

Installing `xppaut`

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1 Unix/Linux/Mac

Get the binary for your system from <http://www.math.pitt.edu/~bard/xpp/xpp.html>. (Binaries are available for most common systems.) The latest binary distributions (as of Sept. 6, 2010) have the following names: `xppaut6.00linux.tgz` (Linux), `xppaut6.00.macintel.tgz` (Intel-based Mac), and `xppaut5.99-macppc.tgz` (Power-PC-based Mac). If a binary is not available for your system, you may have to compile from source. Talk to me if you need help with this. Unpack the archive, then copy the executable (called `xppaut`) into a directory in your path (e.g. `/usr/local/bin`). You will then be able to start it from the command line.

`Xppaut` runs in XWindows (a.k.a. X11), the standard Unix windowing system. On a Unix or Linux system, you should be ready to go. XWindows is also installed by default on newer Macs. It is an optional install on older Macs. Look for it in **Applications/Utilities**. If it isn't there, or if you want to upgrade from an old version of XWindows, I suggest that you install XQuartz, which is an open-source port of XWindows to the Mac. XQuartz is typically much more up to date than Apple's release of XWindows, and I have found that it works better with some software (although `xppaut` isn't very picky). You can get XQuartz from the following web site: <http://xquartz.macosforge.org/trac/wiki/Releases>. It uses a standard Mac installer. The one downside to XQuartz is that updates to the Mac operating system sometimes break it. If you find that XQuartz has stopped working after a security update, just reinstall it.

2 Windows

Because `xppaut` depends on XWindows, the first thing you have to do is to install an XWindows server. There are simple instructions for doing this on the `xppaut` web site at <http://www.math.pitt.edu/~bard/xpp/ezwin.html>. In the rest of this note, I will describe an alternative method for getting XWindows and `xppaut` running on a Windows system. It's a bit more complicated, but it's the way I run it on my machine. The main

advantage of the method I will describe below is that, in addition to `xppaut`, this method opens up the whole world of Unix software to your Windows machine.

2.1 Cygwin

Cygwin is a software layer that allows Unix software to run in Windows, including XWindows. To install Cygwin, go to <http://sourceware.org/Cygwin>, and click on the “Install or update Cygwin now” link. This will download a little program called `setup.exe`, which is the Cygwin package installer. Save this program on your computer, then run it. By default, it will install the core Cygwin libraries and applications. You will run this program again when you want to install other programs using Cygwin. The first time you run it, just follow the instructions until you get to the “Select Packages” screen. At this point, we will add one key package. In the search box, type `xinit`. When you locate this package, click on the status icon (in the “New” column) until a version number comes up. I also suggest that you install `nedit`, which is an easy-to-use Unix text editor. Again, use the search box and click on the status icon until a version number comes up. When you click on the Next button, Cygwin will install itself, along with XWindows.

When you want to install other software, some of which is suggested below, you run `setup.exe` and either find the software among the list of packages, or use the search feature again. Once you have located the software, you can click on the status icon as you did with `xinit` to select the software for installation. When you run `setup.exe`, any software it previously installed will also be upgraded if any upgrades are available.

Once in a while when you start up `setup.exe`, you will be told that a newer version of `setup.exe` is available. When that happens, just go back to the Cygwin web site and get the new version by clicking on “Install or update Cygwin now”.

One confusing aspect of Cygwin is that, by default, it creates user home directories that are distinct from the Windows home directories. In order to override this behavior, start up a Cygwin terminal window (if you installed Cygwin properly, there should be an icon on your desktop for this) and type the following command:

```
mkpasswd -l -p "$(cygpath -H)" > /etc/passwd
```

Then, close the terminal. The next time you start a Cygwin terminal (or `xterm`), your home directory will be the same in Cygwin as it is in Windows.

2.2 Xppaut

Follow the installation instructions at <http://www.math.pitt.edu/~bard/xpp/ezwin.html>. If you installed Cygwin, you can skip the first step (installing an X server). Follow the rest of the instructions, but skip the step that tells you to make a shortcut on the desktop. At least in Windows 7, this doesn’t work properly. Right-click on the file `C:\xppa11\xpp.bat` and select “Edit” from the pop-up menu to launch a Windows editor. Modify the `BROWSER` variable to point to your favorite web browser. (This is needed to make the help system work.) In my case, I have

```
set BROWSER=c:\Program Files\Mozilla Firefox\firefox.exe
```

You can also delete the `pause` command from this file, which serves no obvious purpose.

It's now time to start up XWindows. If you installed Cygwin as described above, "All Programs" in your Start menu should include a folder called Cygwin-X. From this folder, start the "XWin Server". After a few seconds, you should get a terminal window (known as an `xterm`). If the XWindows icon (an X with a circular decoration) appears in your task bar but an `xterm` doesn't appear within a few seconds, right-click on this icon and select `xterm` from the Applications menu. In the `xterm`, type

```
nedit /usr/local/bin/xppaut &
```

This starts up the editor `nedit`, which will ask you to confirm that you want to create a new file. The ampersand (`&`) runs `nedit` as a background process, i.e. it gives you back a prompt in the terminal as soon as `nedit` has started. In `nedit`, type the following two lines:

```
#!/bin/bash
/cygdrive/c/xppall/xpp.bat $1 $2 $3
```

Save this file. You can quit `nedit` after doing this. In your `xterm`, enter the following command:

```
chmod u+x /usr/local/bin/xppaut
```

This makes the file you just created with `nedit` executable.

3 Testing xppaut

Xppaut input files usually have the extension `.ode`. Xppaut is always distributed with some sample ode files, usually in a directory (folder) called `ode`. Find the one called `lorenz.ode`. (You could use any other one you want, but this one makes a nice picture that I can easily describe here.) You will need to start up XWindows:

- On Unix (including Linux) machines, XWindows is already running, unless you set up your machine with a very minimal configuration, but this is unusual. Just open up a terminal window.
- On recent Macs, XWindows will start automatically if you run a command that needs it, whereas on Macs running slightly older versions of OS X, you need to start X11 manually. It's in the folder `Applications/Utilities`. An `xterm` should be started automatically. If not, you can click on `xterm` in the `Applications` menu of X11.
- On Windows, start the "XWin Server" (if you didn't already have it running). Again, an `xterm` should start up automatically.

You then need to navigate to the directory where the ode files are stored. Use the `cd` command in your `xterm` to do this. In Cygwin on Windows, `/cygdrive/c` denotes your C: drive. Note the use of `/` to separate path components, which is the Unix convention, rather than `\`, which you would use in Windows itself. To get to the `xppaut` directory in Cygwin, you would therefore type

```
cd /cygdrive/c/xppall/ode
```

You are now ready to actually start `xppaut`. Type

```
xppaut lorenz.ode
```

This will open up the `xppaut` main window. The version number will be given in the title bar. Now click on `Initialconds`, and `Go`. If all is well, the computer should draw a curve that looks roughly like a butterfly. You can then click on `File`, then `Quit` to exit `xppaut`.