

How to Install OpenOCD for the Flyswatter

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This tutorial will install OpenOCD (Open On-Chip Debugger) on a PC running Ubuntu 8.04 (Hardy Heron) distribution of Linux. All commands are executed from the command line.

OpenOCD (<http://openocd.berlios.de/web/>) is free open source software designed to interface to the on-chip debugging capability of commonly found ARM JTAG probes – like the Flyswatter. It is designed to work with the ARM7, ARM9, ARM11, Cortex-M1, Cortex-A8, as well as the XScale family of processors. OpenOCD provides the capability to flash embedded target systems and it provides a remote debugger interface that can be used by GDB, the GNU Project debugger.

Install the following packages by entering the following command (as root):

```
-----  
sudo apt-get install build-essential automake autoconf  
-----
```

Ubuntu needs the USB filesystem (usbfs) turned on. Type the following command (as root):

```
-----  
sudo mount -t usbfs usbfs /proc/bus/usb  
-----
```

The above command will only enable the usbfs for the current session. To ensure the usbfs is enabled each time you log in, use the gedit editor to modify the file: mountdevsubfs.sh. Type the following command (as root):

```
-----  
sudo gedit /etc/init.d/mountdevsubfs.sh  
-----
```

Find this part in the file:

```
# Magic to make /proc/bus/usb work  
#  
#mkdir -p /dev/bus/usb/.usbfs  
#domount usbfs "" /dev/bus/usb/.usbfs -obusmode=0700,devmode=0600,listmode=0644  
#ln -s .usbfs/devices /dev/bus/usb/devices  
#mount --rbind /dev/bus/usb /proc/bus/usb
```

Remove the # sign in front of the last 4 lines so it looks like this:

```
# Magic to make /proc/bus/usb work  
#  
mkdir -p /dev/bus/usb/.usbfs  
domount usbfs "" /dev/bus/usb/.usbfs -obusmode=0700,devmode=0600,listmode=0644  
ln -s .usbfs/devices /dev/bus/usb/devices  
mount --rbind /dev/bus/usb /proc/bus/usb
```

Save the file and exit the editor. **Reboot the PC.**

For this tutorial, create a directory called flyswatter in your home directory.

```
-----  
cd ~/   
mkdir flyswatter  
cd flyswatter  
-----
```

Copy the following files: openocd.tar.gz & libftd2xx0.4.13.tar.gz from the Tin Can Tools CD:

```
-----  
cd ~/flyswatter  
cp /media/cdrom0/flyswatter/source/openocd.tar.gz .  
cp /media/cdrom0/flyswatter/source/Libftd2xx0.4.13.tar.gz .  
-----
```

Or if you prefer, you may obtain the files from the following internet site:

http://www.elinux.org/Hammer_Board_Software_System#OpenOCD

Extract the Libftd2xx0.4.13.tar.gz and openocd.tar.gz tarball files using the following commands:

```
-----  
mkdir Libftd2xx  
cd Libftd2xx  
tar zxvf ../Libftd2xx0.4.13.tar.gz  
cd ..  
tar zxvf openocd.tar.gz  
-----
```

Copy the ftd2xx.h and WinTypes.h files to the openocd/src/jtag directory:

```
-----  
cp Libftd2xx/ftd2xx.h openocd/src/jtag  
cp Libftd2xx/WinTypes.h openocd/src/jtag  
-----
```

Copy the libftd2xx.so.0.4.13 file to the /usr/lib directory (as root):

```
-----  
sudo cp Libftd2xx/libftd2xx.so.0.4.13 /usr/lib  
-----
```

Create symbolic links for the libftd2xx files by typing the following commands (as root):

```
-----  
cd /usr/lib  
sudo ln -s libftd2xx.so.0.4.13 libftd2xx.so.0.4  
sudo ln -s libftd2xx.so.0.4.13 libftd2xx.so.0  
sudo ln -s libftd2xx.so.0.4.13 libftd2ss.so  
-----
```

Change back to the openocd source directory:

```
-----  
cd ~/flyswatter/openocd  
-----
```

To compile openocd, type in the following commands:

```
-----  
./bootstrap  
./configure --enable-ft2232_ftd2xx  
make  
sudo make install  
-----
```

OpenOCD is now installed on your PC.

To test the OpenOCD installation and configuration, we will flash the Hammer CPU module with a new bootloader, kernel image, and root files system using the Flyswatter:

Copy the Hammer's configuration files: hammer.cfg, hammer.ocd located on the Tin Can Tools CD to the flyswatter directory:

```
-----  
cd ~/flyswatter  
cp /media/cdrom0/flyswatter/binaries/hammer.cfg .  
cp /media/cdrom0/flyswatter/binaries/hammer.ocd .  
-----
```

Copy the Hammer's bootloader, root file system, and kernel image from the Tin Can Tools CD to the flyswatter directory:

```
-----  
cd ~/flyswatter  
cp /media/cdrom0/hammer/binaries/apex.bin .  
cp /media/cdrom0/hammer/binaries/rootfs.arm.ext2.gz .  
cp /media/cdrom0/hammer/binaries/zImage .  
-----
```

Configure the hardware by performing the following:

Connect one end of the Flyswatter's 14-pin JTAG ribbon cable to the 14-pin shrouded connector (J2) on the Flyswatter.

Connect the other end of the 14-pin JTAG ribbon cable to the Hammer's JTAG connector. Make sure the red stripe on the JTAG ribbon cable is properly aligned to pin #1 on the Hammer's JTAG connector.

Plug in the +5VDC power supply into the Hammer Carrier's DC power plug (J1). The RED power LED on the Hammer Carrier should illuminate .

Plug the USB cable into the PC running OpenOCD.

Plug the other end of the USB cable into the Flyswatter's USB connector (J4). The GREEN LED (LED1) on the Flyswatter should now illuminate.

Verify the Flyswatter is connected to the Hammer as shown in Figure 1.

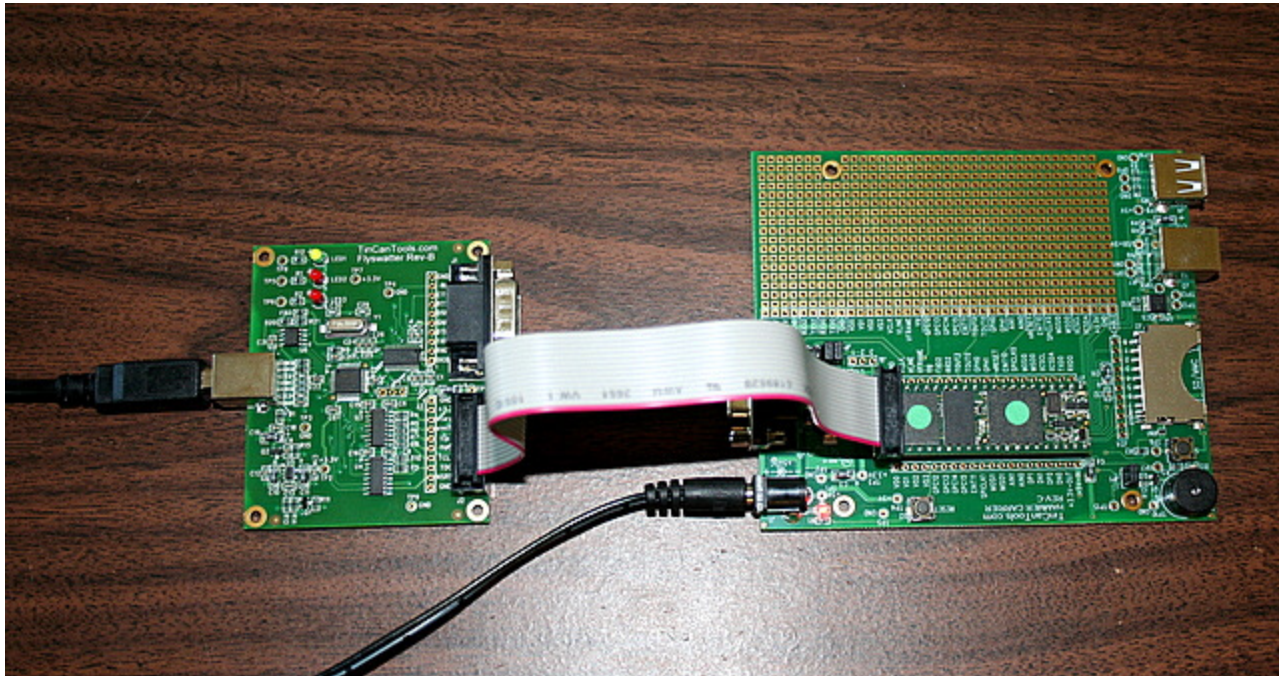


Figure 1

Verify that the Flyswatter is correctly installed by typing the following command:

```
-----  
cat /proc/bus/usb/devices  
-----
```

There will be a list of active USB devices displayed on the monitor. Scroll through the list of USB devices. One of the entries should be for the Flyswatter and should look similar to the following:

```
T: Bus=01 Lev=01 Prnt=01 Port=00 Cnt=01 Dev#= 2 Spd=12 MxCh= 0  
D: Ver= 2.00 Cls=00(>ifc ) Sub=00 Prot=00 MxPS= 8 #Cfgs= 1  
P: Vendor=0403 ProdID=6010 Rev= 5.00  
S: Manufacturer=TinCanTools  
S: Product=Flyswatter  
S: SerialNumber=FS000000  
C:* #Ifs= 2 Cfg#= 1 Atr=80 MxPwr=200mA  
I:* If#= 0 Alt= 0 #EPs= 2 Cls=ff(vend.) Sub=ff Prot=ff Driver=ftdi_sio  
E: Ad=81(I) Atr=02(Bulk) MxPS= 64 Iv1=0ms  
E: Ad=02(O) Atr=02(Bulk) MxPS= 64 Iv1=0ms  
I:* If#= 1 Alt= 0 #EPs= 2 Cls=ff(vend.) Sub=ff Prot=ff Driver=ftdi_sio  
E: Ad=83(I) Atr=02(Bulk) MxPS= 64 Iv1=0ms  
E: Ad=04(O) Atr=02(Bulk) MxPS= 64 Iv1=0ms
```

Take note of the following lines:

```
S: Manufacturer=TinCanTools  
S: Product=Flyswatter  
S: SerialNumber=FS000000
```

If one of the USB entries on your PC has the above three lines, it indicates the Flyswatter is properly configured and recognized by the PC.

Flash the Hammer with a new bootloader, kernel image, and root file system by typing the following commands (as root):

```
-----  
cd ~/flyswatter  
sudo openocd -f hammer.cfg  
-----
```

The openocd flashing process should display the following information:

```
$ sudo openocd -f hammer.cfg  
Info:   openocd.c:92 main(): Open On-Chip Debugger (2007-08-21 18:30 CEST)  
Info:   target.c:232 target_init_handler(): executing reset script './hammer.ocd'  
Info:   configuration.c:50 configuration_output_handler(): fast memory access is enabled  
Info:   configuration.c:50 configuration_output_handler(): dcc downloads are enabled  
Info:   configuration.c:50 configuration_output_handler(): flash 'cfi' found at 0x00000000  
Info:   configuration.c:50 configuration_output_handler(): erased sectors 0 through 127 on flash bank 0 in  
69s 366047us  
Info:   configuration.c:50 configuration_output_handler(): wrote 37908 byte from file ./apex.bin to flash  
bank 0 at offset 0x00000000 in 0s 927706us (39.904378 kb/s)  
Info:   configuration.c:50 configuration_output_handler(): wrote 843952 byte from file ./zImage to flash  
bank 0 at offset 0x00040000 in 16s 285805us (50.606763 kb/s)  
Info:   configuration.c:50 configuration_output_handler(): wrote 561617 byte from file rootfs.arm.ext2.gz  
to flash bank 0 at offset 0x00140000 in 10s 956911us (50.055540 kb/s)
```

It takes approximately 2 minutes to completely flash the Hammer CPU module with a new bootloader, kernel, root file system.
(Note: Each time you flash the target the actual times displayed for each operation will vary slightly.)

Your Hammer board has now been reflashed with a new bootloader, kernel image, and root file system. The Hammer CPU module is now ready to boot.

Note: The hammer.cfg and hammer.ocd are intended to reload the default bootloader, kernel, and ramdisk. If you want a different configuration you must edit the hammer.cfg and hammer.ocd files.