

msmtp

Version 1.4.14, March 10, 2008

Martin Lambers (marlam@marlam.de)

This manual was last updated March 10, 2008 for version 1.4.14 of msmtp.

Copyright (C) 2005, 2006, 2007, 2008 Martin Lambers

Permission is granted to copy, distribute and/or modify this document under the terms of the GNU Free Documentation License, Version 1.2 or any later version published by the Free Software Foundation; with no Invariant Sections, no Front-Cover Texts, and no Back-Cover Texts. A copy of the license is included in the section entitled “GNU Free Documentation License”.

Table of Contents

1	Introduction	1
2	Configuration files	2
2.1	General commands	2
2.2	Authentication commands	3
2.3	TLS commands	3
2.4	Commands specific to sendmail mode	4
3	Invocation	6
3.1	Synopsis	6
3.2	Options	6
3.2.1	General options	6
3.2.2	Changing the mode of operation	6
3.2.3	Configuration options	7
3.2.4	Options specific to sendmail mode	8
3.3	Choosing an account	9
3.4	Exit code	10
3.5	Files	10
3.6	Environment	10
4	Transport Layer Security	11
5	Authentication	13
5.1	Using the Mac OS X Keychain	14
6	Delivery Status Notifications	15
7	Sendmail mode	16
7.1	Envelope-from address	16
7.2	Logging	16
7.3	Bcc header	17
8	Server information mode	18
9	Remote Message Queue Starting mode	19
10	Examples	20
10.1	A system wide configuration file	20
10.2	A user configuration file	20
10.3	Using msmtplib with Mutt	21
10.4	Using msmtplib with mail	22

11	Development	23
Appendix A	Copying Information	24
	GNU Free Documentation License	24
	GNU GPL	30

1 Introduction

msmtp is an SMTP client.

In its default mode of operation, it reads a mail from standard input and sends it to a predefined SMTP server that takes care of proper delivery. Command line options and exit codes are compatible to sendmail.

Supported SMTP features include:

- Authentication methods PLAIN, LOGIN, CRAM-MD5 and EXTERNAL (and GSS-API, DIGEST-MD5 and NTLM when compiled with GNU SASL support)
- TLS encrypted connections with the OpenSSL or GnuTLS libraries (including server certificate verification and the possibility to send a client certificate)
- Support for Internationalized Domain Names (IDN)
- DSN (Delivery Status Notification) support
- PIPELINING support for increased transmission speed
- RMQS (Remote Message Queue Starting) support (ETRN keyword)

The best way to start is probably to have a look at the Examples section. See [Chapter 10 \[Examples\]](#), page 20.

In addition to sendmail mode, there are two other modes of operation:

- Server information mode. In this mode, msmtp prints as much information as it can get about a given SMTP server (supported features, maximum mail size, . . .).
- Remote Message Queue Starting mode. In this mode, msmtp sends a Remote Message Queue Starting request for a host, domain, or queue to a given SMTP server.

Normally, a system wide configuration file and/or a user configuration file contain information about which SMTP server to use and how to use it, but almost all settings can also be configured on the command line.

The information about SMTP servers is organized in accounts. Each account describes one SMTP server: host name, authentication settings, TLS settings, and so on. Each configuration file can define multiple accounts.

2 Configuration files

msmtp supports a system wide configuration file and a user configuration file. Both are optional and need not exist.

If it exists and is readable, a system wide configuration file `SYSCONFDIR/msmtprc` will be loaded, where `SYSCONFDIR` depends on your platform. The default is `/usr/local/etc`. Use `--version` to find out which directory your version uses.

If it exists and is readable, a user configuration file will be loaded (`~/.msmtprc` by default). Accounts defined in the user configuration file override accounts from the system configuration file. The user configuration file must have no more permissions than user read/write. Configuration data from either file can be changed by command line options.

A configuration file is a simple text file. Empty lines and comment lines (whose first non-blank character is `#`) are ignored. Every other line must contain a command and may contain an argument to that command. The argument may be enclosed in double quotes (`"`).

If the first character of a filename is the tilde (`~`), this tilde will be replaced by `HOME`. If a command accepts the argument `'on'`, it also accepts an empty argument and treats that as if it was `'on'`.

Commands form groups. Each group starts with the `'account'` command and defines the settings for one SMTP server.

See [Chapter 10 \[Examples\]](#), page 20.

2.1 General commands

`'defaults'`

Set defaults. The following configuration commands will set default values for all following account definitions in the current configuration file.

`'account name [: account [...]]'`

Start a new account definition with the given name. The current default values are filled in (see [\[defaults\]](#), page 2).

If a colon and a list of previously defined accounts is given after the account name, the new account, with the filled in default values, will inherit all settings from the accounts in the list.

`'host hostname'`

The SMTP server to send the mail to. The argument may be a host name or a network address. Every account definition must contain this command.

`'port number'`

The port that the SMTP server listens on. The default port will be acquired from your operating system's service database: for SMTP, the service is `"smtp"` (default port 25), unless TLS without STARTTLS is used, in which case it is `"ssmtp"` (465). For LMTP, it is `"lmtp"`.

`'timeout (off|seconds)'`

Set or unset a network timeout, in seconds. The argument `'off'` means that no timeout will be set, which means that the operating system default will be

used. For compatibility with older versions, ‘connect_timeout’ is accepted as an alias for this command.

‘protocol (smtp|lmtp)’

Set the protocol to use. Currently only SMTP and LMTP are supported. SMTP is the default. See [\[port\]](#), page 2 for default ports.

‘domain *argument*’

This command sets the argument of the SMTP EHLO (or LMTP LHLO) command. The default is ‘localhost’, which is stupid but should always work. Possible choices are the domain part of your mail address (`provider.example` for `joe@provider.example`) or the fully qualified domain name of your host (if available).

2.2 Authentication commands

See [Chapter 5 \[Authentication\]](#), page 13.

‘auth [(on|off|*method*)]’

This command enables or disables SMTP authentication and optionally chooses an authentication method to use. It should not be necessary to choose a method; with the argument ‘on’, msmtplib will choose the best one available. Accepted methods are ‘plain’, ‘cram-md5’, ‘digest-md5’, ‘gssapi’, ‘external’, ‘login’, and ‘ntlm’. See [Chapter 5 \[Authentication\]](#), page 13.

‘user [*username*]

Set your user name for SMTP authentication. An empty argument unsets the user name. Authentication must be activated with the ‘auth’ command.

‘password [*secret*]

Set your password for SMTP authentication. An empty argument unsets the password. Authentication must be activated with the ‘auth’ command. If no password is set but one is needed during authentication, msmtplib will try to find it in `~/.netrc`. If that fails, it will try to get it from a system specific keychain (if available). If that fails, msmtplib will prompt you for it. See [Chapter 5 \[Authentication\]](#), page 13.

‘ntlm domain [*ntlm domain*]

Set a domain for the ‘ntlm’ authentication method. The default is to use no domain (equivalent to an empty argument), but some servers seem to require one, even if it is an arbitrary string.

2.3 TLS commands

See [Chapter 4 \[Transport Layer Security\]](#), page 11.

‘tls [(on|off)]’

This command enables or disables TLS/SSL encrypted connections to the SMTP server. Not every server supports TLS, and a few that support it require the ‘tls_starttls off’ command.

To use TLS/SSL, it is required to either use the ‘`tls_trust_file`’ command (highly recommended) or to disable ‘`tls_certcheck`’. See [Chapter 4 \[Transport Layer Security\]](#), page 11.

‘`tls_trust_file [file]`’

This command activates strict server certificate verification. The given file must contain one or more certificates of trusted Certification Authorities (CAs) in PEM format.

On Debian based systems, you can install the ‘`ca-certificates`’ package and use the file ‘`/etc/ssl/certs/ca-certificates.crt`’.

An empty argument disables this feature.

‘`tls_key_file [file]`’

This command (together with the ‘`tls_cert_file`’) command enables `msmtp` to send a client certificate to the SMTP server if requested. The file must contain the private key of a certificate in PEM format. An empty argument disables this feature. See [Chapter 4 \[Transport Layer Security\]](#), page 11.

‘`tls_cert_file [file]`’

This command (together with the ‘`tls_key_file`’ command) enables `msmtp` to send a client certificate to the SMTP server if requested. The file must contain a certificate in PEM format. An empty argument disables this feature. See [Chapter 4 \[Transport Layer Security\]](#), page 11.

‘`tls_certcheck [(on|off)]`’

This command enables or disables checks for the server certificate.

WARNING: When the checks are disabled, TLS/SSL sessions will be vulnerable to man-in-the-middle attacks! See [Chapter 4 \[Transport Layer Security\]](#), page 11.

For compatibility with older versions, ‘`tls_nocertcheck`’ is accepted as an alias for ‘`tls_certcheck off`’.

‘`tls_starttls [(on|off)]`’

This command enables or disables the use of the STARTTLS SMTP command to start TLS encryption. It is enabled by default. See [Chapter 4 \[Transport Layer Security\]](#), page 11. For compatibility with older versions, ‘`tls_nostarttls`’ is accepted as an alias for ‘`tls_starttls off`’.

‘`tls_force_sslv3 [(on|off)]`’

Force TLS/SSL version SSLv3. This might be needed to use SSL with some old and broken servers. Do not use this unless you have to. See [Chapter 4 \[Transport Layer Security\]](#), page 11.

2.4 Commands specific to sendmail mode

See [Chapter 7 \[Sendmail mode\]](#), page 16.

‘`auto_from [(on|off)]`’

Enable or disable automatic envelope-from addresses. The default is ‘`off`’.

When enabled, an envelope-from address of the form `user@domain` will be generated. The local part will be set to `USER` or, if that fails, to `LOGNAME` or, if that

fails, to the login name of the current user. The domain part can be set with the `'maildomain'` command (see [\[maildomain\]](#), page 5). If the maildomain is empty, the envelope-from address will only consist of the user name and not have a domain part.

When disabled, the envelope-from address must be set explicitly with the `'from'` command (see [\[from\]](#), page 5).

See [Section 7.1 \[Envelope-from address\]](#), page 16.

`'from [address]'`

Set the envelope-from address. This address will only be used when `'auto_from'` is disabled. See [Section 7.1 \[Envelope-from address\]](#), page 16.

`'maildomain [domain]'`

Set a domain part for the generation of an envelope-from address. This is only used when `'auto_from'` is enabled. The domain may be empty. See [Section 7.1 \[Envelope-from address\]](#), page 16.

`'dsn_notify (off|condition)'`

This command sets the condition(s) under which the mail system should send DSN (Delivery Status Notification) messages. The argument `off` disables explicit DSN requests, which means the mail system decides when to send DSN messages. This is the default. The *condition* must be `'never'`, to never request notification, or a comma separated list (no spaces!) of one or more of the following: `'failure'`, to request notification on transmission failure, `'delay'`, to be notified of message delays, `'success'`, to be notified of successful transmission. The SMTP server must support the DSN extension. See [Chapter 6 \[Delivery Status Notifications\]](#), page 15.

`'dsn_return (off|amount)'`

This command controls how much of a mail should be returned in DSN (Delivery Status Notification) messages. The argument `off` disables explicit DSN requests, which means the mail system decides how much of a mail it returns in DSN messages. This is the default. The *amount* must be `'headers'`, to just return the message headers, or `'full'`, to return the full mail. The SMTP server must support the DSN extension. See [Chapter 6 \[Delivery Status Notifications\]](#), page 15.

`'keepbcc [(on|off)]'`

This command controls whether to remove or keep the Bcc header when sending a mail. The default is to remove it. See [Section 7.3 \[Bcc header\]](#), page 17.

`'logfile [file]'`

This command enables or disables logging to the specified file. An empty argument disables this feature. The file name `'-'` directs the log information to standard output. See [Section 7.2 \[Logging\]](#), page 16.

`'syslog [(on|off|facility)]'`

This command enables or disables syslog logging. The facility can be one of `'LOG_USER'`, `'LOG_MAIL'`, `'LOG_LOCAL0'`, ..., `'LOG_LOCAL7'`. The default facility is `'LOG_USER'`. Syslog logging is disabled by default. See [Section 7.2 \[Logging\]](#), page 16.

3 Invocation

3.1 Synopsis

- Sendmail mode (default):
`msmtp [option...] [--] recipient...`
`msmtp [option...] -t [--] [recipient...]`
- Server information mode:
`msmtp [option...] --serverinfo`
- Remote Message Queue Starting mode:
`msmtp [option...] --rmqs=(host|@domain|#queue)`

3.2 Options

Options override configuration file settings. They are compatible with sendmail where appropriate.

3.2.1 General options

- `--version` Print version information. This includes information about the library used for TLS/SSL support (if any), the library used for authentication, the authentication mechanisms supported by this library, and the default locations of the system and user configuration files.
- `--help` Print help.
- `-p`
- `--pretend` Print the configuration settings that would be used, but do not take further action. An asterisk (*) will be printed instead of the password.
- `-d`
- `--debug` Print lots of debugging information, including the whole conversation with the SMTP server. Be careful with this option: the (potentially dangerous) output will not be sanitized, and your password may get printed in an easily decodable format!

3.2.2 Changing the mode of operation

- `-s`
- `--serverinfo` Print information about the SMTP server and exit. This includes information about supported features (mail size limit, authentication, TLS, DSN, ...) and about the TLS certificate (if TLS is active). See [Chapter 8 \[Server information mode\]](#), page 18.
- `--rmqs=(host|@domain|#queue)` Send a Remote Message Queue Starting request for the given host, domain, or queue to the SMTP server and exit. See [Chapter 9 \[Remote Message Queue Starting mode\]](#), page 19.

3.2.3 Configuration options

Most options in this category correspond to a configuration file command. Please refer to [Chapter 2 \[Configuration files\]](#), [page 2](#) for detailed information.

`'-C filename'`

`'--file=filename'`

Use the given file instead of `~/.msmtprc` as the user configuration file.

`'-a account'`

`'--account=account'`

Use the given account instead of the account named `'default'`. This option cannot be used together with the `'--host'` option. See [\[Choosing an account\]](#), [page 9](#).

`'--host=hostname'`

Use this SMTP server with settings from the command line; do not use any configuration file data. This option cannot be used together with the `'--account'`

option. It disables loading of configuration files. See [\[Choosing an account\]](#), page 9.

`--port=number`

Set the port number to connect to. See [\[port\]](#), page 2.

`--timeout=(off|seconds)`

Set a network timeout. See [\[timeout\]](#), page 2. For compatibility with older versions, `--connect-timeout` is accepted as an alias for this option.

`--protocol=(smtp|lmtplib)`

Set the protocol. See [\[protocol\]](#), page 3.

`--domain=[argument]`

Set the argument of the SMTP EHLO (or LMTP LHLO) command. See [\[domain\]](#), page 3.

`--auth[(on|off|method)]`

Enable or disable authentication and optionally choose the method. See [\[auth\]](#), page 3.

`--user=[username]`

Set or unset the user name for authentication. See [\[user\]](#), page 3.

`--tls[(on|off)]`

Enable or disable TLS/SSL. See [\[tls\]](#), page 3.

`--tls-starttls[(on|off)]`

Enable or disable STARTTLS for TLS encryption. See [\[tls-starttls\]](#), page 4.

`--tls-trust-file=[file]`

Set or unset a trust file for TLS encryption. See [\[tls-trust-file\]](#), page 4.

`--tls-key-file=[file]`

Set or unset a key file for TLS encryption. See [\[tls-key-file\]](#), page 4.

`--tls-cert-file=[file]`

Set or unset a cert file for TLS encryption. See [\[tls-cert-file\]](#), page 4.

`--tls-certcheck[(on|off)]`

Enable or disable server certificate checks for TLS encryption. See [\[tls-certcheck\]](#), page 4.

`--tls-force-ssl3[(on|off)]`

Force TLS/SSL version SSLv3. See [\[tls-force-ssl3\]](#), page 4.

3.2.4 Options specific to sendmail mode

`--auto-from[(on|off)]`

Enable or disable automatic envelope-from addresses. The default is off. See [\[auto-from\]](#), page 4.

`-f address`

`--from=address`

Set the envelope-from address. It is only used when `'auto_from'` is off. See [\[from\]](#), page 5.

If no account was chosen yet (with `'--account'` or `'--host'`), this option will choose the first account that has the given envelope-from address (set with the

`'from'` command). If no such account is found, "default" is used. See [\[Choosing an account\]](#), page 9.

`'--maildomain=[domain]'`

Set the domain part for generated envelope-from addresses. It is only used when `'auto_from'` is on. See [\[maildomain\]](#), page 5.

`'-N (off|condition)'`

`'--dsn-notify=(off|condition)'`

Set or unset DSN notification conditions. See [\[dsn_notify\]](#), page 5.

`'-R (off|amount)'`

`'--dsn-return=(off|amount)'`

Set or unset the DSN notification amount. See [\[dsn_return\]](#), page 5. Note that `'hdrs'` is accepted as an alias for `'headers'` to be compatible with sendmail.

`'--keepbcc[=(on|off)]'`

Enable or disable the preservation of the Bcc header. See [\[keepbcc\]](#), page 5.

`'-X [file]'`

`'--logfile=[file]'`

Set or unset the log file. See [\[logfile\]](#), page 5.

`'--syslog[=(on|off|facility)]'`

Enable or disable syslog logging. See [\[syslog\]](#), page 5.

`'-t'`

`'--read-recipients'`

Send the mail to the recipients given in the To, Cc, and Bcc headers of the mail in addition to the recipients given on the command line.

If any Resent- headers are present, then the addresses from any Resent-To, Resent-Cc, and Resent-Bcc headers in the first block of Resent- headers are used instead.

`'--read-recipients'`

Read the envelope from address from the From header of the mail.

`'--'`

This marks the end of options. All following arguments will be treated as recipient addresses, even if they start with a `'.'`.

The following options are accepted but ignored for sendmail compatibility: `'-Btype'`, `'-bm'`, `'-Fname'`, `'-G'`, `'-hN'`, `'-i'`, `'-L tag'`, `'-m'`, `'-n'`, `'-O option=value'`, `'-ox value'`, `'-v'`

3.3 Choosing an account

There are three ways to choose the account to use. It depends on the circumstances which method is the best.

1. `'--account=account'`

Use the given account. Command line settings override configuration file settings.

2. `'--host=hostname'`

Use only the settings from the command line; do not use any configuration file data.

3. `'--from=address'` or `'--read-envelope-from'`

Choose the first account from the system or user configuration file that has a matching

envelope-from address as specified by a ‘**from**’ command. This works only when neither ‘**--account**’ nor ‘**--host**’ is used.

If none of the above options is used (or if no account has a matching ‘**from**’ command), then the account "default" is used.

3.4 Exit code

The standard exit codes from `sysexits.h` are used.

3.5 Files

‘`SYSCONFDIR/msmtprc`’

The system configuration file. Use the ‘**--version**’ option to find out what `SYSCONFDIR` is on your platform.

‘`~/.msmtprc`’

The default user configuration file.

‘`~/.netrc`’

The `.netrc` file contains login information. If a password is not found in the configuration file, `msmtp` will search it in `.netrc` before prompting the user for it. The syntax of `.netrc` is described in the `netrc(5)` or `ftp(1)` manual page.

3.6 Environment

‘`USER, LOGNAME`’

These variables override the user’s login name when constructing an envelope-from address. `LOGNAME` is only used if `USER` is unset.

‘`TMPDIR`’ Directory to create temporary files in. If this is unset, a system specific default directory is used.

A temporary file is only created when the ‘**-t**’/‘**--read-recipients**’ or ‘**--read-envelope-from**’ option is used. The file is then used to buffer the headers of the mail (but not the body, so the file won’t get very large).

‘`EMAIL, SMTPSERVER`’

These environment variables are used only if neither ‘**--host**’ nor ‘**--account**’ is used and there is no default account defined in the configuration files. In this case, the host name is taken from `SMTPSERVER`, and the envelope from address is taken from `EMAIL`, unless overridden by ‘**--from**’ or ‘**--read-envelope-from**’. Currently `SMTPSERVER` must contain a plain host name (no URL), and `EMAIL` must contain a plain address (no names or additional information).

4 Transport Layer Security

Transport Layer Security (TLS) is a new name for Secure Socket Layer (SSL). The TLS 1.0 protocol is an updated version of the SSL 3.0 protocol. TLS and SSL mean the same thing.

Quoting from RFC2246, the TLS 1.0 protocol specification:

"The TLS protocol provides communications privacy over the Internet. The protocol allows client/server applications to communicate in a way that is designed to prevent eavesdropping, tampering, or message forgery."

SMTP servers can use TLS in one of two modes:

- Immediately. This is SMTP tunneled through TLS, aka SSMTP. The default port for this mode is 465 (ssmtp).
- Via the STARTTLS SMTP command. The SMTP session begins normally. The client sends the STARTTLS command when it wishes to begin TLS encryption. The default port for this mode is the default SMTP port: 25 (smtp).

msmtp can switch between these modes with the `'tls_starttls'` command (see [\[tls_starttls\]](#), page 4) command or the `'--tls-starttls'` option (see [\[--tls-starttls\]](#), page 8).

When TLS is started, the server sends a certificate to identify itself. This certificate contains information about the certificate owner, the certificate issuer, and the activation and expiration times of the certificate. This information can be displayed in server information mode. See [Chapter 8 \[Server information mode\]](#), page 18.

To use TLS, it is required to either enable full server certificate verification using the `'tls_trust_file'` command or `'--tls-trust-file'` option, or to disable all certificate checks using `'tls_certcheck off'` or `'--tls-certcheck=off'`. WARNING: When certificate checks are disabled, TLS/SSL sessions are vulnerable to man-in-the-middle attacks! See [\[tls_trust_file\]](#), page 4, [\[--tls-trust-file\]](#), page 8, [\[tls_certcheck\]](#), page 4, [\[--tls-certcheck\]](#), page 8.

If your system has a file that collects all system-wide trusted CA certificates, it is easiest to just use this in the `'defaults'` section of your configuration file. On Debian-based systems, for example, the adequate command would be `'tls_trust_file /etc/ssl/certs/ca-certificates.crt'`.

But you can also find out manually which CA certificate you need to trust. The following example works as of 2007-04-18.

For the Gmail SMTP server, you first issue the following command:

```
$ msmtp --serverinfo --host=smtp.gmail.com --tls=on --port=587 \
--tls-certcheck=off
```

The option `'--port=587'` is specific to Gmail and should not be used with other servers. The option `'--tls-certcheck=off'` allows msmtp to accept any certificate, so that it can print some information about it.

According to the output of this command, the common name of the server certificate issuer is "Thawte Premium Server CA". This means that you have to trust the Thawte CA to use full TLS security. You can download the Thawte CA certificate bundle from <http://thawte.com/roots>. You get a ZIP file with different certificates. The one you need for the `'tls_trust_file'` command is `'Thawte Server Roots/ThawtePremiumServerCA_b64.txt'`.

The following command should now succeed:

```
$ msmtp --serverinfo --host=smtp.gmail.com --tls=on --port=587 \  
  --tls-trust-file="Thawte Server Roots/ThawtePremiumServerCA_b64.txt"
```

If the server requests it, the client can send a certificate, too. This allows the server to verify the identity of the client. See the EXTERNAL mechanism in [Chapter 5 \[Authentication\]](#), [page 13](#). The ‘`tls_key_file`’/‘`tls_cert_file`’ commands or the ‘`--tls-key-file`’/‘`--tls-cert-file`’ options can be used to set a client certificate. See [\[tls_key_file\]](#), [page 4](#)/[`-tls-key-file`], [page 8](#), [\[tls_cert_file\]](#), [page 4](#)/[`-tls-cert-file`], [page 8](#). Note that GnuTLS will only send a client certificate if it matches one of the CAs advertised by the server. If you set a client certificate but it is not send to the server, it probably was not issued by any CA that the server trusts.

5 Authentication

Many SMTP servers require a client to authenticate itself before it is allowed to send mail.

Multiple authentication methods exist. Most SMTP servers support only some of them. Some methods send authentication data in plain text (or nearly plain text) to the server. These methods should only be used when TLS is active to prevent others from stealing the password. See [Chapter 4 \[Transport Layer Security\], page 11](#).

By default, `msmtp` chooses a method automatically, and it will never choose one that puts the authentication data at risk. See below for details.

`msmtp` supports the following authentication methods:

- ‘PLAIN’
This authentication method needs a user name and a password. Both are send in BASE64 encoding, which can be easily decoded to plain text.
- ‘CRAM-MD5’
This authentication method needs a user name and a password. The authentication data is not sent in plain text, which means this method can safely be used without TLS.
- ‘DIGEST-MD5’
This authentication method needs a user name and a password. The authentication data is not sent in plain text, which means this method can safely be used without TLS.
- ‘GSSAPI’
This authentication method needs a user name. The Kerberos framework takes care of secure authentication, therefore this method can safely be used without TLS.
- ‘EXTERNAL’
This is a special authentication method: The actual authentication happens outside of the SMTP protocol, typically by sending a TLS client certificate (see [Chapter 4 \[Transport Layer Security\], page 11](#)).
The EXTERNAL method merely confirms that this authentication succeeded for the given user (or, if no user name is given, confirms that authentication succeeded). Thus it may not be necessary for authentication to use this method, and if the server does not support the EXTERNAL method, this does not mean that it does not support authentication with TLS client certificates.
This authentication method is not chosen automatically; you have to request it manually.
Note: Sendmail 8.12.11 advertises the EXTERNAL mechanism only after a TLS client certificate has been send. It seems to ignore the optional user name. Does anyone know more about this?
- ‘LOGIN’
This is a non-standard authentication method similar to (but worse than) PLAIN. It needs a user name and a password, both of which are send in BASE64 encoding, which can be easily decoded to plain text.
- ‘NTLM’
This is an obscure non-standard authentication method. It needs a user name and a password and in some cases a special domain parameter (see [\[ntlm domain\], page 3](#)).

The authentication data is not sent in plain text, but since NTLM is not an open standard, it should be considered broken and insecure.

It depends on the underlying authentication library and its version whether a particular method is supported or not. Use the ‘`--version`’ to find out which methods are supported by your version of `msmtp`.

Authentication data can be set with the ‘`user`’ and ‘`password`’ commands or with the ‘`--user`’ option. See [\[user\]](#), [page 3](#), [\[password\]](#), [page 3](#), [\[-user\]](#), [page 8](#). If no password is set but one is needed during authentication, `msmtp` will try to find it in `~/.netrc`. If that fails, it will try to get it from a system specific keychain (if available). If that fails, `msmtp` will prompt you for it.

Currently the only supported keychain is the Mac OS X keychain. See [\[Using the Mac OS X Keychain\]](#), [page 14](#).

The authentication method can be chosen with the ‘`auth`’ command or ‘`--auth`’ option, but it is usually sufficient to just use the ‘`on`’ argument to let `msmtp` choose the method itself. See [\[auth\]](#), [page 3](#), [\[-auth\]](#), [page 8](#).

If `msmtp` chooses the method itself, it will never choose an insecure method. If TLS is active, all methods are considered secure in this context, because the connection to the server is protected by TLS. If TLS is not active, only the CRAM-MD5, DIGEST-MD5, and GSSAPI methods are considered secure in this context, because all the others methods put the authentication data at risk.

If you really want to risk your authentication data, you have to force `msmtp` to do that by manually setting the authentication method while TLS is off.

5.1 Using the Mac OS X Keychain

A Mac OS X user can store a password in a keychain item using the Keychain Access GUI application. The ‘`account name`’ is simply the value of the `msmtp` ‘`user`’ argument. However, the ‘`keychain item name`’ is `smtp://<hostname>` where `<hostname>` matches the `msmtp` ‘`host`’ argument. Using `smtp://` is needed so that the item is created of kind ‘`internet password`’. For example, selecting ‘`File->Get Info`’ on a keychain item that corresponds to ‘`host smtp.freemail.example`’ and ‘`user joe.smith`’ will show:

```
Name: smtp.freemail.example
Kind: Internet password
Account: joe.smith
Where: smtp://smtp.freemail.example
```

6 Delivery Status Notifications

In situations such as delivery failure or very long delivery delay, the mail system often generates a message for the sender of the mail in question, informing him about the difficulties.

Delivery Status Notification (DSN) requests, defined in RFC 3461, try to give the sender of the mail control about how and when these DSN messages are sent. The SMTP server must support the DSN extension. See [Chapter 8 \[Server information mode\]](#), page 18.

A first parameter controls when such messages should be generated: never, on delivery failure, on delivery delay, and/or on success. This can be set with `'dsn_notify'/'--dsn-notify'`, see [\[dsn_notify\]](#), page 5/[\[--dsn-notify\]](#), page 9.

A second parameter controls how much of the original mail should be contained in a DSN message: only the headers, or the full mail. This can be set with `'dsn_return'/'--dsn-return'`, see [\[dsn_return\]](#), page 5/[\[--dsn-return\]](#), page 9. Note that this parameter only applies to DSNs that indicate delivery failure for at least one recipient. If a DSN contains no indications of delivery failure, only the headers of the message are returned.

7 Sendmail mode

7.1 Envelope-from address

The SMTP server expects a sender mail address for each mail. This is the envelope-from address. It is independent of the From header (because it is part of the mail *envelope*, not of the mail itself), but in most cases both addresses are the same.

Envelope-from addresses can be generated automatically (when ‘`auto_from`’ is enabled with the ‘`auto_from`’ command or ‘`--auto-from`’ option) or set explicitly with the ‘`from`’ command and ‘`--from`’ option. See [\[auto_from\]](#), page 4, [\[from\]](#), page 5.

When ‘`auto_from`’ is enabled, an envelope-from address of the form `user@domain` will be generated. The local part will be set to `USER` or, if that fails, to `LOGNAME` or, if that fails, to the login name of the current user. The domain part can be set with the ‘`maildomain`’ command and ‘`--maildomain`’ option (see [\[maildomain\]](#), page 5). If the maildomain is empty, the envelope-from address will only consist of the user name and not have a domain part.

7.2 Logging

Logging is enabled on a per account basis. If it is enabled, `msmtp` will generate one log line for each mail it tries to send via the account in question.

The line will include the following information:

- Host name of the SMTP server: `host=hostname`
- Whether TLS was used: `tls=(on|off)`
- Whether authentication was used: `auth=(on|off)`
- The user name used for authentication (only if authentication is used): `user=name`
- The envelope-from address: `from=address`
- The recipient addresses: `recipients=addr1,addr2,...`
- The size of the mail as transferred to the server, in bytes (only if the delivery succeeded): `mailsize=number`
- The SMTP status code and SMTP error message (only in case of failure and only if available): `smtpstatus=number`, `smtpmsg='message'`. Multiline SMTP messages will be concatenated into one line.
- The `msmtp` error message (only in case of failure and only if available): `errmsg='message'`
- The `msmtp` exit code (from `sysexits.h`; ‘`EX_OK`’ indicates success): `exitcode=EX_...`

If a logfile is given with the ‘`logfile`’ command or ‘`--logfile`’ option, this log line will be prepended with the current date and time and appended to the specified file. See [\[logfile\]](#), page 5, [\[-logfile\]](#), page 9.

If syslog logging is enabled with the ‘`syslog`’ command or ‘`--syslog`’ option, the log line is passed to the syslog service with the specified facility. See [\[syslog\]](#), page 5, [\[-syslog\]](#), page 9.

7.3 Bcc header

msmtp transmits mails unaltered to the SMTP server, with one exception: the Bcc header(s) will be removed before the transmission. This behavior can be changed with the '**keepbcc**' command and '**--keepbcc**' option, see [\[keepbcc\], page 5](#)/[\[-keepbcc\], page 9](#).

8 Server information mode

In server information mode, `msmtp` prints as much information about the SMTP server as it can get and then exits.

The SMTP features that can be detected are:

- **SIZE**
The maximum message size that the SMTP server accepts.
- **PIPELINING**
Whether certain SMTP commands may be send in groups rather than one by one. This can speed up mail transmission if the recipient list is long. This feature is used automatically.
- **STARTTLS**
See [Chapter 4 \[Transport Layer Security\]](#), page 11.
- **AUTH**
See [Chapter 5 \[Authentication\]](#), page 13.
- **DSN**
See [Chapter 6 \[Delivery Status Notifications\]](#), page 15.
- **ETRN**
See [Chapter 9 \[Remote Message Queue Starting mode\]](#), page 19.

If TLS is activated for server information mode, the following information will be printed about the SMTP server's TLS certificate (if available):

- Owner information
 - Common Name
 - Organization
 - Organizational unit
 - Locality
 - State or Province
 - Country
- Issuer information
 - Common Name
 - Organization
 - Organizational unit
 - Locality
 - State or Province
 - Country
- General
 - Activation time
 - Expiration time
 - SHA1 fingerprint
 - MD5 fingerprint

9 Remote Message Queue Starting mode

Remote Message Queue Starting (RMQS) is defined in RFC 1985. It is a way for a client to request that a server start the processing of its mail queues for messages that are waiting at the server for the client machine. If any messages are at the server for the client, then the server creates a new SMTP session and sends the messages at that time.

msmtp can only send the request (using the ETRN SMTP command); a mail server on the client side should then accept the connection of the remote SMTP server to receive the mail.

RMQS requests can be sent with the ‘`--rmqs`’ option (see [\[-rmqs\]](#), page 6). Destinations defined in RFC 1985 are:

- *host*
Request the messages for the given host.
- *@domain*
Request the messages for the given domain.
- *#queue*
Request the delivery of the messages in the given queue.

10 Examples

10.1 A system wide configuration file

```
# A system wide configuration is optional.
# If it exists, it usually defines a default account.
# This allows msmtplib to be used like /usr/sbin/sendmail.
account default

# The SMTP smarthost.
host mailhub.oursite.example

# Construct envelope-from addresses of the form "user@oursite.example".
#auto_from on
#maildomain oursite.example

# Use TLS.
#tls on
#tls_trust_file /etc/ssl/certs/ca-certificates.crt

# Syslog logging with facility LOG_MAIL instead of the default LOG_USER.
syslog LOG_MAIL
```

10.2 A user configuration file

```
# Set default values for all following accounts.
defaults
tls on
tls_trust_file /etc/ssl/certs/ca-certificates.crt
logfile ~/.msmtplib.log

# A freemail service
account freemail
host smtp.freemail.example
from joe_smith@freemail.example
auth on
user joe.smith
password secret

# A second mail address at the same freemail service
account freemail2 : freemail
from joey@freemail.example

# The SMTP server of the provider.
account provider
host mail.provider.example
from smithjoe@provider.example
```



```

auth on
user 123
password pwd

# Set a default account
account default : provider

```

10.3 Using msmtplib with Mutt

Create a configuration file for msmtplib and add the following lines to your Mutt configuration file:

```

set sendmail="/path/to/msmtplib"
set use_from=yes
set realname="Your Name"
set from=you@example.com
set envelope_from=yes

```

The ‘envelope_from=yes’ option lets Mutt use the ‘-f’ option of msmtplib. Therefore msmtplib chooses the first account that matches the from address you@example.com. Alternatively, you can use the ‘-a’ option:

```
set sendmail="/path/to/msmtplib -a my_account"
```

Or set everything from the command line:

```
set sendmail="/path/to/msmtplib --host=mailhub -f me@example.com --tls"
```

See [\[Choosing an account\]](#), page 9.

If you have multiple mail accounts in your msmtplib configuration file and let Mutt use the ‘-f’ option to choose one, you can easily switch accounts in Mutt with the following Mutt configuration lines:

```

macro generic "<esc>1" ":set from=you@example.com"
macro generic "<esc>2" ":set from=you@your-employer.example"
macro generic "<esc>3" ":set from=you@some-other-provider.example"

```

Now you can use <esc>1, <esc>2, and <esc>3 to switch accounts.

The following example uses a different approach: it maps the single key <tab> in Compose context for switching between the various account in a handy visual way. In the same Compose context, = is mapped in order to show the current msmtplib account. This example was contributed by Thomas Baruchel.

```

# Define <tab> and = in order to switch or see the current msmtplib account
# Don't forget to put the right path for msmtplib binary
macro compose \Cx_ ":set sendmail"
macro compose \Cx| "\Cx_ = \"/usr/local/bin/msmtplib"
macro compose \Cx& ":macro compose \\t \\\Cx"
macro compose <tab> "\Cx0"
macro compose = "\Cx_\n"
# Put the account in the following lines (here three accounts)
# Don't forget to put the number of the account at the beginning
# of the line, and the number of the next account after the '&'
macro compose \Cx0 "\Cx|\n\n\Cx&1\n\Cx_\n" # default and switch to 1

```

```
macro compose \Cx1 "\Cx| -a example_account\""\n\Cx&2\n\Cx_\n" # switch to 2
macro compose \Cx2 "\Cx| -a gmail\""\n\Cx&0\n\Cx_\n" # switch to 0
# End of the accounts
```

10.4 Using msmtplib with mail

Define a default account, and put the following into ~/.mailrc:

```
set sendmail="/path/to/msmtplib"
```

You need to define a default account, because mail does not allow extra options to the msmtplib command line.

11 Development

The homepage of `msmtp` is <http://msmtp.sourceforge.net/>; the SourceForge project page is <http://sourceforge.net/projects/msmtp/>.

The mailing list `msmtp-users` can be accessed from the project page.

Please send any questions, suggestions, and bug reports either to the mailing list or to Martin Lambers (marlam@marlam.de, OpenPGP key: <http://www.marlam.de/key.txt>). If you send a bug report, please include the output of `msmtp --version`.

Appendix A Copying Information

GNU Free Documentation License

Version 1.2, November 2002

Copyright © 2000,2001,2002 Free Software Foundation, Inc.
51 Franklin St, Fifth Floor, Boston, MA 02110-1301, USA

Everyone is permitted to copy and distribute verbatim copies
of this license document, but changing it is not allowed.

0. PREAMBLE

The purpose of this License is to make a manual, textbook, or other functional and useful document *free* in the sense of freedom: to assure everyone the effective freedom to copy and redistribute it, with or without modifying it, either commercially or non-commercially. Secondly, this License preserves for the author and publisher a way to get credit for their work, while not being considered responsible for modifications made by others.

This License is a kind of “copyleft”, which means that derivative works of the document must themselves be free in the same sense. It complements the GNU General Public License, which is a copyleft license designed for free software.

We have designed this License in order to use it for manuals for free software, because free software needs free documentation: a free program should come with manuals providing the same freedoms that the software does. But this License is not limited to software manuals; it can be used for any textual work, regardless of subject matter or whether it is published as a printed book. We recommend this License principally for works whose purpose is instruction or reference.

1. APPLICABILITY AND DEFINITIONS

This License applies to any manual or other work, in any medium, that contains a notice placed by the copyright holder saying it can be distributed under the terms of this License. Such a notice grants a world-wide, royalty-free license, unlimited in duration, to use that work under the conditions stated herein. The “Document”, below, refers to any such manual or work. Any member of the public is a licensee, and is addressed as “you”. You accept the license if you copy, modify or distribute the work in a way requiring permission under copyright law.

A “Modified Version” of the Document means any work containing the Document or a portion of it, either copied verbatim, or with modifications and/or translated into another language.

A “Secondary Section” is a named appendix or a front-matter section of the Document that deals exclusively with the relationship of the publishers or authors of the Document to the Document’s overall subject (or to related matters) and contains nothing that could fall directly within that overall subject. (Thus, if the Document is in part a textbook of mathematics, a Secondary Section may not explain any mathematics.) The relationship could be a matter of historical connection with the subject or with related matters, or of legal, commercial, philosophical, ethical or political position regarding them.

The “Invariant Sections” are certain Secondary Sections whose titles are designated, as being those of Invariant Sections, in the notice that says that the Document is released under this License. If a section does not fit the above definition of Secondary then it is not allowed to be designated as Invariant. The Document may contain zero Invariant Sections. If the Document does not identify any Invariant Sections then there are none.

The “Cover Texts” are certain short passages of text that are listed, as Front-Cover Texts or Back-Cover Texts, in the notice that says that the Document is released under this License. A Front-Cover Text may be at most 5 words, and a Back-Cover Text may be at most 25 words.

A “Transparent” copy of the Document means a machine-readable copy, represented in a format whose specification is available to the general public, that is suitable for revising the document straightforwardly with generic text editors or (for images composed of pixels) generic paint programs or (for drawings) some widely available drawing editor, and that is suitable for input to text formatters or for automatic translation to a variety of formats suitable for input to text formatters. A copy made in an otherwise Transparent file format whose markup, or absence of markup, has been arranged to thwart or discourage subsequent modification by readers is not Transparent. An image format is not Transparent if used for any substantial amount of text. A copy that is not “Transparent” is called “Opaque”.

Examples of suitable formats for Transparent copies include plain ASCII without markup, Texinfo input format, LaTeX input format, SGML or XML using a publicly available DTD, and standard-conforming simple HTML, PostScript or PDF designed for human modification. Examples of transparent image formats include PNG, XCF and JPG. Opaque formats include proprietary formats that can be read and edited only by proprietary word processors, SGML or XML for which the DTD and/or processing tools are not generally available, and the machine-generated HTML, PostScript or PDF produced by some word processors for output purposes only.

The “Title Page” means, for a printed book, the title page itself, plus such following pages as are needed to hold, legibly, the material this License requires to appear in the title page. For works in formats which do not have any title page as such, “Title Page” means the text near the most prominent appearance of the work’s title, preceding the beginning of the body of the text.

A section “Entitled XYZ” means a named subunit of the Document whose title either is precisely XYZ or contains XYZ in parentheses following text that translates XYZ in another language. (Here XYZ stands for a specific section name mentioned below, such as “Acknowledgements”, “Dedications”, “Endorsements”, or “History”.) To “Preserve the Title” of such a section when you modify the Document means that it remains a section “Entitled XYZ” according to this definition.

The Document may include Warranty Disclaimers next to the notice which states that this License applies to the Document. These Warranty Disclaimers are considered to be included by reference in this License, but only as regards disclaiming warranties: any other implication that these Warranty Disclaimers may have is void and has no effect on the meaning of this License.

2. VERBATIM COPYING

You may copy and distribute the Document in any medium, either commercially or noncommercially, provided that this License, the copyright notices, and the license notice saying this License applies to the Document are reproduced in all copies, and that you add no other conditions whatsoever to those of this License. You may not use technical measures to obstruct or control the reading or further copying of the copies you make or distribute. However, you may accept compensation in exchange for copies. If you distribute a large enough number of copies you must also follow the conditions in section 3.

You may also lend copies, under the same conditions stated above, and you may publicly display copies.

3. COPYING IN QUANTITY

If you publish printed copies (or copies in media that commonly have printed covers) of the Document, numbering more than 100, and the Document's license notice requires Cover Texts, you must enclose the copies in covers that carry, clearly and legibly, all these Cover Texts: Front-Cover Texts on the front cover, and Back-Cover Texts on the back cover. Both covers must also clearly and legibly identify you as the publisher of these copies. The front cover must present the full title with all words of the title equally prominent and visible. You may add other material on the covers in addition. Copying with changes limited to the covers, as long as they preserve the title of the Document and satisfy these conditions, can be treated as verbatim copying in other respects.

If the required texts for either cover are too voluminous to fit legibly, you should put the first ones listed (as many as fit reasonably) on the actual cover, and continue the rest onto adjacent pages.

If you publish or distribute Opaque copies of the Document numbering more than 100, you must either include a machine-readable Transparent copy along with each Opaque copy, or state in or with each Opaque copy a computer-network location from which the general network-using public has access to download using public-standard network protocols a complete Transparent copy of the Document, free of added material. If you use the latter option, you must take reasonably prudent steps, when you begin distribution of Opaque copies in quantity, to ensure that this Transparent copy will remain thus accessible at the stated location until at least one year after the last time you distribute an Opaque copy (directly or through your agents or retailers) of that edition to the public.

It is requested, but not required, that you contact the authors of the Document well before redistributing any large number of copies, to give them a chance to provide you with an updated version of the Document.

4. MODIFICATIONS

You may copy and distribute a Modified Version of the Document under the conditions of sections 2 and 3 above, provided that you release the Modified Version under precisely this License, with the Modified Version filling the role of the Document, thus licensing distribution and modification of the Modified Version to whoever possesses a copy of it. In addition, you must do these things in the Modified Version:

- A. Use in the Title Page (and on the covers, if any) a title distinct from that of the Document, and from those of previous versions (which should, if there were any,

- be listed in the History section of the Document). You may use the same title as a previous version if the original publisher of that version gives permission.
- B. List on the Title Page, as authors, one or more persons or entities responsible for authorship of the modifications in the Modified Version, together with at least five of the principal authors of the Document (all of its principal authors, if it has fewer than five), unless they release you from this requirement.
 - C. State on the Title page the name of the publisher of the Modified Version, as the publisher.
 - D. Preserve all the copyright notices of the Document.
 - E. Add an appropriate copyright notice for your modifications adjacent to the other copyright notices.
 - F. Include, immediately after the copyright notices, a license notice giving the public permission to use the Modified Version under the terms of this License, in the form shown in the Addendum below.
 - G. Preserve in that license notice the full lists of Invariant Sections and required Cover Texts given in the Document's license notice.
 - H. Include an unaltered copy of this License.
 - I. Preserve the section Entitled "History", Preserve its Title, and add to it an item stating at least the title, year, new authors, and publisher of the Modified Version as given on the Title Page. If there is no section Entitled "History" in the Document, create one stating the title, year, authors, and publisher of the Document as given on its Title Page, then add an item describing the Modified Version as stated in the previous sentence.
 - J. Preserve the network location, if any, given in the Document for public access to a Transparent copy of the Document, and likewise the network locations given in the Document for previous versions it was based on. These may be placed in the "History" section. You may omit a network location for a work that was published at least four years before the Document itself, or if the original publisher of the version it refers to gives permission.
 - K. For any section Entitled "Acknowledgements" or "Dedications", Preserve the Title of the section, and preserve in the section all the substance and tone of each of the contributor acknowledgements and/or dedications given therein.
 - L. Preserve all the Invariant Sections of the Document, unaltered in their text and in their titles. Section numbers or the equivalent are not considered part of the section titles.
 - M. Delete any section Entitled "Endorsements". Such a section may not be included in the Modified Version.
 - N. Do not retitle any existing section to be Entitled "Endorsements" or to conflict in title with any Invariant Section.
 - O. Preserve any Warranty Disclaimers.

If the Modified Version includes new front-matter sections or appendices that qualify as Secondary Sections and contain no material copied from the Document, you may at your option designate some or all of these sections as invariant. To do this, add their

titles to the list of Invariant Sections in the Modified Version’s license notice. These titles must be distinct from any other section titles.

You may add a section Entitled “Endorsements”, provided it contains nothing but endorsements of your Modified Version by various parties—for example, statements of peer review or that the text has been approved by an organization as the authoritative definition of a standard.

You may add a passage of up to five words as a Front-Cover Text, and a passage of up to 25 words as a Back-Cover Text, to the end of the list of Cover Texts in the Modified Version. Only one passage of Front-Cover Text and one of Back-Cover Text may be added by (or through arrangements made by) any one entity. If the Document already includes a cover text for the same cover, previously added by you or by arrangement made by the same entity you are acting on behalf of, you may not add another; but you may replace the old one, on explicit permission from the previous publisher that added the old one.

The author(s) and publisher(s) of the Document do not by this License give permission to use their names for publicity for or to assert or imply endorsement of any Modified Version.

5. COMBINING DOCUMENTS

You may combine the Document with other documents released under this License, under the terms defined in section 4 above for modified versions, provided that you include in the combination all of the Invariant Sections of all of the original documents, unmodified, and list them all as Invariant Sections of your combined work in its license notice, and that you preserve all their Warranty Disclaimers.

The combined work need only contain one copy of this License, and multiple identical Invariant Sections may be replaced with a single copy. If there are multiple Invariant Sections with the same name but different contents, make the title of each such section unique by adding at the end of it, in parentheses, the name of the original author or publisher of that section if known, or else a unique number. Make the same adjustment to the section titles in the list of Invariant Sections in the license notice of the combined work.

In the combination, you must combine any sections Entitled “History” in the various original documents, forming one section Entitled “History”; likewise combine any sections Entitled “Acknowledgements”, and any sections Entitled “Dedications”. You must delete all sections Entitled “Endorsements.”

6. COLLECTIONS OF DOCUMENTS

You may make a collection consisting of the Document and other documents released under this License, and replace the individual copies of this License in the various documents with a single copy that is included in the collection, provided that you follow the rules of this License for verbatim copying of each of the documents in all other respects.

You may extract a single document from such a collection, and distribute it individually under this License, provided you insert a copy of this License into the extracted document, and follow this License in all other respects regarding verbatim copying of that document.

7. AGGREGATION WITH INDEPENDENT WORKS

A compilation of the Document or its derivatives with other separate and independent documents or works, in or on a volume of a storage or distribution medium, is called an “aggregate” if the copyright resulting from the compilation is not used to limit the legal rights of the compilation’s users beyond what the individual works permit. When the Document is included in an aggregate, this License does not apply to the other works in the aggregate which are not themselves derivative works of the Document.

If the Cover Text requirement of section 3 is applicable to these copies of the Document, then if the Document is less than one half of the entire aggregate, the Document’s Cover Texts may be placed on covers that bracket the Document within the aggregate, or the electronic equivalent of covers if the Document is in electronic form. Otherwise they must appear on printed covers that bracket the whole aggregate.

8. TRANSLATION

Translation is considered a kind of modification, so you may distribute translations of the Document under the terms of section 4. Replacing Invariant Sections with translations requires special permission from their copyright holders, but you may include translations of some or all Invariant Sections in addition to the original versions of these Invariant Sections. You may include a translation of this License, and all the license notices in the Document, and any Warranty Disclaimers, provided that you also include the original English version of this License and the original versions of those notices and disclaimers. In case of a disagreement between the translation and the original version of this License or a notice or disclaimer, the original version will prevail.

If a section in the Document is Entitled “Acknowledgements”, “Dedications”, or “History”, the requirement (section 4) to Preserve its Title (section 1) will typically require changing the actual title.

9. TERMINATION

You may not copy, modify, sublicense, or distribute the Document except as expressly provided for under this License. Any other attempt to copy, modify, sublicense or distribute the Document is void, and will automatically terminate your rights under this License. However, parties who have received copies, or rights, from you under this License will not have their licenses terminated so long as such parties remain in full compliance.

10. FUTURE REVISIONS OF THIS LICENSE

The Free Software Foundation may publish new, revised versions of the GNU Free Documentation License from time to time. Such new versions will be similar in spirit to the present version, but may differ in detail to address new problems or concerns. See <http://www.gnu.org/copyleft/>.

Each version of the License is given a distinguishing version number. If the Document specifies that a particular numbered version of this License “or any later version” applies to it, you have the option of following the terms and conditions either of that specified version or of any later version that has been published (not as a draft) by the Free Software Foundation. If the Document does not specify a version number of this License, you may choose any version ever published (not as a draft) by the Free Software Foundation.

ADDENDUM: How to use this License for your documents

To use this License in a document you have written, include a copy of the License in the document and put the following copyright and license notices just after the title page:

```
Copyright (C)  year  your name.
Permission is granted to copy, distribute and/or modify this document
under the terms of the GNU Free Documentation License, Version 1.2
or any later version published by the Free Software Foundation;
with no Invariant Sections, no Front-Cover Texts, and no Back-Cover
Texts. A copy of the license is included in the section entitled ‘‘GNU
Free Documentation License’’.
```

If you have Invariant Sections, Front-Cover Texts and Back-Cover Texts, replace the “with...Texts.” line with this:

```
with the Invariant Sections being list their titles, with
the Front-Cover Texts being list, and with the Back-Cover Texts
being list.
```

If you have Invariant Sections without Cover Texts, or some other combination of the three, merge those two alternatives to suit the situation.

If your document contains nontrivial examples of program code, we recommend releasing these examples in parallel under your choice of free software license, such as the GNU General Public License, to permit their use in free software.

GNU GPL

Version 3, 29 June 2007

Copyright © 2007 Free Software Foundation, Inc. <http://fsf.org/>

Everyone is permitted to copy and distribute verbatim copies of this license document, but changing it is not allowed.

Preamble

The GNU General Public License is a free, copyleft license for software and other kinds of works.

The licenses for most software and other practical works are designed to take away your freedom to share and change the works. By contrast, the GNU General Public License is intended to guarantee your freedom to share and change all versions of a program—to make sure it remains free software for all its users. We, the Free Software Foundation, use the GNU General Public License for most of our software; it applies also to any other work released this way by its authors. You can apply it to your programs, 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 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.

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.

2. Basic Permissions.

All rights granted under this License are granted for the term of copyright on the Program, and are irrevocable provided the stated conditions are met. This License explicitly affirms your unlimited permission to run the unmodified Program. The output from running a covered work is covered by this License only if the output, given its

content, constitutes a covered work. This License acknowledges your rights of fair use or other equivalent, as provided by copyright law.

You may make, run and propagate covered works that you do not convey, without conditions so long as your license otherwise remains in force. You may convey covered works to others for the sole purpose of having them make modifications exclusively for you, or provide you with facilities for running those works, provided that you comply with the terms of this License in conveying all material for which you do not control copyright. Those thus making or running the covered works for you must do so exclusively on your behalf, under your direction and control, on terms that prohibit them from making any copies of your copyrighted material outside their relationship with you.

Conveying under any other circumstances is permitted solely under the conditions stated below. Sublicensing is not allowed; section 10 makes it unnecessary.

3. Protecting Users' Legal Rights From Anti-Circumvention Law.

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.

When you convey a covered work, you waive any legal power to forbid circumvention of technological measures to the extent such circumvention is effected by exercising rights under this License with respect to 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.

7. Additional Terms.

“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 permis-

sions 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.

When you convey a copy of a covered work, you may at your option remove any additional permissions from that copy, or from any part of it. (Additional permissions may be written to require their own removal in certain cases when you modify the work.) You may place additional permissions on material, added by you to a covered work, for which you have or can give appropriate copyright permission.

Notwithstanding any other provision of this License, for material you add to a covered work, you may (if authorized by the copyright holders of that material) supplement the terms of this License with terms:

- a. Disclaiming warranty or limiting liability differently from the terms of sections 15 and 16 of this License; or
- b. Requiring preservation of specified reasonable legal notices or author attributions in that material or in the Appropriate Legal Notices displayed by works containing it; or
- c. Prohibiting misrepresentation of the origin of that material, or requiring that modified versions of such material be marked in reasonable ways as different from the original version; or
- d. Limiting the use for publicity purposes of names of licensors or authors of the material; or
- e. Declining to grant rights under trademark law for use of some trade names, trademarks, or service marks; or
- f. Requiring indemnification of licensors and authors of that material by anyone who conveys the material (or modified versions of it) with contractual assumptions of liability to the recipient, for any liability that these contractual assumptions directly impose on those licensors and authors.

All other non-permissive additional terms are considered “further restrictions” within the meaning of section 10. If the Program as you received it, or any part of it, contains a notice stating that it is governed by this License along with a term that is a further restriction, you may remove that term. If a license document contains a further restriction but permits relicensing or conveying under this 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.

Moreover, your license from a particular copyright holder is reinstated permanently if the copyright holder notifies you of the violation by some reasonable means, this is the first time you have received notice of violation of this License (for any work) from that copyright holder, and you cure the violation prior to 30 days after your receipt of the notice.

Termination of your rights under this section does not terminate the licenses of parties who have received copies or rights from you under this License. If your rights have been terminated and not permanently reinstated, you do not qualify to receive new licenses for the same material under section 10.

9. Acceptance Not Required for Having Copies.

You are not required to accept this License in order to receive or run a copy of the Program. Ancillary propagation of a covered work occurring solely as a consequence of using peer-to-peer transmission to receive a copy likewise does not require acceptance. However, nothing other than this License grants you permission to propagate or modify any covered work. These actions infringe copyright if you do not accept this License. Therefore, by modifying or propagating a covered work, you indicate your acceptance of this License to do so.

10. Automatic Licensing of Downstream Recipients.

Each time you convey a covered work, the recipient automatically receives a license from the original licensors, to run, modify and propagate that work, subject to this License. You are not responsible for enforcing compliance by third parties with this License.

An “entity transaction” is a transaction transferring control of an organization, or substantially all assets of one, or subdividing an organization, or merging organizations. If propagation of a covered work results from an entity transaction, each party to that transaction who receives a copy of the work also receives whatever licenses to the work the party’s predecessor in interest had or could give under the previous paragraph, plus a right to possession of the Corresponding Source of the work from the predecessor in interest, if the predecessor has it or can get it with reasonable efforts.

You may not impose any further restrictions on the exercise of the rights granted or affirmed under this License. For example, you may not impose a license fee, royalty, or other charge for exercise of rights granted under this License, and you may not initiate litigation (including a cross-claim or counterclaim in a lawsuit) alleging that any patent claim is infringed by making, using, selling, offering for sale, or importing the Program or any portion of it.

11. Patents.

A “contributor” is a copyright holder who authorizes use under this License of the Program or a work on which the Program is based. The work thus licensed is called the contributor’s “contributor version”.

A contributor’s “essential patent claims” are all patent claims owned or controlled by the contributor, whether already acquired or hereafter acquired, that would be infringed by some manner, permitted by this License, of making, using, or selling its contributor version, but do not include claims that would be infringed only as a consequence of further modification of the contributor version. For purposes of this definition, “control” includes the right to grant patent sublicenses in a manner consistent with the requirements of this License.

Each contributor grants you a non-exclusive, worldwide, royalty-free patent license under the contributor’s essential patent claims, to make, use, sell, offer for sale, import and otherwise run, modify and propagate the contents of its contributor version.

In the following three paragraphs, a “patent license” is any express agreement or commitment, however denominated, not to enforce a patent (such as an express permission to practice a patent or covenant not to sue for patent infringement). To “grant” such a patent license to a party means to make such an agreement or commitment not to enforce a patent against the party.

If you convey a covered work, knowingly relying on a patent license, and the Corresponding Source of the work is not available for anyone to copy, free of charge and under the terms of this License, through a publicly available network server or other readily accessible means, then you must either (1) cause the Corresponding Source to be so available, or (2) arrange to deprive yourself of the benefit of the patent license for this particular work, or (3) arrange, in a manner consistent with the requirements of this License, to extend the patent license to downstream recipients. “Knowingly relying” means you have actual knowledge that, but for the patent license, your conveying the covered work in a country, or your recipient’s use of the covered work in a country, would infringe one or more identifiable patents in that country that you have reason to believe are valid.

If, pursuant to or in connection with a single transaction or arrangement, you convey, or propagate by procuring conveyance of, a covered work, and grant a patent license to some of the parties receiving the covered work authorizing them to use, propagate, modify or convey a specific copy of the covered work, then the patent license you grant is automatically extended to all recipients of the covered work and works based on it.

A patent license is “discriminatory” if it does not include within the scope of its coverage, prohibits the exercise of, or is conditioned on the non-exercise of one or more of the rights that are specifically granted under this License. You may not convey a covered work if you are a party to an arrangement with a third party that is in the business of distributing software, under which you make payment to the third party based on the extent of your activity of conveying the work, and under which the third party grants, to any of the parties who would receive the covered work from you, a discriminatory patent license (a) in connection with copies of the covered work conveyed by you (or copies made from those copies), or (b) primarily for and in connection with specific products or compilations that contain the covered work, unless you entered into that arrangement, or that patent license was granted, prior to 28 March 2007.

Nothing in this License shall be construed as excluding or limiting any implied license or other defenses to infringement that may otherwise be available to you under applicable patent law.

12. No Surrender of Others' Freedom.

If conditions are imposed on you (whether by court order, agreement or otherwise) that contradict the conditions of this License, they do not excuse you from the conditions of this License. If you cannot convey a covered work so as to satisfy simultaneously your obligations under this License and any other pertinent obligations, then as a consequence you may not convey it at all. For example, if you agree to terms that obligate you to collect a royalty for further conveying from those to whom you convey the Program, the only way you could satisfy both those terms and this License would be to refrain entirely from conveying the Program.

13. Use with the GNU Affero General Public License.

Notwithstanding any other provision of this License, you have permission to link or combine any covered work with a work licensed under version 3 of the GNU Affero General Public License into a single combined work, and to convey the resulting work. The terms of this License will continue to apply to the part which is the covered work, but the special requirements of the GNU Affero General Public License, section 13, concerning interaction through a network will apply to the combination as such.

14. Revised Versions of this License.

The Free Software Foundation may publish revised and/or new versions of the GNU General Public License from time to time. Such new versions will be similar in spirit to the present version, but may differ in detail to address new problems or concerns.

Each version is given a distinguishing version number. If the Program specifies that a certain numbered version of the GNU General Public License “or any later version” applies to it, you have the option of following the terms and conditions either of that numbered version or of any later version published by the Free Software Foundation. If the Program does not specify a version number of the GNU General Public License, you may choose any version ever published by the Free Software Foundation.

If the Program specifies that a proxy can decide which future versions of the GNU General Public License can be used, that proxy's public statement of acceptance of a version permanently authorizes you to choose that version for the Program.

Later license versions may give you additional or different permissions. However, no additional obligations are imposed on any author or copyright holder as a result of your choosing to follow a later version.

15. Disclaimer of Warranty.

THERE IS NO WARRANTY FOR THE PROGRAM, TO THE EXTENT PERMITTED BY APPLICABLE LAW. EXCEPT WHEN OTHERWISE STATED IN WRITING THE COPYRIGHT HOLDERS AND/OR OTHER PARTIES PROVIDE THE PROGRAM “AS IS” WITHOUT WARRANTY OF ANY KIND, EITHER EXPRESSED OR IMPLIED, INCLUDING, BUT NOT LIMITED TO, THE IMPLIED WARRANTIES OF MERCHANTABILITY AND FITNESS FOR A PARTICULAR PURPOSE. THE ENTIRE RISK AS TO THE QUALITY AND PERFORMANCE OF THE PROGRAM IS WITH YOU. SHOULD THE PROGRAM PROVE DEFEC-

TIVE, YOU ASSUME THE COST OF ALL NECESSARY SERVICING, REPAIR OR CORRECTION.

16. Limitation of Liability.

IN NO EVENT UNLESS REQUIRED BY APPLICABLE LAW OR AGREED TO IN WRITING WILL ANY COPYRIGHT HOLDER, OR ANY OTHER PARTY WHO MODIFIES AND/OR CONVEYS THE PROGRAM AS PERMITTED ABOVE, BE LIABLE TO YOU FOR DAMAGES, INCLUDING ANY GENERAL, SPECIAL, INCIDENTAL OR CONSEQUENTIAL DAMAGES ARISING OUT OF THE USE OR INABILITY TO USE THE PROGRAM (INCLUDING BUT NOT LIMITED TO LOSS OF DATA OR DATA BEING RENDERED INACCURATE OR LOSSES SUSTAINED BY YOU OR THIRD PARTIES OR A FAILURE OF THE PROGRAM TO OPERATE WITH ANY OTHER PROGRAMS), EVEN IF SUCH HOLDER OR OTHER PARTY HAS BEEN ADVISED OF THE POSSIBILITY OF SUCH DAMAGES.

17. Interpretation of Sections 15 and 16.

If the disclaimer of warranty and limitation of liability provided above cannot be given local legal effect according to their terms, reviewing courts shall apply local law that most closely approximates an absolute waiver of all civil liability in connection with the Program, unless a warranty or assumption of liability accompanies a copy of the Program in return for a fee.

END OF TERMS AND CONDITIONS

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.

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

This program 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 3 of the License, or (at your option) any later version.

This program 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 General Public License for more details.

You should have received a copy of the GNU General Public License along with this program. If not, see <http://www.gnu.org/licenses/>.

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:

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

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

You should also get your employer (if you work as a programmer) or school, if any, to sign a “copyright disclaimer” for the program, if necessary. For more information on this, and how to apply and follow the GNU GPL, see <http://www.gnu.org/licenses/>.

The GNU 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 Lesser General Public License instead of this License. But first, please read <http://www.gnu.org/philosophy/why-not-lgpl.html>.