

## **SETTING UP A VIRTUAL MACHINE (mimics EECS lab environment)**

In this tutorial, we will work through the process of setting up a virtual machine on your home desktop/laptop, that reflects the working environment you will experience in the laboratory (LAS 1006).

If you are not familiar with virtual machines, or have never used one before, then don't worry – we will learn about them now.

### What is a Virtual Machine (VM)?

A VM is basically a way of emulating a computer system. More specifically, it allows you to emulate one or more different operating systems that would normally run on potentially different computer architectures, all from the convenience of your own desktop.

This means that regardless of the fact that you might be a windows/mac or even a linux user, you can quickly startup a different operating system (in a new window), and run all kinds of wonderful software/tools that might not be available through your normal operating system.

Essentially what we want to do in this tutorial, is setup a VM for the linux operating system that is running in the lab, complete with all the software that is also available in the lab relevant to your needs in this course (Java, Eclipse, etc).

### What is this Linux??

Linux is probably the most widely used open-source operating system (OS). An OS (like Windows 7/8/10, Mac OSX, iOS, etc.) provides the basic software that runs on your computer and allows you to manage files, access storage and access all the hardware inside your computer (e.g. hard drive, memory, screen, keyboard, networking, etc.), or external peripherals connected to your computer (mouse, usb stick, other hard drives, etc).

Linux is a very powerful OS, and was designed to be similar to the Unix operating system (developed in the 1970's at Bell Labs). Unix was essentially the operating system used in some of the first mainframe computers. Linux is free, and has evolved today to have a very similar look and feel as other mainstream OS's – i.e. similar windowed desktop, filesystem tools, programming tools, etc.

There are many 'flavours' or versions of Linux that use the same basic core software (known as the Linux kernel), but package this up with different combinations of software tools and graphical look/feel. The flavour we will be using is called CentOS.

## Virtual Box

The software you will be using to run/manage your VM, is called VirtualBox: <https://www.virtualbox.org>. You can download a copy for your home machine at the previous link.

Different operating systems have different processes for interacting with hardware, and VirtualBox simulates hardware in a way that the virtualized OS (VM) thinks that it is running on real hardware. Cool eh?!

The screenshot shows the official website for Oracle's VirtualBox. At the top left is the Oracle logo. The main title "VirtualBox" is prominently displayed in large blue letters. Below the title is a search bar and links for "Login" and "Preferences". On the left side, there is a sidebar with links for "About", "Screenshots", "Downloads", "Documentation", "End-user docs", "Technical docs", "Contribute", and "Community". The main content area features a large blue button with the text "Download VirtualBox 6.1". Above this button, there is a section titled "Welcome to VirtualBox.org!" with text about the product's capabilities and its use in enterprise and home environments. To the right of the main content is a "News Flash" sidebar containing a list of recent releases and updates, each with a small red "New" or "Important" badge.

**Welcome to VirtualBox.org!**

VirtualBox is a powerful x86 and AMD64/Intel64 [virtualization](#) product for enterprise as well as home use. Not only is VirtualBox an extremely feature rich, high performance product for enterprise customers, it is also the only professional solution that is freely available as Open Source Software under the terms of the GNU General Public License (GPL) version 2. See "[About VirtualBox](#)" for an introduction.

Presently, VirtualBox runs on Windows, Linux, Macintosh, and Solaris hosts and supports a large number of [guest operating systems](#) including but not limited to Windows (NT 4.0, 2000, XP, Server 2003, Vista, Windows 7, Windows 8, Windows 10), DOS/Windows 3.x, Linux (2.4, 2.6, 3.x and 4.x), Solaris and OpenSolaris, OS/2, and OpenBSD.

VirtualBox is being actively developed with frequent releases and has an ever growing list of features, supported guest operating systems and platforms it runs on. VirtualBox is a community effort backed by a dedicated company: everyone is encouraged to contribute while Oracle ensures the product always meets professional quality criteria.

**Download VirtualBox 6.1**

**Hot picks:**

- Pre-built virtual machines for developers at [Oracle Tech Network](#)
- [Hyperbox](#) Open-source Virtual Infrastructure Manager [project site](#)
- [phpVirtualBox](#) AJAX web interface [project site](#)

**News Flash**

- Important August 3rd, 2020 We're hiring!**  
Looking for a new challenge? We're hiring a [VirtualBox senior developer](#) (Germany/Europe/USA).
- New September 4th, 2020 VirtualBox 6.1.14 released!**  
Oracle today released a 6.1 maintenance release which improves stability and fixes regressions. See the [Changelog](#) for details.
- New July 14th, 2020 VirtualBox 6.1.12 released!**  
Oracle today released a 6.1 maintenance release which improves stability and fixes regressions. See the [Changelog](#) for details.
- New July 14th, 2020 VirtualBox 6.0.24 released!**  
Oracle today released a 6.0 maintenance release which improves stability and fixes regressions. See the [Changelog](#) for details.
- New July 14th, 2020 VirtualBox 5.2.44 released!**  
Oracle today released a 5.2 maintenance release which improves stability and fixes regressions. See the [Changelog](#) for details.
- New June 5th, 2020 VirtualBox 6.1.10 released!**  
Oracle today released a 6.1 maintenance release which improves stability and fixes regressions. See the [Changelog](#) for details.
- New May 15th, 2020 VirtualBox 6.1.8 released!**  
Oracle today released a 6.1 maintenance release which improves stability and fixes regressions. See the [Changelog](#) for details.
- New May 15th, 2020**

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You need to download a version that matches your host machine (the machine you are currently running). I.e. if you are using a windows computer right now, and have the windows OS running on it, then you would download the VirtualBox platform package for "Windows hosts". If you have a Mac, then you would download the package for "OS X hosts", etc. Click on the big blue Download VirtualBox 6.1 button to navigate to the downloads section of the site.

VirtualBox essentially distinguishes between the local or “host” machine, and a VM or “guest” machine that will be emulated.

### Installation & Setup

**1: download VirtualBox installer to your host machine**

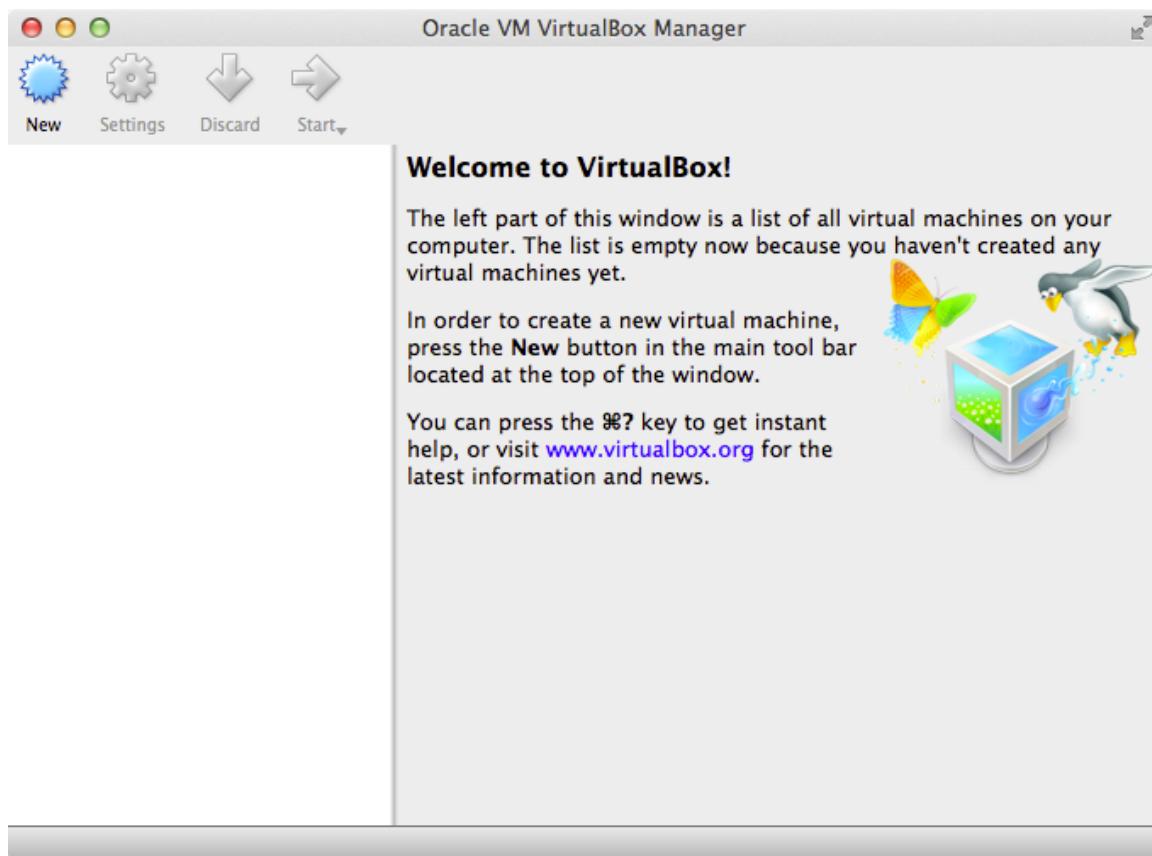
**2: download the Oracle VM VirtualBox Extension Pack to your host machine**

*\*\* the “host” machine that we will setup will be the EECS appliance (a preconfigured virtual machine that we will download later – it has all the software that the lab machines have already setup)*

The screenshot shows the official Oracle VM VirtualBox download page. On the left, there's a sidebar with links to About, Screenshots, Downloads, Documentation, Contribute, and Community. The main content area has a large blue header "VirtualBox". Below it, a section titled "Download VirtualBox" contains a sub-section "VirtualBox binaries". It says "Here you will find links to VirtualBox binaries and its source code." and "By downloading, you agree to the terms and conditions of the respective license." It mentions that version 6.0 packages are available for download. A red arrow points to the link "Windows hosts". Another section below it is "VirtualBox 6.1.14 platform packages", which lists "Windows hosts", "OS X hosts", "Linux distributions", and "Solaris hosts". A red arrow points to the "Windows hosts" link. Further down, there's a note about GPL version 2, a changelog link, and a note about SHA256 checksums. A third red arrow points to the "All supported platforms" link under the "VirtualBox 6.1.14 Oracle VM VirtualBox Extension Pack" section. This section also includes a note about support for various devices and the User Manual.

**3: install virtual box on your machine & open**

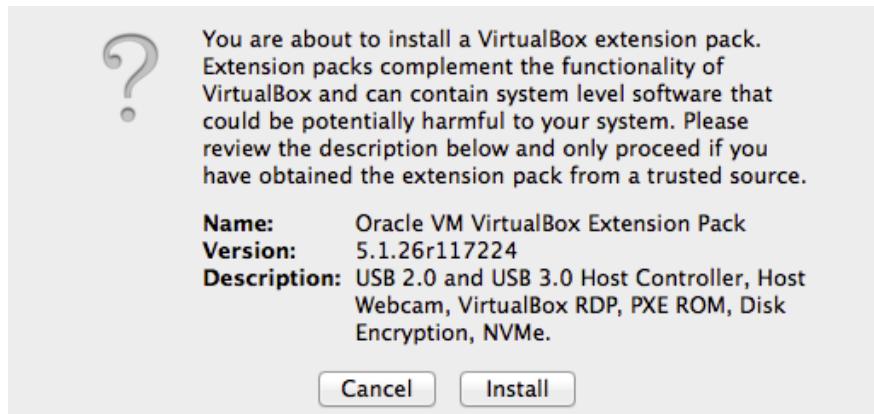
You should now see something similar to the following:



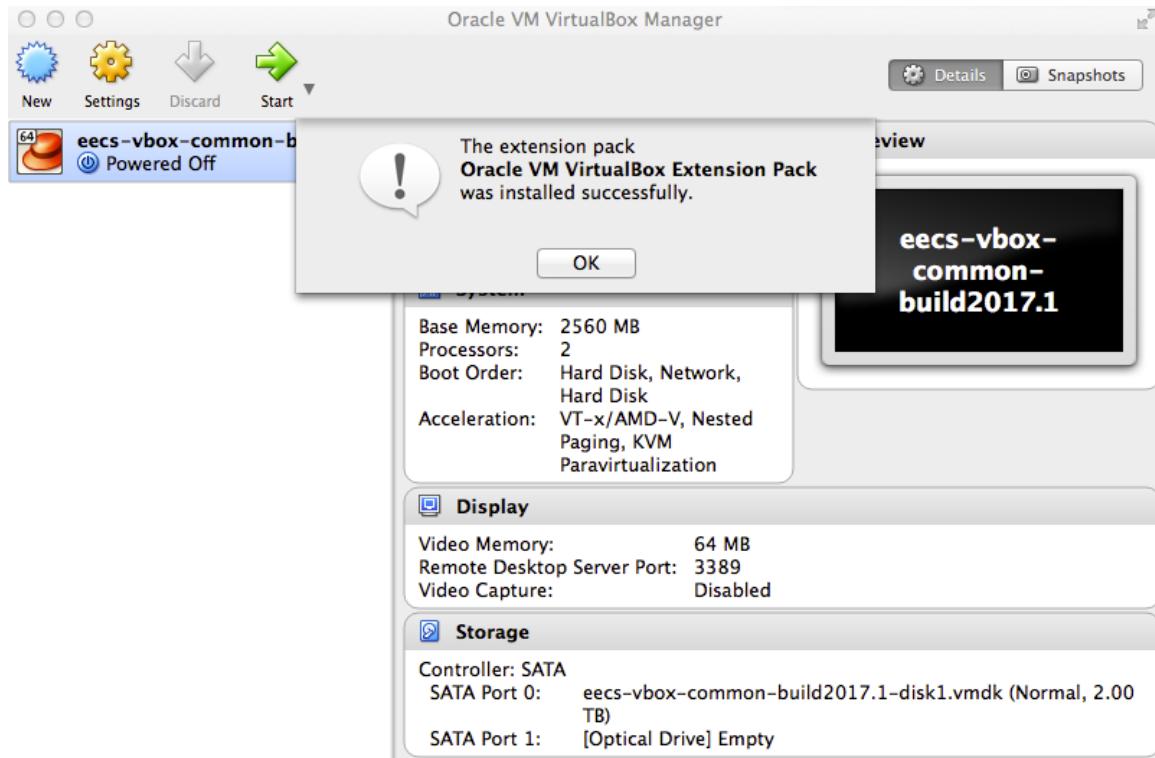
The user manual can be found here (if you need more details as we progress):  
<https://www.virtualbox.org/manual/UserManual.html>

#### 4: Install the Oracle VM VirtualBox Extension Pack (downloaded in step 2)

Double click on the file while VirtualBox is open to install this pack. You will see the following dialogue. Click on Install, then "I Agree" to the license terms.



There will be a message that pops up to indicate successful install.



## 5: importing and setting up the pre-made VM from EECS

We will need to download the VM itself. This is a (big) file available from the following link. The file is quite large (4.8GB), so make sure you have enough space.

Download the student version of the VM here:

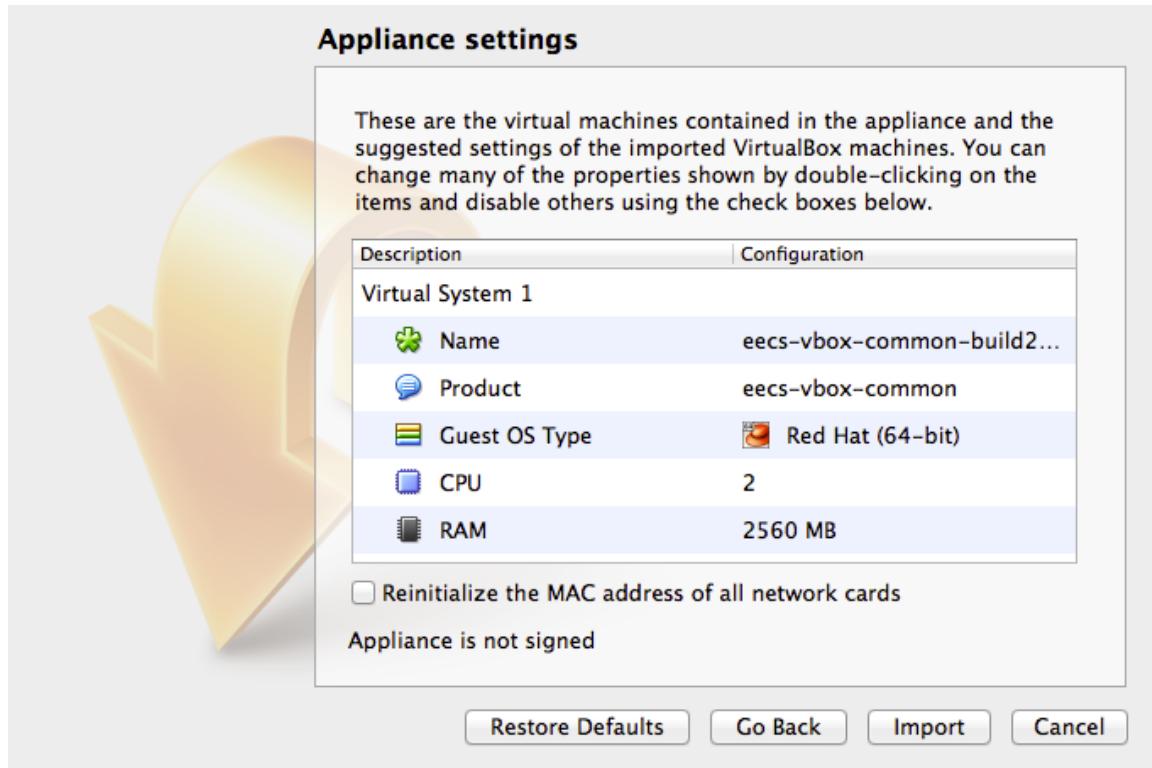
<http://dl.eecs.yorku.ca/common/eecs-vbox-common-latest.ova>

user: common

password: common

NOTE: \*.ova is a standard file format for storing a virtual machine “appliance” .. it can be easily imported into different virtual managers (other than virtualbox). The appliance has all the configuration necessary for the VM. If later you want to create your own VM, you would add one through the “new” button and would have to do the configuration yourself.

To import, go to File -> Import Appliance



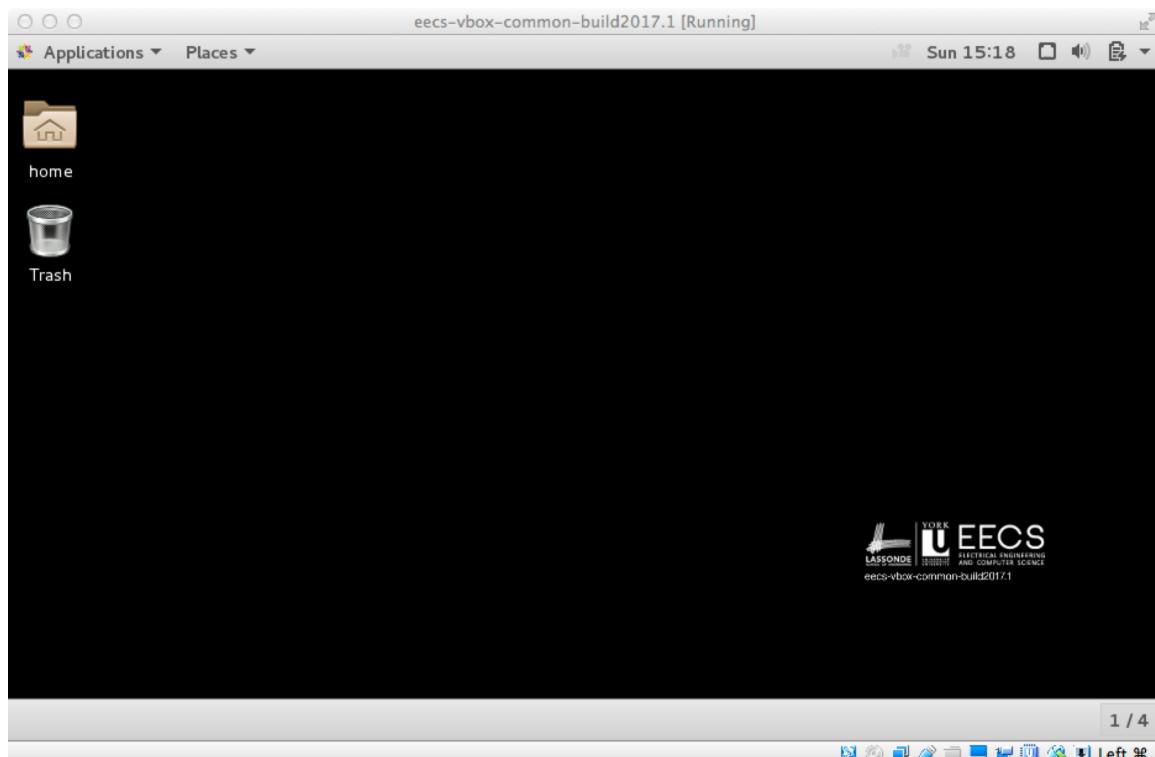
Click on “Import” and the file will be converted into a \*.vmdk file (the virtual machine file format used by Virtual Box).

When this is completed, you should see a new virtual machine in your main VirtualBox window:



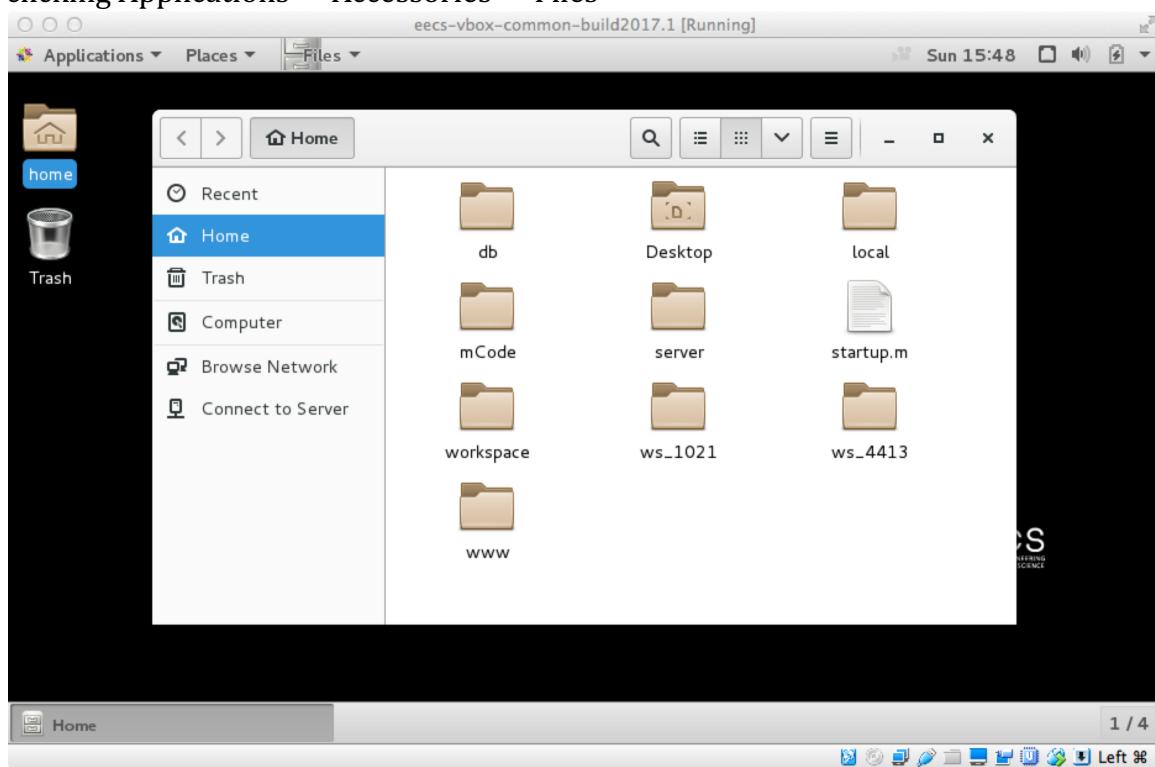
### 7: launch your new VM!

Double click on the new icon in the left (eecs-vbox-common-build2017.1) and the system will boot into Centos. Once booted, you will see the following window. You may now continue with Lab0 (in this environment), or in LAS 1006.

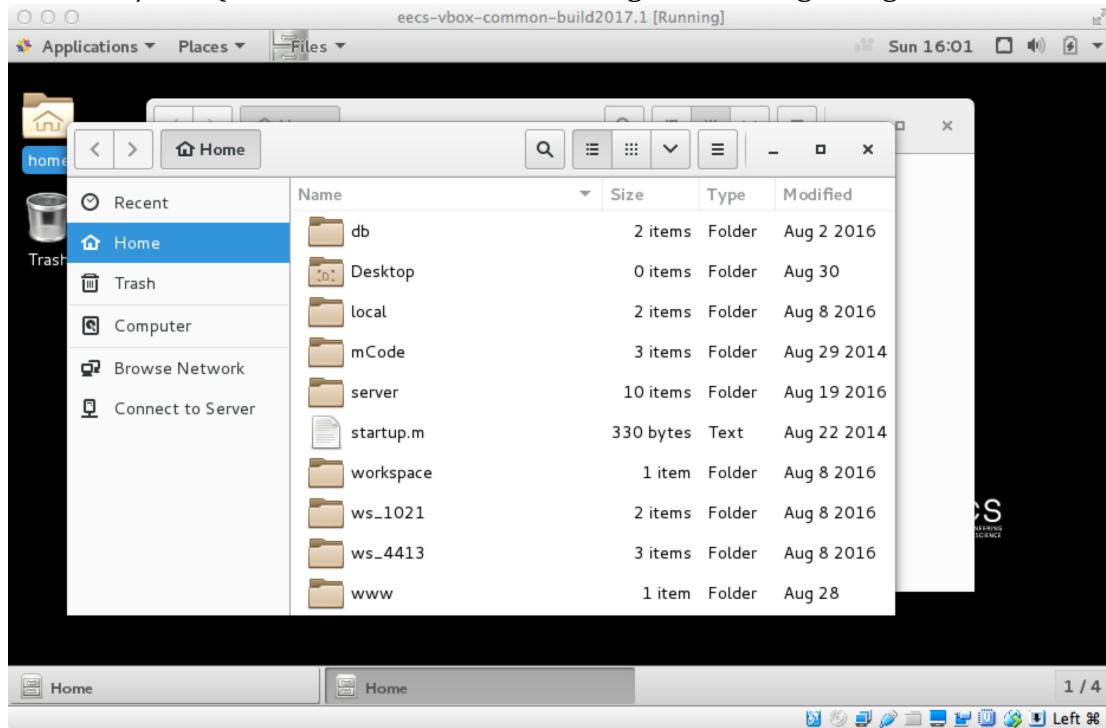


## 8: Basic familiarity with CentOS

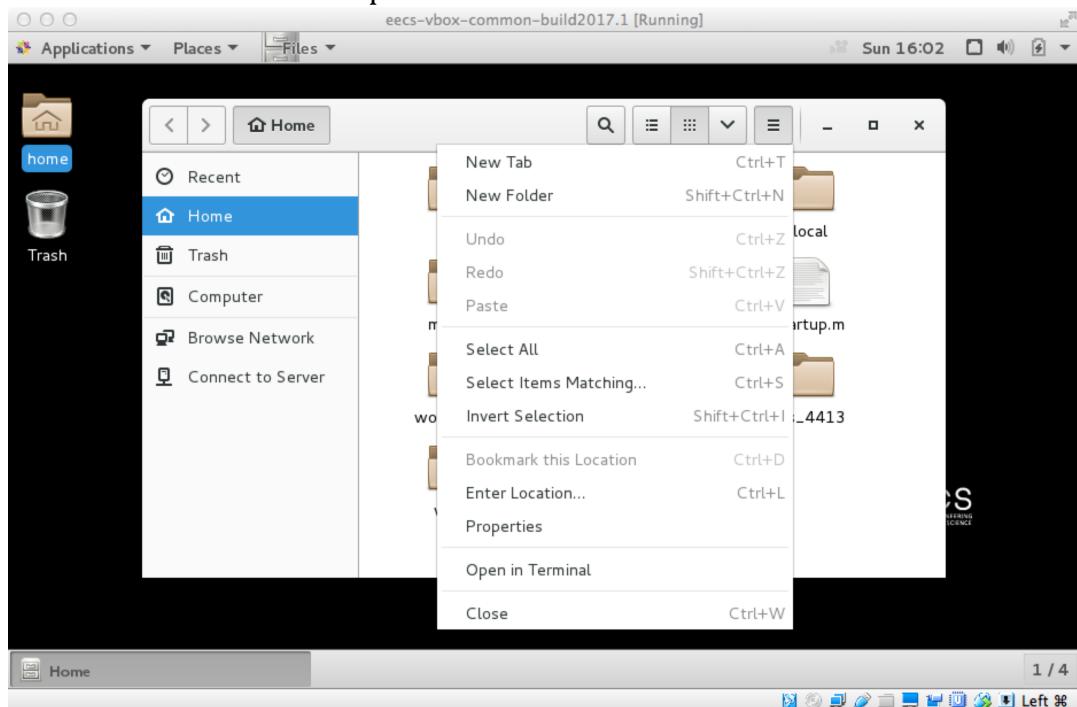
We will look at how to access the files on our VM through the File Browser. Launch the File Browser by either i) double clicking the Home folder on your desktop; or ii) clicking Applications -> Accessories -> Files



You can choose one of a number of “views” to organize your folders – as with Windows/Mac (see the icons next to the hourglass icon: e.g. list, grid, etc.



To create a new folder, simply right click in the whitespace where the folders are displayed (i.e. not on an existing folder), or on the “Location options” icon. Select “New Folder” from the dropdown menu.



Name your folder & hit enter, you should see the new folder appear in the File Browser. Double click on the new icon to navigate to the new folder.

You might also try to launch some other applications at this point. Key applications you will need for this course include:

- i. Firefox Web Browser
- ii. Terminal
- iii. Eclipse

Other useful apps -> LibreOffice (an opensource alternative to MS Office); gedit (a basic text editor (similar to Notepad/TextEdit)).

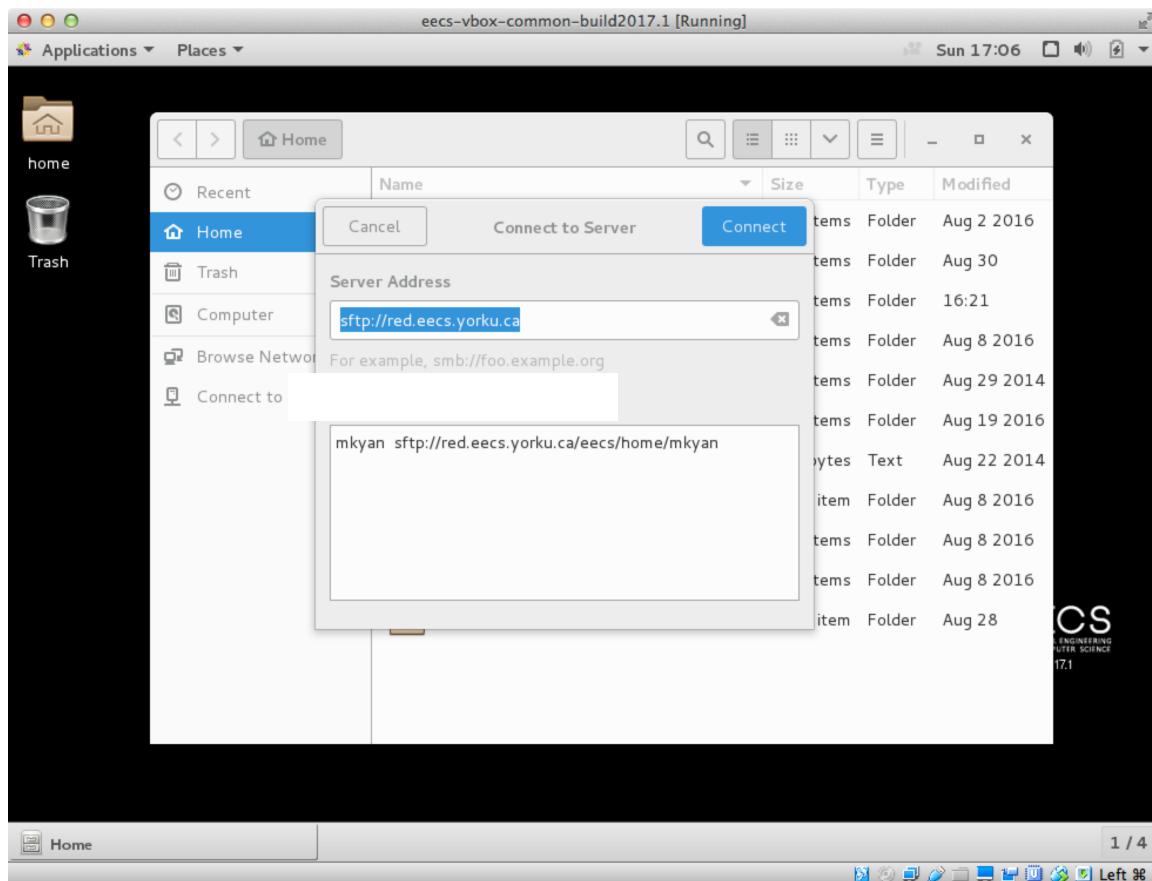
## **9: Setup file browser connection to your prism account [OPTIONAL]**

Finally, if you create or save any new files, note that they all reside locally on your laptop/desktop's virtual machine. I.e. there is no connection to your actual lab accounts on PRISM (although the environment looks very similar).

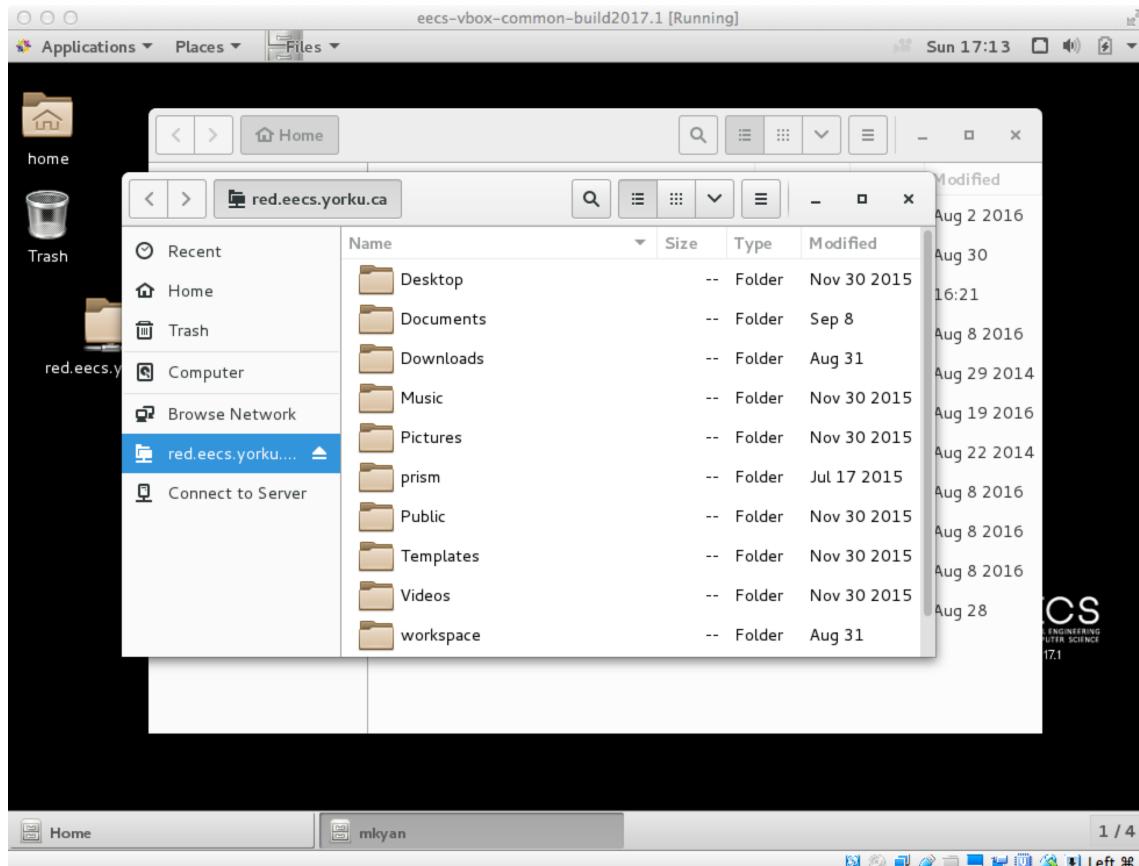
We can setup a connection to your PRISM account so that we can easily transfer files to and from your lab accounts on campus. You will need to transfer files from campus to your local machine to work on them while at home.. any updated files you will want to transfer back to the university machine to continue working there while attending the lab sessions. *[Not necessary for this semester as you cannot physically go into the labs anyway]*

Of course, you may also plug in a usb stick and copy files to and from your virtual machine, and transfer files physically to the lab machines that way also. Consult the VirtualBox user manual for how to connect your virtual machine to a USB key.

To setup a connection through your file browser, click on "Connect to Server" (last item on the left hand margin, in the File Browser window). *[It is assumed you are already connected to the internet on your host machine – you can test this by opening Firefox from within your VM, and browsing the web].*



Enter “`sftp://red.eecs.yorku.ca`” into the Server Address box (shown above). This tells the File Browser to use Secure File Transfer Protocol (SFTP) to connect to the PRISM server (`red.eecs.yorku.ca`). Now click “Connect” and you will be prompted for your PRISM login name and password. Your lab account should be setup prior. Once connected, you will see a new window connected to `red.eecs.yorku.ca`.



Now you can transfer files by dragging and dropping from either your ***local*** system (Home folder or any subfolder), to/from the ***remote*** system (*red.eecs.yorku.ca*). In the diagram above, you can resize and reposition the two file browser windows and experiment by dragging the sample \*.docx file you created earlier across to the *red.eecs.yorku.ca* window (PRISM machine). If you log into a lab machine (in person, or via remote lab), your file should be there! You can also experiment the other direction later.

Note: you can use the file browser to create folders on *red.eecs.yorku.ca* just as you do locally. When we use Eclipse and other tools to run code however, this must be done locally (i.e. on local files only), so you will not be able to run code sitting on *red.eecs.yorku.ca* from your VM.

To disconnect from the PRISM machine, simply click the eject button in the left margin (next to the *red.eecs.yorku.ca* shortcut).

#### **\*\* To close down the VM, you have two options.**

1. Power off -> click the drop down icon (top right of desktop), and hit power button
2. In the VM window, go to the menu: Machine -> Pause (this option saves the current state of your VM, and when you restart, all the work you had open will still be there!). This is somewhat like a suspend/hibernate function on your laptop.