VM and Xilinx Installation Guide

CS141 Spring 2019

Software Setup

In order to do the programming assignments you must first make sure that you have access to all of the software tools that you will need. If you use a Mac, a virtual machine. (VM) has been prepared that has everything you need for the course. Linux and Windows users can choose to use the VM; or if they desire they can install the tools locally (instructions), though we still recommend that you use the VM as it is simpler to install.

The hash that you should compute as part of the instructions below is ef456a31bfa782f79bc1eb1cbc757e8f. If you compute something different, there is a good chance that your VM has been corrupted and will not work properly - in this case, you should attempt to re-download the VM.

There have been complications with certain Mac OS X updates in the past, so we encourage you to try the setup as early as possible to help debug any issues.

System Requirements: You will need at least 22GB of free hard drive space for the VM, and it is recommended that you have at least 4GB of ram on the system you install it on. You will also want to be able to use at least 2 cores on the VM for maximum performance, though this won't really be necessary until later programming assignments.

I. Obtaining the Virtual Machine (VM)

The virtual machine for this course is a large file (approximately 12GB) and will take more space after it is fully imported (up to 22GB). You can access it at this link. It is highly recommended that you download it on a wired (ethernet) connection to save time.

Once downloaded and unzipped, feel free to make sure that the compressed file has not been corrupted by checking the hash with the one provided earlier.

II. Installing a Virtualization Client

We will be using VMWare for this course. Mac Users will want to install VMWare Fusion, and Windows/Linux users will want to install VMWare Workstation.

Any of the following VMware products above these versions should run the VM well: VMware Fusion 6 or 7, VMware Player 6 or 7, VMware Workstation 10 or 11 or 12.

- For students who need a VMware application to run the VM:
    - First, make sure you are registered for this class, and register to apply for VMWare here.
    - In the "web store", you just need to "order" the application that suits your OS (Workstation for Windows or Linux platforms, Fusion for Macs), then go through the whole check-out process.

– On the final screen, the one with the Start Download button, you'll receive a unique "serial number" to be used as your license key for the product.

By default, virtual machines have no access to your main host operating system (for security reasons). The following guide will show you how to use VMWare to set up a network drive that both your computer and the VM can access, which can make work throughout the class much easier.
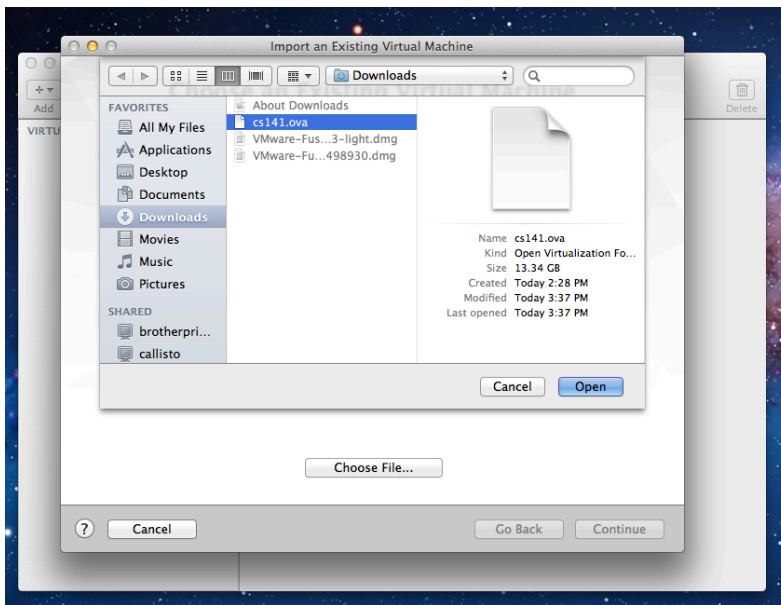
Once you have the files, and have verified that they are not corrupted by checking the md5sum, you can open the image using VMware Workstation (Windows/Linux) or VMWare Fusion (Mac).

III. VMWare Fusion (Macs) or Workstation (Windows) Setup

1. Launch VMWare Fusion, and select the Import... option.
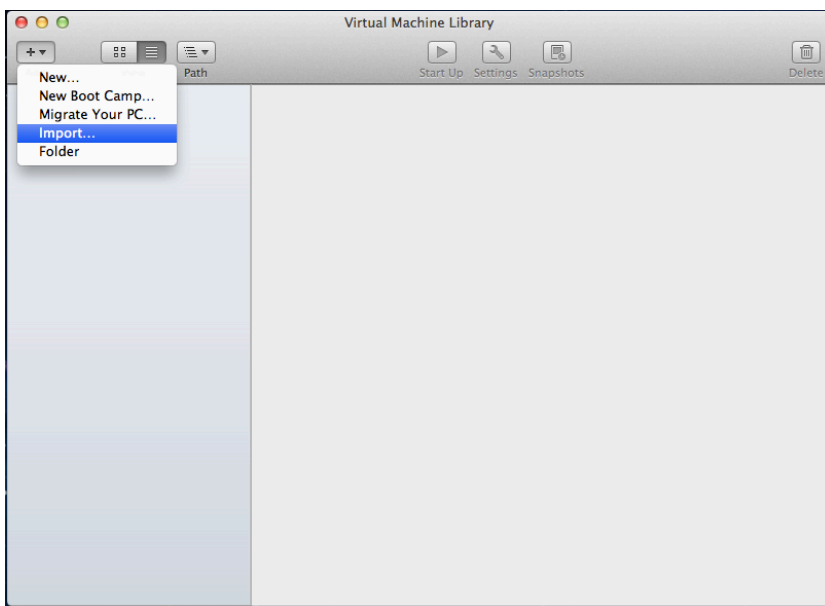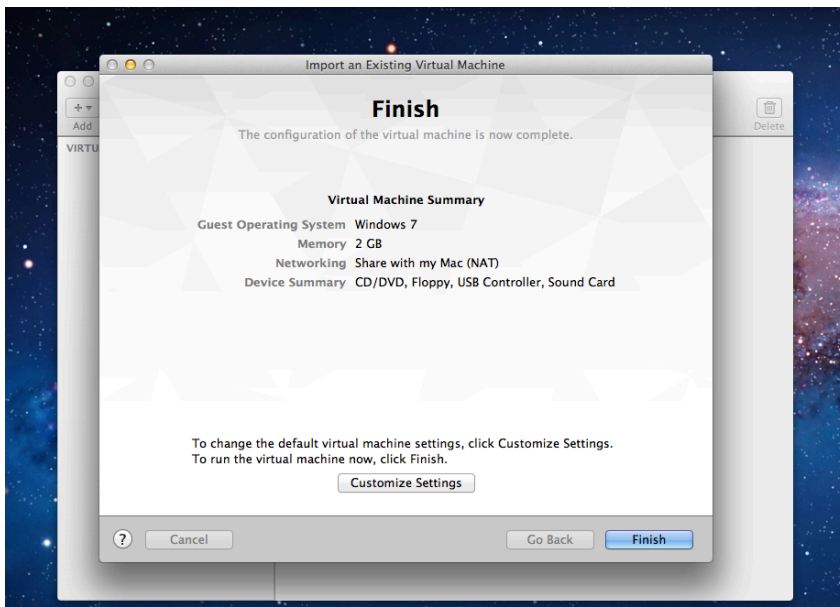

2. Navigate to where you stored the cs141.ova file, and select open.

3. VMWare will slowly prepare the cs141.ova file for use. This can take a while (1-2 hours on a slow machine).
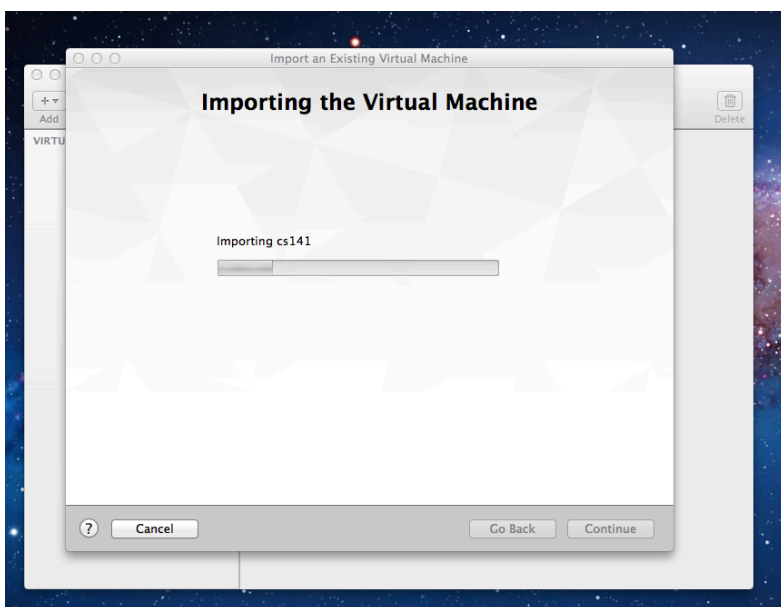

...but will eventually finish:

4. Now you can launch the cs141.ova VM whenever you want! (you may have to hit a big play button).

5. And now you should see the following Windows 7 Desktop:

6. If you are asked to login, the password is "d3fault".

7. In the unlikely event that Windows 7 asks you for a product key, contact Glenn (holloway@eecs.harvard.edu) and ask for one.

8. Double click the ISE Design Suite 14.7 tool.

9. Open the `cylon_leds` project located on the desktop (it might open automatically) by going to `File->Open Project...`, navigating to the desktop, and selecting the `cylon_leds` project:
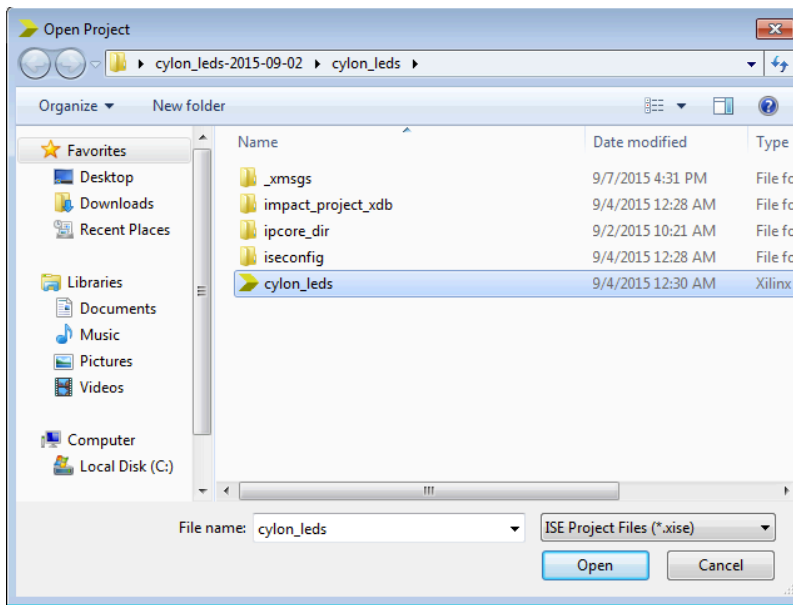
10. You should see the project open up like so: Double click the "Generate Programming File" process highlighted here. This will run the main software chain and make sure that your tools work properly.
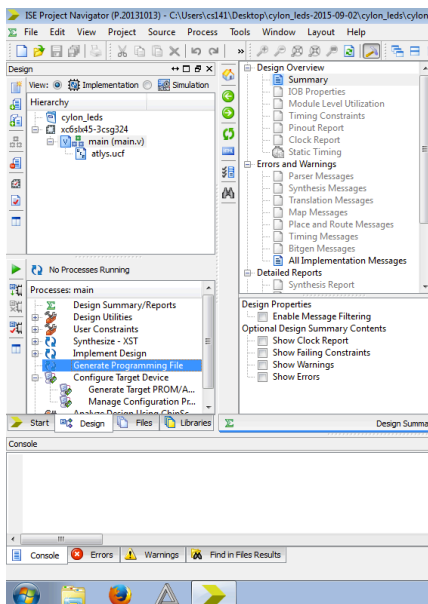
11. If it works you should see that the Implement and Generate processes have green check marks:
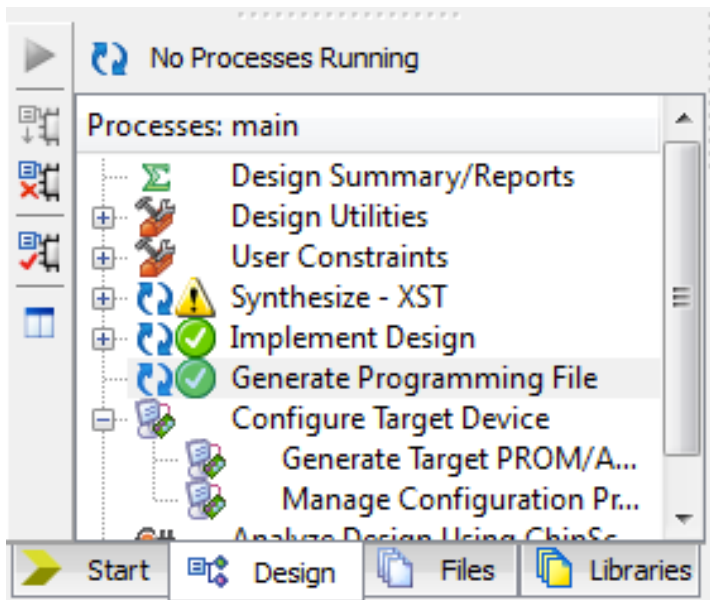
(the Synthesize step has an exclamation point because there were a few warnings at that stage. It'll be a big red x if it didn't actually work).
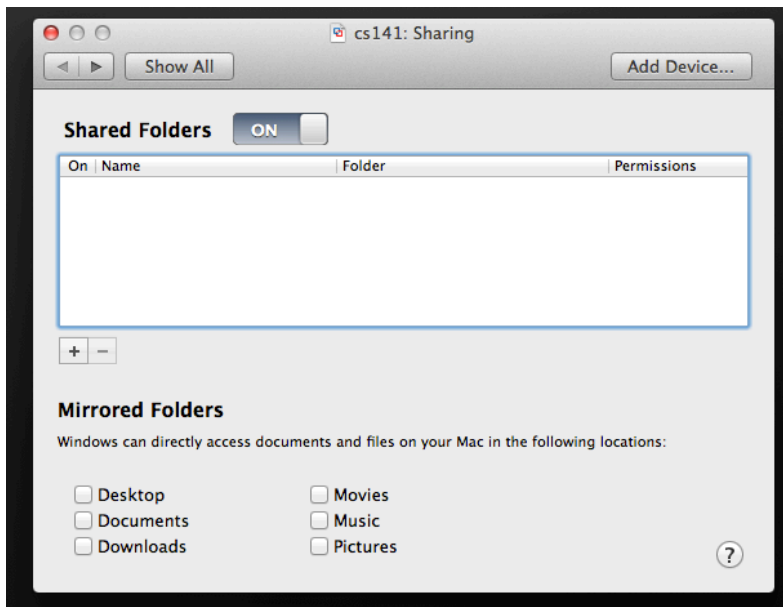
12. If this succeeded, ISE will generate a `*.bit` file in the main project directory, which can be used to upload the design onto the FPGA.

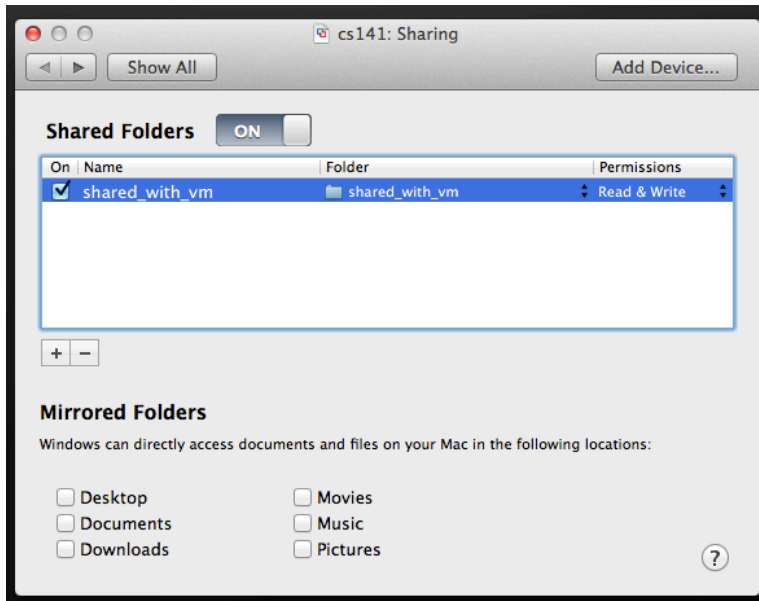## IVa. Setting up Shared Folders with your VMFusion (OS X)

1. Move your mouse to the top of the screen before hitting the big play button that starts the VM, and select the `sharing->sharing` settings menu
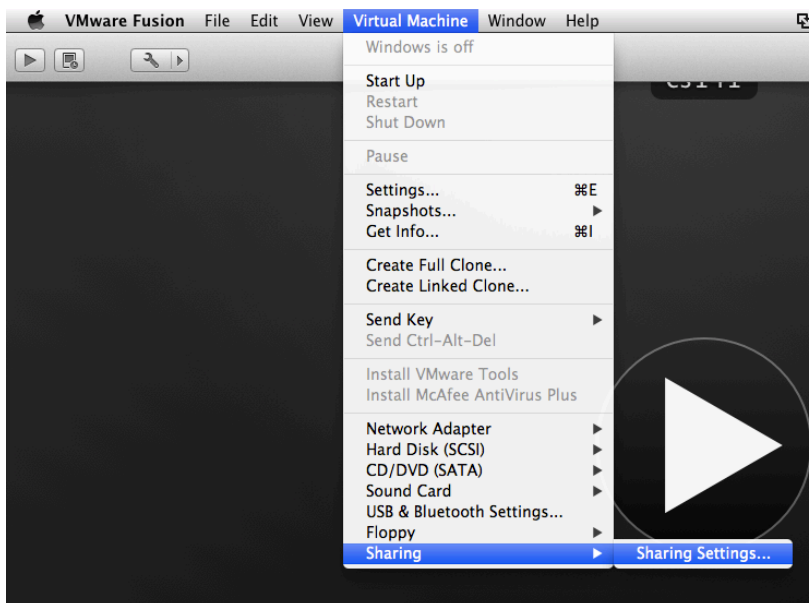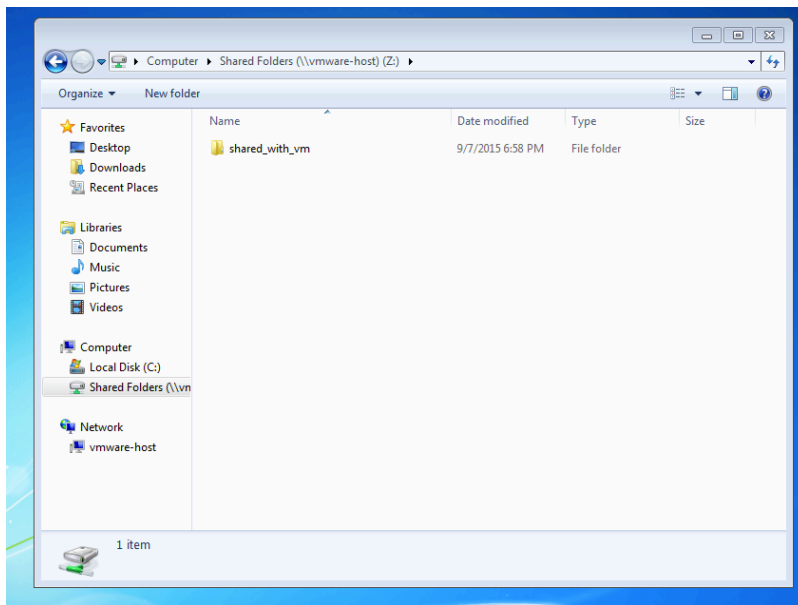

2. This will pop up

3. Turn Shared Folders "ON" and hit the "+" button. Navigate to the folder you want to share and select it.
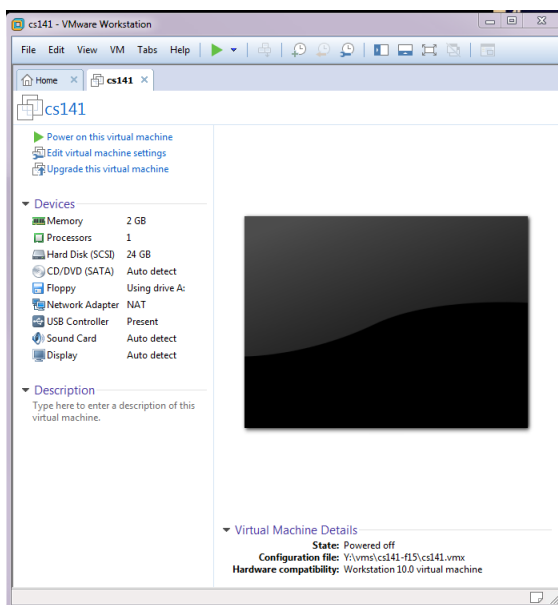

4. You should now be all set, so launch the VM and open File Explorer. By clicking on the Shared Folders (under Computer on the left pane) you should see the folder you added.
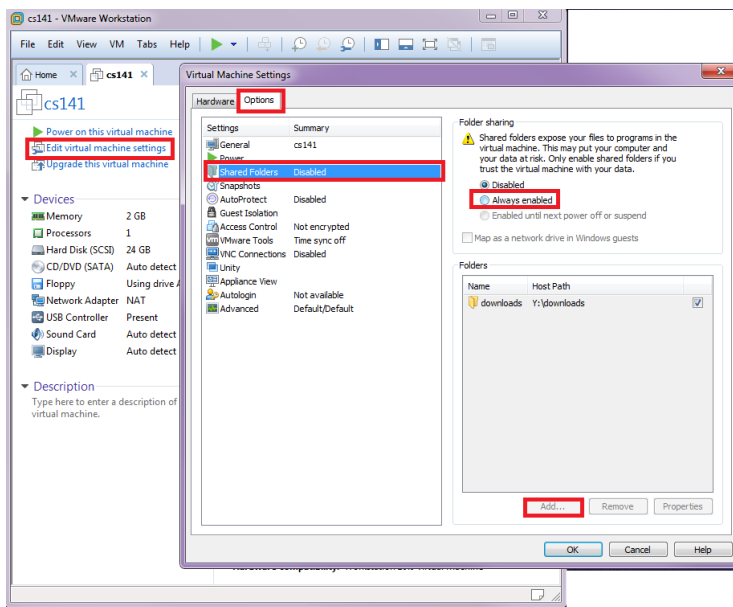
5. Go ahead and try to transfer some files to test this out!

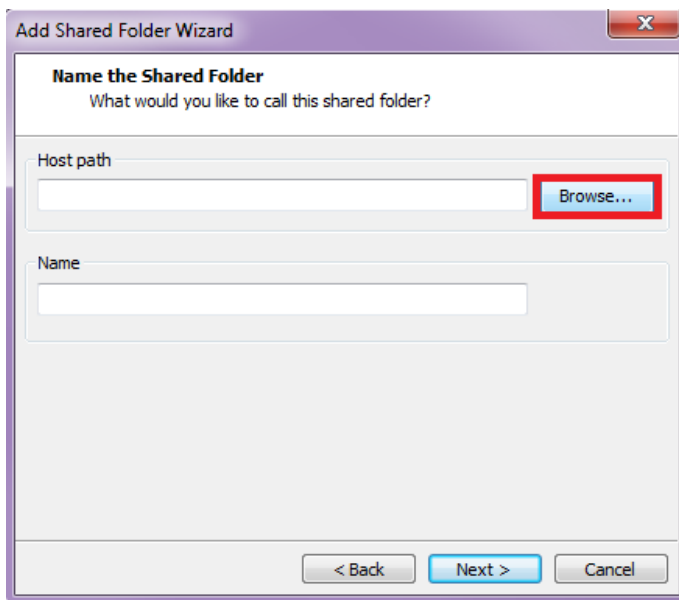# IVb. Workstation (Windows, Linux)

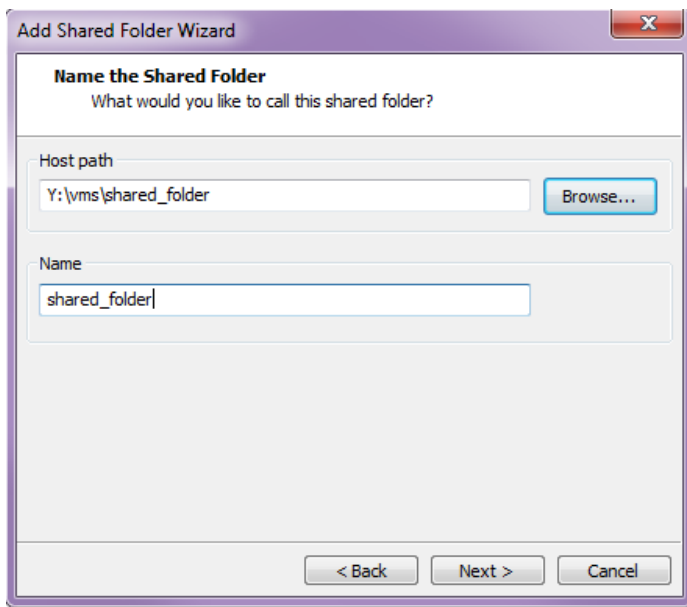1. Launch VMWare Workstation after importing the VM, and click Edit Virtual Machine Settings.

2. Go to the Options tab, Select Shared Folders, Tick the "Always enabled" radio box and click Add...
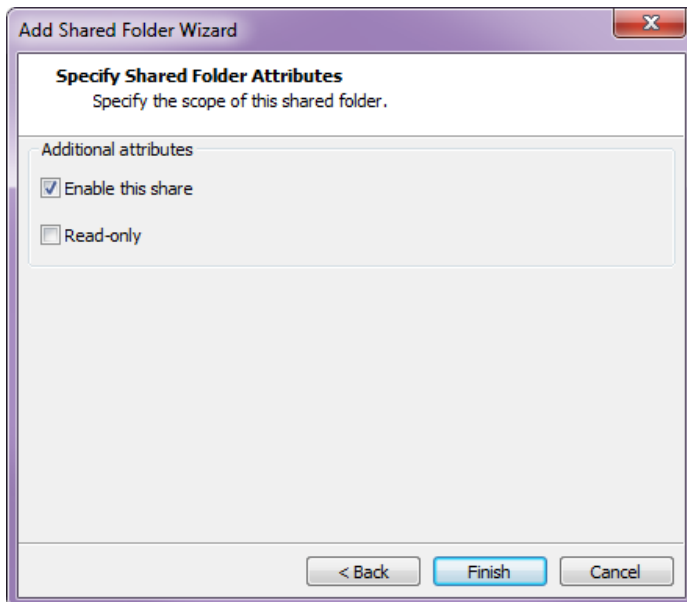
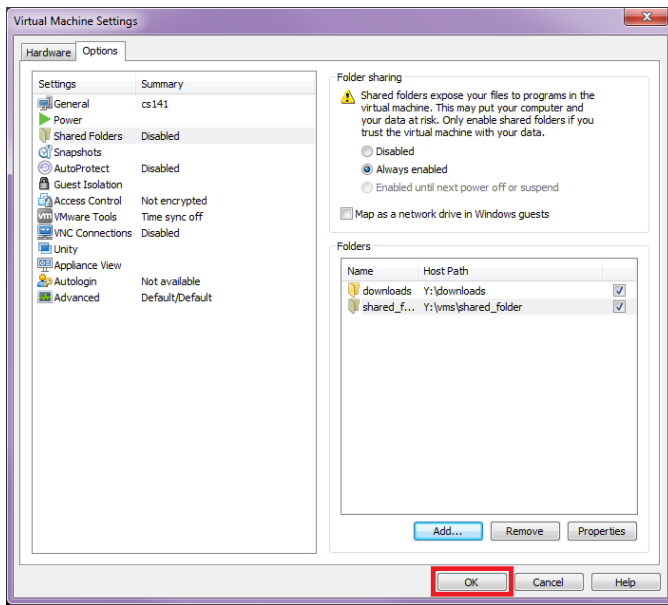3. Browse to the directory that you want to be shared. It's best to create a separate folder for this.
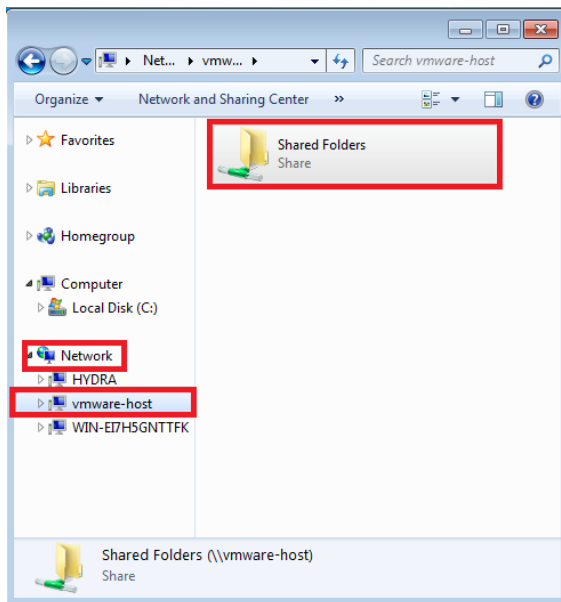

4. Name the shared folder

5. Make sure to enable the share, and click Finish.

6. *Critical* - Click OK on the screen that pops up (don't just launch the VM)

7. The shared folder will be available in the File Explorer, under Network, and under vmware-host:

V. Optional – Lightweight Simulator + Waveform Viewer

In the past students have found it very useful to use Icarus Verilog (simulator) and GTKWave (waveform viewer) instead of the tools included with Xilinx (Isim). If you are curious you can give them a try by following the instructions in the Icarus Verilog and GTKWave guide on the course website.