

# **20MCA136 NETWORKING AND SYSTEM ADMINISTRATION LAB**

*Lab Report Submitted By*

**VISHNU VIJAYAKUMAR**

**Reg. No.: AJC21MCA-2113**

*In Partial fulfillment for the Award of the Degree Of*

**MASTER OF COMPUTER APPLICATIONS (2 Year)  
(MCA)**

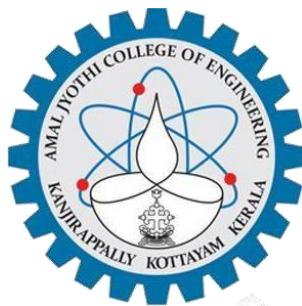
**APJ ABDUL KALAM TECHNOLOGICAL UNIVERSITY**



**AMAL JYOTHI COLLEGE OF ENGINEERING  
KANJIRAPPALLY**

[Affiliated to APJ Abdul Kalam Technological University, Kerala. Approved by AICTE,  
Accredited by NAAC with 'A' grade. Koovapally, Kanjirappally, Kottayam, Kerala – 686518]

**2021-2022**

**DEPARTMENT OF COMPUTER APPLICATIONS****AMAL JYOTHI COLLEGE OF ENGINEERING  
KANJIRAPPALLY****CERTIFICATE**

This is to certify that the lab report, "**20MCA136 NETWORKING AND SYSTEM ADMINISTRATION LAB**" is the bonafide work of **VISHNU VIJAYAKUMAR (Reg NO:AJC21MCA-2113)** in partial fulfillment of the requirements for the award of the Degree of Master of Computer Applications under APJ Abdul Kalam Technological University during the year 2021-22.

**Mrs. Sruthimol Kurian****Rev.Fr.Dr.Rubin Thottupurathu Jose****Lab In-Charge****Head of the Department****Internal Examiner****External Examiner**

---

## CONTENT

<b>Sl.No</b>	<b>Content</b>	<b>Date</b>	<b>PageNo:</b>
1	Introduction to Computer hardware	4/4/2022	1-11
2	Install latest version of Ubuntu on a virtual box	21/3/2022	12-26
3	Study of a terminal based text editor such as Vim or Gedit, Basic Linux commands: - familiarity with following commands/operations expected	24/3/2022	27-45
4	Shell scripting:	5/5/2022	46-55
5	Installation and configuration of LAMP stack. Deploy an open source application such as phpmyadmin and Wordpress.	23/5/2022	56-70
6	Build and install software from source code, familiarity with cmake utility expected.	4/4/2022	71-73
7	Introduction to command line tools.	6/6/2022	74-79
8	Install the wireshark on ubuntu	6/6/2022	80-84
9	Introduction to Hypervisors and VMs: KVM installation and commands.	23/5/2022	85-89

---

10	Introduction to Containers: Docker installation and deployment	23/5/2022	90-95
----	---	-----------	-------

## **Experiment No.: 1**

**Name: Vishnu Vijayakumar**

**Roll No: 53**

**Batch: B**

**Date: 4-04-2022**

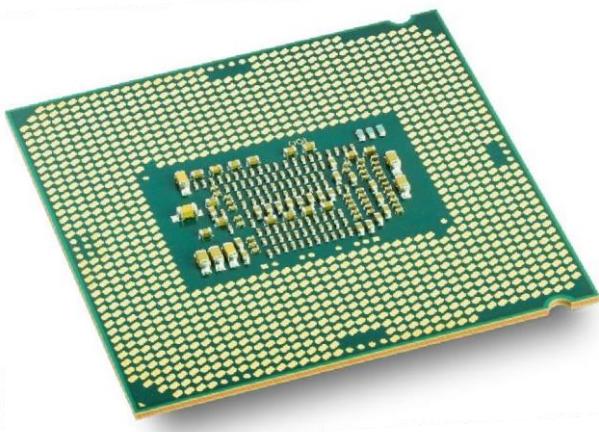
### **Aim**

Introduction to Computer hardware: Physical identification of major components of a computer system such as mother board, RAM modules, daughter cards, bus slots, SMPS, internal storage devices, interfacing ports

### **Procedure**

#### **1. CPU (Central Processing/Processor Unit)**

Central processing unit (CPU), principal part of any digital computer system, generally composed of the main memory, control unit, and arithmetic-logic unit. It constitutes the physical heart of the entire computer system; to it is linked various peripheral equipment, including input/output devices and auxiliary storage units. In modern computers, the CPU is contained on an integrated circuit chip called a microprocessor.



#### **2. Hard drive**

A computer hard drive (or a hard disk or HDD) is one kind of technology that stores the operating system, applications, and data files such as documents, pictures and music that your computer uses. The rest of the

components in your computer work together to show you the applications and files stored on your hard drive.



### **3. Graphics Processing Unit (GPU)**

Graphics processing technology has evolved to deliver unique benefits in the world of computing. The latest graphics processing units (GPUs) unlock new possibilities in gaming, content creation, machine learning, and more.



#### **4. Power Supply Unit (PSU)**

A power supply unit (PSU) converts mains AC to low-voltage regulated DC power for the internal components of a computer. Modern personal computers universally use switched-mode power supplies. Some power supplies have a manual switch for selecting input voltage, while others automatically adapt to the mains voltage.



#### **5. SSD: Solid State Drive**

SSDs got their name—solid state—because they use solidstate devices under the hood. In an SSD, all data is stored in integrated circuits. This difference from HDDs has a lot of implications, especially in size and performance. Without the need for a spinning disk, SSDs can reduce to the shape and size of a stick of gum (what's known as the M.2 form factor) or even as small as a postage stamp. Their capacity—or how much data they can hold—varies, making them flexible for smaller devices, such as slim laptops, convertibles, or 2 in 1s. And SSDs dramatically reduce access time since users don't have to wait for platter rotation to start up.

SSDs are more expensive than HDDs per amount of storage (in gigabytes (GB) and terabytes (TB)), but the gap is closing as SSD prices decline at a faster pace than HDD prices year over year.



## **6. Printers**

A printer is basically an output device which prints a hard copy of the electronic data that is stored in the computer or any other devices. The electronic data may include documents, text, images or even the combination of all three. Particular printers are available for printing particular data types.



## **7. Scanner**

Scanner, also called optical scanner, computer input device that uses a light beam to scan codes, text, or graphic images directly into a computer or computer system. Bar-code scanners are used widely at point-of-sale terminals in retail stores.



## **8. Optical Disc Drive**

Optical Disc Drive (ODD) An optical disc drive (ODD) in a computer system allows you to use CDs, DVDs, and Blu-ray discs to listen to music or watch a movie. Most drives also allow you to write data to a disc, so you can create your own music CDs, video DVDs or even create of back-up copy of your important data files.



## **9. Motherboard**

A motherboard is the main printed circuit board in general-purpose computers and other expandable systems. It holds and allows communication between many of the crucial electronic components of a system, such as the central processing unit and memory, and provides connectors for other peripherals



## **Parts**

### **1. Back Panel Connectors & Ports**

Connectors and ports for connecting the computer to external devices such as display ports, audio ports, USB ports, Ethernet ports, PS/2 ports etc.

### **2. PCI Slots**

PCI: Peripheral Component Interconnect

Slot for older expansion cards such as sound cards, network cards, connector cards.

### **3. PCI Express x1 Slots**

Slot for modern expansion cards such as sound cards, network cards (Wi-Fi, Ethernet, Bluetooth), connector cards (USB, FireWire, eSATA) and certain low-end graphics cards.

### **4. PCI Express x16 Slot**

Slot for discrete graphic cards and high bandwidth devices such as top-end solid state drives.

## 5. **Northbridge**

Also known as Memory Controller Hub (MCH).

Chipset that allows the CPU to communicate with the RAM and graphics card.

Beginning from Intel Sandy Bridge in 2011, this motherboard component is no longer present as it has been integrated within the CPU itself.

## 6. **CPU Socket**

Insert CPU here.

## 7. **ATX 12V Power Connector**

Connects to the 4-pin power cable of a power supply unit which supplies power to the CPU.

## 8. **Front Panel USB 2.0 Connectors**

Connects to USB 2.0 ports at the front or top of a computer case.

## 9. **Front Panel Connectors**

Connects to the power switch, reset switch, power LED, hard drive LED and front audio ports of a computer case.

## 10. **IDE Connector**

Connects to older hard drive disks and optical drives for data transfer.

## 11. **CMOS Battery**

Supplies power to store BIOS settings and keep the real-time clock running.

## 12. **Southbridge**

Also known as the Input/Output Controller Hub (ICH).

Chipset that allows the CPU to communicate with PCI slots, PCI-Express x 1 slots (expansion cards), SATA connectors (hard drives, optical drives), USB ports (USB devices), Ethernet ports and on-board audio.

## 13. **SATA Connectors**

Connects to modern hard disk drives, solid state drives and optical drives for data transfer.

#### **14. Fan Headers**

Supplies power to the CPU heat sink fan and computer case fans.

#### **15. RAM Slots**

Insert RAM here.

#### **16. ATX Power Connector**

Connects to the 24-pin ATX power cable of a power supply unit which supplies power to the motherboard.

#### **17. mSATA Connector**

Connects to a mSATA solid state drive. In most cases, this SSD is used as cache to speed up hard disk drives, but it's possible to re-purpose it as a regular hard drive.

#### **18. Front Panel USB 3.0 Connector**

Connects to USB 3.0 ports at the front or top of the computer case.

#### **19. Power & Reset Button**

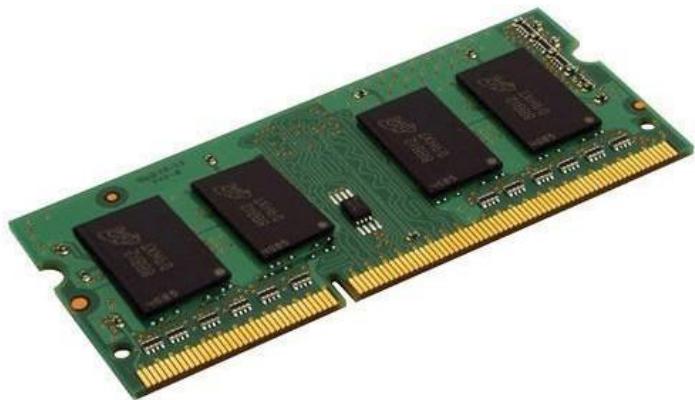
Onboard button to turn on, turn off and reboot the computer.

This motherboard component is more common among high end boards.

## **10. RAM**

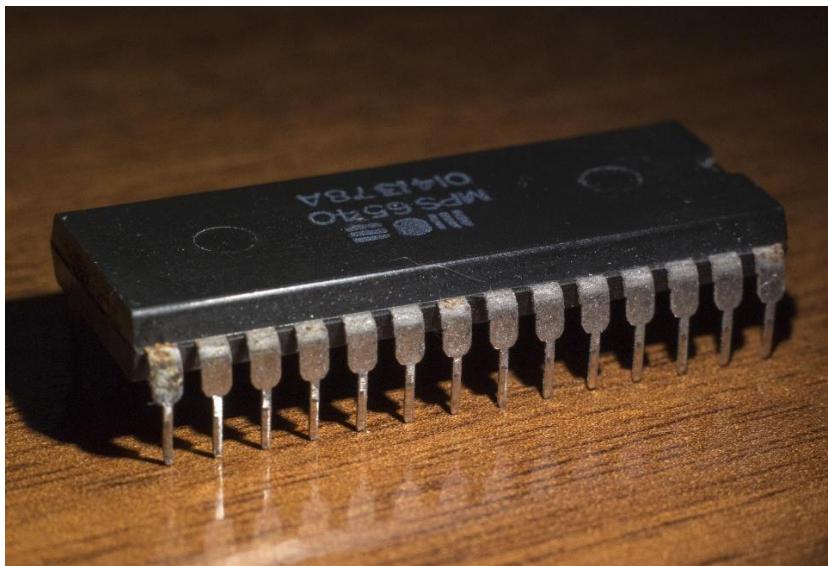
Computer memory or random access memory (RAM) is your system's short-term data storage; it stores the information your computer is actively using so that it can be accessed quickly. The more programs your system is running, the more memory you'll need.

RAM allows your computer to perform many of its everyday tasks, such as loading applications, browsing the internet, editing a spreadsheet, or experiencing the latest game. Memory also allows you to switch quickly among these tasks, remembering where you are in one task when you switch to another task. As a rule, the more memory you have, the better.



## **11. ROM**

ROM stands for Read Only Memory. The memory from which we can only read but cannot write on it. This type of memory is non-volatile. The information is stored permanently in such memories during manufacture. A ROM stores such instructions that are required to start a computer. This operation is referred to as bootstrap. ROM chips are not only used in the computer but also in other electronic items like washing machine and microwave oven.



Name: Vishnu Vijayakumar  
Roll No: 53  
Batch: B  
Date: 21-03-2022

## Experiment No.: 2

### Aim

Install the latest version of Ubuntu on an Oracle VM Virtual Box.

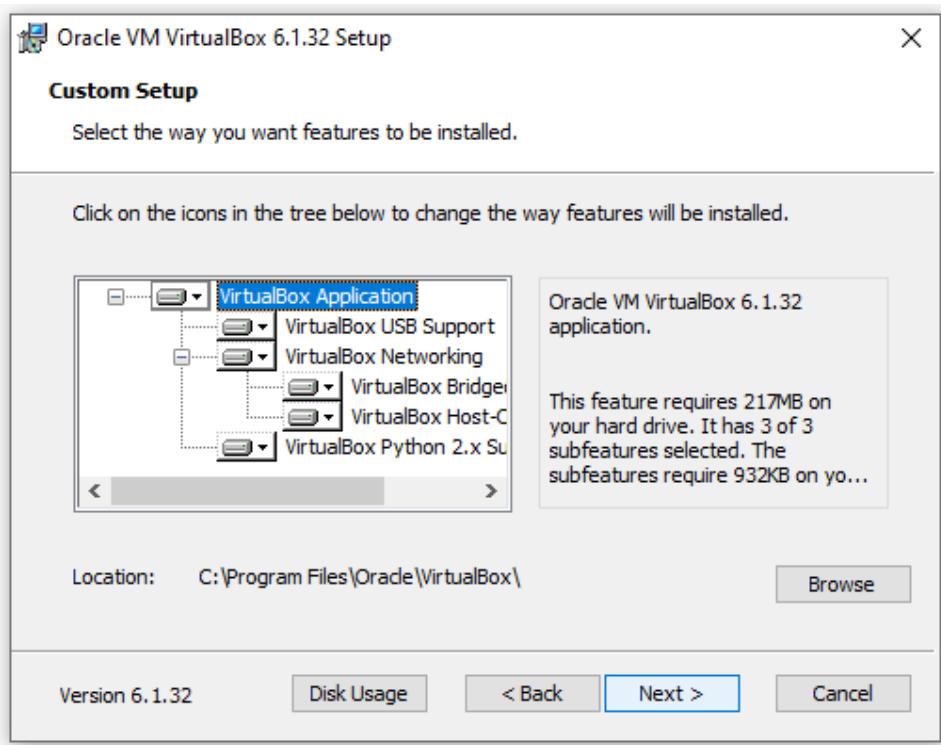
### Procedure

#### 1. Installing Virtual Box.

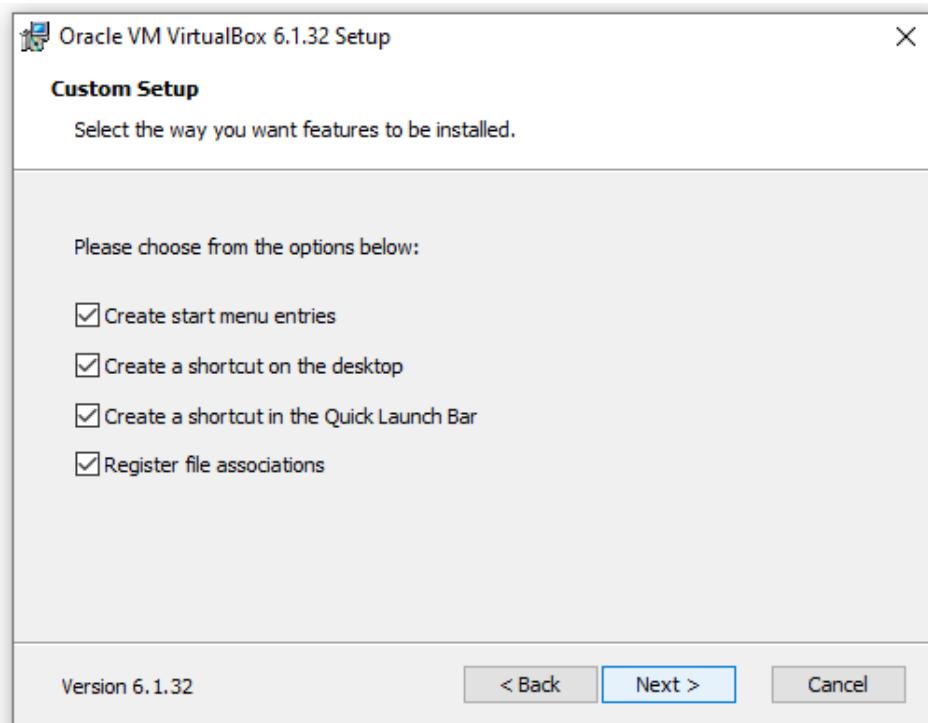
##### a. Starting pop-up window for the installation.



- b. Custom setup window to select the features you want and select installation location.



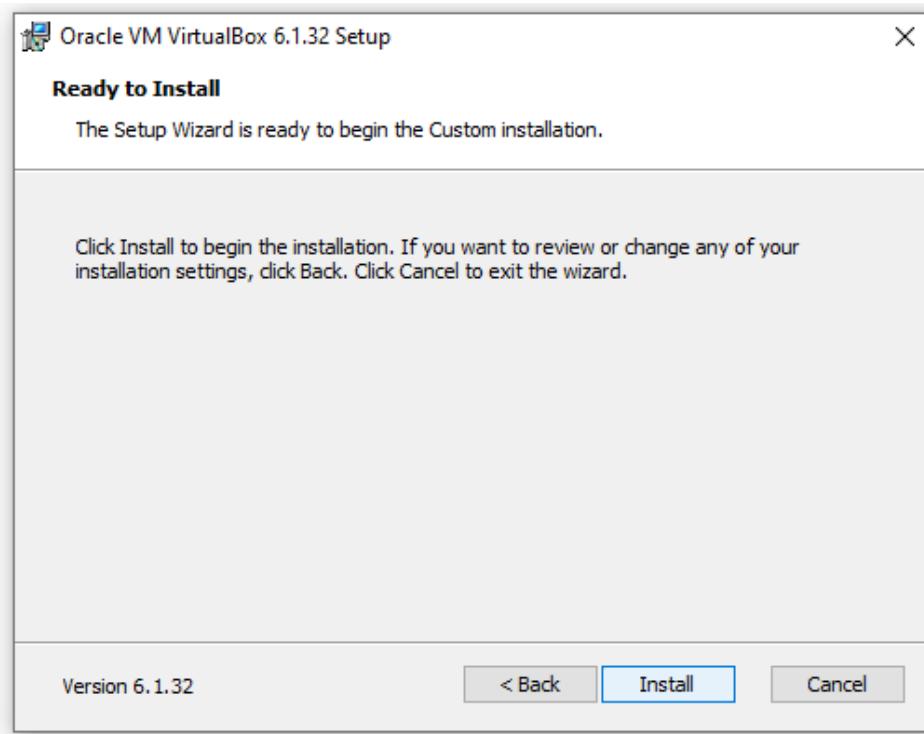
- c. Custom setup window to choose from the option below.



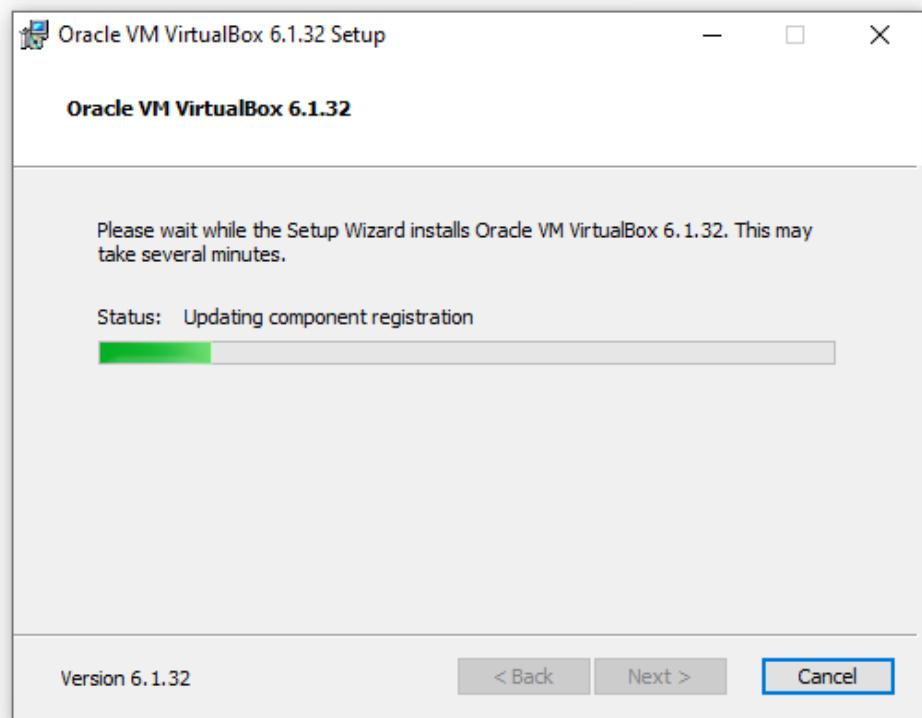
- d. Custom setup window to confirm the installation.



**e. Custom setup window to install the virtual box with the install button.**



**f. Installation box showing the installation status.**



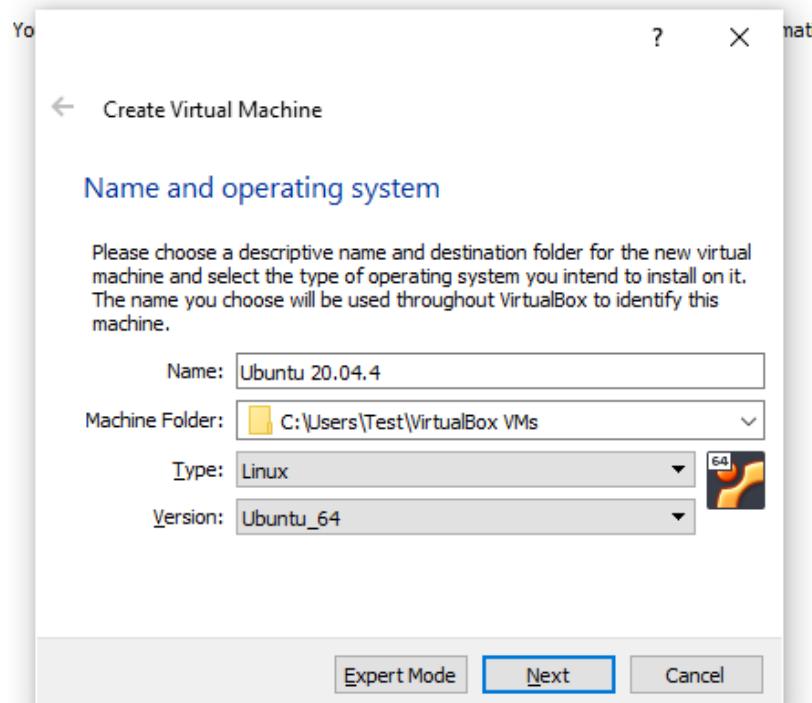
**g. Installation complete pop-up windows with the finish button.**



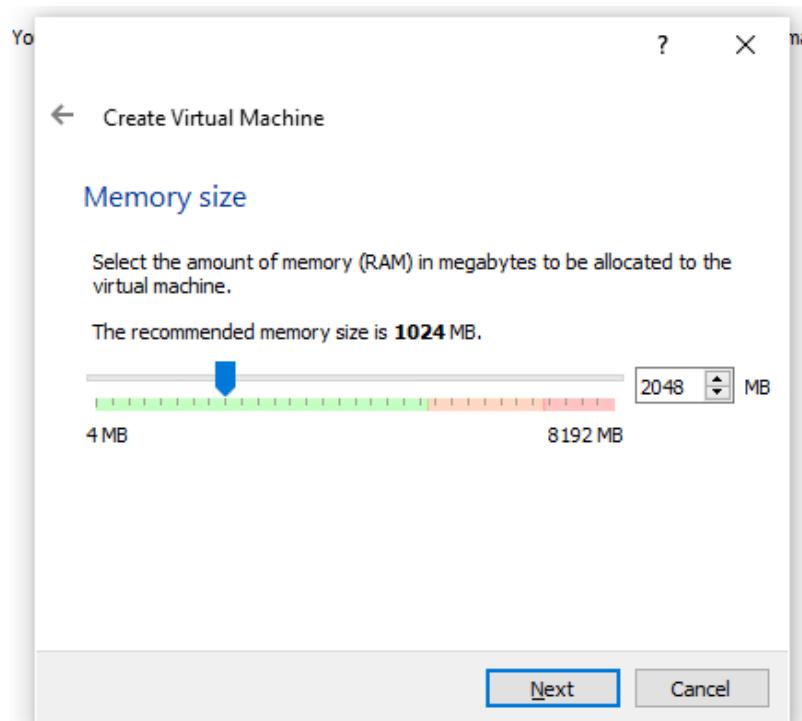
**2. Setup the Ubuntu Instance in the VM Virtual Box.**



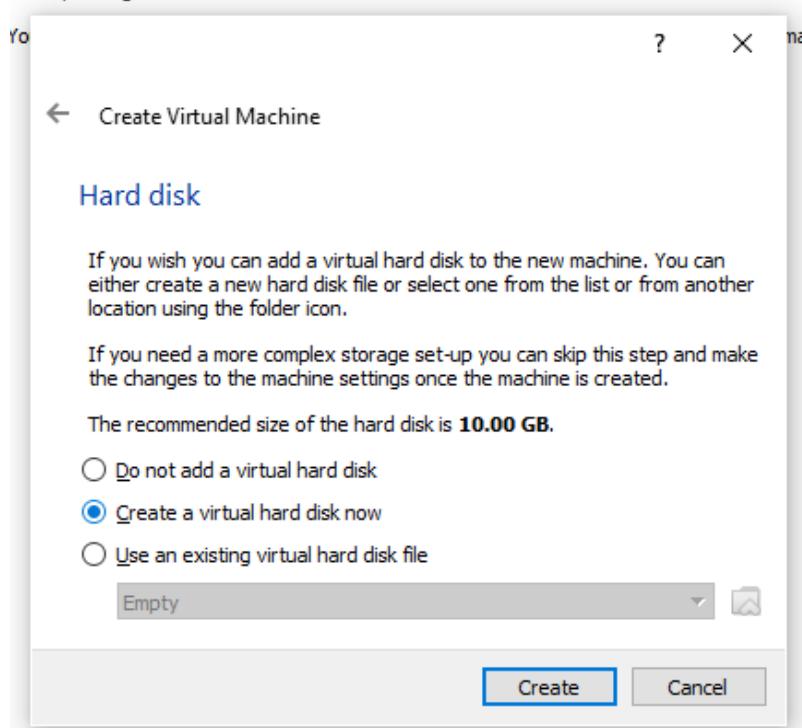
- a. After selecting the NEW button to create the Ubuntu instance, the pop-up window to enter & select the name, type and version of the OS.



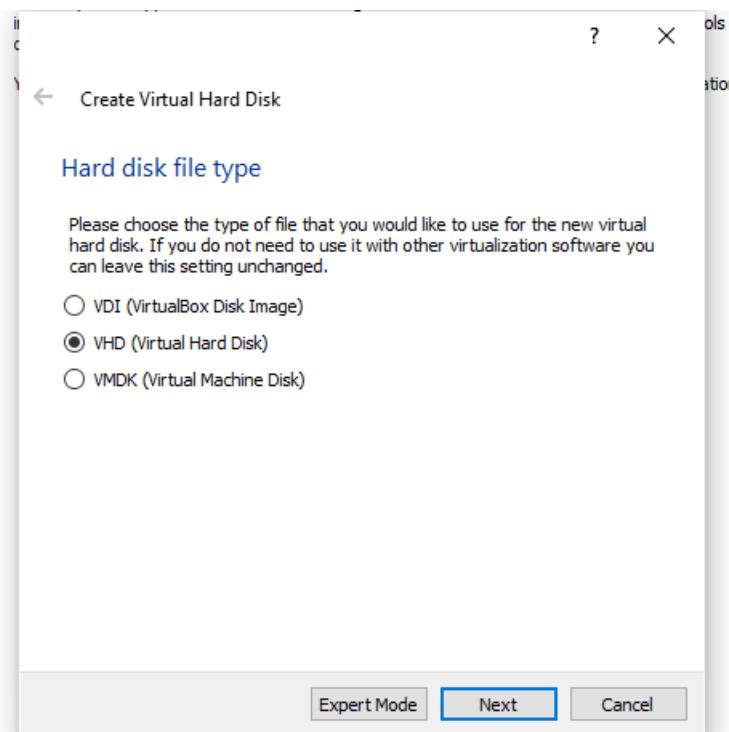
- b. Choose the main memory size for the OS.



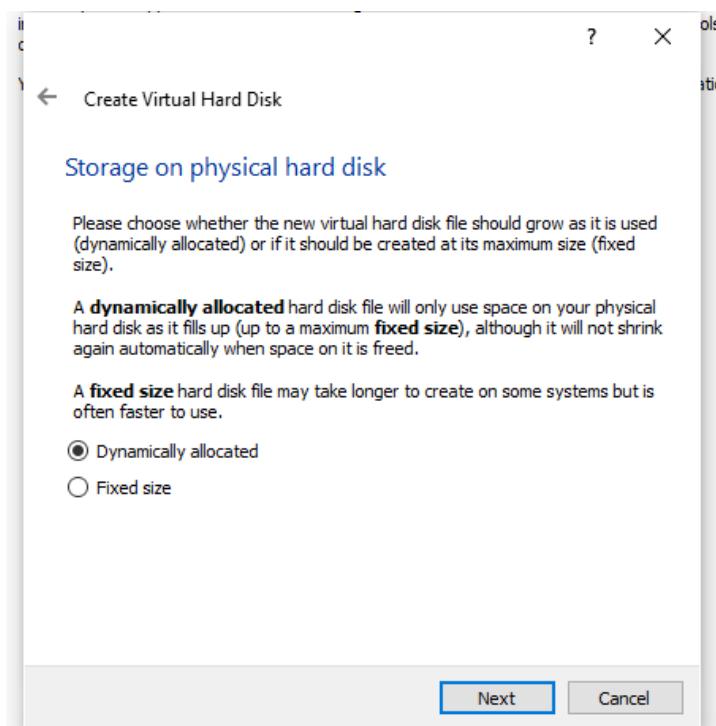
c. Option to add a virtual hard disk to the new machine instance.



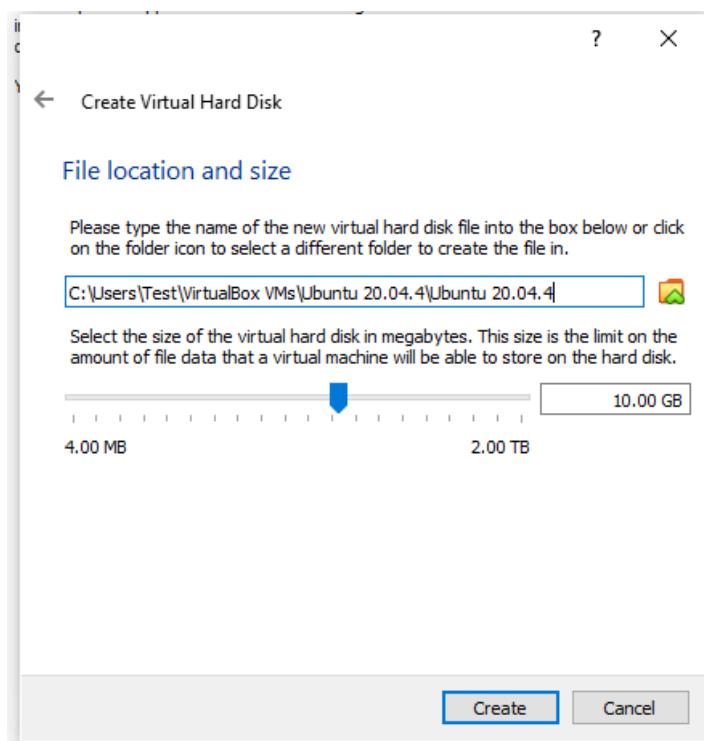
d. Option to choose the type of new virtual hard disk for new instance of OS.



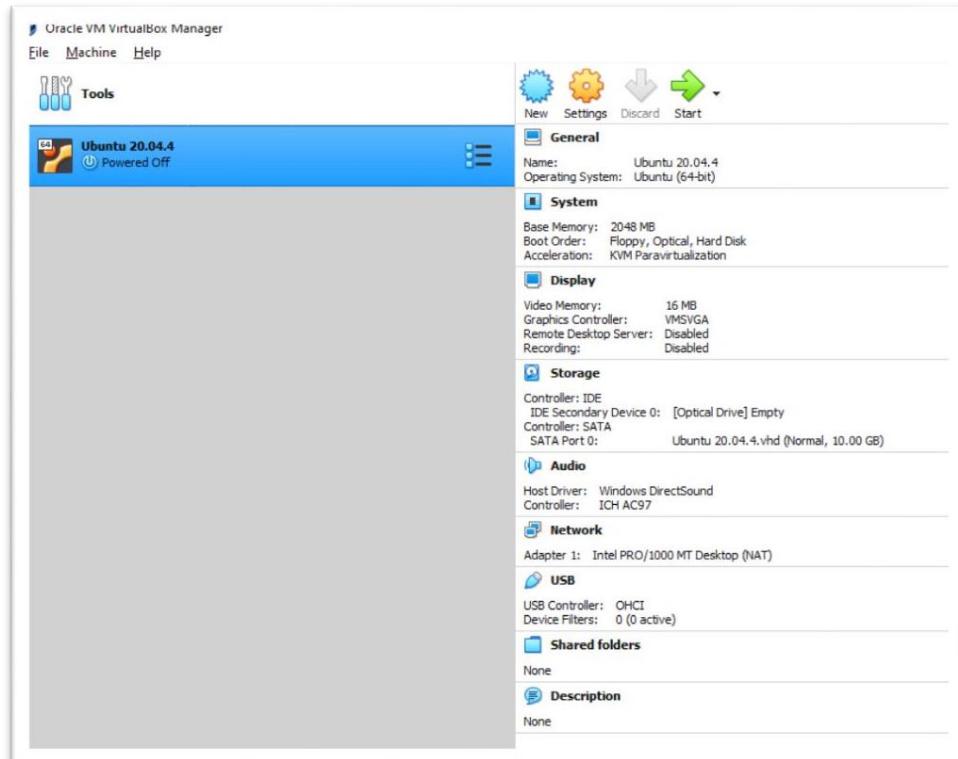
- e. Options to choose the methods of accessing the physical hard disk space for the new instance from the existing hard disk.



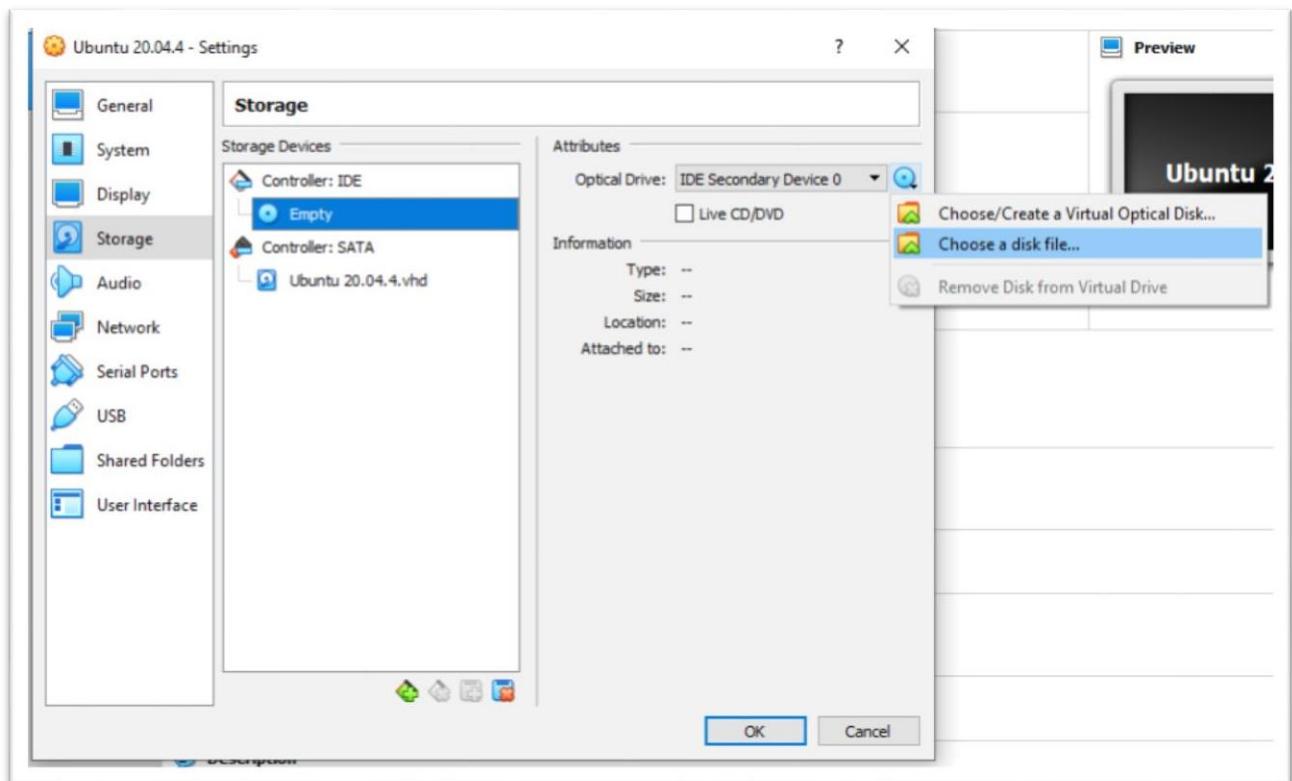
- f. Panel to select the size of the virtual disk in megabytes and location and name of the instance and final submit to create the instance of OS.



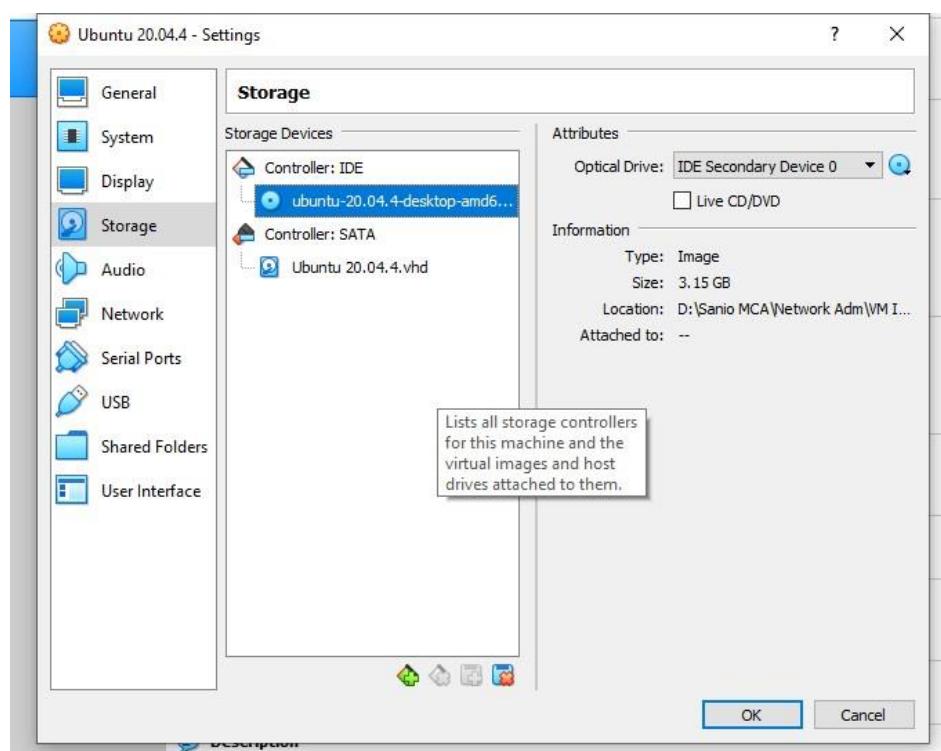
- g. The newly created OS instance and at the left side of the application.



- h. Settings the configurations of the instance created and adding the ISO image file of the OS correspondingly.**

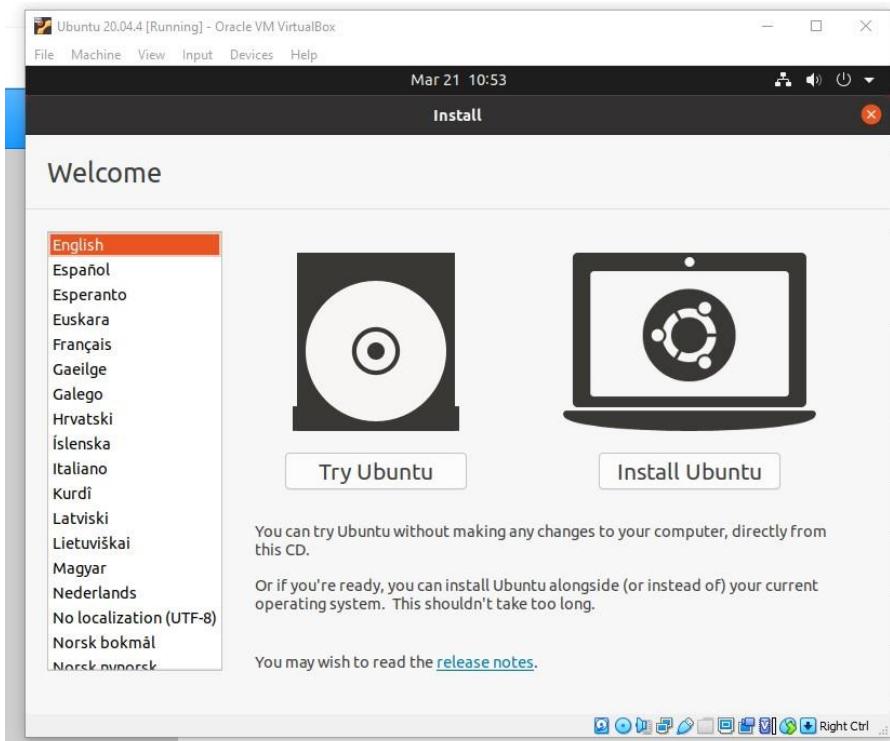


- i. Selecting the ISO image file from the local device.**

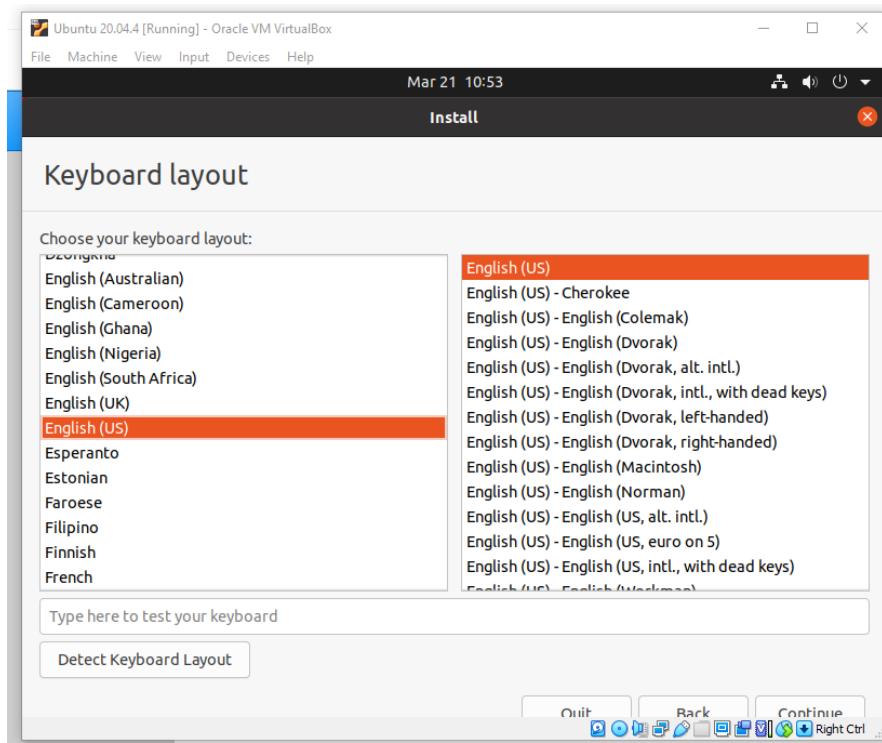


### **3. Installation of the Ubuntu OS within the newly created instance.**

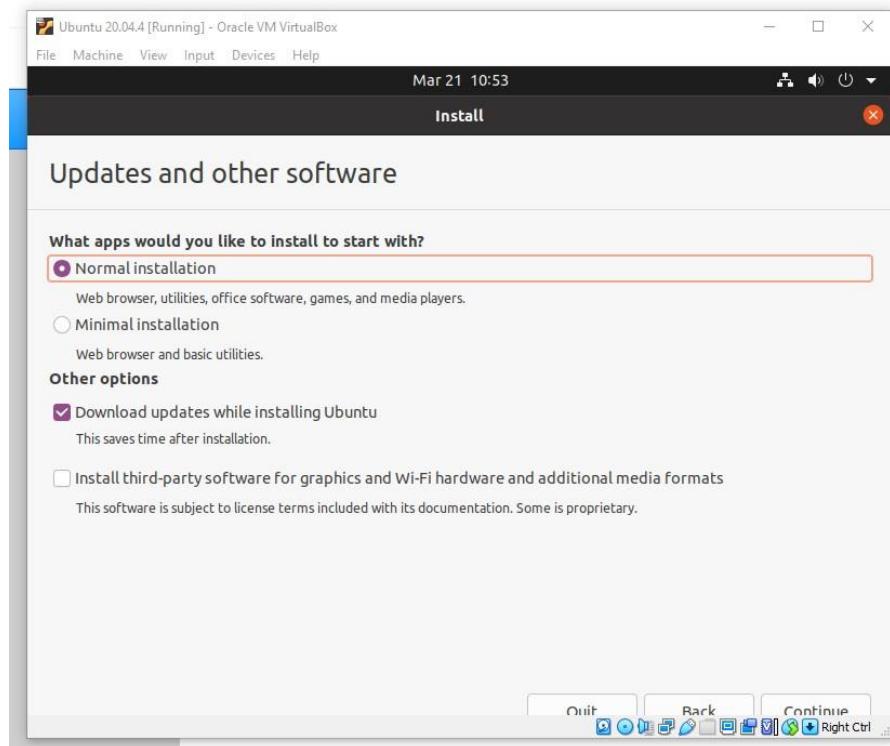
- a. Running the new OS instance and selecting the “Install Ubuntu” to install the loaded ISO file.**



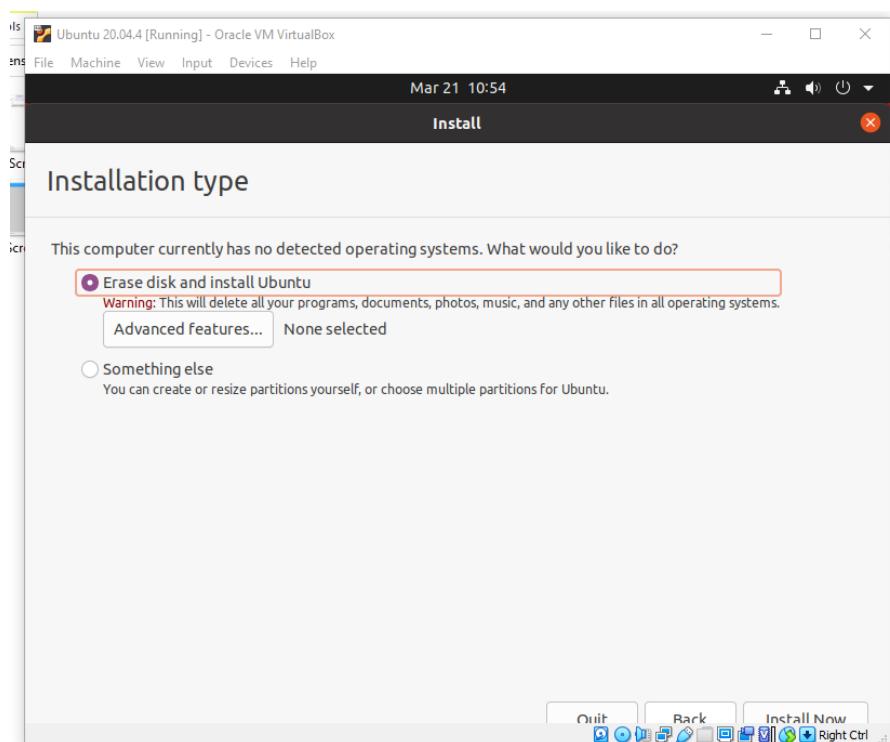
- b. Selecting the language for install the ubuntu OS.**



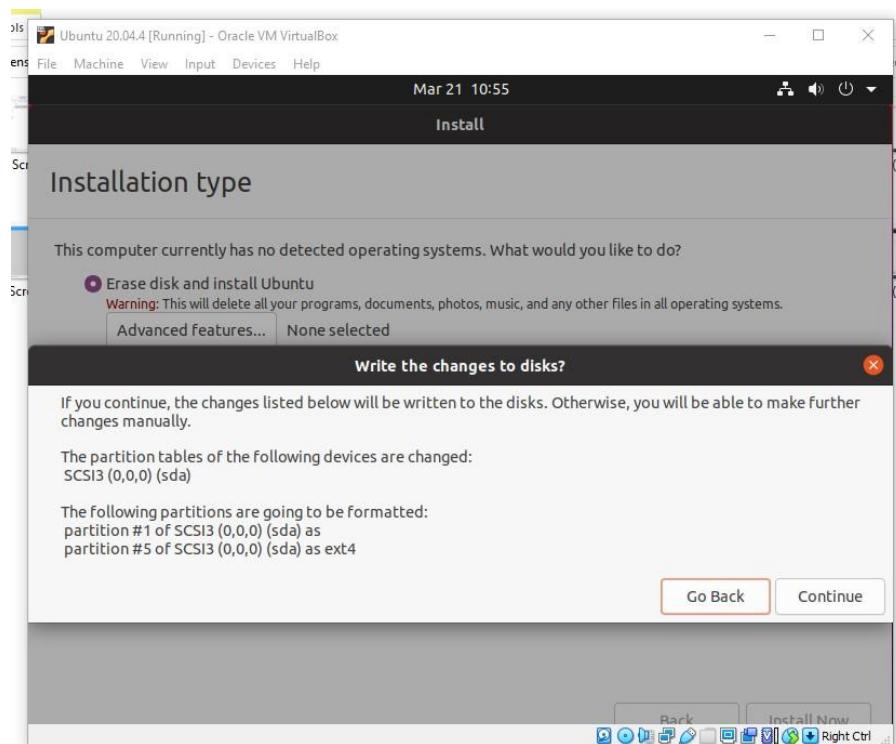
c. Selection of other installation along & within with the installation of ubuntu.



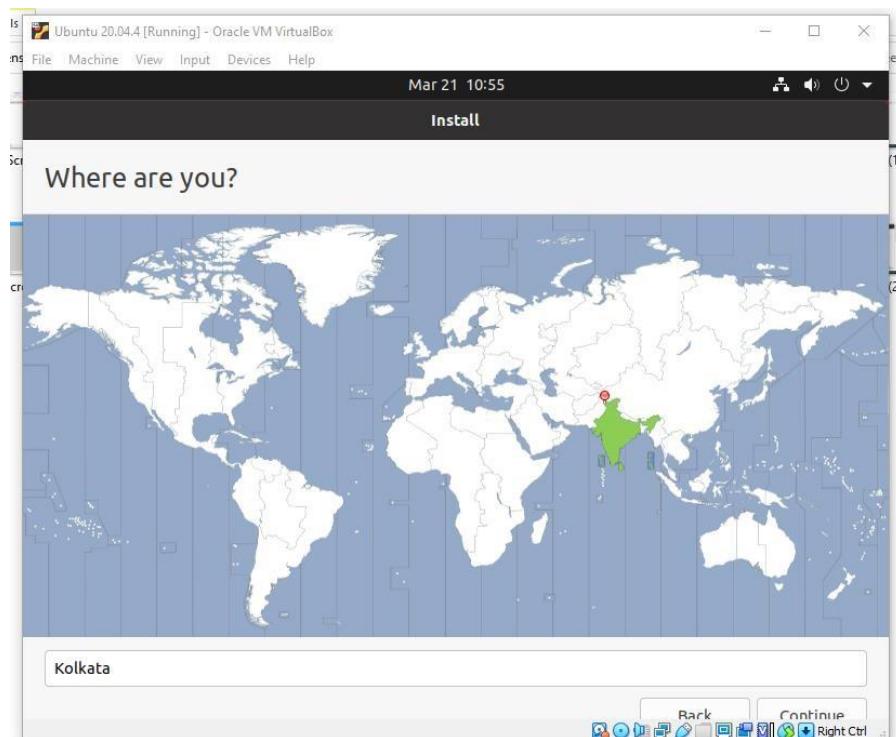
d. Selecting the disk partitioning allocation options from the given below.



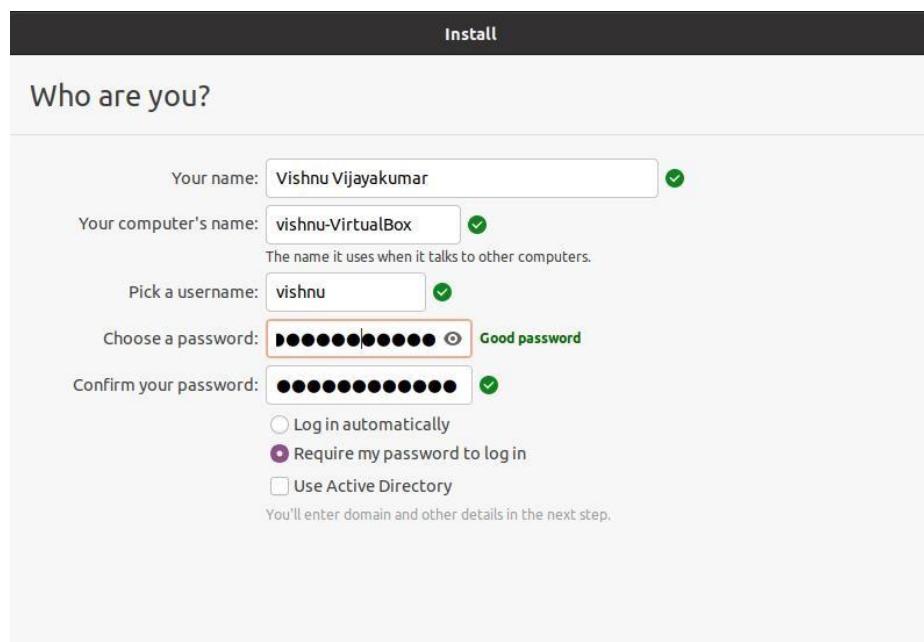
- e. Warning message box about the formatting and partitioning of the allotted hard disk.



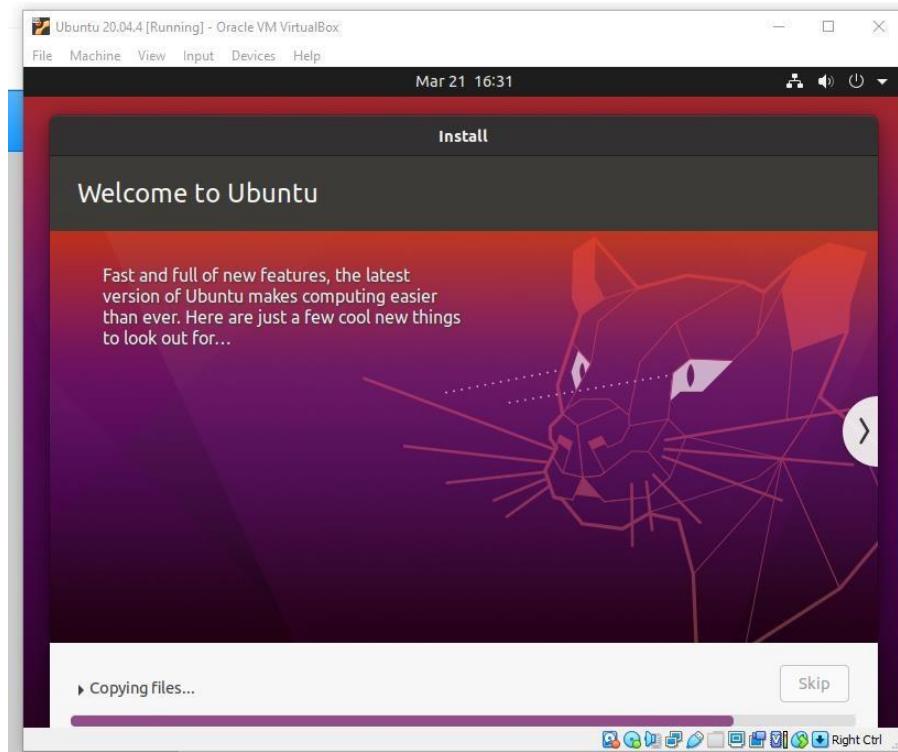
- f. Selecting the geographical location for the time/location.



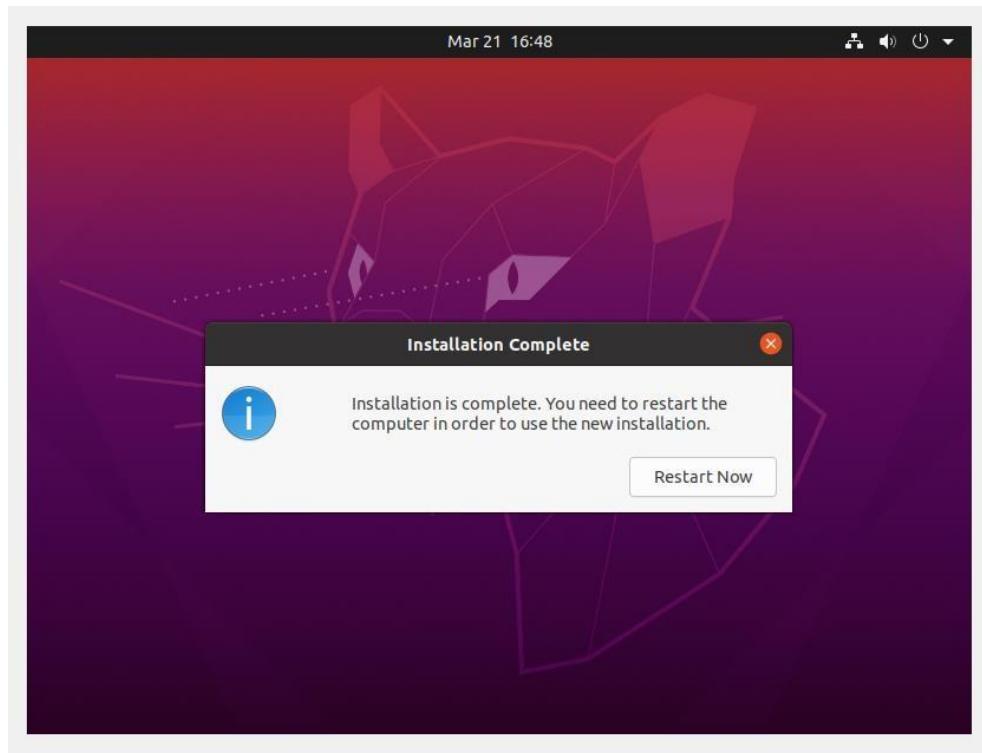
- g. Entering the name, username & password for the account to sign in to the ubuntu OS after installation.**



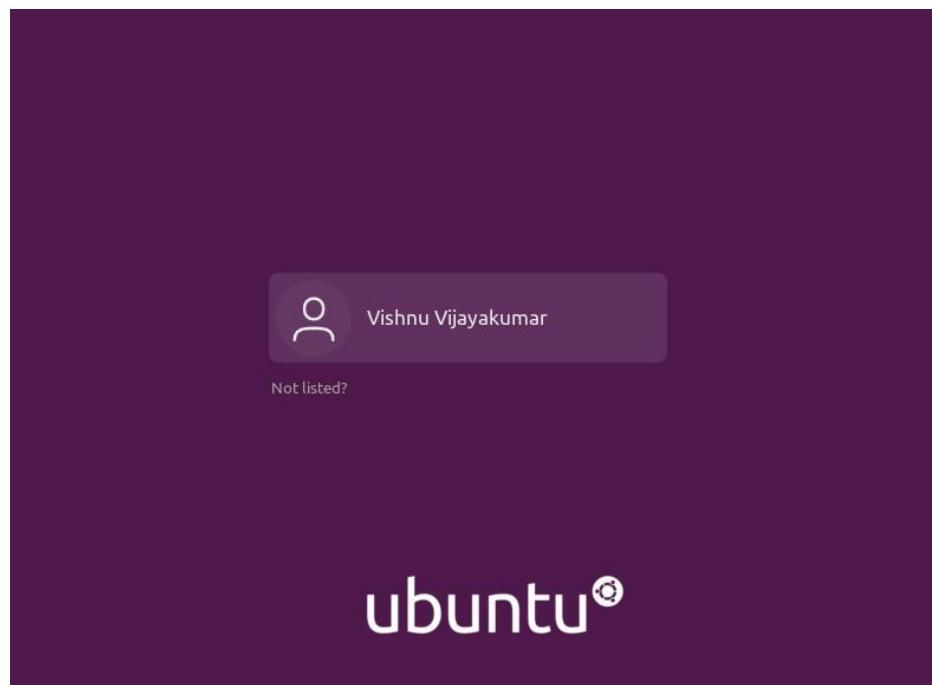
- h. Installing the ubuntu OS in the instance, extracting the ubuntu ISO file, setting configurations, setting the various software within, etc.**



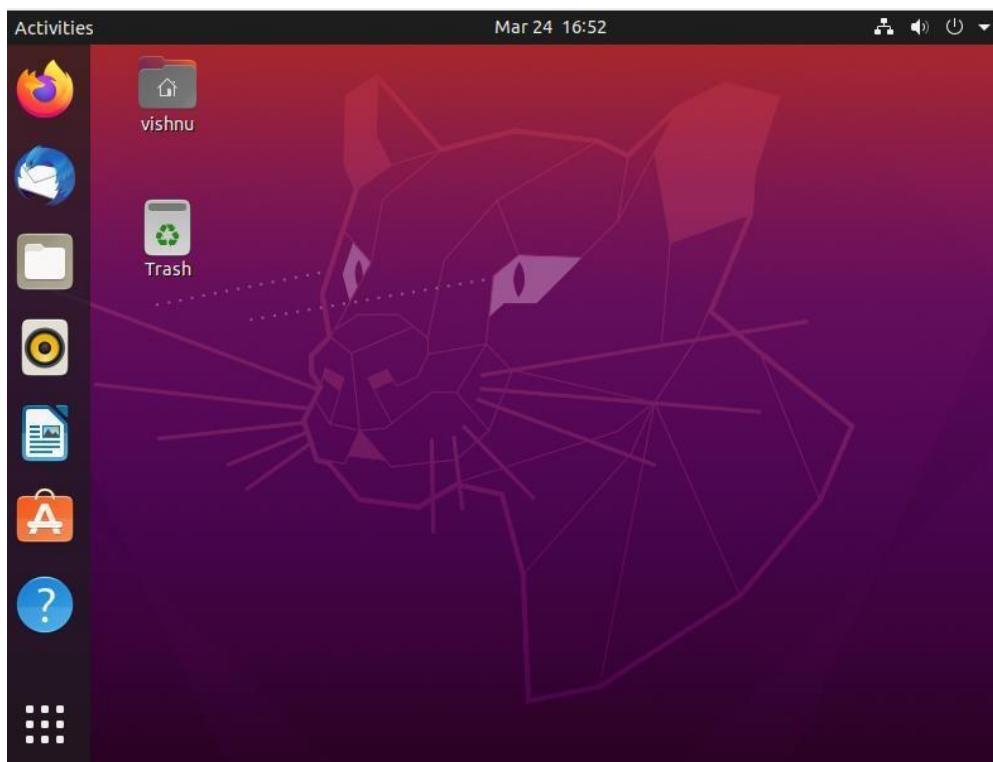
- i. Restarting the OS instance to finalize the installation.**



- j. Signing in and visiting the home screen of the ubuntu OS using the previously registered username & password.



## Output Screenshot



## **Program no:3**

**Aim:** Study of a terminal based text editor such as Vim or Gedit, Basic Linux commands: - familiarity with following commands/operations expected

**Name:** Vishnu Vijayakumar  
**Roll No:**53  
**Batch:**MCA-B  
**Date:**24/3/2022

## **Procedure**

**Pwd:**This command is used to display the location of the current working directory.

Syntax :-\$ pwd

Output:

```
student@S53:~$ pwd
/home/student
student@S53:~$ mkdir vishnuv
```

**Mkdir:**This command is used to create a new directory under any directory.

Syntax :-\$ mkdir<directory name>

Output :-

```
student@S53:~$ mkdir vishnuv
student@S53:~$ pwd
/home/student
```

**ls:**This command is used to display a list of content of directory.

Syntax :-\$ ls

Output :-

```
student@S53:~$ ls
Desktop  Downloads      Music      Public      snap      Videos
Documents examples.desktop  Pictures  PycharmProjects Templates  vishnuv
```

**Man:**This command is used to display the user manual of any command that we can run on the terminal.

Syntax :-\$ man <command name>

Output:

```
student@553:~$ man pwd
student@553:~$ ls -l
```

**ls -l:**This command is used to shows file or directory, size, modified date and time, file or folder name and owner of the file, and its permission.

Syntax :-\$ ls -l

Output:-

```
student@553:~$ ls -l
total 56
drwxr-xr-x 5 student student 4096 Nov 26 10:32 Desktop
drwxr-xr-x 3 student student 4096 Feb 14 10:04 Documents
drwxr-xr-x 2 student student 4096 Dec 20 12:32 Downloads
-rw-r--r-- 1 student student 8980 Oct 4 22:24 examples.desktop
drwxr-xr-x 2 student student 4096 Oct 5 15:25 Music
drwxr-xr-x 2 student student 4096 Oct 5 15:25 Pictures
drwxr-xr-x 2 student student 4096 Oct 5 15:25 Public
drwxrwxr-x 7 student student 4096 Jan 3 12:32 PycharmProjects
drwx----- 4 student student 4096 Dec 20 12:25 snap
drwxr-xr-x 2 student student 4096 Oct 5 15:25 Templates
drwxr-xr-x 2 student student 4096 Oct 5 15:25 Videos
drwxr-xr-x 2 student student 4096 Mar 24 14:29 vishnuv
```

**ls -r:**This command is used to display files and directories in reverse order.

Syntax :-\$ls -r

Output :-

```
student@553:~$ ls -R
.:
Desktop    Downloads      Music      Public      snap      Videos
Documents  examples.desktop Pictures  PycharmProjects  Templates  vishnuv
```

**ls -a:**This command is used to list all files including hidden files.

Syntax :- \$ls -a

Output :-

```
student@SS3:~$ ls -a
.          Documents      Music      .ssh
..         Downloads     .oracle_jre_usage Templates
.bash_history examples.desktop Pictures   .thunderbird
.bash_logout  .gnupg       .pki       Videos
.bashrc      .ICEauthority .profile    vishnuv
.cache       .java        Public
.config      .local       PycharmProjects
Desktop     .mozilla     snap
```

## ls –al

Syntax :-\$ ls -al

Output :-

```
student@SS3:~$ ls -al
total 128
drwxr-xr-x 23 student student 4096 Mar 24 14:29 .
drwxr-xr-x  6 root   root   4096 Jan 13 14:49 ..
-rw-r--r--  1 student student  83 Oct 29 16:04 .bash_history
-rw-r--r--  1 student student 220 Oct  4 22:24 .bash_logout
-rw-r--r--  1 student student 3771 Oct  4 22:24 .bashrc
drwxr---- 16 student student 4096 Dec 20 11:44 .cache
drwxr---- 20 student student 4096 Dec 20 11:44 .config
drwxr-xr-x  5 student student 4096 Nov 26 10:32 Desktop
drwxr-xr-x  3 student student 4096 Feb 14 10:04 Documents
drwxr-xr-x  2 student student 4096 Dec 20 12:32 Downloads
-rw-r--r--  1 student student 8980 Oct  4 22:24 examples.desktop
drwxr----  3 student student 4096 Nov  1 11:15 .gnupg
-rw-r----- 1 student student 7956 Mar 24 2022 .ICEauthority
drwxrwxr-x  4 student student 4096 Nov  1 11:15 .java
drwxr----  3 student student 4096 Oct  5 15:25 .local
drwxr----  5 student student 4096 Nov  1 11:21 .mozilla
drwxrwxr-x  2 student student 4096 Oct  5 15:25 Music
drwxrwxr-x  2 student student 4096 Nov 18 11:16 .oracle_jre_usage
drwxr-xr-x  2 student student 4096 Oct  5 15:25 Pictures
drwxr----  3 student student 4096 Oct 29 15:14 .pki
-rw-r--r--  1 student student 807 Oct  4 22:24 .profile
drwxr-xr-x  2 student student 4096 Oct  5 15:25 Public
drwxrwxr-x  7 student student 4096 Jan  3 12:32 PycharmProjects
drwxr----  4 student student 4096 Dec 20 12:25 snap
drwxr----  2 student student 4096 Nov  1 11:15 .ssh
```

**ls –t:**This command is used to display files in the last modified order.

Syntax :-\$ ls –t

Output :-

```
student@SS3:~$ ls -t
vishnuv  PycharmProjects snap  Music  Public  Videos
Documents Downloads Desktop Pictures Templates examples.desktop
student@SS3:~$ cd vishnuv
student@SS3:~/vishnuv$ cd ..
```

**Cd:**This command is used to change the current directory.

Syntax :-\$ cd <directory name>

Output :-

```
student@SS3:~$ cd vishnuv
student@SS3:~/vishnuv$ cd ..
student@SS3:~$ cd -
/home/student/vishnuv
```

**cd ..**: This command is used to move to the parent directory of current directory, or the directory one level up from the current directory.

Syntax :- \$ cd ..

Output :-

```
student@SS3:~/vishnuv$ cd ..
student@SS3:~$ cd -
/home/student/vishnuv
```

**cd -**: This command is used to switch back to previous directory we were working earlier.

Syntax :-\$ cd –

Output :-

```
student@SS3:~$ cd vishnuv
student@SS3:~/vishnuv$ cd ..
student@SS3:~$ cd -
/home/student/vishnuv
```

**cat > filename**: This command is used to create a file and add contents to that file.

Syntax :-\$ cat > filename.txt

**cat filename**: This command is used to view the contents in the file.

Syntax :-\$ cat filename.txt

Output :-

```
/home/student/vishnuv
student@SS3:~/vishnuv$ cat > v.txt
Network and Administration
^Z
[1]+  Stopped                  cat > v.txt
```

**cat>>filename**: This command is used to add contents to an existing file.

Syntax :-\$ cat >> filename.txt

Output :-

```
/home/student/vishnuv
student@S53:~/vishnuv$ cat > v.txt
Network and Administration
^Z
[1]+  Stopped                  cat > v.txt
student@S53:~/vishnuv$ cat v.txt
Network and Administration
student@S53:~/vishnuv$ cat >> v.txt
```

**cat filename1 > filename2:** This command is used to copy the content from one file to another file.

Syntax :-\$ cat filename1 > filename2

Output :-

```
cat: v: No such file or directory
student@S53:~/vishnuv$ cat v.txt > b.txt
student@S53:~/vishnuv$ cat b.txt
Network and Administration
AJCE Batch B
student@S53:~/vishnuv$
```

**read :**This command is used to read the content of a line to a variable.

Syntax :-\$ read variablename

Output :-

```
student@S53:~$ read name
My name is Vishnu Vijayakumar
student@S53:~$ echo $name
My name is Vishnu Vijayakumar
student@S53:~$ locate a.txt
```

**Find:**This command is used to display contents of particular directory.

Syntax :-\$ find filename.txt

Output :-

```
/home/student/marvel1
student@S53:~$ find marvel1
marvel1
student@S53:~$ find mark1
mark1
```

**grep :**This command will let you search through all the text in a given file.

Syntax :-\$ grep word filename.txt

Output:-

```
student@553:~$ cat v.txt
My Name is Vishnu Vijayakumar
MCA
Batch B
Amal Jyothi College Of Engineering
student@553:~$ grep is v.txt
```

**grep -i** :command used for a case insensitive search

Syntax: \$ grep -i filename.txt

Output:

```
student@553:~$ grep -i is v.txt
My Name is Vishnu Vijayakumar
student@553:~$ grep -v is v.txt
MCA
Batch B
Amal Jyothi College Of Engineering
```

**grep -v** :command used for inverted search.

Syntax: \$ grep -v filename.txt

Output:

```
My Name is Vishnu Vijayakumar
student@553:~$ grep -v is v.txt
MCA
Batch B
Amal Jyothi College Of Engineering
```

**grep -A1**:command used to display line after the result.

Syntax: \$ grep -A1 filename.txt

Output:

```
My Name is Vishnu Vijayakumar
student@553:~$ grep -A1 Vishnu v.txt
My Name is Vishnu Vijayakumar
MCA
student@553:~$ grep -i is v.txt
```

**grep -B1**:command used to display line before the result.

Syntax: \$ grep -B1 filename.txt

Output:

```
student@S53:~$ grep -B1 Batch v.txt
MCA
Batch B
```

**grep -C1:** command used to display line before and after the result.

Syntax: \$ grep -C1 filename.txt

Output:

```
student@S53:~$ grep -c1 Batch v.txt
1
student@S53:~$ grep -C1 Batch v.txt
MCA
Batch B
Amal Jyothi College Of Engineering
```

**wc -word count:** This command is used for counting purpose which is used to find the number of lines, the number of words, the number of characters and the number of bytes.

**wc -l** (count number of lines)

**wc -w** (count number of words)

**wc -c** (count number of characters)

**wc -m** (count number of bytes)

Syntax :- \$ wc -l filename.txt

\$ wc -w filename.txt

\$ wc -c filename.txt

\$ wc -m filename.txt

Output :-

```
student@S3:~$ cat marvel1
captian america
ironman
spiderman
hulk
xmen
strange
student@S3:~$ wc marvel1
6 7 53 marvel1
```

```

student@S53:~$ wc -c v.txt
77 v.txt
student@S53:~$ wc -m v.txt
4 v.txt
student@S53:~$ wc -w v.txt
13 v.txt
student@S53:~$ wc -l v.txt
77 v.txt
student@S53:~$ 
905304 .
student@S53:~$ wc -l v.txt
4 v.txt
student@S53:~$ 

```

**df** :This command is used to get a report on system disc space usage.

Syntax :-\$ df filename.txt

**Output :-**

```

student@S53:~$ df
Filesystem      1K-blocks    Used Available Use% Mounted on
udev            1925304       0   1925304  0% /dev
tmpfs           390960     1836   389124  1% /run
/dev/sda6      114460828 32736144  75867304 31% /
tmpfs           1954792       0   1954792  0% /dev/shm
tmpfs            5120        4    5116  1% /run/lock
tmpfs           1954792       0   1954792  0% /sys/fs/cgroup
/dev/loop0      254848     254848       0 100% /snap/gnome-3-38-2004/99
/dev/loop1      168832     168832       0 100% /snap/gnome-3-28-1804/161
/dev/loop2      144128     144128       0 100% /snap/gnome-3-26-1604/98
/dev/loop3       1024       1024       0 100% /snap/gnome-logs/81
/dev/loop15     207872     207872       0 100% /snap/vlc/1397
/dev/loop16     46080      46080       0 100% /snap/gtk-common-themes/1440
/dev/loop20      256        256       0 100% /snap/gtk2-common-themes/9
/dev/loop19     283776     283776       0 100% /snap/gimp/380
/dev/loop6      66016      66016       0 100% /snap/gtk-common-themes/1519

```

**df -m** :This command is used to see the report in mega bytes.

Syntax :\$ def -m filename.txt

**Output :-**

```

student@S53:~$ df -m
Filesystem    1M-blocks  Used Available Use% Mounted on
udev            1881       0    1881  0% /dev
tmpfs           382        2    381  1% /run
/dev/sda6      111779 31969    74090  31% /
tmpfs           1909       0    1909  0% /dev/shm
tmpfs            5         1      5  1% /run/lock
tmpfs           1909       0    1909  0% /sys/fs/cgroup
/dev/loop0      249        249       0 100% /snap/gnome-3-38-2004/99
/dev/loop1      165        165       0 100% /snap/gnome-3-28-1804/161
/dev/loop2      141        141       0 100% /snap/gnome-3-26-1604/98
/dev/loop3       1         1       0 100% /snap/gnome-logs/81
/dev/loop15     203        203       0 100% /snap/vlc/1397
/dev/loop16      45         45       0 100% /snap/gtk-common-themes/1440
/dev/loop20      1         1       0 100% /snap/gtk2-common-themes/9
/dev/loop19     278        278       0 100% /snap/gimp/380
/dev/loop6       66         66       0 100% /snap/gtk-common-themes/1519
/dev/loop4      112        112       0 100% /snap/core/12941
/dev/loop10      3         3       0 100% /snap/gnome-calculator/920
/dev/loop29      1         1       0 100% /snap/gnome-characters/741

```

**cut -d:** This command is used to cut and display the content based on the delimiter given.

Syntax :-\$ cut –d delimiter –fieldnumber filename

Output :-

```
student@553:~$ du
4      ./ssh
8      ./java/.userPrefs/jetbrains/_!{!!cg"p!{}!}@"j!(k!|w"w!"8!b!"p!"':!e@==
8      ./java/.userPrefs/jetbrains/jetprofile/asset
16      ./java/.userPrefs/jetbrains/jetprofile
32      ./java/.userPrefs/jetbrains
40      ./java/.userPrefs
40      ./java/fonts/11.0.13
40      ./java/fonts/11.0.12
84      ./java/fonts
128      ./java
676      ./cache/fontconfig
88      ./cache/thumbnails/fail/gnome-thumbnail-factory
92      ./cache/thumbnails/fail
212      ./cache/thumbnails/normal
808      ./cache/thumbnails/large
```

**cut -b:**This command is used to cut and display the content based on the specified byte number.

Syntax :-\$ cut –b bytelenumber filename

Output :-

```
student@S53:~$ cut -b 2 mark1
n
a
a
```

**cut --complement -c:**This command is used to erase the specified character and display the remaining content of the file.

Syntax :-\$ cut --complement –c characternumber filename.txt

Output :-

```
student@S53:~$ cut --complement -c 1 mark1
nglish 78
aths 75
alayalam 85
```

**Paste:**This command is used to paste the contents from the specified file.

Syntax :-\$ paste filename

Output :-

```
student@S53:~$ paste marvel1 marvel2
iron man      Captain America
spider man    Bucky Barnes
captain marvel Rocket
groot
thanos
```

**paste file1 file2 > file3:**This command is used to paste the contents from the specified files to another file.

Syntax :-\$ paste file1 file2 > file3

Output:-

```
student@S53:~$ paste marvel1 marvel2 > marvel3
student@S53:~$ cat marvel3
iron man      Captain America
spider man    Bucky Barnes
captain marvel Rocket
groot
thanos
student@S53:~$ paste -d '-' marvel1 marvel2
```

**paste -s:** This command is used to paste the contents sequentially. It reads all the lines from the file and merges all these lines into a single line with each line separated by tab.

Syntax :-`paste -s file1 file2`

Output :-

```
student@SS3:~$ paste -s marvel1 marvel2
iron man      spider man      captain marvel   groot      thanos
Captain America Bucky Barnes      Rocket
```

**paste -d:** This command is used to paste the contents from the given files with the delimiter given.

Syntax :-`$ paste -d delimiter file1 file2`

Output :-

```
student@SS3:~$ paste -d '-' marvel1 marvel2
iron man-Captain America
spider man-Bucky Barnes
captain marvel-Rocket
groot-
thanos-
student@SS3:~$ paste -d '|' marvel1 marvel2 marvel3
iron man|Captain America|iron man      Captain America
spider man|Bucky Barnes|spider man      Bucky Barnes
captain marvel|Rocket|captain marvel      Rocket
groot%|groot
thanos%|thanos
```

**More:** This command is used to view the text files in the command prompt, displaying one screen at a time in case the file is large.

Syntax :-`$ more filename`

Output :-

**student@553:-\$ more sample**

By 2005, Marvel Entertainment had begun planning to produce its own films independently and distribute them through Paramount Pictures.[2] Previously, Marvel had co-produced several superhero films with Columbia Pictures, New Line Cinema and others, including a seven-year development deal with 20th Century Fox.[3] Marvel made relatively little profit from its licensing deals with other studios and wanted to get more money out of its films while maintaining artistic control of the projects and distribution.[4] Avi Arad, head of Marvel's film division, was pleased with Sam Raimi's Spider-Man films at Sony Pictures, but was less pleased with others. As a result, Arad decided to form Marvel Studios, Hollywood's first major independent film studio since DreamWorks.[5]

Kevin Feige, Arad's second-in-command,[5] realized that unlike Spider-Man and the X-Men, whose film rights were licensed to Sony and Fox, respectively, Marvel still owned the rights to the core members of the Avengers. Feige, a self-described "fanboy", envisioned creating a shared universe, just as creators Stan Lee and Jack Kirby had done with their comic books in the early 1960s.[6] To raise capital, the studio secured funding from a seven-year, \$525 million revolving credit facility with Merrill Lynch.[4] Marvel's plan was to release individual films for their main characters and then merge them in a crossover film.[7] Arad, who doubted the strategy yet insisted that it was his reputation that helped secure the initial financing, resigned the following year.[5][8] In 2007, at 33 years old, Feige was named studio chief. In order to preserve its artistic integrity, Marvel Studios formed a creative committee of six people familiar with its comic book lore: Feige, Marvel Studios co-president Louis D'Esposito, Marvel Comics' president of publishing Dan Buckley, Marvel's chief creative officer Joe Quesada, writer Brian Michael Bendis, and Marvel Entertainment president Alan Fine, who oversaw the committee.[5] Feige initially referred to the shared narrative continuity of these films as the "Marvel Cinema Universe", [9] but later used the term "Marvel Cinematic Universe".[10] Since the franchise expanded to other media, this phrase has been used by some to refer to the feature films only.[11] Marvel designated the Marvel Cinematic Universe as Earth-199999 within the continuity of the company's comic multiverse, a collection of fictional alternate universes.[12]

In October 2014, Marvel Studios held a press event to announce the titles of their Phase Three films.[13] By September 2015, after Marvel Studios was integrated into Walt Disney Studios with Feige reporting to Walt Disney Studios chairman Alan Horn instead of Marvel Entertainment CEO Isaac Perlmutter,[14] the studios' creative committee had "nominal" input on the films moving forward, though they continued to consult on Marvel Television productions, which remained under Perlmutter's control.[15][16] All key film decisions going forward were to be made by Feige, D'Esposito and Victoria Alonso.[15] Feige mentioned that Avengers: Endgame (2019) would provide "a definitive end" to the films and storyline preceding it, with the franchise having "two distinct periods. Everything before [Endgame] and everything after".[17]

In December 2017, The Walt Disney Company agreed to acquire assets from 21st Century Fox, including 20th Century Fox.[18] The transaction officially closed on March 19, 2019.[19] The acquisition saw the return of the film rights of Deadpool, the X-Men characters, and the Fantastic Four characters to Marvel Studios, which would "create richer, more complex worlds of inter-related characters and stories".[18] In July 2019, Feige announced the Phase Four slate at San Diego Comic-Con, consisting of films and television event series on Disney+. [20] In December 2020, at Disney's Investor Day, Marvel Studios provided updates to previously announced films and series, and announced additional Disney+ series and a special, which were confirmed to be part of Phase Four. [21][22] Some of the first elements previously controlled by 20th Century Fox, to be

**more -number:**This command is used to display display the lines to the specified number from head.

Syntax :-\$ more -number

Output :-

```
student@554:~$ more +5 name
GNU General Public License (GNU GPL) in 1989. By the early 1990s, many of the programs required in an operating system (such as libraries, compilers, text editors, a command-line shell, and a windowing system) were completed, although low-level elements such as device drivers, daemons, and the kernel, called GNU Hurd, were stalled and incomplete.[43]
--More--(4%)
```

**more +number:**This command use the line number from where we want to displaying the text content.

Syntax :-\$ more +number

Output :-

```
student@553:~$ more +3 sample
student@553:~$ more +3 sample
Kevin Feige, Arad's second-in-command,[5] realized that unlike Spider-Man and the X-Men, whose film rights were licensed to Sony and Fox, respectively, Marvel still owned the rights to the core members of the Avengers. Feige, a self-described "fanboy", envisioned creating a shared universe, just as creators Stan Lee and Jack Kirby had done with their comic books in the early 1960s.[6] To raise capital, the studio secured funding from a seven-year, $525 million revolving credit facility with Merrill Lynch.[4] Marvel's plan was to release individual films for their main characters and then merge them in a crossover film.[7] Arad, who doubted the strategy yet insisted that it was his reputation that helped secure the initial financing, resigned the following year.[5][8] In 2007, at 33 years old, Feige was named studio chief. In order to preserve its artistic integrity, Marvel Studios formed a creative committee of six people familiar with its comic book lore: Feige, Marvel Studios co-president Louis D'Esposito, Marvel Comics' president of publishing Dan Buckley, Marvel's chief creative officer Joe Quesada, writer Brian Michael Bendis, and Marvel Entertainment president Alan Fine, who oversaw the committee.[5] Feige initially referred to the shared narrative continuity of these films as the "Marvel Cinema Universe", [9] but later used the term "Marvel Cinematic Universe".[10] Since the franchise expanded to other media, this phrase has been used by some to refer to the feature films only.[11] Marvel designated the Marvel Cinematic Universe as Earth-199999 within the continuity of the company's comic multiverse, a collection of fictional alternate universes.[12]

In October 2014, Marvel Studios held a press event to announce the titles of their Phase Three films.[13] By September 2015, after Marvel Studios was integrated into Walt Disney Studios with Feige reporting to Walt Disney Studios chairman Alan Horn instead of Marvel Entertainment CEO Isaac Perlmutter,[14] the studios' creative committee had "nominal" input on the films moving forward, though they continued to consult on Marvel Television productions, which remained under Perlmutter's control.[15][16] All key film decisions going forward were to be made by Feige, D'Esposito and Victoria Alonso.[15] Feige mentioned that Avengers: Endgame (2019) would provide "a definitive end" to the films and storyline preceding it, with the franchise having "two distinct periods. Everything before [Endgame] and everything after".[17]

In December 2017, The Walt Disney Company agreed to acquire assets from 21st Century Fox, including 20th Century Fox.[18] The transaction officially closed on March 19, 2019.[19] The acquisition saw the return of the film rights of Deadpool, the X-Men characters, and the Fantastic Four characters to Marvel Studios, which would "create richer, more complex worlds of inter-related characters and stories".[18] In July 2019, Feige announced the Phase Four slate at San Diego Comic-Con, consisting of films and television event series on Disney+. [20] In December 2020, at Disney's Investor Day, Marvel Studios provided updates to previously announced films and series, and announced additional Disney+ series and a special, which were confirmed to be part of Phase Four.[21][22] Some of the first elements previously controlled by 20th Century Fox to be integrated into the MCU were the organization S.W.O.R.D. in the Disney+ series WandaVision and the fictional country Madripoor in the series The Falcon and the Winter Soldier.[23][24] In June 2018, Marvel Television was launched with Jeph Loeb as head.[25] By July 2012, Marvel Television had entered into discussions with ABC to create a show set in the MCU;[26] the network ultimately created the series Agents of S.H.I.E.L.D., Agent Carter,[27] and Inhumans, which was a co-production with IMAX Corporation.[28][29][30] In November 2013, Disney was set to provide Netflix with the live-action series Daredevil, Jessica Jones, Luke Cage, and Iron Fist, leading up to the miniseries The Defenders.[31] In April 2016, Netflix ordered The Punisher, a spin-off from Daredevil.[32] By February 2019, Netflix had cancelled all of their Marvel series.[33] In January 2021, Feige said "never say never" to potentially reviving the series, but noted Marvel Studios was focused on their new Disney+ series.
```

**Cp:**This command is used to copy the contents from an existing file to a new file.

Syntax :-\$ cpexisting\_filenamenew\_filename

Output :-

```
student@553:~$ ls
a.txt      demo      Downloads      'LIXUX PGM OP'    marvel2    neha23    PycharmProjects    Templates    Vishnuvjk
b.txt      Desktop   examples.desktop  mark1       marvel3    Pictures   sample        Videos      v.txt
content   Documents h.txt       marvel1   Music     Public    snap         vishnuvjk
student@553:~$ cp -r Pictures Vishnuvjk
student@553:~$ cd Vishnuvjk
student@553:~/Vishnuvjk$ cd ..
```

```
student@S53:~$ cat > a.txt
Mahendra Singh Dhoni
Virat Kohli
Suresh Raina
Yuvraj Singh
Sachin Tendulkar
^Z
[1]+  Stopped                  cat > a.txt
student@S53:~$ cat > b.txt
^Z
[2]+  Stopped                  cat > b.txt
student@S53:~$ cp a.txt b.txt
student@S53:~$ cat b.txt
Mahendra Singh Dhoni
Virat Kohli
Suresh Raina
Yuvraj Singh
Sachin Tendulkar
student@S53:~$ cd Vishayvik
```

**cp overwriting:** This method is used to overwrite the contents of an existing file from one directory to an existing file with the same name in another directory with the cp command.

Syntax :-\$ cp filename directoryname

Output :-

```
student@S53:~$ cat > a.txt
Mahendra Singh Dhoni
Virat Kohli
Suresh Raina
Yuvraj Singh
Sachin Tendulkar
^Z
[1]+  Stopped                  cat > a.txt
student@S53:~$ cat > b.txt
^Z
[2]+  Stopped                  cat > b.txt
student@S53:~$ cp a.txt b.txt
student@S53:~$ cat b.txt
Mahendra Singh Dhoni
Virat Kohli
Suresh Raina
Yuvraj Singh
Sachin Tendulkar
```

**cp-i:** This command is used to ask the confirmation message once before overwriting the file. We give ‘y’ or ‘n’ as the response.

Syntax :- \$ cp -i filename destination\_directory

Output :-

```
student@S53:~$ cat > a.txt
Brett Lee
Johnson
Marsh
^Z
[3]+  Stopped                  cat > a.txt
student@S53:~$ mv -i a.txt b.txt
mv: overwrite 'b.txt'? y
student@S53:~$ cat b.txt
Brett Lee
Johnson
Marsh
student@S53:~$
```

**Mv:**This command is used to move an existing file or directory from one location to another.

Syntax :-\$ mv filename directory\_name

Output:-

```
Try 'mv --help' for more information.
student@S53:~$ mv b.txt Pictures
student@S53:~$ cd Pictures
student@S53:~/Pictures$ ls
b.txt
[Snipped: From 2022-01-24 15:22:54]
```

**mv overwriting:**This method is used to overwrite the contents of an existing file from one directory to an existing file with the same name in another directory with the mv command.

Syntax :-\$ mv filename directory\_name

Output :-

```
student@S53:~$ mv -i a.txt b.txt
mv: overwrite 'b.txt'? y
student@S53:~$ cat b.txt
Brett Lee
Johnson
Marsh
student@S53:~$
```

**Head:**This command is used to display the first 10 lines of the file by default.

Syntax :-\$ head filename

Output:-

```
student@S53:~$ cat a.txt
subjects marks
maths 50
english 90
malayalam 75
```

**head -number:**This command is used to display the lines of the file to the specified number from head.

Syntax :-\$ head -number filename

Output :-

```
student@S53:~$ head a.txt
subjects marks
maths 50
Enlish 90
malavalam 75
```

**Tail:**This command is used to display the last 10 lines of the file by default.

Syntax :-\$ tail filename

Output :-

```
student@S53:~$ tail a.txt
Ananghu
Nikhil
Anhijith
Nobel
Amal
Kishore
Gokul
Santosh
Alwin
Amruthesh
```

**tail -number:**This command is used to display the lines of the file to the specified number from tail.

Syntax :-\$ tail -number filename

Output :-

```
student@S53:~$ tail -3 a.txt
Santosh
Alwin
Amruthesh
```

**sudo useradd** :This command is used to add new user.

Syntax :-\$ sudo useradd username

Output :-

```
mca@553:~$ sudo useradd vishnu
[sudo] password for mca:
mca@553:~$ sudo useradd vishnu
useradd: user 'vishnu' already exists
mca@553:~$ sudo passwd vishnu
Enter new UNIX password:
Retype new UNIX password:
```

**sudo passwd** :This command is used to add password to the user.

Syntax :-\$ sudo passwd username

Output :-

```
mca@553:~$ sudo passwd vishnu
useradd: user 'vishnu' already exists
mca@553:~$ sudo passwd vishnu
Enter new UNIX password:
Retype new UNIX password:
passwd: password updated successfully
```

**sudo usermod** :This command is used to add members.

Syntax :-\$sudo usermod -G groupname username

**delete**

**sudo userdel username** - used to delete user.

**sudo groupdel groupname** - used to delete group name.

Syntax :-\$ **sudo userdel username**

\$ sudo groupdel groupname

Output :-

```
mca@S53:~$ sudo userdel Vishnu
```

**chmod** :This command is used change directory permission of files.

chmod +rwx

chmod -wx

chmod -rwx

Syntax :- \$ chmod +wx filename

\$ chmod -wx filename

\$ chmod -rwx filename

Output :-

```
Hockey
mca@S53:~$ chmod +rwx v.txt
```

```
mca@S53:~$ chmod -wx v.txt
mca@S53:~$ cat >> v.txt
bash: v.txt: Permission denied
```

```
bash: v.txt: Permission denied
mca@S53:~$ chmod -rwx v.txt
mca@S53:~$ cat v.txt
cat: v.txt: Permission denied
```

**chown**:This command is used to give ownership to user .

Syntax :- \$ sudo chown username filename

Output :-

```
mca@S53:~$ sudo chown vjk v.txt
mca@S53:~$ ls -l v.txt
----- 1 vjk mca 24 Apr 25 14:51 v.txt
mca@S53:~$ ifconfig -a
> ifconfig -a
> 
```

**Ssh:**This command is used to provide a secure encrypted connection between two hosts over an insecure network.

Syntax :- \$ ssh mca@ipaddress

```
mca@553:~$ sudo ssh mca@192.168.6.54
[sudo] password for mca:
ssh: connect to host 192.168.6.54 port 22: Connection refused
mca@553:~$ sudo ssh mca@192.168.6.25
ssh: connect to host 192.168.6.25 port 22: Connection refused
mca@553:~$ sudo ssh mca@192.169.6.46
ssh: connect to host 192.169.6.46 port 22: No route to host
mca@553:~$ sudo ssh mca@192.168.6.46
The authenticity of host '192.168.6.46 (192.168.6.46)' can't be established.
ECDSA key fingerprint is SHA256:hQC0bgw7WB7zuABHq2AKWIpGnXDeBBGvJqDHPNY.
Are you sure you want to continue connecting (yes/no)? yes
Warning: Permanently added '192.168.6.46' (ECDSA) to the list of known hosts.
mca@192.168.6.46's password:
Welcome to Ubuntu 18.04 LTS (GNU/Linux 4.15.0-23-generic x86_64)

 * Documentation:  https://help.ubuntu.com
 * Management:    https://landscape.canonical.com
 * Support:       https://ubuntu.com/advantage

 * Canonical Livepatch is available for installation.
   - Reduce system reboots and improve kernel security. Activate at:
     https://ubuntu.com/livepatch

8 packages can be updated.
0 updates are security updates.

Last login: Mon Apr 25 15:49:38 2022 from 192.168.6.40
```

## **Program no:4**

**Aim:** Shell scripting: study bash syntax, environment variables, variables, control constructs such as if, for and while, aliases and functions, accessing command line arguments passed to shell scripts.

### **Source code &Output**

Program-1

Aim:Write a program to print sum of all digits of a number.

**Name: Vishnu Vijayakumar**  
**Roll No:53**  
**Batch: MCA-B**  
**Date:5/5/2022**

```
echo "Enter a number:"  
read num  
sum=0  
while [ $num -gt 0 ]  
do  
mod=$((num%10))  
sum=$((sum+mod))  
num=$((num/10))  
done  
echo "Sum of the digit:"$sum
```

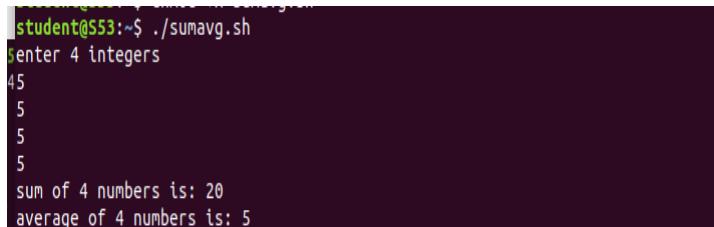
```
student@S53:~$ ./sumdigits.sh  
enter the number  
2255  
the sum of 2255 is 14  
student@S53:~$
```

### Program-2

Aim: write a shell script program to find the average of a number entered in a command line.

```
echo "Enter the
limit"
read N
i=1
sum=0
echo "Enter 4 integers"
while [ $i -le $N ]
do
    read num sum=$((sum
+ num))i=$((i + 1))
done
avg=$(echo "scale=3; $sum / $N "| bc -l)
echo "the average is"$avg
```

### Output screenshot

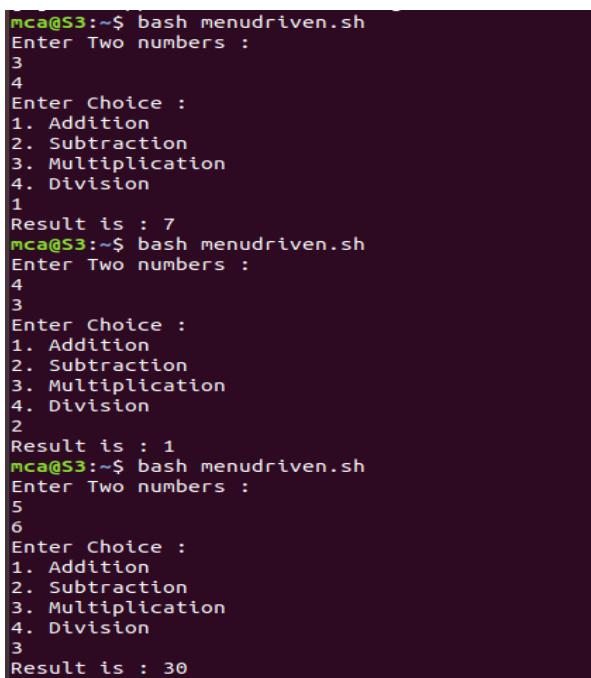


```
student@S53:~/Desktop$ ./sumavg.sh
Enter 4 integers
45
5
5
5
sum of 4 numbers is: 20
average of 4 numbers is: 5
```

### Program-3

Aim::Addition subtract and multiplication using switch case.

```
echo "Enter Two numbers : "
read a
read b
echo "Enter Choice :"
echo "1. Addition"
echo "2. Subtraction"
echo "3. Multiplication"
echo "4. Division"
read ch
case $ch in
  1)res=`echo $a + $b | bc`;;
  ;;
  2)res=`echo $a - $b | bc`;;
  ;;
  3)res=`echo $a \* $b | bc`;;
  ;;
  4)res=`echo "scale=2; $a / $b" | bc`;;
  ;;
esac
echo "Result is : $res"
```



The terminal window displays three separate executions of the script. In each execution, the user is prompted to enter two numbers and a choice (1-4). The script then calculates the result based on the choice using the bc command. The results shown are 7, 1, and 30 respectively.

```
mca@53:~$ bash menudriven.sh
Enter Two numbers :
3
4
Enter Choice :
1. Addition
2. Subtraction
3. Multiplication
4. Division
1
Result is : 7
mca@53:~$ bash menudriven.sh
Enter Two numbers :
4
3
Enter Choice :
1. Addition
2. Subtraction
3. Multiplication
4. Division
2
Result is : 1
mca@53:~$ bash menudriven.sh
Enter Two numbers :
5
6
Enter Choice :
1. Addition
2. Subtraction
3. Multiplication
4. Division
3
Result is : 30
```

## Program-4

Aim :write a shell script to display current date and calender.

```
NOW=$(date)
echo $NOW
echo "calender"
cal
```

```
student@553:~/Desktop$ ./calender1.sh
Current date is Thu May 12 14:14:49 IST 2022 echo
./calender1.sh: line 3: Calender: command not found
      May 2022
Su Mo Tu We Th Fr Sa
 1  2  3  4  5  6  7
 8  9 10 11 12 13 14
15 16 17 18 19 20 21
22 23 24 25 26 27 28
29 30 31
student@553:~/Desktop$
```

## program no-5

Aim:write a shell script to check a number is >,<,= another number.

```
#!/bin/bash
echo "Enter the 1st number:"
read num1
echo "Enter the 2nd number:"
read num2

if [ $num1 -gt $num2 ]
then
    echo $num1 "is greater than " $num2
elif [ $num1 -lt $num2 ]
then
    echo $num1 "is less than " $num2
elif [ $num1 -eq $num2 ]
then
    echo $num1 "is equal to " $num2
else
    echo "Equal to zero"
fi
```

```
mca@S3:~$ bash gtlte.sh
Enter the 1st number:
12
Enter the 2nd number:
34
12 is less than 34
mca@S3:~$ bash gtlte.sh
Enter the 1st number:
34
Enter the 2nd number:
12
34 is greater than 12
mca@S3:~$ bash gtlte.sh
Enter the 1st number:
2
Enter the 2nd number:
2
2 is equal to 2
mca@S3:~$
```

### Program no-6

Aim:write a shell script to find the sum of first 10 numbers.

```
echo "enter the limit"
read n
sum=0
for (( i=0;i<=n;i++ ))
do
sum=$((sum + i))
done
echo "the sum of the entered number is " $sum
```

### Output screenshot

```
student@553:~$ ./sum.sh
enter the limit
10
the sum of the entered number is 55
student@553:~$
```

### Program no-7

Aim:write a shell script to find the sum average and the product of the 4 numbers.

```
num=()
echo "Enter 4 integers"
read num[0]
read num[1]
read num[2]
read num[3]
s=0
prod=1
avg=0
for((i=0;i<4;i++))do
s=$(( s+num[i] )) prod=$(((
prod*num[i] ))done
avg=$(( s/4 ))
echo "sum of 4 numbers is: $s"
echo "average of 4 numbers is: $avg" echo
"product of 4 numbers is : $prod"
```

### Output screenshot



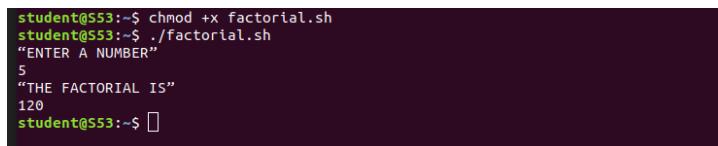
```
student@SS3:~/Desktop$ ./sumavg.sh
Enter 4 integers
45
5
5
5
sum of 4 numbers is: 20
average of 4 numbers is: 5
product of 4 numbers is : 625
```

### program no-8

Aim:write the shell script program to find factorial of a given number.

```
echo "ENTER A NUMBER"
read n
echo "THE FACTORIAL IS"
fact=1i=1
while [ $i -le $n ]do
fact=`expr $fact \* $i`
i=`expr $i + 1`
done
echo $fact
```

### Output screenshot



```
student@SS3:~$ chmod +x factorial.sh
student@SS3:~$ ./factorial.sh
"ENTER A NUMBER"
5
"THE FACTORIAL IS"
120
student@SS3:~$
```

Amal Jyothi College of Engineering, Kanjirappally

program no:9

Aim:display the palindrome of a given number.

```
echo "enter the number"
```

```
read num
```

```
rev=0
```

```
n=$num
```

```
while [ $num -gt 0 ]
do
a=`expr $num % 10`
rev=`expr $rev \* 10 + $a`
num=`expr $num / 10` done
echo $rev
if [ $rev -eq $n ]
then
echo "number is palindrome"
else
echo " number is not palindrome"fi
```

## **Output screenshot**

```
student@553:~$ chmod +x palindrome.sh
student@553:~$ ./palindrome.sh
enter the number
45664
66654
```

program no 10

Aim:program to display leap year or not.

```
echo "Enter the year"
read leap
if [ `expr $leap % 400` -eq 0 ]
then
echo leap year
elif [ `expr $leap % 100` -eq 0 ]
then
echo not a leap year
elif [ `expr $leap % 4` -eq 0 ]
then
echo leap year
else
echo not a leap year
fi
```

```
mca@S3:~$ bash leap.sh
Enter the year
2018
not a leap year
mca@S3:~$ bash leap.sh
Enter the year
2024
leap year
```

## Program no:5

**Aim:** Installation and configuration of LAMP stack. Deploy an open source application such as phpmyadmin and Wordpress.

### Procedure

#### Step 1 — Installing Apache and Updating the Firewall

First, make sure your apt cache is updated with:

➤ sudo apt update

```
mca@553:~$ sudo apt update
[sudo] password for mca:
Hit:1 http://in.archive.ubuntu.com/ubuntu bionic InRelease
Get:2 http://dl.google.com/linux/chrome/deb stable InRelease [1,811 B]
Err:3 http://ppa.launchpad.net/jonathonf/python-3.6/ubuntu bionic InRelease
  403 Forbidden [IP: 185.125.190.52 80]
Err:2 http://dl.google.com/linux/chrome/deb stable InRelease
  The following signatures couldn't be verified because the public key is not available: NO_PUBKEY 78BD65473CB3BD13
Ign:4 https://repo.mongodb.org/apt/ubuntu trusty/mongodb-org/3.6 InRelease
Hit:5 http://ppa.launchpad.net/webupd8team/java/ubuntu bionic InRelease
Get:6 https://repo.mongodb.org/apt/ubuntu trusty/mongodb-org/3.6 Release [2,495 B]
Get:7 https://repo.mongodb.org/apt/ubuntu trusty/mongodb-org/3.6 Release.gpg [801 B]
Err:7 https://repo.mongodb.org/apt/ubuntu trusty/mongodb-org/3.6 Release.gpg
  The following signatures were invalid: EXPKEYSIG 58712A2291FA4AD5 MongoDB 3.6 Release Signing Key <packaging@mongodb.com>
Reading package lists... Done
E: Failed to fetch http://ppa.launchpad.net/jonathonf/python-3.6/ubuntu/dists/bionic/InRelease  403  Forbidden [IP: 185.125.190.52 80]
E: The repository 'http://ppa.launchpad.net/jonathonf/python-3.6/ubuntu bionic InRelease' is not signed.
N: Updating from such a repository can't be done securely, and is therefore disabled by default.
N: See apt-secure(8) manpage for repository creation and user configuration details.
W: GPG error: http://dl.google.com/linux/chrome/deb stable InRelease: The following signatures couldn't be verified because the public key is
not available: NO_PUBKEY 78BD65473CB3BD13
E: The repository 'http://dl.google.com/linux/chrome/deb stable InRelease' is not signed.
N: Updating from such a repository can't be done securely, and is therefore disabled by default.
N: See apt-secure(8) manpage for repository creation and user configuration details.
W: An error occurred during the signature verification. The repository is not updated and the previous index files will be used. GPG error: h
tps://repo.mongodb.org/apt/ubuntu trusty/mongodb-org/3.6 Release: The following signatures were invalid: EXPKEYSIG 58712A2291FA4AD5 MongoDB 3
6 Release Signing Key <packaging@mongodb.com>
```

Once the cache has been updated, you can install Apache with:

➤ sudo apt install apache2

```
mca@553:~$ sudo apt install apache2
Reading package lists... Done
Building dependency tree
Reading state information... Done
The following packages were automatically installed and are no longer required:
debservice dh-autoreconf dh-strip-nondeterminism gimp-data 1965-va-driver libaaacs0 libamdgpu2 libarchive-cpio-perl libavcodec57 libavformat57
libavutil55 libbabl-0.1-0 libbbplus0 libblas3 libbluray2 libbcm2 libccolam2 libcholmod3 libchromaprint1 libcrystalhd3
libfile-stripnondeterminism-perl libgegl-0.3-0 libgfortran4 libgimp2.0 libgme0 libgsmliblapack3 libmail-sendmail-perl libmetiss libmng2
libopenjp2-7 libopenmp30 libpcres3-dev libpcre32-3 libpcrecpp0v5 libshine3 libsnappy1v5 libsoxr0 libssh-gcrypt-4 libssl-dev
libssl-doc libswresample2 libswscale4 libsys-hostname-long-perl libumfpack5 libva-drm2 libva-x11-2 libvba2 libvpdau1 libx264-152
libx265-146 libxvidcore4 libzvbi-common libzvbi0 mesa-va-drivers mesa-vdpau-drivers php-common php-pear php-php7.2-cli php7.2-common
php7.2-json php7.2-opcache php7.2-readline php7.2-xmllibaprp1 libaprutil1-dbd-sqlite3 libaprutil1-ldap liblua5.2-0
Use 'sudo apt autoremove' to remove them.
The following additional packages will be installed:
 apache2-bin apache2-data apache2-utils libapr1 libaprutil1 libaprutil1-dbd-sqlite3 libaprutil1-ldap liblua5.2-0
Suggested packages:
 apache2-doc apache2-suexec-pristine | apache2-suexec-custom
The following NEW packages will be installed:
 apache2 apache2-bin apache2-data apache2-utils libapr1 libaprutil1 libaprutil1-dbd-sqlite3 libaprutil1-ldap liblua5.2-0
0 upgraded, 9 newly installed, 0 to remove and 0 not upgraded.
Need to get 1,710 kB of archives.
After this operation, 6,932 kB of additional disk space will be used.
```

**Name: Vishnu Vijayakumar**

**Roll No:53**

**Batch: MCA-B**

**Date:23/5/2022**

20MCA136 NETWORKING AND SYSTEM ADMINISTRATION LAB      Dept. of Computer Applications  
After entering this command, apt will tell you which packages it plans to install and how much extra disk space they'll take up. Press Y and hit ENTER to confirm, and the installation will proceed.

Adjust the Firewall to Allow Web Traffic Next, assuming that you have followed the initial server setup instructions and enabled the UFW firewall, make sure that your firewall allows HTTP and HTTPS traffic. You can check that UFW has an application profile for Apache like so:

➤ sudo ufw app list

```
mca@S53:~$ sudo ufw app list
Available applications:
  Apache
  Apache Full
  Apache Secure
  CUPS
```

If you look at the Apache Full profile details, you'll see that it enables traffic to ports 80 and 443:

➤ sudo ufw app info "Apache Full"

```
mca@S53:~$ sudo ufw app info "Apache Full"
Profile: Apache Full
Title: Web Server (HTTP,HTTPS)
Description: Apache v2 is the next generation of the omnipresent Apache web
server.

Ports:
  80,443/tcp
```

To allow incoming HTTP and HTTPS traffic for this server, run:

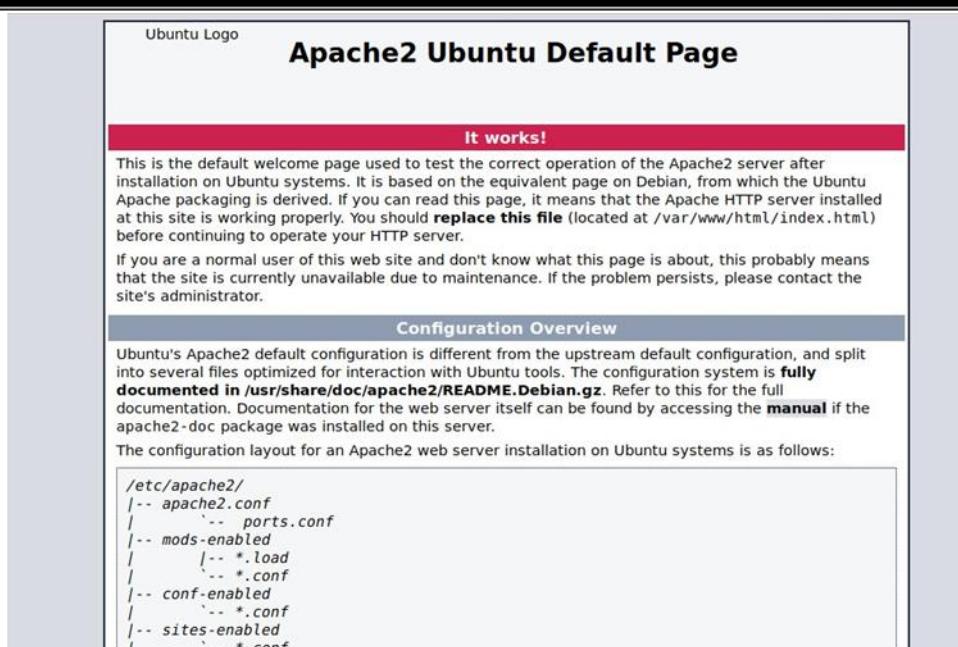
➤ sudo ufw allow "Apache Full"

```
mca@S53:~$ sudo ufw allow "Apache Full"
Rules updated
Rules updated (v6)
```

You can do a spot check right away to verify that everything went as planned by visiting your server's public IP address in your web browser:

➤ [http://your\\_server\\_ip](http://your_server_ip)

You will see the default Ubuntu 18.04 Apache web page, which is there for informational and testing purposes. It should look something like this:



The Apache2 default index page will be displayed in case the webserver is up and running.

Root directory is /var/www/html

## **Step 2 — Installing MySQL**

Again, use apt to acquire and install this software:

➤ sudo apt install mysql-server

```
mca@553:~/Downloads$ sudo apt install mysql-server
Reading package lists... Done
Building dependency tree
Reading state information... Done
The following additional packages will be installed:
 libevent-core-2.1-6 mysql-client-5.7 mysql-client-core-5.7 mysql-common mysql-server-5.7 mysql-server-core-5.7
Suggested packages:
 mailx tinyca
The following NEW packages will be installed:
 libevent-core-2.1-6 mysql-client-5.7 mysql-client-core-5.7 mysql-common mysql-server mysql-server-5.7 mysql-server-core-5.7
0 upgraded, 7 newly installed, 0 to remove and 0 not upgraded.
Need to get 0 B/20.3 MB of archives.
After this operation, 160 MB of additional disk space will be used.
```

This command, too, will show you a list of the packages that will be installed, along with the amount of disk space they'll take up. Enter Y to continue.

When the installation is complete, run a simple security script that comes pre-installed with MySQL which will remove some dangerous defaults and lock down access to your database system. Start the interactive script by running:

➤ [sudo mysql\\_secure\\_installation](#)

```
mca@553:~/Downloads$ sudo mysql_secure_installation
Securing the MySQL server deployment.

Connecting to MySQL using a blank password.

VALIDATE PASSWORD PLUGIN can be used to test passwords
and improve security. It checks the strength of password
and allows the users to set only those passwords which are
secure enough. Would you like to setup VALIDATE PASSWORD plugin?

Press y|Y for Yes, any other key for No: y

There are three levels of password validation policy:

LOW    Length >= 8
MEDIUM Length >= 8, numeric, mixed case, and special characters
STRONG Length >= 8, numeric, mixed case, special characters and dictionary      file

Please enter 0 = LOW, 1 = MEDIUM and 2 = STRONG: 0
Please set the password for root here.

New password:
Re-enter new password:
Estimated strength of the password: 25
Do you wish to continue with the password provided?(Press y|Y for Yes, any other key for No) : y
By default, a MySQL installation has an anonymous user,
allowing anyone to log into MySQL without having to have
a user account created for them. This is intended only for
testing, and to make the installation go a bit smoother.
You should remove them before moving into a production
environment.
```

This will ask if you want to configure the VALIDATE PASSWORD PLUGIN. Answer Y for yes, or anything else to continue without enabling. When you're finished, test if you're able to log in to the MySQL console by typing:

➤ [sudo mysql](#)

```
mca@553:~/Downloads$ sudo mysql
Welcome to the MySQL monitor. Commands end with ; or \g.
Your MySQL connection id is 4
Server version: 5.7.21-1ubuntu1 (Ubuntu)

Copyright (c) 2000, 2018, Oracle and/or its affiliates. All rights reserved.

Oracle is a registered trademark of Oracle Corporation and/or its
affiliates. Other names may be trademarks of their respective
owners.

Type 'help;' or '\h' for help. Type '\c' to clear the current input statement.

mysql> exit
Bye
```

This will connect to the MySQL server as the administrative database user root, which is inferred by the use of sudo when running this command. To exit the MySQL console, type:

➤ [exit](#)

## **Step 3 — Installing PHP**

In addition to the php package, you'll also need libapache2-mod-php to integrate PHP into Apache, and the php-mysql package to allow PHP to connect to MySQL databases. Run the following command to install all three packages and their dependencies:

➤ `sudo apt install php libapache2-mod-php php-mysql`

```
mca@S53:~/Downloads$ sudo apt install php libapache2-mod-php php-mysql
Reading package lists... Done
Building dependency tree
Reading state information... Done
The following additional packages will be installed:
  libapache2-mod-php7.2 php-common php7.2-cli php7.2-common php7.2-json php7.2-mysql php7.2-opcache php7.2-readline
Suggested packages:
  php-pear
The following NEW packages will be installed:
  libapache2-mod-php libapache2-mod-php7.2 php php-common php-mysql php7.2 php7.2-cli php7.2-common php7.2-json php7.2-mysql php7.2-opcache
  php7.2-readline
0 upgraded, 12 newly installed, 0 to remove and 0 not upgraded.
Need to get 3,973 kB of archives.
After this operation, 17.6 MB of additional disk space will be used.
Do you want to continue? [Y/n] y
Get:1 http://in.archive.ubuntu.com/ubuntu bionic/main amd64 php-common all 1:60ubuntu1 [12.1 kB]
Get:2 http://in.archive.ubuntu.com/ubuntu bionic/main amd64 php7.2-common amd64 7.2.3-1ubuntu1 [879 kB]
Get:3 http://in.archive.ubuntu.com/ubuntu bionic/main amd64 php7.2-json amd64 7.2.3-1ubuntu1 [18.8 kB]
Get:4 http://in.archive.ubuntu.com/ubuntu bionic/main amd64 php7.2-opcache amd64 7.2.3-1ubuntu1 [165 kB]
Get:5 http://in.archive.ubuntu.com/ubuntu bionic/main amd64 php7.2-readline amd64 7.2.3-1ubuntu1 [12.1 kB]
Get:6 http://in.archive.ubuntu.com/ubuntu bionic/main amd64 php7.2-cli amd64 7.2.3-1ubuntu1 [1,404 kB]
```

After this, restart the Apache web server in order for your changes to be recognized. You can do that with the following command:

➤ `sudo systemctl restart apache2`

```
mca@mca:~/Desktop$ sudo systemctl restart apache2
```

## **Step 4 — Testing PHP Processing on your Web Server**

In order to test that your system is properly configured for PHP, create a PHP script called info.php. In order for Apache to find this file and serve it correctly, it must be saved to your web root directory. Create the file at the web root you created in the previous step by running:

➤ `sudo nano /var/www/your_domain/info.php`

This will open a blank file. Add the following text, which is valid PHP code, inside the file:

➤ `<?php`

`phpinfo();`

`?>`

```

File Edit View Search Terminal Help
GNU nano 2.9.3
<?php
phpinfo();
?>

```

mca@S4: ~

/var/www/html/info.php

When you are finished, save and close the file.

Now you can test whether your web server is able to correctly display content generated by this PHP script. To try this out, visit this page in your web browser. You'll need your server's public IP address or domain name again.

The address you will want to visit is:

[http://your\\_domain/info.php](http://your_domain/info.php)

The page that you come to should look something like this:

System	Linux S3 4.15.0-23-generic #25-Ubuntu SMP Wed May 23 18:02:16 UTC 2018 x86_64
Build Date	Mar 14 2018 22:03:58
Server API	Apache 2.0 Handler
Virtual Directory Support	disabled
Configuration File (php.ini) Path	/etc/php/7.2/apache2
Loaded Configuration File	/etc/php/7.2/apache2/php.ini
Scan this dir for additional .ini files	/etc/php/7.2/apache2/conf.d
Additional .ini files parsed	/etc/php/7.2/apache2/conf.d/10-mysqlind.ini, /etc/php/7.2/apache2/conf.d/10-opcache.ini, /etc/php/7.2/apache2/conf.d/10-pdo.ini, /etc/php/7.2/apache2/conf.d/20-calendar.ini, /etc/php/7.2/apache2/conf.d/20-ctype.ini, /etc/php/7.2/apache2/conf.d/20-exif.ini, /etc/php/7.2/apache2/conf.d/20-fileinfo.ini, /etc/php/7.2/apache2/conf.d/20-ftp.ini, /etc/php/7.2/apache2/conf.d/20-gettext.ini, /etc/php/7.2/apache2/conf.d/20-iconv.ini, /etc/php/7.2/apache2/conf.d/20-json.ini, /etc/php/7.2/apache2/conf.d/20-mysqli.ini, /etc/php/7.2/apache2/conf.d/20-pdo_mysql.ini, /etc/php/7.2/apache2/conf.d/20-phar.ini, /etc/php/7.2/apache2/conf.d/20-posix.ini, /etc/php/7.2/apache2/conf.d/20-readline.ini, /etc/php/7.2/apache2/conf.d/20-shmop.ini, /etc/php/7.2/apache2/conf.d/20-sockets.ini, /etc/php/7.2/apache2/conf.d/20-sysvmsg.ini, /etc/php/7.2/apache2/conf.d/20-sysvsem.ini, /etc/php/7.2/apache2/conf.d/20-sysvshm.ini, /etc/php/7.2/apache2/conf.d/20-tokenizer.ini
PHP API	20170718
PHP Extension	20170718
Zend Extension	320170718
Zend Extension Build	API320170718.NTS
PHP Extension Build	API20170718.NTS
Debug Build	no
Thread Safety	disabled
Zend Signal Handling	enabled

<b>DTrace Support</b>	available, disabled
<b>Registered PHP Streams</b>	https, ftps, compress.zlib, php, file, glob, data, http, ftp, phar
<b>Registered Stream Socket Transports</b>	tcp, udp, unix, udg, ssl, tls, tlsv1.0, tlsv1.1, tlsv1.2
<b>Registered Stream Filters</b>	zlib.* , string.rot13, string.toupper, string.tolower, string.strip_tags, convert.* , consumed, dechunk, convert.iconv.*

This program makes use of the Zend Scripting Language Engine:  
 Zend Engine v3.2.0, Copyright (c) 1998-2018 Zend Technologies  
 with Zend OPcache v7.2.3-1ubuntu1, Copyright (c) 1999-2018, by Zend Technologies



## Configuration

### apache2handler

<b>Apache Version</b>	Apache/2.4.29 (Ubuntu)
<b>Apache API Version</b>	20120211
<b>Server Administrator</b>	webmaster@localhost
<b>Hostname:Port</b>	127.0.1.1:80
<b>User/Group</b>	www-data(33)/33
<b>Max Requests</b>	Per Child: 0 - Keep Alive: on - Max Per Connection: 100
<b>Timeouts</b>	Connection: 300 - Keep-Alive: 5
<b>Virtual Server</b>	Yes
<b>Server Root</b>	/etc/apache2
<b>Loaded Modules</b>	core mod_so mod_watchdog http_core mod_log_config mod_logio mod_version mod_unixd mod_access_compat mod_alias mod_auth_basic mod_authn_core mod_authn_file mod_authz_core mod_authz_host mod_authz_user mod_autoindex mod_deflate mod_dir mod_env mod_filter mod_mime prefork mod_negotiation mod_php7 mod_reqtimeout mod_setenvif mod_status

## Install WordPress with LAMP on Ubuntu

### 18.04Step 1 – Download WordPress

Download the latest version of the WordPress package and extract it by issuing the commands below on the terminal:

➤ wget -c http://wordpress.org/latest.tar.gz

```
mca@mca:~/Desktop$ wget -c http://wordpress.org/latest.tar.gz
--2022-07-08 15:17:49--  http://wordpress.org/latest.tar.gz
Resolving wordpress.org (wordpress.org)... 198.143.164.252
Connecting to wordpress.org (wordpress.org)|198.143.164.252|:80... connected.
HTTP request sent, awaiting response... 301 Moved Permanently
Location: https://wordpress.org/latest.tar.gz [following]
--2022-07-08 15:17:50--  https://wordpress.org/latest.tar.gz
Connecting to wordpress.org (wordpress.org)|198.143.164.252|:443... connected.
HTTP request sent, awaiting response... 200 OK
Length: 21166276 (20M) [application/octet-stream]
Saving to: 'latest.tar.gz'

latest.tar.gz      100%[=====] 20.19M  6.69MB/s   in 3.0s
```

➤ tar -xzvf latest.tar.gz

```
mca@mca:~/Desktop$ tar -xzvf latest.tar.gz
wordpress/
wordpress/xmlrpc.php
wordpress/wp-blog-header.php
wordpress/readme.html
wordpress/wp-signup.php
wordpress/index.php
```

Then move the WordPress files from the extracted folder to the Apache default root directory, /var/www/html/:

➤ sudo mv wordpress/\* /var/www/html/

```
mca@mca:~/Desktop$ sudo mv wordpress/* /var/www/html/
[sudo] password for mca:
```

Next, set the correct permissions on the website directory, that is give ownership of the WordPress files to the webserver as follows:

➤ sudo chown -R www-data:www-data /var/www/html/

```
mca@mca:~/Desktop$ sudo chown -R www-data:www-data /var/www/html/
```

➤ sudo chmod -R 755 /var/www/html/

```
mca@mca:~/Desktop$ sudo chmod -R 755 /var/www/html/
```

## **Step 2 – Creating a MySQL Database and User for WordPress**

The first step you'll take is a preparatory one. Even though MySQL is already installed, you still need to create a database to manage and store the user information for WordPress to use. To get started, log into the MySQL root (administrative) account by issuing the following command:

➤ sudo mysql

```
mca@mca:~/Desktop$ sudo mysql
Welcome to the MariaDB monitor. Commands end with ; or \g.
Your MariaDB connection id is 38
Server version: 10.3.34-MariaDB-0ubuntu0.20.04.1 Ubuntu 20.04

Copyright (c) 2000, 2018, Oracle, MariaDB Corporation Ab and others.

Type 'help;' or '\h' for help. Type '\c' to clear the current input statement.
```

You will be prompted for the password you set for the MySQL root account when you installed the software. However, if you have password authentication enabled for your root user, you can run the following command and enter your password information when prompted:

➤ mysql -u root -p

From there, you'll create a new database that WordPress will control. You can call this whatever you would like, but we will be using wordpress in this guide as an example. Create the database for WordPress by writing the following:

➤ CREATE DATABASE wordpress DEFAULT CHARACTER SET utf8  
COLLATE utf8\_unicode\_ci;

```
mysql> CREATE DATABASE wordpress DEFAULT CHARACTER SET utf8
      -> COLLATE utf8_unicode_ci;
Query OK, 1 row affected (0.00 sec)

mysql> show databases;
+-----+
| Database      |
+-----+
| information_schema |
| mysql          |
| performance_schema |
| sys            |
| wordpress      |
+-----+
5 rows in set (0.00 sec)
```

Next, you're going to create a separate MySQL user account that you'll use exclusively to operate on the new database. Creating one-function databases and accounts is a good idea from a management and security standpoint. We will use the name `wordpressuser` as an example in this guide. Feel free to change this if you'd like.

You can create this account, set a password for it, and then grant it access to the database you created all by running the following command. Remember to choose a strong password here for your database user:

- GRANT ALL ON `wordpress.*` TO '`wordpressuser`'@'localhost'  
IDENTIFIED BY '`password`';

```
MariaDB [(none)]> GRANT ALL ON wordpress.* TO 'wordpressuser'@'localhost' IDENT
```

After creating this user, flush the privileges to ensure that the current instance of MySQL knows about the recent changes you've made:

- FLUSH PRIVILEGES;

```
mysql> FLUSH PRIVILEGES;
Query OK, 0 rows affected (0.00 sec)
```

Exit out of MySQL:

- EXIT

```
mysql> exit;
Bye
```

You now have a database and user account in MySQL, each made specifically for WordPress.

Go the `/var/www/html/` directory and rename existing `wp-config-sample.php` to `wpconfig.php`. Also, make sure to remove the default Apache index page.

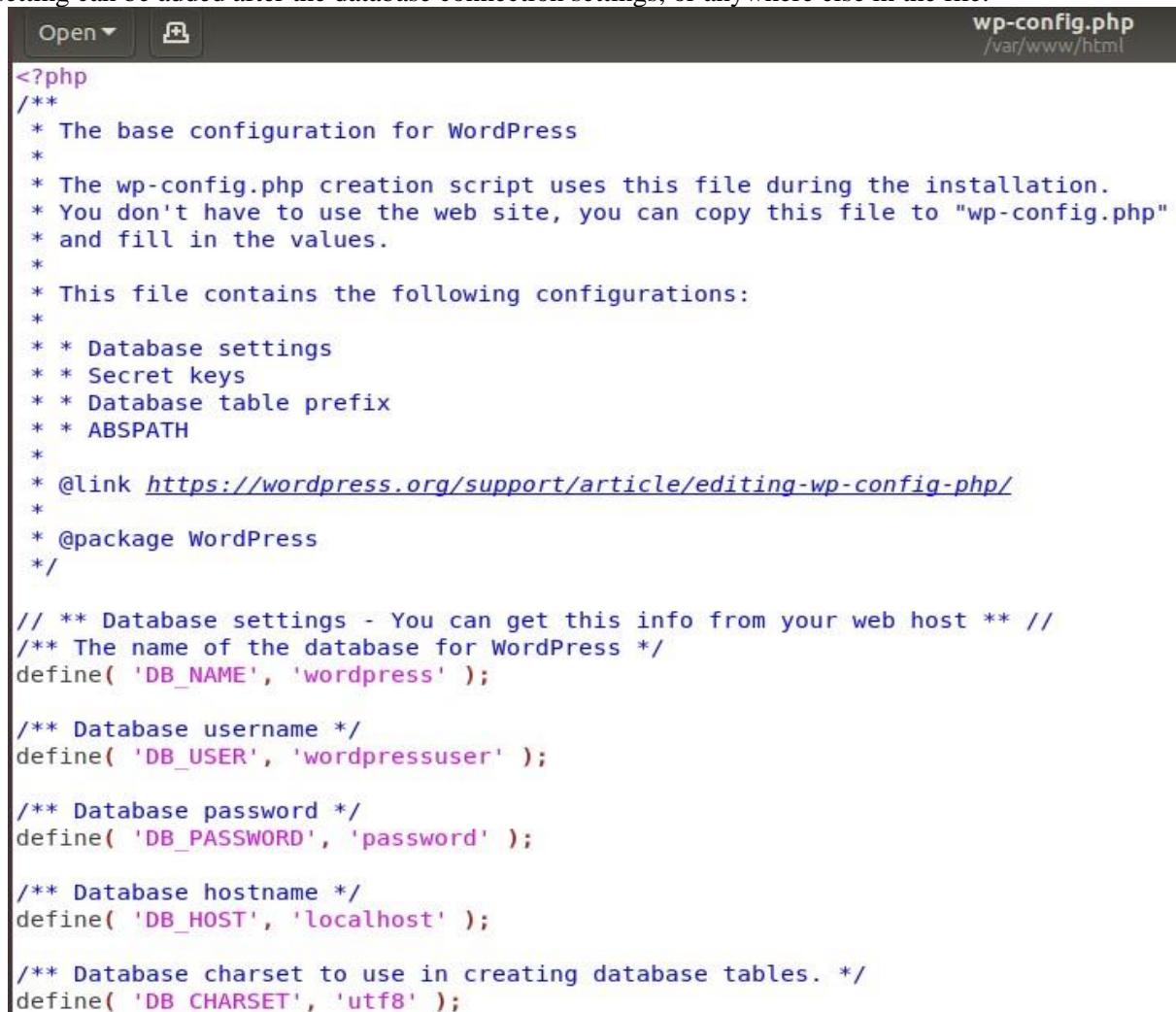
- `cd /var/www/html/`
- `sudo mv wp-config-sample.php wpconfig.php`

- sudo rm -rf index.html

```
mca@mca:~/Desktop$ cd /var/www/html/
mca@mca:/var/www/html$ sudo mv wp-config-sample.php wp-config.php
mca@mca:/var/www/html$ sudo rm -rf index.html
```

Then update it with your database information under the MySQL settings section (refer to the highlighted boxes in the image below):

This setting can be added after the database connection settings, or anywhere else in the file:



```
wp-config.php
/var/www/html

<?php
/**
 * The base configuration for WordPress
 *
 * The wp-config.php creation script uses this file during the installation.
 * You don't have to use the web site, you can copy this file to "wp-config.php"
 * and fill in the values.
 *
 * This file contains the following configurations:
 *
 * * Database settings
 * * Secret keys
 * * Database table prefix
 * * ABSPATH
 *
 * @link https://wordpress.org/support/article/editing-wp-config-php/
 *
 * @package WordPress
 */

// ** Database settings - You can get this info from your web host ** //
/** The name of the database for WordPress */
define( 'DB_NAME', 'wordpress' );

/** Database username */
define( 'DB_USER', 'wordpressuser' );

/** Database password */
define( 'DB_PASSWORD', 'password' );

/** Database hostname */
define( 'DB_HOST', 'localhost' );

/** Database charset to use in creating database tables. */
define( 'DB_CHARSET', 'utf8' );
```

Save and close the file when you are finished.

Restart the web server and mysql service using the commands below:

- sudo systemctl restart apache2.service
- sudo systemctl restart mysql.service

```
mca@mca:/var/www/html$ sudo systemctl restart apache2.service
mca@mca:/var/www/html$ sudo systemctl restart mysql.service
```

Now that the server configuration is complete, you can complete the installation through the web interface. In your web browser, navigate to your server's domain name or public IP address:

- [https://server\\_domain\\_or\\_IP](https://server_domain_or_IP)

Select the language you would like to use:



Next you will be directed to the main setup page. Select a name for your WordPress site and choose a username (it is recommended not to choose something like “admin” for security purposes). A strong password is generated automatically. Save this password or select an alternative strong password. Enter your email address and select whether you want to discourage search engines from indexing your site:

Please provide the following information. Do not worry, you can always change these settings later.

<b>Site Title</b>	wordpress
<b>Username</b>	wordpressuser
Usernames can have only alphanumeric characters, spaces, underscores, hyphens, periods, and the @ symbol.	
<b>Password</b>	@a1b2c3d4e5f6g7h8#A <span style="background-color: #28a745; color: white; padding: 2px 10px; border-radius: 5px;">Strong</span> <span style="border: 1px solid #28a745; padding: 0 5px;">Hide</span>
<b>Important:</b> You will need this password to log in. Please store it in a secure location.	
<b>Confirm Password</b>	<input checked="" type="checkbox"/> Confirm use of weak password

**Your Email**

Double-check your email address before continuing.

**Search engine visibility** Discourage search engines from indexing this site

It is up to search engines to honor this request.

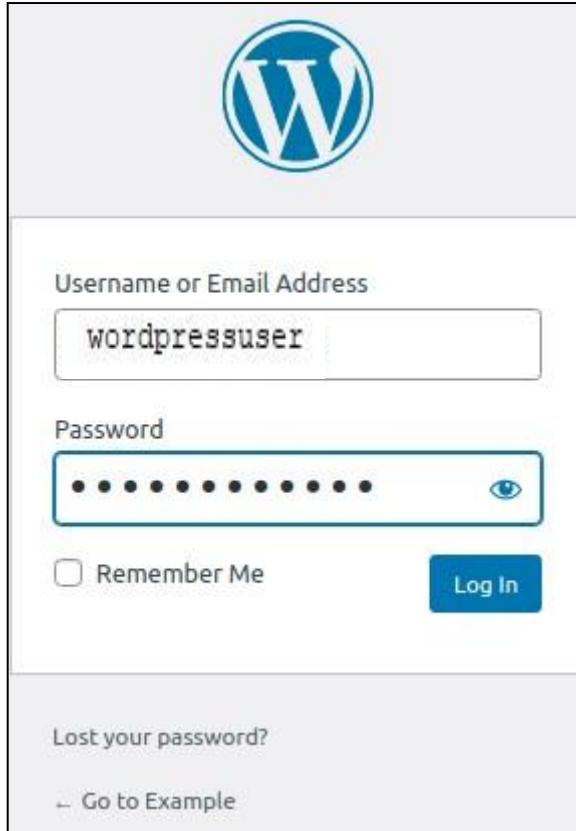
[Install WordPress](#)**Success!**

WordPress has been installed. Thank you, and enjoy!

**Username** wordpressuser

**Password** Your chosen password.

[Log In](#)



Once you log in, you will be taken to the WordPress administration dashboard:

From there, you can begin using and customizing your WordPress site.

## **Program no:6**

**Aim:** Build and install software from source code, familiarity with cmake utility expected.

## **Procedure & Output Screenshot**

## Install the cmake

Name: Vishnu Vijayakumar

Roll No:53

Batch: MCA-B

Date:4/4/2022

## Apt show cmake

```
mca@S53:~/Documents/cmake$ apt show cmake
Package: cmake
Version: 3.10.2-1ubuntu2
Priority: optional
Section: devel
Origin: Ubuntu
Maintainer: Ubuntu Developers <ubuntu-devel-discuss@lists.ubuntu.com>
Original-Maintainer: Debian CMake Team <pkg-cmake-team@lists.alioth.debian.org>
Bugs: https://bugs.launchpad.net/ubuntu/+filebug
Installed-Size: 17.3 MB
Depends: cmake-data (= 3.10.2-1ubuntu2), procps, libarchive13 (>= 3.0.4), libc6 (>= 2.15), libcurl4 (>= 7.16.2), libexpat1 (>= 2.0.1), libgcc1 (>= 1:3.0), libjsoncpp1 (>= 1.7.4), librhash0 (>= 1.2.6), libstdc++6 (>= 5.2), libuv1 (>= 1.4.2), zlib1g (>= 1:1.2.3.3)
Recommends: gcc, make
Suggests: cmake-doc, ninja-build
Homepage: https://cmake.org/
Supported: 5y
Payload Size: 2,129 kB
```

**\$sudo apt install cmake g++ make:** To install cmake , g++ and make using the apt command.

```
mca@S53:~/Documents/cmake$ sudo apt install cmake g++ make
[sudo] password for mca:
Reading package lists... Done
Building dependency tree
Reading state information... Done
g++ is already the newest version (4:7.3.0-3ubuntu2).
make is already the newest version (4.1-9.1ubuntu1).
make set to manually installed.
The following packages were automatically installed and are no longer required:
  debhelper dh-autoreconf dh-strip-nondeterminism gimp-data i965-v-a-driver
  libaaacs0 liblambd2 libarchive-cpio-perl libavcdecs5 libavutill55
  libbbabl-0.1-0 libbdplus0 libblas3 libbluray2 libcamd2 libccolamd2
  libcholmod3 libchromaprint1 libcrystalhd3 libfile-stripnondeterminism-perl
  libgegl-0.3-0 libgfotran4 libgimp2.0 libgme libgsm1 libgpack3
  libmail-sendmail-perl libmetis5 libmng2 libopenjp2-7 libopenmpth0 libpcre16-3
  libpcre3-dev libpcre32-3 libpcrecppv5 libshhne3 libsapphy15 libsoxr0
  libssh-gcrypt-4 libssl-dev libssl-doc libswresample2 libwscale4
  libsys-hostname-long-perl libumfpack5 libva-drm2 libva-x11-2 libvaz
  libvdpau1 libx264-152 libx265-146 libxvidcore4 libzvbi-common libzvbi0
  mesa-va-drivers mesa-vdpau-drivers php-common php-peer php-xml php7.2-cli
  php7.2-common php7.2-json php7.2-ocache php7.2-readline php7.2-xml
  pkg-php-tools po-debconf shtool va-driver-all vdpau-driver-all
Use 'sudo apt autoremove' to remove them.
The following additional packages will be installed:
  cmake-data libcurl4 libjsoncpp1 librhash0 libuv1
Suggested packages:
  cmake-doc ninja-build
The following packages will be installed:
  libcurl4 libjsoncpp1 librhash0 libuv1
```

## Create directory

**Mkdir cmake:** creating a different directory for our project using the mkdir and cd commands

```
ATTACHED packages: MySQL-server-5.7:amd64  
mra@553:~/Documents/cmake$ mkdir myproject
```

## Cd cmake

```
mca@S53:~/Documents/cmake$ cd myproject
```

Now create a C++ source file named Hello\_world.cpp and add the following :

```
mca@S53:~/Documents/cmake/myproject$ gedit Hello_world.cpp
mca@S53:~/Documents/cmake/myproject$ gedit CMakeLists.txt
```

## gedit CmakeLists.txt

Create a CMakeLists.txt file(with this exact capitalization) which is required by CMake:

```
mca@S3:~/Documents/CMake/myproject$ gedit CMakeLists.txt
^Z
[2]+  Stopped                  gedit CMakeLists.txt
mca@S3:~/Documents/CMake/myproject$
```

## Create directory called

### Mkdir build:

```
mca@S53:~/Documents/cmake/myproject$ cd ..
mca@S53:~/Documents/cmake$ mkdir build
mca@S53:~/Documents/cmake$ cd build
```

To run cmake we need to change into the build directory:

## Cmake ..

```
mca@S53:~/Documents/cmake/myproject/build$ cmake ..
-- The C compiler identification is GNU 7.3.0
-- The CXX compiler identification is GNU 7.3.0
-- Check for working C compiler: /usr/bin/cc
-- Check for working C compiler: /usr/bin/cc -- works
-- Detecting C compiler ABI info
-- Detecting C compiler ABI info - done
-- Detecting C compile features
-- Detecting C compile features - done
-- Check for working CXX compiler: /usr/bin/c++
-- Check for working CXX compiler: /usr/bin/c++ -- works
-- Detecting CXX compiler ABI info
-- Detecting CXX compiler ABI info - done
-- Detecting CXX compile features
-- Detecting CXX compile features - done
-- Configuring done
-- Generating done
-- Build files have been written to: /home/mca/Documents/cmake/myproject/build
```

**Cmake –build :** To generate the executable simply by typing:

## run hello

```
mca@S53:~/Documents/cmake/myproject/build$ cmake --build .
Scanning dependencies of target hello
[ 50%] Building CXX object CMakeFiles/hello.dir/Hello_world.cpp.o
[100%] Linking CXX executable hello
[100%] Built target hello
```

## edit Helloworld.cpp

**./hello:** Run the executable by typing:

```
mca@S53:~/Documents/cmake/myproject/build$ ./hello
Hello World!
mca@S53:~/Documents/cmake/myproject/build$
```



```
Mon 15:39 •
hello_world.cpp
~/Desktop/RMCA/cmake/cmake

#include <iostream>
int main() {
    std::cout<<"Hello World!"<<std::endl;
    return 0 ;
}
```



```
CMakeLists.txt
~/Desktop/RMCA/cmake/cmake

cmake_minimum_required(VERSION 3.10)
project(Project1)
add_executable(hello hello_world.cpp)
```

**Name: Vishnu Vijayakumar**

**Roll No:53**

**Batch: MCA-B**

**Date:6/6/2022**

## Program no:7

**Aim:** Introduction to command line tools for networking IPv4 networking, network commands: ping route traceroute, nslookup, ip. Setting up static and dynamic IP addresses. Concept of Subnets, CIDR address schemes, Subnet masks, iptables, setting up a firewall for LAN, Application layer (L7) proxies.

### Procedure

**1. ipconfig:**This commands in windows allows you to see a summarized information of your network such as ip address, subnet mask , server address etc.

**Syntax :-** \$ ipconfig

### Output :-

```
C:\Users\ajcemca>ipconfig
Windows IP Configuration

Ethernet adapter Ethernet:
  Connection-specific DNS Suffix . :
  Link-local IPv6 Address . . . . . : fe80::bda5:5f6c:2e2f:1dee%5
  IPv4 Address. . . . . : 192.168.6.53
  Subnet Mask . . . . . : 255.255.255.0
  Default Gateway . . . . . : 192.168.6.100

Ethernet adapter VirtualBox Host-Only Network:
  Connection-specific DNS Suffix . :
  Link-local IPv6 Address . . . . . : fe80::24da:9fa5:90c:831c%15
  IPv4 Address. . . . . : 192.168.50.1
  Subnet Mask . . . . . : 255.255.255.0
  Default Gateway . . . . . :

Tunnel adapter Teredo Tunneling Pseudo-Interface:
  Connection-specific DNS Suffix . :
  IPv6 Address. . . . . : 2001:0:2851:fcb0:30ee:1d92:8a3e:b01e
  Link-local IPv6 Address . . . . . : fe80::30ee:1d92:8a3e:b01e%14
  Default Gateway . . . . . ::
```

**2. ipconfig/all:**To see the the network information in detail. It is an extension of ipconfig command

**Syntax :-** \$ ipconfig/all

## Output :-

```
C:\Users\ajcemca>ipconfig/all
Windows IP Configuration

Host Name . . . . . : S53
Primary Dns Suffix . . . . . : mca.com
Node Type . . . . . : Hybrid
IP Routing Enabled. . . . . : No
WINS Proxy Enabled. . . . . : No
DNS Suffix Search List. . . . . : mca.com
```

```
Ethernet adapter Ethernet:

Connection-specific DNS Suffix . . . . . :
Description . . . . . : Realtek PCIe GBE Family Controller
Physical Address. . . . . : 2C-56-DC-9B-C1-9F
DHCP Enabled. . . . . : No
Autoconfiguration Enabled . . . . . : Yes
Link-local IPv6 Address . . . . . : fe80::bda5:5f6c:2e2f:1dee%5(PREFERRED)
IPv4 Address. . . . . : 192.168.6.53(Preferred)
Subnet Mask . . . . . : 255.255.255.0
Default Gateway . . . . . : 192.168.6.100
DHCPv6 IAID . . . . . : 102532908
DHCPv6 Client DUID. . . . . : 00-01-00-01-22-D0-C4-27-2C-56-DC-9B-C1-9F
DNS Servers . . . . . : 192.168.6.254
                                         8.8.8.8
NetBIOS over Tcpip. . . . . : Enabled

Ethernet adapter VirtualBox Host-Only Network:

Connection-specific DNS Suffix . . . . . :
Description . . . . . : VirtualBox Host-Only Ethernet Adapter
Physical Address. . . . . : 0A-00-27-00-00-0F
DHCP Enabled. . . . . : No
Autoconfiguration Enabled . . . . . : Yes
Link-local IPv6 Address . . . . . : fe80::24da:9fa5:90c:831c%15(PREFERRED)
IPv4 Address. . . . . : 192.168.56.1(Preferred)
Subnet Mask . . . . . : 255.255.255.0
Default Gateway . . . . . :
DHCPv6 IAID . . . . . : 252313639
DHCPv6 Client DUID. . . . . : 00-01-00-01-22-D0-C4-27-2C-56-DC-9B-C1-9F
DNS Servers . . . . . : fec0:0:0:ffff::1%1
                                         fec0:0:0:ffff::2%1
                                         fec0:0:0:ffff::3%1
NetBIOS over Tcpip. . . . . : Enabled
```

```
Tunnel adapter Teredo Tunneling Pseudo-Interface:

Connection-specific DNS Suffix . . . . . :
Description . . . . . : Microsoft Teredo Tunneling Adapter
Physical Address. . . . . : 00-00-00-00-00-00-E0
DHCP Enabled. . . . . : No
Autoconfiguration Enabled . . . . . : Yes
IPv6 Address. . . . . : 2001:0:2851:fcb0:30ee:1d92:8a3e:b01e(PREFERRED)
Link-local IPv6 Address . . . . . : fe80::30ee:1d92:8a3e:b01e%14(Preferred)
Default Gateway . . . . . :
DHCPv6 IAID . . . . . : 167772160
DHCPv6 Client DUID. . . . . : 00-01-00-01-22-D0-C4-27-2C-56-DC-9B-C1-9F
NetBIOS over Tcpip. . . . . : Disabled
```

### **3. nslookup**

To show the server to which the system is connected by default. If we want to find the ip address of a particular domain name, we can also use nslookup

**Syntax :-** \$ nslookup

### **Output :-**

```
C:\Users\ajcemca>nslookup
Default Server: UnKnown
Address: 192.168.6.254

> www.google.com
Server: UnKnown
Address: 192.168.6.254

Non-authoritative answer:
Name: www.google.com
Addresses: 2404:6800:4007:826::2004
           142.250.195.164

> www.amazon.com
Server: UnKnown
Address: 192.168.6.254

Non-authoritative answer:
Name: d3ag4hukkh6yn.cloudfront.net
Address: 52.84.12.185
Aliases: www.amazon.com
          tp.47cf2c8c9-frontier.amazon.com
```

### **4. ping**

The command used to check the availability of a host. The response shows the URL you are pinging, the ip address associated with the URL and the size of packets being sent on the first line . The next four lines shows the replies from each individual packets including the time(in milliseconds) for the response and

the time to live(TLL) of the packet, that is the amount of time that must pass before the packet discarded.

**Syntax :-** \$ ping <IP\_address>

## **Output :-**

```
C:\Users\ajcemca>ping 142.250.195.164
Pinging 142.250.195.164 with 32 bytes of data:
Reply from 142.250.195.164: bytes=32 time=20ms TTL=59

Ping statistics for 142.250.195.164:
    Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
Approximate round trip times in milli-seconds:
    Minimum = 20ms, Maximum = 20ms, Average = 20ms

C:\Users\ajcemca>tracert

Usage: tracert [-d] [-h maximum_hops] [-j host-list] [-w timeout]
                [-R] [-S srcaddr] [-4] [-6] target_name

Options:
  -d           Do not resolve addresses to hostnames.
  -h maximum_hops Maximum number of hops to search for target.
  -j host-list  Loose source route along host-list (IPv4-only).
  -w timeout   Wait timeout milliseconds for each reply.
  -R           Trace round-trip path (IPv6-only).
  -S srcaddr   Source address to use (IPv6-only).
  -4           Force using IPv4.
  -6           Force using IPv6.
```

## **5. tracert**

The command used to show the packets that are passed through the router to which our system is connected to.

**Syntax :-** \$ tracert <ip\_address\_of\_system>

## **Output :-**

```
C:\Users\ajcemca>tracert 142.250.195.164
Tracing route to maa03s41-in-f4.1e100.net [142.250.195.164]
over a maximum of 30 hops:

  1    <1 ms      <1 ms      <1 ms  192.168.6.100
  2     2 ms       2 ms       1 ms  172.24.9.34
  3     *          *          * Request timed out.
  4     *          *          * Request timed out.
  5    17 ms      17 ms      17 ms  72.14.218.250
  6    17 ms      17 ms      17 ms  216.239.43.133
  7    15 ms      15 ms      15 ms  142.251.55.91
  8    20 ms      20 ms      20 ms  maa03s41-in-f4.1e100.net [142.250.195.164]

Trace complete.
```

## **6. route print:**The command used to display and updates network routing table

**Syntax :-** \$ route print

### **Output :-**

```
C:\Users\ajcemca>route print
=====
Interface List
 5...2c 56 dc 9b c1 9f .....Realtek PCIe GBE Family Controller
 15...0a 00 27 00 00 0f .....VirtualBox Host-Only Ethernet Adapter
 1.....00 00 00 00 00 00 .....Software Loopback Interface 1
 14....00 00 00 00 00 e0 Microsoft Teredo Tunneling Adapter
=====

IPv4 Route Table
=====
Active Routes:
Network Destination      Netmask     Gateway       Interface Metric
          0.0.0.0        0.0.0.0   192.168.6.100  192.168.6.53    281
          127.0.0.0       255.0.0.0   On-link        127.0.0.1    331
          127.0.0.1       255.255.255.255  On-link        127.0.0.1    331
 127.255.255.255       255.255.255.255  On-link        127.0.0.1    331
          192.168.6.0       255.255.255.255  On-link        192.168.6.53    281
          192.168.6.53       255.255.255.255  On-link        192.168.6.53    281
          192.168.6.255      255.255.255.255  On-link        192.168.6.53    281
          192.168.56.0       255.255.255.255  On-link        192.168.56.1    281
          192.168.56.1       255.255.255.255  On-link        192.168.56.1    281
 192.168.56.255       255.255.255.255  On-link        192.168.56.1    281
          224.0.0.0         240.0.0.0   On-link        127.0.0.1    331
          224.0.0.0         240.0.0.0   On-link        192.168.56.1    281
          224.0.0.0         240.0.0.0   On-link        192.168.6.53    281
 255.255.255.255      255.255.255.255  On-link        127.0.0.1    331
 255.255.255.255      255.255.255.255  On-link        192.168.56.1    281
 255.255.255.255      255.255.255.255  On-link        192.168.6.53    281
=====

Persistent Routes:
 Network Address      Netmask     Gateway Address Metric
          0.0.0.0        0.0.0.0   192.168.6.100  Default
=====
```

```
IPv6 Route Table
=====
Active Routes:
If Metric Network Destination      Gateway
14  331 ::/0           On-link
 1  331 ::1/128        On-link
14  331 2001::/32      On-link
14  331 2001:0:2851:fcb0:30ee:1d92:8a3e:b01e/128
                                         On-link
15  281 fe80::/64      On-link
 5  281 fe80::/64      On-link
14  331 fe80::/64      On-link
15  281 fe80::24da:9fa5:90c:831c/128
                                         On-link
14  331 fe80::30ee:1d92:8a3e:b01e/128
                                         On-link
 5  281 fe80::bda5:5f6c:2e2f:1dee/128
                                         On-link
 1  331 ff00::/8        On-link
15  281 ff00::/8        On-link
 5  281 ff00::/8        On-link
14  331 ff00::/8        On-link
=====

Persistent Routes:
 None
```

**7. netstat:** The network statistics or netstat command is a networking tool used for troubleshooting and configuration that can also serve a monitoring tool for the connections over the network.

**Syntax :-** netstat

## **Output :-**

```
none
C:\Users\ajcemca>netstat
Active Connections

  Proto  Local Address        Foreign Address      State
  TCP    192.168.6.53:22874  20.198.162.76:https ESTABLISHED
  TCP    192.168.6.53:22970  117.18.232.200:https CLOSE_WAIT
  TCP    192.168.6.53:23056  a-0003:https       ESTABLISHED
  TCP    192.168.6.53:23057  a-0003:https       ESTABLISHED
  TCP    192.168.6.53:23060  49.44.217.8:https CLOSE_WAIT
  TCP    192.168.6.53:23061  a104-85-134-163:https ESTABLISHED
  TCP    192.168.6.53:23062  13.107.21.200:https ESTABLISHED
  TCP    192.168.6.53:23063  49.44.194.88:https CLOSE_WAIT
  TCP    192.168.6.53:23064  49.44.194.88:https CLOSE_WAIT
  TCP    192.168.6.53:23065  a104-85-134-163:https ESTABLISHED
  TCP    192.168.6.53:23067  152.57.242.186:ms-do SYN_SENT
  TCP    192.168.6.53:23068  114.143.64.26:ms-do SYN_SENT
  TCP    192.168.6.53:23069  49.37.226.205:ms-do SYN_SENT

C:\Users\ajcemca>
```

**Name: Vishnu Vijayakumar**

**Roll No:53**

**Batch: MCA-B**

**Date:6-6-2022**

## Program no:8

**Aim:** Analyzing network packet stream using tcpdump and wireshark. Perform basic network service tests using nc.

### Procedure

Install the the wireshark on ubuntu

### sudo apt update & apt install tcpdump :

Update and install tcpdump on system.

```
mca@U53:~$ sudo apt update && sudo apt install tcpdump
Get:1 https://dl.google.com/linux/chrome/deb stable InRelease [1,811 B]
Hit:2 http://ppa.launchpad.net/codeblocks-devs/releases/ubuntu bionic InRelease
Hit:3 http://archive.ubuntu.com/ubuntu bionic InRelease
Get:4 https://dl.google.com/linux/chrome/deb stable/main amd64 Packages [1,097 B]
Err:5 http://ppa.launchpad.net/jonathonf/python-3.6/ubuntu bionic InRelease
  403 Forbidden [IP: 185.125.190.52 80]
Hit:6 http://ppa.launchpad.net/pasgui/ppa/ubuntu bionic InRelease
Hit:7 http://ppa.launchpad.net/webupd8team/java/ubuntu bionic InRelease
Reading package lists... Done
E: Failed to fetch http://ppa.launchpad.net/jonathonf/python-3.6/ubuntu/dists/bionic/InRelease 403 Forbidden [IP: 185.125.190.52 80]
E: The repository 'http://ppa.launchpad.net/jonathonf/python-3.6/ubuntu bionic InRelease' is no longer signed.
N: Updating from such a repository can't be done securely, and is therefore disabled by default.
N: See apt-secure(8) manpage for repository creation and user configuration details.
```

```
mca@U53:~$ sudo tcpdump
tcpdump: verbose output suppressed, use -v or -vv for full protocol decode
listening on enp5s0, link-type EN10MB (Ethernet), capture size 262144 bytes
15:02:01.069139 ARP, Request who-has 192.168.6.6 tell _gateway, length 46
15:02:01.069782 ARP, Request who-has 192.168.6.110 tell _gateway, length 46
15:02:01.070479 IP U53.56158 > dns.google.domain: 12111+ [1au] PTR? 6.6.168.192.in-addr.arpa. (53)
15:02:01.085519 IP U53.56158 > dns.google.domain: 12111 NXDomain 0/0/1 (53)
15:02:01.085681 IP U53.56158 > dns.google.domain: 12111+ PTR? 6.6.168.192.in-addr.arpa. (42)
15:02:01.100556 IP dns.google.domain > U53.56158: 12111 NXDomain 0/0/0 (42)
15:02:01.102177 IP U53.44528 > dns.google.domain: 51771+ [1au] PTR? 100.6.168.192.in-addr.arpa. (55)
15:02:01.133716 IP U53.55255 > dns.google.domain: 22879+ [1au] PTR? 110.6.168.192.in-addr.arpa. (55)
15:02:01.168855 IP U53.37221 > dns.google.domain: 6605+ [1au] PTR? 8.8.8.8.in-addr.arpa. (49)
15:02:01.282019 IP 192.168.6.191.52120 > 239.255.255.1900: UDP, length 171
15:02:01.282631 IP U53.58572 > dns.google.domain: 9823+ [1au] PTR? 250.255.255.239.in-addr.arpa. (57)
15:02:01.300886 IP dns.google.domain > U53.58572: 9823 NXDomain 0/1/1 (114)
15:02:01.301099 IP U53.58572 > dns.google.domain: 9823+ PTR? 250.255.255.239.in-addr.arpa. (46)
15:02:01.315041 IP 192.168.6.240.50272 > 239.255.255.250.1900: UDP, length 175
15:02:01.319627 IP dns.google.domain > U53.58572: 9823 NXDomain 0/1/0 (103)
15:02:01.320862 IP U53.33710 > dns.google.domain: 41981+ [1au] PTR? 191.6.168.192.in-addr.arpa. (55)
15:02:01.355951 IP U53.49410 > dns.google.domain: 33944+ [1au] PTR? 240.6.168.192.in-addr.arpa. (55)
15:02:01.358536 ARP, Request who-has 192.168.6.208 tell 0.0.0.0, length 46
15:02:01.358543 IP6 fe80::d08d:c434:e060:f749 > ip6-allnodes: ICMP6, neighbor advertisement, tgt is fe80::d08d:c434:e060:f749, 1
15:02:01.372379 IP dns.google.domain > U53.49410: 33944 NXDomain 0/0/1 (55)
15:02:01.390638 IP U53.42502 > dns.google.domain: 46401+ [1au] PTR? 208.6.168.192.in-addr.arpa. (55)
15:02:01.406155 IP dns.google.domain > U53.42502: 46401 NXDomain 0/0/1 (55)
15:02:01.406346 IP U53.42502 > dns.google.domain: 46401+ PTR? 208.6.168.192.in-addr.arpa. (44)
```

**sudo tcpdump -D :** To display all available interfaces.

```
mca@U53:~$ sudo tcpdump -D
1.enp5s0 [Up, Running]
2.any (Pseudo-device that captures on all interfaces) [Up, Running]
3.lo [Up, Running, Loopback]
4.nflog (Linux netfilter log (NFLOG) interface)
5.nfqueue (Linux netfilter queue (NFQUEUE) interface)
6.usbmon1 (USB bus number 1)
7.usbmon2 (USB bus number 2)
```

## sudo tcpdump -i enp5s0 :

```
mca@U53:~$ sudo tcpdump -i enp5s0
tcpdump: verbose output suppressed, use -v or -vv for full protocol decode
listening on enp5s0, link-type EN10MB (Ethernet), capture size 262144 bytes
15:07:24.157462 IP U53.55189 > maa03s37-in-f10.1e100.net.443: UDP, length 33
15:07:24.159363 IP U53.35359 > dns.google.domain: 49335+ [1au] PTR? 223.6.168.192.in-addr.arpa. (55)
15:07:24.174146 IP dns.google.domain > U53.35359: 49335 NXDomain 0/0/1 (55)
15:07:24.174366 IP U53.35359 > dns.google.domain: 49335+ PTR? 223.6.168.192.in-addr.arpa. (44)
15:07:24.178358 IP maa03s37-in-f10.1e100.net.443 > U53.55189: UDP, length 25
15:07:24.189396 IP dns.google.domain > U53.35359: 49335 NXDomain 0/0/0 (44)
15:07:24.204428 ARP, Request who-has 192.168.6.148 tell 192.168.6.163, length 46
```

**sudo tcpdump -c 4 -i enp5s0 :** It will capture all the packets for the specified interface, until you hit the cancel button. But using -c option, you can capture a specified number of packets.

```
mca@U53:~$ sudo tcpdump -c 4 -i enp5s0
tcpdump: verbose output suppressed, use -v or -vv for full protocol decode
listening on enp5s0, link-type EN10MB (Ethernet), capture size 262144 bytes
15:08:30.202239 IP 192.168.6.218.59604 > 239.255.255.250.1900: UDP, length 172
15:08:30.205377 IP U53.34038 > dns.google.domain: 20211+ [1au] PTR? 218.6.168.192.in-addr.arpa. (55)
15:08:30.221525 IP dns.google.domain > U53.34038: 20211 NXDomain 0/0/1 (55)
15:08:30.221693 IP U53.34038 > dns.google.domain: 20211+ PTR? 218.6.168.192.in-addr.arpa. (44)
4 packets captured
12 packets received by filter
4 packets dropped by kernel
```

**sudo tcpdump -c 4 -xx -I enp5s0 :** command -xx capture the data of each packet, including its link level header in HEX and ASCII format.

```
mca@U53:~$ sudo tcpdump -xx -i enp5s0
tcpdump: verbose output suppressed, use -v or -vv for full protocol decode
listening on enp5s0, link-type EN10MB (Ethernet), capture size 262144 bytes
15:09:06.812246 ARP, Request who-has 192.168.1.1 tell 192.168.1.1, length 46
  0x0000: ffff ffff 4431 92f1 0a8c 0806 0001
  0x0010: 0800 0604 0001 4431 92f1 0a8c c0a8 0101
  0x0020: 0000 0000 0000 c0a8 0101 0000 0000 0000
  0x0030: 0000 0000 0000 0000 0000 0000 0000 0000
15:09:06.813569 IP U53.46035 > dns.google.domain: 8376+ [1au] PTR? 1.1.168.192.in-addr.arpa. (53)
  0x0000: 001a 8c6b 54cf 0c9d 9227 0800 4500
  0x0010: 0051 cb54 4000 4011 97b0 c0a8 06df 0808
  0x0020: 0808 b3d3 0035 003d 9d9d 20b8 0100 0001
  0x0030: 0000 0000 0001 0131 0131 0331 3638 0331
  0x0040: 3932 0769 6e2d 6164 6472 0461 7270 6100
  0x0050: 000c 0001 0000 2902 0000 0000 0000 0000
```

**Sudo tcpdump -i enp5s0 -c5 port 80 :** To filter packets based on the desired service or port, use the port filter.

```
mca@U53:~$ sudo tcpdump -i enp5s0 -c 5 port 80
tcpdump: verbose output suppressed, use -v or -vv for full protocol decode
listening on enp5s0, link-type EN10MB (Ethernet), capture size 262144 bytes
^Z
[4]+  Stopped                  sudo tcpdump -i enp5s0 -c 5 port 80
```

**sudo tcpdump -i enp5s0 -c 10 -w icmp.pcap** : tcpdump has a feature to capture and save the file in a .pcap format, to do this just execute the command with -w option.

```
mca@U53:~$ sudo tcpdump -i enp5s0 -c 10 -w icmp.pcap
tcpdump: listening on enp5s0, link-type EN10MB (Ethernet), capture size 262144 bytes
10 packets captured
23 packets received by filter
0 packets dropped by kernel
```

**sudo tcpdump -r icmp.pcap** : To read and analyze captured packet 0001.pcap file use the command with -r option.

```
mca@U53:~$ tcpdump -r icmp.pcap
reading from file icmp.pcap, link-type EN10MB (Ethernet)
15:12:28.609434 IP U53.55189 > maa03s37-in-f10.1e100.net.443: UDP, length 33
15:12:28.629978 IP maa03s37-in-f10.1e100.net.443 > U53.55189: UDP, length 25
15:12:28.647075 STP 802.1s, Rapid STP, CIST Flags [Learn, Forward, Agreement], length 102
15:12:28.653819 ARP, Request who-has 192.168.6.82 tell 192.168.6.245, length 46
15:12:28.812837 ARP, Request who-has 192.168.90.1 tell 192.168.90.60, length 46
15:12:28.814777 IP 192.168.6.221.43185 > 239.255.255.250.1900: UDP, length 172
15:12:28.818072 IP 192.168.6.80.netbios-ns > 192.168.6.255.netbios-ns: NBT UDP PACKET(137): QUERY; REQUEST; BROADCAST
15:12:28.831225 IP U53.55189 > maa03s37-in-f10.1e100.net.443: UDP, length 33
15:12:28.853114 IP maa03s37-in-f10.1e100.net.443 > U53.55189: UDP, length 25
15:12:28.951693 IP 192.168.6.190.59170 > 239.255.255.250.1900: UDP, length 172
```

## Wireshark and Netcat

**Sudo apt install wireshark** : Wireshark's latest version has been added to the APT, you can download and install.

```
mca@U53:~$ sudo apt install wireshark
Reading package lists... Done
Building dependency tree
Reading state information... Done
wireshark is already the newest version (2.4.5-1).
The following packages were automatically installed and are no longer required:
  debhelper dh-autoreconf dh-strip-nondeterminism libarchive-cpio-perl libfile-stripnondeterminism-perl libmail-sendmail-perl libpcre16-3
  libpcre3-dev libpcre32-3 libpcrecpp0v5 libssl-dev libssl-doc libsys-hostname-long-perl po-debconf shtool
Use 'sudo apt autoremove' to remove them.
0 upgraded, 0 newly installed, 0 to remove and 6 not upgraded.
```

## Sudo adduser \$USER wireshark

:

```
mca@U53:~$ sudo adduser $mca wireshark
adduser: The group `wireshark' already exists.
```

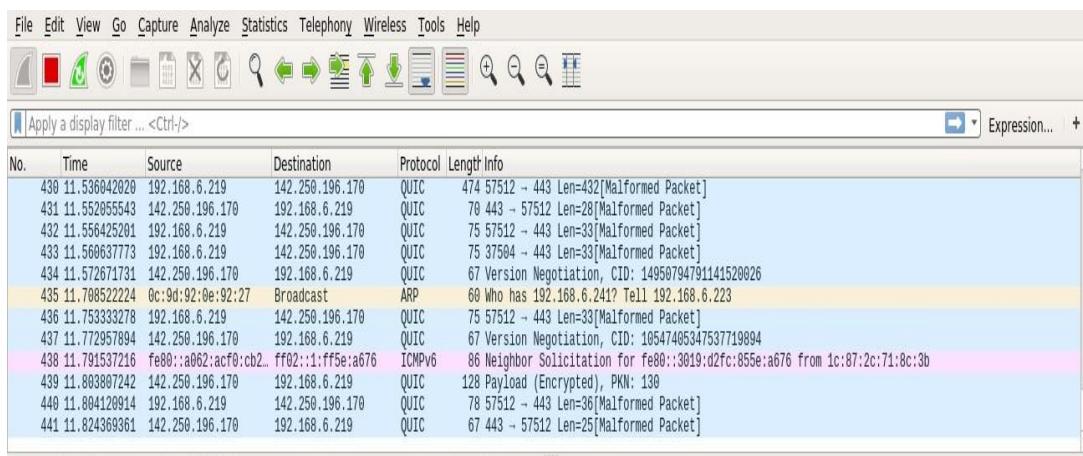
**Sudo wireshark** : To start wireshark application.

```
mca@U53:~$ sudo wireshark
StandardPaths: XDG_RUNTIME_DIR not set, defaulting to '/tmp/runtime-root'
```

**Capturing packet using wireshark :** List of interfaces that you can capture packets to and from. There are many types of interfaces you can monitor using Wireshark, for example, Wired, Wireless, USB and many external devices. You can choose to show specific types of interfaces in the welcome screen from the marked section of the screenshot below:



Many packets were captured:



**Sudo apt –get install netcat :** Installing netcat.

```
mca@S3:~$ sudo apt-get install netcat
[sudo] password for mca:
Reading package lists... Done
Building dependency tree
Reading state information... Done
netcat is already the newest version (1.10-41.1).
The following packages were automatically installed and are no longer required:
  debhelper dh-autoreconf dh-strip-nondeterminism libarchive-cpio-perl
  libfile-stripnondeterminism-perl libmail-sendmail-perl libpcre16-3
  libpcre3-dev libpcre32-3 libpcrecpp0v5 libssl-dev libssl-doc
  libsys-hostname-long-perl php-common php-pear php-xml php7.2-cli
  php7.2-common php7.2-json php7.2-opcache php7.2-readline php7.2-xml
  pkg-php-tools po-debconf shtool
Use 'sudo apt autoremove' to remove them.
0 upgraded, 0 newly installed, 0 to remove and 8 not upgraded.
mca@S3:~$ nc -l -p 1234
Amaljyothi College Of Engineering
```

**nc -l -p 1234** : To set up the server using Netcat in listening mode. We will use port 12345 and will specify the port number with the -p option.

```
mca@S3:~$ nc -l -p 1234
Amaljyothi College Of Engiineering
```

**nc localhost 1234** : The client needs the server ip to connect to it. My server and my client are on the same machine so I use localhost for the hostname. The command ‘nc hostname port’ puts Netcat in client mode and connects to the specified hostname on the specified port.

```
mca@S3:~$ nc 127.0.0.1 1234
Amaljyothi College Of Engiineering
```

## Program no:9

**Aim:** Introduction to Hypervisors and VMs: KVM installation and commands.

### Procedure:

For the Ubuntu system, all packages required to run KVM are available on official upstream repositories.

Install them using the commands:

```
sudo apt update
apt-get install qemu qemu-kvm libvirt-bin bridge-utils virt-manager virt-viewer-y
```

Create Virtual Machine • You can create virtual machine using virt-manager utility. Run the following command to start the virt-manager:

```
sudo virt-manager
```

virsh help

virsh help

virsh help list

Sudo virsh nodeinfo

Virsh start

vm virsh start

virsh start testvm1

**Name:Vishnu Vijayakumar**

**Roll No:53**

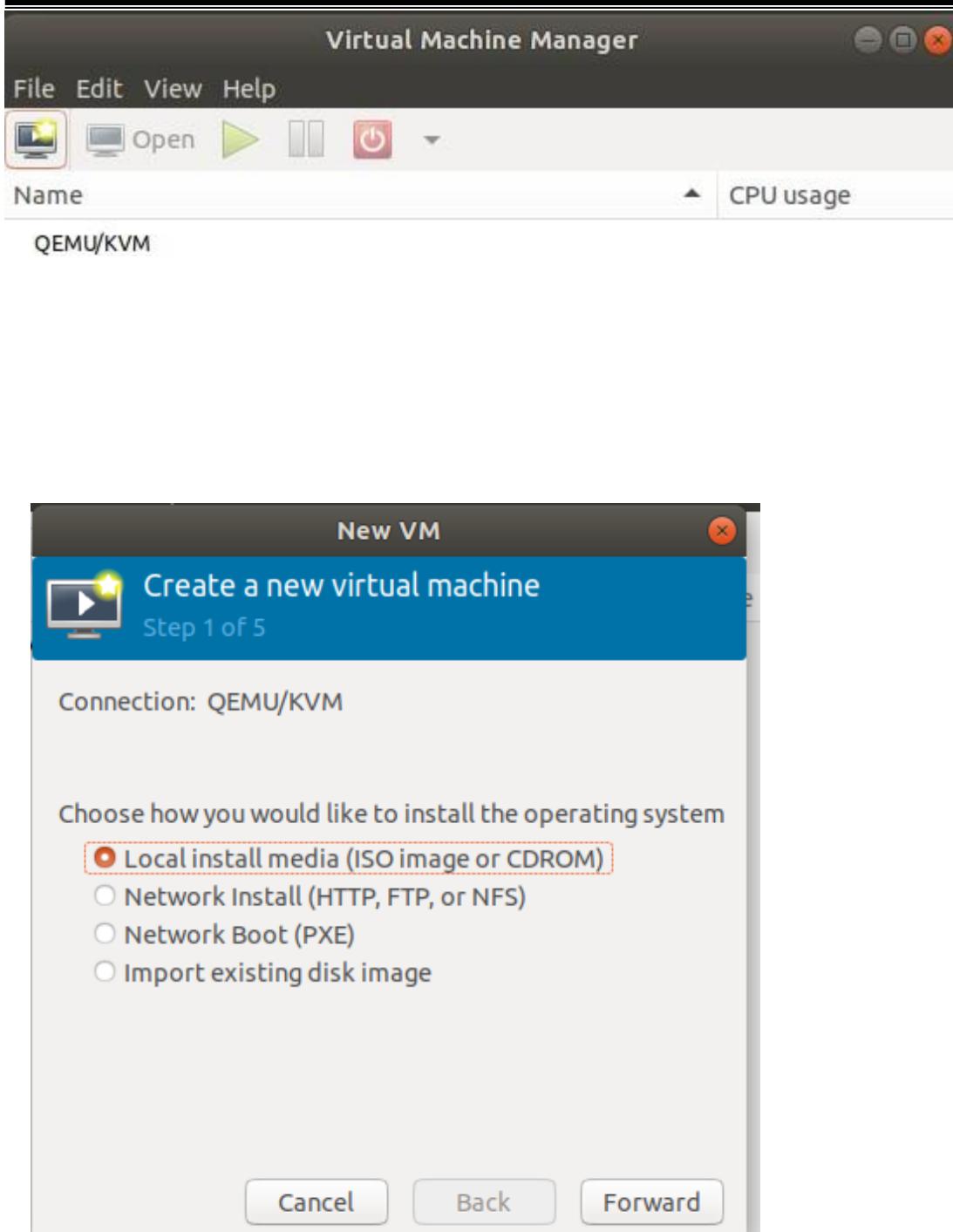
**Batch: MCA-B**

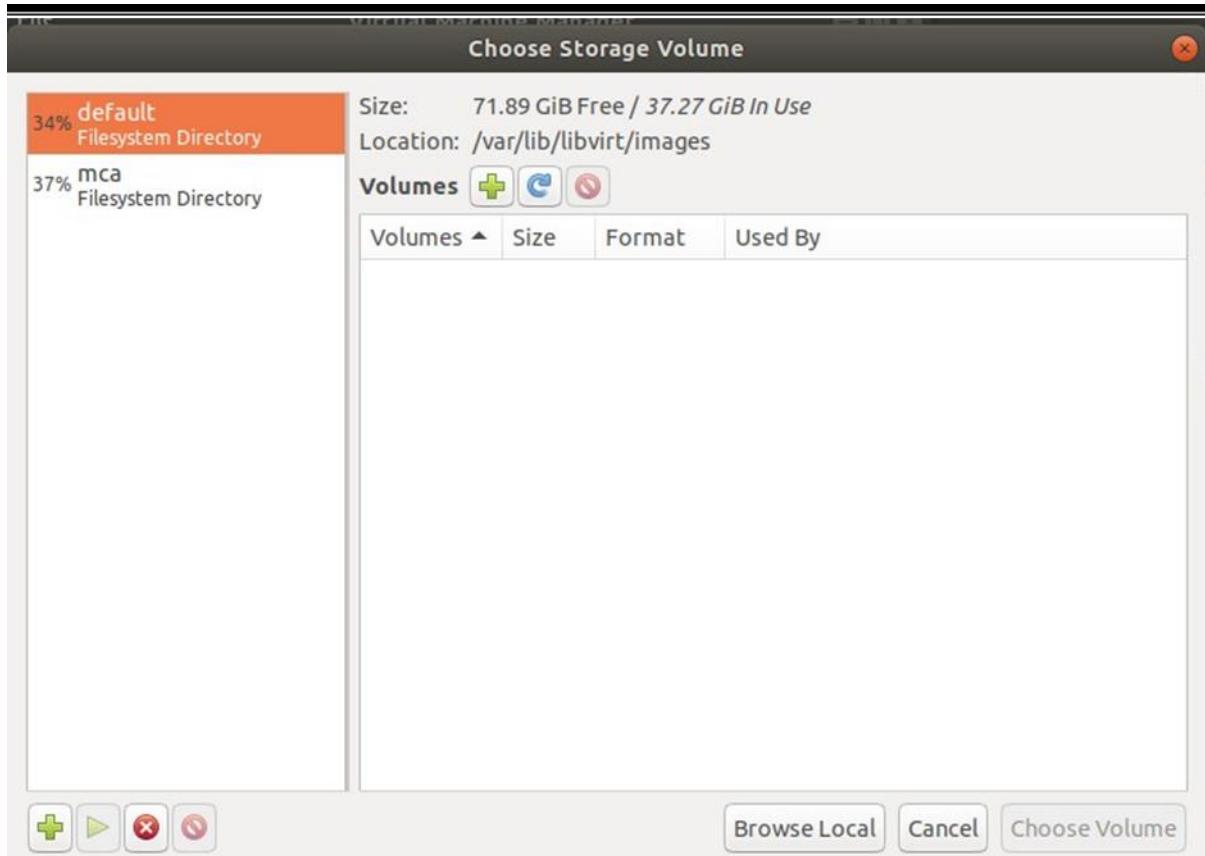
**Date:23/5/2022**

```
mca@U53:~$ sudo apt install qemu-kvm libvirt-daemon-system libvirt-clients bridge-utils
Reading package lists... Done
Building dependency tree
Reading state information... Done
bridge-utils is already the newest version (1.5-15ubuntu1).
bridge-utils set to manually installed.
qemu-kvm is already the newest version (1:2.11+dfsg-1ubuntu7.4).
The following additional packages will be installed:
  augeas-lenses dmeventd ebtables libaugeas0 libdevmapper-event1.02.1 liblvm2app2.2 liblvm2cmd2.02 libnetcf1 libreadline5 libvirt-daemon
  libvirt-daemon-driver-storage-rbd libvirt0 libxml2-utils lvm2
Suggested packages:
  augeas-doc augeas-tools libvirt-daemon-driver-storage-gluster libvirt-daemon-driver-storage-sheepdog libvirt-daemon-driver-storage-zfs
  numad radvd auditd systemtap nfs-common zfsutils pm-utils thin-provisioning-tools
The following NEW packages will be installed:
  augeas-lenses dmeventd ebtables libaugeas0 libdevmapper-event1.02.1 liblvm2app2.2 liblvm2cmd2.02 libnetcf1 libreadline5 libvirt-clients
  libvirt-daemon libvirt-daemon-driver-storage-rbd libvirt-daemon-system libvirt0 libxml2-utils lvm2
0 upgraded, 16 newly installed, 0 to remove and 6 not upgraded.
Need to get 6,831 kB of archives.
After this operation, 28.4 MB of additional disk space will be used.
Do you want to continue? [Y/n] y
Get:1 http://archive.ubuntu.com/ubuntu bionic/main amd64 libvirt0 amd64 4.0.0-1ubuntu8 [1,255 kB]
Get:2 http://archive.ubuntu.com/ubuntu bionic/main amd64 libvirt-clients amd64 4.0.0-1ubuntu8 [596 kB]
Get:3 http://archive.ubuntu.com/ubuntu bionic/main amd64 augeas-lenses all 1.10.1-2 [300 kB]
Get:4 http://archive.ubuntu.com/ubuntu bionic/main amd64 libaugeas0 amd64 1.10.1-2 [159 kB]
Get:5 http://archive.ubuntu.com/ubuntu bionic/main amd64 libnetcf1 amd64 1:0.2.8-1ubuntu2 [46.4 kB]
Get:6 http://archive.ubuntu.com/ubuntu bionic/main amd64 libvirt-daemon amd64 4.0.0-1ubuntu8 [2,173 kB]
```

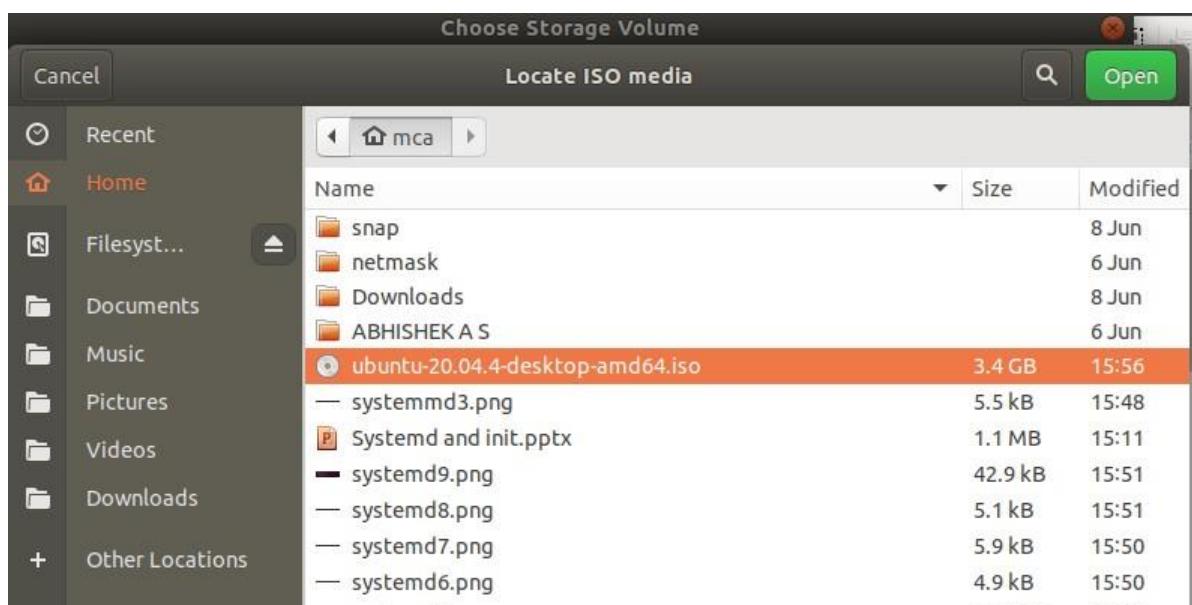
Next, right click on localhost(QEMU) and click on New button.

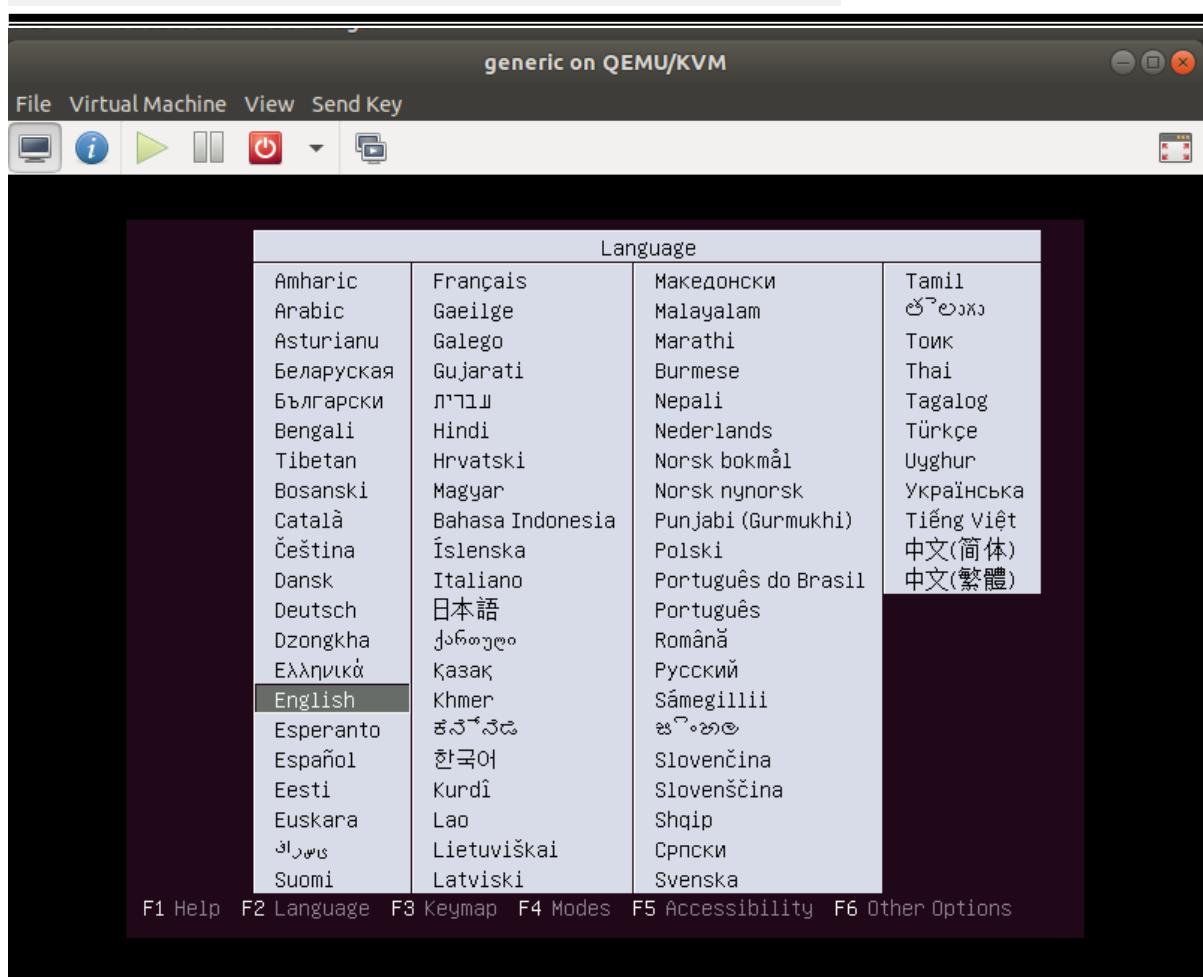
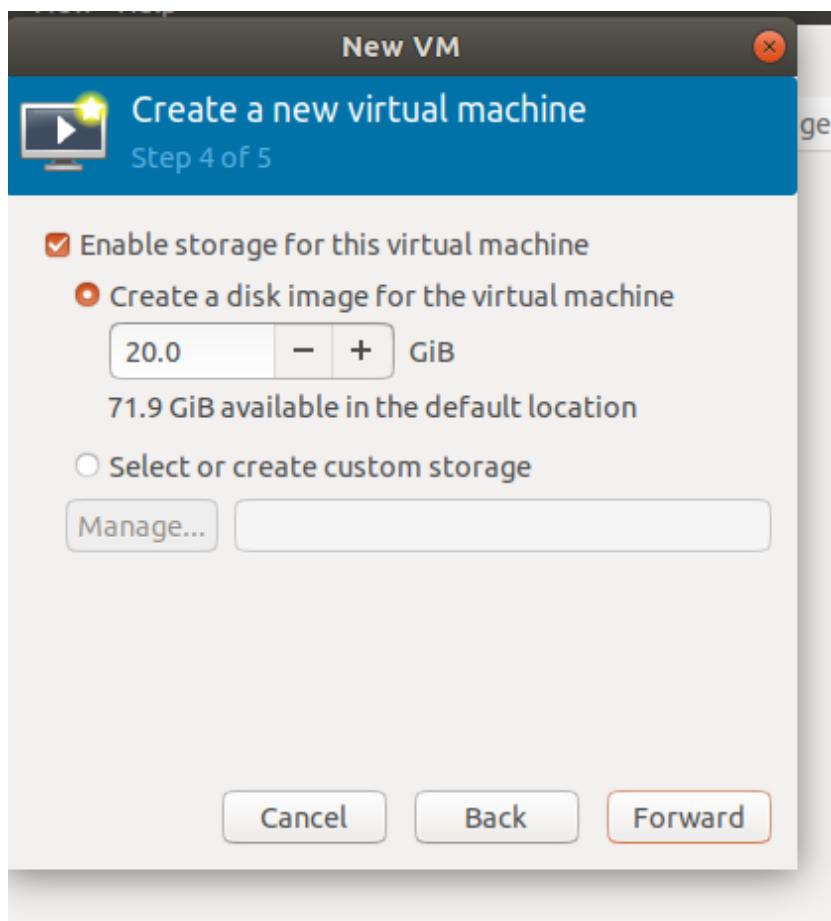
```
mca@U53:~$ sudo virt-manager
mca@U53:~$
```

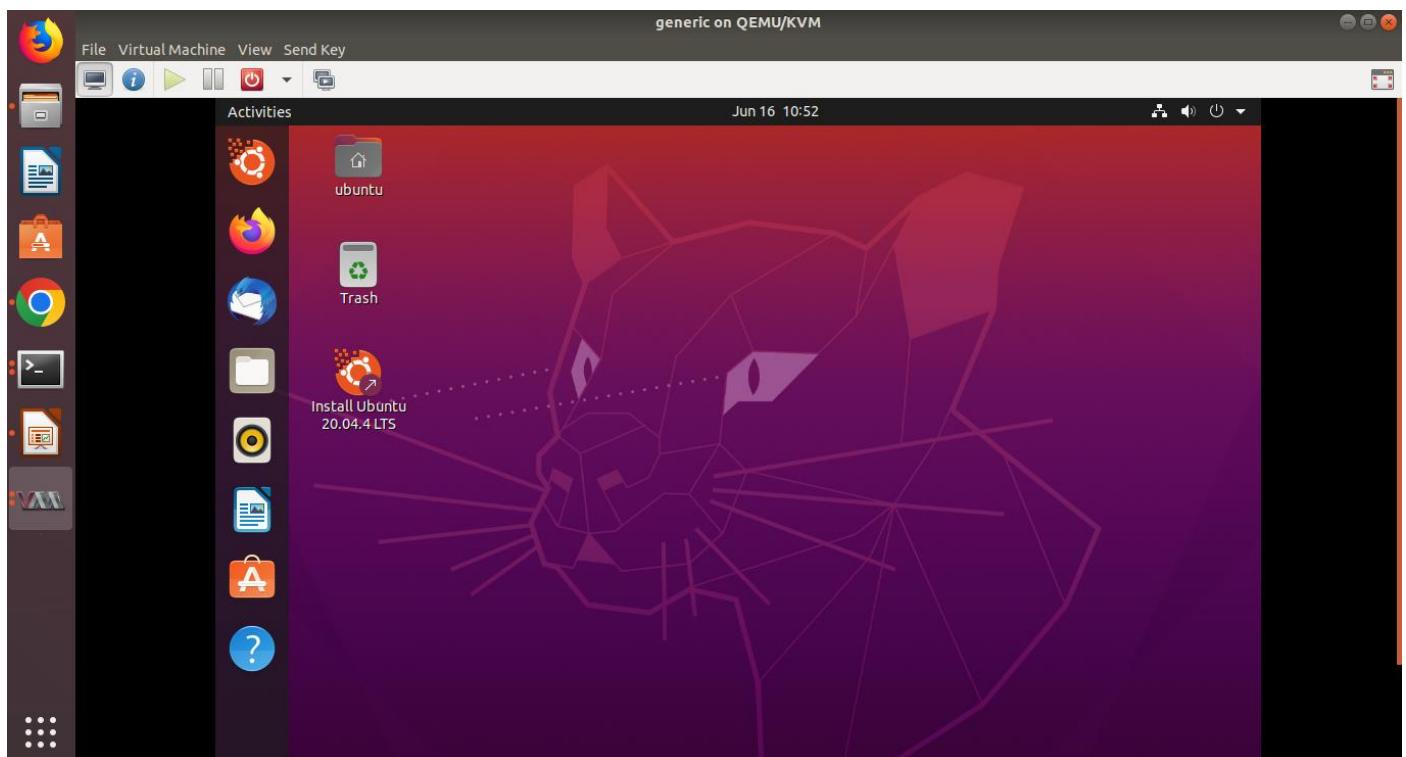




Next, provide the amount of storage that you want to assign to a virtual machine. Then, click on the Forward button







```
mca@U53:~$ virsh list --all
```

Id	Name	State
<hr/>		

```
mca@U3:~$ sudo virsh nodeinfo
CPU model:           x86_64
CPU(s):              6
CPU frequency:       1428 MHz
CPU socket(s):       1
Core(s) per socket: 6
Thread(s) per core: 1
NUMA cell(s):        1
Memory size:         8006128 KiB
```

## **Program no:10**

**Aim:** Introduction to Containers: Docker installation and deployment

### **Procedure**

#### Steps for Installing Docker:

1. Open the terminal on Ubuntu.
2. Remove any Docker file that are running in the system, using the following command:

**\$ sudo apt-get remove docker docker-engine docker.io**

```
mca@553:~$ sudo apt-get remove docker docker-engine docker.io
[sudo] password for mca:
Reading package lists... Done
Building dependency tree
Reading state information... Done
Package 'docker-engine' is not installed, so not removed
Package 'docker' is not installed, so not removed
Package 'docker.io' is not installed, so not removed
The following packages were automatically installed and are no longer required:
  debhelper dh-autoreconf dh-strip-nondeterminism gimp-data i965-va-driver
  libaaacs0 libbamd2 libarchive-cpio-perl libavcodec57 libavformat57 libavutil55
  libbabl-0.1-0 libbdplus0 libblas3 libbluray2 libcand2 libccoland2
  libcholmod3 libchromaprint1 libcrystalhd3 libfile-stripnondeterminism-perl
  libegl-0.3-0 libgfortran4 libgimp2.0 libgme0 libgsml1 liblapack3
  libmail-sendmail-perl libmetis5 libmng2 libopenjp2-7 libopenmpt0 libpcre16-3
  libpcre3-dev libpcre32-3 libpcrecpp0v5 libshine3 libsnappy1v5 libsoxr0
  libssh-gcrypt-4 libssl-dev libssl-doc libswresample2 libswscale4
  libsys-hostname-long-perl libumfpack5 libva-drm2 libva-x11-2 libva2
  libvdpau1 libx264-152 libx265-146 libxvidcore4 libzvbi-common libzvbi0
  mesa-va-drivers mesa-vdpau-drivers php-common php-pear php-xml php7.2-cli
  php7.2-common php7.2-json php7.2-opcache php7.2-readline php7.2-xml
  pkg-php-tools po-debconf shtool va-driver-all vdpau-driver-all
Use 'sudo apt autoremove' to remove them.
0 upgraded, 0 newly installed, 0 to remove and 0 not upgraded.
```

**Name: Vishnu Vijayakumar**

**Roll No:53**

**Batch: MCA-B**

**Date:23/5/2022**

After entering the above command, you will need to enter the password of the root and press enter.

3. Check if the system is up-to-date using the following command:

**\$ sudo apt-get update**

```
mca@553:~$ sudo apt-get update
Hit:1 http://in.archive.ubuntu.com/ubuntu bionic InRelease
Get:2 http://dl.google.com/linux/chrome/deb stable InRelease [1,811 B]
Err:3 http://ppa.launchpad.net/jonathonf/python-3.6/ubuntu bionic InRelease
  403 Forbidden [IP: 185.125.190.52 80]
Err:2 http://dl.google.com/linux/chrome/deb stable InRelease
  The following signatures couldn't be verified because the public key is not available: NO_PUBKEY 78BD65473CB3BD13
Ign:4 https://repo.mongodb.org/apt/ubuntu trusty/mongodb-org/3.6 InRelease
Get:5 http://ppa.launchpad.net/webupd8team/java/ubuntu bionic InRelease [15.4 kB]
Get:6 https://repo.mongodb.org/apt/ubuntu trusty/mongodb-org/3.6 Release [2,495 B]
Get:7 https://repo.mongodb.org/apt/ubuntu trusty/mongodb-org/3.6 Release.gpg [801 B]
Err:7 https://repo.mongodb.org/apt/ubuntu trusty/mongodb-org/3.6 Release.gpg
  The following signatures were invalid: EXPKEYSIG 58712A2291FA4AD5 MongoDB 3.6 Release Signing Key <packaging@mongodb.com>
Reading package lists... Done
E: Failed to fetch http://ppa.launchpad.net/jonathonf/python-3.6/ubuntu/dists/bionic/InRelease 403 Forbidden [IP: 185.125.190.52 80]
E: The repository 'http://ppa.launchpad.net/jonathonf/python-3.6/ubuntu bionic InRelease' is not signed.
N: Updating from such a repository can't be done securely, and is therefore disabled by default.
N: See apt-secure(8) manpage for repository creation and user configuration details.
W: GPG error: http://dl.google.com/linux/chrome/deb stable InRelease: The following signatures couldn't be verified because the public key is not available: NO_PUBKEY 78BD65473CB3BD13
E: The repository 'http://dl.google.com/linux/chrome/deb stable InRelease' is not signed.
N: Updating from such a repository can't be done securely, and is therefore disabled by default.
N: See apt-secure(8) manpage for repository creation and user configuration details.
E: Repository 'http://ppa.launchpad.net/webupd8team/java/ubuntu bionic InRelease' changed its 'Label' value from 'Oracle Java (JDK) 8 / aller PPA' to 'Oracle Java (JDK) 8 Installer PPA (DISCONTINUED)'
N: This must be accepted explicitly before updates for this repository can be applied. See apt-secure(8) manpage for details.
W: An error occurred during the signature verification. The repository is not updated and the previous index files will be used. GPG error: https://repo.mongodb.org/apt/ubuntu trusty/mongodb-org/3.6 Release: The following signatures were invalid: EXPKEYSIG 58712A2291FA4AD5 MongoDB 3.6 Release Signing Key <packaging@mongodb.com>
```

#### 4. Install Docker using the following command:

**\$ sudo apt install docker.io**

You'll then get a prompt asking you to choose between y/n - choose y

```
mca@553:~$ sudo apt install docker.io
Reading package lists... Done
Building dependency tree
Reading state information... Done
The following packages were automatically installed and are no longer required:
  debhelper dh-autoreconf dh-strip-nondeterminism gimp-data i965-va-driver
  libaacls0 libband2 libarchive-cpio-perl libavcodec57 libavformat57 libavutil55
  libbbabl-0.1-0 libbbdplus0 libblas3 libbluray2 libcamd2 libccolamd2
  libcholmod3 libchromaprint1 libcrystalhd3 libffile-stripnondeterminism-perl
  libgegl-0.3-0 libgfortran4 libgimp2.0 libgme0 libgsml liblapack3
  libmail-sendmail-perl libmetis5 libmng2 libopenjp2-7 libopenmpt0 libpcre16-3
  libpcre3-dev libpcre32-3 libpcrecpp0v5 libshine3 libsnappy1v5 libsoxr0
  libssh-gcrypt-4 libssl-dev libssl-doc libswresample2 libswscale4
  libsys-hostname-long-perl libumfpack5 libva-drm2 libva-x11-2 libva2
  libvpau1 libx264-152 libx265-146 libxvidcore4 libzvbi-common libzvbi0
  mesa-va-drivers mesa-vdpau-drivers php-common php-pear php-xml php7.2-cli
  php7.2-common php7.2-json php7.2-opcache php7.2-readline php7.2-xml
  pkg-php-tools po-debconf shtool va-driver-all vdpau-driver-all
Use 'sudo apt autoremove' to remove them.
The following additional packages will be installed:
  bridge-utils cgroupfs-mount ubuntu-fan
Suggested packages:
  aufs-tools btrfs-tools debootstrap docker-doc rinse zfs-fuse | zfsutils
The following NEW packages will be installed:
  bridge-utils cgroupfs-mount docker.io ubuntu-fan
0 upgraded, 4 newly installed, 0 to remove and 0 not upgraded.
Need to get 30.1 MB of archives.
After this operation, 137 MB of additional disk space will be used.
Do you want to continue? [Y/n] Y
Get:1 http://in.archive.ubuntu.com/ubuntu bionic/main amd64 bridge-utils amd64 1.5-15ubuntu1 [30.1 kB]
Get:2 http://in.archive.ubuntu.com/ubuntu bionic/universe amd64 cgroupfs-mount all 1.4 [6,320 B]
Get:3 http://in.archive.ubuntu.com/ubuntu bionic/universe amd64 docker.io amd64 17.12.1-0ubuntu1 [30.1 MB]
Get:4 http://in.archive.ubuntu.com/ubuntu bionic/main amd64 ubuntu-fan all 0.12.10 [34.7 kB]
Fetched 30.1 MB in 1s (27.8 MB/s)
Preconfiguring packages ...
Selecting previously unselected package bridge-utils.
(Reading database ... 176136 files and directories currently installed.)
```

5. Install all the dependency packages using the following command:

**\$ sudo snap install docker**

```
mca@553:~$ sudo snap install docker
docker 20.10.14 from Canonical* installed
```

6. Before testing Docker, check the version installed using the following command:

**\$ docker –version**

```
mca@553:~$ docker --version
Docker version 17.12.1-ce, build 7390fc6
```

7. Pull an image from the Docker hub using the following command:

**\$ sudo docker run hello-world**

Here, *hello-world* is the docker image present on the Docker hub.

```
mca@553:~$ sudo docker run hello-world
Unable to find image 'hello-world:latest' locally
latest: Pulling from library/hello-world
2db29710123e: Pull complete
Digest: sha256:80f31da1ac7b312ba29d65080fddf797dd76acfb870e677f390d5acba9741b17
Status: Downloaded newer image for hello-world:latest

Hello from Docker!
This message shows that your installation appears to be working correctly.

To generate this message, Docker took the following steps:
 1. The Docker client contacted the Docker daemon.
 2. The Docker daemon pulled the "hello-world" image from the Docker Hub.
    (amd64)
 3. The Docker daemon created a new container from that image which runs the
    executable that produces the output you are currently reading.
 4. The Docker daemon streamed that output to the Docker client, which sent it
    to your terminal.

To try something more ambitious, you can run an Ubuntu container with:
$ docker run -it ubuntu bash

Share images, automate workflows, and more with a free Docker ID:
https://hub.docker.com/

For more examples and ideas, visit:
https://docs.docker.com/get-started/
```

8. Check if the docker image has been pulled and is present in your system using the following command:

**\$ sudo docker images**

```
mca@553:~$ sudo docker images
REPOSITORY      TAG          IMAGE ID      CREATED        SIZE
hello-world    latest        feb5d9fea6a5  8 months ago   13.3kB
```

9. To display all the containers pulled, use the following command:

**\$ sudo docker ps -a**

```
mca@553:~$ sudo docker ps -a
CONTAINER ID        IMAGE           COMMAND       CREATED        STATUS          PORTS          NAMES
65a1ccf01aec      hello-world     "/hello"      54 seconds ago   Exited (0)  52 seconds ago   fervent_wilbur
mca@553:~$ sudo docker ps
```

10. To check for containers in a running state, use the following command:

**\$ sudo docker ps**

```
mca@553:~$ sudo docker ps
CONTAINER ID        IMAGE           COMMAND       CREATED        STATUS          PORTS          NAMES
mca@553:~$ docker --version
Docker version 17.12.1-ce, build 7390fc6
mca@553:~$
```

## Setting Up an Apache Container

### Procedure

#### Setting Up an Apache Container

One of the amazing things about the **Docker** ecosystem is that there are tens of standard containers that you can easily download and use.

In the following example, we will instantiate an **Apache 2.4** container named **tecmint-web**, detached from the current terminal. We will use an image called **httpd:2.4** from [Docker Hub](#).

Our plan is to have requests made to our public IP address on port **8080** be redirected to port **80** on the container. Also, instead of serving content from the container itself, we will serve a simple web page from **/home/user/website**.

We do this by mapping **/home/user/website/** on the **/usr/local/apache2/htdocs/** on the container. Note that you will need to use **sudo** or login as **root** to proceed, and do not omit the forward slashes at the end of each directory.

```
$sudo docker run -dit --name tecmint-web -p 8080:80 -v /home/user/website/:/usr/local/apache2/htdocs/ httpd:2.4
```

Pull Docker Apache Container At this point, our **Apache** container should be up and running.

```
$ sudo docker ps
```

#### Check Apache Docker Container

Now let's create a simple web page named **docker.html** inside the **/home/user/website** directory.

```
$ sudo gedit /home/user/website/docker.html
```

Add the following sample HTML content to the file.

```
<!DOCTYPE html>
<html lang="en">
<head>
  <meta charset="UTF-8">
  <title>Learn Docker at Tecmint.com</title>
</head>
<body>
  <h1>Learn Docker With Us</h1>
</body>
```

</html>

Next, point your browser to (where **Server-IP** is your host's public IP address). You should be presented with the page we created previously.



## WELCOME TO DOCKER ON LINUX

Check Apache Page

If you wish, you can now stop the container.

```
$ sudo docker stop tecmint-web
```

and remove it:

```
$ sudo docker rm tecmint-web
```

To finish cleaning up, you may want to delete the image that was used in the container (omit this step if you're planning on creating other **Apache 2.4** containers soon).

```
$ sudo docker image remove httpd:2.4
```

Note that in all the above steps we never had to install the webserver on our host.

```
$sudo docker run -dit --name tecmint-web -p 8080:80 -v /home/user/website/:/usr/local/apache2/htdocs/ httpd
```