X.Org X on Darwin and Mac OS X

Torrey T. Lyons

15 December 2003

1. Introduction

Xorg, a freely redistributable open-source implementation of the X Window System, has been ported to Darwin and Mac OS X. This document is a collection of information for anyone running Xorg's X server on Apple's next generation operating system.

Most of the current work on X for Darwin and Mac OS X is centered around the XonX project at SourceForge. If you are interested in up-to-date status, want to report a bug, or are interested in working on Xorg for Darwin, stop by the XonX project.

2. Hardware Support and Configuration

The X window server for Darwin and Mac OS X provided by the X.Org Foundation. is called XDarwin. XDarwin can run in three different modes. On Mac OS X, XDarwin runs in parallel with Aqua in full screen or rootless modes. These modes are called Quartz modes, named after the Quartz 2D compositing engine used by Aqua. XDarwin can also be run from the Darwin console in IOKit mode.

In full screen Quartz mode, when the X Window System is active, it takes over the entire screen. You can switch back to the Mac OS X desktop by holding down Command-Option-A. This key combination can be changed in the user preferences. From the Mac OS X desktop, click on the XDarwin icon in the Dock to switch back to the X window system. (You can change this behavior in the user preferences so that you must click the XDarwin icon in the floating switch window instead.)

In rootless mode, the X window system and Aqua share your display. The root window of the X11 display is the size of the screen and contains all the other windows. The X11 root window is not displayed in rootless mode as Aqua handles the desktop background.

From the console, the Darwin port of X11R6.9 uses the IOKit for device driver loading and discovery, rather than the X11R6.9 module loader. Because of this, the X11R6.9 configuration file is not used on Darwin or Mac OS X systems. The descriptions found elsewhere of devices supported by X11R6.9 for other operating systems also do not apply.

X11R6.9 for Darwin or Mac OS X will work with any video card that you have an IOKit driver for. If you are running Mac OS X, this typically means any card that has been shipped by Apple. If a card works for you with the Mac OS X GUI, it will work on the same machine with X11R6.9. If you have a pure Darwin installation, you may need to download additional third-party drivers from Apple's Darwin site. IOKit drivers are typically installed in `/System/Library/Extensions/` or `/Library/Extensions/`.

Multi-button and scroll wheel mouse support works well with all USB mice that I have tested. I have done no testing with ADB mice, but without a special driver, only a single mouse button will work on an ADB mouse.

3. Getting Started

Following are instructions for building and running your own copy of X11R6.9. The procedure for getting your X server up and running on Darwin and Mac OS X are very similar. Where there are differences I have noted them below. Note that to build X11R6.9 for yourself on Mac OS X, you need to install the Developers' Tools.

`/Applications`.

If you get the precompiled binaries you can skip ahead to the section on *running the X Window System* (section 4., page 2) On the other hand, if you want to build things yourself from scratch, follow the directions below.

3.1 Get the Code

The first thing you need to do is to get the source code from the X.Org Foundation project.

- Setup CVS: Both Darwin and Mac OS X include CVS (Concurrent Versions System), which is an easy way to download and keep up to date with open source code released by the X.Org Foundation and others. You do have to setup CVS properly, however, to tell it where to look. Follow the X.Org CVS instructions on how to do this either via ssh or via the cvs pserver.
- Now make a directory in some convenient place which will serve as your top level directory for you open source development efforts. I am going to call this directory `sandbox/` in the following discussions and you could put this directory, for example, in `~/sandbox/`.
- From the command line type:

  ```
  cd sandbox
  cvs checkout xc
  ```

  Wait for all the files to complete downloading.

3.2 Build X11R6.9

Once you have everything ready it is easy to build and install X11R6.9. From the command line:

```
cd sandbox/xc
make World >& world.log

(wait for several hours)

sudo make install >& install.log
sudo make install.man >& man.log
```

4. Run the X Window System

4.1 Setting Your Path

You need to add the X Window System executables to your path. Your path is the list of directories to be searched for executable commands. The X11 commands are located in `/usr/X11R6/bin`, which needs to be added to your path. In Quartz mode, the XDarwin application does this for you automatically. It can also be configured to add additional directories where you have installed command line applications. When running from the Darwin console, you will need to set the path correctly for your shell as XDarwin will not do this for you.

More experienced users will have already set their path correctly using the initialization files for their shell. In this case, you can inform XDarwin not to modify your path in the preferences.

XDarwin launches the initial X11 clients in the user's default login shell. (An alternate shell can also be specified in the preferences.) The way to set the path depends on the shell you are using. This is described in the man page documentation for the shell.

In addition you may also want to add the man pages from X11R6.9 to the list of pages to be searched when you are looking for documentation. The X11 man pages are located in `/usr/X11R6/man` and the `MANPATH` environment variable contains the list of directories to search.

4.2 Starting the X Server

On Mac OS X, you can run X11R6.9 from the Darwin text console or in parallel with Aqua. To get to the text console in Mac OS X you need to logout and type ''>console'' as the user name. This will shutdown Core Graphics and bring up the console login prompt. Login again as your user. From the text console you can start the X Window System by typing ''exec startx''.

When you are ready to quit X11R6.9 type ''exit'' in the main terminal window or quit with the window manager if you have one running. Unfortunately in IOKit mode, the X server does not shutdown correctly and if you did not start with ''exec startx'', you will get an apparently frozen screen with only a spinning beachball cursor on it. Nothing you type shows up on the screen, but in fact your keystrokes are being received by the console. Type ''logout'' to return to normalcy after a brief delay. With Darwin, this should put you back at the text console login prompt. With Mac OS X, Core Graphics will restart and you should be given a login window.

To start X11R6.9 in Quartz mode you can launch the XDarwin application in the `/Applications` folder, or from the command line type ''startx -- -quartz''. By default this will give you a mode picker to choose between full screen or rootless mode. You can change the default to always use a particular mode in the preferences, or you can specify the ''-fullscreen'' or ''-rootless'' options on the command line instead of ''-quartz''.

4.3 Double-clickable X11 Executables

Mac OS X 10.3 can be configured to automatically launch XDarwin when you double-click an X11 executable in the Finder. When an executable file is double-clicked Launch Services checks to see if it is linked against the X11 libraries. If it is, Launch Services opens the default X server. To set the default X server, do the following:

- Create a simple file which ends in ''.x11app''.
- Open the file with Get Info in the Finder.
- Under ''Open with:'' select the XDarwin application.
- Select ''Change All...'' to set XDarwin as the default.

On Mac OS X 10.3 the default X server is started when an X11 executable is double-clicked, whether or not its extension is ''.x11app''. On previous versions of Mac OS X, an X11 executable must have a ''.x11app'' extension for this to work.

4.4 Customize the X Window System

The X Window System is very customizable and you will certainly want to change some things. There is a lot you can do to control how your windows look, how the windows are moved, resized, etc. You will likely want to get a fancier window manager than twm, which is included with X11R6.9. The `.xinitrc` file in your home directory controls what programs are run when you start the X Window System. You can find a sample `.xinitrc` file in `/etc/X11/xinit/xinitrc`.

There are many window managers that have been ported to Darwin. The following pages contain collections of window managers and other X window system clients:

- DarwinPorts: An easy way to install various open-source software products on Darwin and Mac OS X.
- Fink: A package manager that will easily download, compile, and install lots of open source software from the Internet.
- GNU-Darwin: A source for tons of software ported to Darwin.

Good luck!

CONTENTS

$XdotOrg: xc/programs/Xserver/hw/xfree86/doc/sgml/Darwin.sgml,v 1.2 2004/04/23 19:23:59 eich Exp