Setting up an Octopus OS development environment

This document describes the installation and configuration of a development environment for use with the genoQs Octopus MIDI control sequencer.

The following document will guide you to perform the following tasks:

- Installing a Linux operating system
- Installing Tclsh
- Installing the eCos embedded OS files
- Installing a Java JRE
- Installing Eclipse C/C++ IDE
- Copying modified eCos base files for the Octopus
- Checking out a working copy of the Octopus source code
- Opening the Octopus OS workspace in Eclipse
- Modifying the source code for configure for specific installation
- Compiling the Octopus OS

NOTE:

Credit for this document goes straight to John Kimble, who was brave enough to take a few hints from us and turn them into a perfectly running installation of the Octopus development environment.

At the same time, John was kind enough to capture his experience and gained expertise into a written document, which he supplied to us so we can make it available to the rest of the Octopus community.

Thank you, John!

Downloading and installing Linux

For this environment we will choose a free and easy to install Linux distribution: Ubuntu. We need to download the OS installation CD image file from the following location:

http://www.ubuntu.com/getubuntu/download

Select the options for Ubuntu 7.04 (or latest), Standard personal computer, and a location that is appropriate. Start the download and if prompted choose to save the file to a directory with at least 700MB of free space.

When the download completes you should have a file with a name similar to "ubuntu-7.04-desktop-i386.iso"

Now you should decide where you will be installing Linux. The environment described in this document will be installed into a virtual machine running in Parallels on a Mac OS X machine. It is possible to install a similar environment on physical hardware or on a Windows environment.

Please see relevant documents for details on the creation of a virtual machine. If installing to a physical machine, you will need to burn the ISO image file to a bootable CD for installation.

Please see the Ubuntu documentation on how to perform the installation of a basic linux machine. After the installation completes, the machine will be rebooted. Once the machine has rebooted, log in as the user you created during installation.

Now we must verify that network connectivity is working. Some components will need to be downloaded from the internet so the network connection must be configured correctly.

Start a terminal session from the Applications -> Accessories -> Terminal menu item.

From the terminal window, run the command "ifconfig". You should see your ethernet adapter listed with an IP address assigned.

NOTE

Specifically for Ubuntu running on a Mac Parallels virtual machine, the "Network Manager" must be uninstalled before network connectivity will work. This can be done by running the command "sudo apt-get remove network-manager" from the terminal window.

Installing eCos

Next the eCos runtime system will be downloaded and installed.

We will install eCos into the /opt/ecos directory. This directory needs to be created and given proper permissions before we can download eCos.

Enter the following commands in the terminal window:

```
cd /opt
sudo mkdir ecos
```

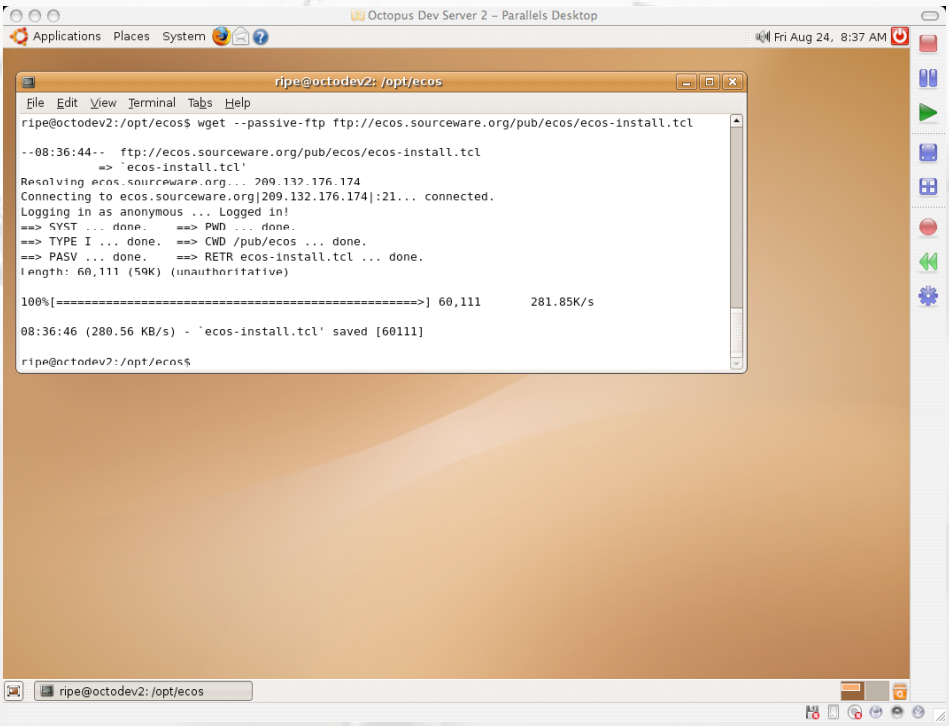
You may be prompted to enter your password, this allows you to run certain commands as an administrative user. Use the same password you have for your login user.

```
sudo chmod 777 ecos
cd ecos
```

Now from your terminal window, enter the following command to download the eCos installation utility:

```
wget --passive-ftp
ftp://ecos.sourceware.org/pub/ecos/ecos-install.tcl
```

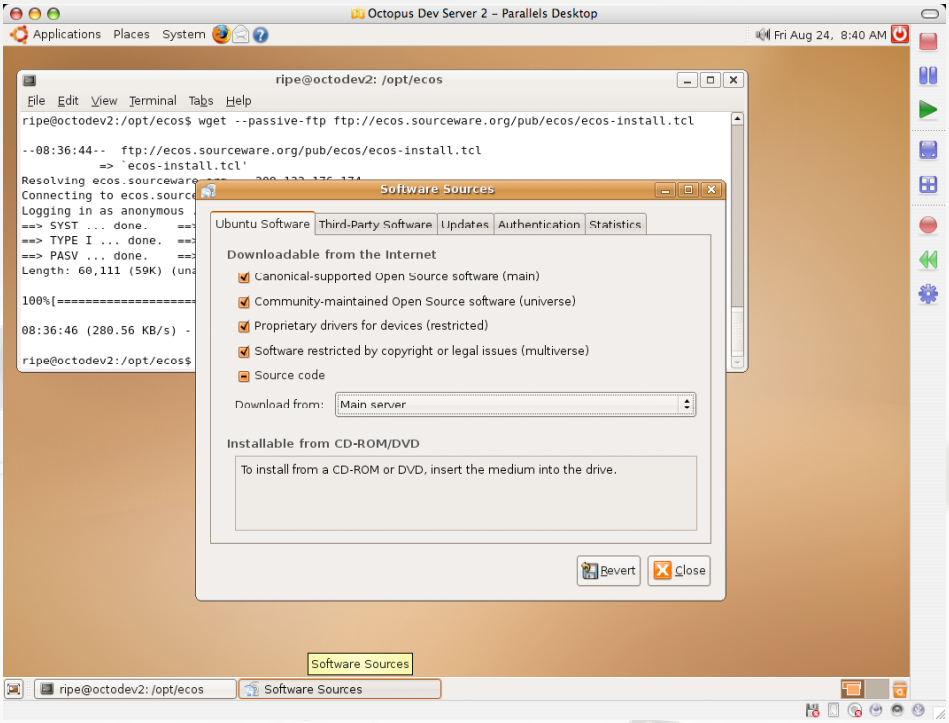
You should see the file being downloaded:



Now before we can execute the installer we need to install tclsh.

First we must update the software sources for our machine. Open the "Software Sources" utility using the menu command System -> Administration -> Software Sources

From the Software Sources window, select a different server from the "Download from:" drop down-list.



Click "Close" and answer yes to updating the software list.

Now using the terminal, enter the command:

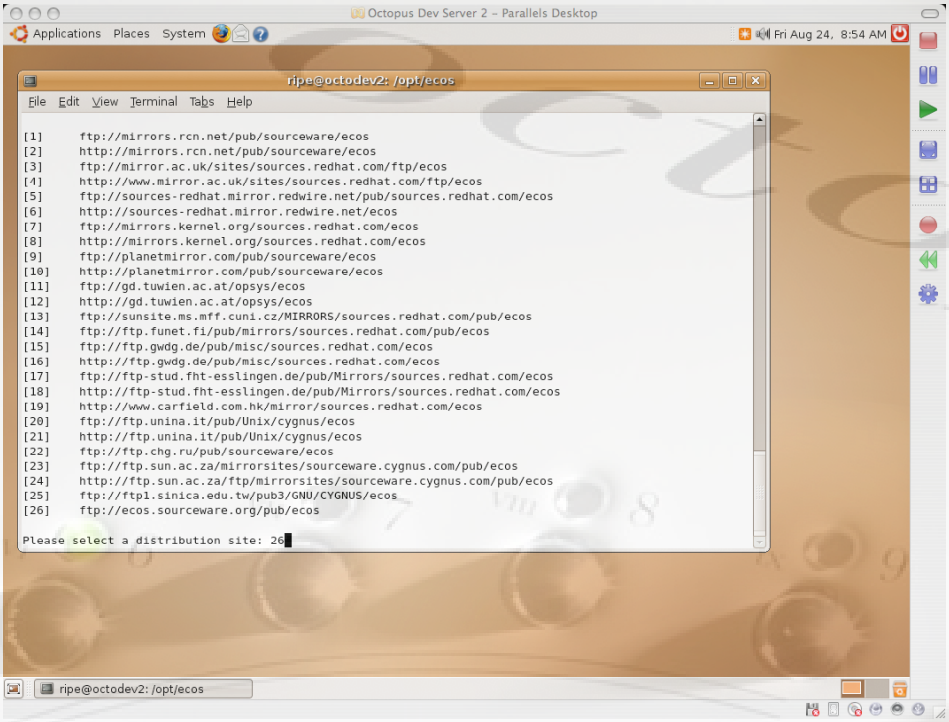
sudo apt-get install tcl8.3

You will see the tcl package being installed.

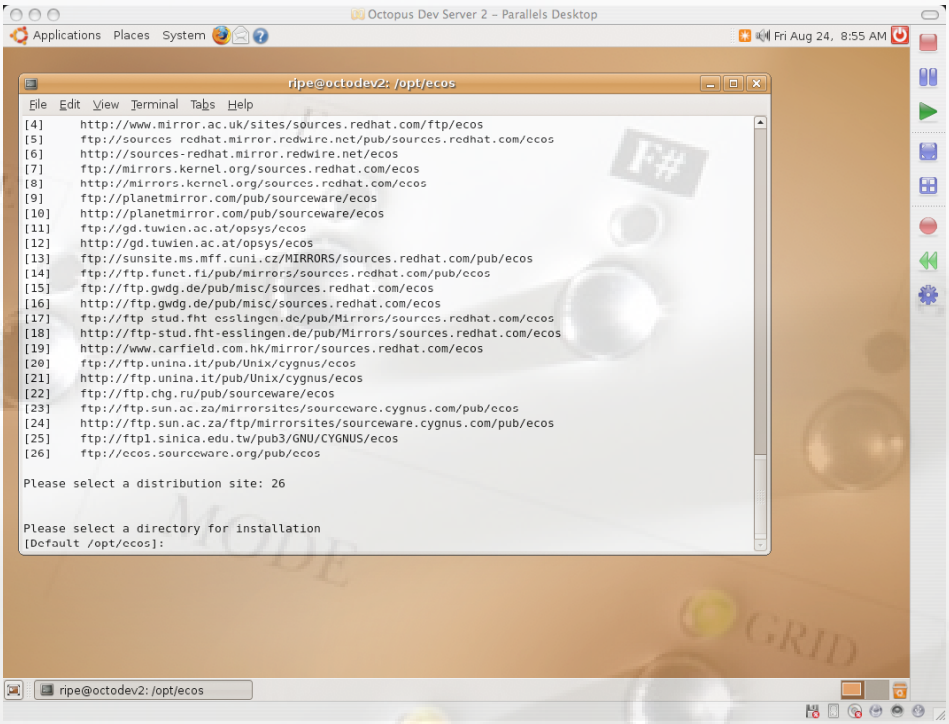
Now the eCos installed can be executed using the terminal window. You should still be in the directory /opt/ecos. Enter the command:

```
sudo sh ecos-install.tcl
```

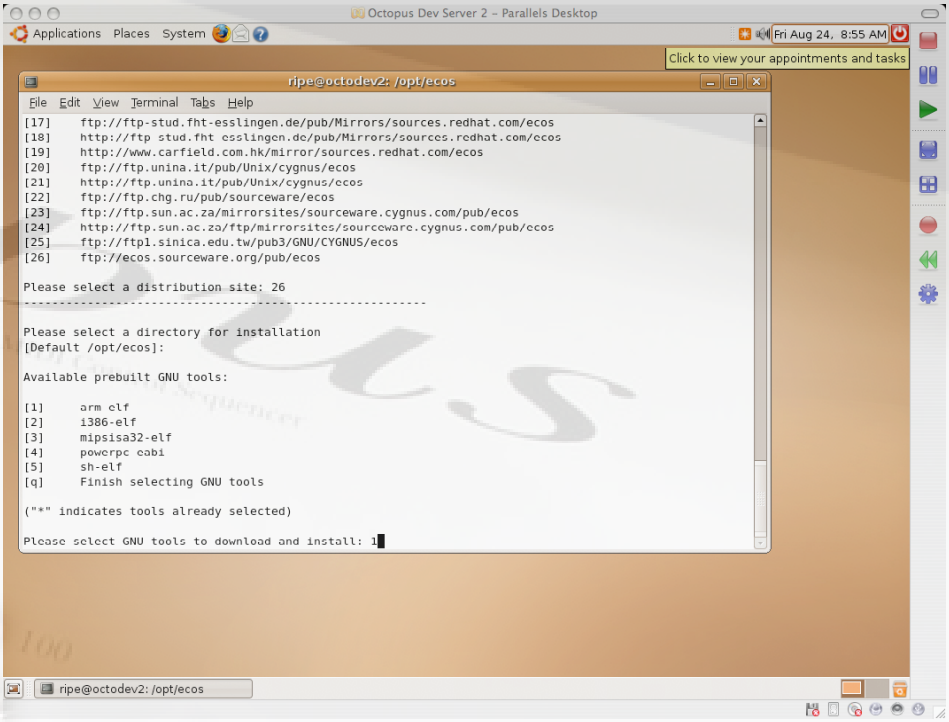
Choose a download site:



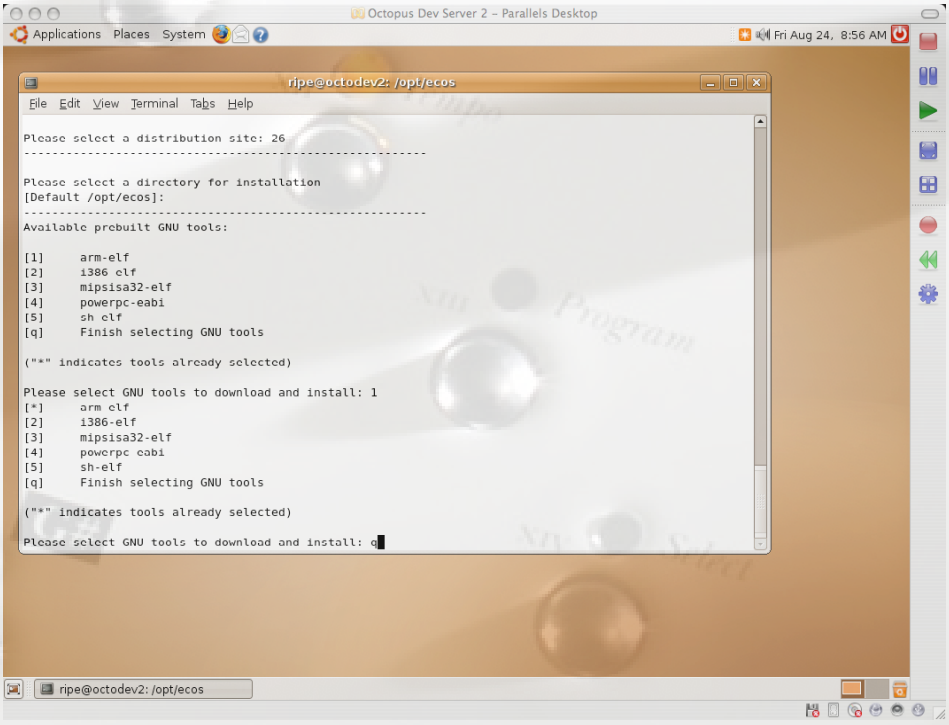
Accept the default installation location:



Choose to install the “arm-elf” toolchain:



Select q to finish the selection:



The files should now download and install automatically after which you should see “Installation complete!”

Installing Java

Now we must install a Java Runtime Environment to use the Eclipse IDE. From a Web Browser window go to the address:

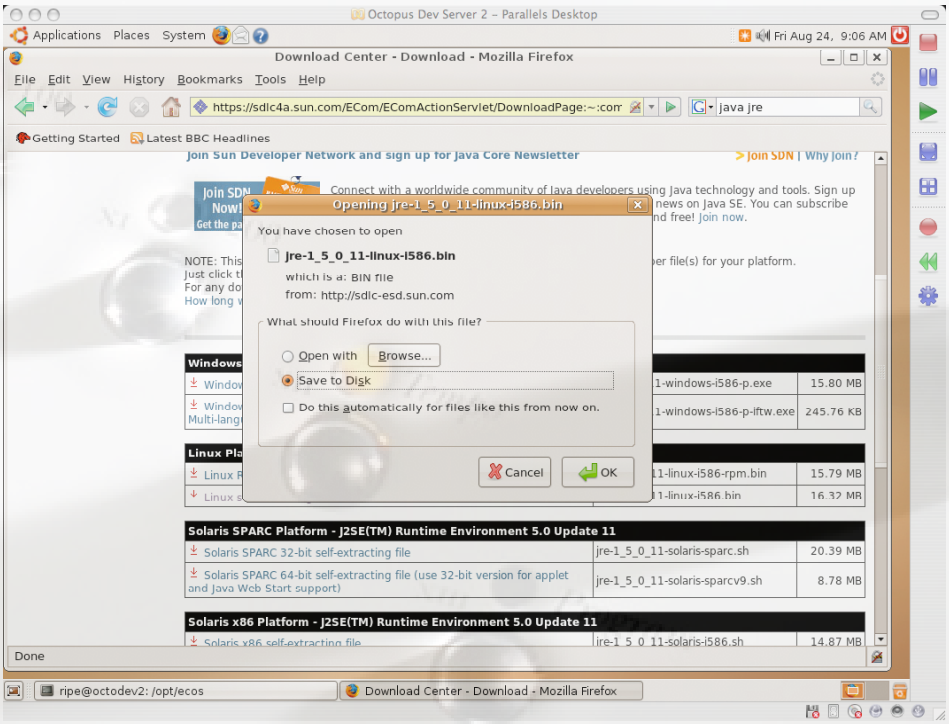
http://java.sun.com/products/archive

Select the "JRE 5.0 Update 11" from JDK/JRE – 5.0 list

On the next window, select to download the JRE installation package.

On the next window, agree to the license agreement and select to download the Linux self extracting install.

Choose to save the file to disk.



Now from the terminal window, change directory to find the file we just downloaded and we will move it to a new directory.

```
cd ~
cd Desktop

sudo mkdir /usr/java
sudo chmod 777 /usr/java
mv *.bin /usr/java
cd /usr/java
```

We must change the file permissions before it can be executed

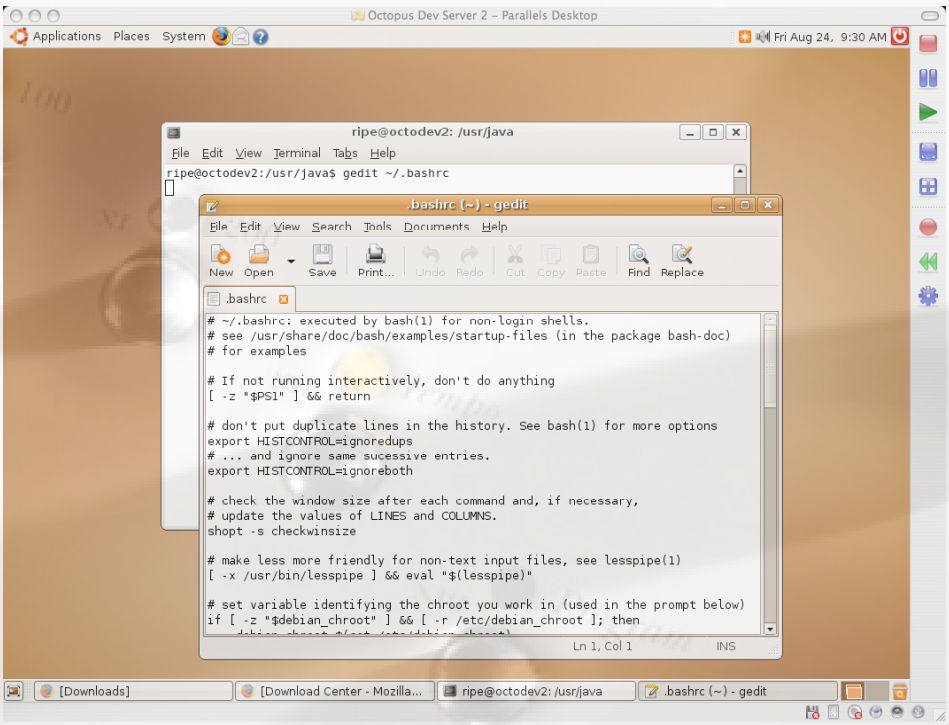
```
chmod +x *.bin
```

Now we can execute the JRE installer with the following command:
`./jre-1_5_0_11-linux-i586.bin`

Hit “space” until you get to the end of the license agreement and type “yes” to agree to the agreement.

Now we will add some environment variables to your shell environment. To open the .bashrc file in gedit use the following command in the terminal window:

```
gedit ~/.bashrc
```



Scroll to the end of the file and add the following lines:

```
export JAVA_HOME=/usr/java/jre1.5.0_11/bin
. /opt/ecos/ecosenv.sh
```

Save and close the file.

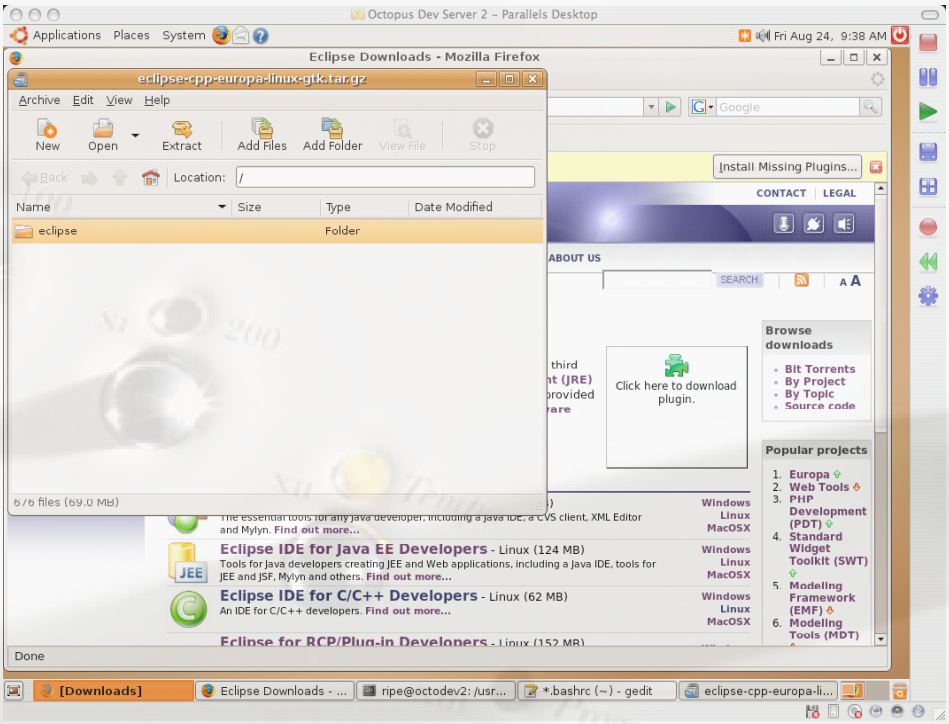
Installing Eclipse

Now we will download and install the Eclipse IDE with support for C/C++. In a web browser, navigate to the following address:

http://www.eclipse.org/downloads/

Select the Eclipse IDE for C/C++ developers (Linux).

Select the "Open With" option. The file will open in Archive Manager when downloading completes:



Click the "Extract" button and select a location for extraction. In this example, the user home directory is selected.

Close Archive Manager after extraction completes. Eclipse is now installed.

Downloading the Octopus source code

Now the good stuff!

We must check out the Octopus source code from the Sourceforge CVS repository, but first we need to install the cvs client.

From a terminal window, issue the following command to install the cvs package:

```
sudo apt-get install cvs
```

You should see the cvs package being downloaded and installed.

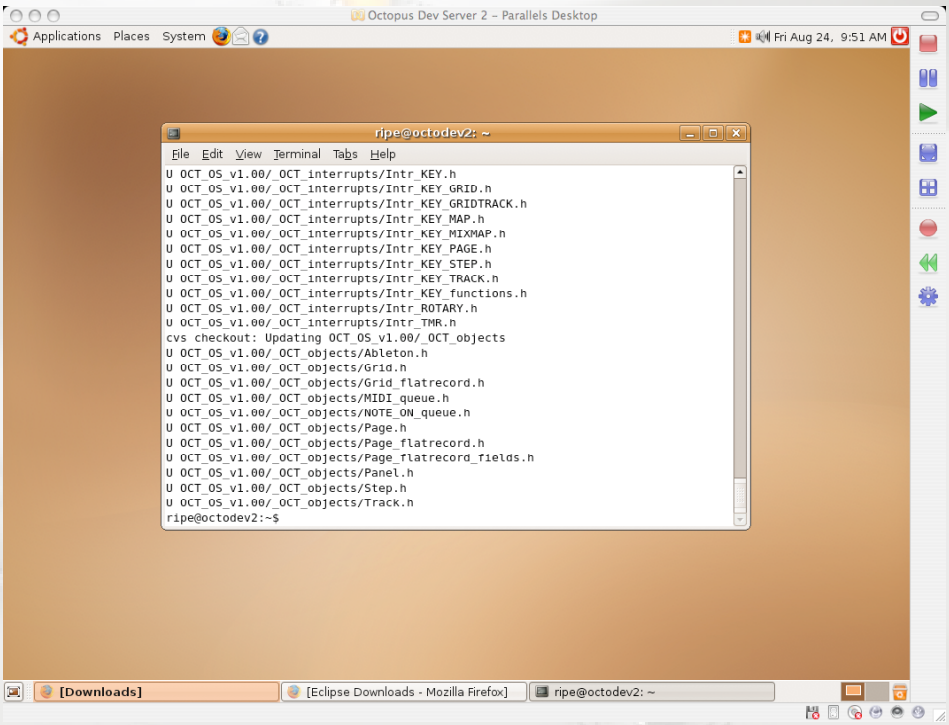
Now we can issue the command to check out the Octopus source code. Remember to first change directory to the location where you would like the source code to be copied.

In this example the code will be checked out into the user's home directory.

Issue the following commands:

```
cd ~
cvs -z3 -d:pserver:anonymous@genoqs.cvs.sourceforge.net:/cvsroot/genoqs
co -P OCT_OS_v1.00
```

You should see the code files being downloaded:



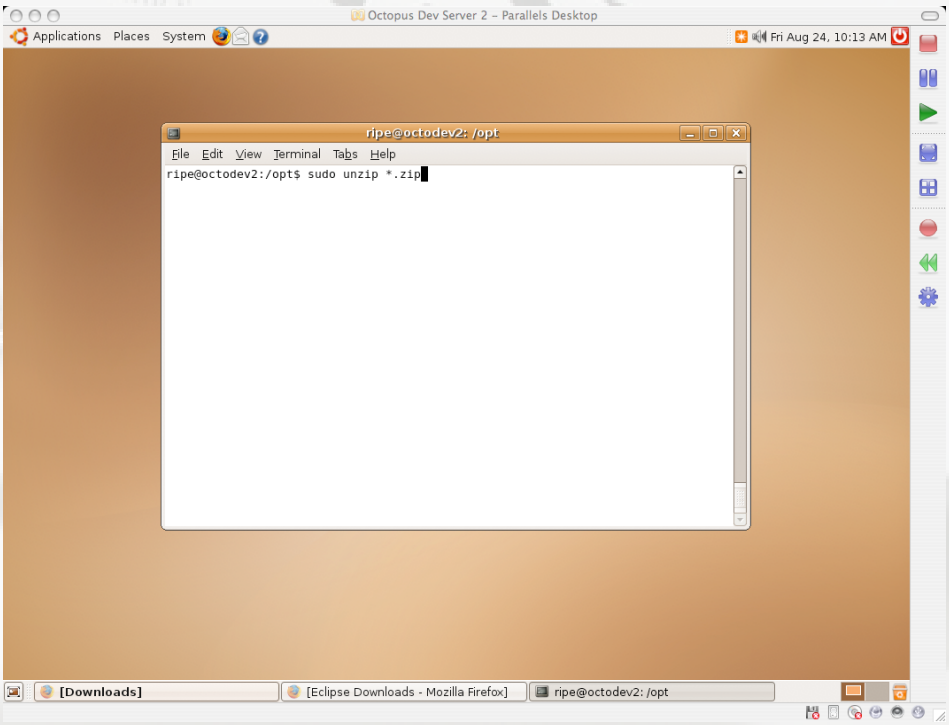
Now we need the modified eCos base files supplied by genoQs.

Issue the following commands to download the modified base files to the /opt directory:

```
cd /opt
sudo wget
http://www.genoqs.com/downloads/OCT_OS_eCos_libs.zip
```

Now unzip the file using the following command:

```
sudo unzip *.zip
```



Now change ownership of the files to your login user by issuing the following command:

```
sudo chown -hR <username> OCT_OS_eCos_libs
```

Where <username> is the name of your specific login.

Starting Eclipse

Now we will start the Eclipse IDE and load the Octopus project.

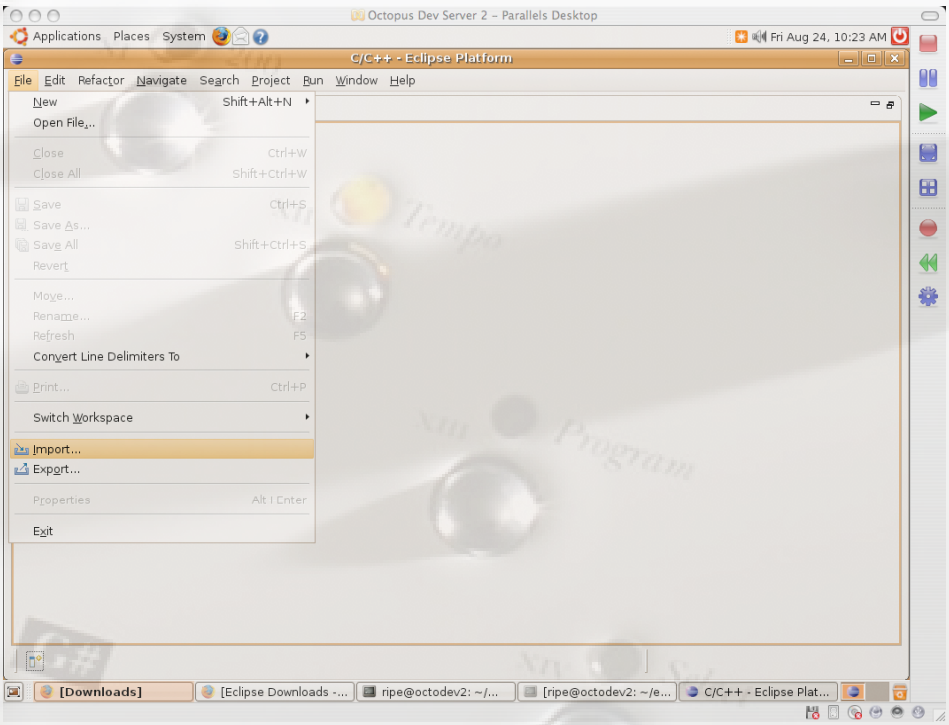
From a terminal window, change directory to the eclipse files and execute eclipse:

```
cd ~
cd eclipse
./eclipse
```

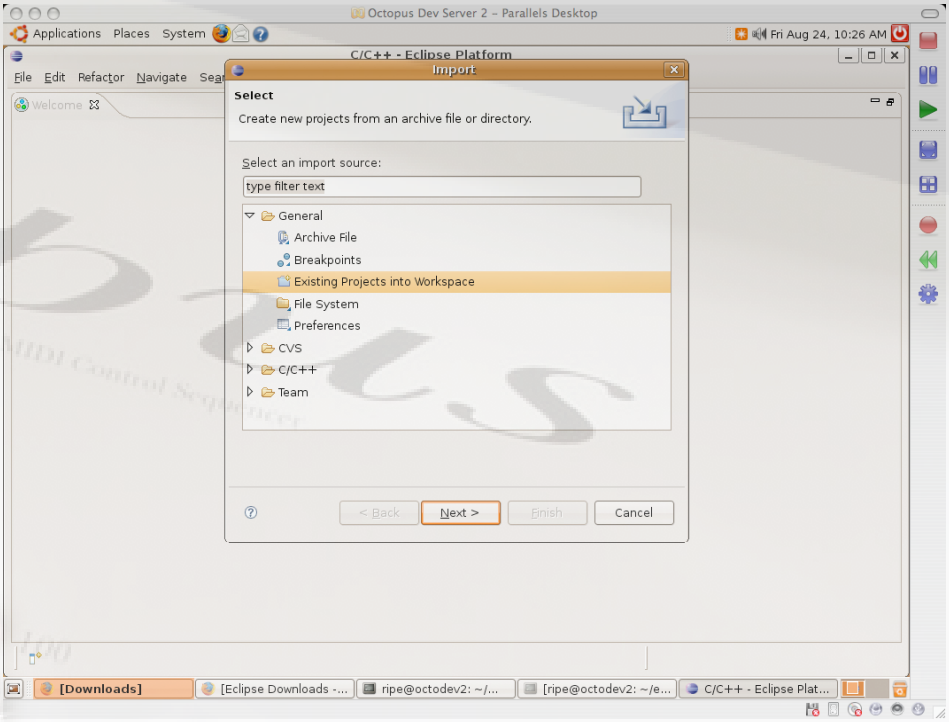
Eclipse will now start. When prompted for a workspace location, accept the default.

Eclipse continues loading. You may see an error message, but that is OK.

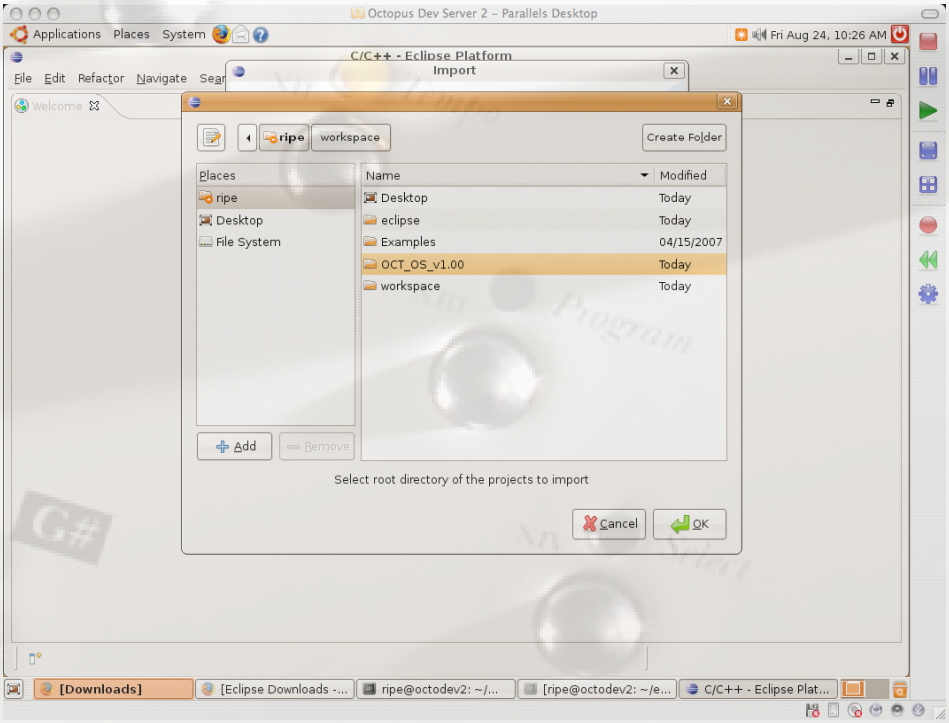
When Eclipse is loaded select the menu item, File -> Import



Select General -> Existing projects into workspace

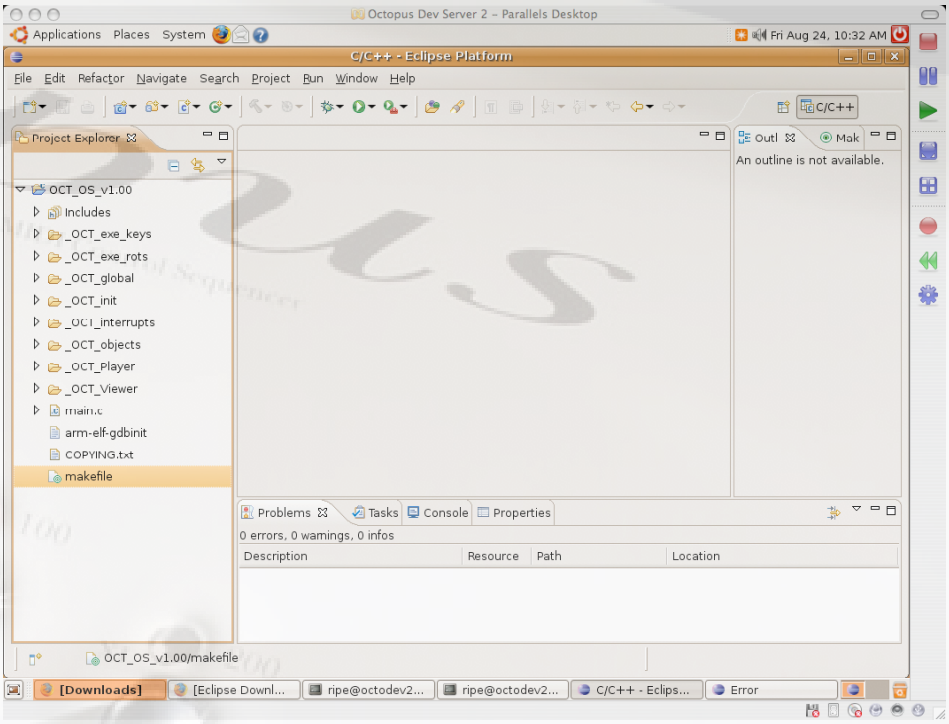


Browse to the location where you checked out the Octopus source code:



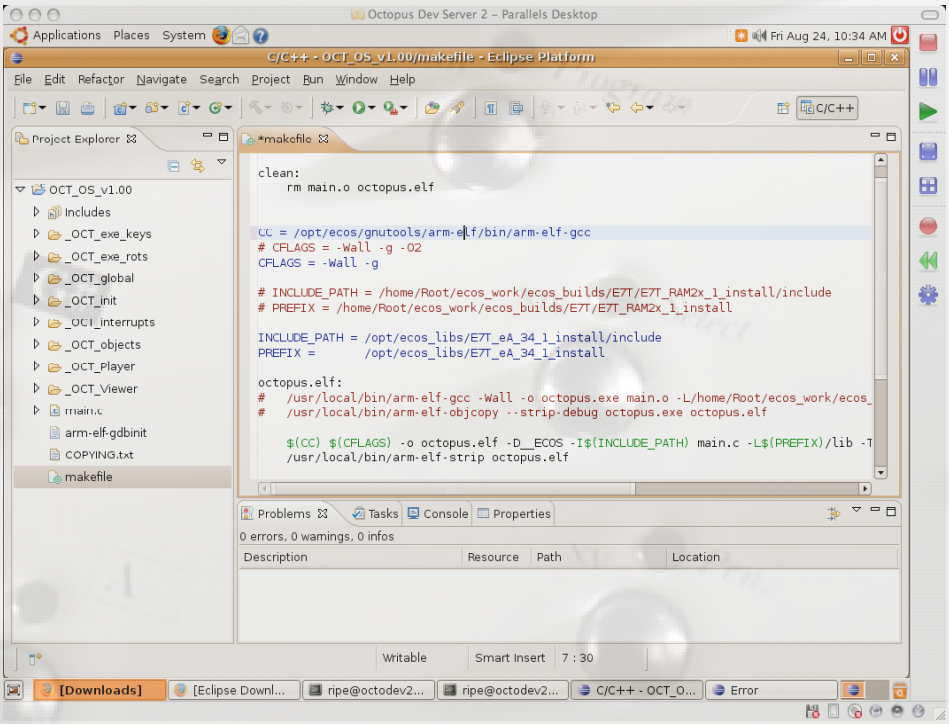
You should see the OCT_OS project listed. Click “Finish”

Close the “Welcome” window and you should see the Octopus project loaded:



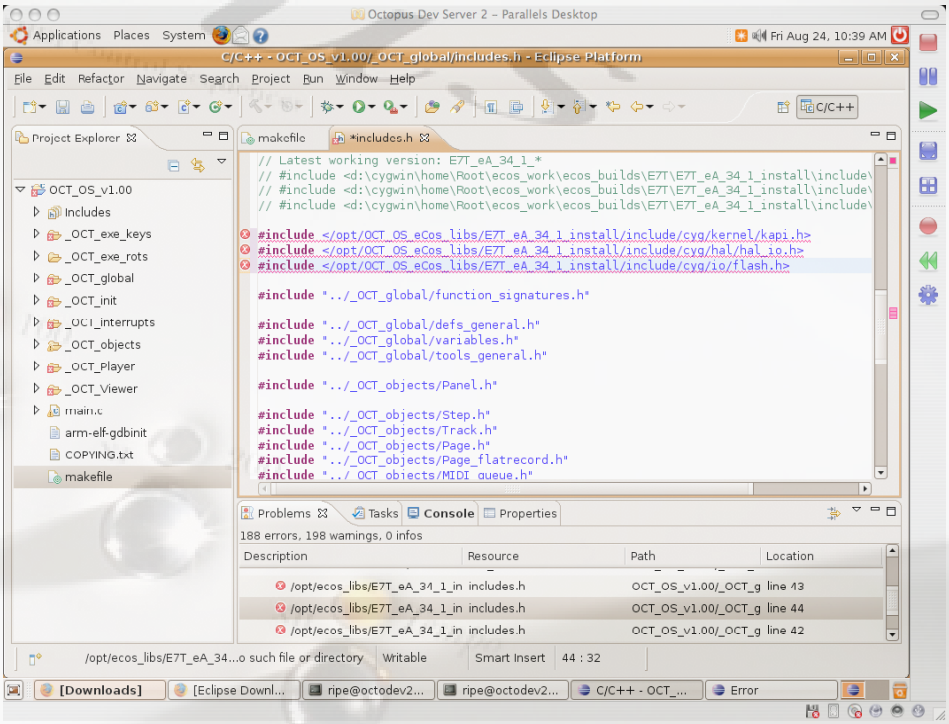
Now we need to modify some paths to match our installation. Open the makefile in Eclipse.

Modify the path for CC, INCLUDE_PATH and PREFIX:



Also modify the paths for the build tasks “octopus.elf” and “main.o”

Save the file. You should see a bunch of errors listed in the Problems window. We still need to modify another file.
Now open the includes.h file in Eclipse. Modify the include paths for the ecos libs.



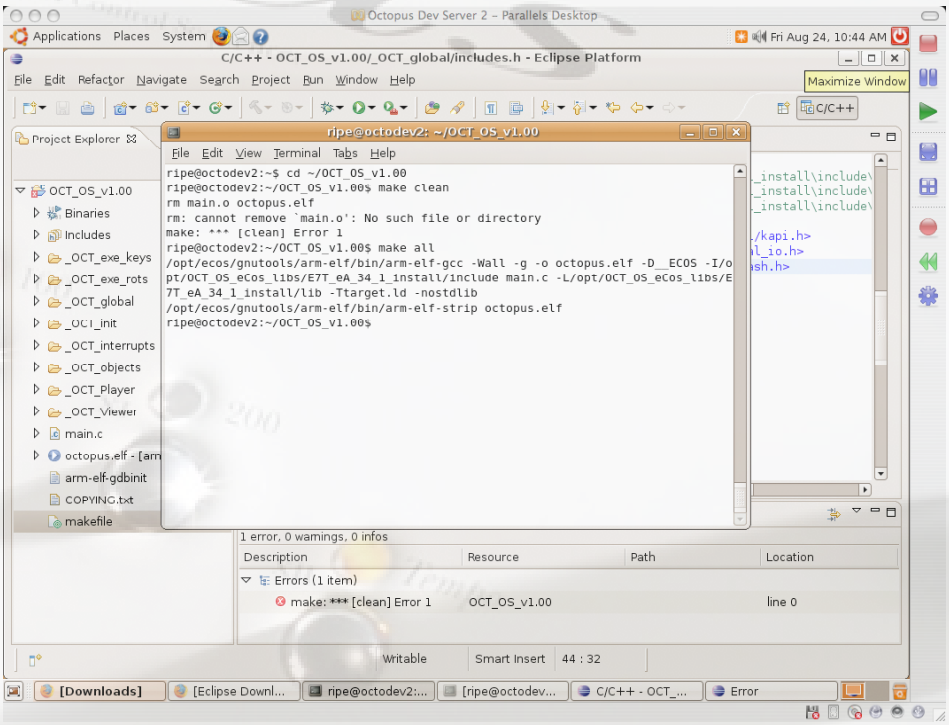
Save the file. You should now see only one error in the Problems window related to “make”, this is OK. You are now ready to compile the Octopus OS!

Compiling the Octopus .elf file

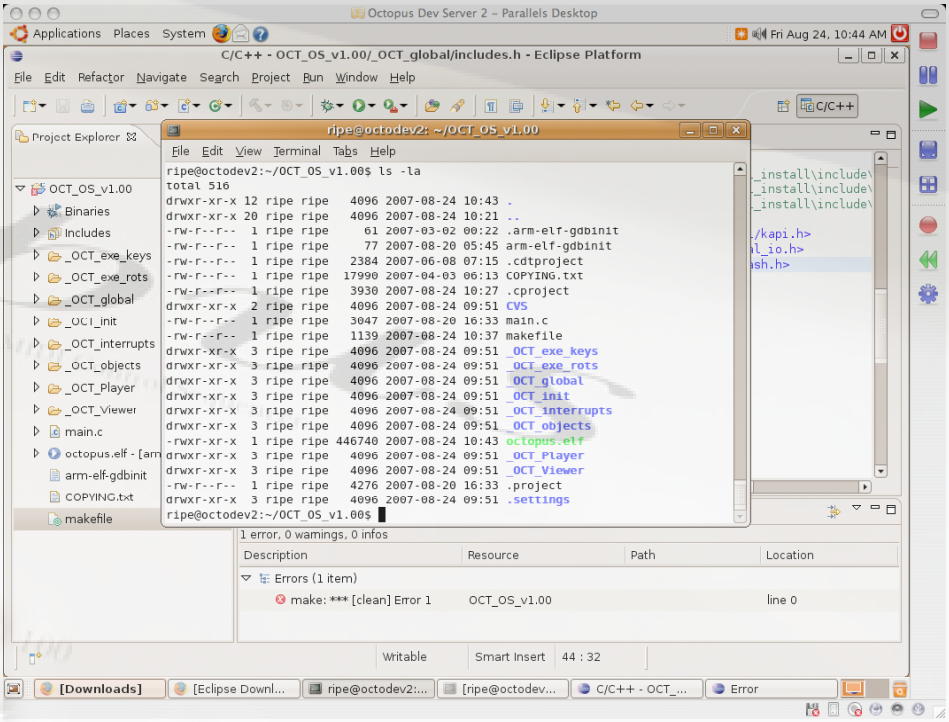
From a terminal window, change directory to your OCT_OS source files.
`cd ~/OCT_OS_v1.00`

Issue the “make clean” command to clean up any files
`make clean`

Now issue the “make all” command to compile the octopus.elf file.



You should now see the octopus.elf file located in the directory, this is your newly compiled OS!



Now to upload the new OS (in form of an .elf file) to your Octopus, follow the directions outlined in the genoQs document for updating the Octopus OS via USB.

Enjoy!