

Guidelines on VM VirtualBox and Ubuntu Linux with Xilinx SDK 2014

by David Robinson and Jianjian Song

(Revision 5.1, August 16, 2021)

Note, the installations require about 20 GB of hard disk space. It is better if your computer is connected to wired Ethernet. It may take about one hour to install Oracle VM VirtualBox and 15 minutes to install Xilinx Linux SDK 2014.4 (64bit).

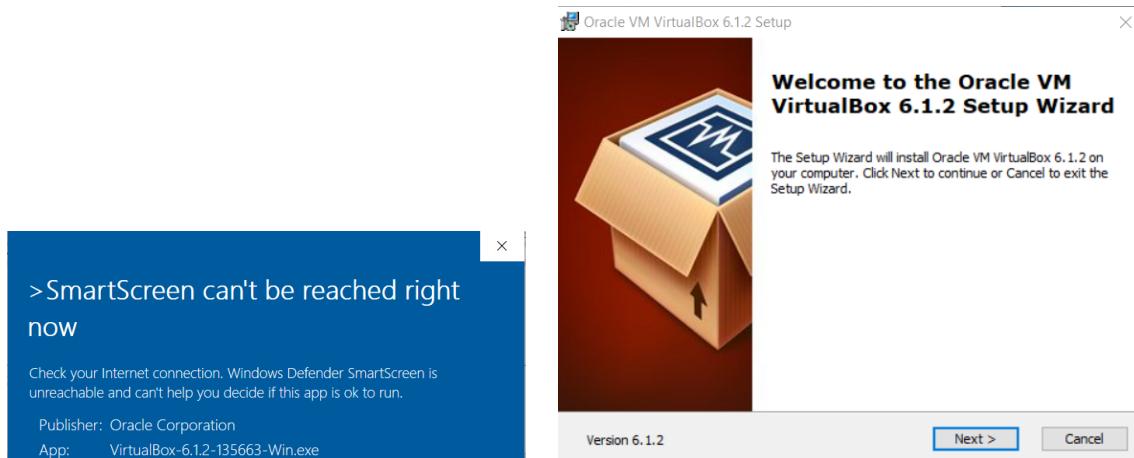
1 Download Oracle VirtualBox Installation and Ubuntu Disk Image Fill

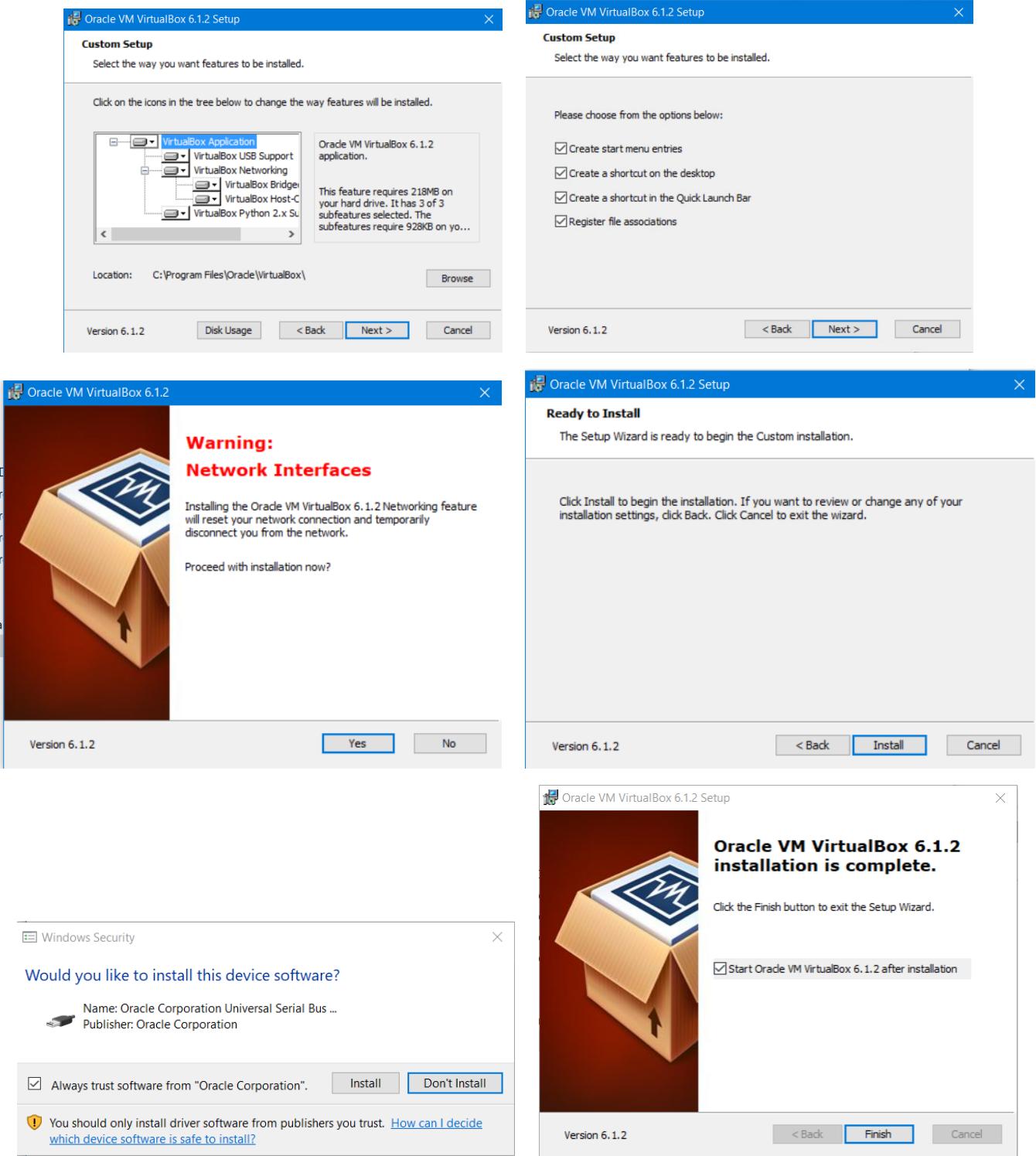
Start by downloading and installing a VM manager, I normally use VirtualBox because VirtualBox 6.1.2 is free at <https://www.virtualbox.org/wiki/Downloads> for Window Hosts. Another popular VM is VMware, which Rose has some licenses. I'll show the instructions using VirtualBox. It takes about 17 minutes to download 108MB VirtualBox-6.1.2-135663-Win.exe file.

Download an Ubuntu ISO. (<https://www.ubuntu.com/download/desktop>). Choose Ubuntu 18.04 LTS, where LTS stands for long term support for five years. The file name is ubuntu-18.04.3-desktop-amd64.iso. the file size is 1.9GB. It takes about 9 minutes over Ethernet.

2 Installation of VirtualBox Manager

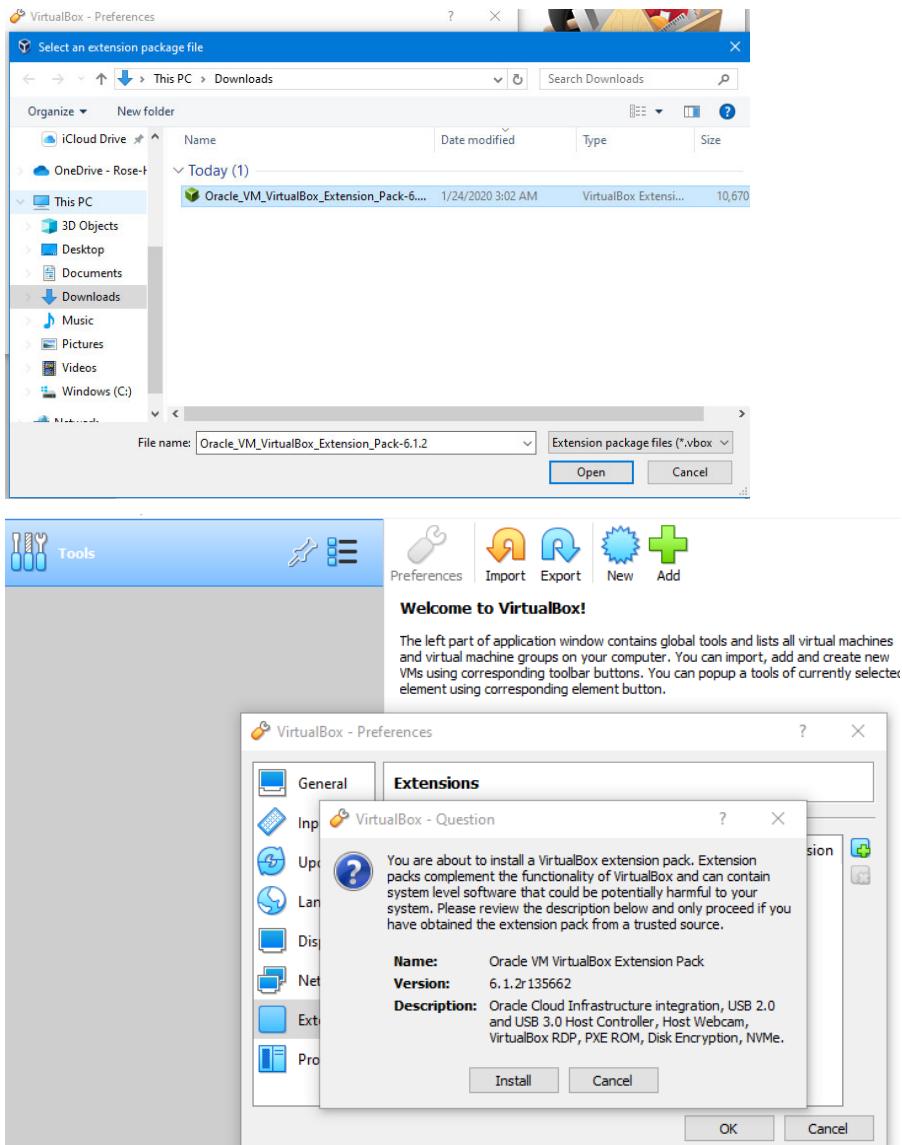
Run the VirtualBox executable file, VirtualBox-6.1.2-135663-Win.exe. If your computer is not connected to the Internet, following warning will appear. Click “Don’t Run”. Wait for your Internet to operate to try again. This installation takes a few seconds.





2.1 Install VirtualBox Extension Pack for your VirtualBox

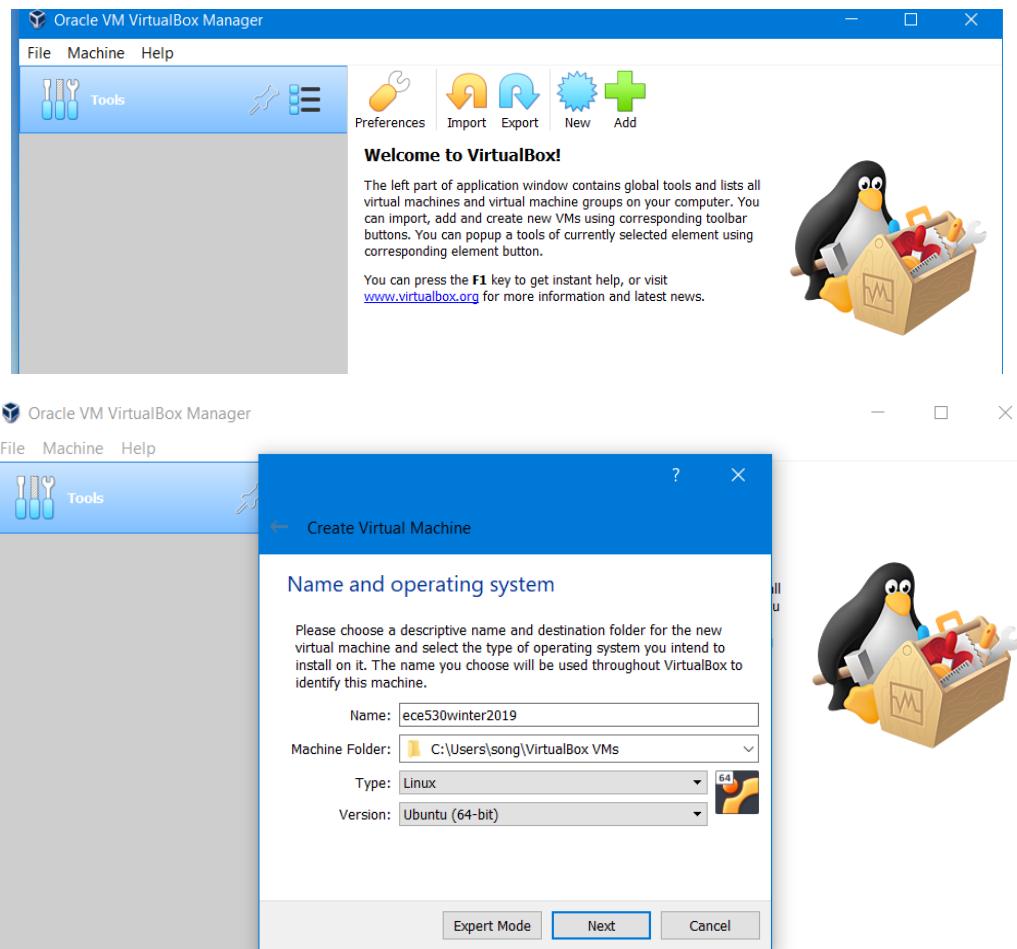
You will need to install Oracle VM Extension Pack in order to interface with USB 2 and 3 Device. Download Oracle VM VirtualBox Extension Pack from <https://www.virtualbox.org/wiki/Downloads>. On your VM VirtualBox Manager, click Tools->Preferences. Go to Extension Menu. Click +Add button to choose an extension package file. Choose “Install”.



3 Start an Oracle VM VirtualBox to Create a Virtual Machine

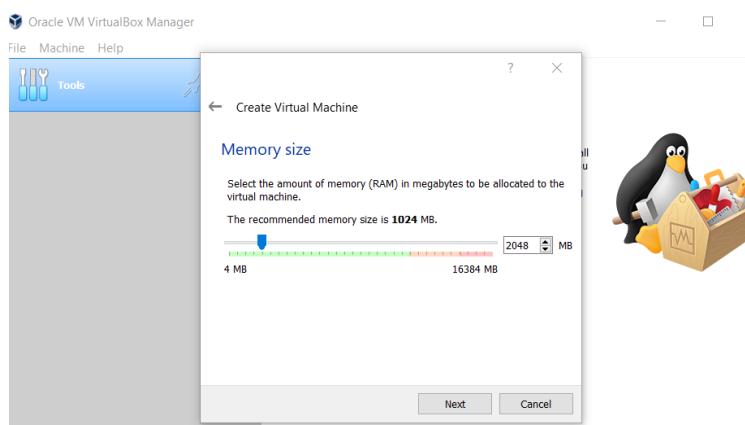
3.1 Create a New VirtualBox

Create a new VirtualBox by clicking the new button under Oracle VM VirtualBox Manager. Name the VM, select Linux as the type, and Ubuntu (64-bit) as the version.

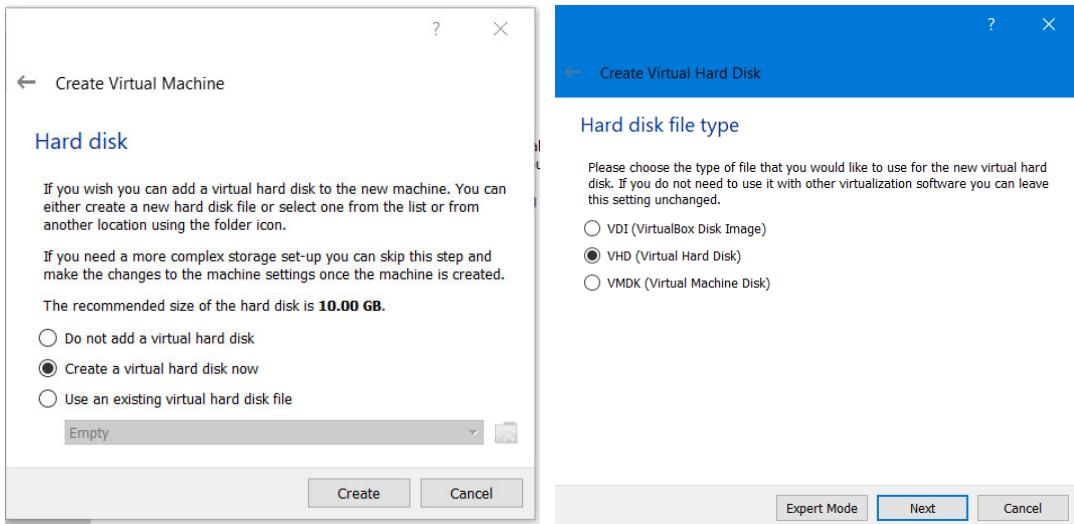


3.2 Setting Up your VirtualBox

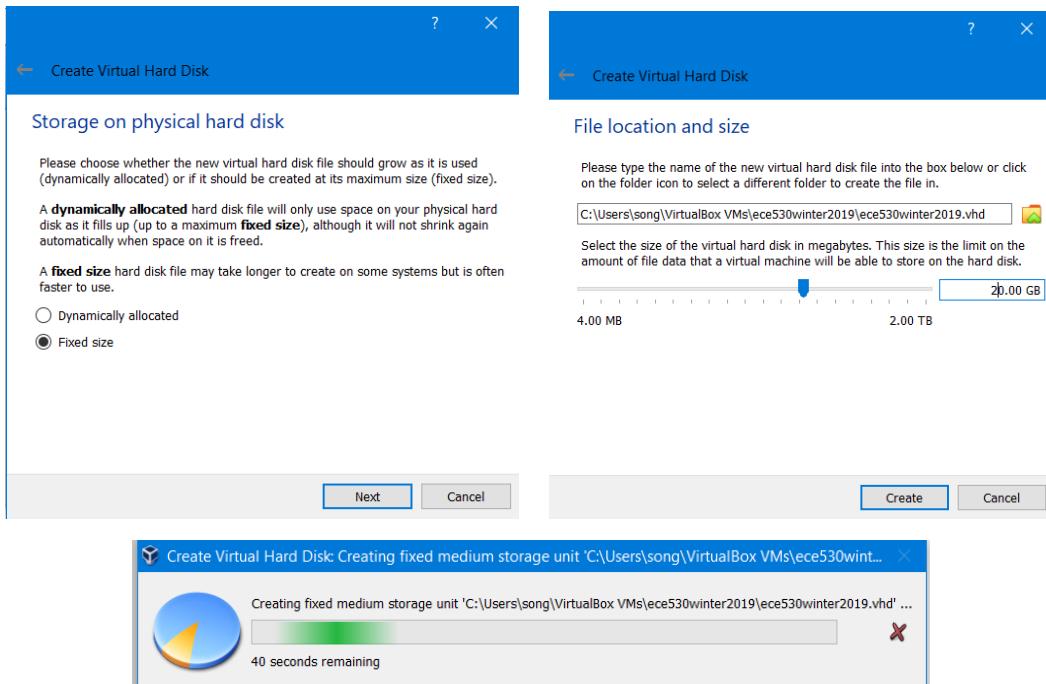
Choose 2048MB for memory size.



Create a new virtual hard disk by clicking **Create**. Choose Virtual Hard Disk. Choose Fixed Size at 20 GB. It is better to have a fixed hard drive than a dynamically allocated so that software with large hard drive requirement could be automatically installed.



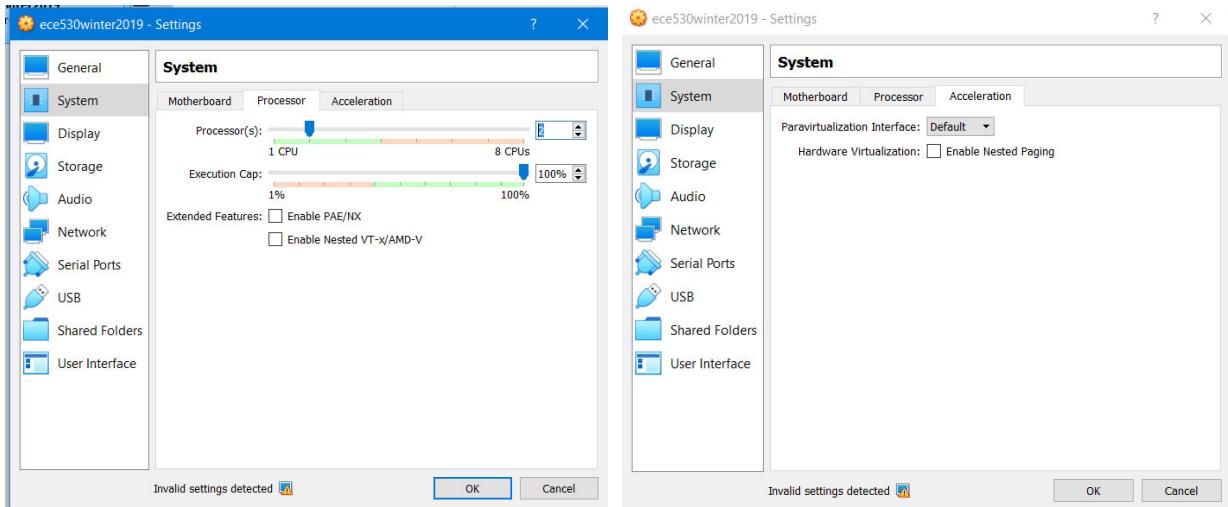
Set virtual hardware size to be 20GB. Click “Create” to make the VM. This hard drive creation may take about 3 minutes. Oracle VM Virtual manager will appear to show ece530winter2019 preview.



3.3 Configure System Settings

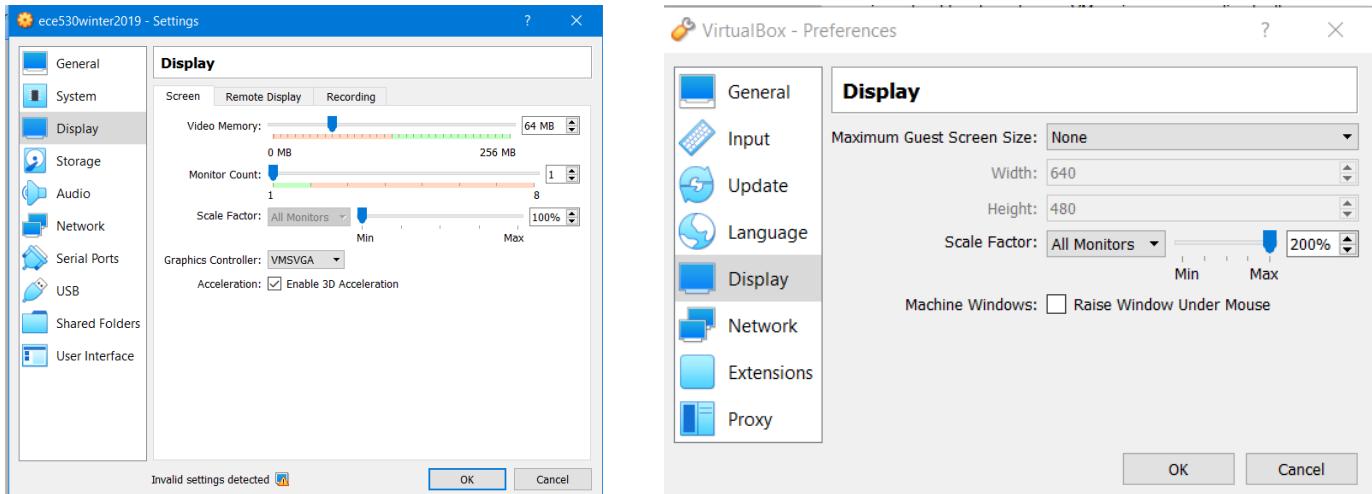
In your VirtualBox Manager, choose Settings. On your Settings Window, choose System ->processor to select 2 processors, which may make the VM run faster.

Choose System -> Acceleration and disable Nested Paging because it may keep the Ubuntu from starting correctly.



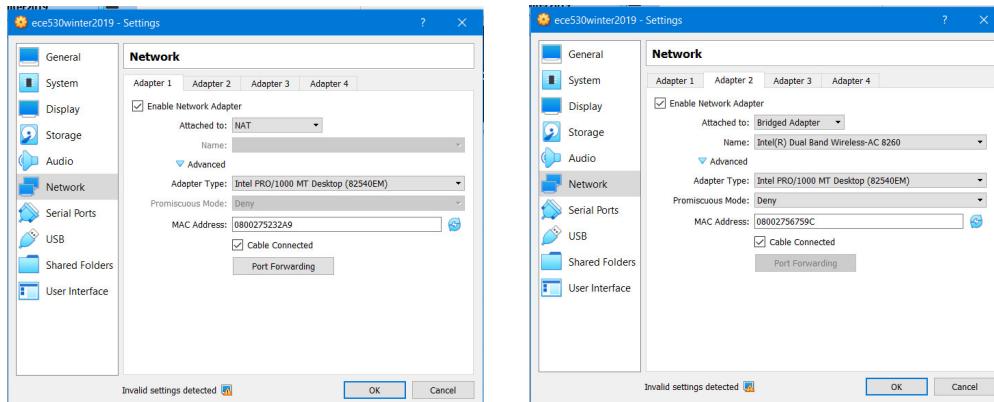
3.4 Configure Display Parameters

Under Settings menu, choose Display. Increase Video Memory to 64 MB. Otherwise, there could be visualization errors. Check Enable 3D Acceleration to speed up visualization. Click OK.



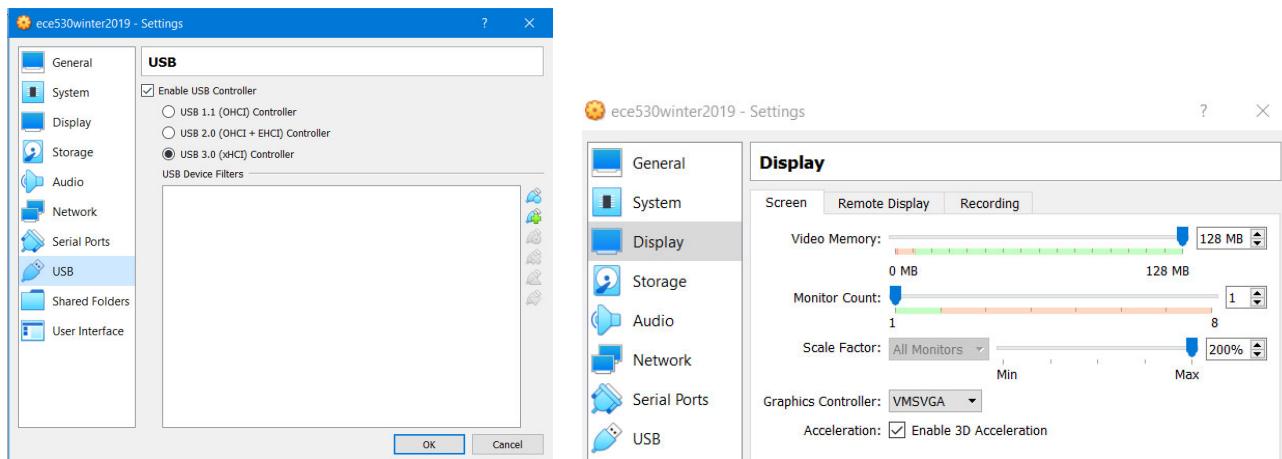
3.5 Start Wireless Connection

To start wireless connection, choose Settings in your VirtualBox and choose Network. Keep Adapter1 unchanged. Add the wireless adaptor, Bridged Adapter, of your laptop as Adaptor2. Click OK. Now your wireless connection should work.



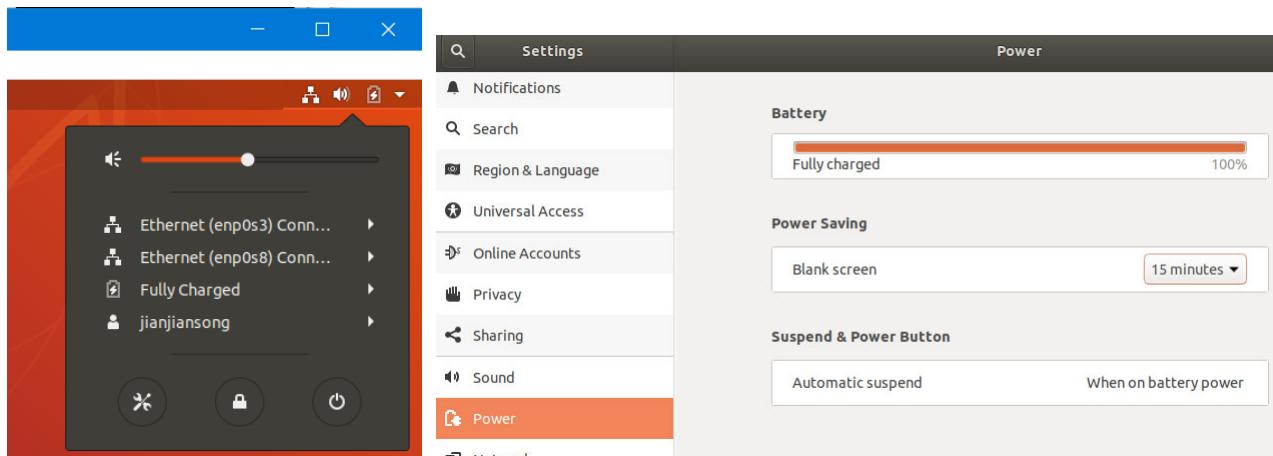
3.6 Change USB Settings to USB3

Choose Settings->USB to change USB settings to USB 3 and Settings->Display to change Display Memory to 120MB.



3.7 Change Screen Blanking Duration of VirtualBox

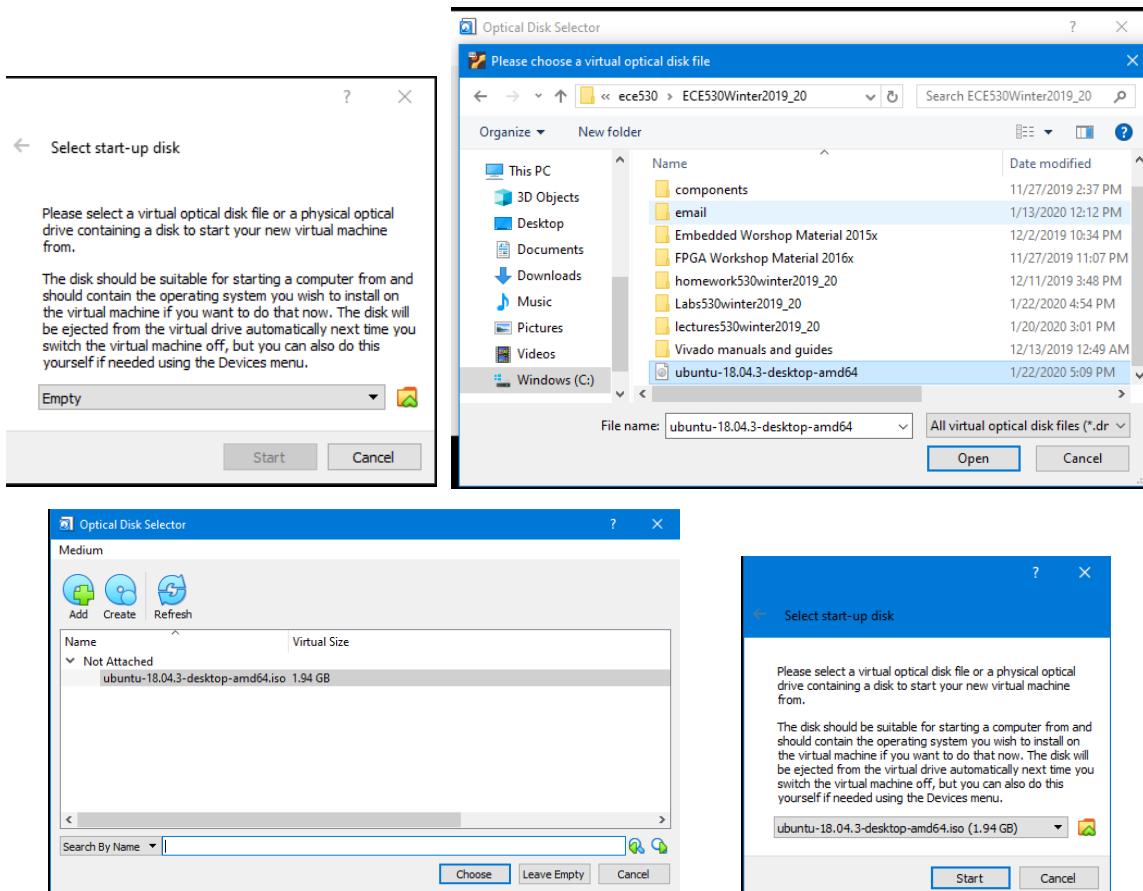
In your VirtualBox, click the setting options on the upper right corner. Choose the left icon to open settings. Move to Power option to set Power Saving Blank screen time from 1 minute to Never.



4 Create a Virtual Machine VirtualBox

4.1.1 Assign Start-Up Disk for ubuntu-18.04.3-desktop-amd64

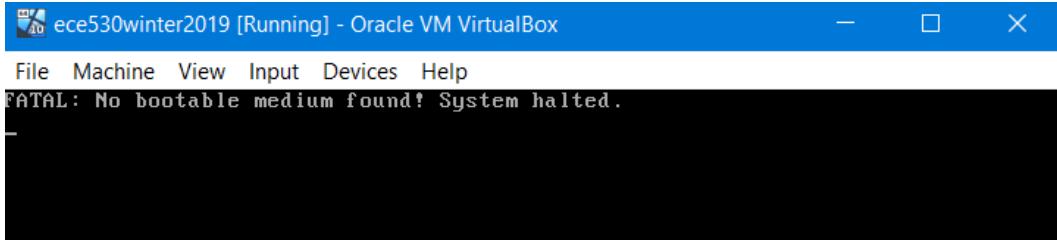
Save your ubuntu-18.04.3-desktop-amd64.iso disk image in your ECE530 class folder so that you know how to remove it when you don't need it anymore.



Click on “Install Ubuntu” to install Ubuntu Linux operating system.

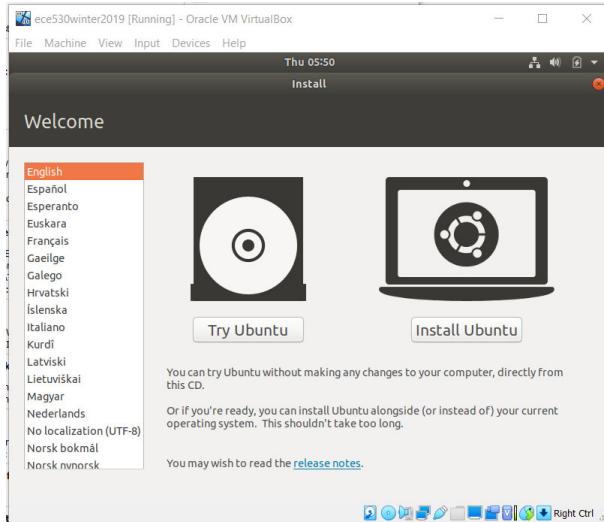


The following error may occur if you did not choose Linux.

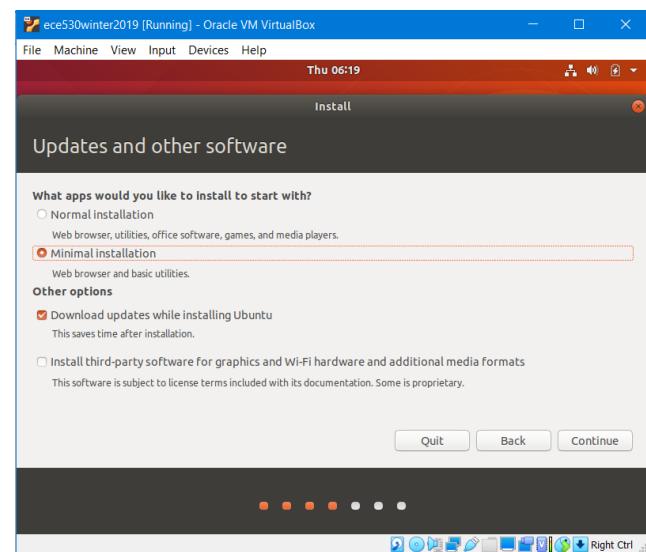
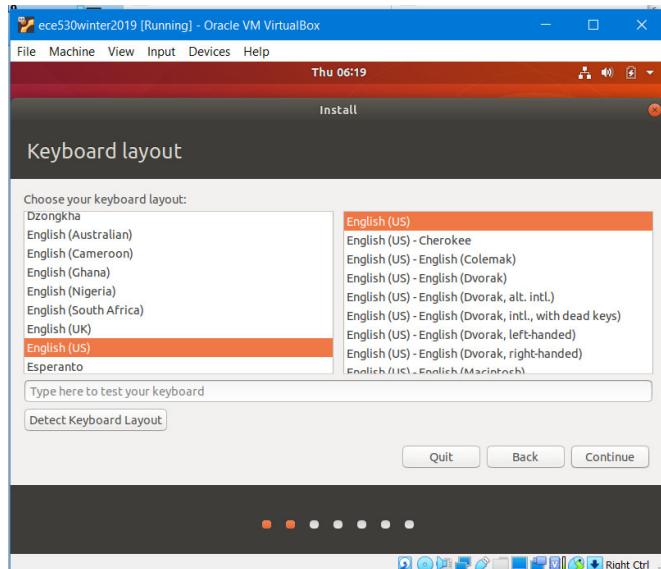


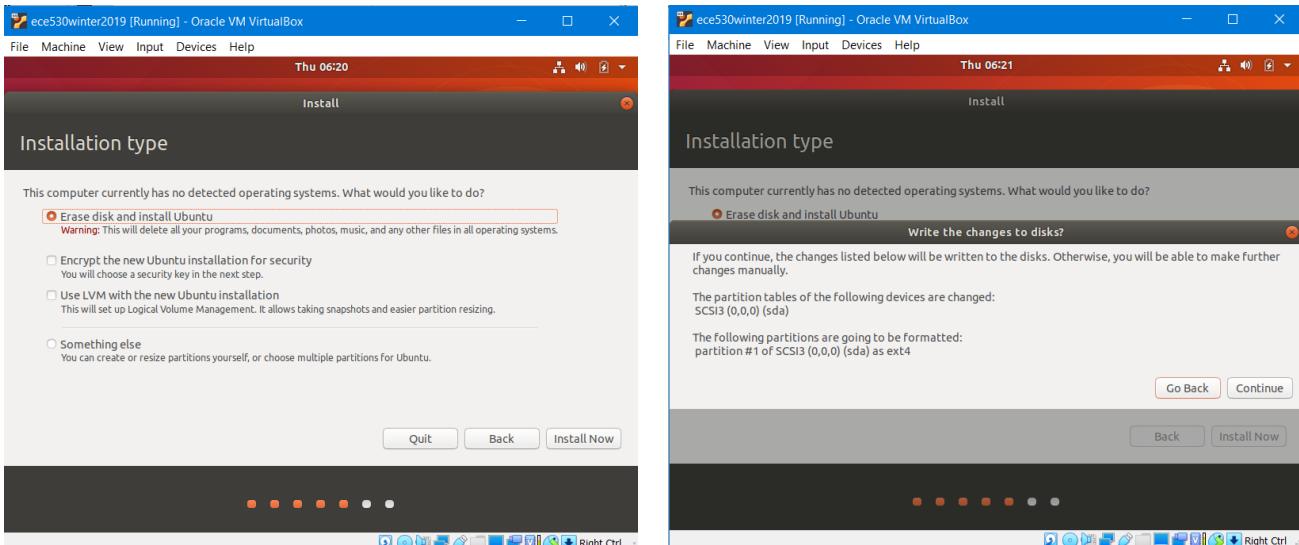
4.2 Install Ubuntu

You are ready to install Ubuntu if you see the following window.

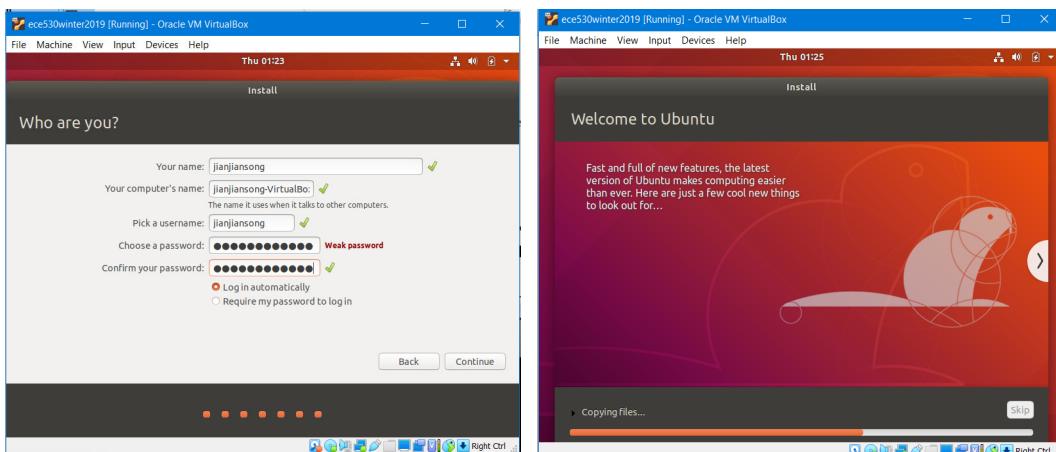


Click Install Ubuntu. Choose default on Keyboard layout and click “continue”. Choose “Minimal installation”. You can check the download updates and install third-party software boxes if you want, but they shouldn’t be needed unless you plan on keeping the VM to do other work. Click “Continue”. Select the Erase disk and install Ubuntu option: Install Now. Click “Continue” on “Write the changes to disks.”

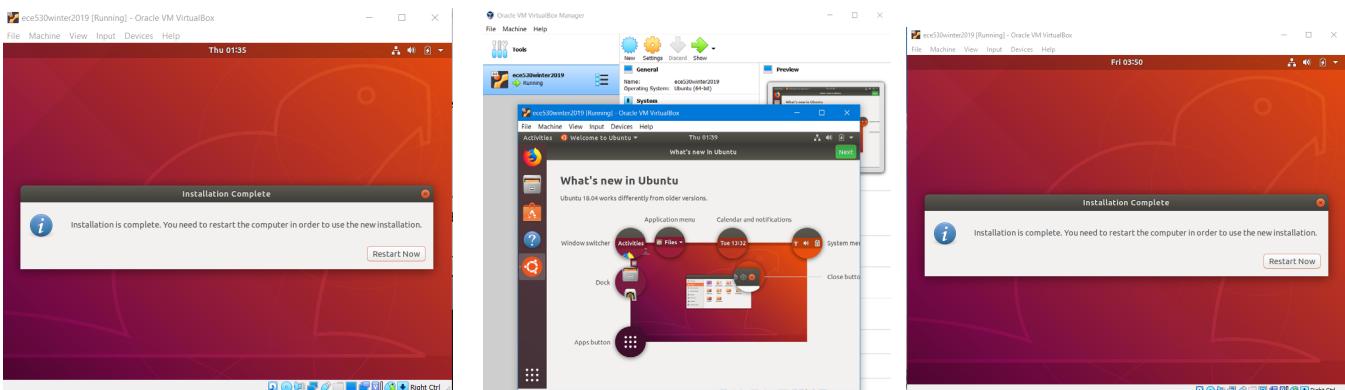




The rest of the options are just preferences you can select. Keep continuing until you have created your user account. Enter your user's name and password and continue. Ubuntu installation will start.

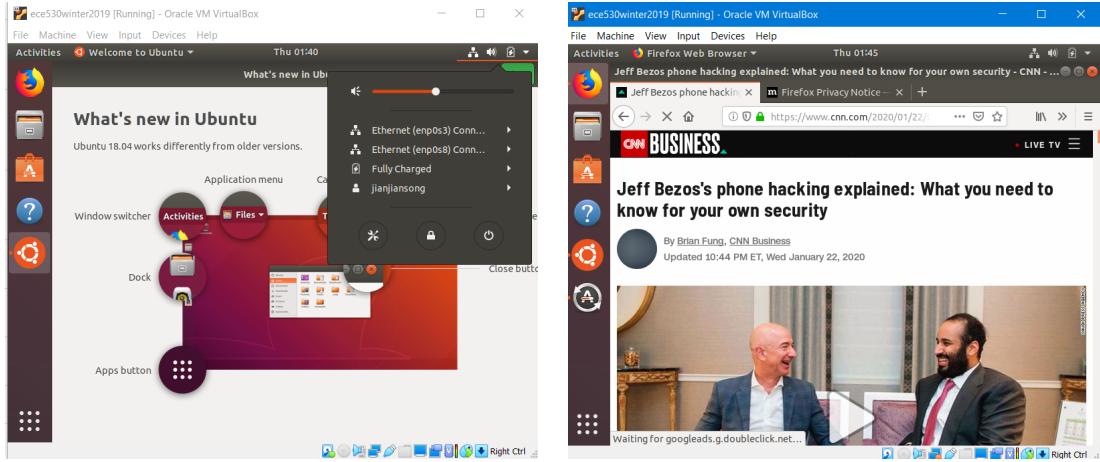


This generally takes about 10 minutes. Click “Restart Now” when the installation is complete. This will not restart your laptop but to restart your Ubuntu operating system.

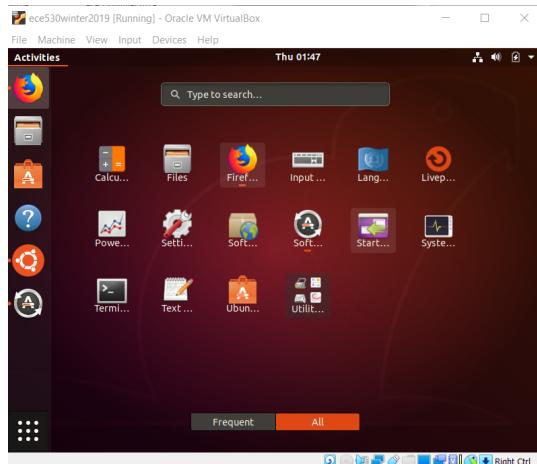


Once Ubuntu has restarted, login or automatically login and then click the button in the top right corner with an up and down arrow to see Ethernet connection(s) to the Internet if your laptop is connected

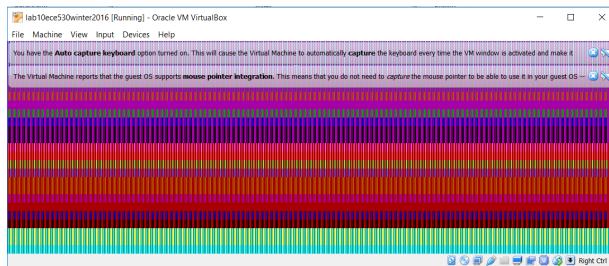
to the Ethernet by wire or a wireless adapter. You can try to open a web site with Firefox Web Browser to test your Internet connection.



You can click on the bottom left dots to show applications. You can toggle full screen mode by pressing right Ctrl +F. You can press Ctrl+Alt+t to start a terminal.



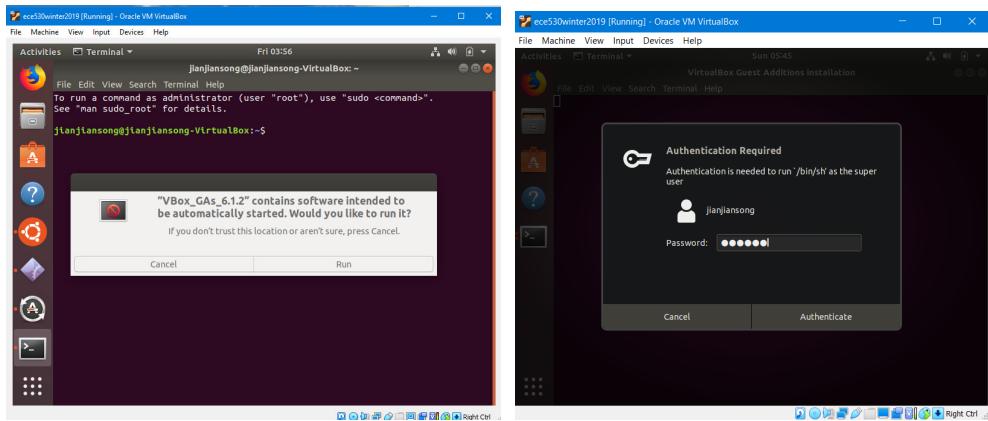
If you see the following, your video memory may not be large enough. Try to increase your video memory.



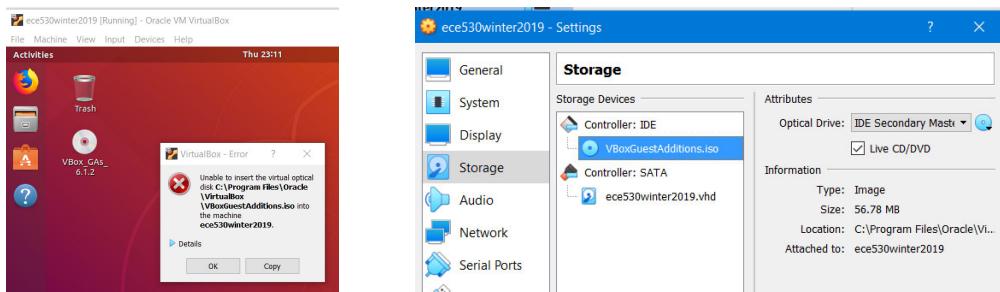
4.3 Install Guest Option Support disk

It is important to install this option so that your VirtualBox window size can be changed.

Start your VirtualBox. Type “Ctrl+Alt+t” to start a terminal. Choose Devices->Insert Guest Additions CD Image Click Run and enter your password if needed and click “Authenticate” to install VirtualBox Guest Additions.

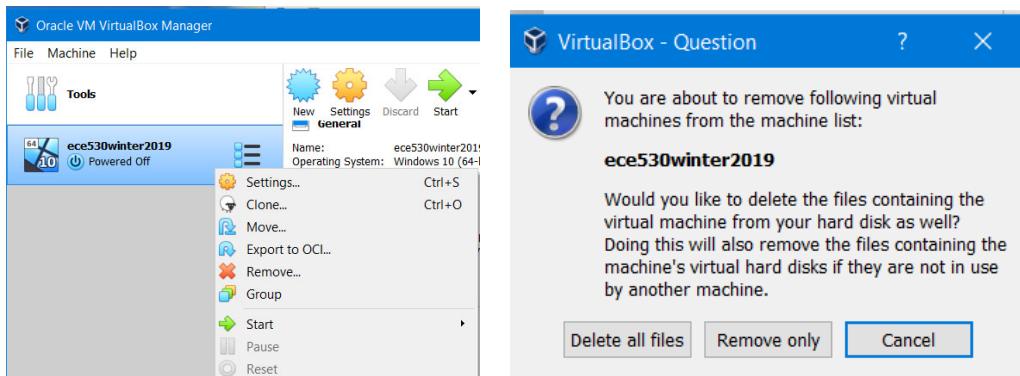


If you see the following error, turn off your VirtualBox and open Settings on your VirtualBox Manager. Choose Storage to see if VBoxGuestAdditions.iso is already mounted as shown below. The best way to deal with this error is to remove your VirtualBox and reinstall your VM manager.



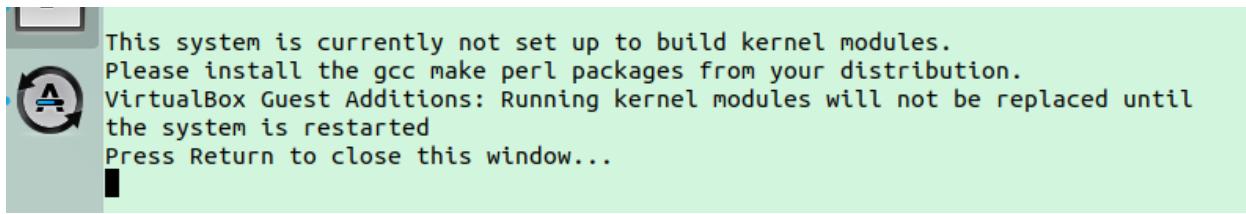
4.4 How to Remove a Virtual Machine VirtualBox

You can remove a Virtual Machine and make a new one if you want to. Power off your VirtualBox. Right click on a Virtual Machine under Oracle VM VirtualBox Manager and choose “Remove”. Choose “Delete all files” to delete files and the virtual hard drive.



5 System Software Installations

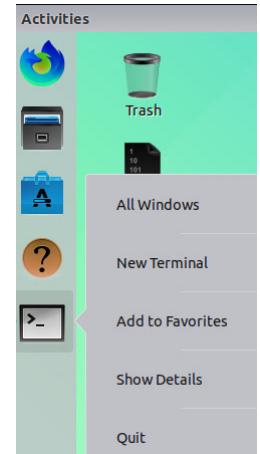
You may see the following warning message after installing Guest Additions CD Image.



5.1 Install GNU GCC Compiler and Development Environment

You will need to open a terminal to enter the following commands. you can type “Ctrl+Alt+t” to open a terminal. Once the terminal is open, you can right click on the terminal icon on the Activities bar to add terminal to Favorites so that the terminal icon will always show on the Activities bar. If you see a error message such as “try apt –fix-broken-install”, you should run “sudo apt –fix-broken install” to fix this error. There are two hyphens before fix.

```
$sudo apt-get update  
$sudo apt-get upgrade  
$sudo apt-get install build-essential
```



Installing the build-essential package in Ubuntu’s package repositories automatically installs the basic software you’ll need to compile from source, like the GCC compiler and other utilities. Install it by running the following commands in a terminal.

```
Activities Terminal ▾ Sun 06:01  
File Edit View Search Terminal Help  
jianjiansong@jianjiansong-VirtualBox:~  
jianjiansong@jianjiansong-VirtualBox:~$ sudo apt update  
[sudo] password for jianjiansong:  
Hit:1 http://us.archive.ubuntu.com/ubuntu bionic InRelease  
Hit:2 http://us.archive.ubuntu.com/ubuntu bionic-updates InRelease  
Hit:3 http://us.archive.ubuntu.com/ubuntu bionic-backports InRelease  
Hit:4 http://security.ubuntu.com/ubuntu bionic-security InRelease  
Reading package lists... Done  
Building dependency tree  
Reading state information... Done  
240 packages can be upgraded. Run 'apt list --upgradable' to see them.  
jianjiansong@jianjiansong-VirtualBox:~$ sudo apt upgrade  
Reading package lists... Done  
Building dependency tree  
Reading state information... Done  
Calculating upgrade... Done
```

In Ubuntu, hit the keyboard combination of “Ctrl+Alt+t” will pop up a terminal. Type the following command to install essential software: \$sudo apt-get install build-essential. There is no space between apt-get. If you get the following errors, close all files and web browsers and power off your VirtualBox. Restart your VirtualBox.

```

File Edit View Search Terminal Help
To run a command as administrator (user "root"), use "sudo <command>".
See "man sudo_root" for details.

[jianjiansong@jianjiansong-VirtualBox:~$ sudo apt-get install build-essential
[sudo] password for jianjiansong:
E: Could not get lock /var/lib/dpkg/lock - open (11: Resource temporarily unavailable)
E: Unable to lock the administration directory (/var/lib/dpkg/), is another process using it?
jianjiansong@jianjiansong-VirtualBox:~$ 

```

The command should work after the VirtualBox is restarted. Type “Y” to continue with this installation. Build-essential installs the following libraries and tools.

1. libc6-dev – C standard library.
2. gcc – C compiler.
3. g++ – C++ compiler.
4. make – GNU make utility to maintain groups of programs.
5. dpkg-dev – Debian package development tools.

```

File Edit View Search Terminal Help
Processing triggers for libc-bin (2.27-3ubuntu1) ...
[jianjiansong@jianjiansong-VirtualBox:~$ sudo apt-get install build-essential
[sudo] password for jianjiansong:
Reading package lists... Done
Building dependency tree
Reading state information... Done
The following packages were automatically installed and are no longer required:
  fonts-liberation2 fonts-opensymbol gir1.2-geocodeglib-1.0 gir1.2-gst-plugins-base-1.0 gir1.2-gstreamer-1.0 gir1.2-gudev-1.0

```

5.2 Install gcc compilers and 32-bit gcc libraries

Install 64-bit gcc: sudo apt-get install gcc-arm-none-eabi gcc-arm-linux-gnueabi.

Install 32-bit gcc library: sudo apt-get install lib32z1 lib32ncurses6 libbz2-1.0:i386 lib32stdc++6.

Install gcc: sudo apt-get install gcc.

```
$sudo apt-get install gcc-arm-none-eabi gcc-arm-linux-gnueabi.
$sudo apt-get install lib32z1 lib32ncurses6 libbz2-1.0:i386 lib32stdc++6.
$sudo apt-get install gcc.
```

```

[jianjiansong@jianjiansong-VirtualBox:~$ sudo apt-get install gcc-arm-none-eabi gcc-arm-linux-gnueabi
Reading package lists... Done
Building dependency tree
Reading state information... Done
The following additional packages will be installed:
  binutils-arm-linux-gnueabi binutils-arm-none-eabi cpp-7-arm-linux-gnueabi cpp-arm-linux-gnueabi gcc-7-arm-linux-gnueabi-base gcc-7-cross-base gcc-8-cross-base libasan4-armel-cross libatomic1-armel-cross libc-bin libcilkrt5-armel-cross libgcc-7-dev-armel-cross libgcc1-armel-cross libgomp1-armel-cross libisl15 libnewlib-arm-none-eabi libstdc++-arm-none-eabi-newlib libstdc++6-armel-cross libubsan0-armel-cross linux-libc-dev-armel-cross
Suggested packages:
  binutils-doc gcc-7-multilib-arm-linux-gnueabi gcc-7-doc libgcc1-dbg-armel-cross libgomp1-dbg-armel-cross libitm1-dbg-armel-cross libatomic1-dbg-armel-cross libasan4-dbg-armel-cross liblsan0-dbg-armel-cross libtsan0-dbg-armel-cross libcilkrt5-dbg-armel-cross libmpx2-dbg-armel-cross libquadmath0-dbg-armel-cross gdb-arm-linux-gnueabi gcc-doc libnewlib-doc
The following NEW packages will be installed:
  binutils-arm-linux-gnueabi binutils-arm-none-eabi cpp-7-arm-linux-gnueabi cpp-arm-linux-gnueabi gcc-7-arm-linux-gnueabi-base gcc-7-cross-base gcc-8-cross-base gcc-arm-linux-gnueabi gcc-arm-none-eabi libasan4 libc6-armel-cross libc6-dev-armel-cross libcilkrt5-armel-cross libgcc-7-dev-armel-cross libgcc1-armel-cross libnewlib-arm-none-eabi libnewlib-dev libstdc++-arm-none-eabi libstdc++6-armel-cross libubsan0-armel-cross
0 upgraded, 25 newly installed, 0 to remove and 11 not upgraded.
Need to get 135 MB of archives.
After this operation, 1,077 MB of additional disk space will be used.
Do you want to continue? [Y/n] y

```

```
jianjiansong@jianjiansong-VirtualBox:~$ sudo apt-get install lib32z1 lib32ncurses5 libbz2-1.0:i386 lib32stdc++6
Reading package lists... Done
Building dependency tree
Reading state information... Done
lib32z1 is already the newest version (1:1.2.11.dfsg-0ubuntu2).
The following additional packages will be installed:
  gcc-8-base:i386 lib32gcc1 lib32tinfo5 libc6:i386 libgcc1:i386
Suggested packages:
  glibc-doc:i386 locales:i386
The following NEW packages will be installed:
  gcc-8-base:i386 lib32gcc1 lib32ncurses5 lib32stdc++6 lib32tinfo5 libbz2-1.0:i386 libc6:i386 libgcc1:i386
0 upgraded, 8 newly installed, 0 to remove and 11 not upgraded.
Need to get 3,289 kB of archives.
After this operation, 14.0 MB of additional disk space will be used.
Do you want to continue? [Y/n] ■
```

If you get the following error, you should try to update apt again: `sudo apt update`. If you still have this error, try: `sudo apt upgrade`.

```
jianjiansong@jianjiansong-VirtualBox:~$ sudo apt-get install gcc-arm-none-eabi gcc-arm-linux-gnueabi
[sudo] password for jianjiansong:
E: Could not get lock /var/lib/dpkg/lock-frontend. It is held by process 83987 (unattended-upgr)
N: Be aware that removing the lock file is not a solution and may break your system.
E: Unable to acquire the dpkg frontend lock (/var/lib/dpkg/lock-frontend), is another process using it?
```

After the installation, you would not see the following error when compiling myled.c

Re: PC with Ubuntu 14.04 64bit, SDK 2015.1 fails to compile (make error 2) compiler not found

Options ▾

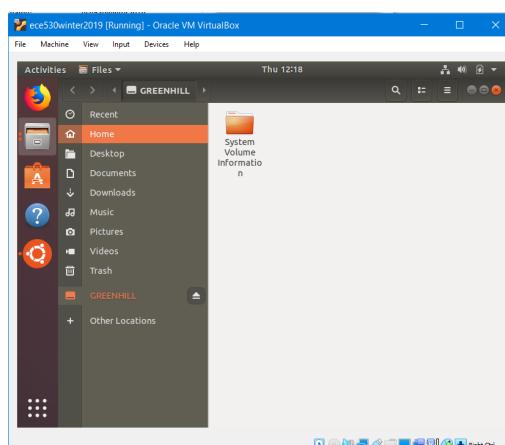
05-15-2015 02:02 PM

This has always been the case with the toolchain on 64-bit Ubuntu. I used to need these to just start Vivado when it was 32-bit, and now after upgrading to the 64-bit 2015.1, I forgot all about it until my system complained that `arm-xilinx-eabi-gcc` could not be found. These are third-party (GNU) projects/programs. Xilinx just packs a stable version in with their installer for convenience, which they probably should have built for amd64 platforms if they're dropping support for 32-bit otherwise, but they're likely just going to push it out later.

If you'd rather use a 64-bit version, you can install it with apt-get or whatever your distro's package manager is, then in the SDK you can change the project settings to use your own toolchain.

```
sudo apt-get install gcc-arm-none-eabi gcc-arm-linux-gnueabi
```

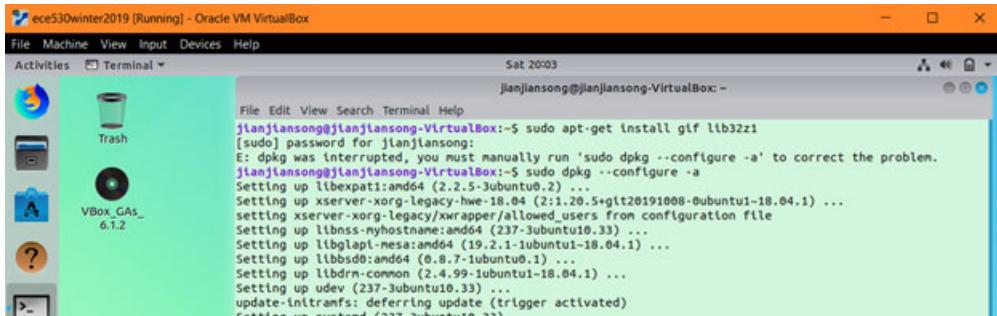
If you think Xilinx is bad, try using TI's Code Composer Studio and the TI-RTOS/SYSBIOS real-time system... I did, and I've cherished every moment I spend with the Xilinx tools ever since, lol, and TI doesn't have to integrate a whole toolchain for FPGA development either.



5.3 Install Git

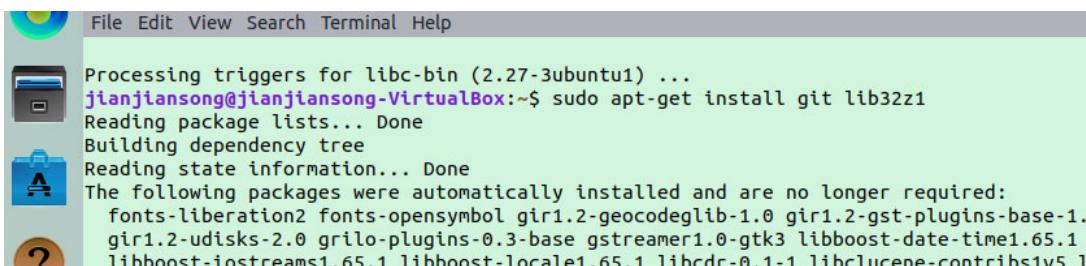
Next, we need to install Git and the 32-bit runtime. You may have to run commands with sudo to get root permission. There is no space between “apt-get”.

If you see the following error, run command to fix dpkg tool, which is basically a package manager for Debian/Debian-based systems.



The screenshot shows a Linux desktop environment with a terminal window open. The terminal window title is "Terminal". The terminal content shows a command being run: "sudo apt-get install gif lib32z1". The output of the command includes an error message: "E: dpkg was interrupted, you must manually run 'sudo dpkg --configure -a' to correct the problem." This indicates that the dpkg tool was interrupted during a previous operation, and the user needs to run a specific command to resolve it.

Run the following command again and type “Y” to install the package.



The screenshot shows a Linux desktop environment with a terminal window open. The terminal window title is "Terminal". The terminal content shows a command being run: "sudo apt-get install git lib32z1". The output of the command shows the packages being processed and installed successfully, including "Processing triggers for libc-bin (2.27-3ubuntu1) ...", "Reading package lists... Done", "Building dependency tree", "Reading state information... Done", and a list of packages being automatically removed: "The following packages were automatically installed and are no longer required: fonts-liberation2 fonts-opensymbol gir1.2-geocodeglib-1.0 gir1.2-gst-plugins-base-1.0 gir1.2-udisks-2.0 grilo-plugins-0.3-base gstreamer1.0-gtk3 libboost-date-time1.65.1 libboost-iostreams1.65.1 libboost-locale1.65.1 libcdcr-0.1-1 libclucene-contribs1v5 1".

6 Accessing USB3 driver

To open a USB driver in VirtualBox click devices -> USB -> your USB to mount it. Soon, a file manager should pop up with your USB drive file folder. If it doesn't, double click on the new USB icon at the bottom left part of the screen. Click and drag any files on your flash drive to Ubuntu's desktop to copy them. If you want to unmount the USB go to devices -> USB -> your USB and uncheck it. Now Windows can see the USB drive. The following example shows a flash drive called GREENHILL is mounted to the VirtualBox.

7 Install Xilinx Linux SDK 2014.4 (64bit)

Xilinx SDK source files are needed to create tool chain functions for Xilinx Zynq chips.

XilinxSDK2014_fixed_broken_symlink.zip from the instructor, which contains Xilinx 2014 SDK source files for Linux. The files need to be installed to directory /opt/Xilinx. Shell settings to be used to compile Linux kernel for Zybo is located at /opt/Xilinx/SDK/2014.4/settings64.sh. This file needs to be sourced: >source /opt/Xilinx/SDK/2014.4/settings64.sh. You can also just install Xilinx SDK under Linux to use its cross-compile tools.

Newer versions of Xilinx SDK source files can be found from Xilinx by searching for “Software Development Kit Standalone WebInstall Client” under PetaLinux-Xilinx heading. The latest version is “SDK 2018.3 Web Install for Linux 64 (BIN 106.45MB). However, 2014 version of Xilinx SDK for Linux is used for this lab due to compatibility issues.

[!\[\]\(3488592b4a8f4d31e7880a75336bfbc7_img.jpg\) SDK 2018.3 Web Install for Windows 64 \(EXE - 57 MB\)](#)

MD5 SUM Value : 0e83e8251d76b51b5d311eea2b2fb8fc

[!\[\]\(cb81769881af651ccb735a5045b47375_img.jpg\) SDK 2018.3 Web Install for Linux 64 \(BIN - 106.45 MB\)](#)

MD5 SUM Value : 3e681ff3759fdffd3521c046c9f13494

Upload a copy of XilinxSDK2014_fixed_broken_symlink.zip to your Virtual Machine and the file will be saved by default to ~/Downloads. Move the file to ~/Documents after it has been downloaded by dragging and dropping the file.

Here are instructions by David Robinson, a student of Rose-Hulman on how to set up Xilinx SDK under Ubuntu Linux. Type the command below in the terminal. You can type a few characters and then type Tab key to complete a directory or file name. You will need to provide the terminal with your password once it finishes unzipping the Xilinx zip. This command unzips the Xilinx zip, moves it to the correct location, and recursively gives your user the ability execute programs in the Xilinx folder.

```
jianjiansong@jianjiansong-VirtualBox:~$ ls
arm_ramdisk.image.gz  Documents  drivers      Music      Public    Templates   uramdisk.image.gz  Videos
Desktop              Downloads  linux-Digilent-Dev  Pictures   snap     u-boot-Digilent-Dev  user_app
jianjiansong@jianjiansong-VirtualBox:~$ cd Documents/
jianjiansong@jianjiansong-VirtualBox:~/Documents$ ls
XilinxSDK2014_fixed_broken_symlink.zip
jianjiansong@jianjiansong-VirtualBox:~/Documents$ unzip -d ~/Desktop/ XilinxSDK2014_fixed_broken_symlink.zip
```

```
jianjiansong@jianjiansong-VirtualBox:~$ ls ~/Desktop/
Xilinx
jianjiansong@jianjiansong-VirtualBox:~$ sudo mv ~/Desktop/Xilinx/ /opt/
[sudo] password for jianjiansong:
jianjiansong@jianjiansong-VirtualBox:~$ sudo chmod -R +x /opt/Xilinx/
jianjiansong@jianjiansong-VirtualBox:~$ cd /
jianjiansong@jianjiansong-VirtualBox:/$ ls /opt/Xilinx/
SDK
jianjiansong@jianjiansong-VirtualBox:/$
```

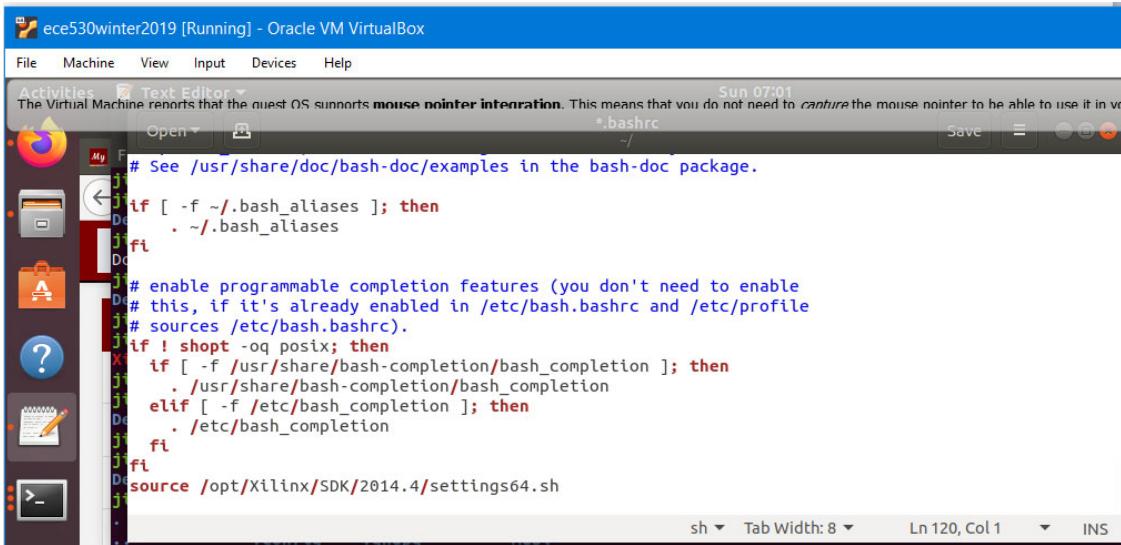
This SDK needs to be configured by sourcing a shell command file /opt/Xilinx/SDK/2014.4/settings64.sh. This can be done automatically by adding a command in the shell script .bashrc. This script will be executed whenever a terminal or a shell is started. This script will be edited to add a source command to execute a shell script under /opt/Xilinx folder. Source command will load any functions file into the current shell script or a command prompt. Run “echo \$PATH” to display the value of PATH variable before adding SDK path. You can also run “ls -a” to see .bashrc file in your home directory.

Next, type the command in your home directory. Type “\$cd ~ and Enter” to get to your home directory if you are not in it. gedit is a text editor to add a source command to .bashrc file. .bashrc file is a shell script that Bash runs whenever it is started interactively. It initializes an interactive shell session. You can put any command in that file that you could type at the command prompt. On Linux, bash is the standard shell for common users.

```
jianjiansong@jianjiansong-VirtualBox:~$ ls -a
..           .bashrc  Documents  .ICEAuthority  Pictures          Templates          .vboxclient-seamless.pid
..           .cache   Downloads  .local        .profile         .vboxclient-clipboard.pid  Videos
.bash_history .config  firefox   .mozilla    Public           .vboxclient-display.pid
.bash_logout  Desktop  .gnupg    Music       .sudo_as_admin_successful .vboxclient-draganddrop.pid
jianjiansong@jianjiansong-VirtualBox:~$ gedit .bashrc
jianjiansong@jianjiansong-VirtualBox:~$
```

A text editor by gedit will appear and add to the bottom of the file “source /opt/Xilinx/SDK/2014.4/settings64.sh”. Save (Ctrl+s) and close the text editor. Note, in Ubuntu the “X”

button to close windows is normally in the top left corner of the window, but if it's maximized the "X" button is hidden, it's there I promise. Move your mouse to the menu bar and it will appear.



If you have downloaded Xilinx.tar.gz file instead of Xilinx.zip file, you can use the following command to open and install it.

```
Desktop Documents Downloads Music Pictures Public Templates Videos
jianjiansong@jianjiansong-VirtualBox:~$ cd Downloads/
jianjiansong@jianjiansong-VirtualBox:~/Downloads$ ls
Xilinx.tar.gz
jianjiansong@jianjiansong-VirtualBox:~/Downloads$ cd -
jianjiansong@jianjiansong-VirtualBox:~$ tar zxvf ~/Downloads/Xilinx.tar.gz -C ~/Desktop/ && sudo mv ~/Desktop/Xilinx /opt/■
```

After exiting gedit and exiting the terminal, restart a terminal (by typing Ctrl+Alt+t) and type: echo \$PATH to see SDK paths be added to the path variable. Ignore the bash: messages about .settings64-Vivado.sh and seettings64-DocNav.sh as these were not created.

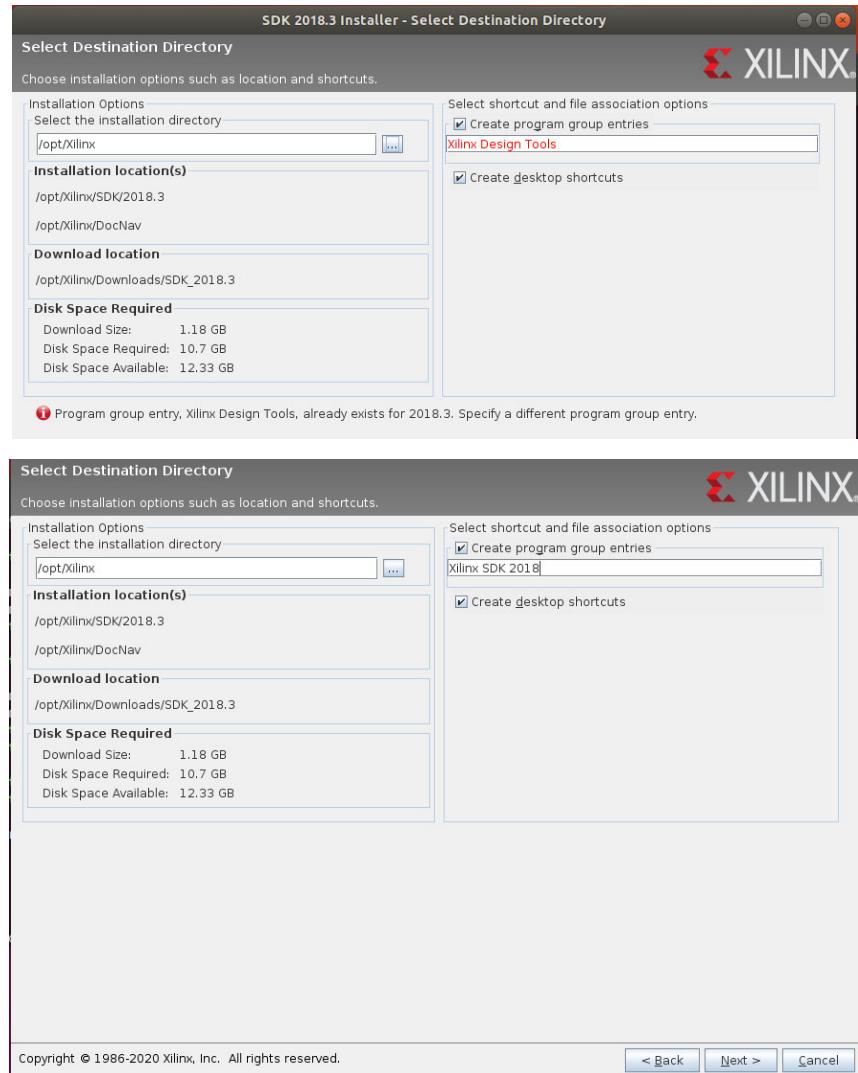


Now you can start Lab #11 by following its handout.

8 Appendix: Possible Errors and Issues

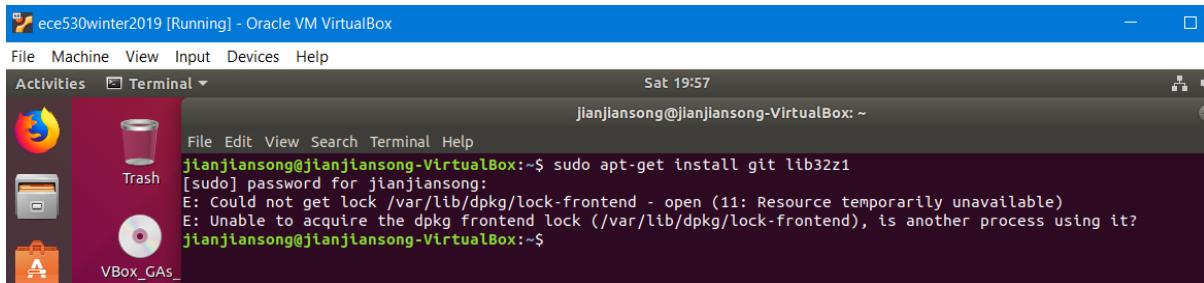
8.1 Program group entry already exists

If you are trying to reinstall Xilinx SDK and see an error "Program group entry already exists". Use a new name for the group.



8.2 Could not get lock /var/lib/dpkg/lock-frontend – open

If you see the following error, power off your VirtualBox and restart it. The reason is probably because VirtualBox system update is updating its software and is taking over the drive.



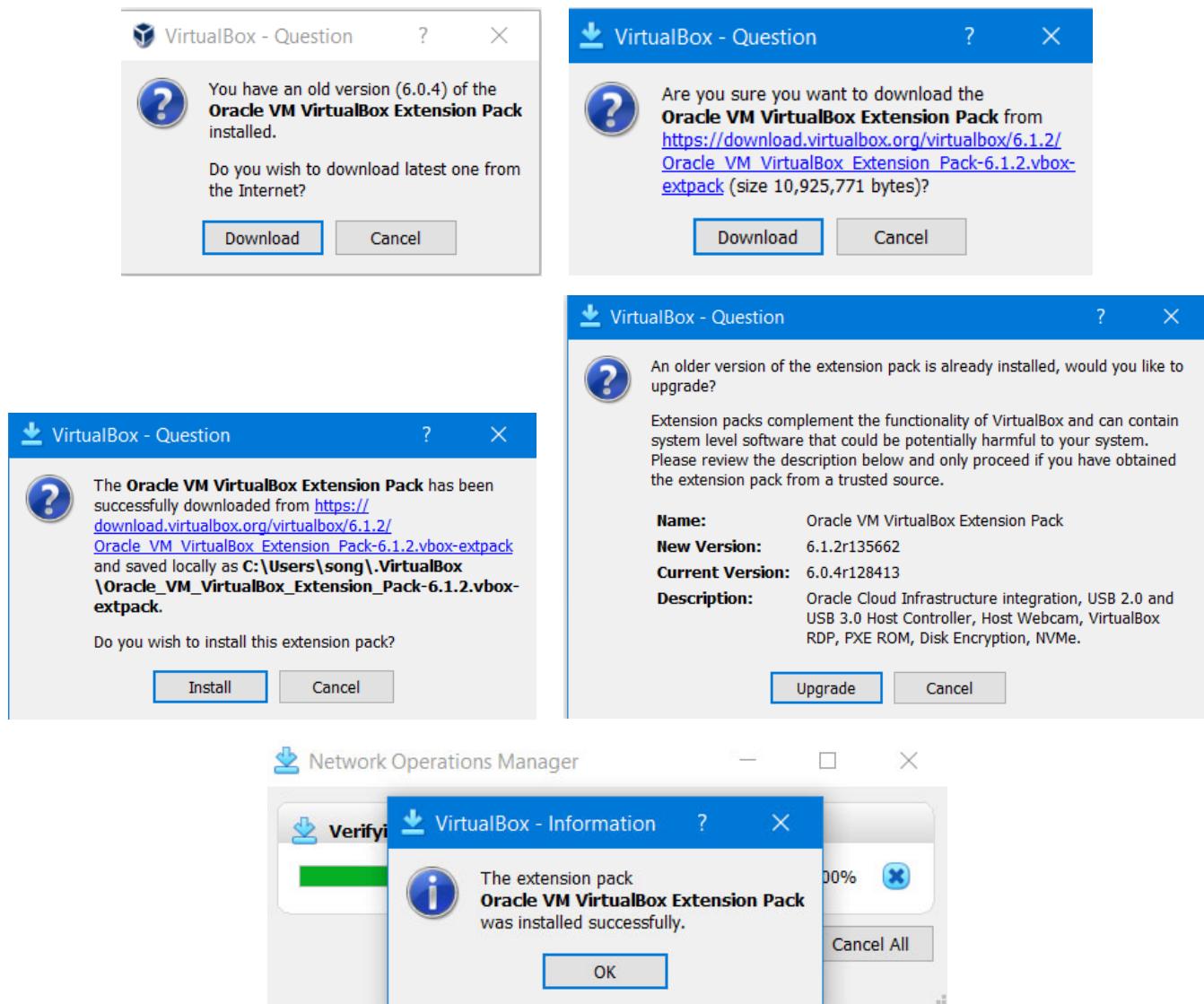
8.3 Set BIOS of your Laptop to Enable 64-bit Options (skip this if not needed)

If you do not see 64-bit options, check your BIOS settings to make sure “Virtualization Technology” and vt-d feature are enabled. To open BIOS settings, restart your laptop and hit “Enter” to start setup modes. Press F1 key to enter BIOS settings. Choose “Security->Virtualization”. Enable

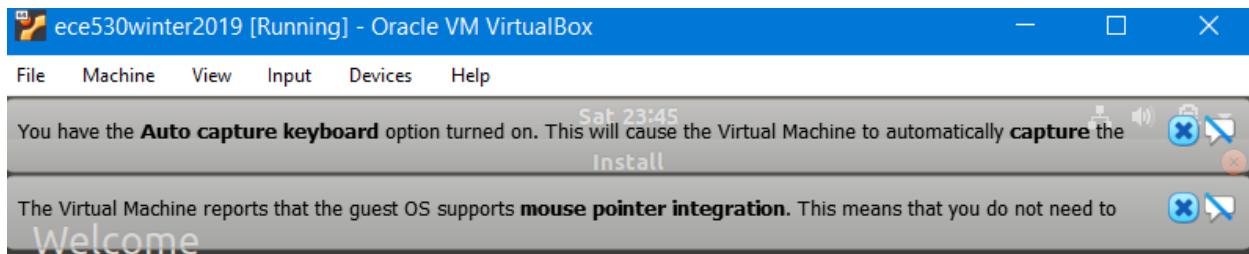
“Virtualization”, hit “Enter”. Under “Virtualization Technology” and “VT-d Feature”, hit “Enter”. Choose [Enable]. Press F10 to Save and Exit. Restart your computer to see 64-bit OS options. Set Memory size to be 2GB.

8.3.1 Install or Upgrade Oracle VM VirtualBox Extension Pack (skip this if not relevant)

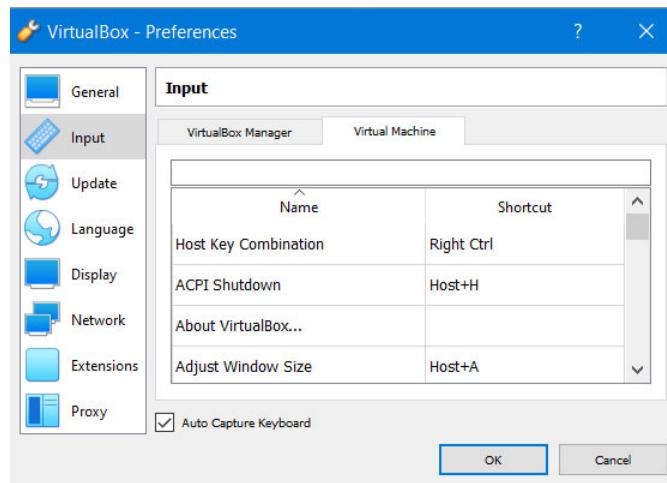
If you see the following questions, follow the instructions to upgrade Oracle VM VirtualBox Extension Pack. You will need to install this pack in order to interface with USB 2 and 3 Device. This is installed on your laptop under Windows, not on your VirtualBox.



8.4 Auto Capture Keyboard and Mouse Pointer Integration



To turn off option on auto capture keyboard, click on Input->Keyboard->Keyboard Settings on your VirtualBox. Check off “Auto Capture Keyboard” icon.



Mouse pointer integration option can be turn on and off by clicking on the mouse pointer icon on the menu bar on the right bottom corner of your VirtualBox.

