

# Guidelines on VM VirtualBox and Ubuntu Linux with Xilinx SDK 2018.3

by David Robinson and Jianjian Song  
(Revision 6.1, December 12, 2020)

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 SDK.

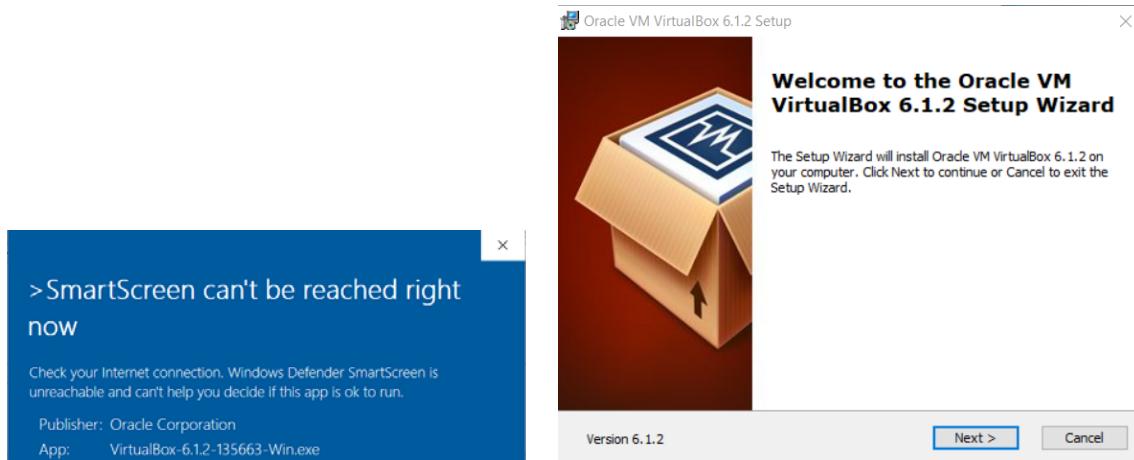
## 1 Download Oracle VirtualBox Installation and Ubuntu Disk Image File

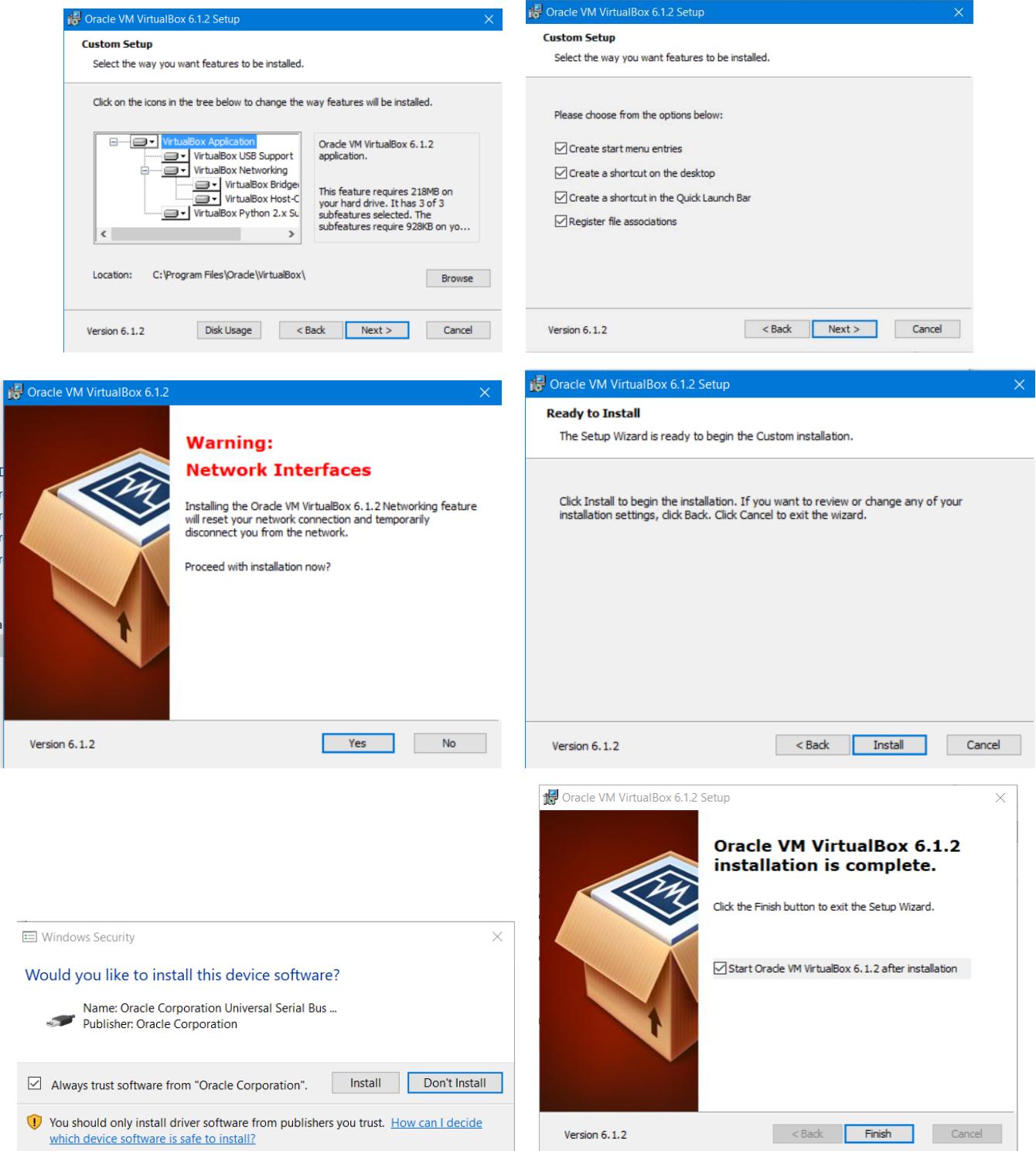
Start by downloading and installing a VM manager, I normally use VirtualBox because VirtualBox 6.1.2 is free at <https://www.virtualbox.org/wiki/Downloads> for Window Hosts. Another popular VM is VMware, which Rose has some licenses. I'll show the instructions using VirtualBox. The file name is VirtualBox-6.1.16-140961-Win.exe file.

Download a Ubuntu ISO. (<https://www.ubuntu.com/download/desktop>). Choose Ubuntu 20.04.1 LTS, where LTS stands for long term support for five years. The file name is ubuntu-20.04.1-desktop-amd64.iso. the file size is 2.6GB. It takes about one hour to download this file from my home wifi network.

## 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.

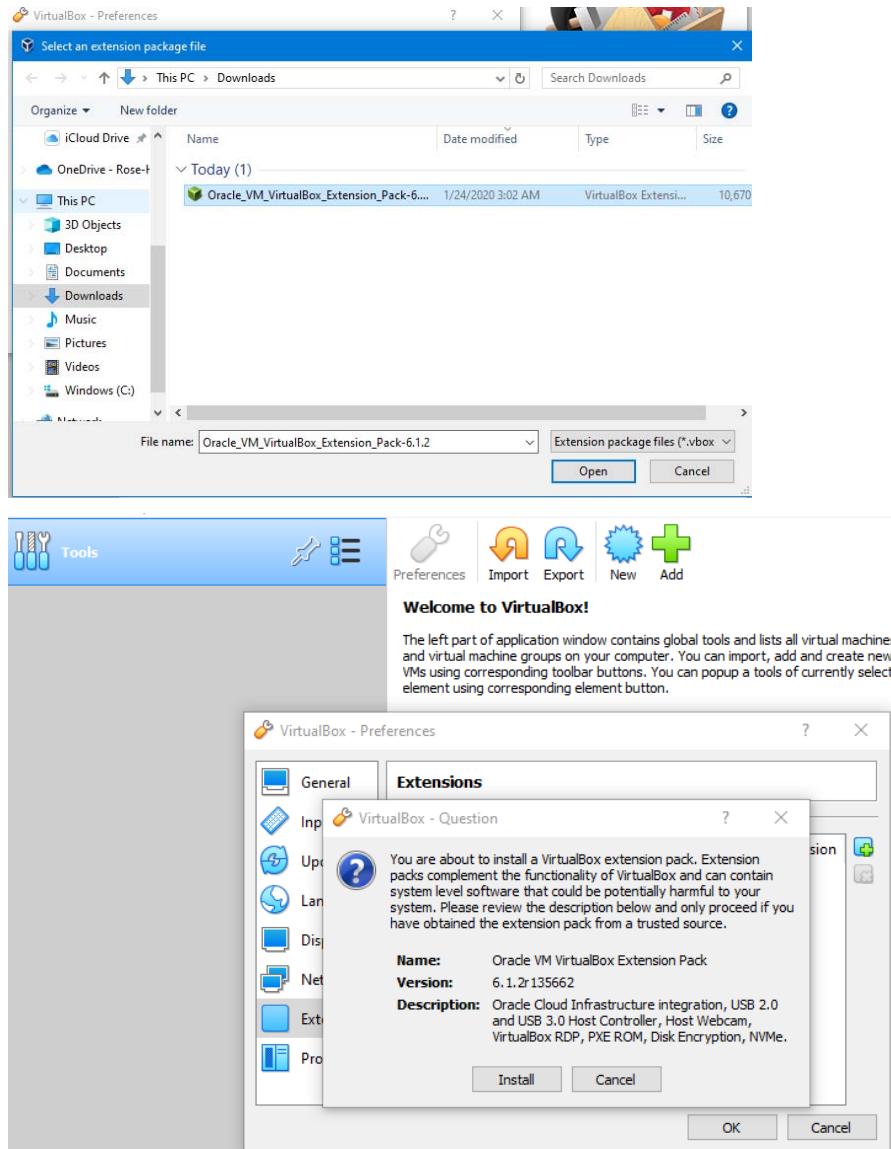




## 2.1 Install VirtualBox Extension Pack for your VirtualBox

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

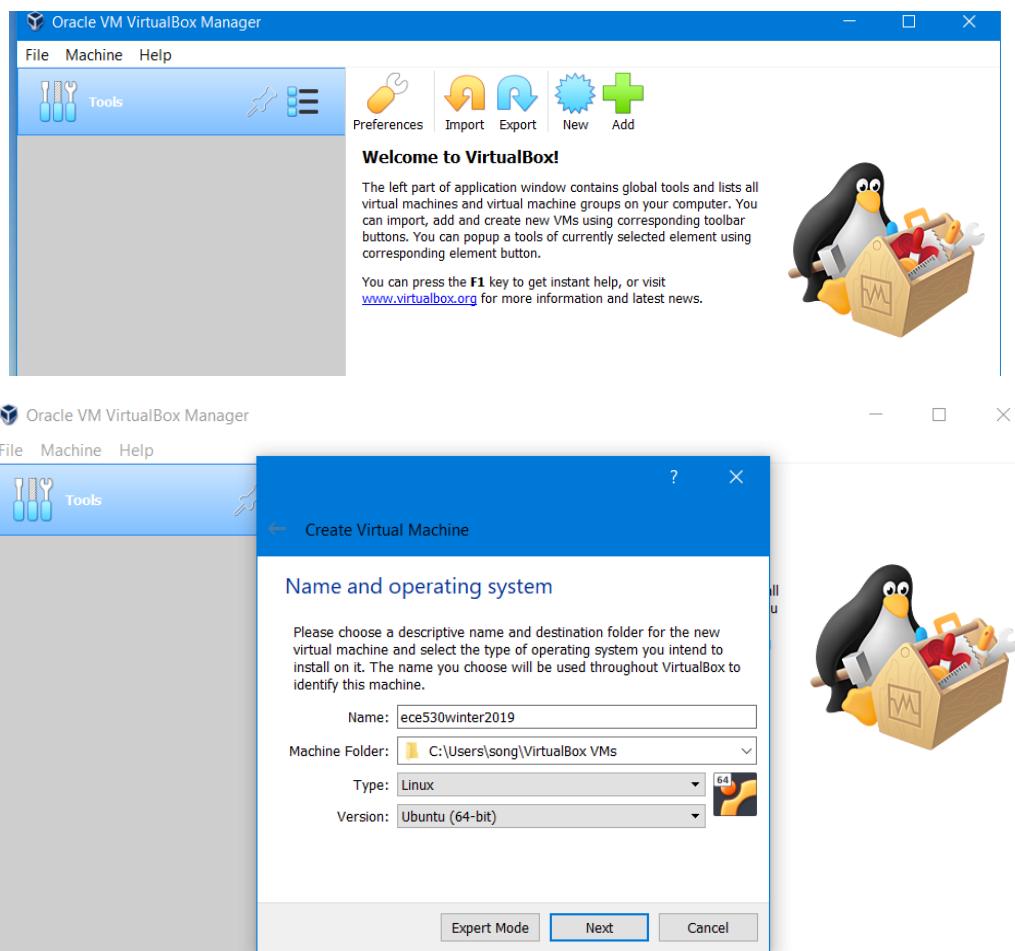
Tools->Preferences. Go to Extension Menu. Click +Add button to choose an extension package file. Choose “Install”.



### 3 Start an Oracle VM VirtualBox to Create a Virtual Machine

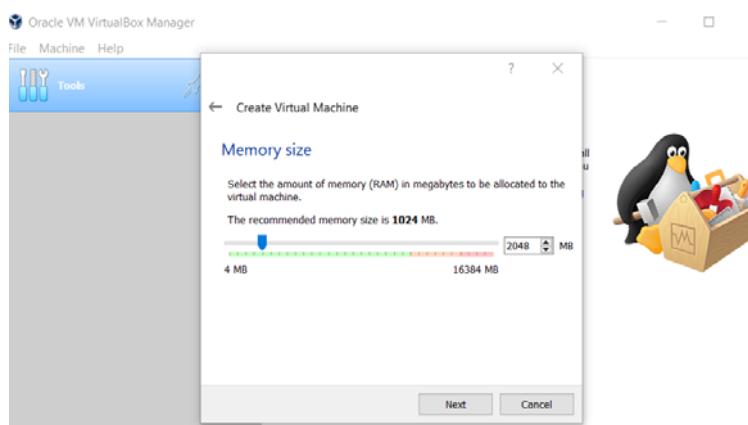
#### 3.1 Create a New VirtualBox

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.

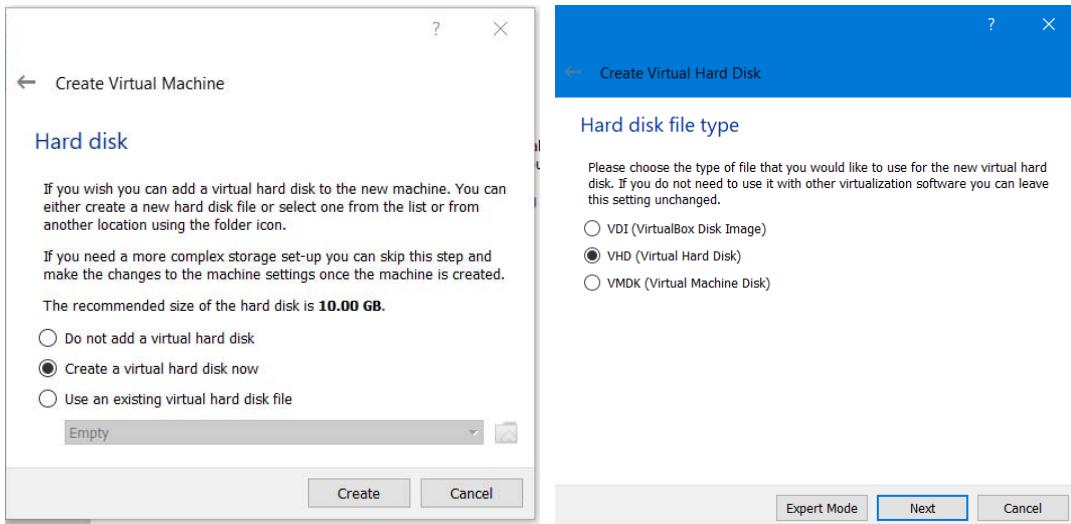


### 3.2 Setting Up your VirtualBox

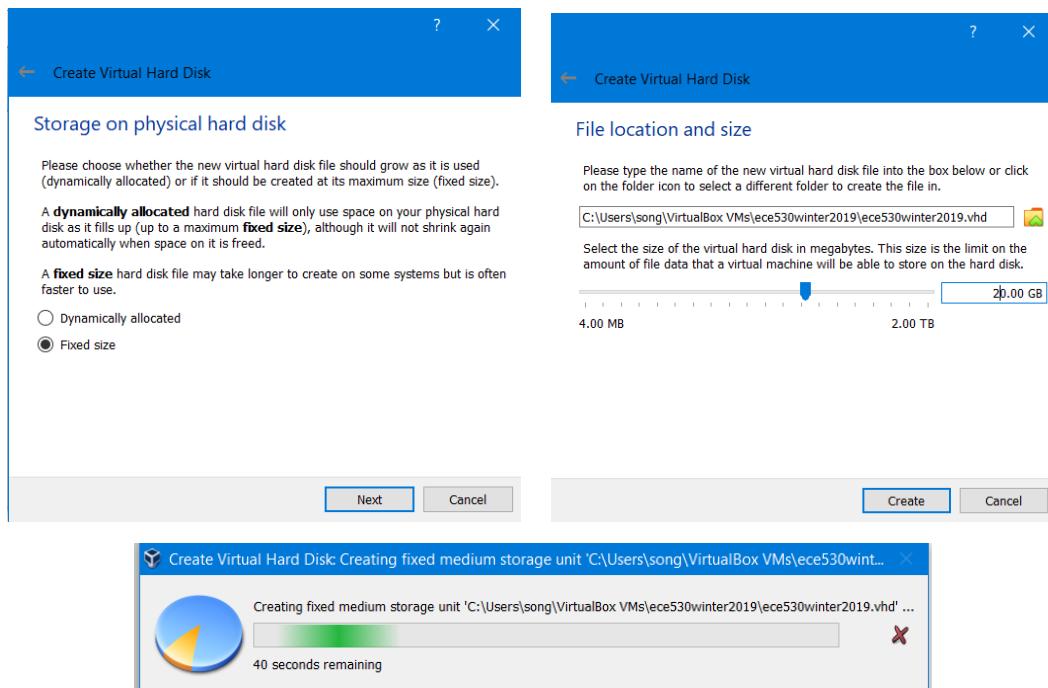
Choose 2048MB for memory size.



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.



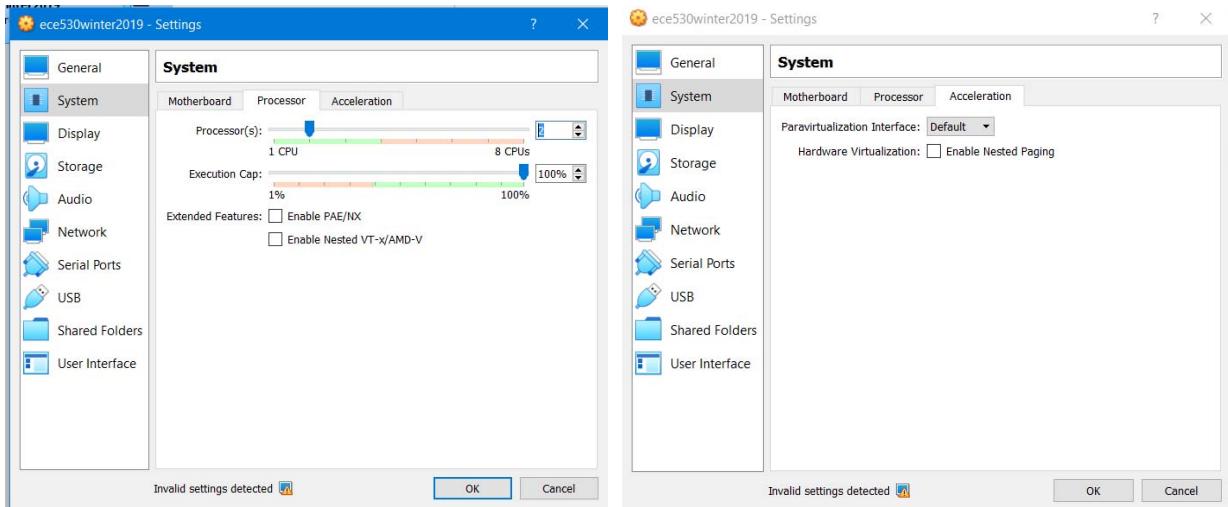
Set virtual hardware size to be 20GB. Click “Create” to make the VM. This hard drive creation may take about 3 minutes. Oracle VM Virtual manager will appear to show ece530winter2019 preview.



### 3.3 Configure System Settings

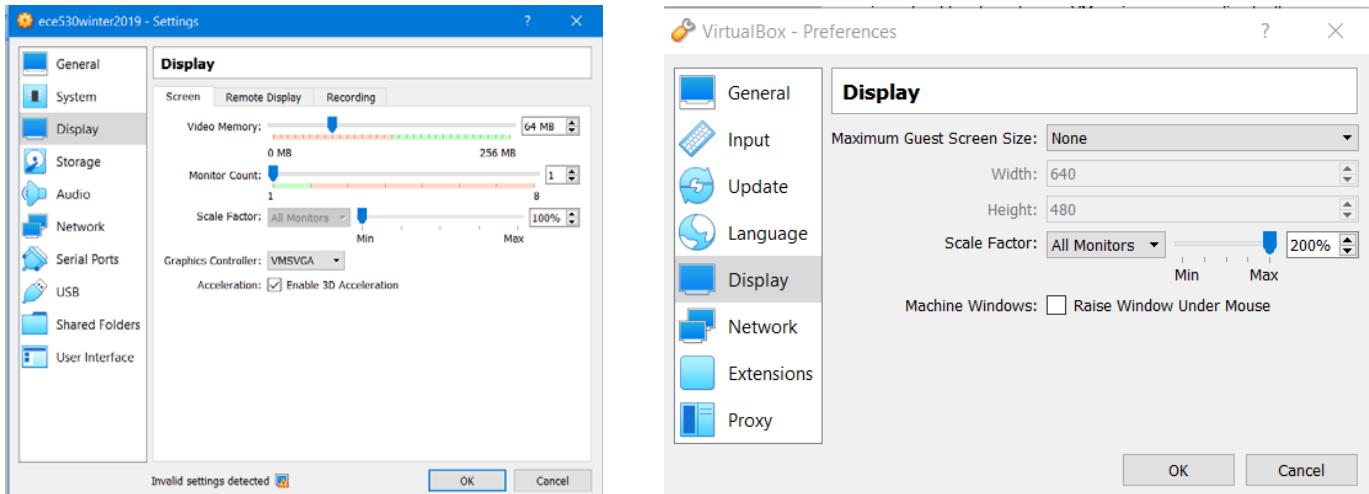
In your VirtualBox Manager, choose Settings. On your Settings Window, choose System ->processor to select 2 processors, which may make the VM run faster.

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



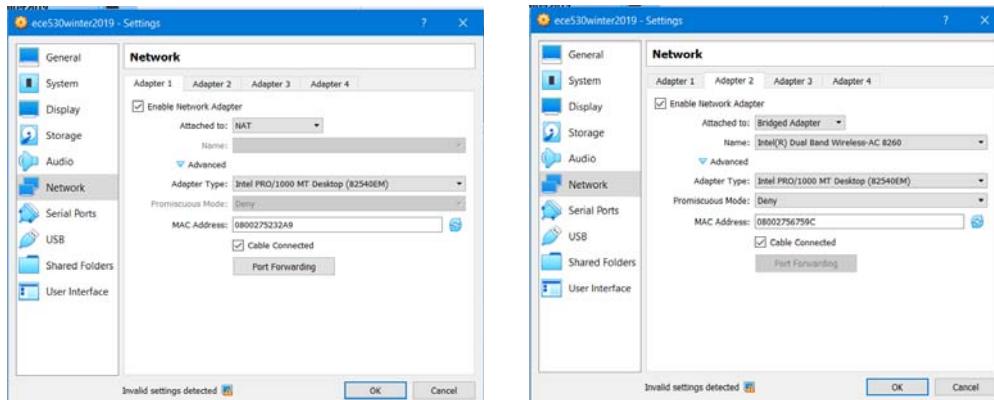
### 3.4 Configure Display Parameters

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.



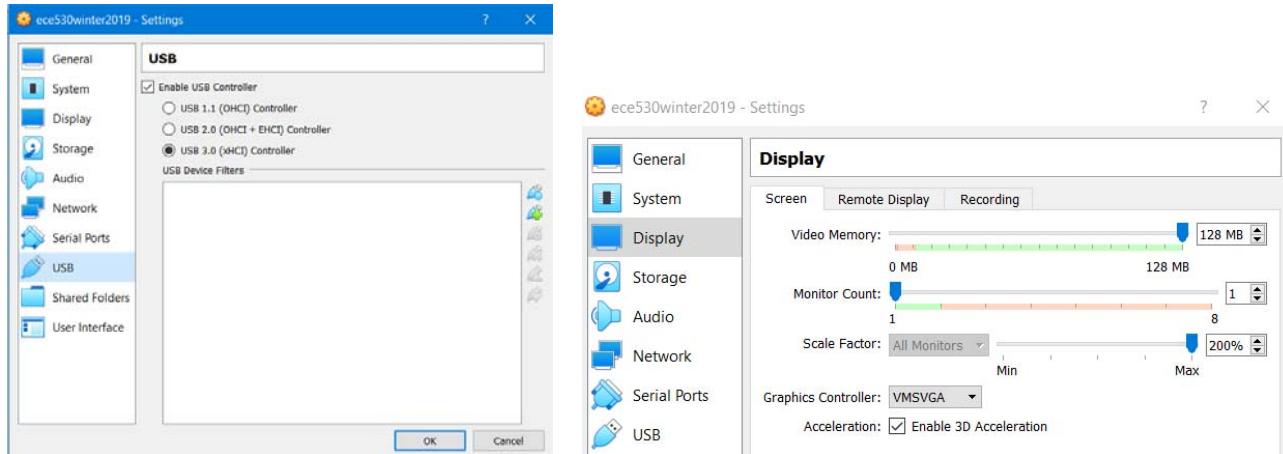
### 3.5 Start Wireless Connection

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.



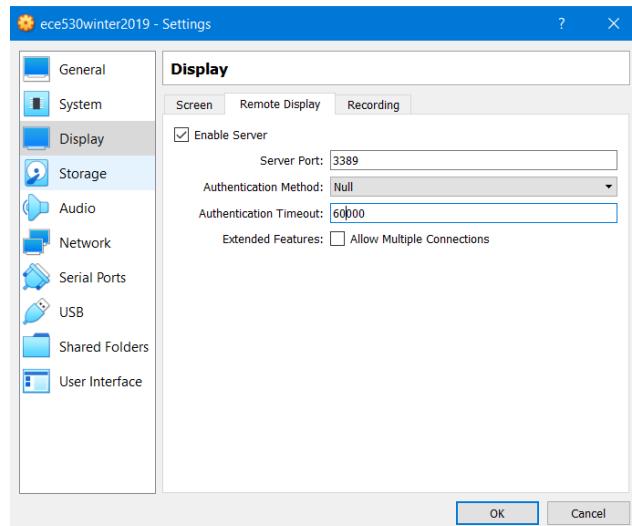
### 3.6 Change USB Settings to USB3

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



### 3.7 Change Screen Timeout Duration of VirtualBox

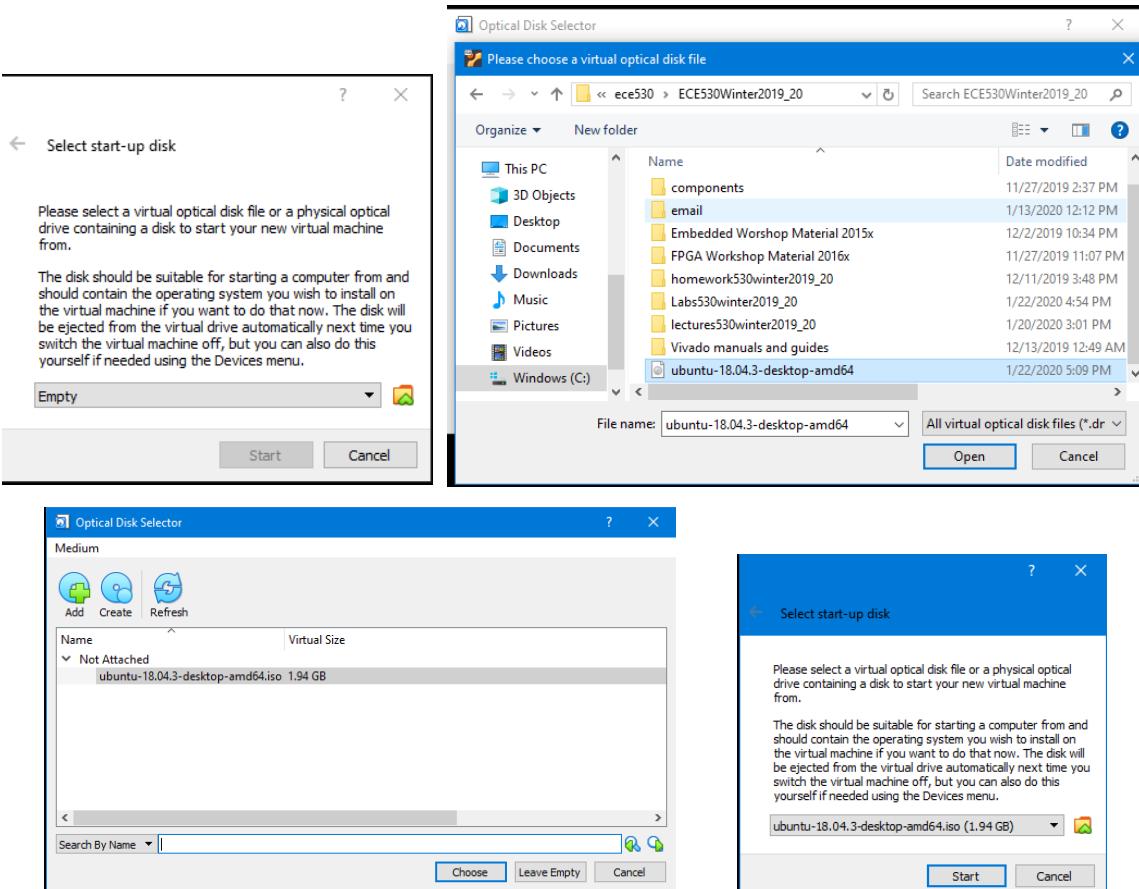
Authentication Timeout value in milliseconds is the screen timeout time of a VirtualBox. Set this time to be 60000 milliseconds to make screen timeout in 60 minutes.



## 4 Create a Virtual Machine VirtualBox

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

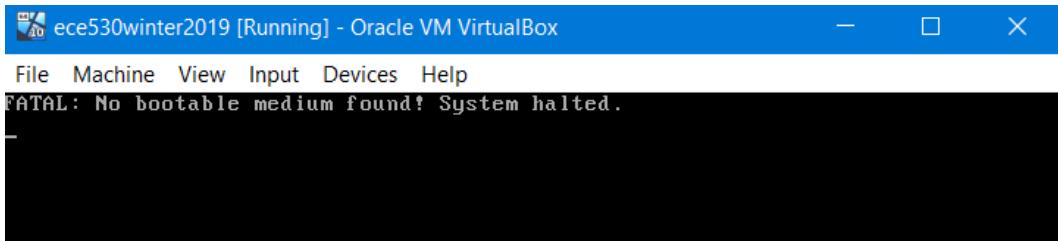
Save your ubuntu-18.04.3-desktop-amd64.iso disk image in your ECE530 class folder so that you know how to remove it when you don't need it anymore.



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

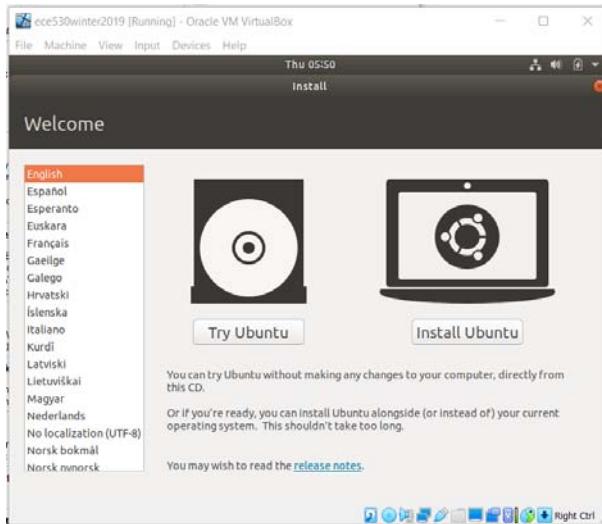


The following error may occur if you did not choose Linux.

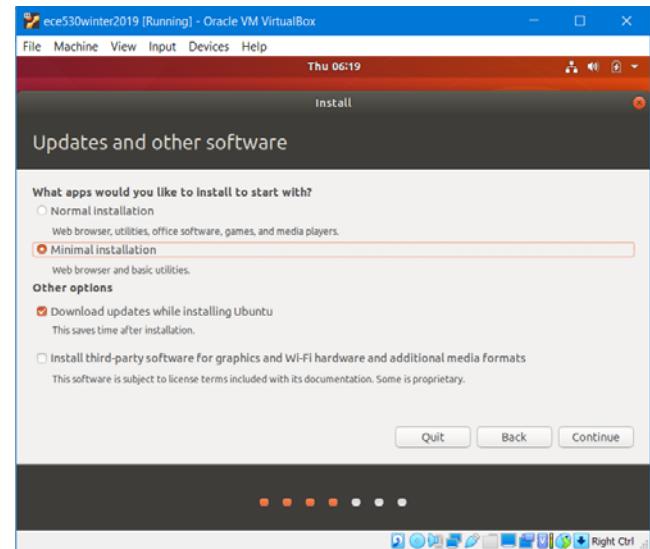
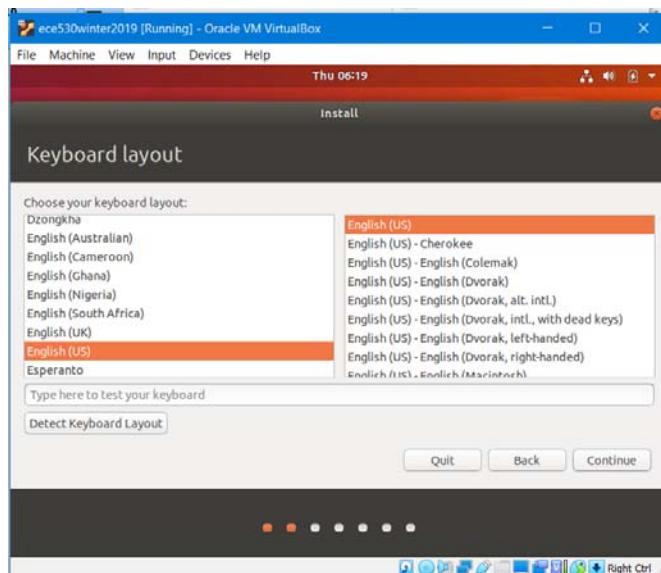


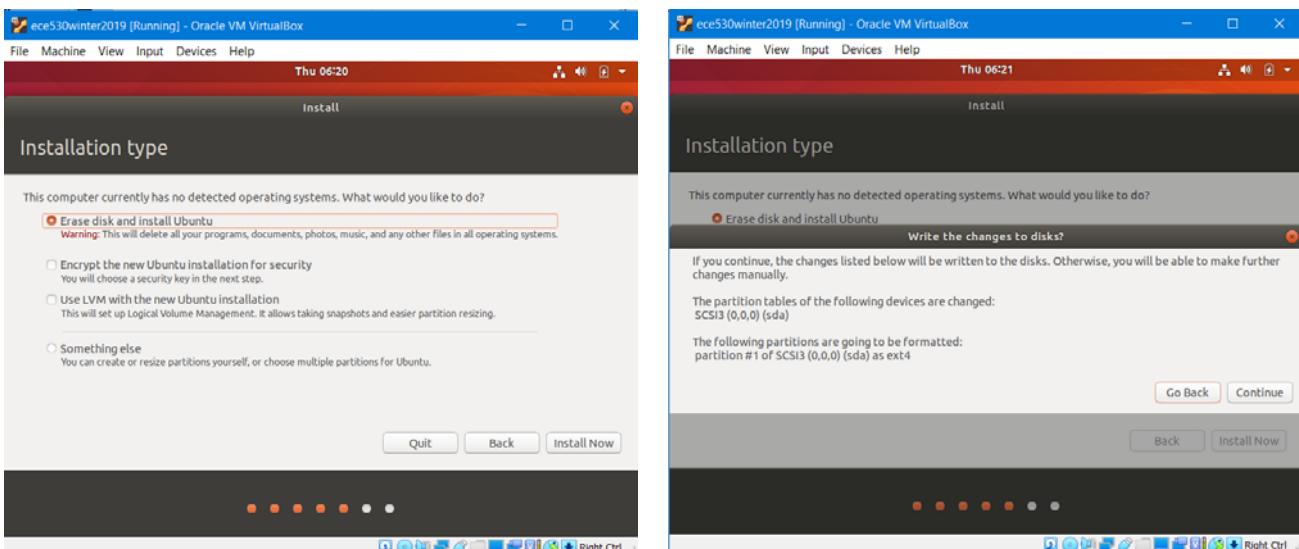
## 4.2 Install Ubuntu

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

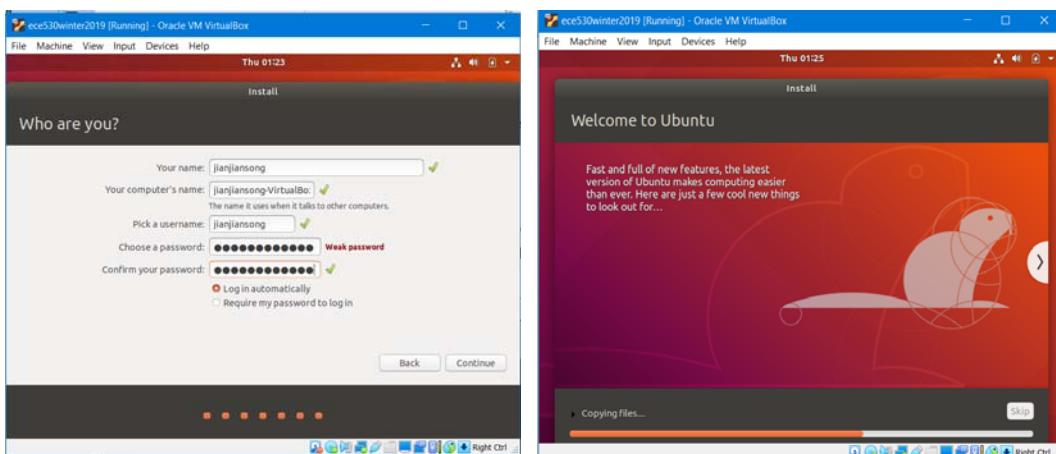


Click **Install Ubuntu**. Choose default on Keyboard layout and click “continue”. Choose “Minimal installation”. You can check the download updates and install third-party software boxes if you want, but they shouldn’t be needed unless you plan on keeping the VM to do other work. Click “Continue”. Select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

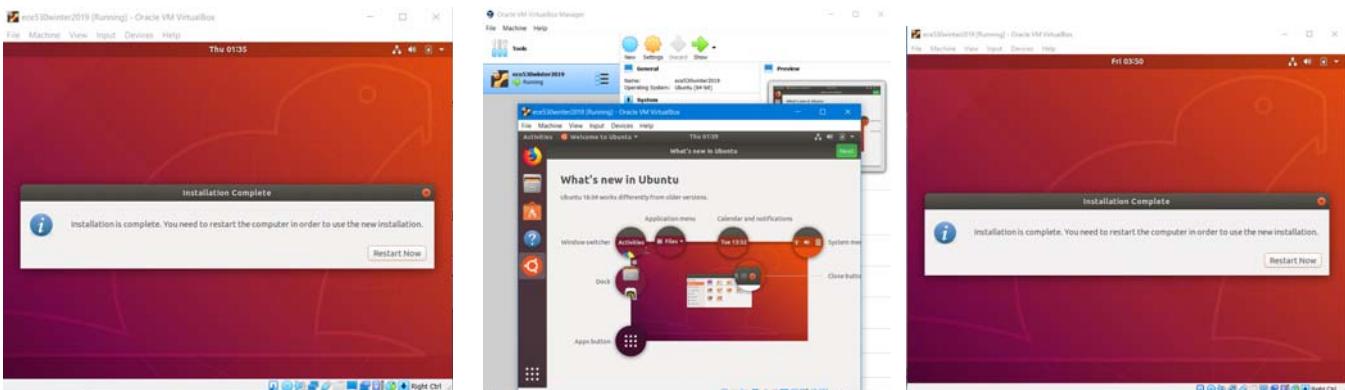




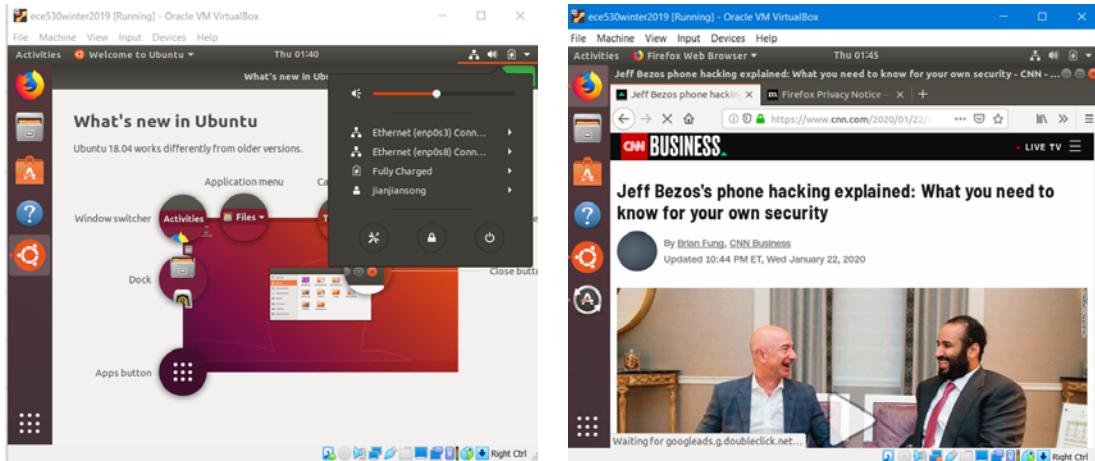
The rest of the options are just preferences you can select. Keep continuing until you have created your user account. Enter your user's name and password and continue. Ubuntu installation will start.



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.

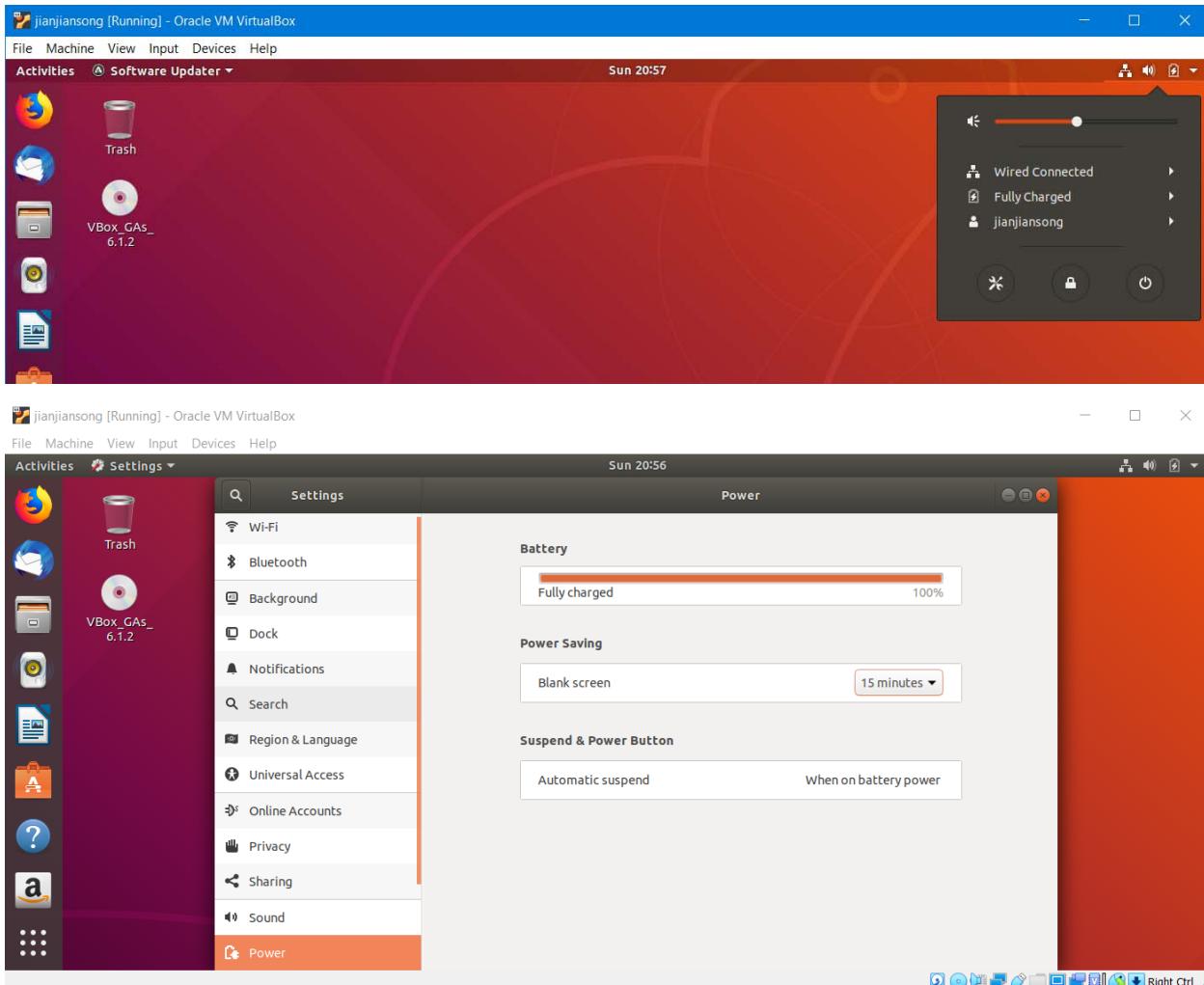


If you see the following, your video memory may not be large enough. Try to increase your video memory.



#### 4.3 Change Blank Screen Time for Power Saving Mode

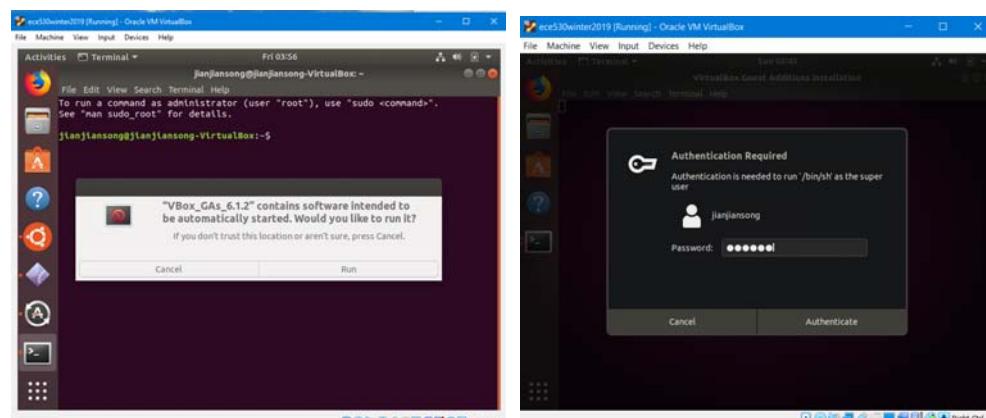
Right click on the options icon on upper right corner of your VirtualBox to choose the left most option Settings. Choose Power to power saving Blank saving time.



#### 4.4 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.

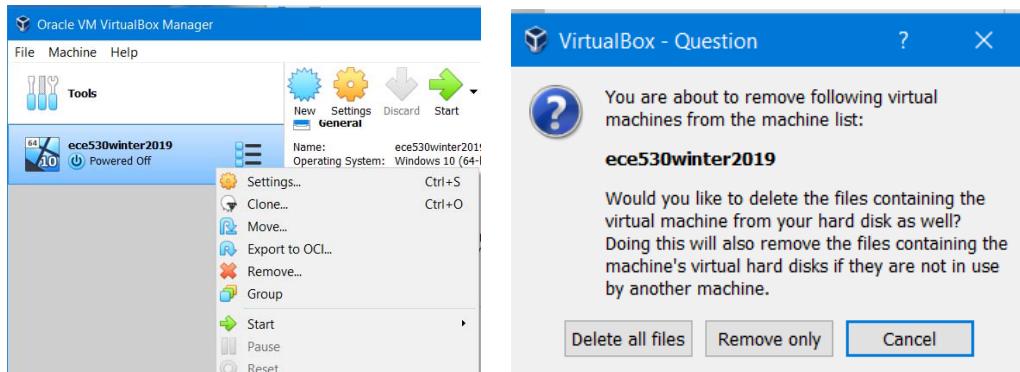


If you see the following error, turn off your VirtualBox and open Settings on your VirtualBox Manager. Choose Storage to see if VBoxGuestAdditions.iso is already mounted as shown below. The best way to deal with this error is to remove your VirtualBox and reinstall your VM manager.



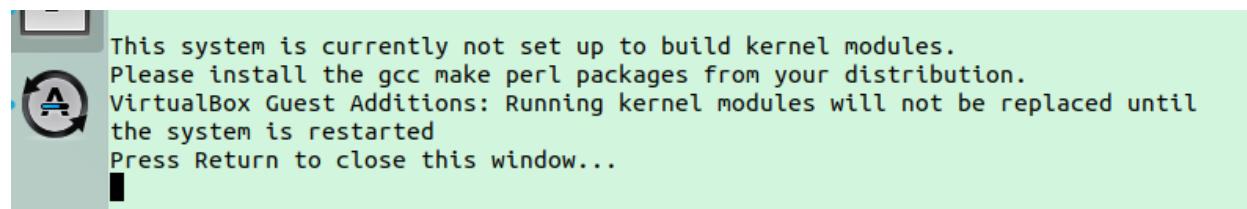
#### 4.5 How to Remove a Virtual Machine VirtualBox

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

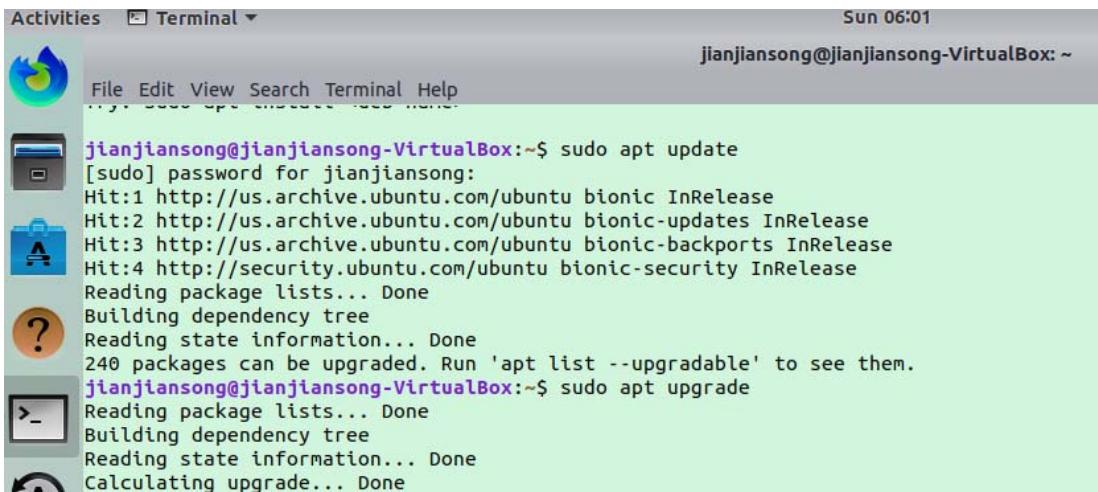
You may see the following warning message after installing Guest Additions CD Image.



#### 5.1 Install GNU GCC Compiler and Development Environment

```
$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
jianjiansong@jianjiansong-VirtualBox: ~

File Edit View Search Terminal Help

[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.

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



```

Activities Terminal Sun 06:01
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

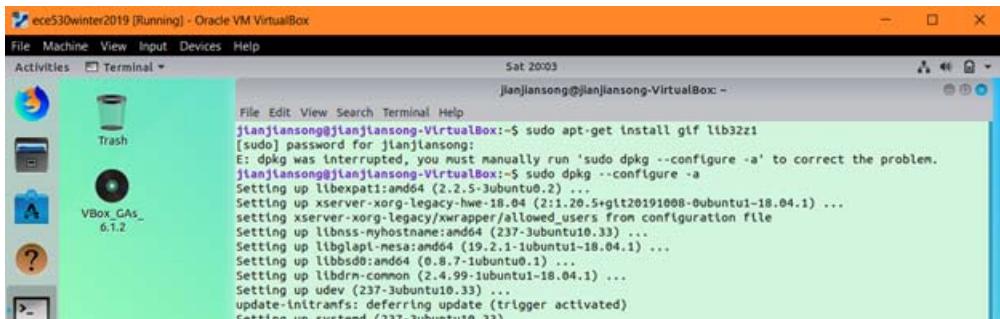
```

## 5.2 Install 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”.

```
Sudo apt install git lib32z1
```

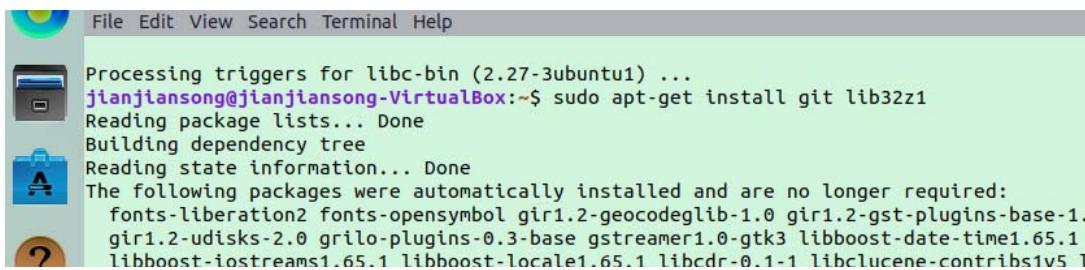
If you see the following error, run command to fix dpkg tool, which is basically a package manager for Debian/Debian-based systems.



A screenshot of a Linux desktop environment in Oracle VM VirtualBox. The desktop has a green theme with icons for Home, Trash, VBox\_GAs\_6.1.2, and Help. A terminal window is open with the following text:

```
jianjiansong@jianjiansong-VirtualBox:~$ sudo apt-get install gif lib32z1
[sudo] password for jianjiansong:
E: dpkg was interrupted, you must manually run 'sudo dpkg --configure -a' to correct the problem.
jianjiansong@jianjiansong-VirtualBox:~$ sudo dpkg --configure -a
Setting up libxpat0:amd64 (2.2.5-3ubuntu0.2) ...
Setting up xserver-xorg-legacy-hwe-18.04 (2:1.20.5+git20191008-0ubuntu1-18.04.1) ...
setting xserver-xorg-legacy/xwrapper/allowed_users from configuration file
Setting up libnss-nyhostname:amd64 (237-3ubuntu10.33) ...
Setting up libglapi-mesa:amd64 (19.2.1-1ubuntu1-18.04.1) ...
Setting up libbsd0:amd64 (0.8.7-1ubuntu0.1) ...
Setting up libdrm-common (2.4.99-1ubuntu1-18.04.1) ...
Setting up udev (237-3ubuntu10.33) ...
update-initramfs: deferring update (trigger activated)
```

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



A screenshot of a Linux terminal window. The terminal shows the output of the command "sudo apt-get install git lib32z1". The output includes processing triggers for libc-bin, reading package lists, building dependency tree, and reading state information. It also lists packages that were automatically installed and are no longer required, including fonts-liberation2, fonts-opensymbol, gir1.2-geocodeglib-1.0, gir1.2-gst-plugins-base-1, 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, libcdr-0.1-1, libclucene-contribs1v5, and libcurl4-openssl-dev.

```
Processing triggers for libc-bin (2.27-3ubuntu1) ...
jianjiansong@jianjiansong-VirtualBox:~$ sudo apt-get install git lib32z1
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.
  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 libcdr-0.1-1 libclucene-contribs1v5 l
libcurl4-openssl-dev
```

## 6 Install Xilinx Linux SDK 2018.3 Webinstall for Linux 64 (15 minutes)

### 6.1 Create a directory /opt/Xilinx under your VirtualBox

Make a directory /opt/Xilinx to install Xilinx SDK: “sudo mkdir /opt/Xilinx”. This directory /opt/Xilinx must allow applications to have write, read and execute permissions. Run “sudo chmod 777 /opt/Xilinx” to change directory permissions to write, read and execute for all users. Check with “ls -l” and “ls -l opt” to see if opt and Xilinx directories both have drwxrwxrwx permissions.



A screenshot of a Linux terminal window. It shows the user navigating to the root directory, listing files, creating a new directory named "Xilinx" in the "/opt" directory, and then listing files again. Finally, it runs the command "ls -l opt" to show the permissions of the "opt" and "Xilinx" directories.

```
jianjiansong@jianjiansong-VirtualBox:/opt/Xilinx$ cd /
jianjiansong@jianjiansong-VirtualBox:$ ls
bin  cdrom  etc  initrd.img  lib  lib64  media  opt  root  sbin  srv  sys  usr  VBox.log  vmlinuz.old
boot  dev  home  initrd.img.old  lib32  lost+found  mnt  proc  run  snap  swapfile  tmp  var  vmlinuz
jianjiansong@jianjiansong-VirtualBox:$ ls -l opt
total 8
drwxr-xr-x  8 root      root        4096 Jan 26 05:47 VBoxGuestAdditions-6.1.2
drwxr-xr-x  2 jianjiansong jianjiansong 4096 Feb  7 17:51 Xilinx
jianjiansong@jianjiansong-VirtualBox:$
```

### 6.2 Download Xilinx SDK from [www.xilinx.com](http://www.xilinx.com)

Xilinx SDK source files are needed to create tool chain functions for Xilinx chips to use Linux cross-compile tools. 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/2018.3/settings64.sh. This file needs to be sourced: >source /opt/Xilinx/SDK/2018.3/settings64.sh.

Newer versions of Xilinx SDK source files can be found from Xilinx by searching for “Software Development Kit Standalone WebInstall Client” under Xilinx Downloads. The latest version is “SDK 2019.2 Web Install for Linux 64 (BIN 107.9MB). However, 2018 version of Xilinx SDK for Linux is used for this lab due to compatibility issues.

The screenshot shows a Firefox browser window with the Xilinx website open. The URL in the address bar is <https://www.xilinx.com/support/download/index.html/content/xilinx/en/downloadNav/embedded-design-tools/2018-3.html>. The page title is "Downloads - Mozilla Firefox". The Xilinx logo is at the top left. The main content area is titled "Downloads" and includes sections for "Vivado Installation Overview Video", "Licensing Help", and "Alveo Accelerator Card Downloads". Below these are tabs for "Vivado (HW Developer)", "Vitis (SW Developer)", "Vitis Embedded Platforms" (which is highlighted), "PetaLinux", and "Device Models". On the left, there's a sidebar with "Version" dropdowns for "2019.2", "2019.1", and "2018.3" (which is also highlighted). The "2018.3" dropdown has "Archive" listed below it. The main content area shows a "Software Development Kit Standalone WebInstall Client - 2018.3 Lightweight Installer Download" section. It includes "Important Information" and "SDK Web Install" links, along with "Download Includes" (Software Development Kit (SDK)) and "Download Type" (Lightweight Installer) details. Two download links are present: one for Windows (EXE - 57 MB) and one for Linux (BIN - 106.45 MB). Below each link is its corresponding MD5 sum value.

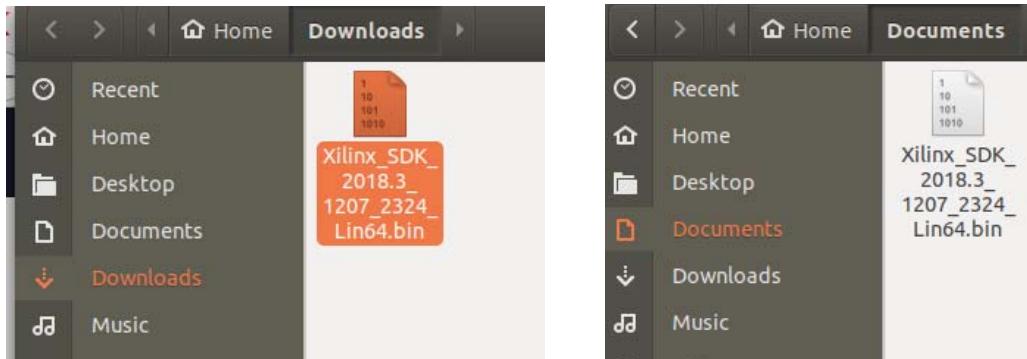
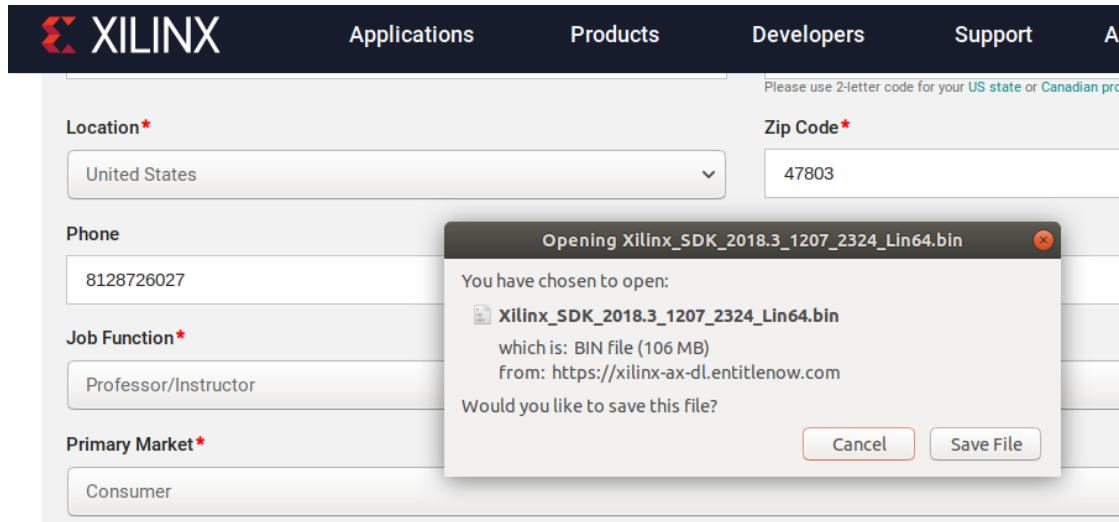
**SDK 2018.3 Web Install for Windows 64 (EXE - 57 MB)**  
MD5 SUM Value : 0e83e8251d76b51b5d311eea2b2fb8fc

**SDK 2018.3 Web Install for Linux 64 (BIN - 106.45 MB)**  
MD5 SUM Value : 3e681ff3759fdffd3521c046c9f13494

### Download Verification i

Open website [www.xilinx.com](http://www.xilinx.com) and browse to Support->Services->Downloads & Licensing->PetaLinux. Choose 2018.3. Click SDK 2018.3 Webinstall for Linux 64 (BIN - 106.45 MB) to download the bin file. You will need to enter your user ID and password of your Xilinx account to download this file. Click “Save File”. The file is saved in your Downloads folder as Xilinx\_SDK\_2018.3\_1207\_2324\_Lin64.bin.

Move Xilinx\_SDK\_2018.3\_1207\_2324\_Lin64.bin from your Downloads folder to your Documents folder by dragging it from Downloads folder and moving and dropping it on Documents folder. You will need to login to your account to download this zipped file.



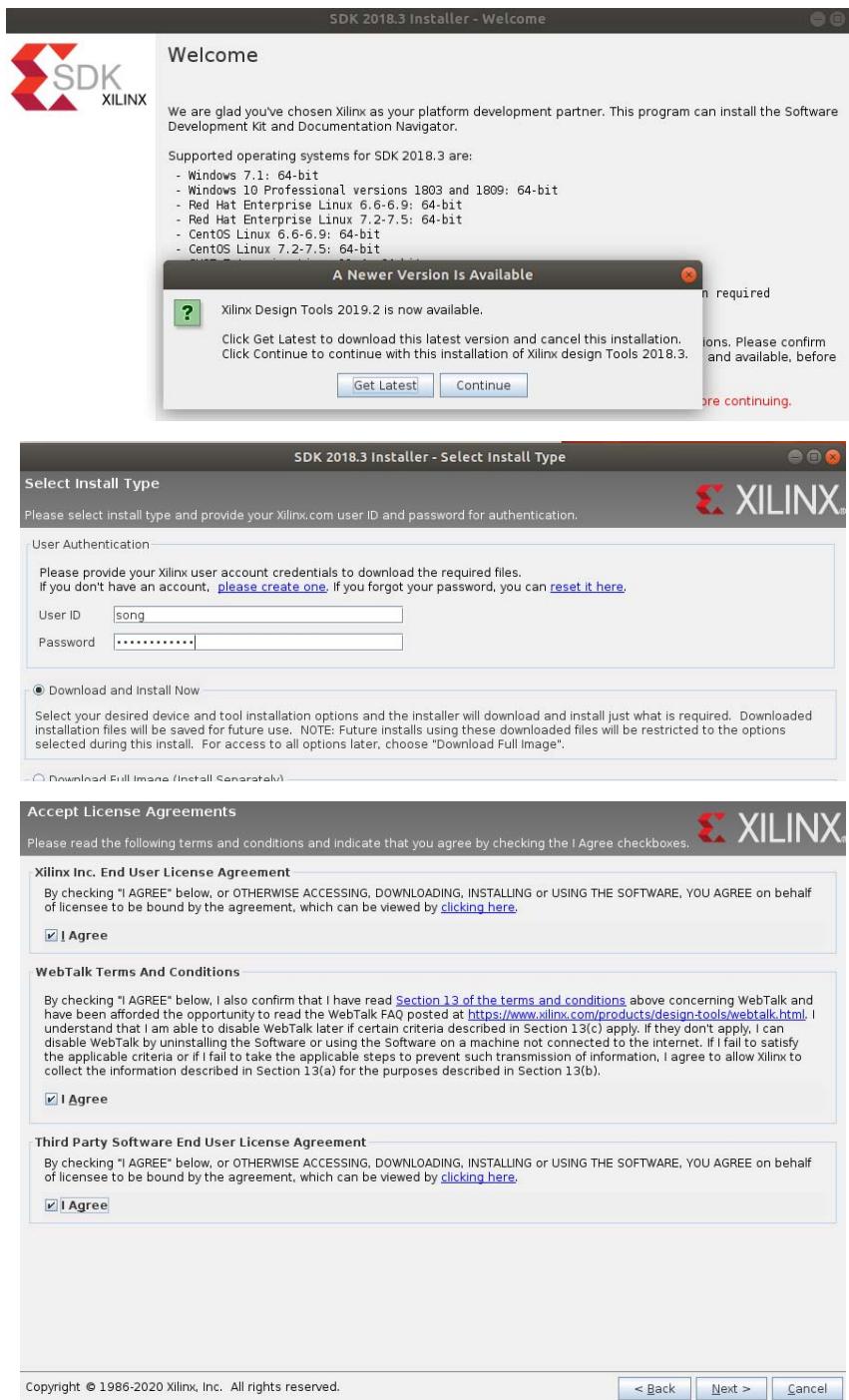
### 6.3 Install Xilinx SDK into directory /opt/Xilinx

Type “Ctrl+Alt+t” to open a terminal. Use cd command to change directory to Documents. You can type the first few characters of a name and type Tab to complete a file name. Type “sudo chmod +x Xilinx\_SDK\_2018.3\_1207\_2324\_Lin64.bin” to make this file executable. And then type “./Xilinx\_SDK\_2018.3\_1207\_2324\_Lin64.bin” to execute this file to install SDK.

```
$sudo +x Xilinx_SDK_2018.3_1207_2324_Lin64.bin
$ ./Xilinx_SDK_2018.3_1207_2324_Lin64.bin
```

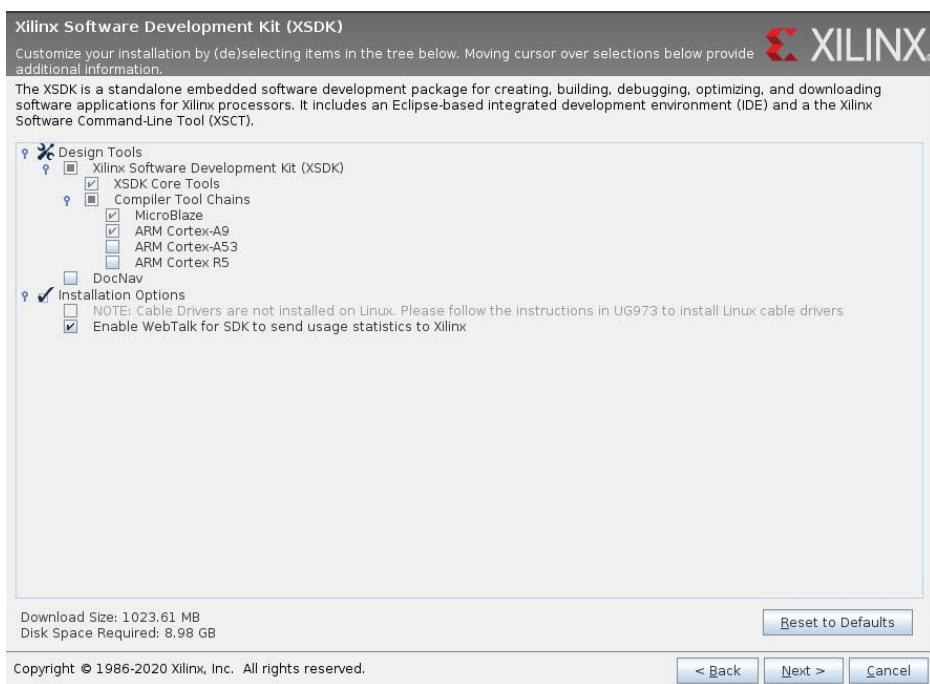
```
jianjiansong@jianjiansong-VirtualBox:~$ cd Documents/
jianjiansong@jianjiansong-VirtualBox:~/Documents$ ls
Xilinx_SDK_2018.3_1207_2324_Lin64.bin
jianjiansong@jianjiansong-VirtualBox:~/Documents$ sudo chmod +x Xilinx_SDK_2018.3_1207_2324_Lin64.bin
[sudo] password for jianjiansong:
jianjiansong@jianjiansong-VirtualBox:~/Documents$ ./ Xilinx_SDK_2018.3_1207_2324_Lin64.bin
bash: ./: Is a directory
jianjiansong@jianjiansong-VirtualBox:~/Documents$ ls
Xilinx_SDK_2018.3_1207_2324_Lin64.bin
jianjiansong@jianjiansong-VirtualBox:~/Documents$ ls -l
total 109012
-rwxrwxr-x 1 jianjiansong jianjiansong 111621361 Feb  7 18:01 Xilinx_SDK_2018.3_1207_2324_Lin64.bin
jianjiansong@jianjiansong-VirtualBox:~/Documents$ ./Xilinx_SDK_2018.3_1207_2324_Lin64.bin
Verifying archive integrity... All good.
Uncompressing Xilinx Installer.....
```

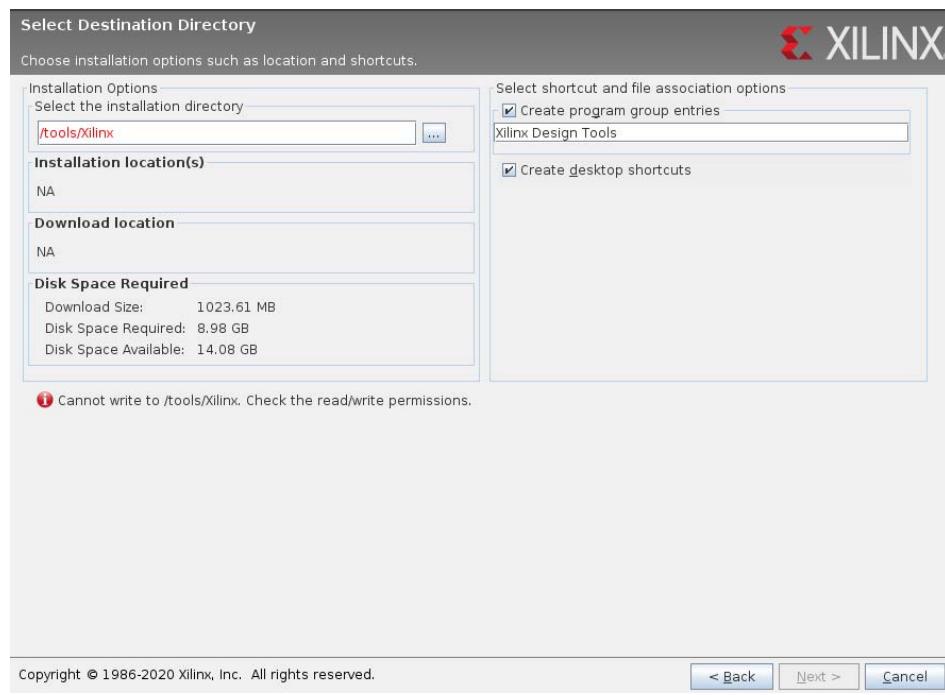
Click “Continue” to install version 2018. and “Next” to enter your Xilinx user’s ID and password.



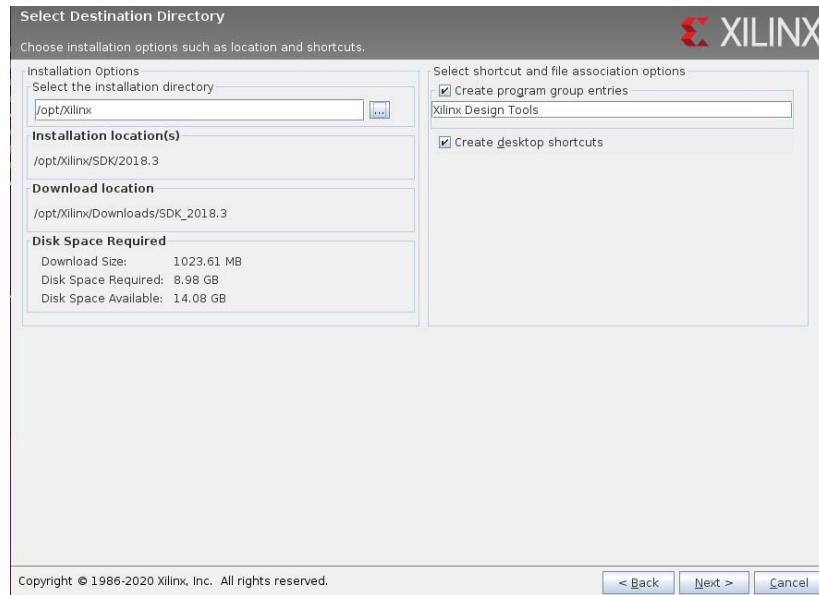


Choose ARM Cortex-A9 only to save hard drive space.



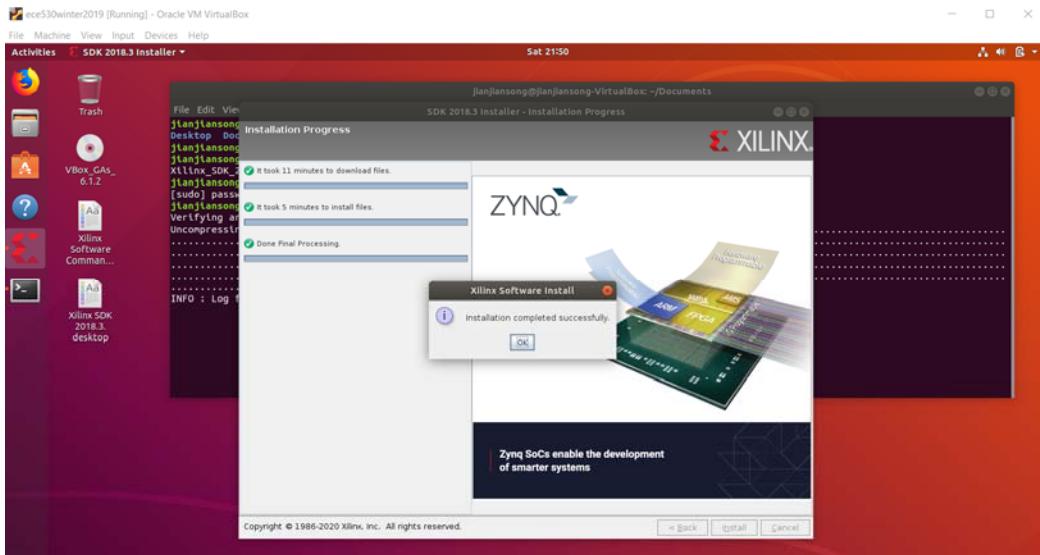


Change the installation directory to /opt/Xilinx. Click “Next” and “Install”.





This installation may take about 15 minutes.



You can now check if Xilinx SDK is installed under /opt/Xilinx directory.

```
jianjiansong@jianjiansong-VirtualBox: /opt/Xilinx/SDK/2018.3
File Edit View Search Terminal Help
jianjiansong@jianjiansong-VirtualBox:~$ cd /opt/Xilinx/SDK/2018.3/
jianjiansong@jianjiansong-VirtualBox:/opt/Xilinx/SDK/2018.3$ ls
bin data doc eclipse gnu lib scripts settings64.csh settings64.sh tps
jianjiansong@jianjiansong-VirtualBox:/opt/Xilinx/SDK/2018.3$
```

#### 6.4 Add Xilinx SDK path to the system path variable

This SDK needs to be configured by sourcing shell command file /opt/Xilinx/SDK/2018.3/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.

```
jianjiansong@jianjiansong-VirtualBox: ~
File Edit View Terminal Help
jianjiansong@jianjiansong-VirtualBox:~$ echo $PATH
/usr/local/sbin:/usr/local/bin:/usr/sbin:/usr/bin:/bin:/usr/games:/usr/local/games:/snap/bin
jianjiansong@jianjiansong-VirtualBox:~$ l -a
./ .bashrc Documents/ .java/ .oracle_jre_usage/ .sudo_as_admin_successful .vboxclient-draganddrop.pid
../.cache/ Downloads/ .local/ Pictures/ Templates/ .vboxclient-seamless.pid
.bash_history .config/ .gnupg/ .mozilla/ .profile .vboxclient-clipboard.pid Videos/
.bash_logout Desktop/ .ICEauthority Music/ Public/ .vboxclient-display.pid Xilinx/
jianjiansong@jianjiansong-VirtualBox:~$
```

This SDK needs to be configured by sourcing a shell command file /opt/Xilinx/SDK/2018.3/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.

Now edit .bashrc to source Xilinx SDK shell script with gedit.

```
jianjiansong@jianjiansong-VirtualBox:~$ gedit .bashrc  
jianjiansong@jianjiansong-VirtualBox:~$
```

A text editor will appear and add to the bottom of the file “source /opt/Xilinx/SDK/2018.3/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. Move your mouse to the menu bar and it will appear.

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.

```
# enable programmable completion features (you don't need to enable  
# this, if it's already enabled in /etc/bash.bashrc and /etc/profile  
# sources /etc/bash.bashrc).  
if ! shopt -oq posix; then  
    if [ -f /usr/share/bash-completion/bash_completion ]; then  
        . /usr/share/bash-completion/bash_completion  
    elif [ -f /etc/bash_completion ]; then  
        . /etc/bash_completion  
    fi  
fi  
source /opt/Xilinx/SDK/2018.3/settings64.sh
```

sh ▾ Tab Width: 8 ▾ Ln 118, Col 41 ▾ INS

After existing 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.

```
jianjiansong@jianjiansong-VirtualBox:~$ echo $PATH  
/opt/Xilinx/SDK/2018.3/bin:/opt/Xilinx/SDK/2018.3/gnu/microblaze/lin/bin:/opt/Xilinx/SDK/2018.3/gnu/arm/lin/bin:/opt/Xilinx/SDK/2018.3/gnu/microblaze/linux_toolchain/lin64_le/bin:/opt/Xilinx/SDK/2018.3/gnu/aarch32/lin/gcc-arm-linux-gnueabi/bin:/opt/Xilinx/SDK/2018.3/gnu/aarch32/lin/gcc-arm-none-eabi/bin:/opt/Xilinx/SDK/2018.3/gnu/aarch64/lin/aarch64-linux/bin:/opt/Xilinx/SDK/2018.3/gnu/aarch64/lin/aarch64-none/bin:/opt/Xilinx/SDK/2018.3/gnu/armr5/lin/gcc-arm-none-eabi/bin:/opt/Xilinx/SDK/2018.3/tps/lnx64/cmake-3.3.2/bin:/usr/local/sbin:/usr/local/bin:/usr/sbin:/usr/bin:/sbin:/bin:/usr/games:/usr/local/games:/snap/bin  
jianjiansong@jianjiansong-VirtualBox:~$
```

## 7 Install gcc compilers and 32-bit gcc libraries

These installations may take twenty minutes.

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 lib32ncurses5 libbz2-1.0:i386 lib32stdc++6.

Install gcc: sudo apt install gcc.

```
jianjiansong@jianjiansong-VirtualBox:~$ sudo apt-get install gcc-arm-none-eabi gcc-arm-linux-gnueabi  
[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-geocode-1.0 gir1.2-gst-plugins-base-1.0 gir1.2-gstreamer-1.0 gir1.
```

```

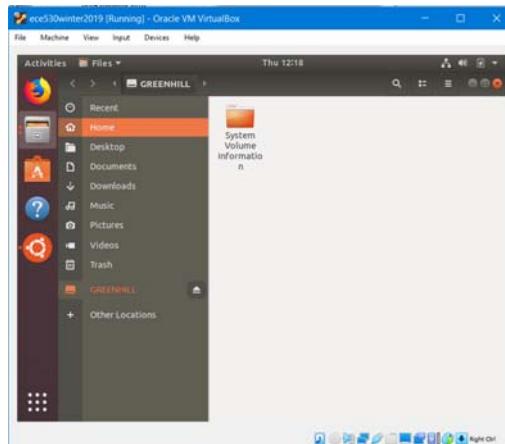
jianjiansong@jianjiansong-VirtualBox:~$ File Edit View Search Terminal Help
E: Unable to locate package lib32ncurses5
jianjiansong@jianjiansong-VirtualBox:~$ sudo apt-get install lib32z1 lib32ncurses5 libbz2-1.0:i386 lib32stdc++6
Reading package lists... Done
Building dependency tree
Reading state information... Done
lib32z1 is already the newest version (1:1.2.11.dfsg-0ubuntu2).
The following 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
  gir1.2-udisks-2.0 grilo-plugins-0.3-base gstreamer1.0-gtk3 libboost-date-time1.65.1 libboost-filesystem1.65.1
  libboost-iostreams1.65.1 libboost-locale1.65.1 libcdr-0.1-1 libclucene-contribs1v5 libclucene-core1v5 libcmis-0.5-5v5 libcolam2
  libdazzle-1.0-0 libe-book-1.2-2 libedataserverui-1.2-2 libebook0.1-1 libevent-2.1-6 libexiv2-14
  libfreerdp-client2-2 libfreerdp2-2 libgc1c2 libgee-0.8-2 libgeexiv2-2 libgom-1.0-0 libgpgmepp6 libgpod-common libgpod4
  liblangtag-common liblangtag1 liblirc-client0 liblua5.3-0 libmediaart-2.0-0 libmspub-0.1-1 libodfgen-0.1-1 libqqwing2v5 libraw16
liblangtag-common liblangtag1 liblirc-client0 liblua5.3-0 libmediaart-2.0-0 libmspub-0.1-1 libodfgen-0.1-1 libqqwing2v5 libraw16

File Edit View Search Terminal Help
jianjiansong@jianjiansong-VirtualBox:~$ sudo apt install gcc
[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 gir1.2-udisks-2.0
  grilo-plugins-0.3-base gstreamer1.0-gtk3 libboost-date-time1.65.1 libboost-filesystem1.65.1 libboost-iostreams1.65.1 libboost-locale1.65.1
  libcdr-0.1-1 libclucene-contribs1v5 libclucene-core1v5 libcmis-0.5-5v5 libcolam2 libdazzle-1.0-0 libe-book-0.1-1 libedataserverui-1.2-2 libebook0.1-1 libevent-2.1-6 libexiv2-14
  libfreerdp-client2-2 libfreerdp2-2 libgc1c2 libgee-0.8-2 libgeexiv2-2 libgom-1.0-0 libgpgmepp6 libgpod-common libgpod4 liblangtag-common liblangtag1 liblirc-client0 liblua5.3-0 libmediaart-2.0-0 libmspub-0.1-1 libodfgen-0.1-1 libqqwing2v5 libraw16 libreveng-0.0-0 libsgutils2-2 libssh-4 libsuitesparseconfig5 libunpr2-2 libxapian30 libxmlsec1 libxmlsec1-nss
liblangtag-common liblangtag1 liblirc-client0 liblua5.3-0 libmediaart-2.0-0 libmspub-0.1-1 libodfgen-0.1-1 libqqwing2v5 libraw16

```

## 8 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.

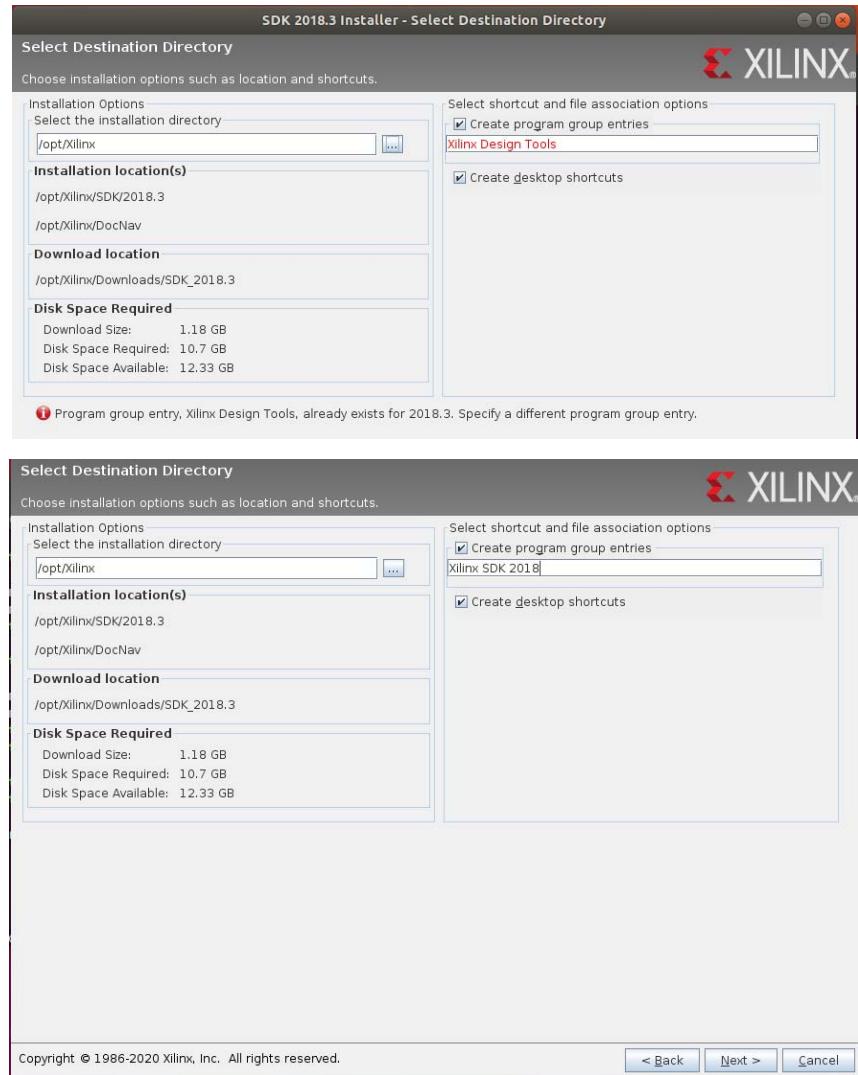


Now you should be able to do section 2 of “Embedded Linux Hands-on Tutorial for the ZYBO”.

## 9 Appendix: Possible Errors and Issues

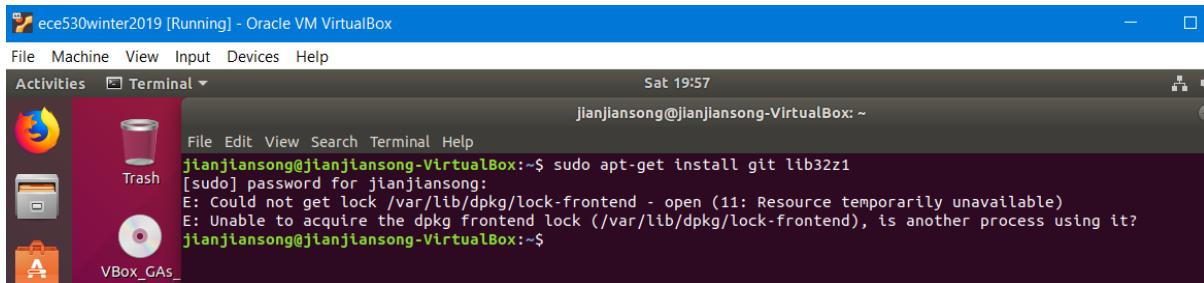
### 9.1 Program group entry already exists

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



## 9.2 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.



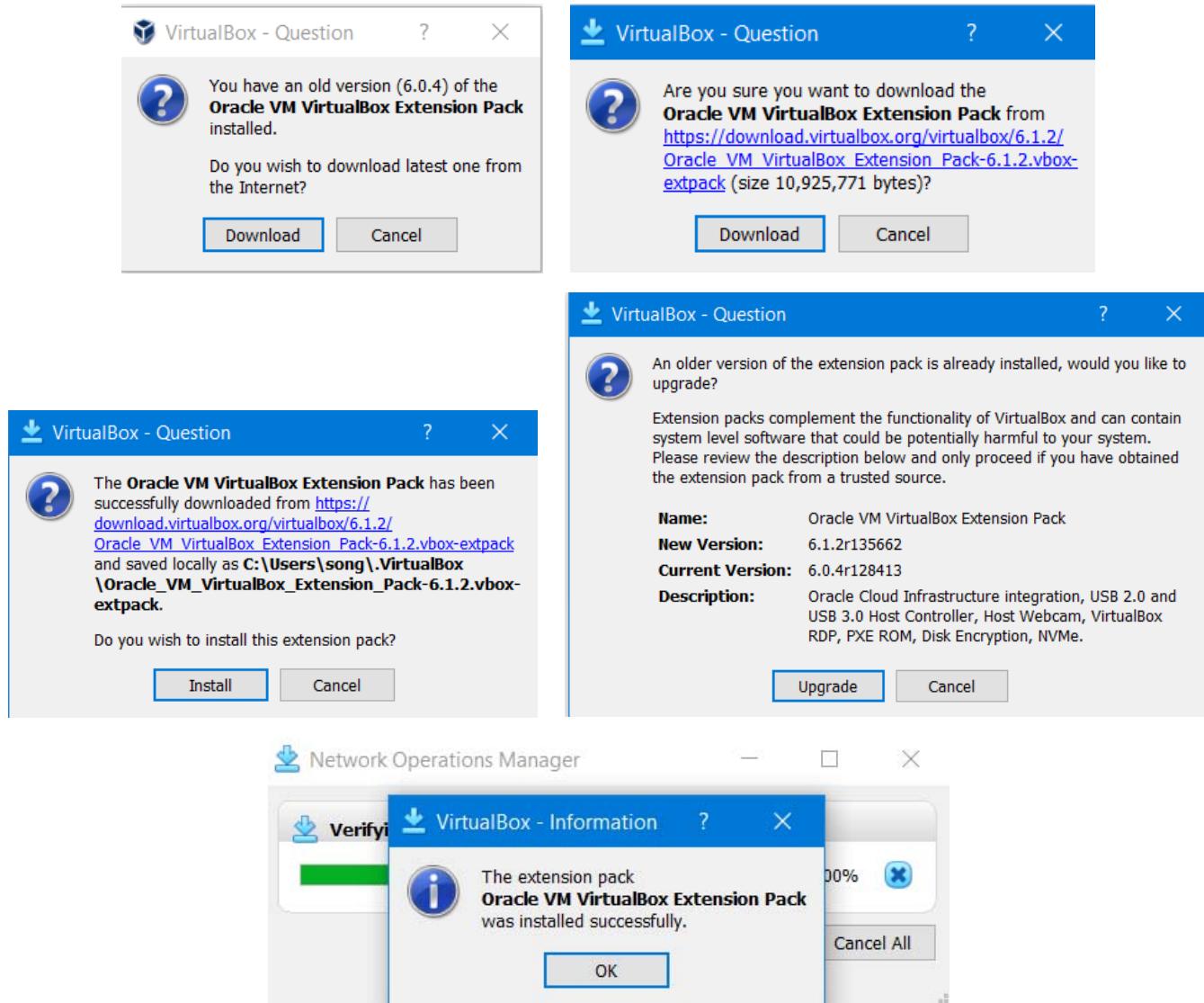
## 9.3 Set BIOS of your Laptop to Enable 64-bit Options (skip this if not needed)

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

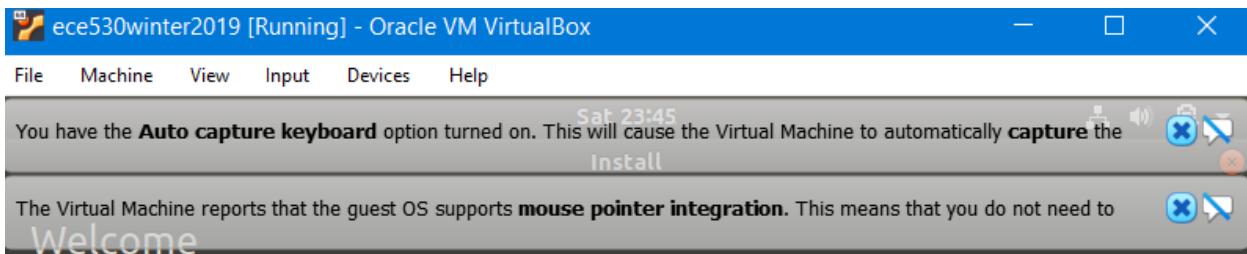
“Security->Virtualization”. Enable “Virtualization”, hit “Enter”. Under “Virtualization Technology” and “VT-d Feature”, hit “Enter”. Choose [Enable]. Press F10 to Save and Exit. Restart your computer to see 64-bit OS options. Set Memory size to be 2GB.

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

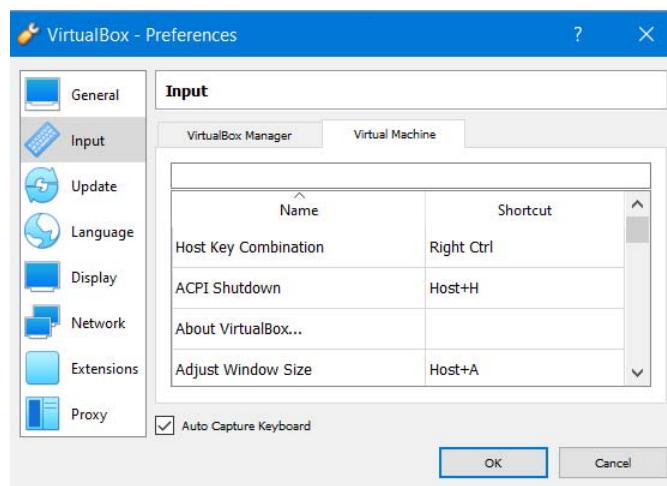
If you see the following questions, follow the instructions to upgrade Oracle VM VirtualBox Extension Pack. You will need to install this pack in order to interface with USB 2 and 3 Device. This is installed on your laptop under Windows, not on your VirtualBox.



## 9.4 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.

