

ROS - Virtualizing Ubuntu Linux with Virtual Box

ME 4140 - Introduction to Robotics - Fall 2020

What is a [Virtual Machine](#) ? :

- A virtual machine is an operating system that is installed or *virtualized* inside another operating system.
- This is useful for learning and testing, but it is resource intensive and is not ideal for permanent use.
- [VirtualBox](#) is a trusted application commonly used for this process



Overview of Setup Process :

You will first download and install VirtualBox from Oracle which is an application for *virtualizing* operating systems on top of an existing one. Next you will download the Ubuntu installation .iso file and setup a virtual operating system for learning ROS. After completing this exercise, you will be ready to install the ROS Melodic software package in Ubuntu which is described in detailed in the next module.

System Requirements :

- **CPU:** Most modern notebook or desktop computers will work well. If you are using a very old computer it may be very slow. A tablet or Chromebook is not supported.
- **Memory:** At least 8Gb of RAM is recommended.
- **Storage:** Approximately 20Gb of free space on a hard drive is required. This space will remain in its current partition, and you are free to delete the files later. USB 2.0 or slower connection to the hard drive is not recommended.

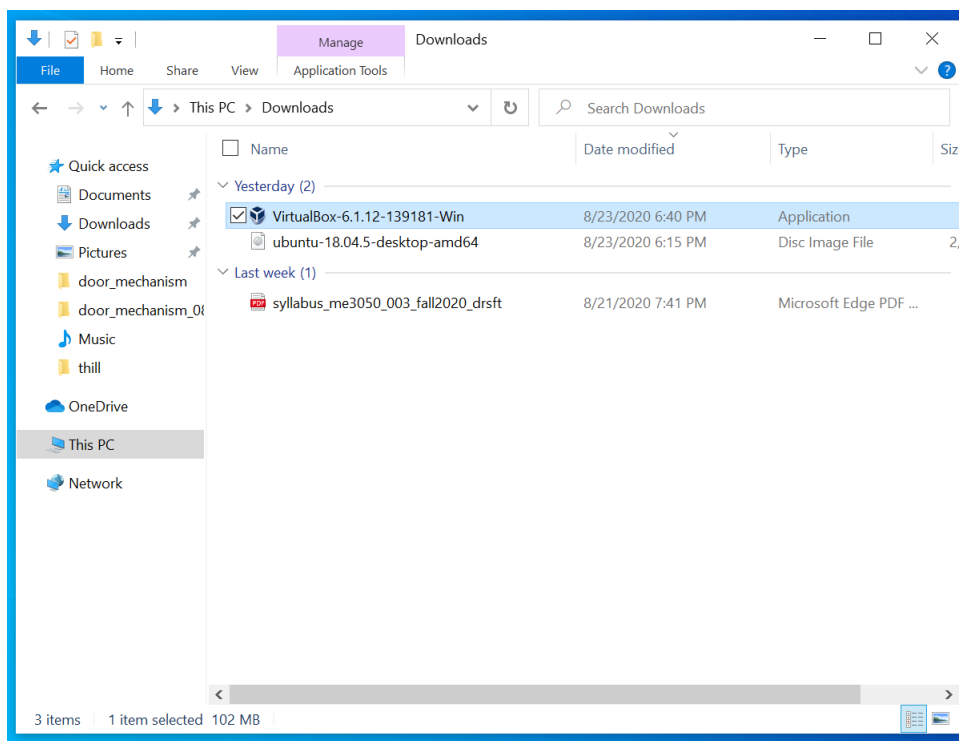
Disclaimer :

- **It is a good idea to back up any important files before you begin a project. Hard disk drives fail. Solid state drives can also fail.**
- Some students may have to adjust a computer BIOS setting to allow virtualization. This setting can be easily reverted.
- It is recommended to have your computer's power supply available before you begin this installation process.

Detailed Setup Process :

Part 1 - Install VirtualBox Application :

- a) Download the VirtualBox installation file using the link on ilearn. Choose the link that matches your computer type. If you are using a Linux computer already, skip step 1 and proceed to step 2.
- b) Click the VirtualBox installation file you downloaded and install the application. You will need to provide administrator access and click allow. You no longer need the installation file, but it is small so it wont hurt to keep it.



Part 2 - Virtual Machine Configuration :

- a) Open the VirtualBox application you installed in step 2.



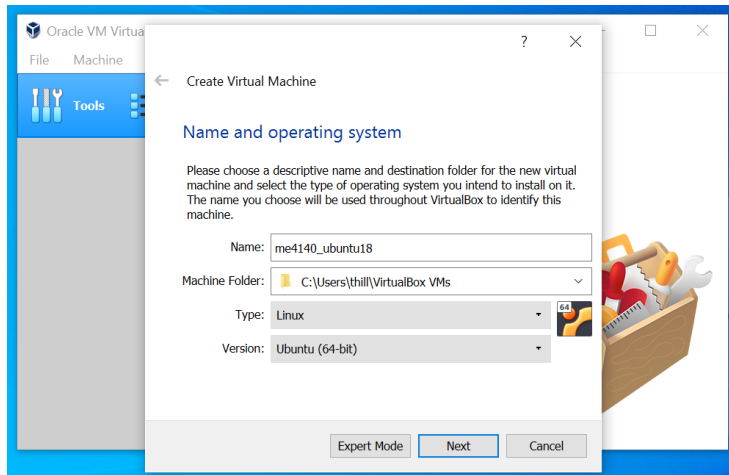
before proceeding make sure you have an **internet connection** access to a **power supply or battery**

- b) Create New Virtual Machine:



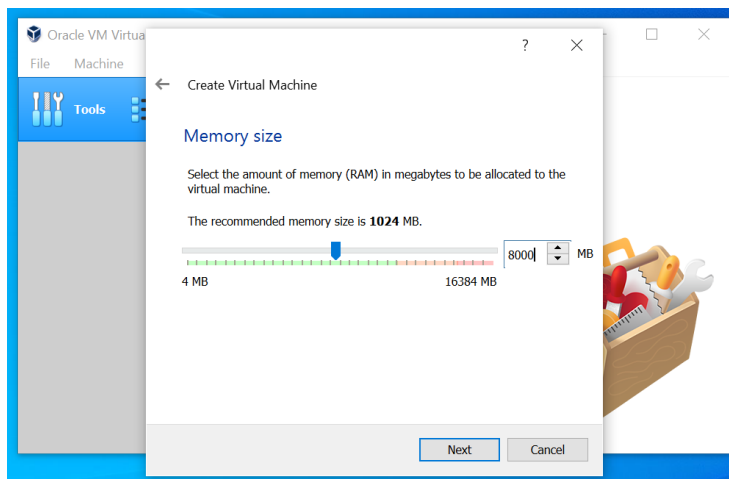
- press the **new** button

c) Define Basic Settings:



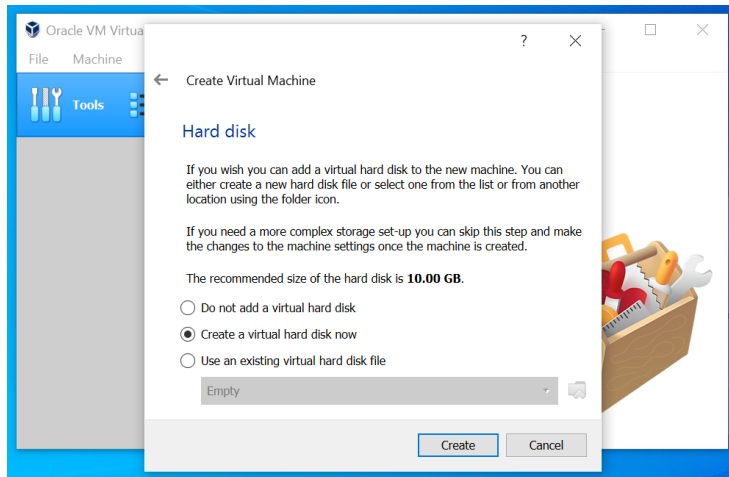
- choose a **computer name** (this is your choice but remember it!)
- choose an **operating system** type (Linux)
- choose a **version**, this depends on your physical machine - probably Ubuntu 64-bit
- click **next**

d) Define Virtual Machine Parameters:



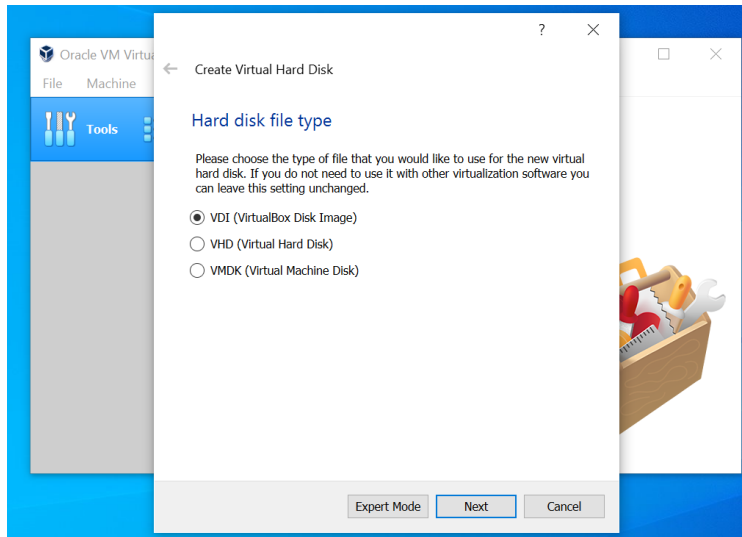
- Choose the amount of RAM you want to allocate to the VM
- More is better but you must leave some RAM for the host operating system (Windows or Mac). If your computer has 8GB total I suggest no more than 6GB for the virtual machine.
- click **next**

e) Define Virtual Hard Drive Parameters:



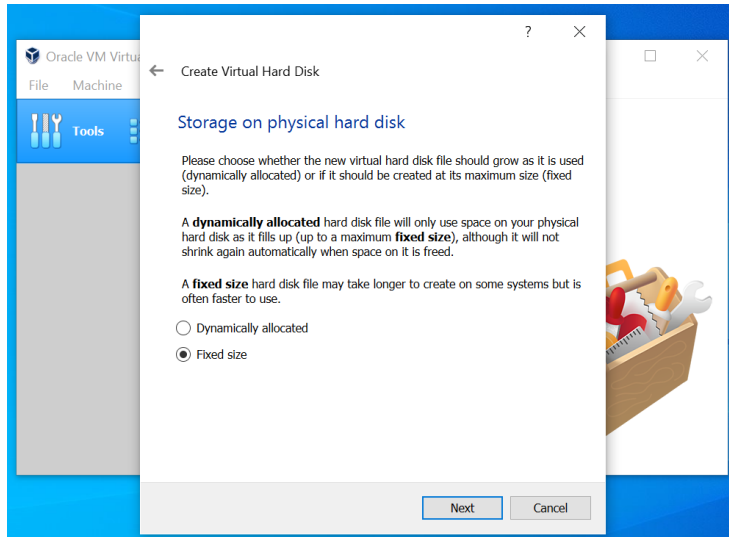
- choose **create a virtual hard drive now**
- click **create**

f) Virtual Hard Drive Setup:



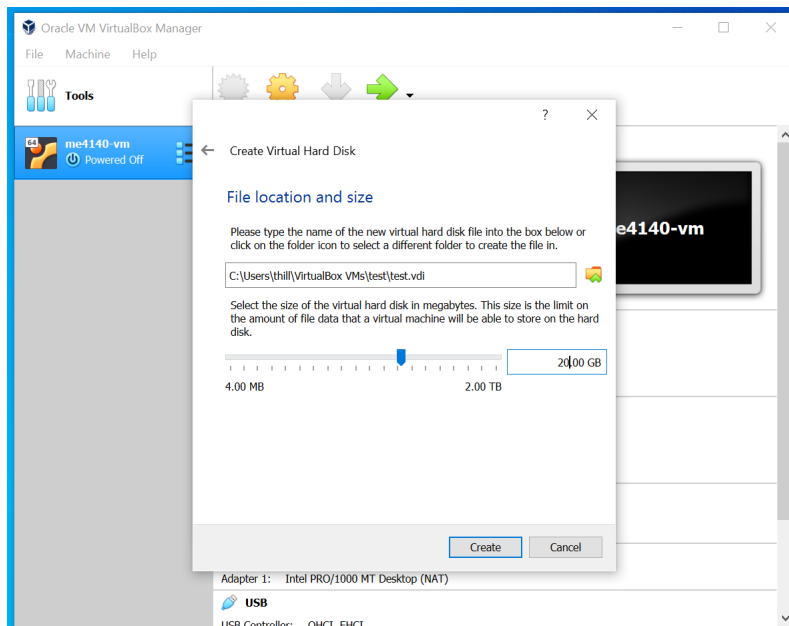
- choose the virtual hard drive type, VDI is recommended.
- click **next**

g) Virtual Hard Drive Setup:



- choose **Fixed size** virtual hard drive.
- click **next**

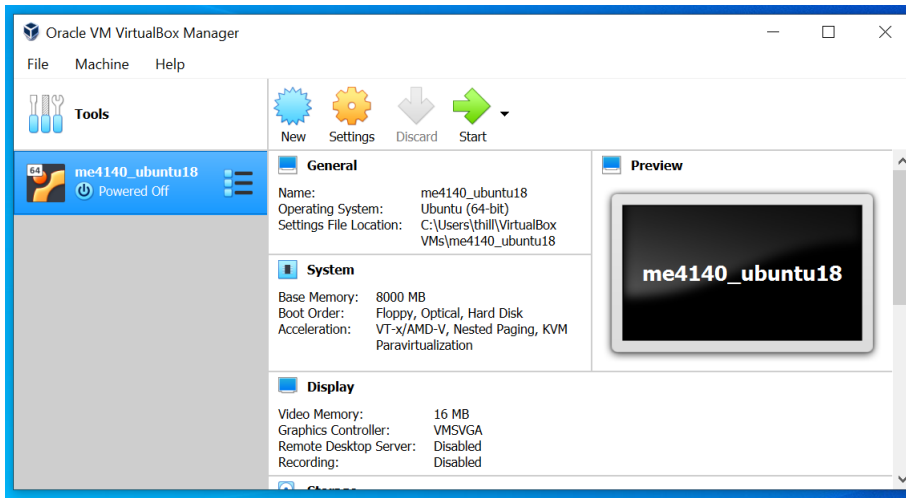
h) Virtual Hard Drive Setup :



- choose the size of your virtual hard drive
- to virtualize Ubuntu and install ROS it is recommended to make a 20 GB VDI if you have space
- click **create**

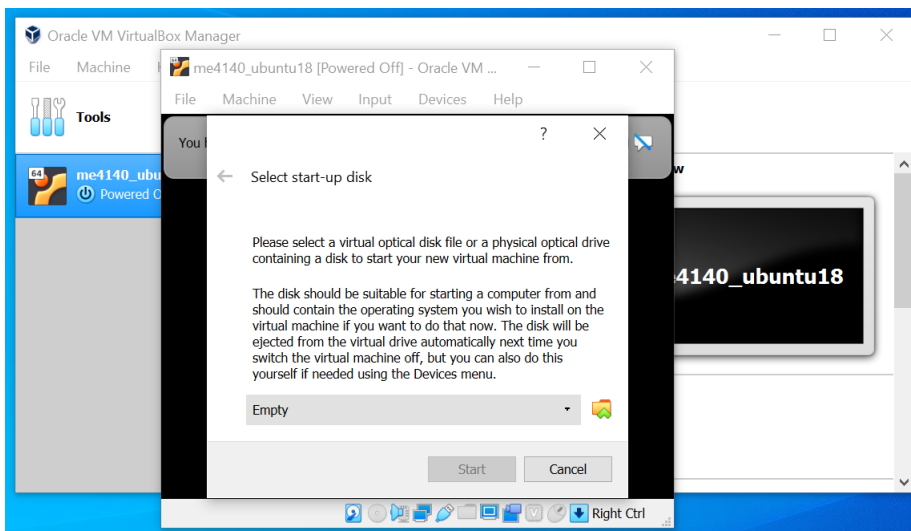
Part 3 - Ubuntu OS Installation and Setup :

1. Start the VM for the first time:



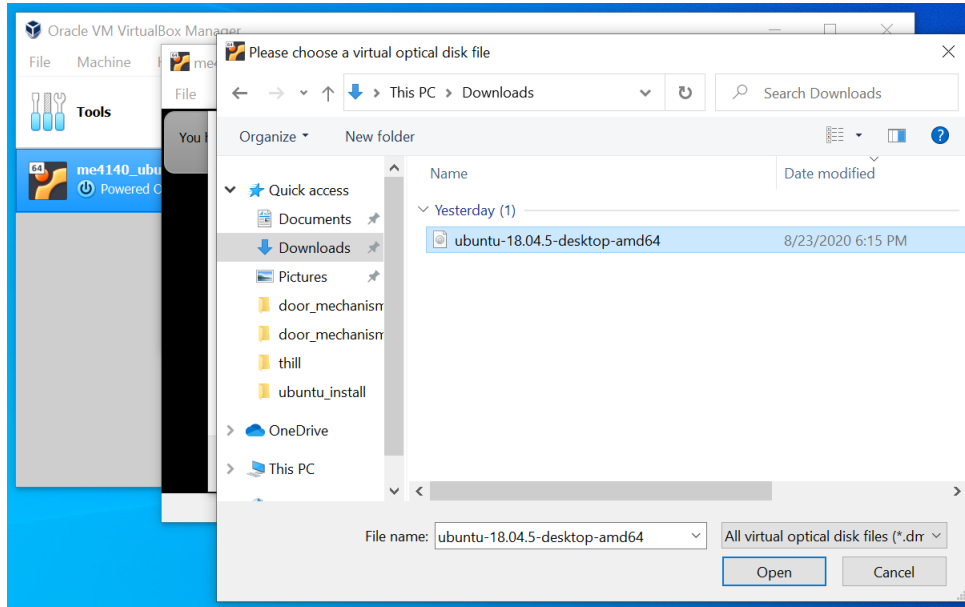
- select your newly created VM
- press the green **start** button and wait...

2. Find the folder icon:



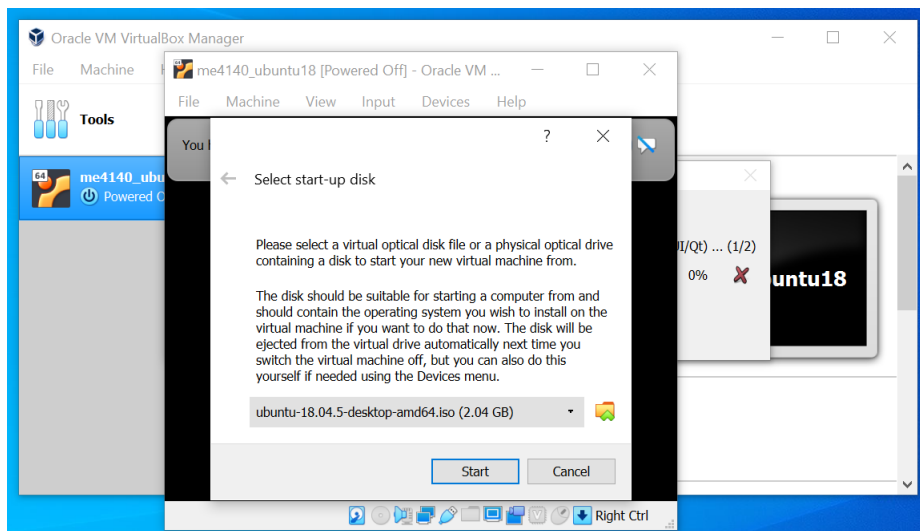
- choose to select media from a local folder

3. Choose the installation media:



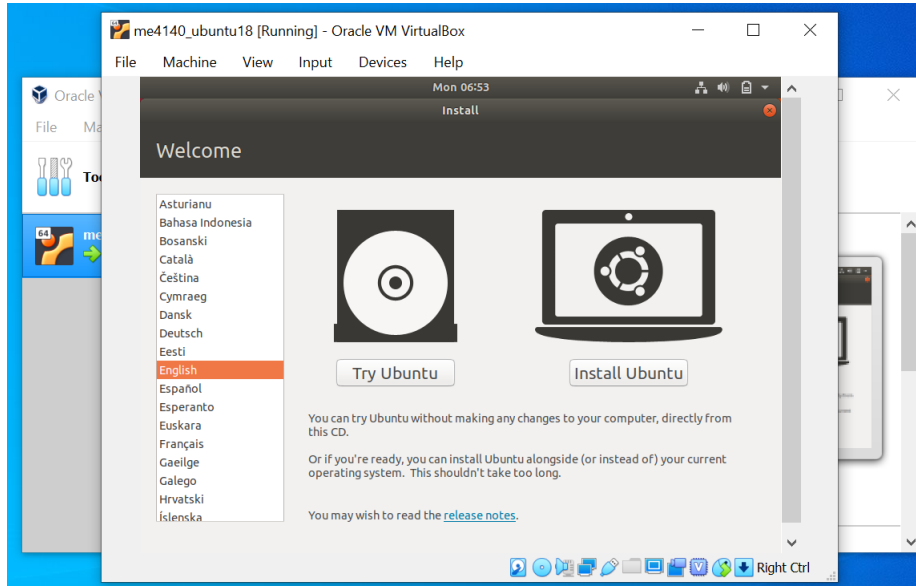
- choose the Ubuntu .iso file that you downloaded.
- it is recommended that the media is on the local machine
- click **open**

4. Boot Ubuntu Installation Image:



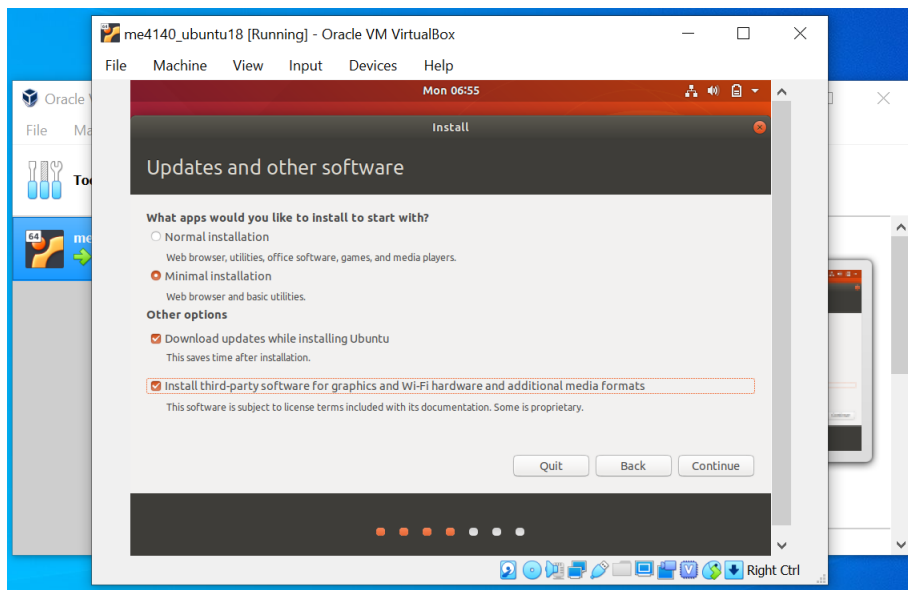
- click **start**

5. Ubuntu Installation:



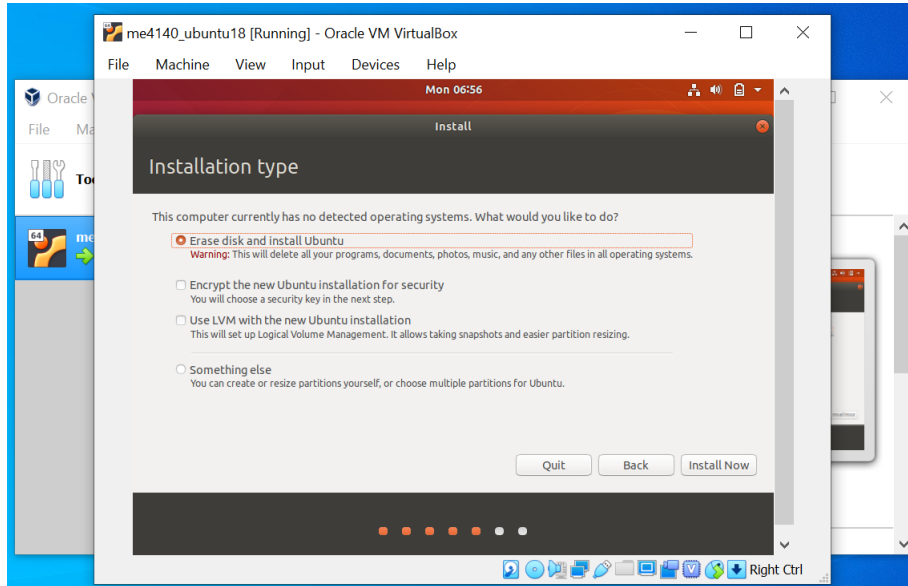
- click **Install Ubuntu** (harmless if using VirtualBox)
- try is for temporary or single session

6. Ubuntu Installation:



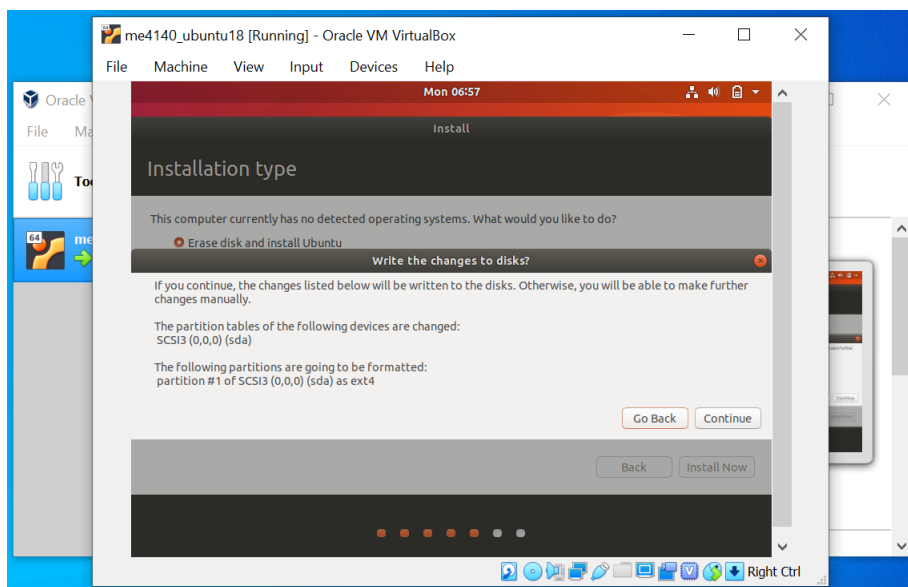
- choose **Minimal Installation**
- choose **Download Updates...**
- choose **Install third-party software...**
- click **continue**

7. Ubuntu Installation:



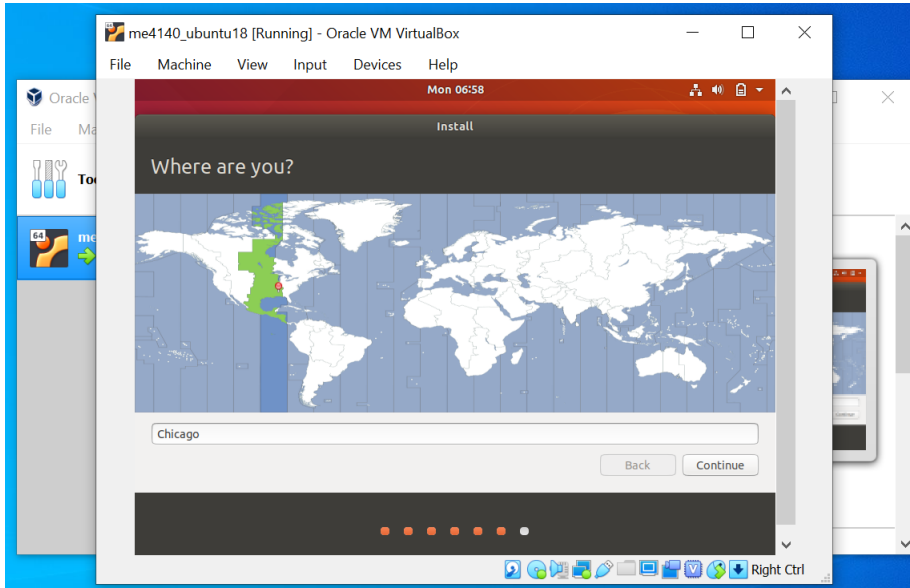
- choose **Erase Everything and Install Ubuntu**
- this is **HARMLESS IF INSIDE VIRTUALBOX**
- this is **DANGEROUS AND PERMANENT IF NOT IN VIRTUALBOX**
- click **Install Now**

8. Confirm Hard drive partitioning:

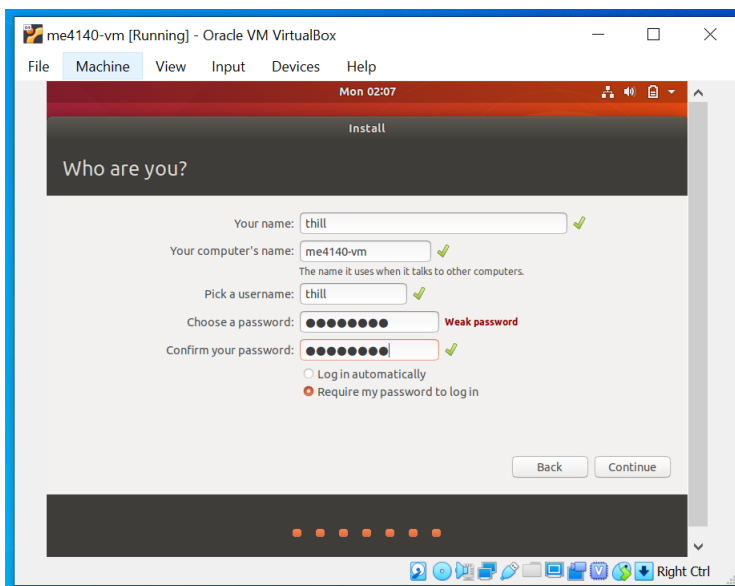


- you are confirming to partition your virtual hard drive
- this will not affect your files outside of VirtualBox
- click **continue**

9. Choose a timezone:

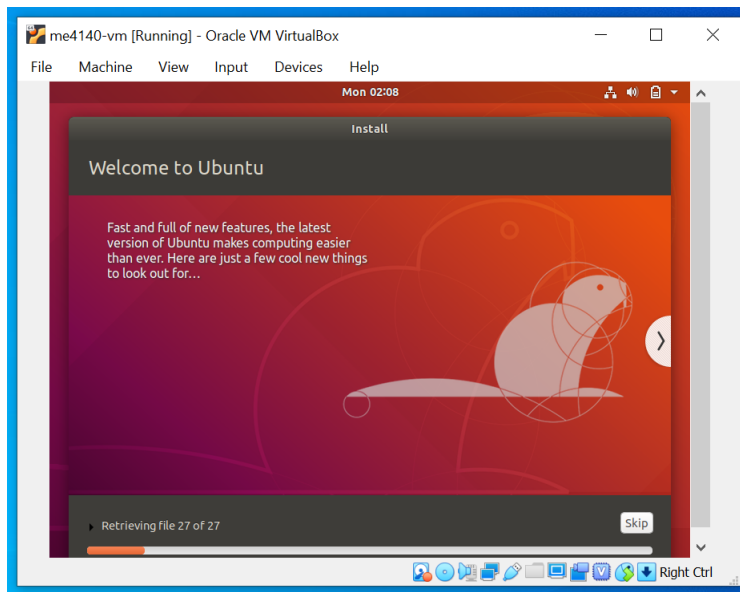


10. Define you user settings:



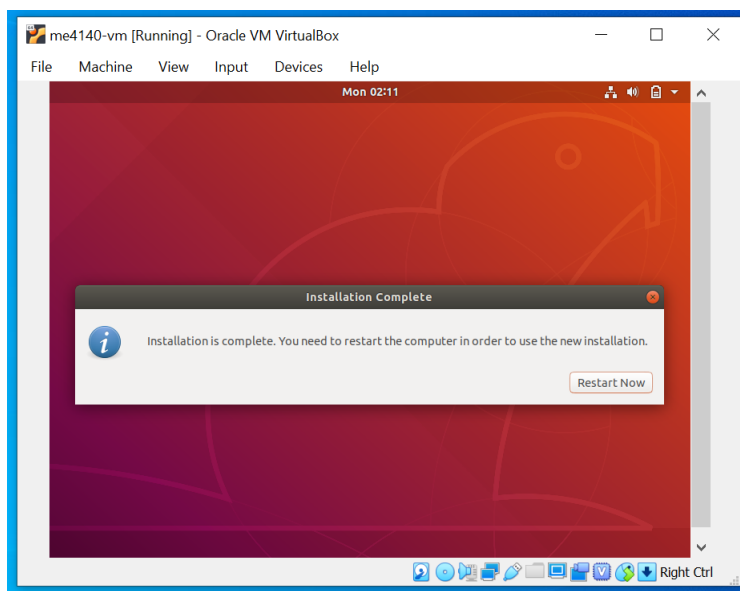
- choose a simple user name and computer name
- choose a simple password or leave it blank
- click **continue**

11. Wait for installation to complete:



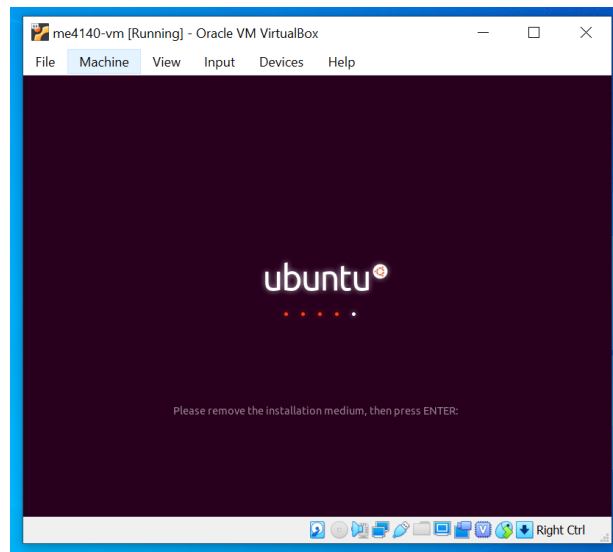
- Make sure you are plugged into a power source or have a good battery
- This will take several minutes depending on your system. Be patient, you are almost done!

12. Restart the VM:



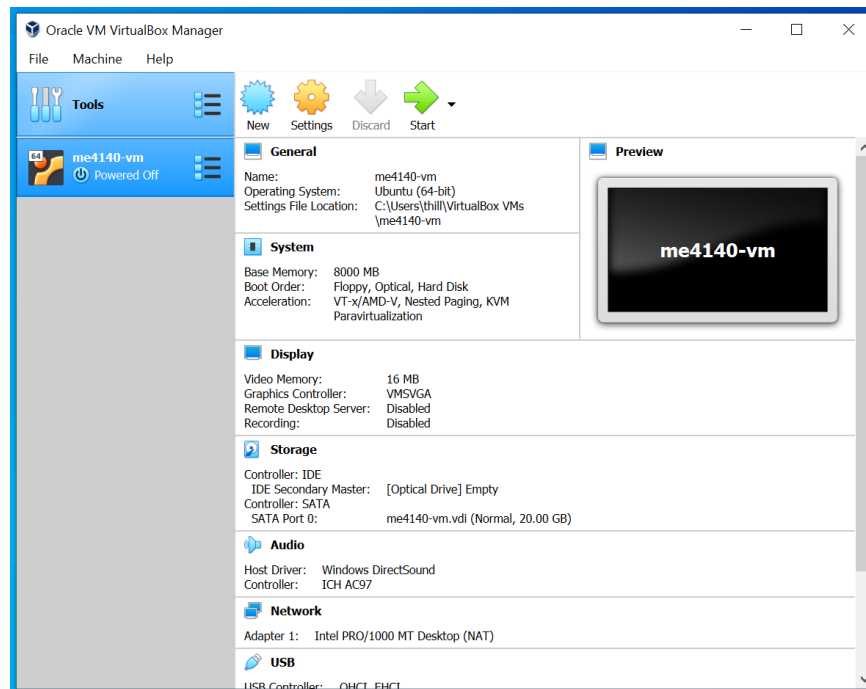
- click **Restart Now**

13. Restart to complete installation:



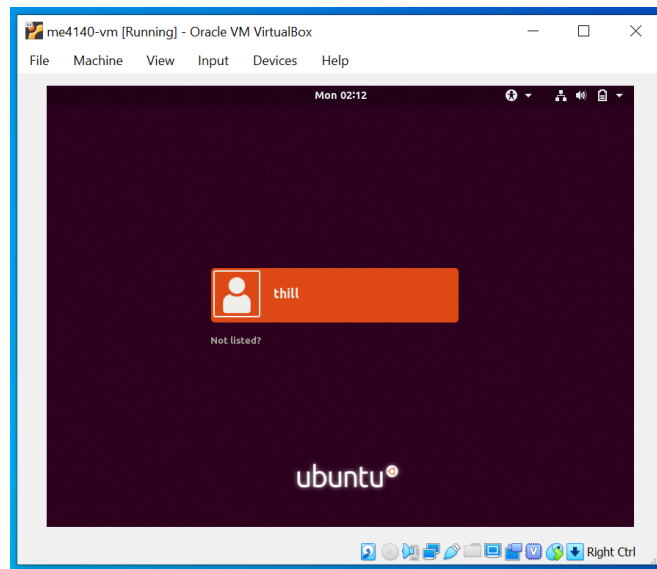
- The installation of Ubuntu is now complete. Press the **enter** key to shut down the machine.
- If it does not shut down click **Machine** → **ACPI Shutdown**.

14. Finally! Installation Complete:



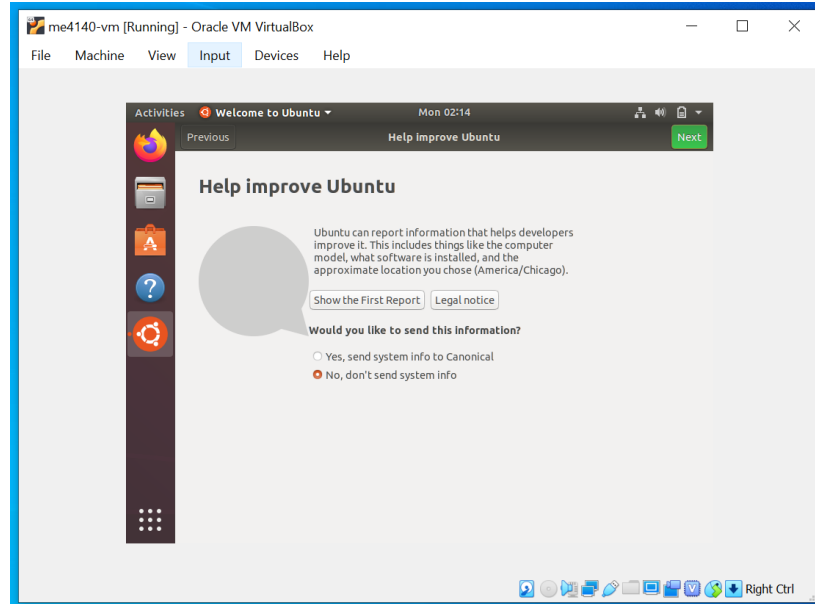
- You should now see your new virtual operating system in the list on the left.
- Click the **start** button to turn it on. Login with the credential you created previously.

15. Ubuntu Login Screen:



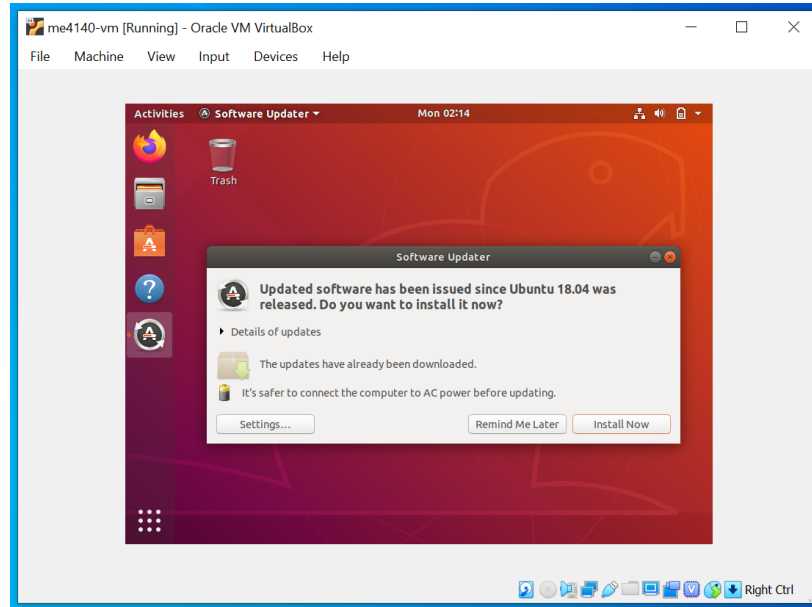
- You should see the username you chose
- Login

16. Ubuntu Welcome:



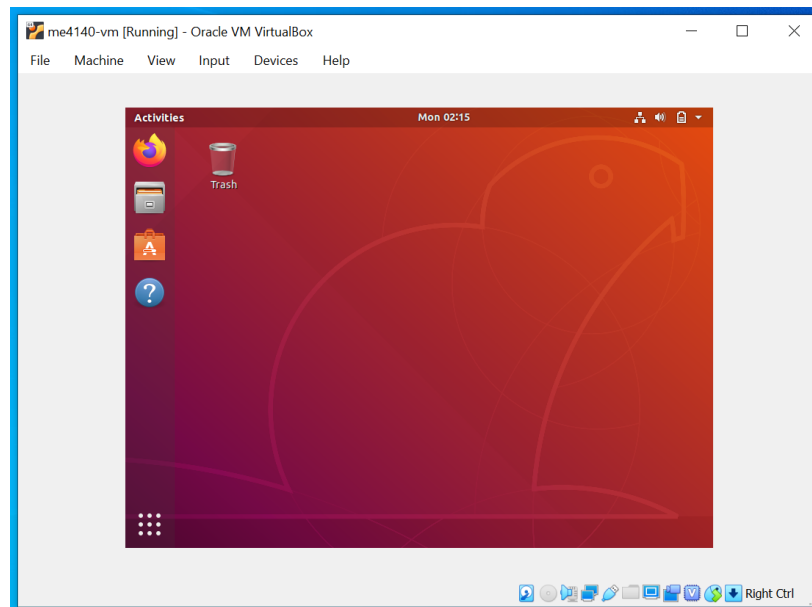
- the default selections are fine
- click **next**

17. Fresh New Ubuntu - Bionic Beaver:



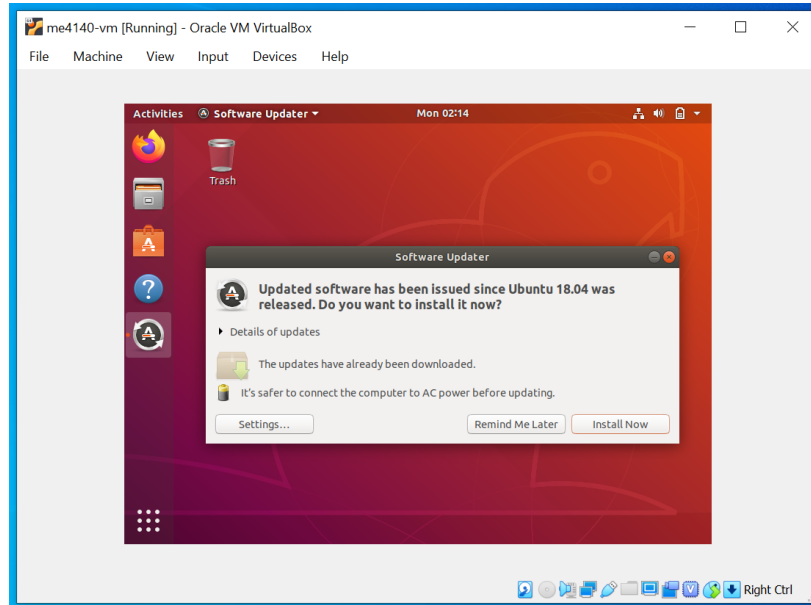
- Install the updates. Do not upgrade to Ubuntu 20.
- This requires the internet. You knew that.

18. Ubuntu Welcome:



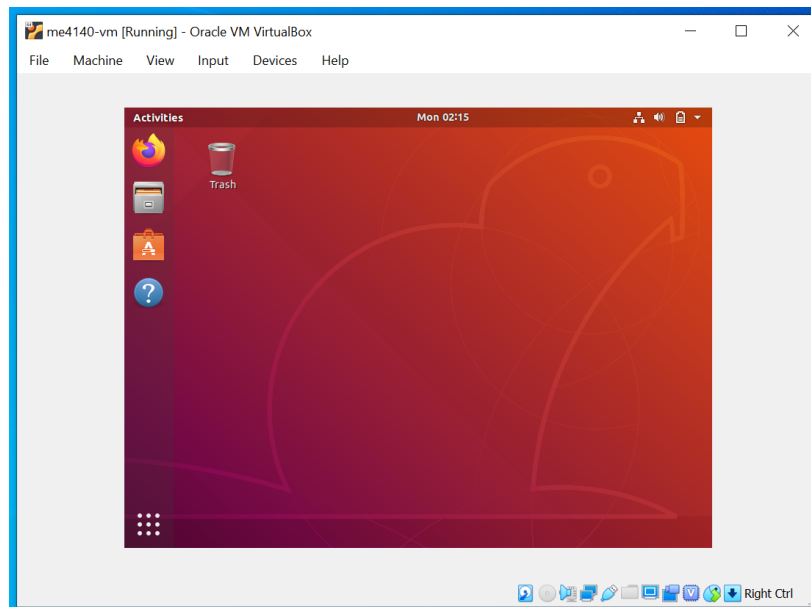
- Now, it is a good idea to make a *backup* of your fresh install. VirtualBox can do this for you but you have to shut it down first.
- Find the **shutdown** button in Ubuntu. You can also use the ACPI shutdown button in VirtualBox. Also, an unexpected shutdown should not hurt the system unless it is updating at the time, and if that happens it can usually repair itself.

19. Fresh New Ubuntu - Bionic Beaver:



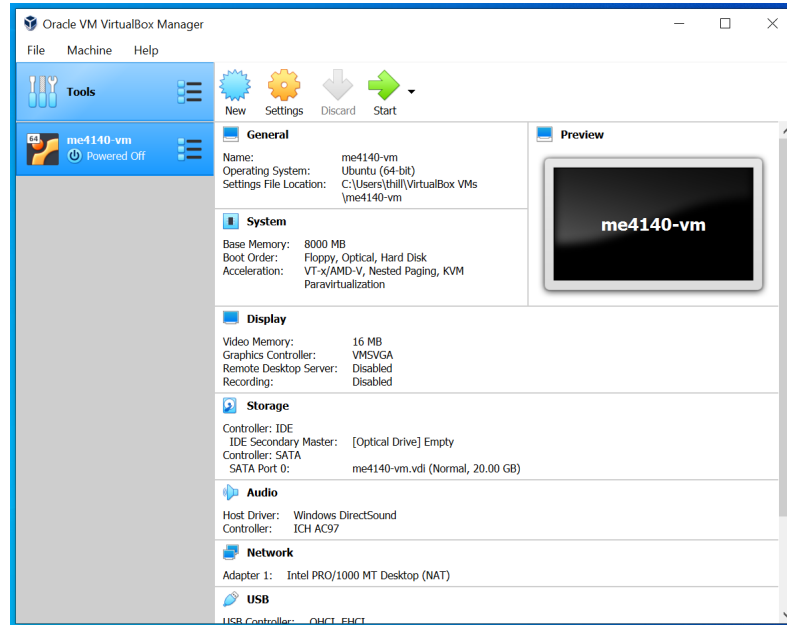
- Install the updates. Do not upgrade to Ubuntu 20.
- This requires the internet. You knew that.

20. Ubuntu Welcome:



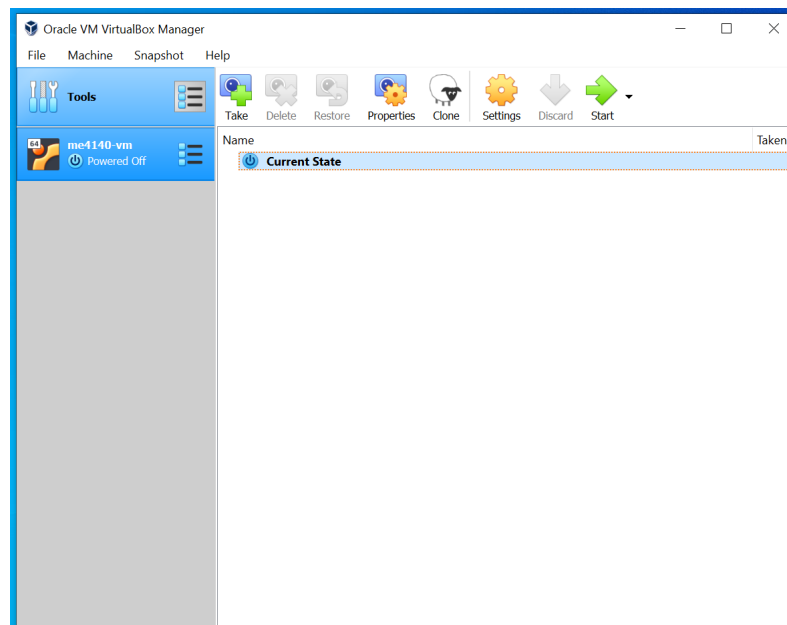
- Now, it is a good idea to make a *backup* of your fresh install. VirtualBox can do this for you but you have to shut it down first.
- Find the **shutdown** button in Ubuntu. You can also use the ACPI shutdown button in VirtualBox. Also, an unexpected shutdown should not hurt the system unless it is updating at the time, and if that happens it can usually repair itself.

21. Back to VirtualBox :



- Select your new VM so that it is highlighted blue
- click **Machine** > **Tools** > **Snapshots**

22. Take a Snapshot for Backup:



- Snapshots can be used as a backup. This will save you all those steps if you if you ever need to start over.
- click **Take** to save a snapshot of the current state of your virtual machine. Whew... that was a lot.
- Welcome to the world of Linux. Have fun!