

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 :

First you will 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. This requires a large file that I recommend downloading ahead of time. Finally, 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:** You need approximately 20Gb of free space on a hard drive to install your virtual operating system. This space will remain in its current partition and you are free to delete the files when you are finished. 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.**
- 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.

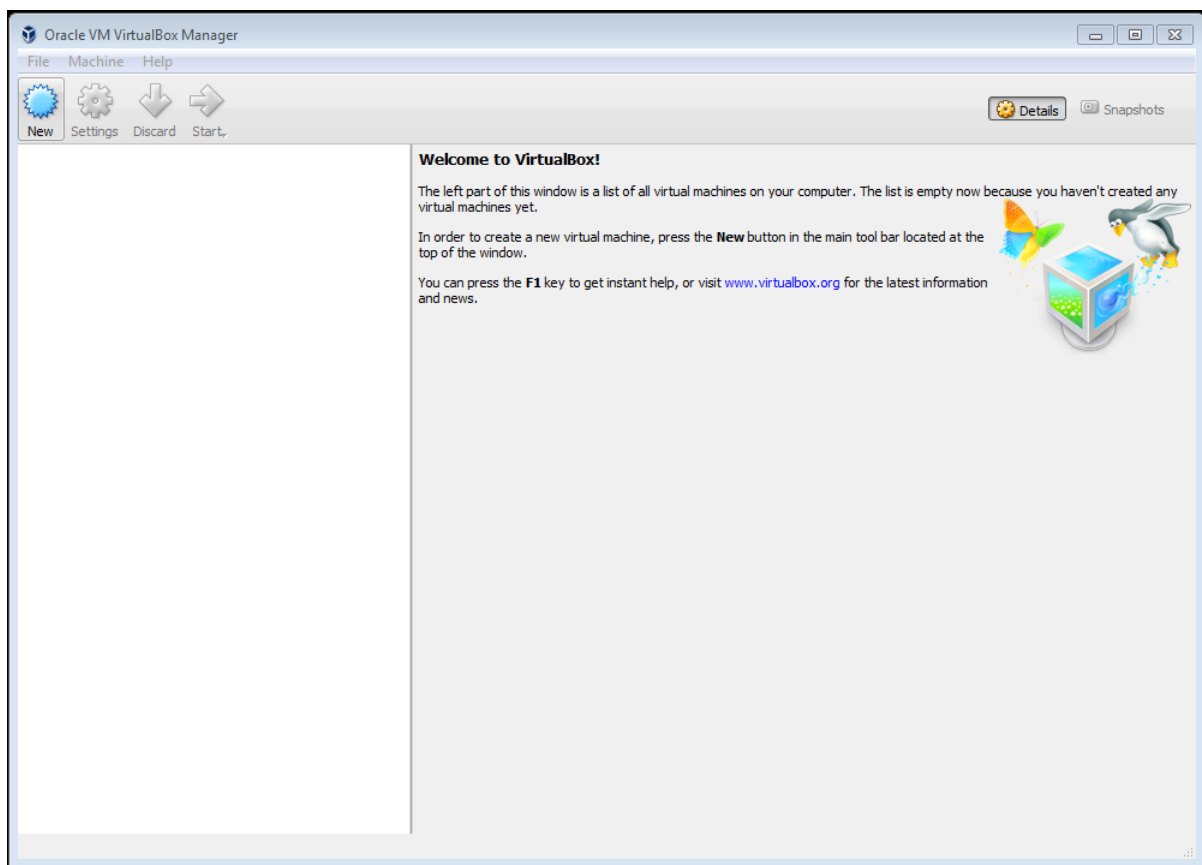
Detailed Setup Process :

1. Install VirtualBox Application:

- (a) Download the VirtualBox installation file from ilearn. Choose the file 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.

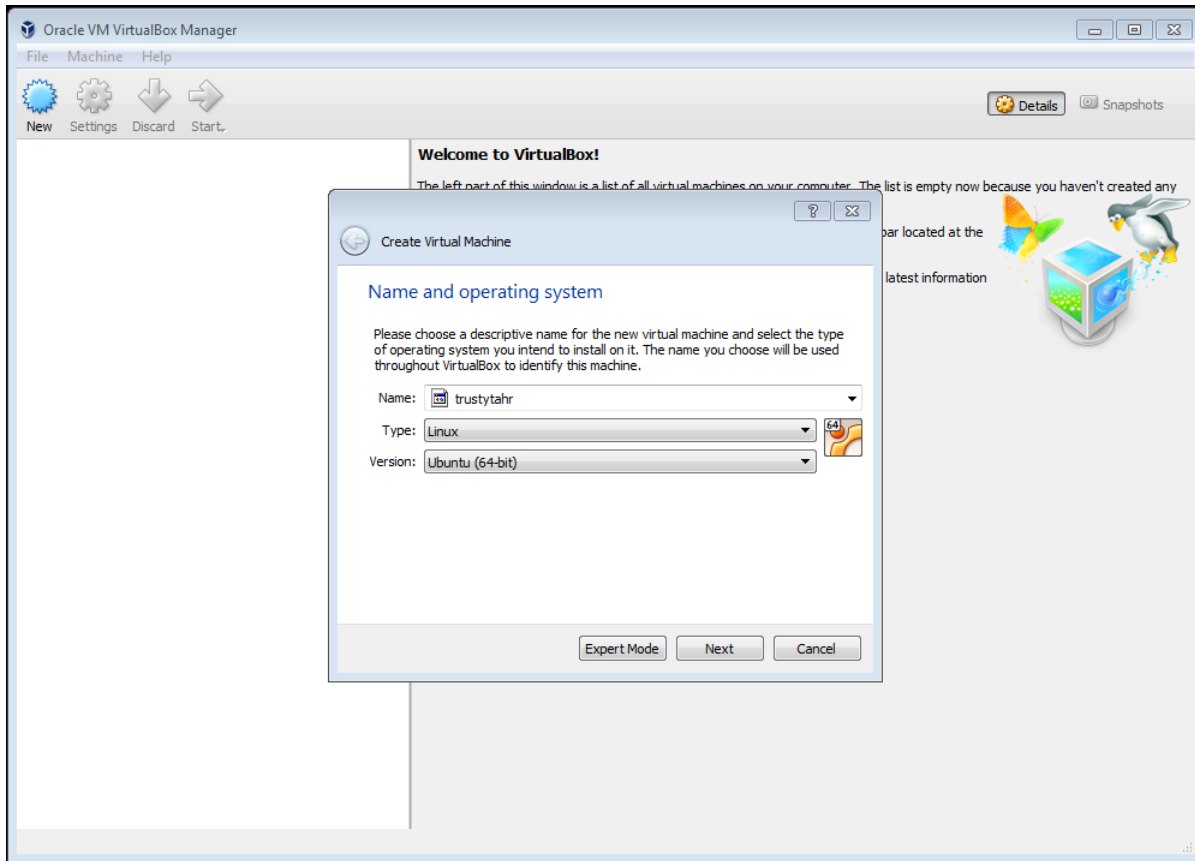
2. Install Virtual Operating System:

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



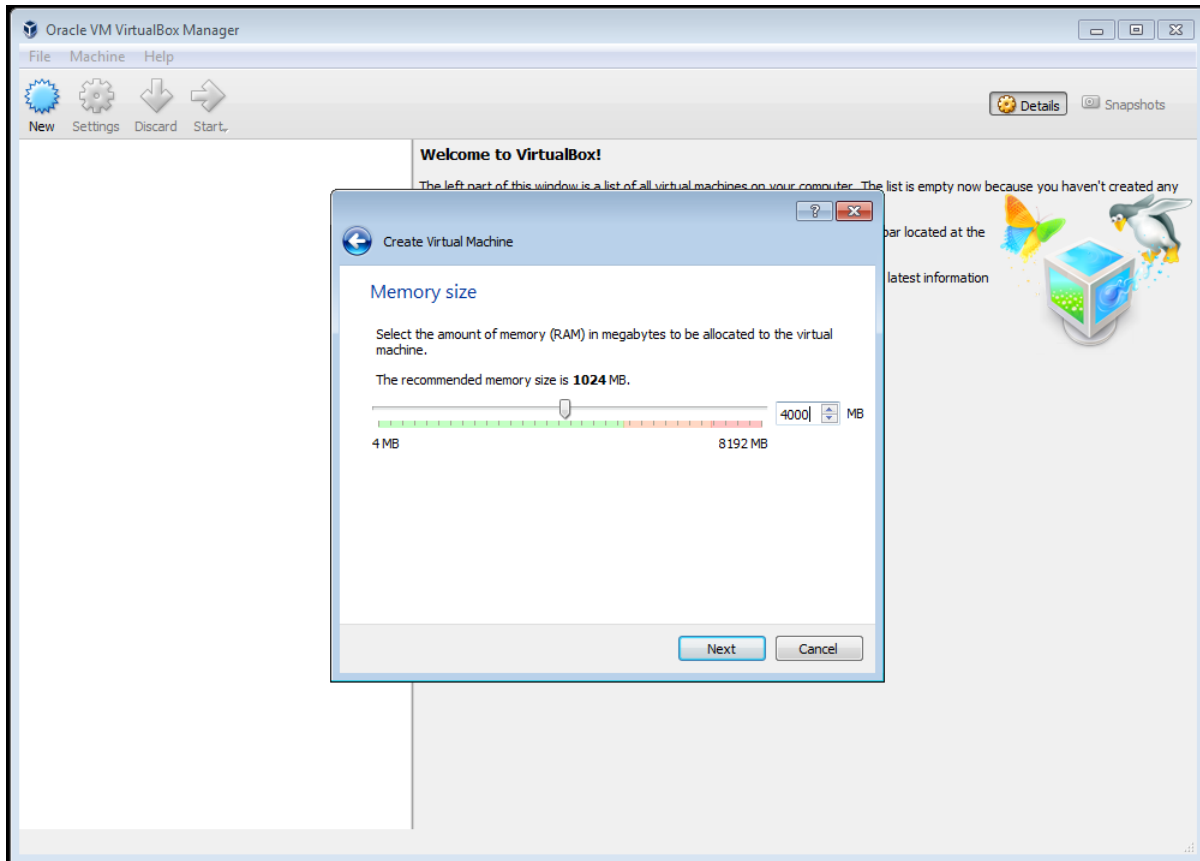
- before proceeding make sure you have an **internet connection**
- before proceeding make sure you have access to a **power supply or battery**

3. Create New Virtual Machine:



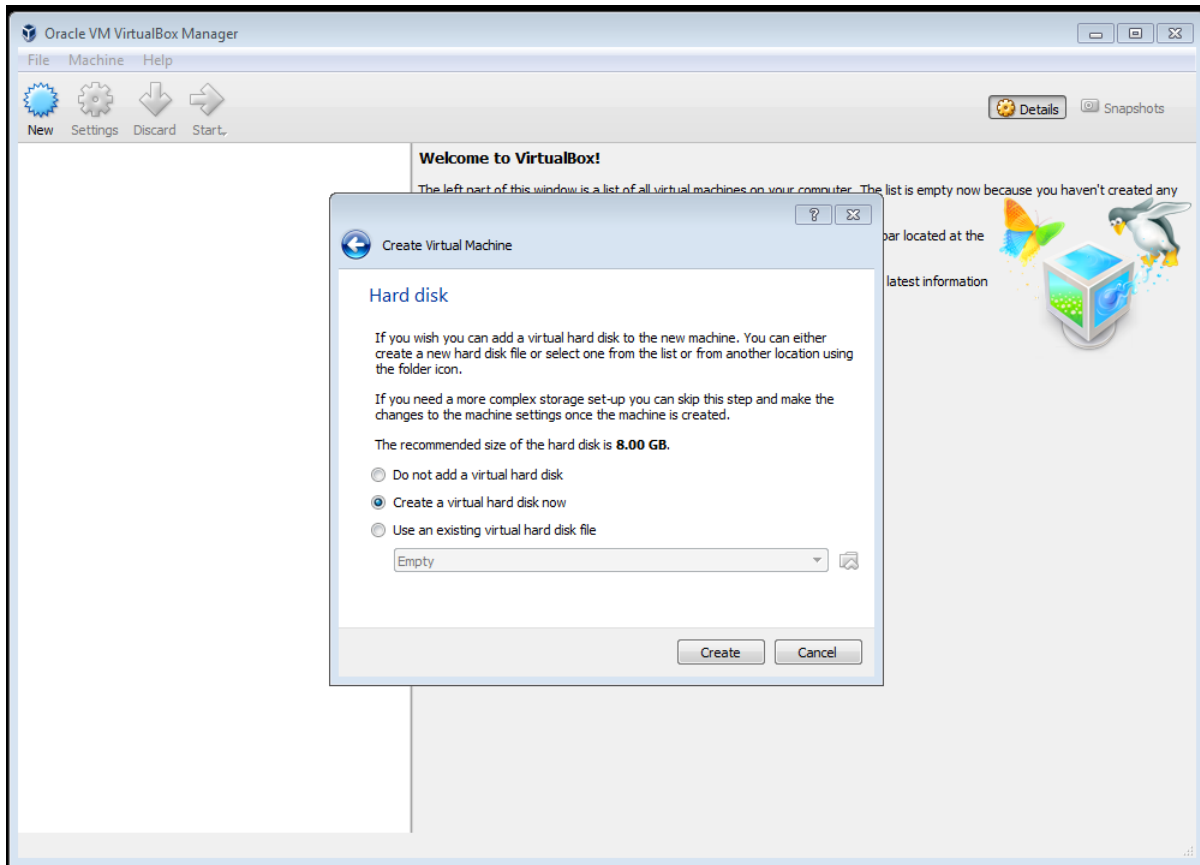
- press the **new** button
- choose a **computer name** (this is your choice but remember it!)
- choose an **operating system** type (Linux)
- choose a **version**, this depends on your physical machine This is probably Ubuntu 64-bit but possibly Ubuntu 32-bit)

4. Define Virtual Machine Parameters:



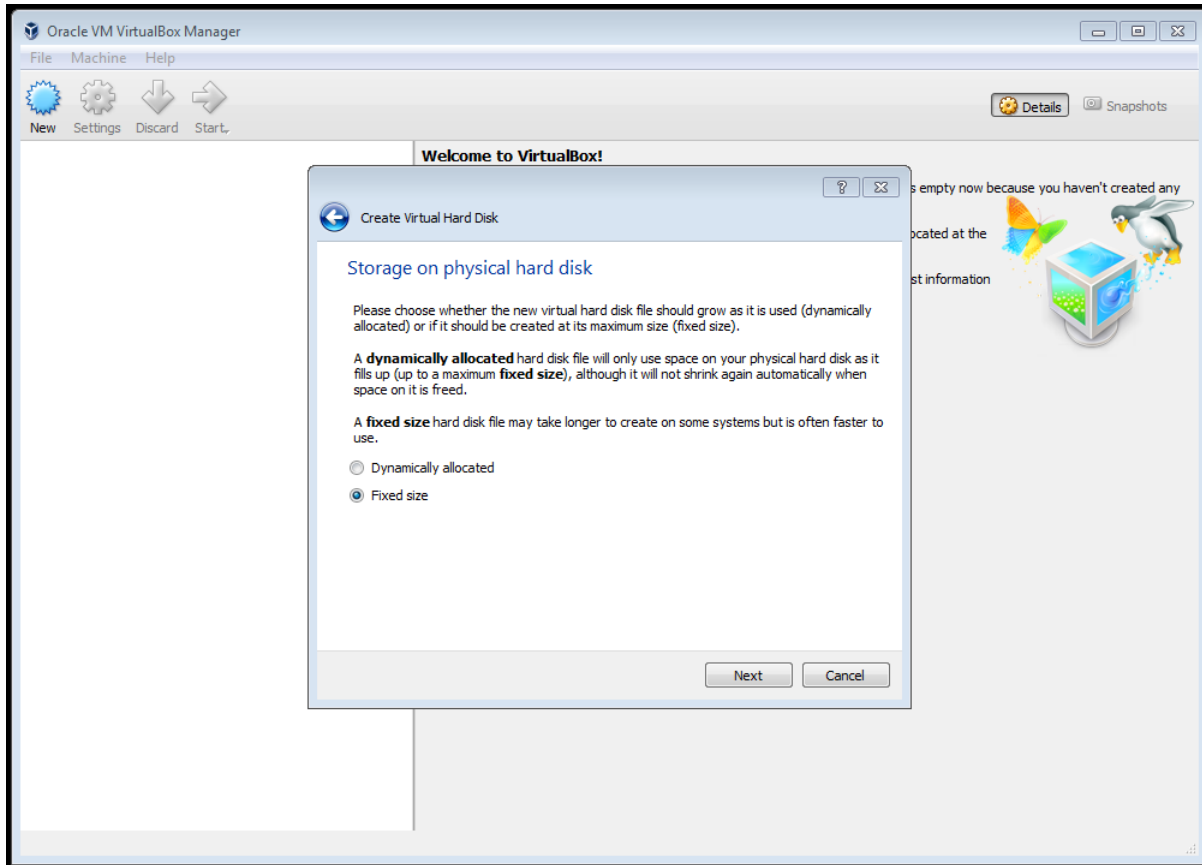
- Choose the amount of RAM you want to allocate to the VM
- This number is based on your available resources. More is better but it helps to leave some for windows. If your computer has 8GB total I suggest no more than 6GB for for VM.

5. Define Virtual Hard Drive Parameters:



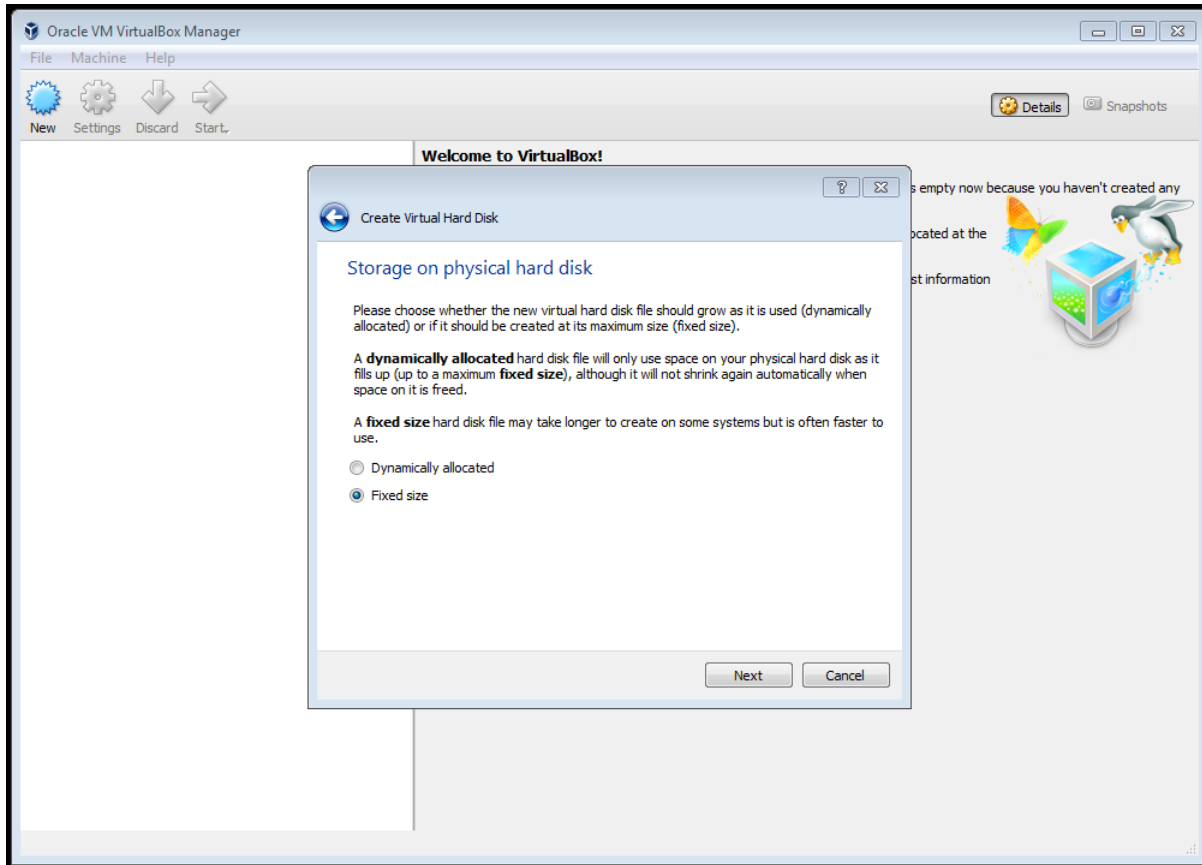
- You must have enough space on your hard drive to virtualize linux and install ROS.
- **create a virtual hard drive now**

6. Virtual Hard Drive Setup:



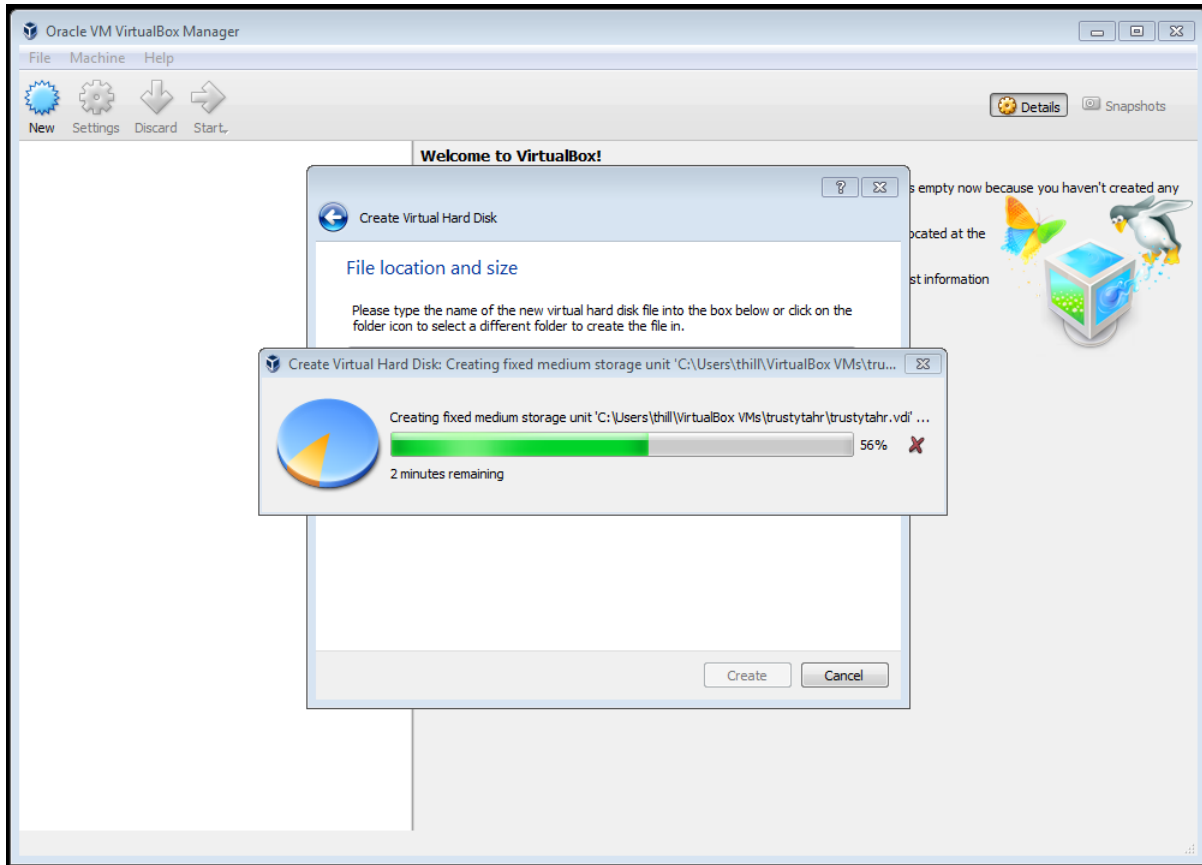
- Create a **fixed size** virtual hard drive.

7. Virtual Hard Drive Setup:



- Choose the virtual hard drive type.
- VDI is recommended.

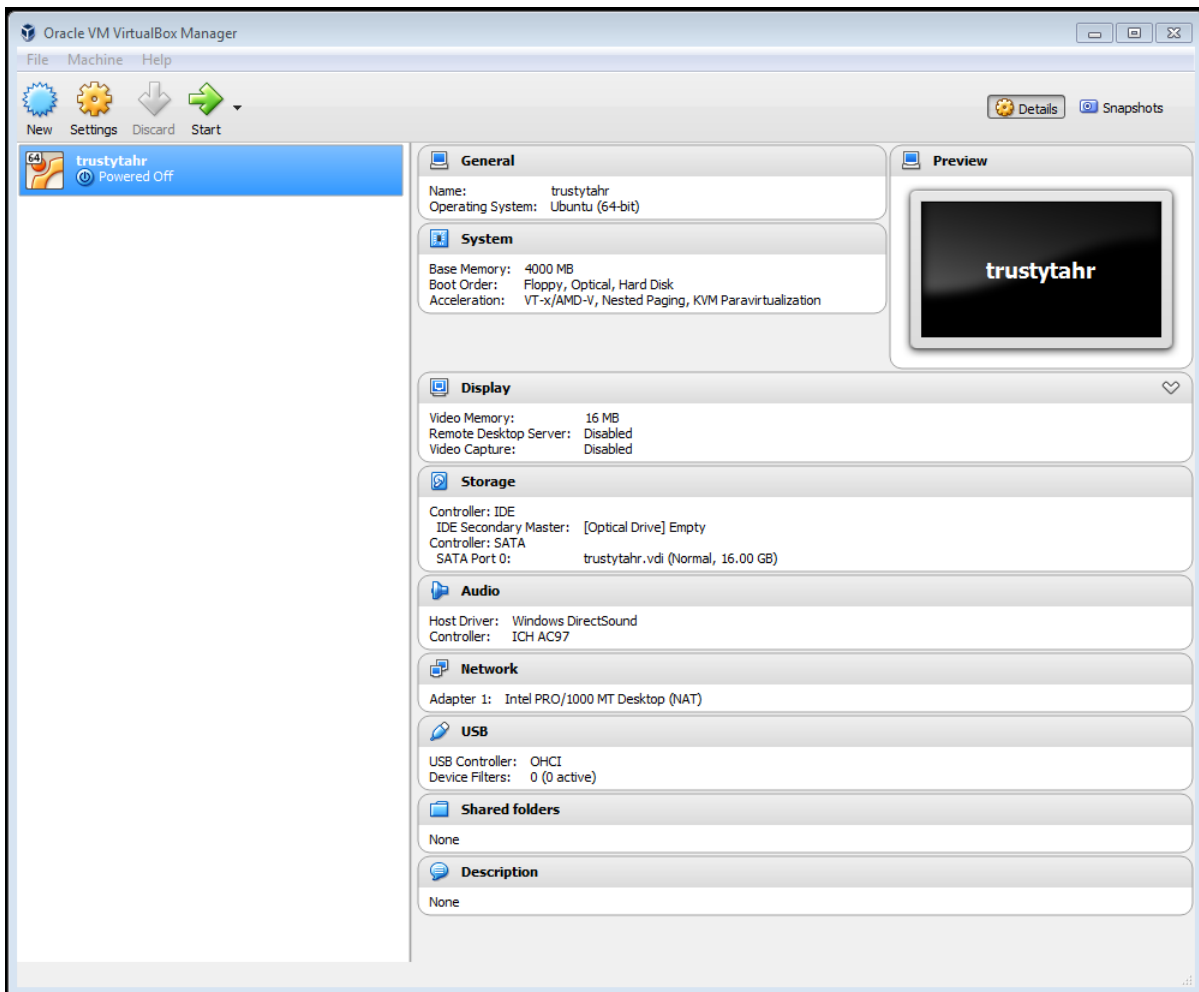
8. Virtual Hard Drive Setup :



- choose the size of your virtual hard drive
- to virtualize Ubuntu and install ROS it is recommended to make a 16 GB VDI
- you can experiment with 'lighter versions'
 - lubuntu
 - many more
 - I am working on this

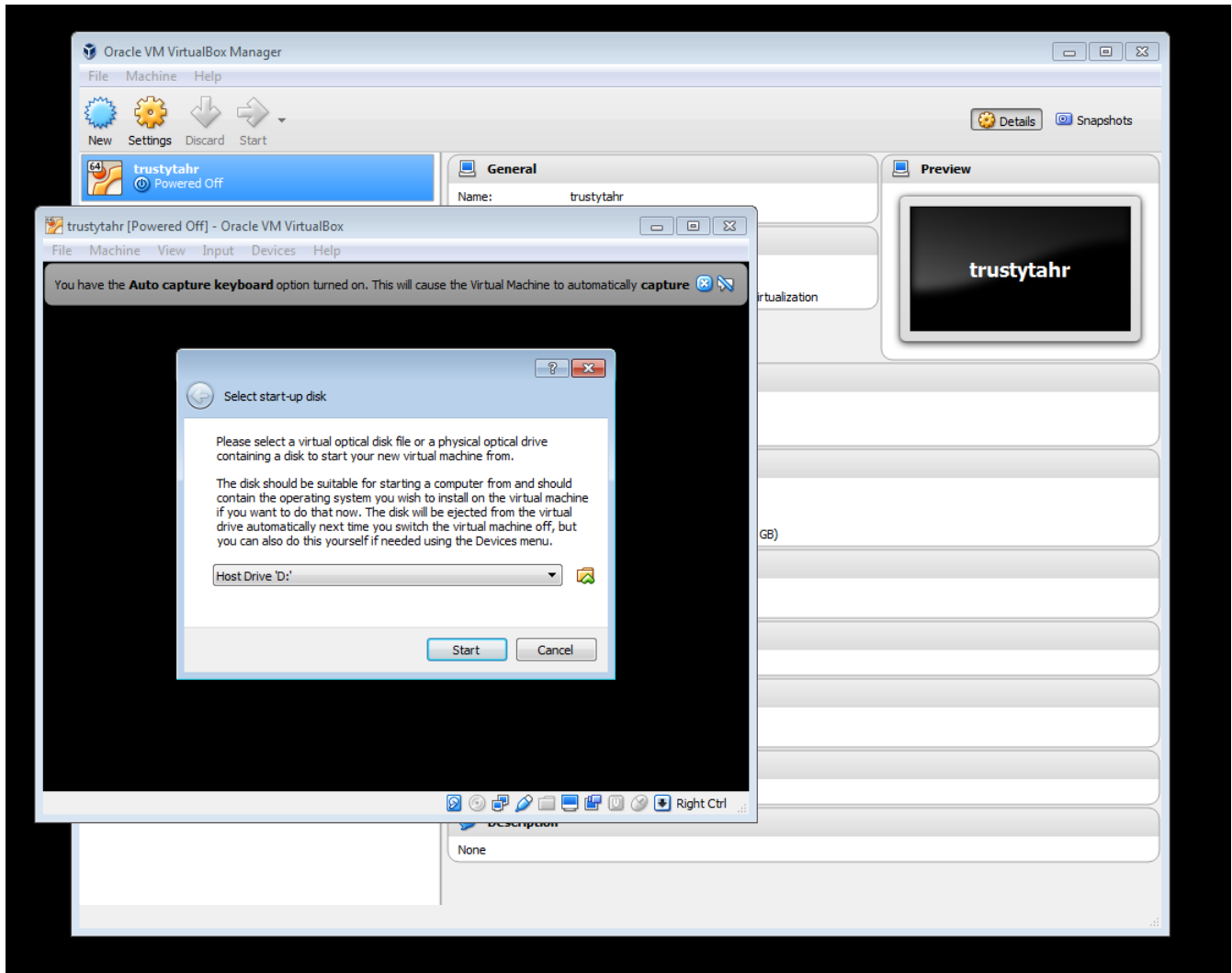
Ubuntu OS Installation and Setup :

1. Start the VM for the first time:



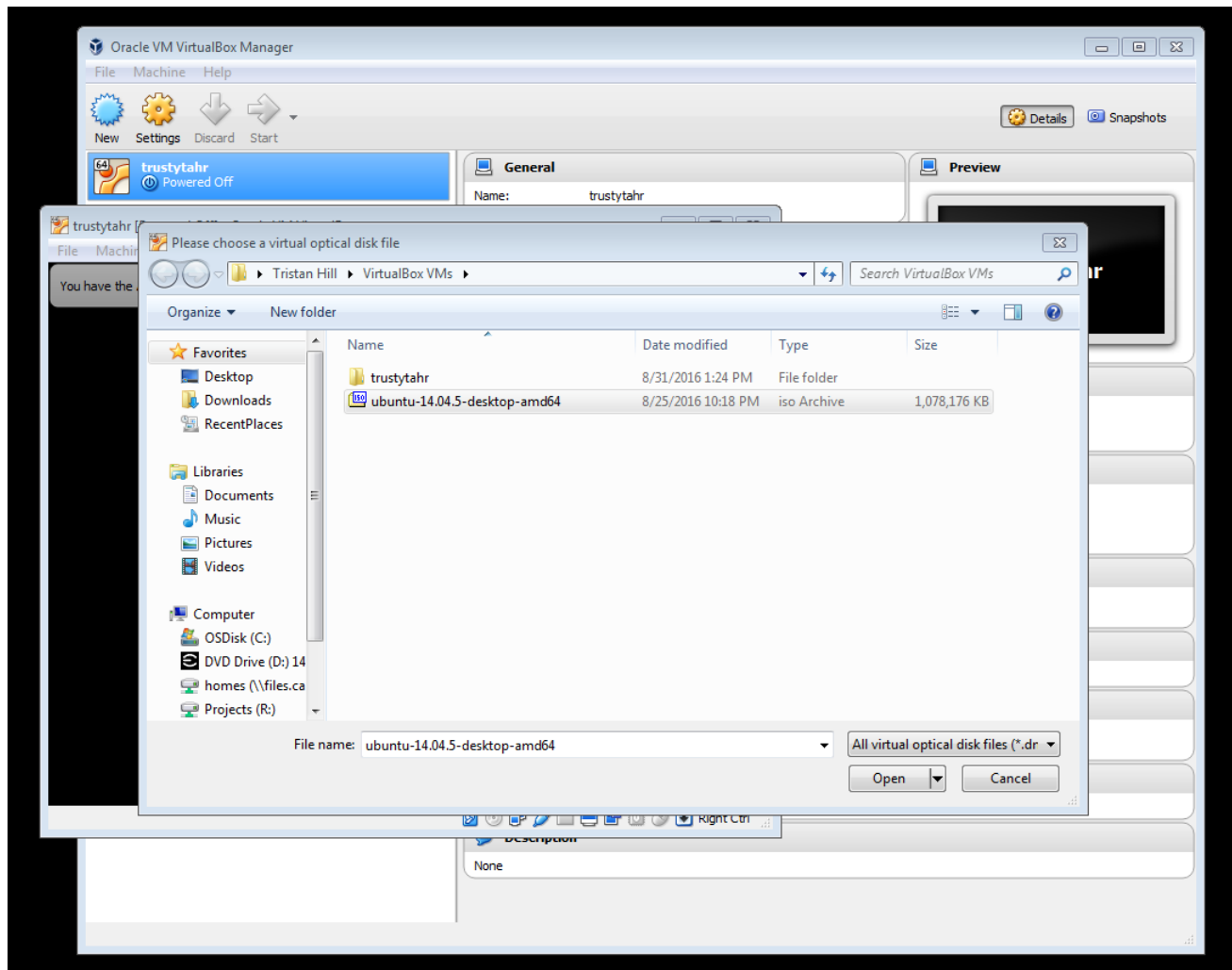
- select your newly created VM
- press the green start button
- wait for it...

2. Start the VM for the first time:



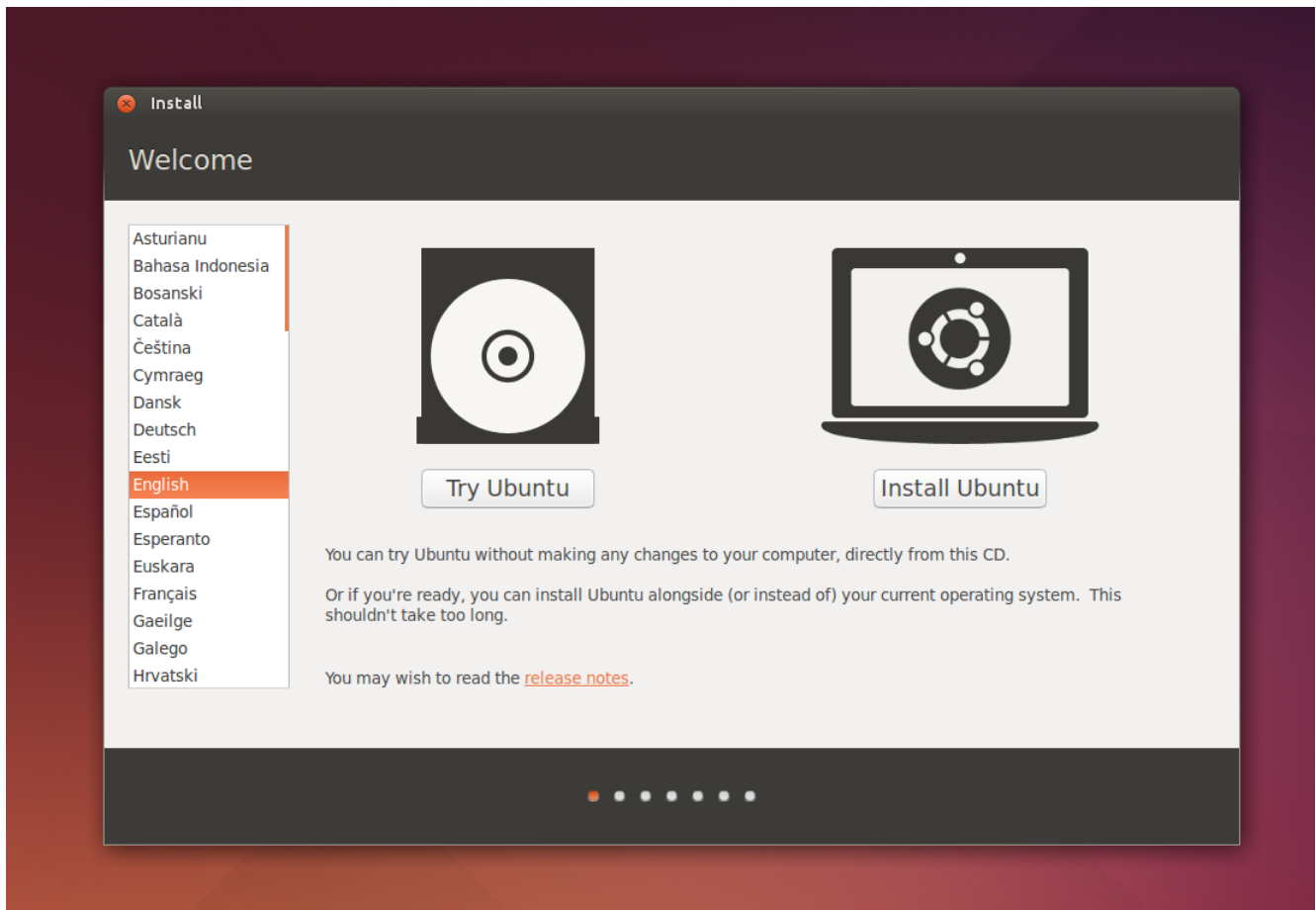
- choose to select media from a local folder
- wait for it...

3. Start the VM for the first time:



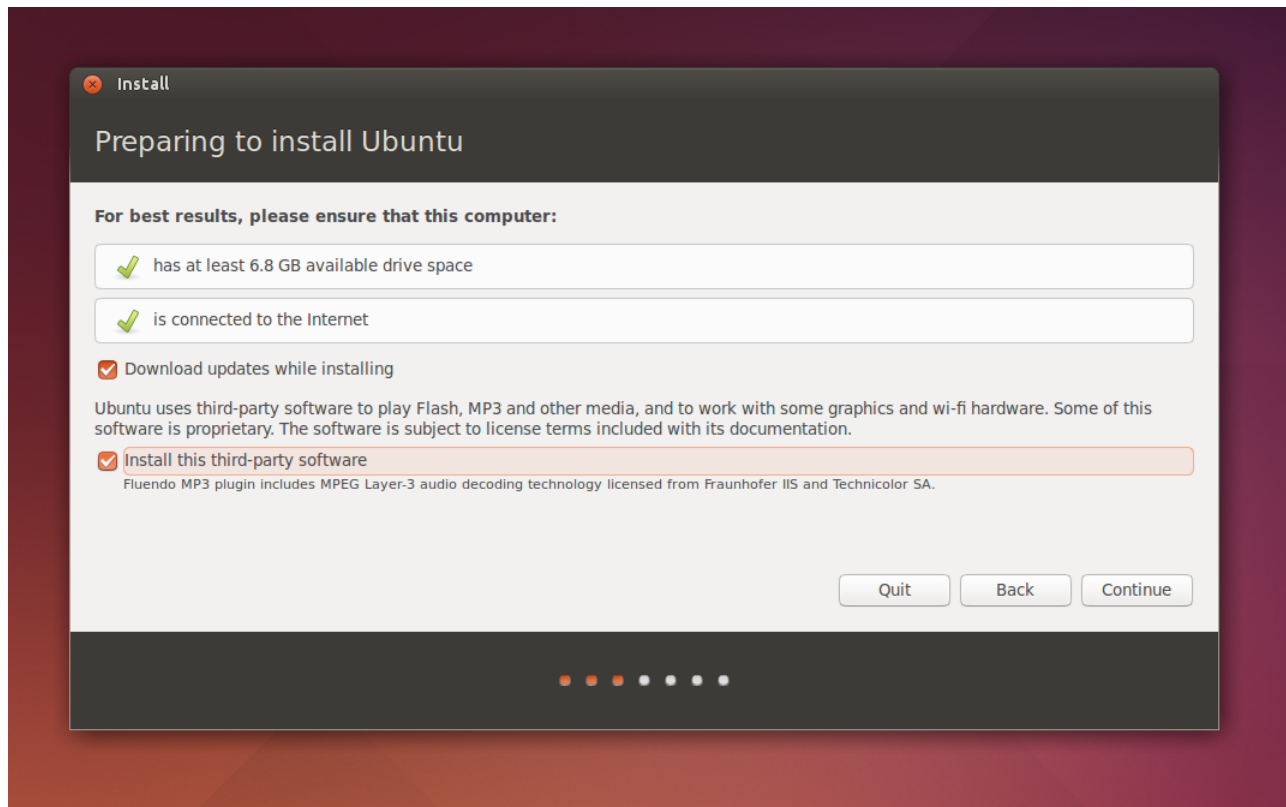
- choose the Ubuntu .iso file that you acquired
- it is recommended that the media is on the local machine
- wait for it...

4. Ubuntu Installation:



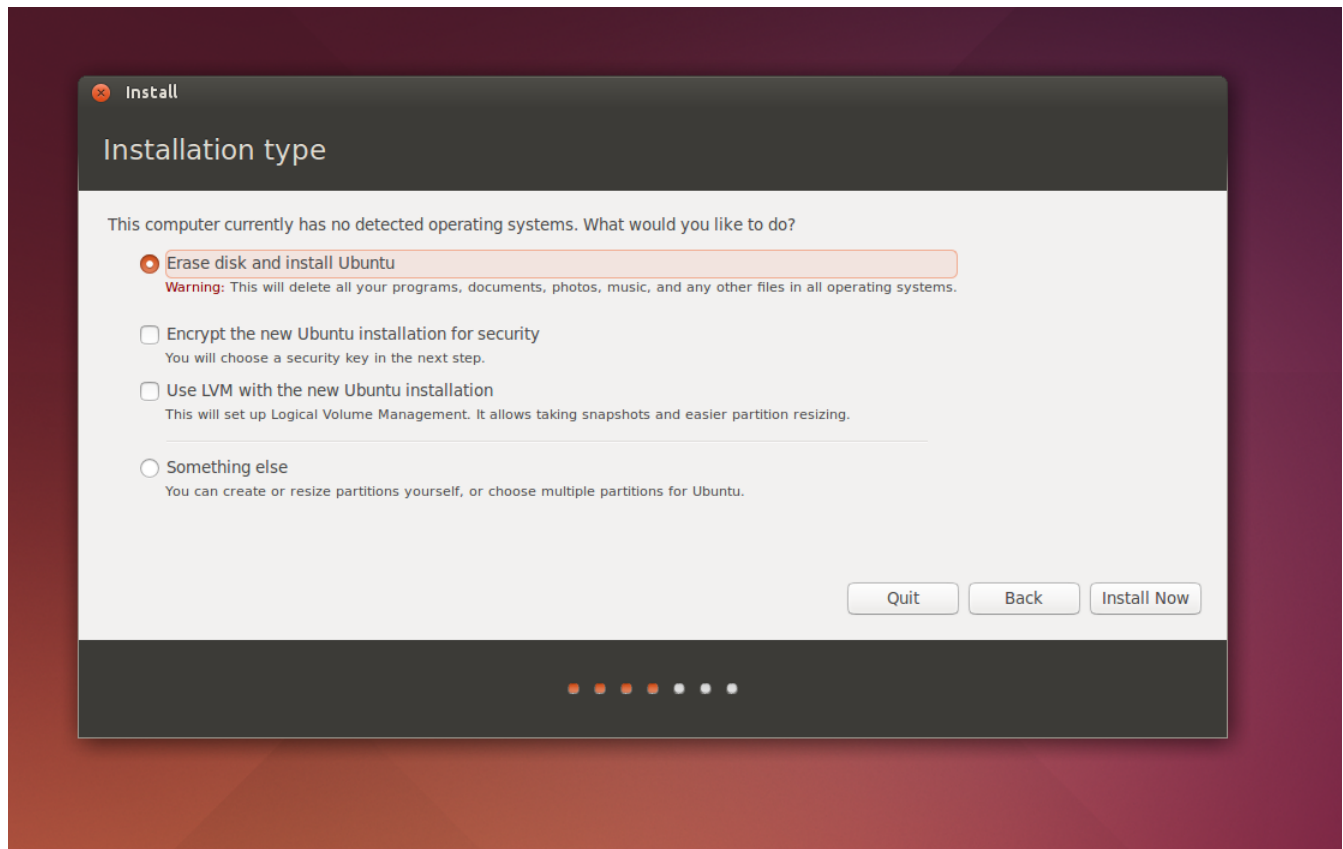
- **Install Ubuntu** (harmless if using VirtualBox)
- try is just temporary (single session)
- wait for it...

5. Ubuntu Installation:



- check that you meet the requirements
- click the two check boxes for proprietary drivers

6. Ubuntu Installation:

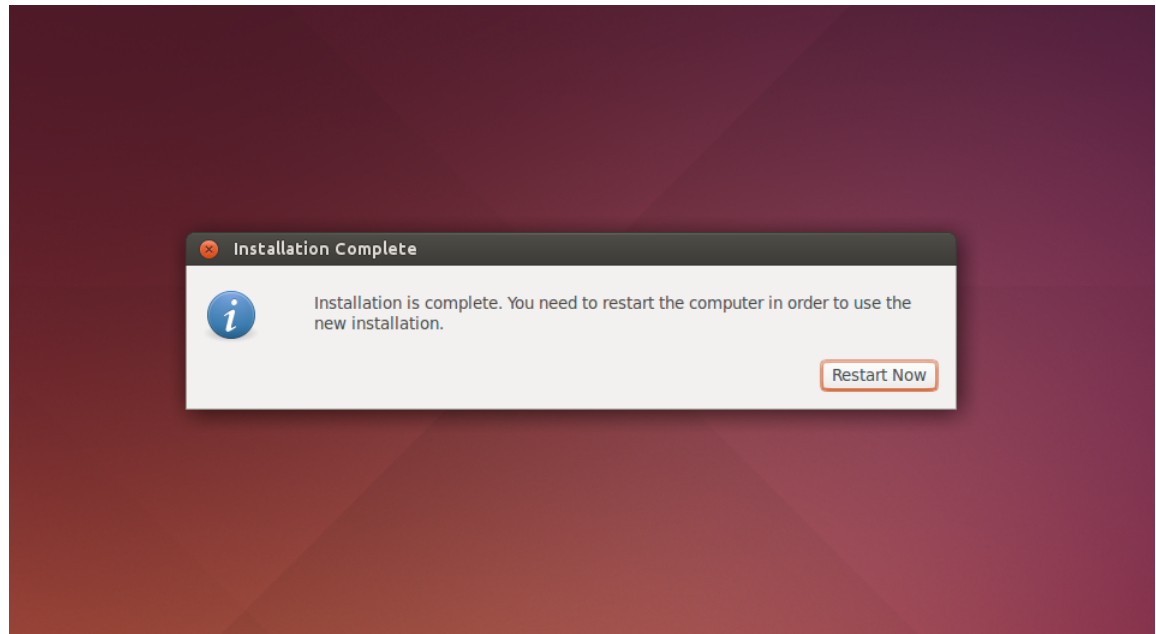


- **Erase Everything and Install Ubuntu** (harmless if using VirtualBox)
- DANGEROUS AND PERMANENT IF NOT USING VIRTUALBOX
- wait for it...

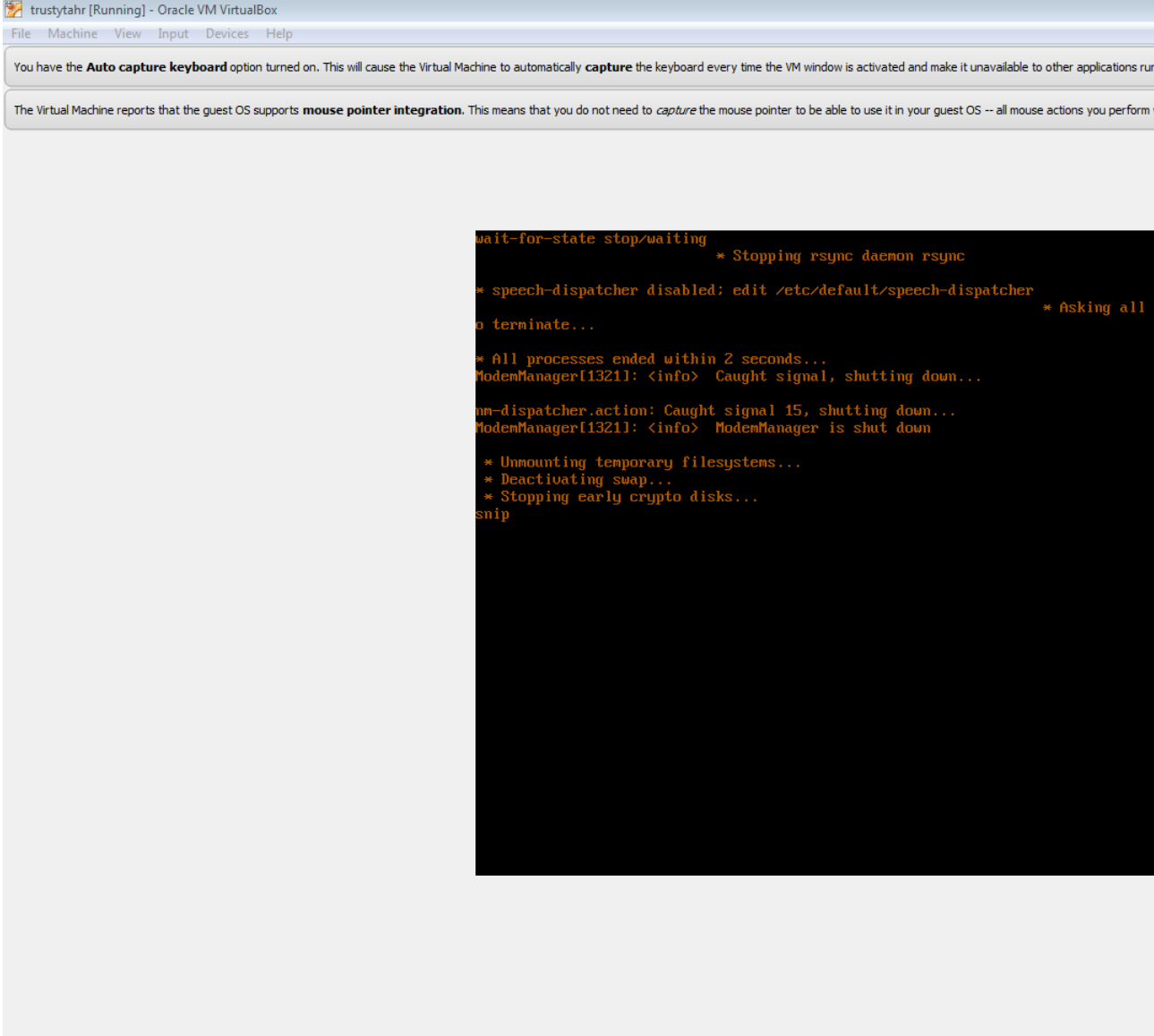
7. Wait Wait Wait:



8. Shut Down The VM:



9. Shut Down The VM:

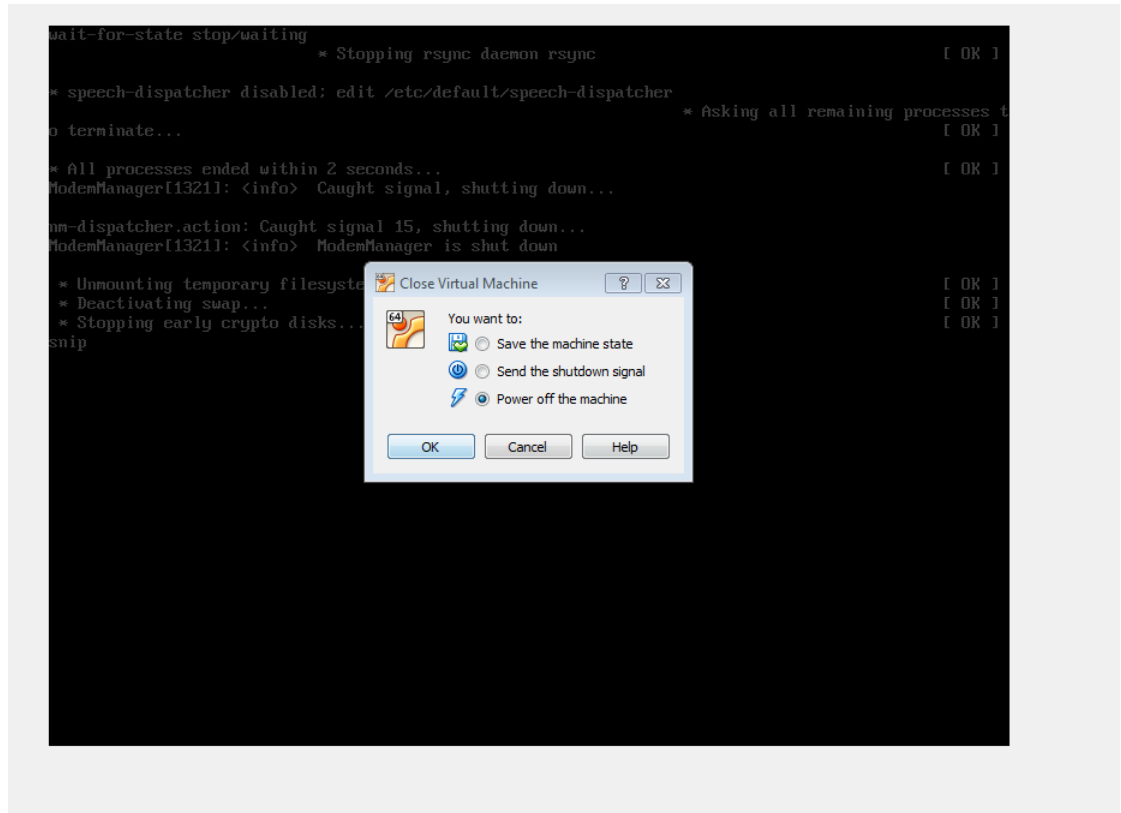


The screenshot shows the Oracle VM VirtualBox interface. The title bar reads 'trustyahr [Running] - Oracle VM VirtualBox'. Below the title bar is a menu bar with 'File', 'Machine', 'View', 'Input', 'Devices', and 'Help'. Two informational messages are displayed in a light blue box: 'You have the **Auto capture keyboard** option turned on. This will cause the Virtual Machine to automatically **capture** the keyboard every time the VM window is activated and make it unavailable to other applications running on the host.' and 'The Virtual Machine reports that the guest OS supports **mouse pointer integration**. This means that you do not need to *capture* the mouse pointer to be able to use it in your guest OS -- all mouse actions you perform will be sent directly to the guest OS.' The main display area shows a terminal window with the following text:

```
wait-for-state stop/waiting
* Stopping rsync daemon rsync
* speech-dispatcher disabled; edit /etc/default/speech-dispatcher
o terminate... * Asking all
* All processes ended within 2 seconds...
ModemManager[13211]: <info> Caught signal, shutting down...
nm-dispatcher.action: Caught signal 15, shutting down...
ModemManager[13211]: <info> ModemManager is shut down
* Unmounting temporary filesystems...
* Deactivating swap...
* Stopping early crypto disks...
snip
```

- wait for it...
- after waiting a few moments you may have to close the window of the VM

10. Finally!:



- POWER OFF the Machine

11. Now restart the VM!!!:

- the VM you made should be in the left list
- select it and click start
- the Ubuntu OS should appear