The Linux XFree86 HOWTO

Table of Contents

The Linux XFree86 HOWTO

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This document describes how to obtain, install, and configure version 4.0 of the XFree86 version of the X Window System (X11R6) for Linux systems. It is a step−by−step guide to configuring XFree86 on your system.

1.Introduction

2.Hardware requirements

3.Installing XFree86

4.Configuring XFree86

5.Running XFree86

6.Translations

1.Introduction

The X Window System is a large and powerful (some might say excessively large and overly complex) graphics environment for UNIX systems. The original X Window System code was developed at MIT; commercial vendors have since made X the industry standard for UNIX platforms. Virtually every UNIX workstation in the world runs some variant of the X Window system.

A freely redistributable port of the MIT X Window System version 11, release 6 (X11R6) for 80386/80486/Pentium UNIX systems has been developed by a team of programmers originally headed by David Wexelblat <dwex@XFree86.org>. The release, known as XFree86, is available for System V/386, 386BSD, and other x86 UNIX implementations, including Linux. It includes all of the required binaries, support files, libraries, and tools.

Complete information on XFree86 is available at the XFree86 web site, http://www.XFree86.org.

In this document, we'll give a step−by−step description of how to install and configure XFree86 for Linux, but you will have to fill in some of the details yourself by reading the documentation released with XFree86 itself. (This documentation is discussed below.) However, using and customizing the X Window System is far beyond the scope of this document−−−for this purpose you should obtain one of the many good books on using the X Window System.

1.1 Other sources of information

If you have never heard of Linux before, there are several sources of basic information about the system. The best place to find these is at the Linux Documentation Project home page at http://metalab.unc.edu/LDP. You can find the latest, up−to−date version of this document there, as http://metalab.unc.edu/LDP/HOWTO/XFree86−HOWTO.html

1.2 New versions of this document

New versions of the Linux XFree86 HOWTO will be periodically posted to comp.os.linux.help and news:comp.os.linux.announce and news.answers. They will also be uploaded to various Linux WWW and FTP sites, including the LDP home page.

You can always view the latest version of this on the World Wide Web via the URL http://metalab.unc.edu/LDP/HOWTO/XFree86−HOWTO.html.

1.3 Feedback and Corrections

If you have questions or comments about this document, please feel free to mail Eric S. Raymond, at esr@thyrsus.com. I welcome any suggestions or criticisms. If you find a mistake with this document, please let me know so I can correct it in the next version. Thanks.

Please do *not* mail me questions about how to make your video card and monitor work with X. This HOWTO is intended to be a rapid, painless guide to *normal* installation using the new interactive configurator. If you run into problems, browse the XFree86 Video Timings HOWTO, http://metalab.unc.edu/LDP/HOWTO/XFree86−Video−Timings−HOWTO.html. (This is the up−to−date HTML version of XFree86's `Videomodes.doc' file.) That document tells everything I know about configuration troubleshooting. If it can't help you, I can't either.

2.Hardware requirements

You can find an up−to−date list of supported cards and chipset types at http://www.xfree86.org/4.0/Status.html.

The documentation included with your video adaptor should specify the chipset used. If you are in the market for a new video card, or are buying a new machine that comes with a video card, have the vendor find out exactly what the make, model, and chipset of the video card is. This may require the vendor to call technical support on your behalf; in general vendors will be happy to do this. Many PC hardware vendors will state that the video card is a ``standard SVGA card'' which ``should work'' on your system. Explain that your software (mention Linux and XFree86!) does not support all video chipsets and that you must have detailed information.

You can also determine your videocard chipset by running the `SuperProbe` program included with the XFree86 distribution. This is covered in more detail below.

Supported video cards will work with all bus types, including ISA and VLB and PCI.

One problem faced by the XFree86 developers is that some video card manufacturers use non−standard mechanisms for determining clock frequencies used to drive the card. Some of these manufacturers either don't release specifications describing how to program the card, or they require developers to sign a non−disclosure statement to obtain the information. This would obviously restrict the free distribution of the XFree86 software, something that the XFree86 development team is not willing to do. For a long time, this has been a problem with certain video cards manufactured by Diamond, but as of release 3.1 of XFree86, Diamond has started to work with the development team to release free drivers for these cards.

The suggested setup for XFree86 under Linux is a 486 or better with at least 8 megabytes of RAM, and a video card with a chipset listed above. For optimal performance, we suggest using an accelerated card, such as an S3−chipset card. You should check the documentation for XFree86 and verify that your particular card is supported before taking the plunge and purchasing expensive hardware.

As a side note, the personal Linux system of Matt Welsh (this FAQ's originator) was a 486DX2−66, 20 megabytes of RAM, equipped with a VLB S3−864 chipset card with 2 megabytes of DRAM. He ran X benchmarks on this machine as well as on Sun Sparc IPX workstations. The Linux system was roughly 7 times faster than the Sparc IPX (for the curious, XFree86−3.1 under Linux, with this video card, runs at around 171,000 xstones; the Sparc IPX at around 24,000). In general, XFree86 on a Linux system with an accelerated SVGA card will give you much greater performance than that found on commercial UNIX workstations (which usually employ simple framebuffers for graphics).

Your machine will need at least 4 megabytes of physical RAM, and 16 megabytes of virtual RAM (for example, 8 megs physical and 8 megs swap). Remember that the more physical RAM that you have, the less that the system will swap to and from disk when memory is low. Because swapping is inherently slow (disks are very slow compared to memory), having 8 megabytes of RAM or more is necessary to run XFree86 comfortably. 16 is better. A system with 4 megabytes of physical RAM could run *much* (up to 10 times) more slowly than one with 8 megs or more.

3.Installing XFree86

It's quite likely that you obtained XFree86 as part of a Linux distribution, in which case downloading the software separately is not necessary. Or you may be able to get RPM binary packages built for your machine, in which case you can just install those using rpm(1). In either case you can skip this the rest of this section.

The Linux binary distributions of XFree86 can be found on a number of FTP sites. On the XFree86 site they are under ftp://ftp.xfree86.org/pub/XFree86/current/binaries/. You will want either the Linux−axp−glibc21, Linux−ix86−glibc20, or Linux−ix86−glibc21 subdirectories, depending on your processor type (axp=alpha, ix86=Intel 80x86) and Gnu C library version.

Before doing anything else, download and run the `Xinstall.sh' shell script first. This may tell you about prerequisites you'll need to have in place before continuing your installation. Complete instructions for installing the XFree86 nbinary distribution are at http://www.xfree86.org/4.0/Install2.html.

The binary directory should contain release notes for the current version in `RELNOTES`. Consult those for installation details

All that is required to install XFree86 is to obtain the above files, create the directory `/usr/X11R6` (as `root`), and unpack the files from `/usr/X11R6` with a command such as:

```
gzip −dc Xbin.tgz | tar xfB −
```

Remember that these tar files are packed relative to `/usr/X11R6`, so it's important to unpack the files there.

You need to make sure that `/usr/X11R6/bin` is on your path. This can be done by editing your system default `/etc/profile` or `/etc/csh.login` (based on the shell that you, or other users on your system, use). Or you can simply add the directory to your personal path by modifying `.bashrc` or `.cshrc`, based on your shell.

You also need to make sure that `/usr/X11R6/lib` can be located by `ld.so`, the runtime linker. To do this, add the line

```
/usr/X11R6/lib
```

to the file `/etc/ld.so.conf`, and run `/sbin/ldconfig`, as `root`.

4.Configuring XFree86

4.1 Normal Configuration

Configuring XFree86 to use your mouse, keyboard, monitor, and video card correctly used to be something of a black art, requiring extensive hand−hacking of a complex configuration file. No more; recent releases have made the process nearly trivial. It simplifies matters a lot that there are no longer separate servers for different kinds of cards, just modules loaded by a common server. All you do to configure it is fire up the program `XF86Setup`.

This program depends on the fact that all new PC hardware these days ships with EGA/VGA capable monitors. It invokes the VGA16 server and uses it to bring up X in a lowest−common−denominator 640x480 mode. Then it runs an interactive program that walks you through a series of five configuration panels −− mouse, keyboard, (video) card, monitor, and `other' (miscellaneous server options). The whole process is quite painless.

(If you're running Red Hat Linux, you may see a different program called `xf86config`. This works fairly similarly to `XF86Setup` but does not itself use an X interface and the VGA16 server.)

One minor point to keep in mind is that, if you're like most people using a current PC, your keyboard is actually what XF86Setup calls `Generic 102−key PC (intl)' rather than the default `Generic 101−key PC'. If you pick the default (101) the key cluster on the extreme right of your keyboard (numeric keypad and friends) may stop working.

If you're not sure of your monitor type, you can try the listed ones in succession. Work your way from top down (upper choices involve lower dot−clock speeds and are less demanding on the hardware). Back off if you get hash or a seriously distorted picture. Minor distortions (picture slightly too large, slightly too small, or slightly off−center) are no problem; you'll get a chance to correct those immediately by fine−tuning the mode.

And, when the program brings up `xvidtune` to allow you to tweak your video mode, don't let the initial warning box make you nervous. Modern multisync monitors (unlike their fixed−frequency predecessors) are not easy to damage this way.

XF86Config may assume that your mouse device is /dev/mouse. If you find this doesn't work, you may need to link /dev/mouse to whatever /dev/ca[01] the mouse is on. If you find that XFree86 gives you a "mouse busy" error when `gpm` is running, you may need to link to /dev/ttyS[01] instead.

The configuration process operates by selecting a server module corresponding to to the general type of your video card and configuring an `XF86Config` that the server will read on startup to get specific parameters for your installation. The location of `XF86Config` varies depending on your OS, but one place to look for it is `/etc/X11`.

On older versions of XFree86, `XF86Setup` links the `X' command directly to the chosen server. In recent versions, `X' is instead linked to a set–user–id wrapper program called Xwrapper. The idea is that all the setuid root stuff gets localized in Xwrapper so the server doesn't have to run setuid root.

4.2 Troubleshooting

Occasionally, something will not be quite right when you initially fire up the X server. This is almost always caused by a problem in your configuration file. Usually, the monitor timing values are off, or the video card dot clocks set incorrectly. Minor problems can be fixed with `xvidtune`; a really garbled screen usually means you need to go back into XF86Setup and choose a less capable monitor type.

If your display seems to roll, or the edges are fuzzy, this is a clear indication that the monitor timing values or dot clocks are wrong. Also be sure that you are correctly specifying your video card chipset, as well as other options for the `Device` section of `XF86Config`. Be absolutely certain that you are using the right X server and that `/usr/X11R6/bin/X` is a symbolic link to this server.

If all else fails, try to start X ``bare''; that is, use a command such as:

```
X > /tmp/x.out 2>&1
```

You can then kill the X server (using the `ctrl-alt-backspace` key combination) and examine the contents of `/tmp/x.out`. The X server will report any warnings or errors–––for example, if your video card doesn't have a dot clock corresponding to a mode supported by your monitor.

Remember that you can use `ctrl-alt-numeric +` and `ctrl-alt-numeric -` to switch between the video modes listed on the `Modes` line of the `Screen` section of `XF86Config`. If the highest resolution mode doesn't look right, try switching to lower resolutions. This will let you know, at least, that those parts of your X configuration are working correctly.

Also, check the vertical and horizontal size/hold knobs on your monitor. In many cases it is necessary to adjust these when starting up X. For example, if the display seems to be shifted slightly to one side, you can usually correct this using the monitor controls.

The USENET newsgroup `comp.windows.x.i386unix` is devoted to discussions about XFree86, as is `comp.os.linux.x`. It might be a good idea to watch that newsgroup for postings relating to your video configuration–––you might run across someone with the same problems as your own.

4.3 Custom Configuration

You will need to hand–hack your X configuration to get optimal performance if your monitor can support 1600x1200 –– the highest canned resolution XF86Setup supports is 1280x1024.

If you want to hand–hack your video configuration for this or any other reason, go see the LDP's XFree86 Video Timings HOWTO, http://metalab.unc.edu/LDP/HOWTO/XFree86–Video–Timings–HOWTO.html. (This is the up–to–date HTML version of XFree86's `Videomodes.doc' file.)

4.4 Using 16−bit Color

By default, X uses 8−bit color depth giving 256 colors. To circumvent this restriction, many applications allocate their own colormaps, resulting in sudden color jumps when the cursor moves between two windows each having a color map of its own. The Arena WWW browser does it this way.

If you want to use advanced graphic applications 256 colors may be not sufficient. You may need to go to 16−bit color depth (65,536 colors). But beware, not all applications will work with 16bit colors.

You can use 16bit color depth with 65K different colors simply by starting X with

```
    startx -- -bpp 16
```

or putting

```
    exec X :0 -bpp 16
```

into your .xserverrc file. In order for this to work, however, you need to have a

```
screen
```

section in your XF86Config with

```
    DefaultColorDepth 16
```

If you're using xdm, you may need to change the Xservers file, which is probably located in /etc/X11/xdm/. A typical configuration has just one uncommented line, looking something like

```
      :0 local /usr/X11R6/bin/X
```

Add

```
-bpp 16
```

to the startup options:

```
      :0 local /usr/X11R6/bin/X -bpp 16
```

Also, you'll need to add to the `screen' section of your X configuration a Display part with a Depth value of 16. Generally you can just duplicate the 8−bit Display section and change the Depth field.

More colors makes your video card transfer more data during the same time. If your video card cannot cope, then either the resolution has or the refresh rate has to be reduced. By default, XFree reduces the resolution. If you want to keep the resolution and reduce the refresh rate, you must insert a new appropriate Modeline into your XF86Config file which defines that resolution with a lower refresh rate. For instance replace the old value

```
Modeline "1024x768"  75  1024 1048 1184 1328 768 771 777 806 -hsync -vsync
```

with

```
Modeline "1024x768"  65  1024 1032 1176 1344 768 771 777 806 -hsync -vsync.
```

The magic numbers 75 and 65 are the respective clock rates which you find reported by X in your .X.err file. Consult the monitors file in the XF86 documentation for Modelines suitable to the maximum clock rate your video card can deliver under 16bit color depth.

5.Running XFree86

With your `XF86Config` file configured, you're ready to fire up the X server and give it a spin. First, be sure that `/usr/X11R6/bin` is on your path.

The command to start up XFree86 is

```
startx
```

This is a front–end to `xinit` (in case you're used to using `xinit` on other UNIX systems).

This command will start the X server and run the commands found in the file `.xinitrc` in your home directory. `.xinitrc` is just a shell script containing X clients to run. If this file does not exist, the system default `/usr/X11R6/lib/X11/xinit/xinitrc` will be used.

A standard `.xinitrc` file looks like this:

```
#!/bin/sh

xterm -fn 7x13bold -geometry 80x32+10+50 &
xterm -fn 9x15bold -geometry 80x34+30-10 &
oclock -geometry 70x70-7+7 &
xsetroot -solid midnightblue &

exec fvwm2
```

This script will start up two `xterm` clients, an `oclock`, and set the root window (background) color to `midnightblue`. It will then start up `fvwm2`, the window manager. Note that `fvwm2` is executed with the shell's `exec` statement; this causes the `xinit` process to be replaced with `fvwm2`. Once the `fvwm2` process exits, the X server will shut down. You can cause `fvwm2` to exit by using the root menus: depress mouse button 1 on the desktop background−−−this will display a pop up menu which will allow you to `Exit Fvwm2`.

Be sure that the last command in `.xinitrc` is started with `exec`, and that it is not placed into the background (no ampersand on the end of the line). Otherwise the X server will shut down as soon as it has started the clients in the `.xinitrc` file.

Alternately, you can exit X by pressing `ctrl-alt-backspace` in combination. This will kill the X server directly, exiting the window system.

The above is a very, very simple desktop configuration. Many wonderful programs and configurations are available with a bit of work on your `.xinitrc` file.

If you are new to the X Window System environment, we strongly suggest picking up a book such as *The Joy of X: An Overview of the X Window System* by Niall Mansfield (Addison−Wesley 1993, ISBN 0201−565129). Using and configuring X is far too in−depth to cover here. See the man pages for `xterm`, `oclock`, and `fvwm2` for clues on getting started.

5.1 Terms of Use

5.2 Acknowledgements

This document was originated by Matt Welsh in the dim and backward abysm of time. Thanks, Matt!

6.Translations

- Italian
- Slovenian
- Croatian
- Dutch
- Hungarian" url="http://www.ppk.ini.hu/texts/XFree86−HOGYAN/XFree86−HOGYAN.html">
