Installing VirtualBox, Ubuntu and ROS

What is ROS

ROS means **Robot Operating System**.

ROS is not an operating system but a meta operating system meaning, that it assumes there is an underlying operating system that will assist it in carrying out its tasks. But what is an operating system? There is no clear definition for operating systems. Usually, an operating system consists of all the things provided by the operating system provider[1].

How to install ROS on Ubuntu

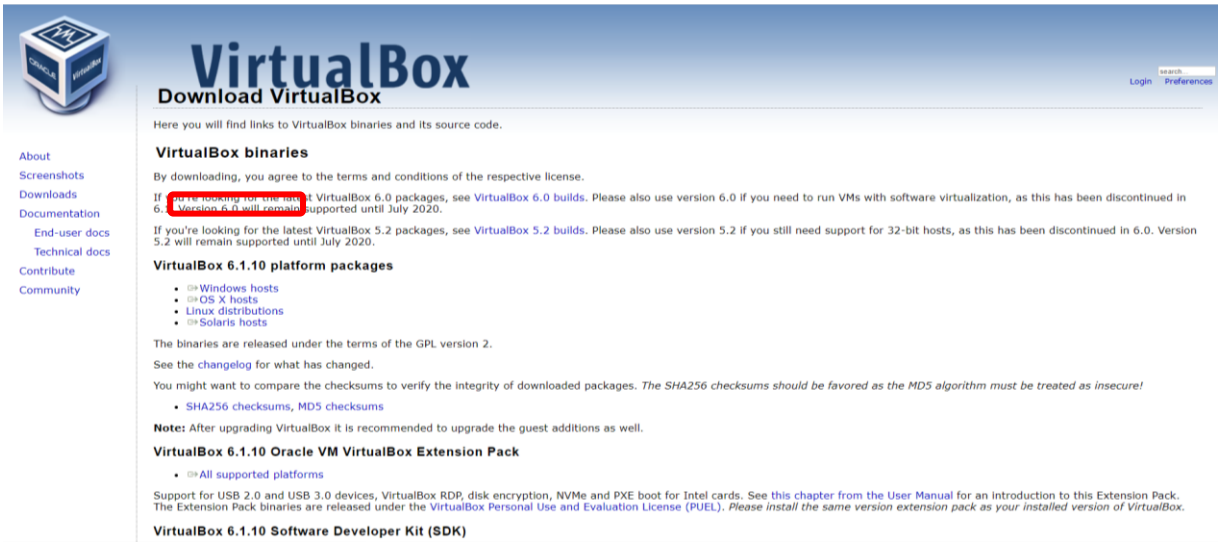
Installation of ROS goes through stages

Operating system (windows10) → Virtual machine (VirtualBox) → Linux (Ubuntu) → ROS

Step 1: Virtual Machine

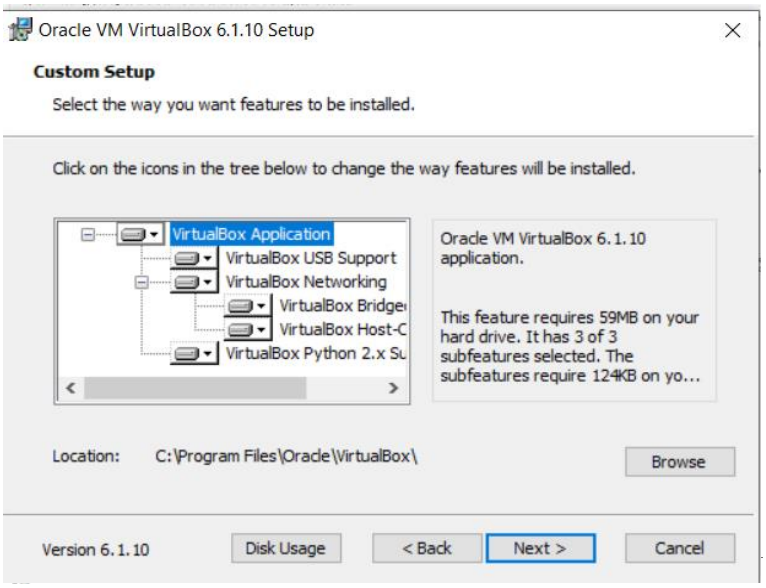
Step 1.1: download the VirtualBox

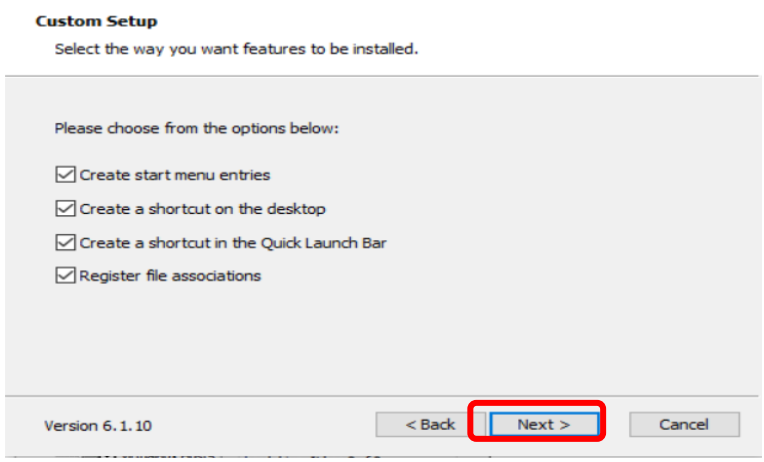
https://www.virtualbox.org/wiki/Downloads

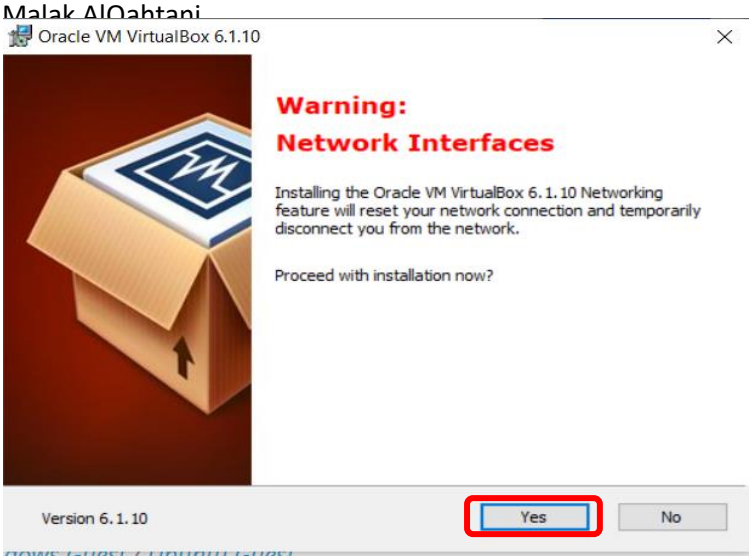


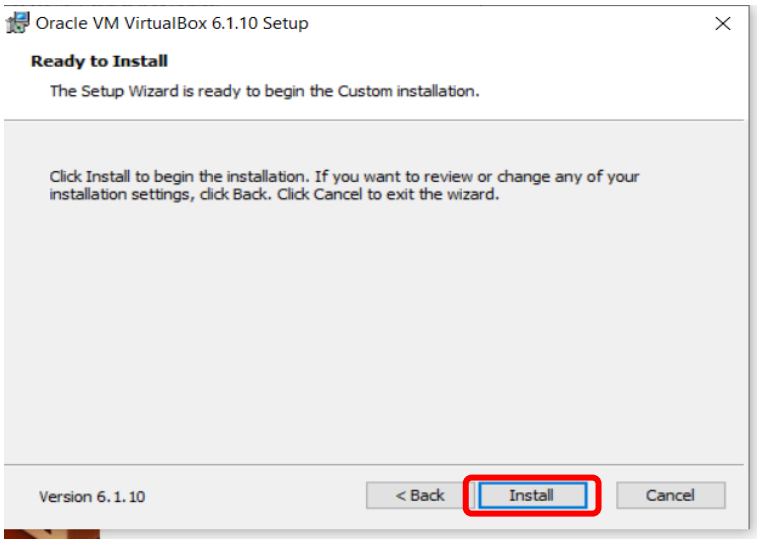
[1] https://towardsdatascience.com/what-why-and-how-of-ros-b2f5ea8be0f3

Step 1.2: Install the VirtualBox






Oracle VM VirtualBox 6.1.10
Warning:
Network Interfaces
Installing the Oracle VM VirtualBox 6.1.10 Networking feature will reset your network connection and temporarily disconnect you from the network.
Proceed with installation now?
Version 6.1.10
Yes
No


Oracle VM VirtualBox 6.1.10 Setup
Ready to Install
The Setup Wizard is ready to begin the Custom installation.
Click Install to begin the installation. If you want to review or change any of your installation settings, click Back. Click Cancel to exit the wizard.
Version 6.1.10
< Back
Install
Cancel

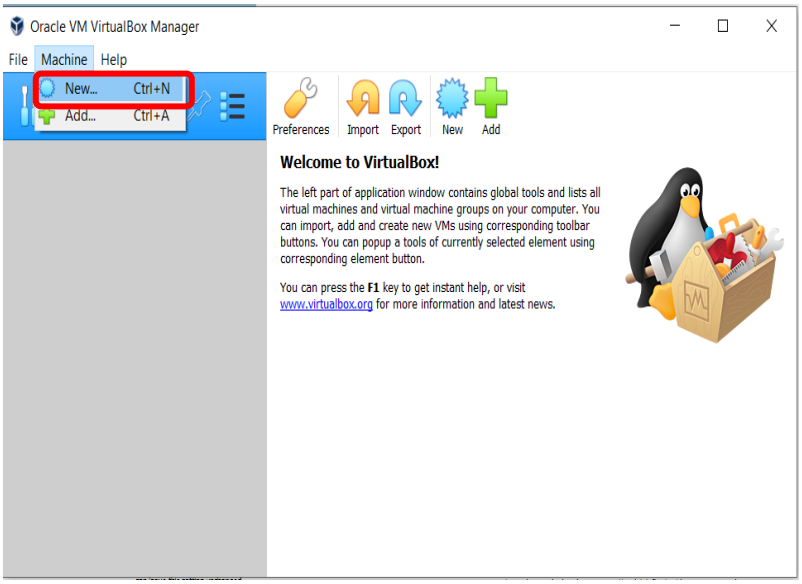

Oracle VM VirtualBox 6.1.10 Setup
Oracle VM VirtualBox 6.1.10 installation is complete.
Click the Finish button to exit the Setup Wizard.
Start Oracle VM VirtualBox 6.1.10 after installation
Version 6.1.10
< Back
Finish
Cancel

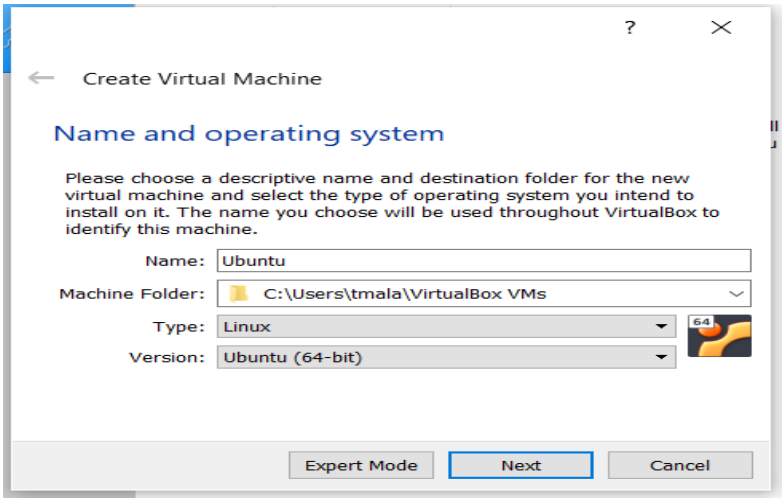
Step 2: Create Virtual Machine

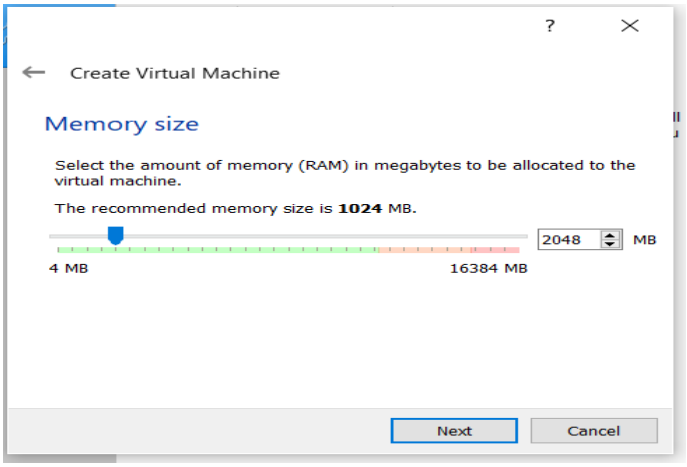
Step 2.1: download the Ubuntu

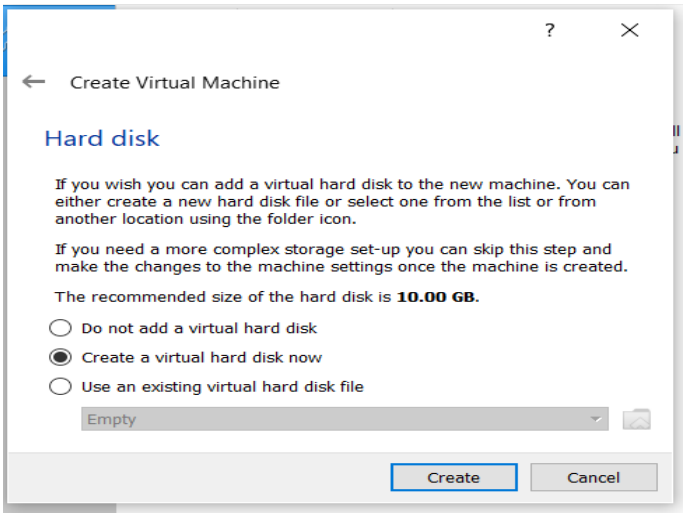
https://releases.ubuntu.com/18.04//ubuntu-18.04.4-desktop-amd64.iso

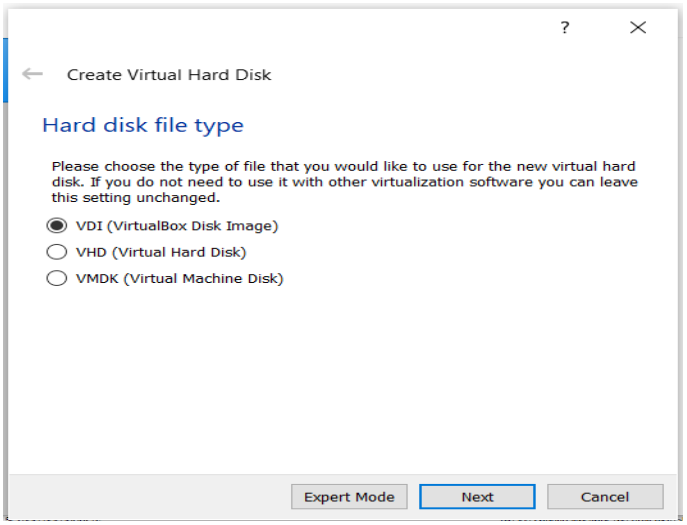
Step 2.2: install the Ubuntu on VirtualBox

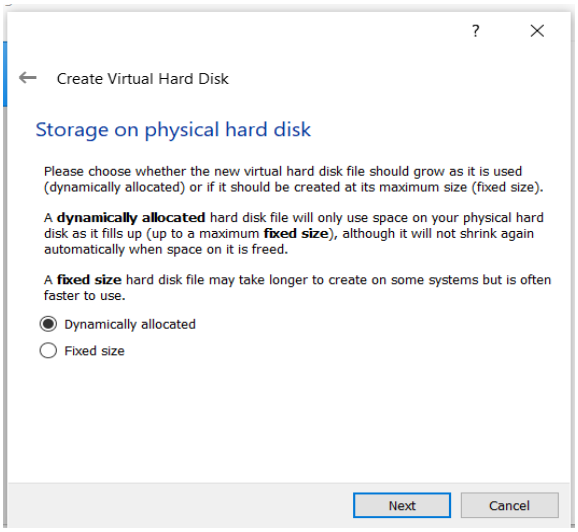


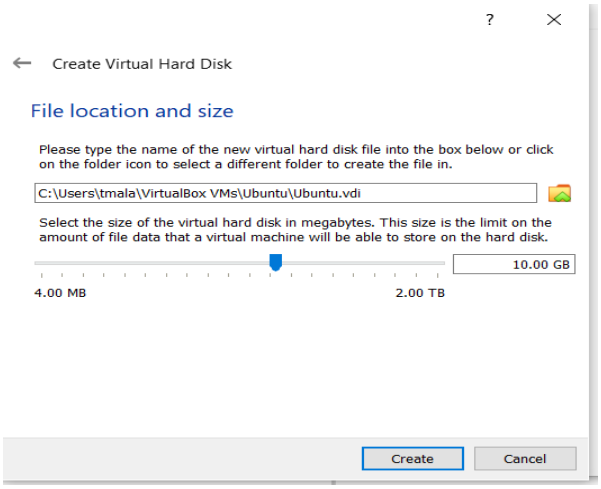


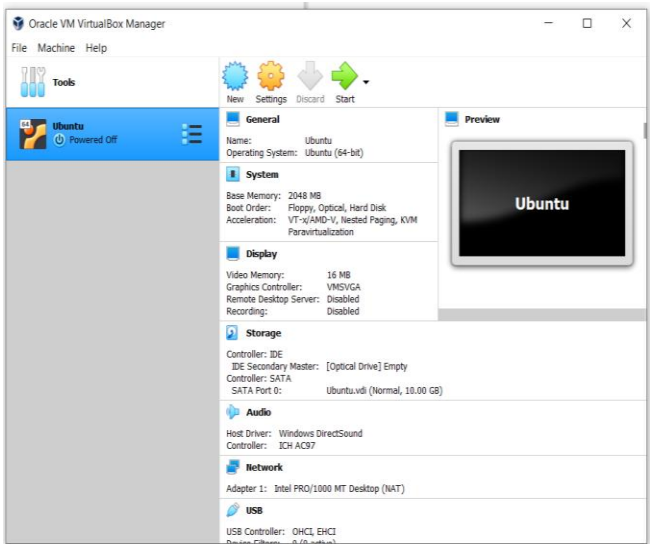

Create Virtual Machine
Memory size
Select the amount of memory (RAM) in megabytes to be allocated to the virtual machine.
The recommended memory size is 1024 MB.
2048
MB
4 MB
16384 MB
Next
Cancel

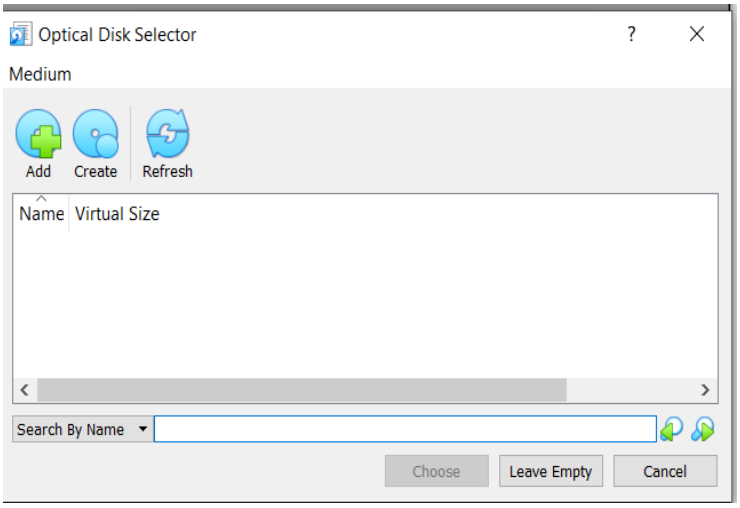

Create Virtual Machine
Hard disk
If you wish you can add a virtual hard disk to the new machine. You can either create a new hard disk file or select one from the list or from another location using the folder icon.
If you need a more complex storage set-up you can skip this step and make the changes to the machine settings once the machine is created.
The recommended size of the hard disk is 10.00 GB.
Do not add a virtual hard disk
Create a virtual hard disk now
Use an existing virtual hard disk file
Empty
Create
Cancel

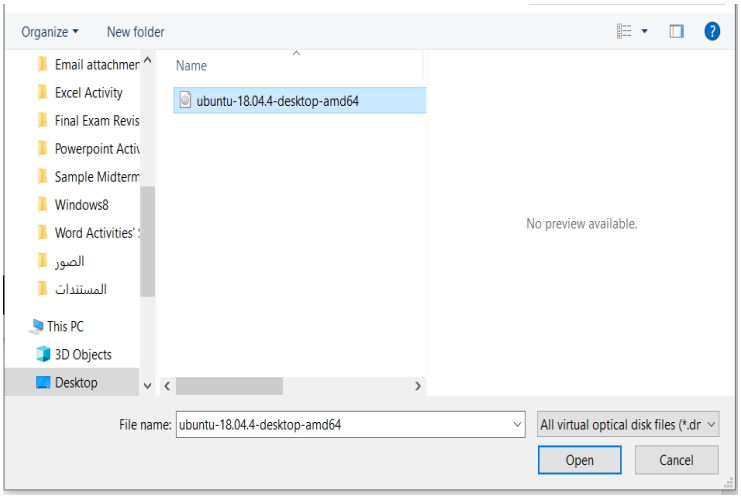

Create Virtual Hard Disk
Hard disk file type
Please choose the type of file that you would like to use for the new virtual hard disk. If you do not need to use it with other virtualization software you can leave this setting unchanged.
VDI (VirtualBox Disk Image)
VHD (Virtual Hard Disk)
VMDK (Virtual Machine Disk)
Expert Mode
Next
Cancel

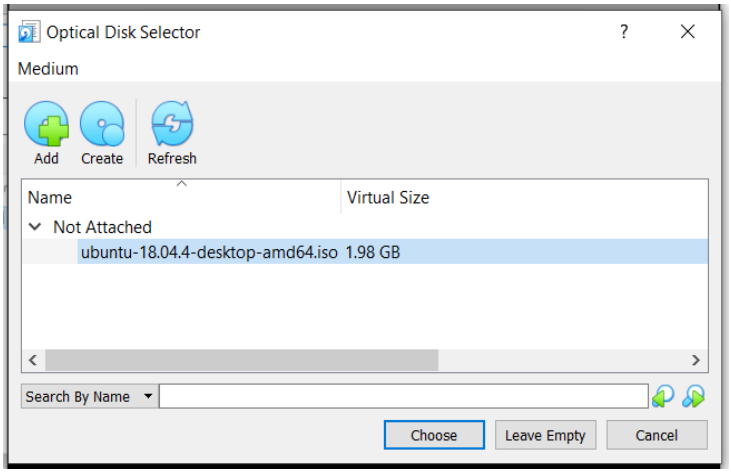

Create Virtual Hard Disk
Storage on physical hard disk
Please choose whether the new virtual hard disk file should grow as it is used (dynamically allocated) or if it should be created at its maximum size (fixed size).
A dynamically allocated hard disk file will only use space on your physical hard disk as it fills up (up to a maximum fixed size), although it will not shrink again automatically when space on it is freed.
A fixed size hard disk file may take longer to create on some systems but is often faster to use.
Dynamically allocated
Fixed size
Next
Cancel

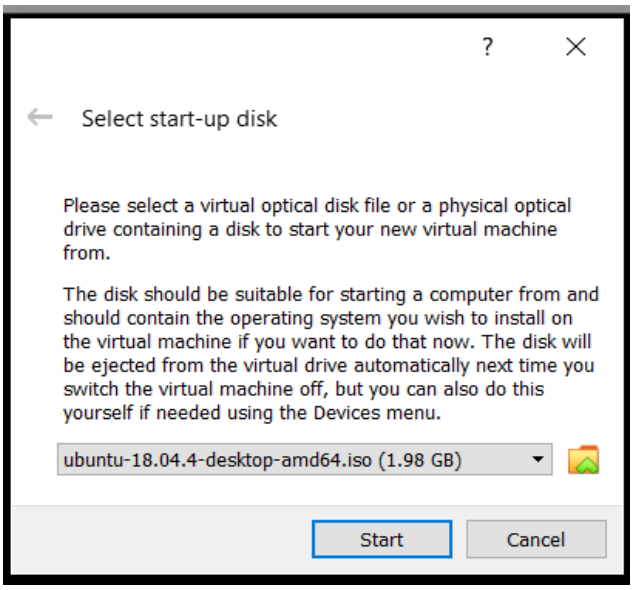

Create Virtual Hard Disk
File location and size
Please type the name of the new virtual hard disk file into the box below or click on the folder icon to select a different folder to create the file in.
C:\Users\tmala\VirtualBox VMs\Ubuntu\Ubuntu.vdi
Select the size of the virtual hard disk in megabytes. This size is the limit on the amount of file data that a virtual machine will be able to store on the hard disk.
10.00 GB
4.00 MB
2.00 TB
Create
Cancel


Oracle VM VirtualBox Manager
File Machine Help
Tools
New Settings Discard Start
Ubuntu
Powered Off
General
Name: Ubuntu
Operating System: Ubuntu (64-bit)
System
Base Memory: 2048 MB
Boot Order: Floppy, Optical, Hard Disk
Acceleration: VT-x/AMD-V, Nested Paging, KVM Paravirtualization
Display
Video Memory: 16 MB
Graphics Controller: VMSVGA
Remote Desktop Server: Disabled
Recording: Disabled
Storage
Controller: IDE
IDE Secondary Master: [Optical Drive] Empty
Controller: SATA
SATA Port 0: Ubuntu.vdi (Normal, 10.00 GB)
Audio
Host Driver: Windows DirectSound
Controller: ICH AC97
Network
Adapter 1: Intel PRO/1000 MT Desktop (NAT)
USB
USB Controller: OHCI, EHCI
Preview
Ubuntu


Optical Disk Selector
Medium
Add
Create
Refresh
Name
Virtual Size
Search By Name
Choose
Leave Empty
Cancel


Organize
New folder
Email attachmer
Excel Activity
Final Exam Revis
Powerpoint Activ
Sample Midterm
Windows8
Word Activities'
الصور
المستندات
This PC
3D Objects
Desktop
Name
ubuntu-18.04.4-desktop-amd64
No preview available.
File name:
ubuntu-18.04.4-desktop-amd64
All virtual optical disk files (*.dr
Open
Cancel

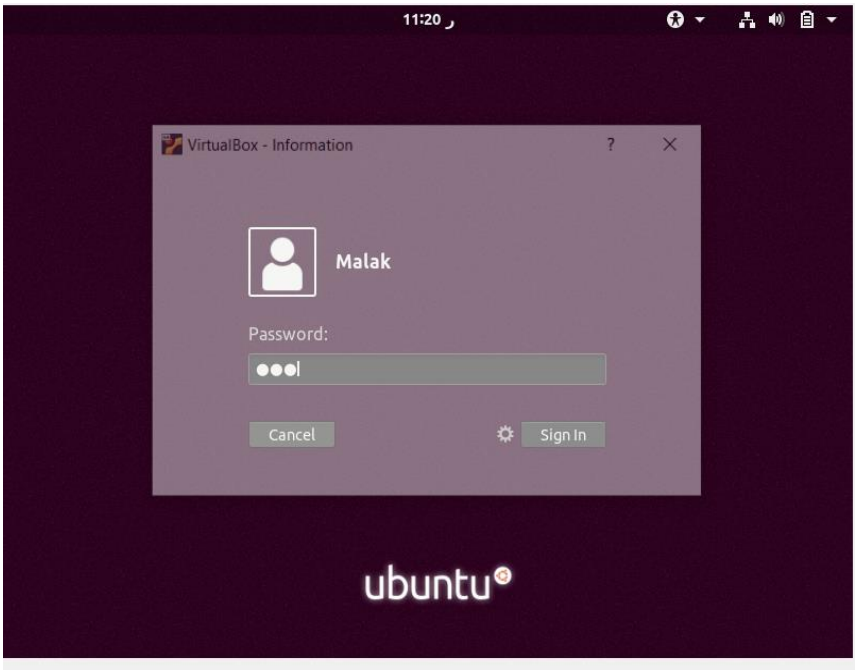

Optical Disk Selector
Medium
Add
Create
Refresh
Name
Virtual Size
Not Attached
ubuntu-18.04.4-desktop-amd64.iso 1.98 GB
Search By Name
Choose
Leave Empty
Cancel



Then select install ubuntu, language and zone

After that, define username and password

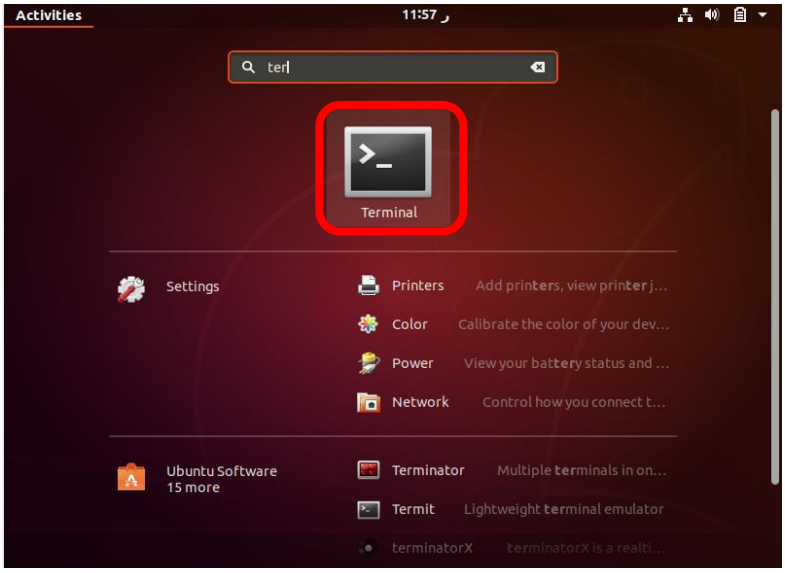
finally, restart the ubuntu



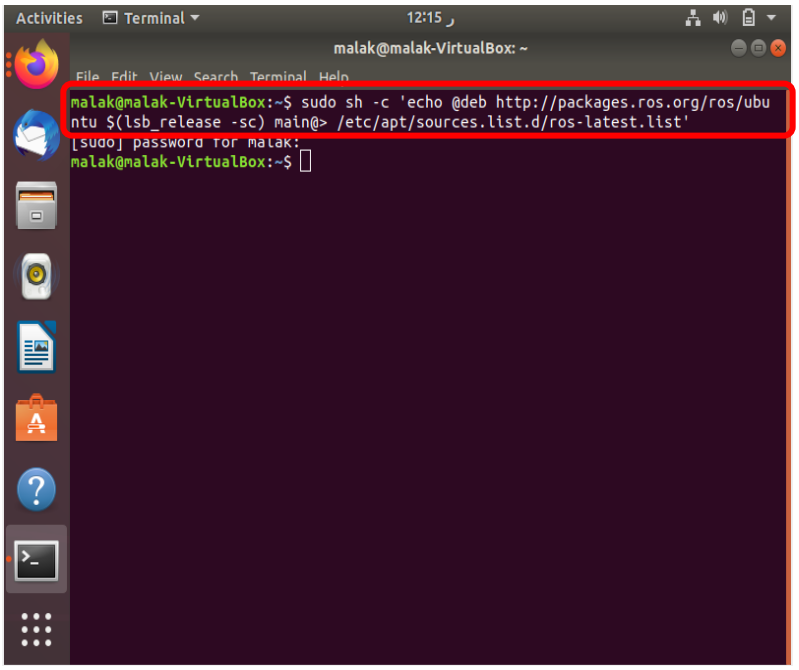
Step 3: Install ROS on Ubuntu

http://wiki.ros.org/noetic/Installation/Ubuntu

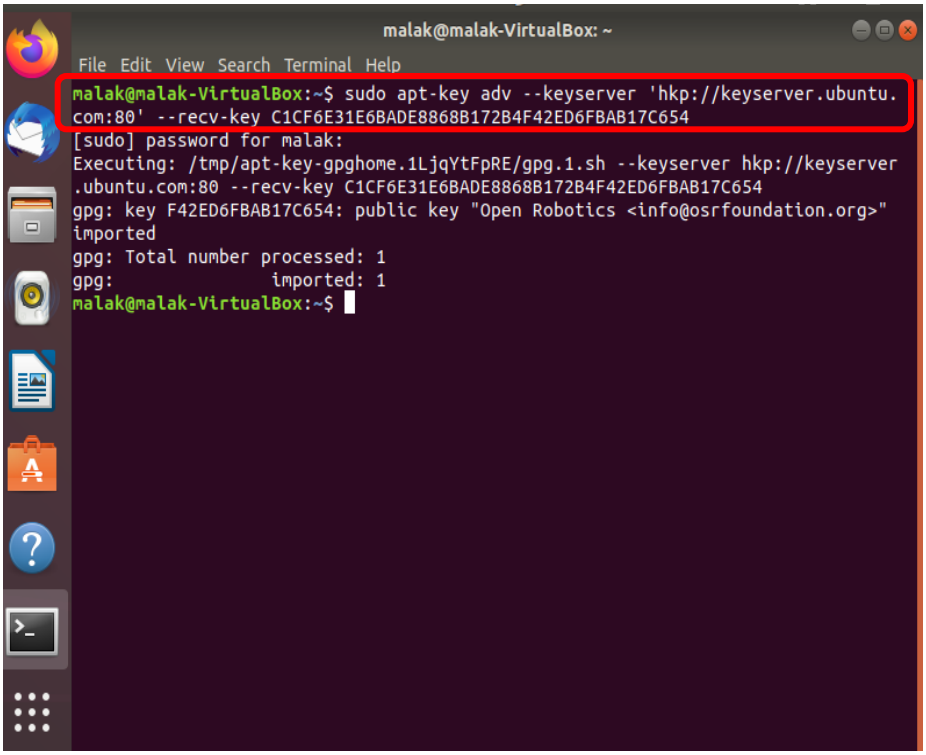
Step 3.1: open the terminal in Ubuntu



Step 3.2: Setup your sources.list



Step 3.3: Set up your keys



Step 3.4: Installation of ROS

```
malak@malak-VirtualBox:~$ curl -sSL 'http://keyserver.ubuntu.com/pks/lookup?op=get&search=0xC1CF6E31E6BADE8868B172B4F42ED6FBAB17C654' | sudo apt-key add -
OK
malak@malak-VirtualBox:~$
```

```
malak@malak-VirtualBox:~$ sudo apt update
Hit:1 http://sa.archive.ubuntu.com/ubuntu bionic InRelease
Get:2 http://sa.archive.ubuntu.com/ubuntu bionic-updates InRelease [88.7 kB]
Get:3 http://packages.ros.org/ros/ubuntu focal InRelease [4650 B]
Get:4 http://sa.archive.ubuntu.com/ubuntu bionic-backports InRelease [74.6 kB]
Get:5 http://packages.ros.org/ros/ubuntu focal/main i386 Packages [15.4 kB]
Get:6 http://sa.archive.ubuntu.com/ubuntu bionic-updates/main amd64 Packages [1008 kB]
Get:7 http://packages.ros.org/ros/ubuntu focal/main amd64 Packages [236 kB]
Get:8 http://security.ubuntu.com/ubuntu bionic-security InRelease [88.7 kB]
Get:9 http://security.ubuntu.com/ubuntu bionic-security/main amd64 Packages [781 kB]
Get:10 http://sa.archive.ubuntu.com/ubuntu bionic-updates/main i386 Packages [7
```

```
malak@malak-VirtualBox:~$ sudo apt-get install aptitude
Reading package lists... Done
Building dependency tree
Reading state information... Done
The following additional packages will be installed:
  aptitude-common libcwidget3v5 libsigc++-2.0-0v5
Suggested packages:
  aptitude-doc-en | aptitude-doc apt-xapian-index debtags
  tasksel libcwidget-dev
The following NEW packages will be installed:
  aptitude aptitude-common libcwidget3v5
  libsigc++-2.0-0v5
0 upgraded, 4 newly installed, 0 to remove and 244 not upgraded.
Need to get 2580 kB of archives.
After this operation, 10.9 MB of additional disk space will be used.
Do you want to continue? [Y/n]
```

```
malak@malak-VirtualBox:~$ sudo aptitude install ros-noetic-desktop-full
The following NEW packages will be installed:
  autoconf{a} automake{a} autopoint{a} autotools-dev{a} binfmt-support{a}
  blt{a} build-essential{a} bzip2-doc{a} cmake{a} cmake-data{a} cython{a}
  debhelper{a} default-libmysqlclient-dev{a} dh-autoreconf{a} dh-python{a}
  dh-strip-nondeterminism{a} docutils-common{a} dpkg-dev{a} fakeroot{a}
  fltk1.3-doc{a} fluid{a} fonts-lato{a} fonts-lyx{a} freeglut3{a}
  freeglut3-dev{a} g++{a} g++-7{a} gazebo11{ab} gazebo11-common{a}
  gazebo11-plugin-base{ab} gcc{a} gcc-4.8-base{a} gcc-7{a} gdal-data{a}
  gir1.2-gtk-2.0{a} gir1.2-harfbuzz-0.0{a} google-mock{a} googletest{a}
  graphviz{a} hddtemp{a} hdf5-helpers{a} i965-va-driver{a}
  ibverbs-providers{a} icu-devtools{a} ignition-tools{a}
```