Software Installation

MRE/EME 5983 Robot Operating Systems

Review of Software Used

- Our coursework will primarily be performed in Linux. We plan to use the following software packages

- Ubuntu 20.04 – Desktop installation
  - https://www.ubuntu.com/
  - Ubuntu is the modern, open source operating system on Linux for the enterprise server, desktop, cloud, and IoT.

- Oracle Virtual Machine – Version 7.0.4
  - https://www.oracle.com/virtualization/virtualbox/
  - VirtualBox is open-source software for virtualizing the x86 computing architecture. It acts as a hypervisor (VM manager), creating a VM (virtual machine) where the user can run another operating system.

System Requirements

- Running Ubuntu in VirtualBox
  - Your computer speed must be as fast as at least LTU's Fujitsu laptop with i7 8650U CPU at 1.9GHz.
  - Windows 10
  - https://www.ltu.edu/ehelp/hardware-software-specs.asp

Course Software Installation Steps – 1 of 2

1. Download virtual box and the extension pack
   - https://drive.google.com/file/d/17nh7HYbR4SQsRlhJzrGCsJoKsaTuVVhW/view?usp=share_link
   - https://drive.google.com/file/d/1GsG-nvoje0SgChGhrdZStS0joYHHbKRE/view?usp=share_link

2. Download Class Image ova (Open Virtual Appliance) file
   - https://drive.google.com/file/d/12g4t7cLnTkG60yydfqxq1LHkg9zVIhkk/view?usp=share_link

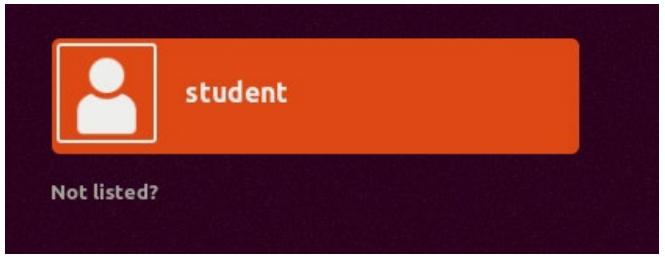
3. Run the setup Wizard using all the default options. Launch the Oracle VM VirtualBox Manager

4. Select File > Import Appliance, and select the downloaded ova file

5. Click on “Next” button (you may need to resize the window)

Course Software Installation Steps – 2 of 2

6. Click on “Import” button (this will take a few minutes)
7. Select the imported machine and click on the green Start Arrow 

8. Click on student user icon or press enter 

9. Password for the “student” login is: ROS_spring23
10. Open a terminal window and run a few Unix commands
11. Create a folder C:\VM_Share on your computer for file sharing

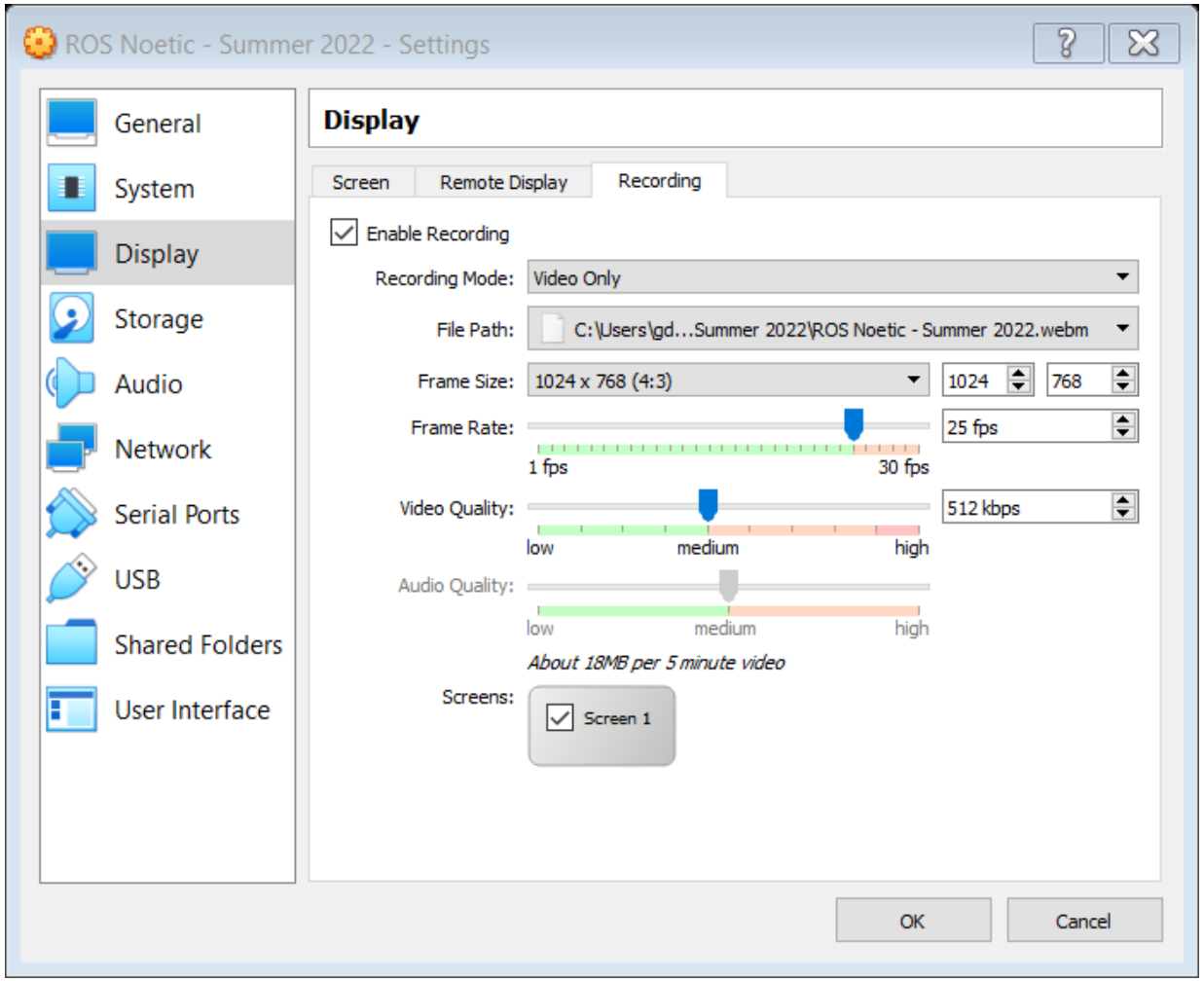
Linux Shell Scripts

- Our Ubuntu installation uses Bash shell in the terminal window
- When launched, the terminal will execute the .bashrc file in your home directory
- There is one ROS command that we need to ensure executes properly
  - **`source /opt/ros/noetic/setup.bash`**
- Check with **`export`**

```
student@student-VirtualBox:~$ export | grep ROS
declare -x ROSLISP_PACKAGE_DIRECTORIES=""
declare -x ROS_DISTRO="noetic"
declare -x ROS_ETC_DIR="/opt/ros/noetic/etc/ros"
declare -x ROS_MASTER_URI="http://localhost:11311"
declare -x ROS_PACKAGE_PATH="/opt/ros/noetic/share"
declare -x ROS_PYTHON_VERSION="3"
declare -x ROS_ROOT="/opt/ros/noetic/share/ros"
declare -x ROS_VERSION="1"
```

Video Recordings

- Most assignments will require a video submission of the ROS programs executing
- You can use VirtualBox or a host machine application to create videos
- In VirtualBox, use the VM settings -> Display to set up video recording



Setting Up A Webcam

- Our class may be leveraging a webcam for a few of our assignments
- To connect a webcam to Ubuntu / VirtualBox
  1. Start the VirtualBox
  2. Select the Virtual Machine
  3. Select Settings -> USB
  4. Add a filtered device
  5. Select your webcam
  6. Hit OK
  7. Start you Virtual Machine
  8. Check from your device under USB Devices
  9. In a terminal execute **cheese** to test!

We will not use webcams this semester

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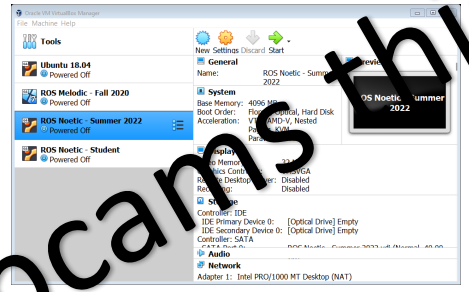

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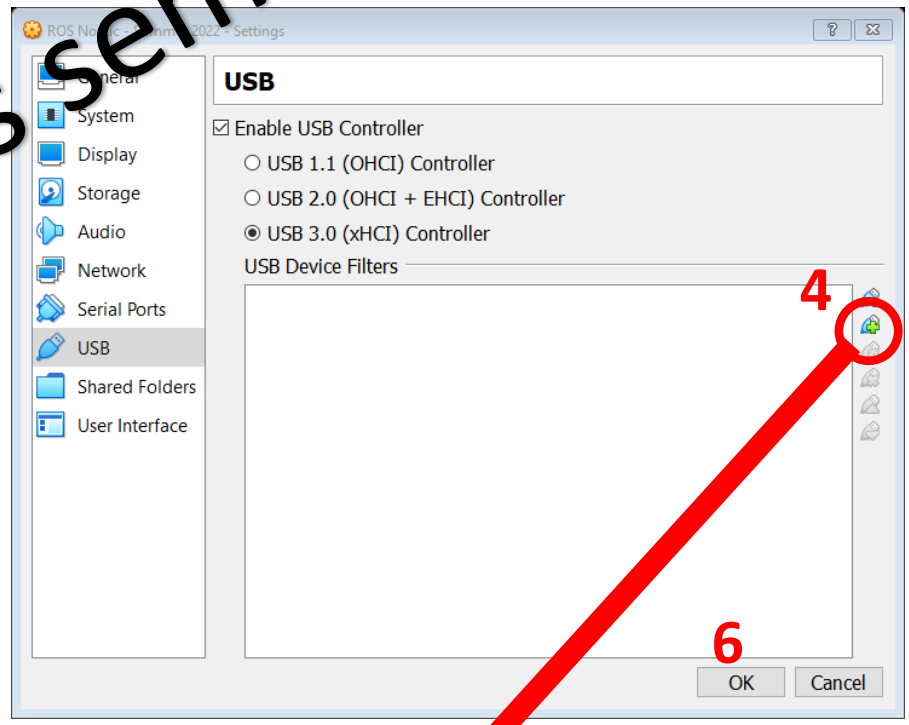

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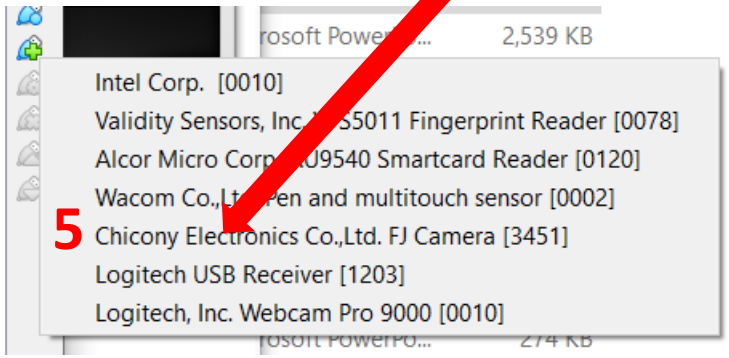

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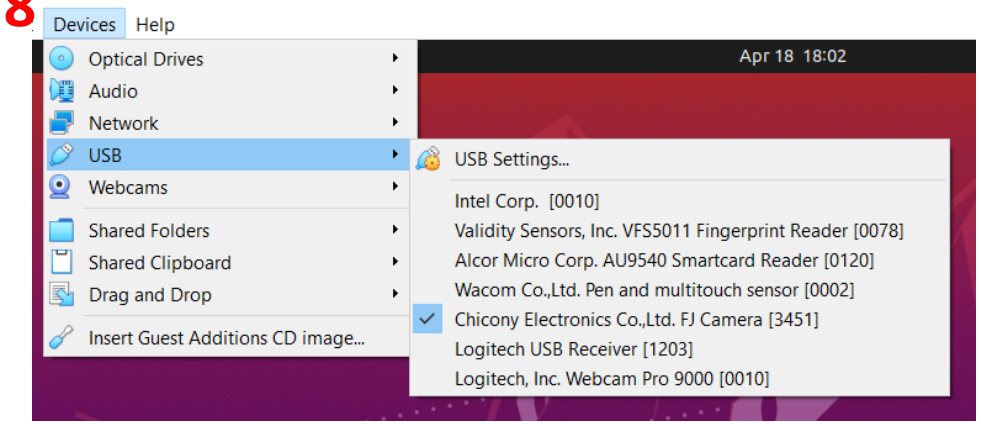
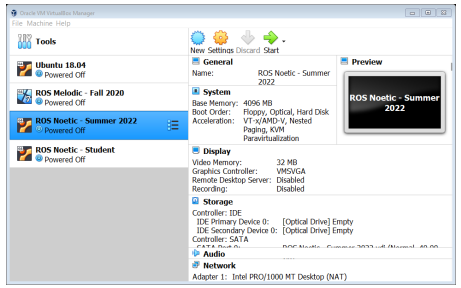
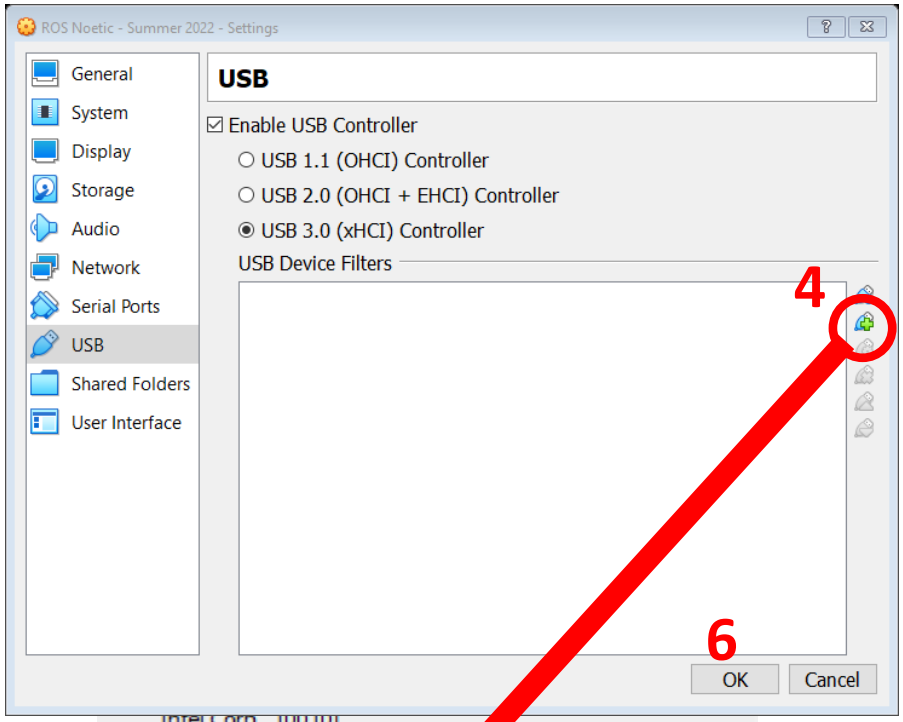
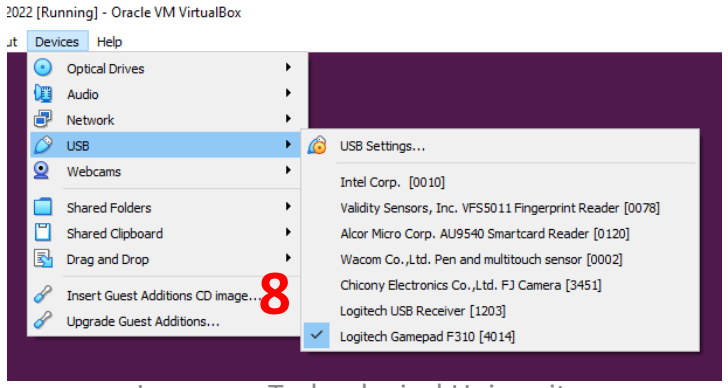


Setting Up A Joystick/Gamepad

- Our class may be leveraging a joystick/gamepad for a few of our assignments
- To connect a webcam to Ubuntu / VirtualBox
  1. Start the VirtualBox
  2. Select the Virtual Machine
  3. Select Settings -> USB
  4. Add a filtered device
  5. Select your joystick/gamepad
  6. Hit OK
  7. Start you Virtual Machine
  8. Check from your device under USB Devices
  9. In a terminal execute **jstest-gtk** to test!







The remaining slides address the installation of Ubuntu directly in VirtualBox (not using the supplied .ova file)

Installing Ubuntu and ROS Directly

- These steps overview the process of creating a virtual machine, installing Ubuntu and ROS

- Follow this process if you were not able to use the VirtualBox .ova file

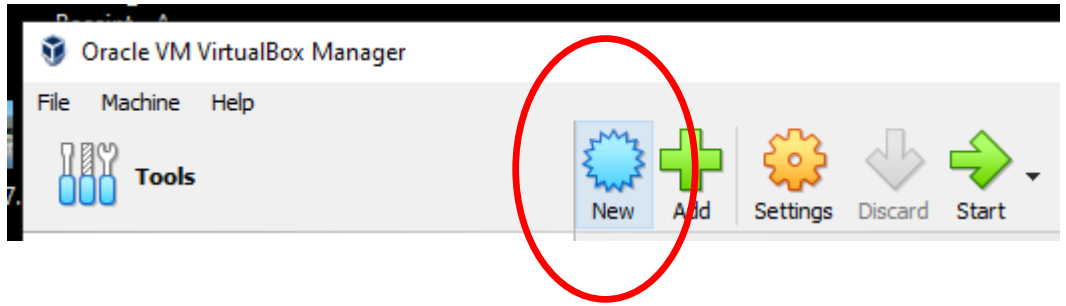
Step 1: Download an Ubuntu ISO image

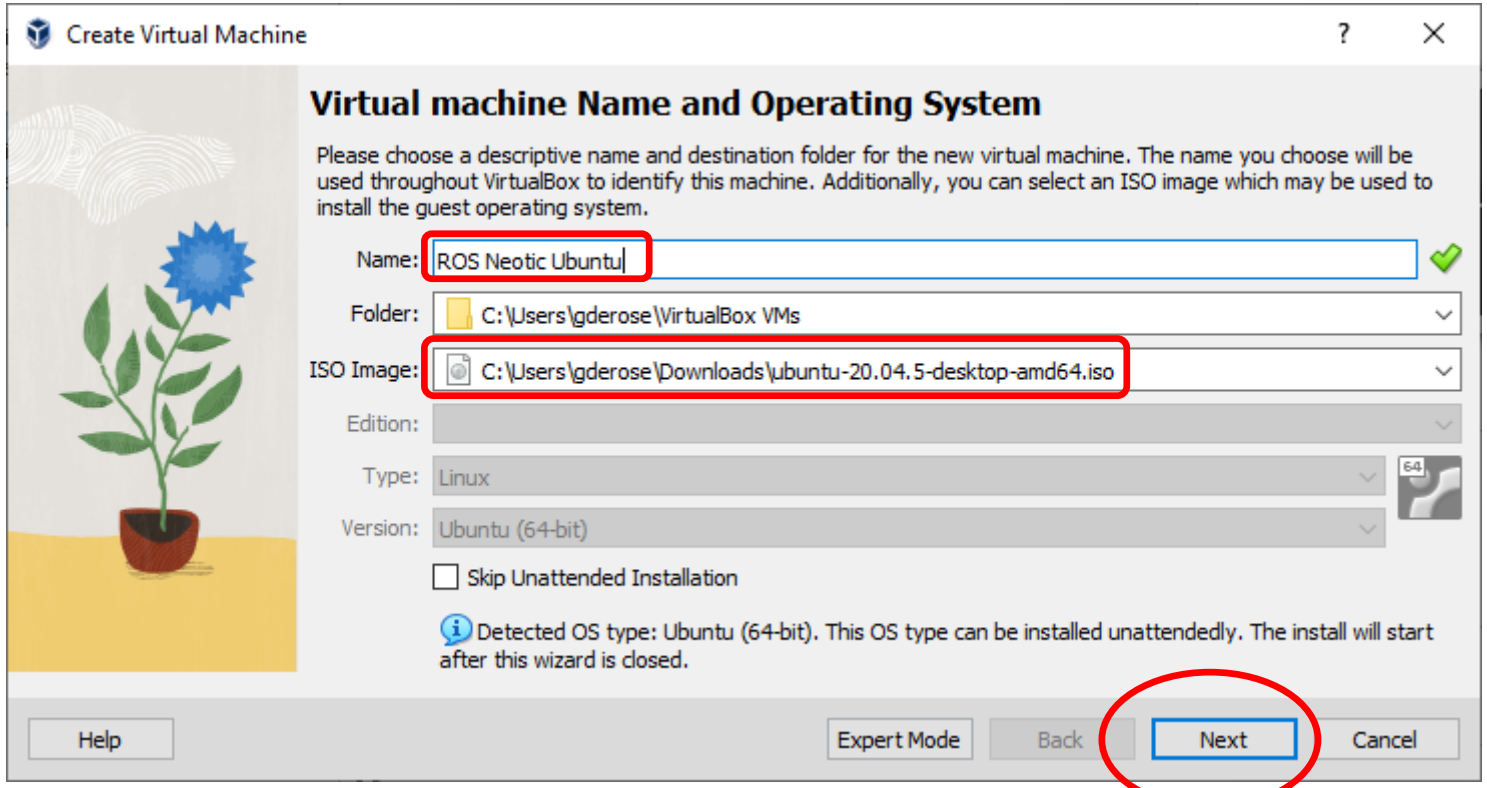
- Find the appropriate **Desktop Image** of Ubuntu 20.04.05 for your computer architecture
  - https://releases.ubuntu.com/20.04.5/

- It is most likely this releaseubuntu-20.04.5-desktop-amd64.iso
  - https://releases.ubuntu.com/20.04.5/ubuntu-20.04.5-desktop-amd64.iso

  - Please note that modern AMD and Intel CPUs support the amd64 architecture

Step 2: Create Ubuntu Virtual Machine in VirtualBox





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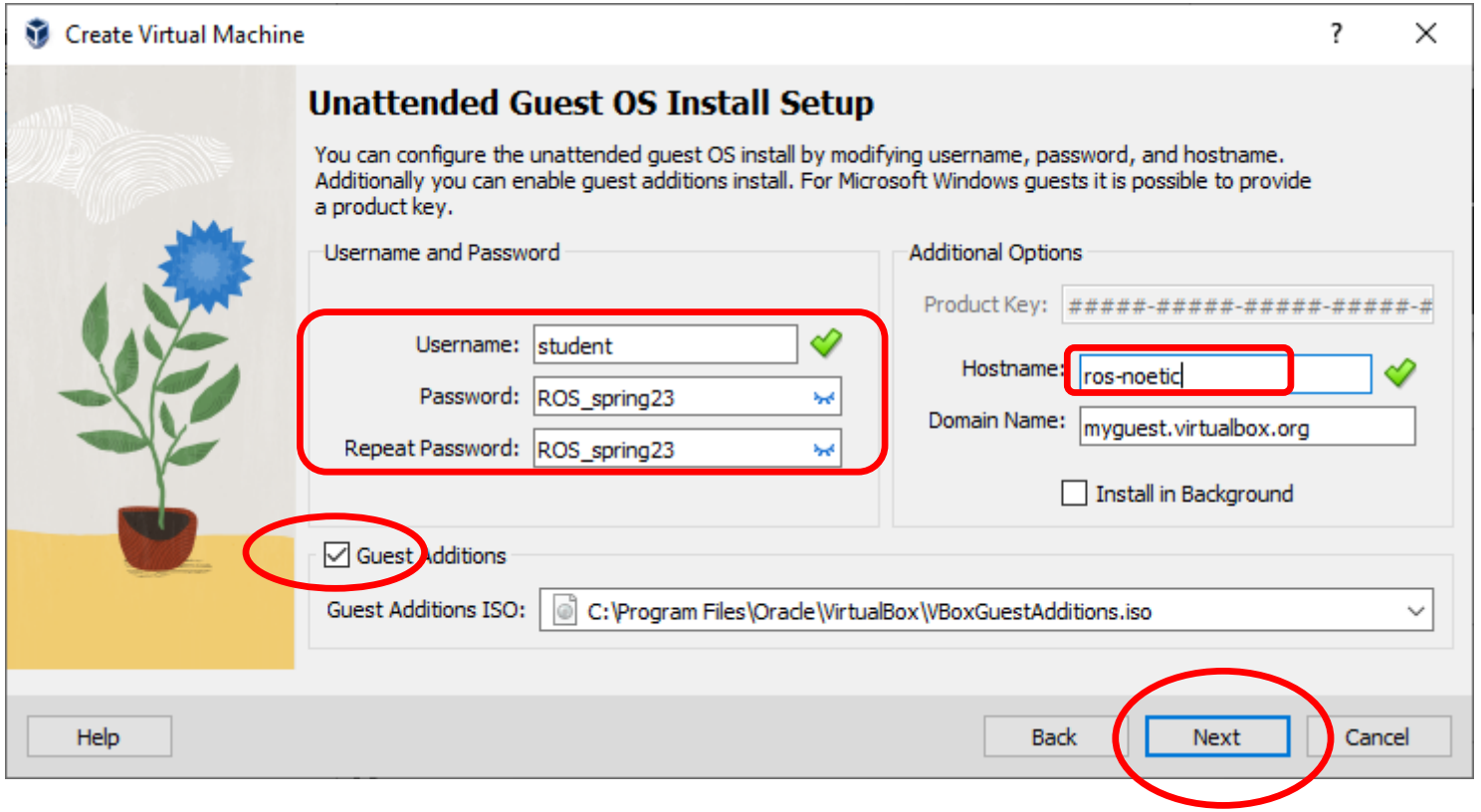

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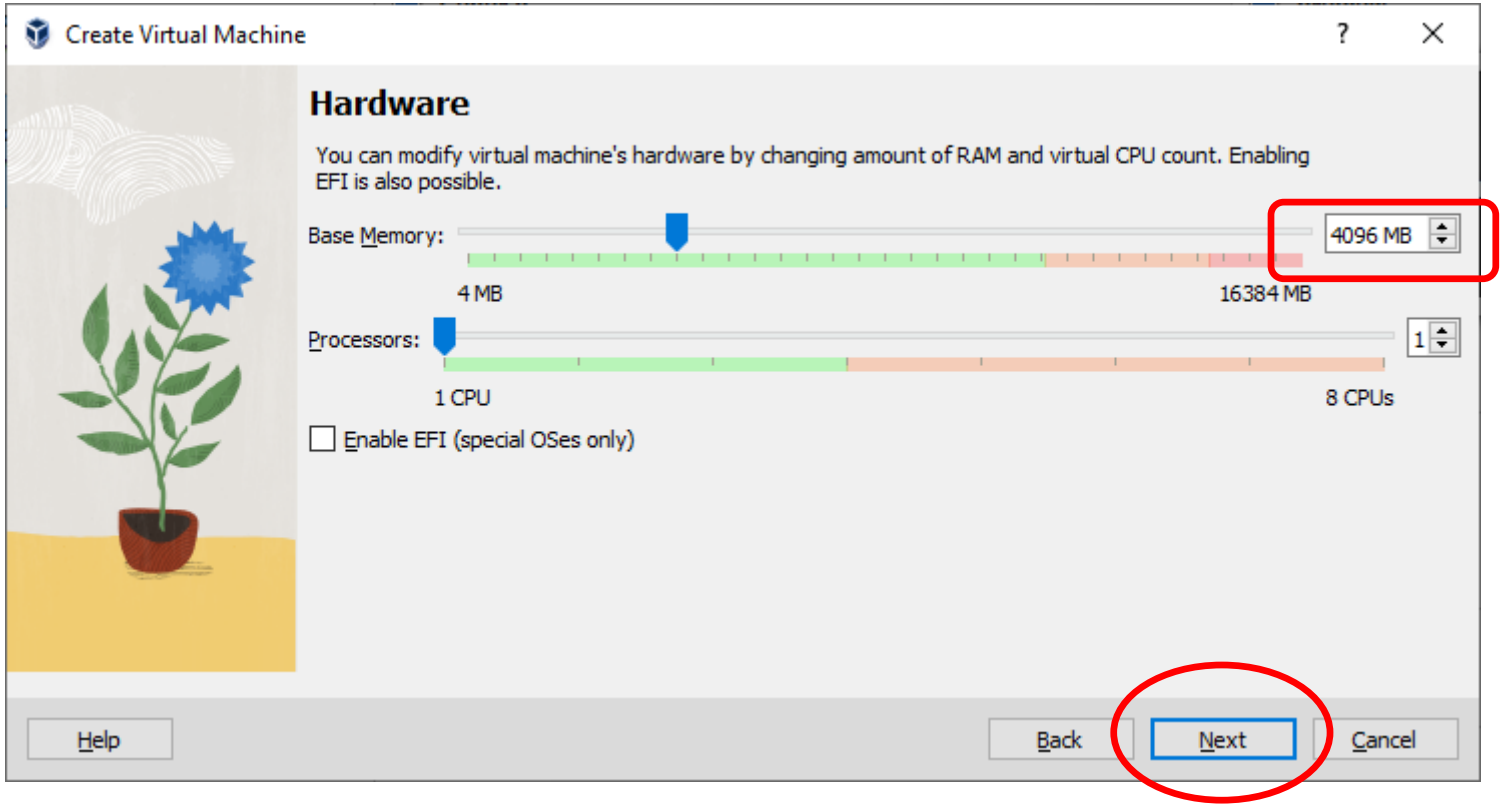
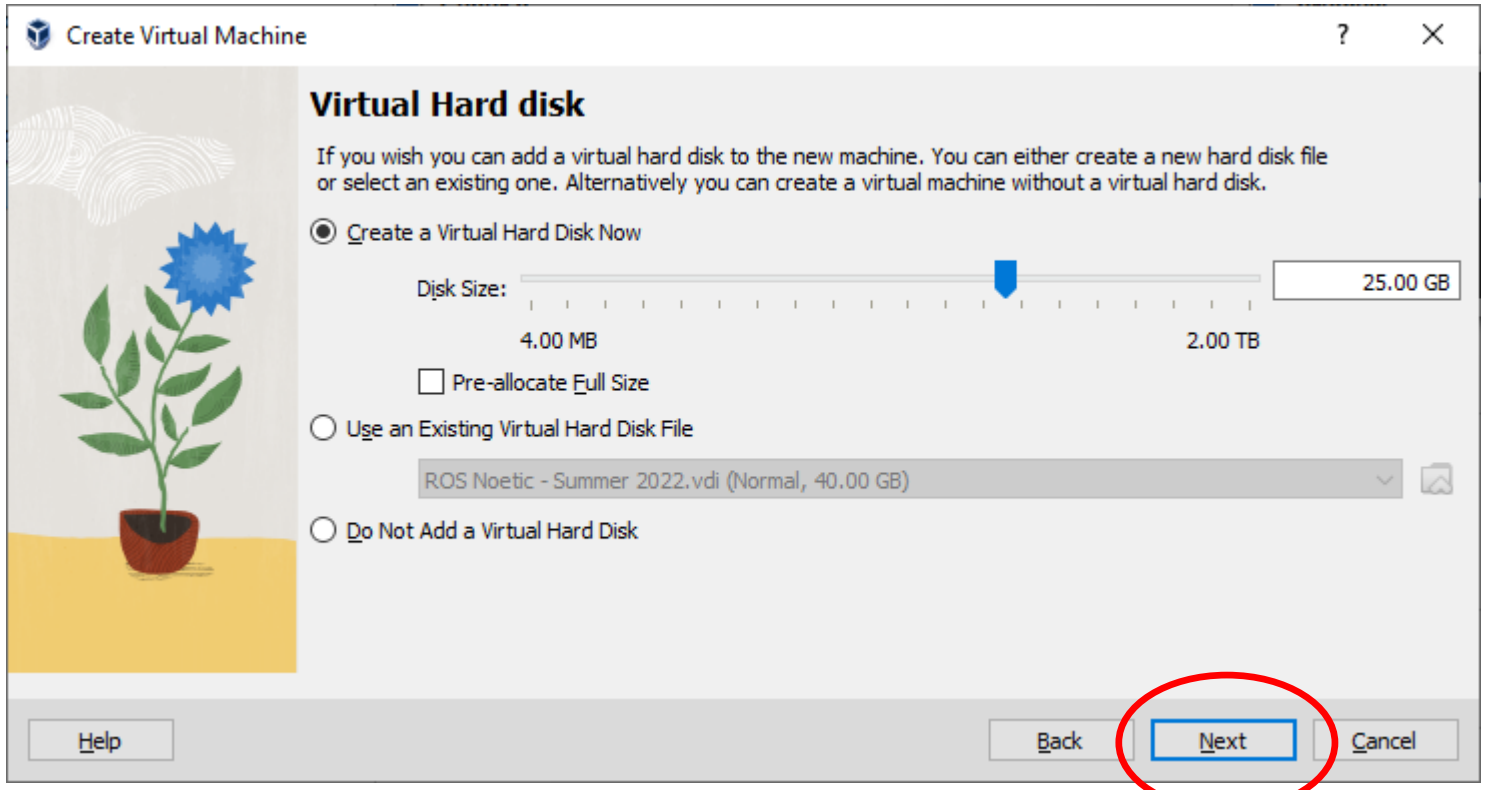
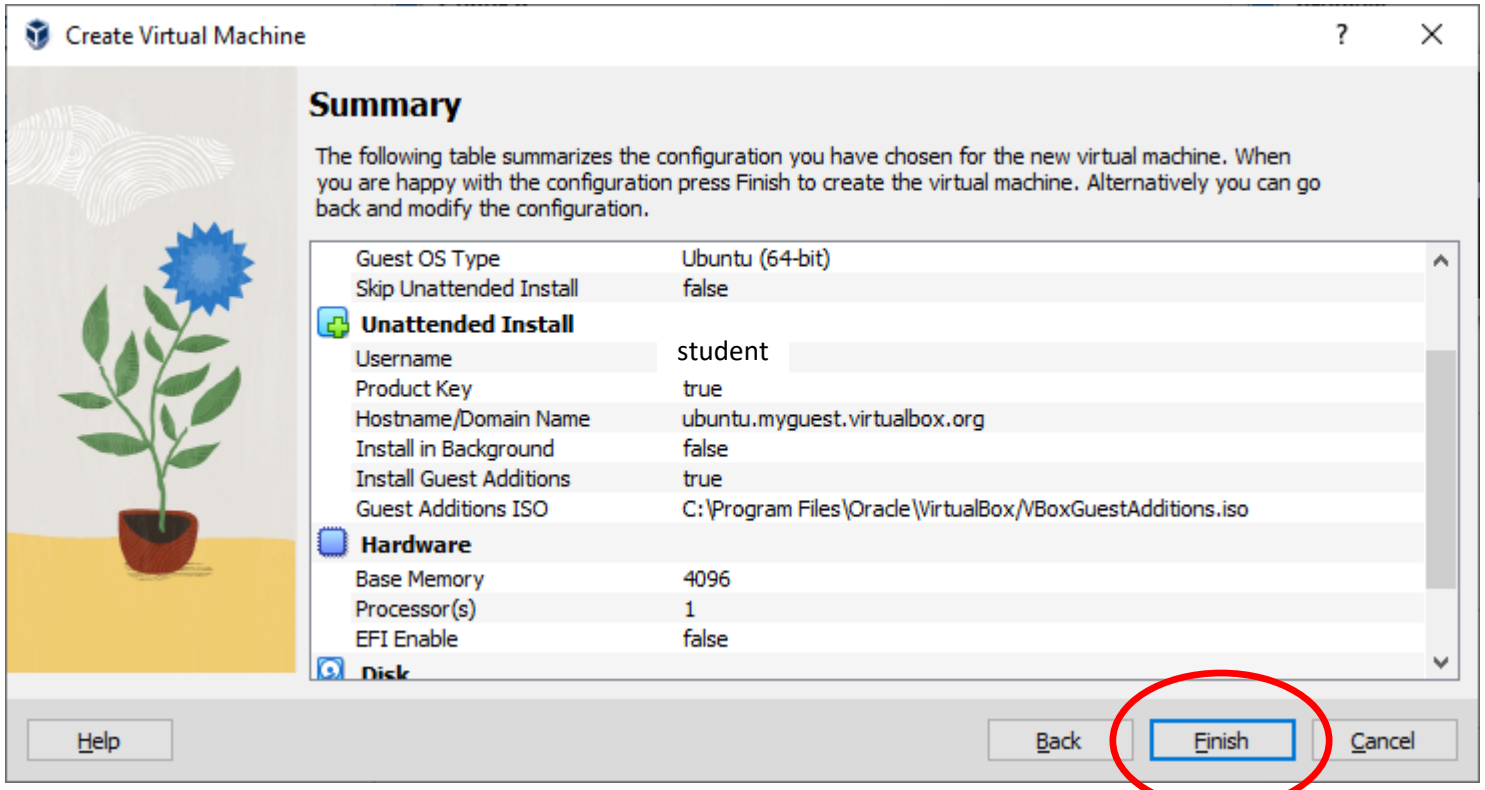


Step 2: Create Ubuntu Virtual Machine in VirtualBox

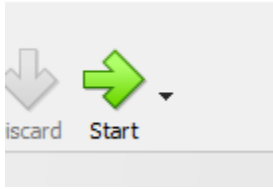


Step 2: Create Ubuntu Virtual Machine in VirtualBox

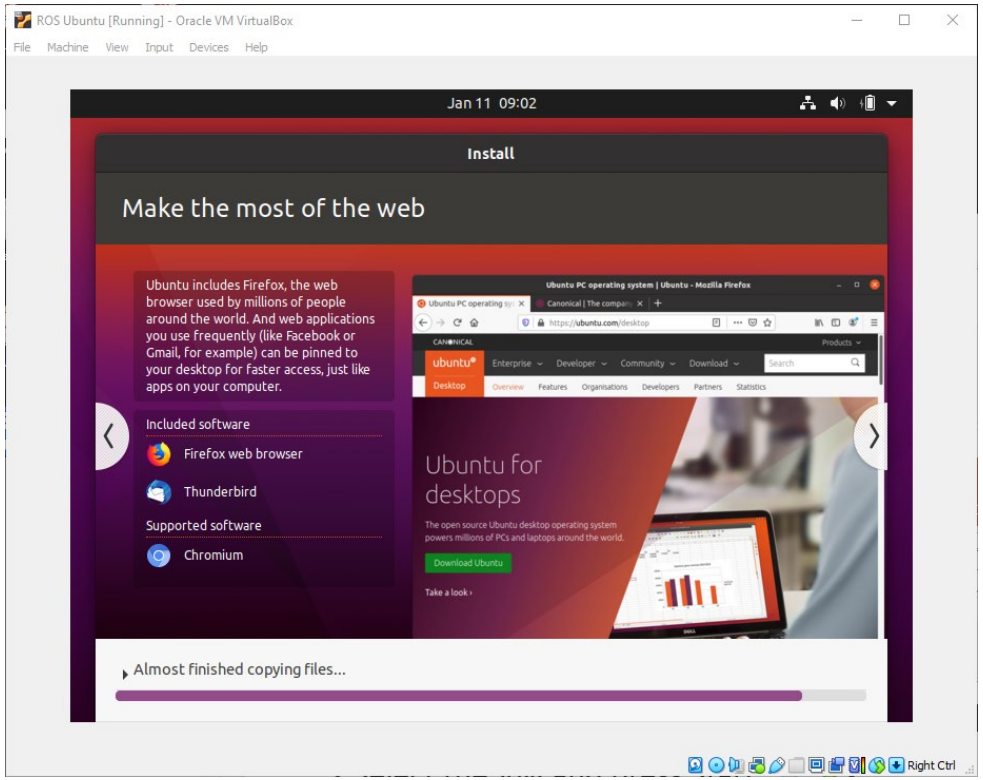


Step 3: Launch Virtual Machine and Set Up Ubuntu

- If the VM did not start automatically, select the VM and press Start

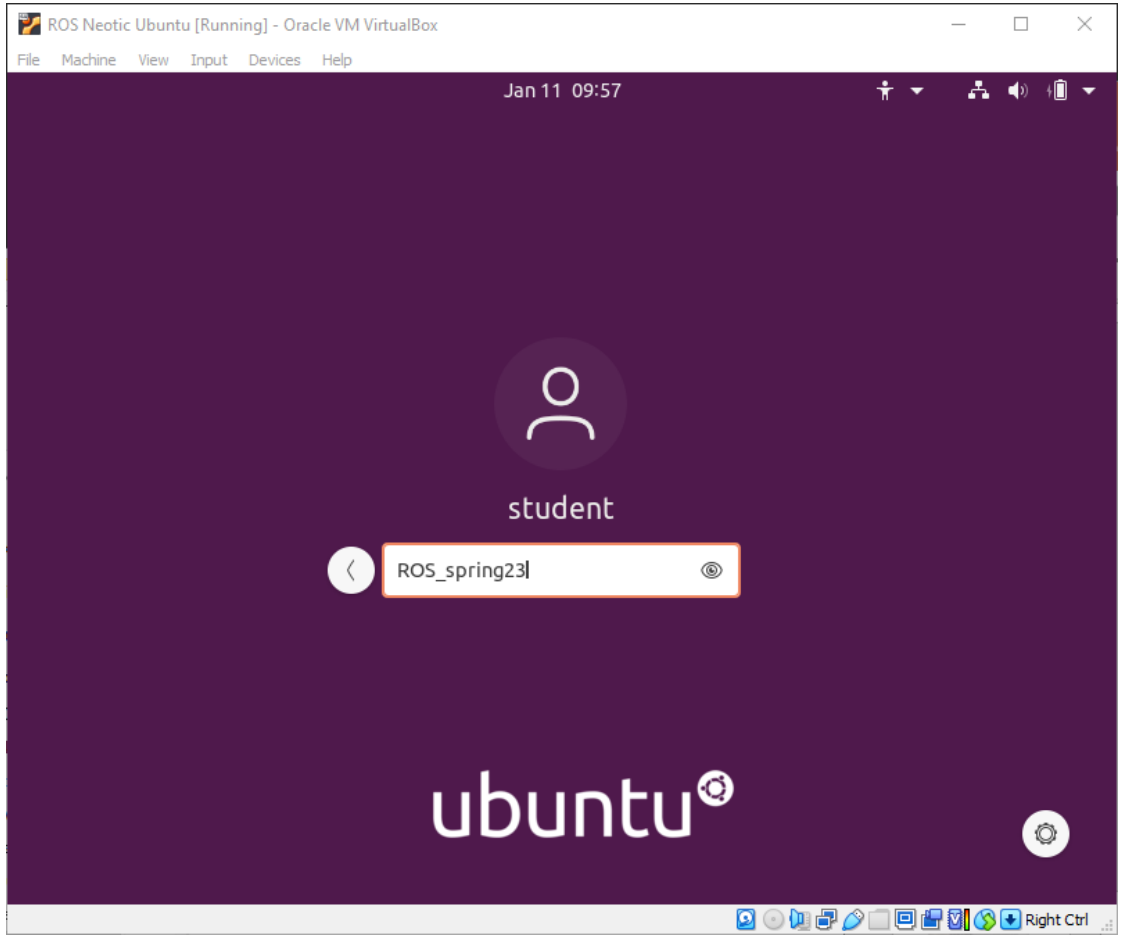


- It will take a few minutes for Ubuntu to install…



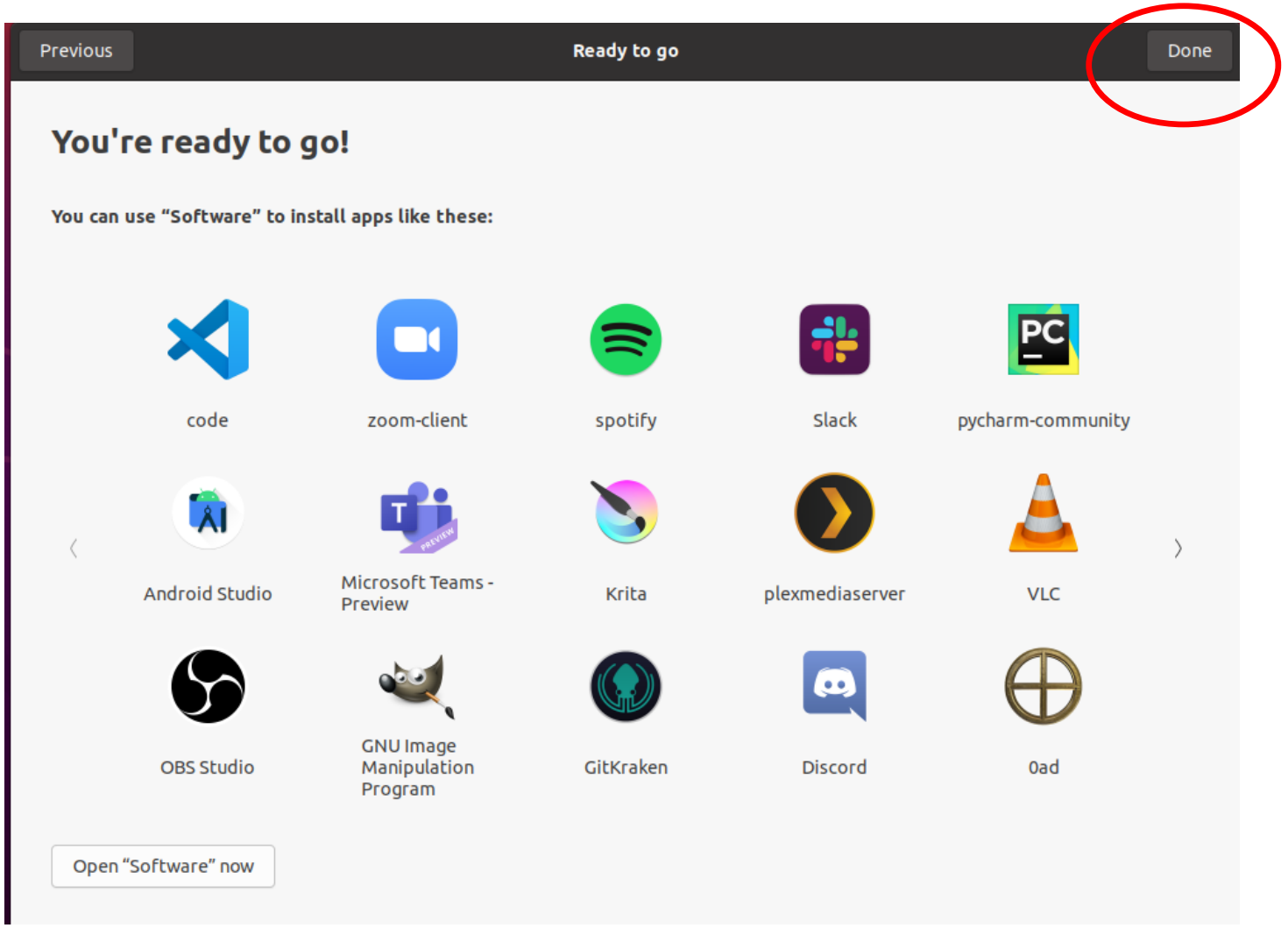
Step 3: Launch Virtual Machine and Set Up Ubuntu

- Once installed, the virtual machine will boot Ubuntu
- After boot, log in with the student account



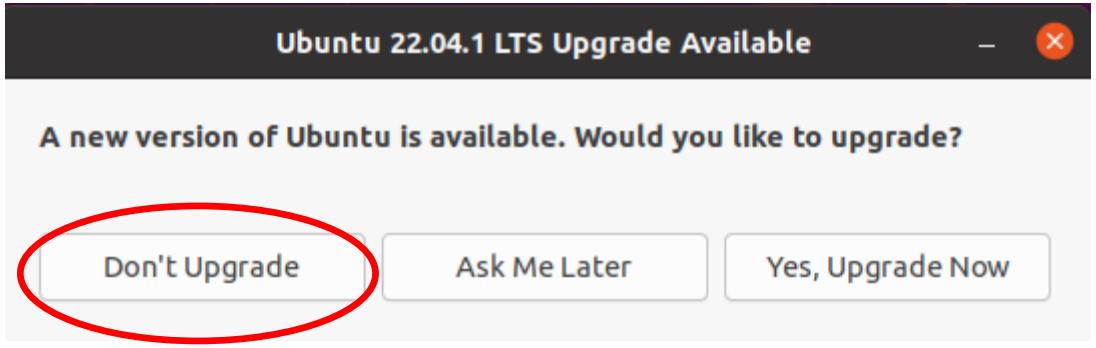
Step 3: Launch Virtual Machine and Set Up Ubuntu

- Set through the set up options (defaults are typically fine)



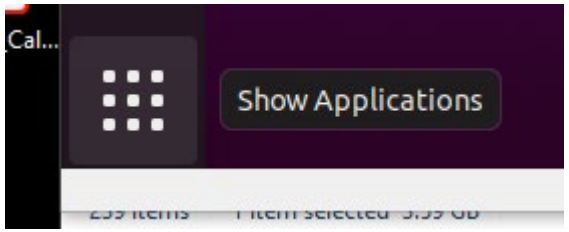
Step 3: Launch Virtual Machine and Set Up Ubuntu

- You will be offered an option to **UPGRADE** Ubuntu – please decline this
  - **UPDATES** are fine
  - **UPGRADES** will change the operating system version

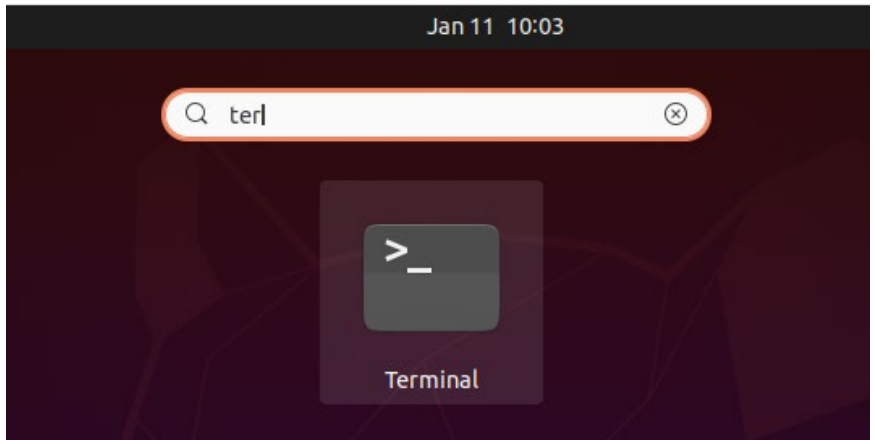


Step 3: Launch Virtual Machine and Set Up Ubuntu

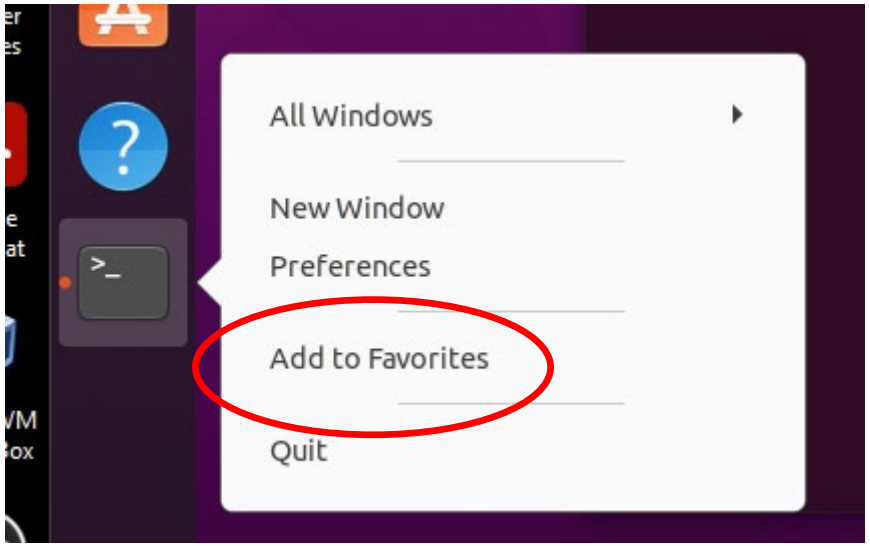
- Now we need to add the terminal to the favorites bar…
  - Select show applications



  - Search and select terminal



Add to favorites



Step 3: Launch Virtual Machine and Set Up Ubuntu

- Lastly, we can update the VirtualBox parameters for your computer (number of CPUs, memory, file sharing, etc)