Cygwin/XFree86 Contributor's Guide

Harold L Hunt, II

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by Harold L Hunt, II

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Chapter 1. Overview

The Cygwin/XFree86 project can use your help! We will do everything we can to make experienced contributers productive as soon as possible. We also want to make it as easy as possible for new contributers to make Cygwin/XFree86 their first open source project.

Cygwin/XFree86 is part of the vast number of open source/free software programs that provide compatibility with closed source/commercial software products. Cygwin/XFree86 enables the coexistence of closed software and open software during the period of transition from an almost completely closed software market to an almost completely open software market.

Join in the excitement of opening your Windows machine to the X Window System.

We need programmers, documentation writers, and website maintainers.

Chapter 2. Programming

Overview

This chapter provides a consolidated overview of all of the information needed to begin making source code contributions to Cygwin/XFree86. Creating a source code contribution for Cygwin/XFree86 requires an amazingly small amount of information; however, prior to this document that tiny amount of information was difficult to obtain, as it was scattered across several documents and source code files. New programmers with no open source project experience, as well as programming gurus, will be able to make sourc code contributions to Cygwin/XFree86 after reading this chapter. Programming gurus are great; our intention is to create more of them.

You will want to start downloading the XFree86 source code tree immediately after reading the section called *Obtaining the Source Code*, if you have an active network connection at your disposal, as downloading the source code tree can take anywhere from 10 minutes to 10 hours, depending upon the speed of your connection. You will find it advantageous to have a source code tree as you read the later sections.

Obtaining the Source Code

Cygwin/XFree86 source code is contained in, and distributed with, the XFree86 source code tree. Read-only CVS access to the XFree86 source tree (http://xfree86.org/cvs/) is also available from the XFree86 project.

The XFree86 CVS tree is not always buildable on Cygwin, as the XFree86 CVS tree is modified frequently, and sometimes those modifications cause building on Cygwin to fail; however, there are a few developers monitoring the build state of the XFree86 CVS tree on Cygwin, and they quickly fix build problems as they appear. It is unlikely that you will experience problems building XFree86 on Cygwin; in the event that you do experience build problems, you may wish to drop a note to cygwin-xfree@cygwin.com to let the developers there know that the tree is not building correctly.

Periodically the Cygwin/XFree86 project releases a snapshot of the XFree86 source code that is known to compile. It is perfectly acceptable, though rarely necessary, to do your independent development work from a stable source code snapshot, rather than from the XFree86 CVS tree. Developing from a stable source code snapshots minimizes the scope of problems that you may encounter, which can greatly ease debugging of new features and other code modifications.

It is highly recommended to get the XFree86 *CVS* tree by using the CVS *pserver* method. CVS pserver is the easiest CVS method to use for anonymous access to public CVS trees, as you need only type in a

well-known password to download the CVS tree. CVS pserver is rarely used to control checkins to CVS trees, as the passwords are stored and sent as plain text; thus, pserver is extremely insecure. However, security does not matter for a public read-only CVS tree.

Follow these steps to checkout the XFree86 CVS tree:

1. Open a Cygwin **bash** shell by double clicking the Cygwin icon on your desktop, or by selecting Start, then Programs, followed by Cygnus Solutions, and finally Cygwin Bash Shell. You will see output similar to the following:

   ```
   Harold@MyWindowsHost ~
   $
   ```

2. Create a directory in which to store your XFree86 CVS tree and your builds; `~/x-devel` is recommended:

   ```
   Harold@MyWindowsHost ~
   $ mkdir x-devel

   Harold@MyWindowsHost ~
   $
   ```

3. Change the current directory to your new XFree86 development directory:

   ```
   Harold@MyWindowsHost ~
   $ cd x-devel

   Harold@MyWindowsHost ~/x-devel
   $
   ```

4. Set the CVSROOT environment variable to point to the XFree86 CVS repository:

   ```
   Harold@MyWindowsHost ~/x-devel
   $ CVSROOT=:pserver:anoncvs@anoncvs.xfree86.org:/cvs

   Harold@MyWindowsHost ~/x-devel
   $ export CVSROOT

   Harold@MyWindowsHost ~/x-devel
   $
   ```

5. Login to the CVS server, using password “anoncvs”:

```
Harold@MyWindowsHost ~/x-devel
$ cvs login
(Logging in to anoncvs@anoncvs.xfree86.org)
CVS password:

Harold@MyWindowsHost ~/x-devel
$
```

6. Checkout the `xc/` directory from the XFree86 CVS tree:

   Tip: The *-zn* parameter specifies the compression level to use, from 1 to 9, with 9 being maximum compression.

   Note: As of 2001-06-12, a checked out XFree86 CVS source code tree contains 16,199 files in 3,021 folders, which is 242 MB of data, but requires 285 MB of storage space on a file system using 4 KB allocation units.

```
Harold@MyWindowsHost ~/x-devel
$ cvs -z4 checkout xc
cvs server: Updating xc

...

Harold@MyWindowsHost ~/x-devel
$
```

   You may preserve a logfile for the checkout session by instead using the following command:

```
Harold@MyWindowsHost ~/x-devel
$ cvs -z4 checkout xc > xc-cvs-checkout.log 2>&1

Harold@MyWindowsHost ~/x-devel
$
```

Compiling the Source Code

Compiling Cygwin/XFree86 doesn't have to be hard, although the XFree86 source code tree contains over 250 MB of data. There are a few simple techniques that make building the source code, keeping the source code up to date, and keeping the source code organized much easier.

Compiling Overview

Compiling the XFree86 source code tree is a lot easier when you keep your builds in directories seperate from the source code directory. Keeping the source code and builds in seperate directories allows you to have many builds for different configurations, allows you to easily delete a build, and keeps the source code tree clean and manageable.

A small utility, `lndir.exe`, is needed to keep your builds directories sepereate from your source directory; `lndir.exe` works just like the standard **ln** on UNIX, but `lndir.exe` creates links recursively for all files and directories in the specified directory. The `lndir.exe` utility is included with the XFree86 source code tree; but the catch is that you need to build the tree before you get `lndir.exe`. `lndir.exe` has been compiled and is available at http://www.msu.edu/~huntharo/xwin/lndir.exe.bz2 (8 kB). Download the file, saving it to your Cygwin root directory (e.g. `c:\cygwin`), then follow the simple instructions below to install the utility:

1. Launch a Cygwin **bash** prompt. You should see a screen similar to the following:

```
Harold@MyWindowsHost ~
$
```

2. Change to your Cygwin root directory:

```
Harold@MyWindowsHost ~
$ cd /

Harold@MyWindowsHost /
$
```

3. Uncompress lndir.exe.bz2:

```
Harold@MyWindowsHost /
$ bunzip2 lndir.exe.bz2

Harold@MyWindowsHost /
$
```

4. Copy lndir.exe to `/bin`:

```
Harold@MyWindowsHost /
$ cp lndir.exe /bin

Harold@MyWindowsHost /
$
```

5. Verify that **lndir** is working:

```
Harold@MyWindowsHost /
$ lndir
usage: lndir.exe [-silent] [-ignorelinks] fromdir [todir]

Harold@MyWindowsHost /
$
```

6. The **lndir** utility is now installed.

Standard Build

Follow these steps to create a standard, non-debug, build:

1. Change the current directory to your XFree86 development directory:

```
Harold@MyWindowsHost ~
$ cd x-devel

Harold@MyWindowsHost ~/x-devel
$
```

2. Create a directory to house your builds, `~/x-devel/build` is recommended:

```
Harold@MyWindowsHost ~/x-devel
$ mkdir build

Harold@MyWindowsHost ~/x-devel/build
$
```

3. Change the current directory to your build directory:

```
Harold@MyWindowsHost ~/x-devel
$ cd build

Harold@MyWindowsHost ~/x-devel/build
$
```

4. Create a directory for your standard build, `std` is recommended:

```
Harold@MyWindowsHost ~/x-devel/build
$ mkdir std

Harold@MyWindowsHost ~/x-devel/build
$
```

5. Change the current directory to your standard build directory:

```
Harold@MyWindowsHost ~/x-devel/build
$ cd std

Harold@MyWindowsHost ~/x-devel/build/std
$
```

6. Create symlinks to your source tree, using **lndir**, in your standard build directory:

> **Note:** As of 2001-06-12, creating symlinks to the source tree creates 11,664 files in 1,510 folders, which is only 2.24 MB of data, but requires 45.5 MB of storage space on a file system using 4 KB allocation units.

```
Harold@MyWindowsHost ~/x-devel/build/std
$ lndir ../../xc/
../../xc/config:
../../../xc/config/cf:

...

Harold@MyWindowsHost ~/x-devel/build/std
$
```

7. Run a standard build of the entire tree, which takes between 30 minutes and 5 hours, saving the output of the build commands to `World.log`:

   Note: As of 2001-06-12, a standard build of the entire tree requires 255.5 MB of storage space on a file system using 4 KB allocation units; that is in addition to the 45.5 MB of previously generated symlinks.

   As a benchmark, a standard build runs for 71 minutes on a machine with a 1.2 GHz Atlhon, 256 MB DDR RAM, and a 7200 RPM ATA/100 HD.

```
Harold@MyWindowsHost ~/x-devel/build/std
$ make World > World.log 2>&1

Harold@MyWindowsHost ~/x-devel/build/std
$
```

Debug Build

Follow these steps to create a build with debugging information:

1. Change the current directory to your XFree86 development directory:

```
Harold@MyWindowsHost ~
$ cd x-devel

Harold@MyWindowsHost ~/x-devel
$
```

2. If you have not already done so, create a directory to house your builds, `~/x-devel/build` is recommended:

```
Harold@MyWindowsHost ~/x-devel
$ mkdir build

Harold@MyWindowsHost ~/x-devel/build
$
```

3. Change the current directory to your build directory:

```
Harold@MyWindowsHost ~/x-devel
```

```
$ cd build

Harold@MyWindowsHost ~/x-devel/build
$
```

4. Create a directory for your debug build, `debug` is recommended:

```
Harold@MyWindowsHost ~/x-devel/build
$ mkdir debug

Harold@MyWindowsHost ~/x-devel/build
$
```

5. Change the current directory to your debug build directory:

```
Harold@MyWindowsHost ~/x-devel/build
$ cd debug

Harold@MyWindowsHost ~/x-devel/build/debug
$
```

6. Create links to your source tree, using **lndir**, in your standard build directory:

> **Note:** As of 2001-06-12, creating symlinks to the source tree creates 11,664 files in 1,510 folders, which is only 2.24 MB of data, but requires 45.5 MB of storage space on a file system using 4 KB allocation units.

```
Harold@MyWindowsHost ~/x-devel/build/debug
$ lndir ../../xc/
../../xc/config:
../../../xc/config/cf:

...

Harold@MyWindowsHost ~/x-devel/build/debug
$
```

7. Run a debug build of the entire tree, which takes between 30 minutes and 5 hours, saving the output of the build commands to `World.log`:

> **Note:** As of 2001-06-12, a debug build of the entire tree requires 566.5 MB of storage space on a file system using 4 KB allocation units; that is in addition to the 45.5 MB of previously generated symlinks.
>
> As a benchmark, a debug build runs for 71 minutes on a machine with a 1.2 GHz Atlhon, 256 MB DDR RAM, and a 7200 RPM ATA/100 HD. You may have noticed that the standard build time and the debug build time are identical.

```
Harold@MyWindowsHost ~/x-devel/build/debug
$ ./config/util/makeg.sh World > World.log 2>&1

Harold@MyWindowsHost ~/x-devel/build/debug
$
```

Installing a local build

Installing a local build enables you to verify that a build of the entire source tree is operational. It is wise to verify the operation of full builds of the source tree from time to time, as full builds will occasionally be broken by changes that other developers are making to the XFree86 source code tree.

Installing a local build on top of an existing build is not a good idea, as this can mask problems that occured during the build process, or it can cause problems that are unrelated to the build process; either situation is undesireable. It is generally a good idea to move your old installation out of the way before installing a local build, and these instructions will assume that you desire to do so. Follow the instructions below to install a local build:

1. Move the `/etc/X11` directory to `/etc/X11_`*`build-prefix_date_time`*:

   ```
   Harold@MyWindowsHost ~
   $ mv /etc/X11 /etc/X11_build-prefix_date_time

   Harold@MyWindowsHost ~
   $
   ```

2. Move the `/usr/X11R6` diretory to `/usr/X11R6_`*`build-prefix_date_time`*:

   ```
   Harold@MyWindowsHost ~
   $ mv /usr/X11R6 /usr/X11R6_build-prefix_date_time
   ```

```
Harold@MyWindowsHost ~
$
```

3. Change the current directory to your desired XFree86 build directory:

```
Harold@MyWindowsHost ~
$ cd ~/x-devel/build/build-prefix

Harold@MyWindowsHost ~/x-devel/build/build-prefix
$
```

4. Make the **`install`** target, which installs binaries, fonts, libraries, and configuration files; in short, **`install`** installs everything except the **man** pages:

> **Note:** As of 2001-06-12, the **`install`** target copies 5,074 files in 83 folders into `/usr/X11R6`, requiring 89.2 MB of storage space for a standard build or 177 MB of storage space for a debug build, and 276 files in 39 folders into `/etc/X11`, requiring 2.57 MB of storage space. All stated storage requirements are for a file system using 4 KB allocation units.
>
> As a benchmark, **`install`** runs for 20 minutes on a machine with a 1.2 GHz Atlhon, 256 MB DDR RAM, and a 7200 RPM ATA/100 HD. Standard and debug installs both complete in the stated time.

```
Harold@MyWindowsHost ~/x-devel/build/build-prefix
$ make install > install.log 2>&1

Harold@MyWindowsHost ~/x-devel/build/build-prefix
$
```

5. Make the **`install.man`** target, which only installs the **man** pages:

> **Note:** As of 2001-06-12, the **`install.man`** target copies 541 files in 3 folders into `/usr/X11R6/man`, requiring 4.22 MB of storage space, and 544 files in 1 folder into `/usr/X11R6/lib/X11/doc`, requiring 4.76 MB of storage space. All stated storage requirements are for a file system using 4 KB allocation units.
>
> As a benchmark, **`install.man`** runs for 2 minutes on a machine with a 1.2 GHz Atlhon, 256 MB DDR RAM, and a 7200 RPM ATA/100 HD.

```
Harold@MyWindowsHost ~/x-devel/build/build-prefix
```

```
$ make install.man > install.man.log 2>&1

Harold@MyWindowsHost ~/x-devel/build/build-prefix
$
```

Keeping your source code tree updated

CVS makes keeping your source code tree up to date easy. You may update your entire source code tree at once, or you can update individual directories or files, if you so choose.

Update the entire source code tree

1. Change the current directory to your XFree86 development directory:

   ```
   Harold@MyWindowsHost ~
   $ cd x-devel

   Harold@MyWindowsHost ~/x-devel
   $
   ```

2. Change the current directory to the root of the XFree86 source code tree, `xc/`:

   ```
   Harold@MyWindowsHost ~/x-devel
   $ cd xc

   Harold@MyWindowsHost ~/x-devel/xc
   $
   ```

3. To update your entire XFree86 source code tree, run the following command:

   Tip: The *-zn* parameter specifies the compression level to use, from 1 to 9, with 9 being maximum compression.

   The *-d* parameter instructs **cvs** to rebuild the directory list, which causes new directories in the source code tree to be downloaded (new directories are skipped if you do not specify *-d*).

   ```
   Harold@MyWindowsHost ~/x-devel/xc
   ```

```
$ cvs -z4 update -d

Harold@MyWindowsHost ~/x-devel/xc
$
```

Update a single file or directory

1. Change the current directory to your XFree86 development directory:

   ```
   Harold@MyWindowsHost ~
   $ cd x-devel

   Harold@MyWindowsHost ~/x-devel
   $
   ```

2. Change the current directory to the directory that contains the file you wish to update, or change the current directory to the directory that you wish to update:

   ```
   Harold@MyWindowsHost ~/x-devel
   $ cd xc/directory_to_update

   Harold@MyWindowsHost ~/x-devel/xc/directory_to_update
   $
   ```

3. To update a single file, or a set of specified files, run the following command:

   > **Tip:** The *-zn* parameter specifies the compression level to use, from 1 to 9, with 9 being maximum compression.

   ```
   Harold@MyWindowsHost ~/x-devel/xc/directory_to_update
   $ cvs -z4 update filename_1 [filename_2 ...]

   Harold@MyWindowsHost ~/x-devel/xc/directory_to_update
   $
   ```

4. To update a single directory, and its subdirectories, run the following command:

Note: The *-zn* parameter specifies the compression level to use, from 1 to 9, with 9 being maximum compression.

The *-d* parameter instructs **cvs** to rebuild the directory list, which causes new directories in the source code tree to be downloaded (new directories are skipped if you do not specify *-d*).

```
Harold@MyWindowsHost ~/x-devel/xc/directory_to_update
$ cvs -z4 update -d

Harold@MyWindowsHost ~/x-devel/xc/directory_to_update
$
```

Chapter 3. Documentation

Foo!

Chapter 4. Web Site Maintenance

Foo!

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Glossary

C

Concurrent Versions System

CVS is an open source version control system used by the majority of open source projects. More information can be found at the CVS project homepage (http://www.cvshome.org).

F

firewall

Firewall software attempts to protect an internal network from intrusions originating from an external network.

P

pserver

CVS pserver, short for “password server”, is one of the user authentication methods supported by CVS. CVS pserver is not secure, as passwords are transmitted and stored as plain text. However, CVS pserver is desireable for read-only anonymous access to open source CVS trees, as CVS pserver is by far the easiest method to use.

V

Virtual Private Network

Virtual Private Networks are encrypted tunnels through which private data can be safely transmitted

over a private network (e.g. the Internet).

X

X Display Manager

An X Display Manager presents a graphical login screen to X users. Often an XDM will allow the user to select a desktop environment or window manager to be for their login session. Some X Display Managers are xdm, gdm (Gnome Display Manager), and kdm (KDE Display Manager).

X Display Manager Control Protocol

XDMCP allows XDM to process logins for users remote to the machine that XDM is running on; login sessions will be run on the machine running XDM. For example, at a university you may use XDMCP to login to an X session running on an engineering department computer from your dorm room.

See Also: X Display Manager.

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Version 1.1, March 2000

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