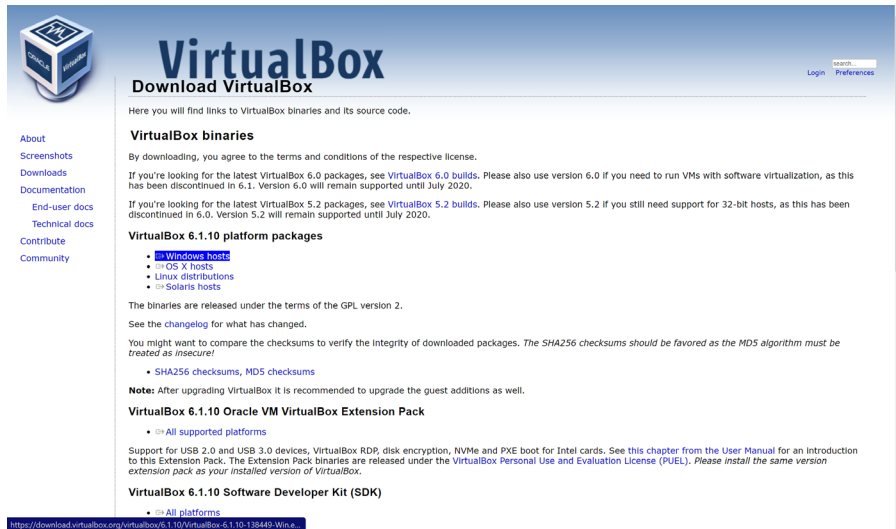
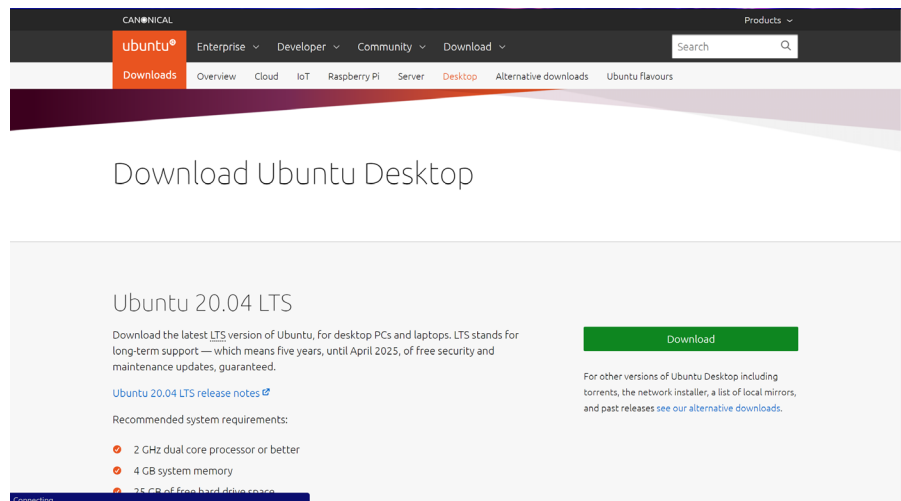


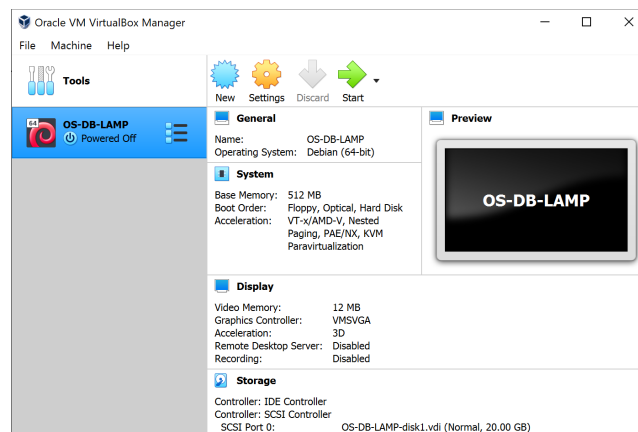
1- Install the virtual box through the VirtualBox downloads page.



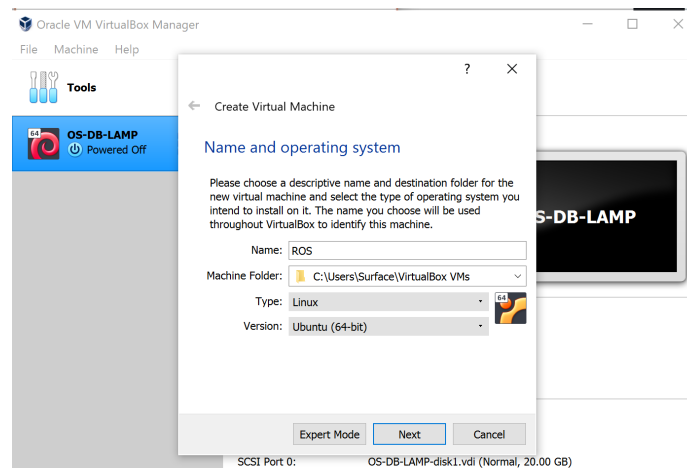
2- Install Ubuntu. A file with iso extension will be downloaded.



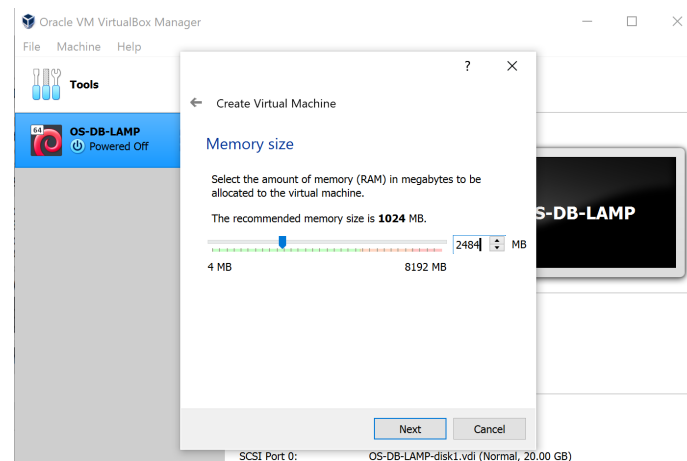
3- In the virtual box, click on New.



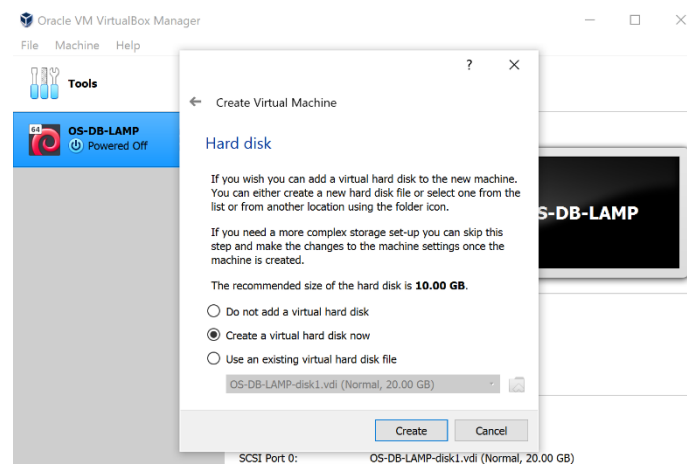
- 4- Enter the name you want for the virtual OS that you want. Select Linux in the type and Ubuntu (64 bit) in the version. Click on Next.



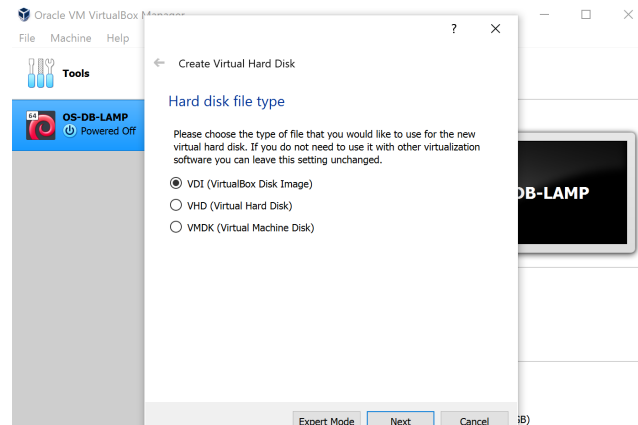
- 5- Allocate the RAM for Ubuntu OS. For example, 2484 MB. Click on next.



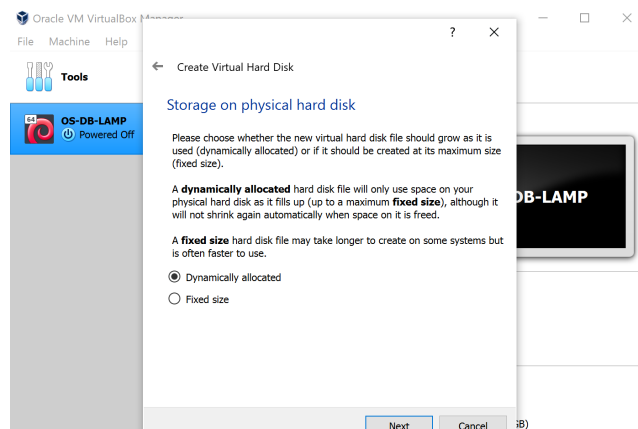
- 6- Choose to create virtual hard disk now, and click on “create”.



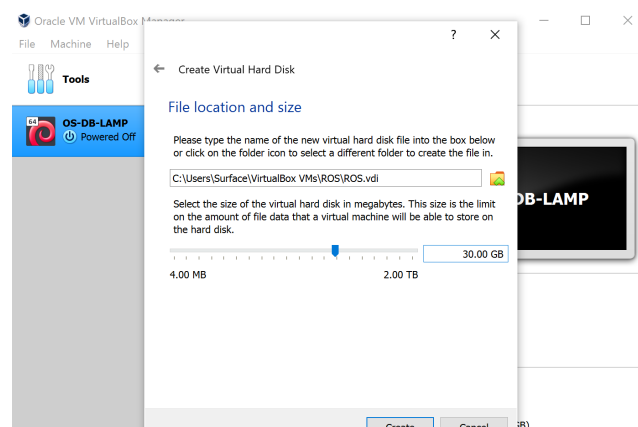
7- We will choose the hard disk file type as the *VDI*. Click on Next.



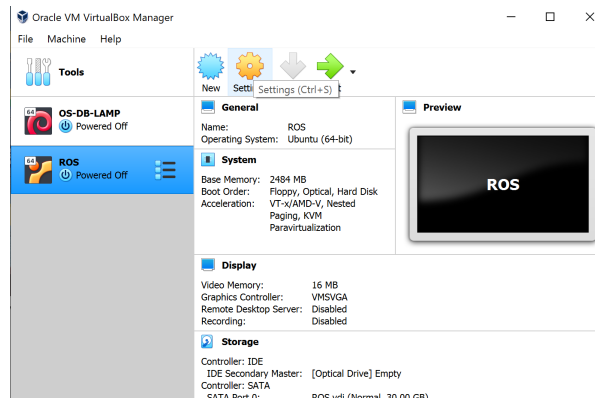
8- Choose *dynamically allocated* option.



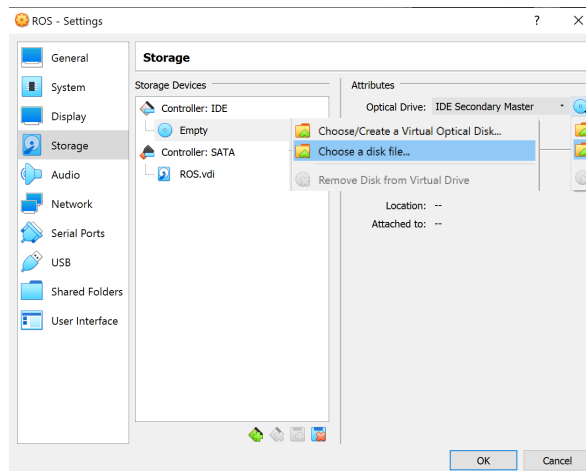
9- Enter the size of the virtual hard disk, for example 30 GB.



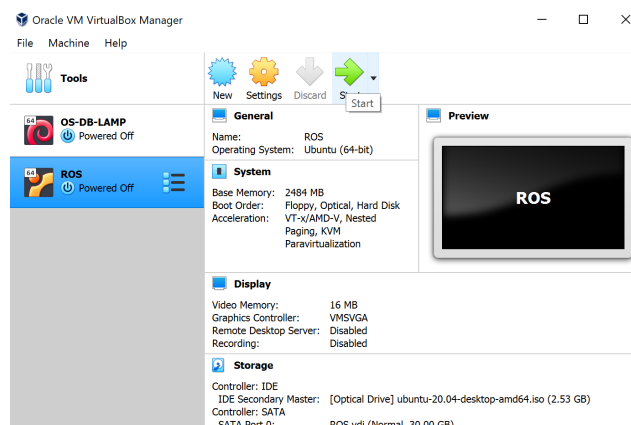
10-Now, we should select the Ubuntu iso file that we downloaded, click on the settings icon.



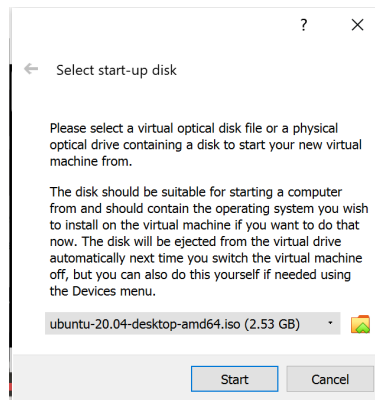
11-Go to the storage tab, make sure to select empty under Controller IDE. In the Optical Device attribute box, click on the disk icon and choose a disk file. A file explorer window will be displayed. Select the iso file of Ubuntu.



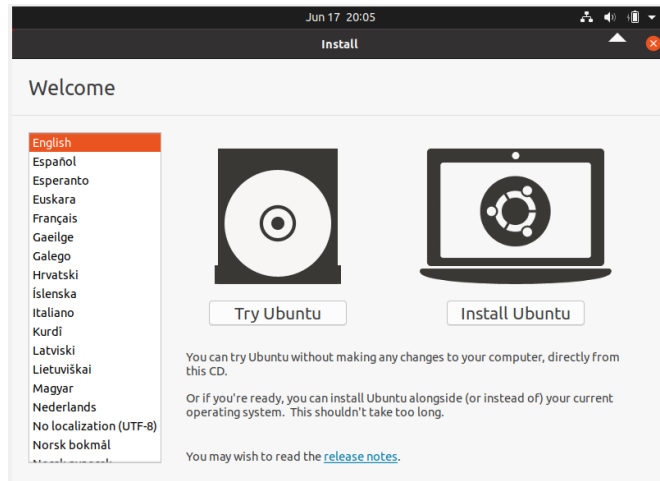
12-Now, we can boot up by clicking the Start icon



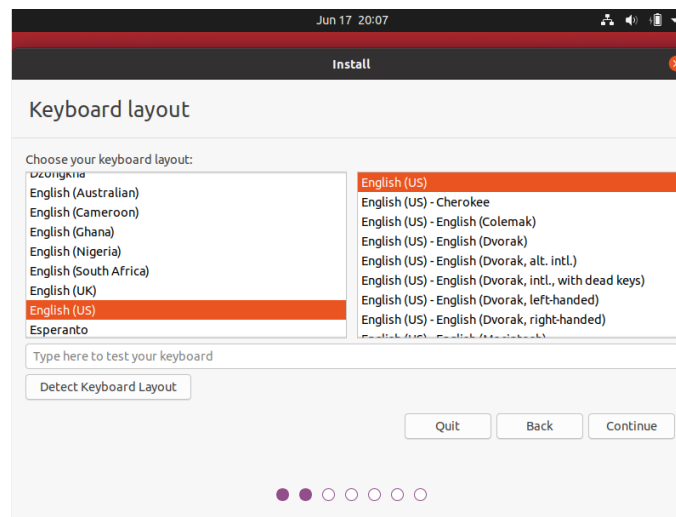
13-Click Start button.



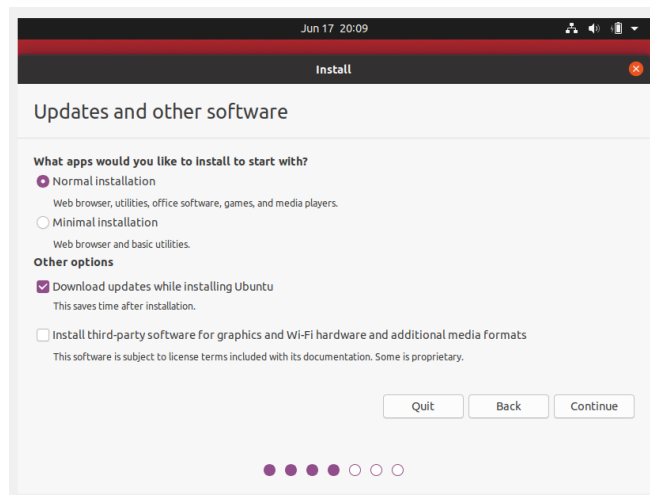
14-Once the boot up ends, click install ubuntu.



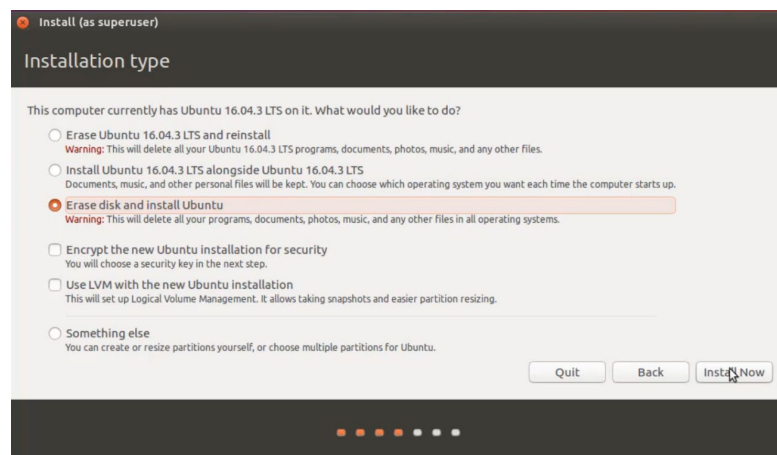
15-Select a language and click Continue.



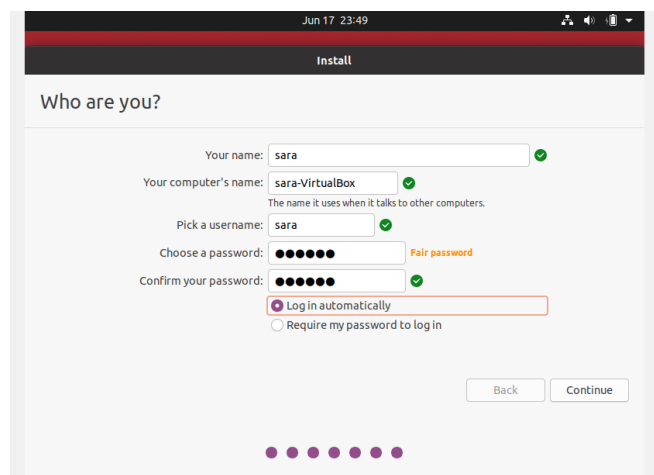
16-Select normal installation and Click continue.



17-Choose *Erase disk and install Ubuntu* option. Click on *Install Now*.



18-Fill the boxes and click on *Continue*.



19-The installation will start. Once it finishes, Click on Restart Now.



Installing ROS

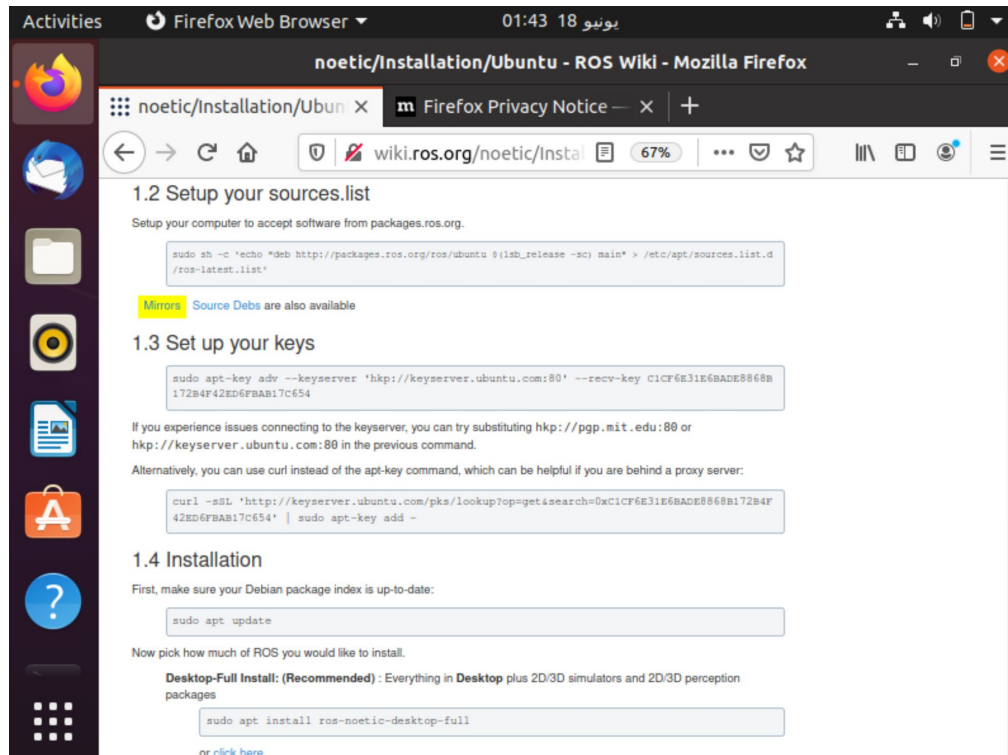
- 1- Open the terminal
- 2- Type the statement `sudo apt update`.

```
Activities  Terminal  00:50 18 يونيو
sara@sara-VirtualBox: ~
sara@sara-VirtualBox:~$ sudo apt update
[sudo] password for sara:
Hit:1 http://sa.archive.ubuntu.com/ubuntu focal InRelease
Hit:2 http://security.ubuntu.com/ubuntu focal-security InRelease
Hit:3 http://sa.archive.ubuntu.com/ubuntu focal-updates InRelease
Hit:4 http://sa.archive.ubuntu.com/ubuntu focal-backports InRelease
Get:5 http://sa.archive.ubuntu.com/ubuntu focal/main DEP-11 48x48 Icons [98.4 kB]
Get:6 http://security.ubuntu.com/ubuntu focal-security/main DEP-11 48x48 Icons [8330 B]
Get:7 http://sa.archive.ubuntu.com/ubuntu focal/main DEP-11 64x64 Icons [163 kB]
Get:8 http://security.ubuntu.com/ubuntu focal-security/main DEP-11 64x64 Icons [12.1 kB]
Get:9 http://security.ubuntu.com/ubuntu focal-security/main DEP-11 64x64@2 Icons [29 B]
Get:10 http://security.ubuntu.com/ubuntu focal-security/universe DEP-11 48x48 Icons [3321 B]
Get:11 http://security.ubuntu.com/ubuntu focal-security/universe DEP-11 64x64 Icons [5013 B]
Get:12 http://security.ubuntu.com/ubuntu focal-security/universe DEP-11 64x64@2 Icons [29 B]
Get:13 http://sa.archive.ubuntu.com/ubuntu focal/main DEP-11 64x64@2 Icons [15.8 kB]
Get:14 http://sa.archive.ubuntu.com/ubuntu focal/universe DEP-11 48x48 Icons [3016 kB]
37% [14 icons-48x48 2318 kB/3016 kB 77%]
```

- 3- Type the statement `sudo apt upgrade`.

```
sara@sara-VirtualBox:~$ sudo apt upgrade
Reading package lists... Done
Building dependency tree
Reading state information... Done
Calculating upgrade... Done
0 upgraded, 0 newly installed, 0 to remove and 0 not upgraded.
sara@sara-VirtualBox:~$
```

- 4- Go to any browser, search for ROS installation. You should make sure to choose the right version which is compatible with the Ubuntu that you downloaded. In our case, we go to noetic installation. Copy the line under *Setup your sources.list*. Paste it in the terminal.

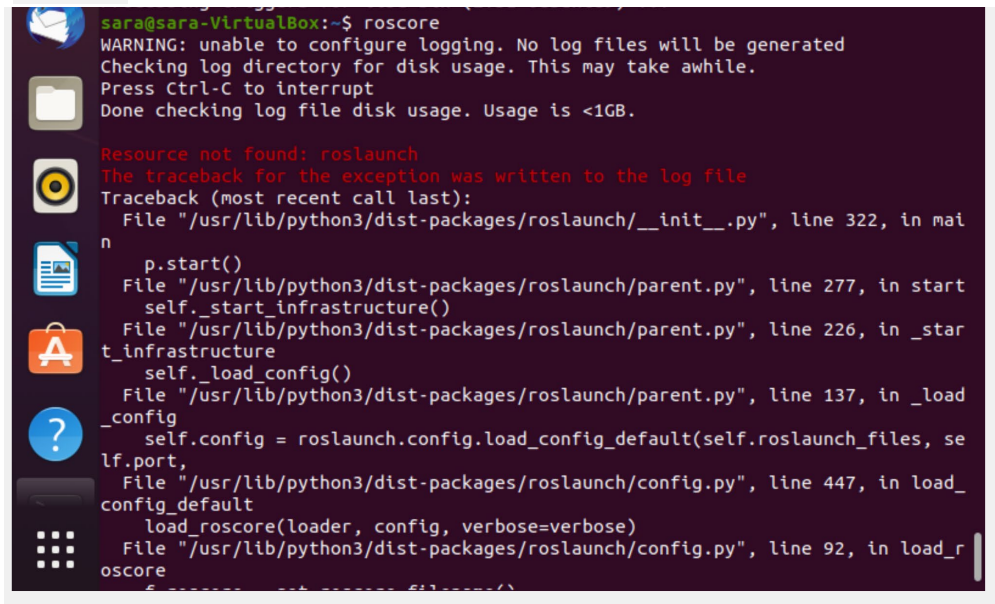


```
sara@sara-VirtualBox:~$ sudo sh -c 'echo "deb http://packages.ros.org/ros/ubuntu $(lsb_release -sc) main" > /etc/apt/sources.list.d/ros-latest.list'
sara@sara-VirtualBox:~$
```

- 5- Do the same with the statement in the next line in the installation page.

```
sara@sara-VirtualBox:~$ sudo apt-key adv --keyserver 'hkp://keyserver.ubuntu.com:80' --recv-key C1CF6E31E6BADE8868B172B4F42ED6FBAB17C654
Executing: /tmp/apt-key-gpghome.11ARN8eYk7/gpg.1.sh --keyserver hkp://keyserver.ubuntu.com:80 --recv-key C1CF6E31E6BADE8868B172B4F42ED6FBAB17C654
gpg: key F42ED6FBAB17C654: public key "Open Robotics <info@osrfoundation.org>" imported
gpg: Total number processed: 1
gpg: imported: 1
sara@sara-VirtualBox:~$
```


6- Type `roscore` to start ROS.

A terminal window with a dark background and light text. The prompt is 'sara@sara-VirtualBox:~\$'. The user has entered 'roscore'. The output shows a warning about logging, a check for disk usage, and then a 'Resource not found: roslaunch' error. A detailed traceback follows, showing the error originates from the roslaunch package's __init__.py file, specifically in the start() function, which calls start_infrastructure(), which then calls _load_config(), leading to the error in load_config_default().

```
sara@sara-VirtualBox:~$ roscore
WARNING: unable to configure logging. No log files will be generated
Checking log directory for disk usage. This may take awhile.
Press Ctrl-C to interrupt
Done checking log file disk usage. Usage is <1GB.

Resource not found: roslaunch
The traceback for the exception was written to the log file
Traceback (most recent call last):
  File "/usr/lib/python3/dist-packages/roslaunch/__init__.py", line 322, in mai
n
    p.start()
  File "/usr/lib/python3/dist-packages/roslaunch/parent.py", line 277, in start
    self._start_infrastructure()
  File "/usr/lib/python3/dist-packages/roslaunch/parent.py", line 226, in _star
t_infrastructure
    self._load_config()
  File "/usr/lib/python3/dist-packages/roslaunch/parent.py", line 137, in _load
_config
    self.config = roslaunch.config.load_config_default(self.roslaunch_files, se
lf.port,
  File "/usr/lib/python3/dist-packages/roslaunch/config.py", line 447, in load_
config_default
    load_roscore(loader, config, verbose=verbose)
  File "/usr/lib/python3/dist-packages/roslaunch/config.py", line 92, in load_r
oscore
    f = open(os.path.expanduser(filename))
```

7- Type the following statements to navigate to noetic and setup ROS.

```
cd /opt/ros/
ls
cd noetic/
ls
source setup.bash
roscore
```

8- Press in the keyboard ctrl + C.

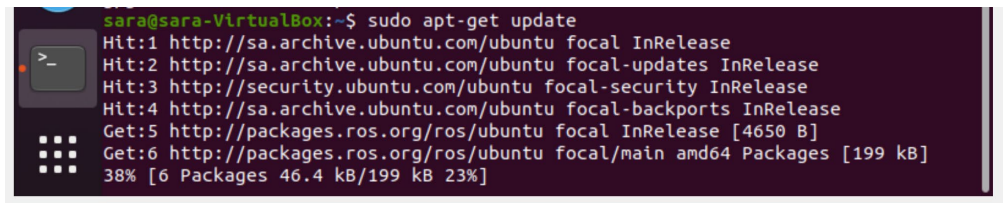
9- Type `vim ~/.bashrc`.

A terminal window showing the prompt 'sara@sara-VirtualBox:/opt/ros/noetic\$'. The user has entered 'vim ~/.bashrc'. The prompt changes to 'sara@sara-VirtualBox:/opt/ros/noetic\$' with a cursor at the end.

```
sara@sara-VirtualBox:/opt/ros/noetic$ vim ~/.bashrc
sara@sara-VirtualBox:/opt/ros/noetic$
```

10-Add the line `source /opt/ros/noetic/setup.bash` at the end of the file. Now, you are able to enter roscore anytime without problems.

11-Finally, update.

A terminal window with a dark purple background and a light gray border. On the left side of the terminal, there is a vertical toolbar with three icons: a terminal icon (a square with a greater-than sign and a dash), a file manager icon (a folder), and an application launcher icon (a 3x3 grid of dots). The terminal text is as follows:

```
sara@sara-VirtualBox:~$ sudo apt-get update
Hit:1 http://sa.archive.ubuntu.com/ubuntu focal InRelease
Hit:2 http://sa.archive.ubuntu.com/ubuntu focal-updates InRelease
Hit:3 http://security.ubuntu.com/ubuntu focal-security InRelease
Hit:4 http://sa.archive.ubuntu.com/ubuntu focal-backports InRelease
Get:5 http://packages.ros.org/ros/ubuntu focal InRelease [4650 B]
Get:6 http://packages.ros.org/ros/ubuntu focal/main amd64 Packages [199 kB]
38% [6 Packages 46.4 kB/199 kB 23%]
```