org>

\* util.h [HAVE\_FOPENCOOKIE]: Fixed type. Thanks to Frank Heckenbach.

2002-03-07 Werner Koch <wk@gnupg.org>

\* gpgme.h (gpgme\_op\_keylist\_ext\_start): Add prototype.

2002-03-06 Marcus Brinkmann <marcus@g10code.de>

\*

encrypt.c (\_gpgme\_encrypt\_sym\_status\_handler): New function.  
(gpgme\_op\_encrypt\_start): New variable SYMMETRIC, set it if RECP  
is null, and if it is set, use \_gpgme\_encrypt\_sym\_status\_handler  
as status handler and run \_gpgme\_passphrase\_start.

\* runpgp.c (\_gpgme\_gpg\_op\_encrypt): If RECP is zero, do symmetric  
encryption.

\* engine-gpgsm.c (\_gpgme\_gpgsm\_op\_encrypt): If RECP is zero,  
return error value.

\* runpgp.c (\_gpgme\_gpg\_op\_verify): Add "--" argument.

2002-03-03 Marcus Brinkmann <marcus@g10code.de>

\* passphrase.c (\_gpgme\_passphrase\_status\_handler): Also set the  
error No\_Passphrase if only a bad passphrase was provided.

2002-03-03 Marcus Brinkmann <marcus@g10code.de>

\* runpgp.c (\_gpgme\_gpg\_op\_verify): If TEXT is of mode  
GPGME\_DATA\_MODE\_IN, construct a command line that stores the  
plaintext in TEXT.

\* verify.c (gpgme\_op\_verify\_start): Accept TEXT being  
uninitialized, and in this case interpret SIG as a normal or  
cleartext signature and TEXT as a return  
data object.

\* engine-gpgsm.c (\_gpgme\_gpgsm\_op\_verify): Likewise.

2002-03-03 Marcus Brinkmann <marcus@g10code.de>

\* engine-gpgsm.c (\_gpgme\_gpgsm\_op\_keylist\_ext) [ENABLE\_GPGSM]:  
Add stub function.

2002-02-28 Werner Koch <wk@gnupg.org>

- \* key.h (subkey\_s): New member expires\_at.
- \* keylist.c (keylist\_colon\_handler): Set it here
- \* key.c (gpgme\_key\_get\_as\_xml,gpgme\_key\_get\_ulong\_attr): Return it.

2002-02-27 Marcus Brinkmann <marcus@g10code.de>

- \* runpgp.h (\_gpgme\_gpg\_op\_keylist\_ext): New prototype.
- \* runpgp.c (\_gpgme\_gpg\_op\_keylist\_ext): New function.
- \* engine-gpgsm.h (\_gpgme\_gpgsm\_op\_keylist\_ext): New prototype.
- \* engine-gpgsm.c (\_gpgme\_gpgsm\_op\_keylist\_ext): New function.
- \* engine.h (\_gpgme\_engine\_op\_keylist\_ext): New prototype.
- \* engine.c (\_gpgme\_engine\_op\_keylist\_ext): New function.
- \* keylist.c (gpgme\_op\_keylist\_ext\_start): New function.

2002-02-27 Marcus Brinkmann <marcus@g10code.de>

- \* gpgme.h: Add new error code GPGME\_Invalid\_Recipient.
- \* encrypt.c (struct encrypt\_result\_s): New member invalid\_recipients, rename no\_recipients to no\_valid\_recipients. (\_gpgme\_encrypt\_status\_handler): Include error for invalid recipients.
- \* engine-gpgsm.c (gpgsm\_set\_recipients): Change type of first argument to GpgsmObject. Use that to report back the status about the recipients.

2002-02-26 Marcus Brinkmann <marcus@g10code.de>

- \* verify.c (\_gpgme\_verify\_status\_handler): Fix the last change.

2002-02-25 Marcus Brinkmann <marcus@g10code.de>

- \* verify.c (\_gpgme\_verify\_status\_handler): Parse the args line to see if the problem is due to a missing key, and report that back to the user.

2002-02-25 Marcus Brinkmann <marcus@g10code.de>

- \* engine.c (\_gpgme\_engine\_op\_encrypt\_sign): New function.
- \* engine.h (\_gpgme\_engine\_op\_encrypt\_sign): New prototype.
- \* runpgp.c (\_gpgme\_append\_gpg\_args\_from\_signers): New function. (\_gpgme\_gpg\_op\_sign): Use that new function. (\_gpgme\_gpg\_op\_encrypt\_sign): New function.
- \* runpgp.h (\_gpgme\_gpg\_op\_encrypt\_sign): New prototype.
- \* gpgme.h (gpgme\_op\_encrypt\_sign\_start): New prototype.

(gpgme\_op\_encrypt\_sign): Likewise.  
\* Makefile.am (libgpgme\_la\_SOURCES): Add encrypt-sign.c.  
\* ops.h (\_gpgme\_encrypt\_status\_handler): Add prototype.  
(\_gpgme\_sign\_status\_handler): Add prototype.  
\* sign.c (sign\_status\_handler): Rename to ...  
(\_gpgme\_sign\_status\_handler): ... this and make non-static.  
\* encrypt.c (encrypt\_status\_handler): Rename to ...  
(\_gpgme\_encrypt\_status\_handler): ... this and make non-static.  
\* encrypt.c (gpgme\_op\_encrypt\_start): Use new status handler name.  
\* sign.c (gpgme\_op\_sign\_start): Likewise.

2002-02-25 Marcus Brinkmann <marcus@g10code.de>

\* context.h (struct gpgme\_context\_s): New member include\_certs.  
\* gpgme.h (gpgme\_set\_include\_certs): Add prototype.  
(gpgme\_get\_include\_certs): Likewise.  
\* gpgme.c (gpgme\_set\_include\_certs): New function.  
(gpgme\_get\_include\_certs): Likewise.  
(gpgme\_new): Set include\_certs to 1 (the default).  
\* engine.c (\_gpgme\_engine\_op\_sign): Accept  
new argument include\_certs,  
and pass it to \_gpgme\_gpgsm\_op\_sign.  
\* engine.h (\_gpgme\_engine\_op\_sign): Likewise for prototype.  
\* engine-gpgsm.c (\_gpgme\_gpgsm\_op\_sign): Accept new argument  
include\_certs and handle it.  
\* engine-gpgsm.h (\_gpgme\_gpgsm\_start): Add new argument include\_certs.  
\* sign.c (gpgme\_op\_sign\_start): Add new argument to  
\_gpgme\_engine\_op\_sign call.

2002-02-14 Werner Koch <wk@gnupg.org>

\* keylist.c (gpgme\_op\_keylist\_start): Do not use a verbose listing.

2002-02-13 Werner Koch <wk@gnupg.org>

\* vasprintf.c, fopencookie.c: Add replacement functions.  
\* util.h: Add prototypes for them.

2002-02-09 Marcus Brinkmann <marcus@g10code.de>

\* engine-gpgsm.c (gpgsm\_assuan\_simple\_command): Return 0 if we  
reach the end of the function.

2002-02-09 Marcus Brinkmann <marcus@g10code.de>

\* genkey.c (gpgme\_op\_genkey\_start): Fix logic in validity check.  
(gpgme\_op\_genkey\_start): Skip newlines after opening tag.



\* engine-gpgsm.c (\_gpgme\_gpgsm\_start): Remove cruft.

2002-02-08

Marcus Brinkmann <marcus@g10code.de>

\* genkey.c (gpgme\_op\_genkey\_start): Allow PUBKEY and SECKEY to be set, and pass them down to the crypto engine.

\* engine-gpgsm.h (\_gpgme\_gpgsm\_start): New arguments PUBKEY and SECKEY.

\* engine.h: Likewise.

\* runpgg.h (\_gpgme\_gpg\_spawn): Likewise.

\* engine.c (\_gpgme\_engine\_op\_genkey): Likewise. Use those arguments.

\* runpgg.c (\_gpgme\_gpg\_op\_genkey): Likewise. Complain if those arguments are set.

\* engine-gpgsm.c (\_gpgme\_gpgsm\_op\_genkey): Likewise. Implement function.

\* engine-gpgsm.c (\_gpgme\_gpgsm\_op\_keylist): Beautify comment.

2002-02-06 Marcus Brinkmann <marcus@g10code.de>

\* runpgg.c (\_gpgme\_gpg\_op\_keylist): Remove handling of keylist mode (for now).

2002-02-06 Marcus Brinkmann <marcus@g10code.de>

\* wait.c (gpgme\_wait): Add new argument STATUS, in which the status of the returned context is returned.

(\_gpgme\_wait\_on\_condition): Rework the function a bit, to make it aware of cancelled processes, and to allow to use gpgme\_wait with

CTX being NULL (as documented in the source).

(struct proc\_s): New member REPORTED.

\* gpgme.h: Fix prototype.

\* verify.c (gpgme\_op\_verify): Fix use of gpgme\_wait.

\* sign.c (gpgme\_op\_sign): Likewise.

\* import.c (gpgme\_op\_import): Likewise.

\* genkey.c (gpgme\_op\_genkey): Likewise.

\* export.c (gpgme\_op\_export): Likewise.

\* encrypt.c (gpgme\_op\_encrypt): Likewise.

\* delete.c (gpgme\_op\_delete): Likewise.

\* decrypt-verify.c (gpgme\_op\_decrypt\_verify): Likewise.

2002-02-06 Marcus Brinkmann <marcus@g10code.de>

\* gpgme.c (gpgme\_set\_keylist\_mode): Possibly return an error value.

(gpgme\_get\_keylist\_mode): New function.

(gpgme\_new): Set the default for keylist\_mode member of CTX.

\* gpgme.h (gpgme\_set\_keylist\_mode): Fix prototype.

(gpgme\_get\_keylist\_mode): New prototype.

(GPGME\_KEYLIST\_MODE\_LOCAL): New macro.

(GPGME\_KEYLIST\_MODE\_EXTERN): Likewise..

2002-02-02 Marcus Brinkmann <marcus@g10code.de>

This patch has gotten a bit large... mmh. The

main thing that

happens here is that error values are now not determined in the operation function after gpgme\_wait completed, but in the status handler when EOF is received. It should always be the case that either an error is flagged or EOF is received, so that after a gpgme\_wait you should never have the situation that no error is flagged and EOF is not received. One problem is that the engine status handlers don't have access to the context, a horrible kludge works around this for now. All errors that happen during a pending operation should be caught and reported in ctx->error, including out-of-core and cancellation. This rounds up neatly a couple of loose ends, and makes it possible to pass up any errors in the communication with the backend as well. As a bonus, there will be a function to access gpgme->wait, so that the operations can truly be implemented with their \_start function.

\* engine-gpgsm.c (gpgsm\_status\_handler): Horrible kludge to report error back

to the context.

\* runpg.c (gpg\_status\_handler): Same horrible kludge applied here.

\* engine-gpgsm.c (gpgsm\_assuan\_simple\_command): Add error checking.

\* wait.c (\_gpgme\_wait\_on\_condition): If canceled, set CTX->error to a value indication that.

\* verify.c (add\_notation): Set error, not out\_of\_core.

(finish\_sig): Likewise.

(gpgme\_op\_verify\_start): Don't clear out\_of\_core.

(\_gpgme\_verify\_status\_handler): At EOF, clean up the notation data.

(gpgme\_op\_verify): And don't do it here.

\* trustlist.c (trustlist\_status\_handler): Check error, not out\_of\_core.

(gpgme\_op\_trustlist\_start): Don't clear out\_of\_core.

(gpgme\_op\_trustlist\_next): Check error, not out\_of\_core.

(gpgme\_op\_trustlist\_end): Likewise.

\* ops.h (test\_and\_allocate\_result): New macro.

(\_gpgme\_passphrase\_result): Remove prototype.

\* delete.c (gpgme\_op\_delete): Return error from context.

(delete\_status\_handler): Use macro test\_and\_allocate\_result.

Perform error checking at EOF.

(gpgme\_op\_delete\_start): Release result.

\* passphrase.c (\_gpgme\_passphrase\_status\_handler): Use macro test\_and\_allocate\_result, and perform error checking here.

(\_gpgme\_passphrase\_result): Function removed.

\* sign.c (gpgme\_op\_sign\_start): Do not set out\_of\_core to zero.

(gpgme\_op\_sign): Just return the error value from the context.

(sign\_status\_handler): Only progress if no error is set yet. If we process an EOF, set the resulting error value (if any).

\* decrypt.c (\_gpgme\_decrypt\_result): Function removed.

(create\_result\_struct): Function removed.

(\_gpgme\_decrypt\_status\_handler): Use macro test\_and\_allocate\_result, calculate error on EOF, do not progress with errors.

(\_gpgme\_decrypt\_start): Do not set out\_of\_core to zero.

(gpgme\_op\_decrypt): Just return the error value from the context.

\* encrypt.c (encrypt\_status\_handler): Perform the error checking here.

(gpgme\_op\_encrypt\_start): Do not clear out\_of\_core.

\* export.c (export\_status\_handler): Return if error is set in context.

(gpgme\_op\_export\_start): Release result.

(gpgme\_op\_export): Return error from context.

\* decrypt-verify.c (gpgme\_op\_decrypt\_verify): Return the error in the context.

\* genkey.c (genkey\_status\_handler): Use macro test\_and\_allocate\_result. Perform error checking at EOF.

(gpgme\_op\_genkey): Just return the error from context.

\* import.c (gpgme\_op\_import): Return the error from context.

(import\_status\_handler): Use macro test\_and\_allocate\_result.

\* keylist.c (gpgme\_op\_keylist\_start): Do not clear out\_of\_core.

(gpgme\_op\_keylist\_next): Return error of context.

(keylist\_colon\_handler): Set error instead out\_of\_code.

(finish\_key): Likewise.

\* context.h: Remove member out\_of\_core, add member error.

\* gpgme.c (\_gpgme\_release\_result): Clear error flag.

\* engine.h (\_gpgme\_engine\_get\_error): New prototype.

\* engine.c (\_gpgme\_engine\_get\_error): New function.

\* engine-gpgsm.c (\_gpgme\_gpgsm\_get\_error): New function.

\* engine-gpgsm.c (map\_assuan\_error): New function.

(gpgsm\_assuan\_simple\_command): Change

return type to GpgmeError,  
use the new function to map error values.  
(gpgsm\_set\_fd): Change return type to GpgmeError.  
(\_gpgme\_gpgsm\_op\_decrypt): Change type of ERR to GpgmeError.  
(gpgsm\_set\_recipients): Likewise. Change type of return value  
equivalently. Adjust error values.  
(\_gpgme\_gpgsm\_op\_import): Likewise.  
(\_gpgme\_gpgsm\_op\_sign): Likewise.  
(struct gpgsm\_object\_s): New member error.  
(gpgsm\_status\_handler): Set error if error occurs. Determine  
error number from ERR line received. If assuan\_read\_line fails,  
terminate the connection.

2002-02-01 Marcus Brinkmann <marcus@g10code.de>

\* Makefile.am (MOSTLYCLEANFILES): New variable.

2002-02-01 Marcus Brinkmann <marcus@g10code.de>

\* engine-gpgsm.c (gpgsm\_status\_handler): At error, terminate the  
connection to the server.

2002-01-31 Marcus Brinkmann <marcus@g10code.de>

\* runpgg.h: Add STATUS\_KEY\_CREATED.

\* progress.c: New file.

\* Makefile.am (libpggme\_la\_SOURCES): Add progress.c.

\* genkey.c (genkey\_status\_handler):

Use

\_gpgme\_progress\_status\_handler. Add check for status.

(struct genkey\_result\_s): New structure.

(\_gpgme\_release\_genkey\_result): New function.

(gpgme\_op\_genkey): Check for error.

\* gpgme.c (\_gpgme\_release\_result): Call

\_gpgme\_release\_genkey\_result.

\* ops.h (\_gpgme\_release\_genkey\_result): Add prototype.

\* types.h (GenKeyResult): New type.

\* context.h (gpgme\_context\_s): Add GenKeyResult to member result.

2002-01-30 Marcus Brinkmann <marcus@g10code.de>

\* gpgme.c (\_gpgme\_release\_result): Call

\_gpgme\_release\_delete\_result.

\* ops.h (\_gpgme\_release\_delete\_result): Add prototype.

\* types.h (DeleteResult): New type.

\* context.h (gpgme\_context\_s): Add DeleteResult to member result.

\* delete.c (enum delete\_problem): New type.  
(struct delete\_result\_s): New structure.  
(\_gpgme\_release\_delete\_result): New function.  
(delete\_status\_handler): Implement more status codes.  
(gpgme\_op\_delete): Return error on failure.

\* import.c (MAX\_IMPORTED\_FIELDS): Bump up to 14.

2002-01-30

Marcus Brinkmann <marcus@g10code.de>

\* import.c (struct import\_result\_s): New structure.  
(\_gpgme\_release\_import\_result): New function.  
(append\_xml\_impinfo): Likewise.  
(import\_status\_handler): Implement.

\* gpgme.c (\_gpgme\_release\_result): Add call to  
\_gpgme\_release\_import\_result.

\* ops.h (\_gpgme\_release\_import\_result): Add prototype.

\* types.h (ImportResult): New type.

\* context.h (gpgme\_context\_s): Add ImportResult to member result.

\* encrypt.c (gpgme\_op\_encrypt): Code clean up.

2002-01-30 Marcus Brinkmann <marcus@g10code.de>

\* gpgme.h: Add lots of comment and fix the formatting. Add  
gpgme\_trustlist\_end prototype.

2002-01-29 Marcus Brinkmann <marcus@g10code.de>

\* gpgme.h: Add new type GpgmeIdleFunc. Change type of  
gpgme\_register\_idle to return and accept this type.

\* wait.c (gpgme\_register\_idle): Fix type.  
Save and return old value of idle\_function.

2002-01-29 Werner Koch <wk@gnupg.org>

\* engine-gpgsm.c (\_gpgme\_gpgsm\_op\_keylist): Implement  
secret only mode.

\* keylist.c (keylist\_colon\_handler): Add support for the new "crs"  
record type.

2002-01-22 Marcus Brinkmann <marcus@g10code.de>

\* engine-gpgsm.c (\_gpgme\_gpgsm\_release): Call assuan\_disconnect,  
not assuan\_pipe\_disconnect.

\* Makefile.am (libpgpgme\_la\_LIBADD): Change to link assuan and jnlib (needed by assuan) statically into libpgpgme. Linking a static library into a shared library this way is not portable.

2002-01-22 Marcus Brinkmann <marcus@g10code.de>

\* gpgme.h (GpgmePassphraseCb): Change type of R\_HD from void\* to void\*\*.

2002-01-22 Marcus Brinkmann <marcus@g10code.de>

\* data.c (gpgme\_data\_new\_from\_filepart): Change type of LENGTH from off\_t to size\_t.  
\* gpgme.h: Likewise.

2002-01-22 Marcus Brinkmann <marcus@g10code.de>

\* wait.c (\_gpgme\_wait\_on\_condition): If the process finished, reset the pending flag. Also if the operation was cancelled.

(struct proc\_s): Rename READY to DONE.

(wait\_item\_s): Likewise.

(set\_process\_ready): Rename to ...

(set\_process\_done): ... this.

(\_gpgme\_remove\_proc\_from\_wait\_queue): Call set\_process\_done instead set\_process\_ready.

(\_gpgme\_wait\_on\_condition): Likewise.

(do\_select): Rename READY to DONE.

\* verify.c (gpgme\_op\_verify): Do not set pending to zero here.

\* sign.c (gpgme\_op\_sign): Likewise.

\* import.c (gpgme\_op\_import): Likewise.

\* genkey.c (gpgme\_op\_genkey): Likewise.

\* export.c (gpgme\_op\_export): Likewise.

\* encrypt.c (gpgme\_op\_encrypt): Likewise.

\* delete.c (gpgme\_op\_delete): Likewise.

\* decrypt-verify.c (gpgme\_op\_decrypt\_verify): Likewise.

\* decrypt.c (gpgme\_op\_decrypt): Likewise.

2002-01-22 Marcus Brinkmann <marcus@g10code.de>

\* export.c: Cleanup.

2002-01-15 Marcus Brinkmann <marcus@g10code.de>

\* trustlist.c: Various source clean ups.

(my\_isdigit): Removed.  
(gpgme\_op\_trustlist\_end): New function.

2002-01-13 Marcus Brinkmann <marcus@g10code.de>

\* gpgme.c: Various source clean ups, like renaming C to CTX where appropriate.

(gpgme\_new): Clear  
R\_CTX before starting the work.  
(my\_isdigit): Removed.  
(my\_isxdigit): Likewise.

\* data.c: Various source clean ups.  
(gpgme\_data\_new\_from\_mem): Check BUFFER after clearing R\_DH.  
(gpgme\_data\_new\_with\_read\_cb): Similar for READ\_CB.  
(gpgme\_data\_new\_from\_file): Loop over fread while EINTR.  
(gpgme\_data\_new\_from\_filepart): Rediddled a bit. Allow LENGTH to be zero. Loop over fread while EINTR.

(my\_isdigit): Removed.  
(my\_isxdigit): Likewise.

2001-12-21 Marcus Brinkmann <marcus@g10code.de>

\* engine-gpgsm.c (\_gpgme\_gpgsm\_new): Replace General\_Error with Pipe\_Error where appropriate.

2001-12-19 Marcus Brinkmann <marcus@g10code.de>

\* engine.c: Include 'string.h'. Reported by Stphane Corthsy.

\* version.c (get\_engine\_info): Remove prototype.

2001-12-19 Marcus Brinkmann <marcus@g10code.de>

\* engine-gpgsm.c (\_gpgme\_gpgsm\_new): New variable CHILD\_FDS.  
Fill it with the servers fds, and pass it to assuan\_pipe\_connect.

2001-12-18 Marcus Brinkmann <marcus@g10code.de>

\*  
keylist.c (gpgme\_op\_keylist\_end): New function.  
\* gpgme.h (gpgme\_op\_keylist\_end): New prototype.  
  
\* engine.h (gpgme\_engine\_check\_version): Move prototype to ...  
\* gpgme.h (gpgme\_engine\_check\_version): ... here.  
  
\* genkey.c (gpgme\_op\_genkey\_start): Remove unused variable.

2001-12-18 Marcus Brinkmann <marcus@g10code.de>

\* version.c (gpgme\_get\_engine\_info): Reimplemented.  
(gpgme\_check\_engine): Reimplemented.  
(\_gpgme\_compare\_versions): Return NULL if MY\_VERSION is NULL.

\* engine.c: Include `io.h'.  
(gpgme\_engine\_get\_info): New function.  
\* engine.h (gpgme\_engine\_check\_version, \_gpgme\_engine\_get\_info):  
Add prototype.

2001-12-18 Marcus Brinkmann <marcus@g10code.de>

\* runpgp.c (struct reap\_s, reap\_list, reap\_list\_lock): Moved to ...  
\* engine.c (struct reap\_s, reap\_list, reap\_list\_lock): ... here.  
Include `time.h', `sys/types.h', `assert.h', and `sema.h'.  
  
\* runpgp.c (\_gpgme\_engine\_add\_child\_to\_reap\_list): New function.  
(do\_reaping, \_gpgme\_gpg\_housecleaning): Moved to  
...  
\* engine.c (do\_reaping, \_gpgme\_engine\_housecleaning): ... here.  
\* runpgp.c (\_gpgme\_gpg\_release): Replace code that is now in its  
own function by call to \_gpgme\_engine\_add\_child\_to\_reap\_list().

\* wait.c: Include `engine.h'.  
(run\_idle): Call \_gpgme\_engine\_housecleaning(), not  
\_gpgme\_gpg\_housecleaning().

2001-12-18 Marcus Brinkmann <marcus@g10code.de>

\* key.c (\_gpgme\_key\_append\_name): Append, not prepend, the uid.  
Initialize the next field of the uid structure.  
(gpgme\_key\_get\_as\_xml): Do not list last uid first.

2001-12-17 Marcus Brinkmann <marcus@g10code.de>

\* engine-gpgsm.c (\_gpgme\_gpgsm\_set\_colon\_line\_handler): New  
function [!ENABLE\_GPGSM].

2001-12-14 Marcus Brinkmann <marcus@g10code.de>

\* engine-gpgsm.c (\_gpgme\_gpgsm\_op\_verify): Put TEXT into  
message\_data, not SIG.  
(\_gpgme\_gpgsm\_op\_sign): Use `--detached', not `--detach'.

\* sign.c (sign\_status\_handler): Call  
\_gpgme\_passphrase\_status\_handler early.



2001-12-14 Marcus Brinkmann <marcus@g10code.de>

\*

engine-gpgsm.c: Revert last change.

2001-12-14 Marcus Brinkmann <marcus@g10code.de>

\* engine-gpgsm.c (gpgsm\_status\_handler): Freeze the output file handler when ending this operation, otherwise the wait function will sit on it.

2001-12-14 Marcus Brinkmann <marcus@g10code.de>

\* engine-gpgsm.c (struct gpgsm\_object\_s): New member colon.attic.  
(\_gpgme\_gpgsm\_new): Initialize some more members.  
(\_gpgme\_gpgsm\_release): Free the colon line handler's attic line.  
(gpgsm\_status\_handler): Rework the inline-data processing.

2001-12-13 Marcus Brinkmann <marcus@g10code.de>

\* runpgg.c (\_gpgme\_gpg\_spawn): Do not add the fds to the child list that are not dup'ed, for those the close-on-exec flag is set now.

\* version.c (\_gpgme\_get\_program\_version): Remove first entry in CFD, as the close-on-exec flag is now set for this fd.

2001-12-13 Marcus Brinkmann <marcus@g10code.de>

\* engine-gpgsm.c (\_gpgme\_gpgsm\_op\_encrypt): Do not add 'armor' option to 'ENCRYPT'.

\* engine-gpgsm.c  
(gpgsm\_set\_recipients): Free LINE when returning successfully.

2001-12-13 Marcus Brinkmann <marcus@g10code.de>

\* engine-gpgsm.c (close\_notify\_handler): New function.  
(\_gpgme\_gpgsm\_new): Manage the file descriptors a bit differently. Do not set close-on-exec flags.  
(\_gpgme\_gpgsm\_op\_decrypt): Do not set message\_fd to -1, this is done by the close handler.  
(\_gpgme\_gpgsm\_op\_encrypt): Likewise.  
(\_gpgme\_gpgsm\_op\_import): Likewise (also for output\_fd).  
(\_gpgme\_gpgsm\_op\_keylist): Likewise (also for input\_fd and output\_fd).  
(\_gpgme\_gpgsm\_op\_sign): Likewise.  
(\_gpgme\_gpgsm\_op\_verify): Likewise, but for output\_fd.

\* posix-io.c (\_gpgme\_io\_pipe): Set the close-on-exec flag for the non-inherited file descriptor index of the pipe.

2001-12-13 Werner Koch <wk@gnupg.org>

\* engine-gpgsm.c (\_gpgme\_gpgsm\_set\_colon\_line\_handler): New. (gpgsm\_status\_handler): Pass datalines to a colon handler

\* engine.c (\_gpgme\_engine\_set\_colon\_line\_handler): Set the colon handler for gpgsm.

\* engine-gpgsm.c

(\_gpgme\_gpgsm\_op\_keylist): Allow NULL for pattern.

(gpgsm\_assuan\_simple\_command): Removed underscore from assuan\_write\_line.

(\_gpgme\_gpgsm\_start): Ditto.

(gpgsm\_assuan\_simple\_command): Replaced internal Assuan read function by the new assuan\_read\_line. Removed the use of the internal header.

(gpgsm\_status\_handler): Ditto. Use the new assuan\_pending\_line.

(\_gpgme\_gpgsm\_start): Use the documented way to get an fd from assuan.

\* keylist.c (keylist\_colon\_handler): Handle "crt" records

\* key.h (gpgme\_key\_s): Add an x509 flag.

\* key.c (parse\_x509\_user\_id): New.

(\_gpgme\_key\_append\_name): Handle x.509 names.

2001-12-05 Marcus Brinkmann <marcus@g10code.de>

\* engine-gpgsm.c (gpgsm\_status\_handler): Make it work with current version of assuan.

2001-12-05 Marcus Brinkmann <marcus@g10code.de>

\* engine-gpgsm.c (gpgsm\_set\_fd): Accept one more argument OPT.

(\_gpgme\_gpgsm\_op\_encrypt): Pass armor argument to gpgsm\_set\_fd for output descriptor.

(\_gpgme\_gpgsm\_op\_sign):

Likewise.

2001-12-05 Marcus Brinkmann <marcus@g10code.de>

\* keylist.c (gpgme\_op\_keylist\_next): Set pending to 0 if EOF occurs.

2001-11-26 Marcus Brinkmann <marcus@g10code.de>

\* engine-gpgsm.c (\_gpgme\_gpgsm\_op\_sign): Fix stupid typo.

2001-11-24 Marcus Brinkmann <marcus@g10code.de>

\* engine-gpgsm.c (gpgsm\_status\_handler): Don't break if bsearch fails.  
Deal with assuan read line returning more than one line (for now).

2001-11-23 Marcus Brinkmann <marcus@g10code.de>

\* engine-gpgsm.c (\_gpgme\_gpgsm\_op\_sign): Implement it according to  
the current protocol definition.

2001-11-23 Marcus Brinkmann <marcus@g10code.de>

\* engine-gpgsm.c (\_gpgme\_gpgsm\_new): Set CLOEXEC flag for parent  
ends of the pipe.

2001-11-22 Marcus Brinkmann <marcus@g10code.de>

\* engine-gpgsm.c: Include stdlib.h and string.h. Also include,  
for now, runpg.h and status-table.h.  
(gpgsm\_status\_handler): Implement more of the status handler.

2001-11-22 Marcus Brinkmann <marcus@g10code.de>

\*

engine.c (\_gpgme\_engine\_op\_decrypt): Implement CMS case.  
(\_gpgme\_engine\_op\_delete): Likewise.  
(\_gpgme\_engine\_op\_encrypt): Likewise.  
(\_gpgme\_engine\_op\_export): Likewise.  
(\_gpgme\_engine\_op\_genkey): Likewise.  
(\_gpgme\_engine\_op\_keylist): Likewise.  
(\_gpgme\_engine\_op\_sign): Likewise.  
(\_gpgme\_engine\_op\_trustlist): Likewise.

\* engine-gpgsm.c (\_gpgme\_gpgsm\_op\_encrypt): New function.  
(gpgsm\_assuan\_simple\_command): Likewise.  
(gpgsm\_set\_recipients): Likewise.  
(gpgsm\_set\_fd): Reimplement using gpgsm\_assuan\_simple\_command.  
(\_gpgme\_gpgsm\_op\_delete): New function.  
(\_gpgme\_gpgsm\_op\_export): Likewise.  
(\_gpgme\_gpgsm\_op\_genkey): Likewise.  
(\_gpgme\_gpgsm\_op\_sign): Likewise.  
(\_gpgme\_gpgsm\_op\_keylist): Likewise.  
(\_gpgme\_gpgsm\_op\_trustlist): Likewise.  
(\_gpgme\_gpgsm\_release): Release command.  
(\_gpgme\_gpgsm\_op\_decrypt): Allocate command.  
(\_gpgme\_gpgsm\_op\_import): Likewise.

(gpgsm\_status\_handler): Also treat `ERR' strings as EOF.

2001-11-22 Marcus Brinkmann <marcus@g10code.de>

\* gpgme.h

(gpgme\_set\_protocol): New prototype.

2001-11-22 Marcus Brinkmann <marcus@g10code.de>

\* engine-gpgsm.c (\_gpgme\_gpgsm\_op\_decrypt): New function.

(\_gpgme\_gpgsm\_op\_import): Likewise.

2001-11-22 Marcus Brinkmann <marcus@g10code.de>

\* engine-gpgsm.c: Shuffle around header inclusion a bit, to still keep them separate.

(\_gpgme\_set\_status\_handler) [ENABLE\_GPGSM]: New function.

2001-11-22 Werner Koch <wk@gnupg.org>

\* engine-gpgsm.c: Include more headers so that NULL and mk\_error is defined even with an undefined GPGSM\_PATH.

2001-11-22 Marcus Brinkmann <marcus@g10code.de>

\* runpgg.c (gpg\_inbound\_handler, write\_mem\_data, write\_cb\_data, gpg\_outbound\_handler): Moved to ...

\* data.c (\_gpgme\_data\_inbound\_handler, write\_mem\_data, write\_cb\_data, \_gpgme\_data\_outbound\_handler): ... here. Make the \_gpgme\_\* ones non-static.

\* data.c: Include io.h.

\* ops.h (\_gpgme\_data\_inbound\_handler): New prototype.

(\_gpgme\_data\_outbound\_handler): Likewise.

(\_gpgme\_gpg\_spawn): Use these new functions.

\* engine-gpgsm.h (\_gpgme\_gpgsm\_op\_decrypt, \_gpgme\_gpgsm\_op\_delete, \_gpgme\_gpgsm\_op\_encrypt, \_gpgme\_gpgsm\_op\_export, \_gpgme\_gpgsm\_op\_genkey, \_gpgme\_gpgsm\_op\_import, \_gpgme\_gpgsm\_op\_keylist, \_gpgme\_gpgsm\_op\_sign, \_gpgme\_gpgsm\_op\_trustlist, \_gpgme\_gpgsm\_op\_verify, \_gpgme\_gpgsm\_start, \_gpgme\_gpgsm\_set\_status\_handler): New prototype. Include <runpgg.h> for status handler function.

\* engine-gpgsm.c (struct gpgsm\_object\_s): New members input\_fd, input\_data, output\_fd, output\_data, message\_fd, message\_data, command and status.

(\_gpgme\_gpgsm\_new): Open input, output and message pipes before connecting to the client. Close server's ends afterwards.  
(\_gpgme\_gpgsm\_release): Close open file descriptors. Remove server process from wait queue.  
(\_gpgme\_gpgsm\_op\_verify, \_gpgme\_gpgsm\_start, \_gpgme\_gpgsm\_set\_status\_handler, gpgms\_status\_handler): New function.

\* engine.c (\_gpgme\_engine\_start): Implement for GPGME\_PROTOCOL\_CMS.  
(\_gpgme\_engine\_set\_status\_handler):  
Likewise.  
(\_gpgme\_engine\_op\_verify): Likewise.

2001-11-21 Marcus Brinkmann <marcus@g10code.de>

\* context.h: Do not include runpgg.h, but engine.h.  
(struct gpgme\_context\_s): Replace member gpg with engine.  
\* gpgme.c (gpgme\_release): Release engine, not gpg.  
  
\* recipient.c (\_gpgme\_append\_gpg\_args\_from\_recipients): Function moved ...  
\* runpgg.c (\_gpgme\_append\_gpg\_args\_from\_recipients): ... here.  
Make static, change order of arguments, and return an error value.  
\* ops.h (\_gpgme\_append\_gpg\_args\_from\_recipients): Removed prototype.

\* runpgg.h (\_gpgme\_gpg\_op\_verify): Add prototype.  
(\_gpgme\_gpg\_op\_encrypt): Likewise.  
(\_gpgme\_gpg\_op\_decrypt): Likewise.  
(\_gpgme\_gpg\_op\_delete): Likewise.  
(\_gpgme\_gpg\_op\_export): Likewise.  
(\_gpgme\_gpg\_op\_genkey): Likewise.  
(\_gpgme\_gpg\_op\_import): Likewise.  
(\_gpgme\_gpg\_op\_keylist): Likewise.  
(\_gpgme\_gpg\_op\_sign): Likewise.  
(\_gpgme\_gpg\_op\_trustlist): Likewise.  
\* runpgg.c (\_gpgme\_gpg\_op\_verify): New function.  
(\_gpgme\_gpg\_op\_encrypt): Likewise.  
(\_gpgme\_gpg\_op\_decrypt):  
Likewise.  
(\_gpgme\_gpg\_op\_delete): Likewise.  
(\_gpgme\_gpg\_op\_export): Likewise.  
(\_gpgme\_gpg\_op\_genkey): Likewise.  
(\_gpgme\_gpg\_op\_import): Likewise.  
(\_gpgme\_gpg\_op\_keylist): Likewise.  
(\_gpgme\_gpg\_op\_sign): Likewise.  
(\_gpgme\_gpg\_op\_trustlist): Likewise.

\* engine.h (\_gpgme\_engine\_set\_status\_handler): Add prototype.  
(\_gpgme\_engine\_set\_command\_handler): Likewise.

(\_gpgme\_engine\_set\_colon\_line\_handler): Likewise.  
 (\_gpgme\_engine\_op\_decrypt): Likewise.  
 (\_gpgme\_engine\_op\_delete): Likewise.  
 (\_gpgme\_engine\_op\_encrypt): Likewise.  
 (\_gpgme\_engine\_op\_export): Likewise.  
 (\_gpgme\_engine\_op\_genkey): Likewise.  
 (\_gpgme\_engine\_op\_import): Likewise.  
 (\_gpgme\_engine\_op\_keylist): Likewise.  
 (\_gpgme\_engine\_op\_sign): Likewise.  
 (\_gpgme\_engine\_op\_trustlist): Likewise.  
 (\_gpgme\_engine\_op\_verify): Likewise.  
 (\_gpgme\_engine\_start): Likewise.  
 \* engine.c (\_gpgme\_engine\_set\_status\_handler): New function.  
 (\_gpgme\_engine\_set\_command\_handler): Likewise.  
 (\_gpgme\_engine\_set\_colon\_line\_handler):  
 Likewise.  
 (\_gpgme\_engine\_op\_decrypt): Likewise.  
 (\_gpgme\_engine\_op\_delete): Likewise.  
 (\_gpgme\_engine\_op\_encrypt): Likewise.  
 (\_gpgme\_engine\_op\_export): Likewise.  
 (\_gpgme\_engine\_op\_genkey): Likewise.  
 (\_gpgme\_engine\_op\_import): Likewise.  
 (\_gpgme\_engine\_op\_keylist): Likewise.  
 (\_gpgme\_engine\_op\_sign): Likewise.  
 (\_gpgme\_engine\_op\_trustlist): Likewise.  
 (\_gpgme\_engine\_op\_verify): Likewise.  
 (\_gpgme\_engine\_start): Likewise.  
  
 \* verify.c (gpgme\_op\_verify\_start): Reimplement in terms of above  
 functions.  
 \* encrypt.c (gpgme\_op\_encrypt\_start): Likewise.  
 \* decrypt.c (\_gpgme\_decrypt\_start): Likewise.  
 \* passphrase.c (\_gpgme\_passphrase\_start): Likewise.  
 \* keylist.c (gpgme\_op\_keylist\_start): Likewise.

2001-11-20 Marcus Brinkmann <marcus@g10code.de>

\* types.h: Add types EngineObject and GpgsmObject.  
  
 \* Makefile.am (libgpgme\_la\_SOURCES): Add engine-gpgsm.h,  
 engine-gpgsm.c, engine.h and engine.c.  
 \* engine.h: New file.  
 \* engine.c: Likewise.  
 \* engine-gpgsm.h: Likewise.  
 \*  
 engine-gpgsm.c: Likewise.  
  
 \* runpgg.c (\_gpgme\_gpg\_get\_version): New function.

(\_gpgme\_gpg\_check\_version): Likewise.

\* runpgg.h: Add prototypes for \_gpgme\_gpg\_get\_version and \_gpgme\_gpg\_check\_version.

\* version.c (compare\_versions): Rename to ...

(\_gpgme\_compare\_versions): ... this. Make non-static.

(gpgme\_check\_version): Use \_gpgme\_compare\_versions rather than compare\_versions.

(gpgme\_check\_engine): Likewise.

\* ops.h (\_gpgme\_get\_program\_version): Add prototype.

2001-11-20 Marcus Brinkmann <marcus@g10code.de>

\* Makefile.am (libgpgme\_la\_INCLUDES): Remove obsolete directive.

(AM\_CPPFLAGS): New directive [BUILD\_ASSUAN].

(libgpgme\_la\_LIBADD): Likewise.

2001-11-20 Marcus Brinkmann <marcus@g10code.de>

\* version.c: Remove global variables lineno and

tmp\_engine\_version.

(version\_handler): Removed.

(\_gpgme\_get\_program\_version): New function.

(get\_engine\_info): Don't use context and version\_handler, but \_gpgme\_get\_program\_version.

\* ops.h (\_gpgme\_get\_program\_version):

Add prototype for

\_gpgme\_get\_program\_version (we expect to use it elsewhere soon).

2001-11-18 Marcus Brinkmann <marcus@g10code.de>

\* version.c (get\_engine\_info): If GnuPG is not available, return an error message.

\* posix-util.c (\_gpgme\_get\_gpg\_path): Allow GPG\_PATH to be undefined.

(\_gpgme\_get\_gpgsm\_path): New function.

\* w32-util.c (find\_program\_in\_registry): New static function.

(\_gpgme\_get\_gpg\_path): Allow GPG\_PATH to be undefined. Rework to use find\_program\_in\_registry.

(\_gpgme\_get\_gpgsm\_path): New function.

(util.h): Prototype \_gpgme\_get\_gpgsm\_path).

\* runpgg.c (\_gpgme\_gpg\_spawn): Verify that \_gpgme\_get\_gpg\_path() returns non-null.

2001-11-16 Marcus Brinkmann <marcus@g10code.de>

\* decrypt-verify.c: New file.

\* Makefile.am (libgpgme\_la\_SOURCES): Add decrypt-verify.c.

- \* types.h: Add decrypt-verify types.
- \* ops.h: Likewise.
- \* context.h: Add result type for decrypt-verify.
- \* gpgme.h: Add decrypt-verify prototypes.

- \* decrypt.c (decrypt\_status\_handler):

Renamed to ...

(\_gpgme\_decrypt\_status\_handler): ... this. Make non-static.

(\_gpgme\_decrypt\_start): New function, derived from  
gpgme\_op\_decrypt\_start.

(gpgme\_op\_decrypt\_start): Reimplement in terms of  
\_gpgme\_decrypt\_start.

(\_gpgme\_decrypt\_result): New function to retrieve error value.

(gpgme\_op\_decrypt): Use \_gpgme\_decrypt\_result.

- \* ops.h: Add prototypes for new functions.

- \* verify.c (verify\_status\_handler): Renamed to ...

(\_gpgme\_verify\_status\_handler): ... this. Make non-static.

(gpgme\_op\_verify\_start): Use new function name.

(intersect\_stati): Renamed to ...

(\_gpgme\_intersect\_stati): ... this. Make non-static.

(gpgme\_op\_verify): Use new name.

- \* ops.h: Add prototypes for new functions.

2001-11-16 Marcus Brinkmann <marcus@g10code.de>

- \* passphrase.c: New file.

- \* Makefile.am (libgpgme\_la\_SOURCES): Add passphrase.c.

- \* ops.h (\_gpgme\_passphrase\_result): Add prototypes from  
passphrase.c.

- \* types.h: Likewise.

- \* context.h: Add member passphrase to result.

- \*

gpgme.c (\_gpgme\_release\_result): Release passphrase member.

- \* decrypt.c: Some formatting and variable name changes (like  
CTX instead C).

(struct decrypt\_result\_s): Remove members now found in  
passphrase result.

(\_gpgme\_release\_decrypt\_result): Don't release removed members.

(decrypt\_status\_handler): Call \_gpgme\_passphrase\_status\_handler,  
and don't handle the cases caught there.

(command\_handler): Removed.

(gpgme\_op\_decrypt\_start): Don't set command handler, but invoke  
\_gpgme\_passphrase\_start which does it.

(gpgme\_op\_decrypt): Invoke \_gpgme\_passphrase\_result and drop the  
cases covered by it.



\* sign.c Some formatting and variable name changes (like CTX instead C).  
(struct sign\_result\_s): Remove members now found in passphrase result.  
(\_gpgme\_release\_sign\_result): Don't release removed members.  
(sign\_status\_handler): Call \_gpgme\_passphrase\_status\_handler, and don't handle the cases caught there.  
(command\_handler): Removed.  
(gpgme\_op\_sign\_start): Don't set command handler, but invoke \_gpgme\_passphrase\_start which does it.  
(gpgme\_op\_sign): Invoke \_gpgme\_passphrase\_result and drop the cases covered by it.

2001-11-15 Marcus Brinkmann <marcus@g10code.de>

\* decrypt.c (command\_handler): Fix last change.

2001-11-15 Marcus Brinkmann <marcus@g10code.de>

\* verify.c (\_gpgme\_release\_verify\_result): Rename RES to RESULT.  
Rename R2 to NEXT\_RESULT.  
(intersect\_stat): Rename RES to RESULT.  
(gpgme\_get\_sig\_status): Likewise. Do not check return\_type, but the member verify of result.  
(gpgme\_get\_sig\_key): Likewise.

\* sign.c (\_gpgme\_release\_sign\_result): Rename RES to RESULT. If RESULT is zero, return.  
(sign\_status\_handler, command\_handler): Do not check return\_type, but the member sign of result.  
(gpgme\_op\_sign): Likewise. Drop assertion.

\* encrypt.c (\_gpgme\_release\_encrypt\_result): Rename RES to RESULT. If RESULT is zero, return.  
(encrypt\_status\_handler): Do not check return\_type, but the member encrypt of result.  
(gpgme\_op\_encrypt):  
Likewise. Drop assertion.

\* decrypt.c (\_gpgme\_release\_decrypt\_result): Rename RES to RESULT.  
(create\_result\_struct): Do not set result\_type.  
(command\_handler, decrypt\_status\_handler): Do not check return\_type, but the member decrypt of result.  
(gpgme\_op\_decrypt): Likewise. Drop assertion.

\* context.h (enum ResultType): Removed.  
(struct gpgme\_context\_s): Remove member result\_type.

(struct result): Replaces union result.

\* gpgme.c: Include string.h.

(\_gpgme\_release\_result): Release all members of c->result, which is now a struct. Zero out all members of the struct afterwards.

2001-11-11 Marcus Brinkmann <marcus@g10code.de>

\* runpgp.c (\_gpgme\_gpg\_release): Release GPG->cmd.cb\_data.

Release all members of the list GPG->arglist.

Reported by Michael Schmidt <mschmidt@cs.uni-sb.de>.

2001-11-02 Marcus Brinkmann <marcus@g10code.de>

\* runpgp.c (pipemode\_copy): Change type of NBYTES to size\_t.

\* key.c: Include string.h.

\* data.c: Likewise.

\* recipient.c: Likewise.

2001-10-29

Marcus Brinkmann <marcus@g10code.de>

\* context.h: New member signers\_len.

\* signers.c (gpgme\_signers\_clear): Require that signers are non-NULL with assertion. Use signers\_len to determine how much keys to release. Add documentation.

(gpgme\_signers\_add): Use signers\_len to determine if the buffer is large enough. Use xtryrealloc rather than xtrymalloc and copying. Add documentation.

(gpgme\_signers\_enum): Use signers\_len to determine if key is available. Add documentation.

2001-10-22 Marcus Brinkmann <marcus@g10code.de>

\* data.c (\_gpgme\_data\_append): Check if LENGTH is smaller than ALLOC\_CHUNK, not DH->length.

2001-10-17 Marcus Brinkmann <marcus@g10code.de>

\* gpgme.c (gpgme\_set\_protocol): Fix last change.

2001-10-15 Werner Koch <wk@gnupg.org>

\* gpgme.h (GpgmeProtocol): New.

\* gpgme.c (gpgme\_set\_protocol): New.

2001-09-26 Werner Koch <wk@gnupg.org>

\* gpgme.c (gpgme\_set\_passphrase\_cb): Ignore a NULL context.  
(gpgme\_set\_progress\_cb): Ditto.  
Suggested by Mark Mutz.

2001-09-17 Werner Koch <wk@gnupg.org>

\* keylist.c (finish\_key): Shortcut for no tmp\_key. Changed all callers to use this function without a check for tmp\_key.

\* keylist.c (gpgme\_op\_keylist\_next): Reset the key\_cond after emptying the queue. Bug reported by Stphane Corthisy.

2001-09-12 Werner Koch <wk@gnupg.org>

\* data.c (gpgme\_data\_rewind): Allow rewind for callbacks.

2001-09-07 Werner Koch <wk@gnupg.org>

\* runpgg.h: Add NO\_RECP.

\* encrypt.c (encrypt\_status\_handler): Take on No\_RECP.  
(gpgme\_op\_encrypt): Better error return.

\* verify.c (verify\_status\_handler): Take on NODATA.

2001-09-03 Werner Koch <wk@gnupg.org>

\* runpgg.h: Added STATUS\_INV\_RECP.

\* gpgme.c (\_gpgme\_release\_result): Add support for new EncryptResult object.

\* encrypt.c (append\_xml\_encinfo): New.  
(encrypt\_status\_handler): Add some status parsing.  
(\_gpgme\_release\_encrypt\_result): New.

2001-08-29 Werner Koch <wk@gnupg.org>

\* recipient.c (gpgme\_recipients\_release):  
Free the list. By Timo.

\* keylist.c (keylist\_colon\_handler): Do a finish key if we receive an EOF here. This is probably the reason for a lot of bugs related to keylisting. It is so obvious. Kudos to Enno Cramer for pointing that out.

2001-08-28 Werner Koch <wk@gnupg.org>

\* gpgme.c, gpgme.h (gpgme\_get\_op\_info): New.  
(\_gpgme\_set\_op\_info): New.  
(\_gpgme\_release\_result): Reset the op\_info here.

\* sign.c (append\_xml\_siginfo): New.  
(sign\_status\_handler): Store the sig create information.

2001-07-31 Werner Koch <wk@gnupg.org>

\* encrypt.c (gpgme\_op\_encrypt): Hack to detect no valid recipients.

2001-07-30 Werner Koch <wk@gnupg.org>

\* gpgme.c (gpgme\_get\_armor,gpgme\_get\_textmode): New.

\* runpgp.c (build\_argv): Disable armor comments

\* w32-io.c (build\_commandline): Need to add quotes here

2001-07-24 Werner Koch <wk@gnupg.org>

\* data.c (gpgme\_data\_read): Add a way to return the available bytes.

2001-07-23 Werner Koch <wk@gnupg.org>

\* util.c: Removed

stpcpy() because we use the version from jnlib.

2001-07-19 Werner Koch <wk@gnupg.org>

\* mkstatus: Define the collating sequence for sort.

2001-06-26 Werner Koch <wk@gnupg.org>

\* runpgp.h: Add STATUS\_UNEXPECTED as suggested by Timo.

2001-06-15 Werner Koch <wk@gnupg.org>

\* keylist.c (set\_userid\_flags): Fixed the assigned values. Kudos to Timo for pointing this out.

2001-06-01 Werner Koch <wk@gnupg.org>

\* debug.c (\_gpgme\_debug\_begin): Fixed a /tmp race. Noted by Johannes Poehlmann.

2001-05-28 Werner Koch <wk@gnupg.org>

\* version.c (gpgme\_check\_engine): Stop version number parsing at the opening angle and not the closing one. By Tommy Reynolds.

2001-05-01 Jos Carlos Garca Sogo <jose@jaimedelamo.eu.org>

\* encrypt.c (gpgme\_op\_encrypt\_start): Deleted the assert ( !c->gpg ) line, because it gave an error if another operation had been made before using the same context.

\* decrypt.c (gpgme\_op\_decrypt\_start): The same as above. Also added one line to release the gpg object in the context (if any).

2001-04-26 Werner Koch <wk@gnupg.org>

\* key.c, key.h (\_gpgme\_key\_cache\_init): New.  
(\_gpgme\_key\_cache\_add): New.  
(\_gpgme\_key\_cache\_get): New.  
\* version.c (do\_subsystem\_inits): Init the cache.  
\* keylist.c (finish\_key): Put key into the cache  
\* verify.c (gpgme\_get\_sig\_key): First look into the cache.

2001-04-19 Werner Koch <wk@gnupg.org>

\* keylist.c (parse\_timestamp): Adjusted for the changed --fixed-list-mode of gpg 1.0.4h.

2001-04-05 Werner Koch <wk@gnupg.org>

\* verify.c (gpgme\_op\_verify\_start): Enabled pipemode for detached sigs.

2001-04-04 Werner Koch <wk@gnupg.org>

\* w32-io.c (\_gpgme\_io\_select): Don't select on the writer if there are still bytes pending. Timo found this not easy to track down race condition.

2001-04-02 Werner Koch <wk@gnupg.org>

\* gpgme.h: Add GPGME\_ATTR\_KEY\_{EXPIRED,DISABLED}.  
\* key.c (gpgme\_key\_get\_ulong\_attr): And return those attribs.

\* verify.c (gpgme\_get\_sig\_key): Set keylisting mode depending on the mode set in the current context. Suggested by Timo.

\* key.c (gpgme\_key\_get\_ulong\_attr): Return can\_certify and not can\_encrypt. By Timo.

2001-03-30 Werner Koch <wk@gnupg.org>

\* debug.c (debug\_init): Allow to specify a debug file.  
(\_gpgme\_debug\_level): New.

\* posix-io.c (\_gpgme\_io\_read, \_gpgme\_io\_write): Print output.  
(\_gpgme\_io\_select): Debug only with level > 2.

2001-03-15 Werner Koch <wk@gnupg.org>

\* runpgg.c: Included time.h.

\* key.h: New keyflags for capabilities.

\* keylist.c (set\_mainkey\_capability, set\_subkey\_capability): New.  
(keylist\_colon\_handler): Parse them.

\* gpgme.h: New attribute values for capabilities.

\* key.c (gpgme\_key\_get\_string\_attr): Return them.

(capabilities\_to\_string): New.

(gpgme\_key\_get\_ulong\_attr): Return the global caps.

2001-03-14 Werner Koch <wk@gnupg.org>

\* w32-io.c (destroy\_reader,destroy\_writer): Fixed syntax error.

Thanks to Jan Oliver Wagner.

2001-03-13 Werner Koch <wk@gnupg.org>

\* context.h: Add

invalid and revoke flags to user\_id structure.

\* keylist.c (gpgme\_op\_keylist\_start): Use --fixed-list-mode.

(keylist\_colon\_handler): Adjust for that.

(set\_userid\_flags): New.

(set\_mainkey\_trust\_info): Handle new key invalid flag

(set\_subkey\_trust\_info): Ditto.

\* gpgme.h: Add new attributes for key and user ID flags.

\* key.c (\_gpgme\_key\_append\_name): Init these flags

(gpgme\_key\_get\_as\_xml): Print them.

(one\_uid\_as\_xml): New helper for above.

(gpgme\_key\_get\_string\_attr, gpgme\_key\_get\_ulong\_attr):

Return the new attributes. Enhanced, so that subkey information  
can be returned now.

2001-02-28 Werner Koch <wk@gnupg.org>

\* w32-io.c (destroy\_reader): Set stop\_me flag.

(writer,create\_writer,destroy\_writer,find\_writer,kill\_writer): New.

(\_gpgme\_io\_write): Use a writer thread to avoid blocking.

(\_gpgme\_io\_close): Cleanup a writer thread

(\_gpgme\_io\_select): Replace the faked wait on writing by a real  
waiting which is now possible due to the use of a writer thread.

2001-02-20

Werner Koch <wk@gnupg.org>

- \* w32-io.c (destroy\_reader, kill\_reader): New.  
(create\_reader, reader): Add a new event to stop the thread.  
(\_gpgme\_io\_close): Kill the reader thread.
- \* posix-io.c (\_gpgme\_io\_select): Handle frozen fds here.
- \* 32-io.c (\_gpgme\_io\_select): Ditto. Removed a bunch of unused code.
- \* wait.c: Reworked the whole thing.
- \* runpgg.c (\_gpgme\_gpg\_new): Init pid to -1.  
(\_gpgme\_gpg\_release): Remove the process from the wait queue.

2001-02-19 Werner Koch <wk@gnupg.org>

- \* w32-io.c (\_gpgme\_io\_set\_close\_notify): New.  
(\_gpgme\_io\_close): Do the notification.
- \* posix-io.c (\_gpgme\_io\_select): Use a 1 sec timeout and not 200 microseconds.
- \* wait.c (remove\_process): Don't close the fd here.  
(do\_select): Set the fd to -1 and remove the is\_closed flag everywhere.  
(\_gpgme\_wait\_on\_condition): Remove the assert on the queue and break out if we could not find the queue. The whole thing should be reworked.
- \* posix-io.c (\_gpgme\_io\_set\_close\_notify): New.  
(\_gpgme\_io\_close):  
Do the notification.
- \* runpgg.c (close\_notify\_handler): New.  
(\_gpgme\_gpg\_new): Register a callback for the fd.  
(\_gpgme\_gpg\_set\_colon\_line\_handler): Ditto.  
(build\_argv): Ditto

2001-02-13 Werner Koch <wk@gnupg.org>

- \* runpgg.c (struct reap\_s): Replaced pid\_t by int.
- \* types.h: Add ulong typedef.
- \* runpgg.c (do\_reaping, \_gpgme\_gpg\_housecleaning): New.  
(\_gpgme\_gpg\_release): Reap children.
- \* io.h, posix-io.c (\_gpgme\_io\_kill): New.
- \* w32-io.c (\_gpgme\_io\_kill): New (dummy).
- \* keylist.c (gpgme\_op\_keylist\_start): Cancel a pending request.

\* posix-io.c (\_gpgme\_io\_read): Add some debug output.  
(\_gpgme\_io\_write): Ditto.  
(\_gpgme\_io\_select): Increased the timeout.

2001-02-12 Werner Koch <wk@gnupg.org>

Enhanced the signature verification, so that it can now handle more than one signature and is able to return more information on the signatures.

\* verify.c (gpgme\_get\_sig\_key): New.  
(gpgme\_get\_sig\_status): New.

\* gpgme.h: Add stdio.h.  
(GpgmeSigStat):  
New status DIFF.

2001-02-01 Werner Koch <wk@gnupg.org>

\* w32-io.c (set\_synchronize): Add EVENT\_MODIFY\_STATE. Add Debug code to all Set/ResetEvent().

\* runpgp.c (read\_status): Check for end of stream only if we have an r. By Timo.

2001-01-31 Werner Koch <wk@gnupg.org>

\* wait.c (\_gpgme\_wait\_on\_condition): Removed all exit code processing.  
(propagate\_term\_results,clear\_active\_fds): Removed.  
(count\_active\_fds): Renamed to ..  
(count\_active\_and\_thawed\_fds): .. this and count only thawed fds.

\* runpgp.c (gpg\_colon\_line\_handler): Return colon.eof and not status.eof ;-)

2001-01-30 Werner Koch <wk@gnupg.org>

\* w32-io.c (\_gpgme\_io\_spawn): Use the supplied path arg.

\* version.c (get\_engine\_info): Return better error information.

\* posix-util.c, w32-util.c: New.  
(\_gpgme\_get\_gpg\_path): New, suggested by Jan-Oliver.  
\* runpgp.c (\_gpgme\_gpg\_spawn): Use new function to get GPG's path.

\* signers.c (gpgme\_signers\_add): Oops, one should test code and not just write it;



the newarr was not assigned. Thanks to Jos  
for pointing this out. Hmm, still not tested, why should a coder  
test his fix :-)

\* w32-io.c: Does now use reader threads, so that we can use  
WaitForMultipleObjects.

\* sema.h, posix-sema.c, w32-sema.c: Support for Critical sections.  
Does currently only work for W32.

\* debug.c, util.h : New. Changed all fprintfs to use this new  
set of debugging functions.

2001-01-23 Werner Koch <wk@gnupg.org>

\* data.c (\_gpgme\_data\_release\_and\_return\_string): Fixed string  
termination.

2001-01-22 Werner Koch <wk@gnupg.org>

\* delete.c: New.

\* signers.c: New.

\* key.c (gpgme\_key\_ref, gpgme\_key\_unref): New.

\* sign.c (gpgme\_op\_sign\_start): Allow the use of other keys.

\* version.c (gpgme\_get\_engine\_info, gpgme\_check\_engine): New.

\* runpgg.c (\_gpgme\_gpg\_set\_simple\_line\_handler): New.

2001-01-05 Werner Koch <wk@gnupg.org>

\* data.c (gpgme\_data\_rewind): Allow to rewind data\_type\_none.

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# -\*- mode: org -\*-

#+TITLE: GNU Privacy Guard (GnuPG) Made Easy Python Bindings

```
#+AUTHOR: Ben McGinnes
#+LATEX_COMPILER: xelatex
#+LATEX_CLASS: article
#+LATEX_CLASS_OPTIONS: [12pt]
#+LATEX_HEADER: \usepackage{xltextra}
#+LATEX_HEADER: \usepackage[margin=1in]{geometry}
#+LATEX_HEADER: \setmainfont[Ligatures={Common}]{Times New Roman}
#+LATEX_HEADER: \author{Ben McGinnes <ben@gnupg.org>}
```

\* GPGME Python Bindings

:PROPERTIES:

:CUSTOM\_ID: top

:END:

\*\* Contents

:PROPERTIES:

:CUSTOM\_ID: contents

:END:

- [[file:short-history]] [A short history of the project]
- [[file:what-is-new]] [What's New]
- [[file:maintenance-mode]] [Maintenance Mode] (from January, 2019)
- [[file:what-was-new]] [What Was New]
- [[file:gpgme-python-howto]] [GPGME Python Bindings HOWTO]

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```
\input texinfo @c -*- texinfo -*-
@c %**start of header
@setfilename short-history.info
@settitle A Short History of the GPGME bindings for Python
@documentencoding utf-8
@documentlanguage en
@c %**end of header
```

```
@finalout
@titlepage
@title A Short History of the GPGME bindings for Python
@author Ben McGinnes
@end titlepage
```

```
@contents
```

```
@ifnottex
@node Top
@top A Short History of the GPGME bindings for Python
@end ifnottex
```

```
@menu
* Overview::
* Relics of the past::
```

```
@detailmenu
--- The Detailed Node Listing ---
```

Overview

- \* In the beginning::
- \* Keeping the flame alive::
- \* Passing the torch::
- \* Coming full circle::

Relics of the past

- \* The Annoyances of Git::
- \* The Perils of PyPI::

The Perils of PyPI

- \* GPG 180 - Python bindings for GPGME GnuPG cryptography library::
- \* PyME 090 - Python support for GPGME GnuPG cryptography library::

```
@end detailmenu
@end menu
```

@node Overview  
@chapter Overview

@multitable {aaaaaaaaaaaaaa} {aaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaa}  
@item Version:  
@tab  
0.0.1  
@item GPGME Version:  
@tab 1.13.0  
@item Author:  
@tab Ben McGinnes <ben@@gnupg.org>  
@item Author GPG Key:  
@tab DB4724E6FA4286C92B4E55C4321E4E2373590E5D  
@item Language:  
@tab Australian English, British English  
@item xml:lang:  
@tab en-AU, en-GB, en  
@end multitable

The GPGME Python bindings passed through many hands and numerous phases before, after a fifteen year journey, coming full circle to return to the source. This is a short explanation of that journey.

@menu  
\* In the beginning::  
\* Keeping the flame alive::  
\* Passing the torch::  
\* Coming full circle::  
@end menu

@node In the beginning  
@section In the beginning

In 2002 John Goerzen released PyME; Python bindings for the GPGME module which utilised the current release of Python of the time and SWIG.@footnote{In all likelihood this would have been Python 2.2 or possibly Python 2.3.} Shortly after creating it and ensuring it worked he stopped supporting it, though he left his work available on his Gopher site.

@node Keeping  
the flame alive  
@section Keeping the flame alive

A couple of years later the project was picked up by Igor Belyi and actively developed and maintained by him from 2004 to 2008. Igor's whereabouts at the time of this document's creation are unknown, but the current authors do hope he is well. We're assuming (or

hoping) that life did what life does and made continuing untenable.

@node Passing the torch

@section Passing the torch

In 2014 Martin Albrecht wanted to patch a bug in the PyME code and discovered the absence of Igor. Following a discussion on the PyME mailing list he became the new maintainer for PyME, releasing version 0.9.0 in May of that year. He remains the maintainer of the original PyME release in Python 2.6 and 2.7 (available via PyPI).

@node Coming full circle

@section Coming full circle

In 2015 Ben McGinnes approached Martin about a Python 3 version, while investigating how complex a task this would be the task ended up being completed. A subsequent discussion with Werner Koch led to the decision to fold the Python 3 port back into the original GPGME release in the languages subdirectory for non-C bindings under the module name of @samp{pyme3}.

In 2016 this PyME module was integrated back into the GPGME project by Justus Winter. During the course of this work Justus adjusted the port to restore limited support for Python 2, but not as many minor point releases as the original PyME package supports. During the course of this integration the package was renamed to more accurately reflect its status as a component of GPGME. The @samp{pyme3} module was renamed to @samp{gpg} and adopted by the upstream GnuPG team.

In 2017 Justus departed G10code and the GnuPG team. Following this Ben returned to maintain of gpgme Python bindings and continue building them from that point.

@node Relics of the past

@chapter Relics of the past

There are a few things, in addition to code specific factors, such as SWIG itself, which are worth noting here.

@menu

\*

The Annoyances of Git::

\* The Perils of PyPI::

@end menu

@node The Annoyances of Git

## @section The Annoyances of Git

As anyone who has ever worked with git knows, submodules are a horrible way to deal with pretty much anything. In the interests of avoiding migraines, that was skipped with addition of the PyME code to GPGME.

Instead the files were added to a subdirectory of the @samp{lang/} directory, along with a copy of the entire git log up to that point as a separate file within the @samp{lang/python/docs/} directory. @footnote{The entire PyME git log and other preceding VCS logs are located in the @samp{gpgme/lang/python/docs/old-commits.log} file.} As the log for PyME is nearly 100KB and the log for GPGME is approximately 1MB, this would cause considerable bloat, as well as some confusion, should the two be merged.

Hence the unfortunate, but necessary, step to simply move the files. A regular repository version has been maintained should it be possible to implement this better in the future.

## @node The Perils of PyPI @section The Perils of PyPI

The early port of the Python 2 @samp{pyme} module as @samp{pyme3} was never added to PyPI while the focus remained on development and testing during 2015 and early 2016. Later in 2016, however, when Justus completed his major integration work and subsequently renamed the module from @samp{pyme3} to @samp{gpg}, some prior releases were also provided through PyPI.

Since these bindings require a matching release of the GPGME libraries in order to function, it was determined that there was little benefit in also providing a copy through PyPI since anyone obtaining the GPGME source code would obtain the Python bindings source code at the same time. Whereas there was the potential to sew confusion amongst Python users installing the module from PyPI, only to discover that without the relevant C files, header files or SWIG compiled binaries, the Python module did them little good.

There are only two files on PyPI which might turn up in a search for this module or a sample of its content:

```
@enumerate
@item
gpg (1.8.0) - Python bindings for GPGME GnuPG cryptography library
@item
```

pyme (0.9.0) - Python support for GPGME GnuPG cryptography library

@end enumerate

@menu

\* GPG 180 - Python bindings for GPGME GnuPG cryptography library::

\* PyME 090 - Python support for GPGME GnuPG cryptography library::

@end menu

@node GPG 180 - Python bindings for GPGME GnuPG cryptography library

@subsection GPG 180 - Python bindings for GPGME GnuPG cryptography library

This is the most recent version to reach PyPI and is the version of the official Python bindings which shipped with GPGME 1.8.0. If you have GPGME 1.8.0 installed and **only** 1.8.0 installed, then it is probably safe to use this copy from PyPI.

As there have been a lot of changes since the release of GPGME 1.8.0, the GnuPG Project recommends not using this version of the module and instead installing the current version of GPGME along with the

Python bindings included with that package.

@node PyME 090 - Python support for GPGME GnuPG cryptography library

@subsection PyME 090 - Python support for GPGME GnuPG cryptography library

This is the last release of the PyME bindings maintained by Martin Albrecht and is only compatible with Python 2, it will not work with Python 3. This is the version of the software from which the port from Python 2 to Python 3 code was made in 2015.

Users of the more recent Python bindings will recognise numerous points of similarity, but also significant differences. It is likely that the more recent official bindings will feel "more pythonic."

For those using Python 2, there is essentially no harm in using this module, but it may lack a number of more recent features added to GPGME.

@bye

commit 2145348ec54c6027f2ea20f695de0277e2871405

Merge: 348ba88 2036f1a

Author: Ben McGinnes <ben@adversary.org>

Date: Wed May 6 03:04:19 2015 +1000

Merge pull request #4 from Hasimir/master

history

commit 2036f1a0a670a0561993e195c458059220b36114

Merge: dbabf0c 348ba88

Author: Ben McGinnes <ben@adversary.org>

Date: Wed May 6 02:57:44 2015 +1000

Merge branch 'master' of github:adversary-org/pyme3

commit dbabf0cf1f2985755c2293b619011832e34faa9c

Author: Ben McGinnes <ben@adversary.org>

Date: Wed May 6 02:52:23 2015 +1000

Added a short history

- \* A (very) brief summary of the project's history since 2002.
- \* Deals with why the commit log in the GPGME repo does not include the history of PyME.
- \* Mentions that intact git repos will be maintained, but not where they are (one will be on github, another will be in a user directory on playfair.gnupg.org).

docs/Short\_History.rst | 57 ++++++

1 file

changed, 57 insertions(+)

commit 348ba883424778c711c04ae9b66035ccdb36eb8c

Merge: 127d0a5 7c37a27

Author: Ben McGinnes <ben@adversary.org>

Date: Wed May 6 02:21:34 2015 +1000

Merge pull request #3 from Hasimir/master

Version release preparation

commit 7c37a27a6845c58222d4d947c2efbe38e955b612

Merge: f692cff 127d0a5

Author: Ben McGinnes <ben@adversary.org>

Date: Wed May 6 02:17:14 2015 +1000

Merge branch 'master' of github:adversary-org/pyme3

commit f692cff50a89c2c61acdbd3d7dd60f5ce3cd15af

Author: Ben McGinnes <ben@adversary.org>

Date: Wed May 6 02:09:44 2015 +1000

TODO update

- \* Removed reference to GitHub, replaced with impending new home at gnupg.org.

docs/TODO.rst | 4 ++--

1 file changed, 2 insertions(+), 2 deletions(-)

commit bd5ccf9e3bfe69fa681613757577e87b72ca08ec

Author: Ben McGinnes <ben@adversary.org>

Date: Wed May 6 02:00:44 2015 +1000

Version bump

- \* Bumped version number to 0.9.1 to keep it somewhat in line with the existing

PyME project, even though there will be some divergence at some point (or even re-merging, depending on how many of the Python 3 modifications can be back-ported to the Python 2 version).

- \* Updated the author and copyright information to reflect the two current authors (Martin and I).

- \* Replaced Igor's contact details with mine.

- \* Replaced project home page with the GnuPG one.

pyme/version.py | 16 ++++++++-----

1 file changed, 9 insertions(+), 7 deletions(-)

commit ec167512f4ca88d8f6e89e2ae831798c8283b4df

Author: Ben McGinnes <ben@adversary.org>

Date: Wed May 6 01:48:01 2015 +1000

README preparation.

- \* Changes in preparation for impending move of code to the GnuPG git server as a part of GPGME.

README.rst | 14 ++++++-----

1 file changed, 7 insertions(+), 7 deletions(-)

commit 8a48515e884c36b5bdb24a13cb4d2e49f4ee6f17

Author: Ben McGinnes <ben@adversary.org>

Date: Wed May 6 01:43:53 2015 +1000

TODO moved to docs

- \* As it says.

TODO.rst | 25 -----

docs/TODO.rst | 25 ++++++

2 files changed, 25 insertions(+), 25 deletions(-)

commit f968c777472f01f308f6e57eac1740bf5c76c205



Author: Ben McGinnes <ben@adversary.org>

Date: Sun May 3 16:52:13 2015 +1000

Started another TODO file.

TODO.rst | 25 ++++++

1 file changed, 25 insertions(+)

commit 127d0a56fa9f7ad1d4fb39d0b529b890a8d67365

Merge: db72dea 44837f6

Author: Ben McGinnes <ben@adversary.org>

Date: Sun May 3 14:59:44 2015 +1000

Merge pull request #2 from Hasimir/master

Minor editing.

commit 44837f6e50fc539c86aef1f75a6a3538b02029ea

Author: Ben McGinnes <ben@adversary.org>

Date: Sun May 3 14:56:55 2015 +1000

Minor editing.

- \* Fixed another URL.

- \* Changed Py3 version's version number to v0.9.1-beta0.

README.rst | 4 ++--

1 file changed, 2 insertions(+), 2 deletions(-)

commit db72deaae19c3513391df040bcaf66a88d9213af

Merge: db34286 48eb185

Author:

Ben McGinnes <ben@adversary.org>

Date: Sun May 3 14:26:11 2015 +1000

Merge pull request #1 from Hasimir/master

Links

commit 48eb1856cb0739cc9f0b9084da9d965e1fc7fddd

Author: Ben McGinnes <ben@adversary.org>

Date: Sun May 3 14:22:30 2015 +1000

Links

- \* Fixed URLs for authors.

- \* Updated my entry to point to github location.

- \*\* I strongly suspect the result of this work will be concurrent

projects, so preparing for that eventuality with this repo.

README.rst | 8 ++++----

1 file changed, 4 insertions(+), 4 deletions(-)

commit db3428659783f30b9a76204403daedf9fc4cf7cf

Author: Ben McGinnes <ben@adversary.org>

Date: Sun May 3 11:29:00 2015 +1000

Explicit over Implicit ...

... isn't just for code.

- \* Removed the 2to3 working directory and its contents.
- \* Made the README.rst file a little more clear that this branch is for Python 3 (set Python 3.2 as a fairly arbitrary requirement for the moment, but will probably raise this to 3.3).

2to3/2to3-output-remaining.log | 60 ---

2to3/2to3-output-setup.log | 35 --

2to3/2to3-output.log | 950 -----

README.rst | 10 +-

4 files changed, 7 insertions(+), 1048 deletions(-)

commit 3edf07a4ba8a86af3a33246234d6e133074862af

Author: Ben McGinnes <ben@adversary.org>

Date: Sun May 3 11:19:41 2015 +1000

Added authors.

- \* In alphabetical order.
- \* Mine will need updating once Martin and I have decided what to do regarding the two main branches.

README.rst | 12 ++++++++

1 file changed, 12 insertions(+)

commit 811eb14b53e8856312d99f46b77215f7f9bd672c

Author: Ben McGinnes <ben@adversary.org>

Date: Sun May 3 10:23:00 2015 +1000

Docs and other things.

- \* Now able to import pyme.core without error, indicates port process is successful.
- \* Code is \*not\* compatible with the Python 2 version.
- \* Will need to consider making this a parallel project with the

master

branch.

- \* Got rid of the .org TODO file.

- \* Changed the README to use the reST file extension since it's full of reST anyway.

2to3/TODO.org | 5 ----

README.rst | 32 ++++++

README.txt | 32 -----

3 files changed, 32 insertions(+), 37 deletions(-)

commit 79e784bdcce1de6f7856921b5431044c62c6f015

Author: Ben McGinnes <ben@adversary.org>

Date: Sun May 3 10:18:40 2015 +1000

Fixed another implicit import by making it explicit. Hopefully this is the last one.

pyme/util.py | 2 +-

1 file changed, 1 insertion(+), 1 deletion(-)

commit 2b52b46ccda3e7abcc50eed0745062259d698661

Author: Ben McGinnes <ben@adversary.org>

Date: Sun May 3 10:16:01 2015 +1000

Fixed another implicit import by making it explicit.

pyme/errors.py | 2 +-

1 file changed, 1 insertion(+), 1 deletion(-)

commit 409c8fd565e21f23cd41daaeffc867e6d23a0863

Author: Ben McGinnes <ben@adversary.org>

Date: Sun May 3 10:08:22

2015 +1000

Bytes vs. Unicode

- \* Trying PyBytes instead of PyUnicode.

gpgme.i | 14 ++++++-----

helpers.c | 8 ++++----

2 files changed, 11 insertions(+), 11 deletions(-)

commit d8164aa2ae98bf8c807c16e2d9be12c5fba7cfd

Author: Ben McGinnes <ben@adversary.org>

Date: Sun May 3 09:22:58 2015 +1000

String to Unicode

\* Replaced all instances of PyString with PyUnicode (and hoping there's no byte data in there).

gpgme.i | 14 ++++++-----  
helpers.c | 8 +++++---  
2 files changed, 11 insertions(+), 11 deletions(-)

commit bd99b7865656e559b17c419c6b64b412a22c6c44  
Author: Ben McGinnes <ben@adversary.org>  
Date: Sun May 3 09:17:06 2015 +1000

PyInt\_AsLong

\* Replaced all instances of PyInt with PyLong, as per C API docs.

gpgme.i | 4 ++--  
helpers.c | 8 +++++---  
2 files changed, 6 insertions(+), 6 deletions(-)

commit 3c91e2ccf8ca788b51e3308e292c6b64888fdb15  
Author: Ben McGinnes <ben@adversary.org>  
Date: Sun May 3 05:59:36 2015 +1000

Import correction

\* Once pygpgme.py is generated and moved, it will be in the right directory for the explicit "from . import pygpgme" to be correct.

pyme/core.py | 2 +-  
1 file changed, 1 insertion(+), 1 deletion(-)

commit 23a49e7070812ff1ce138d8d4cc46d0b80328897  
Author: Ben McGinnes <ben@adversary.org>  
Date: Sun May 3 05:38:29 2015 +1000

The -py3 flag.

Makefile | 2 +-  
1 file changed, 1 insertion(+), 1 deletion(-)

commit b1549587d6db5e33081b9c20f75d1348a1d25938  
Author: Ben McGinnes <ben@adversary.org>  
Date: Sun May 3 05:01:42 2015 +1000

Fixed indentation - 4.

pyme/core.py | 2 +-  
1 file changed, 1 insertion(+), 1 deletion(-)

1 file changed, 1 insertion(+), 1 deletion(-)

commit a685142ce46761ee6f5176e90717176e38e0d24f  
Author: Ben McGinnes <ben@adversary.org>  
Date: Sun May 3 05:00:16 2015 +1000

Fixed indentation - 3.

pyme/core.py | 5 ++---  
1 file changed, 2 insertions(+), 3 deletions(-)

commit 488a70b490cc64eb1c47d2483cb2f4079c6767f7  
Author: Ben McGinnes <ben@adversary.org>  
Date: Sun  
May 3 04:53:21 2015 +1000

Pet Peeve

```
def pet_peeve(self):
 peeve = print("people who don't press return after a colon!")
```

FFS!

pyme/core.py | 5 +++--  
1 file changed, 3 insertions(+), 2 deletions(-)

commit a5d38eb47d64bb17bb609fe594dae2aca480bac9  
Author: Ben McGinnes <ben@adversary.org>  
Date: Sun May 3 04:47:54 2015 +1000

Fixed indentation - 2.

pyme/core.py | 2 +-  
1 file changed, 1 insertion(+), 1 deletion(-)

commit 476a207f732b8559abb1ea3c23147c0e34804730  
Author: Ben McGinnes <ben@adversary.org>  
Date: Sun May 3 04:46:01 2015 +1000

Fixed indentation.

pyme/core.py | 4 ++--  
1 file changed, 2 insertions(+), 2 deletions(-)

commit 0572900eba9bcd9b0283c7d8e022e8972f06f9f8  
Author: Ben McGinnes <ben@adversary.org>  
Date: Sun May 3 04:43:49 2015 +1000

Replaced all tabs with 4 spaces.

pyme/core.py | 18 ++++++-----

1 file changed, 9 insertions(+), 9 deletions(-)

commit 78c0b7677e94ce1e11b8cdb833a9064527187330

Author: Ben McGinnes <ben@adversary.org>

Date:

Sun May 3 04:39:07 2015 +1000

SWIG flags in the wrong place.

Makefile | 4 ++--

1 file changed, 2 insertions(+), 2 deletions(-)

commit dfa7f2589963494a8f89277560d8c1116604a3c8

Author: Ben McGinnes <ben@adversary.org>

Date: Sun May 3 04:35:09 2015 +1000

Fixed subprocess call for swig (again).

setup.py | 2 +-

1 file changed, 1 insertion(+), 1 deletion(-)

commit 249bfd8c714dcda53127b99b6cc8a6c7c4a99f20

Author: Ben McGinnes <ben@adversary.org>

Date: Sun May 3 04:32:40 2015 +1000

Fixed subprocess call for swig.

setup.py | 2 +-

1 file changed, 1 insertion(+), 1 deletion(-)

commit 6fd7e719cf4c975f466ceb39835db7007df36fb2

Author: Ben McGinnes <ben@adversary.org>

Date: Sun May 3 03:51:48 2015 +1000

Linking swig to py3

\* Changed the swig invocations to run with the -python -py3 flags explicitly.

Makefile | 4 ++--

setup.py | 2 +-

2 files changed, 3 insertions(+), 3 deletions(-)

commit 7a6b584f50ed6ddc8617a642185eea1f24ff791a

Author:

Ben McGinnes <ben@adversary.org>

Date: Sat May 2 11:12:00 2015 +1000

String fun

\* streamlined confdata details, including decoding strom binary to string.

setup.py | 4 +---

1 file changed, 1 insertion(+), 3 deletions(-)

commit f7fd3f270592021a95a8f779bfe85ac18f4e390b

Author: Ben McGinnes <ben@adversary.org>

Date: Sat May 2 10:46:59 2015 +1000

Open File

\* Removed deprecated file() and replaced with open().

examples/PyGtkGpgKeys.py | 2 +-  
examples/pygpa.py | 6 +++---

gpgme-h-clean.py | 2 +-  
3 files changed, 5 insertions(+), 5 deletions(-)

commit 4227d486f9558015e7e548d71085e58e1b50ec08

Author: Ben McGinnes <ben@adversary.org>

Date: Sat May 2 10:36:15 2015 +1000

print() fix

Makefile

\* Makefile includes a python print, changed from statement to function.

Makefile | 2 +-  
1 file changed, 1 insertion(+), 1 deletion(-)

commit 406f7f2567b701502186fe0a325dc2a3491ff7f8

Author: Ben McGinnes <ben@adversary.org>

Date: Sat May 2 10:28:42

2015 +1000

Updated Makefile

\* set make to use python3 instead.

\* This will mean a successful port may need to be maintained separately from the original python2 code instead of merged, but ought to be able to share most things. So maybe merge with separated make files or a pre-make script to set python2 or python3 prior to building ... decide later, after it works.

Makefile | 6 +++---

1 file changed, 3 insertions(+), 3 deletions(-)

commit 90b3efa5b193d37e08dc9b4ee766ba9ebc9412af

Author: Ben McGinnes <ben@adversary.org>

Date: Sat May 2 10:15:20 2015 +1000

Env and a little license issue

- \* Updated all the /usr/bin/env paths to point to python3.
- \* Also fixed the hard coded /usr/bin/python paths.
- \* Updated part of setup.py which gave the impression this package was only licensed under the GPL (it's actually licensed under the LGPL as well, essentially the same dual licensing as the GPGME library).

examples/PyGtkGpgKeys.py

| 2 +-

examples/delkey.py | 2 +-

examples/encrypt-to-all.py | 2 +-

examples/exportimport.py | 2 +-

examples/genkey.py | 2 +-

examples/inter-edit.py | 2 +-

examples/pygpa.py | 2 +-

examples/sign.py | 2 +-

examples/signverify.py | 2 +-

examples/simple.py | 2 +-

examples/t-edit.py | 2 +-

examples/testCMSgetkey.py | 2 +-

examples/verifydetails.py | 2 +-

gpgme-h-clean.py | 2 +-

setup.py | 4 ++--

15 files changed, 16 insertions(+), 16 deletions(-)

commit 1a4b55dbccd2774344352e579130bf494bc5fa4b

Author: Ben McGinnes <ben@adversary.org>

Date: Sat May 2 08:50:54 2015 +1000

Removed extraneous files.

- \* The two .bak files.

pyme/errors.py.bak | 46 -----

setup.py.bak | 116 -----

2 files changed, 162 deletions(-)

commit 208879d4f2a6d0514c3f8ee2fc0da8bba42350de

Author: Ben McGinnes <ben@adversary.org>

Date:



Sat May 2 08:19:37 2015 +1000

Added TODO.org

- \* TODO list in Emacs org-mode.
- \* Will eventually be removed along with this entire directory when the porting process is complete.

2to3/TODO.org | 5 +++++  
1 file changed, 5 insertions(+)

commit 1548bf201059638675c5387c6f124d4b703363a9  
Author: Ben McGinnes <ben@adversary.org>  
Date: Sat May 2 07:58:40 2015 +1000

2to3 conversion of remaining files

- \* Ran the extended version against all the unmodified python files.
- \* Only pyme/errors.py required additional work.

2to3/2to3-output-remaining.log | 60 +++++  
pyme/errors.py | 2 +-  
pyme/errors.py.bak | 46 +++++  
3 files changed, 107 insertions(+), 1 deletion(-)

commit 1230650bc6bbe4c14d1284f7877aa932f3e86eb4  
Author: Ben McGinnes <ben@adversary.org>  
Date: Sat May 2 07:50:39 2015 +1000

2to3 conversion of setup.py

- \* Ran extended 2to3 command to produce python 3 code for setup.py.
- \* Effectively testing for what to run against the other originally unmodified py2 files.

2to3/2to3-output-setup.log | 35 +++++  
setup.py | 7 +-  
setup.py.bak | 116 +++++  
3 files changed, 154 insertions(+), 4 deletions(-)

commit edad44955f59aa879e95a369591717fb19eec6b7  
Author: Ben McGinnes <ben@adversary.org>  
Date: Fri May 1 21:50:07 2015 +1000

Removing 2to3 generated .bak files.

- \* Not really needed with a real VCS, but couldn't hurt to have them for

a couple of revisions. ;)

```
examples/PyGtkGpgKeys.py.bak | 663 -----
examples/encrypt-to-all.py.bak | 65 --
examples/exportimport.py.bak | 75 --
examples/genkey.py.bak | 45 -
examples/inter-edit.py.bak | 57 --
examples/pygpa.py.bak | 1457 -----
examples/sign.py.bak
 | 31 -
examples/signverify.py.bak | 78 --
examples/simple.py.bak | 52 --
examples/t-edit.py.bak | 59 --
examples/testCMSgetkey.py.bak | 45 -
examples/verifydetails.py.bak | 100 ---
gpgme-h-clean.py.bak | 42 -
pyme/callbacks.py.bak | 47 --
pyme/constants/data/__init__.py.bak | 4 -
pyme/constants/keylist/__init__.py.bak | 4 -
pyme/constants/sig/__init__.py.bak | 4 -
pyme/core.py.bak | 463 -----
pyme/util.py.bak | 72 --
pyme/version.py.bak | 41 -
20 files changed, 3404 deletions(-)
```

commit 1cfc3c969f885ed191610bffb6d60ac23fdd349e

Author: Ben McGinnes <ben@adversary.org>

Date: Fri May 1 21:45:50 2015 +1000

#### 2to3 conversion log

\* The output of the command to convert the code from Python 2 to 3.

\* Note: this contains the list of files which were not modified

and

which will or may need to be modified.

```
2to3/2to3-output.log | 950 ++++++
1 file changed, 950 insertions(+)
```

commit 078f6cf878aa62d12704fab424198a613a24cc8c

Author: Ben McGinnes <ben@adversary.org>

Date: Fri May 1 21:36:58 2015 +1000

#### 2to3 conversion of pyme master

\* Branch from commit 459f3eca659b4949e394c4a032d9ce2053e6c721

\* Ran this: or x in `find . | egrep .py\$` ; do 2to3 -w \$x; done ;

\* Multiple files not modified, will record elsewhere (see next commit).

```

examples/PyGtkGpgKeys.py | 10 +-
examples/PyGtkGpgKeys.py.bak | 663 +++++
examples/encrypt-to-all.py | 12 +-
examples/encrypt-to-all.py.bak | 65 ++
examples/exportimport.py | 20 +-
examples/exportimport.py.bak | 75 ++
examples/genkey.py | 2 +-
examples/genkey.py.bak | 45 +
examples/inter-edit.py
| 8 +-
examples/inter-edit.py.bak | 57 ++
examples/pygpa.py | 40 +-
examples/pygpa.py.bak | 1457 +++++
examples/sign.py | 2 +-
examples/sign.py.bak | 31 +
examples/signverify.py | 18 +-
examples/signverify.py.bak | 78 ++
examples/simple.py | 8 +-
examples/simple.py.bak | 52 ++
examples/t-edit.py | 12 +-
examples/t-edit.py.bak | 59 ++
examples/testCMSgetkey.py | 8 +-
examples/testCMSgetkey.py.bak | 45 +
examples/verifydetails.py | 34 +-
examples/verifydetails.py.bak | 100 +++
gpgme-h-clean.py | 2 +-
gpgme-h-clean.py.bak | 42 +
pyme/callbacks.py | 6 +-
pyme/callbacks.py.bak | 47 ++
pyme/constants/data/__init__.py
| 2 +-
pyme/constants/data/__init__.py.bak | 4 +
pyme/constants/keylist/__init__.py | 2 +-
pyme/constants/keylist/__init__.py.bak | 4 +
pyme/constants/sig/__init__.py | 2 +-
pyme/constants/sig/__init__.py.bak | 4 +
pyme/core.py | 26 +-
pyme/core.py.bak | 463 +++++
pyme/util.py | 6 +-
pyme/util.py.bak | 72 ++
pyme/version.py | 2 +-
pyme/version.py.bak | 41 +
40 files changed, 3515 insertions(+), 111 deletions(-)

```

commit 459f3eca659b4949e394c4a032d9ce2053e6c721

Merge: c5966ab dae7f14

Author: Martin Albrecht <martinralbrecht@googlemail.com>

Date: Wed Jul 9 10:48:33 2014 +0100

Merged in jerrykan/pyme/fix\_setup\_26 (pull request #1)

Provide support for using setup.py with Python v2.6

commit dae7f14a54e6c2bde0ad4da7308cc7fc0d0c0469

Author: John Kristensen

<john.kristensen@dpipwe.tas.gov.au>

Date: Wed Jul 9 15:54:39 2014 +1000

Provide support for using setup.py with Python v2.6

The setup.py script uses subprocess.check\_output() which was introduced in Python v2.7. The equivalent functionality can be achieved without adding much extra code and provide support for Python v2.6.

setup.py | 4 +++-

1 file changed, 3 insertions(+), 1 deletion(-)

commit c5966abec9d772b3922d32650da288fd50a217be

Author: Martin Albrecht <martinralbrecht@gmail.com>

Date: Thu May 15 19:43:00 2014 +0100

README.txt in ReST, including headlines

README.txt | 8 ++++++--

1 file changed, 6 insertions(+), 2 deletions(-)

commit 43ee8c6f34fa9b6d3975aa6ea60b3d4a741fa721

Author: Martin Albrecht <martinralbrecht@gmail.com>

Date: Thu May 15 19:37:15 2014 +0100

README.txt in ReST

README.txt | 25 ++++++++-----

1 file changed, 13 insertions(+), 12 deletions(-)

commit f71a369484cba8801df23ccc5842335fa496c0df

Author:

Martin Albrecht <martinralbrecht@gmail.com>

Date: Thu May 15 19:28:12 2014 +0100

added MANIFEST.in and README.txt (instead of .md)

MANIFEST.in | 6 ++++++

README.md | 27 -----

README.txt | 27 ++++++++

3 files changed, 33 insertions(+), 27 deletions(-)

commit d0d6755229f920b0bed043e9c2731de2d57c096c

Author: Martin Albrecht <martinralbrecht@googlemail.com>

Date: Tue May 13 09:52:44 2014 +0100

added mailing list to README

README.md | 19 ++++++-----

1 file changed, 16 insertions(+), 3 deletions(-)

commit 30ca60ddf92df684de261cb24c83c68089be0adc

Author: Martin Albrecht <martinralbrecht@googlemail.com>

Date: Sun May 11 13:34:28 2014 +0100

we don't need a separate out of date ChangeLog file

ChangeLog | 802 -----

1 file changed, 802 deletions(-)

commit 8263f1a6d38fdb7f5f3dd5c7e28f83caa7528a08

Author: Martin Albrecht <martinralbrecht@googlemail.com>

Date:

Sun May 11 13:32:31 2014 +0100

adding README.md

README.md | 14 ++++++-----

1 file changed, 14 insertions(+)

commit 3fc71b47e9e14b0b984801c28d722723baa4b406

Author: Martin Albrecht <martinralbrecht@googlemail.com>

Date: Sat May 10 15:43:06 2014 +0100

ValueError -> RuntimeError

setup.py | 4 ++--

1 file changed, 2 insertions(+), 2 deletions(-)

commit eec432abea56296b9fa36aac0d10926a2335b739

Merge: eea6537 d2738b3

Author: Martin Albrecht <martinralbrecht@googlemail.com>

Date: Sat May 10 15:41:02 2014 +0100

Merge branch 'master' of bitbucket.org:malb/pyme

Conflicts:

setup.py

commit eea6537921061b4dcfc54e00a99d3fa110e71433  
Author: Martin Albrecht <martinralbrecht@googlemail.com>  
Date: Sat May 10 15:39:51 2014 +0100

check for swig

setup.py | 8 +++++++  
1 file changed, 8 insertions(+)

commit 53867bf9715ee1b4ea873bf5e2fbb7d9740a2b4a  
Author: Martin Albrecht <martinralbrecht@googlemail.com>  
Date: Sat May 10 15:35:04 2014 +0100

more friendly error message if gpgme is missing

setup.py | 8 ++++++-  
1 file changed, 7 insertions(+), 1 deletion(-)

commit d2738b35d63b1492d69641c5466103685f2d3a30  
Author: Martin Albrecht <martinralbrecht@googlemail.com>  
Date: Sat May 10 15:35:04 2014 +0100

more friendly error message if gpgme is missing

setup.py | 8 ++++++-  
1 file changed, 7 insertions(+), 1 deletion(-)

commit c0b01240becf8ba6cf1d4c1f64b2cb4c056f5163  
Author: Martin Albrecht <martinralbrecht@googlemail.com>  
Date: Fri May 9 15:20:24 2014 +0100

version number should have three digits

pyme/version.py | 2 +-  
1 file changed, 1 insertion(+), 1 deletion(-)

commit 6672bb60b9bec60d38e854016c48658b57774578  
Author: Martin Albrecht <martinralbrecht@googlemail.com>  
Date: Wed May 7 15:11:08 2014 +0100

bump version number for upcoming release

pyme/version.py | 2 +-  
1 file changed, 1 insertion(+), 1 deletion(-)

commit 7bd6de700f33ca5d1f27bc16ebbd401f21d2e788  
Author: Martin Albrecht <martinralbrecht@googlemail.com>

Date:

Sat May 3 19:36:25 2014 +0100

bump version number to indicate changes

pyme/version.py | 2 +-  
1 file changed, 1 insertion(+), 1 deletion(-)

commit 4fb6bd9b3f47c1a343242ac83b326cacd12a136e

Author: Martin Albrecht <martinralbrecht@googlemail.com>

Date: Sat May 3 19:34:07 2014 +0100

pyme instead of pygpgme

setup.py | 2 +-  
1 file changed, 1 insertion(+), 1 deletion(-)

commit 9548973138d78241a45ccb82333b25f2cf36ce7d

Author: Martin Albrecht <martinralbrecht@googlemail.com>

Date: Sat May 3 19:31:10 2014 +0100

dirty hack to make 'python setup.py install' work

setup.py | 7 ++++---  
1 file changed, 4 insertions(+), 3 deletions(-)

commit a961d7eab9db478b7e603324bc5d243bd3c84bad

Author: Martin Albrecht <martinralbrecht@googlemail.com>

Date: Sat May 3 19:05:44 2014 +0100

moved everything down to the toplevel directory

COPYING | 340 ++

COPYING.LESSER | 510 +++

ChangeLog

| 802 ++++++

INSTALL | 15 +

Makefile | 104 +

debian/README.Debian | 6 +

debian/changelog | 93 +

debian/control | 34 +

debian/copyright | 25 +

debian/docs | 2 +

debian/examples | 2 +

debian/rules | 99 +

examples/PyGtkGpgKeys.glade | 1394 ++++++++

examples/PyGtkGpgKeys.gladep | 8 +

examples/PyGtkGpgKeys.py | 663 ++++

```

examples/delkey.py | 34 +
examples/encrypt-to-all.py | 65 +
examples/exportimport.py | 75 +
examples/genkey.py | 45 +
examples/inter-edit.py | 57 +
examples/pygpa.glade | 5546 ++++++
examples/pygpa.py | 1457 ++++++
examples/sign.py | 31 +
examples/signverify.py | 78 +
examples/simple.py | 52 +
examples/t-edit.py | 59 +
examples/testCMSgetkey.py | 45 +
examples/verifydetails.py | 100 +
gpgme-h-clean.py | 42 +
gpgme.i | 267 ++
helpers.c | 154 +
helpers.h | 36 +
pyme/COPYING | 340 --
pyme/COPYING.LESSER | 510 ---
pyme/ChangeLog | 802 -----
pyme/INSTALL | 15 -
pyme/Makefile | 104 -
pyme/__init__.py | 137 +
pyme/callbacks.py | 47 +
pyme/constants/__init__.py | 7 +
pyme/constants/data/__init__.py | 4
+
pyme/constants/data/encoding.py | 20 +
pyme/constants/event.py | 20 +
pyme/constants/import.py | 20 +
pyme/constants/keylist/__init__.py | 4 +
pyme/constants/keylist/mode.py | 20 +
pyme/constants/md.py | 20 +
pyme/constants/pk.py | 20 +
pyme/constants/protocol.py | 20 +
pyme/constants/sig/__init__.py | 4 +
pyme/constants/sig/mode.py | 20 +
pyme/constants/sigsum.py | 20 +
pyme/constants/status.py | 20 +
pyme/constants/validity.py | 20 +
pyme/core.py | 463 +++
pyme/debian/README.Debian | 6 -
pyme/debian/changelog | 93 -
pyme/debian/control | 34 -
pyme/debian/copyright | 25 -
pyme/debian/docs | 2 -
pyme/debian/examples |

```



2 -

|                                         |            |
|-----------------------------------------|------------|
| pyme/debian/rules                       | 99 -       |
| pyme/errors.py                          | 46 +       |
| pyme/examples/PyGtkGpgKeys.glade        | 1394 ----- |
| pyme/examples/PyGtkGpgKeys.gladep       | 8 -        |
| pyme/examples/PyGtkGpgKeys.py           | 663 ----   |
| pyme/examples/delkey.py                 | 34 -       |
| pyme/examples/encrypt-to-all.py         | 65 -       |
| pyme/examples/exportimport.py           | 75 -       |
| pyme/examples/genkey.py                 | 45 -       |
| pyme/examples/inter-edit.py             | 57 -       |
| pyme/examples/pygpa.glade               | 5546 ----- |
| pyme/examples/pygpa.py                  | 1457 ----- |
| pyme/examples/sign.py                   | 31 -       |
| pyme/examples/signverify.py             | 78 -       |
| pyme/examples/simple.py                 | 52 -       |
| pyme/examples/t-edit.py                 | 59 -       |
| pyme/examples/testCMSgetkey.py          | 45 -       |
| pyme/examples/verifydetails.py          | 100 -      |
| pyme/gpgme-h-clean.py                   | 42 -       |
| pyme/gpgme.i                            | 267 --     |
| pyme/helpers.c                          | 154 -      |
| pyme/helpers.h                          | 36 -       |
| pyme/pyme/__init__.py                   | 137 -      |
| pyme/pyme/callbacks.py                  | 47 -       |
| pyme/pyme/constants/__init__.py         | 7 -        |
| pyme/pyme/constants/data/__init__.py    | 4 -        |
| pyme/pyme/constants/data/encoding.py    | 20 -       |
| pyme/pyme/constants/event.py            | 20 -       |
| pyme/pyme/constants/import.py           | 20 -       |
| pyme/pyme/constants/keylist/__init__.py | 4 -        |
| pyme/pyme/constants/keylist/mode.py     | 20 -       |
| pyme/pyme/constants/md.py               | 20 -       |
| pyme/pyme/constants/pk.py               | 20 -       |
| pyme/pyme/constants/protocol.py         | 20 -       |
| pyme/pyme/constants/sig/__init__.py     | 4 -        |
| pyme/pyme/constants/sig/mode.py         | 20 -       |
| pyme/pyme/constants/sigsum.py           | 20 -       |
| pyme/pyme/constants/status.py           | 20 -       |
| pyme/pyme/constants/validity.py         | 20         |
| -                                       |            |
| pyme/pyme/core.py                       | 463 ---    |
| pyme/pyme/errors.py                     | 46 -       |
| pyme/pyme/util.py                       | 72 -       |
| pyme/pyme/version.py                    | 41 -       |
| pyme/setup.py                           | 99 -       |
| pyme/util.py                            | 72 +       |
| pyme/version.py                         | 41 +       |

setup.py | 99 +  
108 files changed, 13384 insertions(+), 13384 deletions(-)

commit 8148cdd424c434e833ce427612ea8c89abc6e41c  
Author: Martin Albrecht <martinralbrecht@googlemail.com>  
Date: Sat May 3 18:58:52 2014 +0100

removing pyme-web

pyme-web/Makefile | 15 -  
pyme-web/default.css | 37 --  
pyme-web/doc/gpgme/ASCII-Armor.html | 57 ---  
pyme-web/doc/gpgme/Advanced-Key-Editing.html | 98 ----  
pyme-web/doc/gpgme/Algorithms.html | 47 --  
pyme-web/doc/gpgme/Building-the-Source.html | 82 ----  
.../doc/gpgme/Callback-Based-Data-Buffers.html | 148 -----  
pyme-web/doc/gpgme/Cancellation.html | 67 ---  
pyme-web/doc/gpgme/Concept-Index.html | 186 -----  
pyme-web/doc/gpgme/Context-Attributes.html | 52 --  
pyme-web/doc/gpgme/Contexts.html | 61 ---  
pyme-web/doc/gpgme/Creating-Contexts.html | 49 --  
pyme-web/doc/gpgme/Creating-Data-Buffers.html | 47 --  
pyme-web/doc/gpgme/Creating-a-Signature.html | 143 -----  
pyme-web/doc/gpgme/Crypto-Engine.html | 79 ---  
pyme-web/doc/gpgme/Crypto-Operations.html | 67 ---  
.../doc/gpgme/Cryptographic-Message-Syntax.html | 42 --  
.../doc/gpgme/Data-Buffer-I\_002fO-Operations.html | 104 ----  
pyme-web/doc/gpgme/Data-Buffer-Meta\_002dData.html | 100 ----  
pyme-web/doc/gpgme/Decrypt-and-Verify.html | 79 ---  
pyme-web/doc/gpgme/Decrypt.html | 123 -----  
pyme-web/doc/gpgme/Deleting-Keys.html | 67  
---  
pyme-web/doc/gpgme/Destroying-Contexts.html | 46 --  
pyme-web/doc/gpgme/Destroying-Data-Buffers.html | 70 ---  
pyme-web/doc/gpgme/Encrypt.html | 45 --  
pyme-web/doc/gpgme/Encrypting-a-Plaintext.html | 147 -----  
pyme-web/doc/gpgme/Engine-Configuration.html | 65 ---  
pyme-web/doc/gpgme/Engine-Information.html | 119 -----  
pyme-web/doc/gpgme/Engine-Version-Check.html | 48 --  
pyme-web/doc/gpgme/Error-Codes.html | 133 -----  
pyme-web/doc/gpgme/Error-Handling.html | 72 ---  
pyme-web/doc/gpgme/Error-Sources.html | 89 ----  
pyme-web/doc/gpgme/Error-Strings.html | 80 ---  
pyme-web/doc/gpgme/Error-Values.html | 159 -----  
pyme-web/doc/gpgme/Exchanging-Data.html | 58 ---  
pyme-web/doc/gpgme/Exporting-Keys.html | 101 ----  
pyme-web/doc/gpgme/Features.html | 59 ---  
pyme-web/doc/gpgme/File-Based-Data-Buffers.html | 74

|                                                    |           |
|----------------------------------------------------|-----------|
| ---                                                |           |
| pyme-web/doc/gpgme/Function-and-Data-Index.html    | 229 ----- |
| pyme-web/doc/gpgme/Generating-Keys.html            | 144 ----- |
| pyme-web/doc/gpgme/Getting-Started.html            | 55 ---    |
| pyme-web/doc/gpgme/Hash-Algorithms.html            | 59 ---    |
| pyme-web/doc/gpgme/Header.html                     | 53 --     |
| .../doc/gpgme/I_002fO-Callback-Example-GDK.html    | 85 ----   |
| .../gpgme/I_002fO-Callback-Example-GTK_002b.html   | 86 ----   |
| .../doc/gpgme/I_002fO-Callback-Example-Qt.html     | 99 ----   |
| pyme-web/doc/gpgme/I_002fO-Callback-Example.html   | 259 ----- |
| pyme-web/doc/gpgme/I_002fO-Callback-Interface.html | 142 ----- |
| pyme-web/doc/gpgme/Importing-Keys.html             | 171 ----- |
| pyme-web/doc/gpgme/Included-Certificates.html      | 70 ---    |
| pyme-web/doc/gpgme/Information-About-Keys.html     | 207 ----- |
| .../doc/gpgme/Information-About-Trust-Items.html   | 75 ---    |
| pyme-web/doc/gpgme/Introduction.html               | 53 --     |
| pyme-web/doc/gpgme/Key-Listing-Mode.html           | 99 ----   |
| pyme-web/doc/gpgme/Key-Management.html             | 260 ----- |
| pyme-web/doc/gpgme/Key-Signatures.html             | 130 ----- |
| .../doc/gpgme/Largefile-Support-_0028LFS_0029.html | 110 ----  |
| pyme-web/doc/gpgme/Library-Copying.html            | 542 ----- |
| pyme-web/doc/gpgme/Library-Version-Check.html      | 97 ----   |
| pyme-web/doc/gpgme/Listing-Keys.html               | 204 ----- |
| pyme-web/doc/gpgme/Listing-Trust-Items.html        | 88 ----   |
| pyme-web/doc/gpgme/Locale.html                     | 69 ---    |
| pyme-web/doc/gpgme/Manipulating-Data-Buffers.html  | 45 --     |
| pyme-web/doc/gpgme/Manipulating-Keys.html          | 63 ---    |
| pyme-web/doc/gpgme/Manipulating-Trust-Items.html   | 62 ---    |
| pyme-web/doc/gpgme/Memory-Based-Data-Buffers.html  | 107 ----  |
| pyme-web/doc/gpgme/Multi-Threading.html            | 93 ----   |
| pyme-web/doc/gpgme/OpenPGP.html                    | 44 --     |
| pyme-web/doc/gpgme/Overview.html                   | 57 ---    |
| pyme-web/doc/gpgme/Passphrase-Callback.html        | 101 ----  |
| pyme-web/doc/gpgme/Preparation.html                | 54 --     |
| pyme-web/doc/gpgme/Progress-Meter-Callback.html    | 80 ---    |
| pyme-web/doc/gpgme/Protocol-Selection.html         | 60 ---    |
| pyme-web/doc/gpgme/Protocols-and-Engines.html      | 82 ----   |
| pyme-web/doc/gpgme/Public-Key-Algorithms.html      | 74 ---    |
| .../doc/gpgme/Registering-I_002fO-Callbacks.html   | 81 ---    |
| pyme-web/doc/gpgme/Run-Control.html                | 53 --     |
| pyme-web/doc/gpgme/Selecting-Signers.html          | 64 ---    |
| pyme-web/doc/gpgme/Sign.html                       | 50 --     |
| pyme-web/doc/gpgme/Signal-Handling.html            | 61 ---    |
| pyme-web/doc/gpgme/Signature-Notation-Data.html    | 85 ----   |
| pyme-web/doc/gpgme/Text-Mode.html                  | 63 ---    |
| pyme-web/doc/gpgme/Trust-Item-Management.html      | 68 ---    |

```

pyme-web/doc/gpgme/Using-Automake.html | 74 ---
pyme-web/doc/gpgme/Using-External-Event-Loops.html | 74 ---
pyme-web/doc/gpgme/Using-Libtool.html
 | 44 --
pyme-web/doc/gpgme/Verify.html | 492 -----
pyme-web/doc/gpgme/Waiting-For-Completion.html | 77 ---
pyme-web/doc/gpgme/index.html | 169 -----
pyme-web/doc/pyme/index.html | 164 -----
pyme-web/doc/pyme/pyme.callbacks.html | 42 --
.../doc/pyme/pyme.constants.data.encoding.html | 48 --
pyme-web/doc/pyme/pyme.constants.data.html | 29 --
pyme-web/doc/pyme/pyme.constants.event.html | 48 --
pyme-web/doc/pyme/pyme.constants.html | 39 --
pyme-web/doc/pyme/pyme.constants.import.html | 49 --
pyme-web/doc/pyme/pyme.constants.keylist.html | 29 --
pyme-web/doc/pyme/pyme.constants.keylist.mode.html | 49 --
pyme-web/doc/pyme/pyme.constants.md.html | 58 ---
pyme-web/doc/pyme/pyme.constants.pk.html | 50 --
pyme-web/doc/pyme/pyme.constants.protocol.html | 48 --
pyme-web/doc/pyme/pyme.constants.sig.html
 | 29 --
pyme-web/doc/pyme/pyme.constants.sig.mode.html | 47 --
pyme-web/doc/pyme/pyme.constants.sigsum.html | 55 ---
pyme-web/doc/pyme/pyme.constants.status.html | 126 -----
pyme-web/doc/pyme/pyme.constants.validity.html | 50 --
pyme-web/doc/pyme/pyme.core.html | 277 -----
pyme-web/doc/pyme/pyme.errors.html | 82 ----
pyme-web/doc/pyme/pyme.html | 164 -----
pyme-web/doc/pyme/pyme.util.html | 81 ---
pyme-web/doc/pyme/pyme.version.html | 37 --
pyme-web/index.html | 72 ---
112 files changed, 10551 deletions(-)

```

commit 684d95feb7e10e538a56fb1b27f1456111bacb60

Author: Martin Albrecht <martinralbrecht@googlemail.com>

Date: Mon Jan 6 17:44:20 2014 +0100

fixing op\_export\_keys()

the conversion of gpgme\_key\_t [] was restricted to gpgme\_key\_t [] with the  
name recv, i.e. only  
the use-cases of encryption were covered.

see: [http://sourceforge.net/mailarchive/forum.php?forum\\_name=pyme-help&max\\_rows=25&style=nested&viewmonth=201309](http://sourceforge.net/mailarchive/forum.php?forum_name=pyme-help&max_rows=25&style=nested&viewmonth=201309)

```

pyme/gpgme.i | 6 +++---

```

1 file changed, 3 insertions(+), 3 deletions(-)

commit 658d23b95110d21eeb50abf4e74701a667521a88  
Author: Martin Albrecht <martinralbrecht@googlemail.com>  
Date: Mon Jan 6 17:41:33 2014 +0100

deleting CVSROOT

CVSROOT/checkoutlist | 13 -----  
CVSROOT/commitinfo | 15 -----  
CVSROOT/config | 21 -----  
CVSROOT/cvswrappers | 19 -----  
CVSROOT/editinfo | 21 -----  
CVSROOT/loginfo | 26 -----  
CVSROOT/modules | 26 -----  
CVSROOT/notify | 12 -----  
CVSROOT/rcsinfo | 13 -----  
CVSROOT/taginfo | 20 -----  
CVSROOT/verifymsg | 21 -----  
11 files changed, 207 deletions(-)

commit 576b555499c094c4786d42de9e59aa9826009b89  
Author:  
convert-repo <devnull@localhost>  
Date: Mon Jan 6 15:22:44 2014 +0000

update tags

commit 2dcf0c5b702eb5a18c66ff1e42a72eaa7427af1d  
Author: belyi <devnull@localhost>  
Date: Wed Nov 26 02:38:33 2008 +0000

Move Windows specific fix from helpers.c to helpers.h so that it works  
for edit callback as well as for the passphrase one.

pyme/helpers.c | 5 ----  
pyme/helpers.h | 5 +++  
2 files changed, 5 insertions(+), 5 deletions(-)

commit 42a035f2ef62470fea7a7f8ee33a1297fa90a603  
Author: belyi <devnull@localhost>  
Date: Mon Nov 24 21:44:30 2008 +0000

Update the way build directives are constructed on MinGW to have a bit  
more robust. Update PyMe build version to 0.8.1 in version.py

pyme/pyme/version.py | 2 +-  
pyme/setup.py | 10 ++++++--  
2 files changed, 9 insertions(+), 3 deletions(-)

commit 3aaa20fbcba17066c9ffd580f5209946022793a2  
Author: belyi <devnull@localhost>  
Date: Mon Nov 24 06:57:11 2008 +0000

Update changelog

pyme/debian/changelog  
| 5 ++++  
1 file changed, 4 insertions(+), 1 deletion(-)

commit 689ff46b2550547e3883f809a6dc40c22c3e137e  
Author: belyi <devnull@localhost>  
Date: Mon Nov 24 06:50:41 2008 +0000

Fix hang problem on Windows when password is written to a filehandle.  
Fix the way path is constructed on MinGW platform.

pyme/helpers.c | 5 +++++  
pyme/setup.py | 4 ++--  
2 files changed, 7 insertions(+), 2 deletions(-)

commit 852a60d541d66cb56f40378182b976fd87a02c46  
Author: belyi <devnull@localhost>  
Date: Sun Nov 23 04:31:31 2008 +0000

Add Bernard's example testCMSgetkey.py and his updates for  
verifydetails.py

pyme/examples/testCMSgetkey.py | 45 +++++++++++++++++++++++++++++++++++++  
pyme/examples/verifydetails.py | 43 ++++++-----  
2 files changed, 77 insertions(+), 11 deletions(-)

commit f080527d9184f3360f0a8ef6136b9a188d8e7d2a  
Author: belyi <devnull@localhost>  
Date: Thu May 29 18:29:37 2008 +0000

Remove debian packaging for python2.3  
since it is removed from both  
testing and unstable dists.  
Update docs build target to have correct PYTHONPATH set.

pyme/Makefile | 2 +-  
pyme/debian/changelog | 4 +++  
pyme/debian/control | 4 ++--  
pyme/debian/rules | 2 --  
4 files changed, 6 insertions(+), 6 deletions(-)

Date: Thu Apr 3 13:37:12 2008 +0000

Forgot to adjust mainText margin. Doing it now.

pyme-web/default.css | 2 +-  
+-----

1 file changed, 1 insertion(+), 1 deletion(-)

Author: belyi <devnull@localhost>

Date: Thu Apr 3 13:00:11 2008 +0000

Fix an error in default.css and make index.html "Standards Compliant".

pyme-web/default.css | 2 +-  
+-----+-----+-----+-----+

pyme-web/index.html | 7 ++++---

2 files changed, 5 insertions(+), 4 deletions(-)

Author: belyi <devnull@localhost>

Date: Thu Apr 3 12:38:42 2008 +0000

Adjust spacing

between links.

pyme-web/default.css | 9 ++++++---

1 file changed, 6 insertions(+), 3 deletions(-)

Author: belyi <devnull@localhost>

Date: Wed Apr 2 22:50:21 2008 +0000

Make style a big more IE friendly.

pyme-web/default.css | 15 ++++++-----

1 file changed, 11 insertions(+), 4 deletions(-)

Author: belyi <devnull@localhost>

Date: Wed Apr 2 11:58:32 2008 +0000

Make GPGME documentation a bit more web friendly on the index.html page.

pyme-web/doc/gpgme/Algorithms.html | 2 +-

[illegible]

[pyme-web/doc/gpgme/Contexts.html](#) | 2 +-  
+-----+-----+

pyme-web/doc/gpgme/Error-Handling.html | 2 +-

pyme-web/doc/gpgme/Exchanging-Data.html | 2 +-  
pyme-web/doc/gpgme/Function-and-Data-Index.html | 2 +-  
pyme-web/doc/gpgme/Introduction.html | 4 +-  
pyme-web/doc/gpgme/Library-Copying.html  
| 2 +-  
pyme-web/doc/gpgme/Preparation.html | 2 +-  
pyme-web/doc/gpgme/Protocols-and-Engines.html | 2 +-  
pyme-web/doc/gpgme/index.html | 229 +-----  
11 files changed, 12 insertions(+), 239 deletions(-)

commit 4f57c0ccb049d4442e7732e2d1d05dabffd2a21d

Author: belyi <devnull@localhost>

Date: Wed Apr 2 06:12:57 2008 +0000

Add missing core.set\_locale() to set default locale for contexts.

pyme/debian/changelog | 2 +-  
pyme/pyme/core.py | 4 ++++  
2 files changed, 5 insertions(+), 1 deletion(-)

commit acf7ead3dea8590cf9fe86b67bb125837ad6ed4f

Author: belyi <devnull@localhost>

Date: Wed Apr 2 05:50:24 2008 +0000

Avoid leaks caused by keys.

Add set/get methods for engine info.

pyme/debian/changelog | 10 ++++++++  
pyme/pyme/core.py | 24 ++++++++  
2 files changed, 34 insertions(+)

commit df4a2fb518adbb6420d95ce74af212c87abff7e7

Author: belyi <devnull@localhost>

Date: Wed Apr 2

04:04:41 2008 +0000

Update index.html to reflect new versions on the web.

pyme-web/Makefile | 3 ++-  
pyme-web/doc/gpgme/index.html | 4 +---  
pyme-web/index.html | 4 ++--  
3 files changed, 5 insertions(+), 6 deletions(-)

commit bd3ffc9bdf98d6aafde6b689c6c8215fa468612d

Author: belyi <devnull@localhost>

Date: Wed Apr 2 04:01:04 2008 +0000

Update PyMe documentation to match 0.8.0 version of the package.



```

pyme-web/doc/pyme/index.html | 14 ++++-----
pyme-web/doc/pyme/pyme.constants.keylist.mode.html | 1 +
pyme-web/doc/pyme/pyme.constants.protocol.html | 4 ++-
pyme-web/doc/pyme/pyme.constants.status.html | 9 ++++++
pyme-web/doc/pyme/pyme.core.html | 36 ++++++-----
pyme-web/doc/pyme/pyme.errors.html | 8 ++---
pyme-web/doc/pyme/pyme.html | 14 ++++-----
pyme-web/doc/pyme/pyme.util.html | 17 ++++++---
pyme-web/doc/pyme/pyme.version.html
 | 14 ++++-----

```

9 files changed, 82 insertions(+), 35 deletions(-)

commit 6973a69a317608a0d0661590d701f4e3f3a21b32

Author: belyi <devnull@localhost>

Date: Wed Apr 2 02:35:24 2008 +0000

Have a fix for Contents being put onto 'Function and Data Index' page.

```

pyme-web/doc/gpgme/Concept-Index.html | 2 +-
pyme-web/doc/gpgme/Function-and-Data-Index.html | 153 +-----
pyme-web/doc/gpgme/index.html | 154 ++++++-----
3 files changed, 155 insertions(+), 154 deletions(-)

```

commit 086315964cbc2abad1187f306dcb9c72ac3257f3

Author: belyi <devnull@localhost>

Date: Wed Apr 2 01:00:29 2008 +0000

Update GPGME documentation. It's for v1.1.6 now.

```

pyme-web/doc/gpgme/ASCII-Armor.html | 57 ++
pyme-web/doc/gpgme/Advanced-Key-Editing.html | 98 +++
pyme-web/doc/gpgme/Algorithms.html | 47 ++
pyme-web/doc/gpgme/Building-the-Source.html | 82 +++
.../doc/gpgme/Callback-Based-Data-Buffers.html
 | 148 ++++++
pyme-web/doc/gpgme/Cancellation.html | 67 ++
pyme-web/doc/gpgme/Concept-Index.html | 186 ++++++
pyme-web/doc/gpgme/Context-Attributes.html | 52 ++
pyme-web/doc/gpgme/Contexts.html | 61 ++
pyme-web/doc/gpgme/Creating-Contexts.html | 49 ++
pyme-web/doc/gpgme/Creating-Data-Buffers.html | 47 ++
pyme-web/doc/gpgme/Creating-a-Signature.html | 143 ++++++
pyme-web/doc/gpgme/Crypto-Engine.html | 79 +++
pyme-web/doc/gpgme/Crypto-Operations.html | 67 ++
.../doc/gpgme/Cryptographic-Message-Syntax.html | 42 ++
.../doc/gpgme/Data-Buffer-I_002fO-Operations.html | 104 +++++
pyme-web/doc/gpgme/Data-Buffer-Meta_002dData.html | 100 +++

```

pyme-web/doc/gpgme/Decrypt-and-Verify.html | 79 +++  
 pyme-web/doc/gpgme/Decrypt.html | 123 ++++  
 pyme-web/doc/gpgme/Deleting-Keys.html | 67 ++  
 pyme-web/doc/gpgme/Destroying-Contexts.html  
 | 46 ++  
 pyme-web/doc/gpgme/Destroying-Data-Buffers.html | 70 +++  
 pyme-web/doc/gpgme/Encrypt.html | 45 ++  
 pyme-web/doc/gpgme/Encrypting-a-Plaintext.html | 147 +++++  
 pyme-web/doc/gpgme/Engine-Configuration.html | 65 ++  
 pyme-web/doc/gpgme/Engine-Information.html | 119 ++++  
 pyme-web/doc/gpgme/Engine-Version-Check.html | 48 ++  
 pyme-web/doc/gpgme/Error-Codes.html | 133 ++++  
 pyme-web/doc/gpgme/Error-Handling.html | 72 +++  
 pyme-web/doc/gpgme/Error-Sources.html | 89 +++  
 pyme-web/doc/gpgme/Error-Strings.html | 80 +++  
 pyme-web/doc/gpgme/Error-Values.html | 159 +++++  
 pyme-web/doc/gpgme/Exchanging-Data.html | 58 ++  
 pyme-web/doc/gpgme/Exporting-Keys.html | 101 +++  
 pyme-web/doc/gpgme/Features.html | 59 ++  
 pyme-web/doc/gpgme/File-Based-Data-Buffers.html | 74 +++  
 pyme-web/doc/gpgme/Function-and-Data-Index.html  
 | 380 ++++++  
 pyme-web/doc/gpgme/Generating-Keys.html | 144 +++++  
 pyme-web/doc/gpgme/Getting-Started.html | 55 ++  
 pyme-web/doc/gpgme/Hash-Algorithms.html | 59 ++  
 pyme-web/doc/gpgme/Header.html | 53 ++  
 ../doc/gpgme/I\_002fO-Callback-Example-GDK.html | 85 +++  
 ../gpgme/I\_002fO-Callback-Example-GTK\_002b.html | 86 +++  
 ../doc/gpgme/I\_002fO-Callback-Example-Qt.html | 99 +++  
 pyme-web/doc/gpgme/I\_002fO-Callback-Example.html | 259 ++++++  
 pyme-web/doc/gpgme/I\_002fO-Callback-Interface.html | 142 +++++  
 pyme-web/doc/gpgme/Importing-Keys.html | 171 +++++  
 pyme-web/doc/gpgme/Included-Certificates.html | 70 +++  
 pyme-web/doc/gpgme/Information-About-Keys.html | 207 ++++++  
 ../doc/gpgme/Information-About-Trust-Items.html | 75 +++  
 pyme-web/doc/gpgme/Introduction.html | 53 ++  
 pyme-web/doc/gpgme/Key-Listing-Mode.html | 99 +++  
 pyme-web/doc/gpgme/Key-Management.html  
 | 260 ++++++  
 pyme-web/doc/gpgme/Key-Signatures.html | 130 ++++  
 ../doc/gpgme/Largefile-Support-\_0028LFS\_0029.html | 110 ++++  
 pyme-web/doc/gpgme/Library-Copying.html | 542 ++++++  
 pyme-web/doc/gpgme/Library-Version-Check.html | 97 +++  
 pyme-web/doc/gpgme/Listing-Keys.html | 204 ++++++  
 pyme-web/doc/gpgme/Listing-Trust-Items.html | 88 +++  
 pyme-web/doc/gpgme/Locale.html | 69 +++  
 pyme-web/doc/gpgme/Manipulating-Data-Buffers.html | 45 ++  
 pyme-web/doc/gpgme/Manipulating-Keys.html | 63 ++

|                                                    |            |
|----------------------------------------------------|------------|
| pyme-web/doc/gpgme/Manipulating-Trust-Items.html   | 62 ++      |
| pyme-web/doc/gpgme/Memory-Based-Data-Buffers.html  | 107 ++++   |
| pyme-web/doc/gpgme/Multi-Threading.html            | 93 +++     |
| pyme-web/doc/gpgme/OpenPGP.html                    | 44 ++      |
| pyme-web/doc/gpgme/Overview.html                   | 57 ++      |
| pyme-web/doc/gpgme/Passphrase-Callback.html        | 101 +++    |
| pyme-web/doc/gpgme/Preparation.html                | 54 ++      |
| pyme-web/doc/gpgme/Progress-Meter-Callback.html    | 80 +++     |
| pyme-web/doc/gpgme/Protocol-Selection.html         | 60 ++      |
| pyme-web/doc/gpgme/Protocols-and-Engines.html      | 82 +++     |
| pyme-web/doc/gpgme/Public-Key-Algorithms.html      | 74 +++     |
| .../doc/gpgme/Registering-I_002fO-Callbacks.html   | 81 +++     |
| pyme-web/doc/gpgme/Run-Control.html                | 53 ++      |
| pyme-web/doc/gpgme/Selecting-Signers.html          | 64 ++      |
| pyme-web/doc/gpgme/Sign.html                       | 50 ++      |
| pyme-web/doc/gpgme/Signal-Handling.html            | 61 ++      |
| pyme-web/doc/gpgme/Signature-Notation-Data.html    | 85 +++     |
| pyme-web/doc/gpgme/Text-Mode.html                  | 63 ++      |
| pyme-web/doc/gpgme/Trust-Item-Management.html      | 68 ++      |
| pyme-web/doc/gpgme/Using-Automake.html             | 74 +++     |
| pyme-web/doc/gpgme/Using-External-Event-Loops.html | 74 +++     |
| pyme-web/doc/gpgme/Using-Libtool.html              | 44 ++      |
| pyme-web/doc/gpgme/Verify.html                     | 492 ++++++ |
| pyme-web/doc/gpgme/Waiting-For-Completion.html     | 77 +++     |
| pyme-web/doc/gpgme/gpgme.html                      | 251 -----  |
| pyme-web/doc/gpgme/gpgme_1.html                    | 76 ---     |
| pyme-web/doc/gpgme/gpgme_10.html                   | 61 --      |
| pyme-web/doc/gpgme/gpgme_11.html                   | 130 ----   |
| pyme-web/doc/gpgme/gpgme_12.html                   | 82 ---     |
| pyme-web/doc/gpgme/gpgme_13.html                   | 130 ----   |
| pyme-web/doc/gpgme/gpgme_14.html                   | 108 ----   |
| pyme-web/doc/gpgme/gpgme_15.html                   | 69 ---     |
| pyme-web/doc/gpgme/gpgme_16.html                   | 169 -----  |
| pyme-web/doc/gpgme/gpgme_17.html                   | 63 --      |
| pyme-web/doc/gpgme/gpgme_18.html                   | 63 --      |
| pyme-web/doc/gpgme/gpgme_19.html                   | 66 --      |
| pyme-web/doc/gpgme/gpgme_2.html                    | 79 ---     |
| pyme-web/doc/gpgme/gpgme_20.html                   | 120 ----   |
| pyme-web/doc/gpgme/gpgme_21.html                   | 102 ---    |
| pyme-web/doc/gpgme/gpgme_22.html                   | 108 ----   |
| pyme-web/doc/gpgme/gpgme_23.html                   | 237 -----  |
| pyme-web/doc/gpgme/gpgme_24.html                   | 154 ----   |
| pyme-web/doc/gpgme/gpgme_25.html                   | 248 -----  |
| pyme-web/doc/gpgme/gpgme_26.html                   | 107 ----   |
| pyme-web/doc/gpgme/gpgme_27.html                   | 80 ---     |

|                                  |           |
|----------------------------------|-----------|
| pyme-web/doc/gpgme/gpgme_28.html | 67 --     |
| pyme-web/doc/gpgme/gpgme_29.html | 164 ----  |
| pyme-web/doc/gpgme/gpgme_3.html  | 86 ---    |
| pyme-web/doc/gpgme/gpgme_30.html | 106 ----  |
| pyme-web/doc/gpgme/gpgme_31.html | 232 ----- |
| pyme-web/doc/gpgme/gpgme_32.html | 85 ---    |
| pyme-web/doc/gpgme/gpgme_33.html | 223 ----- |
| pyme-web/doc/gpgme/gpgme_34.html | 83 ---    |
| pyme-web/doc/gpgme/gpgme_35.html | 70 ---    |
| pyme-web/doc/gpgme/gpgme_36.html | 63 --     |
| pyme-web/doc/gpgme/gpgme_37.html | 66 --     |
| pyme-web/doc/gpgme/gpgme_38.html | 86 ---    |
| pyme-web/doc/gpgme/gpgme_39.html | 79 ---    |
| pyme-web/doc/gpgme/gpgme_4.html  | 83 ---    |
| pyme-web/doc/gpgme/gpgme_40.html | 89 ---    |
| pyme-web/doc/gpgme/gpgme_41.html | 99 ---    |
| pyme-web/doc/gpgme/gpgme_42.html | 144 ----  |
| pyme-web/doc/gpgme/gpgme_43.html | 152 ----  |
| pyme-web/doc/gpgme/gpgme_44.html | 112 ----  |
| pyme-web/doc/gpgme/gpgme_45.html | 101 ---   |
| pyme-web/doc/gpgme/gpgme_46.html | 459 ----- |
| pyme-web/doc/gpgme/gpgme_47.html | 292 ----- |
| pyme-web/doc/gpgme/gpgme_48.html | 363 ----- |
| pyme-web/doc/gpgme/gpgme_49.html | 209 ----- |
| pyme-web/doc/gpgme/gpgme_5.html  | 74 ---    |
| pyme-web/doc/gpgme/gpgme_50.html | 88 ---    |
| pyme-web/doc/gpgme/gpgme_51.html | 208 ----- |
| pyme-web/doc/gpgme/gpgme_52.html | 154 ----  |
| pyme-web/doc/gpgme/gpgme_53.html | 291 ----- |
| pyme-web/doc/gpgme/gpgme_54.html | 91 ---    |
| pyme-web/doc/gpgme/gpgme_55.html | 107 ----  |
| pyme-web/doc/gpgme/gpgme_56.html | 140 ----  |
| pyme-web/doc/gpgme/gpgme_57.html | 106 ----  |
| pyme-web/doc/gpgme/gpgme_58.html | 89 ---    |
| pyme-web/doc/gpgme/gpgme_59.html | 97 ---    |
| pyme-web/doc/gpgme/gpgme_6.html  | 77 ---    |
| pyme-web/doc/gpgme/gpgme_60.html | 142 ----  |
| pyme-web/doc/gpgme/gpgme_61.html | 626 ----- |
| pyme-web/doc/gpgme/gpgme_62.html | 107 ----  |
| pyme-web/doc/gpgme/gpgme_63.html | 67 --     |
| pyme-web/doc/gpgme/gpgme_64.html | 95 ---    |
| pyme-web/doc/gpgme/gpgme_65.html | 233 ----- |
| pyme-web/doc/gpgme/gpgme_66.html | 65 --     |
| pyme-web/doc/gpgme/gpgme_67.html | 220 ----- |
| pyme-web/doc/gpgme/gpgme_68.html | 75 ---    |

```

pyme-web/doc/gpgme/gpgme_69.html | 119 ----
pyme-web/doc/gpgme/gpgme_7.html | 123 ----
pyme-web/doc/gpgme/gpgme_70.html | 107 ----
pyme-web/doc/gpgme/gpgme_71.html | 218 -----
pyme-web/doc/gpgme/gpgme_72.html | 134 ----
pyme-web/doc/gpgme/gpgme_73.html | 299 -----
pyme-web/doc/gpgme/gpgme_74.html | 103 ----
pyme-web/doc/gpgme/gpgme_75.html | 104 ----
pyme-web/doc/gpgme/gpgme_76.html | 118 ----
pyme-web/doc/gpgme/gpgme_77.html | 95 ---
pyme-web/doc/gpgme/gpgme_78.html | 71 ---
pyme-web/doc/gpgme/gpgme_79.html | 686 -----
pyme-web/doc/gpgme/gpgme_8.html | 155 ----
pyme-web/doc/gpgme/gpgme_80.html | 120 ----
pyme-web/doc/gpgme/gpgme_81.html | 278 -----
pyme-web/doc/gpgme/gpgme_82.html | 272 -----
pyme-web/doc/gpgme/gpgme_83.html | 180 -----
pyme-web/doc/gpgme/gpgme_84.html | 99 ---
pyme-web/doc/gpgme/gpgme_9.html | 104 ----
pyme-web/doc/gpgme/gpgme_abt.html | 206 -----
pyme-web/doc/gpgme/gpgme_fot.html | 53 --
pyme-web/doc/gpgme/gpgme_ovr.html | 68 --
pyme-web/doc/gpgme/gpgme_toc.html | 247 -----
pyme-web/doc/gpgme/index.html | 497 ++++++-----
176 files changed, 9054 insertions(+), 13378 deletions(-)

```

commit 163c1053dc761682f5a4231da163bdd0ff7162d7

Author: belyi <devnull@localhost>

Date:

Tue Apr 1 21:14:29 2008 +0000

Update Home page to be a bit more visitor friendly.

```

pyme-web/Makefile | 2 +-
pyme-web/default.css | 27 ++++++
pyme-web/index.html | 70 ++++++-----
3 files changed, 75 insertions(+), 24 deletions(-)

```

commit 05db2d17d8fda0ab8c948bbdc0643dfc1466830d

Author: belyi <devnull@localhost>

Date: Sun Mar 30 21:27:38 2008 +0000

Add a rule to build binary distribution for Windows.

```

pyme/Makefile | 16 ++++++
1 file changed, 14 insertions(+), 2 deletions(-)

```

commit 57acb1089f5f8c24323ee62fc0a7f492a496b9c0

Author: belyi <devnull@localhost>

Date: Sat Mar 29 22:50:11 2008 +0000

Switch to using central location for python files (pycentral)

Update docs rule to fix location of the python source files.

```
pyme/Makefile | 5 +++-
pyme/debian/changelog | 4 ++-
pyme/debian/control | 74 ++++++-----
pyme/debian/dirs
 | 2 --
pyme/debian/docs | 1 +
pyme/debian/postinst.ex | 48 -----
pyme/debian/postrm.ex | 38 -----
pyme/debian/preinst.ex | 44 -----
pyme/debian/prerm.ex | 39 -----
pyme/debian/rules | 50 ++++++-----
pyme/debian/setup.cfg-2.2 | 8 ----
pyme/debian/setup.cfg-2.3 | 8 ----
pyme/debian/setup.cfg-2.4 | 8 ----
pyme/gpgme-h-clean.py | 2 +-
pyme/pyme/core.py | 2 +-
pyme/pyme/util.py | 2 +-
16 files changed, 28 insertions(+), 307 deletions(-)
```

commit 2b56fd10517cfbcffaa4ba98d8ea42f40f0d38a9

Author: belyi <devnull@localhost>

Date: Sun Mar 23 02:01:12 2008 +0000

Turn SWIG's autodoc feature on. Ignore 'next' in the types which are lists now.

Use new style for class declarations. Specify None as a default value for core.check\_version() method. Update version.py for 0.8.0 version.

```
pyme/examples/pygpa.py
| 2 +-
pyme/gpgme.i | 5 +++++
pyme/pyme/core.py | 2 +-
pyme/pyme/util.py | 5 +++--
pyme/pyme/version.py | 6 +++---
5 files changed, 13 insertions(+), 7 deletions(-)
```

commit df5e25d7ee4dc0aa0d429f9d009322dd8ac33bb8

Author: belyi <devnull@localhost>

Date: Thu Mar 20 19:07:00 2008 +0000

Improve matching for DEPRECATED typedefs

```
pyme/gpgme-h-clean.py | 4 +++-
```

1 file changed, 2 insertions(+), 2 deletions(-)

commit 78d8fc732848ac267ec65e9069265cd500587cdf

Author: belyi <devnull@localhost>

Date: Wed Mar 19 19:28:40 2008 +0000

Update API to use list when types containing 'next' field are return.

Update examples accordingly

Add verifydetails.py example

Start adding bullets for 0.8.0 version.

```
pyme/Makefile | 2 +-
pyme/debian/changelog | 14 ++++++-
pyme/examples/PyGtkGpgKeys.py | 53 ++++++++-----
pyme/examples/delkey.py | 7 ++--
pyme/examples/encrypt-to-all.py | 7 ++--
pyme/examples/exportimport.py | 7 ++--
pyme/examples/pygpa.py | 70 ++++++++-----
pyme/examples/signverify.py | 11 +++--
pyme/examples/verifydetails.py | 79 ++++++++-----
pyme/gpgme.i | 19 ++++++-
10 files changed, 180 insertions(+), 89 deletions(-)
```

commit 342d85b07475e7360bcd62804bf5facda039494f

Author: belyi <devnull@localhost>

Date: Mon Mar 10 01:14:16 2008 +0000

Change references to source files so that they point to the WebCVS browse location.

```
pyme-web/doc/pyme/index.html | 2 +-
pyme-web/doc/pyme/pyme.callbacks.html | 2 +-
pyme-web/doc/pyme/pyme.constants.data.encoding.html | 2 +-
pyme-web/doc/pyme/pyme.constants.data.html | 2 +-
pyme-web/doc/pyme/pyme.constants.event.html | 2 +-
pyme-web/doc/pyme/pyme.constants.html | 2 +-
pyme-web/doc/pyme/pyme.constants.import.html | 2 +-
pyme-web/doc/pyme/pyme.constants.keylist.html | 2 +-
pyme-web/doc/pyme/pyme.constants.keylist.mode.html | 2 +-
pyme-web/doc/pyme/pyme.constants.md.html | 2 +-
pyme-web/doc/pyme/pyme.constants.pk.html | 2 +-
pyme-web/doc/pyme/pyme.constants.protocol.html | 2 +-
pyme-web/doc/pyme/pyme.constants.sig.html | 2 +-
pyme-web/doc/pyme/pyme.constants.sig.mode.html | 2 +-
pyme-web/doc/pyme/pyme.constants.sigsum.html | 2 +-
pyme-web/doc/pyme/pyme.constants.status.html | 2 +-
pyme-web/doc/pyme/pyme.constants.validity.html | 2 +-

```

```

pyme-web/doc/pyme/pyme.core.html | 2 +-
pyme-web/doc/pyme/pyme.errors.html | 2 +-
pyme-web/doc/pyme/pyme.html | 2 +-
pyme-web/doc/pyme/pyme.util.html | 2 +-
pyme-web/doc/pyme/pyme.version.html | 2 +-
22 files changed, 22 insertions(+), 22 deletions(-)

```

commit 4139dd1d066c1a6c892d84fe45dc3e6c4aa1b803

Author: belyi

<devnull@localhost>

Date: Sat Mar 8 18:21:08 2008 +0000

Add core.check\_version(None) to all examples since this function is used by Gpgme to do internal initialization. Update debian/rules to use dh\_pysupport instead of deprecated dh\_python.

```

pyme/debian/rules | 8 +++-----
pyme/examples/PyGtkGpgKeys.py | 7 ++++++-
pyme/examples/delkey.py | 2 ++
pyme/examples/encrypt-to-all.py | 3 +++
pyme/examples/exportimport.py | 2 ++
pyme/examples/genkey.py | 1 +
pyme/examples/inter-edit.py | 3 +++
pyme/examples/pygpa.py | 5 ++++++
pyme/examples/sign.py | 2 ++
pyme/examples/signverify.py | 2 ++
pyme/examples/simple.py | 2 ++
pyme/examples/t-edit.py | 3 +++
12 files changed, 34 insertions(+), 6 deletions(-)

```

commit ae76c6176457dd38e0634cbc17d794294a3a81d2

Author: belyi <devnull@localhost>

Date: Wed Apr 12 22:20:38 2006 +0000

Change name of internal package name from 'gpgme' to 'pygpgme' to avoid conflict with gpgme.dll on Windows.

Fix build with SWIG 1.3.28.

Change version to 0.7.1 in a preparation for new release.

```

pyme/Makefile | 3 +-
pyme/debian/changelog | 12 +++++
pyme/gpgme.i | 19 +++---
pyme/pyme/callbacks.py | 1 -
pyme/pyme/core.py | 153 ++++++-----
pyme/pyme/errors.py | 12 ++--
pyme/pyme/util.py | 10 ++--
pyme/pyme/version.py | 2 +-
pyme/setup.py | 4 +-

```



9 files changed, 116 insertions(+), 100 deletions(-)

commit d644383a76e9f83bc2d426628319e3c4a989dc2d

Author: belyi <devnull@localhost>

Date: Sat Dec 17 01:34:53 2005 +0000

Put all constants into pyme.constants package to avoid stepping on python reserved words.

Add build rules for Mingw32 and Cygwin on Windows. Rules for Mingw under Debian are still to come.

Fixed a small bug in pygpa.py example.

```
pyme/Makefile | 11 ++++++---
pyme/examples/pygpa.py
| 3 +-
pyme/pyme/__init__.py | 2 +-
pyme/pyme/constants/__init__.py | 3 +++
pyme/setup.py | 42 ++++++-----
5 files changed, 51 insertions(+), 10 deletions(-)
```

commit 89eb370fcaa8adc9d219eadbaa579dde7bf06329

Author: belyi <devnull@localhost>

Date: Mon Aug 1 03:08:32 2005 +0000

Imported changes provided by Joost van Baal:

Use dh\_python in debian/rules and change the Section pyme belongs to from 'libs' to 'python'.

```
pyme/debian/control | 6 +++---
pyme/debian/rules | 2 ++
2 files changed, 5 insertions(+), 3 deletions(-)
```

commit ad76d10c2a77b45b7459c62131279e946b860891

Author: belyi <devnull@localhost>

Date: Fri Jun 10 03:01:22 2005 +0000

Update 'docs' rule in Makefile to build packages first to ensure that documentation is build for the current version of pyme and not for the installed one.

Added 'callbacks' into the list of visible pyme modules (\_\_all\_\_ var.)

Slightly updated INSTALL file.

```
pyme/INSTALL | 11 ++++++---
pyme/Makefile | 4 ++--
pyme/pyme/__init__.py | 2 +-

```

3 files changed, 11 insertions(+), 6 deletions(-)

commit 2fe1a81e00721698bfa6850b3db2eb85e43d1724

Author: belyi <devnull@localhost>

Date: Wed Jun 8 16:16:18 2005 +0000

Update pyme documentation to remove dead links to pyme.gpgme.html and  
pyme.\_gpgme.html

Added reference to the installed GPGME and PyMe documentation to the head  
web page.

Updated Makefile to install all \*.html files and to clean \*~ files in all  
subdirectories

```
pyme-web/Makefile | 10 ++++++----
pyme-web/doc/pyme/index.html | 8 +++-----
pyme-web/doc/pyme/pyme.callbacks.html | 8 -----
pyme-web/doc/pyme/pyme.core.html | 1 -
pyme-web/doc/pyme/pyme.errors.html | 8 -----
pyme-web/doc/pyme/pyme.html | 8 +++-----
pyme-web/doc/pyme/pyme.util.html | 8 -----
pyme-web/index.html | 9 ++++++++--
8 files
changed, 19 insertions(+), 41 deletions(-)
```

commit 6aa34cce4ea0099e50b4936dfce59778157b8ca8

Author: belyi <devnull@localhost>

Date: Wed Jun 8 15:18:20 2005 +0000

Added pyme and gpgme documentation.

```
pyme-web/doc/gpgme/gpgme.html | 251 ++++++++
pyme-web/doc/gpgme/gpgme_1.html | 76 +++
pyme-web/doc/gpgme/gpgme_10.html | 61 ++
pyme-web/doc/gpgme/gpgme_11.html | 130 ++++
pyme-web/doc/gpgme/gpgme_12.html | 82 +++
pyme-web/doc/gpgme/gpgme_13.html | 130 ++++
pyme-web/doc/gpgme/gpgme_14.html | 108 ++++
pyme-web/doc/gpgme/gpgme_15.html | 69 +++
pyme-web/doc/gpgme/gpgme_16.html | 169 ++++++
pyme-web/doc/gpgme/gpgme_17.html | 63 ++
pyme-web/doc/gpgme/gpgme_18.html | 63 ++
pyme-web/doc/gpgme/gpgme_19.html | 66 ++
pyme-web/doc/gpgme/gpgme_2.html | 79 +++
pyme-web/doc/gpgme/gpgme_20.html | 120 ++++
pyme-web/doc/gpgme/gpgme_21.html | 102 +++
pyme-web/doc/gpgme/gpgme_22.html | 108 ++++
pyme-web/doc/gpgme/gpgme_23.html | 237 ++++++++
```

|                                  |             |
|----------------------------------|-------------|
| pyme-web/doc/gpgme/gpgme_24.html | 154 +++++   |
| pyme-web/doc/gpgme/gpgme_25.html | 248 +++++++ |
| pyme-web/doc/gpgme/gpgme_26.html | 107 +++++   |
| pyme-web/doc/gpgme/gpgme_27.html | 80 +++      |
| pyme-web/doc/gpgme/gpgme_28.html | 67 ++       |
| pyme-web/doc/gpgme/gpgme_29.html | 164 +++++   |
| pyme-web/doc/gpgme/gpgme_3.html  | 86 +++      |
| pyme-web/doc/gpgme/gpgme_30.html | 106 +++++   |
| pyme-web/doc/gpgme/gpgme_31.html | 232 +++++++ |
| pyme-web/doc/gpgme/gpgme_32.html | 85 +++      |
| pyme-web/doc/gpgme/gpgme_33.html | 223 +++++++ |
| pyme-web/doc/gpgme/gpgme_34.html | 83 +++      |
| pyme-web/doc/gpgme/gpgme_35.html | 70 +++      |
| pyme-web/doc/gpgme/gpgme_36.html | 63 ++       |
| pyme-web/doc/gpgme/gpgme_37.html | 66 ++       |
| pyme-web/doc/gpgme/gpgme_38.html | 86 +++      |
| pyme-web/doc/gpgme/gpgme_39.html | 79 +++      |
| pyme-web/doc/gpgme/gpgme_4.html  | 83 +++      |
| pyme-web/doc/gpgme/gpgme_40.html | 89 +++      |
| pyme-web/doc/gpgme/gpgme_41.html | 99 +++      |
| pyme-web/doc/gpgme/gpgme_42.html | 144 +++++   |
| pyme-web/doc/gpgme/gpgme_43.html | 152 +++++   |
| pyme-web/doc/gpgme/gpgme_44.html | 112 +++++   |
| pyme-web/doc/gpgme/gpgme_45.html | 101 +++     |
| pyme-web/doc/gpgme/gpgme_46.html | 459 ++++++  |
| pyme-web/doc/gpgme/gpgme_47.html | 292 +++++++ |
| pyme-web/doc/gpgme/gpgme_48.html | 363 ++++++  |
| pyme-web/doc/gpgme/gpgme_49.html | 209 +++++++ |
| pyme-web/doc/gpgme/gpgme_5.html  | 74 +++      |
| pyme-web/doc/gpgme/gpgme_50.html | 88 +++      |
| pyme-web/doc/gpgme/gpgme_51.html | 208 +++++++ |
| pyme-web/doc/gpgme/gpgme_52.html | 154 +++++   |
| pyme-web/doc/gpgme/gpgme_53.html | 291 +++++++ |
| pyme-web/doc/gpgme/gpgme_54.html | 91 +++      |
| pyme-web/doc/gpgme/gpgme_55.html | 107 +++++   |
| pyme-web/doc/gpgme/gpgme_56.html | 140 +++++   |
| pyme-web/doc/gpgme/gpgme_57.html | 106 +++++   |
| pyme-web/doc/gpgme/gpgme_58.html | 89 +++      |
| pyme-web/doc/gpgme/gpgme_59.html | 97 +++      |
| pyme-web/doc/gpgme/gpgme_6.html  | 77 +++      |
| pyme-web/doc/gpgme/gpgme_60.html | 142 +++++   |
| pyme-web/doc/gpgme/gpgme_61.html | 626 ++++++  |
| pyme-web/doc/gpgme/gpgme_62.html | 107 +++++   |
| pyme-web/doc/gpgme/gpgme_63.html | 67 ++       |
| pyme-web/doc/gpgme/gpgme_64.html | 95 +++      |

|                                                    |              |
|----------------------------------------------------|--------------|
| pyme-web/doc/gpgme/gpgme_65.html                   | 233 +++++++  |
| pyme-web/doc/gpgme/gpgme_66.html                   | 65 ++        |
| pyme-web/doc/gpgme/gpgme_67.html                   | 220 +++++++  |
| pyme-web/doc/gpgme/gpgme_68.html                   | 75 +++       |
| pyme-web/doc/gpgme/gpgme_69.html                   | 119 ++++     |
| pyme-web/doc/gpgme/gpgme_7.html                    | 123 ++++     |
| pyme-web/doc/gpgme/gpgme_70.html                   | 107 ++++     |
| pyme-web/doc/gpgme/gpgme_71.html                   | 218 +++++++  |
| pyme-web/doc/gpgme/gpgme_72.html                   | 134 ++++     |
| pyme-web/doc/gpgme/gpgme_73.html                   | 299 ++++++++ |
| pyme-web/doc/gpgme/gpgme_74.html                   | 103 ++++     |
| pyme-web/doc/gpgme/gpgme_75.html                   | 104 ++++     |
| pyme-web/doc/gpgme/gpgme_76.html                   | 118 ++++     |
| pyme-web/doc/gpgme/gpgme_77.html                   | 95 +++       |
| pyme-web/doc/gpgme/gpgme_78.html                   | 71 +++       |
| pyme-web/doc/gpgme/gpgme_79.html                   | 686 ++++++   |
| pyme-web/doc/gpgme/gpgme_8.html                    | 155 +++++    |
| pyme-web/doc/gpgme/gpgme_80.html                   | 120 ++++     |
| pyme-web/doc/gpgme/gpgme_81.html                   | 278 +++++++  |
| pyme-web/doc/gpgme/gpgme_82.html                   | 272 +++++++  |
| pyme-web/doc/gpgme/gpgme_83.html                   | 180 ++++++   |
| pyme-web/doc/gpgme/gpgme_84.html                   | 99 +++       |
| pyme-web/doc/gpgme/gpgme_9.html                    | 104 ++++     |
| pyme-web/doc/gpgme/gpgme_abt.html                  | 206 +++++++  |
| pyme-web/doc/gpgme/gpgme_fot.html                  | 53 ++        |
| pyme-web/doc/gpgme/gpgme_ovr.html                  | 68 ++        |
| pyme-web/doc/gpgme/gpgme_toc.html                  | 247 +++++++  |
| pyme-web/doc/gpgme/index.html                      | 251 +++++++  |
| pyme-web/doc/pyme/index.html                       | 166 +++++    |
| pyme-web/doc/pyme/pyme.callbacks.html              | 50 ++        |
| .../doc/pyme/pyme.constants.data.encoding.html     | 48 ++        |
| pyme-web/doc/pyme/pyme.constants.data.html         | 29 +         |
| pyme-web/doc/pyme/pyme.constants.event.html        | 48 ++        |
| pyme-web/doc/pyme/pyme.constants.html              | 39 ++        |
| pyme-web/doc/pyme/pyme.constants.import.html       | 49 ++        |
| pyme-web/doc/pyme/pyme.constants.keylist.html      | 29 +         |
| pyme-web/doc/pyme/pyme.constants.keylist.mode.html | 48 ++        |
| pyme-web/doc/pyme/pyme.constants.md.html           | 58 ++        |
| pyme-web/doc/pyme/pyme.constants.pk.html           | 50 ++        |
| pyme-web/doc/pyme/pyme.constants.protocol.html     | 46 ++        |
| pyme-web/doc/pyme/pyme.constants.sig.html          | 29 +         |
| pyme-web/doc/pyme/pyme.constants.sig.mode.html     | 47 ++        |
| pyme-web/doc/pyme/pyme.constants.sigsum.html       | 55 ++        |
| pyme-web/doc/pyme/pyme.constants.status.html       | 117 ++++     |
| pyme-web/doc/pyme/pyme.constants.validity.html     | 50 ++        |
| pyme-web/doc/pyme/pyme.core.html                   |              |

| 254 +++++++  
pyme-web/doc/pyme/pyme.errors.html | 90 +++  
pyme-web/doc/pyme/pyme.html | 166 +++++  
pyme-web/doc/pyme/pyme.util.html | 78 +++  
pyme-web/doc/pyme/pyme.version.html | 37 ++  
pyme-web/index.html | 6 +-  
113 files changed, 14966 insertions(+), 1 deletion(-)

commit 2d6fe54479f042644f7b0f3d2fe35877d2056144  
Author: belyi <devnull@localhost>  
Date: Thu May 19 02:06:09 2005 +0000

Added INSTALL file.

pyme/INSTALL | 10 +++++++  
1 file changed, 10 insertions(+)

commit d6892fff0c3cedf41dba4c25ab8608e7f2bc039c  
Author: belyi <devnull@localhost>  
Date: Tue May 17 16:49:28 2005 +0000

Update copyright note on simple.py

pyme/examples/simple.py | 4 ++--  
1 file changed, 2 insertions(+), 2 deletions(-)

commit c2cd9cdf5995843aad7b200b929db2969effc9d2  
Author: belyi <devnull@localhost>  
Date: Tue May 17 15:03:58 2005  
+0000

Update simple.py to catch errors.

pyme/examples/simple.py | 17 ++++++++-----  
1 file changed, 11 insertions(+), 6 deletions(-)

commit eaedae7c6a0ea993caab067efe781a59b6769c44  
Author: belyi <devnull@localhost>  
Date: Tue May 17 01:18:23 2005 +0000

Added 'PYTHON = python' into Makefile for bug #1199122

pyme/Makefile | 1 +  
pyme/examples/signverify.py | 1 +  
2 files changed, 2 insertions(+)

commit 56fd244bb2636a4d58629899ea3cde1d96428198  
Author: belyi <devnull@localhost>

Date: Wed Apr 27 21:37:06 2005 +0000

Added pygpa example.

```
pyme/debian/changelog | 3 +-
pyme/examples/pygpa.glade | 5546 ++++++
pyme/examples/pygpa.py | 1459 ++++++
3 files changed, 7007 insertions(+), 1 deletion(-)
```

commit 2d9a2a91a59ac3fee5410c953b7e0859e9e7cd35

Author: belyi <devnull@localhost>

Date: Thu Apr 21 15:17:51 2005 +0000

Change version to 0.7.0 due to the change in license.

```
pyme/debian/changelog
| 2 +-
pyme/pyme/version.py | 2 +-
2 files changed, 2 insertions(+), 2 deletions(-)
```

commit 94e34e38d742f145385bd235825b6ba1e30d8339

Author: belyi <devnull@localhost>

Date: Thu Apr 21 03:53:12 2005 +0000

Changed license on PyMe from GPL to LGPL.

PyMe examples keep GPL license.

```
pyme/COPYING.LESSER | 510 ++++++
pyme/Makefile | 20 +-
pyme/debian/changelog | 4 +-
pyme/debian/copyright | 22 +-
pyme/gpgme-h-clean.py | 16 ++
pyme/gpgme.i | 20 +-
pyme/helpers.c | 20 +-
pyme/helpers.h | 20 +-
pyme/pyme/__init__.py | 20 +-
pyme/pyme/callbacks.py | 20 +-
pyme/pyme/constants/data/encoding.py | 20 +-
pyme/pyme/constants/event.py | 20 +-
pyme/pyme/constants/import.py | 20 +-
pyme/pyme/constants/keylist/mode.py | 20 +-
pyme/pyme/constants/md.py
| 20 +-
pyme/pyme/constants/pk.py | 20 +-
pyme/pyme/constants/protocol.py | 20 +-
pyme/pyme/constants/sig/mode.py | 20 +-
pyme/pyme/constants/sigsum.py | 20 +-
pyme/pyme/constants/status.py | 20 +-

```

```
pyme/pyme/constants/validity.py | 20 +-
pyme/pyme/core.py | 20 +-
pyme/pyme/errors.py | 20 +-
pyme/pyme/util.py | 20 +-
pyme/pyme/version.py | 22 +-
pyme/setup.py | 20 +-
26 files changed, 761 insertions(+), 233 deletions(-)
```

commit 0d8aa0f6335cb1506a37085095ed45173b099a02

Author: belyi <devnull@localhost>

Date: Tue Apr 19 01:46:06 2005 +0000

Added `__hash__` and `__eq__` methods to `GpgmeWrapper` to allow both `Context()` and `Data()` to be used as a dictionary key.  
Changed `core.wait()` function to always return a tuple. On timeout now it returns `(0, None)` instead of just `None`. Plus, return context is now a `Context()` object instead of a wrapper return by underlying `gpgme`.

```
pyme/helpers.c | 1 -
pyme/pyme/core.py | 25 ++++++-----
pyme/pyme/util.py | 9 ++++++
3 files changed, 24 insertions(+), 11 deletions(-)
```

commit 63ff6d10637be1dcbcd78c939ac1ef1ac30b1024

Author: belyi <devnull@localhost>

Date: Wed Apr 6 04:58:40 2005 +0000

Made `hook` parameter optional in `passphrase_cb` and `progress_cb`.  
Allowed `None` for callbacks to unset ones set previously.  
Removed cleanup of exception in callbacks - now just retrieve the error code.  
Added `prev_bad` parameter in `passphrase_cb` since it can be used in change password protocols.  
Updated examples to follow new sets of arguments in callbacks  
Updated `op_edit` to check if passed key is `None` (otherwise `gpgme` dumps core)  
God rid of annoying warning "function declaration isn't a prototype" in `helpers.c` and `helpers.h` by changing from `()` to `(void)` list of arguments.

```
pyme/debian/changelog
| 10 +++++--
pyme/examples/signverify.py | 2 +-
pyme/examples/t-edit.py | 2 +-
pyme/gpgme.i | 18 ++++++-----
pyme/helpers.c | 60 ++++++-----
pyme/helpers.h | 4 +--
pyme/pyme/callbacks.py | 6 +++--
pyme/pyme/core.py | 47 ++++++-----
pyme/pyme/errors.py | 2 +-

```

9 files changed, 96 insertions(+), 55 deletions(-)

commit 8f0ab8138c7aa190936376ccbbf33bb09c64d6f1

Author: belyi <devnull@localhost>

Date: Thu Mar 31 23:50:59 2005 +0000

Added exception handling in passphrase\_cb and edit\_cb. If GPGMEError exception is thrown in those callbacks it will be converted into its core representation and return as an error code to the caller. On all other exceptions error code will be GPG\_ERR\_GENERAL.

```
pyme/Makefile | 1 +
pyme/debian/changelog | 8 ++++++++
pyme/gpgme.i | 20 ++++++++-----
pyme/helpers.c | 51
+++++++-----
pyme/helpers.h | 3 +++
5 files changed, 71 insertions(+), 12 deletions(-)
```

commit 9903d1fb11231e7e3d920e58d1ecb674c5988b07

Author: belyi <devnull@localhost>

Date: Thu Mar 31 05:12:15 2005 +0000

Remove workaround from Context.wait() method since the bug report and patch fixing gpgme\_wait's behavior is sent to GPMGE developers already. Added errorcheck into op\_edit() so that it can report an error.

```
pyme/pyme/core.py | 10 +++++-----
1 file changed, 5 insertions(+), 5 deletions(-)
```

commit 45e8a5f4e13d3ca797ec3b0037242874a6be5562

Author: belyi <devnull@localhost>

Date: Sat Mar 26 19:44:18 2005 +0000

Updated version number to 0.6.2 in version.py  
Added examples/\*.glade files into documentation package.

```
pyme/debian/examples | 1 +
pyme/pyme/version.py | 2 +-
2 files changed, 2 insertions(+), 1 deletion(-)
```

commit 270b87bb40e180cb6e8f1de9a0e8161525ffa4ab

Author: belyi <devnull@localhost>

Date: Sat Mar  
26 19:31:14 2005 +0000

Updated debian/changelog regarding PyGtkGpgKeys example and a fix in errors.



pyme/debian/changelog | 5 ++++-

1 file changed, 4 insertions(+), 1 deletion(-)

commit ea4682009a506db91e5174ffd038fe7e4406b591

Author: belyi <devnull@localhost>

Date: Sat Mar 26 19:25:36 2005 +0000

Added handling of right mouse button click.

Changed reporting a string instead of a number on key generation failure.

pyme/examples/PyGtkGpgKeys.glade | 2 ++

pyme/examples/PyGtkGpgKeys.py | 30 ++++++

2 files changed, 29 insertions(+), 3 deletions(-)

commit f65ad1a703d0098a3204fb8527a54d253e5847e7

Author: belyi <devnull@localhost>

Date: Sat Mar 26 18:11:11 2005 +0000

Added another column indicating if a key has a secret part.

Automated generation of the View menu from the view field of the KeyColumn class.

pyme/examples/PyGtkGpgKeys.glade | 93 ++-----

pyme/examples/PyGtkGpgKeys.py | 74

+++++

2 files changed, 44 insertions(+), 123 deletions(-)

commit b54e83a7a7a5785502f3c7e8b95f15e23b40e65a

Author: belyi <devnull@localhost>

Date: Sat Mar 26 16:45:13 2005 +0000

Small change to the way gtk.TreeModel object is used.

pyme/examples/PyGtkGpgKeys.py | 21 ++++++-----

1 file changed, 10 insertions(+), 11 deletions(-)

commit 7078db75cef4c1fd70cf03e37172bdb4f933fd1b

Author: belyi <devnull@localhost>

Date: Fri Mar 25 23:33:06 2005 +0000

Use more comprehensible error reporting since gpgme\_strerror\_r returns None all the time.

pyme/pyme/errors.py | 6 +++---

1 file changed, 3 insertions(+), 3 deletions(-)

commit 151213f4344d9984975721440af07de09e3df61c

Author: belyi <devnull@localhost>

Date: Fri Mar 25 04:30:17 2005 +0000

Improved PyGtkGpgKeys example to manage owner\_trust on keys.  
Added another example inter-edit.py which is just a helper to write  
scripts for Context.op\_edit() command.

```
pyme/examples/PyGtkGpgKeys.glade | 78 ++++++
pyme/examples/PyGtkGpgKeys.py | 68 ++++++-----
pyme/examples/inter-edit.py | 54 ++++++
pyme/examples/t-edit.py | 18 ++++++
4 files changed, 212 insertions(+), 6 deletions(-)
```

commit fc7235af217bcee5231ce7fbd7f234712d5ad3b0

Author: belyi <devnull@localhost>

Date: Fri Mar 25 00:30:39 2005 +0000

Updated PyGtkGpgKeys example to include import, export and reload  
functionality. Also added ability to remove number of keys simultaneously.  
Rearranged how KeyColumn is used to avoid unnecessary sorts and duplication  
of information in different parts of the code.

```
pyme/examples/PyGtkGpgKeys.glade | 86 ++++++
pyme/examples/PyGtkGpgKeys.py | 332 ++++++-----
2 files changed, 325 insertions(+), 93 deletions(-)
```

commit 9f65749ccb1b7cab562e19c03f4371d5f7d94912

Author: belyi <devnull@localhost>

Date: Thu Mar 24 05:51:03

2005 +0000

Added example of PyGTK+ and PyMe integration.  
For now it does only simple things - listing, deleting, and generating keys.

```
pyme/examples/PyGtkGpgKeys.glade | 1321 ++++++
pyme/examples/PyGtkGpgKeys.glade | 8 +
pyme/examples/PyGtkGpgKeys.py | 424 ++++++
3 files changed, 1753 insertions(+)
```

commit 59e23f32c3b46413c9ec09e23e1a385a110fb103

Author: belyi <devnull@localhost>

Date: Thu Mar 24 05:44:58 2005 +0000

Added wait method Context class which handles asynchronous calls a little  
bit better than the one generated by SWIG.

```
pyme/debian/changelog | 7 ++++++
pyme/gpgme.i | 1 +
```

pyme/pyme/core.py | 40 ++++++  
3 files changed, 48 insertions(+)

commit 4c1b5259e4985df2cba0ae4fc09f12cd94603a75

Author: belyi <devnull@localhost>

Date: Tue Mar 22 18:29:31 2005 +0000

Added correct handling of Context.op\_edit() method.  
Added example/t-edit.py showing  
usage for this method.  
Output of this example should match output of the tests/gpg/t-edit  
from the GPGME test suite.  
Remove unused static function from helpers.c

pyme/examples/t-edit.py | 38 ++++++  
pyme/gpgme.i | 36 ++++++  
pyme/helpers.c | 36 -----  
pyme/pyme/core.py | 5 +++-  
4 files changed, 78 insertions(+), 37 deletions(-)

commit dc587e215283bfef2dd594f86a7b2945f74f5155

Author: belyi <devnull@localhost>

Date: Sat Mar 19 01:43:59 2005 +0000

Update changelog to include note about deprecated function in 0.6.1 release

pyme/debian/changelog | 3 +-  
pyme/examples/encrypt-to-all.py | 3 +--  
2 files changed, 3 insertions(+), 3 deletions(-)

commit 86de4b3ad777f980ccf7ba3462c85bbe1787d1fd

Author: belyi <devnull@localhost>

Date: Sat Mar 19 01:40:07 2005 +0000

Remove deprecated functions from helpers.[ch]  
Use gpgme-h-clean.py  
to remove deprecated functions and typedefs from  
the GPGME header file. This will reduce the number of unused methods.

pyme/Makefile | 4 ++--  
pyme/gpgme-h-clean.py | 26 ++++++  
pyme/helpers.c | 8 -----  
pyme/helpers.h | 2 --  
4 files changed, 28 insertions(+), 12 deletions(-)

commit 2483efcbd0d73c628c4d7717928a766c3b58f0aa

Author: belyi <devnull@localhost>

Date: Fri Mar 18 22:15:52 2005 +0000

Update copyright and author values in pyme/version.py  
Create rules to build distribution files - one full and one without  
debian bits.

```
pyme/Makefile | 28 ++++++-----
pyme/pyme/version.py | 12 +++++-----
2 files changed, 28 insertions(+), 12 deletions(-)
```

commit 168593285380f5a7805f3dd08657d429a72d3621  
Author: belyi <devnull@localhost>  
Date: Fri Mar 18 19:09:33 2005 +0000

Added package building for python2.4

Updated copyright notes to include myself and avoid confusion who's the  
maintainer.

In John's own words: "I'd prefer to just step out of the picture".

Jonh's copyright notice left intact.

```
pyme/Makefile | 6 +++--
pyme/debian/changelog | 7 ++++++
pyme/debian/control | 30 ++++++-----
pyme/debian/copyright | 10 +++++-----
pyme/debian/rules | 4 +++++
pyme/debian/setup.cfg-2.4 | 8 ++++++
pyme/examples/genkey.py | 4 ++--
pyme/gpgme.i | 4 ++--
pyme/helpers.c | 4 ++--
pyme/helpers.h | 4 ++--
pyme/pyme/__init__.py | 4 ++--
pyme/pyme/callbacks.py | 4 ++--
pyme/pyme/constants/data/encoding.py | 4 ++--
pyme/pyme/constants/event.py | 4 ++--
pyme/pyme/constants/import.py | 4 ++--
pyme/pyme/constants/keylist/mode.py | 4 ++--
pyme/pyme/constants/md.py | 4 ++--
pyme/pyme/constants/pk.py | 4 ++--
pyme/pyme/constants/protocol.py | 4 ++--
pyme/pyme/constants/sig/mode.py | 4 ++--
pyme/pyme/constants/sigsum.py | 4 ++--
pyme/pyme/constants/status.py | 4 ++--
pyme/pyme/constants/validity.py | 4 ++--
pyme/pyme/core.py | 4 ++--
pyme/pyme/errors.py | 4 ++--
pyme/pyme/util.py | 4 ++--
pyme/pyme/version.py | 2 +-

```

pyme/setup.py | 3 ++-  
28 files changed, 96 insertions(+), 54 deletions(-)

commit 6dbbb252771133724b2879ed6d767cd708196dae  
Author: belyi <devnull@localhost>  
Date: Fri Mar 18 18:04:35 2005 +0000

Remove the note about gpgme.i to be generated - it's been the primary source  
for some time.

pyme/gpgme.i | 6 -----  
1 file changed, 6 deletions(-)

commit 9d449fa4889c6bda6d14583c0625b8d5c4ffe759  
Author: belyi <devnull@localhost>  
Date: Fri May 7 18:31:22 2004 +0000

Added my copyright in genkey.py since there's  
enough changes made.  
Updated signverify to use only keys generated by genkey.py, to check  
that keys added to singers are able to sign and to check that the  
list of signers is not empty. The last check is necessary to prevent  
signing with the key of the user running signverify.py script.  
Added delkey.py script to delete keys generated by genkey.py  
Added exportimport.py example for key export/import.

pyme/examples/delkey.py | 29 ++++++  
pyme/examples/exportimport.py | 76 ++++++  
pyme/examples/genkey.py | 6 ++-  
pyme/examples/signverify.py | 18 +++++-  
4 files changed, 119 insertions(+), 10 deletions(-)

commit df98c8d28245ad2c14b0ab50fc8f8932853bec8b  
Author: belyi <devnull@localhost>  
Date: Tue May 4 17:34:15 2004 +0000

Added examples/signverify.py for unattended sing/verify.  
Updated examples/genkey.py to work correctly.  
Updated gpgme.i to allow None as a value for gpgme\_data\_t

pyme/examples/genkey.py | 14 ++-----  
pyme/examples/signverify.py | 72 ++++++  
pyme/gpgme.i | 21 ++++++-----  
3 files changed, 87 insertions(+), 20 deletions(-)

commit ba45931abf530ab89ead46d7233ff1b62b629a18  
Author: belyi <devnull@localhost>  
Date: Thu Apr 8 16:15:09 2004 +0000

Ensure that we support only python2.2 and up. :-)  
Use generators in core.Context class which makes pyme.aux obsolete  
Remove importing future nested\_scopes since they are standard starting  
with python2.2

```
pyme/pyme/__init__.py | 5 ++---
pyme/pyme/aux.py | 56 -----
pyme/pyme/core.py | 15 ++++++---
pyme/pyme/errors.py | 1 -
pyme/pyme/util.py | 2 +-
5 files changed, 15 insertions(+), 64 deletions(-)
```

commit 4e9be5a55ecffa4da7ad5c192cc892eddaaa9586  
Author: belyi <devnull@localhost>  
Date: Sun Mar 21 03:53:30 2004 +0000

Small change to index.html  
Added clean: rule to the Makefile

```
pyme-web/Makefile | 3 +++
pyme-web/index.html | 6 +++---
2 files changed, 6 insertions(+), 3 deletions(-)
```

commit 2efb95176f4edf56ed61c9ac0c3aa09c56534df0  
Author: belyi <devnull@localhost>  
Date: Sun Mar 21 03:00:32 2004 +0000

Added Makefile rules for pyme module installation.

```
pyme/Makefile | 5 ++++-
1 file changed, 4 insertions(+), 1 deletion(-)
```

commit 2b83d5d8b513029cc3e54f2fa502ccc85618104b  
Author: belyi <devnull@localhost>  
Date: Sun Mar 21 02:29:54 2004 +0000

Decorative change.

```
pyme/pyme/aux.py | 2 +-
1 file changed, 1 insertion(+), 1 deletion(-)
```

commit e3478015d763a036c1d806ae01433fce59712204  
Author: belyi <devnull@localhost>  
Date: Sun Mar 21 02:25:55 2004 +0000

Added RCS Id: tags

```

pyme/Makefile | 1 +
pyme/examples/encrypt-to-all.py | 3 ++-
pyme/examples/genkey.py | 3 ++-
pyme/examples/sign.py | 3 ++-
pyme/examples/simple.py
 | 3 ++-
pyme/gpgme.i | 1 +
pyme/helpers.c | 1 +
pyme/helpers.h | 1 +
pyme/pyme/__init__.py | 1 +
pyme/pyme/aux.py | 1 +
pyme/pyme/callbacks.py | 1 +
pyme/pyme/constants/__init__.py | 2 ++
pyme/pyme/constants/data/__init__.py | 2 ++
pyme/pyme/constants/data/encoding.py | 1 +
pyme/pyme/constants/event.py | 1 +
pyme/pyme/constants/import.py | 1 +
pyme/pyme/constants/keylist/__init__.py | 2 ++
pyme/pyme/constants/keylist/mode.py | 1 +
pyme/pyme/constants/md.py | 1 +
pyme/pyme/constants/pk.py | 1 +
pyme/pyme/constants/protocol.py | 1 +
pyme/pyme/constants/sig/__init__.py | 2 ++
pyme/pyme/constants/sig/mode.py | 1 +
pyme/pyme/constants/sigsum.py | 1 +
pyme/pyme/constants/status.py | 1 +
pyme/pyme/constants/validity.py | 1
+
pyme/pyme/core.py | 1 +
pyme/pyme/errors.py | 1 +
pyme/pyme/util.py | 1 +
pyme/pyme/version.py | 2 ++
30 files changed, 39 insertions(+), 4 deletions(-)

```

commit b3b3712645332c5bc3e8d9d557aab21d48ff0f86

Author: belyi <devnull@localhost>

Date: Sun Mar 21 02:07:36 2004 +0000

Added Id: RCS tags to all files.

```

pyme-web/Makefile | 2 ++
pyme-web/index.html | 3 ++-
2 files changed, 4 insertions(+), 1 deletion(-)

```

commit 6aea2426beaaa8c43e6f2310a37a2737c0c3a1b5

Author: belyi <devnull@localhost>

Date: Sun Mar 21 01:50:55 2004 +0000

Update example on the init pyme.html page to match simple.py example.  
Fix core.py to use getcode() instead of getvalue() method of the exception.

pyme/pyme/\_\_init\_\_.py | 22 ++++++-----  
pyme/pyme/core.py | 4 +--  
2 files changed, 16 insertions(+), 10 deletions(-)

commit dee337455ffd624d3f83e1c159c4bb2cefc692c9  
Author: belyi <devnull@localhost>  
Date: Sat Mar 20 20:32:29 2004 +0000

Added Makefile to simplify publishing web files.

pyme-web/Makefile | 7 ++++++  
1 file changed, 7 insertions(+)

commit af7129baa8260697d85c2ddb434562e8a80b62d8  
Author: belyi <devnull@localhost>  
Date: Sat Mar 20 20:15:53 2004 +0000

Added minimum of formatting and SF icon.

pyme-web/index.html | 18 ++++++-----  
1 file changed, 11 insertions(+), 7 deletions(-)

commit 2e64dcbf99cee796b51667b04d8961e390edde87  
Author: belyi <devnull@localhost>  
Date: Sat Mar 20 18:30:09 2004 +0000

Initial revision

pyme-web/index.html | 33 ++++++-----  
1 file changed, 33 insertions(+)

commit 1c51644b3d0b6611422d971758e35f303d2ad5df  
Author: belyi <devnull@localhost>  
Date: Sat Mar 20 05:10:46 2004 +0000

Update examples and package information on the initial pyme doc page.

pyme/pyme/\_\_init\_\_.py | 27 ++++++-----  
1 file changed, 12 insertions(+), 15 deletions(-)

commit b2d31b0bfbffdf5247d6db4e3c95140cc1b1f19  
Author: belyi <devnull@localhost>  
Date: Sat Mar 20 04:47:42 2004 +0000



Deleted unnecessary files.

Updated debian/control to remove dependency on python-xml package since there's none now.

Move example files from 'doc' into separate control file.

Update debian/rules to build documentation from \*.py files and to exclude CVS directories from the installation.

```
pyme/Makefile | 26 ++-----
pyme/debian/control | 8 +--
pyme/debian/docs | 1 -
pyme/debian/ex.package.doc-base | 22 -----
pyme/debian/examples | 1 +
pyme/debian/manpage.1.ex | 60 -----
pyme/debian/manpage.sgml.ex | 152 -----
pyme/debian/rules | 12 ++--
8 files changed, 15 insertions(+), 267 deletions(-)
```

commit 1b517dd9b82a433499b4696b06d94d756cd36e53

Author: belyi <devnull@localhost>

Date: Sat Mar 20 02:59:15 2004 +0000

Remove doc/gpgme

directory containing GPGME documentation since this belongs  
to a different project. Need to add reference in our documentation.

```
pyme/doc/gpgme/fdl.texi | 402 -----
pyme/doc/gpgme/gpgme.texi | 3372 -----
pyme/doc/gpgme/gpl.texi | 397 -----
pyme/doc/gpgme/version.texi | 4 -
4 files changed, 4175 deletions(-)
```

commit 95d7d171da115a0fedfe2a4a7e5acc8aa408f673

Author: belyi <devnull@localhost>

Date: Sat Mar 20 02:45:03 2004 +0000

Change debian/rules to generate files by swig during build and to cleanup  
those files on 'clean' rule.

Plus, leave generated gpgme\_wrap.c in the root directory instead of moving  
it into subdirectory 'generated'.

```
pyme/Makefile | 8 +++-----
pyme/debian/rules | 3 ++-
pyme/setup.py | 2 +-
3 files changed, 6 insertions(+), 7 deletions(-)
```

commit 545b3d90d445c5c78e8d72b2c1780863e02c789a

Author: belyi <devnull@localhost>

## Initial revision

```

pyme/COPYING | 340 +++++
pyme/ChangeLog | 802 ++++++++
pyme/Makefile | 79 +
pyme/debian/README.Debian | 6 +
pyme/debian/changelog | 19 +
pyme/debian/control | 68 +
pyme/debian/copyright | 27 +
pyme/debian/dirs | 2 +
pyme/debian/docs | 2 +
pyme/debian/ex.package.doc-base | 22 +
pyme/debian/manpage.1.ex | 60 +
pyme/debian/manpage.sgml.ex | 152 ++
pyme/debian/postinst.ex | 48 +
pyme/debian/postrm.ex | 38 +
pyme/debian/preinst.ex | 44 +
pyme/debian/prerm.ex | 39 +
pyme/debian/rules | 130 ++
pyme/debian/setup.cfg-2.2 | 8 +
pyme/debian/setup.cfg-2.3 | 8 +
pyme/doc/gpgme/fdl.texi
 | 402 +++++
pyme/doc/gpgme/gpgme.texi | 3372 +++++++++++++++++++++++++++++++++++++
pyme/doc/gpgme/gpl.texi | 397 +++++
pyme/doc/gpgme/version.texi | 4 +
pyme/examples/encrypt-to-all.py | 63 +
pyme/examples/genkey.py | 55 +
pyme/examples/sign.py | 28 +
pyme/examples/simple.py | 44 +
pyme/gpgme.i | 191 ++
pyme/helpers.c | 139 ++
pyme/helpers.h | 29 +
pyme/pyme/__init__.py | 134 ++
pyme/pyme/aux.py | 55 +
pyme/pyme/callbacks.py | 45 +
pyme/pyme/constants/__init__.py | 2 +
pyme/pyme/constants/data/__init__.py | 2 +
pyme/pyme/constants/data/encoding.py | 19 +
pyme/pyme/constants/event.py | 19 +
pyme/pyme/constants/import.py | 19 +
pyme/pyme/constants/keylist/__init__.py
 | 2 +
pyme/pyme/constants/keylist/mode.py | 19 +
pyme/pyme/constants/md.py | 19 +
pyme/pyme/constants/pk.py | 19 +

```

```
pyme/pyme/constants/protocol.py | 19 +
pyme/pyme/constants/sig/__init__.py | 2 +
pyme/pyme/constants/sig/mode.py | 19 +
pyme/pyme/constants/sigsum.py | 19 +
pyme/pyme/constants/status.py | 19 +
pyme/pyme/constants/validity.py | 19 +
pyme/pyme/core.py | 367 +++++
pyme/pyme/errors.py | 46 +
pyme/pyme/util.py | 61 +
pyme/pyme/version.py | 39 +
pyme/setup.py | 60 +
53 files changed, 7642 insertions(+)
```

commit a3d5a442dc713b6c4d6fc4134db5b47e379dc41d

Author: root <devnull@localhost>

Date: Fri Mar 19 14:12:30 2004 +0000

initial checkin

```
CVSROOT/checkoutlist | 13 ++++++++
CVSROOT/commitinfo | 15 ++++++++
CVSROOT/config
| 21 ++++++++
CVSROOT/cvswrappers | 19 ++++++++
CVSROOT/editinfo | 21 ++++++++
CVSROOT/logininfo | 26 ++++++++
CVSROOT/modules | 26 ++++++++
CVSROOT/notify | 12 ++++++++
CVSROOT/rcsinfo | 13 ++++++++
CVSROOT/taginfo | 20 ++++++++
CVSROOT/verifymsg | 21 ++++++++
11 files changed, 207 insertions(+)
-----BEGIN PGP PUBLIC KEY BLOCK-----
```

```
mQENBFrsKEkBCADKw4Wt8J6M/88qD8PO6lSMCxH1cpwH8iK0uPaFFYsJkkXo7kWf
PTAtrV+REqF/o80dvYcdLvRsV21pvncZz/HXLu1yQ18mC3XObrKokbdgrTTKA5XE
BZkNsqyaMMJauT18H4hYkSg62/tTdO1cu/zWv/LFf7Xyn6+uA74ovXCJlO1s0N2c
PShtr98QRzPMf2owgVk37JnDNp4gGVDGHxSZOuUwxgYAZYnA8SFc+c+3ZrQfY870
+O4j3Mz4p7yD13AwP4buQLBsb/icxekeQCqpRjLH9f7MdEcGXa1x36RcEkHdu+M
yJ392eMgD+dKNfRCtyTPhjZTxvbNELIBYICfABEBAAG0EHRlc3RAZXhhbXBsZS5v
cmeJAVQEEwEIAD4WIQTUFzW5Ejb9uIEJFojAWNe7/DLBQUcWuwoSQIbAwUJA8Jn
AAULCQGhAgYVCgkICwIEFgIDAQIeAQIXgAAKCRAjAWNe7/DLBf9kB/wOQ/S60HGw
Fq07W9N01HWULyHhK0MmcHL6rfZ64oDqLxolPSasz7WAMW1jN4qtWJ0mFzwO83V6
kaBe+wF6Kqir6udFSBW9rPcFg6/VZXPlrT0a6uacIHq6DyQ5iMW4YQWbVY9OR2rN
GkYo1JCBR0XdRJYCSX3yB4TWv/eXnZ37/WjmiTOIZh35rjs+NuU/S5JPDfAp2/k7
0DevQeBsv+UjVXjWpNTZmPbvDnd995uSmC6UY4hzyP84ORYMYn9n1QAR0goxDN6U
unOf9Rlp1oMzdxMool/d1MiCsg2h3jheuhv7lgUF4KpvHOuEPXQ7UO417E0TYcDZ
1J8Nsv87SZeEuQENBFrsKEkBCADjoEBhG/QPqZHg8VyoD1xYRAWGxyDjKX/GrSs6
```

yE+x2hk5FoQCajxKa/d4AVxOnJpdwhAfeXeSNaql5Ejgzax+Tdj9BV6vtGVJVv0p  
O7bgAiZxkA6RHxtNqhpPnPQoXvUzkzpRgpuL+Nj4yIg7z1ITH6KQH4u5SI9vd+j/  
8i9Taz67pdZwuJjac8qBuJHjzAo1bjYctFYUSG5pbmMQyNLySzgiNkFa4DajODlt  
3RuqVGP316Fk+Sy2+60tC/HIX8jgMyMONfOGBQx6jk8tvAphS/LAqrrNepnagIyL  
UGKU+L8cB2g1PGGp2biBFWqZbudZoyRBet/0yH/zirBdQJw1ABEBAAGJATwEGAEI  
ACYWIQTUFzW5Ejb9uIIEjFojAWNe7/DLBQUcWuwoSQIbDAUJA8JnAAAKCRAjAWNe  
7/DLBf0pCACpP5hBuUWngu2Hqvg+tNiujsiYzId3MffFxEk3CbXeHcJ5F32NDJ9  
PYCnra4L8wSv+NZt9gIa8lFwoFSFQCjzH7KE86XcV3MhfdJTNb/+9CR7Jq3e/4Iy  
0N5ip7PNYMCyakcAsxvsNCJKrSaDuYe/OAoTXRBtgRWE2uyT315em02Lkr+2Cc/Q  
k6H+vlNOHGRgnpI/OZZjnUuUfBUvMGHr1phW+y7aeymC9PnUGdViRdJe23nntMSD  
A+0/I7ESO9JsWvJbyBmuiZpu9JjScOjYH9xpQLqRNyw4WHpZriN69F0t9Mmd7bM1  
+UyPgbPEr0iWMeyctYsuOLeUyQKMscDT  
=QyY6

-----END

PGP PUBLIC KEY BLOCK-----

\input texinfo @c -\* texinfo -\*

@c %\*\*start of header

@setfilename what-is-new.info

@settitle What's New in the GPGME Python Bindings and Documentation

@documentencoding utf-8

@documentlanguage en

@c %\*\*end of header

@finalout

@titlepage

@title What's New in the GPGME Python Bindings and Documentation

@author Ben McGinnes

@end titlepage

@contents

@ifnottex

@node Top

@top What's New in the GPGME Python Bindings and Documentation

@end ifnottex

@menu

\* What's New::

@detailmenu

--- The Detailed Node Listing ---

What's New

\* New in GPGME 1.13.0::

@end detailmenu

@end menu

@node What's New  
@chapter What's New

@multitable {aaaaaaaaaaaaaa} {aaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaa}  
@item Version:  
@tab 0.0.1  
@item GPGME Version:  
@tab 1.13.0  
@item Author:  
@tab Ben McGinnes <ben@@gnupg.org>  
@item Author GPG Key:  
@tab DB4724E6FA4286C92B4E55C4321E4E2373590E5D  
@item Language:  
@tab Australian English, British English  
@item xml:lang:  
@tab en-AU, en-GB, en  
@end multitable

Last time the most  
obviously new thing was adding the @emph{What's New}  
section to the HOWTO. Now it's moving it out of the HOWTO.

@menu  
\* New in GPGME 1130::  
@end menu

@node New in GPGME 1130  
@section New in GPGME 1130

Additions since GPGME 1.12.0 include:

@itemize  
@item  
Moving the @emph{What's New} section out of the basic @uref{gpgme-python-howto.org, HOWTO} document  
and  
into its own file so as to more readily include other documents  
beyond that HOWTO.  
@item  
Moving the preceding, archival, segments into @uref{what-was-new.org, another file}.  
@item  
Added @samp{gpg.version.versionintlist} to make it easier for Python  
developers to check for a specific version number, even with beta  
versions (it will drop the "-betaN" part).  
@item  
Added expanded detail on issues pertaining to installing for Windows  
users.  
@item

Bindings enter `@uref{maintenance-mode, maintenance mode}` from January, 2019.

@item

Added documentation on maintenance mode and what changes can be made to the code when in that status. Essentially that boils down to bug fixes only and no feature requests.

@item

The `import-keys-hkp.py` example script, which uses the `@samp{hkp4py}` module to search the SKS servers for a key, has been tightened up to search for both hexadecimal key IDs and user ID strings with reduced chance of unnecessary repetition. There may still be some repetition if a key includes a user ID matching the hexadecimal value of a key ID.

@end itemize

@bye

Using `gpgme.js`

-----

At first, make sure that the environment you want to use `gpgme.js` in has access and permissions for `nativeMessaging`, and `gpgme-json` installed. For details, see the README.

The library itself is started via the `{@link init}` method. This will test the `nativeMessaging` connection, and then resolve into an Object offering the top level API:

```
* [encrypt]{@link GpgME#encrypt}
* [decrypt]{@link GpgME#decrypt}
* [sign]{@link GpgME#sign}
* [verify]{@link GpgME#verify}
* [Keyring]{@link GPGME_Keyring}
```

```
...
```

```
gpgmejs.init()
 .then(function(GPGME) {
 // using GPGME
 }, function(error){
 // error handling;
 })
...
```

All methods that require communication with `nativeMessaging` are asynchronous, using Promises. Rejections will be instances of `{@link GPGME_Error}`.

An exception are Keys, which can be initialized in a 'sync' mode, allowing them to be cached and used synchronously until manually refreshed.

Keyring and Keys

-----  
The gnupg keys  
can be accessed via the [Keyring]{@link GPGME\_Keyring}.

The Keyring offers the methods for accessing information on all Keys known to gnupg.

**\*\*Due to security constraints, the javascript-binding currently only offers limited support for secret-Key interaction.\*\***

The existence of secret Keys is not secret, and those secret Keys can be used for signing, but Operations that may expose, modify or delete secret Keys are not supported.

```
* [getKeysArmored]{@link GPGME_Keyring#getKeysArmored}
* [getKeys]{@link GPGME_Keyring#getKeys}
* [getDefaultKey]{@link GPGME_Keyring#getDefaultKey}
* [generateKey]{@link GPGME_Keyring#generateKey}
* [deleteKey]{@link GPGME_Keyring#deleteKey}
;;; gpgme-grovel.lisp
```

```
;;; This file is part of GPGME-CL.
;;;
;;; GPGME-CL is free software; you can redistribute it and/or modify it
;;; under the terms of the GNU General Public License as published by
;;; the Free Software Foundation; either version 2 of the License, or
;;; (at your option) any later version.
;;;
;;; GPGME-CL is distributed in the hope that it will be useful, but
;;; WITHOUT ANY WARRANTY; without even the implied warranty of
;;; MERCHANTABILITY or FITNESS FOR A PARTICULAR PURPOSE. See the GNU
;;; Lesser General Public License for more details.
;;;
;;; You should have received a copy of the GNU General Public License
;;; along with GPGME; if not, write to the Free Software Foundation,
;;; Inc., 59 Temple Place - Suite 330, Boston, MA 02111-1307, USA.
```

(in-package :gpgme)

(include "errno.h" "sys/types.h")

(constant (+ebadf+ "EBADF"))

(ctype off-t "off\_t")

(ctype size-t "size\_t")

(ctype ssize-t "ssize\_t")

```
(cvar ("errno" *errno*) :int)
(21:protected-private-key(3:dsa(1:p129:_d8|po3s@!WGUOAXRC$_[8SN:y|o?2[.pVxn(kOc\Bk0zu&FnK)(1:q21:
vBeOP\P)(1:g129:fU/e(2hp@hjc2uE=Sg GO;ZkIyFnGM!GsG@
= _SZkII)(1:y128:K:9tA]4SU1 }sG`nZpx/imV^>A;V%?5!!sS{!=6@|
=d
)(9:protected25:openpgp-s2k3-sha1-aes-cbc((4:sha18:Li7:6452224)16:,kO{,.)80:z7OCG/sB48(H9%*ojSO
OGSma`YUs1h<_)(12:protected-at15:20130812T105134)))
```

For a list of the authors of the source code of GPGME, please see the file AUTHORS. The following people supported GPGME development in various ways (for example by finding bugs or giving advice), and we want to thank them for their help. If we forgot you, please let us know.

Adriaan de Groot     adridg@cs.kun.nl  
Albrecht Dre     albrecht.dress@arcor.de  
Alfons Hoogervorst     alfons@proteus.demon.nl  
Daniel Mueller     daniel@danm.de  
Enno Cramer     uebergeek@web.de  
Frank Heckenbach     frank@g-n-u.de  
Igor Belyi     gpgme@katehok.ac93.org  
Jan-Oliver Wagner     jan@intevation.de  
Johannes Poehlmann     jhp@caldera.de  
Jose C. Garca Sogo     jose@jaimedelamo.eu.org  
Leo Gaspard     ekleog@gmail.com  
Mark Mutz     mutz@kde.org  
Miguel Coca     mcoca@gnu.org  
Noel Torres     envite@rolamasao.org  
Patrick Spendrin     patrick.spendrin@kdab.com  
Stphane Corthsy     stephane@sente.ch  
Timo Schulz     twoday@freakmail.de  
Tommy Reynolds     reynolds@redhat.com  
W.  
Trevor King     wking@tremily.us

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This file is distributed in the hope that it will be useful, but WITHOUT ANY WARRANTY, to the extent permitted by law; without even the implied warranty of MERCHANTABILITY or FITNESS FOR A PARTICULAR PURPOSE.  
# This is a template. The dist target uses it to create the real file.  
Summary: GPGME - GnuPG Made Easy  
Name: gpgme  
Version: 1.13.1



```

Release: 1
URL: https://gnupg.org/gpgme.html
Source: https://www.gnupg.org/ftp/gcrypt/gpgme/%{name}-%{version}.tar.gz
Group: Development/Libraries
Copyright: GPL
BuildRoot: %{_tmppath}/%{name}-%{version}
BuildRequires: make
Prereq: /sbin/ldconfig /sbin/install-info
Requires: gnupg

%description
GnuPG Made Easy (GPGME) is a library designed to make access to GnuPG easier
for applications. It provides a High-Level Crypto API for encryption,
decryption, signing, signature verification and key management.

%prep
%setup -q

%build
CFLAGS="$RPM_OPT_FLAGS"; export CFLAGS
./configure --prefix=/usr
make

%install
rm -fr $RPM_BUILD_ROOT
mkdir -p $RPM_BUILD_ROOT
make install prefix=$RPM_BUILD_ROOT/usr infodir=$RPM_BUILD_ROOT%{_infodir}
rm -f $RPM_BUILD_ROOT%{_infodir}/dir

%clean
rm -fr $RPM_BUILD_ROOT
make distclean

%post
/sbin/ldconfig
/sbin/install-info %{_infodir}/gpgme.info.gz
%{_infodir}/dir
/sbin/install-info %{_infodir}/gpgme-python-howto.info.gz %{_infodir}/dir

%preun
if ["$1" = 0]; then
/sbin/install-info --delete %{_infodir}/gpgme.info.gz %{_infodir}/dir
/sbin/install-info --delete %{_infodir}/gpgme-python-howto.info.gz %{_infodir}/dir
fi

%postun
/sbin/ldconfig

```

```
%files
%defattr(-,root,root)
%doc COPYING COPYING.LESSER AUTHORS README INSTALL NEWS ChangeLog TODO THANKS
%attr(0755,root,root) %{_bindir}/gpgme-config
%attr(0755,root,root) %{_libdir}/*gpgme.so*
%attr(0755,root,root) %{_libdir}/*gpgme.la
%attr(0644,root,root) %{_libdir}/*gpgme.a
%{_includedir}/gpgme.h
%{_datadir}/aclocal/gpgme.m4
%{_infodir}/gpgme.info*
%{_infodir}/gpgme-python-howto.info*
```

```
%changelog
* Sat Aug 30 2003 Robert Schiele <rschiele@uni-mannheim.de>
- %{_infodir}/dir is not packaged, remove to prevent checking failure
* Mon Jul 01 2002 Wojciech Polak <polak@lodz.pdi.net>
- initial specfile release for GPGME.
```

```
EOF
-*- mode: org -*-
#+TITLE: GNU Privacy Guard (GnuPG) Made Easy Python Bindings HOWTO (English)
#+AUTHOR: Ben McGinnes
#+LATEX_COMPILER: xelatex
#+LATEX_CLASS: article
#+LATEX_CLASS_OPTIONS: [12pt]
#+LATEX_HEADER: \usepackage{xltextra}
#+LATEX_HEADER: \usepackage[margin=1in]{geometry}
#+LATEX_HEADER: \setmainfont[Ligatures={Common}]{Times New Roman}
#+LATEX_HEADER: \author{Ben McGinnes <ben@gnupg.org>}
```

\* Introduction

:PROPERTIES:

:CUSTOM\_ID: intro

:END:

```
Version:	0.1.5
GPGME Version:	1.13.0
Author:	Ben McGinnes <ben@gnupg.org>
Author GPG Key:	DB4724E6FA4286C92B4E55C4321E4E2373590E5D
Language:	Australian English, British English
Language codes:	en-AU, en-GB, en
```

This document provides basic instruction in how to use the GPGME Python bindings to programmatically leverage the GPGME library.

\*\* Python 2 versus Python

```
:PROPERTIES:
:CUSTOM_ID: py2-vs-py3
:END:
```

Though the GPGME Python bindings themselves provide support for both Python 2 and 3, the focus is unequivocally on Python 3 and specifically from Python 3.4 and above. As a consequence all the examples and instructions in this guide use Python 3 code.

Much of it will work with Python 2, but much of it also deals with Python 3 byte literals, particularly when reading and writing data. Developers concentrating on Python 2.7, and possibly even 2.6, will need to make the appropriate modifications to support the older string and unicode types as opposed to bytes.

There are multiple reasons for concentrating on Python 3; some of which relate to the immediate integration of these bindings, some of which relate to longer term plans for both GPGME and the python bindings and some of which relate to the impending EOL period for Python 2.7. Essentially, though, there is little value in tying the bindings to a version of the language which is a dead end and the advantages offered by Python 3 over Python 2 make handling the data types with which GPGME deals considerably easier.

#### **\*\* Examples**

```
:PROPERTIES:
:CUSTOM_ID: howto-python3-examples
:END:
```

All of the examples found in this document can be found as Python 3 scripts in the `=lang/python/examples/howto=` directory.

#### **\*\* Unofficial Drafts**

```
:PROPERTIES:
:CUSTOM_ID: unofficial-drafts
:END:
```

In addition to shipping with each release of GPGME, there is a section on locations to read or download `[[#draft-editions]][draft editions]` of this document from at the end of it. These are unofficial versions produced in between major releases.

#### **\*\* What's New**

```
:PROPERTIES:
:CUSTOM_ID: new-stuff
:END:
```

Full details of what is new are now available in the [\[\[file:what-is-new.org\]\]](file:what-is-new.org) [\[What's New\]](#) file and archives of the preceding /What's New/ sections are available in the [\[\[file:what-was-new\]\]](file:what-was-new) [\[What Was New\]](#) file.

\*\*\* New in GPGME 1130

```
:PROPERTIES:
:CUSTOM_ID:
new-stuff-1-13-0
:END:
```

See the [\[\[file:what-is-new#new-stuff-1-13-0\]\]](file:what-is-new#new-stuff-1-13-0) [\[What's New\]](#) document for what is new in version 1.13.0.

\*\*\* New in GPGME 1120

```
:PROPERTIES:
:CUSTOM_ID: new-stuff-1-12-0
:END:
```

See the [\[\[file:what-was-new#new-stuff-1-12-0\]\]](file:what-was-new#new-stuff-1-12-0) [\[What Was New\]](#) document for what was new in version 1.12.0.

\* GPGME Concepts

```
:PROPERTIES:
:CUSTOM_ID: gpgme-concepts
:END:
```

\*\* A C API

```
:PROPERTIES:
:CUSTOM_ID: gpgme-c-api
:END:
```

Unlike many modern APIs with which programmers will be more familiar with these days, the GPGME API is a C API. The API is intended for use by C coders who would be able to access its features by including the `=gpgme.h=` header file with their own C source code and then access its functions just as they would any other C headers.

This is a very effective method of gaining complete access to the API and in the most efficient manner possible. It does, however, have the drawback that it cannot be directly used by other languages without some

means of providing an interface to those languages. This is where the need for bindings in various languages stems.

**\*\* Python bindings**

:PROPERTIES:

:CUSTOM\_ID: gpgme-python-bindings

:END:

The Python bindings for GPGME provide a higher level means of accessing the complete feature set of GPGME itself. It also provides a more pythonic means of calling these API functions.

The bindings are generated dynamically with SWIG and the copy of =gpgme.h= generated when GPGME is compiled.

This means that a version of the Python bindings is fundamentally tied to the exact same version of GPGME used to generate that copy of =gpgme.h=.

**\*\* Difference between the Python bindings and other GnuPG Python packages**

:PROPERTIES:

:CUSTOM\_ID: gpgme-python-bindings-diffs

:END:

There have been numerous attempts to add GnuPG support to Python over the years. Some of the most well known are listed here, along with what differentiates them.

**\*\*\* The python-gnupg package maintained**

by Vinay Sajip

:PROPERTIES:

:CUSTOM\_ID: diffs-python-gnupg

:END:

This is arguably the most popular means of integrating GPG with Python. The package utilises the =subprocess= module to implement wrappers for the =gpg= and =gpg2= executables normally invoked on the command line (=gpg.exe= and =gpg2.exe= on Windows).

The popularity of this package stemmed from its ease of use and capability in providing the most commonly required features.

Unfortunately it has been beset by a number of security issues in the past; most of which stemmed from using unsafe methods of accessing the command line via the =subprocess= calls. While some effort has been

made over the last two to three years (as of 2018) to mitigate this, particularly by no longer providing shell access through those subprocess calls, the wrapper is still somewhat limited in the scope of its GnuPG features coverage.

The python-gnupg package is available under the MIT license.

```
*** The gnupg package created
and maintained by Isis Lovecruft
:PROPERTIES:
:CUSTOM_ID: diffs-isis-gnupg
:END:
```

In 2015 Isis Lovecruft from the Tor Project forked and then re-implemented the python-gnupg package as just gnupg. This new package also relied on subprocess to call the `=gpg=` or `=gpg2=` binaries, but did so somewhat more securely.

The naming and version numbering selected for this package, however, resulted in conflicts with the original python-gnupg and since its functions were called in a different manner to python-gnupg, the release of this package also resulted in a great deal of consternation when people installed what they thought was an upgrade that subsequently broke the code relying on it.

The gnupg package is available under the GNU General Public License version 3.0 (or any later version).

```
*** The PyME package maintained by Martin Albrecht
:PROPERTIES:
:CUSTOM_ID: diffs-pyme
:END:
```

This package is the origin of these bindings, though they are somewhat different now.

For details of when and how the PyME package was folded back into GPGME itself see the [\[\[file:short-history.org\]\]](http://file:short-history.org) [\[Short History\]](#) document.<sup>[fn:1]</sup>

The PyME package was first released in 2002 and was also the first attempt to implement a low level binding to GPGME. In doing so it provided access to considerably more functionality than either the `=python-gnupg=` or `=gnupg=` packages.

The PyME package is only available for Python 2.6 and 2.7.

Porting the PyME package to Python 3.4 in 2015 is what resulted in it

being folded into the GPGME project and the current bindings are the end result of that effort.

The PyME package is available under the same dual licensing as GPGME itself: the GNU General Public License version 2.0 (or any later version) and the GNU Lesser General Public License version 2.1 (or any later version).

\* GPGME Python bindings installation

:PROPERTIES:

:CUSTOM\_ID: gpgme-python-install

:END:

\*\* No PyPI

:PROPERTIES:

:CUSTOM\_ID: do-not-use-pypi

:END:

Most

third-party Python packages and modules are available and distributed through the Python Package Installer, known as PyPI.

Due to the nature of what these bindings are and how they work, it is infeasible to install the GPGME Python bindings in the same way.

This is because the bindings use SWIG to dynamically generate C bindings against `gpgme.h` and `gpgme.h` is generated from `gpgme.h.in` at compile time when GPGME is built from source. Thus to include a package in PyPI which actually built correctly would require either statically built libraries for every architecture bundled with it or a full implementation of C for each architecture.

See the additional notes regarding [\[#snafu-ccfi\]\[CFFI and SWIG\]](#) at the end of this section for further details.

\*\* Requirements

:PROPERTIES:

:CUSTOM\_ID: gpgme-python-requirements

:END:

The GPGME Python bindings only have three requirements:

1. A suitable version of Python 2 or Python 3. With Python 2 that means CPython

- 2.7 and with Python 3 that means CPython 3.4 or higher.
2. [\[\[https://www.swig.org\]\]](https://www.swig.org)[SWIG]].
3. GPGME itself. Which also means that all of GPGME's dependencies must be installed too.

#### \*\*\* Recommended Additions

```
:PROPERTIES:
:CUSTOM_ID: gpgme-python-recommendations
:END:
```

Though none of the following are absolute requirements, they are all recommended for use with the Python bindings. In some cases these recommendations refer to which version(s) of CPython to use the bindings with, while others refer to third party modules which provide a significant advantage in some way.

1. If possible, use Python 3 instead of 2.
2. Favour a more recent version of Python since even 3.4 is due to reach EOL soon. In production systems and services, Python 3.6 should be robust enough to be relied on.
3. If possible add the following Python modules which are not part of the standard library: [\[\[http://docs.python-requests.org/en/latest/index.html\]\]](http://docs.python-requests.org/en/latest/index.html)[Requests]], [\[\[https://cython.org/\]\]](https://cython.org/)[Cython]], [\[\[https://pendulum.eustace.io/\]\]](https://pendulum.eustace.io/)[Pendulum]] and [\[\[https://github.com/Selfnet/hkp4py\]\]](https://github.com/Selfnet/hkp4py)[hkp4py]].

Chances are quite high that at least the first one and maybe two of those will already be installed.

Note that, as with Cython, some of advanced use case scenarios will bring with them additional requirements. Most of these will be fairly well known and commonly installed ones, however, which are in many cases likely to have already been installed on many systems or be familiar to Python programmers.

#### \*\* Installation

```
:PROPERTIES:
:CUSTOM_ID: installation
:END:
```

Installing the Python bindings is effectively achieved by compiling and installing GPGME itself.

Once SWIG is installed with Python and all the dependencies for GPGME are installed you only need to confirm that the version(s) of Python you want the bindings installed for are in your `=PATH=`.



By default GPGME will attempt to install the bindings for the most recent or highest version number of Python 2 and Python

3 it detects

in `$PATH`. It specifically checks for the `=python=` and `=python3=` executables first and then checks for specific version numbers.

For Python 2 it checks for these executables in this order: `=python=`, `=python2=` and `=python2.7=`.

For Python 3 it checks for these executables in this order: `=python3=`, `=python3.7=`, `=python3.6=`, `=python3.5=` and `=python3.4=`.<sup>[fn:2]</sup>

On systems where `=python=` is actually `=python3=` and not `=python2=` it may be possible that `=python2=` may be overlooked, but there have been no reports of that actually occurring as yet.

In the three months or so since the release of Python 3.7.0 there has been extensive testing and work with these bindings with no issues specifically relating to the new version of Python or any of the new features of either the language or the bindings. This has also been the case with Python 3.7.1rc1. With that in mind and given the release of Python 3.7.1 is scheduled for around the same time as GPGME 1.12.0, the order of preferred

Python versions has been changed to move Python 3.7 ahead of Python 3.6.

#### \*\*\* Installing GPGME

```
:PROPERTIES:
:CUSTOM_ID: install-gpgme
:END:
```

See the GPGME `=README=` file for details of how to install GPGME from source.

#### \*\* Known Issues

```
:PROPERTIES:
:CUSTOM_ID: snafu
:END:
```

There are a few known issues with the current build process and the Python bindings. For the most part these are easily addressed should they be encountered.

#### \*\*\* Breaking Builds

```
:PROPERTIES:
:CUSTOM_ID: snafu-a-swig-of-this-builds-character
:END:
```

Occasionally when installing GPGME with the Python bindings included it may be observed that the `=make=` portion of that process induces a large very number of warnings and, eventually errors which end that part of the build process. Yet following that with `=make check=` and `=make install=` appears to work seamlessly.

The cause of this is related to the way SWIG needs to be called to dynamically generate the C bindings for GPGME in the first place. So the entire process will always produce `=lang/python/python2-gpg/=` and `=lang/python/python3-gpg/=` directories. These should contain the build output generated during compilation, including the complete bindings and module installed into `=site-packages=`.

Occasionally the errors in the early part or some other conflict (e.g. not installing as `*/root/*` or `*/su/*`) may result in nothing being installed to the relevant `=site-packages=` directory and the build directory missing a lot of expected files. Even when this occurs, the solution is actually quite simple and will always work.

That solution is simply to run the following commands as either the `*root*` user or prepended with `=sudo -H=[fn:3]` in the `=lang/python/=` directory:

```
#+BEGIN_SRC shell
/path/to/pythonX.Y setup.py build
/path/to/pythonX.Y setup.py build
/path/to/pythonX.Y setup.py install
#+END_SRC
```

Yes, the build command does need to be run twice. Yes, you still need to run the potentially failing or incomplete steps during the `=configure=`, `=make=` and `=make install=` steps with installing GPGME. This is because those steps generate a lot of essential files needed, both by and in order to create, the bindings (including both the `=setup.py=` and `=gpgme.h=` files).

```
**** IMPORTANT Note
:PROPERTIES:
:CUSTOM_ID: snafu-swig-build-note
:END:
```

If specifying a selected number of languages to create bindings for, try to leave Python last. Currently the majority of the other language bindings are also preceding Python of either version when listed alphabetically (not counting the Qt bindings).

If Python is set to precede one of the other languages then it is possible that the errors described here may interrupt the build process before generating bindings for those other languages. In these cases it may be preferable to configure all preferred language bindings separately with alternative `=configure=` steps for GPGME using the `--enable-languages=$LANGUAGE=` option.

Alternatively

`=make=` (or `=gmake=`, depending on your platform) may be run with the `=-k=` option, which tells make to keep going even if errors are encountered. In that case the failure of one language's set of bindings to build should not hamper another language's bindings to build.

\*\*\* Reinstalling Responsibly

:PROPERTIES:

:CUSTOM\_ID: snafu-lessons-for-the-lazy

:END:

Regardless of whether you're installing for one version of Python or several, there will come a point where reinstallation is required. With most Python module installations, the installed files go into the relevant site-packages directory and are then forgotten about. Then the module is upgraded, the new files are copied over the old and that's the end of the matter.

While the same is true of these bindings, there have been intermittent issues observed on some platforms which have benefited significantly from removing all the previous installations of the bindings before installing the updated versions.

Removing

the previous version(s) is simply a matter of changing to the relevant `=site-packages=` directory for the version of Python in question and removing the `=gpg/=` directory and any accompanying egg-info files for that module.

In most cases this will require root or administration privileges on the system, but the same is true of installing the module in the first place.

### \*\*\* Multiple installations

```
:PROPERTIES:
:CUSTOM_ID: snafu-the-full-monty
:END:
```

For a variety of reasons it may be either necessary or just preferable to install the bindings to alternative installed Python versions which meet the requirements of these bindings.

On POSIX systems this will generally be most simply achieved by running the manual installation commands (build, build, install) as described in the previous section for each Python installation the bindings need to be installed to.

As per the SWIG documentation: the compilers, libraries and runtime used to build GPGME and the Python Bindings *must* match those used to compile Python itself, including the version number(s) (at least going by major version numbers and probably minor numbers too).

On most POSIX systems, including OS X, this will very likely be the case in most, if not all, cases.

Note that from GPGME [<https://dev.gnupg.org/rMff6ff616aea6f59b7f2ce1176492850ecdf3851e>][1.12.1]] the default installation installs to each version of Python it can find first. That is that it will currently install for the first copies of Python versions 2.7, 3.4, 3.5, 3.6, 3.7 and 3.8 (dev branch) that it finds. Usually this will be in the same prefix as GPGME itself, but is dictated by the `=$PATH=` when the installation is performed. The above instructions can still be performed on other python installations which the installer does not find, including alternative prefixes.

### \*\*\* Won't Work With Windows

```
:PROPERTIES:
:CUSTOM_ID: snafu-runtime-not-funtime
:END:
```

There are semi-regular reports of Windows users having considerable difficulty in installing and using the Python bindings at all. Very often, possibly even always, these reports come from Cygwin users and/or MinGW users and/or Msys2 users. Though not all of them have been confirmed, it appears that these reports have also come from people who installed Python using the Windows installer files from the [<https://python.org>][Python website]] (i.e. mostly MSI installers, sometimes self-extracting

=.exe= files).

The Windows versions of Python are not built using Cygwin, MinGW or Msys2; they're built using Microsoft Visual Studio. Furthermore the version used is /considerably/ more advanced than the version which MinGW obtained a small number of files from many years ago in order to be able to compile anything at all. Not only that, but there are changes to the version of Visual Studio between some micro releases, though that is particularly the case with Python 2.7, since it has been kept around far longer than it should have been.

There  
are two theoretical solutions to this issue:

1. Compile and install the GnuPG stack, including GPGME and the Python bindings using the same version of Microsoft Visual Studio used by the Python Foundation to compile the version of Python installed.

If there are multiple versions of Python then this will need to be done with each different version of Visual Studio used for those versions of Python.

2. Compile and install Python using the same tools used by choice, such as MinGW or Msys2.

Do *\*not\** use the official Windows installer for Python unless following the first method.

In this type of situation it may even be for the best to accept that there are less limitations on permissive software than free software and simply opt to use a recent version of the Community Edition of Microsoft Visual Studio to compile and build all of it, no matter what.

Investigations into the extent or the limitations of this issue are ongoing.

The following table lists  
the version of Microsoft Visual Studio which  
needs to be used when compiling GPGME and the Python bindings with  
each version of the CPython binary released [<https://www.python.org/downloads/windows/>][for Windows]:

| CPython | Microsoft product name | runtime filename |  |
|---------|------------------------|------------------|--|
| 2.7.6   | Visual Studio 2008     | MSVCR90.DLL      |  |
| 3.4.0   | Visual Studio 2010     | MSVCR100.DLL     |  |
| 3.5.0   | Visual Studio 2015     | *see below*      |  |
| 3.6.0   | Visual Studio 2015     | *see below*      |  |

It is important to note that MingW and Msys2 ship with the Visual C runtime from Microsoft Visual Studio 2005 and are thus *\*incompatible\** with all the versions of CPython which can be used with the GPGME Python bindings.

It is also important to note that from CPython 3.5 onwards, the Python Foundation has adopted the reworking of the Visual C runtime which was performed for Visual Studio 2015 and aimed at resolving many of these kinds of issues.

Much greater detail on these issues and the correct file(s) to link to are available from Matthew Brett's invaluable page, [\[\[https://matthew-brett.github.io/pydagogue/python\\_msvc.html\]\]](https://matthew-brett.github.io/pydagogue/python_msvc.html) [\[\[Using Microsoft Visual C with Python\]\]](#). It is also worth reading the Microsoft Developer Network blog post on [\[\[http://blogs.msdn.com/b/vcblog/archive/2015/03/03/introducing-the-universal-crt.aspx\]\]](http://blogs.msdn.com/b/vcblog/archive/2015/03/03/introducing-the-universal-crt.aspx) [\[the universal CRT\]](#) and Steve Dower's blog posts on Python extensions ([\[\[http://stevedower.id.au/blog/building-for-python-3-5\]\]](http://stevedower.id.au/blog/building-for-python-3-5) [\[part 1\]](#) and [\[\[http://stevedower.id.au/blog/building-for-python-3-5-part-two\]\]](http://stevedower.id.au/blog/building-for-python-3-5-part-two) [\[part 2\]](#)).

The second of those two posts by Steve Dower contains the details of specific configuration options required for compiling anything to be used with official CPython releases. In addition to those configuration and compiler settings to use, the versions of Visual Studio prior to Visual Studio 2015 did not support 64-bit systems by default. So compiling a 64-bit version of these bindings for a 64-bit version of CPython 2.7 or 3.4 requires additional work.

In addition to the blog posts, the [\[\[https://wiki.python.org/moin/WindowsCompilers\]\]](https://wiki.python.org/moin/WindowsCompilers) [\[Windows compilers\]](#) wiki page on the CPython wiki is another essential reference on the relevant versions of Visual Studio to use and the degree of compatibility with CPython releases.

Eventually someone will ask why there isn't an installable binary for Windows, which the GPGME of the licenses do not preclude as long as the source code is available in conjunction with such a release.

The sheer number of versions of Visual Studio in conjunction with differing configuration options depending on the target Windows version and whether the architecture is 64-bit or 32-bit makes it difficult to provide a correct binary installer for Windows users. At the bare minimum doing so would require the GnuPG project compile ten different versions of the bindings with each release; both 32-bit and 64-bit versions for CPython 2.7 and 3.4, with 64-bit versions for both x86-64 (i.e. Intel and AMD) and ARM architectures for CPython 3.5,

3.6, 3.7 and later releases. That's the bare \*minimum\*, it'd probably be higher.

Additionally, with only a binary installation used in conjunction with the CPython installer from `=python.org=` the advanced options available which utilise `[[#cython]][Cython]]` will not be able to be used at all. Cython depends on being able to compile the C code it generates and that too would need to utilise a matching runtime to both the installed version of CPython and these bindings in order to work with the bindings.

Considering all of that, what do we recommend?

1. Use a recent version of CPython; at least 3.5, but ideally 3.6 or later.
2. Use Visual Studio 2015 or the standalone build tools for Visual Studio 2017 (or later).
3. Compile both CPython and GPGME with these bindings using the tools selected in step 2.
4. Ignore MingW, Msys2 and the official CPython binary installers.
5. Be thankful  
the answer to this question wasn't simply to say  
something like, install Linux or install FreeBSD (or even  
Apple's OS X).

```
*** CFFI is the Best and GPGME should use it instead of SWIG
:PROPERTIES:
:CUSTOM_ID: snafu-cffi
:END:
```

There are many reasons for favouring `[[https://cffi.readthedocs.io/en/latest/overview.html]][CFFI]]` and proponents of it are quite happy to repeat these things as if all it would take to switch from SWIG to CFFI is repeating that list as if it were a new concept.

The fact is that there are things which Python's CFFI implementation cannot handle in the GPGME C code. Beyond that there are features of SWIG which are simply not available with CFFI at all. SWIG generates the bindings to Python using the `=gpgme.h=` file, but that file is not a single version shipped with each release, it too is generated when GPGME is compiled.

CFFI is currently unable to adapt to such a potentially mutable codebase. If there were some means of applying SWIG's

dynamic code generation to produce the Python/CFFI API modes of accessing the GPGME libraries (or the source source code directly), but such a thing does not exist yet either and it currently appears that work is needed in at least one of CFFI's dependencies before any of this can be addressed.

So if you're a massive fan of CFFI; that's great, but if you want this project to switch to CFFI then rather than just insisting that it should, I'd suggest you volunteer to bring CFFI up to the level this project needs.

If you're actually seriously considering doing so, then I'd suggest taking the `=gpgme-tool.c=` file in the GPGME `=src/=` directory and getting that to work with any of the CFFI API methods (not the ABI methods, they'll work with pretty much anything). When you start running into trouble with "ifdefs" then you'll know what sort of things are lacking. That doesn't even take into account the amount of work saved via SWIG's code generation techniques either.

```
*** Virtualised
Environments
:PROPERTIES:
:CUSTOM_ID: snafu-venv
:END:
```

It is fairly common practice amongst Python developers to, as much as possible, use packages like `virtualenv` to keep various things that are to be installed from interfering with each other. Given how much of the GPGME bindings is often at odds with the usual pythonic way of doing things, it stands to reason that this would be called into question too.

As it happens the answer as to whether or not the bindings can be used with `virtualenv`, the answer is both yes and no.

In general we recommend installing to the relevant path and matching prefix of GPGME itself. Which means that when GPGME, and ideally the rest of the GnuPG stack, is installed to a prefix like `=/usr/local=` or `=/opt/local=` then the bindings would need to be installed to the main Python installation and not a virtualised abstraction. Attempts to separate the two in the past have been known to cause weird and intermittent errors ranging from minor annoyances to complete failures in the build process.

As a consequence we only recommend building with and installing to the



main Python installations within the same prefix as GPGME is installed to or which are found by GPGME's configuration stage immediately prior to running the make commands. Which is exactly what the compiling and installing process of GPGME does by default.

Once that is done, however, it appears that a copy of the compiled module may be installed into a virtualenv of the same major and minor version matching the build. Alternatively it is possible to utilise a `=sites.pth=` file in the `=site-packages/=` directory of a virtualenv installation, which links back to the system installations corresponding directory in order to import anything installed system wide. This may or may not be appropriate on a case by case basis.

Though extensive testing of either of these options is not yet complete, preliminary testing of them indicates that both are viable as long as the main installation is complete. Which means that certain other options normally restricted to virtual environments are also available, including integration with pythonic test suites (e.g. [\[\[https://docs.pytest.org/en/latest/index.html\]\]](https://docs.pytest.org/en/latest/index.html)`[[pytest]]`) and other large projects.

That said, it is worth reiterating the warning regarding non-standard installations. If one were to attempt to install the bindings only to a virtual environment without somehow also including the full GnuPG stack (or enough of it as to include GPGME) then it is highly likely that errors would be encountered at some point and more than a little likely that the build process itself would break.

If a degree of separation from the main operating system is still required in spite of these warnings, then consider other forms of virtualisation. Either a virtual machine (e.g. [\[\[https://www.virtualbox.org/\]\]](https://www.virtualbox.org/)`[[VirtualBox]]`), a hardware emulation layer (e.g. [\[\[https://www.qemu.org/\]\]](https://www.qemu.org/)`[[QEMU]]`) or an application container (e.g. [\[\[https://www.docker.com/why-docker\]\]](https://www.docker.com/why-docker)`[[Docker]]`).

Finally it should be noted that the limited tests conducted thus far have been using the `=virtualenv=` command in a new directory to create the virtual python environment. As opposed to the standard `=python3 -m venv=` and it is possible that this will make a difference depending on the system and version of Python in use. Another option is to run the command `=python3 -m virtualenv /path/to/install/virtual/thingy=` instead.

```
*** Post installation
:PROPERTIES:
:CUSTOM_ID: snafu-docs
:END:
```

Following installation it is recommended to move the `=post_installer.py=` script from the `=lang/python/examples/howto/=` directory to the `=lang/python/=` directory and run it. This will fix or restore files needed by Sphinx which may be removed during a distribution build for release. It will also generate reST files from Org mode files with Pandoc and generate Texinfo files from Org mode files with GNU Emacs and Org mode (in batch mode). Additionally it will fix the UTF-8 declaration line in the Texinfo files (Emacs expects "UTF-8" to be "utf-8").

\* Fundamentals

:PROPERTIES:

:CUSTOM\_ID: howto-fund-a-mental

:END:

Before we can get to the fun stuff, there are a few matters regarding GPGME's design which hold true whether you're dealing with the C code directly or these Python bindings.

\*\* No REST

:PROPERTIES:

:CUSTOM\_ID: no-rest-for-the-wicked

:END:

The first part of which is or will be fairly blatantly obvious upon viewing the first example, but it's worth reiterating anyway. That being that this API is *not* a REST API. Nor indeed could it ever be one.

Most, if not all, Python programmers (and not just Python programmers) know how easy it is to work with a RESTful API. In fact they've become so popular that many other APIs attempt to emulate REST-like behaviour as much as they are able. Right down to the use of JSON formatted output to facilitate the use of their API without having to retrain developers.

This

API does not do that. It would not be able to do that and also provide access to the entire C API on which it's built. It does, however, provide a very pythonic interface on top of the direct bindings and it's this pythonic layer that this HOWTO deals with.

\*\* Context

```
:PROPERTIES:
:CUSTOM_ID: howto-get-context
:END:
```

One of the reasons which prevents this API from being RESTful is that most operations require more than one instruction to the API to perform the task. Sure, there are certain functions which can be performed simultaneously, particularly if the result known or strongly anticipated (e.g. selecting and encrypting to a key known to be in the public keybox).

There are many more, however, which cannot be manipulated so readily: they must be performed in a specific sequence and the result of one operation has a direct bearing on the outcome of subsequent operations. Not merely by generating an error either.

When dealing with this type of persistent state on the web, full of both the RESTful and REST-like, it's most commonly referred to as a session. In GPGME, however, it is called a context and every operation type has one.

#### \* Working with keys

```
:PROPERTIES:
:CUSTOM_ID: howto-keys
:END:
```

#### \*\* Key selection

```
:PROPERTIES:
:CUSTOM_ID: howto-keys-selection
:END:
```

Selecting keys to encrypt to or to sign with will be a common occurrence when working with GPGMe and the means available for doing so are quite simple.

They do depend on utilising a Context; however once the data is recorded in another variable, that Context does not need to be the same one which subsequent operations are performed.

The easiest way to select a specific key is by searching for that key's key ID or fingerprint, preferably the full fingerprint without any spaces in it. A long key ID will probably be okay, but is not advised and short key IDs are already a problem with some being generated to match specific patterns. It does not matter whether

the  
pattern is upper or lower case.

So this is the best method:

```
#+BEGIN_SRC python -i
import gpg

k = gpg.Context().keylist(pattern="258E88DCBD3CD44D8E7AB43F6ECB6AF0DEADBEEF")
keys = list(k)
#+END_SRC
```

This is passable and very likely to be common:

```
#+BEGIN_SRC python -i
import gpg

k = gpg.Context().keylist(pattern="0x6ECB6AF0DEADBEEF")
keys = list(k)
#+END_SRC
```

And this is a really bad idea:

```
#+BEGIN_SRC python -i
import gpg

k = gpg.Context().keylist(pattern="0xDEADBEEF")
keys = list(k)
#+END_SRC
```

Alternatively it may be that the intention is to create a list of keys  
which all match a particular search string. For instance all the  
addresses at a particular domain, like this:

```
#+BEGIN_SRC python -i
import gpg

ncsc = gpg.Context().keylist(pattern="ncsc.mil")
nsa = list(ncsc)
#+END_SRC
```

```
*** Counting keys
:PROPERTIES:
:CUSTOM_ID: howto-keys-counting
:END:
```

Counting the number of keys in your public keybox (=pubring.kbx=), the

format which has superseded the old keyring  
format (=pubring.gpg= and  
=secring.gpg=), or the number of secret keys is a very simple task.

```
#+BEGIN_SRC python -i
import gpg

c = gpg.Context()
seckeys = c.keylist(pattern=None, secret=True)
pubkeys = c.keylist(pattern=None, secret=False)

seclist = list(seckeys)
secnum = len(seclist)

publist = list(pubkeys)
pubnum = len(publist)

print("""
Number of secret keys: {0}
Number of public keys: {1}
""".format(secnum, pubnum))
#+END_SRC
```

NOTE: The `[[#cython][Cython]]` introduction in the `[[#advanced-use][Advanced and Experimental]]` section uses this same key counting code with Cython to demonstrate some areas where Cython can improve performance even with the bindings. Users with large public keyrings or keyboxes, for instance, should consider these options if they are comfortable with using Cython.

```
** Get key
:PROPERTIES:
:CUSTOM_ID: howto-get-key
:END:
```

An alternative method of getting a single key via its fingerprint is available directly within a Context with `=Context().get_key=`.

This is the preferred method of selecting a key in order to modify it, sign or certify it and for obtaining relevant data about a single key as a part of other functions; when verifying a signature made by that key, for instance.

By default this method will select public keys, but it can select secret keys as well.

This first example demonstrates selecting the current key of Werner

Koch, which is due to expire at the end of 2018:

```
#+BEGIN_SRC python -i
import gpg

fingerprint = "80615870F5BAD690333686D0F2AD85AC1E42B367"
key = gpg.Context().get_key(fingerprint)
#+END_SRC
```

Whereas this example demonstrates selecting the author's current key with the `=secret=` key word argument set to `=True=`:

```
#+BEGIN_SRC python -i
import gpg

fingerprint = "DB4724E6FA4286C92B4E55C4321E4E2373590E5D"
key = gpg.Context().get_key(fingerprint, secret=True)
#+END_SRC
```

It is, of course, quite possible to select expired, disabled and revoked keys with this function, but only to effectively display information about those keys.

It is also possible to use both unicode or string literals and byte literals with the fingerprint when getting a key in this way.

```
** Importing keys
:PROPERTIES:
:CUSTOM_ID: howto-import-key
:END:
```

Importing keys is possible with the `=key_import()=` method and takes one argument which is a bytes literal object containing either the binary or ASCII armoured key data for one or more keys.

The following example retrieves one or more keys from the SKS keyserver via the web using the requests module. Since requests returns the content as a bytes literal object, we can then use that directly to import the resulting data into our keybox.

```
#+BEGIN_SRC python -i
import gpg
import os.path
import requests

c = gpg.Context()
```

```

url = "https://sks-keyservers.net/pks/lookup"
pattern = input("Enter the pattern to search for key or user IDs: ")
payload = {"op": "get", "search": pattern}

r = requests.get(url, verify=True, params=payload)
result = c.key_import(r.content)

if
 result is not None and hasattr(result, "considered") is False:
 print(result)
 elif result is not None and hasattr(result, "considered") is True:
 num_keys = len(result.imports)
 new_revs = result.new_revocations
 new_sigs = result.new_signatures
 new_subs = result.new_sub_keys
 new_uids = result.new_user_ids
 new_scert = result.secret_imported
 nochange = result.unchanged
 print("""
The total number of keys considered for import was: {0}

 Number of keys revoked: {1}
 Number of new signatures: {2}
 Number of new subkeys: {3}
 Number of new user IDs: {4}
 Number of new secret keys: {5}
 Number of unchanged keys: {6}

The key IDs for all considered keys were:
""").format(num_keys, new_revs, new_sigs, new_subs, new_uids, new_scert,
 nochange))
 for i in range(num_keys):
 print("{0}\n".format(result.imports[i].fpr))
 else:
 pass
#+END_SRC

```

NOTE: When searching for a key ID of any length or a fingerprint (without spaces), the SKS servers require the the leading =0x= indicative of hexadecimal be included. Also note that the old short key IDs (e.g. =0xDEADBEEF=) should no longer be used due to the relative ease by which such key IDs can be reproduced, as demonstrated by the Evil32 Project in 2014 (which was subsequently exploited in 2016).

Testing for whether a string in any given search is or may be a hexadecimal value which may be missing the leading =0x= is a simple

matter of using a try/except statement which attempts to convert the string as hex to an integer and then back to hex; then using that to search with. Raising a ValueError simply results in treating the string as a string. This is the method and logic utilised in the =import-keys-hkp.py= script (see below).

\*\*\* Working with ProtonMail

```
:PROPERTIES:
:CUSTOM_ID: import-protonmail
:END:
```

Here is a variation on the example above which checks the constrained ProtonMail keyserver for ProtonMail public keys.

```
#+BEGIN_SRC
python -i
import gpg
import requests
import sys

print("""
This script searches the ProtonMail key server for the specified key and
imports it.
""")

c = gpg.Context(armor=True)
url = "https://api.protonmail.ch/pks/lookup"
ksearch = []

if len(sys.argv) >= 2:
 keyterm = sys.argv[1]
else:
 keyterm = input("Enter the key ID, UID or search string: ")

if keyterm.count("@") == 2 and keyterm.startswith("@") is True:
 ksearch.append(keyterm[1:])
 ksearch.append(keyterm[1:])
 ksearch.append(keyterm[1:])
elif keyterm.count("@") == 1 and keyterm.startswith("@") is True:
 ksearch.append("{0}@protonmail.com".format(keyterm[1:]))
 ksearch.append("{0}@protonmail.ch".format(keyterm[1:]))
 ksearch.append("{0}@pm.me".format(keyterm[1:]))
elif keyterm.count("@") == 0:
 ksearch.append("{0}@protonmail.com".format(keyterm))
 ksearch.append("{0}@protonmail.ch".format(keyterm))
 ksearch.append("{0}@pm.me".format(keyterm))
elif keyterm.count("@") == 2 and keyterm.startswith("@")
```



```

is False:
 uidlist = keyterm.split("@")
 for uid in uidlist:
 ksearch.append("{0}@protonmail.com".format(uid))
 ksearch.append("{0}@protonmail.ch".format(uid))
 ksearch.append("{0}@pm.me".format(uid))
 elif keyterm.count("@") > 2:
 uidlist = keyterm.split("@")
 for uid in uidlist:
 ksearch.append("{0}@protonmail.com".format(uid))
 ksearch.append("{0}@protonmail.ch".format(uid))
 ksearch.append("{0}@pm.me".format(uid))
 else:
 ksearch.append(keyterm)

for k in ksearch:
 payload = {"op": "get", "search": k}
 try:
 r = requests.get(url, verify=True, params=payload)
 if r.ok is True:
 result = c.key_import(r.content)
 elif r.ok is False:
 result = r.content
 except Exception as e:
 result = None

 if result is not None and hasattr(result, "considered") is False:
 print("{0} for {1}".format(result.decode(), k))
 elif result is not None and hasattr(result,
"considered") is True:
 num_keys = len(result.imports)
 new_revs = result.new_revocations
 new_sigs = result.new_signatures
 new_subs = result.new_sub_keys
 new_uids = result.new_user_ids
 new_sct = result.secret_imported
 nochange = result.unchanged
 print("""
The total number of keys considered for import was: {0}

```

With UIDs wholly or partially matching the following string:

```
{1}
```

Number of keys revoked: {2}

Number of new signatures: {3}

Number of new subkeys: {4}

Number of new user IDs: {5}

Number of new secret keys: {6}

Number of unchanged keys: {7}

The key IDs for all considered keys were:

```
"""format(num_keys, k, new_revs, new_sigs, new_subs, new_uids, new_scr,
 nochange))
 for i in range(num_keys):
 print(result.imports[i].fpr)
 print("")
 elif result is None:
 print(e)
#+END_SRC
```

Both the above example, `[[../examples/howto/pmkey-import.py][pmkey-import.py]]`,

and a version which prompts

for an alternative GnuPG home directory, `[[../examples/howto/pmkey-import-alt.py][pmkey-import-alt.py]]`, are available with the other examples and are executable scripts.

Note that while the ProtonMail servers are based on the SKS servers, their server is related more to their API and is not feature complete by comparison to the servers in the SKS pool. One notable difference being that the ProtonMail server does not permit non ProtonMail users to update their own keys, which could be a vector for attacking ProtonMail users who may not receive a key's revocation if it had been compromised.

\*\*\* Importing with HKP for Python

```
:PROPERTIES:
:CUSTOM_ID: import-hkp4py
:END:
```

Performing the same tasks with the `[[https://github.com/Selfnet/hkp4py][hkp4py module]]` (available via PyPI) is not too much different, but does provide a number of options of benefit to end users. Not least of which being the ability to perform some checks

on a key before importing it or not. For instance it may be the policy of a site or project to only import keys which have not been revoked. The hkp4py module permits such checks prior to the importing of the keys found.

```
#+BEGIN_SRC python -i
```

```
import gpg
import hkp4py
import sys
```

```
c = gpg.Context()
server = hkp4py.KeyServer("hkps://hkps.pool.sks-keyservers.net")
```

```

results = []
keys = []

if len(sys.argv) > 2:
 pattern = " ".join(sys.argv[1:])
elif len(sys.argv) == 2:
 pattern = sys.argv[1]
else:
 pattern = input("Enter the pattern to search for keys or user IDs: ")

if pattern is not None:
 try:
 key = server.search(hex(int(pattern, 16)))
 keyed = True
 except ValueError as ve:
 key = server.search(pattern)
 keyed = False

 if key is not None:
 keys.append(key[0])
 if keyed is True:
 try:
 fob = server.search(pattern)
 except:
 fob = None
 if fob is not None:
 keys.append(fob[0])
 else:
 pass
 else:
 pass

for logrus in pattern.split():
 try:
 key = server.search(hex(int(logrus, 16)))
 hexed = True
 except ValueError as ve:
 key = server.search(logrus)
 hexed = False

 if key is not None:
 keys.append(key[0])
 if hexed is True:
 try:
 fob = server.search(logrus)
 except:

```

```

 fob = None
 if fob is not None:
 keys.append(fob[0])
 else:
 pass
 else:
 pass

if len(keys) > 0:
 for key in keys:
 import_result = c.key_import(key.key_blob)
 results.append(import_result)

for result in results:
 if result is not None and hasattr(result, "considered") is False:
 print(result)
 elif result is not None and hasattr(result, "considered") is True:
 num_keys
= len(result.imports)
 new_revs = result.new_revocations
 new_sigs = result.new_signatures
 new_subs = result.new_sub_keys
 new_uids = result.new_user_ids
 new_scert = result.secret_imported
 nochange = result.unchanged
 print("""
The total number of keys considered for import was: {0}

Number of keys revoked: {1}
Number of new signatures: {2}
Number of new subkeys: {3}
Number of new user IDs: {4}
Number of new secret keys: {5}
Number of unchanged keys: {6}

The key IDs for all considered keys were:
""").format(num_keys, new_revs, new_sigs, new_subs, new_uids, new_scert,
 nochange))
 for i in range(num_keys):
 print(result.imports[i].fpr)
 print("")
 else:
 pass
#+END_SRC

```

Since the hkp4py module handles multiple keys just as effectively as one (=keys= is a list of responses per matching key), the example

above is able to do a little bit more with the returned data before anything is actually imported.

```
*** Importing from ProtonMail with HKP for Python
:PROPERTIES:
:CUSTOM_ID: import-protonmail-hkp4py
:END:
```

Though this can provide certain benefits even when working with ProtonMail, the scope is somewhat constrained there due to the limitations of the ProtonMail keyserver.

For instance, searching the SKS keyserver pool for the term "gnupg" produces hundreds of results from any time the word appears in any part of a user ID. Performing the same search on the ProtonMail keyserver returns zero results, even though there are at least two test accounts which include it as part of the username.

The cause of this discrepancy is the deliberate configuration of that server by ProtonMail to require an exact match of the full email address of the ProtonMail user whose key is being requested. Presumably this is intended to reduce breaches of privacy of their users as an email address must already be known before a key for that address can be obtained.

\*\*\*\*

```
Import from ProtonMail via HKP for Python Example no. 1
:PROPERTIES:
:CUSTOM_ID: import-hkp4py-pm1
:END:
```

The following script is available with the rest of the examples under the somewhat less than original name, =pmkey-import-hkp.py=.

```
#+BEGIN_SRC python -i
import gpg
import hkp4py
import os.path
import sys

print("""
This script searches the ProtonMail key server for the specified key and
imports it.
```

Usage: pmkey-import-hkp.py [search strings]

```
""")
```

```
c = gpg.Context(armor=True)
server = hkpy.KeyServer("hkps://api.protonmail.ch")
keyterms = []
ksearch = []
allkeys = []
results = []
paradox = []
homeless = None
```

```
if len(sys.argv) > 2:
 keyterms = sys.argv[1:]
elif len(sys.argv) == 2:
 keyterm = sys.argv[1]
 keyterms.append(keyterm)
else:
 key_term = input("Enter the key ID, UID or search string: ")
 keyterms = key_term.split()

for keyterm in keyterms:
 if keyterm.count("@") == 2 and keyterm.startswith("@") is True:
 ksearch.append(keyterm[1:])
 ksearch.append(keyterm[1:])
 ksearch.append(keyterm[1:])
 elif keyterm.count("@") == 1 and keyterm.startswith("@") is True:
 ksearch.append("{0}@protonmail.com".format(keyterm[1:]))
 ksearch.append("{0}@protonmail.ch".format(keyterm[1:]))
 ksearch.append("{0}@pm.me".format(keyterm[1:]))
 elif keyterm.count("@") == 0:
 ksearch.append("{0}@protonmail.com".format(keyterm))
 ksearch.append("{0}@protonmail.ch".format(keyterm))
 ksearch.append("{0}@pm.me".format(keyterm))
 elif keyterm.count("@") == 2 and keyterm.startswith("@") is False:
 uidlist = keyterm.split("@")
 for uid in uidlist:
 ksearch.append("{0}@protonmail.com".format(uid))
 ksearch.append("{0}@protonmail.ch".format(uid))
 ksearch.append("{0}@pm.me".format(uid))
 elif keyterm.count("@") > 2:
 uidlist = keyterm.split("@")
 for uid in uidlist:
 ksearch.append("{0}@protonmail.com".format(uid))
 ksearch.append("{0}@protonmail.ch".format(uid))
 ksearch.append("{0}@pm.me".format(uid))
 else:
 ksearch.append(keyterm)
```

```

for k in ksearch:
 print("Checking for key for: {0}".format(k))
 try:
 keys = server.search(k)
 if isinstance(keys, list) is True:
 for key in keys:
 allkeys.append(key)
 try:
 import_result = c.key_import(key.key_blob)
 except Exception as e:
 import_result = c.key_import(key.key)
 else:
 paradox.append(keys)
 import_result = None
 except Exception as e:
 import_result = None
 results.append(import_result)

for result in results:
 if result is not None and hasattr(result, "considered") is False:
 print("{0} for {1}".format(result.decode(), k))
 elif result is not None and hasattr(result, "considered") is True:
 num_keys = len(result.imports)

```

```

 new_revs = result.new_revocations
 new_sigs = result.new_signatures
 new_subs = result.new_sub_keys
 new_uids = result.new_user_ids
 new_scr = result.secret_imported
 nochange = result.unchanged
 print("""

```

The total number of keys considered for import was: {0}

With UIDs wholly or partially matching the following string:

```
{1}
```

```

 Number of keys revoked: {2}
 Number of new signatures: {3}
 Number of new subkeys: {4}
 Number of new user IDs: {5}
 Number of new secret keys: {6}
 Number of unchanged keys: {7}

```

The key IDs for all considered keys were:

```

"".format(num_keys, k, new_revs, new_sigs, new_subs, new_uids, new_scr,
 nochange))
 for i in range(num_keys):

```

```

 print(result.imports[i].fpr)
 print("")
 elif result is None:
 pass
#+END_SRC

```

\*\*\*\* Import from ProtonMail via HKP for Python Example no. 2

```

:PROPERTIES:
:CUSTOM_ID: import-hkp4py-pm2
:END:

```

Like its counterpart  
above, this script can also be found with the  
rest of the examples, by the name pmkey-import-hkp-alt.py.

With this script a modicum of effort has been made to treat anything  
passed as a =homedir= which either does not exist or which is not a  
directory, as also being a possible user ID to check for. It's not  
guaranteed to pick up on all such cases, but it should cover most of  
them.

```

#+BEGIN_SRC python -i
import gpg
import hkp4py
import os.path
import sys

```

```

print("""
This script searches the ProtonMail key server for the specified key and
imports it. Optionally enables specifying a different GnuPG home directory.

```

```

Usage: pmkey-import-hkp.py [homedir] [search string]
or: pmkey-import-hkp.py [search string]
""")

```

```

c = gpg.Context(armor=True)
server = hkp4py.KeyServer("hkps://api.protonmail.ch")
keyterms = []
ksearch = []
allkeys = []
results = []
paradox = []
homeless = None

```

```

if len(sys.argv) > 3:
 homedir = sys.argv[1]
 keyterms = sys.argv[2:]

```



```

elif len(sys.argv) == 3:
 homedir = sys.argv[1]
 keyterm = sys.argv[2]
 keyterms.append(keyterm)
elif len(sys.argv) == 2:
 homedir = ""
 keyterm = sys.argv[1]
 keyterms.append(keyterm)
else:
 keyterm = input("Enter the key ID, UID or search string: ")
 homedir = input("Enter the GPG configuration directory path (optional): ")
 keyterms.append(keyterm)

if len(homedir) == 0:
 homedir = None
 homeless = False

if homedir is not None:
 if homedir.startswith("~"):
 if os.path.exists(os.path.expanduser(homedir)) is True:
 if os.path.isdir(os.path.expanduser(homedir)) is True:
 c.home_dir = os.path.realpath(os.path.expanduser(homedir))
 else:
 homeless = True
 else:
 homeless = True
 elif os.path.exists(os.path.realpath(homedir)) is True:
 if os.path.isdir(os.path.realpath(homedir)) is True:
 c.home_dir = os.path.realpath(homedir)
 else:
 homeless = True
 else:
 homeless = True

First check to see if the homedir really is a homedir and if not, treat it as
a search string.
if homeless is True:
 keyterms.append(homedir)
 c.home_dir = None
else:
 pass

for keyterm in keyterms:
 if keyterm.count("@") == 2 and keyterm.startswith("@") is True:
 ksearch.append(keyterm[1:])
 ksearch.append(keyterm[1:])
 ksearch.append(keyterm[1:])
 elif keyterm.count("@") == 1 and keyterm.startswith("@") is True:

```

```

ksearch.append("{0}@protonmail.com".format(keyterm[1:]))
ksearch.append("{0}@protonmail.ch".format(keyterm[1:]))
ksearch.append("{0}@pm.me".format(keyterm[1:]))
elif keyterm.count("@") == 0:
 ksearch.append("{0}@protonmail.com".format(keyterm))
 ksearch.append("{0}@protonmail.ch".format(keyterm))
 ksearch.append("{0}@pm.me".format(keyterm))
elif keyterm.count("@") == 2 and keyterm.startswith("@") is False:
 uidlist = keyterm.split("@")
 for uid in
uidlist:
 ksearch.append("{0}@protonmail.com".format(uid))
 ksearch.append("{0}@protonmail.ch".format(uid))
 ksearch.append("{0}@pm.me".format(uid))
elif keyterm.count("@") > 2:
 uidlist = keyterm.split("@")
 for uid in uidlist:
 ksearch.append("{0}@protonmail.com".format(uid))
 ksearch.append("{0}@protonmail.ch".format(uid))
 ksearch.append("{0}@pm.me".format(uid))
else:
 ksearch.append(keyterm)

for k in ksearch:
 print("Checking for key for: {0}".format(k))
 try:
 keys = server.search(k)
 if isinstance(keys, list) is True:
 for key in keys:
 allkeys.append(key)
 try:
 import_result = c.key_import(key.key_blob)
 except Exception as e:
 import_result = c.key_import(key.key)
 else:
 paradox.append(keys)
 import_result = None
 except Exception as e:
 import_result = None
 results.append(import_result)

for result in results:
 if result is not None and hasattr(result, "considered") is False:
 print("{0} for {1}".format(result.decode(), k))
 elif result is not None and hasattr(result, "considered") is True:
 num_keys = len(result.imports)
 new_revs = result.new_revocations
 new_sigs = result.new_signatures

```

```

new_subs = result.new_sub_keys
new_uids = result.new_user_ids
new_sct = result.secret_imported
nochange = result.unchanged
print("""

```

The total number of keys considered for import was: {0}

With UIDs wholly or partially matching the following string:

```
{1}
```

```

Number of keys revoked: {2}
Number of new signatures: {3}
Number of new subkeys: {4}
Number of new user IDs: {5}
Number of new secret keys: {6}
Number of unchanged keys: {7}

```

The key IDs for all considered keys were:

```

"".format(num_keys, k, new_revs, new_sigs, new_subs,
new_uids, new_sct,
nochange))
for i in range(num_keys):
 print(result.imports[i].fpr)
print("")
elif result is None:
 pass
#+END_SRC

```

```

** Exporting keys
:PROPERTIES:
:CUSTOM_ID: howto-export-key
:END:

```

Exporting keys remains a reasonably simple task, but has been separated into three different functions for the OpenPGP cryptographic engine. Two of those functions are for exporting public keys and the third is for exporting secret keys.

```

*** Exporting public keys
:PROPERTIES:
:CUSTOM_ID: howto-export-public-key
:END:

```

There are two methods of exporting public keys, both of which are very similar to the other. The default method, `=key_export()`, will export

a public key or keys matching a specified pattern as normal. The alternative, the `=key_export_minimal()` method, will do the same thing except producing a minimised output with extra signatures and third party signatures or certifications removed.

```
#+BEGIN_SRC
python -i
import gpg
import os.path
import sys

print("""
This script exports one or more public keys.
""")

c = gpg.Context(armor=True)

if len(sys.argv) >= 4:
 keyfile = sys.argv[1]
 logrus = sys.argv[2]
 homedir = sys.argv[3]
elif len(sys.argv) == 3:
 keyfile = sys.argv[1]
 logrus = sys.argv[2]
 homedir = input("Enter the GPG configuration directory path (optional): ")
elif len(sys.argv) == 2:
 keyfile = sys.argv[1]
 logrus = input("Enter the UID matching the key(s) to export: ")
 homedir = input("Enter the GPG configuration directory path (optional): ")
else:
 keyfile = input("Enter the path and filename to save the secret key to: ")
 logrus = input("Enter the UID matching the key(s) to export: ")
 homedir = input("Enter the GPG configuration directory path (optional): ")

if homedir.startswith("~"):
 if os.path.exists(os.path.expanduser(homedir)) is True:
 c.home_dir = os.path.expanduser(homedir)
 else:
 pass
elif os.path.exists(homedir)
is True:
 c.home_dir = homedir
else:
 pass

try:
 result = c.key_export(pattern=logrus)
except:
```

```
result = c.key_export(pattern=None)
```

```
if result is not None:
```

```
 with open(keyfile, "wb") as f:
```

```
 f.write(result)
```

```
else:
```

```
 pass
```

```
#+END_SRC
```

It should be noted that the result will only return =None= when a search pattern has been entered, but has not matched any keys. When the search pattern itself is set to =None= this triggers the exporting of the entire public keybox.

```
#+BEGIN_SRC python -i
```

```
import gpg
```

```
import os.path
```

```
import sys
```

```
print("""
```

```
This script exports one or more public keys in minimised form.
```

```
""")
```

```
c = gpg.Context(armor=True)
```

```
if len(sys.argv) >= 4:
```

```
 keyfile = sys.argv[1]
```

```
 logrus = sys.argv[2]
```

```
 homedir = sys.argv[3]
```

```
elif len(sys.argv) == 3:
```

```
 keyfile = sys.argv[1]
```

```
 logrus = sys.argv[2]
```

```
 homedir = input("Enter the GPG configuration directory path (optional): ")
```

```
elif len(sys.argv) == 2:
```

```
 keyfile = sys.argv[1]
```

```
 logrus = input("Enter
```

```
the UID matching the key(s) to export: ")
```

```
 homedir = input("Enter the GPG configuration directory path (optional): ")
```

```
else:
```

```
 keyfile = input("Enter the path and filename to save the secret key to: ")
```

```
 logrus = input("Enter the UID matching the key(s) to export: ")
```

```
 homedir = input("Enter the GPG configuration directory path (optional): ")
```

```
if homedir.startswith("~"):
```

```
 if os.path.exists(os.path.expanduser(homedir)) is True:
```

```
 c.home_dir = os.path.expanduser(homedir)
```

```
 else:
```

```
 pass
```

```

elif os.path.exists(homedir) is True:
 c.home_dir = homedir
else:
 pass

try:
 result = c.key_export_minimal(pattern=logrus)
except:
 result = c.key_export_minimal(pattern=None)

if result is not None:
 with open(keyfile, "wb") as f:
 f.write(result)
else:
 pass
#+END_SRC

```

```

*** Exporting secret keys
:PROPERTIES:
:CUSTOM_ID: howto-export-secret-key
:END:

```

Exporting secret keys is, functionally, very similar to exporting public keys; save for the invocation of `=pinentry=` via `=gpg-agent=` in order to securely enter the key's passphrase and authorise the export.

The following example exports the secret key to a file which is then set with the same permissions as the output files created by the command line secret key export options.

```

#+BEGIN_SRC python -i
import gpg
import os
import os.path
import sys

print("""
This script exports one or more secret keys.

The gpg-agent and pinentry are invoked to authorise the export.
""")

c = gpg.Context(armor=True)

if len(sys.argv) >= 4:
 keyfile = sys.argv[1]

```

```

logrus = sys.argv[2]
homedir = sys.argv[3]
elif len(sys.argv) == 3:
 keyfile = sys.argv[1]
 logrus = sys.argv[2]
 homedir = input("Enter the GPG configuration directory path (optional): ")
elif len(sys.argv) == 2:
 keyfile = sys.argv[1]
 logrus = input("Enter the UID matching the secret key(s) to export: ")
 homedir = input("Enter the GPG configuration directory path (optional): ")
else:
 keyfile
 = input("Enter the path and filename to save the secret key to: ")
 logrus = input("Enter the UID matching the secret key(s) to export: ")
 homedir = input("Enter the GPG configuration directory path (optional): ")

if len(homedir) == 0:
 homedir = None
elif homedir.startswith("~"):
 userdir = os.path.expanduser(homedir)
 if os.path.exists(userdir) is True:
 homedir = os.path.realpath(userdir)
 else:
 homedir = None
else:
 homedir = os.path.realpath(homedir)

if os.path.exists(homedir) is False:
 homedir = None
else:
 if os.path.isdir(homedir) is False:
 homedir = None
 else:
 pass

if homedir is not None:
 c.home_dir = homedir
else:
 pass

try:
 result = c.key_export_secret(pattern=logrus)
except:
 result = c.key_export_secret(pattern=None)

if result is not None:
 with open(keyfile, "wb") as f:
 f.write(result)

```

```

 os.chmod(keyfile, 0o600)
else:
 pass
#+END_SRC

```

Alternatively the approach of the following script can be used. This longer example saves the exported secret key(s) in files in the GnuPG home directory, in addition to setting the file permissions as only readable and writable by the user. It also exports the secret key(s) twice in order to output both GPG binary (=gpg=) and ASCII armoured (=asc=) files.

```

#+BEGIN_SRC python -i
import gpg
import os
import os.path
import subprocess
import sys

print("""
This script exports one or more secret keys as both ASCII armored and binary
file formats, saved in files within the user's GPG home directory.

The gpg-agent and pinentry are invoked to authorise the export.
""")

if sys.platform == "win32":
 gpgconfcmd = "gpgconf.exe --list-dirs homedir"
else:
 gpgconfcmd = "gpgconf --list-dirs homedir"

a = gpg.Context(armor=True)
b = gpg.Context()
c = gpg.Context()

if len(sys.argv) >= 4:
 keyfile = sys.argv[1]
 logrus = sys.argv[2]
 homedir = sys.argv[3]
elif len(sys.argv) == 3:
 keyfile = sys.argv[1]
 logrus =
sys.argv[2]
 homedir = input("Enter the GPG configuration directory path (optional): ")
elif len(sys.argv) == 2:
 keyfile = sys.argv[1]
 logrus = input("Enter the UID matching the secret key(s) to export: ")

```



```

 homedir = input("Enter the GPG configuration directory path (optional): ")
else:
 keyfile = input("Enter the filename to save the secret key to: ")
 logrus = input("Enter the UID matching the secret key(s) to export: ")
 homedir = input("Enter the GPG configuration directory path (optional): ")

if len(homedir) == 0:
 homedir = None
elif homedir.startswith("~"):
 userdir = os.path.expanduser(homedir)
 if os.path.exists(userdir) is True:
 homedir = os.path.realpath(userdir)
 else:
 homedir = None
else:
 homedir = os.path.realpath(homedir)

if os.path.exists(homedir) is False:
 homedir = None
else:
 if os.path.isdir(homedir) is False:
 homedir = None
 else:
 pass

if homedir is not None:
 c.home_dir = homedir
else:
 pass

if c.home_dir is not None:
 if c.home_dir.endswith("/"):
 gpgfile = "{0}/{1}.gpg".format(c.home_dir, keyfile)
 ascfile = "{0}/{1}.asc".format(c.home_dir, keyfile)
 else:
 gpgfile = "{0}/{1}.gpg".format(c.home_dir, keyfile)
 ascfile = "{0}/{1}.asc".format(c.home_dir, keyfile)
 else:
 if os.path.exists(os.environ["GNUPGHOME"]) is True:
 hd = os.environ["GNUPGHOME"]
 else:
 try:
 hd = subprocess.getoutput(gpgconfcmd)
 except:
 process = subprocess.Popen(gpgconfcmd.split(),
 stdout=subprocess.PIPE)
 procom = process.communicate()
 if sys.version_info[0] == 2:

```

```

 hd = procom[0].strip()
 else:
 hd = procom[0].decode().strip()
 pgpfile = "{0}/{1}.pgp".format(hd, keyfile)
 ascfile = "{0}/{1}.asc".format(hd, keyfile)

 try:
 a_result = a.key_export_secret(pattern=logrus)
 b_result = b.key_export_secret(pattern=logrus)
 except:
 a_result = a.key_export_secret(pattern=None)
 b_result = b.key_export_secret(pattern=None)

 if a_result is not None:
 with open(ascfile, "wb") as f:
 f.write(a_result)
 os.chmod(ascfile, 0o600)
 else:
 pass

 if b_result is not None:
 with open(pgpfile, "wb") as f:
 f.write(b_result)
 os.chmod(pgpfile, 0o600)
 else:
 pass
#+END_SRC

```

```

*** Sending public keys to the SKS Keyservers
:PROPERTIES:
:CUSTOM_ID: howto-send-public-key
:END:

```

As with the previous section on importing keys, the `hkp4py` module adds another option with exporting keys in order to send them to the public keyservers.

The following example demonstrates how this may be done.

```

#+BEGIN_SRC python -i
import pgp
import hkp4py
import os.path
import sys

print("""
This script sends one or more public keys to the SKS keyservers and is

```

essentially a slight variation on the export-key.py script.

```
"""

c = gpg.Context(armor=True)
server = hkp4py.KeyServer("hkps://hkps.pool.sks-keyservers.net")

if
 len(sys.argv) > 2:
 logrus = " ".join(sys.argv[1:])
 elif len(sys.argv) == 2:
 logrus = sys.argv[1]
 else:
 logrus = input("Enter the UID matching the key(s) to send: ")

if len(logrus) > 0:
 try:
 export_result = c.key_export(pattern=logrus)
 except Exception as e:
 print(e)
 export_result = None
 else:
 export_result = c.key_export(pattern=None)

if export_result is not None:
 try:
 try:
 send_result = server.add(export_result)
 except:
 send_result = server.add(export_result.decode())
 if send_result is not None:
 print(send_result)
 else:
 pass
 except Exception as e:
 print(e)
 else:
 pass
#+END_SRC
```

An expanded version of this script with additional functions for specifying an alternative homedir location is in the examples directory as =send-key-to-keyserver.py=.

The =hkp4py= module appears to handle both string and byte literal text data equally well, but the GPGME bindings deal primarily with byte literal data only and so this script sends in that format first, then tries the string literal form.

#### \* Basic Functions

:PROPERTIES:

:CUSTOM\_ID: howto-the-basics

:END:

The most frequently called features of any cryptographic library will be the most fundamental tasks for encryption software. In this section we will look at how to programmatically encrypt data, decrypt it, sign it and verify signatures.

#### \*\* Encryption

:PROPERTIES:

:CUSTOM\_ID: howto-basic-encryption

:END:

Encrypting is very straight forward. In the first example below the message, =text=, is encrypted to a single recipient's key. In the second example the message will be encrypted to multiple recipients.

#### \*\*\* Encrypting to one key

:PROPERTIES:

:CUSTOM\_ID: howto-basic-encryption-single

:END:

Once the the Context is set the main issues with encrypting data is essentially reduced to key selection and the keyword arguments specified in the =gpg.Context().encrypt()= method.

Those keyword arguments are: =recipients=, a list of keys encrypted to (covered in greater detail in the following section); =sign=, whether or not to sign the plaintext data, see subsequent sections on signing and verifying signatures below (defaults to =True=); =sink=, to write results or partial results to a secure sink instead of returning it (defaults to =None=); =passphrase=, only used when utilising symmetric encryption (defaults to =None=); =always\_trust=, used to override the trust model settings for recipient keys (defaults to =False=); =add\_encrypt\_to=, utilises any preconfigured =encrypt-to= or =default-key= settings in the user's =gpg.conf= file (defaults to =False=); =prepare=, prepare for encryption (defaults to =False=); =expect\_sign=, prepare for signing (defaults to =False=); =compress=, compresses the plaintext prior to encryption (defaults to =True=).

#+BEGIN\_SRC python -i

```
import gpg
```

```
a_key
= "0x12345678DEADBEEF"
text = b""Some text to test with.
```

Since the text in this case must be bytes, it is most likely that the input form will be a separate file which is opened with "rb" as this is the simplest method of obtaining the correct data format.

```
"""
```

```
c = gpg.Context(armor=True)
rkey = list(c.keylist(pattern=a_key, secret=False))
ciphertext, result, sign_result = c.encrypt(text, recipients=rkey, sign=False)
```

```
with open("secret_plans.txt.asc", "wb") as afile:
 afile.write(ciphertext)
#+END_SRC
```

Though this is even more likely to be used like this; with the plaintext input read from a file, the recipient keys used for encryption regardless of key trust status and the encrypted output also encrypted to any preconfigured keys set in the =gpg.conf= file:

```
#+BEGIN_SRC python -i
import gpg
```

```
a_key = "0x12345678DEADBEEF"
```

```
with open("secret_plans.txt", "rb") as afile:
 text = afile.read()
```

```
c = gpg.Context(armor=True)
rkey = list(c.keylist(pattern=a_key, secret=False))
ciphertext,
result, sign_result = c.encrypt(text, recipients=rkey, sign=True,
 always_trust=True,
 add_encrypt_to=True)
```

```
with open("secret_plans.txt.asc", "wb") as afile:
 afile.write(ciphertext)
#+END_SRC
```

If the =recipients= parameter is empty then the plaintext is encrypted symmetrically. If no =passphrase= is supplied as a parameter or via a callback registered with the =Context()= then an out-of-band prompt for the passphrase via pinentry will be invoked.

```

*** Encrypting to multiple keys
:PROPERTIES:
:CUSTOM_ID: howto-basic-encryption-multiple
:END:

```

Encrypting to multiple keys essentially just expands upon the key selection process and the recipients from the previous examples.

The following example encrypts a message (=text=) to everyone with an email address on the =gnupg.org= domain,[fn:4] but does /not/ encrypt to a default key or other key which is configured to normally encrypt to.

```
#+BEGIN_SRC
```

```
python -i
import gpg
```

```
text = b"""Oh look, another test message.
```

The same rules apply as with the previous example and more likely than not, the message will actually be drawn from reading the contents of a file or, maybe, from entering data at an input() prompt.

Since the text in this case must be bytes, it is most likely that the input form will be a separate file which is opened with "rb" as this is the simplest method of obtaining the correct data format.

```
"""
```

```
c = gpg.Context(armor=True)
rpattern = list(c.keylist(pattern="@gnupg.org", secret=False))
logrus = []
```

```
for i in range(len(rpattern)):
 if rpattern[i].can_encrypt == 1:
 logrus.append(rpattern[i])
```

```
ciphertext, result, sign_result = c.encrypt(text, recipients=logrus,
 sign=False, always_trust=True)
```

```
with open("secret_plans.txt.asc", "wb") as afile:
```

```
 afile.write(ciphertext)
#+END_SRC
```

All it would take to change the above example to sign the message and

also encrypt the message to any configured default keys would be to change the `=c.encrypt=` line to this:

```
#+BEGIN_SRC python -i
ciphertext, result, sign_result = c.encrypt(text, recipients=logrus,
 always_trust=True,
 add_encrypt_to=True)
#+END_SRC
```

The only keyword arguments requiring modification are those for which the default values are changing. The default value of `=sign=` is `=True=`, the default of `=always_trust=` is `=False=`, the default of `=add_encrypt_to=` is `=False=`.

If `=always_trust=` is not set to `=True=` and any of the recipient keys are not trusted (e.g. not signed or locally signed) then the encryption will raise an error. It is possible to mitigate this somewhat with something more like this:

```
#+BEGIN_SRC python -i
import gpg

with open("secret_plans.txt.asc", "rb") as afile:
 text = afile.read()

c = gpg.Context(armor=True)
rpattern = list(c.keylist(pattern="@gnupg.org", secret=False))
logrus = []

for i in range(len(rpattern)):
 if rpattern[i].can_encrypt == 1:
 logrus.append(rpattern[i])

try:
 ciphertext, result, sign_result = c.encrypt(text, recipients=logrus,
 add_encrypt_to=True)
except gpg.errors.InvalidRecipients as e:
 for i in range(len(e.recipients)):
 for n in range(len(logrus)):
 if logrus[n].fpr == e.recipients[i].fpr:
 logrus.remove(logrus[n])
 else:
 pass
try:
 ciphertext, result, sign_result = c.encrypt(text,
 recipients=logrus,
 add_encrypt_to=True)
```

```

 with open("secret_plans.txt.asc", "wb") as afile:
 afile.write(ciphertext)
 except:
 pass
#+END_SRC

```

This will attempt to encrypt to all the keys searched for, then remove invalid recipients if it fails and try again.

```

** Decryption
:PROPERTIES:
:CUSTOM_ID: howto-basic-decryption
:END:

```

Decrypting something encrypted to a key in one's secret keyring is fairly straight forward.

In this example code, however, preconfiguring either `=gpg.Context()` or `=gpg.core.Context()` as `=c=` is unnecessary because there is no need to modify the Context prior to conducting the decryption and since the Context is only used once, setting it to `=c=` simply adds lines for no gain.

```

#+BEGIN_SRC python -i
import gpg

ciphertext = input("Enter path and filename of encrypted file: ")
newfile = input("Enter path and filename of file to save decrypted data to: ")

with open(ciphertext, "rb") as cfile:
 try:
 plaintext, result, verify_result = gpg.Context().decrypt(cfile)
 except gpg.errors.GPGMEError as e:
 plaintext = None
 print(e)

if plaintext is not None:
 with open(newfile, "wb") as nfile:
 nfile.write(plaintext)
 else:

 pass
#+END_SRC

```

The data available in `=plaintext=` in this example is the decrypted content as a byte object, the recipient key IDs and algorithms in



=result= and the results of verifying any signatures of the data in  
=verify\_result=.

If =gpg.Context().decrypt(cfile, verify=False)= is called instead,  
then =verify\_result= will be returned as =None= and the rest remains  
as described here.

```
** Signing text and files
:PROPERTIES:
:CUSTOM_ID: howto-basic-signing
:END:
```

The following sections demonstrate how to specify keys to sign with.

```
*** Signing key selection
:PROPERTIES:
:CUSTOM_ID: howto-basic-signing-signers
:END:
```

By default GPGME and the Python bindings will use the default key  
configured for the user invoking the GPGME API. If there is no  
default key specified and there is more than one secret key available  
it may be necessary to specify the key or keys with which to sign  
messages and files.

```
#+BEGIN_SRC python -i
import gpg

logrus = input("Enter the email
address or string to match signing keys to: ")
hancock = gpg.Context().keylist(pattern=logrus, secret=True)
sig_src = list(hancock)
#+END_SRC
```

The signing examples in the following sections include the explicitly  
designated =signers= parameter in two of the five examples; once where  
the resulting signature would be ASCII armoured and once where it  
would not be armoured.

While it would be possible to enter a key ID or fingerprint here to  
match a specific key, it is not possible to enter two fingerprints and  
match two keys since the patten expects a string, bytes or None and  
not a list. A string with two fingerprints won't match any single  
key.

\*\*\* Normal or default signing messages or files

:PROPERTIES:

:CUSTOM\_ID: howto-basic-signing-normal

:END:

The normal or default signing process is essentially the same as is most often invoked when also encrypting a message or file. So when the encryption component is not utilised, the result is to produce an encoded and signed

output which may or may not be ASCII armoured and which may or may not also be compressed.

By default compression will be used unless GnuPG detects that the plaintext is already compressed. ASCII armouring will be determined according to the value of `=pgg.Context().armor=`.

The compression algorithm is selected in much the same way as the symmetric encryption algorithm or the hash digest algorithm is when multiple keys are involved; from the preferences saved into the key itself or by comparison with the preferences with all other keys involved.

```
#+BEGIN_SRC python -i
```

```
import gpg
```

```
text0 = """Declaration of ... something.
```

```
"""
```

```
text = text0.encode()
```

```
c = gpg.Context(armor=True, signers=sig_src)
```

```
signed_data, result = c.sign(text, mode=gpg.constants.sig.mode.NORMAL)
```

```
with open("/path/to/statement.txt.asc", "w") as afile:
```

```
 afile.write(signed_data.decode())
```

```
#+END_SRC
```

Though everything in this example is accurate, it is more likely that reading the input data from another file and writing the result to a

new file will be performed more like the way it is done in the next example. Even if the output format is ASCII armoured.

```
#+BEGIN_SRC python -i
```

```
import gpg
```

```
with open("/path/to/statement.txt", "rb") as tfile:
```

```
 text = tfile.read()
```

```
c = gpg.Context()
signed_data, result = c.sign(text, mode=gpg.constants.sig.mode.NORMAL)
```

```
with open("/path/to/statement.txt.sig", "wb") as afile:
 afile.write(signed_data)
#+END_SRC
```

```
*** Detached signing messages and files
:PROPERTIES:
:CUSTOM_ID: howto-basic-signing-detached
:END:
```

Detached signatures will often be needed in programmatic uses of GPGME, either for signing files (e.g. tarballs of code releases) or as a component of message signing (e.g. PGP/MIME encoded email).

```
#+BEGIN_SRC python -i
import gpg

text0 = """Declaration of ... something.

"""
text = text0.encode()

c = gpg.Context(armor=True)
signed_data, result = c.sign(text, mode=gpg.constants.sig.mode.DETACH)

with open("/path/to/statement.txt.asc", "w")
as afile:
 afile.write(signed_data.decode())
#+END_SRC
```

As with normal signatures, detached signatures are best handled as byte literals, even when the output is ASCII armoured.

```
#+BEGIN_SRC python -i
import gpg

with open("/path/to/statement.txt", "rb") as tfile:
 text = tfile.read()

c = gpg.Context(signers=sig_src)
signed_data, result = c.sign(text, mode=gpg.constants.sig.mode.DETACH)

with open("/path/to/statement.txt.sig", "wb") as afile:
 afile.write(signed_data)
```

```
#+END_SRC
```

```
*** Clearsigning messages or text
```

```
:PROPERTIES:
```

```
:CUSTOM_ID: howto-basic-signing-clear
```

```
:END:
```

Though PGP/in-line messages are no longer encouraged in favour of PGP/MIME, there is still sometimes value in utilising in-line signatures. This is where clear-signed messages or text is of value.

```
#+BEGIN_SRC python -i
```

```
import gpg
```

```
text0 = """Declaration of ... something.
```

```
"""
```

```
text = text0.encode()
```

```
c = gpg.Context()
```

```
signed_data, result = c.sign(text, mode=gpg.constants.sig.mode.CLEAR)
```

```
with open("/path/to/statement.txt.asc",
```

```
"w") as afile:
```

```
 afile.write(signed_data.decode())
```

```
#+END_SRC
```

In spite of the appearance of a clear-signed message, the data handled by GPGME in signing it must still be byte literals.

```
#+BEGIN_SRC python -i
```

```
import gpg
```

```
with open("/path/to/statement.txt", "rb") as tfile:
```

```
 text = tfile.read()
```

```
c = gpg.Context()
```

```
signed_data, result = c.sign(text, mode=gpg.constants.sig.mode.CLEAR)
```

```
with open("/path/to/statement.txt.asc", "wb") as afile:
```

```
 afile.write(signed_data)
```

```
#+END_SRC
```

```
** Signature verification
```

```
:PROPERTIES:
```

```
:CUSTOM_ID: howto-basic-verification
```

:END:

Essentially there are two principal methods of verification of a signature. The first of these is for use with the normal or default signing method and for clear-signed messages. The second is for use with files and data with detached signatures.

The following example is intended for use with the default signing method where the file was not ASCII armoured:

```
#+BEGIN_SRC python -i
import
 gpg
import time

filename = "statement.txt"
gpg_file = "statement.txt.gpg"

c = gpg.Context()

try:
 data, result = c.verify(open(gpg_file))
 verified = True
except gpg.errors.BadSignatures as e:
 verified = False
 print(e)

if verified is True:
 for i in range(len(result.signatures)):
 sign = result.signatures[i]
 print("""Good signature from:
{0}
with key {1}
made at {2}
""".format(c.get_key(sign.fpr).uids[0].uid, sign.fpr,
 time.ctime(sign.timestamp)))
 else:
 pass
#+END_SRC
```

Whereas this next example, which is almost identical would work with normal ASCII armoured files and with clear-signed files:

```
#+BEGIN_SRC python -i
import gpg
import time

filename = "statement.txt"
```

```

asc_file = "statement.txt.asc"

c = gpg.Context()

try:
 data, result = c.verify(open(asc_file))
 verified = True
except gpg.errors.BadSignatures as e:
 verified = False
 print(e)

if verified is True:
 for i in range(len(result.signatures)):
 sign
 = result.signatures[i]
 print("""Good signature from:
{0}
with key {1}
made at {2}
""".format(c.get_key(sign.fpr).uids[0].uid, sign.fpr,
 time.ctime(sign.timestamp)))
 else:
 pass
#+END_SRC

```

In both of the previous examples it is also possible to compare the original data that was signed against the signed data in `=data=` to see if it matches with something like this:

```

#+BEGIN_SRC python -i
with open(filename, "rb") as afile:
 text = afile.read()

if text == data:
 print("Good signature.")
else:
 pass
#+END_SRC

```

The following two examples, however, deal with detached signatures. With his method of verification the data that was signed does not get returned since it is already being explicitly referenced in the first argument of `=c.verify=`. So `=data=` is `=None=` and only the information in `=result=` is available.

```

#+BEGIN_SRC python -i
import gpg
import time

```

```

filename = "statement.txt"
sig_file = "statement.txt.sig"

c = gpg.Context()

try:
 data, result = c.verify(open(filename),
open(sig_file))
 verified = True
except gpg.errors.BadSignatures as e:
 verified = False
 print(e)

if verified is True:
 for i in range(len(result.signatures)):
 sign = result.signatures[i]
 print("""Good signature from:
{0}
with key {1}
made at {2}
""".format(c.get_key(sign.fpr).uids[0].uid, sign.fpr,
time.ctime(sign.timestamp)))
 else:
 pass
#+END_SRC

#+BEGIN_SRC python -i
import gpg
import time

filename = "statement.txt"
asc_file = "statement.txt.asc"

c = gpg.Context()

try:
 data, result = c.verify(open(filename), open(asc_file))
 verified = True
except gpg.errors.BadSignatures as e:
 verified = False
 print(e)

if verified is True:
 for i in range(len(result.signatures)):
 sign = result.signatures[i]
 print("""Good signature from:
{0}

```

```

with key {1}
made at {2}
"""".format(c.get_key(sign.fpr).uids[0].uid, sign.fpr,
 time.ctime(sign.timestamp)))
else:
 pass
#+END_SRC

```

```

* Creating
keys and subkeys
:PROPERTIES:
:CUSTOM_ID: key-generation
:END:

```

The one thing, aside from GnuPG itself, that GPGME depends on, of course, is the keys themselves. So it is necessary to be able to generate them and modify them by adding subkeys, revoking or disabling them, sometimes deleting them and doing the same for user IDs.

In the following examples a key will be created for the world's greatest secret agent, Danger Mouse. Since Danger Mouse is a secret agent he needs to be able to protect information to =SECRET= level clearance, so his keys will be 3072-bit keys.

The pre-configured =gpg.conf= file which sets cipher, digest and other preferences contains the following configuration parameters:

```

#+BEGIN_SRC conf
expert
allow-freeform-uid
allow-secret-key-import
trust-model tofu+pgp
tofu-default-policy unknown
enable-large-rsa
enable-dsa2
cert-digest-algo SHA512
default-preference-list TWOFISH CAMELLIA256 AES256 CAMELLIA192 AES192 CAMELLIA128 AES
BLOWFISH
IDEA CAST5 3DES SHA512 SHA384 SHA256 SHA224 RIPEMD160 SHA1 ZLIB BZIP2 ZIP Uncompressed
personal-cipher-preferences TWOFISH CAMELLIA256 AES256 CAMELLIA192 AES192 CAMELLIA128 AES
BLOWFISH IDEA CAST5 3DES
personal-digest-preferences SHA512 SHA384 SHA256 SHA224 RIPEMD160 SHA1
personal-compress-preferences ZLIB BZIP2 ZIP Uncompressed
#+END_SRC

```

**\*\* Primary key**



```
:PROPERTIES:
:CUSTOM_ID: keygen-primary
:END:
```

Generating a primary key uses the `=create_key=` method in a Context. It contains multiple arguments and keyword arguments, including: `=userid=`, `=algorithm=`, `=expires_in=`, `=expires=`, `=sign=`, `=encrypt=`, `=certify=`, `=authenticate=`, `=passphrase=` and `=force=`. The defaults for all of those except `=userid=`, `=algorithm=`, `=expires_in=`, `=expires=` and `=passphrase=` is `=False=`. The defaults for `=algorithm=` and `=passphrase=` is `=None=`. The default for `=expires_in=` is `=0=`. The default for `=expires=` is `=True=`. There is no default for `=userid=`.

If `=passphrase=` is left as `=None=` then the key will not be generated with a passphrase, if `=passphrase=` is set to a string then that will be the passphrase and if `=passphrase=` is set to `=True=` then `gpg-agent` will launch `pinentry` to prompt for a passphrase. For the sake of convenience, these examples will keep `=passphrase=` set to `=None=`.

```
#+BEGIN_SRC python -i
import gpg

c = gpg.Context()

c.home_dir = "~/gnupg-dm"
userid = "Danger Mouse <dm@secret.example.net>"

dmkey = c.create_key(userid, algorithm="rsa3072", expires_in=31536000,
 sign=True, certify=True)
#+END_SRC
```

One thing to note here is the use of setting the `=c.home_dir=` parameter. This enables generating the key or keys in a different location. In this case to keep the new key data created for this example in a separate location rather than adding it to existing and active key store data. As with the default directory, `=~/gnupg=`, any temporary or separate directory needs the permissions set to only permit access by the directory owner. On posix systems this means setting the directory permissions to 700.

The `=temp-homedir-config.py=` script in the HOWTO examples directory will create an alternative homedir with these configuration options already set and the correct directory and file permissions.

The successful generation of the key can be confirmed via the returned `=GenkeyResult=` object, which includes the following data:

```

#+BEGIN_SRC python -i
print("""
Fingerprint: {0}
Primary Key: {1}
Public Key: {2}
Secret Key: {3}
Sub Key: {4}
User IDs: {5}
""".format(dmkey.fpr, dmkey.primary, dmkey.pubkey, dmkey.seckey, dmkey.sub,
 dmkey.uid))
#+END_SRC

```

Alternatively the information can be confirmed using the command line program:

```

#+BEGIN_SRC shell
bash-4.4$ gpg --homedir ~/.gnupg-dm -K
~/.gnupg-dm/pubring.kbx

sec rsa3072 2018-03-15 [SC] [expires: 2019-03-15]
177B7C25DB99745EE2EE13ED026D2F19E99E63AA
uid [ultimate] Danger Mouse <dm@secret.example.net>

bash-4.4$
#+END_SRC

```

As

with generating keys manually, to preconfigure expanded preferences for the cipher, digest and compression algorithms, the `=gpg.conf=` file must contain those details in the home directory in which the new key is being generated. I used a cut down version of my own `=gpg.conf=` file in order to be able to generate this:

```

#+BEGIN_SRC shell
bash-4.4$ gpg --homedir ~/.gnupg-dm --edit-key 177B7C25DB99745EE2EE13ED026D2F19E99E63AA showpref
quit
Secret key is available.

sec rsa3072/026D2F19E99E63AA
 created: 2018-03-15 expires: 2019-03-15 usage: SC
 trust: ultimate validity: ultimate
[ultimate] (1). Danger Mouse <dm@secret.example.net>

[ultimate] (1). Danger Mouse <dm@secret.example.net>
 Cipher: TWOFISH, CAMELLIA256, AES256, CAMELLIA192, AES192, CAMELLIA128, AES, BLOWFISH,
 IDEA, CAST5, 3DES
 Digest: SHA512, SHA384, SHA256, SHA224, RIPEMD160, SHA1

```

Compression: ZLIB, BZIP2, ZIP, Uncompressed

Features: MDC, Keyserver no-modify

```
bash-4.4$
```

```
#+END_SRC
```

**\*\* Subkeys**

:PROPERTIES:

:CUSTOM\_ID: keygen-subkeys

:END:

Adding subkeys to a primary key is fairly similar to creating the primary key with the `=create_subkey=` method. Most of the arguments are the same, but not quite all. Instead of the `=userid=` argument there is now a `=key=` argument for selecting which primary key to add the subkey to.

In the following example an encryption subkey will be added to the primary key. Since Danger Mouse is a security conscious secret agent, this subkey will only be valid for about six months, half the length of the primary key.

```
#+BEGIN_SRC python -i
```

```
import gpg
```

```
c = gpg.Context()
```

```
c.home_dir = "~/gnupg-dm"
```

```
key = c.get_key(dmkey.fpr, secret=True)
```

```
dmsub = c.create_subkey(key, algorithm="rsa3072", expires_in=15768000,
 encrypt=True)
```

```
#+END_SRC
```

As with the primary key, the results here can be checked with:

```
#+BEGIN_SRC python -i
```

```
print("""
```

```
Fingerprint: {0}
```

```
Primary Key: {1}
```

```
Public Key:
```

```
{2}
```

```
Secret Key: {3}
```

```
Sub Key: {4}
```

```
User IDs: {5}
```

```
""").format(dmsub.fpr, dmsub.primary, dmsub.pubkey, dmsub.seckey, dmsub.sub,
 dmsub.uid))
```

```
#+END_SRC
```

As well as on the command line with:

```
#+BEGIN_SRC shell
bash-4.4$ gpg --homedir ~/.gnupg-dm -K
~/.gnupg-dm/pubring.kbx

sec rsa3072 2018-03-15 [SC] [expires: 2019-03-15]
177B7C25DB99745EE2EE13ED026D2F19E99E63AA
uid [ultimate] Danger Mouse <dm@secret.example.net>
ssb rsa3072 2018-03-15 [E] [expires: 2018-09-13]

bash-4.4$
#+END_SRC
```

```
** User IDs
:PROPERTIES:
:CUSTOM_ID: keygen-uids
:END:
```

```
*** Adding User IDs
:PROPERTIES:
:CUSTOM_ID: keygen-uids-add
:END:
```

By comparison to creating primary keys and subkeys, adding a new user ID to an existing key is much simpler. The method used to do this is `=key_add_uid=` and the only arguments it takes are for the `=key=` and the new `=uid=`.

```
#+BEGIN_SRC python -i
import gpg

c = gpg.Context()
c.home_dir = "~/.gnupg-dm"

dmfpr
= "177B7C25DB99745EE2EE13ED026D2F19E99E63AA"
key = c.get_key(dmfpr, secret=True)
uid = "Danger Mouse <danger.mouse@secret.example.net>"

c.key_add_uid(key, uid)
#+END_SRC
```

Unsurprisingly the result of this is:

```

#+BEGIN_SRC shell
bash-4.4$ gpg --homedir ~/.gnupg-dm -K
~/.gnupg-dm/pubring.kbx

sec rsa3072 2018-03-15 [SC] [expires: 2019-03-15]
177B7C25DB99745EE2EE13ED026D2F19E99E63AA
uid [ultimate] Danger Mouse <danger.mouse@secret.example.net>
uid [ultimate] Danger Mouse <dm@secret.example.net>
ssb rsa3072 2018-03-15 [E] [expires: 2018-09-13]

bash-4.4$
#+END_SRC

```

```

*** Revoking User IDs
:PROPERTIES:
:CUSTOM_ID: keygen-uids-revoke
:END:

```

Revoking a user ID is a fairly similar process, except that it uses the `=key_revoke_uid=` method.

```

#+BEGIN_SRC python -i
import gpg

c = gpg.Context()
c.home_dir = "~/.gnupg-dm"

dmfpr = "177B7C25DB99745EE2EE13ED026D2F19E99E63AA"
key = c.get_key(dmfpr, secret=True)
uid = "Danger
Mouse <danger.mouse@secret.example.net>"

c.key_revoke_uid(key, uid)
#+END_SRC

```

```

** Key certification
:PROPERTIES:
:CUSTOM_ID: key-sign
:END:

```

Since key certification is more frequently referred to as key signing, the method used to perform this function is `=key_sign=`.

The `=key_sign=` method takes four arguments: `=key=`, `=uids=`, `=expires_in=` and `=local=`. The default value of `=uids=` is `=None=` and which results in all user IDs being selected. The default value of

both `=expires_in=` and `=local=` is `=False=`; which results in the signature never expiring and being able to be exported.

The `=key=` is the key being signed rather than the key doing the signing. To change the key doing the signing refer to the signing key selection above for signing messages and files.

If the `=uids=` value is not `=None=` then it must either be a string to match a single user ID or a list of strings to match multiple user IDs. In this case the matching of those strings must be precise and it is case sensitive.

To sign Danger Mouse's key for just the initial user ID with a signature which will last a little over a month, do this:

```
#+BEGIN_SRC python -i
import gpg

c = gpg.Context()
uid = "Danger Mouse <dm@secret.example.net>"

dmfpr = "177B7C25DB99745EE2EE13ED026D2F19E99E63AA"
key = c.get_key(dmfpr, secret=True)
c.key_sign(key, uids=uid, expires_in=2764800)
#+END_SRC

*** Verifying key certifications
:PROPERTIES:
:CUSTOM_ID: key-sign-verify
:END:

#+BEGIN_SRC python -i
import gpg
import time

c = gpg.Context()
dmfpr = "177B7C25DB99745EE2EE13ED026D2F19E99E63AA"
keys = list(c.keylist(pattern=dmuid, mode=gpg.constants.keylist.mode.SIGS))
key = keys[0]

for user in key.uids:
 for sig in user.signatures:
 print("0x{0}".format(sig.keyid), "", time.ctime(sig.timestamp), "",
 sig.uid)
#+END_SRC
```

```

#+BEGIN_EXAMPLE
0x92E3F6115435C65A Thu Mar 15 13:17:44 2018 Danger Mouse <dm@secret.example.net>
0x321E4E2373590E5D
 Mon Nov 26 12:46:05 2018 Ben McGinnes <ben@adversary.org>
#+END_EXAMPLE

```

```

#+BEGIN_SRC python -i
import gpg
import math
import pendulum
import time

hd = "/home/dm/.gnupg"
c = gpg.Context()
d = gpg.Context(home_dir=hd)
dmfpr = "177B7C25DB99745EE2EE13ED026D2F19E99E63AA"
dmuid = "Danger Mouse <dm@secret.example.net>"
dkeys = list(c.keylist(pattern=dmuid))
dmkey = dkeys[0]

c.key_import(d.key_export(pattern=None))

tp = pendulum.period(pendulum.now(tz="local"), pendulum.datetime(2019, 1, 1))
ts = tp.total_seconds()
total_secs = math.ceil(ts)
c.key_sign(dmkey, uids=dmuid, expires_in=total_secs)

d.key_import(c.key_export(pattern=dmuid))
keys
= list(c.keylist(pattern=dmuid, mode=gpg.constants.keylist.mode.SIGS))
key = keys[0]

for user in key.uids:
 for sig in user.signatures:
 print("0x{0}".format(sig.keyid), "", time.ctime(sig.timestamp), "",
 sig.uid)
#+END_SRC

```

## Open Source Used In IOS XR Software 24.1.1 3123

/not/ part of Python's standard library, the [\[https://pendulum.eustace.io/\]](https://pendulum.eustace.io/)`[pendulum module]`. Unlike the standard `datetime` module, `pendulum` makes working with dates and times significantly easier in Python; just as the `requests` module makes working with HTTP and HTTPS easier than the builtin modules do.

Though neither `requests` nor `pendulum` are required modules for using the GPGME Python bindings, they are both highly recommended more generally.

\* Advanced or Experimental Use Cases

:PROPERTIES:

:CUSTOM\_ID: advanced-use

:END:

\*\* C plus Python plus SWIG plus Cython

:PROPERTIES:

:CUSTOM\_ID: cython

:END:

In spite of the

apparent incongruence of using Python bindings to a C interface only to generate more C from the Python; it is in fact quite possible to use the GPGME bindings with [\[http://docs.cython.org/en/latest/index.html\]](http://docs.cython.org/en/latest/index.html)`[Cython]`. Though in many cases

the benefits may not be obvious since the most computationally intensive work never leaves the level of the C code with which GPGME itself is interacting with.

Nevertheless, there are some situations where the benefits are demonstrable. One of the better and easier examples being the one of the early examples in this HOWTO, the [\[#howto-keys-counting\]](#)`[key counting]` code. Running that example as an executable Python script, `=keycount.py=` (available in the `=examples/howto/=` directory), will take a noticeable amount of time to run on most systems where the public keybox or keyring contains a few thousand public keys.

Earlier in the evening, prior to starting this section, I ran that script on my laptop; as I tend to do periodically and timed it using

`=time=` utility, with the following results:

```
#+BEGIN_SRC shell
```

```
bash-4.4$ time keycount.py
```

```
Number of secret keys: 23
```

```
Number of public keys: 12112
```



```
real 11m52.945s
user 0m0.913s
sys 0m0.752s
```

```
bash-4.4$
#+END_SRC
```

Sometime after that I imported another key and followed it with a little test of Cython. This test was kept fairly basic, essentially lifting the material from the [\[\[http://docs.cython.org/en/latest/src/tutorial/cython\\_tutorial.html\]\]](http://docs.cython.org/en/latest/src/tutorial/cython_tutorial.html) [Cython Basic Tutorial]] to demonstrate compiling Python code to C. The first step was to take the example key counting code quoted previously, essentially from the importing of the `=gpg=` module to the end of the script:

```
#+BEGIN_SRC python -i
import gpg

c = gpg.Context()
seckey = c.keylist(pattern=None, secret=True)
pubkey = c.keylist(pattern=None, secret=False)

seclist = list(seckey)
secnum = len(seclist)

publist = list(pubkey)
pubnum = len(publist)

print("""
 Number of secret keys: {0}
 Number of public
 keys: {1}

 """.format(secnum, pubnum))
#+END_SRC
```

Save that into a file called `=keycount.pyx=` and then create a `=setup.py=` file which contains this:

```
#+BEGIN_SRC python -i
from distutils.core import setup
from Cython.Build import cythonize

setup(
 ext_modules = cythonize("keycount.pyx")
)
```

```
#+END_SRC
```

Compile it:

```
#+BEGIN_SRC shell
bash-4.4$ python setup.py build_ext --inplace
bash-4.4$
#+END_SRC
```

Then run it in a similar manner to `=keycount.py=`:

```
#+BEGIN_SRC shell
bash-4.4$ time python3.7 -c "import keycount"
```

Number of secret keys: 23  
Number of public keys: 12113

```
real 6m47.905s
user 0m0.785s
sys 0m0.331s
```

```
bash-4.4$
#+END_SRC
```

Cython turned `=keycount.pyx=` into an 81KB `=keycount.o=` file in the `=build/=` directory, a 24KB `=keycount.cpython-37m-darwin.so=` file to be imported into Python 3.7 and a 113KB `=keycount.c=` generated C source code file of nearly three thousand lines. Quite a bit bigger than the 314 bytes of the `=keycount.pyx=` file or the full 1,452 bytes of the full executable `=keycount.py=` example script.

On the other hand it ran in nearly half the time; taking 6 minutes and 47.905 seconds to run. As opposed to the 11 minutes and 52.945 seconds which the CPython script alone took.

The `=keycount.pyx=` and `=setup.py=` files used to generate this example have been added to the `=examples/howto/advanced/cython/=` directory. The example versions include some additional options to annotate the existing code and to detect Cython's use. The latter comes from the [\[\[http://docs.cython.org/en/latest/src/tutorial/pure.html#magic-attributes-within-the-pxd\]\]](http://docs.cython.org/en/latest/src/tutorial/pure.html#magic-attributes-within-the-pxd) [Magic Attributes]] section of the Cython documentation.

\* Miscellaneous extras and work-arounds

:PROPERTIES:

:CUSTOM\_ID: cheats-and-hacks

:END:

Most of the things in the following sections are here simply because there was no better place to put them, even though some are only peripherally related to the GPGME Python bindings. Some are also workarounds for functions not integrated with GPGME as yet. This is especially true of the first of these, dealing with `[[#group-lines][group lines]]`.

**\*\* Group lines**

:PROPERTIES:

:CUSTOM\_ID: group-lines

:END:

There is not yet an easy way to access groups configured in the `gpg.conf` file from within GPGME. As a consequence these central groupings of keys cannot be shared amongst multiple programs, such as MUAs readily.

The following code, however, provides a work-around for obtaining this information in Python.

```
#+BEGIN_SRC python -i
import subprocess
import sys

if sys.platform == "win32":
 gpgconfcmd = "gpgconf.exe --list-options gpg"
else:
 gpgconfcmd = "gpgconf --list-options gpg"

process = subprocess.Popen(gpgconfcmd.split(), stdout=subprocess.PIPE)
procom = process.communicate()

if sys.version_info[0] == 2:
 lines = procom[0].splitlines()
else:
 lines = procom[0].decode().splitlines()

for line in lines:
 if line.startswith("group") is True:
 break

groups = line.split(" ")[-1].replace(" ",
 "").split(',')

group_lines = []
```

```

group_lists = []

for group in groups:
 group_lines.append(group.split("="))
 group_lists.append(group.split("="))

for glist in group_lists:
 glist[1] = glist[1].split()
#+END_SRC

```

The result of that code is that `group_lines` is a list of lists where `group_lines[i][0]` is the name of the group and `group_lines[i][1]` is the key IDs of the group as a string.

The `group_lists` result is very similar in that it is a list of lists. The first part, `group_lists[i][0]` matches `group_lines[i][0]` as the name of the group, but `group_lists[i][1]` is the key IDs of the group as a list.

A demonstration of using the `groups.py` module is also available in the form of the executable `mutt-groups.py` script. This second script reads all the group entries in a user's `gpg.conf` file and converts them into crypt-hooks suitable for use with the Mutt and Neomutt mail clients.

```

** Keyserver access for Python
:PROPERTIES:
:CUSTOM_ID: hkp4py

:END:

```

The [\[\[https://github.com/Selfnet/hkp4py\]\]](https://github.com/Selfnet/hkp4py) module by Marcel Fest was originally a port of the old [\[\[https://github.com/dgladkov/python-hkp\]\]](https://github.com/dgladkov/python-hkp) module from Python 2 to Python 3 and updated to use the [\[\[http://docs.python-requests.org/en/latest/index.html\]\]](http://docs.python-requests.org/en/latest/index.html) module instead. It has since been modified to provide support for Python 2.7 as well and is available via PyPI.

Since it rewrites the `hkp` protocol prefix as `http` and `hkps` as `https`, the module is able to be used even with servers which do not support the full scope of keyserver functions.<sup>[fn:5]</sup> It also works quite readily when incorporated into a [\[\[#cython\]\]](#) generated and compiled version of any code.

```

*** Key import format
:PROPERTIES:
:CUSTOM_ID: hkp4py-strings

```

:END:

The hkp4py module returns key data via requests as string literals (=r.text=) instead of byte literals (=r.content=). This means that the returned key data must be encoded to UTF-8 when importing that key material using a =gpg.Context().key\_import()= method.

For this reason an alternative method has been added to the =search= function of =hkp4py.KeyServer()= which returns the key in the correct format as expected by =key\_import=. When importing using this module, it is now possible to import with this:

```
#+BEGIN_SRC python -i
for key in keys:
 if key.revoked is False:
 gpg.Context().key_import(key.key_blob)
 else:
 pass
#+END_SRC
```

Without that recent addition it would have been necessary to encode the contents of each =hkp4py.KeyServer().search()[i].key= in =hkp4py.KeyServer().search()= before trying to import it.

An example of this is included in the [[#howto-import-key][Importing Keys]] section of this HOWTO and the corresponding executable version of that example is available in the =lang/python/examples/howto= directory as normal; the executable version is the =import-keys-hkp.py= file.

```
** GPGME version checking
:PROPERTIES:
:CUSTOM_ID: gpgme-version-check
:END:
```

For various reasons it may be necessary to check which version of GPGME the bindings have been built against; including whether a minimum required version of GPGME is in use.

For the most part the =gpg.version.versionstr= and =gpg.version.versionlist= methods have been quite sufficient. The former returns the same string as =gpgme-config --version=, while the latter returns the major, minor and patch values in a list.

To check if the installed bindings have actually been built against the current installed libgpgme version, this check can be performed:

```

#+BEGIN_SRC python -i
import gpg
import subprocess
import sys

gpgme_version_call = subprocess.Popen(["gpgme-config", "--version"],
 stdout=subprocess.PIPE,
 stderr=subprocess.PIPE)
gpgme_version_str = gpgme_version_call.communicate()

if sys.version_info[0] == 2:
 gpgme_version = gpgme_version_str[0].strip()
elif sys.version_info[0] >= 3:
 gpgme_version = gpgme_version_str[0].decode().strip()
else:
 gpgme_version = None

if gpgme_version is not None:
 if gpgme_version == gpg.version.versionstr:
 print("The GPGME Python bindings match libgpgme.")
 else:
 print("The GPGME Python bindings do NOT match libgpgme.")
else:
 print("Upgrade Python and reinstall the GPGME Python bindings.")
#+END_SRC

```

For many developers, however, the preferred checking means checking for a minimum version or point release. This is now readily available via the `=gpg.version.versionintlist=` method (added in version `=1.12.1-beta79=`). It is also now possible to easily check whether the installed GPGME Python bindings were built from a development or beta branch of the GPGME source code.

The following code demonstrates how both of those methods may be used:

```

#+BEGIN_SRC python -i
import gpg

try:
 if gpg.version.is_beta is True:
 print("The installed GPGME Python bindings were built from beta code.")
 else:
 print("The installed GPGME Python bindings are a released version.")
except Exception as e:
 print(e)

try:
 if gpg.version.versionintlist[0] == 1:

```

```

if gpg.version.versionintlist[1] == 12:
 if gpg.version.versionintlist[2] == 1:
 print("This is the minimum version for using versionintlist.")
 elif gpg.version.versionintlist[2] > 1:
 print("The versionintlist method is available.")
 else:
 pass
elif gpg.version.versionintlist[1] > 12:
 print("The versionintlist method is available.")
else:
 pass
elif gpg.version.versionintlist[0] > 1:
 print("The versionintlist method is available.")
else:
 pass
except Exception as e:
 print(e)
#+END_SRC

```

The points where `=pass=` is used in the above example will most likely also produce an `=Exception=` error since those results should only occur in versions which do not have the `=gpgme.version.is_beta=` and `=gpgme.version.versionintlist=` methods available.

```

* Copyright and Licensing
:PROPERTIES:
:CUSTOM_ID: copyright-and-license
:END:

```

```

** Copyright
:PROPERTIES:
:CUSTOM_ID: copyright
:END:

```

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```

** Draft Editions of this HOWTO
:PROPERTIES:
:CUSTOM_ID: draft-editions
:END:

```

Draft editions of this HOWTO may be periodically available directly from the author at any of the following URLs:

- [[https://files.au.adversary.org/crypto/gpgme-python-howto.html]][GPGME Python Bindings HOWTO draft (HTML single file, AWS S3 SSL)]]
- [[http://files.au.adversary.org/crypto/gpgme-python-howto.html]][GPGME Python Bindings HOWTO draft (HTML single file, AWS S3 no SSL)]]
- [[https://files.au.adversary.org/crypto/gpgme-python-howto-split/index.html]][GPGME Python Bindings HOWTO draft (HTML multiple files, AWS S3 SSL)]]
- [[http://files.au.adversary.org/crypto/gpgme-python-howto/index.html]][GPGME Python Bindings HOWTO draft (HTML multiple files, AWS S3 no SSL)]]

These draft versions have been generated from this document via GNU Emacs [[https://orgmode.org/][Org mode]] to `=.texi=` and [[https://www.gnu.org/software/texinfo/][GNU Texinfo]] to HTML. Though it is likely that the specific [[https://files.au.adversary.org/crypto/gpgme-python-howto][file]] [[http://files.au.adversary.org/crypto/gpgme-python-howto.org][version]] used will be on the same server with the generated output formats. Occasionally I may include the Org mode generated XHTML versions:

- [[https://files.au.adversary.org/crypto/gpgme-python-howto.xhtml]][GPGME Python Bindings HOWTO draft (HTML single file, AWS S3 SSL)]]
- [[http://files.au.adversary.org/crypto/gpgme-python-howto.xhtml]][GPGME Python Bindings HOWTO draft (HTML single file, AWS S3 no SSL)]]

That XHTML version, however, is exported in a way which inherits a colour scheme from [[https://github.com/holomorph/emacs-zenburn][the author's Emacs theme]] (which is a higher contrast version of [[http://kippura.org/zenburnpage/][Zenburn]] ported by [[https://github.com/holomorph][Holomorph]]). So it's fine for people who prefer dark themed web pages, but not so great for everyone else.

The GNU Texinfo and reStructured Text versions ship with the software, while the GNU Emacs Info version is generated from the Texinfo version using GNU Texinfo or GNU Makeinfo. The Texinfo format is generated from the original Org mode source file in Org mode itself either within GNU Emacs or via the command line by invoking Emacs in batch mode:

```
#+BEGIN_SRC shell
emacs gpgme-python-howto.org --batch -f org-texinfo-export-to-texinfo --kill
emacs gpgme-python-howto --batch -f org-texinfo-export-to-texinfo --kill
#+END_SRC
```

The reStructuredText format is also generated from the Org mode source file, except it is generated using [[https://pandoc.org][Pandoc]] with either of the following commands (depending on the filename):

```
#+BEGIN_SRC shell
pandoc -f org -t rst+smart -o gpgme-python-howto.rst
```



```
gpgme-python-howto.org
pandoc -f org -t rst+smart -o gpgme-python-howto.rst gpgme-python-howto
#+END_SRC
```

Note that the Org mode source files are identified as such via a mode line at the top of each file and have had their `.org` file extensions dropped in order to make scripted generation of output formats easier and not require renaming files post-conversion.

Due to a bug in Org mode's texinfo conversion method, the recommended steps for generating the Texinfo files for all the files in the `=lang/python/doc/src/=` directory are as follows:

```
#+BEGIN_SRC shell
for x in * ; do
 emacs $x --batch -f org-texinfo-export-to-texinfo --kill
 cat $x.texi | sed -e 's/@documentencoding UTF-8/@documentencoding utf-8/g' > ../texinfo/$x.texi
 pandoc -f org -t rst+smart -o ../rst/$x.rst $x
done ;
rm -fv *.texi
cd ../texinfo
mkdir info
mkdir html
for x in *.texi ; do
 makeinfo -v $x
 makeinfo --html --no-split $x
done ;
mv *.info info/
mv *.html html/
#+END_SRC
```

This code snippet includes the generation of the reStructuredText files and would be expected to be run from the `=doc/src/=` directory containing the Org mode source files. It also assumes that the commands are being run on POSIX compliant systems with basic tools like sed, the Bourne shell and GNU Emacs[fn:6] available. The code snippet also includes the steps for generating the Emacs Info files and HTML files from the Texinfo files. Using reStructuredText files with Sphinx is best left for the documentation of that project.

In addition to these there is a significantly less frequently updated version as a HTML [[https://files.au.adversary.org/crypto/gpgme-python/dita/webhelp/index.html][WebHelp site]] (AWS S3 SSL); generated from DITA XML source files, which can be found in [[https://dev.gnupg.org/source/gpgme/browse/ben%252Fhowto-dita/][an alternative branch]] of the GPGME git repository.

Various generated output formats may occasionally be found in subdirectories of the [\[\[https://s3.amazonaws.com/files.au.adversary.org/crypto/gpgme-python\]\]](https://s3.amazonaws.com/files.au.adversary.org/crypto/gpgme-python) directory. In particular within the [\[\[https://s3.amazonaws.com/files.au.adversary.org/crypto/gpgme-python/dita\]\]](https://s3.amazonaws.com/files.au.adversary.org/crypto/gpgme-python/dita) [\[\[https://s3.amazonaws.com/files.au.adversary.org/crypto/gpgme-python/rst\]\]](https://s3.amazonaws.com/files.au.adversary.org/crypto/gpgme-python/rst) [\[\[https://s3.amazonaws.com/files.au.adversary.org/crypto/gpgme-python/texinfo\]\]](https://s3.amazonaws.com/files.au.adversary.org/crypto/gpgme-python/texinfo) subdirectories. The `=rst=` directory contains output files generated with Sphinx and may include a considerable number of its possible output formats, but there are no guarantees as to how recent these are or even if they are present.

These draft editions are not official documents and the version of documentation in the master branch or which ships with released versions is the only official documentation. Nevertheless, these draft editions may occasionally be of use by providing more accessible web versions which are updated between releases. They are provided on the understanding that they may contain errors or may contain content subject to change prior to an official release.

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:PROPERTIES:

:CUSTOM\_ID: license

:END:

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\* Footnotes

[fn:1] `=short-history=` and/or `=short-history.html=`.

[fn:2] With no issues reported specific to Python 3.7, the release of Python 3.7.1 at around the same time as GPGME 1.12.0 and the testing with Python 3.7.1rc1, there is no reason to delay moving 3.7 ahead of 3.6 now. Production environments with more conservative requirements will always enforce their own policies anyway and installation to each supported minor

release is quite possible too.

[fn:3] Yes, even if you use virtualenv with everything you do in Python. If you want to install this module as just your user account then you will need to manually configure, compile and install the /entire/ GnuPG stack as that user as well. This includes libraries which are not often installed that way. It can be done and there are circumstances under which it is worthwhile, but generally only on POSIX systems which utilise single user mode (some even require it).

[fn:4] You probably don't really want to do this. Searching the key servers for "gnupg.org" produces over 400 results, the majority of which aren't actually at the gnupg.org domain, but just included a comment regarding the project in their key somewhere.

[fn:5] Such as with ProtonMail servers. This also means that restricted servers which only advertise either HTTP or HTTPS end points and not HKP or HKPS end points must still be identified as as HKP or HKPS within the Python Code. The =hkp4py= module will rewrite these appropriately when the connection is made to the server.

[fn:6] Okay, Emacs might not necessarily qualify as a basic tool, but it is common enough that having it installed on a system isn't too great an expectation, nor is it difficult to add to most POSIX systems, even if the users of those systems do not personally use it.

## 1.173 libaio 0.3.111

### 1.173.1 Available under license :

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Version 2.1, February 1999

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However, linking a "work that uses the Library" with the Library creates an executable that is a derivative of the Library (because it contains portions of the Library), rather than a "work that uses the library". The executable is therefore covered by this License. Section 6 states terms for distribution of such executables.

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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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a)

Accompany the work with the complete corresponding machine-readable source code for the Library including whatever changes were used in the work (which must be distributed under Sections 1 and 2 above); and, if the work is an executable linked with the Library, with the complete machine-readable "work that uses the Library", as object code and/or source code, so that the user can modify the Library and then relink to produce a modified executable containing the modified Library. (It is understood that the user who changes the contents of definitions files in the Library will not necessarily be able to recompile the application to use the modified definitions.)

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- c) Accompany the work with a written offer, valid for at least three years, to give the same user the materials specified in Subsection 6a, above, for a charge no more than the cost of performing this distribution.
- d) If distribution of the work is made by offering access to copy from a designated place, offer equivalent access to copy the above specified materials from the same place.
- e) Verify that the user has already received a copy of these materials or that you have already sent this user a copy.

For an executable, the required form of the "work that uses the Library" must include any data and utility programs needed for reproducing the executable from it. However, as a special exception, the materials to be distributed need not include anything that is normally distributed (in either source or binary form) with the major components (compiler, kernel, and so on) of the operating system on which the executable runs, unless that component itself accompanies the executable.

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## 1.181 cryptsetup 2.3.7

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## 1.182 go-cache 2.1.0+incompatible

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## 1.184 goprotobuf 1.5.2

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Protocol Buffers for Go with Gadgets

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

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Anton Povarov <[anton.povarov@gmail.com](mailto:anton.povarov@gmail.com)>

Brian Goff <[cpuguy83@gmail.com](mailto:cpuguy83@gmail.com)>

Clayton Coleman <[ccoleman@redhat.com](mailto:ccoleman@redhat.com)>

Denis Smirnov <[denis.smirnov.91@gmail.com](mailto:denis.smirnov.91@gmail.com)>

DongYun Kang <[ceram1000@gmail.com](mailto:ceram1000@gmail.com)>

Dwayne Schultz <[dschultz@pivotal.io](mailto:dschultz@pivotal.io)>

Georg Apitz <[gapitz@pivotal.io](mailto:gapitz@pivotal.io)>

Gustav Paul <[gustav.paul@gmail.com](mailto:gustav.paul@gmail.com)>

Johan Brandhorst <[johan.brandhorst@gmail.com](mailto:johan.brandhorst@gmail.com)>

John Shahid <[jvshahid@gmail.com](mailto:jvshahid@gmail.com)>

John Tuley <[john@tuley.org](mailto:john@tuley.org)>

Laurent <[laurent@adyoulike.com](mailto:laurent@adyoulike.com)>

Patrick Lee <[patrick@dropbox.com](mailto:patrick@dropbox.com)>

Peter Edge <[peter.edge@gmail.com](mailto:peter.edge@gmail.com)>

Roger Johansson <[rogeralsing@gmail.com](mailto:rogeralsing@gmail.com)>

Sam Nguyen <[sam.nguyen@sendgrid.com](mailto:sam.nguyen@sendgrid.com)>

Sergio Arbeo <serabe@gmail.com>  
Stephen J Day <stephen.day@docker.com>  
Tamir Duberstein <tamird@gmail.com>  
Todd Eisenberger <teisenberger@dropbox.com>  
Tormod Erevik Lea <tormodlea@gmail.com>  
Vyacheslav Kim <kane@sendgrid.com>  
Walter Schulze <awalterschulze@gmail.com>

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## 1.189 python3-iniparse 0.4-r0.60

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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 from   | Derived   | 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 |
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| 2.3.3 | 2.3.2 | 2002-2003 | PSF | yes |

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## 1.190 dnf-plugins-core

## 2.1.5+git0+8d1f1758be-r0.60

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## 1.191 libnsl 1.2.0

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Internet Engineering Task Force  
INTERNET-DRAFT  
Obsoletes RFC 2133

R.E. Gilligan (FreeGate)  
S. Thomson (Bellcore)  
Jim Bound (Compaq)  
W. R. Stevens (Consultant)  
January 25, 1999

## Basic Socket Interface Extensions for IPv6

<draft-ietf-ipngwg-bsd-api-new-06.txt>

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### Abstract

The de facto standard application program interface (API) for TCP/IP applications is the "sockets" interface. Although this API was developed for Unix in the early 1980s it has also been implemented on a wide variety of non-Unix systems. TCP/IP applications written using the sockets API have in

the past enjoyed a high degree of portability and we would like the same portability with IPv6 applications. But changes are required to the sockets API to support IPv6 and this memo describes these changes. These include a new socket address structure to carry IPv6 addresses, new address conversion functions, and some new socket options. These extensions are designed to provide access to the basic IPv6 features required by TCP and UDP applications, including

multicasting, while introducing a minimum of change into the system and providing complete compatibility for existing IPv4 applications. Additional extensions for advanced IPv6 features (raw sockets and access to the IPv6 extension headers) are defined in another document [4].

draft-ietf-ipng-bsd-api-new-06.txt Expires June 1999 [Page 1]

INTERNET-DRAFT draft-ietf-ipngwg-bsd-api-new-06.txt January 1999

## Table of Contents:

|                                                                     |    |
|---------------------------------------------------------------------|----|
| 1. Introduction.....                                                | 3  |
| 2. Design Considerations.....                                       | 3  |
| 2.1                                                                 |    |
| What Needs to be Changed.....                                       | 3  |
| 2.2 Data Types.....                                                 | 5  |
| 2.3 Headers.....                                                    | 5  |
| 2.4 Structures.....                                                 | 5  |
| 3. Socket Interface.....                                            | 5  |
| 3.1 IPv6 Address Family and Protocol Family.....                    | 5  |
| 3.2 IPv6 Address Structure.....                                     | 6  |
| 3.3 Socket Address Structure for 4.3BSD-Based Systems.....          | 6  |
| 3.4 Socket Address Structure for 4.4BSD-Based Systems.....          | 7  |
| 3.5 The Socket Functions.....                                       | 8  |
| 3.6 Compatibility with IPv4 Applications.....                       | 9  |
| 3.7 Compatibility with IPv4 Nodes.....                              | 9  |
| 3.8 IPv6 Wildcard Address.....                                      | 10 |
| 3.9 IPv6 Loopback Address.....                                      | 11 |
| 3.10 Portability Additions.....                                     | 11 |
| 4.                                                                  |    |
| Interface Identification.....                                       | 13 |
| 4.1 Name-to-Index.....                                              | 14 |
| 4.2 Index-to-Name.....                                              | 14 |
| 4.3 Return All Interface Names and Indexes.....                     | 15 |
| 4.4 Free Memory.....                                                | 15 |
| 5. Socket Options.....                                              | 15 |
| 5.1 Unicast Hop Limit.....                                          | 16 |
| 5.2 Sending and Receiving Multicast Packets.....                    | 16 |
| 6. Library Functions.....                                           | 18 |
| 6.1 Nodename-to-Address Translation.....                            | 18 |
| 6.2 Address-To-Nodename Translation.....                            | 21 |
| 6.3 Freeing memory for getipnodebyname and getipnodebyaddr.....     | 22 |
| 6.4 Protocol-Independent Nodename and Service Name Translation..... | 22 |
| 6.5 Socket Address Structure to Nodename and Service Name.....      | 25 |
| 6.6 Address Conversion Functions.....                               | 26 |

|                                    |    |
|------------------------------------|----|
| 6.7                                |    |
| Address Testing Macros.....        | 27 |
| 7. Summary of New Definitions..... | 28 |
| 8. Security Considerations.....    | 29 |
| 9. Year 2000 Considerations.....   | 29 |
| Changes From RFC 2133.....         | 30 |
| Acknowledgments.....               | 32 |
| References.....                    | 33 |
| Authors' Addresses.....            | 33 |

draft-ietf-ipng-bsd-api-new-06.txt Expires June 1999 [Page 2]

INTERNET-DRAFT draft-ietf-ipngwg-bsd-api-new-06.txt January 1999

## 1. Introduction

While IPv4 addresses are 32 bits long, IPv6 interfaces are identified by 128-bit addresses. The socket interface makes the size of an IP address quite visible to an application; virtually all TCP/IP applications for BSD-based systems have knowledge of the size of an IP address. Those parts of the API that expose the addresses must be changed to accommodate the larger IPv6 address size. IPv6 also introduces new features (e.g., traffic class and flowlabel), some of which must be made visible to applications via the API. This memo defines a set of extensions to the socket interface to support the larger address size and new features of IPv6.



## 2. Design Considerations

There are a number of important considerations in designing changes to this well-worn API:

- The API changes should provide both source and binary compatibility for programs written to the original API. That is, existing program binaries should continue to operate when run on a system supporting the new API. In addition, existing applications that are re-compiled and run on a system supporting the new API should continue to operate. Simply put, the API changes for IPv6 should not break existing programs. An additional mechanism

for implementations to verify this is to verify the new symbols are protected by Feature Test Macros as described in IEEE Std 1003.1. (Such Feature Test Macros are not defined by this RFC.)

- The changes to the API should be as small as possible in order to simplify the task of converting existing IPv4 applications to IPv6.
- Where possible, applications should be able to use this API to interoperate with both IPv6 and IPv4 hosts. Applications should not need to know which type of host they are communicating with.
- IPv6 addresses carried in data structures should be 64-bit aligned. This is necessary in order to obtain optimum performance on 64-bit machine architectures.

Because of the importance of providing IPv4 compatibility in the API, these extensions are explicitly designed to operate on machines that provide complete support for both IPv4 and IPv6. A subset of this API could probably be designed for operation on systems that support only IPv6. However, this is not addressed in this memo.

### 2.1 What Needs to be Changed

The socket interface API consists of a few distinct components:

- Core socket functions.

INTERNET-DRAFT draft-ietf-ipngwg-bsd-api-new-06.txt January 1999

- Address data structures.
- Name-to-address translation functions.
- Address conversion functions.

The core socket functions -- those functions that deal with such things as setting up and tearing down TCP connections, and sending and receiving UDP packets -- were designed to be transport independent. Where protocol addresses are passed as function arguments, they are carried via opaque pointers. A protocol-specific address data structure is defined for each protocol that the socket functions support. Applications must cast pointers to these protocol-specific address structures into pointers to the generic "sockaddr" address structure when using the socket functions. These functions need not change for IPv6, but a new IPv6-specific address data structure is needed.

The "sockaddr\_in" structure is the protocol-specific data structure for IPv4. This data structure actually includes 8-octets of unused space, and it is tempting to try to use this space to adapt the sockaddr\_in structure to IPv6. Unfortunately, the sockaddr\_in structure is not large enough to hold the 16-octet IPv6 address as well as the other information (address family and port number) that is needed. So a new address data structure must be defined for IPv6.

IPv6 addresses are scoped [2] so they could be link-local, site, organization, global, or other scopes at this time undefined. To support applications that want to be able to identify a set of interfaces for a specific scope, the IPv6 sockaddr\_in structure must support a field that can be used by an implementation to identify a set of interfaces identifying the scope for an IPv6 address.

The name-to-address translation functions in the socket interface are gethostbyname() and gethostbyaddr(). These are left as is and new functions are defined to support IPv4 and IPv6. Additionally, the POSIX 1003.g draft [3] specifies a new nodename-to-address translation function which is protocol independent. This function can also be used with IPv4 and IPv6.

The address conversion functions -- inet\_ntoa() and inet\_addr() --

convert IPv4 addresses between binary and printable form. These functions are quite specific to 32-bit IPv4 addresses. We have designed two analogous functions that convert both IPv4 and IPv6 addresses, and carry an address type parameter so that they can be extended to other protocol families as well.

Finally, a few miscellaneous features are needed to support IPv6. New interfaces are needed to support the IPv6 traffic class, flow label, and hop limit header fields. New socket options are needed to control the sending and receiving of IPv6 multicast packets.

The socket interface will be enhanced in the future to provide access to other IPv6 features. These extensions are described in [4].

draft-ietf-ipng-bsd-api-new-06.txt Expires June 1999 [Page 4]

INTERNET-DRAFT draft-ietf-ipngwg-bsd-api-new-06.txt January 1999

## 2.2 Data Types

The data types of the structure elements given in this memo are intended to be examples, not absolute requirements. Whenever possible, data types from Draft 6.6 (March 1997) of POSIX 1003.1g are used: `uintN_t` means an unsigned integer of exactly N bits (e.g., `uint16_t`). We also assume the argument data types from 1003.1g when possible (e.g., the final argument to `setsockopt()` is a `size_t` value). Whenever buffer sizes are specified, the POSIX 1003.1 `size_t` data type is used (e.g., the two length arguments to `getnameinfo()`).

## 2.3 Headers

When function prototypes and structures are shown we show the headers that must be `#included` to cause that item to be defined.

## 2.4

## Structures

When structures are described the members shown are the ones that must appear in an implementation. Additional, nonstandard members may also be defined by an implementation. As an additional precaution nonstandard members could be verified by Feature Test Macros as described in IEEE Std 1003.1. (Such Feature Test Macros are not defined by this RFC.)

The ordering shown for the members of a structure is the recommended ordering, given alignment considerations of multibyte members, but an implementation may order the members differently.

### 3. Socket Interface

This section specifies the socket interface changes for IPv6.

#### 3.1 IPv6 Address Family and Protocol Family

A new address family name, `AF_INET6`, is defined in `<sys/socket.h>`. The `AF_INET6` definition distinguishes between the original `sockaddr_in` address data structure, and the new `sockaddr_in6` data structure.

A new protocol family name, `PF_INET6`, is defined in `<sys/socket.h>`. Like most of the other protocol family names, this will usually be defined to have the same value as the corresponding address family name:

```
#define PF_INET6 AF_INET6
```

The `PF_INET6` is used in the first argument to the `socket()` function to indicate that an IPv6 socket is being created.

draft-ietf-ipng-bsd-api-new-06.txt Expires June 1999 [Page 5]

INTERNET-DRAFT draft-ietf-ipngwg-bsd-api-new-06.txt January 1999

#### 3.2 IPv6 Address Structure

A new `in6_addr` structure holds a single IPv6 address and is defined as a result of including `<netinet/in.h>`:

```
struct in6_addr {
 uint8_t s6_addr[16]; /* IPv6 address */
};
```

This data structure contains an array of sixteen 8-bit elements, which make up one 128-bit IPv6 address. The IPv6 address is stored in network byte order.

The structure `in6_addr` above is usually implemented with an embedded union with extra fields that force the desired alignment level in a manner similar to BSD implementations of "struct `in_addr`". Those additional implementation details are omitted here for simplicity.

An example is as follows:

```
struct in6_addr {
 union {
 uint8_t _S6_u8[16];
 uint32_t _S6_u32[4];
 uint64_t _S6_u64[2];
 } _S6_un;
};
#define s6_addr _S6_un._S6_u8
```

### 3.3 Socket Address Structure for 4.3BSD-Based Systems

In the socket interface, a different protocol-specific data structure is defined to carry the addresses for each protocol suite. Each protocol-specific data structure is designed so it can be cast into a protocol-independent data structure -- the "sockaddr" structure. Each has a "family" field that overlays the "sa\_family" of the sockaddr data structure. This field identifies the type of the data structure.

The `sockaddr_in` structure is the protocol-specific address data structure for IPv4. It is used to pass addresses between applications and the system in the socket functions. The following `sockaddr_in6` structure holds IPv6 addresses and is defined as a result of including the `<netinet/in.h>` header:

```
struct sockaddr_in6 {
```

```

sa_family_t sin6_family; /* AF_INET6 */
in_port_t sin6_port; /* transport layer port # */
uint32_t sin6_flowinfo; /* IPv6 traffic class & flow info */
struct in6_addr sin6_addr; /* IPv6 address */
uint32_t sin6_scope_id; /* set of interfaces for a scope */
};

```

This structure is designed to be compatible with the `sockaddr` data structure used in the 4.3BSD release.

The `sin6_family` field identifies this as a `sockaddr_in6` structure. This

draft-ietf-ipng-bsd-api-new-06.txt Expires June 1999 [Page 6]

INTERNET-DRAFT draft-ietf-ipngwg-bsd-api-new-06.txt January 1999

field overlays the `sa_family` field when the buffer is cast to a `sockaddr` data structure. The value of this field must be `AF_INET6`.

The `sin6_port` field contains the 16-bit UDP or TCP port number. This field is used in the same way as the `sin_port` field of the `sockaddr_in` structure.

The port number is stored in network byte order.

The `sin6_flowinfo` field is a 32-bit field that contains two pieces of information: the traffic class and the flow label. The contents and interpretation of this member is specified in [1]. The `sin6_flowinfo` field SHOULD be set to zero by an implementation prior to using the `sockaddr_in6` structure by an application on receive operations.

The `sin6_addr` field is a single `in6_addr` structure (defined in the previous section). This field holds one 128-bit IPv6 address. The address is stored in network byte order.

The ordering of elements in this structure is specifically designed so that when `sin6_addr` field is aligned on a 64-bit boundary, the start of the structure will also be aligned on a 64-bit boundary. This is done for optimum performance on 64-bit architectures.

The `sin6_scope_id` field is a 32-bit integer that identifies a set of interfaces as appropriate for the scope of the address carried in the `sin6_addr` field. For a link scope `sin6_addr sin6_scope_id` would be an interface index. For a site scope `sin6_addr sin6_scope_id` would be a site identifier. The mapping of `sin6_scope_id` to an interface or set of

interfaces is left to implementation and future specifications on the subject of site identifiers.

Notice that the `sockaddr_in6` structure will normally be larger than the generic `sockaddr` structure. On many existing implementations the `sizeof(struct sockaddr_in)` equals `sizeof(struct sockaddr)`, with both being 16 bytes. Any existing code that makes this assumption needs to be examined carefully when converting to IPv6.

### 3.4 Socket Address Structure for 4.4BSD-Based Systems

The 4.4BSD release includes a small, but incompatible change to the socket interface. The "sa\_family" field of the `sockaddr` data structure was changed from a 16-bit value to an 8-bit value, and the space saved used to hold a length field, named "sa\_len". The `sockaddr_in6` data structure given in the previous section cannot be correctly cast into the newer `sockaddr` data structure. For this reason, the following alternative IPv6 address data structure is provided to be used on systems based on 4.4BSD. It is defined as a result of including the `<netinet/in.h>` header.

```
struct sockaddr_in6 {
 uint8_t sin6_len; /* length of this struct */
 sa_family_t sin6_family; /* AF_INET6 */
 in_port_t sin6_port; /* transport layer port # */
 uint32_t sin6_flowinfo; /* IPv6 flow information */
 struct in6_addr sin6_addr; /* IPv6 address */
 uint32_t sin6_scope_id; /* set of interfaces for a scope */
};
```

draft-ietf-ipng-bsd-api-new-06.txt Expires June 1999 [Page 7]

INTERNET-DRAFT draft-ietf-ipngwg-bsd-api-new-06.txt January 1999

The only differences between this data structure and the 4.3BSD variant are the inclusion of the length field, and the change of the family field to a 8-bit data type.

The definitions of all the other fields are identical to the structure defined in the previous section.

Systems that provide this version of the `sockaddr_in6` data structure must also declare `SIN6_LEN` as a result of including the `<netinet/in.h>`

header. This macro allows applications to determine whether they are being built on a system that supports the 4.3BSD or 4.4BSD variants of the data structure.

### 3.5 The Socket Functions

Applications call the `socket()` function to create a socket descriptor that represents a communication endpoint. The arguments to the `socket()` function tell the system which protocol to use, and what format address structure will be used in subsequent functions. For example, to create an IPv4/TCP socket, applications make the call:

```
s = socket(PF_INET, SOCK_STREAM, 0);
```

To create an IPv4/UDP socket, applications make the call:

```
s = socket(PF_INET, SOCK_DGRAM, 0);
```

Applications may create IPv6/TCP and IPv6/UDP sockets by simply using the constant `PF_INET6` instead of `PF_INET` in the first argument. For example, to create an IPv6/TCP socket, applications make the call:

```
s = socket(PF_INET6, SOCK_STREAM, 0);
```

To create an IPv6/UDP socket, applications make the call:

```
s = socket(PF_INET6, SOCK_DGRAM, 0);
```

Once the application has created a `PF_INET6` socket, it must use the `sockaddr_in6` address structure when passing addresses in to the system. The functions that the application uses to pass addresses into the system are:

```
bind()
connect()
sendmsg()
sendto()
```

The system will use the `sockaddr_in6` address structure to return addresses to applications that are using `PF_INET6` sockets. The functions that return an address from the system to an application are:

```
accept()
recvfrom()
recvmsg()
```



getpeername()  
getsockname()

No changes to the syntax of the socket functions are needed to support

draft-ietf-ipng-bsd-api-new-06.txt Expires June 1999 [Page 8]

INTERNET-DRAFT draft-ietf-ipngwg-bsd-api-new-06.txt  
January 1999

IPv6, since all of the "address carrying" functions use an opaque address pointer, and carry an address length as a function argument.

### 3.6 Compatibility with IPv4 Applications

In order to support the large base of applications using the original API, system implementations must provide complete source and binary compatibility with the original API. This means that systems must continue to support PF\_INET sockets and the sockaddr\_in address structure. Applications must be able to create IPv4/TCP and IPv4/UDP sockets using the PF\_INET constant in the socket() function, as described in the previous section. Applications should be able to hold a combination of IPv4/TCP, IPv4/UDP, IPv6/TCP and IPv6/UDP sockets simultaneously within the same process.

Applications using the original API should continue to operate as they did on systems supporting only IPv4. That is, they should continue to interoperate with IPv4 nodes.

### 3.7 Compatibility with IPv4 Nodes

The

API also provides a different type of compatibility: the ability for IPv6 applications to interoperate with IPv4 applications. This feature uses the IPv4-mapped IPv6 address format defined in the IPv6 addressing architecture specification [2]. This address format allows the IPv4 address of an IPv4 node to be represented as an IPv6 address. The IPv4 address is encoded into the low-order 32 bits of the IPv6 address, and the high-order 96 bits hold the fixed prefix 0:0:0:0:FFFF. IPv4-mapped addresses are written as follows:

::FFFF:<IPv4-address>

These addresses can be generated automatically by the `getipnodebyname()` function when the specified host has only IPv4 addresses (as described in Section 6.1).

Applications may use `PF_INET6` sockets to open TCP connections to IPv4 nodes, or send UDP packets to IPv4 nodes, by simply encoding the destination's IPv4 address as an IPv4-mapped IPv6 address, and passing that address, within a `sockaddr_in6` structure, in the `connect()` or `sendto()` call. When applications use `PF_INET6` sockets to accept TCP connections from IPv4 nodes, or receive UDP packets from IPv4 nodes, the system returns the peer's address to the application in the `accept()`, `recvfrom()`, or `getpeername()` call using a `sockaddr_in6` structure encoded this way.

Few applications will likely need to know which type of node they are interoperating with. However, for those applications that do need to know, the `IN6_IS_ADDR_V4MAPPED()` macro, defined in Section 6.7, is provided.

draft-ietf-ipng-bsd-api-new-06.txt Expires June 1999 [Page 9]

INTERNET-DRAFT draft-ietf-ipngwg-bsd-api-new-06.txt January 1999

### 3.8 IPv6 Wildcard Address

While the `bind()` function allows applications to select the source IP address of UDP packets and TCP connections, applications often want the system to select the source address for them. With IPv4, one specifies the address as the symbolic constant `INADDR_ANY` (called the "wildcard" address) in the `bind()` call, or simply omits the `bind()` entirely.

Since the IPv6 address type is a structure (`struct in6_addr`), a symbolic constant can be used to initialize an IPv6 address variable, but cannot be used in an assignment. Therefore systems provide the IPv6 wildcard address in two forms.

The first version is a global variable named `"in6addr_any"` that is an

in6\_addr structure. The extern declaration for this variable is defined in <netinet/in.h>:

```
extern const struct in6_addr in6addr_any;
```

Applications use in6addr\_any similarly to the way they use INADDR\_ANY in IPv4. For example, to bind a socket to port number 23, but let the system select the source address, an application could use the following code:

```
struct sockaddr_in6 sin6;
...
sin6.sin6_family = AF_INET6;
sin6.sin6_flowinfo = 0;
sin6.sin6_port = htons(23);
sin6.sin6_addr = in6addr_any; /* structure assignment */
...
if (bind(s, (struct sockaddr *) &sin6, sizeof(sin6)) == -1)
 ..
.
```

The other version is a symbolic constant named IN6ADDR\_ANY\_INIT and is defined in <netinet/in.h>. This constant can be used to initialize an in6\_addr structure:

```
struct in6_addr anyaddr = IN6ADDR_ANY_INIT;
```

Note that this constant can be used ONLY at declaration time. It can not be used to assign a previously declared in6\_addr structure. For example, the following code will not work:

```
/* This is the WRONG way to assign an unspecified address */
struct sockaddr_in6 sin6;
...
sin6.sin6_addr = IN6ADDR_ANY_INIT; /* will NOT compile */
```

Be aware that the IPv4 INADDR\_xxx constants are all defined in host byte order but the IPv6 IN6ADDR\_xxx constants and the IPv6 in6addr\_xxx externals are defined in network byte order.

### 3.9 IPv6 Loopback Address

Applications may need to send UDP packets to, or originate TCP connections

to, services residing on the local node. In IPv4, they can do this by using the constant IPv4 address INADDR\_LOOPBACK in their connect(), sendto(), or sendmsg() call.

IPv6 also provides a loopback address to contact local TCP and UDP services. Like the unspecified address, the IPv6 loopback address is provided in two forms -- a global variable and a symbolic constant.

The global variable is an in6\_addr structure named "in6addr\_loopback." The extern declaration for this variable is defined in <netinet/in.h>:

```
extern const struct in6_addr in6addr_loopback;
```

Applications use in6addr\_loopback as they would use INADDR\_LOOPBACK in IPv4 applications (but beware of the byte ordering difference mentioned at the end of the previous section). For example, to open a TCP connection to the local telnet server, an application could use the following code:

```
struct sockaddr_in6 sin6;
...
sin6.sin6_family = AF_INET6;
sin6.sin6_flowinfo = 0;
sin6.sin6_port = htons(23);

sin6.sin6_addr = in6addr_loopback; /* structure assignment */
...
if (connect(s, (struct sockaddr *) &sin6, sizeof(sin6)) == -1)
 ...
```

The symbolic constant is named IN6ADDR\_LOOPBACK\_INIT and is defined in <netinet/in.h>. It can be used at declaration time ONLY; for example:

```
struct in6_addr loopbackaddr = IN6ADDR_LOOPBACK_INIT;
```

Like IN6ADDR\_ANY\_INIT, this constant cannot be used in an assignment to a previously declared IPv6 address variable.

### 3.10 Portability Additions

One simple addition to the sockets API that can help application writers is the "struct sockaddr\_storage". This data structure can simplify writing code portable across multiple address families and platforms. This data structure is designed with the following goals.

- It has a large enough implementation specific maximum size to store the desired set of protocol specific socket address data structures. Specifically, it is at least large enough to accommodate sockaddr\_in and sockaddr\_in6 and possibly other protocol specific socket addresses too.
- It is aligned at an appropriate boundary so protocol specific socket address data structure pointers can be cast to it and access their fields without alignment problems. (e.g. pointers to sockaddr\_in6 and/or sockaddr\_in can be cast to it and access fields without alignment

draft-ietf-ipng-bsd-api-new-06.txt Expires June 1999 [Page 11]

INTERNET-DRAFT draft-ietf-ipngwg-bsd-api-new-06.txt January 1999

problems).

- It has the initial field(s) isomorphic to the fields of the "struct sockaddr" data structure on that implementation which can be used as a discriminants for deriving the protocol in use. These initial field(s) would on most implementations either be a single field of type "sa\_family\_t" (isomorphic to sa\_family field, 16 bits) or two fields of type uint8\_t and sa\_family\_t respectively, (isomorphic to sa\_len and sa\_family\_t, 8 bits each).

An example implementation design of such a data structure would be as follows.

```
/*
 * Desired design of maximum size and alignment
 */
#define _SS_MAXSIZE 128 /* Implementation specific max size */
#define _SS_ALIGNSIZE (sizeof (int64_t))
 /* Implementation specific desired alignment */
/*
 * Definitions used for sockaddr_storage structure paddings design.
 */
```

```

#define _SS_PAD1SIZE (_SS_ALIGNSIZE - sizeof (sa_family_t))
#define _SS_PAD2SIZE (_SS_MAXSIZE - (sizeof (sa_family_t)+
 _SS_PAD1SIZE + _SS_ALIGNSIZE))
struct sockaddr_storage {
 sa_family_t __ss_family; /* address family */
 /* Following fields are implementation specific */
 char __ss_pad1[_SS_PAD1SIZE];
 /* 6 byte pad, this is to make implementation
 /* specific pad up to alignment field that */
 /* follows explicit in the data structure */
 int64_t __ss_align; /* field to force
desired structure */
 /* storage alignment */
 char __ss_pad2[_SS_PAD2SIZE];
 /* 112 byte pad to achieve desired size, */
 /* _SS_MAXSIZE value minus size of ss_family */
 /* __ss_pad1, __ss_align fields is 112 */
};

```

On implementations where sockaddr data structure includes a "sa\_len", field this data structure would look like this:

```

/*
 * Definitions used for sockaddr_storage structure paddings design.
 */
#define _SS_PAD1SIZE (_SS_ALIGNSIZE -
 (sizeof (uint8_t) + sizeof (sa_family_t))
#define _SS_PAD2SIZE (_SS_MAXSIZE - (sizeof (sa_family_t)+
 _SS_PAD1SIZE + _SS_ALIGNSIZE))
struct sockaddr_storage {
 uint8_t __ss_len; /* address length */
 sa_family_t __ss_family; /* address family */
 /* Following fields are implementation specific */
 char __ss_pad1[_SS_PAD1SIZE];
 /* 6 byte pad, this is to make implementation
 /* specific pad up to alignment field that */
 /* follows explicit in the data structure */
 int64_t __ss_align; /* field to force desired structure */

```

draft-ietf-ipng-bsd-api-new-06.txt Expires June 1999 [Page 12]

INTERNET-DRAFT draft-ietf-ipngwg-bsd-api-new-06.txt January 1999

```

 /* storage alignment */
 char __ss_pad2[_SS_PAD2SIZE];

```

```

/* 112 byte pad to achieve desired size, */
/* __SS_MAXSIZE value minus size of ss_len, */
/* __ss_family, __ss_pad1, __ss_align fields is 112 */
};

```

The above example implementation illustrates a data structure which will align on a 64 bit boundary. An implementation specific field "`__ss_align`" along "`__ss_pad1`" is used to force a 64-bit alignment which covers proper alignment good enough for needs of `sockaddr_in6` (IPv6), `sockaddr_in` (IPv4) address data structures. The size of padding fields `__ss_pad1` depends on the chosen alignment boundary. The size of padding field `__ss_pad2` depends on the value of overall size chosen for the total size of the structure. This size and alignment are represented in the above example by implementation specific (not required) constants `_SS_MAXSIZE` (chosen value 128) and `_SS_ALIGNMENT` (with chosen value 8). Constants `_SS_PAD1SIZE` (derived value 6) and `_SS_PAD2SIZE` (derived value 112) are also for illustration and not required. The implementation specific definitions and structure field names above start with an underscore to denote implementation private namespace. Portable code is not expected to access or reference those fields or constants.

The `sockaddr_storage` structure solves the problem of declaring storage for automatic variables which is large enough and aligned enough for storing socket address data structure of any family. For example, code with a file descriptor and without the context of the address family can pass a pointer to a variable of this type where a pointer to a socket address structure is expected in calls such as `getpeername()` and determine the address family by accessing the received content after the call.

The `sockaddr_storage` structure may also be useful and applied to certain other interfaces where a generic socket address large enough and aligned for use with multiple address families may be needed. A discussion of those interfaces is outside the scope of this document.

Also, much existing code assumes that any socket address structure can fit in a generic `sockaddr` structure. While this has been true for IPv4 socket address structures, it has always been false for Unix domain socket address structures (but in practice this has not been a problem) and it is also false for IPv6 socket address structures (which can be a problem).

So now an application can do the following:

```

struct sockaddr_storage __ss;
struct sockaddr_in6 *sin6;

```

```
sin6 = (struct sockaddr_in6 *) &__ss;
```

#### 4. Interface Identification

This

API uses an interface index (a small positive integer) to identify the local interface on which a multicast group is joined (Section 5.3). Additionally, the advanced API [4] uses these same interface indexes to identify the interface on which a datagram is received, or to specify

draft-ietf-ipng-bsd-api-new-06.txt Expires June 1999 [Page 13]

INTERNET-DRAFT draft-ietf-ipngwg-bsd-api-new-06.txt January 1999

the interface on which a datagram is to be sent.

Interfaces are normally known by names such as "le0", "sl1", "ppp2", and the like. On Berkeley-derived implementations, when an interface is made known to the system, the kernel assigns a unique positive integer value (called the interface index) to that interface. These are small positive integers that start at 1. (Note that 0 is never used for an interface index.) There may be gaps so that there is no current interface for a particular positive interface index.

This API defines two functions that map between an interface name and index, a third function that returns all the interface names and indexes, and a fourth function to return the dynamic memory allocated by the previous function. How these functions are implemented is left up to the implementation. 4.4BSD implementations can implement these functions using the existing sysctl() function with the NET\_RT\_IFLIST command. Other implementations may wish to use ioctl() for this purpose.

##### 4.1 Name-to-Index

The first function maps an interface name into its corresponding index.

```
#include <net/if.h>
```

```
unsigned int if_nametoindex(const char *ifname);
```



If the specified interface name does not exist, the return value is 0, and `errno` is set to `ENXIO`. If there was a system error (such as running out of memory), the return value is 0 and `errno` is set to the proper value (e.g., `ENOMEM`).

## 4.2 Index-to-Name

The second function maps an interface index into its corresponding name.

```
#include <net/if.h>
```

```
char *if_indextoname(unsigned
int ifindex, char *ifname);
```

The `ifname` argument must point to a buffer of at least `IF_NAMESIZE` bytes into which the interface name corresponding to the specified index is returned. (`IF_NAMESIZE` is also defined in `<net/if.h>` and its value includes a terminating null byte at the end of the interface name.) This pointer is also the return value of the function. If there is no interface corresponding to the specified index, `NULL` is returned, and `errno` is set to `ENXIO`, if there was a system error (such as running out of memory), `if_indextoname` returns `NULL` and `errno` would be set to the proper value (e.g., `ENOMEM`).

draft-ietf-ipng-bsd-api-new-06.txt Expires June 1999 [Page 14]

INTERNET-DRAFT draft-ietf-ipngwg-bsd-api-new-06.txt January 1999

## 4.3 Return All Interface Names and Indexes

The `if_nameindex` structure holds the information about a single interface and is defined as a result of including the `<net/if.h>` header.

```
struct if_nameindex {
 unsigned int if_index; /* 1, 2, ... */
 char *if_name; /* null terminated name: "le0", ... */
};
```

The final function returns an array of `if_nameindex` structures, one structure per interface.

```
struct if_nameindex *if_nameindex(void);
```

The end of the array of structures is indicated by a structure with an `if_index` of 0 and an `if_name` of `NULL`. The function returns a `NULL` pointer upon an error, and would set `errno` to the appropriate value.

The memory used for this array of structures along with the interface names pointed to by the `if_name` members is obtained dynamically. This memory is freed by the next function.

#### 4.4 Free Memory

The following function frees the dynamic memory that was allocated by `if_nameindex()`.

```
#include <net/if.h>
```

```
void if_freenameindex(struct if_nameindex *ptr);
```

The argument to this function must be a pointer that was returned by `if_nameindex()`.

Currently `net/if.h` doesn't have prototype definitions for functions and it is

recommended that these definitions be defined in `net/if.h` as well and the struct `if_nameindex{}`.

#### 5. Socket Options

A number of new socket options are defined for IPv6. All of these new options are at the `IPPROTO_IPV6` level. That is, the "level" parameter in the `getsockopt()` and `setsockopt()` calls is `IPPROTO_IPV6` when using these options. The constant name prefix `IPv6_` is used in all of the new socket options. This serves to clearly identify these options as applying to IPv6.

The declaration for `IPPROTO_IPV6`, the new IPv6 socket options, and related constants defined in this section are obtained by including the header `<netinet/in.h>`.

INTERNET-DRAFT draft-ietf-ipngwg-bsd-api-new-06.txt January 1999

## 5.1 Unicast Hop Limit

A new `setsockopt()` option controls the hop limit used in outgoing unicast IPv6 packets. The name of this option is `IPV6_UNICAST_HOPS`, and it is used at the `IPPROTO_IPV6` layer. The following example illustrates how it is used:

```
int hoplimit = 10;

if (setsockopt(s, IPPROTO_IPV6, IPV6_UNICAST_HOPS,
 (char *) &hoplimit, sizeof(hoplimit)) == -1)
 perror("setsockopt IPV6_UNICAST_HOPS");
```

When the `IPV6_UNICAST_HOPS` option is set with `setsockopt()`, the option value given is used as the hop limit for all subsequent unicast packets sent via that socket. If the option is not set, the system selects a default value. The integer hop limit value (called `x`) is interpreted as follows:

```
x < -1: return an error of EINVAL
x == -1: use kernel default
0 <= x <= 255: use x
x >= 256: return an error of EINVAL
```

The `IPV6_UNICAST_HOPS` option may be used with `getsockopt()` to determine the hop limit value that the system will use for subsequent unicast packets sent via that socket. For example:

```
int hoplimit;
size_t len = sizeof(hoplimit);

if (getsockopt(s, IPPROTO_IPV6, IPV6_UNICAST_HOPS,
 (char *) &hoplimit, &len) == -1)
 perror("getsockopt IPV6_UNICAST_HOPS");
else
 printf("Using %d for hop limit.\n", hoplimit);
```

## 5.2 Sending and Receiving Multicast Packets

IPv6 applications may send UDP multicast packets by simply specifying an IPv6 multicast address in the address argument of the `sendto()` function.

Three socket options at the `IPPROTO_IPV6` layer control some of the parameters for sending multicast packets. Setting these options is not required: applications may send multicast packets without using these options. The `setsockopt()` options for controlling the sending of multicast packets are summarized below. These three options can also be used with `getsockopt()`.

### IPV6\_MULTICAST\_IF

Set the interface to use for outgoing multicast packets.  
The argument is the index of the interface to use.

Argument type: unsigned int

draft-ietf-ipng-bsd-api-new-06.txt Expires June 1999 [Page 16]

INTERNET-DRAFT draft-ietf-ipngwg-bsd-api-new-06.txt  
January 1999

### IPV6\_MULTICAST\_HOPS

Set the hop limit to use for outgoing multicast packets.  
(Note a separate option - `IPV6_UNICAST_HOPS` - is provided to set the hop limit to use for outgoing unicast packets.)

The interpretation of the argument is the same as for the `IPV6_UNICAST_HOPS` option:

`x < -1:` return an error of `EINVAL`  
`x == -1:` use kernel default  
`0 <= x <= 255:` use `x`  
`x >= 256:` return an error of `EINVAL`

If `IPV6_MULTICAST_HOPS` is not set, the default is 1  
(same as IPv4 today)

Argument type: int

## IPV6\_MULTICAST\_LOOP

If a multicast datagram is sent to a group to which the sending host itself belongs (on the outgoing interface), a copy of the datagram is looped back by the IP layer for local delivery if this option is set to 1. If this option is set to 0 a copy is not looped back. Other option values

return an error of EINVAL.

If IPV6\_MULTICAST\_LOOP is not set, the default is 1 (loopback; same as IPv4 today).

Argument type: unsigned int

The reception of multicast packets is controlled by the two setsockopt() options summarized below. An error of EOPNOTSUPP is returned if these two options are used with getsockopt().

## IPV6\_JOIN\_GROUP

Join a multicast group on a specified local interface.

If the interface index is specified as 0, the kernel chooses the local interface.

For example, some kernels look up the multicast group in the normal IPv6 routing table and using the resulting interface.

Argument type: struct ipv6\_mreq

## IPV6\_LEAVE\_GROUP

Leave a multicast group on a specified interface.

Argument type: struct ipv6\_mreq

The argument type of both of these options is the ipv6\_mreq structure, defined as a result of including the <netinet/in.h> header;

```
struct ipv6_mreq {
 struct in6_addr ipv6mr_multiaddr;
 /* IPv6 multicast addr */
```

```

 unsigned int ipv6mr_interface; /* interface index */
};

```

Note that to receive multicast datagrams a process must join the multicast group and bind the UDP port to which datagrams will be sent. Some processes also bind the multicast group address to the socket, in addition to the port, to prevent other datagrams destined to that same port from being delivered to the socket.

## 6. Library Functions

New library functions are needed to perform a variety of operations with IPv6 addresses. Functions are needed to lookup IPv6 addresses in the Domain Name System (DNS). Both forward lookup (nodename-to-address translation) and reverse lookup (address-to-nodename translation) need to be supported. Functions are also needed to convert IPv6 addresses between their binary and textual form.

We note that the two existing functions, `gethostbyname()` and `gethostbyaddr()`, are left as-is. New functions are defined to handle both IPv4 and IPv6 addresses.

### 6.1 Nodename-to-Address Translation

The commonly used function `gethostbyname()` is inadequate for many applications, first because it provides no way for the caller to specify anything about the types of addresses desired (IPv4 only, IPv6 only, IPv4-mapped IPv6 are OK, etc.), and second because many implementations of this function are not thread safe. RFC 2133 defined a function named `gethostbyname2()` but this function was also inadequate, first because its use required setting a global option (`RES_USE_INET6`) when IPv6 addresses were required, and second because a flag argument is needed to provide the caller with additional control over the types of addresses required.

The following function is new and must be thread safe:

```

#include <sys/socket.h>
#include <netdb.h>

```

```

struct hostent *getipnodebyname(const char *name, int
af, int flags
 int *error_num);

```

The name argument can be either a node name or a numeric address string (i.e., a dotted-decimal IPv4 address or an IPv6 hex address). The af argument specifies the address family, either AF\_INET or AF\_INET6. The error\_num value is returned to the caller, via a pointer, with the appropriate error code in error\_num, to support thread safe error code returns. error\_num will be set to one of the following values:

HOST\_NOT\_FOUND

No such host is known.

draft-ietf-ipng-bsd-api-new-06.txt Expires June 1999 [Page 18]

INTERNET-DRAFT draft-ietf-ipngwg-bsd-api-new-06.txt January 1999

NO\_ADDRESS

The server recognised the request and the name but no address is available. Another type of request to the name server for the domain might return an answer.

NO\_RECOVERY

An unexpected server failure occurred which cannot be recovered.

TRY\_AGAIN

A temporary and possibly transient error occurred, such as a failure of a server to respond.

The flags argument specifies the types of addresses that are searched for, and the types of addresses that are returned. We note that a special flags value of AI\_DEFAULT (defined below) should handle most applications.

That is, porting simple applications to use IPv6 replaces the call

```

hptr = gethostbyname(name);

```

with

```
hptr = getipnodebyname(name, AF_INET6, AI_DEFAULT, &error_num);
```

and changes any subsequent error diagnosis code to use error\_num instead of externally declared variables, such as h\_errno.

Applications desiring finer control over the types of addresses searched for and returned, can specify other combinations of the flags argument.

A flags of 0 implies a strict interpretation of the af argument:

- If flags is 0 and af is AF\_INET, then the caller wants only IPv4 addresses. A query is made for A records. If successful, the IPv4 addresses are returned and the h\_length

member of the hostent

structure will be 4, else the function returns a NULL pointer.

- If flags is 0 and if af is AF\_INET6, then the caller wants only IPv6 addresses. A query is made for AAAA records. If successful, the IPv6 addresses are returned and the h\_length member of the hostent structure will be 16, else the function returns a NULL pointer.

Other constants can be logically-ORed into the flags argument, to modify the behavior of the function.

- If the AI\_V4MAPPED flag is specified along with an af of AF\_INET6, then the caller will accept IPv4-mapped IPv6 addresses. That is, if no AAAA records are found then a query is made for A records and any found are returned as IPv4-mapped IPv6 addresses (h\_length will be 16). The AI\_V4MAPPED flag is ignored unless af equals AF\_INET6.

draft-ietf-ipng-bsd-api-new-06.txt Expires June 1999 [Page 19]

INTERNET-DRAFT draft-ietf-ipngwg-bsd-api-new-06.txt  
January 1999

- The AI\_ALL flag is used in conjunction with the AI\_V4MAPPED flag, and is only used with the IPv6 address family. When AI\_ALL is logically or'd with AI\_V4MAPPED flag then the caller wants all addresses: IPv6 and IPv4-mapped IPv6. A query is first made



for AAAA records and if successful, the IPv6 addresses are returned. Another query is then made for A records and any found are returned as IPv4-mapped IPv6 addresses. `h_length` will be 16. Only if both queries fail does the function return a NULL pointer. This flag is ignored unless `af` equals `AF_INET6`.

- The `AI_ADDRCONFIG` flag specifies that a query for AAAA records should occur only if the node has at least one IPv6 source address configured and a query for A records should occur only if the node has at least one IPv4 source address configured.

For example, if the node has no IPv6 source addresses configured, and `af` equals

`AF_INET6`, and the node name being looked up has both AAAA and A records, then:

- (a) if only `AI_ADDRCONFIG` is specified, the function returns a NULL pointer;
- (b) if `AI_ADDRCONFIG | AI_V4MAPPED` is specified, the A records are returned as IPv4-mapped IPv6 addresses;

The special flags value of `AI_DEFAULT` is defined as

```
#define AI_DEFAULT (AI_V4MAPPED | AI_ADDRCONFIG)
```

We noted that the `getipnodebyname()` function must allow the name argument to be either a node name or a literal address string (i.e., a dotted-decimal IPv4 address or an IPv6 hex address). This saves applications from having to call `inet_pton()` to handle literal address strings.

There are four scenarios based on the type of literal address string and the value of the `af` argument.

The two simple cases are:

When name is a dotted-decimal IPv4 address and `af` equals `AF_INET`, or when name is an IPv6 hex address and `af` equals `AF_INET6`. The members of the returned `hostent`

structure are: `h_name` points to a copy of the name argument, `h_aliases` is a NULL pointer, `h_addrtype` is a copy of the `af` argument, `h_length` is either 4 (for `AF_INET`) or 16 (for `AF_INET6`), `h_addr_list[0]` is a pointer to the 4-byte or 16-byte binary address, and `h_addr_list[1]` is a NULL pointer.

When name is a dotted-decimal IPv4 address and `af` equals `AF_INET6`, and flags equals `AI_V4MAPPED`, an IPv4-mapped IPv6 address is returned: `h_name` points to an IPv6 hex address containing the IPv4-mapped IPv6

address, h\_aliases is a NULL pointer, h\_addrtype is AF\_INET6, h\_length is 16, h\_addr\_list[0] is a pointer to the 16-byte binary address, and h\_addr\_list[1] is a NULL pointer. If AI\_V4MAPPED is set (with or without AI\_ALL) return IPv4-mapped otherwise return NULL.

It is an error when name is an IPv6 hex address and af equals AF\_INET. The function's return value is a NULL pointer and error\_num equals HOST\_NOT\_FOUND.

draft-ietf-ipng-bsd-api-new-06.txt Expires June 1999 [Page 20]

## INTERNET-DRAFT

draft-ietf-ipngwg-bsd-api-new-06.txt January 1999

### 6.2 Address-To-Nodename Translation

The following function has the same arguments as the existing gethostbyaddr() function, but adds an error number.

```
#include <sys/socket.h>
#include <netdb.h>
```

```
struct hostent *getipnodebyaddr(const void *src, size_t len, int af,
 int *error_num);
```

As with getipnodebyname(), getipnodebyaddr() must be thread safe. The error\_num value is returned to the caller with the appropriate error code, to support thread safe error code returns. The following error conditions may be returned for error\_num:

HOST\_NOT\_FOUND

No such host is known.

NO\_ADDRESS

The server recognized the request and the name but no address is available. Another type of request to the name server for the domain might return an answer.

NO\_RECOVERY

An unexpected server failure occurred which cannot be recovered.

TRY\_AGAIN

A temporary and possibly transient error occurred, such as a failure of a server to respond.

One possible source of confusion is the handling of IPv4-mapped IPv6 addresses and IPv4-compatible IPv6 addresses, but the following logic should apply.

1. If af is AF\_INET6, and if len equals 16, and if the IPv6 address is an IPv4-mapped IPv6 address or an IPv4-compatible IPv6 address, then skip over the first 12 bytes of the IPv6 address, set af to AF\_INET, and set len to 4.
2. If af is AF\_INET, lookup the name for the given IPv4 address (e.g., query for a PTR record in the in-addr.arpa domain).
3. If af is AF\_INET6, lookup the name for the given IPv6 address (e.g., query for a PTR record in the ip6.int domain).
4. If the function is returning success, then the single address that is returned in the hostent structure is a copy of the first argument to the function with the same address family that was passed as an argument to this function.

All four steps listed are performed, in order. Also note that the IPv6 hex addresses "::" and "::1" MUST NOT be treated as IPv4-compatible

draft-ietf-ipng-bsd-api-new-06.txt Expires June 1999 [Page 21]

INTERNET-DRAFT draft-ietf-ipngwg-bsd-api-new-06.txt January 1999

addresses, and if the address is "::", HOST\_NOT\_FOUND MUST be returned and a query of the address not performed.

Also for the macro in section 6.7 IN6\_IS\_ADDR\_V4COMPAT MUST return false for "::" and "::1".

### 6.3 Freeing memory for getipnodebyname and getipnodebyaddr

The hostent structure does not change from its existing definition. This structure, and the information pointed to by this structure, are

dynamically allocated by `getipnodebyname` and `getipnodebyaddr`. The following function frees this memory:

```
#include <netdb.h>

void freehostent(struct hostent *ptr);
```

#### 6.4 Protocol-Independent Nodename and Service Name Translation

Nodename-to-address translation is done in a protocol-independent fashion using the `getaddrinfo()` function that is taken from the Institute of Electrical and Electronic Engineers (IEEE) POSIX 1003.1g (Protocol Independent Interfaces) draft specification [3].

The official specification for this function will be the final POSIX standard, with the following additional requirements:

- `getaddrinfo()` (along with the `getnameinfo()` function described in the next section) must be thread safe.
- The `AI_NUMERICHOST` is new with this document.
- All fields in socket address structures returned by `getaddrinfo()` that are not filled in through an explicit argument (e.g., `sin6_flowinfo` and `sin_zero`) must be set to 0. (This makes it easier to compare socket address structures.)
- `getaddrinfo()` must fill in the length field of a socket address structure (e.g., `sin6_len`) on systems that support this field.

We are providing this independent description of the function because POSIX standards are not freely available (as are IETF documents).

```
#include <sys/socket.h>
#include <netdb.h>

int getaddrinfo(const char *nodename, const char *servname,
 const struct addrinfo *hints,
 struct addrinfo **res);
```

The `addrinfo` structure is defined as a result of including the `<netdb.h>` header.

```
struct addrinfo {
```

INTERNET-DRAFT draft-ietf-ipngwg-bsd-api-new-06.txt January 1999

```

int ai_flags; /* AI_PASSIVE, AI_CANONNAME, AI_NUMERICHOST */
int ai_family; /* PF_xxx */
int ai_socktype; /* SOCK_xxx */
int ai_protocol; /* 0 or IPPROTO_xxx for IPv4 and IPv6 */
size_t ai_addrlen; /* length of ai_addr */
char *ai_canonname; /* canonical name for nodename */
struct sockaddr *ai_addr; /* binary address */
struct addrinfo *ai_next; /* next structure in linked list */
};

```

The return

value from the function is 0 upon success or a nonzero error code. The following names are the nonzero error codes from `getaddrinfo()`, and are defined in `<netdb.h>`:

```

EAI_ADDRFAMILY address family for nodename not supported
EAI_AGAIN temporary failure in name resolution
EAI_BADFLAGS invalid value for ai_flags
EAI_FAIL non-recoverable failure in name resolution
EAI_FAMILY ai_family not supported
EAI_MEMORY memory allocation failure
EAI_NODATA no address associated with nodename
EAI_NONAME nodename nor servname provided, or not known
EAI_SERVICE servname not supported for ai_socktype
EAI_SOCKTYPE ai_socktype not supported
EAI_SYSTEM system error returned in errno

```

The `nodename` and `servname` arguments are pointers to null-terminated strings or `NULL`. One or both of these two arguments must be a non-`NULL` pointer. In the normal client scenario, both the `nodename` and `servname` are specified. In the normal server scenario, only the `servname` is specified. A non-`NULL` `nodename` string can be either a node name or a numeric host address string (i.e., a dotted-decimal IPv4 address or an IPv6 hex address). A non-`NULL` `servname` string can be either a service name or a decimal port number.

The caller can optionally pass an `addrinfo` structure, pointed to by the third argument, to provide hints concerning the type of socket that the caller supports. In this hints structure all members other than

ai\_flags, ai\_family, ai\_socktype, and ai\_protocol must be zero or a NULL pointer. A value of PF\_UNSPEC for ai\_family means the caller will accept any protocol family. A value of 0 for ai\_socktype means the caller will accept any socket type. A value of 0 for ai\_protocol means the caller will accept any protocol. For example, if the caller handles only TCP and not UDP, then the ai\_socktype member of the hints structure should be set to SOCK\_STREAM when getaddrinfo() is called. If the caller handles only IPv4 and not IPv6, then the ai\_family member of the hints structure should be set to PF\_INET when getaddrinfo() is called. If the third argument to getaddrinfo() is a NULL pointer, this is the same as if the caller had filled in an addrinfo structure initialized to zero with ai\_family set to PF\_UNSPEC.

Upon successful return a pointer to a linked list of one or more addrinfo structures is returned through the final argument. The caller can process each addrinfo structure in this list by following the ai\_next pointer, until a NULL pointer is encountered. In each returned addrinfo structure the three members ai\_family, ai\_socktype, and ai\_protocol are the corresponding arguments for a call to the socket() function. In each addrinfo structure the ai\_addr member points to a

draft-ietf-ipng-bsd-api-new-06.txt Expires June 1999 [Page 23]

INTERNET-DRAFT draft-ietf-ipngwg-bsd-api-new-06.txt January 1999

filled-in socket address structure whose length is specified by the ai\_addrlen member.

If the AI\_PASSIVE bit is set in the ai\_flags member of the hints structure, then the caller plans to use the returned socket address structure in a call to bind(). In this case, if the nodename argument is a NULL pointer, then the IP address portion of the socket address structure will be set to INADDR\_ANY for an IPv4 address or IN6ADDR\_ANY\_INIT for an IPv6 address.

If the AI\_PASSIVE bit is not set in the ai\_flags member of the hints structure, then the returned socket address structure will be ready for a call to connect() (for a connection-oriented protocol) or either connect(), sendto(), or sendmsg() (for a connectionless protocol). In this case, if the nodename argument is a NULL pointer, then the IP address portion of the socket address structure will be set to the loopback address.

If the `AI_CANONNAME` bit is set in the `ai_flags` member of the hints structure, then upon successful return the `ai_canonname` member of the first `addrinfo` structure in the linked list will point to a null-terminated string containing the canonical name of the specified `nodename`.

If the `AI_NUMERICHOST` bit is set in the `ai_flags` member of the hints structure, then a non-NULL `nodename` string must be a numeric host address string. Otherwise an error of `EAI_NONAME` is returned. This flag prevents any type of name resolution service (e.g., the DNS) from being called.

All of the information returned by `getaddrinfo()` is dynamically allocated: the `addrinfo` structures, and the socket address structures and canonical node name strings pointed to by the `addrinfo` structures. To return this information to the system the function `freeaddrinfo()` is called:

```
#include <sys/socket.h>
#include <netdb.h>

void freeaddrinfo(struct addrinfo *ai);
```

The `addrinfo` structure pointed to by the `ai` argument is freed, along with any dynamic storage pointed to by the structure. This operation is repeated until a NULL `ai_next` pointer is encountered.

To aid applications in printing error messages based on the `EAI_XXX` codes returned by `getaddrinfo()`, the following function is defined.

```
#include <sys/socket.h>
#include <netdb.h>

char *gai_strerror(int ecode);
```

The argument is one of the `EAI_XXX` values defined earlier and the return value points to a string describing the error. If the argument is not one of the `EAI_XXX` values, the function still returns a pointer to a string whose contents indicate an unknown error.

## 6.5 Socket Address Structure to Nodename and Service Name

The POSIX 1003.1g specification includes no function to perform the reverse conversion from `getaddrinfo()`: to look up a nodename and service name, given the binary address and port. Therefore, we define the following function:

```
#include <sys/socket.h>
#include <netdb.h>

int getnameinfo(const struct sockaddr *sa, socklen_t
salen,
 char *host, size_t hostlen,
 char *serv, size_t servlen,
 int flags);
```

This function looks up an IP address and port number provided by the caller in the DNS and system-specific database, and returns text strings for both in buffers provided by the caller. The function indicates successful completion by a zero return value; a non-zero return value indicates failure.

The first argument, `sa`, points to either a `sockaddr_in` structure (for IPv4) or a `sockaddr_in6` structure (for IPv6) that holds the IP address and port number. The `salen` argument gives the length of the `sockaddr_in` or `sockaddr_in6` structure.

The function returns the nodename associated with the IP address in the buffer pointed to by the `host` argument. The caller provides the size of this buffer via the `hostlen` argument. The service name associated with the port number is returned in the buffer pointed to by `serv`, and the `servlen` argument gives the length of this buffer. The caller specifies not to return either string by providing a zero value for the `hostlen` or `servlen` arguments. Otherwise, the caller must provide buffers large enough to hold the nodename and the service name, including the terminating null characters.

Unfortunately most systems do not provide constants that specify the maximum size of either a fully-qualified domain name or a service name. Therefore to aid the application in allocating buffers for these two returned strings the following constants are defined in `<netdb.h>`:

```
#define NI_MAXHOST 1025
#define NI_MAXSERV 32
```



The first value is actually defined as the constant MAXDNAME in recent versions of BIND's <arpa/nameser.h> header (older versions of BIND define this constant to be 256) and the second is a guess based on the services listed in the current Assigned Numbers RFC.

The final argument is a flag that changes the default actions of this function. By default the fully-qualified domain name (FQDN) for the host is looked up in the DNS and returned. If the flag bit NI\_NOFQDN is set, only the nodename portion of the FQDN is returned for local hosts.

If the flag bit NI\_NUMERICHOST is set, or if the host's name cannot be located in the DNS, the numeric form of the host's address is returned instead of its name (e.g., by calling inet\_ntop() instead of getipnodebyaddr()). If the flag bit NI\_NAMEREQD is set, an error is

draft-ietf-ipng-bsd-api-new-06.txt Expires June 1999 [Page 25]

INTERNET-DRAFT draft-ietf-ipngwg-bsd-api-new-06.txt January 1999

returned if the host's name cannot be located in the DNS.

If the flag bit NI\_NUMERICSERV is set, the numeric form of the service address is returned (e.g., its port number) instead of its name. The two NI\_NUMERICxxx flags are required to support the "-n" flag that many commands provide.

A fifth flag bit, NI\_DGRAM, specifies that the service is a datagram service, and causes getservbyport() to be called with a second argument of "udp" instead of its default of "tcp". This is required for the few ports (e.g. 512-514) that have different services for UDP and TCP.

These NI\_xxx flags are defined in <netdb.h> along with the AI\_xxx flags already defined for getaddrinfo().

## 6.6 Address Conversion Functions

The two functions inet\_addr() and inet\_ntoa() convert an IPv4 address between binary and text form. IPv6 applications need similar functions. The following two functions convert both IPv6 and IPv4 addresses:

```
#include <sys/socket.h>
```

```
#include <arpa/inet.h>
```

```
int inet_pton(int af, const char *src, void *dst);
```

```
const char *inet_ntop(int af, const void *src,
 char *dst, size_t size);
```

The `inet_pton()` function converts an address in its standard text presentation form into its numeric binary form. The `af` argument specifies the family of the address. Currently the `AF_INET` and `AF_INET6` address families are supported. The `src` argument points to the string being passed

in. The `dst` argument points to a buffer into which the function stores the numeric address. The address is returned in network byte order. `inet_pton()` returns 1 if the conversion succeeds, 0 if the input is not a valid IPv4 dotted-decimal string or a valid IPv6 address string, or -1 with `errno` set to `EAFNOSUPPORT` if the `af` argument is unknown. The calling application must ensure that the buffer referred to by `dst` is large enough to hold the numeric address (e.g., 4 bytes for `AF_INET` or 16 bytes for `AF_INET6`).

If the `af` argument is `AF_INET`, the function accepts a string in the standard IPv4 dotted-decimal form:

```
ddd.ddd.ddd.ddd
```

where `ddd` is a one to three digit decimal number between 0 and 255. Note that many implementations of the existing `inet_addr()` and `inet_aton()` functions accept nonstandard input: octal numbers, hexadecimal numbers, and fewer than four numbers. `inet_pton()` does not accept these formats.

If the `af` argument is `AF_INET6`, then the function accepts a string in one of the standard IPv6 text forms defined in Section 2.2 of the addressing architecture specification [2].

draft-ietf-ipng-bsd-api-new-06.txt Expires June 1999 [Page 26]

INTERNET-DRAFT draft-ietf-ipngwg-bsd-api-new-06.txt January 1999

The `inet_ntop()` function converts a numeric address into a text string suitable for presentation. The `af` argument specifies the family of the address. This can be `AF_INET` or `AF_INET6`. The `src` argument points to a buffer holding an IPv4 address if the `af` argument is `AF_INET`, or an IPv6

address if the af argument is AF\_INET6, the address must be in network byte order. The dst argument points to a buffer where the function will store the resulting text string. The size argument specifies the size of this buffer. The application must specify a non-NULL dst argument. For IPv6 addresses, the buffer must be at least 46-octets. For IPv4 addresses, the buffer must be at least 16-octets. In order to allow applications to easily declare buffers of the proper size to store IPv4 and IPv6 addresses in string form, the following two constants are defined in <netinet/in.h>:

```
#define INET_ADDRSTRLEN 16
#define INET6_ADDRSTRLEN 46
```

The inet\_ntop() function returns a pointer to the buffer containing the text string if the conversion succeeds, and NULL otherwise. Upon failure, errno is set to EAFNOSUPPORT if the af argument is invalid or ENOSPC if the size of the result buffer is inadequate.

## 6.7 Address Testing Macros

The following macros can be used to test for special IPv6 addresses.

```
#include <netinet/in.h>

int IN6_IS_ADDR_UNSPECIFIED (const struct in6_addr *);
int IN6_IS_ADDR_LOOPBACK (const struct in6_addr *);
int IN6_IS_ADDR_MULTICAST (const struct in6_addr *);
int IN6_IS_ADDR_LINKLOCAL (const struct in6_addr *);
int IN6_IS_ADDR_SITELOCAL (const struct in6_addr *);
int IN6_IS_ADDR_V4MAPPED (const struct in6_addr *);
int IN6_IS_ADDR_V4COMPAT (const struct in6_addr *);

int IN6_IS_ADDR_MC_NODELOCAL(const struct in6_addr *);
int IN6_IS_ADDR_MC_LINKLOCAL(const struct in6_addr *);
int IN6_IS_ADDR_MC_SITELOCAL(const struct in6_addr *);
int IN6_IS_ADDR_MC_ORGLOCAL (const struct in6_addr *);
int IN6_IS_ADDR_MC_GLOBAL (const struct in6_addr *);
```

The first seven macros return true if the address is of the specified type, or false otherwise. The last five test the scope of a multicast address and return true if the address is a multicast address of the specified scope or false if the address is either not a multicast address or not of the specified scope. Note that IN6\_IS\_ADDR\_LINKLOCAL and IN6\_IS\_ADDR\_SITELOCAL return true only for the two local-use IPv6

unicast addresses. These two macros do not return true for IPv6 multicast addresses of either link-local scope or site-local scope.

draft-ietf-ipng-bsd-api-new-06.txt Expires June 1999 [Page 27]

INTERNET-DRAFT draft-ietf-ipngwg-bsd-api-new-06.txt  
January 1999

## 7. Summary of New Definitions

The following list summarizes the constants, structure, and extern definitions discussed in this memo, sorted by header.

```
<net/if.h> IF_NAMESIZE
<net/if.h> struct if_nameindex{};

<netdb.h> AI_ADDRCONFIG
<netdb.h> AI_DEFAULT
<netdb.h> AI_ALL
<netdb.h> AI_CANONNAME
<netdb.h> AI_NUMERICHOST
<netdb.h> AI_PASSIVE
<netdb.h> AI_V4MAPPED
<netdb.h> EAI_ADDRFAMILY
<netdb.h> EAI_AGAIN
<netdb.h> EAI_BADFLAGS
<netdb.h> EAI_FAIL
<netdb.h> EAI_FAMILY
<netdb.h> EAI_MEMORY
<netdb.h> EAI_NODATA
<netdb.h> EAI_NONAME
<netdb.h> EAI_SERVICE
<netdb.h> EAI_SOCKTYPE
<netdb.h> EAI_SYSTEM
<netdb.h> NI_DGRAM
<netdb.h> NI_MAXHOST
<netdb.h> NI_MAXSERV
<netdb.h> NI_NAMEREQD
<netdb.h> NI_NOFQDN
```

```

<netdb.h> NI_NUMERICHOST
<netdb.h>
 NI_NUMERICSERV
<netdb.h> struct addrinfo{};

<netinet/in.h> IN6ADDR_ANY_INIT
<netinet/in.h> IN6ADDR_LOOPBACK_INIT
<netinet/in.h> INET6_ADDRSTRLEN
<netinet/in.h> INET_ADDRSTRLEN
<netinet/in.h> IPPROTO_IPV6
<netinet/in.h> IPV6_JOIN_GROUP
<netinet/in.h> IPV6_LEAVE_GROUP
<netinet/in.h> IPV6_MULTICAST_HOPS
<netinet/in.h> IPV6_MULTICAST_IF
<netinet/in.h> IPV6_MULTICAST_LOOP
<netinet/in.h> IPV6_UNICAST_HOPS
<netinet/in.h> SIN6_LEN
<netinet/in.h> extern const struct in6_addr in6addr_any;
<netinet/in.h> extern const struct in6_addr in6addr_loopback;
<netinet/in.h> struct in6_addr{};
<netinet/in.h> struct ipv6_mreq{};
<netinet/in.h> struct sockaddr_in6{};

<sys/socket.h> AF_INET6
<sys/socket.h> PF_INET6
<sys/socket.h> struct sockaddr_storage;

```

The following list summarizes the function and macro prototypes

draft-ietf-ipng-bsd-api-new-06.txt Expires June 1999 [Page 28]

#### INTERNET-DRAFT

draft-ietf-ipngwg-bsd-api-new-06.txt January 1999

discussed in this memo, sorted by header.

```

<arpa/inet.h> int inet_pton(int, const char *, void *);
<arpa/inet.h> const char *inet_ntop(int, const void *,
 char *, size_t);

<net/if.h> char *if_indextoname(unsigned int, char *);
<net/if.h> unsigned int if_nametoindex(const char *);
<net/if.h> void if_freenameindex(struct if_nameindex *);
<net/if.h> struct if_nameindex *if_nameindex(void);

```

```

<netdb.h> int getaddrinfo(const char *, const char *,
 const struct addrinfo *,
 struct addrinfo **);
<netdb.h> int getnameinfo(const struct sockaddr *, socklen_t,
 char *, size_t, char *, size_t, int);
<netdb.h> void freeaddrinfo(struct addrinfo *);
<netdb.h> char *gai_strerror(int);
<netdb.h> struct hostent *getipnodebyname(const
char *, int, int,
 int *);
<netdb.h> struct hostent *getipnodebyaddr(const void *, size_t, int,
 int *);
<netdb.h> void freehostent(struct hostent *);

<netinet/in.h> int IN6_IS_ADDR_LINKLOCAL(const struct in6_addr *);
<netinet/in.h> int IN6_IS_ADDR_LOOPBACK(const struct in6_addr *);
<netinet/in.h> int IN6_IS_ADDR_MC_GLOBAL(const struct in6_addr *);
<netinet/in.h> int IN6_IS_ADDR_MC_LINKLOCAL(const struct in6_addr *);
<netinet/in.h> int IN6_IS_ADDR_MC_NODELOCAL(const struct in6_addr *);
<netinet/in.h> int IN6_IS_ADDR_MC_ORGLOCAL(const struct in6_addr *);
<netinet/in.h> int IN6_IS_ADDR_MC_SITELOCAL(const struct in6_addr *);
<netinet/in.h> int IN6_IS_ADDR_MULTICAST(const struct in6_addr *);
<netinet/in.h> int IN6_IS_ADDR_SITELOCAL(const struct in6_addr *);
<netinet/in.h> int IN6_IS_ADDR_UNSPECIFIED(const struct in6_addr *);
<netinet/in.h>
int IN6_IS_ADDR_V4COMPAT(const struct in6_addr *);
<netinet/in.h> int IN6_IS_ADDR_V4MAPPED(const struct in6_addr *);

```

## 8. Security Considerations

IPv6 provides a number of new security mechanisms, many of which need to be accessible to applications. Companion memos detailing the extensions to the socket interfaces to support IPv6 security are being written.

## 9. Year 2000 Considerations

There are no issues for this draft concerning the Year 2000 issue regarding the use of dates.

INTERNET-DRAFT draft-ietf-ipngwg-bsd-api-new-06.txt January 1999

### Changes From RFC 2133

Changes made in the March 1998 Edition (-01 draft):

Changed all "hostname" to "nodename" for consistency with other IPv6 documents.

Section 3.3: changed comment for sin6\_flowinfo to be "traffic class & flow info" and updated corresponding text description to current definition of these two fields.

Section 3.10 ("Portability Additions") is new.

Section 6: a new paragraph was added reiterating that the existing gethostbyname() and gethostbyaddr() are not changed.

Section 6.1: change gethostbyname3() to getnodebyname(). Add AI\_DEFAULT to handle majority of applications. Renamed AI\_V6ADDRCONFIG to AI\_ADDRCONFIG and define it for A records and IPv4 addresses too. Defined exactly what getnodebyname() must return if the name argument is a numeric address string.

Section 6.2: change gethostbyaddr() to getnodebyaddr(). Reword items 2 and 3 in the description of how to handle IPv4-mapped and IPv4-compatible addresses to "lookup a name" for a given address, instead of specifying what type of DNS query to issue.

Section 6.3: added two more requirements to getaddrinfo().

Section 7: added the following constants to the list for <netdb.h>: AI\_ADDRCONFIG, AI\_ALL, and AI\_V4MAPPED. Add union sockaddr\_union and SA\_LEN to the lists for <sys/socket.h>.

Updated references.

Changes made in the November 1997 Edition (-00 draft):

The data types have been changed to conform with Draft 6.6 of the

Posix 1003.1g standard.

Section 3.2: data type of `s6_addr` changed to `uint8_t`.

Section 3.3: data type of `sin6_family` changed to `sa_family_t`. data type of `sin6_port` changed to `in_port_t`, data type of `sin6_flowinfo` changed to `uint32_t`.

Section 3.4: same as Section 3.3, plus data type of `sin6_len` changed to `uint8_t`.

Section 6.2: first argument of `gethostbyaddr()` changed from `const char *` to `const void *` and second argument changed from `int` to `size_t`.

Section 6.4: second argument of `getnameinfo()` changed from `size_t` to `socklen_t`.

The wording was changed when new structures were defined, to be more explicit as to which header must be included to define the structure:

draft-ietf-ipng-bsd-api-new-06.txt Expires June 1999 [Page 30]

INTERNET-DRAFT draft-ietf-ipngwg-bsd-api-new-06.txt  
January 1999

Section 3.2 (`in6_addr{}`), Section 3.3 (`sockaddr_in6{}`), Section 3.4 (`sockaddr_in6{}`), Section 4.3 (`if_nameindex{}`), Section 5.3 (`ipv6_mreq{}`), and Section 6.3 (`addrinfo{}`).

Section 4: `NET_RT_LIST` changed to `NET_RT_IFLIST`.

Section 5.1: The `IPV6_ADDRFORM` socket option was removed.

Section 5.3: Added a note that an option value other than 0 or 1 for `IPV6_MULTICAST_LOOP` returns an error. Added a note that `IPV6_MULTICAST_IF`, `IPV6_MULTICAST_HOPS`, and `IPV6_MULTICAST_LOOP` can also be used with `getsockopt()`, but `IPV6_ADD_MEMBERSHIP` and `IPV6_DROP_MEMBERSHIP` cannot be used with `getsockopt()`.

Section 6.1: Removed the description of `gethostbyname2()` and its associated `RES_USE_INET6` option, replacing it with `gethostbyname3()`.

Section 6.2: Added requirement that `gethostbyaddr()` be thread safe. Reworded step 4 to avoid using the `RES_USE_INET6` option.



Section 6.3: Added the requirement that `getaddrinfo()` and `getnameinfo()` be thread safe. Added the `AI_NUMERICHOST` flag.

Section 6.6: Added clarification about `IN6_IS_ADDR_LINKLOCAL` and `IN6_IS_ADDR_SITELOCAL` macros.

Changes made to the draft -01 specification Sept 98

Changed priority to traffic class in the spec.

Added the need for scope identification in section 2.1.

Added `sin6_scope_id` to struct `sockaddr_in6` in sections 3.3 and 3.4.

Changed 3.10 to use generic storage structure to support holding IPv6 addresses and removed the `SA_LEN` macro.

Distinguished between invalid input parameters and system failures for Interface Identification in Section 4.1 and 4.2.

Added defaults for multicast operations in section 5.2 and changed the names from `ADD` to `JOIN` and `DROP` to `LEAVE` to be consistent with IPv6 multicast terminology.

Changed `getnodebyname` to `getipnodebyname`, `getnodebyaddr` to `getipnodebyaddr`, and added MT safe error code to function parameters in section 6.

Moved `freehostent` to its own sub-section after `getipnodebyaddr` now 6.3 (so this bumps all remaining sections in section 6.

Clarified the use of `AI_ALL` and `AI_V4MAPPED` that these are dependent on the `AF` parameter and must be used as a conjunction in section 6.1.

Removed the restriction that literal addresses cannot be used with a `flags` argument in section 6.1.

Added Year 2000 Section to the draft

draft-ietf-ipng-bsd-api-new-06.txt Expires June 1999 [Page 31]

INTERNET-DRAFT draft-ietf-ipngwg-bsd-api-new-06.txt January 1999

Deleted Reference to the following because the attached is deleted from the ID directory and has expired. But the logic from the aforementioned draft still applies, so that was kept in Section 6.2 bullets after 3rd paragraph.

[7] P. Vixie, "Reverse Name Lookups of Encapsulated IPv4 Addresses in IPv6", Internet-Draft, <draft-vixie-ipng-ipv4ptr-00.txt>, May 1996.

Deleted the following reference as it is no longer referenced.

And the draft has expired.

[3] D. McDonald, "A Simple IP Security API Extension to BSD Sockets", Internet-Draft, <draft-mcdonald-simple-ipsec-api-01.txt>, March 1997.

Deleted the following reference as it is no longer referenced.

[4] C. Metz, "Network Security API for Sockets", Internet-Draft, <draft-metz-net-security-api-01.txt>, January 1998.

Update current references to current status.

Added alignment notes for in6\_addr and sin6\_addr.

Clarified further that AI\_V4MAPPED must be used with a dotted IPv4 literal address for getipnodebyname(), when address family is AF\_INET6.

Added text to clarify "::" and "::1" when used by getipnodebyaddr().

## Acknowledgments

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The `getaddrinfo()` and `getnameinfo()` functions are taken from an earlier Internet Draft by Keith Sklower. As noted in that draft, William Durst, Steven Wise, Michael Karels, and Eric Allman provided many useful discussions on the subject of protocol-independent name-to-address translation, and reviewed early versions of Keith Sklower's original proposal. Eric Allman implemented the first prototype of `getaddrinfo()`. The observation that specifying the pair of name and service would suffice for connecting to a service independent of protocol details was made by Marshall Rose in a proposal to X/Open for a "Uniform Network Interface".

Craig Metz, Jack McCann, Erik Nordmark, Tim Hartrick, and Mukesh Kacker made many contributions to this document. Ramesh Govindan made a number

draft-ietf-ipng-bsd-api-new-06.txt Expires June 1999 [Page 32]

INTERNET-DRAFT draft-ietf-ipngwg-bsd-api-new-06.txt January 1999

of contributions and co-authored an earlier version of this memo.

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- [1] S. Deering, R. Hinden, "Internet Protocol, Version 6 (IPv6) Specification", RFC 2460 Draft Standard.
- [2] R. Hinden, S. Deering, "IP Version 6 Addressing Architecture", RFC 2373, July 1998 Draft Standard.
- [3] IEEE, "Protocol Independent Interfaces", IEEE Std 1003.1g, DRAFT 6.6, March 1997.
- [4] W. Stevens, M. Thomas, "Advanced Sockets API for IPv6", RFC 2292, February 1998.

## Authors' Addresses

Robert E. Gilligan  
FreeGate Corporation

1208 E. Arques Ave.  
Sunnyvale, CA 94086  
Phone: +1 408 617 1004  
Email: gilligan@freegate.net

Susan  
Thomson  
Bell Communications Research  
MRE 2P-343, 445 South Street  
Morristown, NJ 07960  
Telephone: +1 201 829 4514  
Email: set@thumper.bellcore.com

Jim Bound  
Compaq Computer Corporation  
110 Spitbrook Road ZK3-3/U14  
Nashua, NH 03062-2698  
Phone: +1 603 884 0400  
Email: bound@zk3.dec.com

W. Richard Stevens  
1202 E. Paseo del Zorro  
Tucson, AZ 85718-2826  
Phone: +1 520 297 9416  
Email: rstevens@kohala.com

draft-ietf-ipng-bsd-api-new-06.txt Expires June 1999 [Page 33]  
./CHANGES X  
2000,2001,2002,2003,2004,2005,2006,2007,2008,2009,2010,2011,2012,2013,2014,2015,2016,2017,2018,2019,2020,2021,2022  
./CONTRIBUTING X 2018,2019,2020,2021,2022  
./CONTRIBUTING.md MKD 2018,2019,2020,2021,2022  
./COPYRIGHT TXT.TOP  
1996,1997,1998,1999,2000,2001,2002,2003,2004,2005,2006,2007,2008,2009,2010,2011,2012,2013,2014,2015,2016,2017,2018,2019,2020,2021,2022  
./EXCLUDED X 2017,2018,2019,2020,2021,2022  
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./HISTORY.md MKD 2017,2018,2019,2020,2021,2022  
./Kyuafile X 2017,2018,2019,2020,2021,2022

./LICENSE X 2016,2018,2019,2020,2021,2022

./Makefile.in MAKE  
1998,1999,2000,2001,2002,2004,2005,2006,2007,2008,2009,2011,2012,2013,2014,2015,2016,2017,2018,2019,2020,2021,2022

./OPTIONS X 2017,2018,2019,2020,2021,2022

./OPTIONS.md MKD 2017,2018,2019,2020,2021,2022

./README X  
1999,2000,2001,2002,2003,2004,2005,2006,2007,2008,2009,2010,2011,2012,2013,2014,2015,2016,2017,2018,2019,2020,2021,2022

./README.md MKD 2017,2018,2019,2020,2021,2022

./acconfig.h C 1999,2000,2001,2002,2003,2004,2005,2007,2008,2012,2014,2016,2018,2019,2020,2021,2022

./aclocal.m4 X 1999,2000,2001,2012,2014,2018,2019,2020,2021,2022

./autogen.sh SH 2015,2016,2018,2019,2020,2021,2022

./bin/Makefile.in MAKE 1998,1999,2000,2001,2004,2007,2009,2012,2013,2014,2016,2018,2019,2020,2021,2022

./bin/check/Makefile.in MAKE  
2000,2001,2002,2003,2004,2005,2006,2007,2009,2012,2014,2015,2016,2018,2019,2020,2021,2022

./bin/check/check-tool.c C  
2000,2001,2002,2004,2005,2006,2007,2008,2009,2010,2011,2012,2013,2014,2015,2016,2017,2018,2019,2020,2021,2022

./bin/check/check-tool.h C 2000,2001,2002,2004,2005,2007,2010,2011,2013,2014,2016,2018,2019,2020,2021,2022

./bin/check/named-checkconf.8 MAN DOCBOOK

./bin/check/named-checkconf.c C  
1999,2000,2001,2002,2004,2005,2006,2007,2009,2010,2011,2012,2013,2014,2015,2016,2018,2019,2020,2021,2022

./bin/check/named-checkconf.docbook SGML  
2000,2001,2002,2004,2005,2007,2009,2014,2015,2016,2018,2019,2020,2021,2022

./bin/check/named-checkconf.html HTML DOCBOOK

./bin/check/named-checkzone.8 MAN DOCBOOK

./bin/check/named-checkzone.c C  
1999,2000,2001,2002,2003,2004,2005,2006,2007,2008,2009,2010,2011,2012,2013,2014,2015,2016,2018,2019,2020,2021,2022

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 ./bin/tests/optional/log\_test.c C 1999,2000,2001,2004,2007,2011,2014,2015,2016,2018,2019,2020,2021,2022  
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 ./bin/tests/optional/rwlock\_test.c C  
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./bin/tests/optional/shutdown\_test.c C  
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./bin/tests/optional/zone\_test.c C  
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./bin/tests/pkcs11/Makefile.in MAKE 2014,2016,2018,2019,2020,2021,2022

./bin/tests/pkcs11/README X 2014,2016,2018,2019,2020,2021,2022

./bin/tests/pkcs11/benchmarks/Makefile.in MAKE 2014,2016,2017,2018,2019,2020,2021,2022

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./bin/tests/pkcs11/benchmarks/find.c C 2014,2015,2016,2018,2019,2020,2021,2022

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./bin/tests/pkcs11/benchmarks/random.c C 2014,2015,2016,2018,2019,2020,2021,2022

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./bin/tests/pkcs11/benchmarks/sha1.c C 2014,2015,2016,2018,2019,2020,2021,2022

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./bin/tests/startperf/clean.sh SH 2011,2012,2016,2018,2019,2020,2021,2022

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./bin/tests/startperf/setup.sh SH 2011,2012,2016,2018,2019,2020,2021,2022

./bin/tests/startperf/smallzone.db ZONE 2011,2016,2018,2019,2020,2021,2022

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./bin/tests/system/acl/clean.sh SH 2008,2012,2014,2015,2016,2017,2018,2019,2020,2021,2022

./bin/tests/system/acl/ns2/named1.conf.in CONF-C 2018,2019,2020,2021,2022

./bin/tests/system/acl/ns2/named2.conf.in CONF-C 2018,2019,2020,2021,2022

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./bin/tests/system/acl/ns2/named4.conf.in CONF-C 2018,2019,2020,2021,2022

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./bin/tests/system/acl/ns3/example.db ZONE 2017,2018,2019,2020,2021,2022

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./bin/tests/system/acl/ns4/existing.db ZONE 2017,2018,2019,2020,2021,2022

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 ./bin/tests/system/additional/ns1/root.db ZONE 2019,2020,2021,2022  
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 ./bin/tests/system/additional/tests.sh SH 2013,2016,2017,2018,2019,2020,2021,2022  
 ./bin/tests/system/addzone/clean.sh SH 2010,2012,2013,2014,2015,2016,2017,2018,2019,2020,2021,2022  
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 ./bin/tests/system/addzone/ns1/named.conf.in CONF-C 2018,2019,2020,2021,2022  
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 ./bin/tests/system/addzone/ns2/redirect.db ZONE 2016,2018,2019,2020,2021,2022  
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 ./bin/tests/system/addzone/tests.sh SH 2010,2011,2012,2013,2014,2015,2016,2017,2018,2019,2020,2021,2022  
 ./bin/tests/system/allow-query/clean.sh SH 2018,2019,2020,2021,2022  
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./bin/tests/system/allow-query/ns3/named.conf.in CONF-C 2018,2019,2020,2021,2022  
./bin/tests/system/allow-query/setup.sh SH 2018,2019,2020,2021,2022  
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./bin/tests/system/ans.pl PERL 2011,2012,2014,2016,2017,2018,2019,2020,2021,2022  
./bin/tests/system/auth/clean.sh SH 2018,2019,2020,2021,2022  
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./bin/tests/system/auth/ns1/example.net.db ZONE 2018,2019,2020,2021,2022  
./bin/tests/system/auth/ns1/named.conf.in CONF-C 2018,2019,2020,2021,2022  
./bin/tests/system/auth/ns2/named.conf.in CONF-C 2018,2019,2020,2021,2022  
./bin/tests/system/auth/setup.sh SH 2018,2019,2020,2021,2022  
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./bin/tests/system/autosign/clean.sh SH 2009,2010,2011,2012,2013,2014,2015,2016,2017,2018,2019,2020,2021,2022  
./bin/tests/system/autosign/ns1/keygen.sh SH 2009,2010,2011,2012,2014,2016,2018,2019,2020,2021,2022  
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./bin/tests/system/autosign/ns1/root.db.in ZONE 2009,2010,2016,2018,2019,2020,2021,2022  
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 ./bin/tests/system/autosign/ns2/example.db.in ZONE 2009,2010,2016,2018,2019,2020,2021,2022  
 ./bin/tests/system/autosign/ns2/insecure.secure.example.db ZONE 2009,2016,2018,2019,2020,2021,2022  
 ./bin/tests/system/autosign/ns2/keygen.sh SH 2009,2010,2011,2012,2014,2015,2016,2018,2019,2020,2021,2022  
 ./bin/tests/system/autosign/ns2/named.conf.in CONF-C 2018,2019,2020,2021,2022  
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 ./bin/tests/system/autosign/ns3/insecure.example.db ZONE 2009,2016,2018,2019,2020,2021,2022  
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 2009,2010,2011,2012,2014,2015,2016,2017,2018,2019,2020,2021,2022  
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 ./bin/tests/system/autosign/ns3/nsec3.optout.example.db.in ZONE 2009,2016,2018,2019,2020,2021,2022  
 ./bin/tests/system/autosign/ns3/oldsigs.example.db.in ZONE 2010,2016,2018,2019,2020,2021,2022  
 ./bin/tests/system/autosign/ns3/optout.example.db.in ZONE 2009,2016,2018,2019,2020,2021,2022  
 ./bin/tests/system/autosign/ns3/optout.nsec3.example.db.in ZONE 2009,2016,2018,2019,2020,2021,2022  
 ./bin/tests/system/autosign/ns3/optout.optout.example.db.in ZONE 2009,2016,2018,2019,2020,2021,2022  
 ./bin/tests/system/autosign/ns3/rsasha256.example.db.in ZONE 2009,2016,2018,2019,2020,2021,2022  
 ./bin/tests/system/autosign/ns3/rsasha512.example.db.in ZONE 2009,2016,2018,2019,2020,2021,2022  
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 ./bin/tests/system/autosign/ns3/secure.optout.example.db.in ZONE 2009,2016,2018,2019,2020,2021,2022  
 ./bin/tests/system/autosign/ns3/sync.example.db.in ZONE 2015,2016,2018,2019,2020,2021,2022  
 ./bin/tests/system/autosign/ns3/ttl1.example.db.in ZONE 2011,2016,2018,2019,2020,2021,2022  
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 ./bin/tests/system/autosign/ns5/named.conf.in CONF-C 2018,2019,2020,2021,2022  
 ./bin/tests/system/autosign/prereq.sh SH 2009,2010,2012,2014,2016,2018,2019,2020,2021,2022  
 ./bin/tests/system/autosign/setup.sh SH 2009,2010,2012,2014,2016,2018,2019,2020,2021,2022

./bin/tests/system/autosign/tests.sh SH 2009,2010,2011,2012,2013,2014,2015,2016,2017,2018,2019,2020,2021,2022  
 ./bin/tests/system/builtin/clean.sh SH 2014,2016,2018,2019,2020,2021,2022  
 ./bin/tests/system/builtin/ns1/named.conf.in CONF-C 2018,2019,2020,2021,2022  
 ./bin/tests/system/builtin/ns2/named.conf.in CONF-C 2018,2019,2020,2021,2022  
 ./bin/tests/system/builtin/ns3/named.conf.in CONF-C 2018,2019,2020,2021,2022  
 ./bin/tests/system/builtin/setup.sh SH 2018,2019,2020,2021,2022  
 ./bin/tests/system/builtin/tests.sh SH 2011,2012,2014,2015,2016,2018,2019,2020,2021,2022  
 ./bin/tests/system/cachecclean/clean.sh SH 2001,2004,2007,2011,2012,2014,2015,2016,2018,2019,2020,2021,2022  
 ./bin/tests/system/cachecclean/dig.batch X 2001,2018,2019,2020,2021,2022  
 ./bin/tests/system/cachecclean/knowngood.dig.out X 2001,2018,2019,2020,2021,2022  
 ./bin/tests/system/cachecclean/ns1/example.db ZONE 2001,2004,2007,2012,2016,2018,2019,2020,2021,2022  
 ./bin/tests/system/cachecclean/ns1/expire-test.db ZONE 2014,2016,2018,2019,2020,2021,2022  
 ./bin/tests/system/cachecclean/ns1/flushtest.db ZONE 2011,2016,2018,2019,2020,2021,2022  
 ./bin/tests/system/cachecclean/ns1/named.conf.in CONF-C 2018,2019,2020,2021,2022  
 ./bin/tests/system/cachecclean/ns2/named.conf.in CONF-C 2018,2019,2020,2021,2022  
 ./bin/tests/system/cachecclean/setup.sh SH 2018,2019,2020,2021,2022  
 ./bin/tests/system/cachecclean/tests.sh SH 2001,2004,2007,2011,2012,2013,2014,2016,2018,2019,2020,2021,2022  
 ./bin/tests/system/case/clean.sh SH 2013,2014,2015,2016,2018,2019,2020,2021,2022  
 ./bin/tests/system/case/dynamic.good X 2015,2018,2019,2020,2021,2022  
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 ./bin/tests/system/case/ns1/example.db ZONE 2013,2016,2018,2019,2020,2021,2022  
 ./bin/tests/system/case/ns1/named.conf.in CONF-C 2018,2019,2020,2021,2022  
 ./bin/tests/system/case/ns2/named.conf.in CONF-C 2018,2019,2020,2021,2022  
 ./bin/tests/system/case/postns1.good X 2015,2018,2019,2020,2021,2022  
 ./bin/tests/system/case/postupdate.good X 2015,2018,2019,2020,2021,2022  
 ./bin/tests/system/case/setup.sh SH 2015,2016,2018,2019,2020,2021,2022  
 ./bin/tests/system/case/tests.sh SH 2013,2014,2015,2016,2018,2019,2020,2021,2022  
 ./bin/tests/system/catz/clean.sh SH 2016,2018,2019,2020,2021,2022  
 ./bin/tests/system/catz/ns1/catalog.example.db.in ZONE 2016,2018,2019,2020,2021,2022  
 ./bin/tests/system/catz/ns1/named.conf.in CONF-C 2016,2017,2018,2019,2020,2021,2022  
 ./bin/tests/system/catz/ns2/named.conf.in CONF-C 2016,2017,2018,2019,2020,2021,2022  
 ./bin/tests/system/catz/ns3/dom5.example.db ZONE 2016,2018,2019,2020,2021,2022  
 ./bin/tests/system/catz/ns3/dom6.example.db ZONE 2016,2018,2019,2020,2021,2022  
 ./bin/tests/system/catz/ns3/named.conf.in CONF-C 2016,2018,2019,2020,2021,2022  
 ./bin/tests/system/catz/setup.sh SH 2016,2018,2019,2020,2021,2022  
 ./bin/tests/system/catz/tests.sh SH 2016,2017,2018,2019,2020,2021,2022  
 ./bin/tests/system/chain/README TXT.BRIEF 2017,2018,2019,2020,2021,2022  
 ./bin/tests/system/chain/ans3/ans.pl PERL 2017,2018,2019,2020,2021,2022  
 ./bin/tests/system/chain/ans4/README.anspy TXT.BRIEF 2017,2018,2019,2020,2021,2022  
 ./bin/tests/system/chain/ans4/ans.py PYTHON 2017,2018,2019,2020,2021,2022  
 ./bin/tests/system/chain/clean.sh SH 2011,2012,2014,2015,2016,2017,2018,2019,2020,2021,2022  
 ./bin/tests/system/chain/ns1/named.conf.in CONF-C 2018,2019,2020,2021,2022  
 ./bin/tests/system/chain/ns1/root.db ZONE 2011,2016,2017,2018,2019,2020,2021,2022  
 ./bin/tests/system/chain/ns2/example.db ZONE 2011,2016,2017,2018,2019,2020,2021,2022  
 ./bin/tests/system/chain/ns2/generic.db ZONE 2017,2018,2019,2020,2021,2022  
 ./bin/tests/system/chain/ns2/named.conf.in CONF-C 2018,2019,2020,2021,2022  
 ./bin/tests/system/chain/ns2/sign.sh SH 2017,2018,2019,2020,2021,2022  
 ./bin/tests/system/chain/ns2/sub.db ZONE 2017,2018,2019,2020,2021,2022

./bin/tests/system/chain/ns5/named.conf.in CONF-C 2018,2019,2020,2021,2022  
./bin/tests/system/chain/ns5/sub.db ZONE 2017,2018,2019,2020,2021,2022  
./bin/tests/system/chain/ns7/named.conf.in CONF-C 2018,2019,2020,2021,2022  
./bin/tests/system/chain/ns7/root.hint ZONE 2017,2018,2019,2020,2021,2022  
./bin/tests/system/chain/prereq.sh SH 2017,2018,2019,2020,2021,2022  
./bin/tests/system/chain/setup.sh SH 2017,2018,2019,2020,2021,2022  
./bin/tests/system/chain/tests.sh SH 2011,2012,2016,2017,2018,2019,2020,2021,2022  
./bin/tests/system/checkconf/altdb.conf CONF-C 2014,2016,2018,2019,2020,2021,2022  
./bin/tests/system/checkconf/altdlz.conf CONF-C 2014,2016,2018,2019,2020,2021,2022  
./bin/tests/system/checkconf/bad-also-notify.conf CONF-C 2012,2013,2016,2018,2019,2020,2021,2022  
./bin/tests/system/checkconf/bad-catz-zone.conf CONF-C 2016,2018,2019,2020,2021,2022  
./bin/tests/system/checkconf/bad-dnssec.conf CONF-C 2012,2013,2016,2018,2019,2020,2021,2022  
./bin/tests/system/checkconf/bad-hint.conf CONF-C 2014,2016,2018,2019,2020,2021,2022  
./bin/tests/system/checkconf/bad-in-view-dup.conf CONF-C 2018,2019,2020,2021,2022  
./bin/tests/system/checkconf/bad-inline-slave.conf CONF-C 2013,2016,2018,2019,2020,2021,2022  
./bin/tests/system/checkconf/bad-ipv4-prefix-dotted1.conf CONF-C 2019,2020,2021,2022  
./bin/tests/system/checkconf/bad-ipv4-prefix2.conf CONF-C 2019,2020,2021,2022  
./bin/tests/system/checkconf/bad-keep-response-order.conf CONF-C 2015,2016,2018,2019,2020,2021,2022  
./bin/tests/system/checkconf/bad-lifetime.conf CONF-C 2014,2016,2018,2019,2020,2021,2022  
./bin/tests/system/checkconf/bad-lmdb-mapsize-bogus.conf CONF-C 2017,2018,2019,2020,2021,2022  
./bin/tests/system/checkconf/bad-lmdb-mapsize-toolarge.conf CONF-C 2017,2018,2019,2020,2021,2022  
./bin/tests/system/checkconf/bad-lmdb-mapsize-toosmall.conf CONF-C 2017,2018,2019,2020,2021,2022  
./bin/tests/system/checkconf/bad-lmdb-mapsize-unlimited.conf CONF-C 2017,2018,2019,2020,2021,2022  
./bin/tests/system/checkconf/bad-many.conf CONF-C 2005,2012,2015,2016,2018,2019,2020,2021,2022  
./bin/tests/system/checkconf/bad-master-request-ixfr.conf CONF-C 2014,2016,2018,2019,2020,2021,2022  
./bin/tests/system/checkconf/bad-maxttlmap.conf CONF-C 2014,2016,2018,2019,2020,2021,2022  
./bin/tests/system/checkconf/bad-noddns.conf CONF-C 2014,2016,2018,2019,2020,2021,2022  
./bin/tests/system/checkconf/bad-options-also-notify.conf CONF-C 2016,2018,2019,2020,2021,2022  
./bin/tests/system/checkconf/bad-rate-limit-acl.conf CONF-C 2016,2018,2019,2020,2021,2022  
./bin/tests/system/checkconf/bad-rate-limit-all-per-second.conf CONF-C 2016,2018,2019,2020,2021,2022  
./bin/tests/system/checkconf/bad-rate-limit-errors-per-second.conf CONF-C 2016,2018,2019,2020,2021,2022  
./bin/tests/system/checkconf/bad-rate-limit-ipv4-prefix-length.conf CONF-C 2016,2018,2019,2020,2021,2022  
./bin/tests/system/checkconf/bad-rate-limit-ipv6-prefix-length.conf CONF-C 2016,2018,2019,2020,2021,2022  
./bin/tests/system/checkconf/bad-rate-limit-max-table-size.conf CONF-C 2016,2018,2019,2020,2021,2022  
./bin/tests/system/checkconf/bad-rate-limit-nodata-per-second.conf CONF-C 2016,2018,2019,2020,2021,2022  
./bin/tests/system/checkconf/bad-rate-limit-nxdomain-per-second.conf CONF-C 2016,2018,2019,2020,2021,2022  
./bin/tests/system/checkconf/bad-rate-limit-qps-scale.conf CONF-C 2016,2018,2019,2020,2021,2022  
./bin/tests/system/checkconf/bad-rate-limit-referrals-per-second.conf CONF-C 2016,2018,2019,2020,2021,2022  
./bin/tests/system/checkconf/bad-rate-limit-responses-per-second.conf CONF-C 2016,2018,2019,2020,2021,2022  
./bin/tests/system/checkconf/bad-rate-limit-slip.conf CONF-C 2016,2018,2019,2020,2021,2022  
./bin/tests/system/checkconf/bad-rate-limit-window.conf CONF-C 2016,2018,2019,2020,2021,2022  
./bin/tests/system/checkconf/bad-rpz-zone.conf CONF-C 2016,2018,2019,2020,2021,2022  
./bin/tests/system/checkconf/bad-sharedwritable1.conf CONF-C 2014,2016,2018,2019,2020,2021,2022  
./bin/tests/system/checkconf/bad-sharedwritable2.conf CONF-C 2014,2016,2018,2019,2020,2021,2022  
./bin/tests/system/checkconf/bad-sharedzone1.conf CONF-C 2013,2016,2018,2019,2020,2021,2022  
./bin/tests/system/checkconf/bad-sharedzone2.conf CONF-C 2013,2016,2018,2019,2020,2021,2022  
./bin/tests/system/checkconf/bad-sharedzone3.conf CONF-C 2018,2019,2020,2021,2022  
./bin/tests/system/checkconf/bad-stub-masters-dialup.conf CONF-C 2018,2019,2020,2021,2022

./bin/tests/system/checkconf/bad-tsig.conf CONF-C 2012,2013,2016,2018,2019,2020,2021,2022  
./bin/tests/system/checkconf/bad-update-policy1.conf CONF-C 2018,2019,2020,2021,2022  
./bin/tests/system/checkconf/bad-update-policy10.conf CONF-C 2018,2019,2020,2021,2022  
./bin/tests/system/checkconf/bad-update-policy11.conf CONF-C 2018,2019,2020,2021,2022  
./bin/tests/system/checkconf/bad-update-policy12.conf CONF-C 2018,2019,2020,2021,2022  
./bin/tests/system/checkconf/bad-update-policy13.conf CONF-C 2018,2019,2020,2021,2022  
./bin/tests/system/checkconf/bad-update-policy14.conf CONF-C 2018,2019,2020,2021,2022  
./bin/tests/system/checkconf/bad-update-policy15.conf CONF-C 2018,2019,2020,2021,2022  
./bin/tests/system/checkconf/bad-update-policy2.conf CONF-C 2018,2019,2020,2021,2022  
./bin/tests/system/checkconf/bad-update-policy3.conf CONF-C 2018,2019,2020,2021,2022  
./bin/tests/system/checkconf/bad-update-policy4.conf CONF-C 2018,2019,2020,2021,2022  
./bin/tests/system/checkconf/bad-update-policy5.conf CONF-C 2018,2019,2020,2021,2022  
./bin/tests/system/checkconf/bad-update-policy6.conf CONF-C 2018,2019,2020,2021,2022  
./bin/tests/system/checkconf/bad-update-policy7.conf CONF-C 2018,2019,2020,2021,2022  
./bin/tests/system/checkconf/bad-update-policy8.conf CONF-C 2018,2019,2020,2021,2022  
./bin/tests/system/checkconf/bad-update-policy9.conf CONF-C 2018,2019,2020,2021,2022  
./bin/tests/system/checkconf/bad-view-also-notify.conf CONF-C 2016,2018,2019,2020,2021,2022  
./bin/tests/system/checkconf/check-dlv-ksk-key.conf CONF-C 2018,2019,2020,2021,2022  
./bin/tests/system/checkconf/check-dup-records-fail.conf CONF-C 2014,2016,2018,2019,2020,2021,2022  
./bin/tests/system/checkconf/check-dup-records.db ZONE 2014,2016,2018,2019,2020,2021,2022  
./bin/tests/system/checkconf/check-missing-zone.conf CONF-C 2020,2021,2022  
./bin/tests/system/checkconf/check-mx-cname-fail.conf CONF-C 2014,2016,2018,2019,2020,2021,2022  
./bin/tests/system/checkconf/check-mx-cname.db ZONE 2014,2016,2018,2019,2020,2021,2022  
./bin/tests/system/checkconf/check-mx-fail.conf CONF-C 2014,2016,2018,2019,2020,2021,2022  
./bin/tests/system/checkconf/check-mx.db ZONE 2014,2016,2018,2019,2020,2021,2022  
./bin/tests/system/checkconf/check-names-fail.conf CONF-C 2014,2016,2018,2019,2020,2021,2022  
./bin/tests/system/checkconf/check-names.db ZONE 2014,2016,2018,2019,2020,2021,2022  
./bin/tests/system/checkconf/check-root-ksk-2010.conf CONF-C 2018,2019,2020,2021,2022  
./bin/tests/system/checkconf/check-root-ksk-2017.conf CONF-C 2018,2019,2020,2021,2022  
./bin/tests/system/checkconf/check-root-ksk-both.conf CONF-C 2018,2019,2020,2021,2022  
./bin/tests/system/checkconf/check-srv-cname-fail.conf CONF-C 2014,2016,2018,2019,2020,2021,2022  
./bin/tests/system/checkconf/check-srv-cname.db ZONE 2014,2016,2018,2019,2020,2021,2022  
./bin/tests/system/checkconf/clean.sh SH 2011,2012,2013,2014,2016,2018,2019,2020,2021,2022  
./bin/tests/system/checkconf/dlz-bad.conf CONF-C 2012,2013,2016,2018,2019,2020,2021,2022  
./bin/tests/system/checkconf/dnssec.1 CONF-C 2011,2016,2018,2019,2020,2021,2022  
./bin/tests/system/checkconf/dnssec.2 CONF-C 2011,2016,2018,2019,2020,2021,2022  
./bin/tests/system/checkconf/dnssec.3 CONF-C 2011,2016,2017,2018,2019,2020,2021,2022  
./bin/tests/system/checkconf/good-acl.conf CONF-C 2016,2018,2019,2020,2021,2022  
./bin/tests/system/checkconf/good-class.conf CONF-C 2015,2016,2018,2019,2020,2021,2022  
./bin/tests/system/checkconf/good-dlv-dlv.example.com.conf CONF-C 2017,2018,2019,2020,2021,2022  
./bin/tests/system/checkconf/good-dup-managed-key.conf CONF-C 2019,2020,2021,2022  
./bin/tests/system/checkconf/good-dup-trusted-key.conf CONF-C 2019,2020,2021,2022  
./bin/tests/system/checkconf/good-lmdb-mapsize-largest.conf CONF-C 2017,2018,2019,2020,2021,2022  
./bin/tests/system/checkconf/good-lmdb-mapsize-smallest.conf CONF-C 2017,2018,2019,2020,2021,2022  
./bin/tests/system/checkconf/good-nested.conf CONF-C 2015,2016,2018,2019,2020,2021,2022  
./bin/tests/system/checkconf/good-options-also-notify.conf CONF-C 2016,2018,2019,2020,2021,2022  
./bin/tests/system/checkconf/good-response-dot.conf CONF-C 2017,2018,2019,2020,2021,2022  
./bin/tests/system/checkconf/good-update-policy1.conf CONF-C 2018,2019,2020,2021,2022

./bin/tests/system/checkconf/good-update-policy10.conf CONF-C 2018,2019,2020,2021,2022  
 ./bin/tests/system/checkconf/good-update-policy11.conf CONF-C 2018,2019,2020,2021,2022  
 ./bin/tests/system/checkconf/good-update-policy12.conf CONF-C 2018,2019,2020,2021,2022  
 ./bin/tests/system/checkconf/good-update-policy2.conf CONF-C 2018,2019,2020,2021,2022  
 ./bin/tests/system/checkconf/good-update-policy3.conf CONF-C 2018,2019,2020,2021,2022  
 ./bin/tests/system/checkconf/good-update-policy4.conf CONF-C 2018,2019,2020,2021,2022  
 ./bin/tests/system/checkconf/good-update-policy5.conf CONF-C 2018,2019,2020,2021,2022  
 ./bin/tests/system/checkconf/good-update-policy6.conf CONF-C 2018,2019,2020,2021,2022  
 ./bin/tests/system/checkconf/good-update-policy7.conf CONF-C 2018,2019,2020,2021,2022  
 ./bin/tests/system/checkconf/good-update-policy8.conf CONF-C 2018,2019,2020,2021,2022  
 ./bin/tests/system/checkconf/good-update-policy9.conf CONF-C 2018,2019,2020,2021,2022  
 ./bin/tests/system/checkconf/good-view-also-notify.conf CONF-C 2016,2018,2019,2020,2021,2022  
 ./bin/tests/system/checkconf/good.conf CONF-C  
 2005,2007,2010,2011,2012,2013,2014,2015,2016,2017,2018,2019,2020,2021,2022  
 ./bin/tests/system/checkconf/hint-nofile.conf CONF-C 2013,2016,2018,2019,2020,2021,2022  
 ./bin/tests/system/checkconf/in-view-good.conf CONF-C 2015,2016,2018,2019,2020,2021,2022  
 ./bin/tests/system/checkconf/inline-bad.conf CONF-C 2013,2016,2018,2019,2020,2021,2022  
 ./bin/tests/system/checkconf/inline-good.conf CONF-C 2013,2016,2018,2019,2020,2021,2022  
 ./bin/tests/system/checkconf/inline-no.conf CONF-C 2013,2016,2018,2019,2020,2021,2022  
 ./bin/tests/system/checkconf/max-cache-size-good.conf CONF-C 2015,2016,2018,2019,2020,2021,2022  
 ./bin/tests/system/checkconf/max-ttl.conf CONF-C 2014,2016,2018,2019,2020,2021,2022  
 ./bin/tests/system/checkconf/maxttl-bad.conf CONF-C 2014,2016,2018,2019,2020,2021,2022  
 ./bin/tests/system/checkconf/maxttl-bad.db ZONE 2014,2016,2018,2019,2020,2021,2022  
 ./bin/tests/system/checkconf/maxttl.db ZONE 2014,2016,2018,2019,2020,2021,2022  
 ./bin/tests/system/checkconf/notify.conf CONF-C 2014,2016,2018,2019,2020,2021,2022  
 ./bin/tests/system/checkconf/portrange-good.conf CONF-C 2015,2016,2018,2019,2020,2021,2022  
 ./bin/tests/system/checkconf/range.conf CONF-C 2013,2016,2018,2019,2020,2021,2022  
 ./bin/tests/system/checkconf/shared.example.db ZONE 2015,2016,2018,2019,2020,2021,2022  
 ./bin/tests/system/checkconf/tests.sh SH  
 2005,2007,2010,2011,2012,2013,2014,2015,2016,2017,2018,2019,2020,2021,2022  
 ./bin/tests/system/checkconf/view-class-any1.conf CONF-C 2016,2018,2019,2020,2021,2022  
 ./bin/tests/system/checkconf/view-class-any2.conf CONF-C 2016,2018,2019,2020,2021,2022  
 ./bin/tests/system/checkconf/view-class-in1.conf CONF-C 2016,2018,2019,2020,2021,2022  
 ./bin/tests/system/checkconf/view-class-in2.conf CONF-C 2016,2018,2019,2020,2021,2022  
 ./bin/tests/system/checkconf/warn-address-prefix-length-mismatch.conf CONF-C 2020,2021,2022  
 ./bin/tests/system/checkconf/warn-dlv-auto.conf CONF-C 2017,2018,2019,2020,2021,2022  
 ./bin/tests/system/checkconf/warn-dlv-dlv.isc.org.conf CONF-C 2017,2018,2019,2020,2021,2022  
 ./bin/tests/system/checkconf/warn-duplicate-key.conf CONF-C 2019,2020,2021,2022  
 ./bin/tests/system/checkconf/warn-duplicate-root-key.conf CONF-C 2019,2020,2021,2022  
 ./bin/tests/system/checkconf/warn-keydir.conf CONF-C 2013,2016,2018,2019,2020,2021,2022  
 ./bin/tests/system/checkconf/warn-validation-auto-key.conf CONF-C 2019,2020,2021,2022  
 ./bin/tests/system/checkds/clean.sh SH 2012,2013,2014,2016,2018,2019,2020,2021,2022  
 ./bin/tests/system/checkds/dig.bat BAT 2016,2018,2019,2020,2021,2022  
 ./bin/tests/system/checkds/dig.pl PERL 2014,2016,2018,2019,2020,2021,2022  
 ./bin/tests/system/checkds/dig.sh SH 2012,2013,2016,2018,2019,2020,2021,2022  
 ./bin/tests/system/checkds/missing.example.dlv.example.dlv.db X 2012,2018,2019,2020,2021,2022  
 ./bin/tests/system/checkds/missing.example.dnskey.db X 2012,2018,2019,2020,2021,2022  
 ./bin/tests/system/checkds/missing.example.ds.db X 2012,2018,2019,2020,2021,2022



./bin/tests/system/checkds/none.example.dlv.example.dlv.db X 2012,2018,2019,2020,2021,2022  
 ./bin/tests/system/checkds/none.example.dnskey.db X 2012,2018,2019,2020,2021,2022  
 ./bin/tests/system/checkds/none.example.ds.db X 2012,2018,2019,2020,2021,2022  
 ./bin/tests/system/checkds/ok.example.dlv.example.dlv.db X 2012,2018,2019,2020,2021,2022  
 ./bin/tests/system/checkds/ok.example.dnskey.db X 2012,2018,2019,2020,2021,2022  
 ./bin/tests/system/checkds/ok.example.ds.db X 2012,2018,2019,2020,2021,2022  
 ./bin/tests/system/checkds/tests.sh SH 2012,2013,2014,2016,2018,2019,2020,2021,2022  
 ./bin/tests/system/checkds/wrong.example.dlv.example.dlv.db X 2012,2018,2019,2020,2021,2022  
 ./bin/tests/system/checkds/wrong.example.dnskey.db X 2012,2018,2019,2020,2021,2022  
 ./bin/tests/system/checkds/wrong.example.ds.db X 2012,2018,2019,2020,2021,2022  
 ./bin/tests/system/checknames/clean.sh SH 2004,2007,2012,2014,2015,2016,2018,2019,2020,2021,2022  
 ./bin/tests/system/checknames/ns1/fail.example.db.in ZONE 2004,2007,2016,2018,2019,2020,2021,2022  
 ./bin/tests/system/checknames/ns1/fail.update.db.in ZONE 2004,2007,2016,2018,2019,2020,2021,2022  
 ./bin/tests/system/checknames/ns1/ignore.example.db.in ZONE 2004,2007,2016,2018,2019,2020,2021,2022  
 ./bin/tests/system/checknames/ns1/ignore.update.db.in ZONE 2004,2007,2016,2018,2019,2020,2021,2022  
 ./bin/tests/system/checknames/ns1/named.conf.in CONF-C 2018,2019,2020,2021,2022  
 ./bin/tests/system/checknames/ns1/root.db ZONE 2004,2007,2016,2018,2019,2020,2021,2022  
 ./bin/tests/system/checknames/ns1/warn.example.db.in ZONE 2004,2007,2016,2018,2019,2020,2021,2022  
 ./bin/tests/system/checknames/ns1/warn.update.db.in ZONE 2004,2007,2016,2018,2019,2020,2021,2022  
 ./bin/tests/system/checknames/ns2/named.conf.in CONF-C 2018,2019,2020,2021,2022  
 ./bin/tests/system/checknames/ns2/root.hints ZONE 2004,2007,2016,2018,2019,2020,2021,2022  
 ./bin/tests/system/checknames/ns3/named.conf.in CONF-C 2018,2019,2020,2021,2022  
 ./bin/tests/system/checknames/ns3/root.hints ZONE 2004,2007,2016,2018,2019,2020,2021,2022  
 ./bin/tests/system/checknames/ns4/master-ignore.update.db.in ZONE 2014,2016,2018,2019,2020,2021,2022  
 ./bin/tests/system/checknames/ns4/named.conf.in CONF-C 2018,2019,2020,2021,2022  
 ./bin/tests/system/checknames/ns4/root.hints ZONE 2014,2016,2018,2019,2020,2021,2022  
 ./bin/tests/system/checknames/setup.sh SH 2004,2007,2012,2014,2016,2018,2019,2020,2021,2022  
 ./bin/tests/system/checknames/tests.sh SH 2004,2007,2012,2013,2014,2015,2016,2018,2019,2020,2021,2022  
 ./bin/tests/system/checkzone/clean.sh SH 2011,2012,2013,2014,2016,2018,2019,2020,2021,2022  
 ./bin/tests/system/checkzone/setup.sh SH 2014,2016,2018,2019,2020,2021,2022  
 ./bin/tests/system/checkzone/tests.sh SH 2011,2012,2013,2014,2015,2016,2017,2018,2019,2020,2021,2022  
 ./bin/tests/system/checkzone/zones/bad-badclass.raw X 2015,2018,2019,2020,2021,2022  
 ./bin/tests/system/checkzone/zones/bad-caa-rr.db ZONE 2015,2016,2018,2019,2020,2021,2022  
 ./bin/tests/system/checkzone/zones/bad-cdnskey.db ZONE 2019,2020,2021,2022  
 ./bin/tests/system/checkzone/zones/bad-cds.db ZONE 2019,2020,2021,2022  
 ./bin/tests/system/checkzone/zones/bad-dhcid.db ZONE 2019,2020,2021,2022  
 ./bin/tests/system/checkzone/zones/bad-dns-sd-reverse.db ZONE 2015,2016,2018,2019,2020,2021,2022  
 ./bin/tests/system/checkzone/zones/bad-eid.db ZONE 2019,2020,2021,2022  
 ./bin/tests/system/checkzone/zones/bad-generate-tkey.db ZONE 2018,2019,2020,2021,2022  
 ./bin/tests/system/checkzone/zones/bad-nimloc.db ZONE 2019,2020,2021,2022  
 ./bin/tests/system/checkzone/zones/bad-nsap-empty.db ZONE 2015,2016,2018,2019,2020,2021,2022  
 ./bin/tests/system/checkzone/zones/bad-nsap-odd-nibble.db ZONE 2015,2016,2018,2019,2020,2021,2022  
 ./bin/tests/system/checkzone/zones/bad-nsec3-padded.db ZONE 2014,2016,2018,2019,2020,2021,2022  
 ./bin/tests/system/checkzone/zones/bad-nsec3owner-padded.db ZONE 2014,2016,2018,2019,2020,2021,2022  
 ./bin/tests/system/checkzone/zones/bad-tkey.db ZONE 2018,2019,2020,2021,2022  
 ./bin/tests/system/checkzone/zones/bad-tsig.db ZONE 2018,2019,2020,2021,2022  
 ./bin/tests/system/checkzone/zones/bad-unspec.db ZONE 2015,2016,2018,2019,2020,2021,2022  
 ./bin/tests/system/checkzone/zones/bad1.db ZONE 2013,2016,2018,2019,2020,2021,2022

./bin/tests/system/checkzone/zones/bad2.db ZONE 2014,2016,2018,2019,2020,2021,2022  
 ./bin/tests/system/checkzone/zones/bad3.db ZONE 2015,2016,2018,2019,2020,2021,2022  
 ./bin/tests/system/checkzone/zones/bad4.db ZONE 2015,2016,2018,2019,2020,2021,2022  
 ./bin/tests/system/checkzone/zones/badttl.db ZONE 2014,2016,2018,2019,2020,2021,2022  
 ./bin/tests/system/checkzone/zones/crashzone.db ZONE 2016,2018,2019,2020,2021,2022  
 ./bin/tests/system/checkzone/zones/delegating-ns-address-below-dname.db ZONE 2017,2018,2019,2020,2021,2022  
 ./bin/tests/system/checkzone/zones/good-cdnskey.db ZONE 2019,2020,2021,2022  
 ./bin/tests/system/checkzone/zones/good-cds.db ZONE 2019,2020,2021,2022  
 ./bin/tests/system/checkzone/zones/good-dns-sd-reverse.db ZONE 2015,2016,2018,2019,2020,2021,2022  
 ./bin/tests/system/checkzone/zones/good-gc-msdcs.db ZONE 2015,2016,2018,2019,2020,2021,2022  
 ./bin/tests/system/checkzone/zones/good-nsap.db ZONE 2015,2016,2018,2019,2020,2021,2022  
 ./bin/tests/system/checkzone/zones/good-nsec3-nopadhash.db ZONE 2014,2016,2018,2019,2020,2021,2022  
 ./bin/tests/system/checkzone/zones/good-occulted-ns-by-dname.db ZONE 2017,2018,2019,2020,2021,2022  
 ./bin/tests/system/checkzone/zones/good-occulted-ns-by-ns.db ZONE 2017,2018,2019,2020,2021,2022  
 ./bin/tests/system/checkzone/zones/good1.db ZONE 2011,2016,2018,2019,2020,2021,2022  
 ./bin/tests/system/checkzone/zones/inherit.db ZONE 2014,2016,2018,2019,2020,2021,2022  
 ./bin/tests/system/checkzone/zones/nowarn.inherited.owner.db ZONE 2014,2016,2018,2019,2020,2021,2022  
 ./bin/tests/system/checkzone/zones/ns-address-below-dname.db ZONE 2017,2018,2019,2020,2021,2022  
 ./bin/tests/system/checkzone/zones/spf.db ZONE 2013,2016,2018,2019,2020,2021,2022  
 ./bin/tests/system/checkzone/zones/test1.db ZONE 2013,2016,2018,2019,2020,2021,2022  
 ./bin/tests/system/checkzone/zones/test2.db ZONE 2013,2016,2018,2019,2020,2021,2022  
 ./bin/tests/system/checkzone/zones/warn.inherit.origin.db ZONE 2014,2016,2018,2019,2020,2021,2022  
 ./bin/tests/system/checkzone/zones/warn.inherited.owner.db ZONE 2014,2016,2018,2019,2020,2021,2022  
 ./bin/tests/system/cleanall.sh SH 2000,2001,2004,2007,2012,2014,2015,2016,2018,2019,2020,2021,2022  
 ./bin/tests/system/cleanpkcs11.sh SH 2010,2012,2014,2016,2018,2019,2020,2021,2022  
 ./bin/tests/system/common/controls.conf CONF-C 2000,2001,2004,2007,2013,2016,2018,2019,2020,2021,2022  
 ./bin/tests/system/common/controls.conf.in CONF-C 2018,2019,2020,2021,2022  
 ./bin/tests/system/common/rndc.conf CONF-C 2000,2001,2004,2007,2013,2016,2018,2019,2020,2021,2022  
 ./bin/tests/system/common/rndc.key CONF-C 2011,2013,2016,2018,2019,2020,2021,2022  
 ./bin/tests/system/common/root.hint ZONE 2000,2001,2004,2007,2016,2018,2019,2020,2021,2022  
 ./bin/tests/system/conf.sh.in SH  
 2000,2001,2002,2003,2004,2005,2006,2007,2008,2009,2010,2011,2012,2013,2014,2015,2016,2017,2018,2019,2020,2021,2022  
 ./bin/tests/system/conf.sh.win32 SH 2016,2017,2018,2019,2020,2021,2022  
 ./bin/tests/system/cookie/ans9/ans.py PYTHON 2020,2021,2022  
 ./bin/tests/system/cookie/bad-cookie-badaes.conf.in X 2019,2020,2021,2022  
 ./bin/tests/system/cookie/bad-cookie-badhex.conf CONF-C 2014,2015,2016,2018,2019,2020,2021,2022  
 ./bin/tests/system/cookie/bad-cookie-badsha1.conf CONF-C 2017,2018,2019,2020,2021,2022  
 ./bin/tests/system/cookie/bad-cookie-badsha256.conf CONF-C 2017,2018,2019,2020,2021,2022  
 ./bin/tests/system/cookie/bad-cookie-badsiphash24.conf X 2019,2020,2021,2022  
 ./bin/tests/system/cookie/bad-cookie-toolong.conf CONF-C 2014,2015,2016,2018,2019,2020,2021,2022  
 ./bin/tests/system/cookie/clean.sh SH 2014,2015,2016,2018,2019,2020,2021,2022  
 ./bin/tests/system/cookie/good-cookie-aes.conf.in X 2019,2020,2021,2022  
 ./bin/tests/system/cookie/good-cookie-sha1.conf CONF-C 2017,2018,2019,2020,2021,2022  
 ./bin/tests/system/cookie/good-cookie-sha256.conf CONF-C 2017,2018,2019,2020,2021,2022  
 ./bin/tests/system/cookie/good-cookie-siphash24.conf X 2019,2020,2021,2022  
 ./bin/tests/system/cookie/ns1/example.db ZONE 2014,2015,2016,2018,2019,2020,2021,2022  
 ./bin/tests/system/cookie/ns1/named.conf.in CONF-C 2018,2019,2020,2021,2022

./bin/tests/system/cookie/ns1/root.hint ZONE 2014,2015,2016,2018,2019,2020,2021,2022  
 ./bin/tests/system/cookie/ns2/named.conf.in CONF-C 2018,2019,2020,2021,2022  
 ./bin/tests/system/cookie/ns2/root.db ZONE 2014,2015,2016,2018,2019,2020,2021,2022  
 ./bin/tests/system/cookie/ns3/named.conf.in CONF-C 2018,2019,2020,2021,2022  
 ./bin/tests/system/cookie/ns3/root.hint ZONE 2015,2016,2018,2019,2020,2021,2022  
 ./bin/tests/system/cookie/ns4/named.conf.in CONF-C 2018,2019,2020,2021,2022  
 ./bin/tests/system/cookie/ns4/root.hint ZONE 2018,2019,2020,2021,2022  
 ./bin/tests/system/cookie/ns5/named.conf.in CONF-C 2018,2019,2020,2021,2022  
 ./bin/tests/system/cookie/ns5/root.hint ZONE 2018,2019,2020,2021,2022  
 ./bin/tests/system/cookie/ns6/named.conf.in CONF-C 2018,2019,2020,2021,2022  
 ./bin/tests/system/cookie/ns6/root.hint ZONE 2018,2019,2020,2021,2022  
 ./bin/tests/system/cookie/ns7/named.conf.in CONF-C 2018,2019,2020,2021,2022  
 ./bin/tests/system/cookie/ns7/root.db ZONE 2018,2019,2020,2021,2022  
 ./bin/tests/system/cookie/ns8/example.db ZONE 2018,2019,2020,2021,2022  
 ./bin/tests/system/cookie/ns8/named.conf.in CONF-C 2018,2019,2020,2021,2022  
 ./bin/tests/system/cookie/prereq.sh SH 2020,2021,2022  
 ./bin/tests/system/cookie/setup.sh SH 2018,2019,2020,2021,2022  
 ./bin/tests/system/cookie/tests.sh SH 2014,2015,2016,2017,2018,2019,2020,2021,2022  
 ./bin/tests/system/coverage/01-ksk-inactive/README X 2013,2018,2019,2020,2021,2022  
 ./bin/tests/system/coverage/01-ksk-inactive/expect X 2013,2018,2019,2020,2021,2022  
 ./bin/tests/system/coverage/02-zsk-inactive/README X 2013,2018,2019,2020,2021,2022  
 ./bin/tests/system/coverage/02-zsk-inactive/expect X 2013,2018,2019,2020,2021,2022  
 ./bin/tests/system/coverage/03-ksk-unpublished/README X 2013,2018,2019,2020,2021,2022  
 ./bin/tests/system/coverage/03-ksk-unpublished/expect X 2013,2016,2018,2019,2020,2021,2022  
 ./bin/tests/system/coverage/04-zsk-unpublished/README X 2013,2018,2019,2020,2021,2022  
 ./bin/tests/system/coverage/04-zsk-unpublished/expect X 2013,2016,2018,2019,2020,2021,2022  
 ./bin/tests/system/coverage/05-ksk-unpub-active/README X 2013,2018,2019,2020,2021,2022  
 ./bin/tests/system/coverage/05-ksk-unpub-active/expect X 2013,2016,2018,2019,2020,2021,2022  
 ./bin/tests/system/coverage/06-zsk-unpub-active/README X 2013,2018,2019,2020,2021,2022  
 ./bin/tests/system/coverage/06-zsk-unpub-active/expect X 2013,2016,2018,2019,2020,2021,2022  
 ./bin/tests/system/coverage/07-ksk-ttl/README X 2013,2018,2019,2020,2021,2022  
 ./bin/tests/system/coverage/07-ksk-ttl/expect X 2013,2016,2018,2019,2020,2021,2022  
 ./bin/tests/system/coverage/08-zsk-ttl/README X 2013,2018,2019,2020,2021,2022  
 ./bin/tests/system/coverage/08-zsk-ttl/expect X 2013,2016,2018,2019,2020,2021,2022  
 ./bin/tests/system/coverage/09-check-zsk/README X 2014,2018,2019,2020,2021,2022  
 ./bin/tests/system/coverage/09-check-zsk/expect X 2014,2018,2019,2020,2021,2022  
 ./bin/tests/system/coverage/10-check-ksk/README X 2014,2018,2019,2020,2021,2022  
 ./bin/tests/system/coverage/10-check-ksk/expect X 2014,2018,2019,2020,2021,2022  
 ./bin/tests/system/coverage/11-cutoff/README X 2014,2018,2019,2020,2021,2022  
 ./bin/tests/system/coverage/11-cutoff/expect X 2014,2018,2019,2020,2021,2022  
 ./bin/tests/system/coverage/12-ksk-deletion/expect X 2018,2019,2020,2021,2022  
 ./bin/tests/system/coverage/13-dotted-dotless/expect X 2019,2020,2021,2022  
 ./bin/tests/system/coverage/clean.sh SH 2013,2014,2016,2018,2019,2020,2021,2022  
 ./bin/tests/system/coverage/prereq.sh SH 2014,2016,2018,2019,2020,2021,2022  
 ./bin/tests/system/coverage/setup.sh SH 2013,2014,2016,2018,2019,2020,2021,2022  
 ./bin/tests/system/coverage/tests.sh SH 2013,2014,2016,2018,2019,2020,2021,2022  
 ./bin/tests/system/database/clean.sh SH 2011,2012,2014,2016,2018,2019,2020,2021,2022  
 ./bin/tests/system/database/ns1/named1.conf.in CONF-C 2011,2013,2018,2019,2020,2021,2022

./bin/tests/system/database/ns1/named2.conf.in CONF-C 2011,2013,2018,2019,2020,2021,2022  
./bin/tests/system/database/setup.sh SH 2011,2012,2016,2018,2019,2020,2021,2022  
./bin/tests/system/database/tests.sh SH 2011,2012,2016,2018,2019,2020,2021,2022  
./bin/tests/system/delzone/clean.sh SH 2016,2018,2019,2020,2021,2022  
./bin/tests/system/delzone/ns1/inlineslave.db ZONE 2016,2018,2019,2020,2021,2022  
./bin/tests/system/delzone/ns1/named.conf CONF-C 2016,2018,2019,2020,2021,2022  
./bin/tests/system/delzone/ns2/added.db ZONE 2016,2018,2019,2020,2021,2022  
./bin/tests/system/delzone/ns2/named.args X 2016,2018,2019,2020,2021,2022  
./bin/tests/system/delzone/ns2/named.conf CONF-C 2016,2018,2019,2020,2021,2022  
./bin/tests/system/delzone/ns2/normal.db ZONE 2016,2018,2019,2020,2021,2022  
./bin/tests/system/delzone/tests.sh SH 2016,2018,2019,2020,2021,2022  
./bin/tests/system/dialup/clean.sh SH 2019,2020,2021,2022  
./bin/tests/system/dialup/ns1/example.db ZONE 2000,2001,2004,2007,2016,2018,2019,2020,2021,2022  
./bin/tests/system/dialup/ns1/named.conf CONF-C 2000,2001,2004,2007,2016,2018,2019,2020,2021,2022  
./bin/tests/system/dialup/ns1/root.db ZONE 2000,2001,2004,2007,2016,2018,2019,2020,2021,2022  
./bin/tests/system/dialup/ns2/hint.db ZONE 2000,2001,2004,2007,2016,2018,2019,2020,2021,2022  
./bin/tests/system/dialup/ns2/named.conf CONF-C 2000,2001,2004,2007,2016,2018,2019,2020,2021,2022  
./bin/tests/system/dialup/ns3/hint.db ZONE 2000,2001,2004,2007,2016,2018,2019,2020,2021,2022  
./bin/tests/system/dialup/ns3/named.conf CONF-C 2000,2001,2004,2007,2016,2018,2019,2020,2021,2022  
./bin/tests/system/dialup/tests.sh SH 2000,2001,2004,2007,2012,2016,2018,2019,2020,2021,2022  
./bin/tests/system/digcomp.pl PERL 2000,2001,2004,2007,2012,2013,2016,2018,2019,2020,2021,2022  
./bin/tests/system/digdelv/ans4/startme X 2017,2018,2019,2020,2021,2022  
./bin/tests/system/digdelv/ans7/ans.pl PERL 2020,2021,2022  
./bin/tests/system/digdelv/clean.sh SH 2015,2016,2018,2019,2020,2021,2022  
./bin/tests/system/digdelv/ns1/named.conf.in CONF-C 2018,2019,2020,2021,2022  
./bin/tests/system/digdelv/ns1/root.db ZONE 2015,2016,2018,2019,2020,2021,2022  
./bin/tests/system/digdelv/ns2/example.db ZONE 2015,2016,2018,2019,2020,2021,2022  
./bin/tests/system/digdelv/ns2/named.conf.in CONF-C 2018,2019,2020,2021,2022  
./bin/tests/system/digdelv/ns3/named.conf.in CONF-C 2018,2019,2020,2021,2022  
./bin/tests/system/digdelv/prereq.sh SH 2018,2019,2020,2021,2022  
./bin/tests/system/digdelv/setup.sh SH 2018,2019,2020,2021,2022  
./bin/tests/system/digdelv/tests.sh SH 2015,2016,2017,2018,2019,2020,2021,2022  
./bin/tests/system/ditch.pl PERL 2015,2016,2018,2019,2020,2021,2022  
./bin/tests/system/dlv/clean.sh SH 2004,2007,2010,2011,2012,2014,2016,2018,2019,2020,2021,2022  
./bin/tests/system/dlv/ns1/named.conf.in CONF-C 2018,2019,2020,2021,2022  
./bin/tests/system/dlv/ns1/root.db.in ZONE 2011,2016,2018,2019,2020,2021,2022  
./bin/tests/system/dlv/ns1/rootservers.utld.db ZONE 2004,2007,2016,2018,2019,2020,2021,2022  
./bin/tests/system/dlv/ns1/sign.sh SH 2011,2012,2014,2016,2018,2019,2020,2021,2022  
./bin/tests/system/dlv/ns2/druz.db.in ZONE 2011,2016,2018,2019,2020,2021,2022  
./bin/tests/system/dlv/ns2/hints ZONE 2004,2007,2016,2018,2019,2020,2021,2022  
./bin/tests/system/dlv/ns2/named.conf.in CONF-C 2018,2019,2020,2021,2022  
./bin/tests/system/dlv/ns2/sign.sh SH 2011,2012,2014,2016,2018,2019,2020,2021,2022  
./bin/tests/system/dlv/ns2/utld.db ZONE 2004,2007,2016,2018,2019,2020,2021,2022  
./bin/tests/system/dlv/ns3/child.db.in ZONE 2004,2007,2010,2016,2018,2019,2020,2021,2022  
./bin/tests/system/dlv/ns3/dlv.db.in ZONE 2004,2007,2016,2018,2019,2020,2021,2022  
./bin/tests/system/dlv/ns3/hints ZONE 2004,2007,2016,2018,2019,2020,2021,2022  
./bin/tests/system/dlv/ns3/named.conf.in CONF-C 2018,2019,2020,2021,2022  
./bin/tests/system/dlv/ns3/sign.sh SH 2004,2007,2009,2010,2011,2012,2014,2016,2018,2019,2020,2021,2022

./bin/tests/system/dlv/ns4/child.db ZONE 2004,2007,2016,2018,2019,2020,2021,2022  
 ./bin/tests/system/dlv/ns4/hints ZONE 2004,2007,2016,2018,2019,2020,2021,2022  
 ./bin/tests/system/dlv/ns4/named.conf.in CONF-C 2018,2019,2020,2021,2022  
 ./bin/tests/system/dlv/ns5/hints ZONE 2004,2007,2016,2018,2019,2020,2021,2022  
 ./bin/tests/system/dlv/ns5/named.conf.in CONF-C 2018,2019,2020,2021,2022  
 ./bin/tests/system/dlv/ns5/rndc.conf CONF-C 2004,2007,2013,2016,2018,2019,2020,2021,2022  
 ./bin/tests/system/dlv/ns6/child.db.in ZONE 2010,2016,2018,2019,2020,2021,2022  
 ./bin/tests/system/dlv/ns6/hints ZONE 2010,2016,2018,2019,2020,2021,2022  
 ./bin/tests/system/dlv/ns6/named.conf.in CONF-C 2018,2019,2020,2021,2022  
 ./bin/tests/system/dlv/ns6/sign.sh SH 2010,2011,2012,2014,2016,2018,2019,2020,2021,2022  
 ./bin/tests/system/dlv/ns7/hints ZONE 2019,2020,2021,2022  
 ./bin/tests/system/dlv/ns7/named.conf.in CONF-C 2019,2020,2021,2022  
 ./bin/tests/system/dlv/prereq.sh SH 2014,2016,2018,2019,2020,2021,2022  
 ./bin/tests/system/dlv/setup.sh SH 2004,2007,2009,2011,2012,2014,2016,2018,2019,2020,2021,2022  
 ./bin/tests/system/dlv/tests.sh SH 2004,2007,2010,2011,2012,2016,2018,2019,2020,2021,2022  
 ./bin/tests/system/dlz/clean.sh SH 2010,2012,2014,2016,2018,2019,2020,2021,2022  
 ./bin/tests/system/dlz/ns1/dns-root/com/broken/dns.d/@/DNAME=10=example.net.= TXT.BRIEF  
 2015,2016,2018,2019,2020,2021,2022  
 ./bin/tests/system/dlz/ns1/dns-root/com/broken/dns.d/@/NS=10=example.com.= TXT.BRIEF  
 2015,2016,2018,2019,2020,2021,2022  
 ./bin/tests/system/dlz/ns1/dns-  
 root/com/broken/dns.d/@/SOA=10=ns.example.com.=root.example.com.=None=None=None=None=None=  
 TXT.BRIEF 2015,2016,2018,2019,2020,2021,2022  
 ./bin/tests/system/dlz/ns1/dns-root/com/example/dns.d/@/DNAME=10=example.net.= TXT.BRIEF  
 2010,2016,2018,2019,2020,2021,2022  
 ./bin/tests/system/dlz/ns1/dns-root/com/example/dns.d/@/NS=10=example.com.= TXT.BRIEF  
 2010,2016,2018,2019,2020,2021,2022  
 ./bin/tests/system/dlz/ns1/dns-  
 root/com/example/dns.d/@/SOA=10=ns.example.com.=root.example.com.=2010062900=0=0=0=10= TXT.BRIEF  
 2010,2016,2018,2019,2020,2021,2022  
 ./bin/tests/system/dlz/ns1/dns-root/com/example/xfr.d/10.53.0.1 TXT.BRIEF 2010,2016,2018,2019,2020,2021,2022  
 ./bin/tests/system/dlz/ns1/named.conf.in CONF-C 2018,2019,2020,2021,2022  
 ./bin/tests/system/dlz/prereq.sh SH 2011,2012,2016,2018,2019,2020,2021,2022  
 ./bin/tests/system/dlz/setup.sh SH 2018,2019,2020,2021,2022  
 ./bin/tests/system/dlz/tests.sh SH 2010,2011,2012,2013,2015,2016,2018,2019,2020,2021,2022  
 ./bin/tests/system/dlzexternal/Makefile.in MAKE 2011,2012,2014,2015,2016,2017,2018,2019,2020,2021,2022  
 ./bin/tests/system/dlzexternal/clean.sh SH 2010,2012,2014,2015,2016,2018,2019,2020,2021,2022  
 ./bin/tests/system/dlzexternal/driver.c C 2011,2012,2013,2014,2015,2016,2017,2018,2019,2020,2021,2022  
 ./bin/tests/system/dlzexternal/driver.h C 2011,2016,2018,2019,2020,2021,2022  
 ./bin/tests/system/dlzexternal/ns1/dlzs.conf.in CONF-C 2018,2019,2020,2021,2022  
 ./bin/tests/system/dlzexternal/ns1/named.conf.in CONF-C 2011,2012,2013,2014,2016,2018,2019,2020,2021,2022  
 ./bin/tests/system/dlzexternal/ns1/root.db ZONE 2014,2016,2018,2019,2020,2021,2022  
 ./bin/tests/system/dlzexternal/prereq.sh SH 2010,2011,2012,2014,2016,2018,2019,2020,2021,2022  
 ./bin/tests/system/dlzexternal/setup.sh SH 2010,2012,2014,2016,2018,2019,2020,2021,2022  
 ./bin/tests/system/dlzexternal/tests.sh SH 2010,2011,2012,2013,2014,2015,2016,2018,2019,2020,2021,2022  
 ./bin/tests/system/dns64/clean.sh SH 2010,2012,2014,2015,2016,2018,2019,2020,2021,2022  
 ./bin/tests/system/dns64/conf/bad1.conf CONF-C 2010,2016,2018,2019,2020,2021,2022  
 ./bin/tests/system/dns64/conf/bad18.conf CONF-C 2019,2020,2021,2022

./bin/tests/system/dns64/conf/bad19.conf CONF-C 2019,2020,2021,2022  
 ./bin/tests/system/dns64/conf/bad2.conf CONF-C 2010,2016,2018,2019,2020,2021,2022  
 ./bin/tests/system/dns64/conf/bad3.conf CONF-C 2010,2016,2018,2019,2020,2021,2022  
 ./bin/tests/system/dns64/conf/bad4.conf CONF-C 2010,2016,2018,2019,2020,2021,2022  
 ./bin/tests/system/dns64/conf/bad5.conf CONF-C 2010,2016,2018,2019,2020,2021,2022  
 ./bin/tests/system/dns64/conf/bad6.conf CONF-C 2010,2016,2018,2019,2020,2021,2022  
 ./bin/tests/system/dns64/conf/bad7.conf CONF-C 2012,2016,2018,2019,2020,2021,2022  
 ./bin/tests/system/dns64/conf/bad8.conf CONF-C 2012,2016,2018,2019,2020,2021,2022  
 ./bin/tests/system/dns64/conf/bad9.conf CONF-C 2012,2016,2018,2019,2020,2021,2022  
 ./bin/tests/system/dns64/conf/good1.conf CONF-C 2010,2016,2018,2019,2020,2021,2022  
 ./bin/tests/system/dns64/conf/good2.conf CONF-C 2010,2016,2018,2019,2020,2021,2022  
 ./bin/tests/system/dns64/conf/good3.conf CONF-C 2010,2016,2018,2019,2020,2021,2022  
 ./bin/tests/system/dns64/conf/good4.conf CONF-C 2010,2016,2018,2019,2020,2021,2022  
 ./bin/tests/system/dns64/conf/good5.conf CONF-C 2010,2016,2018,2019,2020,2021,2022  
 ./bin/tests/system/dns64/conf/warn1.conf CONF-C 2019,2020,2021,2022  
 ./bin/tests/system/dns64/conf/warn2.conf CONF-C 2019,2020,2021,2022  
 ./bin/tests/system/dns64/conf/warn3.conf CONF-C 2019,2020,2021,2022  
 ./bin/tests/system/dns64/conf/warn4.conf CONF-C 2019,2020,2021,2022  
 ./bin/tests/system/dns64/conf/warn5.conf CONF-C 2019,2020,2021,2022  
 ./bin/tests/system/dns64/conf/warn6.conf CONF-C 2019,2020,2021,2022  
 ./bin/tests/system/dns64/conf/warn7.conf CONF-C 2019,2020,2021,2022  
 ./bin/tests/system/dns64/conf/warn8.conf CONF-C 2019,2020,2021,2022  
 ./bin/tests/system/dns64/ns1/example.db ZONE 2010,2011,2013,2016,2018,2019,2020,2021,2022  
 ./bin/tests/system/dns64/ns1/named.conf.in CONF-C 2018,2019,2020,2021,2022  
 ./bin/tests/system/dns64/ns1/root.db ZONE 2010,2016,2018,2019,2020,2021,2022  
 ./bin/tests/system/dns64/ns1/sign.sh SH 2010,2012,2014,2016,2018,2019,2020,2021,2022  
 ./bin/tests/system/dns64/ns2/named.conf.in CONF-C 2018,2019,2020,2021,2022  
 ./bin/tests/system/dns64/ns2/rpz.db ZONE 2013,2016,2018,2019,2020,2021,2022  
 ./bin/tests/system/dns64/prereq.sh SH 2014,2016,2018,2019,2020,2021,2022  
 ./bin/tests/system/dns64/setup.sh SH 2010,2012,2014,2016,2018,2019,2020,2021,2022  
 ./bin/tests/system/dns64/tests.sh SH 2010,2011,2012,2013,2014,2016,2018,2019,2020,2021,2022  
 ./bin/tests/system/dnssec/README.TXT.BRIEF 2000,2001,2002,2004,2011,2016,2018,2019,2020,2021,2022  
 ./bin/tests/system/dnssec/ans10/ans.py PYTHON 2020,2021,2022  
 ./bin/tests/system/dnssec/clean.sh SH  
 2000,2001,2002,2004,2007,2008,2009,2010,2011,2012,2013,2014,2015,2016,2017,2018,2019,2020,2021,2022  
 ./bin/tests/system/dnssec/dnssec\_update\_test.pl PERL 2002,2004,2007,2010,2012,2016,2018,2019,2020,2021,2022  
 ./bin/tests/system/dnssec/ns1/named.conf.in CONF-C 2018,2019,2020,2021,2022  
 ./bin/tests/system/dnssec/ns1/root.db.in ZONE  
 2000,2001,2004,2007,2010,2013,2014,2016,2018,2019,2020,2021,2022  
 ./bin/tests/system/dnssec/ns1/sign.sh SH  
 2000,2001,2002,2003,2004,2006,2007,2008,2009,2010,2011,2012,2013,2014,2016,2018,2019,2020,2021,2022  
 ./bin/tests/system/dnssec/ns2/algroll.db.in ZONE 2010,2016,2018,2019,2020,2021,2022  
 ./bin/tests/system/dnssec/ns2/badparam.db.in ZONE 2010,2016,2018,2019,2020,2021,2022  
 ./bin/tests/system/dnssec/ns2/cdnskey-auto.secure.db.in ZONE 2015,2016,2018,2019,2020,2021,2022  
 ./bin/tests/system/dnssec/ns2/cdnskey-update.secure.db.in ZONE 2015,2016,2018,2019,2020,2021,2022  
 ./bin/tests/system/dnssec/ns2/cdnskey.secure.db.in ZONE 2015,2016,2018,2019,2020,2021,2022  
 ./bin/tests/system/dnssec/ns2/cds-auto.secure.db.in ZONE 2015,2016,2018,2019,2020,2021,2022  
 ./bin/tests/system/dnssec/ns2/cds-update.secure.db.in ZONE 2015,2016,2018,2019,2020,2021,2022

./bin/tests/system/dnssec/ns2/cds.secure.db.in ZONE 2015,2016,2018,2019,2020,2021,2022  
 ./bin/tests/system/dnssec/ns2/child.nsec3.example.db ZONE 2006,2008,2016,2018,2019,2020,2021,2022  
 ./bin/tests/system/dnssec/ns2/child.optout.example.db ZONE 2006,2008,2016,2018,2019,2020,2021,2022  
 ./bin/tests/system/dnssec/ns2/dlv.db.in ZONE 2004,2007,2016,2018,2019,2020,2021,2022  
 ./bin/tests/system/dnssec/ns2/dst.example.db.in ZONE 2004,2007,2016,2018,2019,2020,2021,2022  
 ./bin/tests/system/dnssec/ns2/example.db.in ZONE  
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 ./bin/tests/system/dnssec/ns2/in-addr.arpa.db.in ZONE 2014,2016,2018,2019,2020,2021,2022  
 ./bin/tests/system/dnssec/ns2/insecure.secure.example.db ZONE  
 2000,2001,2004,2007,2013,2016,2018,2019,2020,2021,2022  
 ./bin/tests/system/dnssec/ns2/key.db.in ZONE 2019,2020,2021,2022  
 ./bin/tests/system/dnssec/ns2/named.conf.in CONF-C 2018,2019,2020,2021,2022  
 ./bin/tests/system/dnssec/ns2/private.secure.example.db.in ZONE  
 2000,2001,2004,2007,2016,2018,2019,2020,2021,2022  
 ./bin/tests/system/dnssec/ns2/rfc2335.example.db X 2004,2018,2019,2020,2021,2022  
 ./bin/tests/system/dnssec/ns2/sign.sh SH  
 2000,2001,2002,2003,2004,2006,2007,2008,2009,2010,2011,2012,2014,2015,2016,2018,2019,2020,2021,2022  
 ./bin/tests/system/dnssec/ns2/single-nsec3.db.in ZONE 2010,2016,2018,2019,2020,2021,2022  
 ./bin/tests/system/dnssec/ns2/template.secure.db.in ZONE 2019,2020,2021,2022  
 ./bin/tests/system/dnssec/ns2/too-many-iterations.db.in ZONE 2021,2022  
 ./bin/tests/system/dnssec/ns3/auto-nsec.example.db.in ZONE 2011,2016,2018,2019,2020,2021,2022  
 ./bin/tests/system/dnssec/ns3/auto-nsec3.example.db.in ZONE 2011,2016,2018,2019,2020,2021,2022  
 ./bin/tests/system/dnssec/ns3/bogus.example.db.in ZONE  
 2000,2001,2004,2007,2014,2016,2018,2019,2020,2021,2022  
 ./bin/tests/system/dnssec/ns3/dname-at-apex-nsec3.example.db.in ZONE 2018,2019,2020,2021,2022  
 ./bin/tests/system/dnssec/ns3/dnskey-nsec3-unknown.example.db.in ZONE 2014,2016,2018,2019,2020,2021,2022  
 ./bin/tests/system/dnssec/ns3/dnskey-unknown.example.db.in ZONE 2014,2016,2018,2019,2020,2021,2022  
 ./bin/tests/system/dnssec/ns3/dnskey-unsupported-2.example.db.in ZONE 2018,2019,2020,2021,2022  
 ./bin/tests/system/dnssec/ns3/dnskey-unsupported.example.db.in ZONE 2018,2019,2020,2021,2022  
 ./bin/tests/system/dnssec/ns3/dynamic.example.db.in ZONE 2002,2004,2007,2016,2018,2019,2020,2021,2022  
 ./bin/tests/system/dnssec/ns3/expired.example.db.in ZONE 2011,2012,2016,2018,2019,2020,2021,2022  
 ./bin/tests/system/dnssec/ns3/expiring.example.db.in ZONE 2011,2012,2016,2018,2019,2020,2021,2022  
 ./bin/tests/system/dnssec/ns3/future.example.db.in ZONE 2014,2016,2018,2019,2020,2021,2022  
 ./bin/tests/system/dnssec/ns3/generic.example.db.in ZONE 2001,2002,2004,2007,2016,2018,2019,2020,2021,2022  
 ./bin/tests/system/dnssec/ns3/inline.example.db ZONE 2012,2016,2018,2019,2020,2021,2022  
 ./bin/tests/system/dnssec/ns3/insecure.below-cname.example.db ZONE 2011,2016,2018,2019,2020,2021,2022  
 ./bin/tests/system/dnssec/ns3/insecure.example.db ZONE 2000,2001,2004,2007,2016,2018,2019,2020,2021,2022  
 ./bin/tests/system/dnssec/ns3/insecure.nsec3.example.db ZONE 2008,2016,2018,2019,2020,2021,2022  
 ./bin/tests/system/dnssec/ns3/insecure.optout.example.db ZONE 2008,2016,2018,2019,2020,2021,2022  
 ./bin/tests/system/dnssec/ns3/key.db.in ZONE 2019,2020,2021,2022  
 ./bin/tests/system/dnssec/ns3/kskonly.example.db.in ZONE 2010,2016,2018,2019,2020,2021,2022  
 ./bin/tests/system/dnssec/ns3/lower.example.db.in ZONE 2012,2016,2018,2019,2020,2021,2022  
 ./bin/tests/system/dnssec/ns3/managed-future.example.db.in ZONE 2016,2018,2019,2020,2021,2022  
 ./bin/tests/system/dnssec/ns3/multiple.example.db.in ZONE 2006,2008,2016,2018,2019,2020,2021,2022  
 ./bin/tests/system/dnssec/ns3/named.conf.in CONF-C 2018,2019,2020,2021,2022  
 ./bin/tests/system/dnssec/ns3/nosign.example.db.in ZONE 2011,2016,2018,2019,2020,2021,2022  
 ./bin/tests/system/dnssec/ns3/nsec3-unknown.example.db.in ZONE 2006,2008,2016,2018,2019,2020,2021,2022  
 ./bin/tests/system/dnssec/ns3/nsec3.example.db.in ZONE 2006,2008,2016,2018,2019,2020,2021,2022

./bin/tests/system/dnssec/ns3/nsec3.nsec3.example.db.in ZONE 2008,2016,2018,2019,2020,2021,2022  
 ./bin/tests/system/dnssec/ns3/nsec3.optout.example.db.in ZONE 2008,2016,2018,2019,2020,2021,2022  
 ./bin/tests/system/dnssec/ns3/occluded.example.db.in ZONE 2018,2019,2020,2021,2022  
 ./bin/tests/system/dnssec/ns3/optout-unknown.example.db.in ZONE 2006,2008,2016,2018,2019,2020,2021,2022  
 ./bin/tests/system/dnssec/ns3/optout.example.db.in ZONE 2006,2008,2016,2018,2019,2020,2021,2022  
 ./bin/tests/system/dnssec/ns3/optout.nsec3.example.db.in ZONE 2008,2016,2018,2019,2020,2021,2022  
 ./bin/tests/system/dnssec/ns3/optout.optout.example.db.in ZONE 2008,2016,2018,2019,2020,2021,2022  
 ./bin/tests/system/dnssec/ns3/publish-inactive.example.db.in ZONE 2013,2016,2018,2019,2020,2021,2022  
 ./bin/tests/system/dnssec/ns3/rsasha256.example.db.in ZONE 2009,2016,2018,2019,2020,2021,2022  
 ./bin/tests/system/dnssec/ns3/rsasha512.example.db.in ZONE 2009,2016,2018,2019,2020,2021,2022  
 ./bin/tests/system/dnssec/ns3/secure.below-cname.example.db.in ZONE 2011,2016,2018,2019,2020,2021,2022  
 ./bin/tests/system/dnssec/ns3/secure.example.db.in ZONE  
 2000,2001,2004,2007,2008,2010,2012,2013,2014,2016,2018,2019,2020,2021,2022  
 ./bin/tests/system/dnssec/ns3/secure.nsec3.example.db.in ZONE 2008,2016,2018,2019,2020,2021,2022  
 ./bin/tests/system/dnssec/ns3/secure.optout.example.db.in ZONE 2008,2016,2018,2019,2020,2021,2022  
 ./bin/tests/system/dnssec/ns3/siginterval.example.db.in ZONE 2013,2016,2018,2019,2020,2021,2022  
 ./bin/tests/system/dnssec/ns3/siginterval1.conf CONF-C 2013,2016,2018,2019,2020,2021,2022  
 ./bin/tests/system/dnssec/ns3/siginterval2.conf CONF-C 2013,2016,2018,2019,2020,2021,2022  
 ./bin/tests/system/dnssec/ns3/sign.sh SH  
 2000,2001,2002,2004,2006,2007,2008,2009,2010,2011,2012,2013,2014,2015,2016,2018,2019,2020,2021,2022  
 ./bin/tests/system/dnssec/ns3/split-dnssec.example.db.in ZONE 2011,2016,2018,2019,2020,2021,2022  
 ./bin/tests/system/dnssec/ns3/split-smart.example.db.in ZONE 2011,2016,2018,2019,2020,2021,2022  
 ./bin/tests/system/dnssec/ns3/tlpatch.example.db.in ZONE 2011,2016,2018,2019,2020,2021,2022  
 ./bin/tests/system/dnssec/ns3/unsupported-algorithm.key X 2018,2019,2020,2021,2022  
 ./bin/tests/system/dnssec/ns3/update-nsec3.example.db.in ZONE 2011,2016,2018,2019,2020,2021,2022  
 ./bin/tests/system/dnssec/ns3/upper.example.db.in ZONE 2012,2016,2018,2019,2020,2021,2022  
 ./bin/tests/system/dnssec/ns4/named1.conf.in CONF-C 2018,2019,2020,2021,2022  
 ./bin/tests/system/dnssec/ns4/named2.conf.in CONF-C 2018,2019,2020,2021,2022  
 ./bin/tests/system/dnssec/ns4/named3.conf.in CONF-C 2018,2019,2020,2021,2022  
 ./bin/tests/system/dnssec/ns4/named4.conf.in CONF-C 2018,2019,2020,2021,2022  
 ./bin/tests/system/dnssec/ns4/named5.conf.in CONF-C 2018,2019,2020,2021,2022  
 ./bin/tests/system/dnssec/ns5/named1.conf.in CONF-C 2018,2019,2020,2021,2022  
 ./bin/tests/system/dnssec/ns5/named2.conf.in CONF-C 2018,2019,2020,2021,2022  
 ./bin/tests/system/dnssec/ns5/sign.sh SH 2015,2016,2018,2019,2020,2021,2022  
 ./bin/tests/system/dnssec/ns5/trusted.conf.bad CONF-C 2000,2001,2004,2007,2016,2018,2019,2020,2021,2022  
 ./bin/tests/system/dnssec/ns6/named.args X 2013,2014,2016,2018,2019,2020,2021,2022  
 ./bin/tests/system/dnssec/ns6/named.conf.in CONF-C 2018,2019,2020,2021,2022  
 ./bin/tests/system/dnssec/ns6/optout-tld.db.in ZONE 2013,2016,2018,2019,2020,2021,2022  
 ./bin/tests/system/dnssec/ns6/sign.sh SH 2013,2014,2016,2018,2019,2020,2021,2022  
 ./bin/tests/system/dnssec/ns7/named.conf.in CONF-C 2018,2019,2020,2021,2022  
 ./bin/tests/system/dnssec/ns7/named.nosoa TXT.BRIEF 2010,2016,2018,2019,2020,2021,2022  
 ./bin/tests/system/dnssec/ns7/nosoa.secure.example.db ZONE 2010,2016,2018,2019,2020,2021,2022  
 ./bin/tests/system/dnssec/ns7/sign.sh SH 2014,2016,2018,2019,2020,2021,2022  
 ./bin/tests/system/dnssec/ns7/split-rrsig.db.in ZONE 2014,2016,2018,2019,2020,2021,2022  
 ./bin/tests/system/dnssec/ns8/named.conf.in CONF-C 2019,2020,2021,2022  
 ./bin/tests/system/dnssec/ns9/named.conf.in CONF-C 2019,2020,2021,2022  
 ./bin/tests/system/dnssec/ntadiff.pl PERL 2015,2016,2018,2019,2020,2021,2022  
 ./bin/tests/system/dnssec/prereq.sh SH



2000,2001,2002,2004,2006,2007,2009,2012,2014,2015,2016,2018,2019,2020,2021,2022  
 ./bin/tests/system/dnssec/setup.sh SH  
 2000,2001,2004,2007,2009,2011,2012,2013,2014,2015,2016,2018,2019,2020,2021,2022  
 ./bin/tests/system/dnssec/signer/example.db.in ZONE 2010,2016,2018,2019,2020,2021,2022  
 ./bin/tests/system/dnssec/signer/general/Kexample.com.+005+07065.key X 2018,2019,2020,2021,2022  
 ./bin/tests/system/dnssec/signer/general/Kexample.com.+005+07065.private X 2018,2019,2020,2021,2022  
 ./bin/tests/system/dnssec/signer/general/Kexample.com.+005+23362.key X 2018,2019,2020,2021,2022  
 ./bin/tests/system/dnssec/signer/general/Kexample.com.+005+23362.private X 2018,2019,2020,2021,2022  
 ./bin/tests/system/dnssec/signer/general/Kexample.com.+008+15002.key X 2021,2022  
 ./bin/tests/system/dnssec/signer/general/Kexample.com.+008+15002.private X 2021,2022  
 ./bin/tests/system/dnssec/signer/general/Kexample.com.+008+63613.key X 2021,2022  
 ./bin/tests/system/dnssec/signer/general/Kexample.com.+008+63613.private X 2021,2022  
 ./bin/tests/system/dnssec/signer/general/bogus-ksk.key X 2018,2019,2020,2021,2022  
 ./bin/tests/system/dnssec/signer/general/bogus-zsk.key X 2018,2019,2020,2021,2022  
 ./bin/tests/system/dnssec/signer/general/test1.zone ZONE 2018,2019,2020,2021,2022  
 ./bin/tests/system/dnssec/signer/general/test2.zone ZONE 2018,2019,2020,2021,2022  
 ./bin/tests/system/dnssec/signer/general/test3.zone ZONE 2018,2019,2020,2021,2022  
 ./bin/tests/system/dnssec/signer/general/test4.zone ZONE 2018,2019,2020,2021,2022  
 ./bin/tests/system/dnssec/signer/general/test5.zone ZONE 2018,2019,2020,2021,2022  
 ./bin/tests/system/dnssec/signer/general/test6.zone ZONE 2018,2019,2020,2021,2022  
 ./bin/tests/system/dnssec/signer/general/test7.zone ZONE 2018,2019,2020,2021,2022  
 ./bin/tests/system/dnssec/signer/general/test8.zone ZONE 2018,2019,2020,2021,2022  
 ./bin/tests/system/dnssec/signer/general/test9.zone ZONE 2021,2022  
 ./bin/tests/system/dnssec/signer/remove.db.in ZONE 2016,2018,2019,2020,2021,2022  
 ./bin/tests/system/dnssec/signer/remove2.db.in ZONE 2016,2018,2019,2020,2021,2022  
 ./bin/tests/system/dnssec/tests.sh SH  
 2000,2001,2002,2004,2005,2006,2007,2008,2009,2010,2011,2012,2013,2014,2015,2016,2017,2018,2019,2020,2021,2022  
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 ./bin/tests/system/dnstap/README TXT.BRIEF 2019,2020,2021,2022  
 ./bin/tests/system/dnstap/bad-fstrm-set-buffer-hint-max.conf CONF-C 2016,2018,2019,2020,2021,2022  
 ./bin/tests/system/dnstap/bad-fstrm-set-buffer-hint-min.conf CONF-C 2016,2018,2019,2020,2021,2022  
 ./bin/tests/system/dnstap/bad-fstrm-set-flush-timeout-max.conf CONF-C 2016,2018,2019,2020,2021,2022  
 ./bin/tests/system/dnstap/bad-fstrm-set-flush-timeout-min.conf CONF-C 2016,2018,2019,2020,2021,2022  
 ./bin/tests/system/dnstap/bad-fstrm-set-input-queue-size-max.conf CONF-C 2016,2018,2019,2020,2021,2022  
 ./bin/tests/system/dnstap/bad-fstrm-set-input-queue-size-min.conf CONF-C 2016,2018,2019,2020,2021,2022  
 ./bin/tests/system/dnstap/bad-fstrm-set-input-queue-size-po2.conf CONF-C 2016,2018,2019,2020,2021,2022  
 ./bin/tests/system/dnstap/bad-fstrm-set-output-notify-threshold.conf CONF-C 2016,2018,2019,2020,2021,2022  
 ./bin/tests/system/dnstap/bad-fstrm-set-output-queue-size-max.conf CONF-C 2016,2018,2019,2020,2021,2022  
 ./bin/tests/system/dnstap/bad-fstrm-set-output-queue-size-min.conf CONF-C 2016,2018,2019,2020,2021,2022  
 ./bin/tests/system/dnstap/bad-fstrm-set-reopen-interval-max.conf CONF-C 2016,2018,2019,2020,2021,2022  
 ./bin/tests/system/dnstap/bad-fstrm-set-reopen-interval-min.conf CONF-C 2016,2018,2019,2020,2021,2022  
 ./bin/tests/system/dnstap/bad-missing-dnstap-output-view.conf CONF-C 2019,2020,2021,2022  
 ./bin/tests/system/dnstap/bad-missing-dnstap-output.conf CONF-C 2019,2020,2021,2022  
 ./bin/tests/system/dnstap/clean.sh SH 2015,2016,2017,2018,2019,2020,2021,2022  
 ./bin/tests/system/dnstap/good-dnstap-in-options.conf CONF-C 2019,2020,2021,2022  
 ./bin/tests/system/dnstap/good-dnstap-in-view.conf CONF-C 2019,2020,2021,2022  
 ./bin/tests/system/dnstap/good-fstrm-set-buffer-hint.conf CONF-C 2016,2018,2019,2020,2021,2022  
 ./bin/tests/system/dnstap/good-fstrm-set-flush-timeout.conf CONF-C 2016,2018,2019,2020,2021,2022

./bin/tests/system/dnstap/good-fstrm-set-input-queue-size.conf CONF-C 2016,2018,2019,2020,2021,2022  
./bin/tests/system/dnstap/good-fstrm-set-output-notify-threshold.conf CONF-C 2016,2018,2019,2020,2021,2022  
./bin/tests/system/dnstap/good-fstrm-set-output-queue-model-mpsc.conf CONF-C 2016,2018,2019,2020,2021,2022  
./bin/tests/system/dnstap/good-fstrm-set-output-queue-model-spsc.conf CONF-C 2016,2018,2019,2020,2021,2022  
./bin/tests/system/dnstap/good-fstrm-set-output-queue-size.conf CONF-C 2016,2018,2019,2020,2021,2022  
./bin/tests/system/dnstap/good-fstrm-set-reopen-interval.conf CONF-C 2016,2018,2019,2020,2021,2022  
./bin/tests/system/dnstap/large-answer.fstrm X 2019,2020,2021,2022  
./bin/tests/system/dnstap/ns1/named.conf.in CONF-C 2018,2019,2020,2021,2022  
./bin/tests/system/dnstap/ns1/root.db ZONE 2015,2016,2018,2019,2020,2021,2022  
./bin/tests/system/dnstap/ns2/example.db ZONE 2015,2016,2018,2019,2020,2021,2022  
./bin/tests/system/dnstap/ns2/named.conf.in CONF-C 2018,2019,2020,2021,2022  
./bin/tests/system/dnstap/ns3/named.conf.in CONF-C 2018,2019,2020,2021,2022  
./bin/tests/system/dnstap/ns4/named.conf.in CONF-C 2018,2019,2020,2021,2022  
./bin/tests/system/dnstap/setup.sh SH 2018,2019,2020,2021,2022  
./bin/tests/system/dnstap/tests.sh SH 2015,2016,2017,2018,2019,2020,2021,2022  
./bin/tests/system/dnstap/ydump.py PYTHON 2016,2017,2018,2019,2020,2021,2022  
./bin/tests/system/dscp/clean.sh SH 2013,2014,2015,2016,2018,2019,2020,2021,2022  
./bin/tests/system/dscp/ns1/named.args X 2013,2014,2018,2019,2020,2021,2022  
./bin/tests/system/dscp/ns1/named.conf.in CONF-C 2018,2019,2020,2021,2022  
./bin/tests/system/dscp/ns1/root.db ZONE 2013,2016,2018,2019,2020,2021,2022  
./bin/tests/system/dscp/ns2/named.args X 2013,2014,2018,2019,2020,2021,2022  
./bin/tests/system/dscp/ns2/named.conf.in CONF-C 2018,2019,2020,2021,2022  
./bin/tests/system/dscp/ns3/hint.db ZONE 2013,2016,2018,2019,2020,2021,2022  
./bin/tests/system/dscp/ns3/named.args X 2013,2014,2018,2019,2020,2021,2022  
./bin/tests/system/dscp/ns3/named.conf.in CONF-C 2018,2019,2020,2021,2022  
./bin/tests/system/dscp/ns4/named.args X 2013,2014,2018,2019,2020,2021,2022  
./bin/tests/system/dscp/ns4/named.conf.in CONF-C 2018,2019,2020,2021,2022  
./bin/tests/system/dscp/ns4/root.db ZONE 2013,2016,2018,2019,2020,2021,2022  
./bin/tests/system/dscp/ns5/named.args X 2013,2014,2018,2019,2020,2021,2022  
./bin/tests/system/dscp/ns5/named.conf.in CONF-C 2018,2019,2020,2021,2022  
./bin/tests/system/dscp/ns6/hint.db ZONE 2013,2016,2018,2019,2020,2021,2022  
./bin/tests/system/dscp/ns6/named.args X 2013,2014,2018,2019,2020,2021,2022  
./bin/tests/system/dscp/ns6/named.conf.in CONF-C 2018,2019,2020,2021,2022  
./bin/tests/system/dscp/ns7/named.args X 2013,2014,2018,2019,2020,2021,2022  
./bin/tests/system/dscp/ns7/named.conf.in CONF-C 2018,2019,2020,2021,2022  
./bin/tests/system/dscp/setup.sh SH 2018,2019,2020,2021,2022  
./bin/tests/system/dscp/tests.sh SH 2013,2016,2018,2019,2020,2021,2022  
./bin/tests/system/dsdigest/clean.sh SH 2012,2014,2016,2018,2019,2020,2021,2022  
./bin/tests/system/dsdigest/ns1/named.conf.in CONF-C 2018,2019,2020,2021,2022  
./bin/tests/system/dsdigest/ns1/root.db.in ZONE 2012,2016,2018,2019,2020,2021,2022  
./bin/tests/system/dsdigest/ns1/sign.sh SH 2012,2014,2016,2018,2019,2020,2021,2022  
./bin/tests/system/dsdigest/ns2/bad.db.in ZONE 2012,2016,2018,2019,2020,2021,2022  
./bin/tests/system/dsdigest/ns2/good.db.in ZONE 2012,2016,2018,2019,2020,2021,2022  
./bin/tests/system/dsdigest/ns2/named.conf.in CONF-C 2018,2019,2020,2021,2022  
./bin/tests/system/dsdigest/ns2/sign.sh SH 2012,2014,2016,2018,2019,2020,2021,2022  
./bin/tests/system/dsdigest/ns3/named.conf.in CONF-C 2018,2019,2020,2021,2022  
./bin/tests/system/dsdigest/ns4/named.conf.in CONF-C 2018,2019,2020,2021,2022  
./bin/tests/system/dsdigest/prereq.sh SH 2012,2014,2016,2018,2019,2020,2021,2022

./bin/tests/system/dsdigest/setup.sh SH 2012,2014,2016,2018,2019,2020,2021,2022  
 ./bin/tests/system/dsdigest/tests.sh SH 2012,2016,2018,2019,2020,2021,2022  
 ./bin/tests/system/dupsigs/check\_journal.pl PERL 2018,2019,2020,2021,2022  
 ./bin/tests/system/dupsigs/clean.sh SH 2018,2019,2020,2021,2022  
 ./bin/tests/system/dupsigs/ns1/named.args X 2018,2019,2020,2021,2022  
 ./bin/tests/system/dupsigs/ns1/named.conf.in CONF-C 2018,2019,2020,2021,2022  
 ./bin/tests/system/dupsigs/ns1/reset\_keys.sh SH 2018,2019,2020,2021,2022  
 ./bin/tests/system/dupsigs/ns1/signing.test.db.in ZONE 2018,2019,2020,2021,2022  
 ./bin/tests/system/dupsigs/prereq.sh SH 2018,2019,2020,2021,2022  
 ./bin/tests/system/dupsigs/setup.sh SH 2018,2019,2020,2021,2022  
 ./bin/tests/system/dupsigs/tests.sh SH 2018,2019,2020,2021,2022  
 ./bin/tests/system/dyndb/Makefile.in MAKE 2015,2016,2018,2019,2020,2021,2022  
 ./bin/tests/system/dyndb/clean.sh SH 2015,2016,2018,2019,2020,2021,2022  
 ./bin/tests/system/dyndb/driver/AUTHORS X 2015,2018,2019,2020,2021,2022  
 ./bin/tests/system/dyndb/driver/COPYING X 2015,2016,2018,2019,2020,2021,2022  
 ./bin/tests/system/dyndb/driver/Makefile.in MAKE 2015,2016,2018,2019,2020,2021,2022  
 ./bin/tests/system/dyndb/driver/README X 2015,2018,2019,2020,2021,2022  
 ./bin/tests/system/dyndb/driver/db.c X 2015,2016,2017,2018,2019,2020,2021,2022  
 ./bin/tests/system/dyndb/driver/db.h X 2015,2018,2019,2020,2021,2022  
 ./bin/tests/system/dyndb/driver/driver.c X 2015,2016,2018,2019,2020,2021,2022  
 ./bin/tests/system/dyndb/driver/instance.c X 2015,2016,2018,2019,2020,2021,2022  
 ./bin/tests/system/dyndb/driver/instance.h X 2015,2016,2018,2019,2020,2021,2022  
 ./bin/tests/system/dyndb/driver/lock.c X 2015,2018,2019,2020,2021,2022  
 ./bin/tests/system/dyndb/driver/lock.h X 2015,2018,2019,2020,2021,2022  
 ./bin/tests/system/dyndb/driver/log.c X 2015,2018,2019,2020,2021,2022  
 ./bin/tests/system/dyndb/driver/log.h X 2015,2018,2019,2020,2021,2022  
 ./bin/tests/system/dyndb/driver/syncptr.c X 2015,2017,2018,2019,2020,2021,2022  
 ./bin/tests/system/dyndb/driver/syncptr.h X 2015,2018,2019,2020,2021,2022  
 ./bin/tests/system/dyndb/driver/util.h X 2015,2018,2019,2020,2021,2022  
 ./bin/tests/system/dyndb/driver/zone.c X 2015,2018,2019,2020,2021,2022  
 ./bin/tests/system/dyndb/driver/zone.h X 2015,2018,2019,2020,2021,2022  
 ./bin/tests/system/dyndb/ns1/named.conf.in CONF-C 2018,2019,2020,2021,2022  
 ./bin/tests/system/dyndb/prereq.sh SH 2015,2016,2018,2019,2020,2021,2022  
 ./bin/tests/system/dyndb/setup.sh SH 2018,2019,2020,2021,2022  
 ./bin/tests/system/dyndb/tests.sh SH 2015,2016,2018,2019,2020,2021,2022  
 ./bin/tests/system/ecdsa/clean.sh SH 2012,2014,2016,2018,2019,2020,2021,2022  
 ./bin/tests/system/ecdsa/ns1/named.conf CONF-C 2012,2016,2018,2019,2020,2021,2022  
 ./bin/tests/system/ecdsa/ns1/root.db.in ZONE 2012,2016,2018,2019,2020,2021,2022  
 ./bin/tests/system/ecdsa/ns1/sign.sh SH 2012,2014,2016,2018,2019,2020,2021,2022  
 ./bin/tests/system/ecdsa/ns2/named.conf CONF-C 2012,2016,2018,2019,2020,2021,2022  
 ./bin/tests/system/ecdsa/prereq.sh SH 2012,2014,2016,2018,2019,2020,2021,2022  
 ./bin/tests/system/ecdsa/setup.sh SH 2012,2014,2016,2018,2019,2020,2021,2022  
 ./bin/tests/system/ecdsa/tests.sh SH 2012,2013,2015,2016,2018,2019,2020,2021,2022  
 ./bin/tests/system/eddsa/clean.sh SH 2017,2018,2019,2020,2021,2022  
 ./bin/tests/system/eddsa/ns1/named.conf CONF-C 2017,2018,2019,2020,2021,2022  
 ./bin/tests/system/eddsa/ns1/root.db.in ZONE 2017,2018,2019,2020,2021,2022  
 ./bin/tests/system/eddsa/ns1/sign.sh SH 2017,2018,2019,2020,2021,2022  
 ./bin/tests/system/eddsa/ns2/Xexample.com.+015+03613.key X 2017,2018,2019,2020,2021,2022

./bin/tests/system/eddsa/ns2/Xexample.com.+015+03613.private X 2017,2018,2019,2020,2021,2022  
./bin/tests/system/eddsa/ns2/Xexample.com.+015+35217.key X 2017,2018,2019,2020,2021,2022  
./bin/tests/system/eddsa/ns2/Xexample.com.+015+35217.private X 2017,2018,2019,2020,2021,2022  
./bin/tests/system/eddsa/ns2/Xexample.com.+016+09713.key X 2019,2020,2021,2022  
./bin/tests/system/eddsa/ns2/Xexample.com.+016+09713.private X 2019,2020,2021,2022  
./bin/tests/system/eddsa/ns2/Xexample.com.+016+38353.key X 2019,2020,2021,2022  
./bin/tests/system/eddsa/ns2/Xexample.com.+016+38353.private X 2019,2020,2021,2022  
./bin/tests/system/eddsa/ns2/example.com.db ZONE 2017,2018,2019,2020,2021,2022  
./bin/tests/system/eddsa/ns2/named.conf CONF-C 2017,2018,2019,2020,2021,2022  
./bin/tests/system/eddsa/ns2/sign.sh SH 2017,2018,2019,2020,2021,2022  
./bin/tests/system/eddsa/prereq.sh SH 2017,2018,2019,2020,2021,2022  
./bin/tests/system/eddsa/setup.sh SH 2017,2018,2019,2020,2021,2022  
./bin/tests/system/eddsa/tests.sh SH 2017,2018,2019,2020,2021,2022  
./bin/tests/system/ednscompliance/clean.sh SH 2014,2015,2016,2018,2019,2020,2021,2022  
./bin/tests/system/ednscompliance/ns1/named.conf.in CONF-C 2018,2019,2020,2021,2022  
./bin/tests/system/ednscompliance/ns1/root.db ZONE 2014,2016,2018,2019,2020,2021,2022  
./bin/tests/system/ednscompliance/setup.sh SH 2018,2019,2020,2021,2022  
./bin/tests/system/ednscompliance/tests.sh SH 2014,2015,2016,2018,2019,2020,2021,2022  
./bin/tests/system/emptyzones/clean.sh SH 2014,2015,2016,2018,2019,2020,2021,2022  
./bin/tests/system/emptyzones/ns1/empty.db ZONE 2014,2016,2018,2019,2020,2021,2022  
./bin/tests/system/emptyzones/ns1/named1.conf.in CONF-C 2018,2019,2020,2021,2022  
./bin/tests/system/emptyzones/ns1/named2.conf.in CONF-C 2018,2019,2020,2021,2022  
./bin/tests/system/emptyzones/ns1/rfc1918.zones CONF-C 2014,2016,2018,2019,2020,2021,2022  
./bin/tests/system/emptyzones/ns1/root.hint ZONE 2014,2016,2018,2019,2020,2021,2022  
./bin/tests/system/emptyzones/setup.sh SH 2014,2016,2018,2019,2020,2021,2022  
./bin/tests/system/emptyzones/tests.sh SH 2014,2015,2016,2018,2019,2020,2021,2022  
./bin/tests/system/feature-test.c C 2016,2017,2018,2019,2020,2021,2022  
./bin/tests/system/fetchlimit/ans4/ans.pl PERL 2015,2016,2018,2019,2020,2021,2022  
./bin/tests/system/fetchlimit/clean.sh SH 2015,2016,2018,2019,2020,2021,2022  
./bin/tests/system/fetchlimit/ns1/named.conf.in CONF-C 2018,2019,2020,2021,2022  
./bin/tests/system/fetchlimit/ns1/root.db ZONE 2015,2016,2018,2019,2020,2021,2022  
./bin/tests/system/fetchlimit/ns2/example.db ZONE 2015,2016,2018,2019,2020,2021,2022  
./bin/tests/system/fetchlimit/ns2/named.conf.in CONF-C 2018,2019,2020,2021,2022  
./bin/tests/system/fetchlimit/ns3/named.args X 2015,2018,2019,2020,2021,2022  
./bin/tests/system/fetchlimit/ns3/named1.conf.in CONF-C 2018,2019,2020,2021,2022  
./bin/tests/system/fetchlimit/ns3/named2.conf.in CONF-C 2018,2019,2020,2021,2022  
./bin/tests/system/fetchlimit/ns3/named3.conf.in CONF-C 2018,2019,2020,2021,2022  
./bin/tests/system/fetchlimit/ns3/root.hint ZONE 2015,2016,2018,2019,2020,2021,2022  
./bin/tests/system/fetchlimit/prereq.sh SH 2018,2019,2020,2021,2022  
./bin/tests/system/fetchlimit/setup.sh SH 2015,2016,2018,2019,2020,2021,2022  
./bin/tests/system/fetchlimit/tests.sh SH 2015,2016,2018,2019,2020,2021,2022  
./bin/tests/system/filter-aaaa/clean.sh SH 2010,2012,2014,2016,2018,2019,2020,2021,2022  
./bin/tests/system/filter-aaaa/conf/bad1.conf CONF-C 2010,2016,2018,2019,2020,2021,2022  
./bin/tests/system/filter-aaaa/conf/bad2.conf CONF-C 2010,2016,2018,2019,2020,2021,2022  
./bin/tests/system/filter-aaaa/conf/bad3.conf CONF-C 2010,2016,2018,2019,2020,2021,2022  
./bin/tests/system/filter-aaaa/conf/bad4.conf CONF-C 2010,2016,2018,2019,2020,2021,2022  
./bin/tests/system/filter-aaaa/conf/bad5.conf CONF-C 2010,2016,2018,2019,2020,2021,2022  
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./bin/tests/system/filter-aaaa/conf/good1.conf CONF-C 2010,2016,2018,2019,2020,2021,2022  
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 ./bin/tests/system/filter-aaaa/conf/good3.conf CONF-C 2010,2016,2018,2019,2020,2021,2022  
 ./bin/tests/system/filter-aaaa/conf/good4.conf CONF-C 2010,2016,2018,2019,2020,2021,2022  
 ./bin/tests/system/filter-aaaa/conf/good5.conf CONF-C 2010,2016,2018,2019,2020,2021,2022  
 ./bin/tests/system/filter-aaaa/conf/good6.conf CONF-C 2010,2016,2018,2019,2020,2021,2022  
 ./bin/tests/system/filter-aaaa/conf/good7.conf CONF-C 2010,2016,2018,2019,2020,2021,2022  
 ./bin/tests/system/filter-aaaa/conf/good8.conf CONF-C 2010,2016,2018,2019,2020,2021,2022  
 ./bin/tests/system/filter-aaaa/ns1/named1.conf.in CONF-C 2018,2019,2020,2021,2022  
 ./bin/tests/system/filter-aaaa/ns1/named2.conf.in CONF-C 2018,2019,2020,2021,2022  
 ./bin/tests/system/filter-aaaa/ns1/root.db ZONE 2010,2012,2016,2017,2018,2019,2020,2021,2022  
 ./bin/tests/system/filter-aaaa/ns1/sign.sh SH 2010,2012,2014,2016,2018,2019,2020,2021,2022  
 ./bin/tests/system/filter-aaaa/ns1/signed.db.in ZONE 2010,2012,2016,2017,2018,2019,2020,2021,2022  
 ./bin/tests/system/filter-aaaa/ns1/signed.db.presigned X 2014,2017,2018,2019,2020,2021,2022  
 ./bin/tests/system/filter-aaaa/ns1/unsigned.db ZONE 2010,2012,2016,2017,2018,2019,2020,2021,2022  
 ./bin/tests/system/filter-aaaa/ns2/hints ZONE 2010,2016,2018,2019,2020,2021,2022  
 ./bin/tests/system/filter-aaaa/ns2/named1.conf.in CONF-C 2018,2019,2020,2021,2022  
 ./bin/tests/system/filter-aaaa/ns2/named2.conf.in CONF-C 2018,2019,2020,2021,2022  
 ./bin/tests/system/filter-aaaa/ns3/hints ZONE 2010,2016,2018,2019,2020,2021,2022  
 ./bin/tests/system/filter-aaaa/ns3/named1.conf.in CONF-C 2018,2019,2020,2021,2022  
 ./bin/tests/system/filter-aaaa/ns3/named2.conf.in CONF-C 2018,2019,2020,2021,2022  
 ./bin/tests/system/filter-aaaa/ns4/named1.conf.in CONF-C 2018,2019,2020,2021,2022  
 ./bin/tests/system/filter-aaaa/ns4/named2.conf.in CONF-C 2018,2019,2020,2021,2022  
 ./bin/tests/system/filter-aaaa/ns4/root.db ZONE 2010,2012,2016,2017,2018,2019,2020,2021,2022  
 ./bin/tests/system/filter-aaaa/ns4/sign.sh SH 2010,2012,2014,2016,2018,2019,2020,2021,2022  
 ./bin/tests/system/filter-aaaa/ns4/signed.db.in ZONE 2010,2012,2016,2017,2018,2019,2020,2021,2022  
 ./bin/tests/system/filter-aaaa/ns4/signed.db.presigned X 2014,2018,2019,2020,2021,2022  
 ./bin/tests/system/filter-aaaa/ns4/unsigned.db ZONE 2010,2012,2016,2017,2018,2019,2020,2021,2022  
 ./bin/tests/system/filter-aaaa/ns5/hints ZONE 2018,2019,2020,2021,2022  
 ./bin/tests/system/filter-aaaa/ns5/named.conf.in CONF-C 2018,2019,2020,2021,2022  
 ./bin/tests/system/filter-aaaa/prereq.sh SH 2010,2012,2014,2016,2018,2019,2020,2021,2022  
 ./bin/tests/system/filter-aaaa/setup.sh SH 2010,2012,2014,2016,2018,2019,2020,2021,2022  
 ./bin/tests/system/filter-aaaa/tests.sh SH 2010,2012,2015,2016,2017,2018,2019,2020,2021,2022  
 ./bin/tests/system/formerr/clean.sh SH 2013,2014,2015,2016,2018,2019,2020,2021,2022  
 ./bin/tests/system/formerr/formerr.pl PERL 2013,2014,2016,2018,2019,2020,2021,2022  
 ./bin/tests/system/formerr/nametoolong X 2013,2018,2019,2020,2021,2022  
 ./bin/tests/system/formerr/noquestions X 2013,2018,2019,2020,2021,2022  
 ./bin/tests/system/formerr/ns1/named.conf.in CONF-C 2018,2019,2020,2021,2022  
 ./bin/tests/system/formerr/ns1/root.db ZONE 2013,2016,2018,2019,2020,2021,2022  
 ./bin/tests/system/formerr/setup.sh SH 2018,2019,2020,2021,2022  
 ./bin/tests/system/formerr/tests.sh SH 2013,2015,2016,2018,2019,2020,2021,2022  
 ./bin/tests/system/formerr/twoquestions X 2013,2018,2019,2020,2021,2022  
 ./bin/tests/system/forward/ans6/startme X 2019,2020,2021,2022  
 ./bin/tests/system/forward/clean.sh SH 2000,2001,2004,2007,2012,2014,2015,2016,2018,2019,2020,2021,2022  
 ./bin/tests/system/forward/ns1/example.db X 2000,2001,2018,2019,2020,2021,2022  
 ./bin/tests/system/forward/ns1/named.conf.in CONF-C 2018,2019,2020,2021,2022  
 ./bin/tests/system/forward/ns1/root.db ZONE 2000,2001,2004,2007,2016,2018,2019,2020,2021,2022  
 ./bin/tests/system/forward/ns2/example.db X 2000,2001,2018,2019,2020,2021,2022

./bin/tests/system/forward/ns2/named.conf.in CONF-C 2018,2019,2020,2021,2022  
 ./bin/tests/system/forward/ns2/root.db ZONE 2000,2001,2004,2007,2016,2018,2019,2020,2021,2022  
 ./bin/tests/system/forward/ns3/named.conf.in CONF-C 2018,2019,2020,2021,2022  
 ./bin/tests/system/forward/ns3/root.db ZONE 2000,2001,2004,2007,2016,2018,2019,2020,2021,2022  
 ./bin/tests/system/forward/ns4/malicious.db ZONE 2020,2021,2022  
 ./bin/tests/system/forward/ns4/named.conf.in CONF-C 2018,2019,2020,2021,2022  
 ./bin/tests/system/forward/ns4/root.db ZONE 2000,2001,2004,2007,2016,2018,2019,2020,2021,2022  
 ./bin/tests/system/forward/ns5/named.conf.in CONF-C 2018,2019,2020,2021,2022  
 ./bin/tests/system/forward/ns5/rebind.db ZONE 2020,2021,2022  
 ./bin/tests/system/forward/ns5/root.db ZONE 2011,2016,2018,2019,2020,2021,2022  
 ./bin/tests/system/forward/ns7/named.conf.in CONF-C 2019,2020,2021,2022  
 ./bin/tests/system/forward/ns7/root.db ZONE 2019,2020,2021,2022  
 ./bin/tests/system/forward/prereq.sh SH 2019,2020,2021,2022  
 ./bin/tests/system/forward/rfc1918-inherited.conf CONF-C 2016,2018,2019,2020,2021,2022  
 ./bin/tests/system/forward/rfc1918-notinherited.conf CONF-C 2016,2018,2019,2020,2021,2022  
 ./bin/tests/system/forward/setup.sh SH 2018,2019,2020,2021,2022  
 ./bin/tests/system/forward/tests.sh SH 2000,2001,2004,2007,2011,2012,2013,2014,2016,2018,2019,2020,2021,2022  
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 ./bin/tests/system/forward/ula-notinherited.conf CONF-C 2016,2018,2019,2020,2021,2022  
 ./bin/tests/system/genzone.sh SH  
 2001,2002,2003,2004,2007,2009,2011,2012,2013,2014,2015,2016,2017,2018,2019,2020,2021,2022  
 ./bin/tests/system/geoip/clean.sh SH 2013,2014,2016,2018,2019,2020,2021,2022  
 ./bin/tests/system/geoip/data/GeoIP.csv X 2013,2014,2018,2019,2020,2021,2022  
 ./bin/tests/system/geoip/data/GeoIP.dat X 2013,2014,2018,2019,2020,2021,2022  
 ./bin/tests/system/geoip/data/GeoIPASNum.csv X 2013,2018,2019,2020,2021,2022  
 ./bin/tests/system/geoip/data/GeoIPASNum.dat X 2013,2018,2019,2020,2021,2022  
 ./bin/tests/system/geoip/data/GeoIPASNumv6.csv X 2013,2018,2019,2020,2021,2022  
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 ./bin/tests/system/geoip/data/GeoIPCity.csv X 2013,2018,2019,2020,2021,2022  
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 ./bin/tests/system/geoip/data/GeoIPDomain.csv X 2013,2018,2019,2020,2021,2022  
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 ./bin/tests/system/geoip/data/GeoIPISP.csv X 2013,2018,2019,2020,2021,2022  
 ./bin/tests/system/geoip/data/GeoIPISP.dat X 2013,2018,2019,2020,2021,2022  
 ./bin/tests/system/geoip/data/GeoIPNetSpeed.csv X 2013,2018,2019,2020,2021,2022  
 ./bin/tests/system/geoip/data/GeoIPNetSpeed.dat X 2013,2018,2019,2020,2021,2022  
 ./bin/tests/system/geoip/data/GeoIPOrg.csv X 2013,2018,2019,2020,2021,2022  
 ./bin/tests/system/geoip/data/GeoIPOrg.dat X 2013,2018,2019,2020,2021,2022  
 ./bin/tests/system/geoip/data/GeoIPRegion.csv X 2013,2018,2019,2020,2021,2022  
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 ./bin/tests/system/geoip/data/GeoIPv6.csv X 2013,2018,2019,2020,2021,2022  
 ./bin/tests/system/geoip/data/GeoIPv6.dat X 2013,2018,2019,2020,2021,2022  
 ./bin/tests/system/geoip/data/README TXT.BRIEF 2013,2014,2016,2018,2019,2020,2021,2022  
 ./bin/tests/system/geoip/ns2/example.db.in ZONE 2013,2016,2018,2019,2020,2021,2022  
 ./bin/tests/system/geoip/ns2/named1.conf.in CONF-C 2018,2019,2020,2021,2022  
 ./bin/tests/system/geoip/ns2/named10.conf.in CONF-C 2018,2019,2020,2021,2022

./bin/tests/system/geoip/ns2/named11.conf.in CONF-C 2018,2019,2020,2021,2022  
./bin/tests/system/geoip/ns2/named12.conf.in CONF-C 2018,2019,2020,2021,2022  
./bin/tests/system/geoip/ns2/named13.conf.in CONF-C 2018,2019,2020,2021,2022  
./bin/tests/system/geoip/ns2/named14.conf.in CONF-C 2018,2019,2020,2021,2022  
./bin/tests/system/geoip/ns2/named15.conf.in CONF-C 2018,2019,2020,2021,2022  
./bin/tests/system/geoip/ns2/named16.conf.in CONF-C 2019,2020,2021,2022  
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./bin/tests/system/geoip/ns2/named3.conf.in CONF-C 2018,2019,2020,2021,2022  
./bin/tests/system/geoip/ns2/named4.conf.in CONF-C 2018,2019,2020,2021,2022  
./bin/tests/system/geoip/ns2/named5.conf.in CONF-C 2018,2019,2020,2021,2022  
./bin/tests/system/geoip/ns2/named6.conf.in CONF-C 2018,2019,2020,2021,2022  
./bin/tests/system/geoip/ns2/named7.conf.in CONF-C 2018,2019,2020,2021,2022  
./bin/tests/system/geoip/ns2/named8.conf.in CONF-C 2018,2019,2020,2021,2022  
./bin/tests/system/geoip/ns2/named9.conf.in CONF-C 2018,2019,2020,2021,2022  
./bin/tests/system/geoip/options.conf CONF-C 2015,2016,2018,2019,2020,2021,2022  
./bin/tests/system/geoip/prereq.sh SH 2013,2014,2016,2018,2019,2020,2021,2022  
./bin/tests/system/geoip/setup.sh SH 2013,2014,2016,2018,2019,2020,2021,2022  
./bin/tests/system/geoip/tests.sh SH 2013,2014,2015,2016,2018,2019,2020,2021,2022  
./bin/tests/system/geoip2/clean.sh SH 2019,2020,2021,2022  
./bin/tests/system/geoip2/conf/bad-areacode.conf CONF-C 2019,2020,2021,2022  
./bin/tests/system/geoip2/conf/bad-dbname.conf CONF-C 2019,2020,2021,2022  
./bin/tests/system/geoip2/conf/bad-netspeed.conf CONF-C 2019,2020,2021,2022  
./bin/tests/system/geoip2/conf/bad-regiondb.conf CONF-C 2019,2020,2021,2022  
./bin/tests/system/geoip2/conf/bad-threeletter.conf CONF-C 2019,2020,2021,2022  
./bin/tests/system/geoip2/conf/good-options.conf CONF-C 2019,2020,2021,2022  
./bin/tests/system/geoip2/data/GeoIP2-City.json X 2019,2020,2021,2022  
./bin/tests/system/geoip2/data/GeoIP2-City.mmdb X 2019,2020,2021,2022  
./bin/tests/system/geoip2/data/GeoIP2-Country.json X 2019,2020,2021,2022  
./bin/tests/system/geoip2/data/GeoIP2-Country.mmdb X 2019,2020,2021,2022  
./bin/tests/system/geoip2/data/GeoIP2-Domain.json X 2019,2020,2021,2022  
./bin/tests/system/geoip2/data/GeoIP2-Domain.mmdb X 2019,2020,2021,2022  
./bin/tests/system/geoip2/data/GeoIP2-ISP.json X 2019,2020,2021,2022  
./bin/tests/system/geoip2/data/GeoIP2-ISP.mmdb X 2019,2020,2021,2022  
./bin/tests/system/geoip2/data/GeoLite2-ASN.json X 2019,2020,2021,2022  
./bin/tests/system/geoip2/data/GeoLite2-ASN.mmdb X 2019,2020,2021,2022  
./bin/tests/system/geoip2/data/README.md MKD 2019,2020,2021,2022  
./bin/tests/system/geoip2/data/write-test-data.pl PERL 2019,2020,2021,2022  
./bin/tests/system/geoip2/ns2/example.db.in ZONE 2019,2020,2021,2022  
./bin/tests/system/geoip2/ns2/named1.conf.in CONF-C 2019,2020,2021,2022  
./bin/tests/system/geoip2/ns2/named10.conf.in CONF-C 2019,2020,2021,2022  
./bin/tests/system/geoip2/ns2/named11.conf.in CONF-C 2019,2020,2021,2022  
./bin/tests/system/geoip2/ns2/named12.conf.in CONF-C 2019,2020,2021,2022  
./bin/tests/system/geoip2/ns2/named13.conf.in CONF-C 2019,2020,2021,2022  
./bin/tests/system/geoip2/ns2/named14.conf.in CONF-C 2019,2020,2021,2022  
./bin/tests/system/geoip2/ns2/named2.conf.in CONF-C 2019,2020,2021,2022  
./bin/tests/system/geoip2/ns2/named3.conf.in CONF-C 2019,2020,2021,2022  
./bin/tests/system/geoip2/ns2/named4.conf.in CONF-C 2019,2020,2021,2022  
./bin/tests/system/geoip2/ns2/named5.conf.in CONF-C 2019,2020,2021,2022

./bin/tests/system/geoip2/ns2/named6.conf.in CONF-C 2019,2020,2021,2022  
 ./bin/tests/system/geoip2/ns2/named7.conf.in CONF-C 2019,2020,2021,2022  
 ./bin/tests/system/geoip2/ns2/named8.conf.in CONF-C 2019,2020,2021,2022  
 ./bin/tests/system/geoip2/ns2/named9.conf.in CONF-C 2019,2020,2021,2022  
 ./bin/tests/system/geoip2/prereq.sh SH 2019,2020,2021,2022  
 ./bin/tests/system/geoip2/setup.sh SH 2019,2020,2021,2022  
 ./bin/tests/system/geoip2/tests.sh SH 2019,2020,2021,2022  
 ./bin/tests/system/glue/clean.sh SH 2000,2001,2004,2007,2012,2014,2015,2016,2018,2019,2020,2021,2022  
 ./bin/tests/system/glue/fi.good X 2000,2001,2018,2019,2020,2021,2022  
 ./bin/tests/system/glue/nogluue.good X 2000,2001,2018,2019,2020,2021,2022  
 ./bin/tests/system/glue/ns1/cache.in ZONE 2000,2001,2004,2007,2016,2018,2019,2020,2021,2022  
 ./bin/tests/system/glue/ns1/mil.db ZONE 2000,2001,2004,2007,2016,2018,2019,2020,2021,2022  
 ./bin/tests/system/glue/ns1/named.conf.in CONF-C 2018,2019,2020,2021,2022  
 ./bin/tests/system/glue/ns1/net.db ZONE 2000,2001,2004,2007,2016,2018,2019,2020,2021,2022  
 ./bin/tests/system/glue/ns1/root-servers.nil.db ZONE 2000,2001,2004,2007,2016,2018,2019,2020,2021,2022  
 ./bin/tests/system/glue/ns1/root.db ZONE 2000,2001,2004,2007,2016,2018,2019,2020,2021,2022  
 ./bin/tests/system/glue/setup.sh SH 2001,2004,2007,2012,2016,2018,2019,2020,2021,2022  
 ./bin/tests/system/glue/tests.sh SH 2000,2001,2003,2004,2007,2012,2013,2016,2018,2019,2020,2021,2022  
 ./bin/tests/system/glue/xx.good X 2000,2001,2018,2019,2020,2021,2022  
 ./bin/tests/system/glue/yy.good X 2000,2001,2003,2018,2019,2020,2021,2022  
 ./bin/tests/system/gost/clean.sh SH 2010,2012,2014,2016,2018,2019,2020,2021,2022  
 ./bin/tests/system/gost/ns1/named.conf CONF-C 2010,2016,2018,2019,2020,2021,2022  
 ./bin/tests/system/gost/ns1/root.db.in ZONE 2010,2016,2018,2019,2020,2021,2022  
 ./bin/tests/system/gost/ns1/sign.sh SH 2010,2012,2014,2016,2018,2019,2020,2021,2022  
 ./bin/tests/system/gost/ns2/named.conf CONF-C 2010,2016,2018,2019,2020,2021,2022  
 ./bin/tests/system/gost/prereq.sh SH 2010,2012,2014,2016,2018,2019,2020,2021,2022  
 ./bin/tests/system/gost/setup.sh SH 2010,2012,2014,2016,2018,2019,2020,2021,2022  
 ./bin/tests/system/gost/tests.sh SH 2010,2012,2013,2016,2018,2019,2020,2021,2022  
 ./bin/tests/system/idna/clean.sh SH 2018,2019,2020,2021,2022  
 ./bin/tests/system/idna/ns1/named.conf.in CONF-C 2018,2019,2020,2021,2022  
 ./bin/tests/system/idna/ns1/root.db ZONE 2018,2019,2020,2021,2022  
 ./bin/tests/system/idna/setup.sh SH 2018,2019,2020,2021,2022  
 ./bin/tests/system/idna/tests.sh SH 2018,2019,2020,2021,2022  
 ./bin/tests/system/ifconfig.bat BAT 2016,2018,2019,2020,2021,2022  
 ./bin/tests/system/ifconfig.sh SH  
 2000,2001,2002,2003,2004,2007,2008,2009,2010,2012,2013,2016,2018,2019,2020,2021,2022  
 ./bin/tests/system/inline/checkdsa.sh.in SH 2013,2014,2016,2018,2019,2020,2021,2022  
 ./bin/tests/system/inline/clean.sh SH 2011,2012,2013,2014,2015,2016,2017,2018,2019,2020,2021,2022  
 ./bin/tests/system/inline/ns1/named.conf.in CONF-C 2018,2019,2020,2021,2022  
 ./bin/tests/system/inline/ns1/root.db.in ZONE 2011,2012,2013,2016,2017,2018,2019,2020,2021,2022  
 ./bin/tests/system/inline/ns1/sign.sh SH 2011,2012,2014,2016,2018,2019,2020,2021,2022  
 ./bin/tests/system/inline/ns2/bits.db.in ZONE 2011,2016,2018,2019,2020,2021,2022  
 ./bin/tests/system/inline/ns2/named.conf.in CONF-C 2018,2019,2020,2021,2022  
 ./bin/tests/system/inline/ns2/nsec3-loop.db.in ZONE 2017,2018,2019,2020,2021,2022  
 ./bin/tests/system/inline/ns3/master.db.in ZONE 2011,2012,2016,2018,2019,2020,2021,2022  
 ./bin/tests/system/inline/ns3/master2.db.in ZONE 2011,2012,2016,2018,2019,2020,2021,2022  
 ./bin/tests/system/inline/ns3/master3.db.in ZONE 2012,2016,2018,2019,2020,2021,2022  
 ./bin/tests/system/inline/ns3/master4.db.in ZONE 2012,2016,2018,2019,2020,2021,2022



./bin/tests/system/inline/ns3/master5.db.in ZONE 2018,2019,2020,2021,2022  
./bin/tests/system/inline/ns3/master6.db.in ZONE 2019,2020,2021,2022  
./bin/tests/system/inline/ns3/named.conf.in CONF-C 2018,2019,2020,2021,2022  
./bin/tests/system/inline/ns3/sign.sh SH 2011,2012,2013,2014,2016,2017,2018,2019,2020,2021,2022  
./bin/tests/system/inline/ns4/named.conf.in CONF-C 2018,2019,2020,2021,2022  
./bin/tests/system/inline/ns4/noixfr.db.in ZONE 2011,2016,2018,2019,2020,2021,2022  
./bin/tests/system/inline/ns5/named.conf.post CONF-C 2011,2014,2016,2018,2019,2020,2021,2022  
./bin/tests/system/inline/ns5/named.conf.pre CONF-C 2011,2016,2018,2019,2020,2021,2022  
./bin/tests/system/inline/ns6/named.conf.in CONF-C 2018,2019,2020,2021,2022  
./bin/tests/system/inline/ns7/named.conf.in CONF-C 2018,2019,2020,2021,2022  
./bin/tests/system/inline/ns7/sign.sh SH 2017,2018,2019,2020,2021,2022  
./bin/tests/system/inline/ns8/example.com.db.in ZONE 2020,2021,2022  
./bin/tests/system/inline/ns8/named.conf.in CONF-C 2020,2021,2022  
./bin/tests/system/inline/ns8/sign.sh SH 2020,2021,2022  
./bin/tests/system/inline/prereq.sh SH 2014,2016,2018,2019,2020,2021,2022  
./bin/tests/system/inline/setup.sh SH 2011,2012,2013,2014,2016,2017,2018,2019,2020,2021,2022  
./bin/tests/system/inline/tests.sh SH 2011,2012,2013,2014,2016,2017,2018,2019,2020,2021,2022  
./bin/tests/system/integrity/clean.sh SH 2017,2018,2019,2020,2021,2022  
./bin/tests/system/integrity/ns1/mx-cname.db ZONE 2017,2018,2019,2020,2021,2022  
./bin/tests/system/integrity/ns1/named.conf.in CONF-C 2018,2019,2020,2021,2022  
./bin/tests/system/integrity/ns1/srv-cname.db ZONE 2017,2018,2019,2020,2021,2022  
./bin/tests/system/integrity/setup.sh SH 2018,2019,2020,2021,2022  
./bin/tests/system/integrity/tests.sh SH 2017,2018,2019,2020,2021,2022  
./bin/tests/system/ixfr/ans2/startme X 2011,2018,2019,2020,2021,2022  
./bin/tests/system/ixfr/clean.sh SH 2001,2004,2007,2011,2012,2014,2015,2016,2018,2019,2020,2021,2022  
./bin/tests/system/ixfr/ns1/startme X 2012,2013,2018,2019,2020,2021,2022  
./bin/tests/system/ixfr/ns3/mytest0.db ZONE 2011,2016,2018,2019,2020,2021,2022  
./bin/tests/system/ixfr/ns3/mytest1.db ZONE 2011,2016,2018,2019,2020,2021,2022  
./bin/tests/system/ixfr/ns3/mytest2.db ZONE 2011,2016,2018,2019,2020,2021,2022  
./bin/tests/system/ixfr/ns3/named.conf.in CONF-C 2018,2019,2020,2021,2022  
./bin/tests/system/ixfr/ns3/subtest0.db ZONE 2011,2016,2018,2019,2020,2021,2022  
./bin/tests/system/ixfr/ns3/subtest1.db ZONE 2011,2016,2018,2019,2020,2021,2022  
./bin/tests/system/ixfr/ns4/named.conf.in CONF-C 2018,2019,2020,2021,2022  
./bin/tests/system/ixfr/ns5/named.conf.in CONF-C 2019,2020,2021,2022  
./bin/tests/system/ixfr/prereq.sh SH 2001,2004,2007,2012,2014,2016,2018,2019,2020,2021,2022  
./bin/tests/system/ixfr/setup.sh SH 2001,2004,2007,2011,2012,2013,2014,2016,2018,2019,2020,2021,2022  
./bin/tests/system/ixfr/tests.sh SH 2001,2004,2007,2011,2012,2014,2016,2018,2019,2020,2021,2022  
./bin/tests/system/keymgr/01-ksk-inactive/README.TXT.BRIEF 2016,2018,2019,2020,2021,2022  
./bin/tests/system/keymgr/01-ksk-inactive/expect X 2016,2018,2019,2020,2021,2022  
./bin/tests/system/keymgr/02-zsk-inactive/README.TXT.BRIEF 2016,2018,2019,2020,2021,2022  
./bin/tests/system/keymgr/02-zsk-inactive/expect X 2016,2018,2019,2020,2021,2022  
./bin/tests/system/keymgr/03-ksk-unpublished/README.TXT.BRIEF 2016,2018,2019,2020,2021,2022  
./bin/tests/system/keymgr/03-ksk-unpublished/expect X 2016,2018,2019,2020,2021,2022  
./bin/tests/system/keymgr/04-zsk-unpublished/README.TXT.BRIEF 2016,2018,2019,2020,2021,2022  
./bin/tests/system/keymgr/04-zsk-unpublished/expect X 2016,2018,2019,2020,2021,2022  
./bin/tests/system/keymgr/05-ksk-unpub-active/README.TXT.BRIEF 2016,2018,2019,2020,2021,2022  
./bin/tests/system/keymgr/05-ksk-unpub-active/expect X 2016,2018,2019,2020,2021,2022  
./bin/tests/system/keymgr/06-zsk-unpub-active/README.TXT.BRIEF 2016,2018,2019,2020,2021,2022

./bin/tests/system/keymgr/06-zsk-unpub-active/expect X 2016,2018,2019,2020,2021,2022  
./bin/tests/system/keymgr/07-ksk-ttl/README.TXT.BRIEF 2016,2018,2019,2020,2021,2022  
./bin/tests/system/keymgr/07-ksk-ttl/expect X 2016,2018,2019,2020,2021,2022  
./bin/tests/system/keymgr/08-zsk-ttl/README.TXT.BRIEF 2016,2018,2019,2020,2021,2022  
./bin/tests/system/keymgr/08-zsk-ttl/expect X 2016,2018,2019,2020,2021,2022  
./bin/tests/system/keymgr/09-no-keys/README.TXT.BRIEF 2016,2018,2019,2020,2021,2022  
./bin/tests/system/keymgr/09-no-keys/expect X 2016,2018,2019,2020,2021,2022  
./bin/tests/system/keymgr/10-change-roll/README.TXT.BRIEF 2016,2018,2019,2020,2021,2022  
./bin/tests/system/keymgr/10-change-roll/expect X 2016,2018,2019,2020,2021,2022  
./bin/tests/system/keymgr/11-many-simul/README.TXT.BRIEF 2016,2018,2019,2020,2021,2022  
./bin/tests/system/keymgr/11-many-simul/expect X 2016,2018,2019,2020,2021,2022  
./bin/tests/system/keymgr/12-many-active/README.TXT.BRIEF 2016,2018,2019,2020,2021,2022  
./bin/tests/system/keymgr/12-many-active/expect X 2016,2018,2019,2020,2021,2022  
./bin/tests/system/keymgr/13-noroll/README.TXT.BRIEF 2016,2018,2019,2020,2021,2022  
./bin/tests/system/keymgr/13-noroll/expect X 2016,2018,2019,2020,2021,2022  
./bin/tests/system/keymgr/14-wrongalg/README.TXT.BRIEF 2016,2018,2019,2020,2021,2022  
./bin/tests/system/keymgr/14-wrongalg/expect X 2016,2018,2019,2020,2021,2022  
./bin/tests/system/keymgr/15-unspec/README.TXT.BRIEF 2016,2018,2019,2020,2021,2022  
./bin/tests/system/keymgr/15-unspec/expect X 2016,2018,2019,2020,2021,2022  
./bin/tests/system/keymgr/16-wrongalg-unspec/README.TXT.BRIEF 2016,2018,2019,2020,2021,2022  
./bin/tests/system/keymgr/16-wrongalg-unspec/expect X 2016,2018,2019,2020,2021,2022  
./bin/tests/system/keymgr/17-noforce/README.TXT.BRIEF 2016,2018,2019,2020,2021,2022  
./bin/tests/system/keymgr/17-noforce/expect X 2016,2018,2019,2020,2021,2022  
./bin/tests/system/keymgr/18-nonstd-prepub/README.TXT.BRIEF 2016,2018,2019,2020,2021,2022  
./bin/tests/system/keymgr/18-nonstd-prepub/expect X 2016,2018,2019,2020,2021,2022  
./bin/tests/system/keymgr/18-nonstd-prepub/policy.conf CONF-C 2016,2018,2019,2020,2021,2022  
./bin/tests/system/keymgr/19-old-keys/README.TXT.BRIEF 2019,2020,2021,2022  
./bin/tests/system/keymgr/19-old-keys/expect X 2019,2020,2021,2022  
./bin/tests/system/keymgr/19-old-keys/extra.sh SH 2019,2020,2021,2022  
./bin/tests/system/keymgr/19-old-keys/policy.conf CONF-C 2019,2020,2021,2022  
./bin/tests/system/keymgr/clean.sh SH 2016,2018,2019,2020,2021,2022  
./bin/tests/system/keymgr/policy.conf CONF-C 2016,2018,2019,2020,2021,2022  
./bin/tests/system/keymgr/policy.good X 2016,2018,2019,2020,2021,2022  
./bin/tests/system/keymgr/policy.sample CONF-C 2016,2017,2018,2019,2020,2021,2022  
./bin/tests/system/keymgr/prereq.sh SH 2016,2018,2019,2020,2021,2022  
./bin/tests/system/keymgr/setup.sh SH 2016,2018,2019,2020,2021,2022  
./bin/tests/system/keymgr/testpolicy.py PYTHON 2016,2018,2019,2020,2021,2022  
./bin/tests/system/keymgr/tests.sh SH 2016,2018,2019,2020,2021,2022  
./bin/tests/system/legacy/build.sh SH 2014,2016,2018,2019,2020,2021,2022  
./bin/tests/system/legacy/clean.sh SH 2014,2016,2018,2019,2020,2021,2022  
./bin/tests/system/legacy/ns1/named1.conf.in CONF-C 2018,2019,2020,2021,2022  
./bin/tests/system/legacy/ns1/named2.conf.in CONF-C 2018,2019,2020,2021,2022  
./bin/tests/system/legacy/ns1/root.db ZONE 2014,2016,2018,2019,2020,2021,2022  
./bin/tests/system/legacy/ns1/trusted.conf X 2014,2018,2019,2020,2021,2022  
./bin/tests/system/legacy/ns10/ednsrefused.db ZONE 2018,2019,2020,2021,2022  
./bin/tests/system/legacy/ns10/named.conf.in CONF-C 2018,2019,2020,2021,2022  
./bin/tests/system/legacy/ns10/named.ednsrefused X 2018,2019,2020,2021,2022  
./bin/tests/system/legacy/ns2/dropedns.db ZONE 2014,2016,2018,2019,2020,2021,2022

./bin/tests/system/legacy/ns2/named.conf.in CONF-C 2018,2019,2020,2021,2022  
 ./bin/tests/system/legacy/ns2/named.droppedns X 2014,2018,2019,2020,2021,2022  
 ./bin/tests/system/legacy/ns3/droppedns-notcp.db ZONE 2014,2016,2018,2019,2020,2021,2022  
 ./bin/tests/system/legacy/ns3/named.conf.in CONF-C 2018,2019,2020,2021,2022  
 ./bin/tests/system/legacy/ns3/named.droppedns X 2014,2018,2019,2020,2021,2022  
 ./bin/tests/system/legacy/ns3/named.notcp X 2014,2018,2019,2020,2021,2022  
 ./bin/tests/system/legacy/ns4/named.args X 2014,2018,2019,2020,2021,2022  
 ./bin/tests/system/legacy/ns4/named.conf.in CONF-C 2018,2019,2020,2021,2022  
 ./bin/tests/system/legacy/ns4/plain.db ZONE 2014,2016,2018,2019,2020,2021,2022  
 ./bin/tests/system/legacy/ns5/named.args X 2014,2018,2019,2020,2021,2022  
 ./bin/tests/system/legacy/ns5/named.conf.in CONF-C 2018,2019,2020,2021,2022  
 ./bin/tests/system/legacy/ns5/named.notcp X 2014,2018,2019,2020,2021,2022  
 ./bin/tests/system/legacy/ns5/plain-notcp.db ZONE 2014,2016,2018,2019,2020,2021,2022  
 ./bin/tests/system/legacy/ns6/edns512.db.in ZONE 2014,2016,2018,2019,2020,2021,2022  
 ./bin/tests/system/legacy/ns6/edns512.db.signed X 2014,2018,2019,2020,2021,2022  
 ./bin/tests/system/legacy/ns6/named.args X 2014,2018,2019,2020,2021,2022  
 ./bin/tests/system/legacy/ns6/named.conf.in CONF-C 2018,2019,2020,2021,2022  
 ./bin/tests/system/legacy/ns6/sign.sh SH 2014,2016,2018,2019,2020,2021,2022  
 ./bin/tests/system/legacy/ns7/edns512-notcp.db.in ZONE 2014,2016,2018,2019,2020,2021,2022  
 ./bin/tests/system/legacy/ns7/edns512-notcp.db.signed X 2014,2018,2019,2020,2021,2022  
 ./bin/tests/system/legacy/ns7/named.args X 2014,2018,2019,2020,2021,2022  
 ./bin/tests/system/legacy/ns7/named.conf.in CONF-C 2018,2019,2020,2021,2022  
 ./bin/tests/system/legacy/ns7/named.notcp X 2014,2018,2019,2020,2021,2022  
 ./bin/tests/system/legacy/ns7/sign.sh SH 2014,2016,2018,2019,2020,2021,2022  
 ./bin/tests/system/legacy/ns8/ednsformerr.db ZONE 2018,2019,2020,2021,2022  
 ./bin/tests/system/legacy/ns8/named.conf.in CONF-C 2018,2019,2020,2021,2022  
 ./bin/tests/system/legacy/ns8/named.ednsformerr X 2018,2019,2020,2021,2022  
 ./bin/tests/system/legacy/ns9/ednsnotimp.db ZONE 2018,2019,2020,2021,2022  
 ./bin/tests/system/legacy/ns9/named.conf.in CONF-C 2018,2019,2020,2021,2022  
 ./bin/tests/system/legacy/ns9/named.ednsnotimp X 2018,2019,2020,2021,2022  
 ./bin/tests/system/legacy/setup.sh SH 2014,2016,2018,2019,2020,2021,2022  
 ./bin/tests/system/legacy/tests.sh SH 2014,2015,2016,2018,2019,2020,2021,2022  
 ./bin/tests/system/limits/clean.sh SH 2000,2001,2004,2007,2012,2014,2015,2016,2018,2019,2020,2021,2022  
 ./bin/tests/system/limits/knowngood.dig.out.1000 X 2000,2001,2018,2019,2020,2021,2022  
 ./bin/tests/system/limits/knowngood.dig.out.2000 X 2000,2001,2018,2019,2020,2021,2022  
 ./bin/tests/system/limits/knowngood.dig.out.3000 X 2000,2001,2018,2019,2020,2021,2022  
 ./bin/tests/system/limits/knowngood.dig.out.4000 X 2000,2001,2018,2019,2020,2021,2022  
 ./bin/tests/system/limits/knowngood.dig.out.a-maximum-rrset X 2000,2001,2018,2019,2020,2021,2022  
 ./bin/tests/system/limits/ns1/example.db ZONE 2000,2001,2004,2007,2016,2018,2019,2020,2021,2022  
 ./bin/tests/system/limits/ns1/named.conf.in CONF-C 2018,2019,2020,2021,2022  
 ./bin/tests/system/limits/ns1/root.db ZONE 2000,2001,2004,2007,2016,2018,2019,2020,2021,2022  
 ./bin/tests/system/limits/setup.sh SH 2018,2019,2020,2021,2022  
 ./bin/tests/system/limits/tests.sh SH 2000,2001,2004,2007,2011,2012,2016,2018,2019,2020,2021,2022  
 ./bin/tests/system/logfileconfig/clean.sh SH 2011,2012,2014,2015,2016,2018,2019,2020,2021,2022  
 ./bin/tests/system/logfileconfig/ns1/controls.conf.in CONF-C 2018,2019,2020,2021,2022  
 ./bin/tests/system/logfileconfig/ns1/named.dirconf CONF-C 2011,2013,2016,2018,2019,2020,2021,2022  
 ./bin/tests/system/logfileconfig/ns1/named.pipeconf CONF-C 2011,2013,2016,2018,2019,2020,2021,2022  
 ./bin/tests/system/logfileconfig/ns1/named.plain CONF-C 2011,2013,2014,2016,2018,2019,2020,2021,2022

./bin/tests/system/logfileconfig/ns1/named.plainconf CONF-C 2014,2016,2018,2019,2020,2021,2022  
 ./bin/tests/system/logfileconfig/ns1/named.symconf CONF-C 2011,2013,2016,2018,2019,2020,2021,2022  
 ./bin/tests/system/logfileconfig/ns1/named.unlimited CONF-C 2016,2018,2019,2020,2021,2022  
 ./bin/tests/system/logfileconfig/ns1/named.versconf CONF-C 2016,2018,2019,2020,2021,2022  
 ./bin/tests/system/logfileconfig/ns1/rndc.conf.in CONF-C 2011,2013,2016,2017,2018,2019,2020,2021,2022  
 ./bin/tests/system/logfileconfig/ns1/root.db ZONE 2011,2016,2018,2019,2020,2021,2022  
 ./bin/tests/system/logfileconfig/setup.sh SH 2011,2012,2014,2016,2018,2019,2020,2021,2022  
 ./bin/tests/system/logfileconfig/tests.sh SH 2011,2012,2013,2014,2016,2017,2018,2019,2020,2021,2022  
 ./bin/tests/system/lwresd/Makefile.in MAKE  
 2000,2001,2002,2004,2007,2009,2012,2014,2015,2016,2018,2019,2020,2021,2022  
 ./bin/tests/system/lwresd/clean.sh SH 2008,2012,2013,2014,2015,2016,2018,2019,2020,2021,2022  
 ./bin/tests/system/lwresd/lwresd1/lwresd.conf CONF-C 2000,2001,2004,2007,2016,2018,2019,2020,2021,2022  
 ./bin/tests/system/lwresd/lwresd1/nosearch.conf CONF-C 2016,2018,2019,2020,2021,2022  
 ./bin/tests/system/lwresd/lwresd1/resolv.conf CONF-SH  
 2000,2001,2004,2007,2012,2016,2018,2019,2020,2021,2022  
 ./bin/tests/system/lwresd/lwtest.c C  
 2000,2001,2002,2004,2007,2008,2012,2013,2015,2016,2018,2019,2020,2021,2022  
 ./bin/tests/system/lwresd/ns1/10.10.10.in-addr.arpa.db ZONE 2000,2001,2004,2007,2016,2018,2019,2020,2021,2022  
 ./bin/tests/system/lwresd/ns1/e.example1.db X 2008,2018,2019,2020,2021,2022  
 ./bin/tests/system/lwresd/ns1/example1.db ZONE  
 2000,2001,2002,2003,2004,2007,2008,2016,2018,2019,2020,2021,2022  
 ./bin/tests/system/lwresd/ns1/example2.db ZONE 2000,2001,2002,2004,2007,2016,2018,2019,2020,2021,2022  
 ./bin/tests/system/lwresd/ns1/ip6.arpa.db ZONE 2000,2001,2002,2004,2007,2016,2018,2019,2020,2021,2022  
 ./bin/tests/system/lwresd/ns1/ip6.int.db ZONE 2000,2001,2002,2004,2007,2016,2018,2019,2020,2021,2022  
 ./bin/tests/system/lwresd/ns1/named.conf CONF-C  
 2000,2001,2004,2006,2007,2008,2016,2018,2019,2020,2021,2022  
 ./bin/tests/system/lwresd/ns1/root.db ZONE 2000,2001,2004,2007,2016,2018,2019,2020,2021,2022  
 ./bin/tests/system/lwresd/resolv.conf CONF-SH 2000,2001,2004,2007,2012,2016,2018,2019,2020,2021,2022  
 ./bin/tests/system/lwresd/tests.sh SH 2000,2001,2004,2007,2011,2012,2013,2014,2016,2018,2019,2020,2021,2022  
 ./bin/tests/system/masterfile/clean.sh SH 2001,2004,2007,2010,2012,2014,2015,2016,2018,2019,2020,2021,2022  
 ./bin/tests/system/masterfile/knowngood.dig.out X 2001,2004,2012,2018,2019,2020,2021,2022  
 ./bin/tests/system/masterfile/ns1/include.db ZONE 2001,2004,2007,2012,2016,2018,2019,2020,2021,2022  
 ./bin/tests/system/masterfile/ns1/named.conf.in CONF-C 2018,2019,2020,2021,2022  
 ./bin/tests/system/masterfile/ns1/sub.db ZONE 2001,2004,2007,2016,2018,2019,2020,2021,2022  
 ./bin/tests/system/masterfile/ns1/ttl1.db ZONE 2001,2004,2007,2016,2018,2019,2020,2021,2022  
 ./bin/tests/system/masterfile/ns1/ttl2.db ZONE 2001,2004,2007,2016,2018,2019,2020,2021,2022  
 ./bin/tests/system/masterfile/ns2/example.db ZONE 2010,2016,2018,2019,2020,2021,2022  
 ./bin/tests/system/masterfile/ns2/named.conf.in CONF-C 2018,2019,2020,2021,2022  
 ./bin/tests/system/masterfile/setup.sh SH 2018,2019,2020,2021,2022  
 ./bin/tests/system/masterfile/tests.sh SH 2001,2004,2007,2010,2012,2015,2016,2018,2019,2020,2021,2022  
 ./bin/tests/system/masterfile/zone/inheritownerafterinclude.db ZONE 2015,2016,2018,2019,2020,2021,2022  
 ./bin/tests/system/masterfile/zone/inheritownerafterinclude.good X 2015,2018,2019,2020,2021,2022  
 ./bin/tests/system/masterfile/zone/nameservers.db ZONE 2015,2016,2018,2019,2020,2021,2022  
 ./bin/tests/system/masterformat/clean.sh SH 2005,2007,2011,2012,2013,2014,2015,2016,2018,2019,2020,2021,2022  
 ./bin/tests/system/masterformat/ns1/compile.sh SH  
 2005,2006,2007,2011,2012,2013,2014,2016,2018,2019,2020,2021,2022  
 ./bin/tests/system/masterformat/ns1/example.db ZONE 2005,2007,2014,2016,2018,2019,2020,2021,2022  
 ./bin/tests/system/masterformat/ns1/large.db.in ZONE 2012,2016,2018,2019,2020,2021,2022

./bin/tests/system/masterformat/ns1/named.conf.in CONF-C 2018,2019,2020,2021,2022  
./bin/tests/system/masterformat/ns1/signed.db ZONE 2013,2016,2018,2019,2020,2021,2022  
./bin/tests/system/masterformat/ns2/formerly-text.db.in ZONE 2011,2016,2018,2019,2020,2021,2022  
./bin/tests/system/masterformat/ns2/named.conf.in CONF-C 2018,2019,2020,2021,2022  
./bin/tests/system/masterformat/ns3/named.conf.in CONF-C 2018,2019,2020,2021,2022  
./bin/tests/system/masterformat/prereq.sh SH 2014,2016,2018,2019,2020,2021,2022  
./bin/tests/system/masterformat/setup.sh SH 2005,2006,2007,2011,2012,2013,2014,2016,2018,2019,2020,2021,2022  
./bin/tests/system/masterformat/tests.sh SH 2005,2007,2011,2012,2013,2014,2016,2017,2018,2019,2020,2021,2022  
./bin/tests/system/metadata/child.db ZONE 2009,2016,2018,2019,2020,2021,2022  
./bin/tests/system/metadata/clean.sh SH 2009,2011,2012,2014,2016,2017,2018,2019,2020,2021,2022  
./bin/tests/system/metadata/parent.db ZONE 2009,2016,2018,2019,2020,2021,2022  
./bin/tests/system/metadata/prereq.sh SH 2009,2012,2014,2016,2018,2019,2020,2021,2022  
./bin/tests/system/metadata/setup.sh SH 2009,2011,2012,2014,2016,2018,2019,2020,2021,2022  
./bin/tests/system/metadata/tests.sh SH 2009,2011,2012,2013,2014,2016,2017,2018,2019,2020,2021,2022  
./bin/tests/system/mkeys/README TXT.BRIEF 2015,2016,2017,2018,2019,2020,2021,2022  
./bin/tests/system/mkeys/clean.sh SH 2015,2016,2017,2018,2019,2020,2021,2022  
./bin/tests/system/mkeys/ns1/named1.conf.in CONF-C 2018,2019,2020,2021,2022  
./bin/tests/system/mkeys/ns1/named2.conf.in CONF-C 2018,2019,2020,2021,2022  
./bin/tests/system/mkeys/ns1/named3.conf.in CONF-C 2018,2019,2020,2021,2022  
./bin/tests/system/mkeys/ns1/root.db ZONE 2015,2016,2017,2018,2019,2020,2021,2022  
./bin/tests/system/mkeys/ns1/sign.sh SH 2015,2016,2017,2018,2019,2020,2021,2022  
./bin/tests/system/mkeys/ns1/unsupported.key X 2019,2020,2021,2022  
./bin/tests/system/mkeys/ns2/named.args X 2015,2016,2017,2018,2019,2020,2021,2022  
./bin/tests/system/mkeys/ns2/named.conf.in CONF-C 2018,2019,2020,2021,2022  
./bin/tests/system/mkeys/ns3/named.args X 2015,2016,2017,2018,2019,2020,2021,2022  
./bin/tests/system/mkeys/ns3/named.conf.in CONF-C 2018,2019,2020,2021,2022  
./bin/tests/system/mkeys/ns5/named.conf.in CONF-C 2018,2019,2020,2021,2022  
./bin/tests/system/mkeys/ns5/named1.args X 2017,2018,2019,2020,2021,2022  
./bin/tests/system/mkeys/ns5/named2.args X 2017,2018,2019,2020,2021,2022  
./bin/tests/system/mkeys/ns6/named.args X 2019,2020,2021,2022  
./bin/tests/system/mkeys/ns6/named.conf.in CONF-C 2019,2020,2021,2022  
./bin/tests/system/mkeys/ns6/setup.sh SH 2019,2020,2021,2022  
./bin/tests/system/mkeys/ns6/unsupported-managed.key X 2019,2020,2021,2022  
./bin/tests/system/mkeys/ns7/named.conf.in CONF-C 2019,2020,2021,2022  
./bin/tests/system/mkeys/prereq.sh SH 2015,2016,2018,2019,2020,2021,2022  
./bin/tests/system/mkeys/setup.sh SH 2015,2016,2017,2018,2019,2020,2021,2022  
./bin/tests/system/mkeys/tests.sh SH 2015,2016,2017,2018,2019,2020,2021,2022  
./bin/tests/system/names/clean.sh SH 2015,2016,2018,2019,2020,2021,2022  
./bin/tests/system/names/ns1/example.db ZONE 2015,2016,2018,2019,2020,2021,2022  
./bin/tests/system/names/ns1/named.conf.in CONF-C 2018,2019,2020,2021,2022  
./bin/tests/system/names/setup.sh SH 2015,2016,2018,2019,2020,2021,2022  
./bin/tests/system/names/tests.sh SH 2015,2016,2018,2019,2020,2021,2022  
./bin/tests/system/notify/clean.sh SH 2000,2001,2004,2007,2011,2012,2014,2015,2016,2018,2019,2020,2021,2022  
./bin/tests/system/notify/ns1/named.conf.in CONF-C 2018,2019,2020,2021,2022  
./bin/tests/system/notify/ns1/root.db ZONE 2000,2001,2004,2007,2016,2018,2019,2020,2021,2022  
./bin/tests/system/notify/ns2/example1.db ZONE 2000,2001,2002,2004,2007,2009,2016,2018,2019,2020,2021,2022  
./bin/tests/system/notify/ns2/example2.db ZONE 2000,2001,2002,2004,2007,2009,2016,2018,2019,2020,2021,2022  
./bin/tests/system/notify/ns2/example3.db ZONE 2000,2001,2002,2004,2007,2009,2016,2018,2019,2020,2021,2022

./bin/tests/system/notify/ns2/example4.db ZONE 2000,2001,2002,2004,2007,2009,2016,2018,2019,2020,2021,2022  
 ./bin/tests/system/notify/ns2/generic.db ZONE 2014,2016,2018,2019,2020,2021,2022  
 ./bin/tests/system/notify/ns2/named.conf.in CONF-C 2018,2019,2020,2021,2022  
 ./bin/tests/system/notify/ns3/named.conf.in CONF-C 2018,2019,2020,2021,2022  
 ./bin/tests/system/notify/ns4/named.conf.in CONF-C 2018,2019,2020,2021,2022  
 ./bin/tests/system/notify/ns4/named.port.in X 2018,2019,2020,2021,2022  
 ./bin/tests/system/notify/ns5/named.conf.in CONF-C 2018,2019,2020,2021,2022  
 ./bin/tests/system/notify/ns5/x21.db ZONE 2015,2016,2018,2019,2020,2021,2022  
 ./bin/tests/system/notify/setup.sh SH 2000,2001,2004,2007,2012,2014,2016,2018,2019,2020,2021,2022  
 ./bin/tests/system/notify/tests.sh SH  
 2000,2001,2004,2007,2011,2012,2013,2014,2015,2016,2018,2019,2020,2021,2022  
 ./bin/tests/system/nslookup/clean.sh SH 2014,2015,2016,2018,2019,2020,2021,2022  
 ./bin/tests/system/nslookup/ns1/example.net.db ZONE 2016,2018,2019,2020,2021,2022  
 ./bin/tests/system/nslookup/ns1/named.conf.in CONF-C 2018,2019,2020,2021,2022  
 ./bin/tests/system/nslookup/setup.sh SH 2014,2016,2018,2019,2020,2021,2022  
 ./bin/tests/system/nslookup/tests.sh SH 2014,2016,2018,2019,2020,2021,2022  
 ./bin/tests/system/nsupdate/ans4/ans.pl PERL 2017,2018,2019,2020,2021,2022  
 ./bin/tests/system/nsupdate/clean.sh SH  
 2000,2001,2004,2007,2009,2010,2011,2012,2014,2015,2016,2017,2018,2019,2020,2021,2022  
 ./bin/tests/system/nsupdate/commandlist X 2012,2018,2019,2020,2021,2022  
 ./bin/tests/system/nsupdate/knowngood.ns1.after X 2000,2001,2003,2004,2009,2018,2019,2020,2021,2022  
 ./bin/tests/system/nsupdate/knowngood.ns1.afterstop X 2001,2004,2018,2019,2020,2021,2022  
 ./bin/tests/system/nsupdate/knowngood.ns1.before X 2000,2001,2003,2004,2009,2018,2019,2020,2021,2022  
 ./bin/tests/system/nsupdate/krb/setup.sh SH 2018,2019,2020,2021,2022  
 ./bin/tests/system/nsupdate/ns1/example1.db ZONE  
 2000,2001,2002,2004,2007,2009,2016,2018,2019,2020,2021,2022  
 ./bin/tests/system/nsupdate/ns1/many.test.db.in ZONE 2014,2016,2018,2019,2020,2021,2022  
 ./bin/tests/system/nsupdate/ns1/max-ttl.db ZONE 2014,2016,2018,2019,2020,2021,2022  
 ./bin/tests/system/nsupdate/ns1/named.conf.in CONF-C 2018,2019,2020,2021,2022  
 ./bin/tests/system/nsupdate/ns1/sample.db.in ZONE 2016,2018,2019,2020,2021,2022  
 ./bin/tests/system/nsupdate/ns10/dns.keytab X 2018,2019,2020,2021,2022  
 ./bin/tests/system/nsupdate/ns10/example.com.db.in ZONE 2018,2019,2020,2021,2022  
 ./bin/tests/system/nsupdate/ns10/in-addr.db.in ZONE 2018,2019,2020,2021,2022  
 ./bin/tests/system/nsupdate/ns10/machine.ccache X 2018,2019,2020,2021,2022  
 ./bin/tests/system/nsupdate/ns10/named.conf.in CONF-C 2018,2019,2020,2021,2022  
 ./bin/tests/system/nsupdate/ns2/named.conf.in CONF-C 2018,2019,2020,2021,2022  
 ./bin/tests/system/nsupdate/ns2/sample.db.in ZONE 2016,2018,2019,2020,2021,2022  
 ./bin/tests/system/nsupdate/ns3/delegation.test.db.in ZONE 2016,2018,2019,2020,2021,2022  
 ./bin/tests/system/nsupdate/ns3/dnskey.test.db.in ZONE 2011,2016,2018,2019,2020,2021,2022  
 ./bin/tests/system/nsupdate/ns3/example.db.in ZONE 2010,2016,2018,2019,2020,2021,2022  
 ./bin/tests/system/nsupdate/ns3/named.conf.in CONF-C 2018,2019,2020,2021,2022  
 ./bin/tests/system/nsupdate/ns3/nsec3param.test.db.in ZONE 2010,2016,2018,2019,2020,2021,2022  
 ./bin/tests/system/nsupdate/ns3/sign.sh SH 2010,2011,2012,2014,2016,2018,2019,2020,2021,2022  
 ./bin/tests/system/nsupdate/ns3/too-big.test.db.in ZONE 2016,2018,2019,2020,2021,2022  
 ./bin/tests/system/nsupdate/ns5/local.db.in ZONE 2017,2018,2019,2020,2021,2022  
 ./bin/tests/system/nsupdate/ns5/named.args X 2017,2018,2019,2020,2021,2022  
 ./bin/tests/system/nsupdate/ns5/named.conf.in CONF-C 2017,2018,2019,2020,2021,2022  
 ./bin/tests/system/nsupdate/ns6/in-addr.db.in ZONE 2018,2019,2020,2021,2022

./bin/tests/system/nsupdate/ns6/named.args X 2018,2019,2020,2021,2022  
 ./bin/tests/system/nsupdate/ns6/named.conf.in CONF-C 2018,2019,2020,2021,2022  
 ./bin/tests/system/nsupdate/ns7/dns.keytab X 2018,2019,2020,2021,2022  
 ./bin/tests/system/nsupdate/ns7/example.com.db.in ZONE 2018,2019,2020,2021,2022  
 ./bin/tests/system/nsupdate/ns7/in-addr.db.in ZONE 2018,2019,2020,2021,2022  
 ./bin/tests/system/nsupdate/ns7/machine.ccache X 2018,2019,2020,2021,2022  
 ./bin/tests/system/nsupdate/ns7/named.conf.in CONF-C 2018,2019,2020,2021,2022  
 ./bin/tests/system/nsupdate/ns8/dns-other-than-KRB5\_KTNAME.keytab X 2018,2019,2020,2021,2022  
 ./bin/tests/system/nsupdate/ns8/example.com.db.in ZONE 2018,2019,2020,2021,2022  
 ./bin/tests/system/nsupdate/ns8/in-addr.db.in ZONE 2018,2019,2020,2021,2022  
 ./bin/tests/system/nsupdate/ns8/machine.ccache X 2018,2019,2020,2021,2022  
 ./bin/tests/system/nsupdate/ns8/named.conf.in CONF-C 2018,2019,2020,2021,2022  
 ./bin/tests/system/nsupdate/ns9/dns.keytab X 2018,2019,2020,2021,2022  
 ./bin/tests/system/nsupdate/ns9/example.com.db.in ZONE 2018,2019,2020,2021,2022  
 ./bin/tests/system/nsupdate/ns9/in-addr.db.in ZONE 2018,2019,2020,2021,2022  
 ./bin/tests/system/nsupdate/ns9/machine.ccache X 2018,2019,2020,2021,2022  
 ./bin/tests/system/nsupdate/ns9/named.conf.in CONF-C 2018,2019,2020,2021,2022  
 ./bin/tests/system/nsupdate/prereq.sh SH 2014,2015,2016,2018,2019,2020,2021,2022  
 ./bin/tests/system/nsupdate/setup.sh SH  
 2000,2001,2004,2007,2009,2010,2011,2012,2014,2016,2017,2018,2019,2020,2021,2022  
 ./bin/tests/system/nsupdate/tests.sh SH  
 2000,2001,2004,2007,2009,2010,2011,2012,2013,2014,2015,2016,2017,2018,2019,2020,2021,2022  
 ./bin/tests/system/nsupdate/update\_test.pl PERL 2000,2001,2004,2007,2012,2016,2018,2019,2020,2021,2022  
 ./bin/tests/system/nsupdate/verylarge.in X 2013,2018,2019,2020,2021,2022  
 ./bin/tests/system/nzd2nzf/clean.sh SH 2016,2018,2019,2020,2021,2022  
 ./bin/tests/system/nzd2nzf/ns1/added.db ZONE 2016,2018,2019,2020,2021,2022  
 ./bin/tests/system/nzd2nzf/ns1/named.conf.in CONF-C 2018,2019,2020,2021,2022  
 ./bin/tests/system/nzd2nzf/prereq.sh SH 2016,2018,2019,2020,2021,2022  
 ./bin/tests/system/nzd2nzf/setup.sh SH 2016,2018,2019,2020,2021,2022  
 ./bin/tests/system/nzd2nzf/tests.sh SH 2016,2018,2019,2020,2021,2022  
 ./bin/tests/system/org.isc.bind.system SH 2010,2012,2013,2016,2018,2019,2020,2021,2022  
 ./bin/tests/system/org.isc.bind.system.plist X 2010,2018,2019,2020,2021,2022  
 ./bin/tests/system/packet.pl PERL 2011,2012,2016,2018,2019,2020,2021,2022  
 ./bin/tests/system/parallel.sh SH 2019,2020,2021,2022  
 ./bin/tests/system/pending/clean.sh SH 2009,2012,2014,2016,2018,2019,2020,2021,2022  
 ./bin/tests/system/pending/ns1/named.conf.in CONF-C 2018,2019,2020,2021,2022  
 ./bin/tests/system/pending/ns1/root.db.in ZONE 2009,2010,2016,2018,2019,2020,2021,2022  
 ./bin/tests/system/pending/ns1/sign.sh SH 2009,2010,2012,2014,2016,2018,2019,2020,2021,2022  
 ./bin/tests/system/pending/ns2/example.com.db.in ZONE 2009,2010,2016,2018,2019,2020,2021,2022  
 ./bin/tests/system/pending/ns2/example.db.in ZONE 2009,2010,2016,2018,2019,2020,2021,2022  
 ./bin/tests/system/pending/ns2/forgery.db ZONE 2010,2016,2018,2019,2020,2021,2022  
 ./bin/tests/system/pending/ns2/named.conf.in CONF-C 2018,2019,2020,2021,2022  
 ./bin/tests/system/pending/ns2/sign.sh SH 2009,2010,2012,2014,2016,2018,2019,2020,2021,2022  
 ./bin/tests/system/pending/ns3/hostile.db ZONE 2009,2016,2018,2019,2020,2021,2022  
 ./bin/tests/system/pending/ns3/mail.example.db ZONE 2009,2016,2018,2019,2020,2021,2022  
 ./bin/tests/system/pending/ns3/named.conf.in CONF-C 2018,2019,2020,2021,2022  
 ./bin/tests/system/pending/ns4/named.conf.in CONF-C 2018,2019,2020,2021,2022  
 ./bin/tests/system/pending/prereq.sh SH 2009,2012,2014,2016,2018,2019,2020,2021,2022

./bin/tests/system/pending/setup.sh SH 2009,2012,2014,2016,2018,2019,2020,2021,2022  
 ./bin/tests/system/pending/tests.sh SH 2009,2010,2012,2015,2016,2018,2019,2020,2021,2022  
 ./bin/tests/system/pipelined/Makefile.in MAKE 2014,2015,2016,2018,2019,2020,2021,2022  
 ./bin/tests/system/pipelined/clean.sh SH 2014,2015,2016,2018,2019,2020,2021,2022  
 ./bin/tests/system/pipelined/input X 2014,2015,2018,2019,2020,2021,2022  
 ./bin/tests/system/pipelined/inputb X 2014,2015,2018,2019,2020,2021,2022  
 ./bin/tests/system/pipelined/ns1/named.conf.in CONF-C 2018,2019,2020,2021,2022  
 ./bin/tests/system/pipelined/ns1/root.db ZONE 2014,2015,2016,2018,2019,2020,2021,2022  
 ./bin/tests/system/pipelined/ns2/examplea.db ZONE 2014,2015,2016,2018,2019,2020,2021,2022  
 ./bin/tests/system/pipelined/ns2/named.conf.in CONF-C 2018,2019,2020,2021,2022  
 ./bin/tests/system/pipelined/ns3/exampleb.db ZONE 2014,2015,2016,2018,2019,2020,2021,2022  
 ./bin/tests/system/pipelined/ns3/named.args X 2014,2015,2018,2019,2020,2021,2022  
 ./bin/tests/system/pipelined/ns3/named.conf.in CONF-C 2018,2019,2020,2021,2022  
 ./bin/tests/system/pipelined/ns4/named.conf.in CONF-C 2018,2019,2020,2021,2022  
 ./bin/tests/system/pipelined/pipequeries.c C 2014,2015,2016,2018,2019,2020,2021,2022  
 ./bin/tests/system/pipelined/ref X 2014,2015,2018,2019,2020,2021,2022  
 ./bin/tests/system/pipelined/refb X 2014,2015,2018,2019,2020,2021,2022  
 ./bin/tests/system/pipelined/setup.sh SH 2014,2015,2016,2018,2019,2020,2021,2022  
 ./bin/tests/system/pipelined/tests.sh SH 2014,2015,2016,2017,2018,2019,2020,2021,2022  
 ./bin/tests/system/pkcs11/2037-pk11\_numbits-crash-test.pkt X 2020,2021,2022  
 ./bin/tests/system/pkcs11/clean.sh SH 2010,2012,2014,2016,2017,2018,2019,2020,2021,2022  
 ./bin/tests/system/pkcs11/ns1/example.db.in ZONE 2010,2016,2018,2019,2020,2021,2022  
 ./bin/tests/system/pkcs11/ns1/named.conf CONF-C 2018,2019,2020,2021,2022  
 ./bin/tests/system/pkcs11/setup.sh SH 2010,2012,2013,2014,2016,2017,2018,2019,2020,2021,2022  
 ./bin/tests/system/pkcs11/tests.sh SH 2010,2012,2014,2016,2017,2018,2019,2020,2021,2022  
 ./bin/tests/system/pkcs11/usepkcs11 X 2010,2018,2019,2020,2021,2022  
 ./bin/tests/system/pkcs11ssl/clean.sh SH 2014,2016,2018,2019,2020,2021,2022  
 ./bin/tests/system/pkcs11ssl/ns1/example.db.in ZONE 2014,2016,2018,2019,2020,2021,2022  
 ./bin/tests/system/pkcs11ssl/ns1/named.conf CONF-C 2018,2019,2020,2021,2022  
 ./bin/tests/system/pkcs11ssl/prereq.sh SH 2014,2016,2018,2019,2020,2021,2022  
 ./bin/tests/system/pkcs11ssl/setup.sh SH 2014,2016,2018,2019,2020,2021,2022  
 ./bin/tests/system/pkcs11ssl/tests.sh SH 2014,2016,2018,2019,2020,2021,2022  
 ./bin/tests/system/pkcs11ssl/usepkcs11 X 2014,2018,2019,2020,2021,2022  
 ./bin/tests/system/reclimit/README TXT.BRIEF 2014,2016,2017,2018,2019,2020,2021,2022  
 ./bin/tests/system/reclimit/ans2/ans.pl PERL 2014,2015,2016,2017,2018,2019,2020,2021,2022  
 ./bin/tests/system/reclimit/ans4/ans.pl PERL 2018,2019,2020,2021,2022  
 ./bin/tests/system/reclimit/ans7/ans.pl PERL 2014,2016,2018,2019,2020,2021,2022  
 ./bin/tests/system/reclimit/clean.sh SH 2014,2016,2018,2019,2020,2021,2022  
 ./bin/tests/system/reclimit/ns1/named.conf.in CONF-C 2018,2019,2020,2021,2022  
 ./bin/tests/system/reclimit/ns1/root.db ZONE 2014,2016,2017,2018,2019,2020,2021,2022  
 ./bin/tests/system/reclimit/ns3/hints.db ZONE 2014,2016,2018,2019,2020,2021,2022  
 ./bin/tests/system/reclimit/ns3/named1.conf.in CONF-C 2018,2019,2020,2021,2022  
 ./bin/tests/system/reclimit/ns3/named2.conf.in CONF-C 2018,2019,2020,2021,2022  
 ./bin/tests/system/reclimit/ns3/named3.conf.in CONF-C 2018,2019,2020,2021,2022  
 ./bin/tests/system/reclimit/ns3/named4.conf.in CONF-C 2018,2019,2020,2021,2022  
 ./bin/tests/system/reclimit/prereq.sh SH 2015,2016,2017,2018,2019,2020,2021,2022  
 ./bin/tests/system/reclimit/setup.sh SH 2014,2016,2018,2019,2020,2021,2022  
 ./bin/tests/system/reclimit/tests.sh SH 2014,2015,2016,2017,2018,2019,2020,2021,2022



./bin/tests/system/redirect/clean.sh SH 2011,2012,2013,2014,2015,2016,2018,2019,2020,2021,2022  
 ./bin/tests/system/redirect/conf/bad1.conf CONF-C 2011,2016,2018,2019,2020,2021,2022  
 ./bin/tests/system/redirect/conf/bad2.conf CONF-C 2011,2016,2018,2019,2020,2021,2022  
 ./bin/tests/system/redirect/conf/bad3.conf CONF-C 2011,2016,2018,2019,2020,2021,2022  
 ./bin/tests/system/redirect/conf/good1.conf CONF-C 2011,2016,2018,2019,2020,2021,2022  
 ./bin/tests/system/redirect/conf/good2.conf CONF-C 2011,2016,2018,2019,2020,2021,2022  
 ./bin/tests/system/redirect/conf/good3.conf CONF-C 2011,2016,2018,2019,2020,2021,2022  
 ./bin/tests/system/redirect/conf/good4.conf CONF-C 2011,2016,2018,2019,2020,2021,2022  
 ./bin/tests/system/redirect/ns1/example.db ZONE 2011,2016,2018,2019,2020,2021,2022  
 ./bin/tests/system/redirect/ns1/named.conf.in CONF-C 2018,2019,2020,2021,2022  
 ./bin/tests/system/redirect/ns1/redirect.db ZONE 2011,2016,2018,2019,2020,2021,2022  
 ./bin/tests/system/redirect/ns1/root.db ZONE 2011,2016,2018,2019,2020,2021,2022  
 ./bin/tests/system/redirect/ns1/sign.sh SH 2011,2012,2014,2016,2018,2019,2020,2021,2022  
 ./bin/tests/system/redirect/ns2/example.db.in ZONE 2013,2016,2018,2019,2020,2021,2022  
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 ./bin/tests/system/redirect/ns3/example.db ZONE 2015,2016,2018,2019,2020,2021,2022  
 ./bin/tests/system/redirect/ns3/named.conf.in CONF-C 2018,2019,2020,2021,2022  
 ./bin/tests/system/redirect/ns3/redirect.db ZONE 2015,2016,2018,2019,2020,2021,2022  
 ./bin/tests/system/redirect/ns3/root.db ZONE 2015,2016,2018,2019,2020,2021,2022  
 ./bin/tests/system/redirect/ns3/sign.sh SH 2015,2016,2018,2019,2020,2021,2022  
 ./bin/tests/system/redirect/ns4/example.db.in ZONE 2015,2016,2018,2019,2020,2021,2022  
 ./bin/tests/system/redirect/ns4/named.conf.in CONF-C 2018,2019,2020,2021,2022  
 ./bin/tests/system/redirect/ns4/root.hint ZONE 2015,2016,2018,2019,2020,2021,2022  
 ./bin/tests/system/redirect/prereq.sh SH 2014,2016,2018,2019,2020,2021,2022  
 ./bin/tests/system/redirect/setup.sh SH 2011,2012,2013,2014,2015,2016,2018,2019,2020,2021,2022  
 ./bin/tests/system/redirect/tests.sh SH 2011,2012,2013,2014,2015,2016,2018,2019,2020,2021,2022  
 ./bin/tests/system/resolver/ans2/ans.pl PERL 2000,2001,2004,2007,2009,2010,2012,2016,2018,2019,2020,2021,2022  
 ./bin/tests/system/resolver/ans3/ans.pl PERL 2000,2001,2004,2007,2009,2012,2016,2018,2019,2020,2021,2022  
 ./bin/tests/system/resolver/ans8/ans.pl PERL 2017,2018,2019,2020,2021,2022  
 ./bin/tests/system/resolver/clean.sh SH 2008,2009,2010,2011,2012,2013,2014,2015,2016,2018,2019,2020,2021,2022  
 ./bin/tests/system/resolver/ns1/named.conf.in CONF-C 2018,2019,2020,2021,2022  
 ./bin/tests/system/resolver/ns1/root.hint ZONE 2000,2001,2004,2007,2016,2018,2019,2020,2021,2022  
 ./bin/tests/system/resolver/ns4/broken.db ZONE 2012,2016,2018,2019,2020,2021,2022  
 ./bin/tests/system/resolver/ns4/child.server.db ZONE 2011,2016,2018,2019,2020,2021,2022  
 ./bin/tests/system/resolver/ns4/moves.db ZONE 2011,2016,2018,2019,2020,2021,2022  
 ./bin/tests/system/resolver/ns4/named.conf.in CONF-C 2018,2019,2020,2021,2022  
 ./bin/tests/system/resolver/ns4/named.noaa TXT.BRIEF 2010,2016,2018,2019,2020,2021,2022  
 ./bin/tests/system/resolver/ns4/root.db ZONE 2010,2014,2015,2016,2017,2018,2019,2020,2021,2022  
 ./bin/tests/system/resolver/ns4/sourcens.db ZONE 2020,2021,2022  
 ./bin/tests/system/resolver/ns4/tld1.db ZONE 2012,2014,2016,2018,2019,2020,2021,2022  
 ./bin/tests/system/resolver/ns4/tld2.db ZONE 2012,2014,2016,2018,2019,2020,2021,2022  
 ./bin/tests/system/resolver/ns5/child.server.db ZONE 2011,2016,2018,2019,2020,2021,2022  
 ./bin/tests/system/resolver/ns5/moves.db ZONE 2011,2016,2018,2019,2020,2021,2022  
 ./bin/tests/system/resolver/ns5/named.conf.in CONF-C 2018,2019,2020,2021,2022  
 ./bin/tests/system/resolver/ns5/root.hint ZONE 2010,2016,2018,2019,2020,2021,2022  
 ./bin/tests/system/resolver/ns6/broken.db ZONE 2012,2016,2018,2019,2020,2021,2022  
 ./bin/tests/system/resolver/ns6/delegation-only.db ZONE 2015,2016,2018,2019,2020,2021,2022

./bin/tests/system/resolver/ns6/ds.example.net.db.in ZONE 2016,2018,2019,2020,2021,2022  
 ./bin/tests/system/resolver/ns6/example.net.db.in ZONE 2010,2014,2016,2018,2019,2020,2021,2022  
 ./bin/tests/system/resolver/ns6/keygen.sh SH 2010,2012,2014,2016,2017,2018,2019,2020,2021,2022  
 ./bin/tests/system/resolver/ns6/moves.db ZONE 2011,2016,2018,2019,2020,2021,2022  
 ./bin/tests/system/resolver/ns6/named.conf.in CONF-C 2018,2019,2020,2021,2022  
 ./bin/tests/system/resolver/ns6/no-edns-version.tld.db ZONE 2014,2016,2018,2019,2020,2021,2022  
 ./bin/tests/system/resolver/ns6/root.db ZONE 2010,2011,2014,2016,2018,2019,2020,2021,2022  
 ./bin/tests/system/resolver/ns6/targetns.db ZONE 2020,2021,2022  
 ./bin/tests/system/resolver/ns6/to-be-removed.tld.db.in ZONE 2012,2016,2018,2019,2020,2021,2022  
 ./bin/tests/system/resolver/ns7/all-cnames.db ZONE 2014,2016,2018,2019,2020,2021,2022  
 ./bin/tests/system/resolver/ns7/edns-version.tld.db ZONE 2014,2016,2018,2019,2020,2021,2022  
 ./bin/tests/system/resolver/ns7/named.args X 2011,2012,2014,2018,2019,2020,2021,2022  
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 ./bin/tests/system/resolver/ns7/named2.conf.in CONF-C 2018,2019,2020,2021,2022  
 ./bin/tests/system/resolver/ns7/root.hint ZONE 2010,2016,2018,2019,2020,2021,2022  
 ./bin/tests/system/resolver/ns7/server.db.in ZONE 2011,2016,2018,2019,2020,2021,2022  
 ./bin/tests/system/resolver/prereq.sh SH 2000,2001,2004,2007,2012,2014,2016,2018,2019,2020,2021,2022  
 ./bin/tests/system/resolver/setup.sh SH 2010,2011,2012,2013,2014,2016,2018,2019,2020,2021,2022  
 ./bin/tests/system/resolver/tests.sh SH  
 2000,2001,2004,2007,2009,2010,2011,2012,2013,2014,2015,2016,2017,2018,2019,2020,2021,2022  
 ./bin/tests/system/rndc/Makefile.in MAKE 2014,2015,2016,2018,2019,2020,2021,2022  
 ./bin/tests/system/rndc/clean.sh SH 2011,2012,2013,2014,2015,2016,2017,2018,2019,2020,2021,2022  
 ./bin/tests/system/rndc/gencheck.c C 2014,2015,2016,2018,2019,2020,2021,2022  
 ./bin/tests/system/rndc/ns2/incl.db ZONE 2013,2016,2018,2019,2020,2021,2022  
 ./bin/tests/system/rndc/ns2/named.conf.in CONF-C 2018,2019,2020,2021,2022  
 ./bin/tests/system/rndc/ns2/secondkey.conf CONF-C 2012,2013,2016,2018,2019,2020,2021,2022  
 ./bin/tests/system/rndc/ns3/named.conf.in CONF-C 2018,2019,2020,2021,2022  
 ./bin/tests/system/rndc/ns4/named.conf.in CONF-C 2013,2014,2015,2016,2018,2019,2020,2021,2022  
 ./bin/tests/system/rndc/ns5/named.conf.in CONF-C 2018,2019,2020,2021,2022  
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 ./bin/tests/system/rndc/tests.sh SH 2011,2012,2013,2014,2015,2016,2017,2018,2019,2020,2021,2022  
 ./bin/tests/system/rootkeysentinel/clean.sh SH 2018,2019,2020,2021,2022  
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 ./bin/tests/system/rootkeysentinel/ns1/sign.sh SH 2018,2019,2020,2021,2022  
 ./bin/tests/system/rootkeysentinel/ns2/example.db.in ZONE 2018,2019,2020,2021,2022  
 ./bin/tests/system/rootkeysentinel/ns2/named.conf.in CONF-C 2018,2019,2020,2021,2022  
 ./bin/tests/system/rootkeysentinel/ns2/sign.sh SH 2018,2019,2020,2021,2022  
 ./bin/tests/system/rootkeysentinel/ns3/hint.db ZONE 2018,2019,2020,2021,2022  
 ./bin/tests/system/rootkeysentinel/ns3/named.conf.in CONF-C 2018,2019,2020,2021,2022  
 ./bin/tests/system/rootkeysentinel/ns4/hint.db ZONE 2018,2019,2020,2021,2022  
 ./bin/tests/system/rootkeysentinel/ns4/named.conf.in CONF-C 2018,2019,2020,2021,2022  
 ./bin/tests/system/rootkeysentinel/prereq.sh SH 2018,2019,2020,2021,2022  
 ./bin/tests/system/rootkeysentinel/setup.sh SH 2018,2019,2020,2021,2022  
 ./bin/tests/system/rootkeysentinel/tests.sh SH 2018,2019,2020,2021,2022  
 ./bin/tests/system/rpz/README TXT.BRIEF 2019,2020,2021,2022

./bin/tests/system/rpz/clean.sh SH 2011,2012,2013,2014,2016,2018,2019,2020,2021,2022  
 ./bin/tests/system/rpz/ns1/named.conf.in CONF-C 2018,2019,2020,2021,2022  
 ./bin/tests/system/rpz/ns1/root.db ZONE 2011,2012,2013,2016,2018,2019,2020,2021,2022  
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 ./bin/tests/system/rpz/ns2/blv2.tld2.db.in ZONE 2013,2016,2018,2019,2020,2021,2022  
 ./bin/tests/system/rpz/ns2/blv3.tld2.db.in ZONE 2013,2016,2018,2019,2020,2021,2022  
 ./bin/tests/system/rpz/ns2/hints ZONE 2011,2013,2016,2018,2019,2020,2021,2022  
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 ./bin/tests/system/rpz/ns3/base.db ZONE 2011,2012,2013,2016,2018,2019,2020,2021,2022  
 ./bin/tests/system/rpz/ns3/broken.db.in ZONE 2019,2020,2021,2022  
 ./bin/tests/system/rpz/ns3/crash1 X 2011,2013,2018,2019,2020,2021,2022  
 ./bin/tests/system/rpz/ns3/crash2 X 2011,2012,2013,2018,2019,2020,2021,2022  
 ./bin/tests/system/rpz/ns3/hints ZONE 2011,2013,2016,2018,2019,2020,2021,2022  
 ./bin/tests/system/rpz/ns3/manual-update-rpz-2.db.in ZONE 2019,2020,2021,2022  
 ./bin/tests/system/rpz/ns3/manual-update-rpz.db.in ZONE 2019,2020,2021,2022  
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 ./bin/tests/system/rpz/ns4/tld4.db ZONE 2011,2012,2013,2016,2018,2019,2020,2021,2022  
 ./bin/tests/system/rpz/ns5/empty.db.in ZONE 2014,2016,2018,2019,2020,2021,2022  
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 ./bin/tests/system/rpz/ns5/tld5.db ZONE 2013,2016,2018,2019,2020,2021,2022  
 ./bin/tests/system/rpz/ns6/hints ZONE 2014,2016,2018,2019,2020,2021,2022  
 ./bin/tests/system/rpz/ns6/named.conf.in CONF-C 2018,2019,2020,2021,2022  
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 ./bin/tests/system/rpz/ns9/hints ZONE 2019,2020,2021,2022  
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 ./bin/tests/system/rpz/prereq.sh SH 2014,2016,2018,2019,2020,2021,2022  
 ./bin/tests/system/rpz/qperf.sh SH 2012,2013,2016,2018,2019,2020,2021,2022  
 ./bin/tests/system/rpz/setup.sh SH 2011,2012,2013,2014,2016,2018,2019,2020,2021,2022  
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 ./bin/tests/system/rpz/test2 ZONE 2011,2012,2013,2016,2018,2019,2020,2021,2022  
 ./bin/tests/system/rpz/test3 ZONE 2011,2013,2016,2018,2019,2020,2021,2022  
 ./bin/tests/system/rpz/test4 ZONE 2011,2013,2016,2018,2019,2020,2021,2022  
 ./bin/tests/system/rpz/test4a ZONE 2013,2016,2018,2019,2020,2021,2022  
 ./bin/tests/system/rpz/test5 ZONE 2011,2012,2013,2016,2018,2019,2020,2021,2022  
 ./bin/tests/system/rpz/test6 ZONE 2013,2016,2018,2019,2020,2021,2022  
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 ./bin/tests/system/rpzrecurse/README TXT.BRIEF 2015,2016,2018,2019,2020,2021,2022  
 ./bin/tests/system/rpzrecurse/ans5/ans.pl PERL 2016,2018,2019,2020,2021,2022  
 ./bin/tests/system/rpzrecurse/clean.sh SH 2015,2016,2018,2019,2020,2021,2022  
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./bin/tests/system/rpzrecurse/ns1/example.com.db ZONE 2020,2021,2022  
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./bin/tests/system/rpzrecurse/ns1/test1.example.net.db ZONE 2015,2016,2018,2019,2020,2021,2022  
./bin/tests/system/rpzrecurse/ns1/test2.example.net.db ZONE 2015,2016,2018,2019,2020,2021,2022  
./bin/tests/system/rpzrecurse/ns2/db.clientip1 ZONE 2015,2016,2018,2019,2020,2021,2022  
./bin/tests/system/rpzrecurse/ns2/db.clientip2 ZONE 2015,2016,2018,2019,2020,2021,2022  
./bin/tests/system/rpzrecurse/ns2/db.clientip21 ZONE 2016,2018,2019,2020,2021,2022  
./bin/tests/system/rpzrecurse/ns2/db.given ZONE 2020,2021,2022  
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./bin/tests/system/rpzrecurse/ns2/db.log2 ZONE 2015,2016,2018,2019,2020,2021,2022  
./bin/tests/system/rpzrecurse/ns2/db.log3 ZONE 2015,2016,2018,2019,2020,2021,2022  
./bin/tests/system/rpzrecurse/ns2/db.passthru ZONE 2020,2021,2022  
./bin/tests/system/rpzrecurse/ns2/db.wildcard1 ZONE 2015,2016,2018,2019,2020,2021,2022  
./bin/tests/system/rpzrecurse/ns2/db.wildcard2a ZONE 2015,2016,2018,2019,2020,2021,2022  
./bin/tests/system/rpzrecurse/ns2/db.wildcard2b ZONE 2015,2016,2018,2019,2020,2021,2022  
./bin/tests/system/rpzrecurse/ns2/db.wildcard3 ZONE 2015,2016,2018,2019,2020,2021,2022  
./bin/tests/system/rpzrecurse/ns2/named.clientip.conf CONF-C 2015,2016,2018,2019,2020,2021,2022  
./bin/tests/system/rpzrecurse/ns2/named.clientip2.conf CONF-C 2016,2018,2019,2020,2021,2022  
./bin/tests/system/rpzrecurse/ns2/named.conf.header.in CONF-C 2015,2016,2018,2019,2020,2021,2022  
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./bin/tests/system/rpzrecurse/ns2/named.log.conf CONF-C 2015,2016,2018,2019,2020,2021,2022  
./bin/tests/system/rpzrecurse/ns2/named.wildcard1.conf CONF-C 2015,2016,2018,2019,2020,2021,2022  
./bin/tests/system/rpzrecurse/ns2/named.wildcard2.conf CONF-C 2015,2016,2018,2019,2020,2021,2022  
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./bin/tests/system/rpzrecurse/ns2/named.wildcard4.conf CONF-C 2020,2021,2022  
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./bin/tests/system/rpzrecurse/ns3/named2.conf.in CONF-C 2016,2018,2019,2020,2021,2022  
./bin/tests/system/rpzrecurse/ns3/policy.db ZONE 2016,2018,2019,2020,2021,2022  
./bin/tests/system/rpzrecurse/ns3/root.db ZONE 2016,2018,2019,2020,2021,2022  
./bin/tests/system/rpzrecurse/ns4/child.example.db ZONE 2016,2018,2019,2020,2021,2022  
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./bin/tests/system/rpzrecurse/setup.sh SH 2015,2016,2018,2019,2020,2021,2022  
./bin/tests/system/rpzrecurse/testgen.pl PERL 2015,2016,2018,2019,2020,2021,2022  
./bin/tests/system/rpzrecurse/tests.sh SH 2015,2016,2018,2019,2020,2021,2022  
./bin/tests/system/rrchecker/classlist.good X 2013,2018,2019,2020,2021,2022  
./bin/tests/system/rrchecker/clean.sh SH 2013,2014,2016,2017,2018,2019,2020,2021,2022  
./bin/tests/system/rrchecker/privatelist.good X 2013,2018,2019,2020,2021,2022  
./bin/tests/system/rrchecker/tests.sh SH 2013,2014,2015,2016,2017,2018,2019,2020,2021,2022  
./bin/tests/system/rrchecker/typelist.good X 2013,2014,2015,2016,2017,2018,2019,2020,2021,2022  
./bin/tests/system/rrl/broken.conf CONF-C 2016,2018,2019,2020,2021,2022  
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./bin/tests/system/rrl/ns1/named.conf.in CONF-C 2018,2019,2020,2021,2022

./bin/tests/system/rrl/ns1/root.db ZONE 2012,2013,2016,2018,2019,2020,2021,2022  
./bin/tests/system/rrl/ns2/hints ZONE 2012,2013,2016,2018,2019,2020,2021,2022  
./bin/tests/system/rrl/ns2/named.conf.in CONF-C 2018,2019,2020,2021,2022  
./bin/tests/system/rrl/ns2/tld2.db ZONE 2012,2013,2016,2018,2019,2020,2021,2022  
./bin/tests/system/rrl/ns3/hints ZONE 2012,2013,2016,2018,2019,2020,2021,2022  
./bin/tests/system/rrl/ns3/named.conf.in CONF-C 2018,2019,2020,2021,2022  
./bin/tests/system/rrl/ns3/tld3.db ZONE 2012,2013,2016,2018,2019,2020,2021,2022  
./bin/tests/system/rrl/ns4/hints ZONE 2016,2018,2019,2020,2021,2022  
./bin/tests/system/rrl/ns4/named.conf.in CONF-C 2018,2019,2020,2021,2022  
./bin/tests/system/rrl/ns4/tld4.db ZONE 2016,2018,2019,2020,2021,2022  
./bin/tests/system/rrl/setup.sh SH 2012,2013,2016,2018,2019,2020,2021,2022  
./bin/tests/system/rrl/tests.sh SH 2012,2013,2015,2016,2018,2019,2020,2021,2022  
./bin/tests/system/rrsetorder/clean.sh SH 2006,2007,2008,2011,2012,2014,2016,2018,2019,2020,2021,2022  
./bin/tests/system/rrsetorder/dig.out.fixed.good X 2006,2018,2019,2020,2021,2022  
./bin/tests/system/rrsetorder/dig.out.random.good1 X 2006,2018,2019,2020,2021,2022  
./bin/tests/system/rrsetorder/dig.out.random.good10 X 2006,2018,2019,2020,2021,2022  
./bin/tests/system/rrsetorder/dig.out.random.good11 X 2006,2018,2019,2020,2021,2022  
./bin/tests/system/rrsetorder/dig.out.random.good12 X 2006,2018,2019,2020,2021,2022  
./bin/tests/system/rrsetorder/dig.out.random.good13 X 2006,2018,2019,2020,2021,2022  
./bin/tests/system/rrsetorder/dig.out.random.good14 X 2006,2018,2019,2020,2021,2022  
./bin/tests/system/rrsetorder/dig.out.random.good15 X 2006,2018,2019,2020,2021,2022  
./bin/tests/system/rrsetorder/dig.out.random.good16 X 2006,2018,2019,2020,2021,2022  
./bin/tests/system/rrsetorder/dig.out.random.good17 X 2006,2018,2019,2020,2021,2022  
./bin/tests/system/rrsetorder/dig.out.random.good18 X 2006,2018,2019,2020,2021,2022  
./bin/tests/system/rrsetorder/dig.out.random.good19 X 2006,2018,2019,2020,2021,2022  
./bin/tests/system/rrsetorder/dig.out.random.good2 X 2006,2018,2019,2020,2021,2022  
./bin/tests/system/rrsetorder/dig.out.random.good20 X 2006,2018,2019,2020,2021,2022  
./bin/tests/system/rrsetorder/dig.out.random.good21 X 2006,2018,2019,2020,2021,2022  
./bin/tests/system/rrsetorder/dig.out.random.good22 X 2006,2018,2019,2020,2021,2022  
./bin/tests/system/rrsetorder/dig.out.random.good23 X 2006,2018,2019,2020,2021,2022  
./bin/tests/system/rrsetorder/dig.out.random.good24 X 2006,2018,2019,2020,2021,2022  
./bin/tests/system/rrsetorder/dig.out.random.good3 X 2006,2018,2019,2020,2021,2022  
./bin/tests/system/rrsetorder/dig.out.random.good4 X 2006,2018,2019,2020,2021,2022  
./bin/tests/system/rrsetorder/dig.out.random.good5 X 2006,2018,2019,2020,2021,2022  
./bin/tests/system/rrsetorder/dig.out.random.good6 X 2006,2018,2019,2020,2021,2022  
./bin/tests/system/rrsetorder/dig.out.random.good7 X 2006,2018,2019,2020,2021,2022  
./bin/tests/system/rrsetorder/dig.out.random.good8 X 2006,2018,2019,2020,2021,2022  
./bin/tests/system/rrsetorder/dig.out.random.good9 X 2006,2018,2019,2020,2021,2022  
./bin/tests/system/rrsetorder/ns1/named.conf.in CONF-C 2018,2019,2020,2021,2022  
./bin/tests/system/rrsetorder/ns1/root.db ZONE 2006,2007,2012,2016,2018,2019,2020,2021,2022  
./bin/tests/system/rrsetorder/ns2/named.conf.in CONF-C 2018,2019,2020,2021,2022  
./bin/tests/system/rrsetorder/ns3/named.conf.in CONF-C 2018,2019,2020,2021,2022  
./bin/tests/system/rrsetorder/ns4/named.conf.in CONF-C 2018,2019,2020,2021,2022  
./bin/tests/system/rrsetorder/setup.sh SH 2018,2019,2020,2021,2022  
./bin/tests/system/rrsetorder/tests.sh SH 2006,2007,2008,2011,2012,2014,2015,2016,2018,2019,2020,2021,2022  
./bin/tests/system/rsabigexponent/Makefile.in MAKE 2012,2014,2015,2016,2018,2019,2020,2021,2022  
./bin/tests/system/rsabigexponent/README.md TXT.BRIEF 2021,2022  
./bin/tests/system/rsabigexponent/bigkey.c C 2012,2014,2015,2016,2018,2019,2020,2021,2022

./bin/tests/system/rsabigexponent/clean.sh SH 2012,2014,2016,2018,2019,2020,2021,2022  
 ./bin/tests/system/rsabigexponent/conf/bad01.conf CONF-C 2012,2016,2018,2019,2020,2021,2022  
 ./bin/tests/system/rsabigexponent/conf/bad02.conf CONF-C 2012,2016,2018,2019,2020,2021,2022  
 ./bin/tests/system/rsabigexponent/conf/bad03.conf CONF-C 2012,2016,2018,2019,2020,2021,2022  
 ./bin/tests/system/rsabigexponent/conf/good01.conf CONF-C 2012,2016,2018,2019,2020,2021,2022  
 ./bin/tests/system/rsabigexponent/conf/good02.conf CONF-C 2012,2016,2018,2019,2020,2021,2022  
 ./bin/tests/system/rsabigexponent/conf/good03.conf CONF-C 2012,2016,2018,2019,2020,2021,2022  
 ./bin/tests/system/rsabigexponent/ns1/named.conf.in CONF-C 2018,2019,2020,2021,2022  
 ./bin/tests/system/rsabigexponent/ns1/root.db.in ZONE 2012,2016,2018,2019,2020,2021,2022  
 ./bin/tests/system/rsabigexponent/ns1/sign.sh SH 2012,2014,2016,2018,2019,2020,2021,2022  
 ./bin/tests/system/rsabigexponent/ns2/Xexample.+005+05896.key X 2012,2018,2019,2020,2021,2022  
 ./bin/tests/system/rsabigexponent/ns2/Xexample.+005+05896.private X 2012,2018,2019,2020,2021,2022  
 ./bin/tests/system/rsabigexponent/ns2/Xexample.+005+51829.key X 2012,2018,2019,2020,2021,2022  
 ./bin/tests/system/rsabigexponent/ns2/Xexample.+005+51829.private X 2012,2018,2019,2020,2021,2022  
 ./bin/tests/system/rsabigexponent/ns2/dsset-example.in X 2012,2018,2019,2020,2021,2022  
 ./bin/tests/system/rsabigexponent/ns2/example.db.bad ZONE 2012,2016,2018,2019,2020,2021,2022  
 ./bin/tests/system/rsabigexponent/ns2/example.db.in ZONE 2012,2016,2018,2019,2020,2021,2022  
 ./bin/tests/system/rsabigexponent/ns2/named.conf.in CONF-C 2018,2019,2020,2021,2022  
 ./bin/tests/system/rsabigexponent/ns2/sign.sh SH 2012,2014,2016,2018,2019,2020,2021,2022  
 ./bin/tests/system/rsabigexponent/ns3/named.conf.in CONF-C 2018,2019,2020,2021,2022  
 ./bin/tests/system/rsabigexponent/prereq.sh SH 2012,2014,2016,2018,2019,2020,2021,2022  
 ./bin/tests/system/rsabigexponent/setup.sh SH 2012,2014,2016,2018,2019,2020,2021,2022  
 ./bin/tests/system/rsabigexponent/tests.sh SH 2012,2016,2018,2019,2020,2021,2022  
 ./bin/tests/system/run.gdb X 2019,2020,2021,2022  
 ./bin/tests/system/run.sh SH 2000,2001,2004,2007,2010,2012,2014,2015,2016,2017,2018,2019,2020,2021,2022  
 ./bin/tests/system/runall.sh SH 2000,2001,2004,2007,2010,2011,2012,2014,2015,2016,2018,2019,2020,2021,2022  
 ./bin/tests/system/runsequential.sh SH 2018,2019,2020,2021,2022  
 ./bin/tests/system/runtime/README TXT.BRIEF 2014,2016,2018,2019,2020,2021,2022  
 ./bin/tests/system/runtime/clean.sh SH 2014,2015,2016,2017,2018,2019,2020,2021,2022  
 ./bin/tests/system/runtime/ns2/named-alt1.conf.in CONF-C 2014,2016,2017,2018,2019,2020,2021,2022  
 ./bin/tests/system/runtime/ns2/named-alt2.conf.in CONF-C 2014,2016,2017,2018,2019,2020,2021,2022  
 ./bin/tests/system/runtime/ns2/named-alt3.conf.in CONF-C 2014,2016,2017,2018,2019,2020,2021,2022  
 ./bin/tests/system/runtime/ns2/named-alt4.conf.in CONF-C 2014,2016,2017,2018,2019,2020,2021,2022  
 ./bin/tests/system/runtime/ns2/named-alt5.conf.in CONF-C 2014,2016,2017,2018,2019,2020,2021,2022  
 ./bin/tests/system/runtime/ns2/named-alt6.conf.in CONF-C 2014,2016,2017,2018,2019,2020,2021,2022  
 ./bin/tests/system/runtime/ns2/named-alt9.conf.in CONF-C 2019,2020,2021,2022  
 ./bin/tests/system/runtime/ns2/named1.conf.in CONF-C 2014,2016,2017,2018,2019,2020,2021,2022  
 ./bin/tests/system/runtime/setup.sh SH 2015,2016,2017,2018,2019,2020,2021,2022  
 ./bin/tests/system/runtime/tests.sh SH 2014,2015,2016,2017,2018,2019,2020,2021,2022  
 ./bin/tests/system/send.pl PERL 2001,2004,2007,2011,2012,2016,2018,2019,2020,2021,2022  
 ./bin/tests/system/setup.sh SH 2000,2001,2004,2007,2012,2014,2016,2018,2019,2020,2021,2022  
 ./bin/tests/system/sfcache/README TXT.BRIEF 2014,2016,2018,2019,2020,2021,2022  
 ./bin/tests/system/sfcache/clean.sh SH 2014,2015,2016,2018,2019,2020,2021,2022  
 ./bin/tests/system/sfcache/ns1/named.conf.in CONF-C 2018,2019,2020,2021,2022  
 ./bin/tests/system/sfcache/ns1/root.db.in ZONE 2014,2016,2018,2019,2020,2021,2022  
 ./bin/tests/system/sfcache/ns1/sign.sh SH 2014,2016,2018,2019,2020,2021,2022  
 ./bin/tests/system/sfcache/ns2/example.db.in ZONE 2014,2016,2018,2019,2020,2021,2022  
 ./bin/tests/system/sfcache/ns2/named.conf.in CONF-C 2018,2019,2020,2021,2022

./bin/tests/system/sfcache/ns2/sign.sh SH 2014,2016,2018,2019,2020,2021,2022  
 ./bin/tests/system/sfcache/ns5/named.conf.in CONF-C 2018,2019,2020,2021,2022  
 ./bin/tests/system/sfcache/ns5/trusted.conf.bad CONF-C 2014,2016,2018,2019,2020,2021,2022  
 ./bin/tests/system/sfcache/prereq.sh SH 2014,2016,2018,2019,2020,2021,2022  
 ./bin/tests/system/sfcache/setup.sh SH 2014,2016,2018,2019,2020,2021,2022  
 ./bin/tests/system/sfcache/tests.sh SH 2014,2016,2018,2019,2020,2021,2022  
 ./bin/tests/system/smartsign/child.db ZONE 2010,2016,2018,2019,2020,2021,2022  
 ./bin/tests/system/smartsign/clean.sh SH 2010,2012,2014,2016,2018,2019,2020,2021,2022  
 ./bin/tests/system/smartsign/parent.db ZONE 2010,2016,2018,2019,2020,2021,2022  
 ./bin/tests/system/smartsign/prereq.sh SH 2010,2012,2014,2016,2018,2019,2020,2021,2022  
 ./bin/tests/system/smartsign/setup.sh SH 2010,2012,2014,2016,2018,2019,2020,2021,2022  
 ./bin/tests/system/smartsign/tests.sh SH 2010,2011,2012,2014,2016,2017,2018,2019,2020,2021,2022  
 ./bin/tests/system/sortlist/clean.sh SH 2000,2001,2004,2007,2009,2012,2014,2015,2016,2018,2019,2020,2021,2022  
 ./bin/tests/system/sortlist/ns1/example.db ZONE 2000,2001,2004,2007,2016,2018,2019,2020,2021,2022  
 ./bin/tests/system/sortlist/ns1/named.conf.in CONF-C 2018,2019,2020,2021,2022  
 ./bin/tests/system/sortlist/ns1/root.db ZONE 2000,2001,2004,2007,2016,2018,2019,2020,2021,2022  
 ./bin/tests/system/sortlist/setup.sh SH 2018,2019,2020,2021,2022  
 ./bin/tests/system/sortlist/tests.sh SH 2000,2001,2004,2007,2012,2016,2018,2019,2020,2021,2022  
 ./bin/tests/system/spf/clean.sh SH 2013,2014,2016,2018,2019,2020,2021,2022  
 ./bin/tests/system/spf/ns1/named.conf.in CONF-C 2018,2019,2020,2021,2022  
 ./bin/tests/system/spf/ns1/spf.db ZONE 2013,2016,2018,2019,2020,2021,2022  
 ./bin/tests/system/spf/setup.sh SH 2018,2019,2020,2021,2022  
 ./bin/tests/system/spf/tests.sh SH 2013,2014,2016,2018,2019,2020,2021,2022  
 ./bin/tests/system/start.pl SH  
 2001,2004,2005,2006,2007,2008,2010,2011,2012,2013,2014,2015,2016,2017,2018,2019,2020,2021,2022  
 ./bin/tests/system/start.sh SH 2000,2001,2004,2007,2012,2016,2018,2019,2020,2021,2022  
 ./bin/tests/system/staticstub/clean.sh SH 2010,2012,2014,2015,2016,2018,2019,2020,2021,2022  
 ./bin/tests/system/staticstub/conf/bad01.conf CONF-C 2010,2016,2018,2019,2020,2021,2022  
 ./bin/tests/system/staticstub/conf/bad02.conf CONF-C 2010,2016,2018,2019,2020,2021,2022  
 ./bin/tests/system/staticstub/conf/bad03.conf CONF-C 2010,2016,2018,2019,2020,2021,2022  
 ./bin/tests/system/staticstub/conf/bad04.conf CONF-C 2010,2016,2018,2019,2020,2021,2022  
 ./bin/tests/system/staticstub/conf/bad05.conf CONF-C 2010,2016,2018,2019,2020,2021,2022  
 ./bin/tests/system/staticstub/conf/bad06.conf CONF-C 2010,2016,2018,2019,2020,2021,2022  
 ./bin/tests/system/staticstub/conf/bad07.conf CONF-C 2010,2016,2018,2019,2020,2021,2022  
 ./bin/tests/system/staticstub/conf/bad08.conf CONF-C 2010,2016,2018,2019,2020,2021,2022  
 ./bin/tests/system/staticstub/conf/bad09.conf CONF-C 2010,2016,2018,2019,2020,2021,2022  
 ./bin/tests/system/staticstub/conf/bad10.conf CONF-C 2010,2016,2018,2019,2020,2021,2022  
 ./bin/tests/system/staticstub/conf/bad11.conf CONF-C 2010,2016,2018,2019,2020,2021,2022  
 ./bin/tests/system/staticstub/conf/good01.conf CONF-C 2010,2016,2018,2019,2020,2021,2022  
 ./bin/tests/system/staticstub/conf/good02.conf CONF-C 2010,2016,2018,2019,2020,2021,2022  
 ./bin/tests/system/staticstub/conf/good03.conf CONF-C 2010,2016,2018,2019,2020,2021,2022  
 ./bin/tests/system/staticstub/conf/good04.conf CONF-C 2010,2016,2018,2019,2020,2021,2022  
 ./bin/tests/system/staticstub/conf/good05.conf CONF-C 2010,2016,2018,2019,2020,2021,2022  
 ./bin/tests/system/staticstub/knowngood.dig.out.rec X 2010,2013,2018,2019,2020,2021,2022  
 ./bin/tests/system/staticstub/ns1/named.conf.in CONF-C 2018,2019,2020,2021,2022  
 ./bin/tests/system/staticstub/ns1/root.db ZONE 2010,2016,2018,2019,2020,2021,2022  
 ./bin/tests/system/staticstub/ns2/named.conf.in CONF-C 2010,2015,2016,2018,2019,2020,2021,2022  
 ./bin/tests/system/staticstub/ns3/example.db.in ZONE 2010,2016,2018,2019,2020,2021,2022

./bin/tests/system/staticstub/ns3/example.org.db ZONE 2010,2016,2018,2019,2020,2021,2022  
./bin/tests/system/staticstub/ns3/named.conf.in CONF-C 2010,2013,2015,2016,2018,2019,2020,2021,2022  
./bin/tests/system/staticstub/ns3/sign.sh SH 2010,2012,2014,2015,2016,2018,2019,2020,2021,2022  
./bin/tests/system/staticstub/ns3/undelegated.db.in ZONE 2015,2016,2018,2019,2020,2021,2022  
./bin/tests/system/staticstub/ns4/example.com.db ZONE 2010,2016,2018,2019,2020,2021,2022  
./bin/tests/system/staticstub/ns4/example.info.db ZONE 2010,2016,2018,2019,2020,2021,2022  
./bin/tests/system/staticstub/ns4/example.org.db ZONE 2010,2016,2018,2019,2020,2021,2022  
./bin/tests/system/staticstub/ns4/named.conf.in CONF-C 2018,2019,2020,2021,2022  
./bin/tests/system/staticstub/ns4/sign.sh SH 2010,2012,2014,2016,2018,2019,2020,2021,2022  
./bin/tests/system/staticstub/ns4/sub.example.db.in ZONE 2010,2016,2018,2019,2020,2021,2022  
./bin/tests/system/staticstub/prereq.sh SH 2014,2016,2018,2019,2020,2021,2022  
./bin/tests/system/staticstub/setup.sh SH 2010,2012,2014,2016,2018,2019,2020,2021,2022  
./bin/tests/system/staticstub/tests.sh SH 2010,2011,2012,2013,2015,2016,2018,2019,2020,2021,2022  
./bin/tests/system/statistics/ans4/ans.pl PERL 2012,2016,2018,2019,2020,2021,2022  
./bin/tests/system/statistics/clean.sh SH 2012,2014,2015,2016,2018,2019,2020,2021,2022  
./bin/tests/system/statistics/ns1/named.conf.in CONF-C 2018,2019,2020,2021,2022  
./bin/tests/system/statistics/ns1/root.db ZONE 2012,2016,2018,2019,2020,2021,2022  
./bin/tests/system/statistics/ns1/zone.db ZONE 2015,2016,2018,2019,2020,2021,2022  
./bin/tests/system/statistics/ns2/example.db ZONE 2012,2016,2018,2019,2020,2021,2022  
./bin/tests/system/statistics/ns2/internal.db ZONE 2012,2016,2018,2019,2020,2021,2022  
./bin/tests/system/statistics/ns2/named.conf.in CONF-C 2018,2019,2020,2021,2022  
./bin/tests/system/statistics/ns3/internal.db ZONE 2012,2016,2018,2019,2020,2021,2022  
./bin/tests/system/statistics/ns3/named.conf.in CONF-C 2018,2019,2020,2021,2022  
./bin/tests/system/statistics/ns3/root.hint ZONE 2012,2016,2018,2019,2020,2021,2022  
./bin/tests/system/statistics/prereq.sh SH 2012,2014,2016,2018,2019,2020,2021,2022  
./bin/tests/system/statistics/setup.sh SH 2018,2019,2020,2021,2022  
./bin/tests/system/statistics/tests.sh SH 2012,2015,2016,2018,2019,2020,2021,2022  
./bin/tests/system/statschannel/clean.sh SH 2015,2016,2018,2019,2020,2021,2022  
./bin/tests/system/statschannel/fetch.pl PERL 2015,2016,2018,2019,2020,2021,2022  
./bin/tests/system/statschannel/ns2/example.db ZONE 2015,2016,2018,2019,2020,2021,2022  
./bin/tests/system/statschannel/ns2/named.conf.in CONF-C 2018,2019,2020,2021,2022  
./bin/tests/system/statschannel/prereq.sh SH 2015,2016,2018,2019,2020,2021,2022  
./bin/tests/system/statschannel/server-json.pl PERL 2015,2016,2017,2018,2019,2020,2021,2022  
./bin/tests/system/statschannel/server-xml.pl PERL 2015,2016,2017,2018,2019,2020,2021,2022  
./bin/tests/system/statschannel/setup.sh SH 2018,2019,2020,2021,2022  
./bin/tests/system/statschannel/tests.sh SH 2015,2016,2018,2019,2020,2021,2022  
./bin/tests/system/statschannel/traffic-json.pl PERL 2015,2016,2017,2018,2019,2020,2021,2022  
./bin/tests/system/statschannel/traffic-xml.pl PERL 2015,2016,2017,2018,2019,2020,2021,2022  
./bin/tests/system/statschannel/traffic.expect.1 X 2015,2018,2019,2020,2021,2022  
./bin/tests/system/statschannel/traffic.expect.2 X 2015,2018,2019,2020,2021,2022  
./bin/tests/system/statschannel/traffic.expect.4 X 2015,2018,2019,2020,2021,2022  
./bin/tests/system/statschannel/traffic.expect.5 X 2015,2016,2018,2019,2020,2021,2022  
./bin/tests/system/statschannel/traffic.expect.6 X 2015,2016,2018,2019,2020,2021,2022  
./bin/tests/system/stop.pl SH 2001,2004,2005,2006,2007,2012,2016,2018,2019,2020,2021,2022  
./bin/tests/system/stop.sh SH 2000,2001,2004,2007,2012,2016,2018,2019,2020,2021,2022  
./bin/tests/system/stopall.sh SH 2018,2019,2020,2021,2022  
./bin/tests/system/stress/clean.sh SH 2000,2001,2004,2007,2012,2014,2016,2018,2019,2020,2021,2022  
./bin/tests/system/stress/ns1/named.conf CONF-C 2000,2001,2004,2007,2016,2018,2019,2020,2021,2022



./bin/tests/system/stress/ns2/named.conf CONF-C 2000,2001,2004,2007,2016,2018,2019,2020,2021,2022  
 ./bin/tests/system/stress/ns3/named.conf CONF-C 2000,2001,2004,2007,2013,2016,2018,2019,2020,2021,2022  
 ./bin/tests/system/stress/ns4/named.conf CONF-C 2000,2001,2004,2007,2016,2018,2019,2020,2021,2022  
 ./bin/tests/system/stress/prereq.sh SH 2015,2016,2018,2019,2020,2021,2022  
 ./bin/tests/system/stress/setup.pl PERL 2000,2001,2004,2007,2012,2016,2018,2019,2020,2021,2022  
 ./bin/tests/system/stress/setup.sh SH 2000,2001,2004,2007,2012,2016,2018,2019,2020,2021,2022  
 ./bin/tests/system/stress/tests.sh SH 2000,2001,2004,2007,2012,2014,2015,2016,2018,2019,2020,2021,2022  
 ./bin/tests/system/stress/update.pl PERL 2000,2001,2004,2007,2012,2016,2018,2019,2020,2021,2022  
 ./bin/tests/system/stub/clean.sh SH 2000,2001,2004,2007,2012,2014,2015,2016,2018,2019,2020,2021,2022  
 ./bin/tests/system/stub/knowngood.dig.out.norec X 2000,2001,2018,2019,2020,2021,2022  
 ./bin/tests/system/stub/knowngood.dig.out.rec X 2000,2001,2013,2018,2019,2020,2021,2022  
 ./bin/tests/system/stub/ns1/named.conf.in CONF-C 2018,2019,2020,2021,2022  
 ./bin/tests/system/stub/ns1/root.db ZONE 2000,2001,2004,2007,2016,2018,2019,2020,2021,2022  
 ./bin/tests/system/stub/ns2/child.example.db ZONE 2000,2001,2004,2007,2016,2018,2019,2020,2021,2022  
 ./bin/tests/system/stub/ns2/named.conf.in CONF-C 2018,2019,2020,2021,2022  
 ./bin/tests/system/stub/ns3/example.db ZONE 2000,2001,2004,2007,2016,2018,2019,2020,2021,2022  
 ./bin/tests/system/stub/ns3/named.conf.in CONF-C 2018,2019,2020,2021,2022  
 ./bin/tests/system/stub/ns4/example.db ZONE 2020,2021,2022  
 ./bin/tests/system/stub/ns4/named.conf.in CONF-C 2020,2021,2022  
 ./bin/tests/system/stub/ns5/named.conf.in CONF-C 2020,2021,2022  
 ./bin/tests/system/stub/setup.sh SH 2018,2019,2020,2021,2022  
 ./bin/tests/system/stub/tests.sh SH 2000,2001,2004,2007,2011,2012,2013,2016,2018,2019,2020,2021,2022  
 ./bin/tests/system/tcp/ans6/ans.py PYTHON 2019,2020,2021,2022  
 ./bin/tests/system/tcp/clean.sh SH 2014,2016,2018,2019,2020,2021,2022  
 ./bin/tests/system/tcp/ns1/named.conf.in CONF-C 2018,2019,2020,2021,2022  
 ./bin/tests/system/tcp/ns1/root.db ZONE 2014,2016,2018,2019,2020,2021,2022  
 ./bin/tests/system/tcp/ns2/example.db ZONE 2014,2016,2018,2019,2020,2021,2022  
 ./bin/tests/system/tcp/ns2/named.conf.in CONF-C 2018,2019,2020,2021,2022  
 ./bin/tests/system/tcp/ns3/named.conf.in CONF-C 2018,2019,2020,2021,2022  
 ./bin/tests/system/tcp/ns4/named.conf.in CONF-C 2018,2019,2020,2021,2022  
 ./bin/tests/system/tcp/ns5/named.conf.in CONF-C 2019,2020,2021,2022  
 ./bin/tests/system/tcp/prereq.sh SH 2019,2020,2021,2022  
 ./bin/tests/system/tcp/setup.sh SH 2018,2019,2020,2021,2022  
 ./bin/tests/system/tcp/tests.sh SH 2014,2016,2018,2019,2020,2021,2022  
 ./bin/tests/system/testcrypto.sh SH 2014,2016,2017,2018,2019,2020,2021,2022  
 ./bin/tests/system/testsock.pl PERL 2000,2001,2004,2007,2010,2011,2012,2013,2016,2018,2019,2020,2021,2022  
 ./bin/tests/system/testsock6.pl PERL 2010,2012,2014,2016,2018,2019,2020,2021,2022  
 ./bin/tests/system/testsummary.sh SH 2018,2019,2020,2021,2022  
 ./bin/tests/system/tkey/Makefile.in MAKE  
 2001,2002,2004,2007,2009,2012,2014,2015,2016,2018,2019,2020,2021,2022  
 ./bin/tests/system/tkey/clean.sh SH 2001,2004,2007,2011,2012,2013,2014,2015,2016,2018,2019,2020,2021,2022  
 ./bin/tests/system/tkey/keycreate.c C  
 2001,2004,2005,2007,2009,2011,2012,2014,2015,2016,2018,2019,2020,2021,2022  
 ./bin/tests/system/tkey/keydelete.c C  
 2001,2004,2005,2007,2009,2010,2011,2014,2015,2016,2018,2019,2020,2021,2022  
 ./bin/tests/system/tkey/ns1/example.db ZONE 2013,2016,2018,2019,2020,2021,2022  
 ./bin/tests/system/tkey/ns1/named.conf.in CONF-C  
 2001,2004,2007,2009,2011,2013,2014,2016,2018,2019,2020,2021,2022

./bin/tests/system/tkey/ns1/setup.sh SH 2001,2004,2007,2009,2012,2014,2016,2018,2019,2020,2021,2022  
 ./bin/tests/system/tkey/prereq.sh SH 2001,2004,2006,2007,2009,2012,2014,2016,2018,2019,2020,2021,2022  
 ./bin/tests/system/tkey/setup.sh SH 2001,2004,2007,2009,2012,2013,2014,2016,2018,2019,2020,2021,2022  
 ./bin/tests/system/tkey/tests.sh SH 2001,2004,2007,2009,2011,2012,2013,2014,2016,2018,2019,2020,2021,2022  
 ./bin/tests/system/tsig/ans2/ans.pl PERL 2020,2021,2022  
 ./bin/tests/system/tsig/badlocation X 2020,2021,2022  
 ./bin/tests/system/tsig/badtime X 2020,2021,2022  
 ./bin/tests/system/tsig/clean.sh SH 2005,2006,2007,2012,2014,2016,2018,2019,2020,2021,2022  
 ./bin/tests/system/tsig/ns1/example.db ZONE 2005,2006,2007,2009,2012,2016,2018,2019,2020,2021,2022  
 ./bin/tests/system/tsig/ns1/named.conf.in CONF-C 2018,2019,2020,2021,2022  
 ./bin/tests/system/tsig/prereq.sh SH 2020,2021,2022  
 ./bin/tests/system/tsig/setup.sh SH 2016,2018,2019,2020,2021,2022  
 ./bin/tests/system/tsig/tests.sh SH 2005,2006,2007,2011,2012,2016,2018,2019,2020,2021,2022  
 ./bin/tests/system/tsiggss/authsock.pl PERL 2011,2012,2016,2018,2019,2020,2021,2022  
 ./bin/tests/system/tsiggss/clean.sh SH 2010,2011,2014,2015,2016,2018,2019,2020,2021,2022  
 ./bin/tests/system/tsiggss/ns1/administrator.ccache X 2010,2018,2019,2020,2021,2022  
 ./bin/tests/system/tsiggss/ns1/dns.keytab X 2010,2018,2019,2020,2021,2022  
 ./bin/tests/system/tsiggss/ns1/example.nil.db.in X 2011,2018,2019,2020,2021,2022  
 ./bin/tests/system/tsiggss/ns1/named.conf.in CONF-C 2018,2019,2020,2021,2022  
 ./bin/tests/system/tsiggss/ns1/testdenied.ccache X 2010,2018,2019,2020,2021,2022  
 ./bin/tests/system/tsiggss/prereq.sh SH 2010,2011,2012,2014,2016,2018,2019,2020,2021,2022  
 ./bin/tests/system/tsiggss/setup.sh SH 2010,2011,2012,2014,2016,2018,2019,2020,2021,2022  
 ./bin/tests/system/tsiggss/tests.sh SH 2010,2011,2014,2016,2017,2018,2019,2020,2021,2022  
 ./bin/tests/system/unknown/clean.sh SH  
 2000,2001,2004,2007,2012,2013,2014,2015,2016,2018,2019,2020,2021,2022  
 ./bin/tests/system/unknown/large.out X 2012,2018,2019,2020,2021,2022  
 ./bin/tests/system/unknown/ns1/broken1.db ZONE 2000,2001,2004,2007,2016,2018,2019,2020,2021,2022  
 ./bin/tests/system/unknown/ns1/broken2.db ZONE 2000,2001,2004,2007,2016,2018,2019,2020,2021,2022  
 ./bin/tests/system/unknown/ns1/broken3.db ZONE 2000,2001,2004,2007,2016,2018,2019,2020,2021,2022  
 ./bin/tests/system/unknown/ns1/broken4.db ZONE 2000,2001,2004,2007,2016,2018,2019,2020,2021,2022  
 ./bin/tests/system/unknown/ns1/broken5.db ZONE 2000,2001,2004,2007,2016,2018,2019,2020,2021,2022  
 ./bin/tests/system/unknown/ns1/class10.hints ZONE 2000,2001,2004,2007,2016,2018,2019,2020,2021,2022  
 ./bin/tests/system/unknown/ns1/example-class10.db ZONE 2000,2001,2004,2007,2016,2018,2019,2020,2021,2022  
 ./bin/tests/system/unknown/ns1/example-in.db ZONE  
 2000,2001,2004,2007,2011,2012,2016,2018,2019,2020,2021,2022  
 ./bin/tests/system/unknown/ns1/large.db ZONE 2012,2016,2018,2019,2020,2021,2022  
 ./bin/tests/system/unknown/ns1/named.conf.in CONF-C 2018,2019,2020,2021,2022  
 ./bin/tests/system/unknown/ns2/named.conf.in CONF-C 2018,2019,2020,2021,2022  
 ./bin/tests/system/unknown/ns3/named.conf.in CONF-C 2018,2019,2020,2021,2022  
 ./bin/tests/system/unknown/ns3/sign.sh SH 2012,2014,2016,2018,2019,2020,2021,2022  
 ./bin/tests/system/unknown/prereq.sh SH 2014,2016,2018,2019,2020,2021,2022  
 ./bin/tests/system/unknown/setup.sh SH 2012,2014,2016,2018,2019,2020,2021,2022  
 ./bin/tests/system/unknown/tests.sh SH 2000,2001,2004,2007,2011,2012,2013,2016,2018,2019,2020,2021,2022  
 ./bin/tests/system/unknown/zones/nan.bad ZONE 2013,2016,2018,2019,2020,2021,2022  
 ./bin/tests/system/upforwd/ans4/ans.pl PERL 2011,2012,2016,2018,2019,2020,2021,2022  
 ./bin/tests/system/upforwd/clean.sh SH 2000,2001,2004,2007,2011,2012,2014,2015,2016,2018,2019,2020,2021,2022  
 ./bin/tests/system/upforwd/knowngood.after1 X 2000,2001,2018,2019,2020,2021,2022  
 ./bin/tests/system/upforwd/knowngood.after2 X 2000,2001,2018,2019,2020,2021,2022

./bin/tests/system/upforwd/knowngood.before X 2000,2001,2018,2019,2020,2021,2022  
 ./bin/tests/system/upforwd/knowngood.ns2.before X 2000,2001,2018,2019,2020,2021,2022  
 ./bin/tests/system/upforwd/ns1/example1.db ZONE 2000,2001,2004,2007,2016,2018,2019,2020,2021,2022  
 ./bin/tests/system/upforwd/ns1/named.conf.in CONF-C 2018,2019,2020,2021,2022  
 ./bin/tests/system/upforwd/ns2/named.conf.in CONF-C 2018,2019,2020,2021,2022  
 ./bin/tests/system/upforwd/ns3/named.conf.in CONF-C 2018,2019,2020,2021,2022  
 ./bin/tests/system/upforwd/ns3/nomaster.db ZONE 2011,2016,2018,2019,2020,2021,2022  
 ./bin/tests/system/upforwd/prereq.sh SH 2012,2014,2016,2018,2019,2020,2021,2022  
 ./bin/tests/system/upforwd/setup.sh SH 2000,2001,2004,2007,2011,2012,2014,2016,2018,2019,2020,2021,2022  
 ./bin/tests/system/upforwd/tests.sh SH 2000,2001,2004,2007,2011,2012,2013,2014,2016,2018,2019,2020,2021,2022  
 ./bin/tests/system/verify/clean.sh SH 2012,2014,2016,2018,2019,2020,2021,2022  
 ./bin/tests/system/verify/prereq.sh SH 2014,2016,2018,2019,2020,2021,2022  
 ./bin/tests/system/verify/setup.sh SH 2012,2014,2016,2018,2019,2020,2021,2022  
 ./bin/tests/system/verify/tests.sh SH 2012,2013,2016,2017,2018,2019,2020,2021,2022  
 ./bin/tests/system/verify/zones/genzones.sh SH 2012,2013,2014,2016,2018,2019,2020,2021,2022  
 ./bin/tests/system/verify/zones/unsigned.db ZONE 2012,2016,2018,2019,2020,2021,2022  
 ./bin/tests/system/views/clean.sh SH  
 2000,2001,2004,2005,2007,2012,2013,2014,2015,2016,2018,2019,2020,2021,2022  
 ./bin/tests/system/views/ns1/named.conf.in CONF-C 2018,2019,2020,2021,2022  
 ./bin/tests/system/views/ns1/root.db ZONE 2000,2001,2004,2007,2016,2018,2019,2020,2021,2022  
 ./bin/tests/system/views/ns2/1.10.in-addr.arpa.db ZONE 2015,2016,2018,2019,2020,2021,2022  
 ./bin/tests/system/views/ns2/clone.db ZONE 2013,2016,2018,2019,2020,2021,2022  
 ./bin/tests/system/views/ns2/example1.db ZONE 2000,2001,2004,2007,2016,2018,2019,2020,2021,2022  
 ./bin/tests/system/views/ns2/example2.db ZONE 2000,2001,2004,2007,2016,2018,2019,2020,2021,2022  
 ./bin/tests/system/views/ns2/external/inline.db ZONE 2014,2016,2018,2019,2020,2021,2022  
 ./bin/tests/system/views/ns2/internal.db ZONE 2000,2001,2004,2007,2016,2018,2019,2020,2021,2022  
 ./bin/tests/system/views/ns2/internal/inline.db ZONE 2014,2016,2018,2019,2020,2021,2022  
 ./bin/tests/system/views/ns2/named1.conf.in CONF-C 2018,2019,2020,2021,2022  
 ./bin/tests/system/views/ns2/named2.conf.in CONF-C 2018,2019,2020,2021,2022  
 ./bin/tests/system/views/ns3/child.clone.db ZONE 2013,2016,2018,2019,2020,2021,2022  
 ./bin/tests/system/views/ns3/internal.db ZONE 2000,2001,2004,2007,2016,2018,2019,2020,2021,2022  
 ./bin/tests/system/views/ns3/named1.conf.in CONF-C 2018,2019,2020,2021,2022  
 ./bin/tests/system/views/ns3/named2.conf.in CONF-C 2018,2019,2020,2021,2022  
 ./bin/tests/system/views/ns5/child.clone.db ZONE 2013,2016,2018,2019,2020,2021,2022  
 ./bin/tests/system/views/ns5/named.conf.in CONF-C 2018,2019,2020,2021,2022  
 ./bin/tests/system/views/setup.sh SH 2000,2001,2004,2007,2012,2014,2016,2018,2019,2020,2021,2022  
 ./bin/tests/system/views/tests.sh SH 2000,2001,2004,2007,2012,2013,2014,2016,2018,2019,2020,2021,2022  
 ./bin/tests/system/wildcard/clean.sh SH 2012,2013,2014,2016,2018,2019,2020,2021,2022  
 ./bin/tests/system/wildcard/ns1/dlv.db.in ZONE 2013,2016,2018,2019,2020,2021,2022  
 ./bin/tests/system/wildcard/ns1/named.conf.in CONF-C 2012,2013,2016,2018,2019,2020,2021,2022  
 ./bin/tests/system/wildcard/ns1/nsec.db.in ZONE 2012,2013,2016,2018,2019,2020,2021,2022  
 ./bin/tests/system/wildcard/ns1/nsec3.db.in ZONE 2012,2013,2016,2018,2019,2020,2021,2022  
 ./bin/tests/system/wildcard/ns1/private.nsec.db.in ZONE 2012,2013,2016,2018,2019,2020,2021,2022  
 ./bin/tests/system/wildcard/ns1/private.nsec3.db.in ZONE 2012,2013,2016,2018,2019,2020,2021,2022  
 ./bin/tests/system/wildcard/ns1/root.db.in ZONE 2012,2013,2016,2018,2019,2020,2021,2022  
 ./bin/tests/system/wildcard/ns1/sign.sh SH 2012,2013,2014,2016,2018,2019,2020,2021,2022  
 ./bin/tests/system/wildcard/ns2/named.conf.in CONF-C 2018,2019,2020,2021,2022  
 ./bin/tests/system/wildcard/ns3/named.conf.in CONF-C 2018,2019,2020,2021,2022

./bin/tests/system/wildcard/ns4/named.conf.in CONF-C 2018,2019,2020,2021,2022  
./bin/tests/system/wildcard/ns5/named.conf.in CONF-C 2018,2019,2020,2021,2022  
./bin/tests/system/wildcard/prereq.sh SH 2014,2016,2018,2019,2020,2021,2022  
./bin/tests/system/wildcard/setup.sh SH 2012,2014,2016,2018,2019,2020,2021,2022  
./bin/tests/system/wildcard/tests.sh SH 2012,2013,2016,2018,2019,2020,2021,2022  
./bin/tests/system/win32/bigkey.dsp.in X 2016,2018,2019,2020,2021,2022  
./bin/tests/system/win32/bigkey.dsw X 2016,2018,2019,2020,2021,2022  
./bin/tests/system/win32/bigkey.mak.in X 2016,2018,2019,2020,2021,2022  
./bin/tests/system/win32/bigkey.vcxproj.filters.in X 2016,2018,2019,2020,2021,2022  
./bin/tests/system/win32/bigkey.vcxproj.in X 2016,2017,2018,2019,2020,2021,2022  
./bin/tests/system/win32/bigkey.vcxproj.user X 2016,2018,2019,2020,2021,2022  
./bin/tests/system/win32/feature-test.dsp.in X 2016,2018,2019,2020,2021,2022  
./bin/tests/system/win32/feature-test.dsw X 2016,2018,2019,2020,2021,2022  
./bin/tests/system/win32/feature-test.mak.in X 2016,2018,2019,2020,2021,2022  
./bin/tests/system/win32/feature-test.vcxproj.filters.in X 2016,2018,2019,2020,2021,2022  
./bin/tests/system/win32/feature-test.vcxproj.in X 2016,2017,2018,2019,2020,2021,2022  
./bin/tests/system/win32/feature-test.vcxproj.user X 2016,2018,2019,2020,2021,2022  
./bin/tests/system/win32/gencheck.dsp.in X 2016,2018,2019,2020,2021,2022  
./bin/tests/system/win32/gencheck.dsw X 2016,2018,2019,2020,2021,2022  
./bin/tests/system/win32/gencheck.mak.in X 2016,2018,2019,2020,2021,2022  
./bin/tests/system/win32/gencheck.vcxproj.filters.in X 2016,2018,2019,2020,2021,2022  
./bin/tests/system/win32/gencheck.vcxproj.in X 2016,2017,2018,2019,2020,2021,2022  
./bin/tests/system/win32/gencheck.vcxproj.user X 2016,2018,2019,2020,2021,2022  
./bin/tests/system/win32/keycreate.dsp.in X 2016,2018,2019,2020,2021,2022  
./bin/tests/system/win32/keycreate.dsw X 2016,2018,2019,2020,2021,2022  
./bin/tests/system/win32/keycreate.mak.in X 2016,2018,2019,2020,2021,2022  
./bin/tests/system/win32/keycreate.vcxproj.filters.in X 2016,2018,2019,2020,2021,2022  
./bin/tests/system/win32/keycreate.vcxproj.in X 2016,2017,2018,2019,2020,2021,2022  
./bin/tests/system/win32/keycreate.vcxproj.user X 2016,2018,2019,2020,2021,2022  
./bin/tests/system/win32/keydelete.dsp.in X 2016,2018,2019,2020,2021,2022  
./bin/tests/system/win32/keydelete.dsw X 2016,2018,2019,2020,2021,2022  
./bin/tests/system/win32/keydelete.mak.in X 2016,2018,2019,2020,2021,2022  
./bin/tests/system/win32/keydelete.vcxproj.filters.in X 2016,2018,2019,2020,2021,2022  
./bin/tests/system/win32/keydelete.vcxproj.in X 2016,2017,2018,2019,2020,2021,2022  
./bin/tests/system/win32/keydelete.vcxproj.user X 2016,2018,2019,2020,2021,2022  
./bin/tests/system/win32/lwtest.dsp.in X 2016,2018,2019,2020,2021,2022  
./bin/tests/system/win32/lwtest.dsw X 2016,2018,2019,2020,2021,2022  
./bin/tests/system/win32/lwtest.mak.in X 2016,2018,2019,2020,2021,2022  
./bin/tests/system/win32/lwtest.vcxproj.filters.in X 2016,2018,2019,2020,2021,2022  
./bin/tests/system/win32/lwtest.vcxproj.in X 2016,2017,2018,2019,2020,2021,2022  
./bin/tests/system/win32/lwtest.vcxproj.user X 2016,2018,2019,2020,2021,2022  
./bin/tests/system/win32/pipequeries.dsp.in X 2016,2018,2019,2020,2021,2022  
./bin/tests/system/win32/pipequeries.dsw X 2016,2018,2019,2020,2021,2022  
./bin/tests/system/win32/pipequeries.mak.in X 2016,2018,2019,2020,2021,2022  
./bin/tests/system/win32/pipequeries.vcxproj.filters.in X 2016,2018,2019,2020,2021,2022  
./bin/tests/system/win32/pipequeries.vcxproj.in X 2016,2017,2018,2019,2020,2021,2022  
./bin/tests/system/win32/pipequeries.vcxproj.user X 2016,2018,2019,2020,2021,2022  
./bin/tests/system/xfer/ans5/badkeydata X 2011,2018,2019,2020,2021,2022

./bin/tests/system/xfer/ans5/badmessageid X 2020,2021,2022  
 ./bin/tests/system/xfer/ans5/goodaxfr X 2011,2018,2019,2020,2021,2022  
 ./bin/tests/system/xfer/ans5/partial X 2011,2018,2019,2020,2021,2022  
 ./bin/tests/system/xfer/ans5/unknownkey X 2011,2018,2019,2020,2021,2022  
 ./bin/tests/system/xfer/ans5/unsigned X 2011,2018,2019,2020,2021,2022  
 ./bin/tests/system/xfer/ans5/wrongkey X 2011,2018,2019,2020,2021,2022  
 ./bin/tests/system/xfer/clean.sh SH  
 2000,2001,2004,2007,2011,2012,2013,2014,2015,2016,2018,2019,2020,2021,2022  
 ./bin/tests/system/xfer/dig1.good X  
 2000,2001,2003,2004,2009,2011,2012,2013,2014,2015,2016,2017,2018,2019,2020,2021,2022  
 ./bin/tests/system/xfer/dig2.good X  
 2000,2001,2003,2004,2009,2011,2012,2013,2014,2015,2016,2017,2018,2019,2020,2021,2022  
 ./bin/tests/system/xfer/knowngood.mapped X 2016,2018,2019,2020,2021,2022  
 ./bin/tests/system/xfer/ns1/axfr-too-big.db ZONE 2016,2018,2019,2020,2021,2022  
 ./bin/tests/system/xfer/ns1/ixfr-too-big.db.in ZONE 2016,2018,2019,2020,2021,2022  
 ./bin/tests/system/xfer/ns1/named.conf.in CONF-C 2018,2019,2020,2021,2022  
 ./bin/tests/system/xfer/ns1/root.db ZONE 2000,2001,2004,2007,2016,2018,2019,2020,2021,2022  
 ./bin/tests/system/xfer/ns2/mapped.db.in ZONE 2016,2018,2019,2020,2021,2022  
 ./bin/tests/system/xfer/ns2/named.conf.in CONF-C 2018,2019,2020,2021,2022  
 ./bin/tests/system/xfer/ns2/slave.db.in ZONE 2013,2016,2018,2019,2020,2021,2022  
 ./bin/tests/system/xfer/ns3/named.conf.in CONF-C 2018,2019,2020,2021,2022  
 ./bin/tests/system/xfer/ns4/named.conf.base CONF-C 2011,2013,2016,2018,2019,2020,2021,2022  
 ./bin/tests/system/xfer/ns4/root.db.in ZONE 2011,2016,2018,2019,2020,2021,2022  
 ./bin/tests/system/xfer/ns6/named.conf.in CONF-C 2018,2019,2020,2021,2022  
 ./bin/tests/system/xfer/ns7/named.conf.in CONF-C 2018,2019,2020,2021,2022  
 ./bin/tests/system/xfer/ns8/example.db ZONE 2015,2016,2018,2019,2020,2021,2022  
 ./bin/tests/system/xfer/ns8/named.conf.in CONF-C 2018,2019,2020,2021,2022  
 ./bin/tests/system/xfer/prereq.sh SH 2011,2012,2014,2016,2018,2019,2020,2021,2022  
 ./bin/tests/system/xfer/setup.sh SH  
 2001,2002,2004,2007,2011,2012,2013,2014,2015,2016,2018,2019,2020,2021,2022  
 ./bin/tests/system/xfer/tests.sh SH  
 2000,2001,2004,2005,2007,2011,2012,2013,2014,2015,2016,2018,2019,2020,2021,2022  
 ./bin/tests/system/xferquota/clean.sh SH 2000,2001,2004,2007,2012,2014,2015,2016,2018,2019,2020,2021,2022  
 ./bin/tests/system/xferquota/ns1/changing1.db ZONE 2000,2001,2004,2007,2016,2018,2019,2020,2021,2022  
 ./bin/tests/system/xferquota/ns1/changing2.db ZONE 2000,2001,2004,2007,2016,2018,2019,2020,2021,2022  
 ./bin/tests/system/xferquota/ns1/named.conf.in CONF-C 2018,2019,2020,2021,2022  
 ./bin/tests/system/xferquota/ns1/root.db ZONE 2000,2001,2004,2007,2016,2018,2019,2020,2021,2022  
 ./bin/tests/system/xferquota/ns2/example.db ZONE  
 2000,2001,2002,2003,2004,2007,2009,2016,2018,2019,2020,2021,2022  
 ./bin/tests/system/xferquota/ns2/named.conf.in CONF-C 2018,2019,2020,2021,2022  
 ./bin/tests/system/xferquota/setup.pl PERL 2000,2001,2004,2007,2011,2012,2016,2018,2019,2020,2021,2022  
 ./bin/tests/system/xferquota/setup.sh SH 2000,2001,2004,2007,2012,2016,2018,2019,2020,2021,2022  
 ./bin/tests/system/xferquota/tests.sh SH 2000,2001,2004,2007,2012,2016,2018,2019,2020,2021,2022  
 ./bin/tests/system/zero/ans5/ans.pl PERL 2016,2018,2019,2020,2021,2022  
 ./bin/tests/system/zero/clean.sh SH 2013,2014,2015,2016,2018,2019,2020,2021,2022  
 ./bin/tests/system/zero/ns1/named.conf.in CONF-C 2018,2019,2020,2021,2022  
 ./bin/tests/system/zero/ns1/root.db ZONE 2013,2016,2018,2019,2020,2021,2022  
 ./bin/tests/system/zero/ns2/named.conf.in CONF-C 2018,2019,2020,2021,2022

./bin/tests/system/zero/ns2/tld.db ZONE 2016,2018,2019,2020,2021,2022  
./bin/tests/system/zero/ns3/named.conf.in CONF-C 2018,2019,2020,2021,2022  
./bin/tests/system/zero/ns3/root.hint ZONE 2013,2016,2018,2019,2020,2021,2022  
./bin/tests/system/zero/ns4/named.conf.in CONF-C 2018,2019,2020,2021,2022  
./bin/tests/system/zero/ns4/one.tld.db ZONE 2016,2018,2019,2020,2021,2022  
./bin/tests/system/zero/prereq.sh SH 2018,2019,2020,2021,2022  
./bin/tests/system/zero/setup.sh SH 2013,2014,2016,2018,2019,2020,2021,2022  
./bin/tests/system/zero/tests.sh SH 2013,2016,2017,2018,2019,2020,2021,2022  
./bin/tests/system/zonechecks/a.db ZONE 2004,2007,2016,2018,2019,2020,2021,2022  
./bin/tests/system/zonechecks/aaaa.db ZONE 2004,2007,2016,2018,2019,2020,2021,2022  
./bin/tests/system/zonechecks/bigserial.db ZONE 2015,2016,2018,2019,2020,2021,2022  
./bin/tests/system/zonechecks/clean.sh SH 2004,2007,2012,2014,2015,2016,2018,2019,2020,2021,2022  
./bin/tests/system/zonechecks/cname.db ZONE 2004,2007,2016,2018,2019,2020,2021,2022  
./bin/tests/system/zonechecks/dname.db ZONE 2004,2007,2016,2018,2019,2020,2021,2022  
./bin/tests/system/zonechecks/noaddress.db ZONE 2004,2007,2016,2018,2019,2020,2021,2022  
./bin/tests/system/zonechecks/ns1/named.conf.in CONF-C 2018,2019,2020,2021,2022  
./bin/tests/system/zonechecks/ns2/named.conf.in CONF-C 2018,2019,2020,2021,2022  
./bin/tests/system/zonechecks/nxdomain.db ZONE 2004,2007,2016,2018,2019,2020,2021,2022  
./bin/tests/system/zonechecks/prereq.sh SH 2014,2016,2018,2019,2020,2021,2022  
./bin/tests/system/zonechecks/setup.sh SH 2012,2013,2014,2015,2016,2018,2019,2020,2021,2022  
./bin/tests/system/zonechecks/tests.sh SH 2004,2007,2009,2012,2013,2014,2015,2016,2018,2019,2020,2021,2022  
./bin/tests/testdata/wire/wire\_test.data X 1999,2000,2001,2018,2019,2020,2021,2022  
./bin/tests/testdata/wire/wire\_test.data2 X 1999,2000,2001,2018,2019,2020,2021,2022  
./bin/tests/testdata/wire/wire\_test.data3 X 1999,2000,2001,2018,2019,2020,2021,2022  
./bin/tests/testdata/wire/wire\_test.data4 X 1999,2000,2001,2018,2019,2020,2021,2022  
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./bin/tests/virtual-time/README TXT.BRIEF 2010,2016,2018,2019,2020,2021,2022  
./bin/tests/virtual-time/autosign-ksk/clean.sh SH 2010,2012,2015,2016,2018,2019,2020,2021,2022  
./bin/tests/virtual-time/autosign-ksk/ns1/example.db.in ZONE 2010,2016,2018,2019,2020,2021,2022  
./bin/tests/virtual-time/autosign-ksk/ns1/named.conf CONF-C 2010,2016,2018,2019,2020,2021,2022  
./bin/tests/virtual-time/autosign-ksk/ns1/root.db ZONE 2010,2016,2018,2019,2020,2021,2022  
./bin/tests/virtual-time/autosign-ksk/ns1/sign.sh SH 2010,2012,2016,2018,2019,2020,2021,2022  
./bin/tests/virtual-time/autosign-ksk/ns1/wrap.sh SH 2010,2012,2016,2018,2019,2020,2021,2022  
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./bin/tests/virtual-time/autosign-ksk/tests.sh SH 2010,2012,2016,2018,2019,2020,2021,2022  
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 ./bin/tests/virtual-time/slave/clean.sh SH 2010,2012,2015,2016,2018,2019,2020,2021,2022  
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 ./util/COPYRIGHT.BSDI X 2000,2001,2004,2007,2016,2018,2019,2020,2021,2022  
 ./util/COPYRIGHT.NAI X 1996,1997,1998,1999,2000,2001,2004,2007,2016,2018,2019,2020,2021,2022  
 ./util/COPYRIGHT.NOM X 2001,2004,2007,2016,2018,2019,2020,2021,2022  
 ./util/COPYRIGHT.PORION X 1996,1997,1998,1999,2000,2001,2004,2007,2016,2018,2019,2020,2021,2022  
 ./util/COPYRIGHT.TOP X 2018,2019,2020,2021,2022  
 ./util/altbuild.sh SH 2000,2001,2002,2004,2007,2008,2012,2016,2018,2019,2020,2021,2022  
 ./util/api-checker.sh SH 2020,2021,2022  
 ./util/bindkeys.pl PERL 2009,2010,2011,2012,2014,2016,2017,2018,2019,2020,2021,2022  
 ./util/branchsync.sh SH 2013,2016,2018,2019,2020,2021,2022  
 ./util/check-ans-prereq.sh SH 2019,2020,2021,2022  
 ./util/check-categories.sh SH 2015,2016,2017,2018,2019,2020,2021,2022  
 ./util/check-changes PERL 2002,2004,2007,2012,2016,2018,2019,2020,2021,2022  
 ./util/check-cocci X 2018,2019,2020,2021,2022  
 ./util/check-includes.pl PERL 2000,2001,2004,2007,2012,2016,2018,2019,2020,2021,2022  
 ./util/check-instincludes.sh SH 2000,2001,2004,2007,2012,2016,2018,2019,2020,2021,2022



./util/check-line-length.sh SH 2021,2022  
 ./util/check-make-install.in SH 2020,2021,2022  
 ./util/check-pullups.pl PERL 2001,2002,2003,2004,2007,2012,2016,2018,2019,2020,2021,2022  
 ./util/check-sources.pl PERL 2000,2001,2004,2007,2012,2013,2016,2018,2019,2020,2021,2022  
 ./util/check-win32util-configure SH 2019,2020,2021,2022  
 ./util/checklibs.sh SH 2017,2018,2019,2020,2021,2022  
 ./util/commit-arm.sh SH 2012,2016,2018,2019,2020,2021,2022  
 ./util/copyrights X  
 1998,1999,2000,2001,2002,2003,2004,2005,2006,2007,2008,2009,2010,2011,2012,2013,2014,2015,2016,2017,2018,2019,2020,2021,2022  
 ./util/git-replay-merge.sh SH 2018,2019,2020,2021,2022  
 ./util/kit.sh SH  
 2000,2001,2002,2003,2004,2007,2008,2009,2010,2012,2013,2014,2015,2016,2018,2019,2020,2021,2022  
 ./util/mandoc2docbook.pl PERL 2001,2004,2007,2012,2016,2018,2019,2020,2021,2022  
 ./util/mdnbuildtest.sh SH 2000,2001,2004,2007,2012,2016,2018,2019,2020,2021,2022  
 ./util/memleak.pl PERL 1999,2000,2001,2004,2007,2012,2016,2018,2019,2020,2021,2022  
 ./util/merge\_copyrights PERL  
 1998,1999,2000,2001,2003,2004,2005,2006,2007,2009,2010,2011,2012,2013,2014,2015,2016,2017,2018,2019,2020,2021,2022  
 ./util/mksymtbl.pl PERL 2009,2012,2016,2018,2019,2020,2021,2022  
 ./util/models.c C 2015,2016,2018,2019,2020,2021,2022  
 ./util/nanny.pl PERL 2000,2001,2004,2007,2012,2016,2018,2019,2020,2021,2022  
 ./util/new-func PERL 2005,2007,2012,2016,2018,2019,2020,2021,2022  
 ./util/nt-kit SH 1999,2000,2001,2004,2007,2012,2016,2018,2019,2020,2021,2022  
 ./util/pairwise-testing.sh SH 2020,2021,2022  
 ./util/parse\_tsan.py PYTHON-BIN 2020,2021,2022  
 ./util/spacewhack.pl PERL 2000,2001,2004,2007,2012,2016,2018,2019,2020,2021,2022  
 ./util/tabify-changes SH 2004,2007,2012,2016,2018,2019,2020,2021,2022  
 ./util/update-drafts.pl PERL 2000,2001,2004,2007,2012,2016,2018,2019,2020,2021,2022  
 ./util/update\_branches PERL 2005,2007,2012,2016,2018,2019,2020,2021,2022  
 ./util/update\_copyrights PERL  
 1998,1999,2000,2001,2004,2005,2006,2007,2008,2009,2010,2012,2013,2014,2015,2016,2017,2018,2019,2020,2021,2022  
 ./util/xc SH 2012,2013,2016,2018,2019,2020,2021,2022  
 ./util/xmllint-html.sh SH 2021,2022  
 ./version X  
 1998,1999,2000,2001,2003,2005,2006,2007,2008,2009,2010,2011,2012,2013,2014,2016,2017,2018,2019,2020,2021,2022  
 ./win32utils/Configure PERL 2013,2014,2015,2016,2017,2018,2019,2020,2021,2022  
 ./win32utils/GeoIP.diff X 2013,2018,2019,2020,2021,2022  
 ./win32utils/bind9.sln.in X 2013,2014,2015,2016,2017,2018,2019,2020,2021,2022  
 ./win32utils/index.html HTML 2006,2007,2008,2012,2013,2014,2015,2016,2018,2019,2020,2021,2022  
 ./win32utils/legacy/BINDBuild.dsw.in X  
 2001,2005,2006,2008,2009,2010,2013,2014,2015,2016,2018,2019,2020,2021,2022  
 ./win32utils/legacy/BuildAll.bat.in BAT  
 2001,2002,2004,2005,2006,2007,2008,2009,2010,2013,2014,2015,2016,2018,2019,2020,2021,2022  
 ./win32utils/legacy/BuildPost.bat.in BAT 2005,2006,2013,2014,2016,2018,2019,2020,2021,2022  
 ./win32utils/legacy/BuildSetup.bat.in BAT

2001,2002,2004,2005,2006,2007,2008,2009,2010,2012,2013,2014,2015,2016,2018,2019,2020,2021,2022  
./win32utils/legacy/makedefs.pl PERL 2001,2004,2007,2009,2012,2013,2014,2016,2018,2019,2020,2021,2022  
./win32utils/legacy/win32-build.txt TXT.BRIEF 2001,2002,2004,2005,2008,2009,2012,2013,2014,2016,2018,2019  
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-->

<!-- Generate ISC copyright comments from Docbook copyright metadata. -->

<xsl:stylesheet version="1.0"

xmlns:xsl="http://www.w3.org/1999/XSL/Transform"

xmlns:xi="http://www.w3.org/2001/XInclude"

xmlns:db="http://docbook.org/ns/docbook">

<xsl:template name="isc.copyright.format">

<xsl:param name="text"/>

<xsl:value-of select="\$isc.copyright.leader"/>

<xsl:value-of select="normalize-space(substring-before(\$text, '&#10;'))"/>

```

<xsl:text>
</xsl:text>
<xsl:variable name="rest" select="substring-after($text, '
')"/>
<xsl:if test="translate($rest, '	 ', '')">
 <xsl:call-template name="isc.copyright.format">
 <xsl:with-param name="text" select="$rest"/>
 </xsl:call-template>
</xsl:if>
</xsl:template>

<xsl:variable name="isc.copyright.text">
 <xsl:text>
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 </xsl:text>
</xsl:variable>

<xsl:variable name="isc.copyright">
 <xsl:call-template name="isc.copyright.format">
 <xsl:with-param name="text">
 <xsl:for-each select="db:book/db:info/db:copyright | db:refentry/db:docinfo/db:copyright">
 <xsl:text>Copyright (C) </xsl:text>
 <xsl:call-template name="copyright.years">
 <xsl:with-param name="years" select="db:year"/>
 </xsl:call-template>
 <xsl:text> </xsl:text>
 <xsl:value-of select="db:holder"/>
 <xsl:value-of select="$isc.copyright.breakline"/>
 </xsl:for-each>
 </xsl:with-param>
 </xsl:call-template>
</xsl:variable>
</xsl:stylesheet>

<!--
- Local variables:
- mode: sgml
- End:
-->
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```

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## 1.194 zlib 1.2.11

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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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Jean-loup Gailly      Mark Adler  
jloup@gzip.org      madler@alumni.caltech.edu

The data format used by the zlib library is described by RFCs (Request for Comments) 1950 to 1952 in the files <http://tools.ietf.org/html/rfc1950> (zlib format), rfc1951 (deflate format) and rfc1952 (gzip format).

\*/

# 1.195 popt 1.16-r3.56

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## 1.196 tcp-wrappers 7.6-r10.56

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 * merchantability and fitness for any particular purpose.
 */
```

## 1.197 go.mozilla.org-pkcs7 0.0.0-

## 20210826202110-33d05740a352

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## 1.198 go-control-plane 0.10.3

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## 1.203 talloc 2.3.0

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/\*

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Samba trivial allocation library - new interface

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# 1.207 gmp 6.2.0

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## 1.208 pyyaml 5.3.1

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## 1.213 berkeley-db 6.1.38-r1.26

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- \*
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- \*
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- \* conveying of source, or (2) access to copy the
- \* Corresponding Source from a network server at no charge.
- \*
- \* c) Convey individual copies of the object code with a copy of the
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- \* alternative is allowed only occasionally and noncommercially, and
- \* only if you received the object code with such an offer, in accord
- \* with subsection 6b.
- \*
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- \* copy the object
- code is a network server, the Corresponding Source
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- \* Corresponding Source, you remain obligated to ensure that it is
- \* available for as long as needed to satisfy these requirements.
- \*
- \* e) Convey the object code using peer-to-peer transmission, provided
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- \*
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- \* and execute modified versions of a covered work

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- \* a modified version of its Corresponding Source. The information must
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\*

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\*

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\*

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## 1.217 lxc 4.0.6

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## 1.225 grpc-go 1.53.0

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Found in path(s):

\* /matwey-setserial-2-17-0-ge4ab0db-1-tar-gz/matwey-setserial-e4ab0db/setserial.8.in

\* /matwey-setserial-2-17-0-ge4ab0db-1-tar-gz/matwey-setserial-e4ab0db/setserial.8

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/\*

\* version.h --- Defines the version number of setserial

```
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*/
```

Found in path(s):

```
* /matvey-setserial-2-17-0-ge4ab0db-1-tar-gz/matvey-setserial-e4ab0db/version.h
```

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```
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* include/linux/serial.h
*
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*/
```

Found in path(s):

```
* /matvey-setserial-2-17-0-ge4ab0db-1-tar-gz/matvey-setserial-e4ab0db/linux/serial.h
```

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#### END OF TERMS AND CONDITIONS

#### Appendix: How to Apply These Terms to Your New Programs

If you develop a new program, and you want it to be of the greatest possible use to the public, the best way to achieve this is to make it free software which everyone can redistribute and change under these terms.

To do so, attach the following notices to the program. It is safest to attach them to the start of each source file to most effectively convey the exclusion of warranty; and each file should have at least the "copyright" line and a pointer to where the full notice is found.

<one line to give the program's name and a brief idea of what it does.>  
Copyright (C) 19yy <name of author>



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

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

Gnomovision version 69, Copyright (C) 19yy name of author  
Gnomovision comes with ABSOLUTELY NO WARRANTY; for details type `show w'.  
This is free software, and you are welcome to redistribute it  
under certain conditions; type `show c' for details.

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

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

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

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

This General Public License does not permit incorporating your program into proprietary programs. If your program is a subroutine library, you may consider it more useful to permit linking proprietary applications with the library. If this is what you want to do, use the GNU Library General Public License instead of this License.

# 1.228 berkeley-db 6.1.38

## 1.228.1 Available under license :

```
/*-
 * Id
 */
```

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```
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 *
 *
 * Preamble
 *
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 * cooperation with the community in the case of network server software.
 *
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 * share and change all versions of a program--to make sure it remains free
 * software for all its users.
 *
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```

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 \* want it,  
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 \* and/or modify the software.  
 \*  
 \* A secondary benefit of defending all users' freedom is that  
 \* improvements made in alternate versions of the program, if they  
 \* receive widespread use, become available for other developers to  
 \* incorporate. Many developers of free software are heartened and  
 \* encouraged by the resulting cooperation. However, in the case of  
 \* software used on network servers, this result may fail to come about.  
 \* The GNU General Public License permits making a modified version and  
 \* letting the public access it on a server without ever releasing its  
 \* source code to the public.

\* The GNU Affero General Public License  
 is designed specifically to  
 \* ensure that, in such cases, the modified source code becomes available  
 \* to the community. It requires the operator of a network server to  
 \* provide the source code of the modified version running there to the  
 \* users of that server. Therefore, public use of a modified version, on  
 \* a publicly accessible server, gives the public access to the source  
 \* code of the modified version.

\* An older license, called the Affero General Public License and  
 \* published by Affero, was designed to accomplish similar goals. This is  
 \* a different license, not a version of the Affero GPL, but Affero has  
 \* released a new version of the Affero GPL which permits relicensing under  
 \* this license.

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

## \* TERMS AND CONDITIONS

### \* 0. Definitions.

\* "This License" refers to version 3 of the GNU Affero General Public License.

\* "Copyright"  
 also means copyright-like laws that apply to other kinds of  
 \* works, such as semiconductor masks.

- \* "The Program" refers to any copyrightable work licensed under this
- \* License. Each licensee is addressed as "you". "Licensees" and
- \* "recipients" may be individuals or organizations.
- \*
- \* To "modify" a work means to copy from or adapt all or part of the work
- \* in a fashion requiring copyright permission, other than the making of an
- \* exact copy. The resulting work is called a "modified version" of the
- \* earlier work or a work "based on" the earlier work.
- \*
- \* A "covered work" means either the unmodified Program or a work based
- \* on the Program.
- \*
- \* To "propagate" a work means to do anything with it that, without
- \* permission, would make you directly or secondarily liable for
- \* infringement under applicable copyright law, except executing it on a
- \* computer or modifying a private copy. Propagation includes copying,
- \* distribution (with or without modification),
- making available to the
- \* public, and in some countries other activities as well.
- \*
- \* To "convey" a work means any kind of propagation that enables other
- \* parties to make or receive copies. Mere interaction with a user through
- \* a computer network, with no transfer of a copy, is not conveying.
- \*
- \* An interactive user interface displays "Appropriate Legal Notices"
- \* to the extent that it includes a convenient and prominently visible
- \* feature that (1) displays an appropriate copyright notice, and (2)
- \* tells the user that there is no warranty for the work (except to the
- \* extent that warranties are provided), that licensees may convey the
- \* work under this License, and how to view a copy of this License. If
- \* the interface presents a list of user commands or options, such as a
- \* menu, a prominent item in the list meets this criterion.
- \*
- \* 1. Source Code.
- \*
- \* The "source code" for a work means the preferred form of the work
- \* for making modifications to it. "Object
- code" means any non-source
- \* form of a work.
- \*
- \* A "Standard Interface" means an interface that either is an official
- \* standard defined by a recognized standards body, or, in the case of
- \* interfaces specified for a particular programming language, one that
- \* is widely used among developers working in that language.
- \*
- \* The "System Libraries" of an executable work include anything, other
- \* than the work as a whole, that (a) is included in the normal form of
- \* packaging a Major Component, but which is not part of that Major

\* Component, and (b) serves only to enable use of the work with that  
\* Major Component, or to implement a Standard Interface for which an  
\* implementation is available to the public in source code form. A  
\* "Major Component", in this context, means a major essential component  
\* (kernel, window system, and so on) of the specific operating system  
\* (if any) on which the executable work runs, or a compiler used to  
\* produce the work, or an object  
code interpreter used to run it.

\*

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

\*

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

\*

\* The Corresponding Source for a work in source code form is that  
\* same work.

\*

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\*

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\* permission to run the unmodified Program. The output from running a  
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\* content, constitutes a covered work. This License acknowledges your  
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\* of having them make modifications exclusively for you, or provide you  
\* with facilities for running those works, provided that you comply  
with

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\* not control copyright. Those thus making or running the covered works

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- \* similar laws prohibiting or restricting circumvention of such
- \* measures.
- \*
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- measures to the extent such circumvention
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- \* the covered work, and you disclaim any intention to limit operation or
- \* modification of the work as a means of enforcing, against the work's
- \* users, your or third parties' legal rights to forbid circumvention of
- \* technological measures.
- \*
- \* 4. Conveying Verbatim Copies.
- \*
- \* You may convey verbatim copies of the Program's source code as you
- \* receive it, in any medium, provided that you conspicuously and
- \* appropriately publish on each copy an appropriate copyright notice;
- \* keep intact all notices stating that this License and any
- \* non-permissive terms added in accord with section 7 apply to the code;
- \* keep intact all notices of the absence of any warranty; and give all
- \* recipients a copy of this License along with the Program.
- \*
- \* You may charge any price or no price for each copy that you convey,
- \* and you may offer support or warranty
- protection for a fee.
- \*
- \* 5. Conveying Modified Source Versions.
- \*
- \* You may convey a work based on the Program, or the modifications to
- \* produce it from the Program, in the form of source code under the
- \* terms of section 4, provided that you also meet all of these conditions:
- \*
- \* a) The work must carry prominent notices stating that you modified
- \* it, and giving a relevant date.
- \*

- \* b) The work must carry prominent notices stating that it is
- \* released under this License and any conditions added under section
- \* 7. This requirement modifies the requirement in section 4 to
- \* "keep intact all notices".
- \*
- \* c) You must license the entire work, as a whole, under this
- \* License to anyone who comes into possession of a copy. This
- \* License will therefore apply, along with any applicable section 7
- \* additional terms, to the whole of the work, and all its parts,
- \* regardless of how they are packaged. This License
- gives no
- \* permission to license the work in any other way, but it does not
- \* invalidate such permission if you have separately received it.
- \*
- \* d) If the work has interactive user interfaces, each must display
- \* Appropriate Legal Notices; however, if the Program has interactive
- \* interfaces that do not display Appropriate Legal Notices, your
- \* work need not make them do so.
- \*
- \* A compilation of a covered work with other separate and independent
- \* works, which are not by their nature extensions of the covered work,
- \* and which are not combined with it such as to form a larger program,
- \* in or on a volume of a storage or distribution medium, is called an
- \* "aggregate" if the compilation and its resulting copyright are not
- \* used to limit the access or legal rights of the compilation's users
- \* beyond what the individual works permit. Inclusion of a covered work
- \* in an aggregate does not cause this License to apply to the other
- \* parts of the
- aggregate.
- \*
- \* 6. Conveying Non-Source Forms.
- \*
- \* You may convey a covered work in object code form under the terms
- \* of sections 4 and 5, provided that you also convey the
- \* machine-readable Corresponding Source under the terms of this License,
- \* in one of these ways:
- \*
- \* a) Convey the object code in, or embodied in, a physical product
- \* (including a physical distribution medium), accompanied by the
- \* Corresponding Source fixed on a durable physical medium
- \* customarily used for software interchange.
- \*
- \* b) Convey the object code in, or embodied in, a physical product
- \* (including a physical distribution medium), accompanied by a
- \* written offer, valid for at least three years and valid for as
- \* long as you offer spare parts or customer support for that product
- \* model, to give anyone who possesses the object code either (1) a
- \* copy of the Corresponding Source for all the software in the

- \* product that is covered
- by this License, on a durable physical
- \* medium customarily used for software interchange, for a price no
- \* more than your reasonable cost of physically performing this
- \* conveying of source, or (2) access to copy the
- \* Corresponding Source from a network server at no charge.
- \*
- \* c) Convey individual copies of the object code with a copy of the
- \* written offer to provide the Corresponding Source. This
- \* alternative is allowed only occasionally and noncommercially, and
- \* only if you received the object code with such an offer, in accord
- \* with subsection 6b.
- \*
- \* d) Convey the object code by offering access from a designated
- \* place (gratis or for a charge), and offer equivalent access to the
- \* Corresponding Source in the same way through the same place at no
- \* further charge. You need not require recipients to copy the
- \* Corresponding Source along with the object code. If the place to
- \* copy the object
- code is a network server, the Corresponding Source
- \* may be on a different server (operated by you or a third party)
- \* that supports equivalent copying facilities, provided you maintain
- \* clear directions next to the object code saying where to find the
- \* Corresponding Source. Regardless of what server hosts the
- \* Corresponding Source, you remain obligated to ensure that it is
- \* available for as long as needed to satisfy these requirements.
- \*
- \* e) Convey the object code using peer-to-peer transmission, provided
- \* you inform other peers where the object code and Corresponding
- \* Source of the work are being offered to the general public at no
- \* charge under subsection 6d.
- \*
- \* A separable portion of the object code, whose source code is excluded
- \* from the Corresponding Source as a System Library, need not be
- \* included in conveying the object code work.
- \*
- \* A "User Product" is either (1) a "consumer product", which means any
- \* tangible personal property which is normally used for personal, family,
- \* or household purposes, or (2) anything designed or sold for incorporation
- \* into a dwelling. In determining whether a product is a consumer product,
- \* doubtful cases shall be resolved in favor of coverage. For a particular
- \* product received by a particular user, "normally used" refers to a
- \* typical or common use of that class of product, regardless of the status
- \* of the particular user or of the way in which the particular user
- \* actually uses, or expects or is expected to use, the product. A product
- \* is a consumer product regardless of whether the product has substantial
- \* commercial, industrial or non-consumer uses, unless such uses represent
- \* the only significant mode of use of the product.



\*  
 \* "Installation Information" for a User Product means any methods,  
 \* procedures, authorization keys, or other information required to install  
 \* and execute modified versions of a covered work  
 in that User Product from  
 \* a modified version of its Corresponding Source. The information must  
 \* suffice to ensure that the continued functioning of the modified object  
 \* code is in no case prevented or interfered with solely because  
 \* modification has been made.  
 \*  
 \* If you convey an object code work under this section in, or with, or  
 \* specifically for use in, a User Product, and the conveying occurs as  
 \* part of a transaction in which the right of possession and use of the  
 \* User Product is transferred to the recipient in perpetuity or for a  
 \* fixed term (regardless of how the transaction is characterized), the  
 \* Corresponding Source conveyed under this section must be accompanied  
 \* by the Installation Information. But this requirement does not apply  
 \* if neither you nor any third party retains the ability to install  
 \* modified object code on the User Product (for example, the work has  
 \* been installed in ROM).  
 \*  
 \* The requirement to provide Installation  
 Information does not include a  
 \* requirement to continue to provide support service, warranty, or updates  
 \* for a work that has been modified or installed by the recipient, or for  
 \* the User Product in which it has been modified or installed. Access to a  
 \* network may be denied when the modification itself materially and  
 \* adversely affects the operation of the network or violates the rules and  
 \* protocols for communication across the network.  
 \*  
 \* Corresponding Source conveyed, and Installation Information provided,  
 \* in accord with this section must be in a format that is publicly  
 \* documented (and with an implementation available to the public in  
 \* source code form), and must require no special password or key for  
 \* unpacking, reading or copying.  
 \*  
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 \*  
 \* "Additional permissions" are terms that supplement the terms of this  
 \* License by making exceptions from one or more of its conditions.  
 \* Additional permissions that are applicable to  
 the entire Program shall  
 \* be treated as though they were included in this License, to the extent  
 \* that they are valid under applicable law. If additional permissions  
 \* apply only to part of the Program, that part may be used separately  
 \* under those permissions, but the entire Program remains governed by  
 \* this License without regard to the additional permissions.  
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- \* d) Limiting the use for publicity purposes of names of licensors or
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- \* License, you may add to a covered work material governed by the terms
- \* of that license document, provided that the further restriction does
- \* not survive such relicensing or conveying.
- \*
- \* If you add terms to a covered work in accord with this section, you
- \* must place, in the relevant source files, a statement of the

- \* additional terms that apply to those files, or a notice indicating
- \* where to find
- the applicable terms.
- \*
- \* Additional terms, permissive or non-permissive, may be stated in the
- \* form of a separately written license, or stated as exceptions;
- \* the above requirements apply either way.
- \*
- \* 8. Termination.
- \*
- \* You may not propagate or modify a covered work except as expressly
- \* provided under this License. Any attempt otherwise to propagate or
- \* modify it is void, and will automatically terminate your rights under
- \* this License (including any patent licenses granted under the third
- \* paragraph of section 11).
- \*
- \* However, if you cease all violation of this License, then your
- \* license from a particular copyright holder is reinstated (a)
- \* provisionally, unless and until the copyright holder explicitly and
- \* finally terminates your license, and (b) permanently, if the copyright
- \* holder fails to notify you of the violation by some reasonable means
- \* prior to 60 days after the cessation.
- \*
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- \* violation by some reasonable means, this is the first time you have
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- \* Chris Burgoyne <cburgoyne@google.com>
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2006-Jan-27

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#

.gitignore

#

builds/unix/pkg.m4

#

docs/FTL.TXT

docs/GPLv2.TXT

#

include/freetype/internal/fthash.h

#

src/base/fthash.c

src/base/md5.c

src/base/md5.h

#

src/bdf/bdf.c

src/bdf/bdf.h

src/bdf/bdfdrivr.c

src/bdf/bdfdrivr.h

src/bdf/bdferror.h

src/bdf/bdflib.c

src/bdf/module.mk

src/bdf/README

src/bdf/rules.mk

#

```

src/pcf/module.mk
src/pcf/pcf.c
src/pcf/pcf.h
src/pcf/pcfdrivr.c
src/pcf/pcfdrivr.h
src/pcf/pcferror.h
src/pcf/pcfread.c
src/pcf/pcfread.h
src/pcf/pcfutil.c
src/pcf/pcfutil.h
src/pcf/README
src/pcf/rules.mk
#
src/gzip/adler32.c
src/gzip/infblock.c
src/gzip/infblock.h
src/gzip/infcodes.c
src/gzip/infcodes.h
src/gzip/inffixed.h
src/gzip/inflate.c
src/gzip/inftrees.c
src/gzip/inftrees.h
src/gzip/infutil.c
src/gzip/infutil.h
src/gzip/zconf.h
src/gzip/zlib.h
src/gzip/zutil.c
src/gzip/zutil.h
#
src/tools/apinames.c
src/tools/ftrandom/ftrandom.c
#
#
EOF

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# 1.236 ima-evm-utils 1.2.1+git0+3eab1f93b6-r0.7

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The

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## 1.240 bsd-mailx 12.5

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```

/*
* imap_gssapi.c is partially derived from sample code in:
* GSS-API Programming Guide
* Part No: 816-1331-11
* Sun Microsystems, Inc. 4150 Network Circle Santa Clara, CA 95054 U.S.A.
*
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```

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=====  
/\*

\* hmac.c is derived from:

Network Working Group      H. Krawczyk  
Request for Comments: 2104      IBM  
Category: Informational      M. Bellare  
                                UCSD  
                                R. Canetti  
                                IBM  
                                February 1997

## HMAC: Keyed-Hashing for Message Authentication

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### Appendix -- Sample Code

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Parts of nss.c are derived from the Mozilla NSS 3.9.2 source, mozilla/security/nss/cmd/smime tools/cmsutil.c. Therefore:

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```
#!/usr/bin/env bash
MIT licenses will each have a unique MD5 sum since they contain a unique copyright.
This script will read the license file into memory, strip out the copyright, and then
generate an MD5 that is not unique and can be matched against a known MIT MD5 sum.
set -e
```

```
calculate_md5_sum() {
 local FILE="$1"

 # Read the contents of the file into a variable
 local raw_license_text=$(<"$FILE")

 # Convert to lowercase
 local lowercase_license_text="${raw_license_text,,}"

 # Remove anything before the beginning of the license
 local stripped_license_text=$(awk '/permission is hereby granted,/{p=1} p' <<< "$lowercase_license_text")
```

```

Replace line breaks (Windows or Linux) with a single space
local replaced_linebreaks=$(tr '\r\n' ' ' <<< "$stripped_license_text")

Replace multiple spaces with a single space
local normalized_license_text=$(tr -s ' ' <<< "$replaced_linebreaks")

Strip away any non-printable, non-whitespace characters
local clean_unprintable_license_text=$(tr
-cd '[:print:][:space:]' <<< "$normalized_license_text")

Remove punctuation and special characters
local clean_license_text=$(echo "$clean_unprintable_license_text" | sed 's/[^a-zA-Z]//g')

Calculate the MD5 sum of the cleaned license text
local MD5SUM=$(echo -n "$clean_license_text" | md5sum | awk '{print $1}')

Output the MD5 sum
echo "$MD5SUM"
}

Check if the FILE argument is provided
if [-z "$1"]; then
 echo "Please provide a FILE as an argument."
 exit 1
fi

Invoke the function with the provided FILE argument
calculate_md5_sum "$1"

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```

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# 1.249 pango 1.44.7-r0.8

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## 1.251 erlang-otp 5.10

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-----

Written by: Philip Hazel  
Email local part: ph10  
Email domain: cam.ac.uk

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 */
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-----  
[zlib]

```
/* zlib.h -- interface of the 'zlib' general purpose compression library
 version 1.2.3, July 18th, 2005
```

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Jean-loup Gailly      Mark Adler  
jloup@gzip.org      madler@alumni.caltech.edu

The data format used by the zlib library is described by RFCs (Request for Comments) 1950 to 1952 in the files <http://www.ietf.org/rfc/rfc1950.txt> (zlib format), rfc1951.txt (deflate format) and rfc1952.txt (gzip format).

\*/

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[edoc, syntax\_tools]

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[leex]

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-----

Written by: Philip Hazel  
Email local part: ph10  
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## 1.253 lvm2 1.02.165

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\* /dcm-spice-yajl-2-1-0-0-g88d7964-tar-gz/dcm-spice-yajl-64437c8/include/yajl/yajl\_parse.h  
\* /dcm-spice-yajl-2-1-0-0-g88d7964-tar-gz/dcm-spice-yajl-64437c8/include/yajl/yajl\_common.h  
\*  
/dcm-spice-yajl-2-1-0-0-g88d7964-tar-gz/dcm-spice-yajl-64437c8/include/yajl/yajl\_gen.h

# 1.256 google-golang-org-genproto 0.0.0-2023022225845-10f96fb3dbec

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# 1.257 google-golang-org-genproto 0.0.0-20220608133413-ed9918b62aac

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## 1.258 leemcloughlin-logfile 0.0.0-

## 20201123203928-cff1c8a30a10

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# Name <email address>

Raul Silvera <rsilvera@google.com>

Tipp Moseley <tipp@google.com>

Hyoun Kyu Cho <netforce@google.com>

Martin Spier <spiermar@gmail.com>

Taco de Wolff <tacodewolff@gmail.com>

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## 1.268 golang 1.17.13

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## 1.269 setools 4.3.0-3.el8

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```
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```
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```

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```
/*
```

```
* ima-evm-utils - IMA/EVM support utilities
```

```
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```

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- \* File: pcr\_tss.c
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- \*/

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\$Id\$

\*)

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\*\*\*\*\*

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## 1.274 selinux-labeldev 0.1-r0.7

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meta-selinux  
=====

This layer's purpose is enabling SE Linux support.

The majority of this layers work is accomplished in bbappend files, used to enable SE Linux support in existing recipes.

A new recipes-security was added. The purpose of this category is to add software specific to system security.

Please see the MAINTAINERS file for information on contacting the maintainers of this layer, as well as instructions for submitting patches.

#### Dependencies

-----

This layer depends on the openembedded-core metadata and the meta-python and meta-oe layers from the meta-openembedded repository.

#### Maintenance

-----

Please see the MAINTAINERS file for information on contacting the maintainers of this layer, as well as instructions for submitting patches.

#### Building the meta-selinux layer

-----

In order to add selinux support to the poky build this layer should be added to your projects bblayers.conf file.

By default the selinux components are disabled. This conforms to the Yocto Project compatible guideline that indicate that simply including a layer should not change the system behavior.

In order to use the components in this layer you must add the 'selinux' to the DISTRO\_FEATURES. In addition to selinux, you should be sure that acl, xattr and pam are also present.

e.g. DISTRO\_FEATURES:append = " acl xattr pam selinux"

You must also specify a preferred provider for the virtual/refpolicy. The included policies with this layer are simply reference policies and will need to be tailored for your environment.

\* Enable the refpolicy-mls:

e.g. PREFERRED\_PROVIDER\_virtual/refpolicy ?= "refpolicy-mls"

#### Using different versions of refpolicy

-----

To prepare selinux enabled images using different ver. of refpolicy, we can choose supported releases of refpolicy refer to available versions under recipes-security/refpolicy



We can

use the retpolicy directly from git repository instead of release tarballs.

By default retpolicy from git builds head commit of master branch, we can update SRCREV for retpolicy and retpolicy-contrib as appropriate at retpolicy\_git.inc to check retpolicy as per required commits.

\* enable the preferred retpolicy-minimum:

```
PREFERRED_VERSION_retpolicy-minimum = "2.20151208"
```

```
PREFERRED_VERSION_retpolicy = "2.20151208"
```

Using different init manager

-----

By default selinux enabled images coming up with "sysvinit" as init manager, we can use "systemd" as an init manager using below changes to local.conf

\* enable systemd as init manager changes to local.conf

```
DISTRO_FEATURES:remove = " sysvinit"
```

```
DISTRO_FEATURES:append = " systemd"
```

```
VIRTUAL-RUNTIME_init_manager = "systemd"
```

```
DISTRO_FEATURES_BACKFILL_CONSIDERED = ""
```

Starting up the system

-----

Most likely the reference policy selected will not just work "out of the box".

As always, if you update the reference

policy to better work with OpenEmbedded

or Poky configurations, please submit the changes back to the project.

When using 'core-image-selinux', the system will boot and automatically setup the policy by running the "fixfiles -f -F relabel" for you. This is implemented via the 'selinux-autorelabel' recipe.

The 'core-image-selinux-minimal' does not automatically relabel the system.

So you must boot using the parameters "selinux=1 enforcing=0", and then manually perform the setup. Running 'fixfiles -f -F relabel' is available in this configuration.

After logging in you can verify selinux is present using:

```
$ sestatus
```

Output should include:

```
SELinux status: enabled
```

```
...
```

Current mode: enforcing

...

The above indicates that selinux is currently running, and if you are running in an enforcing mode or not.

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-----

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Found in path(s):

\* /meta-selinux-master-tar-gz/meta-selinux-master/README

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From b3ff2e8572cd929c419775e57b547f309ba9d8fb Mon Sep 17 00:00:00 2001

From: Yi Zhao <yi.zhao@windriver.com>

Date: Mon, 24 Aug 2020 11:29:09 +0800

Subject: [PATCH] policy/modules/system/modutils: allow mod\_t to access confidentiality of class lockdown

The SELinux lockdown implementation was introduced since kernel 5.6 by commit 59438b46471ae6cdfb761afc8c9beaf1e428a331. We need to allow mod\_t and udev\_t to access confidentiality of class lockdown to mount tracefs.

Fixes:

kernel: Could not create tracefs 'iwifi\_data/filter' entry

kernel: Could not create tracefs 'enable' entry

kernel: Could not create tracefs 'id' entry

kernel: Could not create tracefs 'filter' entry

kernel: Could not create tracefs 'trigger' entry

kernel: Could not create tracefs 'format' entry

audit[170]: AVC avc: denied { confidentiality } for pid=170

comm="modprobe" lockdown\_reason="use of tracefs"

scontext=system\_u:system\_r:kmod\_t:s15:c0.c1023

tcontext=system\_u:system\_r:kmod\_t:s15:c0.c1023

tclass=lockdown

permissive=0

audit[190]: AVC avc: denied { confidentiality } for pid=190

comm="systemd-udev" lockdown\_reason="use of tracefs"

```
scontext=system_u:system_r:udev_t:s0-s15:c0.c1023
tcontext=system_u:system_r:udev_t:s0-s15:c0.c1023 tclass=lockdown
permissive=0
```

Upstream-Status: Inappropriate [embedded specific]

Signed-off-by: Yi Zhao <yi.zhao@windriver.com>

---

```
policy/modules/system/modutils.te | 2 ++
policy/modules/system/udev.te | 2 ++
2 files changed, 4 insertions(+)
```

```
diff --git a/policy/modules/system/modutils.te b/policy/modules/system/modutils.te
index b0a419dc1..5b4f0aca1 100644
```

```
--- a/policy/modules/system/modutils.te
+++ b/policy/modules/system/modutils.te
@@ -41,6 +41,8 @@ dontaudit kmod_t self:capability sys_admin;
allow kmod_t self:udp_socket create_socket_perms;
allow kmod_t self:rawip_socket create_socket_perms;
```

```
+allow kmod_t self:lockdown confidentiality;
+
```

```
Read module config and dependency
information
```

```
list_dirs_pattern(kmod_t, modules_conf_t, modules_conf_t)
read_files_pattern(kmod_t, modules_conf_t, modules_conf_t)
```

```
diff --git a/policy/modules/system/udev.te b/policy/modules/system/udev.te
index c50ff68c1..4c5a690fb 100644
```

```
--- a/policy/modules/system/udev.te
+++ b/policy/modules/system/udev.te
@@ -67,6 +67,8 @@ ifdef(`init_systemd',`
for systemd-udev to rename interfaces
allow udev_t self:netlink_route_socket nlmsg_write;
```

```
+allow udev_t self:lockdown confidentiality;
+
```

```
can_exec(udev_t, udev_exec_t)
```

```
allow udev_t udev_helper_exec_t:dir list_dir_perms;
```

```
--
```

2.17.1

Found in path(s):

\* /meta-selinux-master-tar-gz/meta-selinux-master/recipes-security/refpolicy/refpolicy/0034-policy-modules-system-modutils-allow-mod\_t-to-access.patch

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From 8343ff97a265836ba1e1e2f4159f888c21e5cabe Mon Sep 17 00:00:00 2001

From: Yi Zhao <yi.zhao@windriver.com>

Date: Tue, 9 Feb 2021 17:31:55 +0800

Subject: [PATCH] policy/modules/system/modutils: allow kmod\_t to write keys

Fixes:

kernel: cfg80211: Problem loading in-kernel X.509 certificate (-13)

avc: denied { write } for pid=219 comm="modprobe"

scontext=system\_u:system\_r:kmod\_t tcontext=system\_u:system\_r:kmod\_t

tclass=key permissive=0

Upstream-Status: Inappropriate [embedded specific]

Signed-off-by: Yi Zhao <yi.zhao@windriver.com>

---

policy/modules/system/modutils.te | 1 +

1 file changed, 1 insertion(+)

diff --git a/policy/modules/system/modutils.te b/policy/modules/system/modutils.te

index 5b4f0aca1..008f286a8 100644

--- a/policy/modules/system/modutils.te

+++ b/policy/modules/system/modutils.te

@@ -42,6 +42,7 @@ allow kmod\_t self:udp\_socket create\_socket\_perms;

allow kmod\_t self:rawip\_socket create\_socket\_perms;

allow kmod\_t self:lockdown confidentiality;

+allow kmod\_t self:key write;

# Read module config and dependency information

list\_dirs\_pattern(kmod\_t, modules\_conf\_t, modules\_conf\_t)

--

2.17.1

Found in path(s):

\* /meta-selinux-master-tar-gz/meta-selinux-master/recipes-security/refpolicy/refpolicy/0044-policy-modules-system-modutils-allow-kmod\_t-to-write.patch

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#

# Multi-Category Security translation table for SELinux

#

#

# Objects can be categorized with 0-1023 categories defined by the admin.

# Objects can be in more than one category at a time.

# Categories are stored in the system as c0-c1023. Users can use this

# table to translate the categories into a more meaningful output.

# Examples:

# s0:c0=CompanyConfidential

```
s0:c1=PatientRecord
s0:c2=Unclassified
s0:c3=TopSecret
s0:c1,c3=CompanyConfidentialRedHat
s0=SystemLow
s0-s0:c0.c1023=SystemLow-SystemHigh
s0:c0.c1023=SystemHigh
```

Found in path(s):

```
* /meta-selinux-master-tar-gz/meta-selinux-master/recipes-security/refpolicy/files/setrans-mcs.conf
```

## 1.275 base-files 3.0.14-r89.8

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## 1.277 volatile-binds 1.0-r0.71

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## 1.282 initramfs-module-install-efi 1.0-r4.7

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## 1.289 util-linux 2.35.1

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```
#!/usr/bin/env bash
```

```
MIT licenses will each have a unique MD5 sum since they contain a unique copyright.
```

```
This script will read the license file into memory, strip out the copyright, and then
```

```
generate an MD5 that is not unique and can be matched against a known MIT MD5 sum.
```

```
set -e
```

```
calculate_md5_sum() {
```

```
 local FILE="$1"
```

```
 # Read the contents of the file into a variable
```

```
 local raw_license_text=$(<"$FILE")
```

```
 # Convert to lowercase
```

```
 local lowercase_license_text="${raw_license_text,,}"
```

```
 # Remove anything before the beginning of the license
```

```
 local stripped_license_text=$(awk '/permission is hereby granted,/{p=1} p' <<< "$lowercase_license_text")
```

```
 # Replace line breaks (Windows or Linux) with a single space
```

```
 local replaced_linebreaks=$(tr '\r\n' ' ' <<< "$stripped_license_text")
```

```
 # Replace multiple spaces with a single space
```

```
 local normalized_license_text=$(tr -s ' ' <<< "$replaced_linebreaks")
```

```
 # Strip away any non-printable, non-whitespace characters
```

```
 local clean_unprintable_license_text=$(tr
```

```
-cd '[:print:][:space:]' <<< "$normalized_license_text")
```

```
 # Remove punctuation and special characters
```

```
 local clean_license_text=$(echo "$clean_unprintable_license_text" | sed 's/[^a-zA-Z]//g')
```

```
 # Calculate the MD5 sum of the cleaned license text
```

```
 local MD5SUM=$(echo -n "$clean_license_text" | md5sum | awk '{print $1}')
```

```
 # Output the MD5 sum
```

```
 echo "$MD5SUM"
```

```
}
```

```
Check if the FILE argument is provided
```

```
if [-z "$1"]; then
```

```
 echo "Please provide a FILE as an argument."
```

exit 1

fi

# Invoke the function with the provided FILE argument

calculate\_md5\_sum "\$1"

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Version 3, 29 June 2007

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```
WEV @@ WEV[B "1
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## 1.292 expat 2.2.8

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# 1.295 busybox 1.31.1

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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, 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 <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 |
| 2.1.2         | 2.1.1     | 2002     | PSF | yes |
| 2.1.3         | 2.1.2     | 2002     | PSF | yes |
| 2.2 and above | 2.1.1     | 2001-now |     |     |
| PSF           | yes       |          |     |     |

Footnotes:

(1) GPL-compatible doesn't mean that we're distributing Python under the GPL. All Python licenses, unlike the GPL, let you distribute a modified version without making your changes open source. The GPL-compatible licenses make it possible to combine Python with other software that is released under the GPL; the others don't.

(2) According to Richard Stallman, 1.6.1 is not GPL-compatible, because its license has a choice of law clause. According to CNRI, however, Stallman's lawyer has told CNRI's lawyer that 1.6.1 is "not incompatible" with the GPL.

Thanks to the many outside volunteers who have worked under Guido's direction to make these releases possible.

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## 1.297 vim 8.2

### 1.297.1 Available under license :

\*uganda.txt\* For Vim version 8.2. Last change: 2019 Dec 07

VIM REFERENCE MANUAL by Bram Moolenaar

\*uganda\* \*Uganda\* \*copying\* \*copyright\* \*license\*  
SUMMARY

\*iccf\* \*ICCF\*

Vim is Charityware. You can use and copy it as much as you like, but you are encouraged to make a donation for needy children in Uganda. Please see |kcc| below or visit the ICCF web site, available at these URLs:

<http://iccf-holland.org/>  
<http://www.vim.org/iccf/>  
<http://www.iccf.nl/>

You can also sponsor the development of Vim. Vim sponsors can vote for features. See |sponsor|. The money goes to Uganda anyway.

The Open Publication License applies to the Vim documentation, see |manual-copyright|.

=== begin of license ===

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II) It is allowed to distribute a modified (or extended) version of Vim, including executables and/or source code, when the following four conditions are met:

- 1) This license text must be included unmodified.
- 2) The modified Vim must be distributed in one of the following five ways:
  - a) If you make changes to Vim yourself, you must clearly describe in the distribution how to contact you. When the maintainer asks you (in any way) for a copy of the modified Vim you distributed, you must make your changes, including source code, available to the maintainer without fee. The maintainer reserves the right to include your changes in the official version of Vim. What the maintainer will do with your changes and under what license they will be distributed is negotiable. If there has been no negotiation

then this license, or a later version, also applies to your changes.

The current maintainer is Bram Moolenaar <Bram@vim.org>. If this changes it will be announced in appropriate places (most likely vim.sf.net, www.vim.org and/or comp.editors). When it is completely impossible to contact the maintainer, the obligation to send him your changes ceases. Once the maintainer has confirmed that he has received your changes they will not have to be sent again.

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- You clearly describe in the distribution how to contact you. This contact information must remain valid for at least three years after last distributing the corresponding

modified Vim, or as long

as possible.

e) When the GNU General Public License (GPL) applies to the changes, you can distribute the modified Vim under the GNU GPL version 2 or any later version.

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4) The contact information as required under 2)a) and 2)d) must not be removed or changed, except that the person himself can make corrections.

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the files to a server and e-mailing the URL.

If the number of changes is small (e.g., a modified Makefile) e-mailing a context diff will do. The e-mail address to be used is

<maintainer@vim.org>

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=== end of license ===

Note:

- If you are happy with Vim, please express that by reading the rest of this file and consider helping needy children in Uganda.
- If you want to support further Vim development consider becoming a [sponsor]. The money goes to Uganda anyway.
- According to Richard Stallman the Vim license is GNU GPL compatible. A few minor changes have been made since he checked it, but that should not make a difference.
- If you link Vim with a library that goes under the GNU GPL, this limits further distribution to the GNU GPL. Also when you didn't actually change anything in Vim.
- Once a change is included that goes under the GNU GPL, this forces all

further changes to also be made under the GNU GPL or a compatible license.

- If you distribute a modified version of Vim, you can include your name and contact information with the "--with-modified-by" configure argument or the MODIFIED\_BY define.

=====

Kibaale Children's Centre \*kcc\* \*Kibaale\* \*charity\*

Kibaale Children's Centre (KCC) is located in Kibaale, a small town in the south of Uganda, near Tanzania, in East Africa. The area is known as Rakai District. The population is mostly farmers. Although people are poor, there is enough food. But this district is suffering from AIDS more than any other part of the world. Some say that it started there. Estimations are that 10 to 30% of the Ugandans are infected with HIV. Because parents die, there are many orphans. In this district about 60,000 children have lost one or both parents, out of a population of 350,000. And this is still continuing.

The children need a lot of help. The KCC is working hard to provide the needy with food, medical care and education. Food and medical care to keep them healthy now, and education so that they can take care of themselves in the future. KCC works on a Christian base, but help is given to children of any religion.

The key to solving the problems in this area is education. This has been neglected in the past years with president Idi Amin and the following civil wars. Now that the government is stable again, the children and parents have to learn how to take care of themselves and how to avoid infections. There is also help for people who are ill and hungry, but the primary goal is to prevent people from getting ill and to teach them how to grow healthy food.

Most of the orphans are living in an extended family. An uncle or older sister is taking care of them. Because these families are big and the income (if any) is low, a child is lucky if it gets healthy food. Clothes, medical care and schooling is beyond its reach. To help these needy children, a sponsorship program was put into place. A child can be financially adopted. For a few dollars a month KCC sees to it that the child gets indispensable items, is healthy, goes to school and KCC takes care of anything else that needs to be done for the child and the family that supports it.

Besides helping the child directly, the environment where the child grows up needs to be improved. KCC helps schools to improve their teaching methods. There is a demonstration school at the centre and teacher trainings are given. Health workers are being trained, hygiene education is carried out and households are stimulated to build a proper latrine. I helped setting up a production site for cement slabs. These are used to build a good latrine.

They are sold  
below cost price.

There is a small clinic at the project, which provides children and their family with medical help. When needed, transport to a hospital is offered. Immunization programs are carried out and help is provided when an epidemic is breaking out (measles and cholera have been a problem).

\*donate\*

Summer 1994 to summer 1995 I spent a whole year at the centre, working as a volunteer. I have helped to expand the centre and worked in the area of water and sanitation. I learned that the help that the KCC provides really helps. When I came back to Holland, I wanted to continue supporting KCC. To do this I'm raising funds and organizing the sponsorship program. Please consider one of these possibilities:

1. Sponsor a child in primary school: 17 euro a month (or more).
2. Sponsor a child in secondary school: 25 euro a month (or more).
3. Sponsor the clinic: Any amount a month or quarter
4. A one-time donation

Compared with other organizations that do child sponsorship the amounts are very low. This is because the money goes directly to the centre. Less than 5% is used for administration. This is possible because this is a small organization that works with volunteers. If you would like to sponsor a child, you should have the intention to do this for at least one year.

How do you know that the money will be spent right? First of all you have my personal guarantee as the author of Vim. I trust the people that are working at the centre, I know them personally. Furthermore, the centre has been co-sponsored and inspected by World Vision, Save the Children Fund and is now under the supervision of Pacific Academy Outreach Society. The centre is visited about once a year to check the progress (at our own cost). I have visited the centre myself many times, starting in 1993. The visit reports are on the ICCF web site.

If you have any further questions, send me e-mail: <Bram@vim.org>.

The address of the centre is:  
Kibaale Children's Centre  
p.o.  
box 1658  
Masaka, Uganda, East Africa

Sending money: \*iccf-donations\*

Check the ICCF web site for the latest information! See |iccf| for the URL.

USA: The methods mentioned below can be used.

Sending a check to the Nehemiah Group Outreach Society (NGOS) is no longer possible, unfortunately. We are looking for another way to get you an IRS tax receipt.

For sponsoring a child contact KCF in Canada (see below). US checks can be sent to them to lower banking costs.

Canada: Contact Kibaale Children's Fund (KCF) in Surrey, Canada. They take care of the Canadian sponsors for the children in Kibaale. KCF forwards 100% of the money to the project in Uganda. You can send them a one time donation directly. Please send me a note so that I know what has been donated because of Vim. Ask KCF for information about sponsorship.

Kibaale Children's Fund c/o Pacific Academy  
10238-168 Street  
Surrey, B.C. V4N 1Z4  
Canada  
Phone: 604-581-5353

If  
you make a donation to Kibaale Children's Fund (KCF) you will receive a tax receipt which can be submitted with your tax return.

Holland: Transfer to the account of "Stichting ICCF Holland" in Lisse. This will allow for tax deduction if you live in Holland.  
Postbank, nr. 4548774  
IBAN: NL95 INGB 0004 5487 74

Germany: It is possible to make donations that allow for a tax return. Check the ICCF web site for the latest information:  
<http://iccf-holland.org/germany.html>

World: Use a postal money order. That should be possible from any country, mostly from the post office. Use this name (which is in my passport): "Abraham Moolenaar". Use Euro for the currency if possible.

Europe: Use a bank transfer if possible. Your bank should have a form that you can use for this. See "Others" below for the swift code and IBAN number.  
Any other method should work. Ask for information about sponsorship.

Credit Card: You can use PayPal to send money with a Credit card. This is the most widely used Internet based payment system. It's really simple to use. Use this link to find more info:

[https://www.paypal.com/en\\_US/mrb/pal=XAC62PML3GF8Q](https://www.paypal.com/en_US/mrb/pal=XAC62PML3GF8Q)

The e-mail address for sending the money to is:

Bram@iccf-holland.org

For amounts above 400 Euro (\$500) sending a check is preferred.

Others: Transfer to one of these accounts if possible:

Postbank, account 4548774

Swift code: INGB NL 2A

IBAN: NL95 INGB 0004 5487 74

under the name "stichting ICCF Holland", Lisse

If that doesn't work:

Rabobank Lisse, account 3765.05.117

Swift code: RABO NL 2U

under the name "Bram Moolenaar", Lisse

Otherwise, send a check in euro or US dollars to the address below. Minimal amount: \$70 (my bank does not accept smaller amounts for foreign check, sorry)

Address to send checks to:

Bram Moolenaar

Finsterruetihof 1

8134 Adliswil

Switzerland

This address is expected to be valid for a long time.

vim:tw=78:ts=8:noet:ft=help:norl:

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Version 2.1, February 1999

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(For example, a function in a library to compute square roots has a purpose that is entirely well-defined independent of the application. Therefore, Subsection 2d requires that any application-supplied function or table used by this function must be optional: if the application does not supply it, the square root function must still compute square roots.)

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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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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,  
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## 1.298 rsync 3.2.5

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`show c' for details.
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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, 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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| 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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|---------|---------|------|-------|------|

|                | from      |           | 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     |
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## 1.304 libvirt 6.1.0

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```

```
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## 1.306 e2fsprogs 1.45.7

## 1.306.1 Available under license :

This package was added to the e2fsprogs debian source package by Theodore Ts'o <tytso@mit.edu> on Sat Mar 15 15:33:37 EST 2003

It is part of the main e2fsprogs distribution, which can be found at:

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#

# This is a Makefile stub which handles the creation of BSD shared  
# libraries.

```

#
In order to use this stub, the following makefile variables must be defined.
#
BSDLIB_VERSION = 1.0
BSDLIB_IMAGE = libce
BSDLIB_MYDIR = et
BSDLIB_INSTALL_DIR = $(SHLIBDIR)
#

all:: image

real-subdirs:: Makefile
@echo " MKDIR pic"
@mkdir -p pic

BSD_LIB = $(BSDLIB_IMAGE).so.$(BSDLIB_VERSION)
BSDLIB_PIC_FLAG = -fpic

image: $(BSD_LIB)

$(BSD_LIB): $(OBJS)
(cd pic; ld -Bshareable -o $(BSD_LIB) $(LDFLAGS_SHLIB) $(OBJS))
$(MV) pic/$(BSD_LIB) .
$(RM) -f ../$(BSD_LIB)
(cd ..; $(LN) $(LINK_BUILD_FLAGS) \
`echo $(my_dir) | sed -e 's;lib/;;'/'$(BSD_LIB) $(BSD_LIB)`)

install-shlibs install:: $(BSD_LIB)
@echo " INSTALL_PROGRAM $(BSDLIB_INSTALL_DIR)/$(BSD_LIB)"
@$(INSTALL_PROGRAM) $(BSD_LIB) \
$(DESTDIR)$$(BSDLIB_INSTALL_DIR)/$(BSD_LIB)
@-$(LDCONFIG)

install-strip: install

install-shlibs-strip:: install-shlibs

uninstall-shlibs uninstall::
$(RM) -f $(DESTDIR)$$(BSDLIB_INSTALL_DIR)/$(BSD_LIB)

clean::
$(RM)
-rf pic
$(RM) -f $(BSD_LIB)
$(RM) -f ../$(BSD_LIB)
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```

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This is the Debian GNU/Linux prepackaged version of the translation files of the EXT2 file system utilities. The EXT2 utilities were written by Theodore Ts'o <tytso@mit.edu> and Remy Card <card@masi.ibp.fr>.

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This package was added to the e2fsprogs debian source package by  
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Index: tdbsa/tdb.c

-----  
--- tdbsa.orig/tdb.c

+++ tdbsa/tdb.c

@@ -4,11 +4,11 @@ Rev: 23371

Last Changed Date: 2007-06-06 20:14:06 -0400 (Wed, 06 Jun 2007)

\*/

/\*

- Unix SMB/CIFS implementation.
- + trivial database library - standalone version
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- 
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Theodore Ts'o  
23-June-2007

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This is the Debian GNU/Linux prepackaged version of the EXT2 file system utilities (e2fsck, mke2fs, etc.). The EXT2 utilities were written by Theodore Ts'o <tytso@mit.edu> and Remy Card <card@masi.ibp.fr>.

Sources were obtained from <http://sourceforge.net/projects/e2fsprogs>

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This package was added to the e2fsprogs debian source package by Theodore Ts'o <tytso@mit.edu> on Sat Mar 15 15:33:37 EST 2003

It is part of the main e2fsprogs distribution, which can be found at:

<http://sourceforge.net/projects/e2fsprogs>

Upstream Author: Theodore Ts'o <tytso@mit.edu>

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This package was put together by Yann Dirson <dirson@debian.org>, from sources obtained from a mirror of:  
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```
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Version 2.1, February 1999

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# 1.312 pcre 7.8

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## THE BASIC LIBRARY FUNCTIONS

-----

Written by: Philip Hazel

Email local part: ph10

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## 1.313 iputils 20190709

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## 1.316 python-pip 22.0.4

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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:

<http://mxr.mozilla.org/mozilla/source/security/nss/lib/ckfw/builtins/certdata.txt?raw=1#>

It contains the certificates in PEM format and therefore  
can be directly used with curl / libcurl / php\_curl, or with  
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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 <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 |
| 2.7   | 2.6   | 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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#### A. HISTORY OF THE SOFTWARE

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

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

In May 2000, Guido and the Python core development team moved to  
BeOpen.com to form the BeOpen PythonLabs team. In October of the same  
year, the PythonLabs team moved to Digital Creations (now Zope  
Corporation, see <http://www.zope.com>). In 2001, the Python Software  
Foundation (PSF, see <http://www.python.org/psf/>) was formed, a  
non-profit organization created specifically to own Python-related  
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All Python releases are Open Source (see <http://www.opensource.org> for 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                 |
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| 2.3.4          | 2.3.3        | 2004      | PSF        | yes                 |
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| 2.4.3          | 2.4.2        | 2006      | PSF        | yes                 |
| 2.4.4          | 2.4.3        | 2006      | PSF        | yes                 |
| 2.5            | 2.4          | 2006      | PSF        | yes                 |
| 2.5.1          | 2.5          | 2007      | PSF        | yes                 |
| 2.5.2          | 2.5.1        | 2008      | PSF        | yes                 |
| 2.5.3          | 2.5.2        | 2008      | PSF        | yes                 |
| 2.6            | 2.5          | 2008      | PSF        | yes                 |
| 2.6.1          | 2.6          | 2008      | PSF        | yes                 |
| 2.6.2          | 2.6.1        | 2009      | PSF        | yes                 |
| 2.6.3          | 2.6.2        | 2009      | PSF        | yes                 |
| 2.6.4          | 2.6.3        | 2009      | PSF        | yes                 |
| 2.6.5          | 2.6.4        | 2010      | PSF        | yes                 |
| 3.0            | 2.6          | 2008      | PSF        | yes                 |
| 3.0.1          | 3.0          | 2009      | PSF        | yes                 |
| 3.1            | 3.0.1        | 2009      | PSF        | yes                 |

|       |     |      |     |     |
|-------|-----|------|-----|-----|
| 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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#### History

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Before (and including) argparse 1.1, the argparse package was licensed under Apache License v2.0.

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The project repository then had a clean start with some files taken from Python 2.7.1, so definitely all files are under Python License now.

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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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| 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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# 1.317 libtasn 4.16.0

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<https://gist.github.com/imneme/f1f7821f07cf76504a97f6537c818083>

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Finally, software patents pose a constant threat to the existence of any free program. We wish to make sure that a company cannot effectively restrict the users of a free program by obtaining a restrictive license from a patent holder. Therefore, we insist that any patent license obtained for a version of the library must be consistent with the full freedom of use specified in this license.

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When a program is linked with a library, whether statically or using a shared library, the combination of the two is legally speaking a combined work, a derivative of the original library. The ordinary General Public License therefore permits such linking only if the entire combination fits its criteria of freedom. The Lesser General Public License permits more lax criteria for linking other code with



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We call this license the "Lesser" General Public License because it does Less to protect the user's freedom than the ordinary General Public License. It also provides other free software developers Less of an advantage over competing non-free programs. These disadvantages are the reason we use the ordinary General Public License for many libraries. However, the Lesser license provides advantages in certain special circumstances.

For example, on rare occasions, there may be a special need to encourage the widest possible use of a certain library, so that it becomes a de-facto standard. To achieve this, non-free programs must be allowed to use the library. A more frequent case is that a free library does the same job as widely used non-free libraries. In this case, there is little to gain by limiting the free library to free software only, so we use the Lesser General Public License.

In other cases, permission to use a particular library in non-free programs enables a greater number of people to use a large body of free software. For example, permission to use the GNU C Library in non-free programs enables many more people to use the whole GNU operating system, as well as its variant, the GNU/Linux operating system.

Although the Lesser General Public License is Less protective of the users' freedom, it does ensure that the user of a program that is linked with the Library has the freedom and the wherewithal to run that program using a modified version of the Library.

The precise terms and conditions for copying, distribution and modification follow. Pay close attention to the difference between a "work based on the library" and a "work that uses the library". The former contains code derived from the library, whereas the latter must be combined with the library in order to run.

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A "library" means a collection of software functions and/or data

prepared so as to be conveniently linked with application programs (which use some of those functions and data) to form executables.

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"Source code" for a work means the preferred form of the work for making modifications to it. For a library, complete source code means all the source code for all modules it contains, plus any associated interface definition files, plus the scripts used to control compilation and installation of the library.

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(For example, a function in a library to compute square roots has a purpose that is entirely well-defined independent of the application. Therefore, Subsection 2d requires that any application-supplied function or table used by this function must be optional: if the application does not supply it, the square root function must still compute square roots.)

These requirements apply to the modified work as a whole. If identifiable sections of that work are not derived from the Library, and can be reasonably considered independent and separate works in themselves, then this License, and its terms, do not apply to those sections when you distribute them as separate works. But when you distribute the same sections as part of a whole which is a work based on the Library, the distribution of the whole must be on the terms of this License, whose permissions for other licensees extend to the entire whole, and thus to each and every part regardless of who wrote it.

Thus, it is not the intent of this section to claim rights or contest your rights to work written entirely by you; rather, the intent is to exercise the right to control the distribution of derivative or collective works based on the Library.

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When a "work that uses the Library" uses material from a header file that is part of the Library, the object code for the work may be a derivative work of the Library even though the source code is not. Whether this is true is especially significant if the work can be linked without the Library, or if the work is itself a library. The threshold for this to be true is not precisely defined by law.

If such an object file uses only numerical parameters, data structure layouts and accessors, and small macros and small inline functions (ten lines or less in length), then the use of the object

file is unrestricted, regardless of whether it is legally a derivative work. (Executables containing this object code plus portions of the Library will still fall under Section 6.)

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

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Any executables containing that work also fall under Section 6, whether or not they are linked directly with the Library itself.

6. As an exception to the Sections above, you may also combine or link a "work that uses the Library" with the Library to produce a work containing portions of the Library, and distribute that work under terms of your choice, provided that the terms permit modification of the work for the customer's own use and reverse engineering for debugging such modifications.

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# 1.322 gawk 5.0.1

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Most GNU software, including some libraries, is covered by the ordinary GNU General Public License, which was designed for utility programs. This license, the GNU Library General Public License, applies to certain designated libraries. This license is quite different from the ordinary one; be sure to read it in full, and don't assume that anything in it is the same as in the ordinary license.

The reason we have a separate public license for some libraries is that

they blur the distinction we usually make between modifying or adding to a program and simply using it. Linking a program with a library, without changing the library, is in some sense simply using the library, and is analogous to running a utility program or application program. However, in a textual and legal sense, the linked executable is a combined work, a derivative of the original library, and the ordinary General Public License treats it as such.

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  
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(For example, a function in a library to compute square roots has a purpose that is entirely well-defined independent of the application. Therefore, Subsection 2d requires that any application-supplied function or table used by this function must be optional: if the application does not supply it, the square root function must still compute square roots.)

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4. You may copy and distribute the Library (or a portion or derivative of it, under Section 2) in object code or executable form under the terms of Sections 1 and 2 above provided that you accompany it with the complete corresponding machine-readable source code, which must be distributed under the terms of Sections 1 and 2 above on a medium customarily used for software interchange.

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code or patches to this implementation of sudo since I began  
maintaining it in 1993. This list is known to be incomplete--if  
you believe you should be listed, please send a note to [sudo@sudo.ws](mailto:sudo@sudo.ws).

Ackeret, Matt  
Adler, Mark  
Allbery, Russ  
Anderson, Jamie  
Andrew, Nick  
Andric, Dimitry  
Barron, Danny  
Bates, Tom  
Behan, Zdenk  
Bellis, Ray  
Benali, Elias  
Beverly, Jamie  
Boardman, Spider  
Bos, Sander  
Bostley, P.J.  
Bowes, Keith  
Boyce, Keith Garry  
Brantley, Michael  
Braun, Rob  
Bezina, Pavel  
Brooks, Piete  
Brown, Jerry  
Burr, Michael E  
Burton, Ross  
Bussjaeger, Andreas  
Calvin, Gary  
Campbell, Aaron  
Chazelas, Stephane  
Cheloha, Scott  
ek, Vtzslav  
Coleman, Chris  
Corzine, Deven T.  
Cusack, Frank  
Dai, Wei  
Dill, David  
Earickson, Jeff  
Eckhardt, Drew  
Edgington, Ben  
Esipovich, Marc  
Espie, Marc  
Faigon, Ariel  
Farrell, Brian  
Fobes, Steve  
Frysinger, Mike  
G., Daniel Richard  
Gailly, Jean-loup  
Gelman, Stephen  
Gerraty, Simon J.

Graber, Stephane  
Guillory, B.  
Hayman, Randy M.  
Henke, Joachim  
Hideaki, Yoshifuji  
Hieb, Dave  
Holloway, Nick  
Hoover, Adam  
Hunter, Michael T.  
Hutchings, Ben  
Irrgang, Eric  
Jackson, Brian  
Jackson, John R.  
Jackson, Richard L., Jr.  
Janssen, Mark  
Jepeway, Chris  
Jorge, Joel Pele  
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Juhani, Timo  
Kikuchi, Ayamura  
Kadow, Kevin  
Kasal, Stepan  
Kienenberger, Mike  
King, Dale  
King, Michael  
Klyachkin, Andrey  
Knoble, Jim  
Knox, Tim  
Komarnitsky, Alek O.  
Kondrashov, Nikolai  
Kopeek, Daniel  
Kranenburg, Paul  
Krause, David  
Lakin, Eric  
Larsen, Case  
Levin, Dmitry V.  
Libby, Kendall  
Lobbies, Phillip E.  
McIntyre, Jason  
MacKenzie, David J.  
McLaughlin, Tom  
Makey, Jeff  
Mallayya, Sangamesh  
Marchionna, Michael D.  
Markham, Paul  
Martinian, Emin  
Meskes, Michael  
Michael, David

Miller, Todd C.  
Minier, Loc  
Moffat, Darren  
Moldung, Jan Thomas  
Morris, Charles  
Mueller, Andreas  
Mller, Dworkin  
Nieusma, Jeff  
Nikitser, Peter A.  
Nussel, Ludwig  
Ouellet, Jean-Philippe  
Paquet, Eric  
Paradis, Chantal  
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Perera, Andres  
Peron, Christian S.J.  
Peschel, Aaron  
Peslyak, Alexander  
Peterson, Toby  
Petten, Diego Elio  
Pickett, Joel  
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Richards, Matt  
Rossum, Guido van  
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Rowe, William A., Jr.  
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Smith, Andy  
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Webb, Kirk  
Wetzel, Timm  
Wieringen, Marco van  
Wilk, Jakub  
Winiger, Gary  
Wood, David  
Zacarias, Gustavo  
Zolnowsky, John

The following people have worked to translate sudo into other languages as part of the Translation Project, see <https://translationproject.org> for more details.

Albuquerque, Pedro  
Blttermann, Mario  
Bogusz, Jakub  
Buo-ren, Lin  
Casagrande, Milo  
Castro, Felipe  
Cho, Seong-ho  
Chornoivan, Yuri  
Diguez,  
Francisco  
Fontenelle, Rafael  
Garca-Fontes, Walter

Gezer, Volkan  
Hamasaki, Takeshi  
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Karvonen, Jorma  
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Kelemen, Gbor  
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Koir, Klemen  
Kozlov, Yuri  
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r, Balzs  
Uranga, Mikel Olasagasti  
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Wang, Wylmer

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Jean-loup Gailly  
jloup@gzip.org

Mark Adler  
madler@alumni.caltech.edu

## 1.324 dnf 2.7.5-r0.68

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## 1.330 rng-tools 6.9-r0.7

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## 1.339 python 3.8.14-r0.3

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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, 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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| Release | Derived | Year | Owner | GPL- |
|---------|---------|------|-------|------|
|---------|---------|------|-------|------|

|                | from      |           | 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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## 1.343 libjitterentropy 3.4.1-r0.11

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```

```
*
```

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