

# **Cygwin/X User's Guide**

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by Harold L. Hunt, II

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# Chapter 1. Cygwin/X Overview

Cygwin/X is a port of the X Window System to Cygwin; Cygwin provides a UNIX-like API on the Win32 platform.

# Chapter 2. Setting Up Cygwin/X

## Cygwin/X Contents

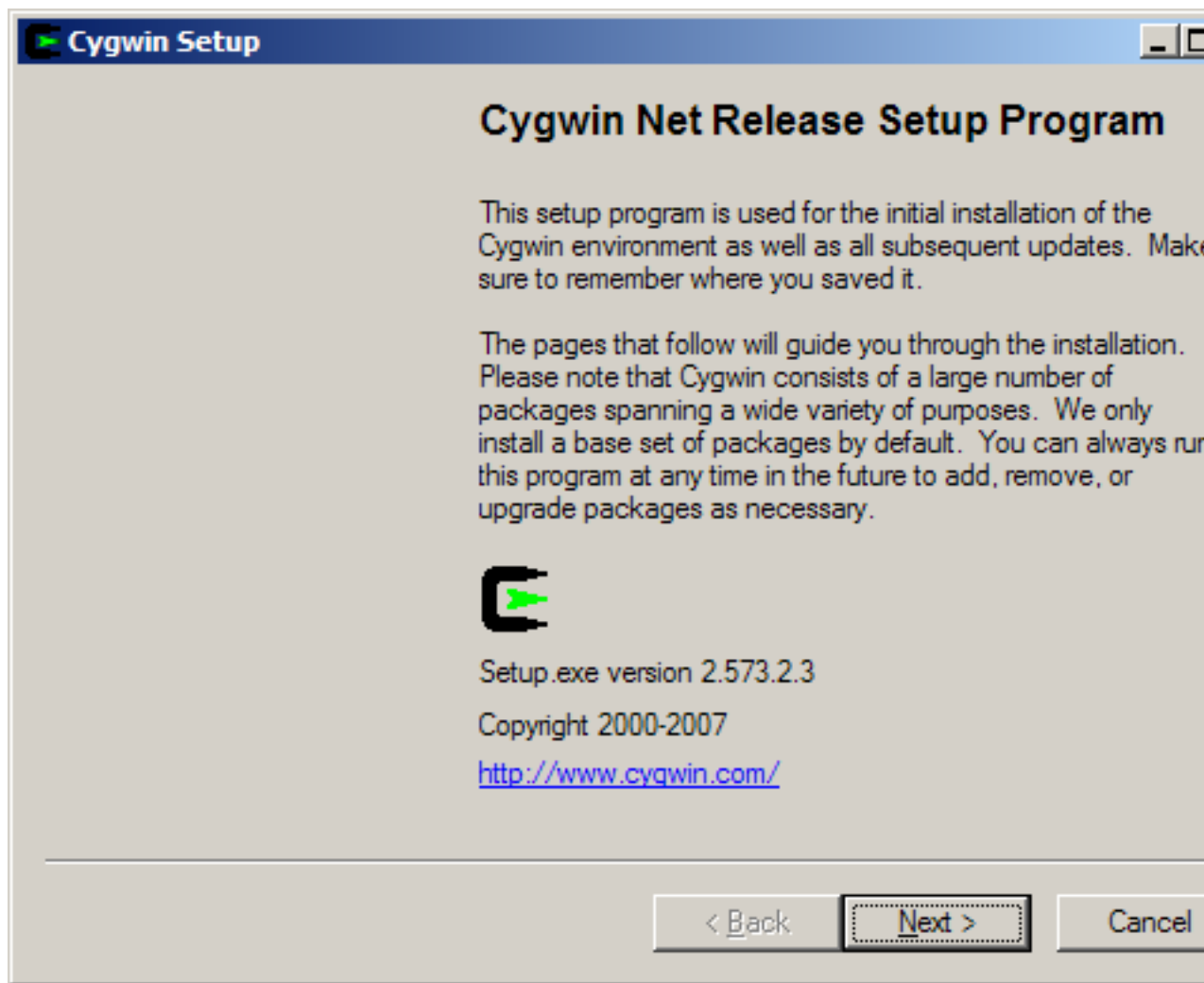
Cygwin/X consists of two parts: Cygwin, a port of the GNU tools to Win32, and Cygwin/X, a port of the X Window System to Win32. Both parts of Cygwin/X are needed to successfully run an X Server on a Win32 platform.

## Installing Cygwin/X

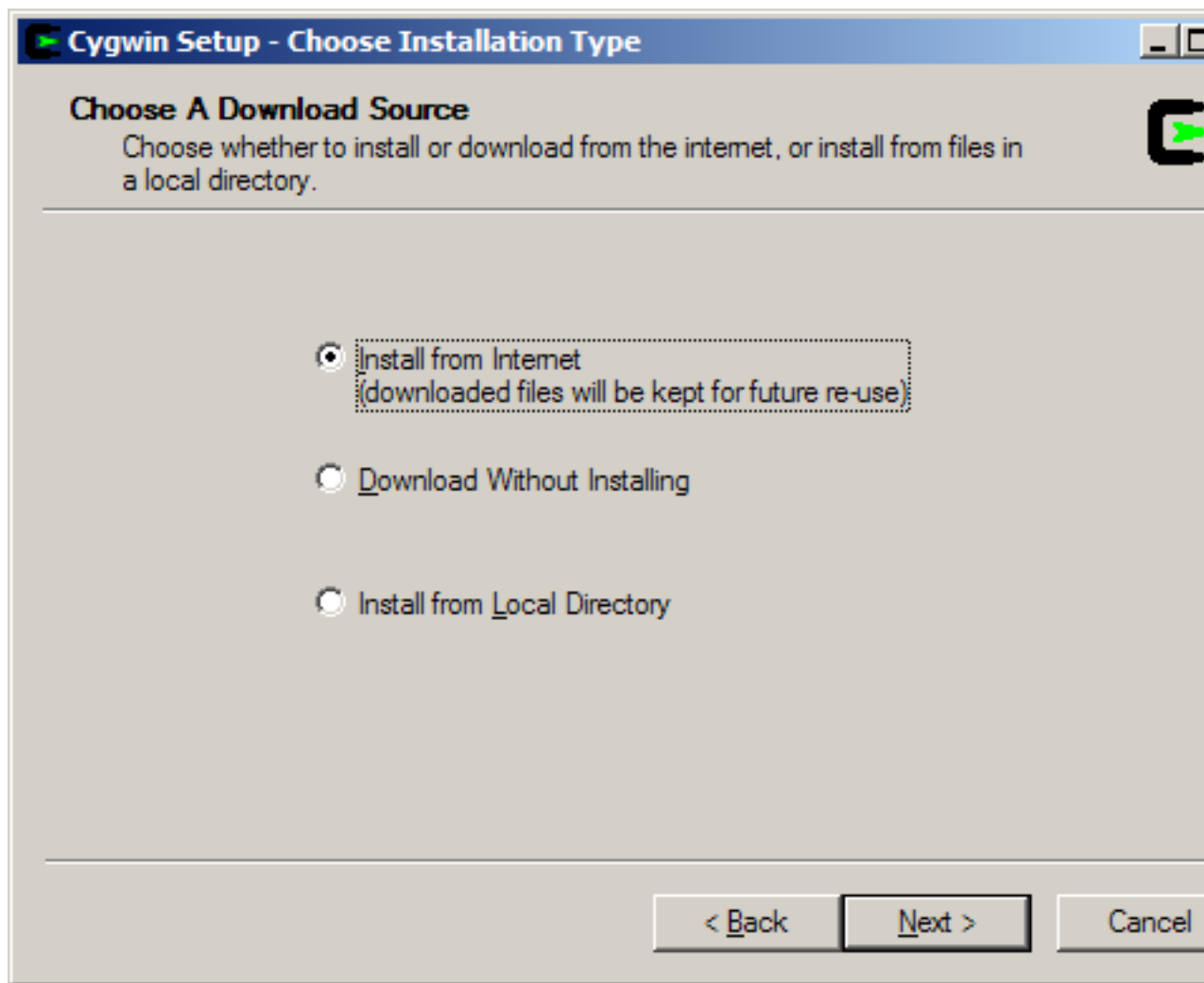
Cygwin tools are, in the words of the Cygwin development homepage, <http://cygwin.com/>, “ports of the popular GNU development tools and utilities for Windows 95, 98, and NT. They function by using the Cygwin library which provides a UNIX-like API on top of the Win32 API.” Cygwin allows the compilation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

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

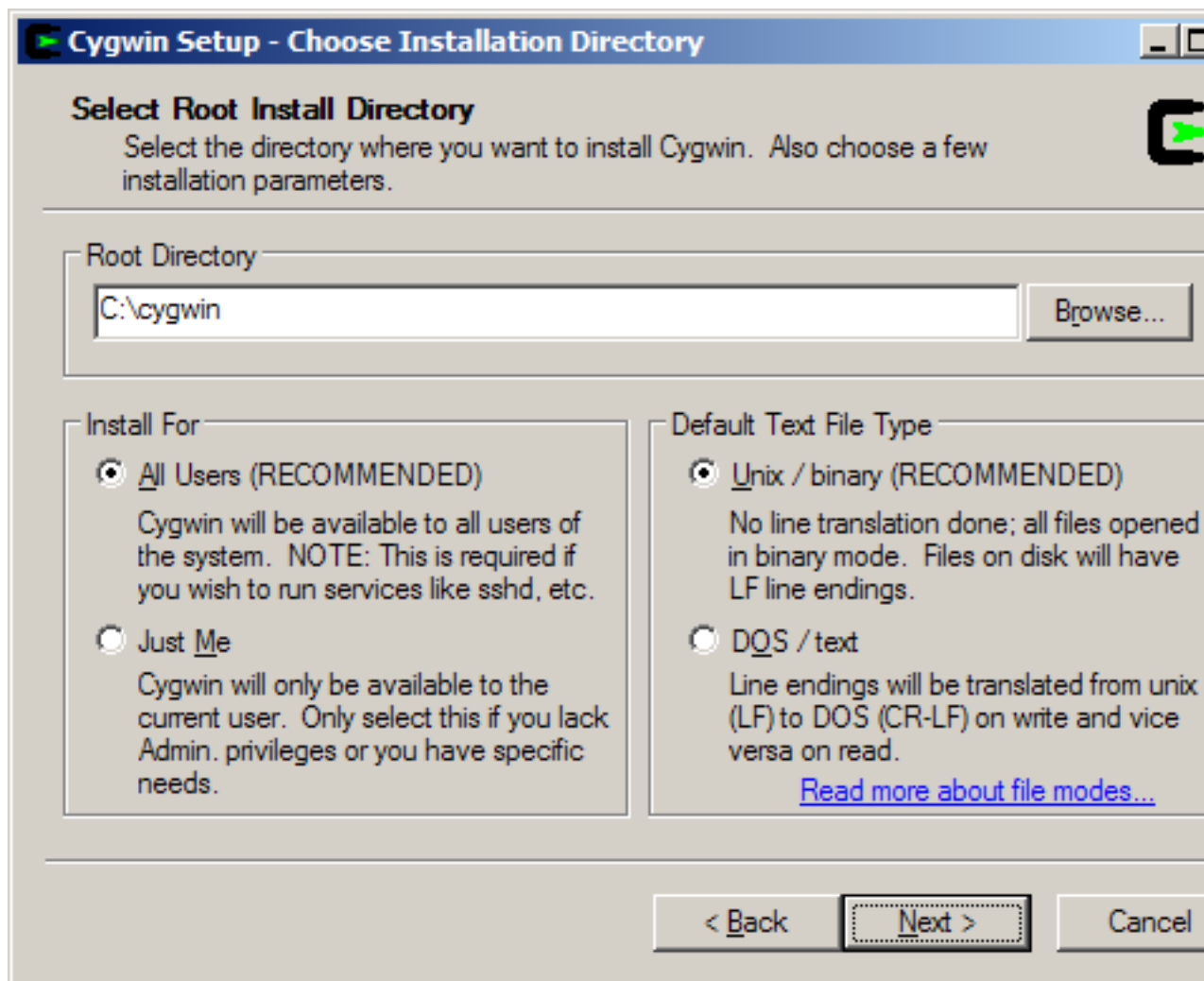
1. Open the Cygwin, <http://cygwin.com/> page in your web browser
2. Click the “Install Cygwin Now” (<http://cygwin.com/setup.exe>) link in the upper-right hand corner of the page. This link downloads `setup.exe` from the primary Cygwin server; save `setup.exe` to the directory that you would like to store the downloaded packages in (e.g. `c:\download`); do not save `setup.exe` to `c:\cygwin`, as that is the default directory for the extraction and installation of the downloaded packages.
3. Run `setup.exe`, you will see the welcome screen:



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

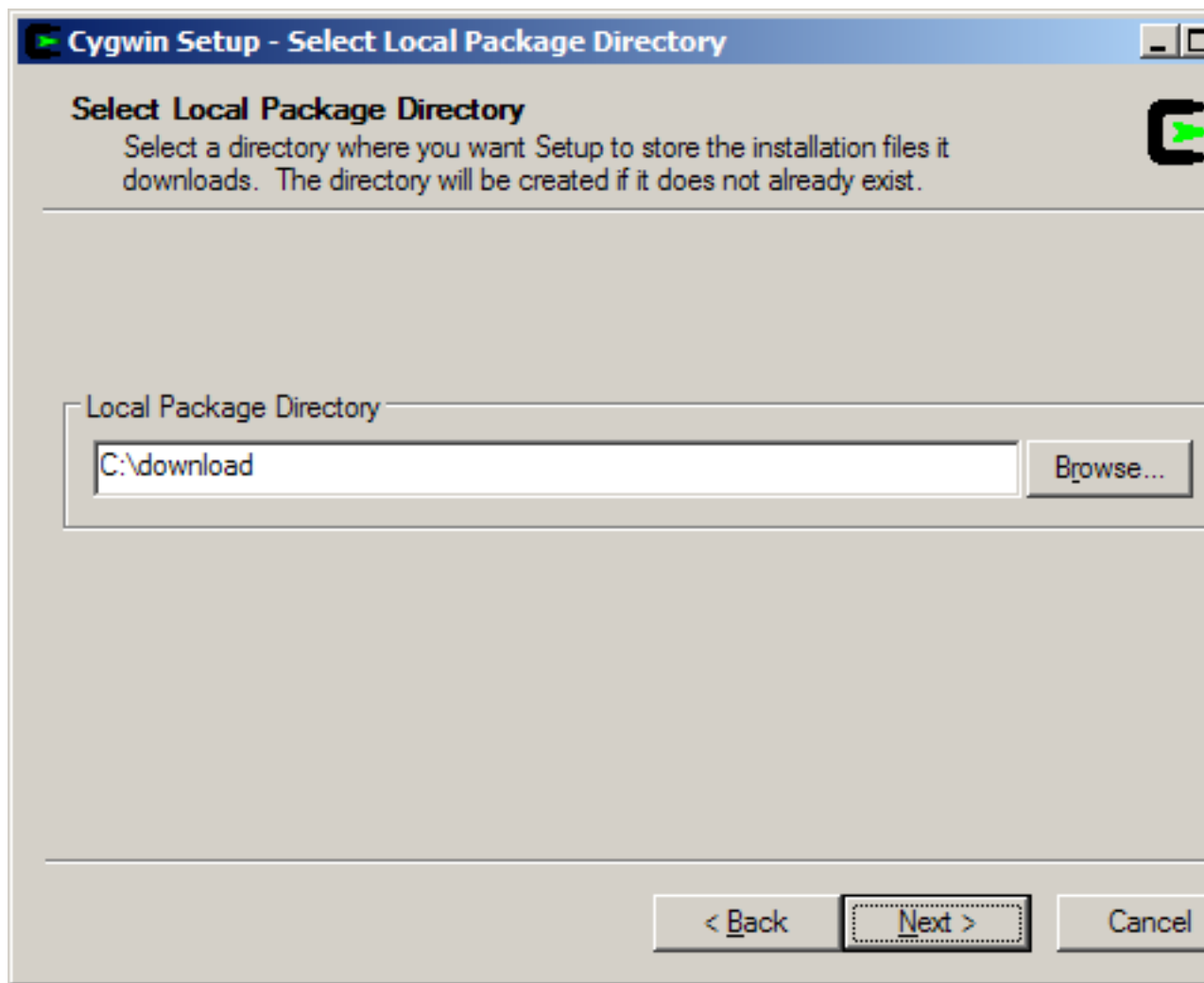


6. Click Next to proceed to the next screen.
7. The default Install Root is `c:\cygwin` which should be fine for most installations. Leave Default Text File Type as UNIX. Leave Install For set to All unless you lack local administrative privileges.

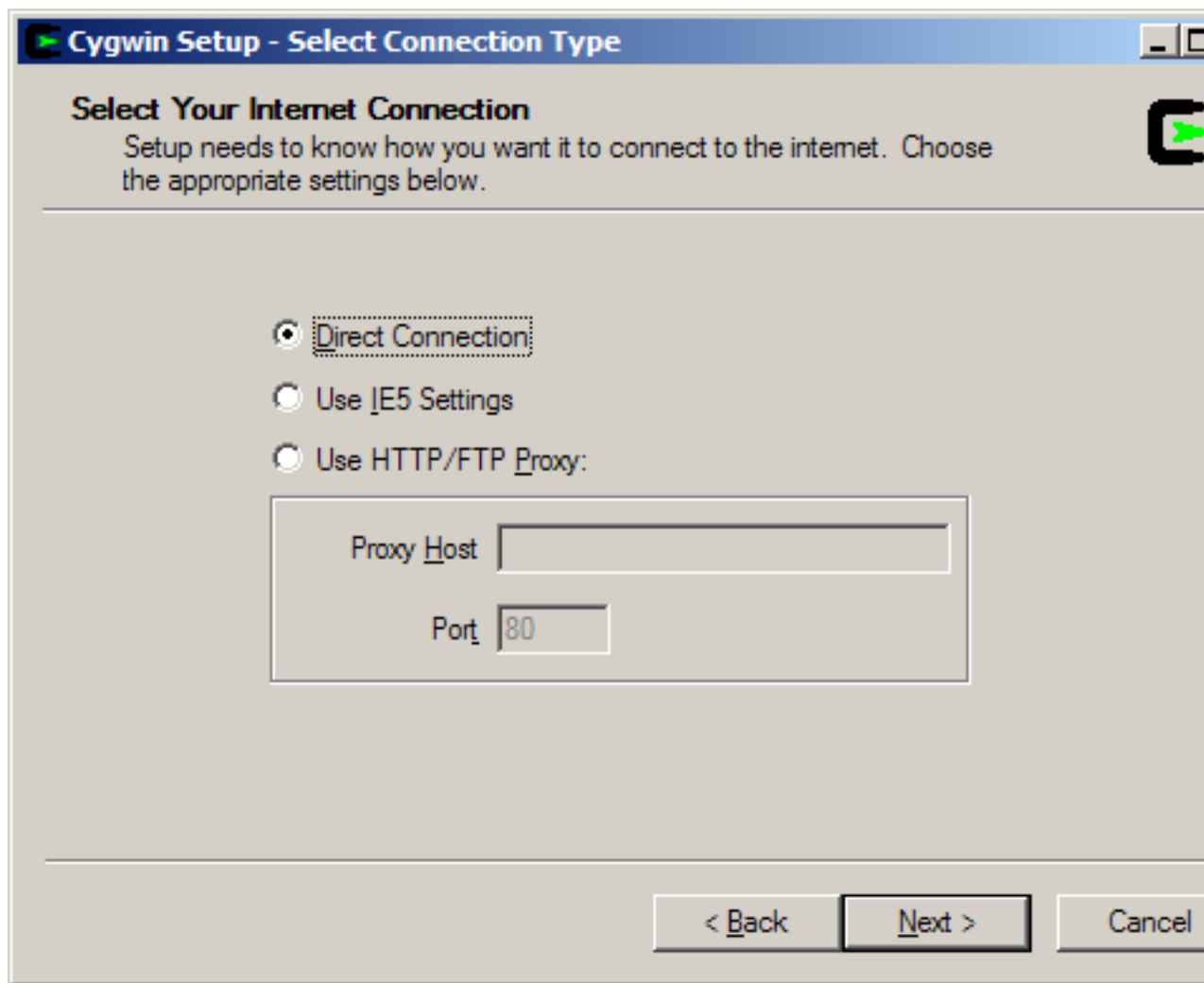


8. Click Next to proceed to the next screen.
9. Local Package Directory should default to the directory that you ran `setup.exe` from:

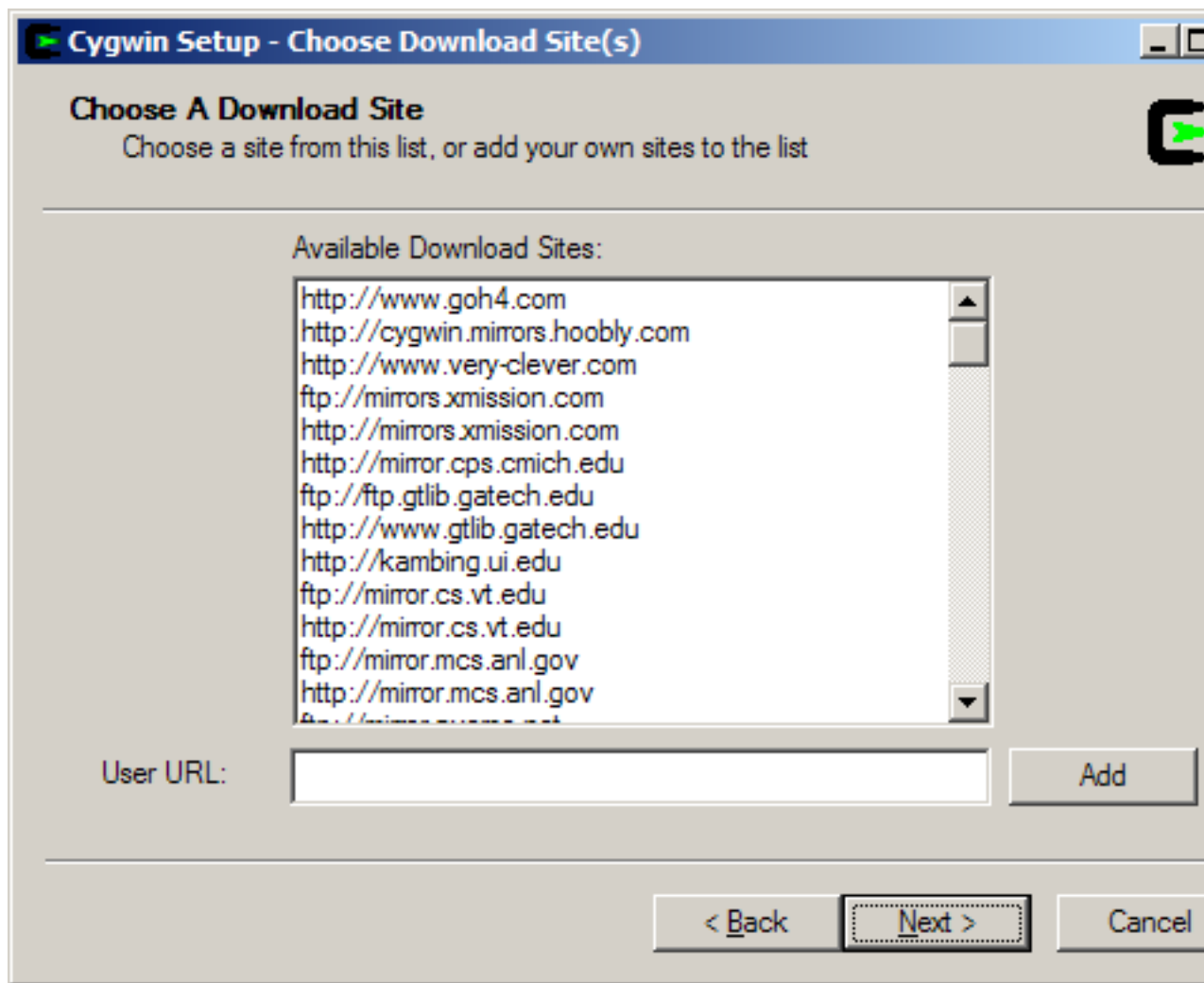




10. Click **Next** to proceed to the next screen.
11. Choose your proxy setup, or, just choose **Direct Connection** if no proxy is needed:



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

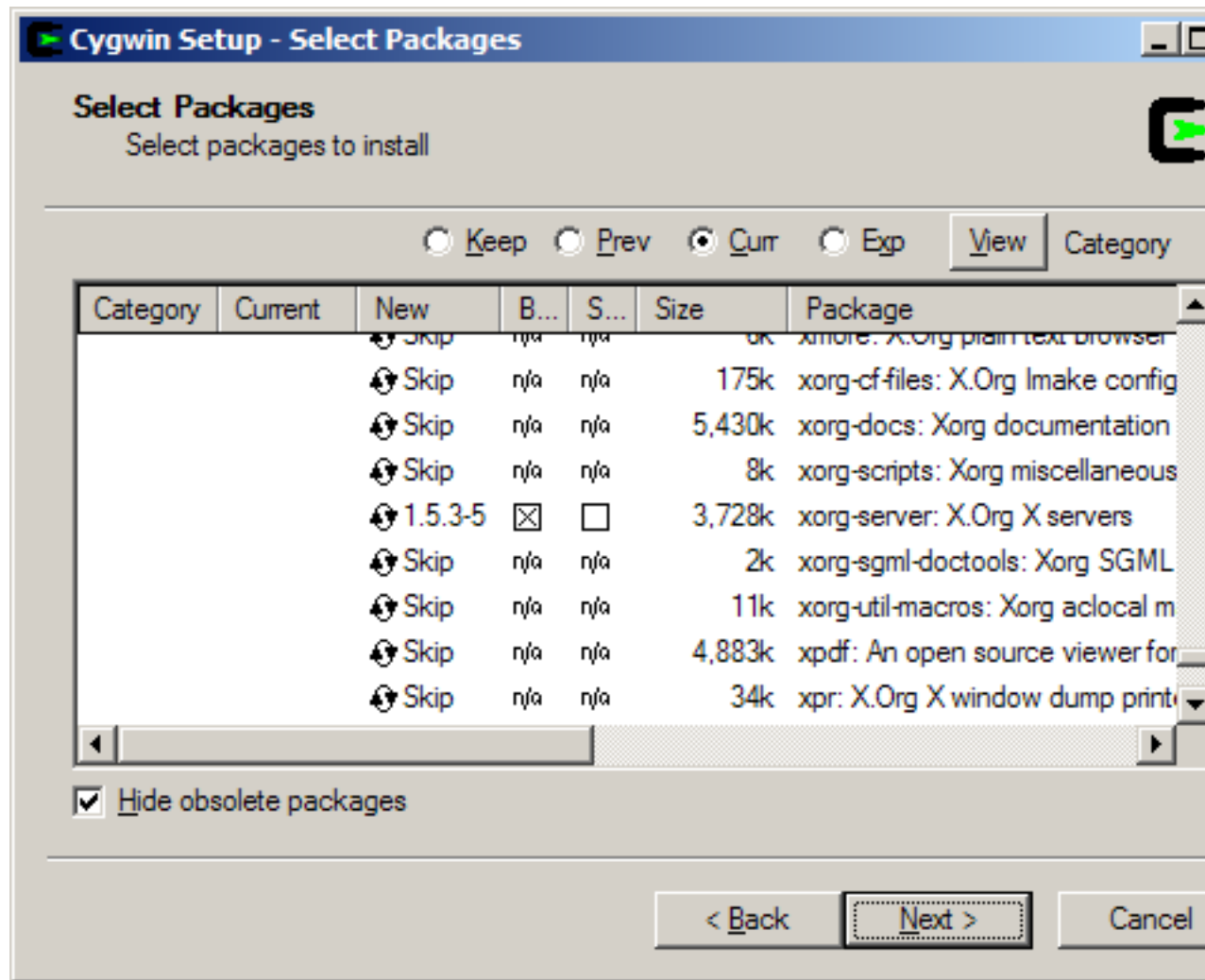


14. Click **Next** to proceed to the next screen; setup will download a list of available packages as it moves to the next screen.
15. On the next screen you will select the packages that will be downloaded and installed. A listing of the Cygwin/X packages is given below; a listing of the general Cygwin packages would be beyond the scope of this document.

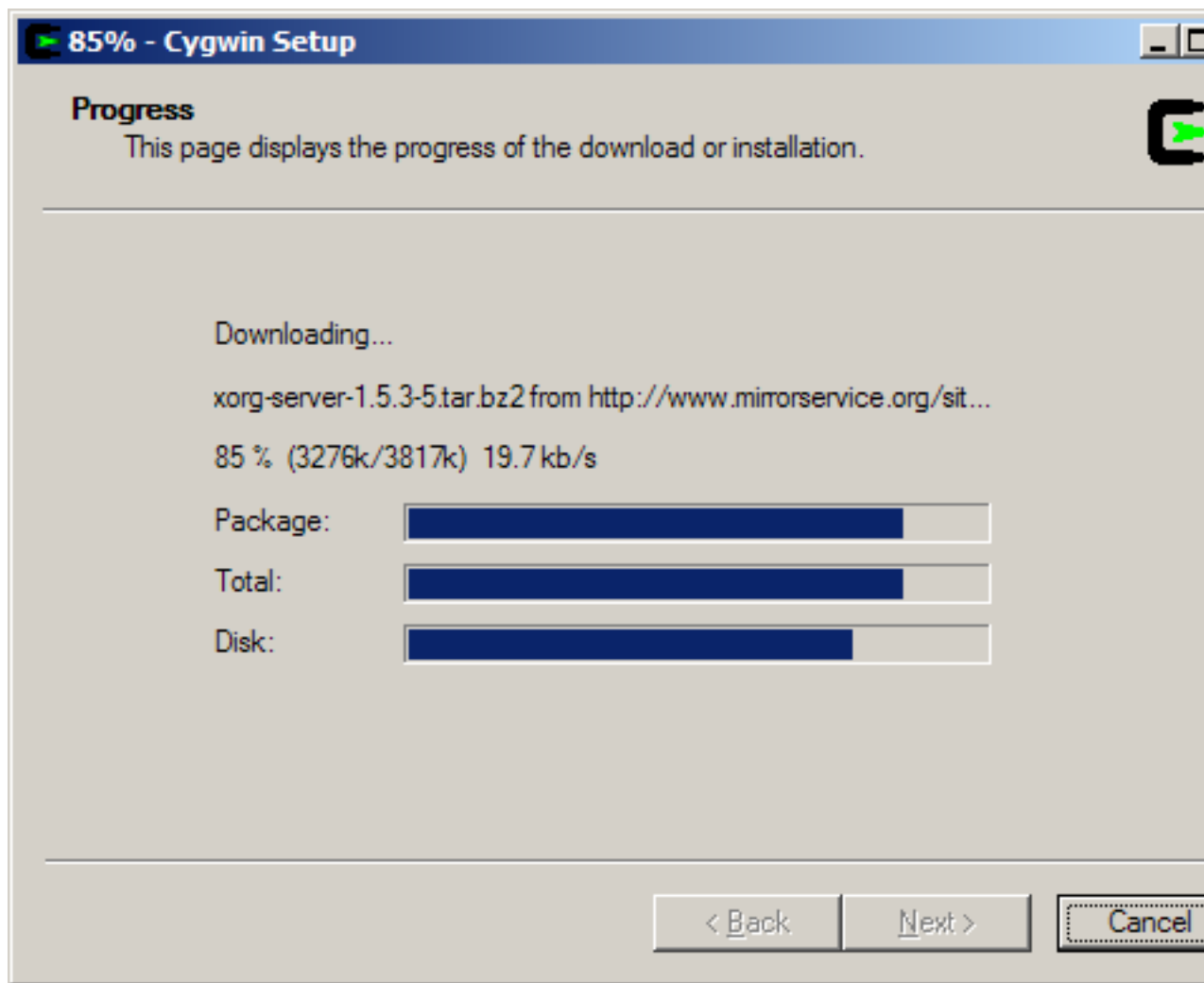
Cygwin/X packages are located in the `x11` category.

- `xorg-server` (required, the Cygwin/X X Server)
- `xinit` (required, scripts for starting the X server: **`xinit`**, **`startx`**, **`startwin`** (and a shortcut on the Start Menu to run it), **`startxdmcp.bat`** )
- `xorg-docs` (optional, **`man`** pages)
- `X-start-menu-icons` (optional, adds icons for X Clients to the Start menu)
- You may also select any X client programs you want to use, and any fonts you would like to have available.

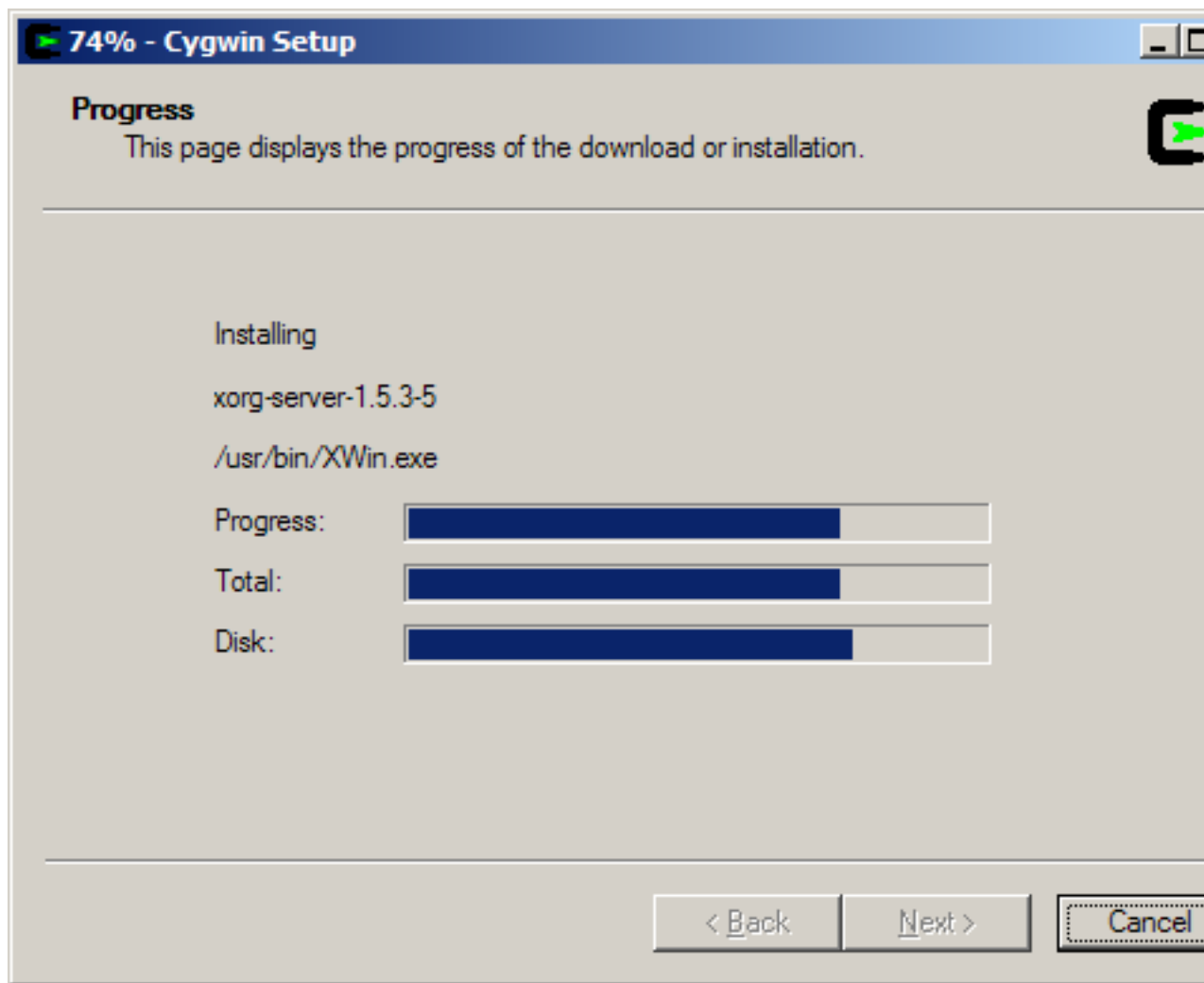
- You may also want to ensure that the `inetutils` or `openssh` packages are selected if you wish to use **telnet** or **ssh** connections to run remote X clients.



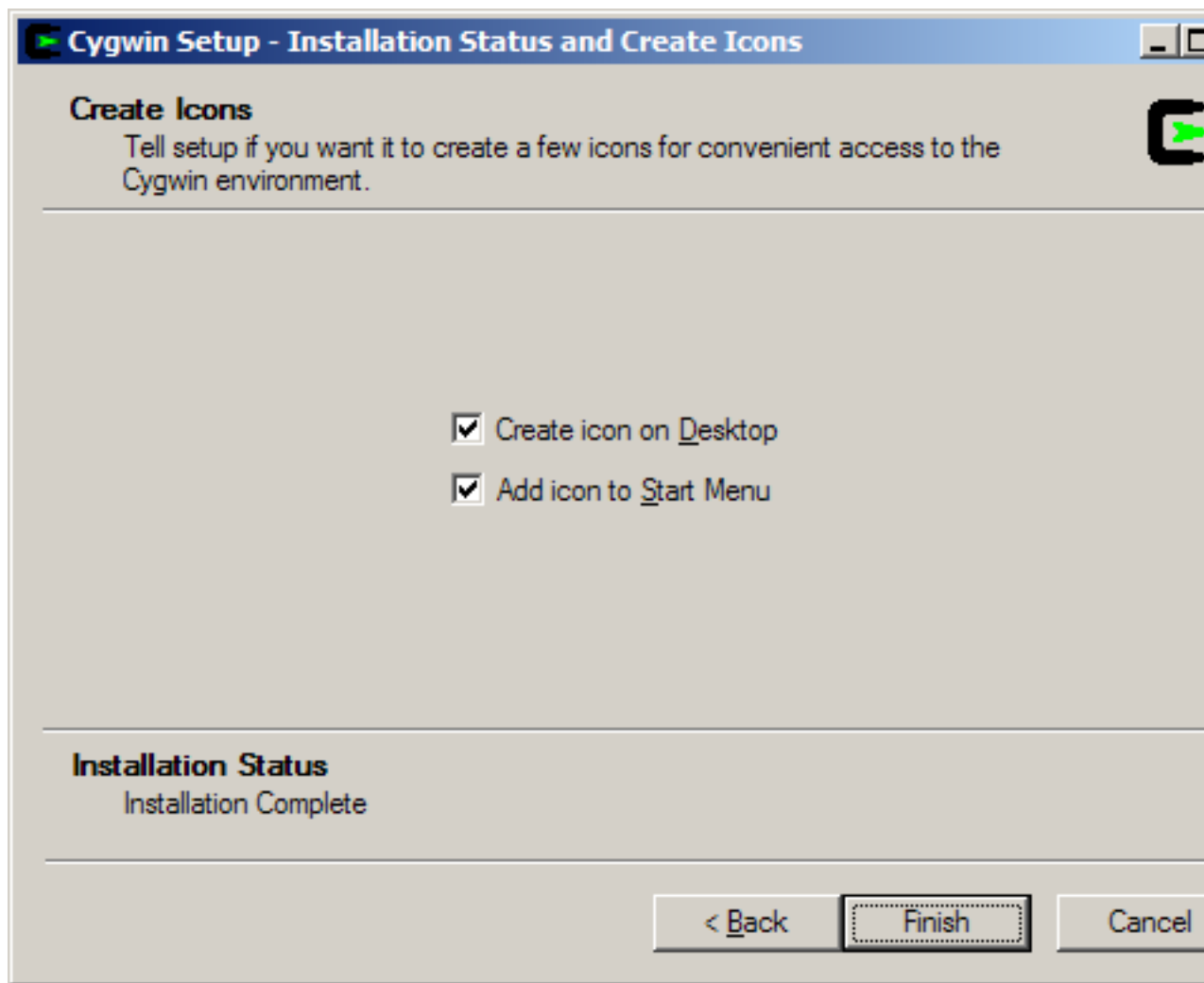
- Click Next to begin the download process, you may want to try another mirror if you see a "Connecting" message on this screen for a long period of time:



17. After the packages are downloaded, setup will automatically begin to install them:



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



19. Click **Finish** to close the setup program.

You have now successfully installed Cygwin/X. Proceed to Chapter 4 for instructions on how to use Cygwin/X.

# Chapter 3. Configuring Cygwin/X

## Configuration overview

Cygwin/X settings are configured primarily through command-line parameters passed to `xwin.exe`.

A `xwinrc` file is used to configure the notification area icon menu, and customize window appearance in multiwindow mode.

## Windowing mode

Cygwin/X can be configured to present X windows for an X screen in three different ways:

- Windowed or rooted mode. (*default*)

Each X screen appears as a single Windows window and all X windows are contained within those windows. (the Windows window contains the X root window for the screen)

**Note:** This is typically used to present a virtual full-screen X session using the X window manager of your choice, or for remote XDMCP sessions.

- Multiwindow mode. *-multiwindow*

Each top-level X window appears in its own Windows window.

**Note:** This is typically used to work with local or remote X applications, integrated into your native Windows desktop.

- Rootless mode. *-rootless*

The X root window is hidden from view, but top-level X windows are drawn.

**Note:** This is typically used to work with local or remote X applications, integrated into your native Windows desktop, but controlled using the X window manager of your choice.

Because the X root window is hidden in this mode, this is not particularly useful with X window managers with which you need to interact with the root window (for example, clicking on the root window to get a menu listing programs you can launch) <sup>1</sup>, but is more useful with X window managers which show a dock or panel window for selecting applications from.

Also note that the X window manager has no knowledge of the stacking of Windows windows, and vice versa, so raising one X window above a Windows window raises all of the X windows, and raising one Windows window above an X window raises it above all of the X windows. Exactly as if all X windows were being drawn into a hidden Windows window :-)



## Command line parameters

Cygwin/X, by default, runs in windowed mode with the largest window that will fit on your Windows desktop, using the best performing engine that is installed on your system; you do not need to pass any parameters to **XWin.exe** to use the default behavior.

Up to date documentation of **XWin.exe** options can be read with **man XWin** (<http://x.cygwin.com/docs/man1/XWin.1.html>).

## XWinrc configuration file

With the `.XWinrc` configuration file it is possible to:

- Add items and submenus into the menu opened by right-clicking on the notification area icon.
- In multiwindow mode: add items and submenus into the Windows window system menu (opened by clicking on the icon in the top-left of the Windows window frame) and override the window icon and window styles for Windows windows, by window name or window class name.

Full documentation of the **XWinrc** file format and command can be read with **man XWinrc** (<http://x.cygwin.com/docs/man5/XWinrc.5.html>).

## Notes

1. Although this can be worked around, to some extent, by using a utility like **xroot** (<http://www.sealiesoftware.com/xroot.c>), which provides a clickable area of root window.

# Chapter 4. Using Cygwin/X

## Starting Cygwin/X

Described below are several methods of starting up the Cygwin/X X Server with a startup utility that optionally starts initial clients (for example, a terminal or a window manager) and performs X server configuration (for example, loading a keyboard modifier map).

### Starting Cygwin/X in multiwindow mode (startxwin)

Use the custom XWin startup utility **startxwin**

**startxwin** is included in the `xinit` package (installed by following the instructions in the Section called *Installing Cygwin/X* in Chapter 2), which starts the X server in multiwindow mode along with a single X terminal. Run **startxwin** by:

- using the "XWin Server" shortcut under "Cygwin-X" on the Start Menu
- starting it from a MS-DOS shell
- Starting `/usr/bin/startxwin` in a Cygwin shell:  

```
$ startxwin
```
- double-clicking it in Windows Explorer

Full documentation for **startxwin** can be read with **man startxwin**

(<http://x.cygwin.com/docs/man1/startxwin.1.html>). Note that the special option `--` is used to mark the end of client options and the beginning of server options, so, for example, if you wish to start the X server with the `-noclipboard` option, as described in the Section called *Command line parameters* in Chapter 3, use the following command:

```
$ startxwin -- -noclipboard
```

You may create a `~/startxwinrc` script to customize the client programs started, rather than a single `xterm`.

**Note:** The MS-DOS batch file `startxwin.bat` and bash shell script `startxwin.sh` previously used to start the X server are no longer provided. Implemented as a script made it difficult to reliably wait until the the X server had started before starting any clients. Use `startxwin` instead.

**Note:** If you want to have a Start Menu shortcut which runs **startxwin** with custom options, you should use a copy of the Start Menu shortcut installed by `xinit`, so that your changes are not overwritten when the `xinit` package is updated.

**Note:** **startxwin** is a specialized version of **startx** with a few differences appropriate to running in multiwindow mode, rather than windowed mode.

- **startxwin** supplies the **-multiwindow** option to XWin.exe
- It uses a different script to start clients (`~/startxwinrc` rather than `~/xinitrc`), because `~/xinitrc` will normally end by starting a window manager, which would be incorrect for `~/startxwinrc` (as it would discover the internal window manager is already running and exit immediately).
- **startxwin** exits after `~/startxwinrc` has completed and leaves XWin.exe running, whereas **startx** waits until `~/xinitrc` exits (which is usually waiting for the window manager started by it to exit) and then kills XWin.exe.

## Starting Cygwin/X in windowed mode (startx)

Use the standard X Window System **startx** command with its attendant `~/xinitrc` configuration file.

Run **startx** in a Cygwin shell:

```
$ startx
```

Full documentation for **startx** can be read with **man startx** (<http://www.x.org/releases/X11R7.5/doc/man/man1/startx.1.html>). Note that the special option `--` is used to mark the end of client options and the beginning of server options, so, for example, if you wish to start the X server with the `-emulate3buttons` option, as described in the Section called *Command line parameters* in Chapter 3, use the following command:

```
$ startx -- -emulate3buttons
```

You may create a `~/xinitrc` from the template in `/etc/X11/xinit/xinitrc` and then customize `~/xinitrc` as required

```
$ cp /etc/X11/xinit/xinitrc ~/xinitrc
[edit ~/xinitrc as desired]
```

Alternatively, if you just want to start a single client program (perhaps a window manager), you don't need to use a `~/xinitrc`, and can start the client directly from **startx**, e.g.

```
$ startx /usr/bin/fvwm2
```

**Note:** The client name supplied to **startx** must begin with `/` or `.`, otherwise it is treated as options to the default **xterm** client.

## Other startup methods

Advanced users may wish to start the X server by invoking **X** directly, for example, to start XDMCP sessions.

## Switching out of Cygwin/X

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

## Stopping Cygwin/X

When you are done using Cygwin/X, press **Alt-F4** to shutdown the X Server; this is the default key combination to shutdown the X Server. The `-[no]winkill` and `-[no]unixkill` parameters can change the set of key combinations that will shutdown the X Server. Using the `-unixkill` allows the **Ctrl-Alt-Backspace** key combination to shutdown the X Server, in addition to the default **Alt-F4** key combination.

## Window managers

A window manager is required in order to decorate, move, resize, and perform other operations on individual X windows.

Cygwin/X works with window managers in a couple of different ways:

- Internal window manager for multiwindow mode. The internal window manager that creates a Windows window for each top-level X window is automatically started when using the `-multiwindow` command-line parameter to **XWin.exe**. See the Section called *Command line parameters* in Chapter 3 for more information on the `-multiwindow` command-line parameter.
- External local window managers (e.g. **twm**, **mwm** (part of the lesstif package)). These local window managers must be installed on Cygwin; they are run locally and cannot be used together with the internal window manager.
- Remote window managers via an XDMCP session, which you can read more about in the Section called *Remote sessions via XDMCP*.
- Remote window manager launched through an **ssh** tunnel. This is not Cygwin/X-specific, so you should be able to find information about launching remote window managers from other sources. See the Section called *Secure ssh* for more information on using **ssh**.

## Windows Clipboard integration

The X Window System, and thus Cygwin/X, uses its own internal clipboard system that is distinct from the clipboard system used by Windows. Copying and pasting text between these two clipboard systems requires a clipboard integration program that watches for updates to either clipboard and copies data between them when either one is updated.

Cygwin/X has an internal clipboard integration system that is invoked via the `-clipboard` command-line parameter. See the Section called *Command line parameters* in Chapter 3 for more information on the `-clipboard` command-line parameter.

## Shared memory support

Shared memory support is needed by the MIT-SHM and XFree86-BigFont extensions.

Shared memory is provided by the **cygserver** Windows service.

To install cygserver run the **cygserver-config** script. It will install the service.

**Note:** for Cygwin 1.5 only

`file-server-exe;` will not use shared memory if the `CYGWIN` environment variable does not contain the `server` keyword. Starting **XWin.exe** with

```
CYGWIN=server XWin.exe
```

will enable shared memory support if the cygserver service is running.

## Remote sessions via XDMCP

Cygwin/X can be used login to one or several remote sessions using XDMCP (X Display Manager Control Protocol).

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

```
XWin.exe -query remote_hostname_or_ip_address
```

You may login to several remote sessions with a single or multiple hosts using XDMCP. Each session will need a separate display number, specified by the `:display_number` parameter, such as `:0`. A display number is not the same as a screen number, as a single display can have multiple screens associated with it. Each display listens on a different network port number, so each display can connect to multiple machines. Start Cygwin/X with command lines similar to the following to login to several remote sessions using XDMCP:

```
XWin.exe :0 -query remote_hostname_or_ip_address_0
```

```
XWin.exe :1 -query remote_hostname_or_ip_address_1
```

Note that the `:display_number` parameter is a general X Server parameter, not specific to Cygwin/X. Further documentation of the `:display_number` parameter can be found in the X Server manual page (<http://www.x.org/archive/X11R6.8.1/doc/Xserver.1.html>). XDMCP is a complex system that is not specific to Cygwin/X; further discussion of XDMCP is beyond the scope of this document. You may wish to read the Linux XDMCP HOWTO (<http://en.tldp.org/HOWTO/XDMCP-HOWTO/>) or the X Server XDMCP Options (<http://www.x.org/archive/X11R6.8.1/doc/Xserver.1.html#toc6>) for more information.

## Displaying remote clients

Displaying remote X clients with Cygwin/X is nearly identical to displaying remote X clients with any other X Server. You may use the secure **ssh** method, or the insecure **telnet** method (not recommended).

### Secure ssh

On your Windows machine:

1. Make sure you have the `openssh` package installed.
2. Launch Cygwin/X
3. Run the following in an X terminal:  

```
$ ssh -Y username@remote_hostname_or_ip_address
```
4. Enter your password when prompted by **ssh**.
5. Your **ssh** session should now show you a shell prompt for your remote machine.
6. You can now launch remote X clients in your **ssh** session, for example, **xterm&** will launch an `xterm` running on your remote host that will display on your Cygwin/X screen.
7. Launch other remote clients in the same manner. I recommend starting the remote clients in the background, by appending `&` to the command name, so that you don't have to open several **ssh** sessions.

### Insecure telnet

On your Windows machine:

1. Make sure you have the `inetutils` package installed.
2. Launch Cygwin/X
3. In an X terminal type `/usr/bin/xhost remote_hostname_or_ip_address`
4. In an X terminal type `/usr/bin/telnet remote_hostname_or_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/X.
5. Login to your remote machine via your **telnet** session

6. In your **telnet** session type, `DISPLAY=windows_hostname_or_ip_address:0.0`
7. In your **telnet** session type, `export DISPLAY`
8. You can now launch remote X clients in your **telnet** session, for example, `xterm&` will launch an xterm running on your remote host that will display on your Cygwin/X screen.
9. Launch other remote clients in the same manner; I recommend starting the remote clients in the background, by appending `&` to the command name, so that you don't have to open several **telnet** sessions.

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