

Cygwin/XFree86 User's Guide

Harold L Hunt, II

Cygwin/XFree86 User's Guide

by Harold L Hunt, II

Copyright (c) 2000 Harold L Hunt II. Permission is granted to copy, distribute and/or modify this document under the terms of the GNU Free Documentation License, Version 1.1 or any later version published by the Free Software Foundation; with no Invariant Sections, with no Front-Cover Texts, and with no Back-Cover Texts. A copy of the license is included in the section entitled "GNU Free Documentation License".

Revision History

Revision 0.0.5 2001-07-03 Revised by: huntharo@msu.edu

Change the download directory from / to /tmp.

Revision 0.0.4 2001-07-02 Revised by: huntharo@msu.edu

Updated the Cygwin/XFree86 downloading instructions with the new archive names that are created by the XFree86 build-bindist script.

Revision 0.0.3 2001-06-11 Revised by: huntharo@msu.edu

Replaced the Cygwin/XFree86 Installation graphics with screen markup.

Revision 0.0.2 2001-05-06 Revised by: huntharo@msu.edu

Revision 0.0.1 2001-04-19 Revised by: huntharo@msu.edu

Revision 0.0.0 2000-09-13 Revised by: harold@compasstechnologies.com

Table of Contents

1. Cygwin/XFree86 Overview	1
2. Setting Up Cygwin/XFree86	1
Cygwin/XFree86 Contents	1
Downloading Cygwin	1
Installing Cygwin	6
Downloading Cygwin/XFree86	10
Installing Cygwin/XFree86	12
3. Configuring Cygwin/XFree86	15
Configuration Overview	15
Command Line Parameters	15
4. Using Cygwin/XFree86	16
Starting Cygwin/XFree86	16
Switching Out of Cygwin/XFree86	16
Stopping Cygwin/XFree86	16
Remote Sessions via XDMCP	16
Displaying Remote Clients	16
A. GNU Free Documentation License	18
0. PREAMBLE	18
1. APPLICABILITY AND DEFINITIONS	18
2. VERBATIM COPYING	19
3. COPYING IN QUANTITY	19
4. MODIFICATIONS	20
5. COMBINING DOCUMENTS	22
6. COLLECTIONS OF DOCUMENTS	22
7. AGGREGATION WITH INDEPENDENT WORKS	22
8. TRANSLATION	23
9. TERMINATION	23
10. FUTURE REVISIONS OF THIS LICENSE	23
How to use this License for your documents	24

Chapter 1. Cygwin/XFree86 Overview

Cygwin/XFree86 is a port of XFree86 to Cygwin; Cygwin provides a UNIX-like API on the Win32 platform. As of 2001-07-01 the supported Win32 platforms are Windows 95, Windows 98, Windows Me, Windows NT 4.0, and Windows 2000.

Chapter 2. Setting Up Cygwin/XFree86

Cygwin/XFree86 Contents

Cygwin/XFree86 consists of two parts: Cygwin, a port of the GNU tools to Win32, and Cygwin/XFree86, a port of XFree86 to Win32. Both parts of Cygwin/XFree86 are needed to successfully run an X Server on a Win32 platform.

Downloading Cygwin

Cygwin tools are, in the words of the Cygwin development homepage, <http://cygwin.com/>, “ports of the popular GNU development tools and utilities for Windows 95, 98, and NT. They function by using the Cygwin library which provides a UNIX-like API on top of the Win32 API.” Cygwin allows the compilation of the XFree86 source on Win32; several patches were made to the XFree86 source to make XFree86 actually compile and run under Cygwin; those patches have been merged into the XFree86 4.0 source tree.

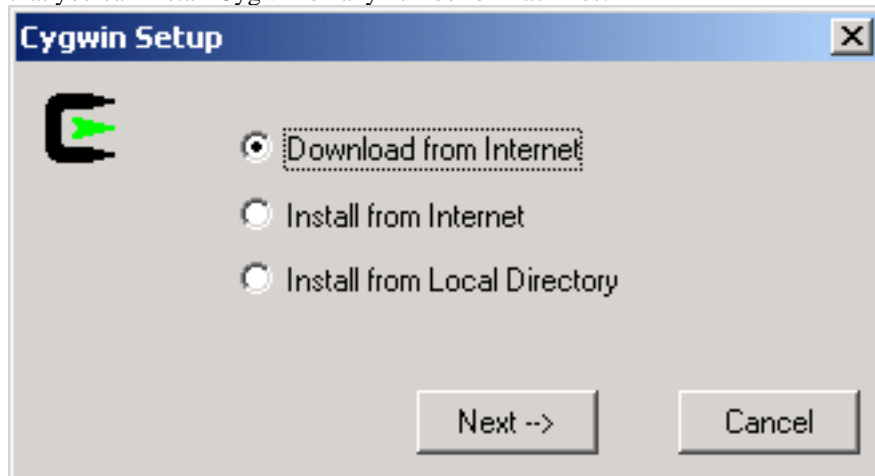
Cygwin has a nice setup program that downloads and installs the necessary Cygwin packages for you.

Tip: Be sure to use `setup.exe` version 2.13 or greater if you intend to save the downloaded packages to a Samba share; some versions of Samba have a problem with prior versions of `setup.exe`.

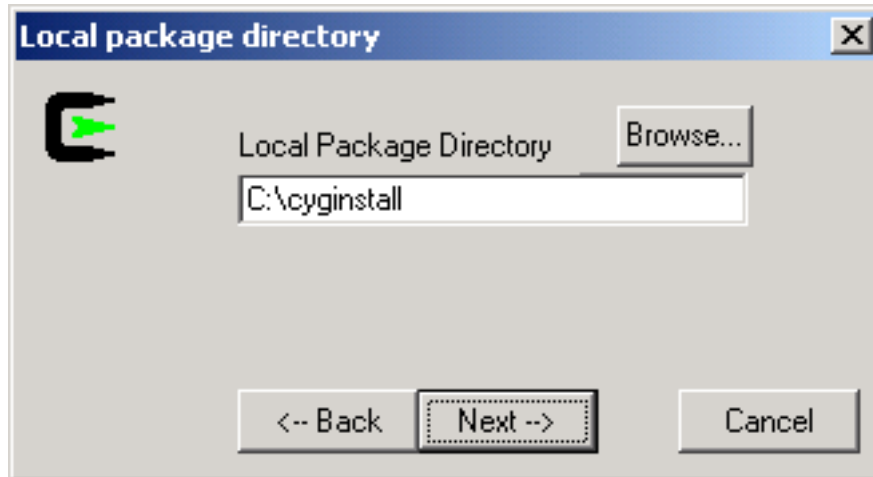
1. Open the Cygwin, <http://cygwin.com/> page in your web browser
2. Click the “Install Cygwin Now” link in the upper-right hand corner of the page; or, click the “Install” link next to “Latest net release:”, which should be near the top of the page in the main content area. This link downloads `setup.exe` from the primary Cygwin server; save `setup.exe` to the directory that you would like to store the downloaded packages in (e.g. `c:\cyginstall`); do not save `setup.exe` to `c:\cygwin`, as that is the default directory for the extraction and installation of the downloaded packages. At the time of writing, a full download of all Cygwin packages takes 25 MB of disk space.
3. Run `setup.exe`, you will see the welcome screen:



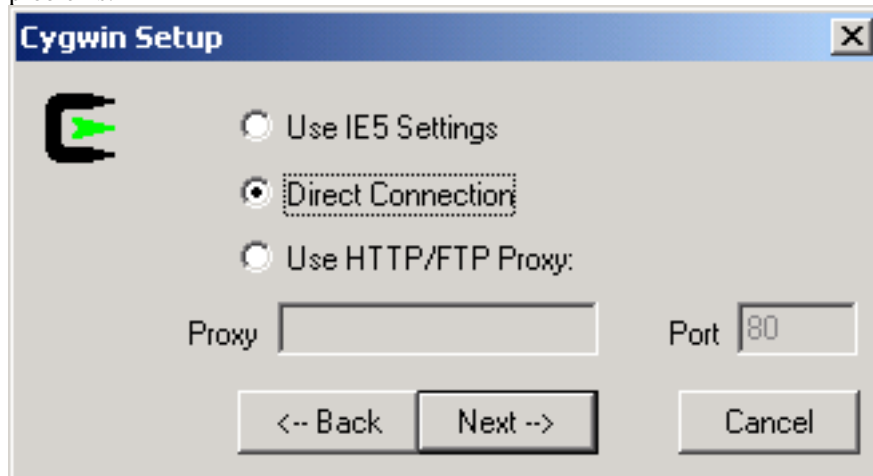
4. Click Next to proceed to the next screen
5. Choose, Download from Internet, this will save the package files to your download directory so that you can install Cygwin on any number of machines:



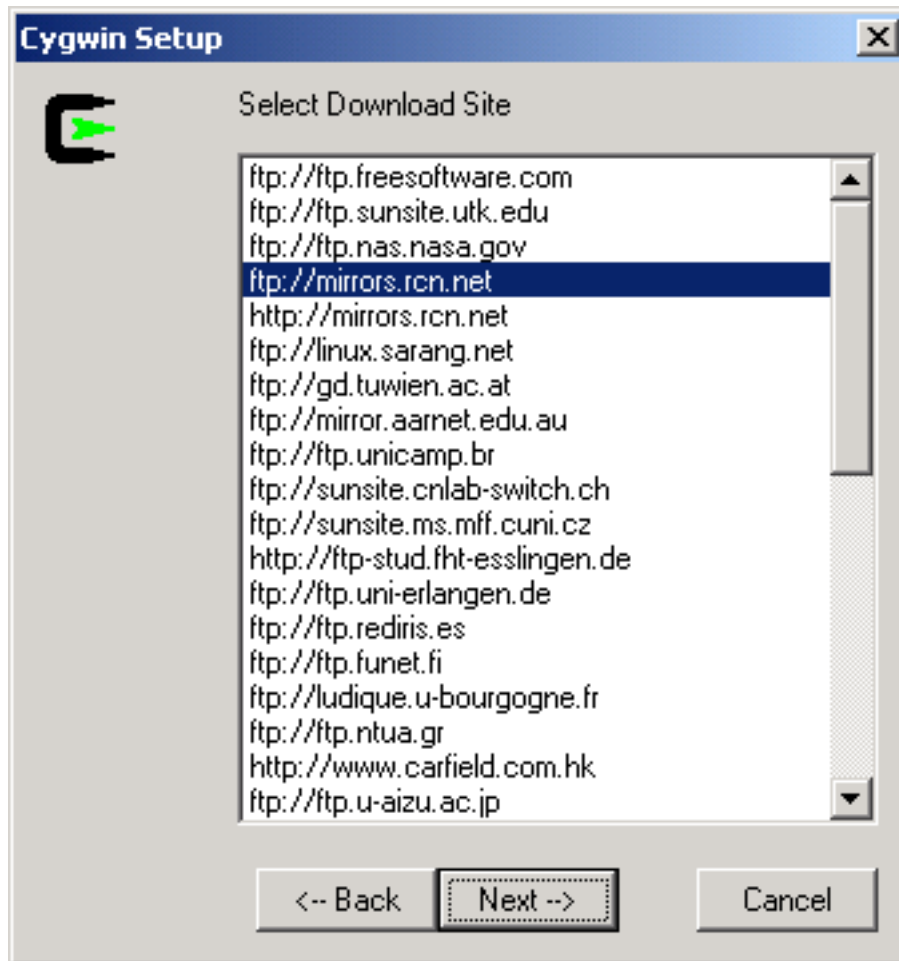
6. Click Next to proceed to the next screen
7. Local Package Directory should default to the directory that you ran setup.exe from:



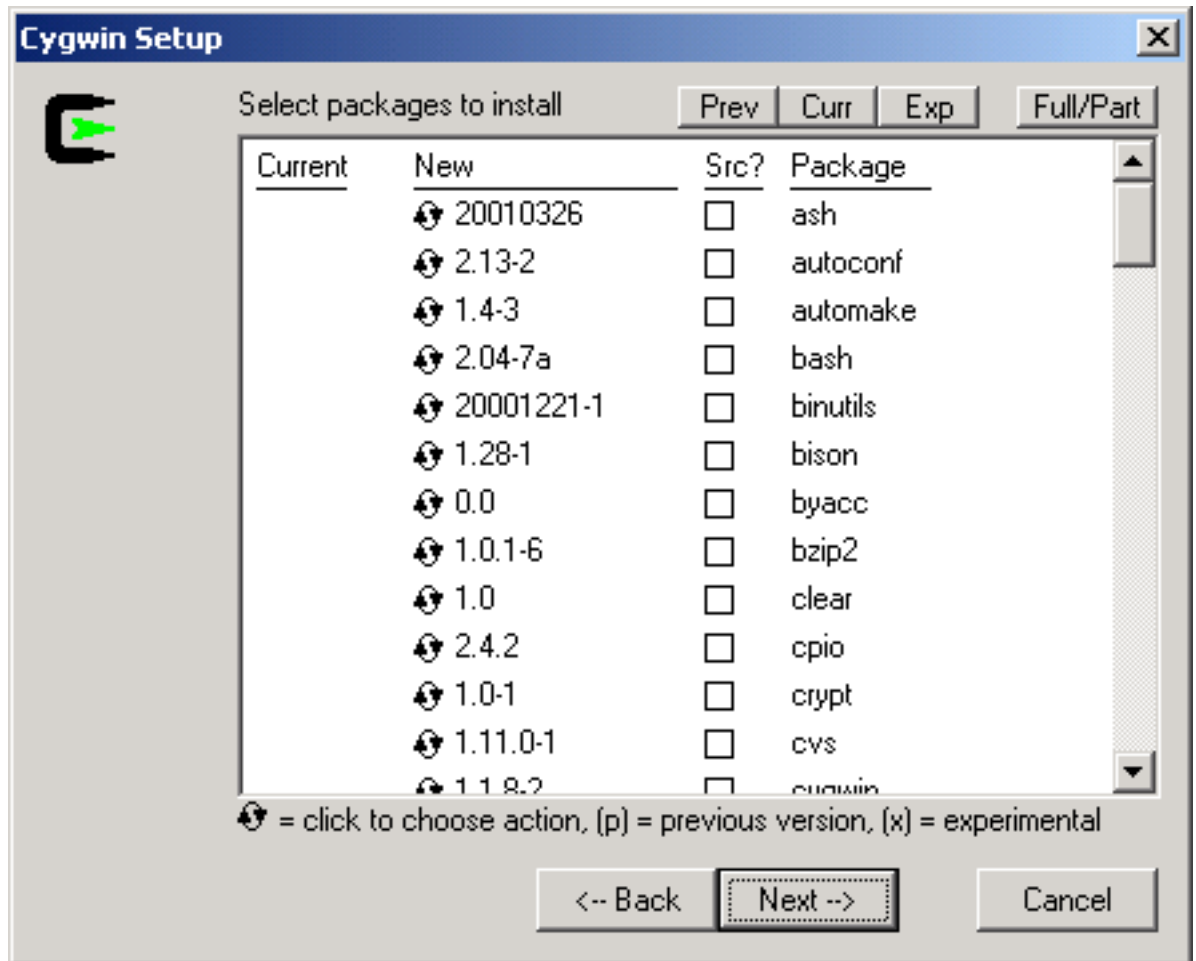
8. Click **Next** to proceed to the next screen
9. Choose your proxy setup, or, just choose **Direct Connection** to limit the scope of download problems:



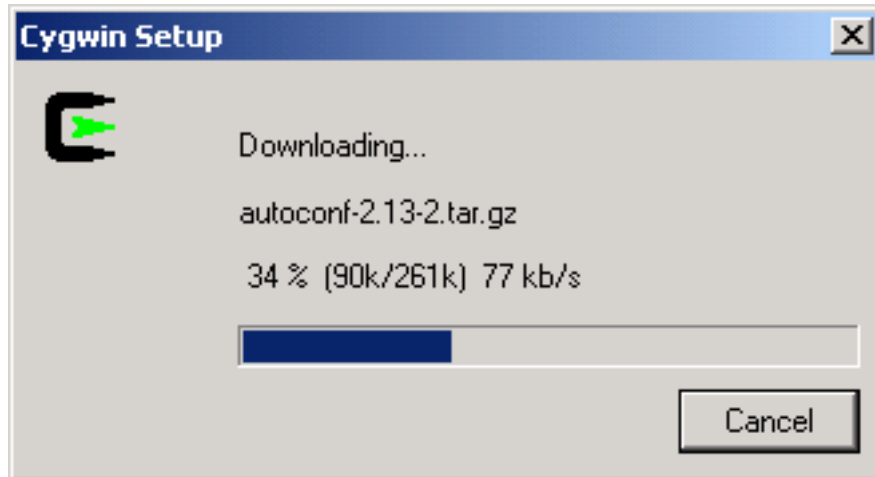
10. Click **Next** to proceed to the next screen
11. Select your nearest mirror for downloading:



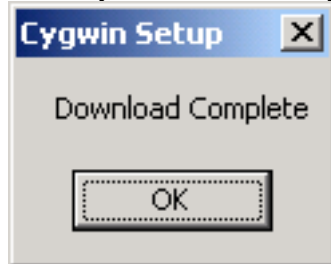
12. Click **Next** to proceed to the next screen; setup will download a list of available packages as it moves to the next screen
13. All packages, downloaded size of 56.1 MB as of 2001-04-19, are selected for download by default; I do not recommend changing the list of packages to download unless you really know what you are doing:



14. Click Next to begin the download process, you may want to try another mirror if you see a "Connecting" message on this screen for a long period of time:



15. You should receive a message that the download has completed; you now have all of the packages necessary for installation of Cygwin:



Installing Cygwin

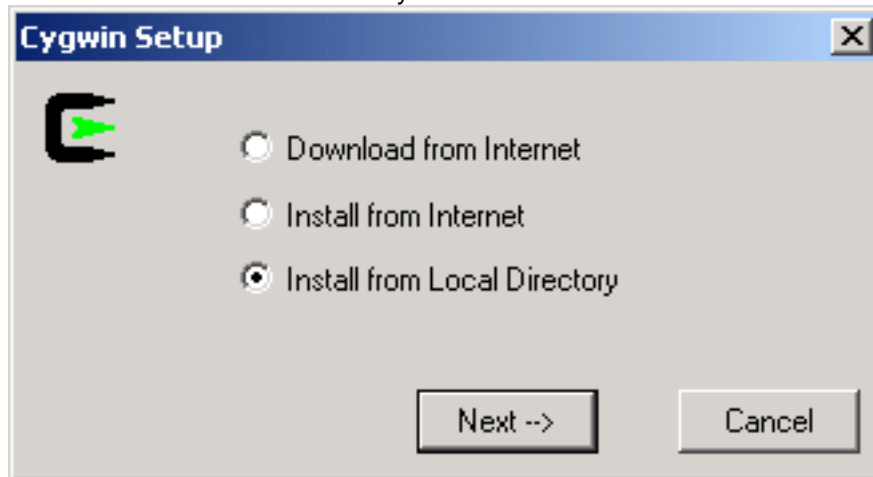
You may install the downloaded Cygwin packages on any number of the machines by simply copying your download directory to that machine, or making the download directory accessible via a network share, and following the installation steps below. The following installation steps assume that you are installing Cygwin on the same machine that you used to download the Cygwin packages.

Follow these steps to install Cygwin:

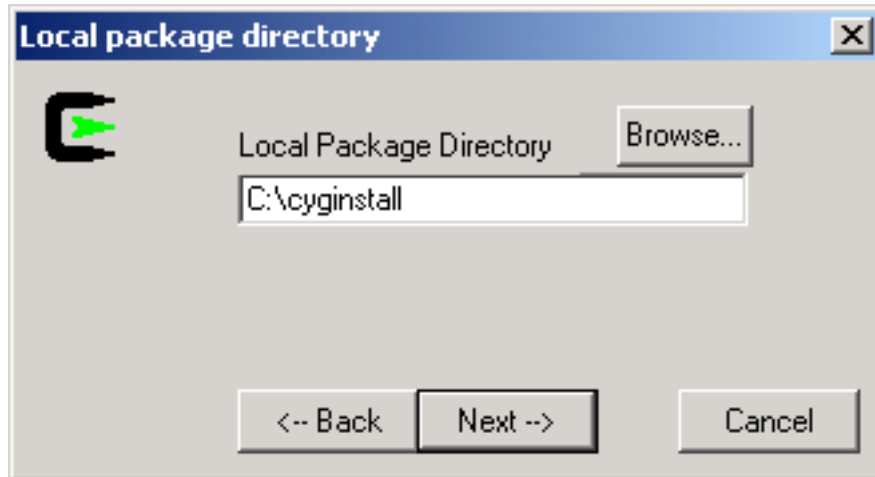
1. Run `setup.exe` from your download directory (e.g. `c:\cyginstall`), you will get the same welcome screen as before:



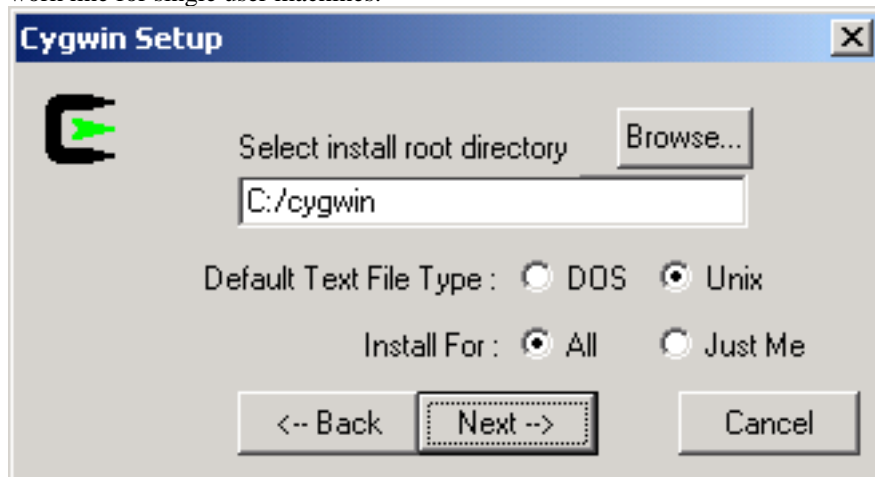
2. Click Next to proceed to the next screen
3. Choose Install from Local Directory:



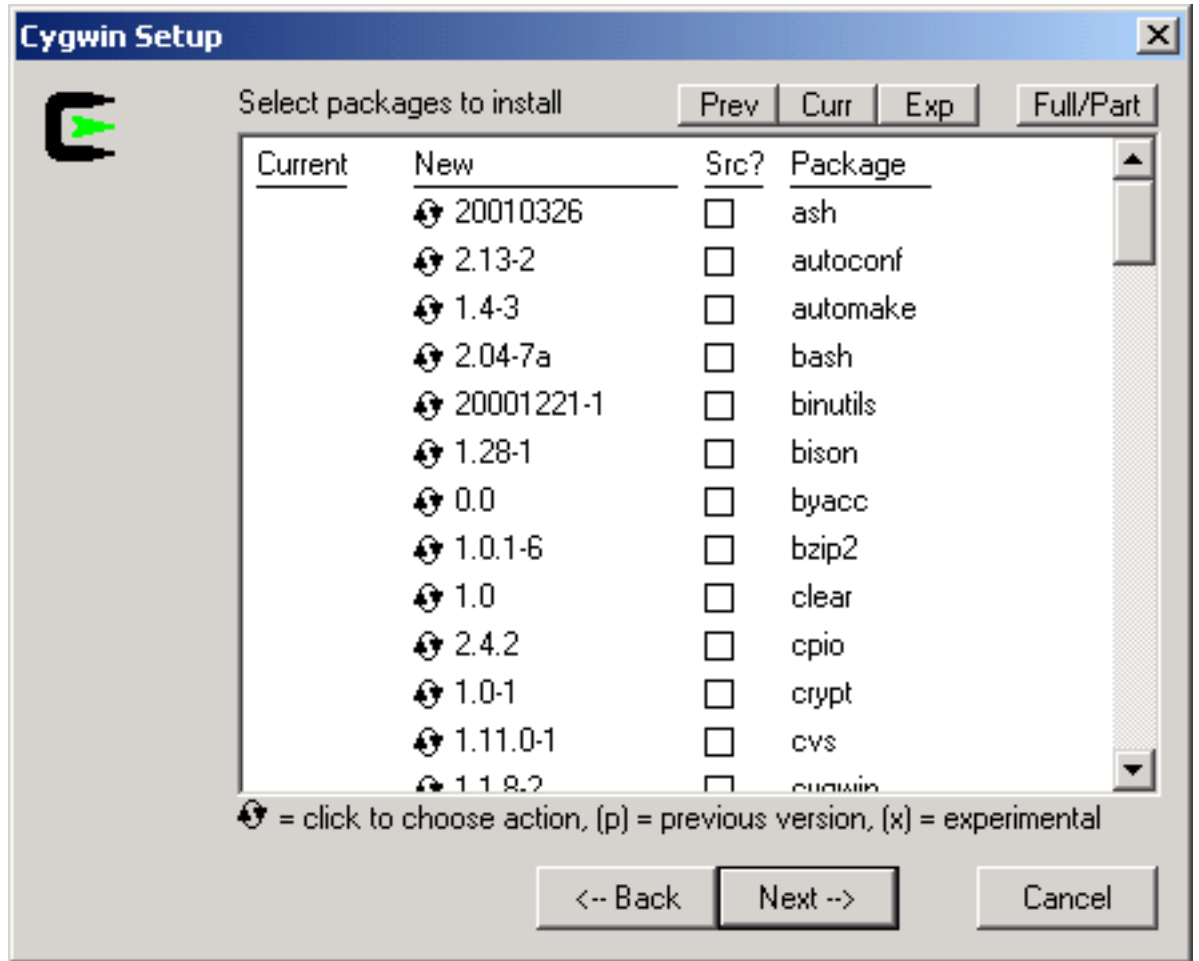
4. Click Next to proceed to the next screen
5. Local Package Directory should default to the directory that you ran `setup.exe` from, which should also be the same directory that you previously downloaded the packages to:



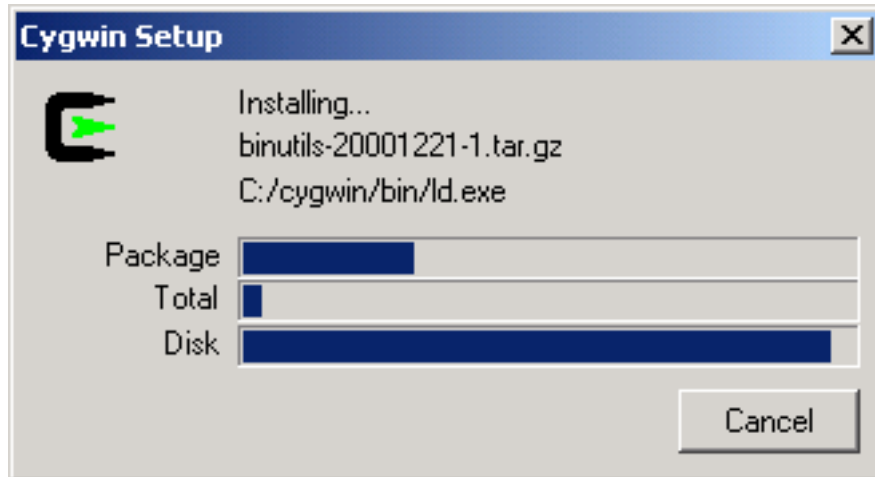
6. Click Next to proceed to the next screen
7. The default Install Root is `c:\cygwin`; this should be fine for most installations. Leave Default Text File Type as UNIX. If you have several users on your NT machine, and you are logged in with local administrative privileges, you may wish to set Install For to All, but the default of Just Me will work fine for single user machines.



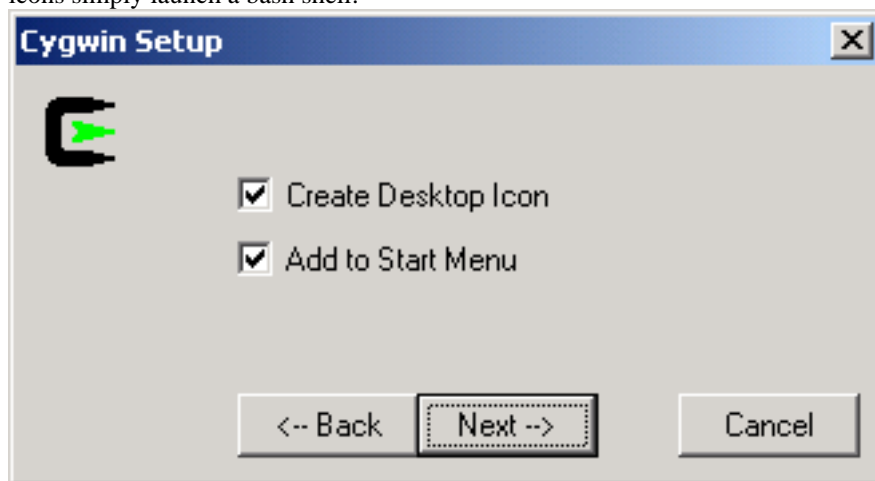
8. Click Next to proceed to the next screen
9. All downloaded packages, with an installed size of 175 MB as of 2001-04-19, are selected for installation by default; I do not recommend changing the list of packages to install unless you really know what you are doing:



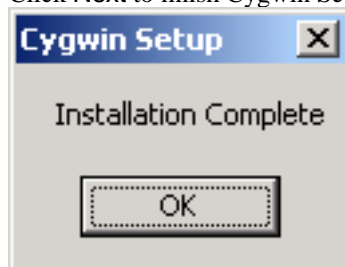
10. Click Next to proceed with the installation



11. I highly recommend allowing Cygwin Setup to create Desktop and Start Menu icons for you; these icons simply launch a bash shell:



12. Click Next to finish Cygwin Setup:



Downloading Cygwin/XFree86

Cygwin/XFree86 is comprised of several binary tarballs.

Follow these steps to download Cygwin/XFree86 binaries:

1. Visit the Cygwin Mirrors page, <http://cygwin.com/mirrors.html>, to find your closest mirror
2. The ftp url for your mirror site should take you to the Cygwin directory on the mirror
3. Download the following files from `xfree/xc-4-binaries`, saving them to the `tmp` directory in the root of your Cygwin installation directory (e.g. `c:\cygwin`). The full path that you save the files to will look like `c:\cygwin\tmp`. The compressed file size appears after each file; as of 2001-07-01 you will need approximately 30 MB of disk space to download the required files, your download size will vary if you choose to download any optional files.

Downloading with a Web Browser: Some web browsers automatically decompress saved files when you use the left mouse button to follow the link to a file; bunzip2 will report, "Data integrity error when decompressing.", when attempting to decompress a file that has been decompressed by your web browser. Prevent your files from being automatically decompressed by clicking the right mouse button on a file link and choosing a command such as Save Target As... or Save Link As... from the context sensitive menu. Better yet, download your files with a stand alone ftp client.

- `extract.exe.bz2` (119 KB; required, used by the installation script)
- `startup-scripts.tgz` (1.4 KB; required, example X Server and client startup scripts)
- `Xbin.tgz` (12.1 MB; required, executables for xterm, twm, etc.)
- `Xdoc.tgz` (35.2 KB; required, formatted documentation)
- `Xetc.tgz` (593 KB; required, configuration files for the X Server and programs in Xbin.tgz)
- `Xf100.tgz` (12.1 MB; optional, 100 dpi fonts (75 dpi fonts are used by default))
- `Xfcyr.tgz` (368 KB; optional, Cyrillic fonts)
- `Xfenc.tgz` (311 KB; required, font encodings)
- `Xfnts.tgz` (13.9 MB; required, 75 dpi fonts)
- `Xfsc1.tgz` (1.6 MB; optional, Speedo and Type1 scalable fonts)
- `Xfsrv.tgz` (248 KB; optional, X Font Server)
- `Xhtml.tgz` (703 KB; optional, documentation html format)

- `xinstall.sh` (34 KB; required, XFree86 installation script)
- `xjdoc.tgz` (107 KB; optional, XFree86 Japanese documentation)
- `xlib.tgz` (95 KB; required, X11R6/lib/ files)
- `xman.tgz` (616 KB; required, **man** pages)
- `xnest.tgz` (1.2 MB; optional, **Xnest** nested X Server)
- `xprog.tgz` (553 KB; optional, additional files needed to compile programs for Cygwin/XFree86)
- `xprt.tgz` (846 KB; optional, X Print (Xprt) server)
- `xps.tgz` (5.9 MB; optional, documentation in Postscript format)
- `xvfb.tgz` (1.3 MB; optional, X Virtual Frame Buffer (Xvfb) server)
- `xserv.tgz` (1.3 MB; required, the Cygwin/XFree86 X Server)

4. Download of Cygwin/XFree86 binaries is now complete

Installing Cygwin/XFree86

Cygwin/XFree86 binaries are installed by the `xinstall.sh` script.

Follow these steps to install Cygwin/XFree86 binaries:

1. Launch your Cygwin environment, using either the icon on your Desktop, the icon in your Start Menu, or by running `cygwin.bat` from your Cygwin directory (e.g. `c:\cygwin`); you should see a window like the following:

```
Harold@MyWindowsHost ~
$
```

2. Change the current directory to the `tmp` directory in your Cygwin root directory:

```
Harold@MyWindowsHost ~
$ cd /tmp

Harold@MyWindowsHost /tmp
$
```

3. Extract the `extract.exe.bz2` archive:


```
Harold@MyWindowsHost /tmp
$ bunzip2 extract.exe.bz2
```

```
Harold@MyWindowsHost /tmp
$
```

4. Copy the `extract.exe` file to `/bin`:

```
Harold@MyWindowsHost /tmp
$ cp extract.exe /bin
```

```
Harold@MyWindowsHost /tmp
$
```

5. Run the `Xinstall.sh` script. Follow the step-by-step instructions that the script provides:

```
Harold@MyWindowsHost /tmp
$ ./Xinstall.sh
```

```
Welcome to the XFree86 4.1.0 installer
```

```
You are strongly advised to backup your existing XFree86 installation
before proceeding.  This includes the /usr/X11R6 and /etc/X11
directories.  The installation process will overwrite existing files
in those directories, and this may include some configuration files
that may have been customised.
```

```
If you are installing a version different from 4.1.0, you
may need an updated version of this installer script.
```

```
Do you wish to continue? (y/n) [n] n
```

```
...
```

```
Harold@MyWindowsHost /tmp
$
```

6. Copy `startup-scripts.tgz` to `/usr/X11R6/bin`:

```
Harold@MyWindowsHost /tmp
$ cp startup-scripts.tgz /usr/X11R6/bin
```

```
Harold@MyWindowsHost /tmp
```

\$

7. Change the current directory to /usr/X11R6/bin:

```
Harold@MyWindowsHost /tmp
```

```
$ cd /usr/X11R6/bin
```

```
Harold@MyWindowsHost /usr/X11R6/bin
```

\$

8. Extract startup-scripts.tgz:

```
Harold@MyWindowsHost /usr/X11R6/bin
```

```
$ tar -xzf startup-scripts.tgz
```

```
Harold@MyWindowsHost /usr/X11R6/bin
```

\$

9. Installation of Cygwin/XFree86 binaries is now complete.

Chapter 3. Configuring Cygwin/XFree86

Configuration Overview

Cygwin/XFree86 settings are configured primarily through command-line parameters passed to `xwin.exe`. Cygwin/XFree86 comes with a file called `startxwin.bat` that launches an X Server, a terminal, and a window manager.

Command Line Parameters

You need to pass a proper screen configuration for screen number 0 to **XWin.exe**; below is the syntax for **XWin.exe** parameters.

```
XWin.exe {-screen screen_number widthxheightxbit_depth ...}  
[-engine engine_number ] [-fullscreen] [-emulate3buttons timeout_in_milliseconds ]
```

Below is an example command line for **XWin.exe**.

```
XWin.exe -screen 0 800x600x16
```

Chapter 4. Using Cygwin/XFree86

Starting Cygwin/XFree86

Run `/usr/X11R6/bin/startxwin.bat` by double-clicking it in Windows Explorer.

Switching Out of Cygwin/XFree86

Press **Alt-Tab** to switch from Cygwin/XFree86 to your Windows desktop or other running Windows applications.

Stopping Cygwin/XFree86

When you are done running Cygwin/XFree86, press **Alt-F4** to shutdown the X server.

Remote Sessions via XDMCP

Cygwin/XFree86 can be used login to a remote session using XDMCP (X Display Manager Control Protocol).

Start Cygwin/XFree86 with a command similar to the following to login to a remote session using XDMCP:

```
XWin.exe -screen screen_number widthxheightxdepth -query  
remote_host_ip_address -from local_host_ip_address
```

XDMCP is a complex system; further discussion of XDMCP is beyond the scope of this document.

Displaying Remote Clients

Displaying remote X clients with Cygwin/XFree86 is nearly identical to displaying remote X clients with any other X Server. Simply follow the commands listed below.

On your Windows machine:

1. Launch Cygwin/XFree86
2. In an X terminal type `/usr/X11R6/bin/xhost remote_host_ip_address`
3. In an X terminal type `/usr/bin/telnet remote_host_ip_address`. Use the explicit path to ensure that Cygwin's telnet is run instead of Microsoft's telnet; Microsoft's telnet will crash on startup when run from Cygwin/XFree86.
4. Login to your remote machine via your telnet session
5. In your telnet session type, `DISPLAY=windows_host_ip_address:0.0`
6. In your telnet session type, `export DISPLAY`
7. In your telnet session type, `xterm&`. This will launch an xterm that should display in your Cygwin/XFree86 screen.
8. Launch other remote clients from the remote xterm window that you just opened; I recommend starting the remote clients in the background, by appending `&` to the command name, so that you don't have to open several remote xterm's.

Appendix A. GNU Free Documentation License

Version 1.1, March 2000

Copyright (C) 2000 Free Software Foundation, Inc. 59 Temple Place, Suite 330, Boston, MA 02111-1307 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 written 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 noncommercially. 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 that contains a notice placed by the copyright holder saying it can be distributed under the terms of this License. The "Document", below, refers to any such manual or work. Any member of the public is a licensee, and is addressed as "you".

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. (For example, 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.

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 "Transparent" copy of the Document means a machine-readable copy, represented in a format whose specification is available to the general public, whose contents can be viewed and edited directly and 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 has been designed to thwart or discourage subsequent modification by readers is not Transparent. 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 designed for human modification. Opaque formats include PostScript, PDF, 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 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.

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 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 publicly-accessible computer-network location containing a complete Transparent copy of the Document, free of added material, which the general network-using public has access to download anonymously at no charge using public-standard network protocols. 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 less than five).

- 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", and 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. In any section entitled "Acknowledgements" or "Dedications", preserve the section's title, 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 as "Endorsements" or to conflict in title with any Invariant Section.

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.

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, does not as a whole count as a Modified Version of the Document, provided no compilation copyright is claimed for the compilation. Such a compilation is called an "aggregate", and this License does not apply to the other self-contained works thus compiled with the Document, on account of their being thus compiled, if they 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 quarter of the entire aggregate, the Document's Cover Texts may be placed on covers that surround only the Document within the aggregate. Otherwise they must appear on covers around 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 provided that you also include the original English version of this License. In case of a disagreement between the translation and the original English version of this License, the original English version will prevail.

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.

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 1.1 or any later version published by the Free Software Foundation; with the Invariant Sections being LIST THEIR TITLES, with the Front-Cover Texts being LIST, and with the Back-Cover Texts being LIST. A copy of the license is included in the section entitled "GNU Free Documentation License".

If you have no Invariant Sections, write "with no Invariant Sections" instead of saying which ones are invariant. If you have no Front-Cover Texts, write "no Front-Cover Texts" instead of "Front-Cover Texts being LIST"; likewise for Back-Cover Texts.

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.