

Installing Syscomp Instruments under Mac OSX

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May 19, 2009

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1 Overview

Syscomp instruments consist of a hardware pod that plugs into a USB port and software that runs on the host computer. The pod receives power and commands via the USB cable. The host computer runs a program written in the Tcl/Tk language. That provides a user interface to the hardware.

This application note describes how to install Syscomp instruments on a MacBook running OSX. These instructions are quite lengthy and detailed, but hopefully clear and comprehensive as a result. Once you've gone through this procedure and the program is working, none of this will be required again.

In what follows it helps if you're familiar with Unix or Linux. However, I've tried to not make that assumption.

2 Computer Specifications

The Syscomp software is interpreted by the Tcl/Tk language interpreter, so it is essential that the machine is capable of running Tcl/Tk.

The ActiveState website (originators of Tcl/Tk) indicate that Tcl/Tk should run correctly on platforms with 'Mac OS X 10.2+'. There is no mention of requirement for Intel or Power PC processors¹.

The first step is to determine that the computer is capable of running this software. To do that:

1. Click on the Apple icon in the top left corner of the screen.
2. Select 'About this Mac'

For example, on the local Mac machine the Mac information is:

- Mac OSX 10.5.6
- 2.4GHz Intel Core 2 Duo
- 2GB 667MHz RAM

The key items are that the operating system is OSX and it's version is later than 10.2. So the software should run on this machine. The only difference between Intel and Power PC processors is the type of driver (section 5 below).

3 Open the Terminal Program

We will need the Terminal program to access the underlying Linux machine.

3.1 Method 1

This is the method suggested on the Web.

1. Open Finder
2. Go to Applications -> Utilities
3. Double click on Terminal

That doesn't work on this machine. There is no Applications folder.

¹<http://www.tcl.tk/software/tcltk/platforms.html>

3.2 Method 2

1. Open File -> Find
2. In the upper right corner of the Find Window, enter 'Terminal'
3. A list appears, Terminal is first on the list.
4. Double click on that entry and the Terminal Window pops up.

The Terminal window opens in the user's home directory, in this case `/usr/dorothyrawek`. This indicates that the topmost directory (root) is at `/`, the first subdirectory is `usr` and a further subdirectory of that is `dorothyrawek`. This is a *directory tree*, and you need to be able to move around in it using the `cd` command, as we'll see.

4 Check that the Wish Interpreter is Installed

The `Wish` interpreter is a program that executes the Syscomp source code. Here we check that `Wish` is installed and find out the version.

1. In the Terminal window, type 'which wish'
2. The computer displays `/usr/bin/wish`. This is the 'path' to the 'Wish' program.
3. Now we'll change to that directory and have a closer look. Type `'cd /usr/bin/'`. The 'cd' command means 'change directory'.
4. To ensure we are in the correct directory, type `'pwd'`, for 'print working directory'. The computer displays `'/usr/bin/wish'`.
5. Type `'ls -l wish'` to obtain a 'long listing' for the `Wish` program. The computer displays `wish -> wish8.4`. (Some additional information omitted.) This says that the `Wish` in `/usr/bin/wish` is linked to 'wish8.4', which indicates that this is version 8.4 of `Wish`. That's useful to know.
6. To return to the home directory, type `'cd'`.
7. Let's see if the 'Wish' program will run. In the Terminal, type `'wish'`. A 'Wish shell' window appears and the Tcl/Tk icon on the task bar. This means that the `Wish` interpreter is installed and the path to it is correct.

You could now type in a Tcl/Tk program and it would execute in the Terminal and `Wish` shell window. However, that's another story.

If `Wish` is *not* present², then download and install it from the ActiveState website³.

²Tcl/Tk is normally shipped with the OSX operating system. However, we have had some reports that version may not be complete. If you get errors that refer to missing files, then it would be a good idea to download the current version.

³<http://www.activestate.com/activetcl/downloads/>

5 Check that the Drivers are Installed

1. In the Terminal window, type `'cd /System/Library/Extensions'`. Hint: You can type the first few letters of a file or folder name (enough to be distinctive) and then hit `'tab'` to complete the name.
2. To examine the files in that directory, type `ls | more`. This produces a page of listing at a time. Hit the space bar to advance to the next page. Hit `'q'` to quit.

Note: Apparently, the `|` character is not available on some Mac keyboards. If that's the case, try `'ls -more'`. If that doesn't work, type `'ls F*'`. That will list all files beginning with `'F'`.

3. There should be a file there with a name like `FTDIUSBSerialDriver.kext`. The Syscomp instruments use a `'usb-serial'` driver by the FTDI company, so this is probably it. The `.kext` extension indicates that this is a *kernel extension*, ie, part of the operating system.
4. Type `'cd'` to return to the home directory.

If there is any question about whether the correct drivers are installed, you can download and install them from the FTDI website. Go to <http://www.ftdichip.com/Drivers/VCP.htm>. (VCP = Virtual Com Port). If you have an Intel processor, the correct driver at this time is 2.2.10. If you have a Power PC processor, the correct driver at this time is 2.1.10.

6 Check that the Device is Recognized

1. Now we will go to the `/dev` directory and see the device connect. Type `'cd /dev'`.
2. Type `'ls *usb*'`, that is, list any file name containing `'usb'`. You will get a message `'no such file or directory'`.
3. Now plug in the Syscomp instrument to a USB port. The green LED should illuminate, indicating that the instrument is receiving power.
4. Repeat the previous step. This time, the computer lists:

```
cu.usbserial-CGSITZMM
tty.usbserial-CGSITZM
```

Your exact messages will probably differ, but something similar indicates that the operating system has connected to the USB device. Mac OSX (Linux) creates these two `'files'` for the device.

The `'tty.usbserial'` device does not work. The `'cu-usbserial'` device is the one used by the interface. Here's the explanation, from web location <http://stackoverflow.com/questions/3976/>:

```
/dev/cu.xxxxx is the "callout" device, it's what you use when you establish
a connection to the serial device and start talking to it. /dev/tty.xxxxx
is the "dialin" device, used for monitoring a port for incoming calls for
e.g. a fax listener.
```

This is mac-specific. That's not how it works under Linux.

7 Install Software from CD

First, we'll look for the directory where we will put the software.

1. In Terminal, type `'cd'` to return to the home directory.
2. Check that this *is* the home directory with a `'pwd'` command. The computer shows `/users/dorothyrawek`. That's home on this machine. Your home will differ.
3. Execute the directory listing command `ls` to see what directories (folders) are available. There may be one that is labelled `Downloads`. That's where web downloads end up, so if we download replacement code for the scope it will end up there. `Downloads` fills up with junk so it periodically needs to be vacuumed out. We need something more permanent, so let's make our own directory. You can do that from Finder or, since we have a terminal up, we can do it with the Linux command `'mkdir Oscilloscope'`. Do that.
4. Execute `'ls'` to do a listing and make sure the directory really is there.

Now we'll move the source code from the CD to that directory, using Finder.

1. Put the CD in the drive. A whirring noise ensues. An icon appears on the desktop, labelled `'CGR101'` or something similar.
2. Double-click on the CD icon to open it. Find the directory labelled `Source`.
3. Right click on the `Source` directory. Select `Copy "Source"`.
4. Start `Finder`. Double click on the home directory to open it. Then double-click on the `Oscilloscope` directory to open it.
5. With the mouse inside the `Oscilloscope` directory, right click and select `Paste Item`.
6. You should now have the `Source` directory installed in `Oscilloscope`. Double click on the `Source` directory and you will see a number of files that comprise the program for the Syscomp instrument.

8 Start the Program

There are two methods to start the program: from the Terminal, and by file association and double clicking.

8.1 Method 1: Starting from the Terminal

We previously established that the path to contents of the `Source` directory (on this machine) is now `/users/dorothyrawek/Oscilloscope/Source`.

1. Open the Terminal. Use `'pwd'` to confirm you are in the home directory.
2. Change directory `Oscilloscope`: `'cd Oscilloscope'`
3. Change directory `Source`: `'cd Source'`
4. List the files in that directory: `'ls'`.
5. One of the files should be `'main.tcl'`

6. Type 'wish main.tcl' into the Terminal and the program should start.
7. On the first startup, it will query `Examine connections?`. Select `Yes`.
8. A small window pops up, listing various possible connections. Select the name that has 'usbserial' in it, eg `/dev/cu.usbserial-DSQ3Q7Z0`.
9. The `Connected` indicator on the oscilloscope GUI should change to green. The red LED on the scope hardware should flash. The scope trace should show some slight activity. The terminal window (where you ran the `wish main.tcl` command) will display message traffic between the scope hardware and the host computer.
10. Thereafter, you should not need to specify the connection port. Just enter 'wish main.tcl' and the program should start and run.

8.2 Method 2: Double Clicking

It should be possible to set up a 'file association' so that double clicking on `main.tcl` naturally invokes `/usr/bin/wish` to run it. That's easily done on Windows and Linux machines. The method described here has been observed to work, but not tested extensively.

1. Start AppleScript.
2. Enter the line


```
do shell script "/usr/bin/wish /usr/dorothyrawek/scope/main.tcl "
```

 where `/usr/bin/wish` is the location of the 'wish' program and `/usr/dorothyrawek/scope/main.tcl` is the location of the Syscomp source code file `main.tcl`.
3. Execute this script to test it. The scope program should start correctly.
4. Save this AppleScript with some appropriate name such as `MyScope`.
5. Now clicking on the icon for `MyScope` should start the scope program.

9 Ejecting the CD

There's no `eject` button. Steve Jobs doesn't like buttons, apparently. Right click on the CD icon, and select `Eject CD`.

10 Renaming a Directory (Optional)

The name `Source` is rather vague. If you want to rename that directory to something more specific, such as `DSO-101-V1.11`, do the following:

1. Right click on the `Source` directory. Select `Name` and `Extension`.
2. Enter the new name in the edit field. Press `return`. The directory name is seen to change to the new name.

11 Downloading and Installing from the Syscomp Web Site

You may want to do this if you would like the latest version of the program.

1. Point your browser at `http://www.syscompdesign.com/download.htm`.
2. To download the file `Mac OSX (zip)`, right click on it.
3. In the Safari browser, select `Download linked file`.
4. The file downloads into the `Downloads` folder, which is in your home directory:
eg, `/usr/dorothyrawek/Downloads`.
Note: On some Macs, the `Downloads` folder does not exist. You could use Finder to create it.
5. Use `Finder` to open the `Download` directory.
6. Right click on the file, which will be named something like `CGR101v111.zip`.
7. Select `Copy`. Move to the `Oscilloscope` folder. Right click and select `Paste`. You should now have the zip file `CGR101v111.zip` (or whatever) in the `Oscilloscope` folder.
8. Right click on the zip file. Select `Open with.. -> Archive Utility (default)`
9. A new folder appears, with the same name as the zip file.
10. Open that folder and confirm that there is a list of files.
11. Plug in the hardware, confirm that the green LED illuminates.
12. Start `Terminal` as described above.
13. Change to the `Downloads` directory as described above.
14. Execute the command `wish main.tcl` (ie, type that into the terminal command line).
15. If the `Unable to Connect, Examine Connection Settings?` panel appears, click on `Yes` and in the port select panel select the appropriate port (the one that has `usbserial` in the port name).
16. The program should indicate `Connected`, some activity should be visible on the scope trace, the red LED on the scope hardware should flash, and there should be message traffic in the terminal window.

Acknowledgements

Special thanks to Dorothy Rawek, Miles Pierce and Seneca Cunningham. Dorothy provided her MacBook for this investigation. Miles acted as a beta tester for this install process and supplied important feedback. Seneca showed me how to create a shell script using AppleScript.