OPERATING SYSTEM LABORATORY MANUAL

UNIVERSITY OF THE PUNJAB

FACULTY OF COMPUTING & INFORMATION TECHNOLOGY, LAHORE

DEPARTMENT OF COMPUTER SCIENCE

Course:	**Operating System Lab**	**Date:**
Course Code:	**CC-217-3L**	**Max Marks: 40**
Faculty/Instructor's Name & Email:	**Dr. Ahmad Hassan Butt (ahmad.hassan@pucit.edu.pk)**	

LAB MANUAL # 2

(SPRING 2023)

Name:_____ Enroll No: _____

Objective(s) :

Installation of VMWare and Ubuntu.

Lab Tasks :

Task 1 + 2 : Installation of VMWare

Task 3 + 4 : Installation of Ubuntu

Lab Grading Sheet :

Task	Max Marks	Obtained Marks	Comments(*if any*)
1.	10		
2.	10		
3.	10		
4.	10		
Total	**40**		**Signature**

Note : Attempt all tasks and get them checked by your Instructor

Lab 02: Installation of VMWare and Ubuntu

Objective(s):

Installation of VMWare and Ubuntu.

Tool(s) used:

Ubuntu

UNIX OPERATING SYSTEM

An operating system is the program that controls all the other parts of a computer system - both the hardware and the software. Most importantly, it allows you to make use of the facilities provided by the system. Example of operating system are Windows XP, Windows NT, UNIX, Linux, ..etc.

UNIX is an operating system which was first developed in the 1960s, and has been under constant development ever since. By operating system, we mean the suite of programs which make the computer work. It is a stable, multi-user, multi-tasking system for servers, desktops and laptops.

UNIX systems also have a graphical user interface (GUI) similar to Microsoft Windows which provides an easy to use environment. However, knowledge of UNIX is required for operations which aren't covered by a graphical program, or for when there is no windows interface available, for example, in a telnet session.

Different Versions of Unix

There are many different versions of UNIX, although they share common similarities. The most popular varieties of UNIX are:

Sun Solaris,
GNU/Linux, and
MacOS X.

UBUNTU Operating System

Ubuntu is a Debian-based Linux operating system for personal computers, tablets and smartphones, where Ubuntu Touch edition is used; and also runs network servers, usually with the Ubuntu Server edition, either on physical or virtual servers (such as on mainframes) or with containers, that is with enterprise-class features; runs on the most popular architectures, including server-class ARM-based.

Installation of UBUNTU

The installation system is easy to use even if you lack previous knowledge of Linux or computer networks. If you select default options, Ubuntu provides a complete desktop operating system, including productivity applications, Internet utilities, and desktop tools. Ubuntu Workstation is a reliable, user-friendly, and powerful operating system for your laptop or desktop computer. It supports a wide range of developers, from hobbyists and students to professionals in corporate environments.

Installing VMware Tools

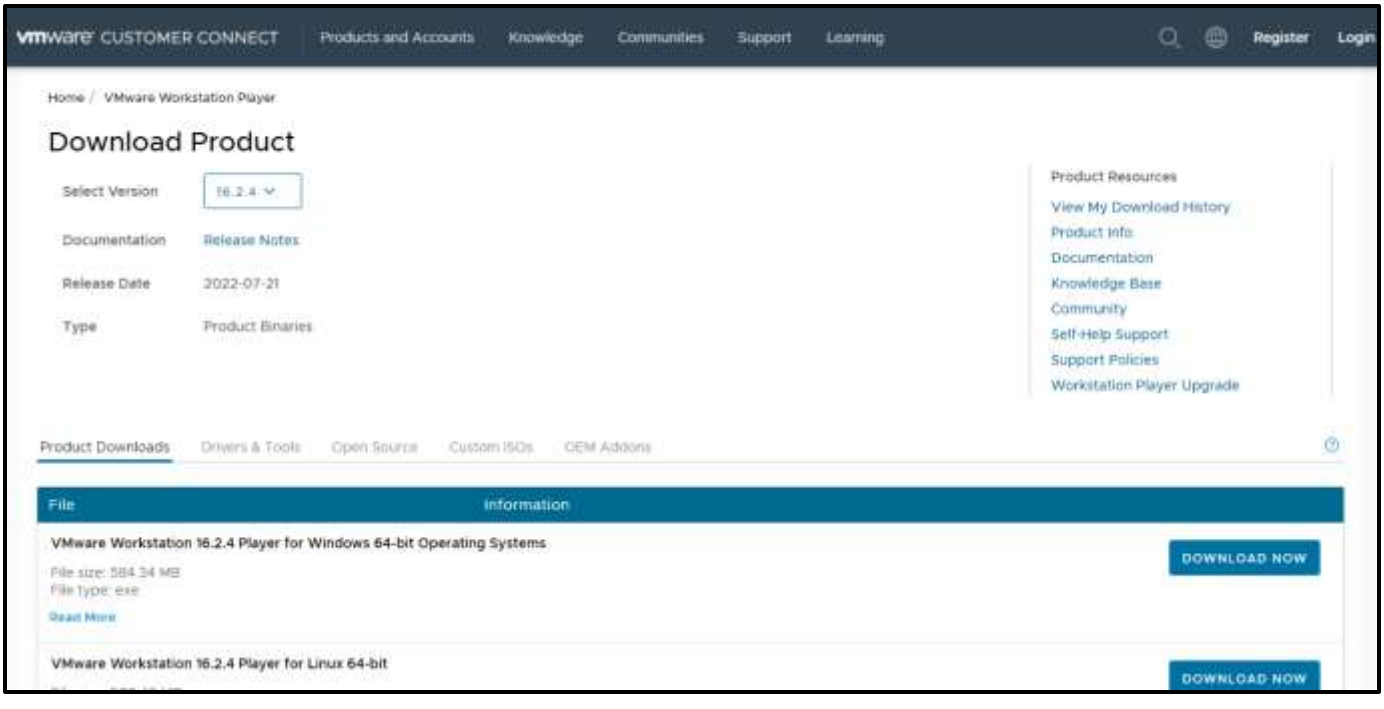
The following are general steps used to start the VMware Tools installation in most VMware products. Certain guest operating systems may require different steps, but these steps work for most operating systems. Links to more detailed steps for different operating systems are included in this article. Make sure to review the VMware documentation for the product you are using.

VMware develops virtualization Software. Virtualization software creates an abstraction layer over computer hardware that allows the hardware elements of a single computer processors, memory, storage, and more to be divided into multiple virtual computers, commonly called virtual machines (VMs). Each virtual machine runs its own operating system (OS) and behaves like an independent computer, even though it is running on a portion of the actual underlying computer hardware. A VM is a software-based representation of a physical computer. An operating system (OS) running in a VM is called a guest OS.

Method 01: Setting up Ubuntu with Vmware

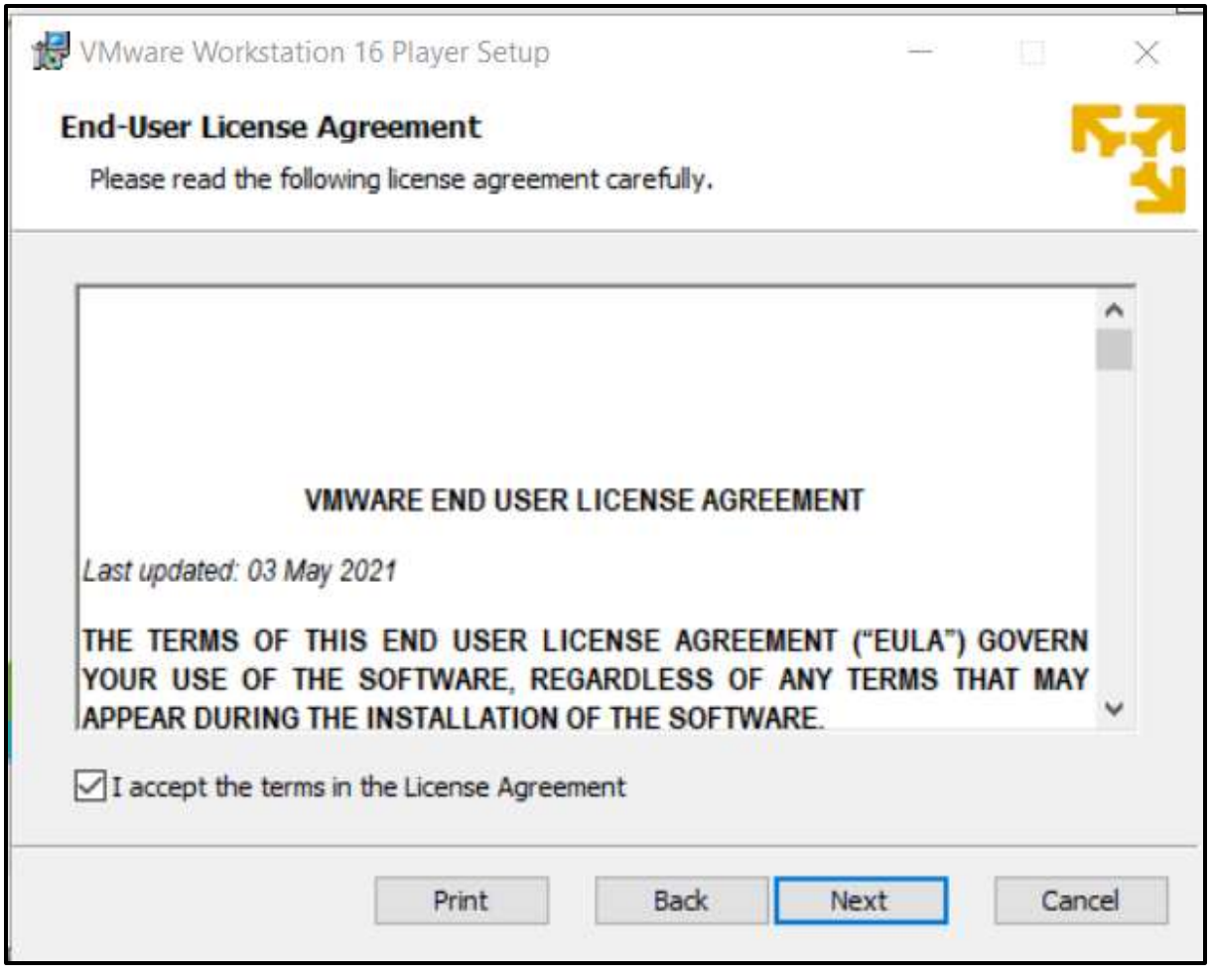
1. Installing VMware Workstation from given below link. There are two options for downloading one is Windows and other for Linux.

   https://customerconnect.vmware.com/en/downloads/details?downloadGroup=WKST-PLAYER-1624&productId=1039&rPId=91446

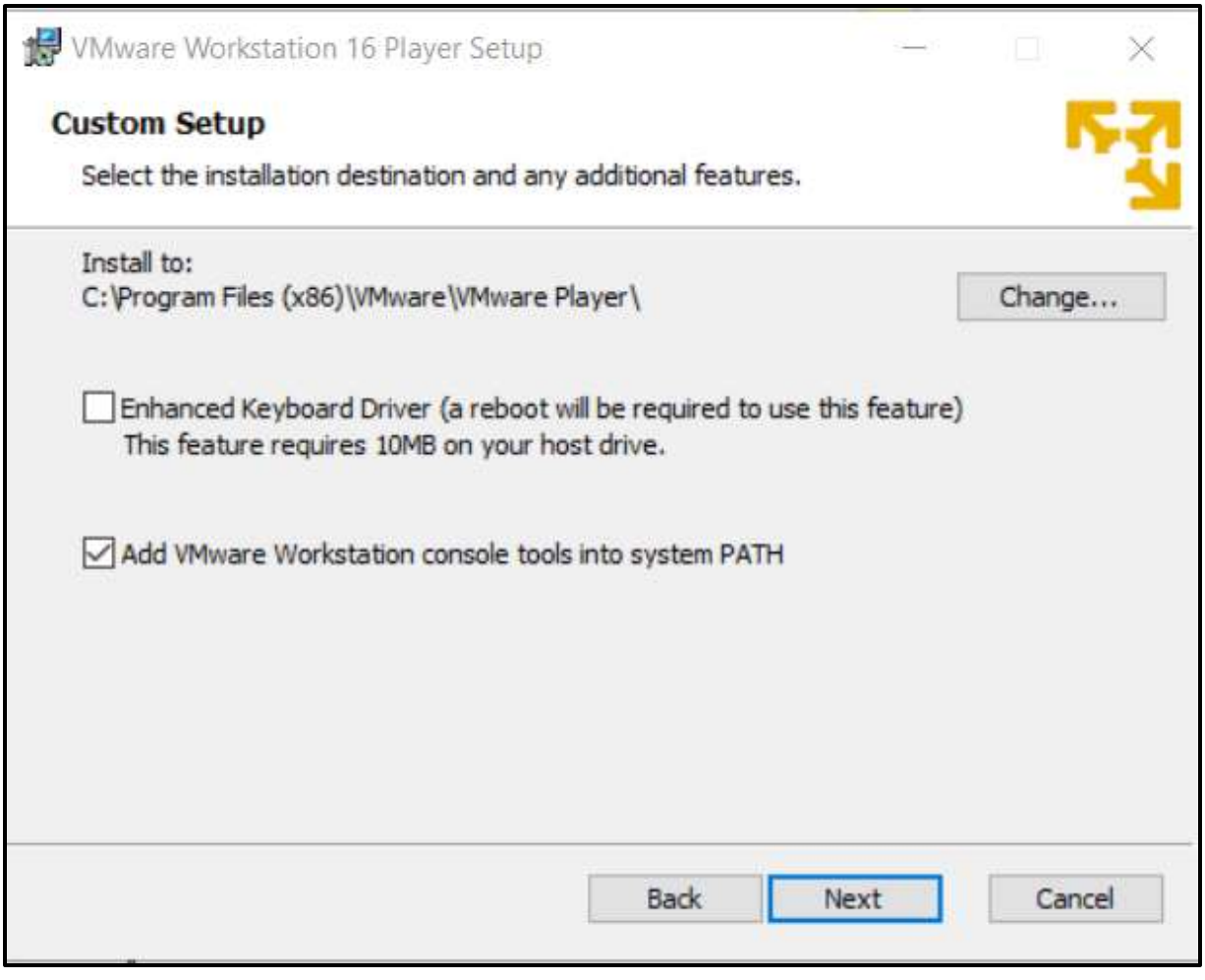


2. Run the VMware downloaded File and Click on Next to the Installation wizard.

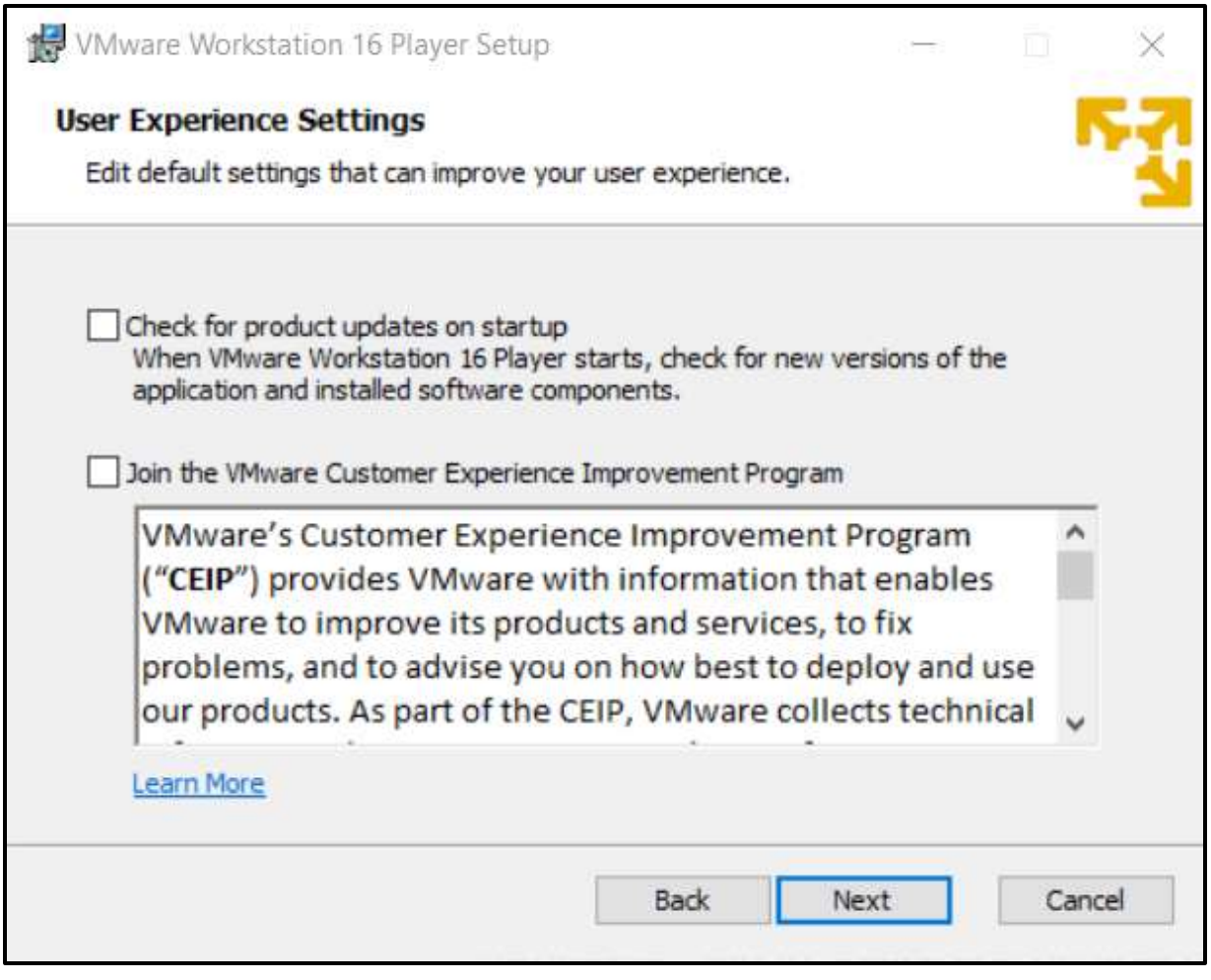
3. Accept user license agreement and click on next.



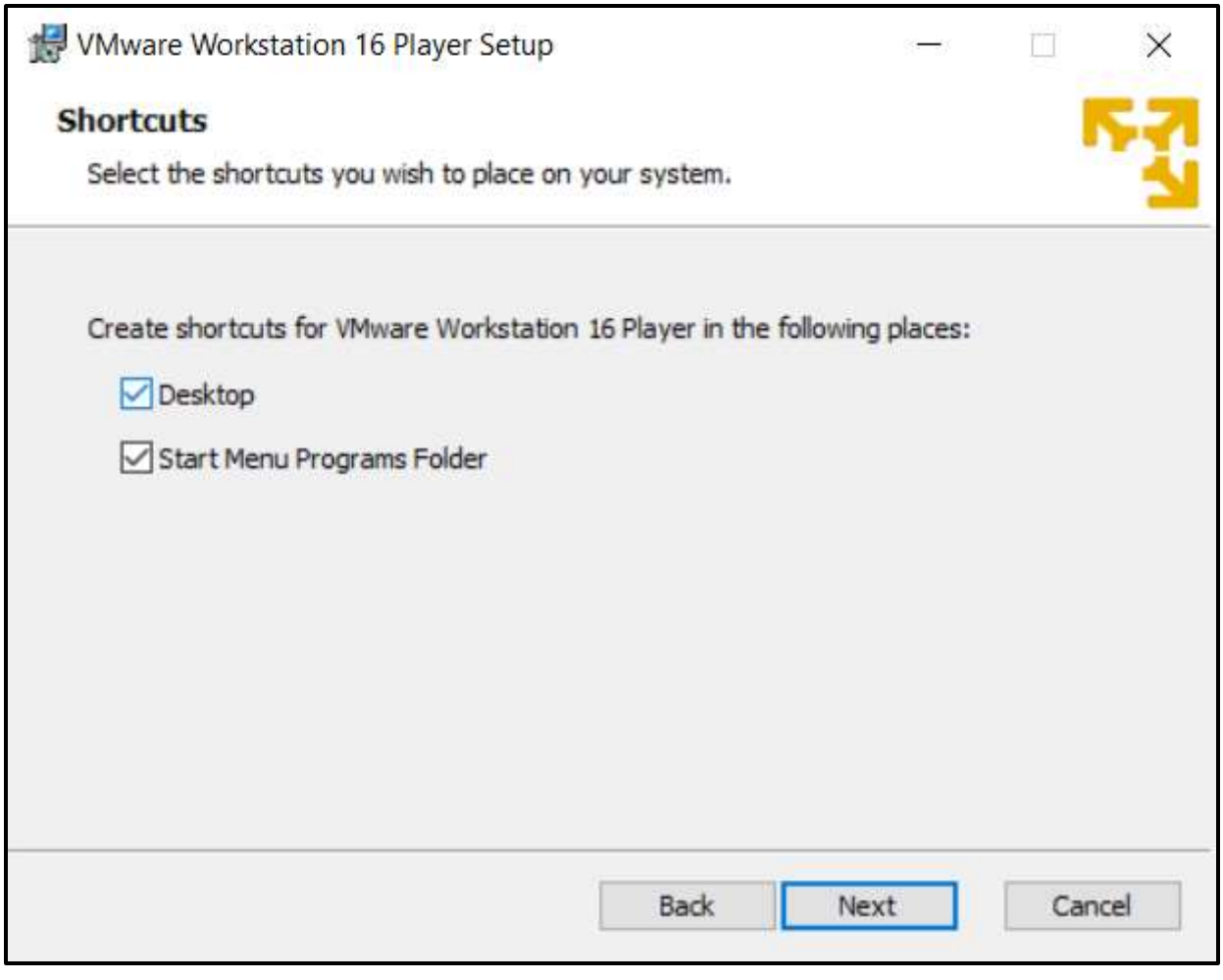
4. Specify the Installation directory. You can also enable Enhance keyboard driver here. Click Next to continue.



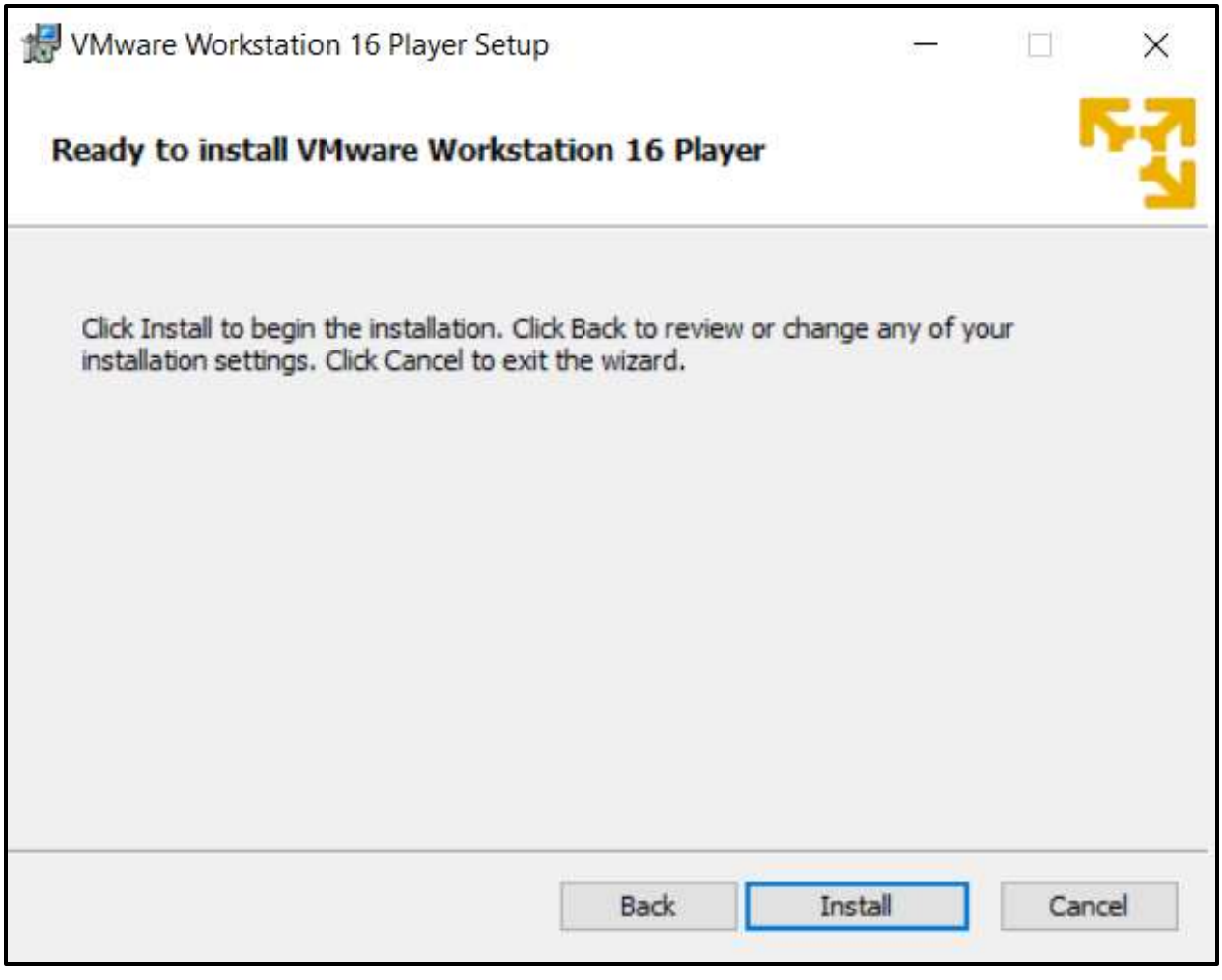
5. You can enable product startup and join the VMware Customer experience Improvement program here. Click Next to Continue.



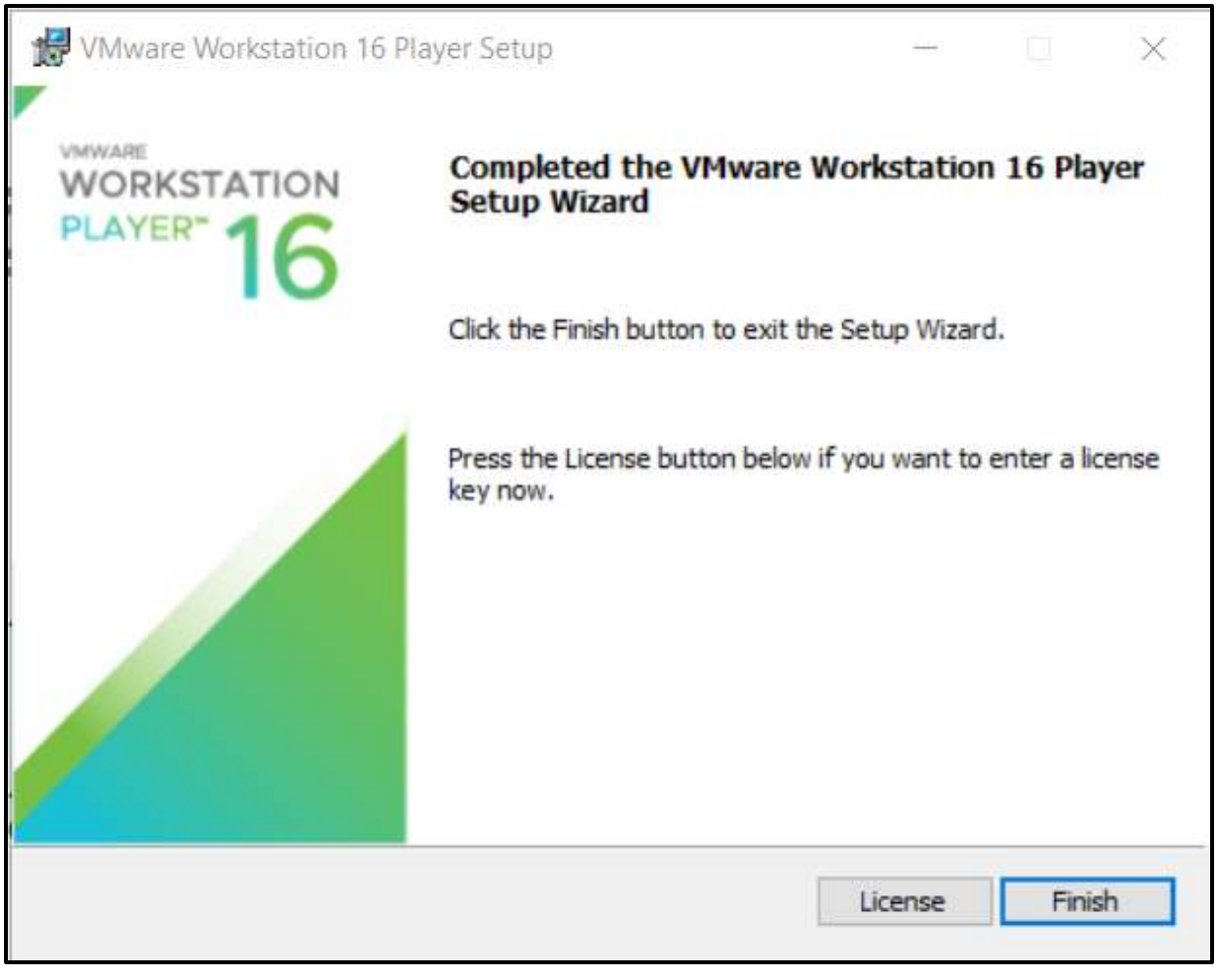
6. Select the shortcuts you want to create for easy access to VMware Workstation. Click Next to Continue.



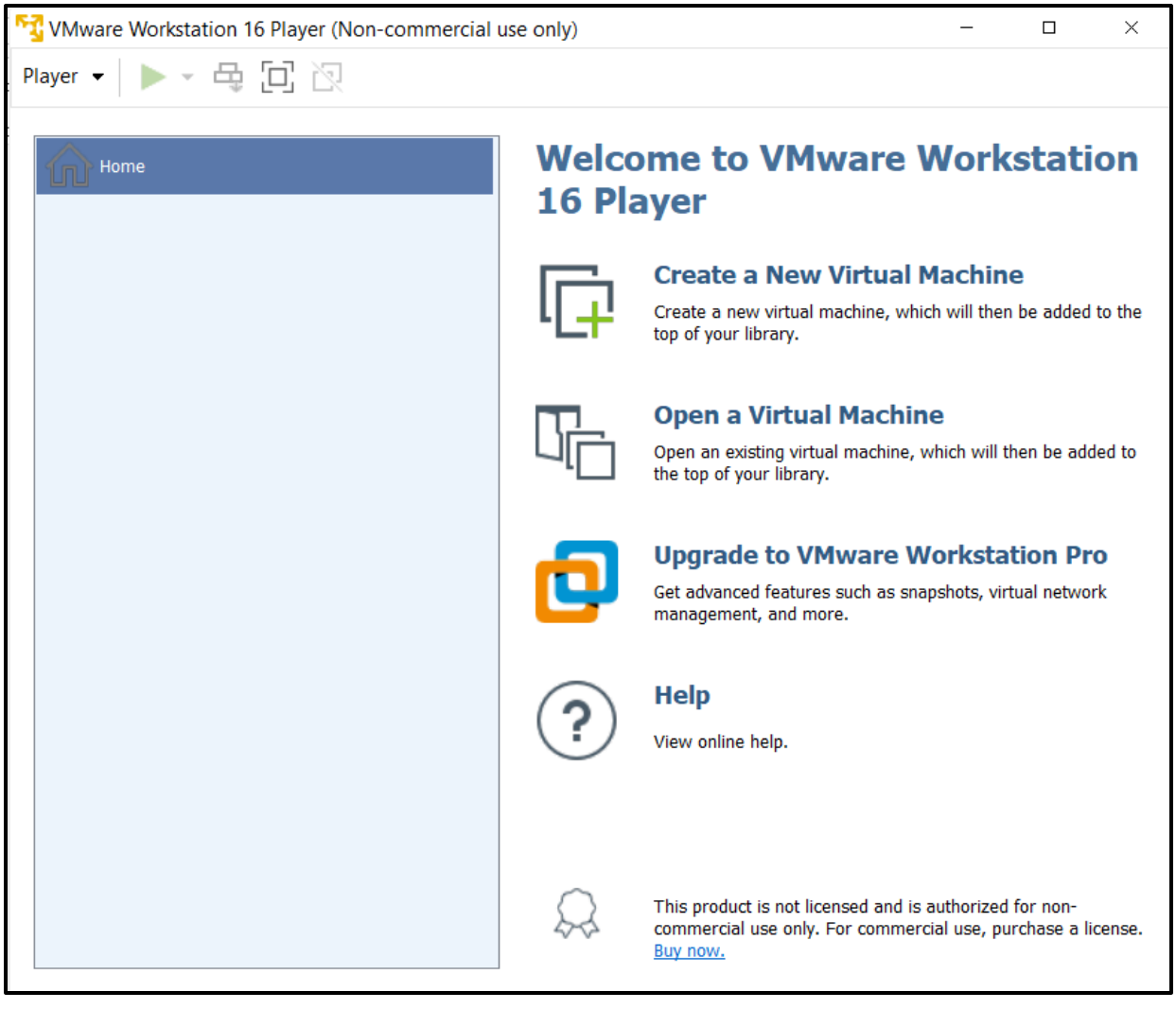
7. Click Install button to start the installation.



8. Installation will take just few seconds to complete. Click finish.

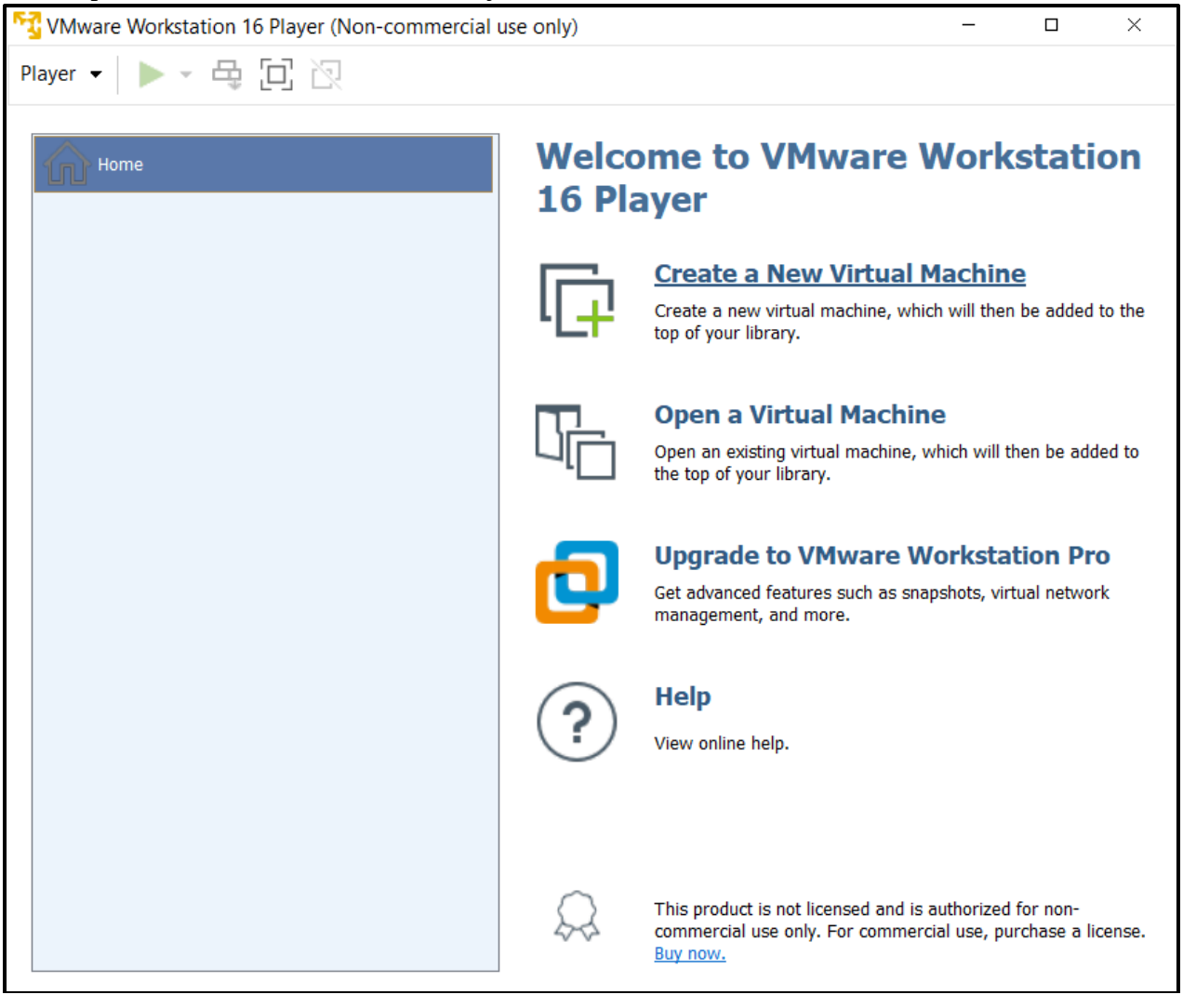


9. Now you can start the VMware Workstation Player by clicking on the shortcut on Desktop. Below is the home screen of the VMware Workstation player.

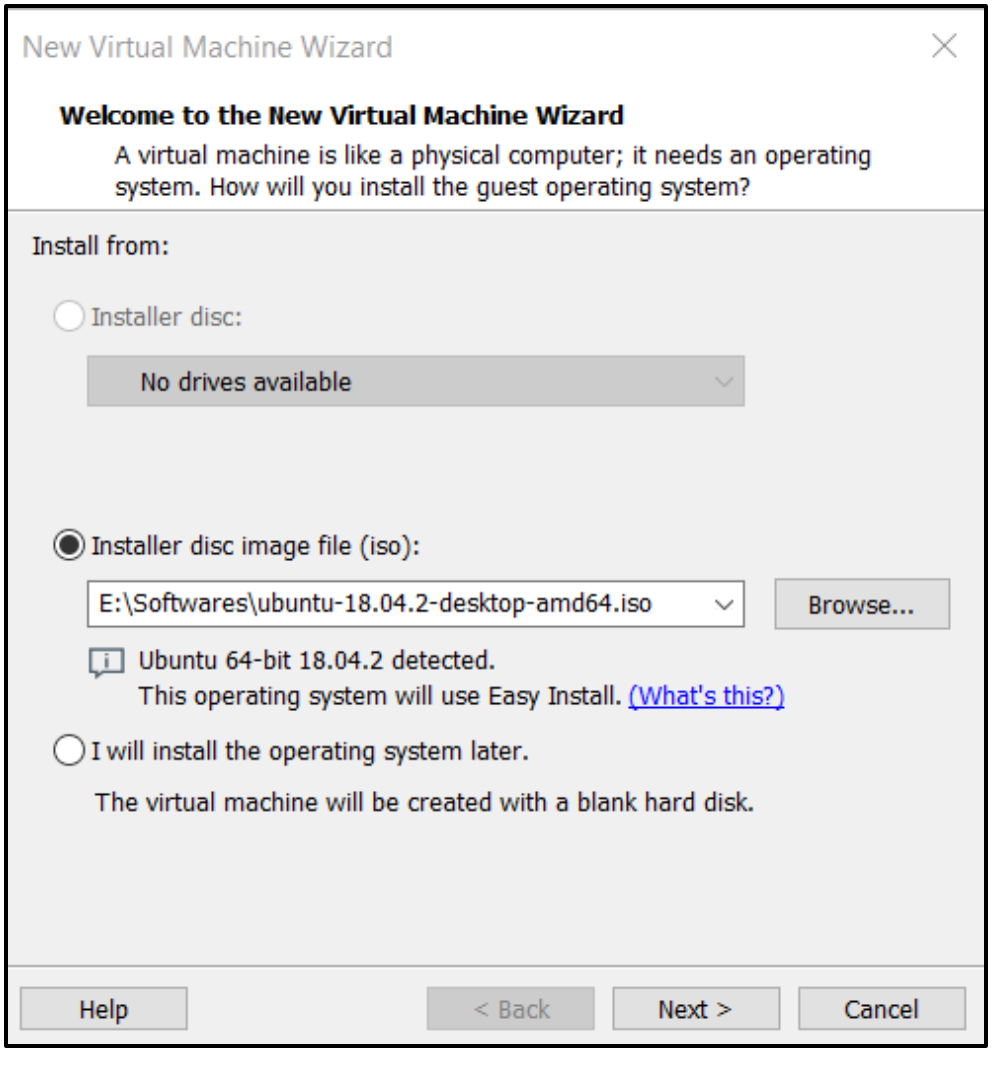


Install Ubuntu Linux on VMWare Workstation

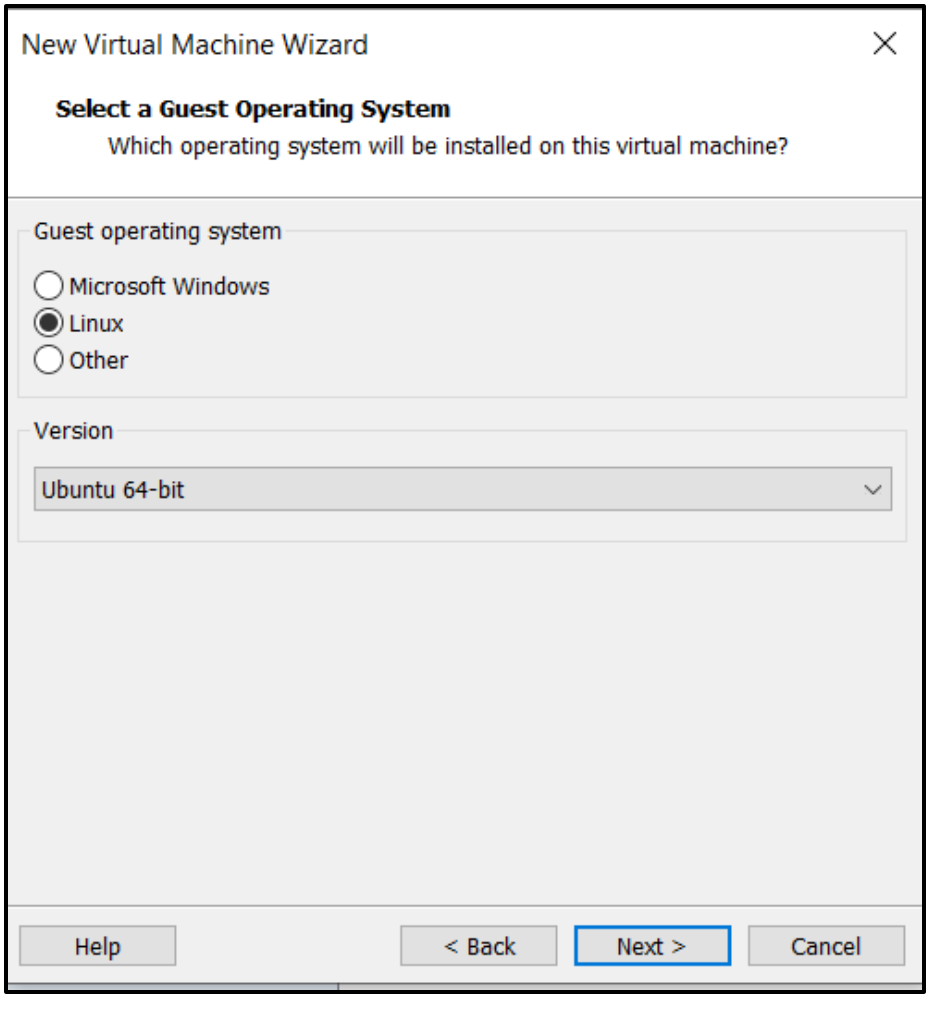
1. Open the VMware Workstation Player after installation. Create a new Virtual Machine.



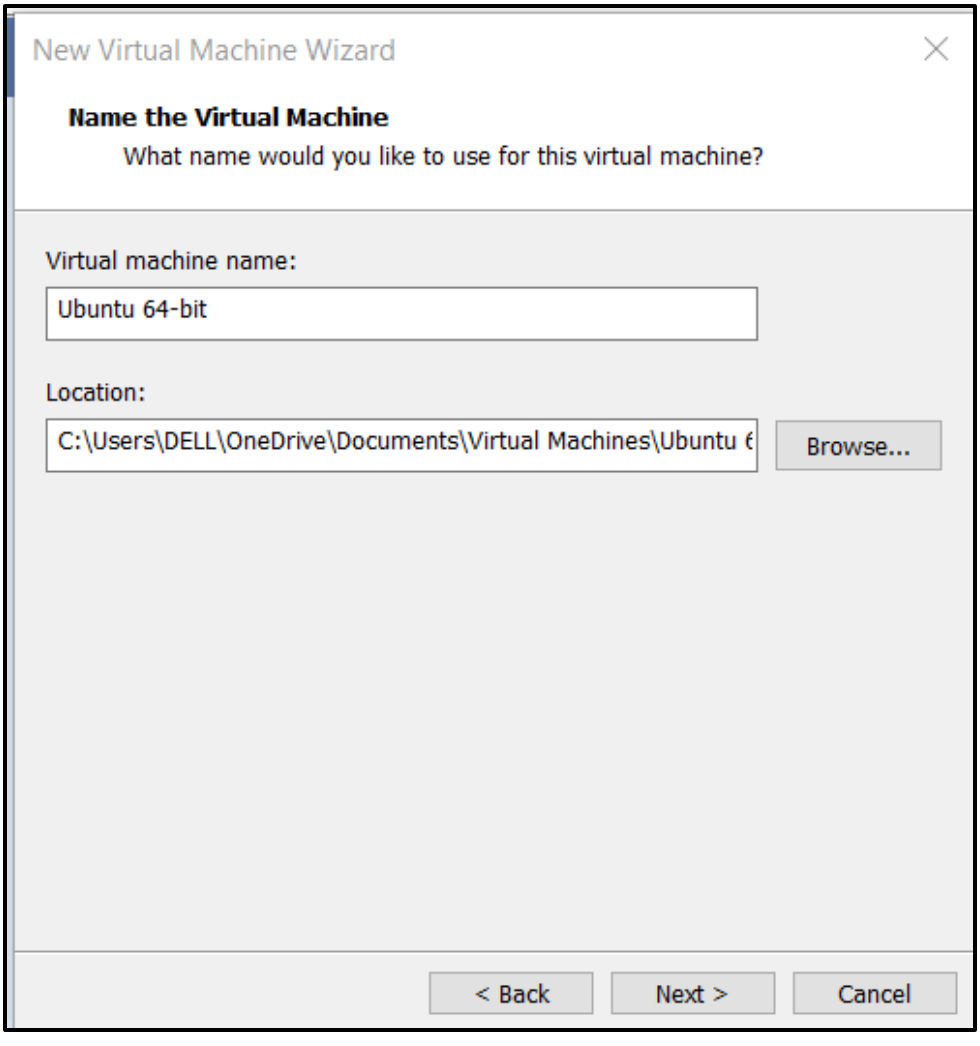
2. Select ubuntu iso file and click on next to continue.



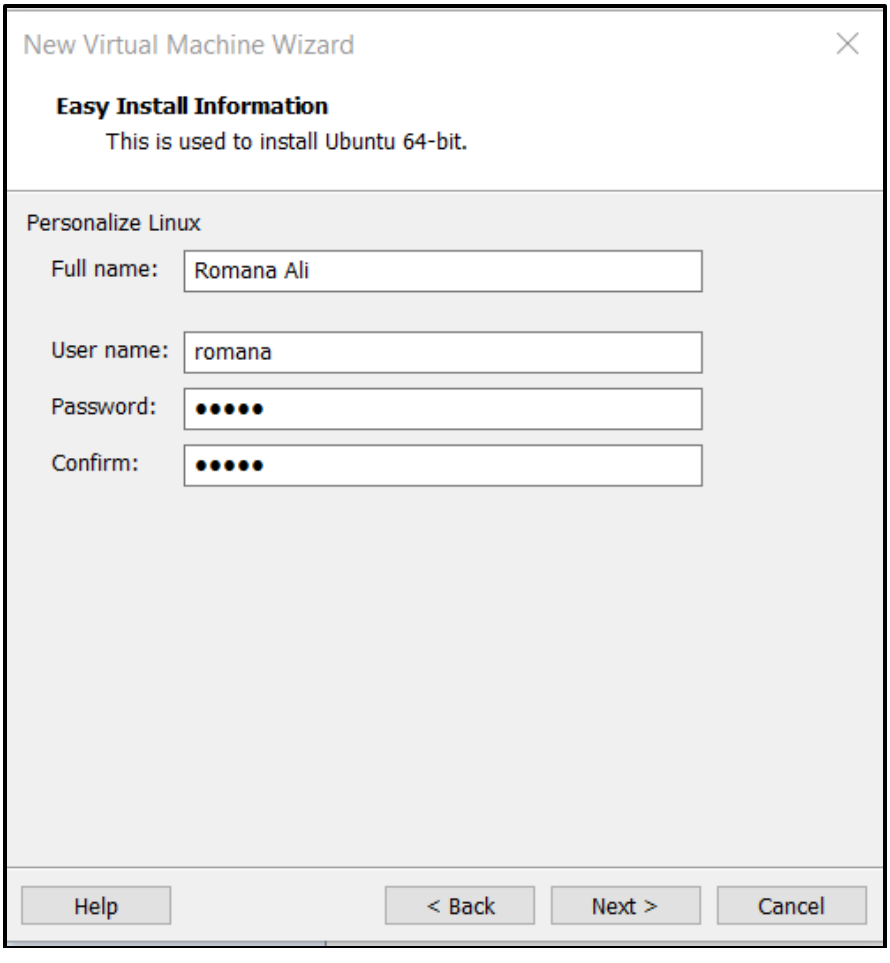
3. Select Linux and version of the Linux.



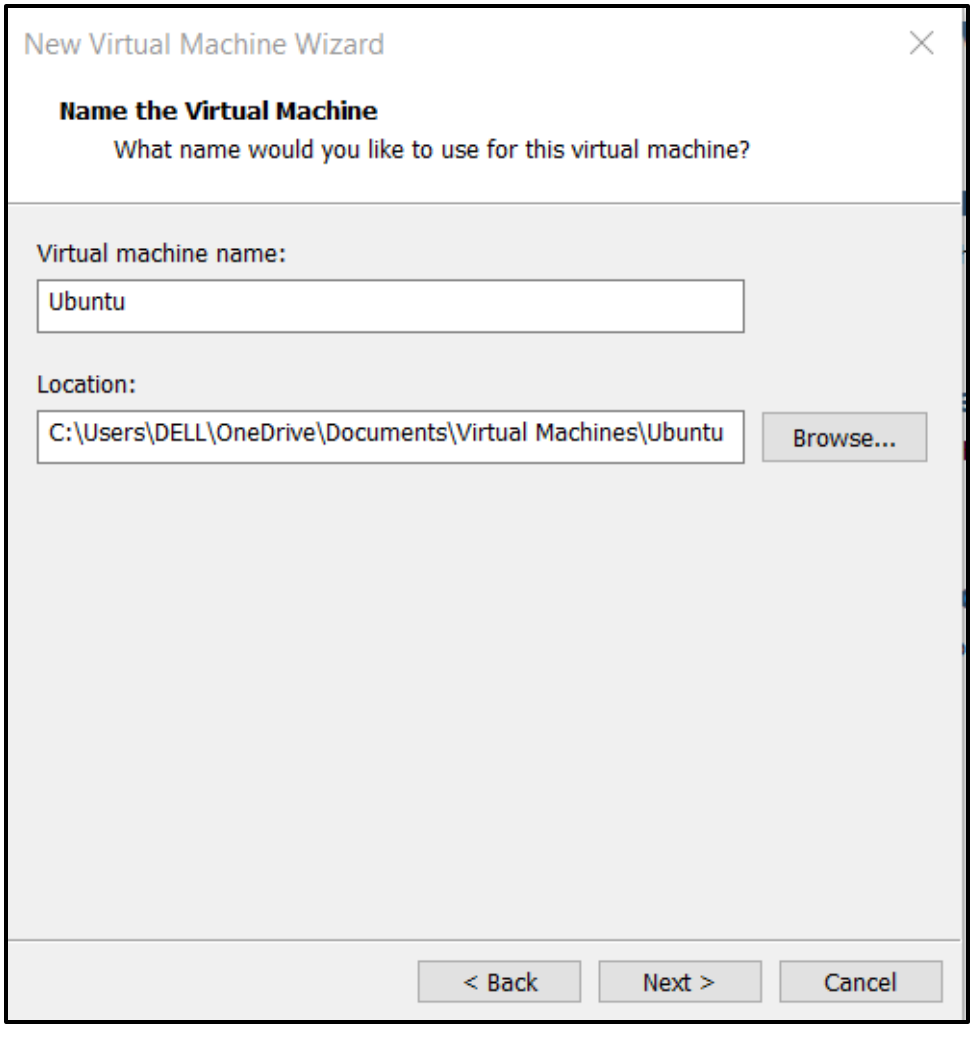
4. Name the virtual machine.



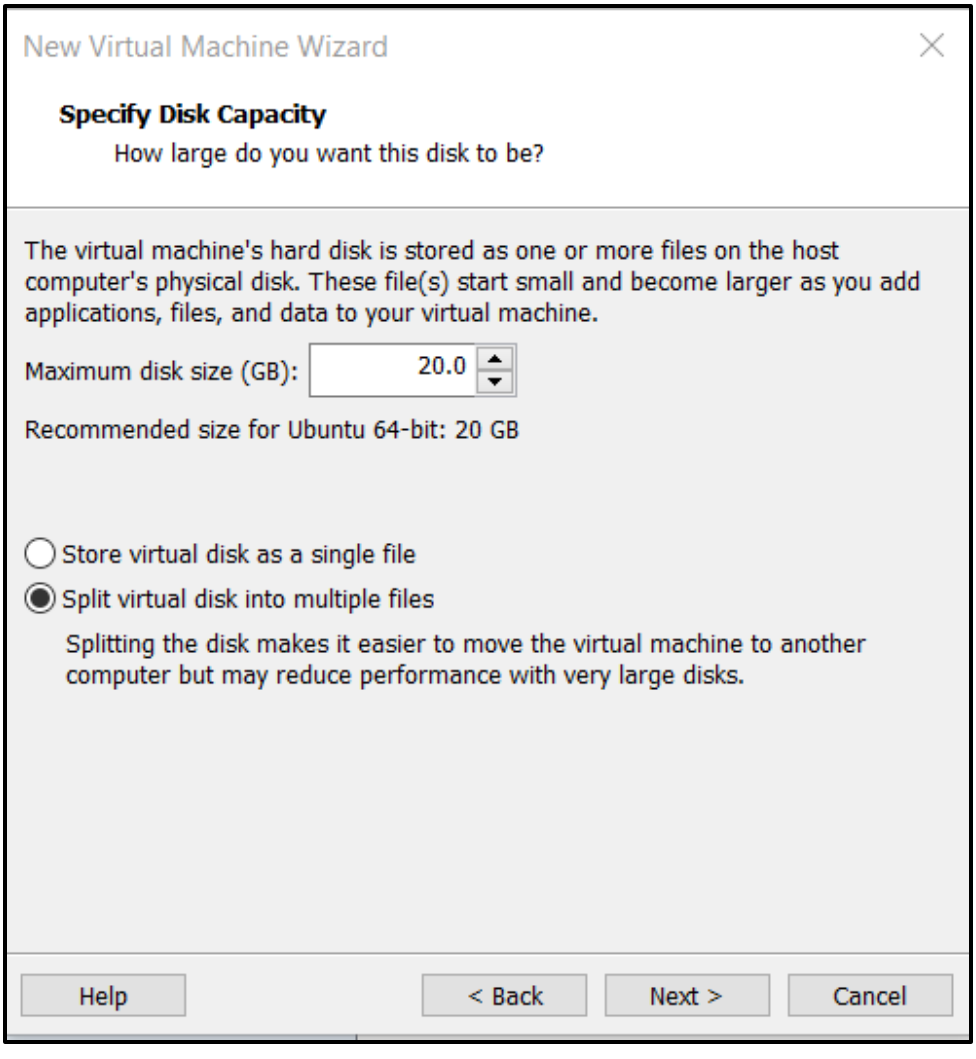
5. Provide credentials for new virtual machine. And click on next to continue.
   Note: remember these credentials for future login.



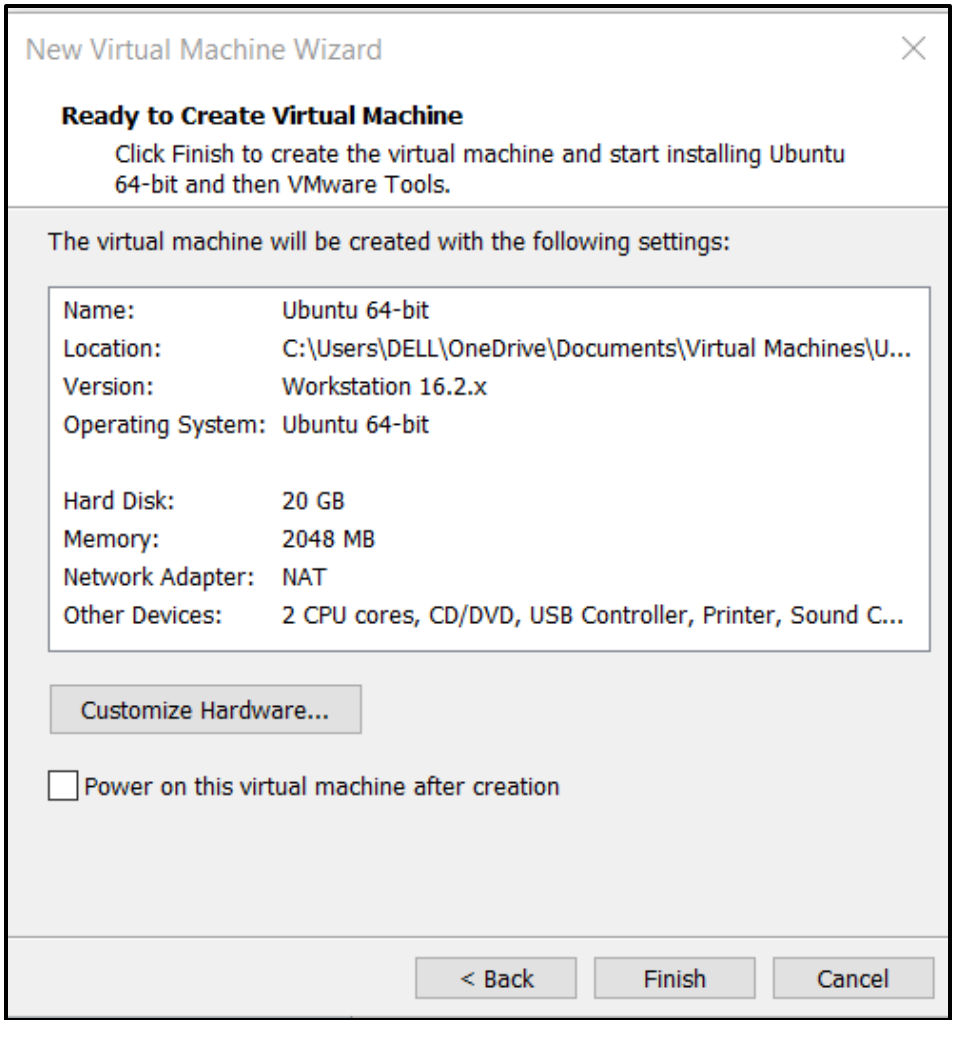
6. Set name for the new virtual machine. And click on next to continue.



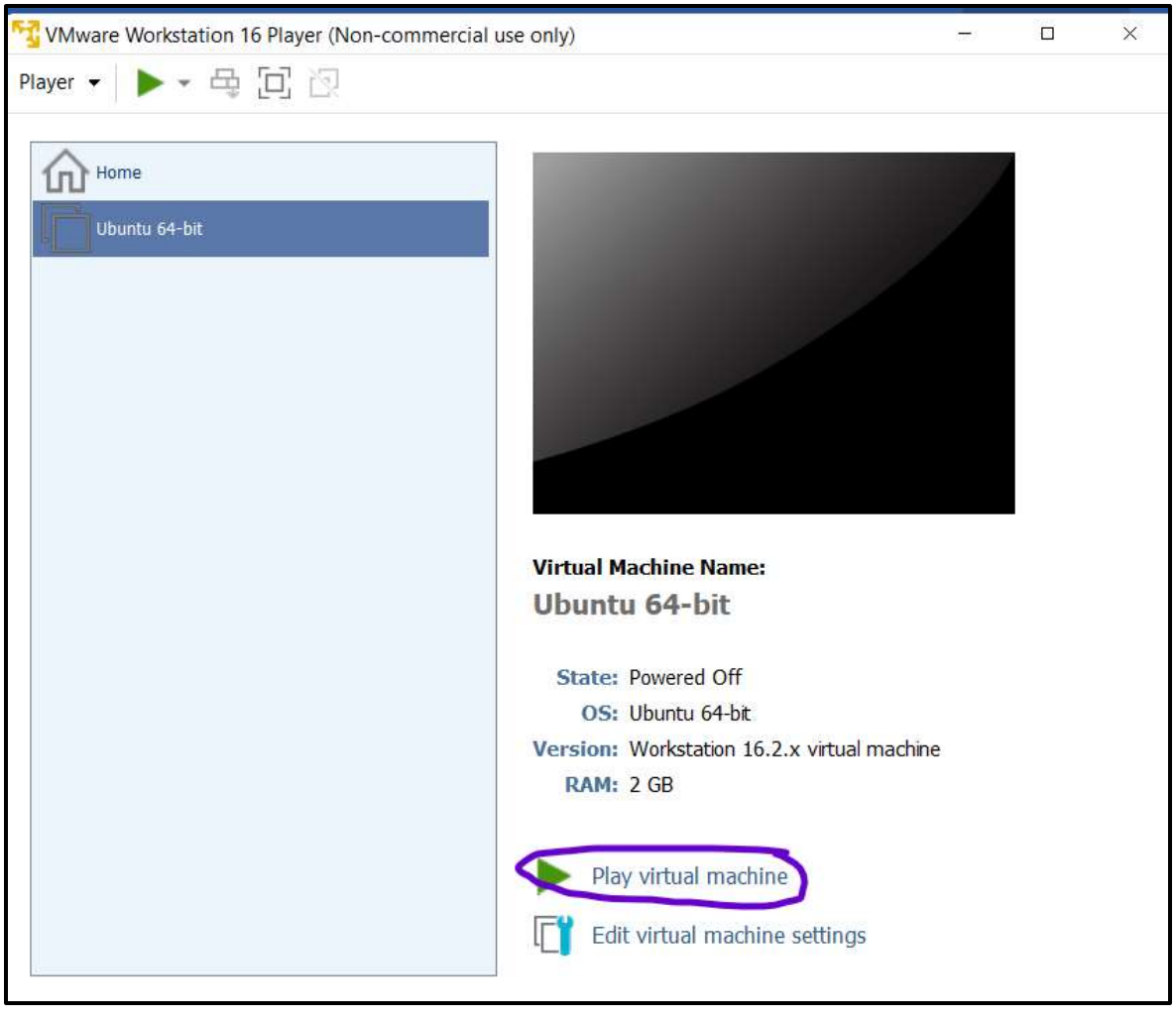
7. Use recommended settings but you can reduce its size. click on next to continue.



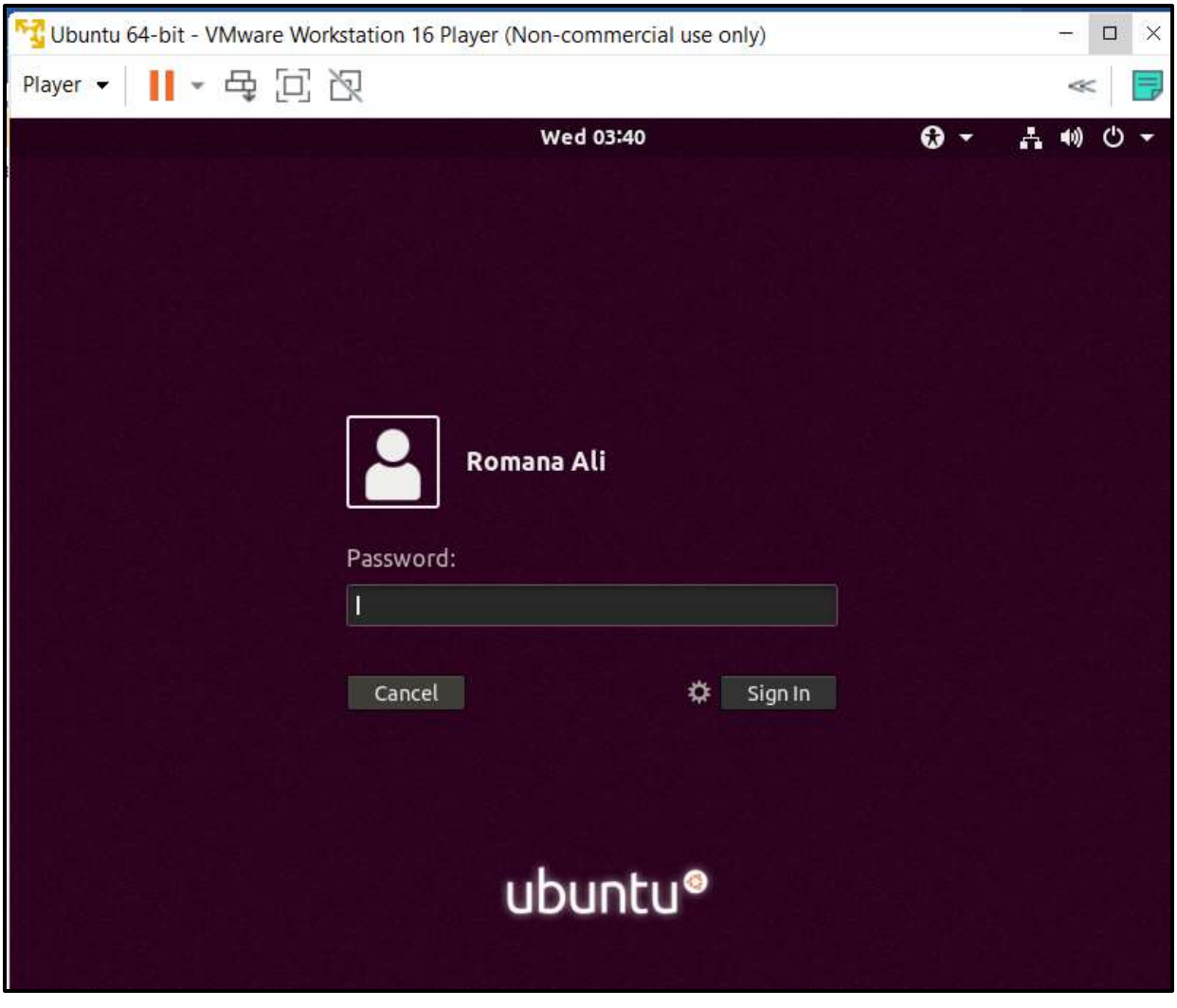
8. Click on finish to complete the setup.



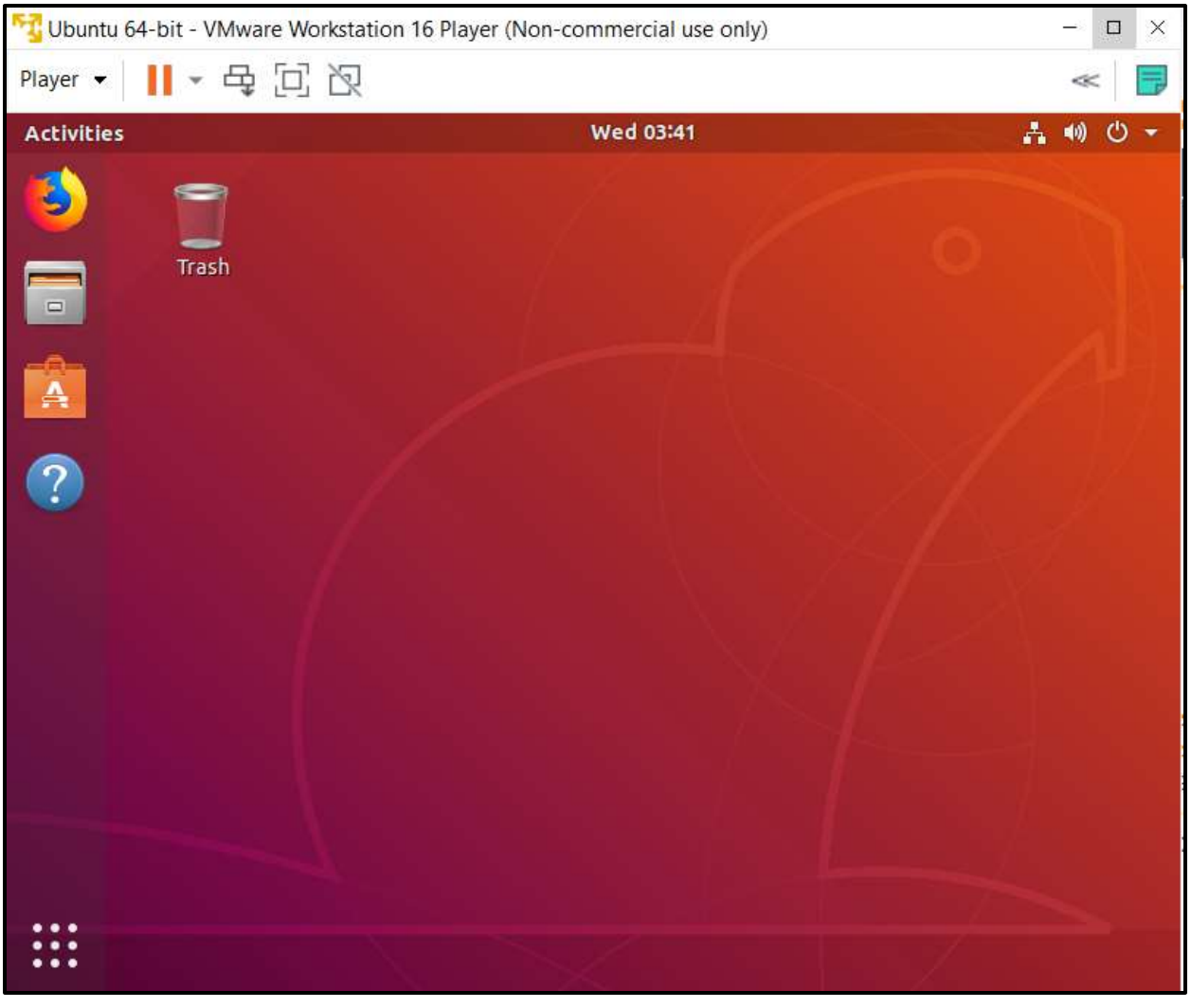
9. Play virtual machine. It will take some time for installation.



10. Provide the password as provided at step 5.



11. Welcome to Ubuntu Virtual Machine



Install G++ the C++ Compiler on Ubuntu VMWare

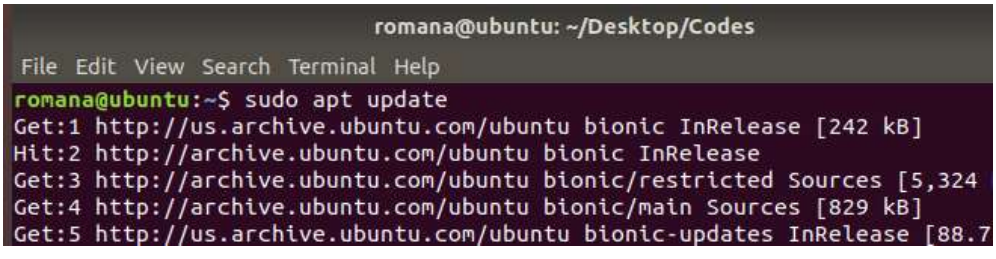
The GNU Compiler Collection (GCC) is a collection of compilers and libraries for C, C++. Many open-source projects, including the GNU tools and the Linux kernel, are compiled with GCC. To able to add new repositories and install packages on your Ubuntu system, you must be logged in as root or user with sudo privileges.

Installing G++ on Ubuntu

The default Ubuntu repositories contain a meta-package named build-essential that contains the GCC compiler and a lot of libraries and other utilities required for compiling software.

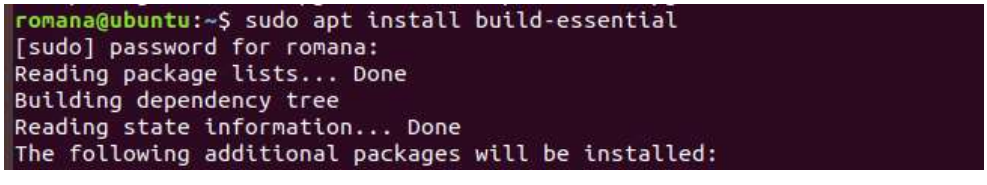
1. Start by updating the packages list:

$ sudo apt update



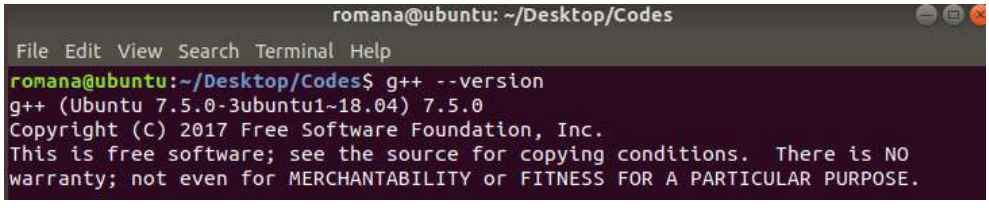
2. Install the build-essential package by typing:

$ sudo apt install build-essential



3. Check the version of g++ compiler by following command.

$ g++ --version



Installing VSCode on Ubuntu

1. Install snap inorder to download latest version of vs code by typing.

$ sudo apt-get install snap

```
romana@ubuntu:~$ sudo apt-get install snap
Reading package lists... Done
Building dependency tree
Reading state information... Done
The following NEW packages will be installed:
  snap
0 upgraded, 1 newly installed, 0 to remove and 580 not upgraded.
Need to get 375 kB of archives.
After this operation, 2,714 kB of additional disk space will be used.
Get:1 http://us.archive.ubuntu.com/ubuntu bionic/universe amd64 snap amd64 2013
-11-29-8 [375 kB]
Fetched 375 kB in 3s (120 kB/s)
Selecting previously unselected package snap.
(Reading database ... 117109 files and directories currently installed.)
Preparing to unpack .../snap_2013-11-29-8_amd64.deb ...
Unpacking snap (2013-11-29-8) ...
Setting up snap (2013-11-29-8) ...
Processing triggers for man-db (2.8.3-2ubuntu0.1) ...
```

2. Install VS code by following command.

$ sudo snap install –classic code

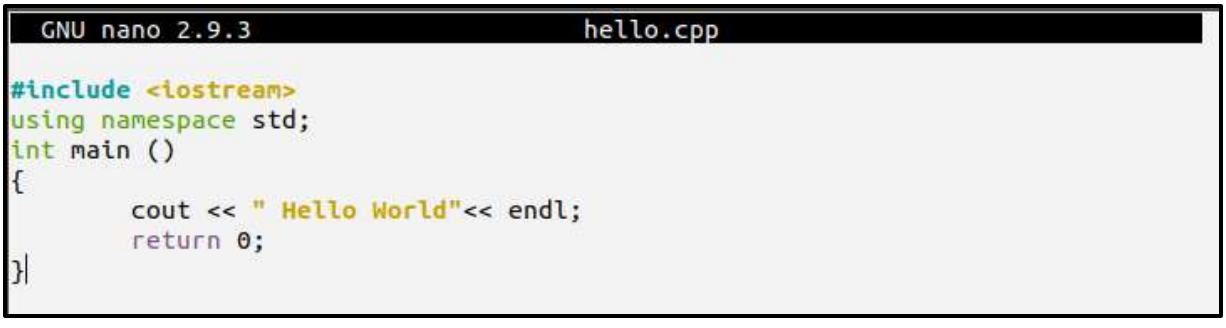
```
romana@ubuntu:~$ sudo snap install --classic code
code c722ca6c from Visual Studio Code (vscode✓) installed
```

Basic C++ Program

let's create hello world C++ program. Save the following code as hello.cpp text file and run it. Perform the steps below.

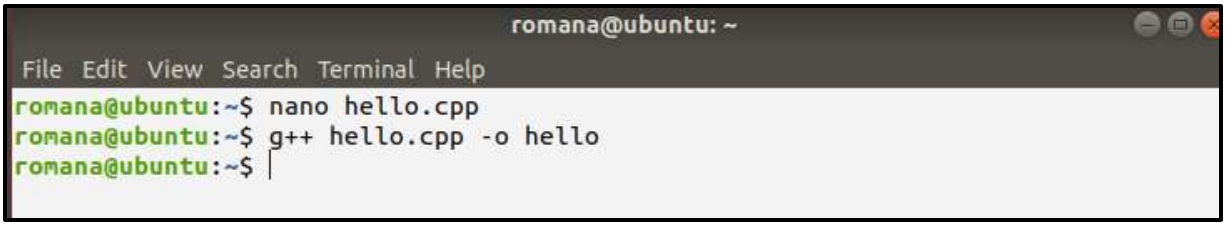
1. Create a text file hello.cpp by following command and write simple code as shown in figure

$ nano hello.cpp



2. Close the editor and compile it by using

$ program-source-code.cpp -o executable-file-name



3. To run or execute the program use following command

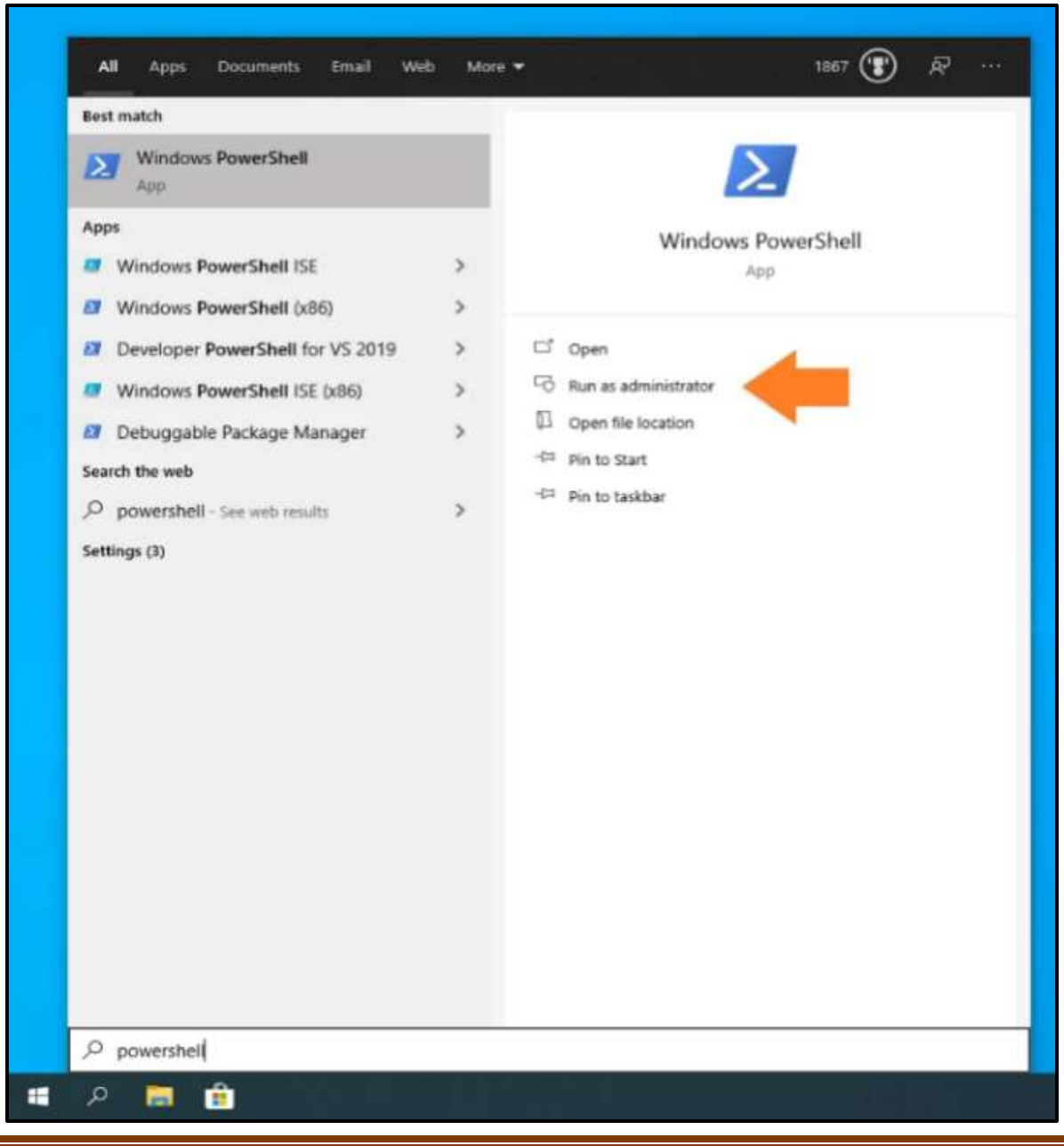
$ **./executable-file-name**

Method 02: Install Ubuntu on WSL2 on Windows 10

https://ubuntu.com/tutorials/install-ubuntu-on-wsl2-on-windows-10#1-overview

Windows Subsystem for Linux (WSL) allows you to install a complete Ubuntu terminal environment in minutes on your Windows machine, allowing you to develop cross-platform applications without leaving Windows.

1. Search for Windows PowerShell in your Windows search bar, then select **Run as administrator**.



2. At the command prompt type:

wsl –install

And wait for the process to complete. For WSL to be properly activated, you will now need to restart your computer.

3. WSL supports a variety of Linux distributions, including the latest Ubuntu release, Ubuntu 20.04 LTS and Ubuntu 18.04 LTS. You can find them by opening the Microsoft store app and searching for Ubuntu. Choose the distribution you prefer and then click on Get as shown in the following screenshot:

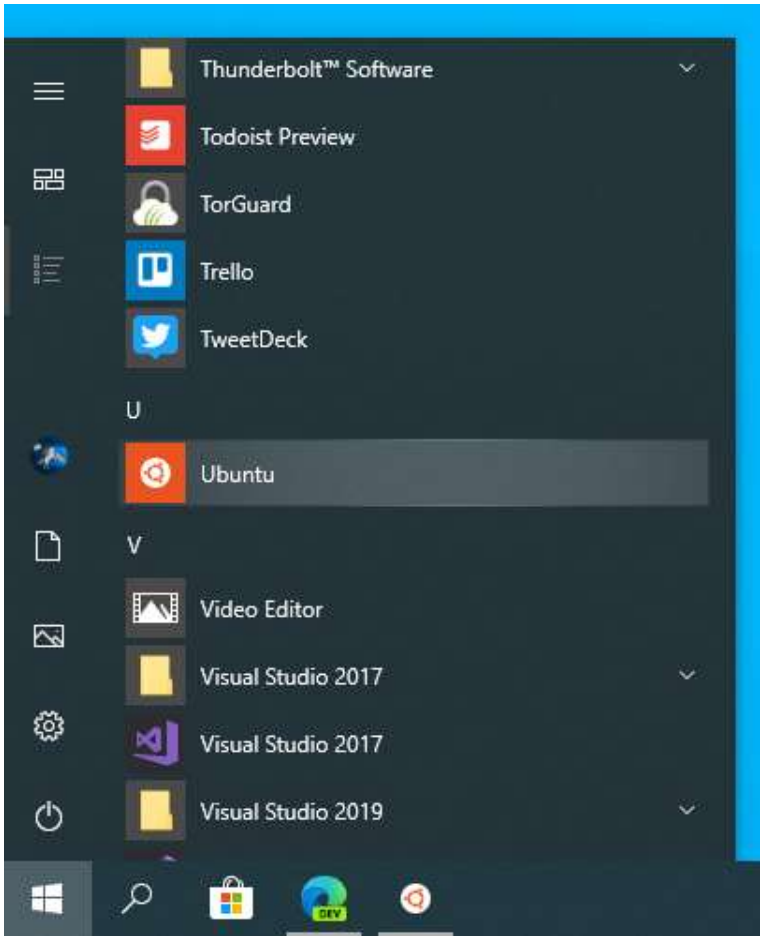
4. Ubuntu will then install on your machine.

5. There is a single command that will install both WSL and Ubuntu at the same time. When opening PowerShell for the first time, simply modify the initial instruction to:

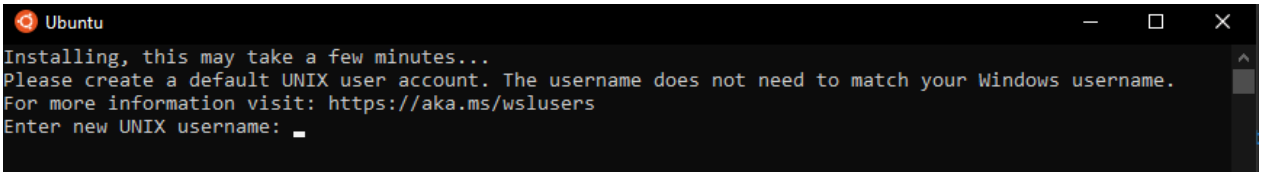
wsl --install -d ubuntu

This will install both WSL and Ubuntu! Don't forget to restart your machine before continuing.

6. Once installed, you can either launch the application directly from the store or search for **Ubuntu** in your Windows search bar.



7. Once Ubuntu has finished its initial setup you will need to create a username and password (this does not need to match your Windows user credentials).



8. Finally, it's always good practice to install the latest updates with the following commands, entering your password when prompted.

sudo apt update

Then

sudo apt upgrade

Press Y when prompted.

Install G++ the C++ Compiler and VS Code on Ubuntu WSL2

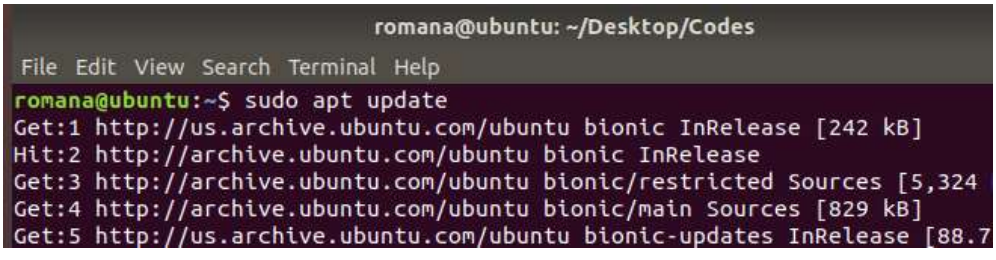
The GNU Compiler Collection (GCC) is a collection of compilers and libraries for C, C++. Many open-source projects, including the GNU tools and the Linux kernel, are compiled with GCC. To able to add new repositories and install packages on your Ubuntu system, you must be logged in as root or user with sudo privileges.

Installing G++ on Ubuntu

Use following commands on Ubuntu to install compilers for running C++ programs on Ubuntu.

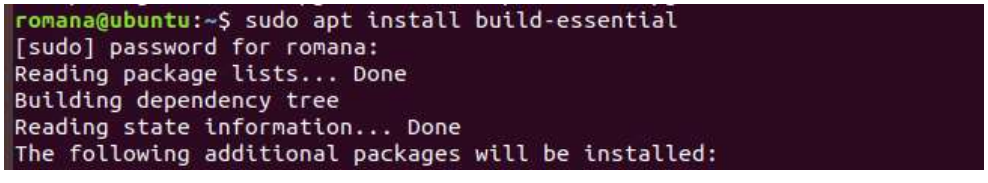
3. Start by updating the packages list:

$ sudo apt update



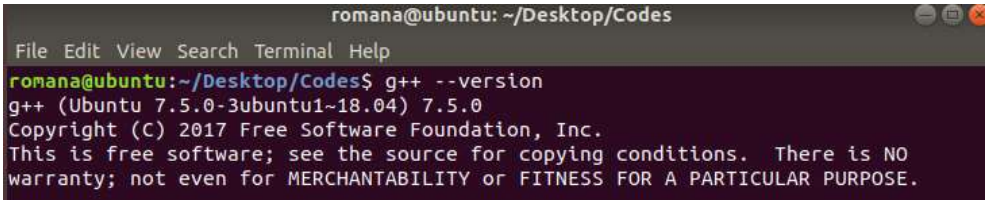
4. Install the build-essential package by typing:

$ sudo apt install build-essential



5. Check the version of g++ compiler by following command.

$ g++ --version



Installing VSCode on Ubuntu

6. Install snap inorder to download latest version of vs code by typing.

$ sudo apt-get install snap

```
romana@ubuntu:~$ sudo apt-get install snap
Reading package lists... Done
Building dependency tree
Reading state information... Done
The following NEW packages will be installed:
  snap
0 upgraded, 1 newly installed, 0 to remove and 580 not upgraded.
Need to get 375 kB of archives.
After this operation, 2,714 kB of additional disk space will be used.
Get:1 http://us.archive.ubuntu.com/ubuntu bionic/universe amd64 snap amd64 2013
-11-29-8 [375 kB]
Fetched 375 kB in 3s (120 kB/s)
Selecting previously unselected package snap.
(Reading database ... 117109 files and directories currently installed.)
Preparing to unpack .../snap_2013-11-29-8_amd64.deb ...
Unpacking snap (2013-11-29-8) ...
Setting up snap (2013-11-29-8) ...
Processing triggers for man-db (2.8.3-2ubuntu0.1) ...
```

7. Install VS code by following command.

$ sudo snap install –classic code

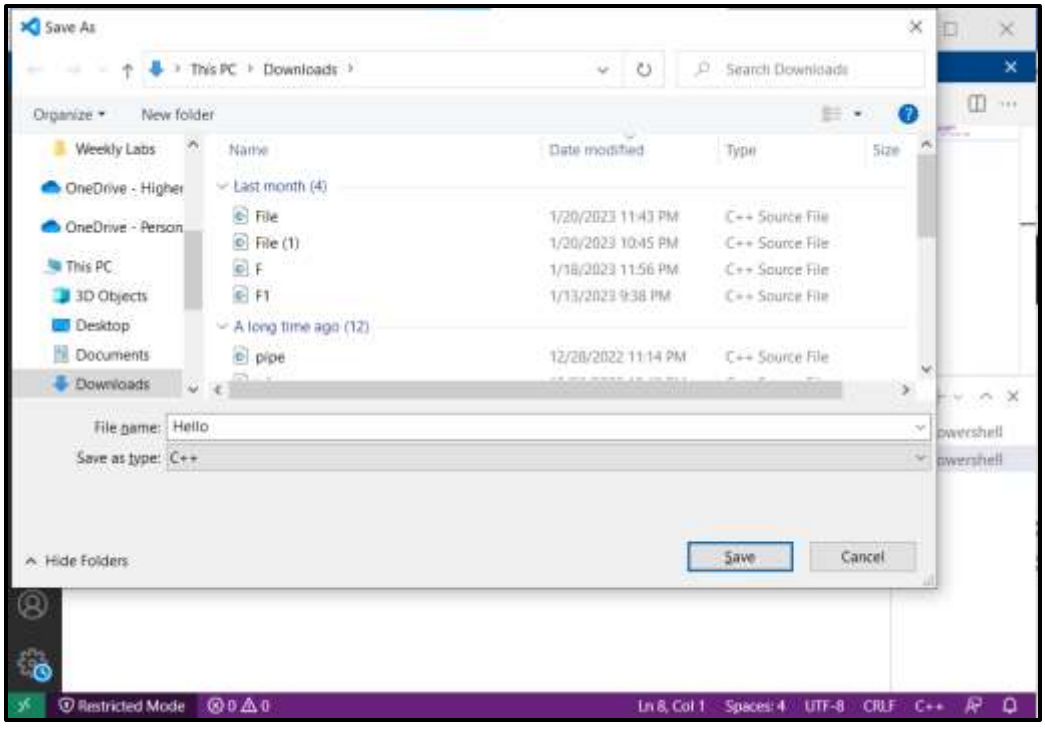
```
romana@ubuntu:~$ sudo snap install --classic code
code c722ca6c from Visual Studio Code (vscode✓) installed
```

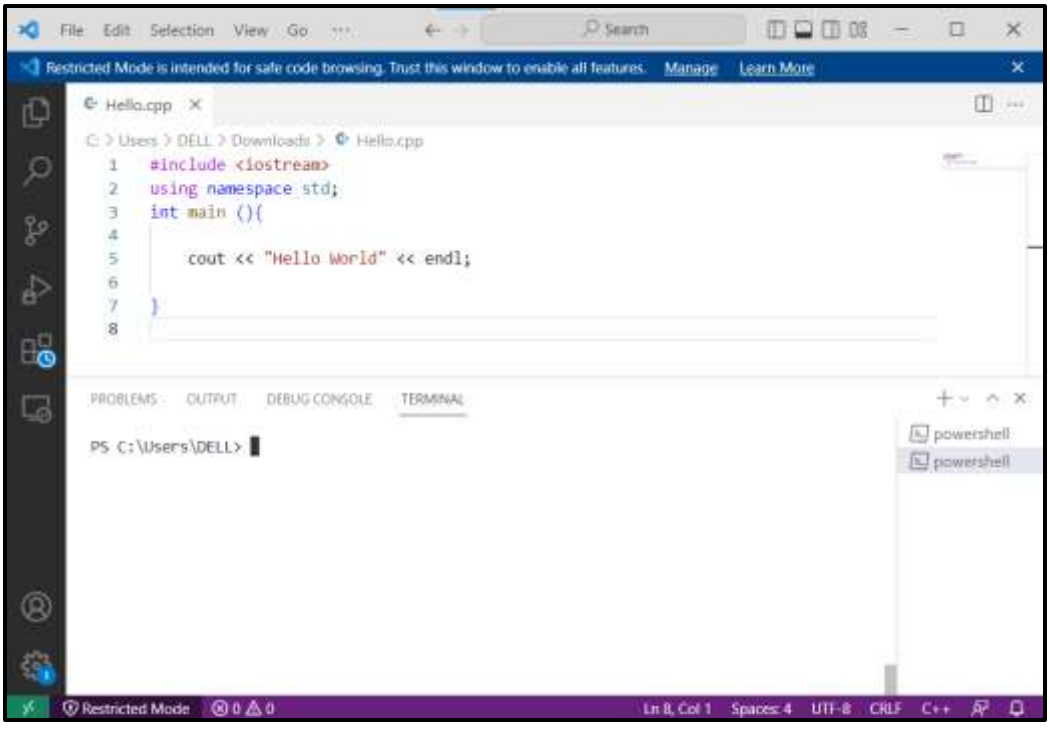
8. Let's make a directory **Codes** on Desktop. Make and open a new file of VS Code in the Codes directory by following command

$ code .

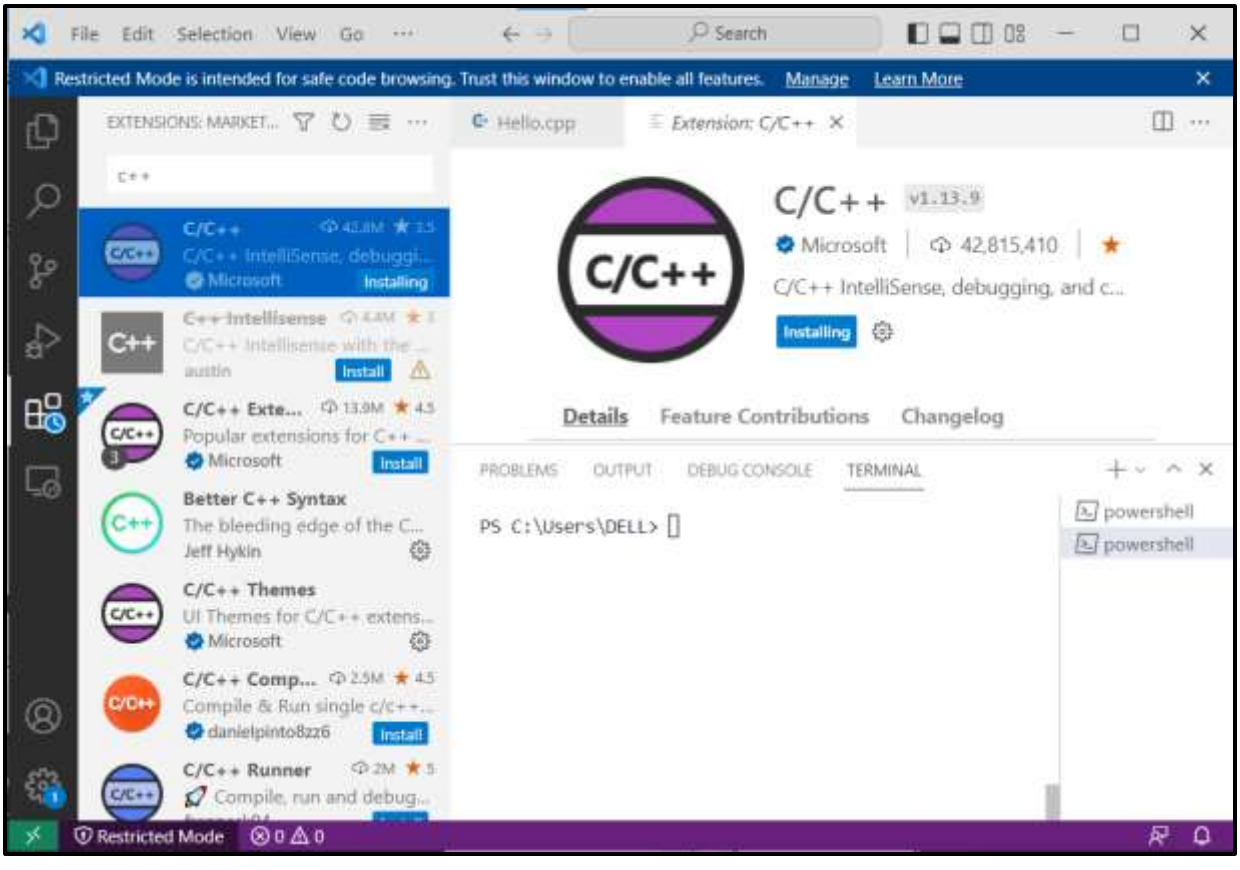
```
romana@ubuntu: ~/Desktop/Codes
File  Edit  View  Search  Terminal  Help
romana@ubuntu:~/Desktop$ cd Codes
romana@ubuntu:~/Desktop/Codes$ code .
romana@ubuntu:~/Desktop/Codes$
```

9. In Code directory, write a simple hello world program and save the file as .cpp file.



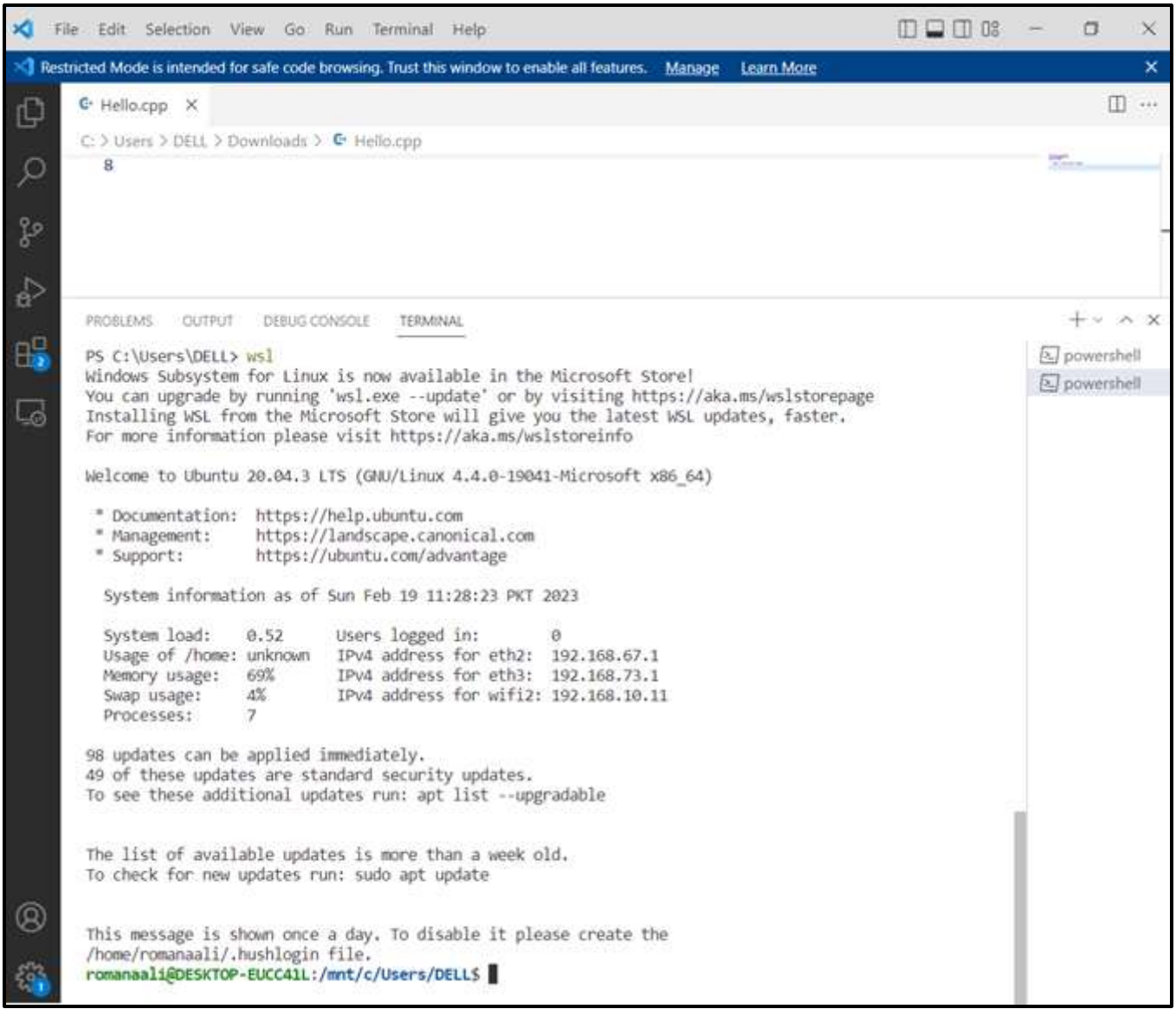


10. Install the C++ extensions and run the program using g++ compiler on terminal present in vs code.

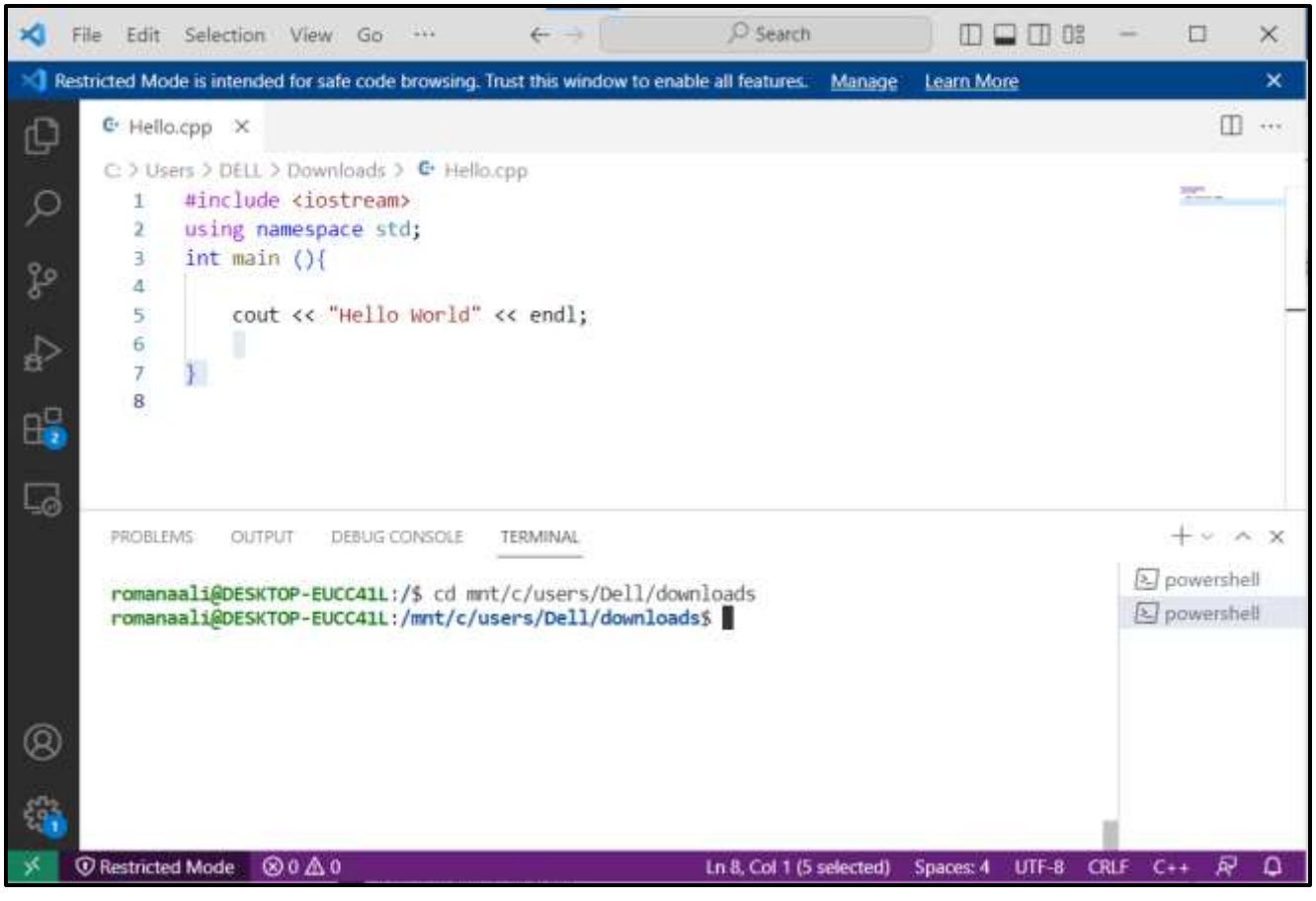


11. In order to compile, code open ubuntu terminal. Write following in the vs code terminal and press enter. Ubuntu console will be opened in the vscode. As shown in the picture.

wsl



12. Hello.cpp is present in downloads in windows whose address is **"/mnt/c/users/Dell/downloads**". We will change directories using **cd.**



13. Use following command to compile the hello.cpp.

g++ Hello.cpp -o h

This command will create a object file of Hello.cpp named h. use following to run this object file/ executable. As shown in the figure.

./h