

Experiment No.: 1

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. Specifications of desktop and server class computers.

CO1

Install and configure common operating systems in virtual environment

Procedure

1. Motherboard:

A motherboard is the main circuit board inside a computer that connects all of the computer's hardware components together, such as the central processing unit (CPU), memory, storage drives, and expansion cards. It serves as a communication hub between these components, allowing them to work together and perform various functions.

The motherboard typically includes several important components, including the chipset and the BIOS (Basic Input/Output System). Modern motherboards come in different form factors, such as ATX, microATX, and mini-ITX, which determine their size and layout. Overall, the motherboard is a critical component that plays a central role in the operation of a computer.

2. RAM:

RAM (Random Access Memory) modules are computer components that store data and instructions temporarily while the computer is running. RAM is a type of volatile memory, which means that its contents are erased when the computer is turned off or restarted. RAM modules come in various types, speeds, and capacities. They are typically installed in slots on the motherboard and can be easily upgraded or replaced. RAM modules are also used to support multitasking, where multiple programs can run simultaneously. RAM modules are an essential component of a computer that provides temporary storage for data and instructions. They help to improve the computer's performance and support multitasking.

3. Daughter Card:

A daughter card, also known as a daughterboard or expansion card, is a circuit board that connects to the main motherboard of a computer to add new functionality or enhance existing features. Daughter cards are commonly used to expand the capabilities of a computer, such as adding additional ports, memory, or processing power. Examples of daughter cards include graphics cards, sound cards, network interface cards (NICs), and storage expansion cards.

4. Bus Slot:

A bus slot, also known as an expansion slot, is a socket on the motherboard of a computer that allows expansion cards to be inserted and connected to the computer's bus system. There are several types of bus slots commonly used in computers, including Peripheral Component Interconnect (PCI), PCI Express (PCIe), and Accelerated Graphics Port (AGP) slots. These slots vary in their bandwidth, power, and physical size, and are designed to accommodate different types of expansion cards.

Expansion cards, such as graphics cards, sound cards, and network interface cards, are connect to the computer's bus system through the bus slot, allowing them to communicate with other components and exchange data.

5. SMPS:

SMPS stands for Switched-Mode Power Supply, and it is a type of power supply used in computers and other electronic devices. The SMPS is responsible for converting AC power from a wall outlet into DC power that the computer can use to operate. SMPS uses high-frequency switching and regulation to convert AC power to DC power more efficiently.

SMPS units are widely used in modern computers, as they are more reliable, energy-efficient, and generate less heat than linear power supplies. It plays a vital role in powering the system and ensuring its proper operation.

6. Internal Storage Devices:

Internal storage devices are electronic components used to store data within a computer or other electronic devices. There are two main types of internal storage devices: Hard Disk Drives (HDDs) and Solid-State Drives (SSDs). HDDs are the traditional type of internal storage device and are typically larger in capacity than SSDs. They consist of spinning disks that store data magnetically and read/write heads that move over the disks to access the data. SSDs, on the other hand, use flash memory to store data and have no moving parts, which makes them faster, more durable, and more energy-efficient than HDDs. They are typically more expensive than HDD.

7. Interfacing Ports:

Interfacing ports refers to the process of connecting different devices or components together in order to exchange information or perform certain tasks. Ports are used to facilitate communication between devices, and they can come in different forms, such as USB ports, Ethernet ports, HDMI ports, and so on. Interfacing ports is an important aspect of modern computing, as it allows us to connect a wide range of devices and components together in order to create complex systems and networks. Whether it's connecting a keyboard and mouse to a computer, or setting up a network of servers and workstations in a large enterprise, interfacing ports is a crucial part of the process.

Result

The program was executed and the result was successfully obtained. Thus CO1 was obtained..

Experiment No.: 2

Aim

Study of a terminal based text editor such as Vim or Emacs. Basic Linux commands, familiarity with following commands/operations expected 1. man 2. ls, echo, read 3. more, less, cat, 4. cd, mkdir, pwd, find 5. mv, cp, rm 6. wc, cut, paste 7. head, tail, grep, expr 8 chmod, chown 9. useradd, usermod, userdel, passwd 10. df,top, ps 12 ssh, ssh-keygen

CO2

Install and configure common operating systems in virtual environment

Procedure

man command

man is used to learn and understand the existing commands we can learn and understand about different commands from the shell using man command.

Syntax: \$ man mkdir

Output:

```
MKDIR(1)                               User Commands
NAME
    mkdir - make directories

SYNOPSIS
    mkdir [OPTION]... DIRECTORY...

DESCRIPTION
    Create the DIRECTORY(ies), if they do not already exist.

    Mandatory arguments to long options are mandatory for short options too.

    -m, --mode=MODE
        set file mode (as in chmod), not a=rwx - umask

    -p, --parents
        no error if existing, make parent directories as needed

    -v, --verbose
        print a message for each created directory

    -Z      set SELinux security context of each created directory to the default type

    --context[=CTX]
        like -Z, or if CTX is specified then set the SELinux or SMACK security context to CTX

    --help display this help and exit
```

ls command

ls is used to list the files and content in the directory.

Syntax: \$ls

Output:

```
student@t2:~$ ls
Desktop Documents Downloads Music Pictures Public PycharmProjects snap Templates Videos vishalnew
```

Options of ls command.

- a) **ls -R** – used to list the directory as well as the subdirectory.

Syntax: \$ ls -R

Output:

```
student@t2:~$ ls -R
.:
Desktop Documents Downloads Music Pictures Public PycharmProjects snap Templates Videos vishalnew
./Desktop:
newvls vishal
./Desktop/newvls:
new newvls planets vls1 vls2 visnew.txt
./Desktop/vishal:
new newvls planets vls1 vls2 visnew.txt
./Desktop/vishal/newvls:
./Documents:
./Downloads:
```

- b) **ls -l** – used to view the long list of directories.

Syntax: \$ ls -l

Output:

```
student@t2:~$ ls -l
total 44
drwxr-xr-x 4 student student 4096 Mar  7 15:20 Desktop
drwxr-xr-x 2 student student 4096 Jun 17 2022 Documents
drwxr-xr-x 2 student student 4096 Aug 29 2022 Downloads
drwxr-xr-x 2 student student 4096 Jun 17 2022 Music
drwxr-xr-x 2 student student 4096 Mar  7 15:36 Pictures
drwxr-xr-x 2 student student 4096 Jun 17 2022 Public
drwxrwxr-x 3 student student 4096 Jun 17 2022 PycharmProjects
drwx----- 4 student student 4096 Mar  6 11:25 snap
drwxr-xr-x 2 student student 4096 Jun 17 2022 Templates
drwxr-xr-x 2 student student 4096 Jun 17 2022 Videos
drwxrwxr-x 2 student student 4096 Mar  6 13:03 vishalnew
```

- c) **ls -a** – used to view the list in directory along with hidden files.

Syntax: \$ ls -a

Output:

```
student@t2:~$ ls -a
. .bash_history .bashrc .config Documents .gnupg .local Music .pkt Public
.. .bash_logout .cache Desktop Downloads .java .mozilla Pictures .profile PycharmProjects
```

- d) **ls -al** – used to view the list in directory with detailed information along with hidden files.

Syntax: \$ ls -al

Output:

```
student@t2:~$ ls -al
total 104
drwxr-xr-x 22 student student 4096 Mar  6 12:00 .
drwxr-xr-x  6 root   root   4096 Jun 17 2022 ..
-rw-----  1 student student  843 Mar  6 13:03 .bash_history
-rw-r--r--  1 student student 220 Jun 17 2022 .bash_logout
-rw-r--r--  1 student student 3771 Jun 17 2022 .bashrc
drwxrwxr-x 24 student student 4096 Mar  7 15:35 .cache
drwxr-xr-x 20 student student 4096 Mar  7 15:34 .config
drwxr-xr-x  4 student student 4096 Mar  7 15:20 Desktop
drwxr-xr-x  2 student student 4096 Jun 17 2022 Documents
drwxr-xr-x  2 student student 4096 Aug 29 2022 Downloads
drwx-----  3 student student 4096 Mar  7 15:34 .gnupg
drwxrwxr-x  4 student student 4096 Jun 17 2022 .java
drwxr-xr-x  3 student student 4096 Jun 17 2022 .local
drwx-----  5 student student 4096 Aug 29 2022 .mozilla
drwxr-xr-x  2 student student 4096 Jun 17 2022 Music
```

- e) **ls -t** – used to view the list in sorted order of last modified.

Syntax: \$ ls -t

Output:

```
student@t2:~$ ls -t
Pictures Desktop vishalnew snap Downloads PycharmProjects Documents Music Public Templates Videos
```

- f) **ls -r** – used to view the list in reverse order of last modified.

Syntax: \$ ls -r

Output:

```
student@t2:~$ ls -r
vishalnew Videos Templates snap PycharmProjects Public Pictures Music Downloads Documents Desktop
student@t2:~$
```

echo command

echo is used to display lines of text or strings that are passed as arguments

Syntax: \$ echo \$REPLY

Output:

```
student@t2:~/vishal003$ read
vishal c viswam
student@t2:~/vishal003$ echo $REPLY
vishal c viswam
student@t2:~/vishal003$
```

read command

read is to read the contents of a line into a variable.

Options of read command

- a) **read** – read contents of a line into variable.

Syntax: \$ read

vishal c viswam

\$ echo \$REPLY

Output:

```
student@t2:~/vishal003$ read
vishal c viswam
student@t2:~/vishal003$ echo $REPLY
vishal c viswam
student@t2:~/vishal003$
```

- b) **read <variable_name>** – read contents of a line to a particular variable.

Syntax: \$ read var1 var2 var3

my name is vishal

\$ echo “[var1] [var2] [var3]”

Output:

```
student@t2:~/vishal003$ read var1 var2 var3
my name is vishal
student@t2:~/vishal003$ echo "[var1][var2][var3]"
[var1][var2][var3]
student@t2:~/vishal003$ echo "[${var1}][${var2}][${var3}]"
[my][name][is vishal]
student@t2:~/vishal003$
```

- c) **read** – read from multiple lines

Syntax:

```
$ read
earth \
is \
a \
blue\
planet
$ echo $REPLY
```

Output:

```
student@t2:~/vishal003$ read
earth \
> is \
> a \
> blue \
> planet
student@t2:~/vishal003$ echo $REPLY
earth is a blue planet
student@t2:~/vishal003$
```

- d) **read -p** – read with prompt message

Syntax: \$ read -p “Enter your age”

Output:

```
student@t2:~/vishal003$ read -p "enter your age"
enter your age23
student@t2:~/vishal003$ echo "my age is : $REPLY"
my age is : 23
student@t2:~/vishal003$
```

- e) **read -n** – read with limit of characters can be read

Syntax: \$ read -n 5 -p “Enter 5 characters only:”

Output:

```
student@t2:~/vishal003$ read -n 5 -p " enter 5 characters only :"
enter 5 characters only :vishastudent@t2:~/vishal003$
```

- f) **read -s** – read lines securely without displaying the data entered

Syntax: \$ read -s -p “Enter the password”

Output:

```
student@t2:~/vishal003$ read -s -p "enter the password :"
enter the password :studecho "password is $REPLY"
password is zxcv123
student@t2:~/vishal003$
```

more command

more is similar to **get** to display the contents, the only difference is that in case of longer text or content **get** command output will scroll off your screen while **more** command displays the output only screen full at a time.

Options of more command

- a) **more <filename>** – display contents of a file

Syntax: \$ more earth

Output:

```
student@t2:~/vishalcopy$ more earth
Earth is our home planet. Scientists believe Earth and its moon formed around the same time as the rest of the solar system. They think that was about 4.5 billion years ago. Earth is the fifth-largest planet in the solar system. Its diameter is about 8,000 miles. And Earth is the third-closest planet to the sun. Its average distance from the sun is about 93 million miles. Only Mercury and Venus are closer.

Earth has been called the "Goldilocks planet." In the story of "Goldilocks and the Three Bears," a little girl named Goldilocks liked everything just right. Her porridge couldn't be too hot or too cold. And her bed couldn't be too hard or too soft. On Earth, everything is just right for life to exist. It's warm, but not too warm. And it has water, but not too much water.

Earth is the only planet known to have large amounts of liquid water. Liquid water is essential for life. Earth is the only planet where life is known to exist.

From space, Earth looks like a blue marble with white swirls and areas of brown, yellow, green and white. The blue is water, which covers about 71 percent of Earth's surface. The white swirls are clouds. The areas of brown, yellow and green are land. And the areas of white are ice and snow.

The equator is an imaginary circle that divides Earth into two halves. The northern half is called the Northern Hemisphere. The southern half is called the Southern Hemisphere.
--More--(55%)
```

- b) **more +20 <filename>** – display contents of a file

Syntax: \$ more +10 earth

Output:

```
student@t2:~/vishalcopy$ more +10 earth
Today, scientists use geodesy, which is the science of measuring Earth's shape, gravity and rotation. Geodesy provides accurate measurements that show Earth is round. With GPS and other satellites, scientists can measure Earth's size and shape to within a centimeter. Pictures from space also show Earth is round like the moon.

Even though our planet is a sphere, it is not a perfect sphere. Because of the force caused when Earth rotates, the North and South Poles are slightly flat. Earth's rotation, wobbly motion and other forces are making the planet change shape very slowly, but it is still round.
student@t2:~/vishalcopy$
```

- c) **more +/pattern<filename>** – to search in train inside your document, you can view all the instances by navigating through the result

Syntax: \$ more +/GPS earth

Output:

```
student@t2:~/vishalcopy$ more +/GPS earth
...skipping
Humans have known that Earth is round for more than 2,000 years! The ancient Greeks measured shadows during summer solstice and also calculate d Earth's circumference. They used positions of stars and constellations to estimate distances on Earth. They could even see the planet's roun d shadow on the moon during a lunar eclipse. (We still can see this during lunar eclipses.)

Today, scientists use geodesy, which is the science of measuring Earth's shape, gravity and rotation. Geodesy provides accurate measurements t hat show Earth is round. With GPS and other satellites, scientists can measure Earth's size and shape to within a centimeter. Pictures from sp ace also show Earth is round like the moon.

Even though our planet is a sphere, it is not a perfect sphere. Because of the force caused when Earth rotates, the North and South Poles are slightly flat. Earth's rotation, wobbly motion and other forces are making the planet change shape very slowly, but it is still round.
student@t2:~/vishalcopy$
```

- d) **more -p <filename>** – to display the contents of a file after clearing the screen

Syntax: \$ more -p earth

Output:

```
vishalviswam@LAPTOP-A6DV9JQ0:~/vishalcopy$ 
vishalviswam@LAPTOP-A6DV9JQ0:~/vishalcopy$ pwd
/home/vishalviswam/vishalcopy
vishalviswam@LAPTOP-A6DV9JQ0:~/vishalcopy$ ls
earth
vishalviswam@LAPTOP-A6DV9JQ0:~/vishalcopy$ more -p earth
Earth has never been perfectly round. The planet bulges around the equator by
an extra 0.3 percent as
a result of the fact that it rotates about its axis. Earth's diameter from No
rth to South Pole is 12,714 kilometers (7,900 miles), while through the equat
or it is 12,756 kilometers (7,926 miles). The difference – 42.78 kilometers (
26.58 miles) – is about 1/300th the diameter of Earth. This variation is too
tiny to be seen in pictures of Earth from space, so the planet appears round
to the human eye. Recent research from NASA's Jet Propulsion Laboratory sugge
sts that melting glaciers are causing Earth's waistline to spread. The length
```

- e) **more -d <filename>** – display instructions such as, space to continue and q to quit.

Syntax: \$ more -d earth

Output:

```
student@t2:~/vishalcopy$ more -d earth
Earth is our home planet. Scientists believe Earth and its moon formed around
the same time as the rest of the solar system. They think that was about 4.5
billion years ago. Earth is the fifth-largest planet in the solar system. It
s diameter is about 8,000 miles. And Earth is the third-closest planet to the
sun. Its average distance from the sun is about 93 million miles. Only Mercur
y and Venus are closer.

Earth has been called the "Goldilocks planet." In the story of "Goldilocks an
d the Three Bears," a little girl named Goldilocks liked everything just righ
t. Her porridge couldn't be too hot or too cold. And her bed couldn't be too
hard or too soft. On Earth, everything is just right for life to exist. It's
warm, but not too warm. And it has water, but not too much water.

Earth is the only planet known to have large amounts of liquid water. Liquid
water is essential for life. Earth is the only planet where life is known to
exist.

From space, Earth looks like a blue marble with white swirls and areas of bro
wn, yellow, green and white. The blue is water, which covers about 71 percent
of Earth's surface. The white swirls are clouds. The areas of brown, yellow
and green are land. And the areas of white are ice and snow.

--More--(49%)[Press space to continue, 'q' to quit.]
```

less command

Less command is a Linux utility that can be used to read the contents of a text file one page (one screen) at a time. It has faster access because if a file is large, it doesn't access the complete file, but accesses it page by page.

Syntax: \$ less sample.txt

cat command

cat is used to create a new blank file and also to add contents to the file.

Options of cat commands:

- a) **cat >** – used to create a new blank file and also to add contents to the file.

Syntax: \$ cat ><filename>

Output:

```
student@t2:~/vishaldir$ cat >filenew1
hello ! my name is vishal
nice to meet you
^C
student@t2:~/vishaldir$ cat filenew1
hello ! my name is vishal
nice to meet you
student@t2:~/vishaldir$ █
```

- b) **cat >>** – used to append new contents to existing file.

Syntax: \$ cat >><filename>

Output:

```
student@t2:~/vishaldir$ cat >>filenew1
the age is 22
all the way from india
^C
student@t2:~/vishaldir$ cat filenew1
hello ! my name is vishal
nice to meet you
the age is 22
all the way from india
student@t2:~/vishaldir$ █
```

- c) **cat file1 file2 > file3** – copy contents of two files to a third file.

Syntax: \$ cat <filename><filename>><filename>

Output:

```
student@t2:~/vishaldir$ cat >filenew2
I am a MCA student at AJCE
^C
student@t2:~/vishaldir$ cat filenew1 filenew2 >filenew3
student@t2:~/vishaldir$ cat filenew3
hello ! my name is vishal
nice to meet you
the age is 22
all the way from india
I am a MCA student at AJCE
student@t2:~/vishaldir$ █
```

- d) **cat -n** – to display the contents with line numbers.

Syntax: \$ cat -n <filename>

Output:

```
student@t2:~/vishaldir$ cat -n filenew3
 1 hello ! my name is vishal
 2 nice to meet you
 3 the age is 22
 4 all the way from india
 5 I am a MCA student at AJCE
student@t2:~/vishaldir$ █
```

- e) **cat -b** – to remove numbering for empty lines.

Syntax: \$ cat -b <filename>

Output:

```
student@t2:~/vishaldir$ cat -b filenew3
 1 hello ! my name is vishal
 2 nice to meet you
 3 the age is 22
 4 all the way from india
 5 I am a MCA student at AJCE
 6 hi

 7 bye
student@t2:~/vishaldir$ █
```

- f) **cat <filename> | tr a-z A-Z ><filename>** – converts the contents of a file to Uppercase and saves into another file.

Syntax: \$ cat <filename> | tr a-z A-Z ><filename>

Output:

```
student@t2:~/vishaldir$ cat filenew3|tr a-z A-Z > filenew4
student@t2:~/vishaldir$ cat filenew4
HELLO ! MY NAME IS VISHAL
NICE TO MEET YOU
THE AGE IS 22
ALL THE WAY FROM INDIA
I AM A MCA STUDENT AT AJCE
HI

BYE
student@t2:~/vishaldir$ █
```

cd command

cd is used to navigate through directory.

Options of cd commands:

- a) **cd** – used to switch to home directory.

Syntax: \$ cd

Output:

```
vishalviswam@LAPTOP-A6DV9JQ0:~/vishalcopy$ cd
vishalviswam@LAPTOP-A6DV9JQ0:~$
```

- b) **cd <path>** - used to change to a particular path or directory

Syntax: \$ cd <directory_path>

Output:

```
vishalviswam@LAPTOP-A6DV9JQ0:~$ cd vishalcopy
vishalviswam@LAPTOP-A6DV9JQ0:~/vishalcopy$
```

- c) **cd ..** – used to switch back to previous directory or one directory back from the current directory

Syntax: \$ cd ..

Output:

```
vishalviswam@LAPTOP-A6DV9JQ0:~/vishalcopy$ cd ..
vishalviswam@LAPTOP-A6DV9JQ0:~$
```

mkdir command

mkdir is used to make new directory.

Syntax: \$ mkdir <directory_name>

Output:

```
student@t2:~$ mkdir vishalvv
student@t2:~$ cd vishalvv
student@t2:~/vishalvv$ ls
student@t2:~/vishalvv$ cd ..
student@t2:~$ ls
Desktop Documents Downloads Music Pictures Public PycharmProjects snap
student@t2:~$
```

pwd command

pwd is used to print the working directory. After execution it shows the absolute path.

Syntax: \$ pwd

Output:

```
student@t2:~/Desktop$ pwd
/home/student/Desktop
```

find command

The find command helps us to find a particular file within a directory. It is used to find the list of files for the various conditions like permission, user ownership, modification, date/time, size, and more.

Syntax: \$ find . -name "*.txt"

wc command**wc – word count****Options of wc commands**

- a) **wc<filename>** – to display number of lines, words, bytes and filename from a file

Syntax: \$ wc file01

Output:

```
student@t2:~/vishal003$ wc file01
 3 12 57 file01
student@t2:~/vishal003$ █
```

- b) **wc -l <filename>** – to display number of lines and filename from a file

Syntax: \$ wc -l file01

Output:

```
student@t2:~/vishal003$ wc -l file01
3 file01
student@t2:~/vishal003$ █
```

- c) **wc -m <filename>** – to display number of bytes and filename from a file

Syntax: \$ wc -m file01

Output:

```
student@t2:~/vishal003$ wc -m file01
57 file01
student@t2:~/vishal003$ █
```

- d) **wc -c <filename>** – to display number of characters and filename from a file

Syntax: \$ wc -c file01

Output:

```
student@t2:~/vishal003$ wc -c file01
57 file01
student@t2:~/vishal003$ █
```

- e) **wc -w <filename>** – to display number of words and filename from a file

Syntax: \$ wc -w file01

Output:

```
student@t2:~/vishal003$ wc -w file01
12 file01
student@t2:~/vishal003$ █
```

- f) **wc-L <filename>** – to display length of largest line.

Syntax: \$ wc-L file01

Output:

```
student@t2:~/vishal003$ wc -L file01
20 file01
student@t2:~/vishal003$ █
```

cut command

cut – to cut the contents of the file.

Options of cut command:

- a) **cut -b1** – to cut the contents of a file by byte position.

Syntax: \$ cut -b1 <filename>

Output:

```
student@t2:~$ cut -b1 colors
r
g
b
v
p
student@t2:~$ █
```

- b) **cut -d ‘-’ -f1** – use delimiter to cut the contents at ‘-’ in the first column which is given by -f1.

Syntax: \$ cut -d ‘-’ -f1 <filename>

Output:

```
student@t2:~$ cat > planets1
sun - red
earth - blue
jupiter - white
^C
student@t2:~$ cut -d - -f1 planets1
sun
earth
jupiter
student@t2:~$ █
```

- c) **cut -c** – to cut the characters from a specified position in a file.

Syntax: \$ cut -c [1,3] <filename>

Output:

```
student@t2:~$ cut -c 1,3 planets1
sn
er
jp
student@t2:~$ █
```

paste command

paste – to paste the content of a file to another.

Options of paste command

- a) **paste <filename><filename>** – to paste the contents in file1 to file2.
 Syntax: \$ paste <filename><filename>

Output:

```
student@t2:~$ cat > planets2
venus
saturn
neptune
^C
student@t2:~$ paste planets1 planets2
sun - red      venus
earth - blue   saturn
jupiter - white neptune
student@t2:~$
```

- b) **paste <filename><filename>><filename>** – to paste the contents of two files to a third file.

Syntax: \$ paste <filename><filename>><filename>
 Output:

```
student@t2:~$ paste planets1 planets2 >planets3
student@t2:~$ cat planets3
sun - red      venus
earth - blue   saturn
jupiter - white neptune
student@t2:~$
```

- c) **paste -d ‘%’ <filename><filename>** – to paste % and join the contents of a file with another file.

Syntax: \$ paste -d '%' <filename><filename>
 Output:

```
student@t2:~$ paste -d '%' planets3 planets2
sun - red      venus%venus
earth - blue   saturn%saturn
jupiter - white neptune%neptune
student@t2:~$
```

- d) **paste -s** – to show all contents of a file in a single line.

Syntax: \$ paste -s <filename>
 Output:

```
student@t2:~$ paste -s planets2
venus    saturn   neptune
student@t2:~$
```

head command

head – display top contents of the file, by default it displays top 10 lines.

Options of head command.

- a) head <filename> – display top 10 lines of a file

Syntax:

```
$ head file02
```

Output:

```
student@t2:~/vishal$ head file02
line 01
line 02
line 03
line 04
line 05
line 06
line 07
line 08
line 09
line 10
student@t2:~/vishal$
```

- b) head -<limit><filename> – display top number of lines mentioned in the limit of a file

Syntax:

```
$ head -5 file02
```

Output:

```
student@t2:~/vishal$ head -5 file02
line 01
line 02
line 03
line 04
line 05
student@t2:~/vishal$
```

tail command

tail – display bottom contents of the file, by default it displays bottom 10 lines.

Options of tail command.

- a) tail<filename> – display bottom 10 lines of a file

Syntax:

```
$ tail file02
```

Output:

```
student@t2:~/vishal$ tail file02
line 06
line 07
line 08
line 09
line 10
line 11
line 12
line 13
line 14
line 15
student@t2:~/vishal$
```

grep command

grep – used to filter the contents of a file, which makes search easy.

Options of grep command

- a) grep <content><filename> – search and display a particular content from a file

Syntax:

```
$ grep -i 76 file01
```

Output:

```
student@t2:~/vishal$ grep -i 76 file01
malayalam 76
student@t2:~/vishal$
```

- b) grep -i <pattern><filename> – used to search and display a matching pattern, case insensitive

Syntax:

```
$ grep -i english file01
```

Output:

```
student@t2:~/vishal$ grep -i english file01
english 78
```

- c) grep -v <content><filename> – inverted search and display

Syntax:

```
$ grep -v 57 file01
```

Output:

```
student@t2:~/vishal$ grep -v 57 file01
chemistry 98
english 78
malayalam 76
student@t2:~/vishal$
```

- d) grep -A1 <content><filename> – display searched content and the next line from a file.

Syntax:

```
$ grep -A1 english file01
```

Output:

```
student@t2:~/vishal$ grep -A1 english file01
english 78
malayalam 76
```

- e) grep -B1 <content><filename> – display searched content and the previous line from a file.

Syntax:

```
$ grep -B1 math file01
```

Output:

```
student@t2:~/vishal$ grep -B1 math file01
chemistry 98
math 57
student@t2:~/vishal$
```

- f) grep -C1 <content><filename> – display searched content and the previous and next line from a file.

Syntax:

```
$ grep -C1 english file01
```

Output:

```
student@t2:~/vishal$ grep -C1 english file01
math 57
english 78
malayalam 76
student@t2:~/vishal$
```

expr command

expr – evaluates and displays output.

Options of expr:

- a) expr – addition

Syntax: \$ expr <value> + <value>

- b) expr – subtraction

Syntax: \$ expr <value>-<value>

- c) expr – multiplication

Syntax: \$ expr <value>*<value>

```
student@t2:~/vishal07$ expr 12 + 3
15
student@t2:~/vishal07$ expr 3 - 5
-2
student@t2:~/vishal07$ expr 3 * 10
30
```

- d) expr – read from console

Syntax: \$ read file01
 \$ read file02
 \$ expr \$file01 + \$file02

Output:

```
student@t2:~/vishal07$ read file01
50
student@t2:~/vishal07$ read file02
60
student@t2:~/vishal07$ expr file01 + file02
expr: non-integer argument
student@t2:~/vishal07$ expr $file01 + $file02
110
student@t2:~/vishal07$ █
```

chmod command

chmod – change permissions

Options of chmod:

- a) chmod + – add/allow permissions

Syntax: \$ chmod + rwx<filename>

Output:

```
mca@t2:~$ chmod +rwx add.txt
mca@t2:~$ cat >> add.txt
hey vishal
^C
mca@t2:~$ cat add.txt
Name:Akhila Anand
Roll No:3
Roll No:3
Admission No:13243
Amal Jyothi College Of Engineering
hey vishal
mca@t2:~$ █
```

- b) chmod – remove/revoke permission

Syntax: \$ chmod - wx<filename>

Output:

```
mca@t2:~$ chmod -wx add.txt
mca@t2:~$ cat >> add.txt
bash: add.txt: Permission denied
```

chown command

chown – change owner of the file/folder

Syntax: \$ chown <username><filename>

Output:

```
mca@t2:~$ sudo chown vishal10 add.txt
[sudo] password for mca:
mca@t2:~$ chmod +rwx add.txt
chmod: changing permissions of 'add.txt': Operation not permitted
mca@t2:~$ ls -l add.txt
-rwxrwxr-x 1 vishal10 mca 103 Mar 20 11:57 add.txt
mca@t2:~$ █
```

useradd command

useradd – create a new user

Syntax: \$ sudo useradd <username>

Output:

```
mca@t2:~$ sudo useradd username
mca@t2:~$ █
```

passwd command

passwd – create/update a password for a user

Syntax: \$ sudo passwd <username>

Output:

```
mca@t2:~$ sudo passwd username
New password:
Retype new password:
passwd: password updated successfully
mca@t2:~$ █
```

usermod command

usermod – add a user to the group

Syntax: \$ sudo usermod -G <groupname><username>

Output:

```
mca@t2:~$ sudo usermod -G groupname username
mca@t2:~$ █
```

userdel command

userdel – delete a user

Syntax: \$ sudo userdel<username>

Output:

```
mca@t2:~$ sudo userdel username
[sudo] password for mca:
mca@t2:~$ sudo userdel username
userdel: user 'username' does not exist
mca@t2:~$
```

df command

df – display disk utilization of entire disk

Syntax: \$ df

Output:

```
student@t2:~/vishal07$ df
Filesystem      1K-blocks    Used Available Use% Mounted on
udev             3950480      0   3950480  0% /dev
tmpfs            797752   1812   795940  1% /run
/dev/sda6        143074460 24904488 110829380 19% /
tmpfs            3988752      0   3988752  0% /dev/shm
tmpfs             5120       4    5116  1% /run/lock
tmpfs            3988752      0   3988752  0% /sys/fs/cgroup
/dev/loop1         128      128      0 100% /snap/bare/5
/dev/loop2        246656   246656      0 100% /snap/gnome-3-3
/dev/loop6        354688   354688      0 100% /snap/gnome-3-3
/dev/loop7        64896    64896      0 100% /snap/gnome-3-3
```

ps command

ps – stands for process, displays currently running programs or instances.

Options of ps command:

- a) ps – displays currently running programs or instances

Syntax: \$ ps

Output:

```
mca@t2:~/Desktop$ ps
      PID TTY          TIME CMD
  11920 pts/0    00:00:00 bash
  12136 pts/0    00:00:00 ps
mca@t2:~/Desktop$
```

- b) ps – C – display is running processes of a specific program.

Syntax: \$ ps – C firefox

Output:

```
mca@t2:~$ ps -C firefox
      PID TTY          TIME CMD
  14401 ?        00:00:04 firefox
mca@t2:~$
```

- c) ps – f –p <process_id> – list of process by process ID.

Syntax: \$ ps – f – p 2276

Output:

```
mca@t2:~$ ps -f -p 14401
  UID        PID  PPID  C STIME TTY          TIME CMD
mca        14401   1441  9 15:58 ?
                      00:00:05 /usr/lib/firefox/
mca@t2:~$
```

- d) ps – u – displays all the running processes of a specific user.

Syntax: \$ ps – u <username>

Output:

```
mca@t2:~$ ps -u mca
      PID TTY          TIME CMD
    1441 ?        00:00:00 systemd
    1446 ?        00:00:00 (sd-pam)
    1453 ?        00:03:45 pulseaudio
    1455 ?        00:00:00 tracker-miner-f
    1458 ?        00:00:01 dbus-daemon
    1462 ?        00:00:00 gnome-keyring-d
    1466 ?        00:00:00 gvfsd
    1471 ?        00:00:00 gvfsd-fuse
```

top command

top command is used to show the Linux processes. It provides a dynamic real-time view of the running system. Usually, this command shows the summary information of the system and the list of processes or threads which are currently managed by the Linux Kernel.

Syntax: \$ top

ssh command

ssh stands for secure shell protocol, used to securely connect to a remote server or system. ssh is secure in the sense that transfers data in encrypted form between the host to the client.

- a) ssh<username> @ <ip_address>

Syntax: \$ ssh user @ 192.168.6.16

Output:

```
mca@t2:~$ ssh user@192.168.6.16
ssh: connect to host 192.168.6.16 port 22: Connection refused
mca@t2:~$
```

- b) \$ sudo apt-get install openssh -server – updating port 22, if already taken.

Syntax: \$ sudo apt-get install openssh-server

Output:

```
mca@t2:~$ sudo apt-get install openssh-server
Reading package lists... Done
Building dependency tree
Reading state information... Done
The following additional packages will be installed:
  ncurses-term openssh-client openssh-sftp-server ssh-import-id
Suggested packages:
  keychain libpam-ssh monkeysphere ssh-askpass molly-guard
The following NEW packages will be installed:
  ncurses-term openssh-server openssh-sftp-server ssh-import-id
The following packages will be upgraded:
  openssh-client
  . upgraded, 4 newly installed, 0 to remove and 682 not upgraded.
Need to get 1,359 kB of archives.
After this operation, 6,010 kB of additional disk space will be used.
```

- c) \$ sudo ufw allow 22 – allowing port 22 for ssh

Syntax: \$ sudo ufw allow 22

Output:

```
mca@t2:~$ sudo ufw allow 22
Rules updated
Rules updated (v6)
mca@t2:~$
```

d) \$ ssh mca @ 192.168.6.15 – connecting to remote server

Syntax: \$ ssh mca @ 192.168.6.15

Output:

```
mca@t2:~/Desktop$ ssh mca@192.168.6.29
mca@192.168.6.29's password:
Welcome to Ubuntu 20.04 LTS (GNU/Linux 5.4.0-26-generic x86_64)

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

698 updates can be installed immediately.
459 of these updates are security updates.
To see these additional updates run: apt list --upgradable

Your Hardware Enablement Stack (HWE) is supported until April 2025.
Last login: Tue Mar 21 15:30:25 2023 from 192.168.6.30
mca@t2:~$ cd Desktop/
```

ssh-keygen command

ssh – keygen – generate a key for secure shell.

Syntax: \$ ssh – keygen

Output:

```
mca@t2:~/Desktop$ ssh-keygen
Generating public/private rsa key pair.
Enter file in which to save the key (/home/mca/.ssh/id_rsa): keygen.txt
Enter passphrase (empty for no passphrase):
Enter same passphrase again:
Your identification has been saved in keygen.txt
Your public key has been saved in keygen.txt.pub
The key fingerprint is:
SHA256:fxNeV9pzNfTdbSvN+b9KQl8T4sj7D3sHlefeYesGCFw mca@t2
The key's randomart image is:
+---[RSA 3072]----+
|          . |
|          E . =|
| . . . oX|
| +. o +=X|
| S o++oo@*|
| .oo=++B|
| o ++o=|
| + o+=|
| +*++|
+----[SHA256]----+
mca@t2:~/Desktop$
```

Result

The program was executed and the result was successfully obtained. Thus, CO2 was obtained.

Experiment No.: 3

Aim

File system hierarchy in a common Linux distribution, file and device permissions, study of system configuration files in /etc, familiarizing log files for system events, user activity, network events.

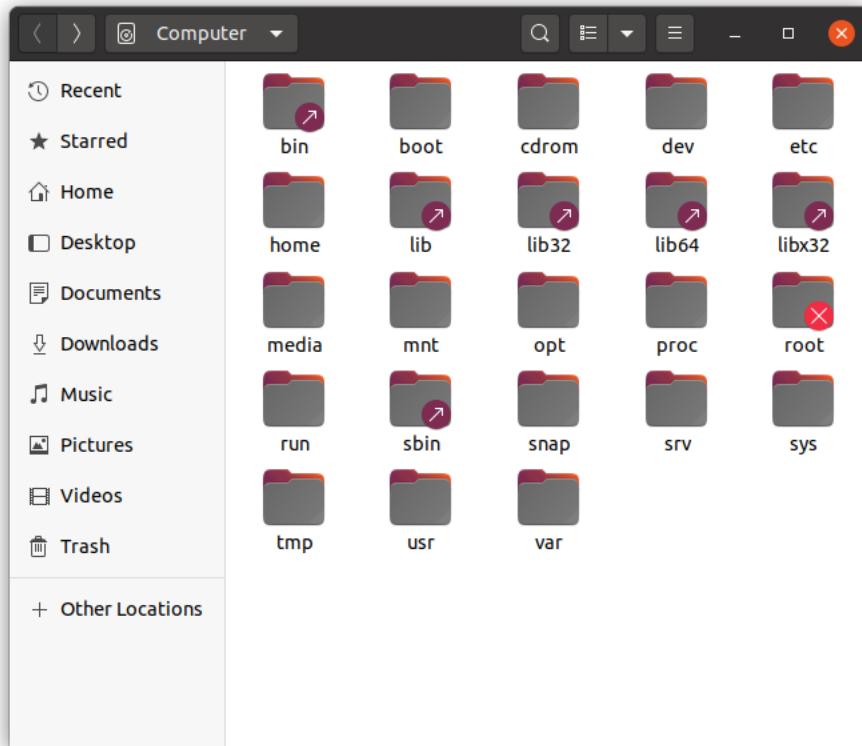
CO2

Perform system administration tasks including network configurations, user creations and troubleshooting.

Procedure

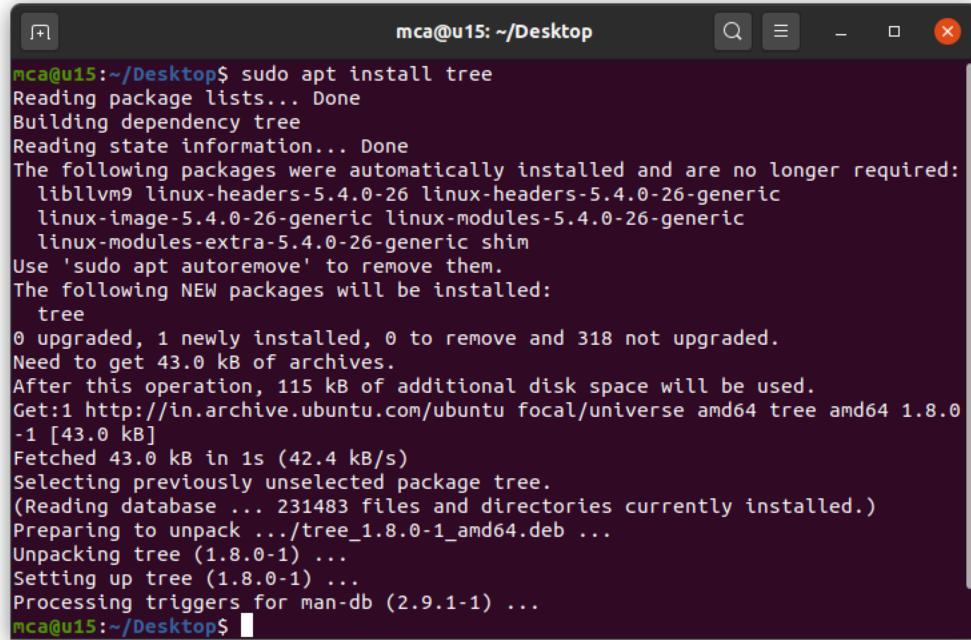
- 1) /root - Contains the home directory for the root user, which is the superuser account with unrestricted access to all files and directories on the system.
- 2) /bin - Contains essential command-line tools that are available to all users.
- 3) /boot - Contains boot-related files, including the Linux kernel and initial RAM disk images. The /boot directory contains boot-related files used to start the system. These files include the Linux kernel, the core of the operating system, and initial RAM disk images that are used to load the kernel into memory and start the system.
- 4) /dev - Contains device files, which represent various devices on the system, such as hard drives, printers, and terminal devices.
- 5) /etc - Contains configuration files for the system and installed programs. The /etc directory is an essential component of the Ubuntu system, as it contains the configuration files used to control the various aspects of the system.
- 6) /home - Contains the home directories of all users on the system. Each user has a subdirectory under /home, where they can store their files.
- 7) /lib - Contains shared libraries and kernel modules that are required by programs in the /bin and /sbin directories.
- 8) /media - Contains mount points for removable media, such as CD-ROMs and USB drives.
- 9) /mnt - Contains mount points for temporary file systems, such as those used for system maintenance or recovery.
- 10) /opt - Contains optional software packages not part of the default Ubuntu installation.

- 11) /sys - Contains information about system hardware and devices.
- 12) /tmp - Contains temporary files created by programs and typically deleted when the system is restarted.
- 13) /usr - Contains user-related files and directories, including applications, libraries, documentation, and localization files.
- 14) /var - Contains variable data generated by programs, such as log files, database files, and email messages.



Install tree

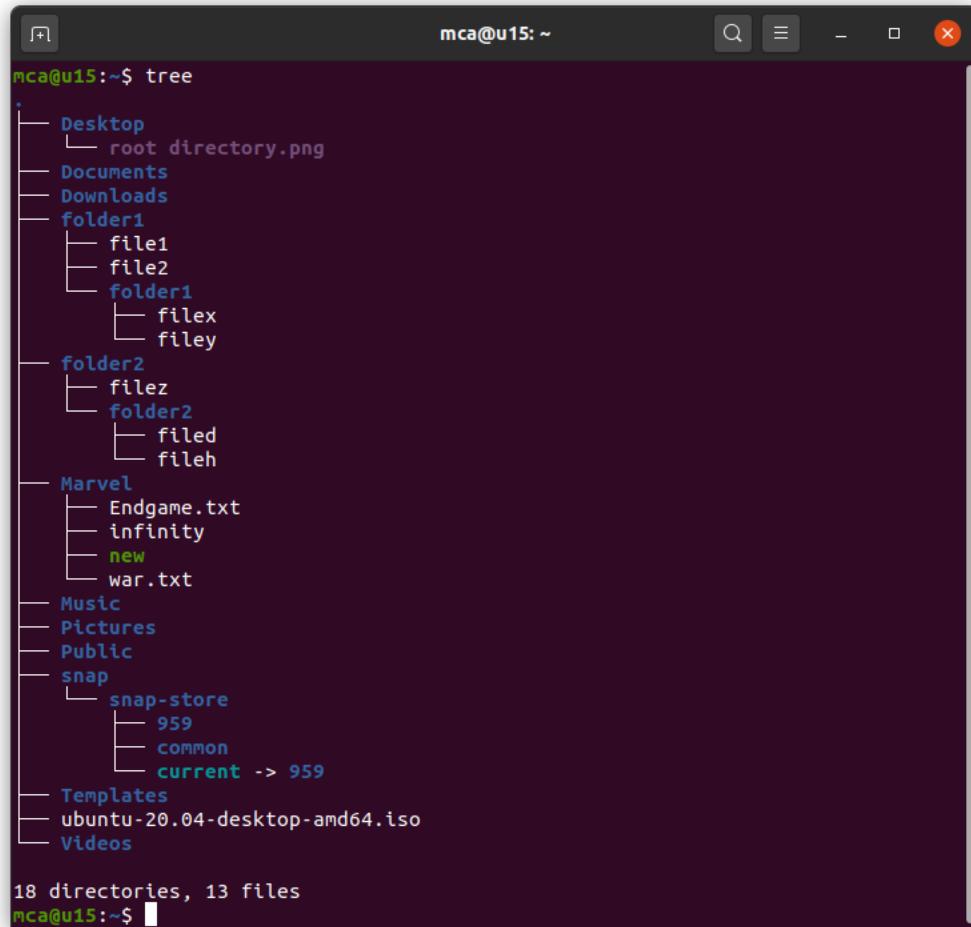
```
$ sudo apt install tree
```



```
mca@u15:~/Desktop$ sudo apt install tree
Reading package lists... Done
Building dependency tree
Reading state information... Done
The following packages were automatically installed and are no longer required:
  liblvm9 linux-headers-5.4.0-26 linux-headers-5.4.0-26-generic
  linux-image-5.4.0-26-generic linux-modules-5.4.0-26-generic
  linux-modules-extra-5.4.0-26-generic shim
Use 'sudo apt autoremove' to remove them.
The following NEW packages will be installed:
  tree
0 upgraded, 1 newly installed, 0 to remove and 318 not upgraded.
Need to get 43.0 kB of archives.
After this operation, 115 kB of additional disk space will be used.
Get:1 http://in.archive.ubuntu.com/ubuntu focal/universe amd64 tree amd64 1.8.0-1 [43.0 kB]
Fetched 43.0 kB in 1s (42.4 kB/s)
Selecting previously unselected package tree.
(Reading database ... 231483 files and directories currently installed.)
Preparing to unpack .../tree_1.8.0-1_amd64.deb ...
Unpacking tree (1.8.0-1) ...
Setting up tree (1.8.0-1) ...
Processing triggers for man-db (2.9.1-1) ...
mca@u15:~/Desktop$
```

Run tree

```
$ tree
```



```
mca@u15:~$ tree
.
├── Desktop
│   └── root directory.png
├── Documents
├── Downloads
├── folder1
│   ├── file1
│   ├── file2
│   └── folder1
│       ├── filex
│       └── filey
└── folder2
    ├── filez
    └── folder2
        ├── filed
        └── fileh
.
└── Marvel
    ├── Endgame.txt
    ├── infinity
    ├── new
    └── war.txt
.
└── Music
.
└── Pictures
.
└── Public
.
└── snap
    └── snap-store
        ├── 959
        │   └── common
        │       └── current -> 959
    .
    └── Templates
.
└── ubuntu-20.04-desktop-amd64.iso
.
└── Videos
.
18 directories, 13 files
mca@u15:~$
```

Display files in hierarchy in root directory

```
$ tree /
```

```
mca@u15:~$ tree /
.
├── cups [error opening dir]
├── libreoffice
│   └── uno_packages
│       └── cache
├── mail -> ../mail
└── rsyslog [error opening dir]

/tmp
├── systemd-private-ed6b8982fa804fc5ba865d82ab9af688-colord.service-c5c
├── jMi [error opening dir]
│   ├── systemd-private-ed6b8982fa804fc5ba865d82ab9af688-fwupd.service-BeNH
│   └── eh [error opening dir]
│       ├── systemd-private-ed6b8982fa804fc5ba865d82ab9af688-ModemManager.servi
│       └── ce-mqrs2g [error opening dir]
│           ├── systemd-private-ed6b8982fa804fc5ba865d82ab9af688-switcheroo-control
│           │   ├── .service-dj4dwf [error opening dir]
│           │   └── systemd-private-ed6b8982fa804fc5ba865d82ab9af688-systemd-logind.ser
│           └── vice-fSBe8f [error opening dir]
│               ├── systemd-private-ed6b8982fa804fc5ba865d82ab9af688-systemd-resolved.s
│               └── ervice-qqq3e [error opening dir]
│                   ├── systemd-private-ed6b8982fa804fc5ba865d82ab9af688-systemd-timesyncd.
│                   └── service-SKGArg [error opening dir]
│                       └── systemd-private-ed6b8982fa804fc5ba865d82ab9af688-upower.service-atQ
└── lFF [error opening dir]

80403 directories, 750074 files
mca@u15:~$
```

Display files in hierarchy in a particular directory

```
$ tree /<directory_name>
```

```
mca@u15:~/Desktop$ tree /bin
/bin
[
├── aa-enabled
├── aa-exec
├── aconnect
├── acpi_listen
├── add-apt-repository
├── addpart
├── addr2line -> x86_64-linux-gnu-addr2line
├── alsabat
├── alsaloop
├── alsamixer
├── alsatplg
├── alsaucm
├── amidi
├── amixer
├── amuFormat.sh
├── apg
├── apgbfm
└── aplay

80403 directories, 750074 files
mca@u15:~/Desktop$
```

```
mca@u15: ~/Desktop
zipgrep
zipinfo
zipnote
zipsplit
zjsdecode
zless
zmore
znew

1 directory, 1559 files
mca@u15:~/Desktop$
```

Result

The program was executed and the result was successfully obtained. Thus, CO₂ was obtained.

Experiment 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.

CO4

Write shell scripts required for system administration.

Procedure

1. Write a shell script to count lines and words in a file

```
#!/bin/bash
file_path="/home/vishalviswam/file01"
number_of_lines=`wc --lines < $file_path`
number_of_words=`wc --word < $file_path`
echo "number of lines: $number_of_lines"
echo "number of words: $number_of_words"
```

Output

```
vishalviswam@LAPTOP-A6DV9JQ0:~$ ./fifthprogram.sh
number of line :2
number of words :6
vishalviswam@LAPTOP-A6DV9JQ0:~$
```

2. Shell Script to check a number is even or odd

```
#!/bin/bash
read -p "Enter a number a: " a
if (( $(a%2) == 0 ))
then
    echo a is even.
else
    echo a is odd.
fi
```

Output

```
vishalviswam@LAPTOP-A6DV9JQ0:~$ ./oddoreven.sh
enter a number a :5
a is odd
```

3. Shell script to check whether a number is positive or negative

```
#!/bin/bash
read -p "enter a number" a
if (( $a<0))
then
    echo the given is a negative number
elif (( $a>0))
then
    echo the given number is a positive number
else
    echo the given number is zero
fi
```

Output

```
vishalviswam@LAPTOP-A6DV9JQ0:~$ vi postiveornegative.sh
vishalviswam@LAPTOP-A6DV9JQ0:~$ chmod +x postiveornegative.sh
vishalviswam@LAPTOP-A6DV9JQ0:~$ ./postiveornegative.sh
enter a number 33
the given number is a positive number
vishalviswam@LAPTOP-A6DV9JQ0:~$ ./postiveornegative.sh
enter a number -22
the given is a negative number
vishalviswam@LAPTOP-A6DV9JQ0:~$ ./postiveornegative.sh
enter a number 0
the given number is zero
vishalviswam@LAPTOP-A6DV9JQ0:~$ _
```

4. Shell script to find the greatest of three numbers

```
#!/bin/bash
read -p "enter first number" a
read -p "enter second number" b
read -p "enter third number" c
if((a>b && a>c))
then
    echo first number is the largest
elif((b>a && b>c))
then
    echo second number is the largest
else
    echo third number is the largest
fi
```

Output

```
mca@T70:~$ vi greatest.sh
mca@T70:~$ chmod +x greatest.sh
mca@T70:~$ ./greatest.sh
enter first number24
enter second number55
enter third number7
second number is the largest
mca@T70:~$ █
```

5. Shell Script to demonstrate String Operators

```
#!/bin/bash
read -p "enter string a :" a
read -p "enter string b :" b
if [ $a == $b ]
then
echo "the strings are same"
else
echo the strings are not same
fi
if [ $a != $b ]
then
echo strings are not same
else
echo strings are same
fi
if [ -z $a ]
then echo string length is zero
else
echo string length is not zero
fi
if [ -n $b ]
then
echo string length is not zero
else
echo string length is zero
fi
if (( $a ))
then
echo "string is not empty"
else
echo "string is empty"
fi i
f (( $b ))
then echo "string is not empty"
else
```

```
echo "string is empty"
fi
```

Output

```
vishal@VISHALVISWAM:~/stringprgrm.sh
enter string a :vishal
enter string b :viswam
the strings are not same
strings are not same
string length is not zero
string length is not zero
string is empty
string is empty
vishal@VISHALVISWAM:~$ -
```

- 6. Shell Script to analyse people of certain age groups who are eligible for getting a suitable job if their condition and norms get satisfied using nested if statement.**

```
#!/bin/bash
echo -n "Enter your age: "
read age
if [ "$age" -ge 18 ] && [ "$age" -le 60 ]; then
    echo "You are eligible for the job."
else
    echo "You are not eligible for the job."
fi
```

Output

```
vishalviswam@LAPTOP-A6DV9JQ0:~/vishalcopy$ vi ageexp.sh
vishalviswam@LAPTOP-A6DV9JQ0:~/vishalcopy$ chmod +x ageexp.sh
vishalviswam@LAPTOP-A6DV9JQ0:~/vishalcopy$ ./ageexp.sh
Enter your age: 67
You are not eligible for the job.
vishalviswam@LAPTOP-A6DV9JQ0:~/vishalcopy$ -
```

- 7. Write a shell script to display the capital of a state using case...esac statement.**

```
#!/bin/bash
read -p "Enter any State (Tamil Nadu, Kerala, Karnataka): " capital
case "$capital" in
    "Tamil Nadu") echo "Chennai is the Capital of Tamil Nadu";;
    "Kerala") echo "Trivandrum is the Capital of Kerala";;
    "Karnataka") echo "Bangalore is the Capital of Karnataka";;
    *) echo "INVALID OPTION";;
esac
```

Output

```
vishalviswam@LAPTOP-A6DV9JQ0:~/vishalcopy$ vi capital.sh
vishalviswam@LAPTOP-A6DV9JQ0:~/vishalcopy$ chmod +x capital.sh
vishalviswam@LAPTOP-A6DV9JQ0:~/vishalcopy$ ./capital.sh
Enter any State (Tamil Nadu, Kerala, Karnataka): Kerala
Trivandrum is the Capital of Kerala
vishalviswam@LAPTOP-A6DV9JQ0:~/vishalcopy$
```

- 8. Write a shell script to count the number in reverse direction.**

```
#!/bin/bash
for (( i=11 ; i>=0 ; i-- ))
do
    echo $i
done
```

Output

```
mca@u49:~/Desktop$ ./forloopprgrm6.sh
11
10
9
8
7
6
5
4
3
2
1
mca@u49:~/Desktop$
```

- 9. Write a shell script to check whether the number is palindrome or not**

```
#!/bin/bash
read -p "Enter the number: " n
rev=0
temp=$n
while [ $temp -gt 0 ]
do
    rem=$(expr $temp % 10)
    temp=$(expr $temp / 10)
    rev=$((rev * 10))
    rev=$((rev + $rem))
done
if [ $rev -eq $n ]
then
    echo "$n is a palindrome number"
else
    echo "$n is not a palindrome number"
fi
```

Output

```
vishalviswam@LAPTOP-A6DV9JQ0:~/vishalcopy$ vi palindrome.sh
vishalviswam@LAPTOP-A6DV9JQ0:~/vishalcopy$ chmod +x palindrome.sh
vishalviswam@LAPTOP-A6DV9JQ0:~/vishalcopy$ ./palindrome.sh
Enter the number: 121
121 is a palindrome number
vishalviswam@LAPTOP-A6DV9JQ0:~/vishalcopy$
```

10. Write a shell script to check whether a given number is Armstrong or not

```
#!/bin/bash
read -p "Enter a number: " n
temp=$n
sum=0
while [ $temp -gt 0 ]
do
rem=$((temp % 10))
temp=$((temp / 10))
cb=$((rem * rem * rem))
sum=$((sum + cb))
done
if [ $sum == $n ]
then
echo "$n is an Armstrong number" else
echo "$n is not an Armstrong number"
fi
```

Output

```
vishalviswam@LAPTOP-A6DV9JQ0:~/vishalcopy$ chmod +x armstrong.sh
vishalviswam@LAPTOP-A6DV9JQ0:~/vishalcopy$ ./armstrong.sh
Enter a number: 371
371 is an Armstrong number
vishalviswam@LAPTOP-A6DV9JQ0:~/vishalcopy$ ./armstrong.sh
Enter a number: 365
365 is not an Armstrong number
vishalviswam@LAPTOP-A6DV9JQ0:~/vishalcopy$
```

11. Write a shell script to check whether a number is prime or not

```
#!/bin/bash
read -p "Enter the number: " n
if [ $n -lt 2 ]
then
echo "$n is not a prime number" else
for (( i=2; i<$n; i++ )) do
```

```

num=$(expr $n % $i)
if [ $num -eq 0 ]
then
echo "$n is not a prime number"
exit
fi
done
fi
echo "$n is a prime number"

```

Output

```

vishalviswam@LAPTOP-A6DV9JQ0:~/vishalcopy$ ./primenumbers.sh
Enter the number: 2
2 is a prime number
vishalviswam@LAPTOP-A6DV9JQ0:~/vishalcopy$ ./primenumbers.sh
Enter the number: 8
8 is not a prime number
vishalviswam@LAPTOP-A6DV9JQ0:~/vishalcopy$ .

```

12. Write a shell script for factorial of a number

```

#!/bin/bash
read -p "Enter the number: " n
temp=$n
f=1
for (( i=$n; i>1; i-- ))
do
f=$((f * i))
done
echo "Factorial of $temp is $f"

```

Output

```

vishalviswam@LAPTOP-A6DV9JQ0:~/vishalcopy$ vi fact.sh
vishalviswam@LAPTOP-A6DV9JQ0:~/vishalcopy$ chmod +x fact.sh
vishalviswam@LAPTOP-A6DV9JQ0:~/vishalcopy$ ./fact.sh
Enter the number: 7
Factorial of 7 is 5040

```

13. Write a shell Script to print Fibonacci series

```

#!/bin/bash
read -p "Enter the limit: " lt
n1=0
n2=1
for (( i=0; i<$lt; i++ ))
do
echo -n "$n1 "
n3=$((n1 + n2))
n1=$n2
n2=$n3
done

```

```
n1=$n2
n2=$n3
done
echo "
```

Output

```
vishalviswam@LAPTOP-A6DV9JQ0:~/vishalcopy$ vi fibonacci.sh
vishalviswam@LAPTOP-A6DV9JQ0:~/vishalcopy$ chmod +x fibonacci.sh
vishalviswam@LAPTOP-A6DV9JQ0:~/vishalcopy$ ./fibonacci.sh
Enter the limit: 13
0 1 1 2 3 5 8 13 21 34 55 89 144
vishalviswam@LAPTOP-A6DV9JQ0:~/vishalcopy$
```

14. Write a shell script to check if the current year is a leap year or not

```
#!/bin/bash
read -p "Enter the year (YYYY): " y
c1=$((y % 4))
c2=$((y % 100))
c3=$((y % 400))
if [ $c1 -eq 0 ]
then
if [ $c2 -ne 0 -o $c3 -eq 0 ]
then
echo "$y is a leap year" else
echo "$y is not a leap year" fi
else
echo "$y is not a leap year"
fi
```

Output

```
vishalviswam@LAPTOP-A6DV9JQ0:~/vishalcopy$ ./leap.sh
Enter the year (YYYY): 2022
2022 is not a leap year
vishalviswam@LAPTOP-A6DV9JQ0:~/vishalcopy$ ./leap.sh
Enter the year (YYYY): 2024
2024 is a leap year
vishalviswam@LAPTOP-A6DV9JQ0:~/vishalcopy$
```

Result

The program was executed and the result was successfully obtained. Thus, CO4 was obtained.

Experiment No.: 5

Aim

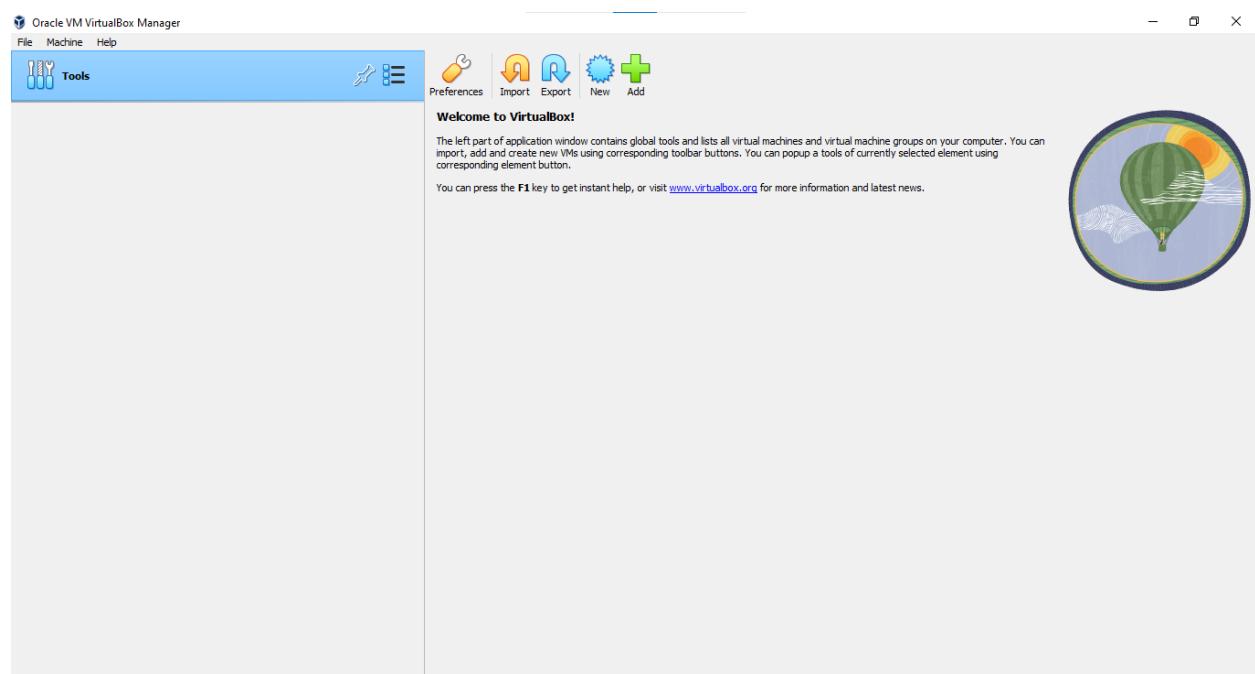
Install latest version of Ubuntu on a virtual box

CO1

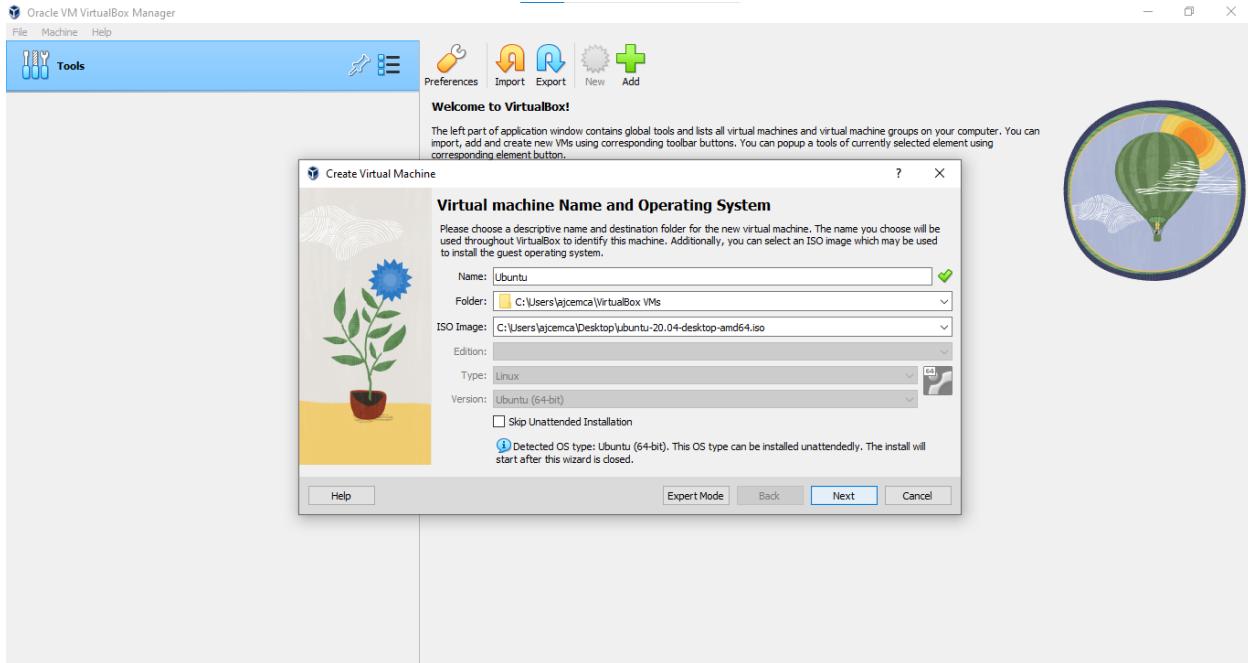
Install and configure common operating systems in virtual environment.

Procedure

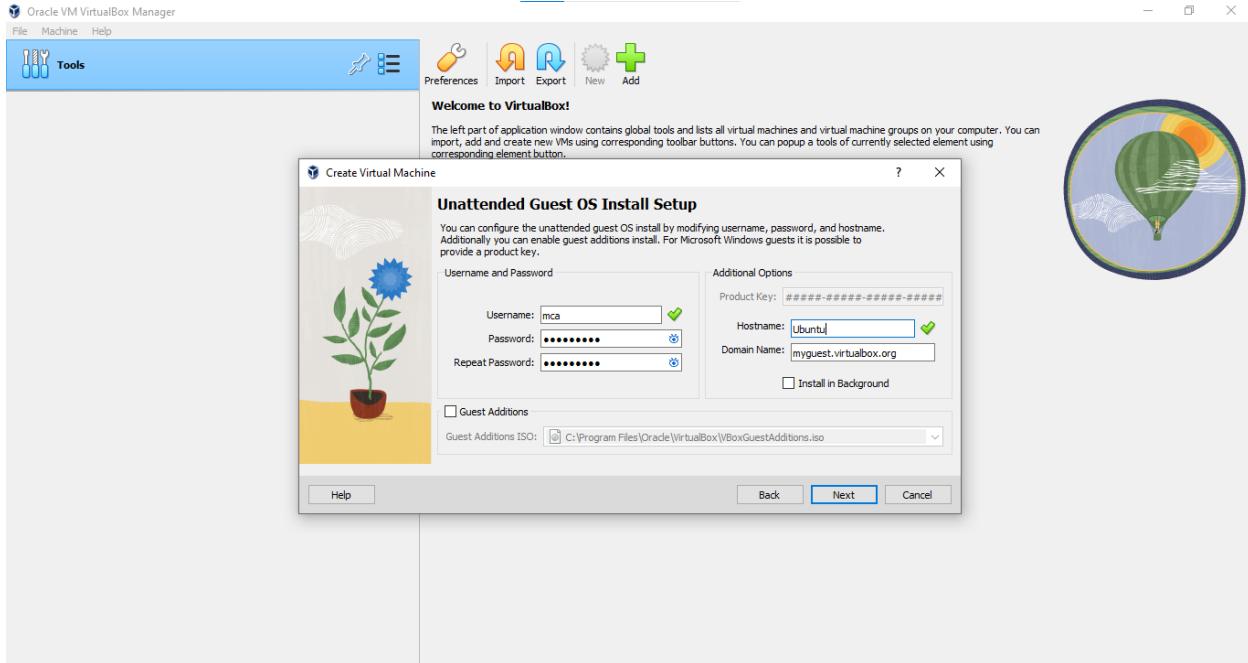
1. Download and Install Oracle Virtual Box



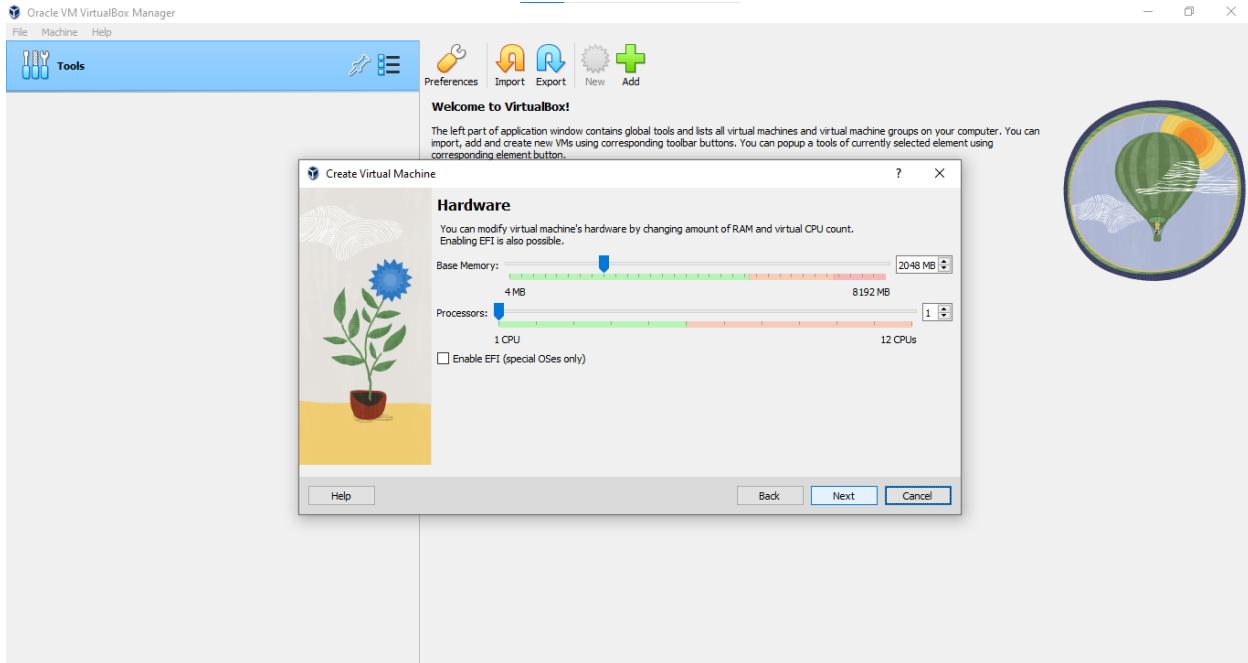
2. Create New Virtual Machine – Configure Name and OS



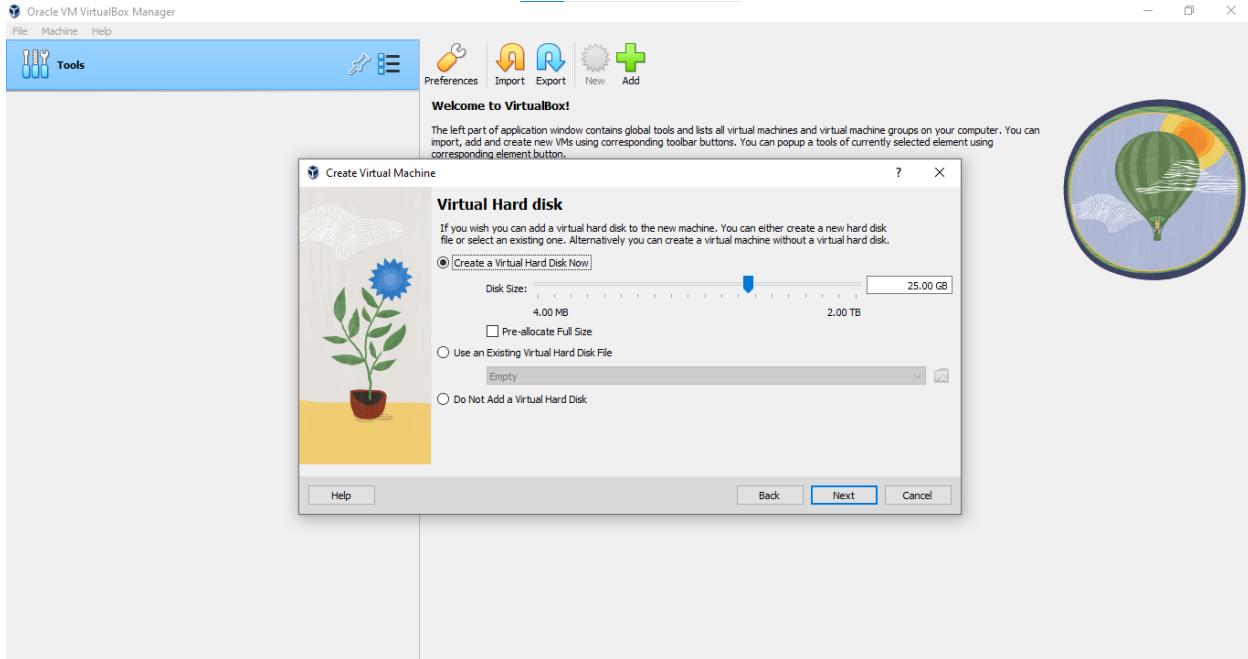
3. OS Setup – Configuration



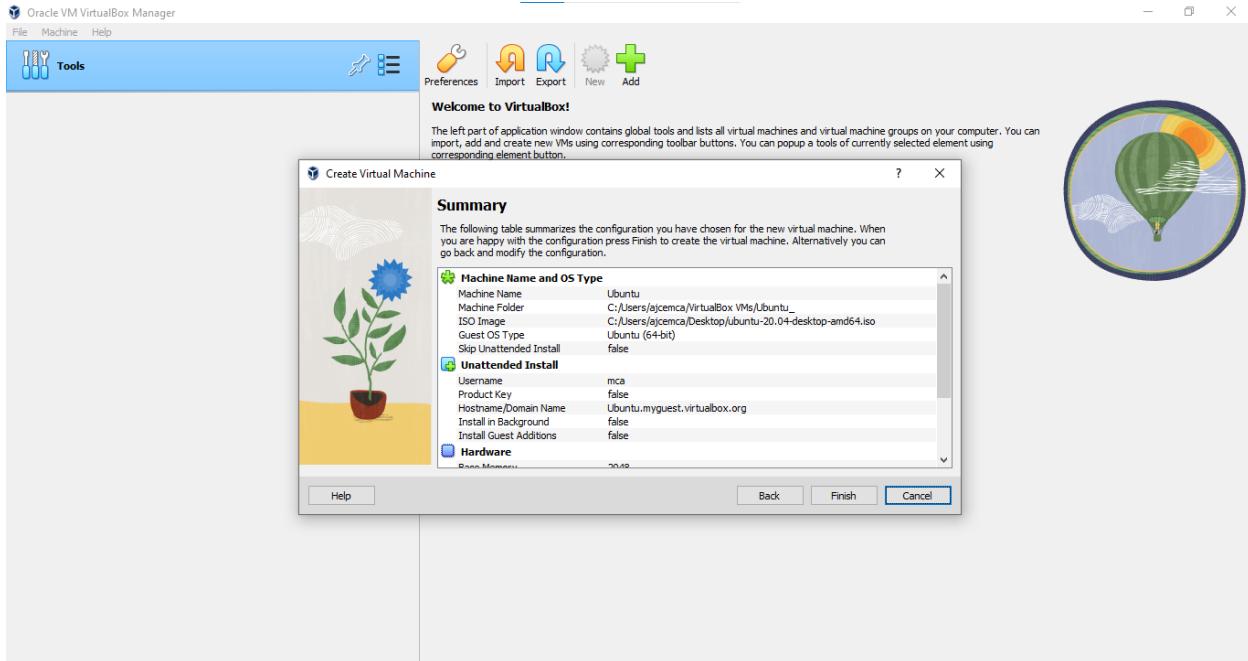
4. Hardware Configuration



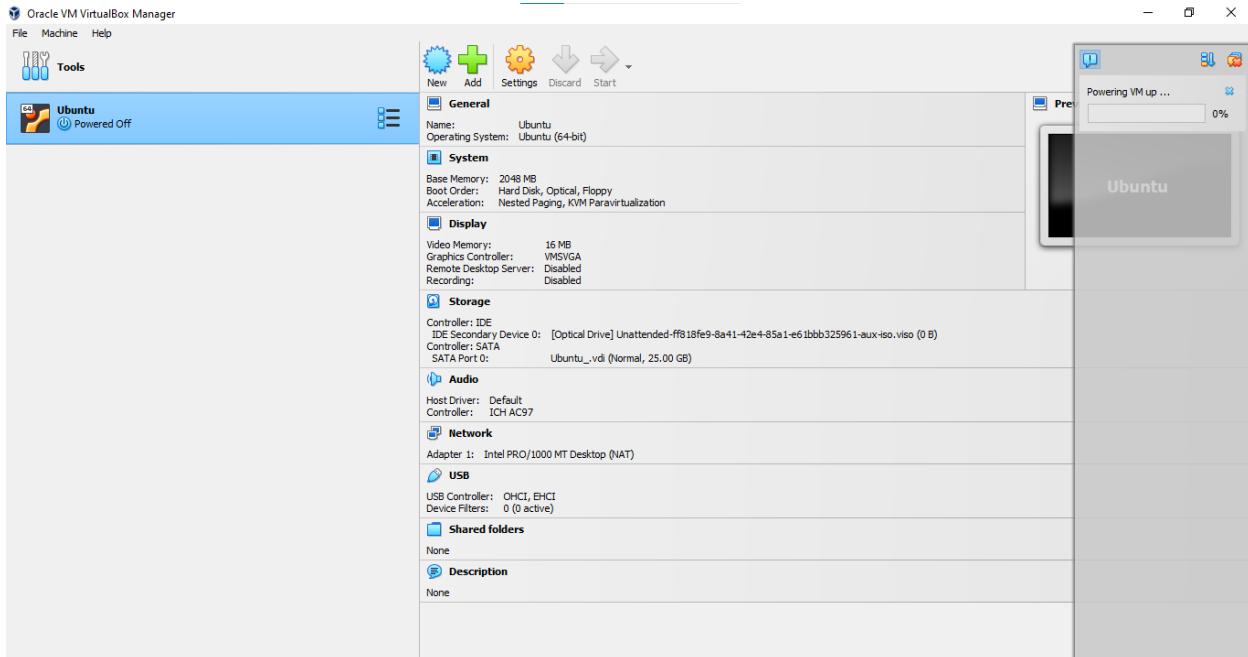
5. Disk Configuration



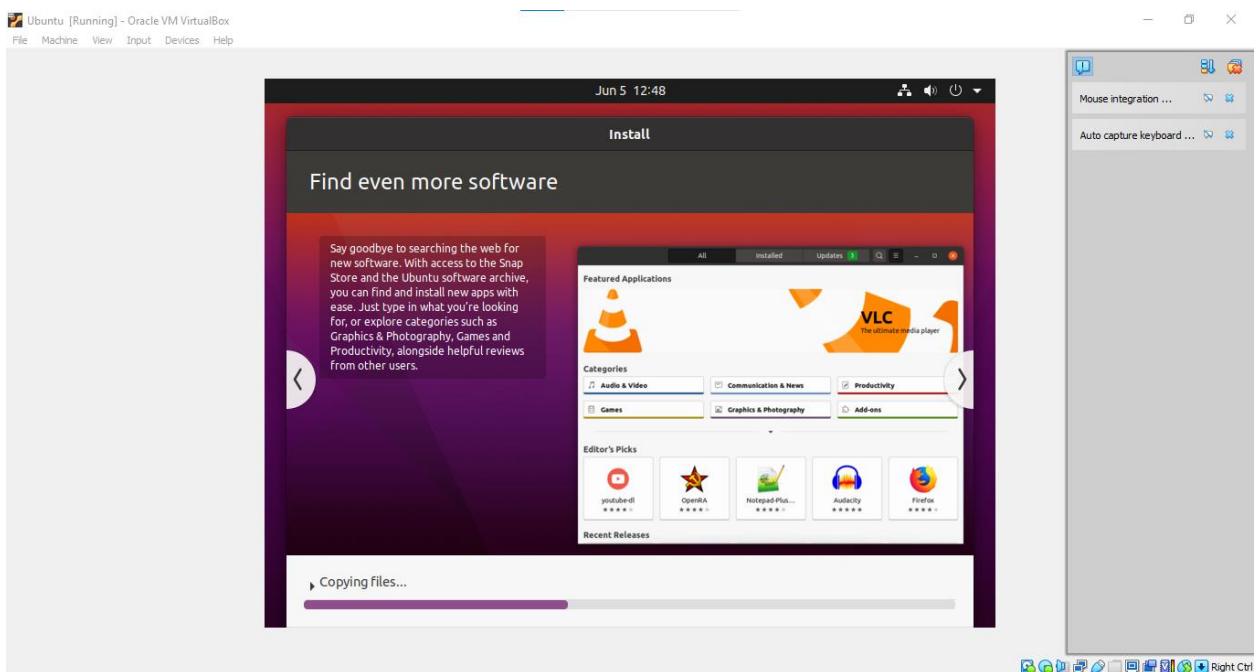
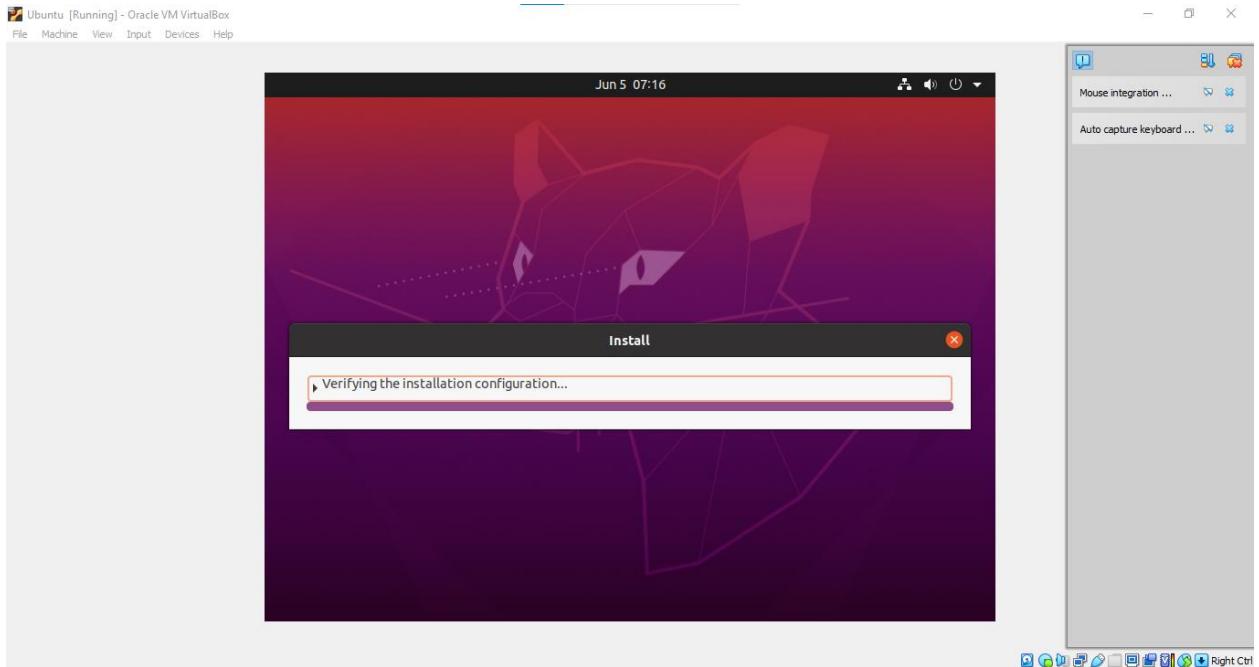
6. Verify Configuration



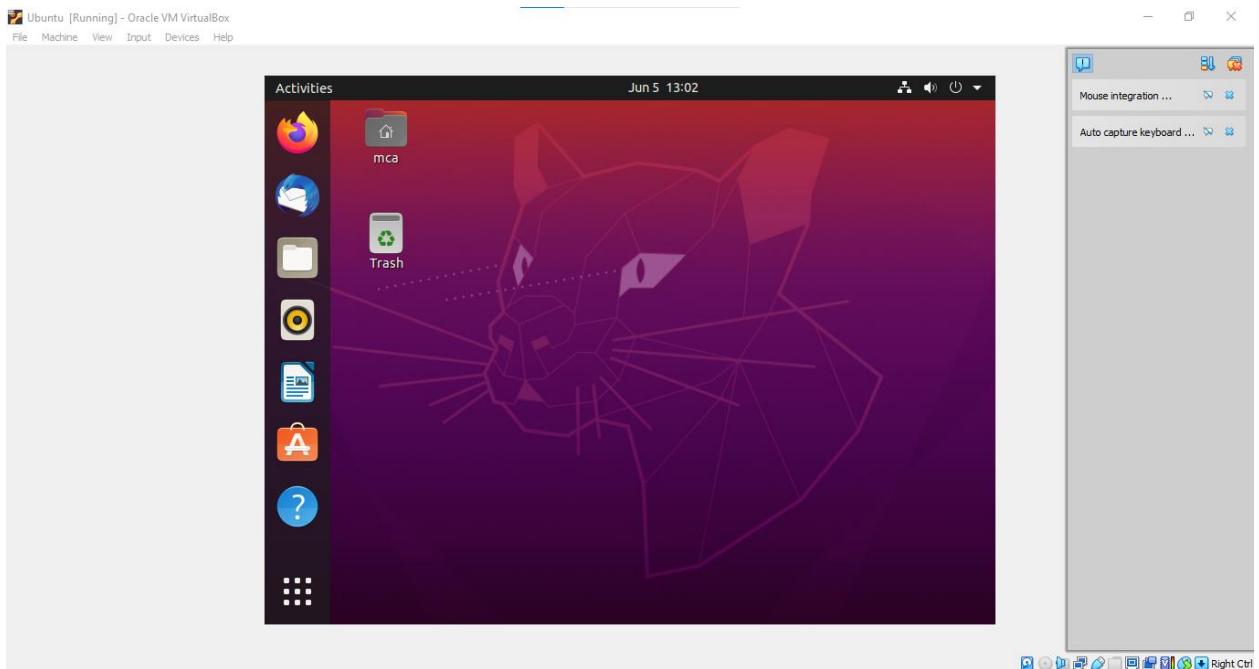
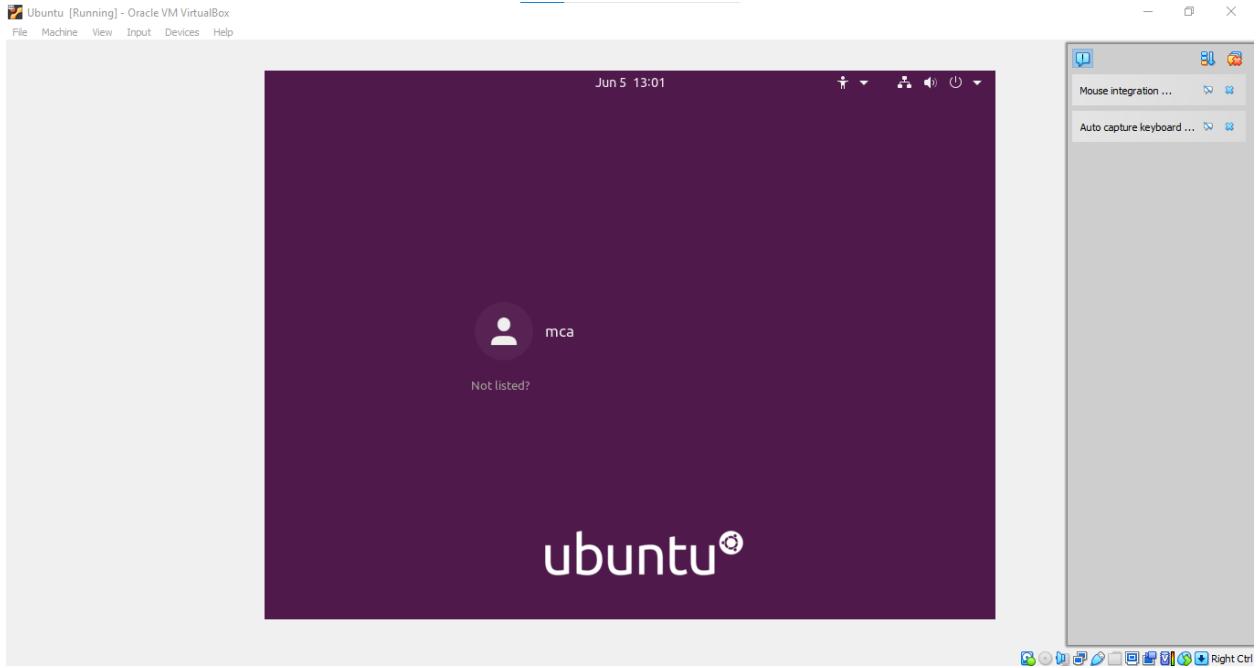
7. Preview the VM Configuration



8. Installation of OS in VM



9. Login in to the VM



Result

The program was executed and the result was successfully obtained. Thus, CO1 was obtained.

Experiment No.: 6

Aim

Installation and configuration of LAMP stack. Deploy an open-source application such as phpmyadmin

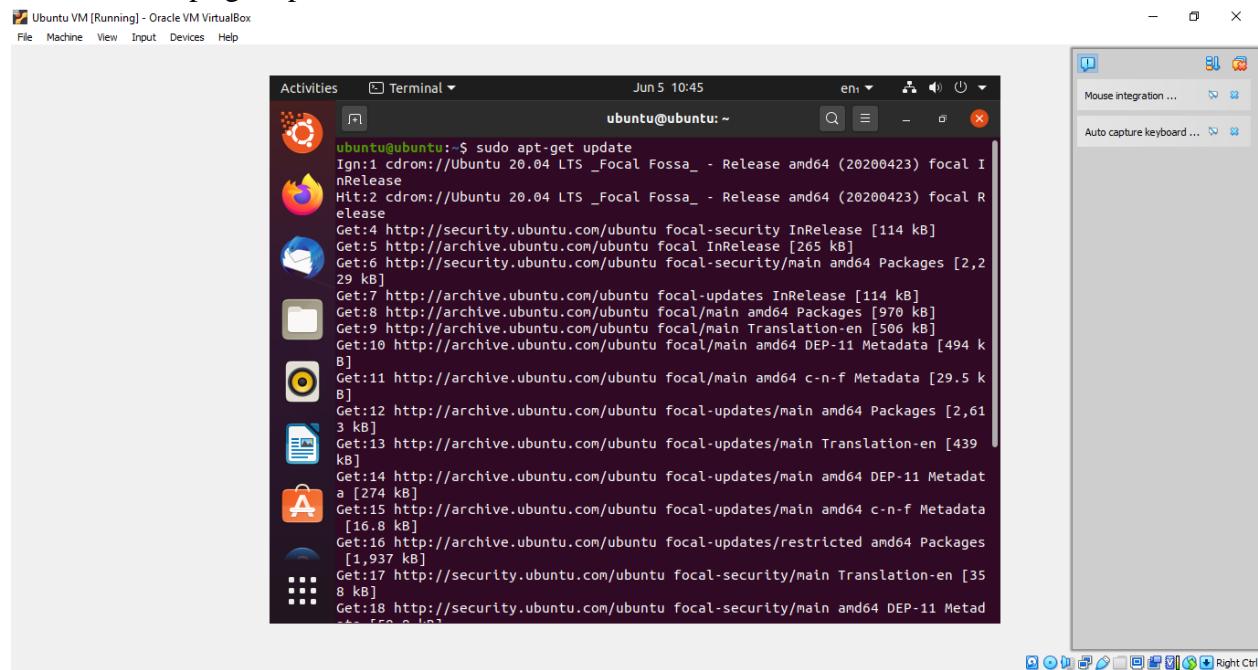
CO3

Install and manage servers for web applications

Procedure

Install Apache

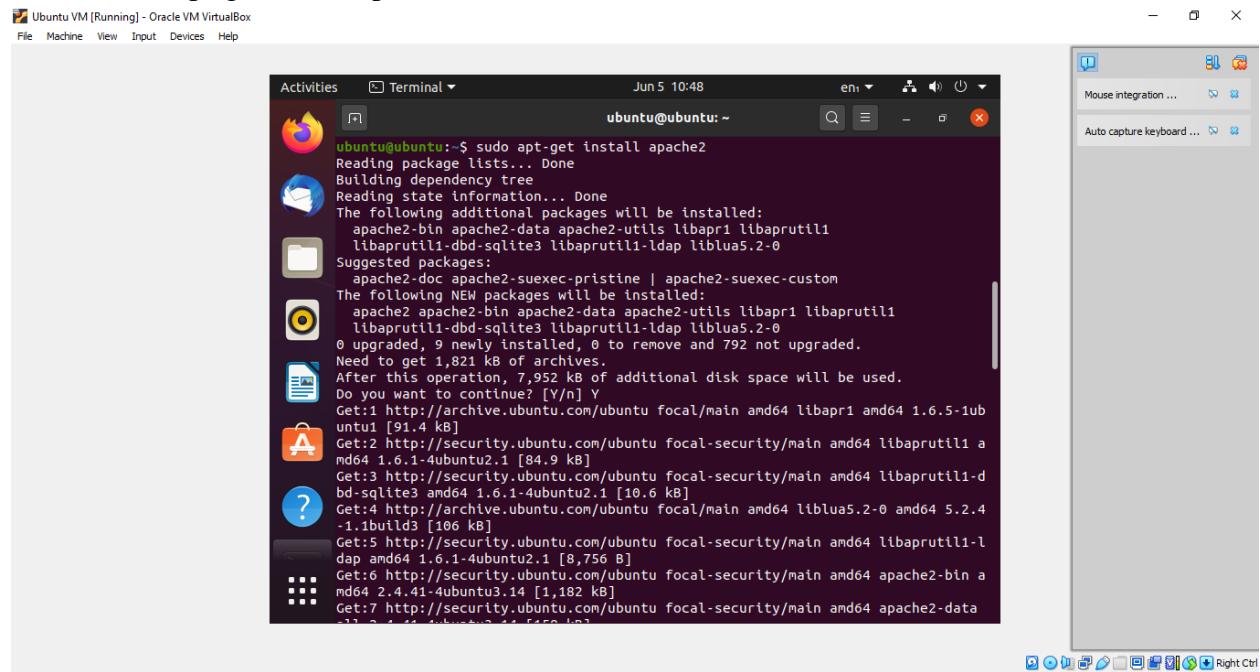
1. sudo apt-get update



The screenshot shows a terminal window titled "Terminal" running on an Ubuntu VM. The window displays the command "sudo apt-get update" being run at the prompt. The output shows the system checking for updates from various repositories, including "cdrom://Ubuntu 20.04 LTS _Focal Fossa_ - Release amd64 (20200423) focal InRelease" and "http://security.ubuntu.com/ubuntu focal-security InRelease". Numerous files and packages are listed as being downloaded, ranging from 114 kB to 970 kB.

```
ubuntu@ubuntu:~$ sudo apt-get update
Ign:1 cdrom://Ubuntu 20.04 LTS _Focal Fossa_ - Release amd64 (20200423) focal InRelease
Hit:2 cdrom://Ubuntu 20.04 LTS _Focal Fossa_ - Release amd64 (20200423) focal Release
Get:4 http://security.ubuntu.com/ubuntu focal-security InRelease [114 kB]
Get:5 http://archive.ubuntu.com/ubuntu focal InRelease [265 kB]
Get:6 http://security.ubuntu.com/ubuntu focal-security/main amd64 Packages [2,29 kB]
Get:7 http://archive.ubuntu.com/ubuntu focal-updates InRelease [114 kB]
Get:8 http://archive.ubuntu.com/ubuntu focal/main amd64 Packages [970 kB]
Get:9 http://archive.ubuntu.com/ubuntu focal/main Translation-en [506 kB]
Get:10 http://archive.ubuntu.com/ubuntu focal/main amd64 DEP-11 Metadata [494 kB]
Get:11 http://archive.ubuntu.com/ubuntu focal/main amd64 c-n-f Metadata [29.5 kB]
Get:12 http://archive.ubuntu.com/ubuntu focal-updates/main amd64 Packages [2,613 kB]
Get:13 http://archive.ubuntu.com/ubuntu focal-updates/main Translation-en [439 kB]
Get:14 http://archive.ubuntu.com/ubuntu focal-updates/main amd64 DEP-11 Metadata [274 kB]
Get:15 http://archive.ubuntu.com/ubuntu focal-updates/main amd64 c-n-f Metadata [16.8 kB]
Get:16 http://archive.ubuntu.com/ubuntu focal-updates/restricted amd64 Packages [1,937 kB]
Get:17 http://security.ubuntu.com/ubuntu focal-security/main Translation-en [358 kB]
Get:18 http://security.ubuntu.com/ubuntu focal-security/main amd64 DEP-11 Metadata [556 kB]
```

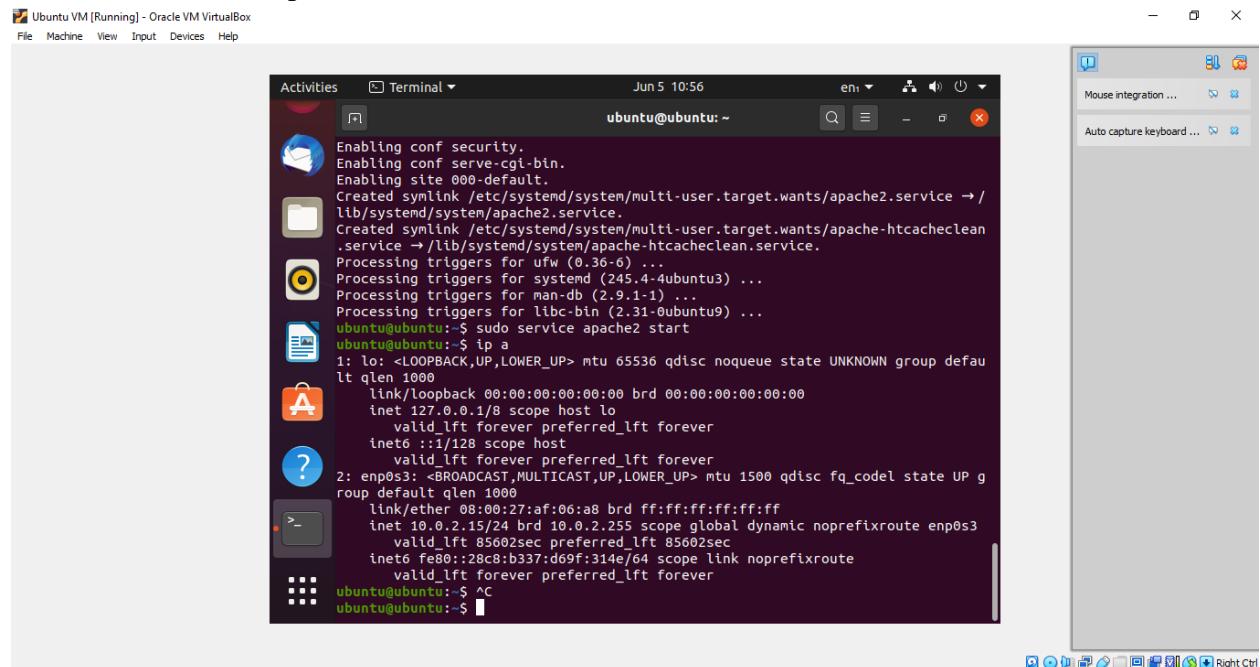
2. sudo apt-get install apache2



```
ubuntu@ubuntu:~$ sudo apt-get install apache2
Reading package lists... Done
Building dependency tree
Reading state information... Done
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
  liblua5.2-0
Need to get 1,821 kB of archives.
After this operation, 7,952 kB of additional disk space will be used.

Do you want to continue? [Y/n] Y
Get:1 http://archive.ubuntu.com/ubuntu focal/main amd64 libapr1 amd64 1.6.5-1ub
untu1 [91.4 kB]
Get:2 http://security.ubuntu.com/ubuntu focal-security/main amd64 libaprutil1 a
md64 1.6.1-4ubuntu2.1 [84.9 kB]
Get:3 http://security.ubuntu.com/ubuntu focal-security/main amd64 libaprutil1-d
bd-sqlite3 amd64 1.6.1-4ubuntu2.1 [10.6 kB]
Get:4 http://archive.ubuntu.com/ubuntu focal/main amd64 liblua5.2-0 amd64 5.2.4
-1.1build3 [106 kB]
Get:5 http://security.ubuntu.com/ubuntu focal-security/main amd64 libaprutil1-l
dap amd64 1.6.1-4ubuntu2.1 [8,756 B]
Get:6 http://security.ubuntu.com/ubuntu focal-security/main amd64 apache2-bin a
md64 2.4.41-4ubuntu3.14 [1,182 kB]
Get:7 http://security.ubuntu.com/ubuntu focal-security/main amd64 apache2-data
2.4.41-4ubuntu3.14 [1,182 kB]
```

3. sudo service apache2 start



```
ubuntu@ubuntu:~$ Enabling conf security.
Enabling conf serve-cgi-bin.
Enabling site 000-default.
Created symlink /etc/systemd/system/multi-user.target.wants/apache2.service → /
lib/systemd/system/apache2.service.
Created symlink /etc/systemd/system/multi-user.target.wants/apache-htcacheclean.
service → /lib/systemd/system/apache-htcacheclean.service.
Processing triggers for ufw (0.36-6) ...
Processing triggers for systemd (245.4-4ubuntu3) ...
Processing triggers for man-db (2.9.1-1) ...
Processing triggers for libc-bin (2.31-0ubuntu9) ...
ubuntu@ubuntu:~$ sudo service apache2 start
ubuntu@ubuntu:~$ ip a
1: lo: <LOOPBACK,UP,LOWER_UP> mtu 65536 qdisc noqueue state UNKNOWN group defau
lt qlen 1000
    link/loopback 00:00:00:00:00:00 brd 00:00:00:00:00:00
        inet 127.0.0.1/8 scope host lo
            valid_lft forever preferred_lft forever
        inet6 ::1/128 scope host
            valid_lft forever preferred_lft forever
2: enp0s3: <BROADCAST,MULTICAST,UP,LOWER_UP> mtu 1500 qdisc fq_codel state UP g
roup default qlen 1000
    link/ether 08:00:27:af:06:a8 brd ff:ff:ff:ff:ff:ff
        inet 10.0.2.15/24 brd 10.0.2.255 scope global dynamic noprefixroute enp0s3
            valid_lft 85602sec preferred_lft 85602sec
        inet6 fe80::28c8:b337:d69f:314e/64 scope link noprefixroute
            valid_lft forever preferred_lft forever
ubuntu@ubuntu:~$ ^C
ubuntu@ubuntu:~$
```

4. Apache Accessed successful

5. which apache2

6. systemctl status apache2

```

Ubuntu [Running] - Oracle VM VirtualBox
File Machine View Input Devices Help
Activities Terminal Jun 21 16:03
root@mca: /home/mca

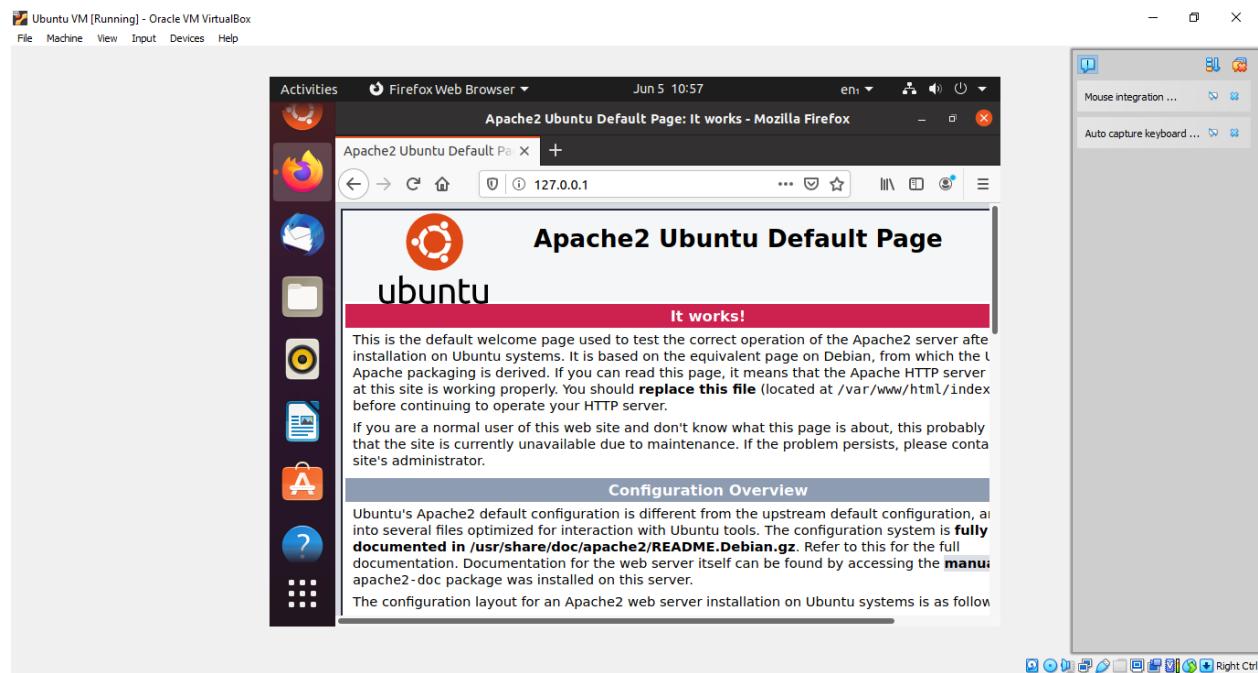
command 'iwconfig' from deb wireless-tools (30-pre9-13ubuntu1)
command 'ifconfig' from deb net-tools (1.60+git20180626.aebd88e-1ubuntu1)
command 'iconfig' from deb ipmiutil (3.1.5-1)

Try: apt install <deb name>
root@mca:/home/mca# which apache
root@mca:/home/mca# which apache
/usr/sbin/apache2
root@mca:/home/mca# systemctl status apache2
apache2.service - The Apache HTTP Server
   Loaded: loaded (/lib/systemd/system/apache2.service; enabled; vendor pres
   Active: active (running) since Wed 2023-06-21 16:00:22 IST; 2min 21s ago
     Docs: https://httpd.apache.org/docs/2.4/
          >Main PID: 2906 (apache2)
             Tasks: 55 (limit: 2295)
            Memory: 4.7M
           CGroup: /system.slice/apache2.service
                   ├─2906 /usr/sbin/apache2 -k start
                   ├─2908 /usr/sbin/apache2 -k start
                   └─2909 /usr/sbin/apache2 -k start

Jun 21 16:00:22 mca systemd[1]: Starting The Apache HTTP Server...
Jun 21 16:00:22 mca apachectl[2905]: AH00558: apache2: Could not reliably determine the server's fully qualified domain name, using 127.0.0.1 for port 80
Jun 21 16:00:22 mca systemd[1]: Started The Apache HTTP Server.

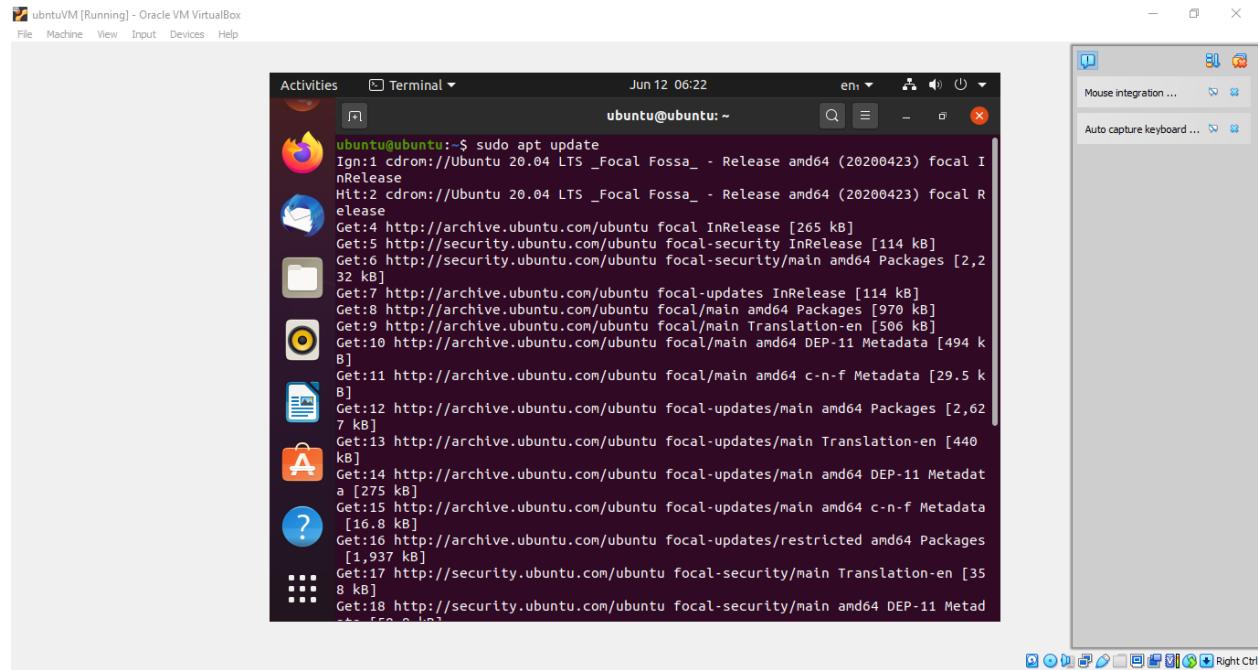
[1]+  Stopped                  systemctl status apache2
root@mca:/home/mca#

```



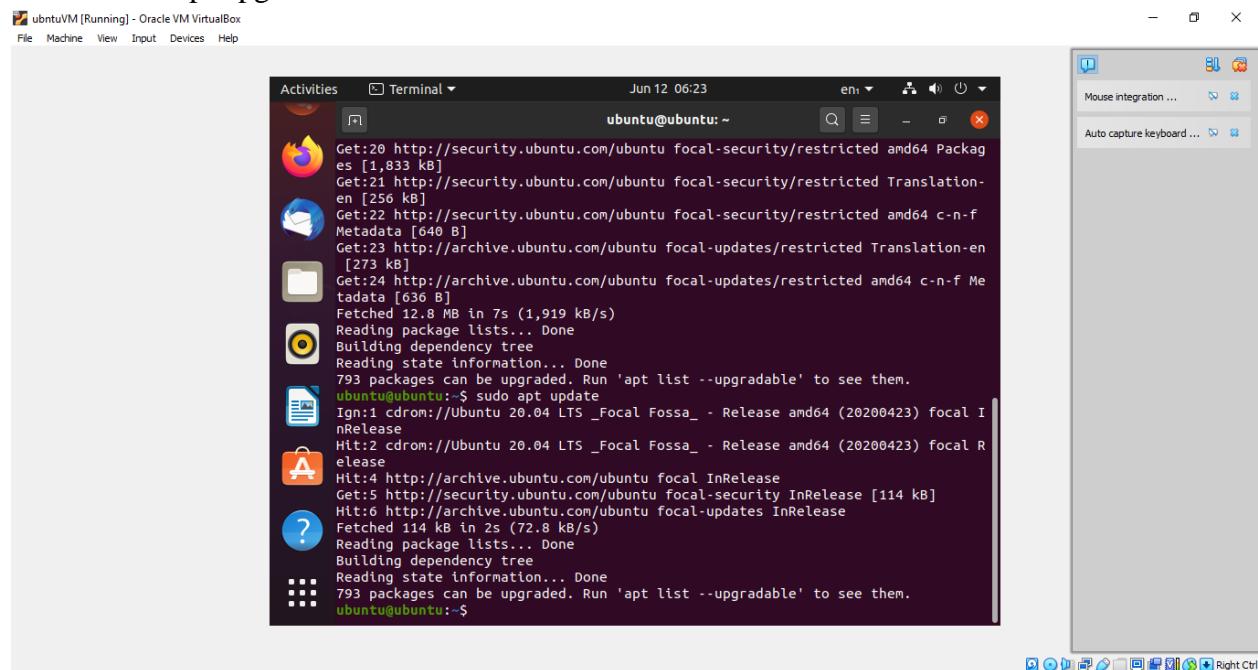
Install MySql

1. sudo apt update



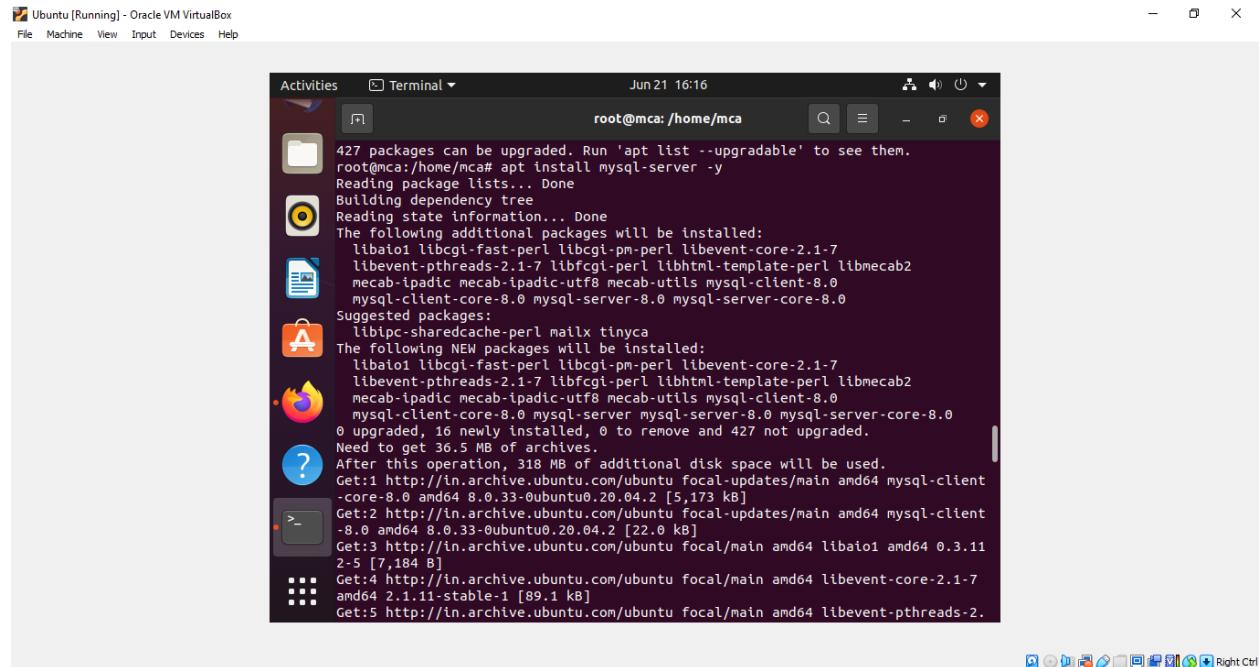
```
ubuntu@ubuntu:~$ sudo apt update
Ign:1 cdrom://Ubuntu 20.04 LTS _Focal Fossa_ - Release amd64 (20200423) focal InRelease
Hit:2 cdrom://Ubuntu 20.04 LTS _Focal Fossa_ - Release amd64 (20200423) focal Release
Get:4 http://archive.ubuntu.com/ubuntu focal InRelease [265 kB]
Get:5 http://security.ubuntu.com/ubuntu focal-security InRelease [114 kB]
Get:6 http://security.ubuntu.com/ubuntu focal-security/main amd64 Packages [2,232 kB]
Get:7 http://archive.ubuntu.com/ubuntu focal-updates InRelease [114 kB]
Get:8 http://archive.ubuntu.com/ubuntu focal/main amd64 Packages [970 kB]
Get:9 http://archive.ubuntu.com/ubuntu focal/main Translation-en [506 kB]
Get:10 http://archive.ubuntu.com/ubuntu focal/main amd64 DEP-11 Metadata [494 kB]
Get:11 http://archive.ubuntu.com/ubuntu focal/main amd64 c-n-f Metadata [29.5 kB]
Get:12 http://archive.ubuntu.com/ubuntu focal-updates/main amd64 Packages [2,627 kB]
Get:13 http://archive.ubuntu.com/ubuntu focal-updates/main Translation-en [440 kB]
Get:14 http://archive.ubuntu.com/ubuntu focal-updates/main amd64 DEP-11 Metadata [275 kB]
Get:15 http://archive.ubuntu.com/ubuntu focal-updates/main amd64 c-n-f Metadata [16.8 kB]
Get:16 http://archive.ubuntu.com/ubuntu focal-updates/restricted amd64 Packages [1,937 kB]
Get:17 http://security.ubuntu.com/ubuntu focal-security/main Translation-en [358 kB]
Get:18 http://security.ubuntu.com/ubuntu focal-security/main amd64 DEP-11 Metadata [500 kB]
```

2. sudo apt upgrade



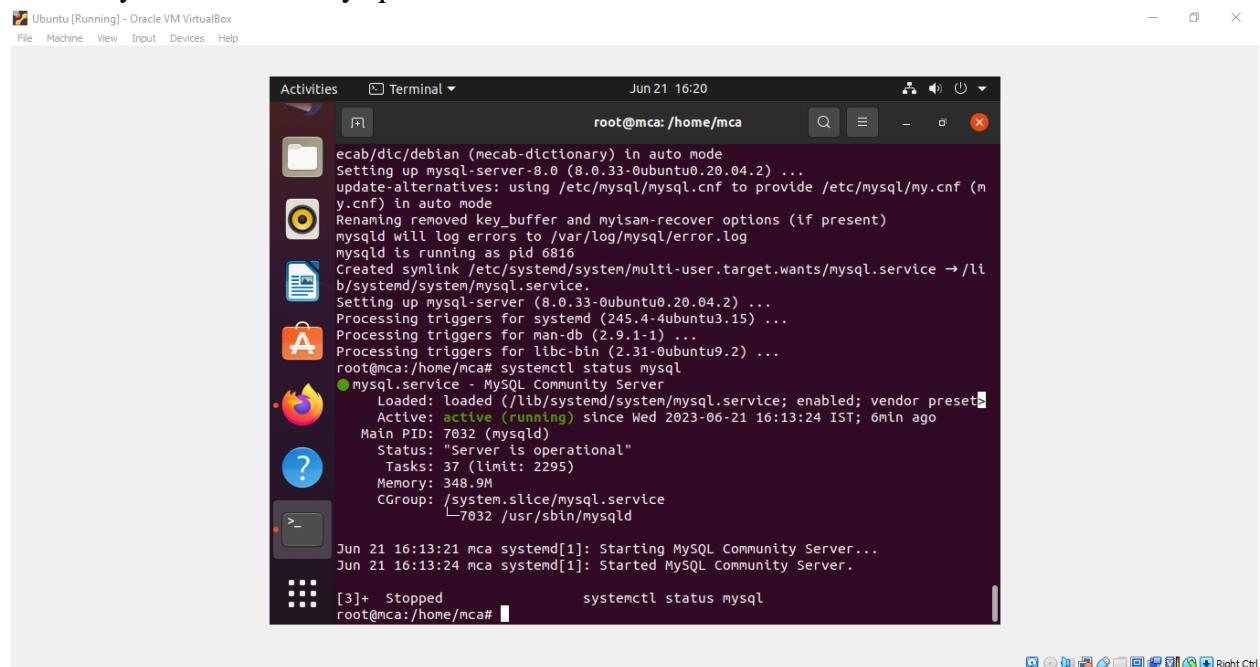
```
ubuntu@ubuntu:~$ sudo apt upgrade
Get:20 http://security.ubuntu.com/ubuntu focal-security/restricted amd64 Packages [1,833 kB]
Get:21 http://security.ubuntu.com/ubuntu focal-security/restricted Translation-en [256 kB]
Get:22 http://security.ubuntu.com/ubuntu focal-security/restricted amd64 c-n-f Metadata [640 B]
Get:23 http://archive.ubuntu.com/ubuntu focal-updates/restricted Translation-en [273 kB]
Get:24 http://archive.ubuntu.com/ubuntu focal-updates/restricted amd64 c-n-f Metadata [636 B]
Fetched 12.8 MB in 7s (1,919 kB/s)
Reading package lists... Done
Building dependency tree
Reading state information... Done
793 packages can be upgraded. Run 'apt list --upgradable' to see them.
ubuntu@ubuntu:~$ sudo apt update
Ign:1 cdrom://Ubuntu 20.04 LTS _Focal Fossa_ - Release amd64 (20200423) focal InRelease
Hit:2 cdrom://Ubuntu 20.04 LTS _Focal Fossa_ - Release amd64 (20200423) focal Release
Get:4 http://archive.ubuntu.com/ubuntu focal InRelease [265 kB]
Get:5 http://security.ubuntu.com/ubuntu focal-security InRelease [114 kB]
Get:6 http://archive.ubuntu.com/ubuntu focal-updates InRelease
Fetched 114 kB in 2s (72.8 kB/s)
Reading package lists... Done
Building dependency tree
Reading state information... Done
793 packages can be upgraded. Run 'apt list --upgradable' to see them.
ubuntu@ubuntu:~$
```

3. apt install mysql-server -y



```
Ubuntu [Running] - Oracle VM VirtualBox
File Machine View Input Devices Help
Activities Terminal Jun 21 16:16
root@mca:/home/mca#
root@mca:/home/mca# apt install mysql-server -y
Reading package lists... Done
Building dependency tree...
Reading state information... Done
The following additional packages will be installed:
  libaio1 libcgifast-perl libcgipm-perl libevent-core-2.1-7
  libevent-pthreads-2.1-7 libfcgi-perl libhtml-template-perl libmecab2
  mecab-ipadic mecab-ipadic-utf8 mecab-utils mysql-client-8.0
  mysql-client-core-8.0 mysql-server-8.0 mysql-server-core-8.0
Suggested packages:
  libipc-sharedcache-perl mailx tinyca
The following NEW packages will be installed:
  libaio1 libcgifast-perl libcgipm-perl libevent-core-2.1-7
  libevent-pthreads-2.1-7 libfcgi-perl libhtml-template-perl libmecab2
  mecab-ipadic mecab-ipadic-utf8 mecab-utils mysql-client-8.0
  mysql-client-core-8.0 mysql-server mysql-server-8.0 mysql-server-core-8.0
0 upgraded, 16 newly installed, 0 to remove and 427 not upgraded.
Need to get 36.5 MB of archives.
After this operation, 318 MB of additional disk space will be used.
Get:1 http://in.archive.ubuntu.com/ubuntu focal-updates/main amd64 mysql-client-8.0 amd64 8.0.33-0ubuntu0.20.04.2 [5,173 kB]
Get:2 http://in.archive.ubuntu.com/ubuntu focal-updates/main amd64 mysql-client-8.0 amd64 8.0.33-0ubuntu0.20.04.2 [22.0 kB]
Get:3 http://in.archive.ubuntu.com/ubuntu focal/main amd64 libaio1 amd64 0.3.11-2-5 [7,184 B]
Get:4 http://in.archive.ubuntu.com/ubuntu focal/main amd64 libevent-core-2.1-7 amd64 2.1.11-stable-1 [89.1 kB]
Get:5 http://in.archive.ubuntu.com/ubuntu focal/main amd64 libevent-pthreads-2.1-7 amd64 2.1.11-stable-1 [10.0 kB]
root@mca:/home/mca#
```

4. systemctl status mysql

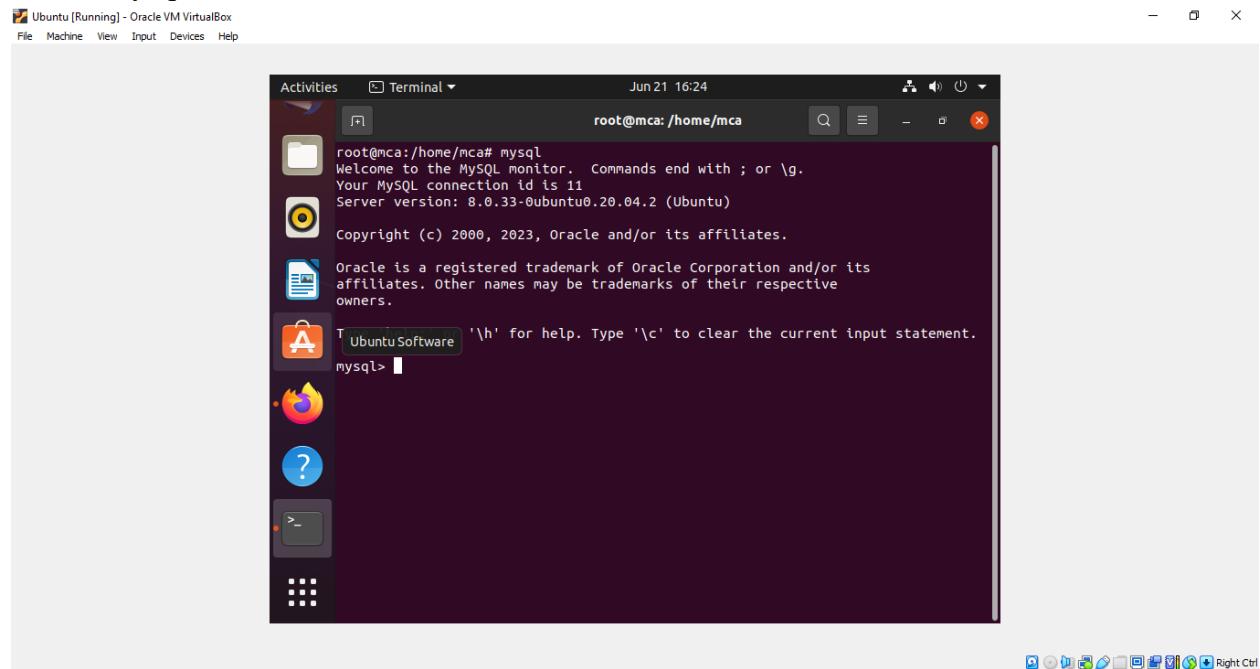


```
Ubuntu [Running] - Oracle VM VirtualBox
File Machine View Input Devices Help
Activities Terminal Jun 21 16:20
root@mca:/home/mca#
root@mca:/home/mca# systemctl status mysql
● mysql.service - MySQL Community Server
   Loaded: loaded (/lib/systemd/system/mysql.service; enabled; vendor preset: enabled)
   Active: active (running) since Wed 2023-06-21 16:13:24 IST; 6min ago
     Main PID: 7032 (mysqld)
       Status: "Server is operational"
          Tasks: 37 (limit: 2295)
         Memory: 348.9M
            CPU: 0.000 CPU(s) since start
           CGrou: /system.slice/mysql.service
                     └─ 7032 /usr/sbin/mysqld

Jun 21 16:13:21 mca systemd[1]: Starting MySQL Community Server...
Jun 21 16:13:24 mca systemd[1]: Started MySQL Community Server.

[3]+ Stopped                  systemctl status mysql
root@mca:/home/mca#
```

5. mysql



1. Install PHP

```
root@mca:/home/mca# 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-php7.4 php-common php7.4 php7.4-cli php7.4-common
  php7.4-json php7.4-mysql php7.4-opcache php7.4-readline
Suggested packages:
  php-pear
The following NEW packages will be installed:
  libapache2-mod-php libapache2-mod-php7.4 php php-common php-mysql php7.4
  php7.4-cli php7.4-common php7.4-json php7.4-mysql php7.4-opcache
  php7.4-readline
0 upgraded, 12 newly installed, 0 to remove and 410 not upgraded.
Need to get 4,158 kB of archives.
After this operation, 18.5 MB of additional disk space will be used.
Do you want to continue? [Y/n] y
Get:1 http://in.archive.ubuntu.com/ubuntu focal/main amd64 php-common all 2:75
[11.9 kB]
Get:2 http://in.archive.ubuntu.com/ubuntu focal-updates/main amd64 php7.4-commo
n amd64 7.4.3-4ubuntu2.18 [982 kB]
Get:3 http://in.archive.ubuntu.com/ubuntu focal-updates/main amd64 php7.4-json
amd64 7.4.3-4ubuntu2.18 [19.2 kB]
Get:4 http://in.archive.ubuntu.com/ubuntu focal-updates/main amd64 php7.4-opcac
he amd64 7.4.3-4ubuntu2.18 [198 kB]
Get:5 http://in.archive.ubuntu.com/ubuntu focal-updates/main amd64 php7.4-readl
ine amd64 7.4.3-4ubuntu2.18 [12.6 kB]
Get:6 http://in.archive.ubuntu.com/ubuntu focal-updates/main amd64 php7.4-cli a
```

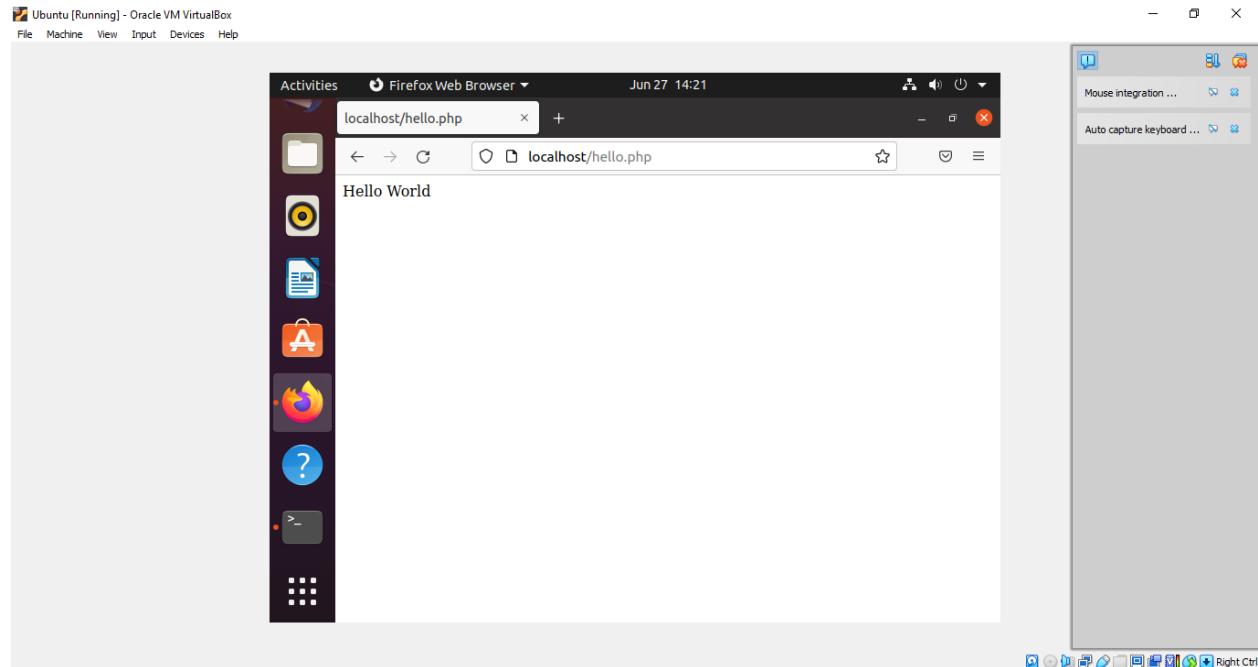
3. Check PHP version

```
root@mca:/home/mca# php -v
PHP 7.4.3-4ubuntu2.18 (cli) (built: Feb 23 2023 12:43:23) ( NTS )
Copyright (c) The PHP Group
Zend Engine v3.4.0, Copyright (c) Zend Technologies
    with Zend OPcache v7.4.3-4ubuntu2.18, Copyright (c), by Zend Technologies
```

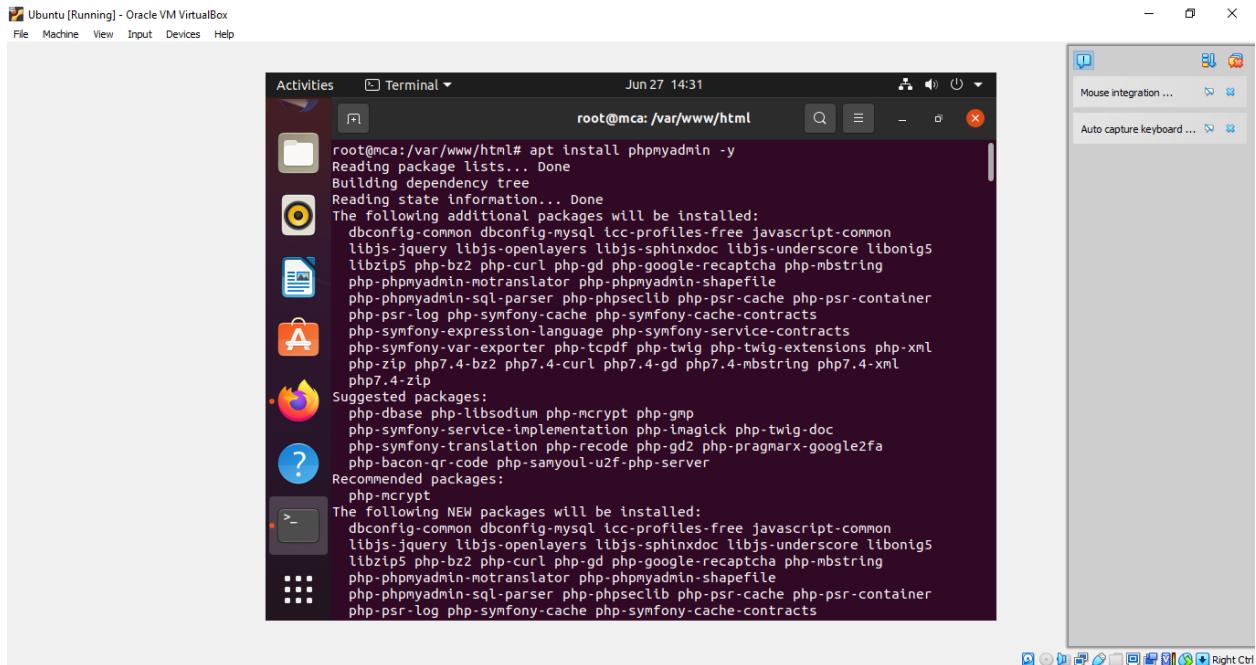
4. Create a php file

```
root@mca:/# cd /var
root@mca:/var# cd www
root@mca:/var/www# cd html
root@mca:/var/www/html# cat > hello.php
<?php
echo "Hello World";
?>
^Z
[4]+  Stopped                  cat > hello.php
```

5. Run .php file



6. Install phpmyadmin



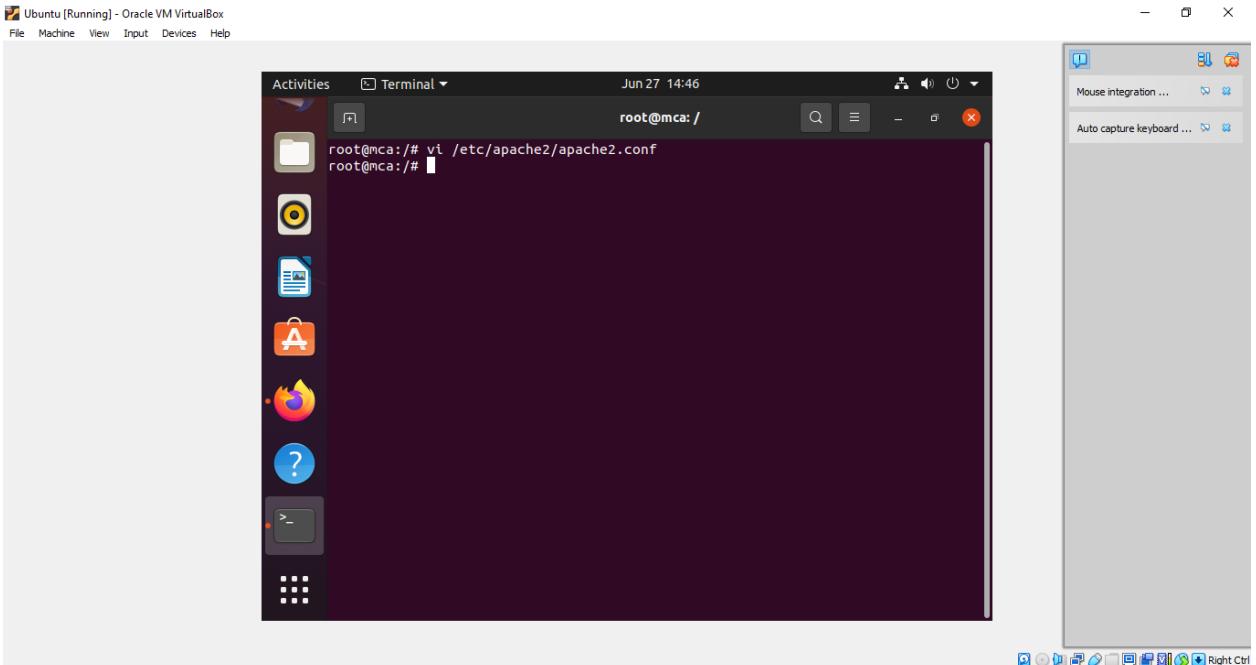
Ubuntu [Running] - Oracle VM VirtualBox

File Machine View Input Devices Help

Activities Terminal Jun 27 14:31

```
root@mca:/var/www/html# apt install phpmyadmin -y
Reading package lists... Done
Building dependency tree
Reading state information... Done
The following additional packages will be installed:
  dbconfig-common dbconfig-mysql icc-profiles-free javascript-common
  libjs-jquery libjs-openlayers libjs-sphinxdoc libjs-underscore libonig5
  libztp5 php-bz2 php-curl php-gd php-google-recaptcha php-mbstring
  php-phpmyadmin-motranslator php-phpmyadmin-shapefile
  php-phpmyadmin-sql-parser php-phpseclib php-psr-cache php-psr-container
  php-psr-log php-symfony-cache php-symfony-cache-contracts
  php-symfony-expression-language php-symfony-service-contracts
  php-symfony-var-exporter php-tcpdf php-twig php-twиг-extensions php-xml
  php-zip php7.4-bz2 php7.4-curl php7.4-gd php7.4-mbstring php7.4-xml
  php7.4-zip
Suggested packages:
  php-dbase php-libodium php-mcrypt php-gmp
  php-symfony-service-implementation php-imagick php-twig-doc
  php-symfony-translation php-recode php-gd2 php-pragmarx-google2fa
  php-bacon-qr-code php-samyoul-u2f-php-server
Recommended packages:
  php-mcrypt
The following NEW packages will be installed:
  dbconfig-common dbconfig-mysql icc-profiles-free javascript-common
  libjs-jquery libjs-openlayers libjs-sphinxdoc libjs-underscore libonig5
  libztp5 php-bz2 php-curl php-gd php-google-recaptcha php-mbstring
  php-phpmyadmin-motranslator php-phpmyadmin-shapefile
  php-phpmyadmin-sql-parser php-phpseclib php-psr-cache php-psr-container
  php-psr-log php-symfony-cache php-symfony-cache-contracts
```

7. vi /etc/apache2/apache2.conf



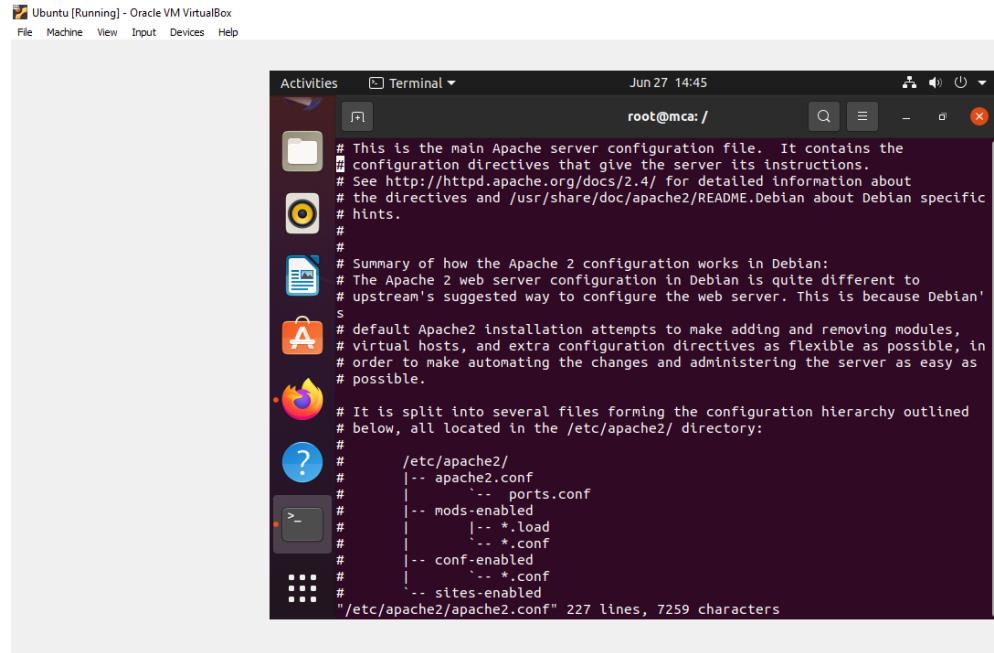
Ubuntu [Running] - Oracle VM VirtualBox

File Machine View Input Devices Help

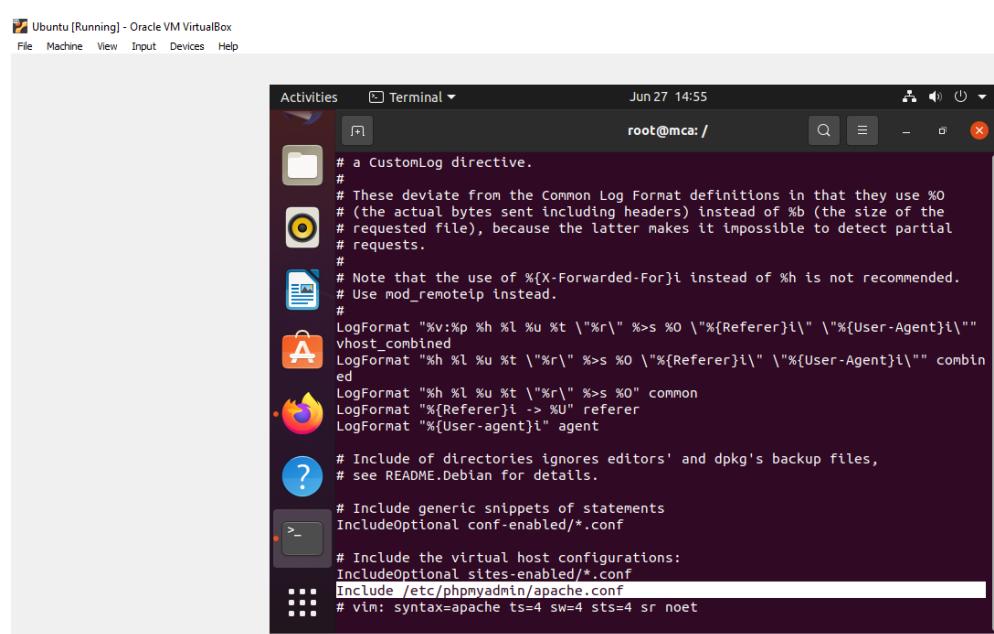
Activities Terminal Jun 27 14:46

```
root@mca:/# vi /etc/apache2/apache2.conf
root@mca:/#
```

8. include /etc/phpmyadmin/apache.conf

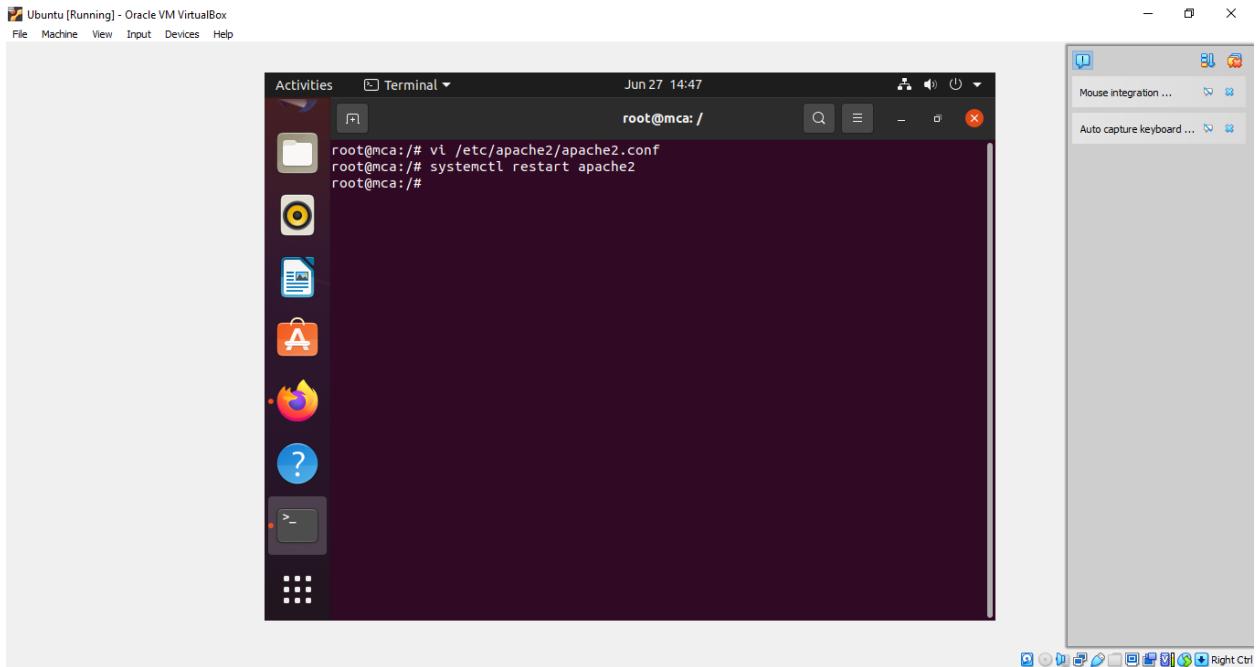


```
# This is the main Apache server configuration file. It contains the
# configuration directives that give the server its instructions.
# See http://httpd.apache.org/docs/2.4/ for detailed information about
# the directives and /usr/share/doc/apache2/README.Debian about Debian specific
# hints.
#
# Summary of how the Apache 2 configuration works in Debian:
# The Apache 2 web server configuration in Debian is quite different to
# upstream's suggested way to configure the web server. This is because Debian'
# default Apache2 installation attempts to make adding and removing modules,
# virtual hosts, and extra configuration directives as flexible as possible, in
# order to make automating the changes and administering the server as easy as
# possible.
#
# It is split into several files forming the configuration hierarchy outlined
# below, all located in the /etc/apache2/ directory:
#
#      /etc/apache2/
#          |-- apache2.conf
#              '-- ports.conf
#          '-- mods-enabled
#              '-- *.load
#              '-- *.conf
#          '-- conf-enabled
#              '-- *.conf
#          '-- sites-enabled
#              '-- *.conf
"/etc/apache2/apache2.conf" 227 lines, 7259 characters
```

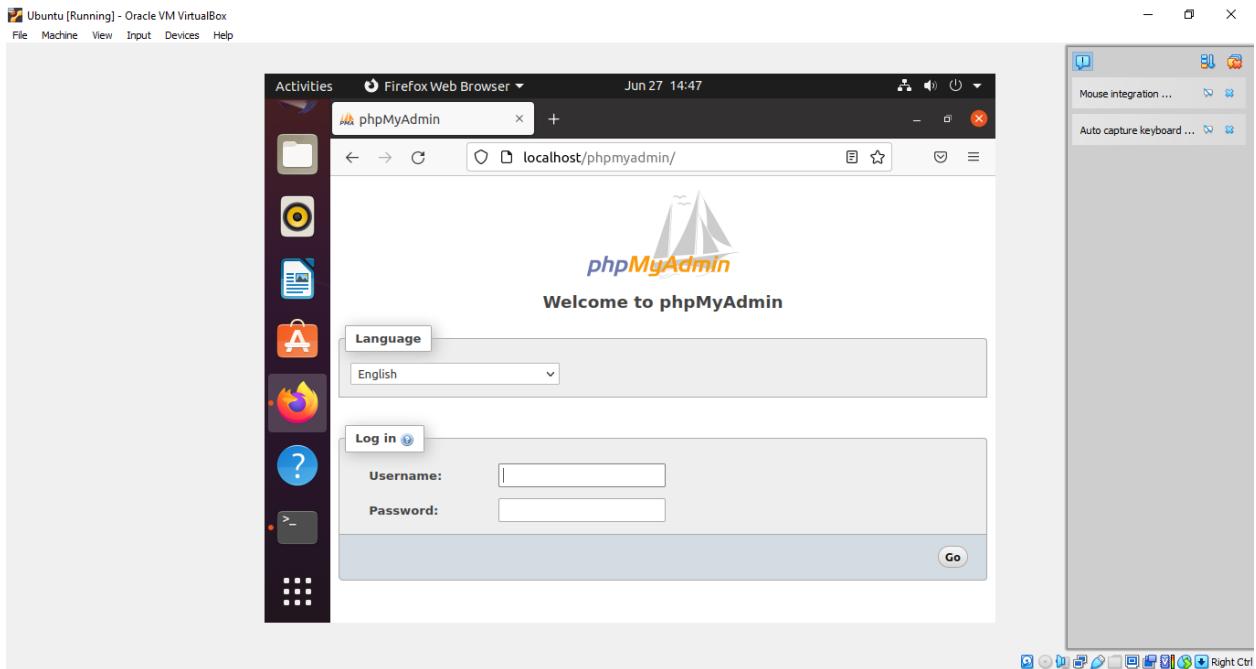



```
# a CustomLog directive.
#
# These deviate from the Common Log Format definitions in that they use %O
# (the actual bytes sent including headers) instead of %b (the size of the
# requested file), because the latter makes it impossible to detect partial
# requests.
#
# Note that the use of %{X-Forwarded-For}i instead of %h is not recommended.
# Use mod_remoteip instead.
#
# LogFormat "%v:%p %h %l %u %t \"%r\" %>s %O \"%{Referer}i\" \"%{User-Agent}i\""
# vhost_combined
# LogFormat "%h %l %u %t \"%r\" %>s %O \"%{Referer}i\" \"%{User-Agent}i\""
# combined
# LogFormat "%h %l %u %t \"%r\" %>s %O" common
# LogFormat "%{Referer}i -> %U" referer
# LogFormat "%{User-Agent}i" agent
#
# Include of directories ignores editors' and dpkg's backup files,
# see README.Debian for details.
#
# Include generic snippets of statements
IncludeOptional conf-enabled/*.conf
#
# Include the virtual host configurations:
IncludeOptional sites-enabled/*.conf
Include /etc/phpmyadmin/apache.conf
#
# vlm: syntax=apache ts=4 sw=4 sts=4 sr noet
```

9. systemctl restart apache2



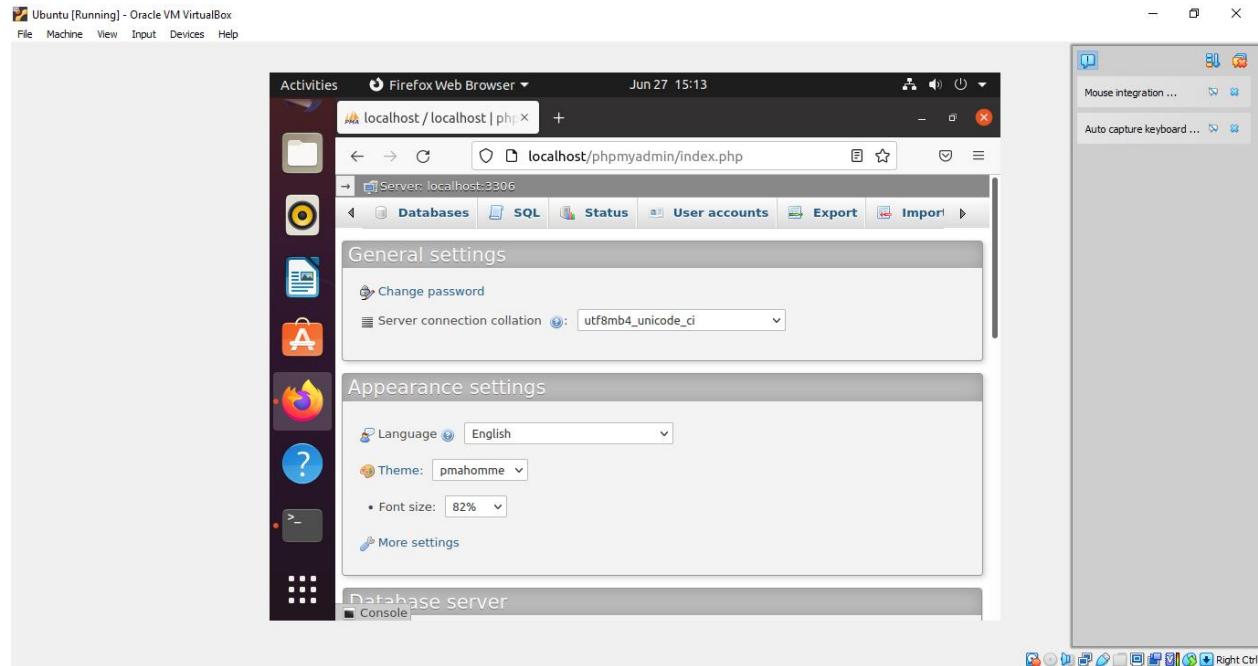
10. Open phpmyadmin



11. Reset Password for root user

```
mysql> alter user root@localhost identified with caching_sha2_password by 'root';
Query OK, 0 rows affected (0.52 sec)

mysql>
```



Result

The program was executed and the result was successfully obtained. Thus, CO3 was obtained.

Experiment No.: 7

Aim

Build and install software from source code, familiarity with make and cmake utilities expected.

CO4

Write shell scripts required for system administration.

Procedure

1. Write a program to find factorial of a number using make utility.

function1.cpp

```
#include <iostream>
#include "functions.h"
int factorial(int n){
    if(n!=1){
        return(n*factorial(n-1));
    }
    else
        return 1;
}
```

function2.cpp

```
#include <iostream>
#include "functions.h"
void print_hello(){
    std::cout << "Hello World!";
}
```

functions.h

```
void print_hello();
int factorial(int n);
```

main.cpp

```
#include <iostream>
#include "functions.h"
int main(){
    print_hello();
    std :: cout << std :: endl;
    std :: cout << "The Factorial of 5 is: " << factorial(5) << std :: endl;
    return 0;
}
```

MakeFile

all:

```
g++ main.cpp function1.cpp function2.cpp -o result
```

Output

```
mca@u15:~/Desktop/make$ ls
function1.cpp  function2.cpp  functions.h  main.cpp  Makefile
mca@u15:~/Desktop/make$ make
g++ main.cpp function1.cpp function2.cpp -o result
mca@u15:~/Desktop/make$ ls
function1.cpp  function2.cpp  functions.h  main.cpp  Makefile  result
mca@u15:~/Desktop/make$ ./result
Hello World!
The Factorial of 5 is: 120
mca@u15:~/Desktop/make$
```

2. Write a program to add two numbers using cmake utility.**add.cpp**

```
#include "add.h"
int add(int a,int b)
{
    return a + b;
}
```

add.h

```
#pragma once
int add(int a ,int b);
```

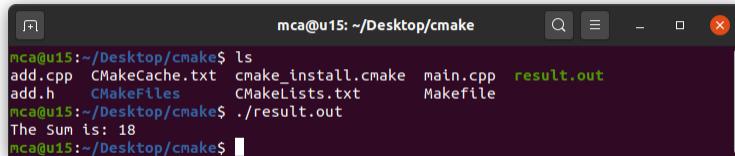
main.cpp

```
#include<iostream>
#include "add.h"
int main()
{
    std::cout << "The Sum is: " << add(12,6) << "\n";
    return 0;
}
```

CMakeLists.txt

```
cmake_minimum_required(VERSION 3.16.3)
project("result")
add_executable(result.out main.cpp add.cpp)
```

Output



A screenshot of a terminal window titled "mca@u15: ~/Desktop/cmake". The window shows the following command-line session:

```
mca@u15:~/Desktop/cmake$ ls
add.cpp  CMakeCache.txt  cmake_install.cmake  main.cpp  result.out
add.h    CMakeFiles      CMakeLists.txt      Makefile
mca@u15:~/Desktop/cmake$ ./result.out
The Sum is: 18
mca@u15:~/Desktop/cmake$
```

Result

The program was executed and the result was successfully obtained. Thus CO4 was obtained.

Experiment No.: 8

Aim

Introduction to command line tools for networking IPv4 networking, network commands: ping route traceroute, nslookup, ip.

CO5

Acquire skill sets required for a DevOps.

Procedure

- 1) Update

```
$ sudo apt update
```

- 2) Install net-tools

```
$ sudo apt install net-tools
```

- 3) If-Congfig – Get network setup information such as IP Address, MAC Address etc

```
$ ifconfig
```

```
mca@u15:~/Desktop$ ifconfig
enp5s0: flags=4163<UP,BROADCAST,RUNNING,MULTICAST> mtu 1500
        inet 192.168.6.185 netmask 255.255.255.0 broadcast 192.168.6.255
              inet6 fe80::1b74:5518:2e80:4cb7 prefixlen 64 scopeid 0x20<link>
                ether 0c:9d:92:0e:8e:08 txqueuelen 1000 (Ethernet)
                  RX packets 1241887 bytes 1843960140 (1.8 GB)
                  RX errors 0 dropped 39 overruns 0 frame 0
                  TX packets 236571 bytes 16506532 (16.5 MB)
                  TX errors 0 dropped 0 overruns 0 carrier 0 collisions 0

lo: flags=73<UP,LOOPBACK,RUNNING> mtu 65536
      inet 127.0.0.1 netmask 255.0.0.0
            inet6 ::1 prefixlen 128 scopeid 0x10<host>
              loop txqueuelen 1000 (Local Loopback)
                RX packets 3045 bytes 327914 (327.9 KB)
                RX errors 0 dropped 0 overruns 0 frame 0
                TX packets 3045 bytes 327914 (327.9 KB)
                TX errors 0 dropped 0 overruns 0 carrier 0 collisions 0
```

- 4) Ifup/Ifdown

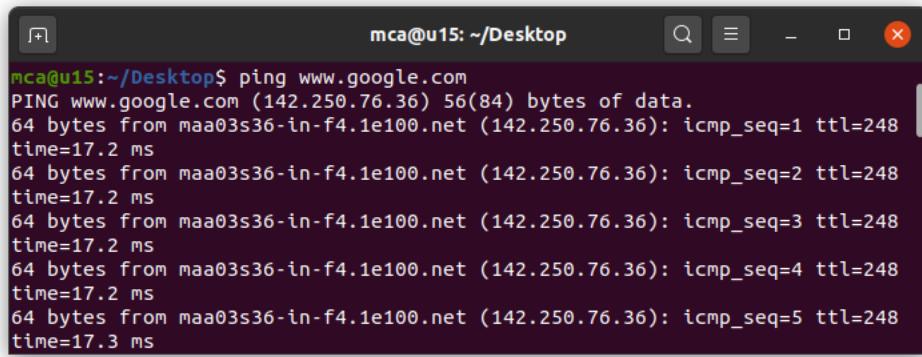
- a) ifup – used to up the network interface
\$ sudo ifup en5s0

- b) ifdown – used to down the network interface
\$ sudo ifdown en5s0

5) ping – used to detect connectivity between host and the server

a) ping <url>

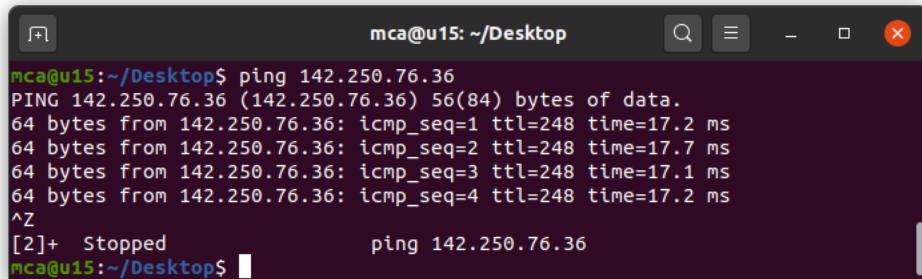
```
$ ping google.com
```



```
mca@u15:~/Desktop$ ping www.google.com
PING www.google.com (142.250.76.36) 56(84) bytes of data.
64 bytes from maa03s36-in-f4.1e100.net (142.250.76.36): icmp_seq=1 ttl=248
time=17.2 ms
64 bytes from maa03s36-in-f4.1e100.net (142.250.76.36): icmp_seq=2 ttl=248
time=17.2 ms
64 bytes from maa03s36-in-f4.1e100.net (142.250.76.36): icmp_seq=3 ttl=248
time=17.2 ms
64 bytes from maa03s36-in-f4.1e100.net (142.250.76.36): icmp_seq=4 ttl=248
time=17.2 ms
64 bytes from maa03s36-in-f4.1e100.net (142.250.76.36): icmp_seq=5 ttl=248
time=17.3 ms
```

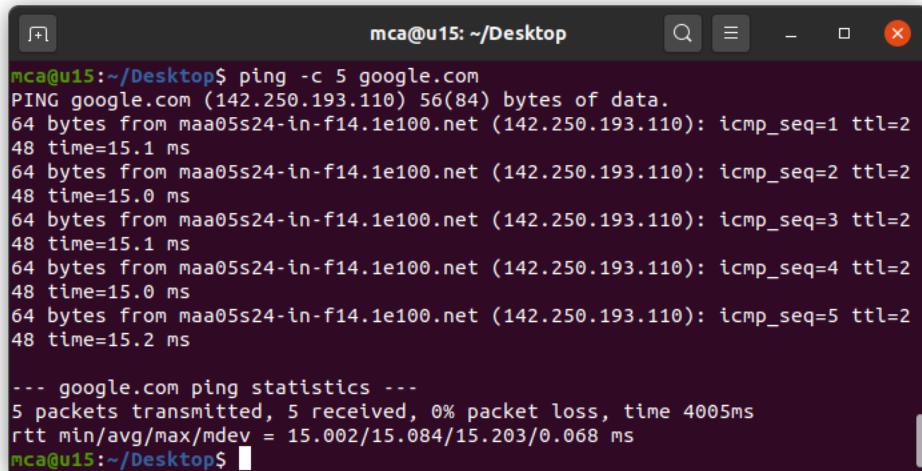
b) ping <ip address>

```
$ ping 142.250.182.78
```



```
mca@u15:~/Desktop$ ping 142.250.76.36
PING 142.250.76.36 (142.250.76.36) 56(84) bytes of data.
64 bytes from 142.250.76.36: icmp_seq=1 ttl=248 time=17.2 ms
64 bytes from 142.250.76.36: icmp_seq=2 ttl=248 time=17.7 ms
64 bytes from 142.250.76.36: icmp_seq=3 ttl=248 time=17.1 ms
64 bytes from 142.250.76.36: icmp_seq=4 ttl=248 time=17.2 ms
^Z
[2]+  Stopped                  ping 142.250.76.36
mca@u15:~/Desktop$
```

c) \$ ping -c 5 google.com



```
mca@u15:~/Desktop$ ping -c 5 google.com
PING google.com (142.250.193.110) 56(84) bytes of data.
64 bytes from maa05s24-in-f14.1e100.net (142.250.193.110): icmp_seq=1 ttl=2
48 time=15.1 ms
64 bytes from maa05s24-in-f14.1e100.net (142.250.193.110): icmp_seq=2 ttl=2
48 time=15.0 ms
64 bytes from maa05s24-in-f14.1e100.net (142.250.193.110): icmp_seq=3 ttl=2
48 time=15.1 ms
64 bytes from maa05s24-in-f14.1e100.net (142.250.193.110): icmp_seq=4 ttl=2
48 time=15.0 ms
64 bytes from maa05s24-in-f14.1e100.net (142.250.193.110): icmp_seq=5 ttl=2
48 time=15.2 ms

--- google.com ping statistics ---
5 packets transmitted, 5 received, 0% packet loss, time 4005ms
rtt min/avg/max/mdev = 15.002/15.084/15.203/0.068 ms
mca@u15:~/Desktop$
```

6) Install Traceroute

```
$ sudo apt install traceroute
```

a) \$ sudo traceroute google.com

```
mca@u15:~$ traceroute google.com
traceroute to google.com (142.250.193.110), 30 hops max, 60 byte packets
 1 _gateway (192.168.6.100)  0.111 ms  0.114 ms  0.100 ms
 2 136.232.57.109 (136.232.57.109)  1.576 ms  1.570 ms  1.742 ms
 3 172.20.97.57 (172.20.97.57)  14.667 ms  14.657 ms  14.921 ms
 4 172.27.9.126 (172.27.9.126)  16.256 ms  16.571 ms  16.520 ms
 5 172.27.9.125 (172.27.9.125)  16.694 ms  17.024 ms  16.465 ms
 6 172.17.97.221 (172.17.97.221)  14.523 ms  14.538 ms  14.491 ms
 7 172.16.5.90 (172.16.5.90)  16.250 ms  16.587 ms  16.557 ms
 8 142.251.55.221 (142.251.55.221)  16.338 ms  142.251.55.234 (142.251.55.234)  17.209 ms  108.170.253.97 (108.170.253.97)  18.019 ms
 9 108.170.253.106 (108.170.253.106)  16.432 ms  142.251.55.223 (142.251.55.223)  16.889 ms  maa05s24-in-f14.1e100.net (142.250.193.110)  15.311 ms
mca@u15:~$
```

7) Install whois

```
$ sudo apt install whois
a) $ whois google.com
```

```
mca@u15:~$ whois google.com
Domain Name: GOOGLE.COM
Registry Domain ID: 2138514_DOMAIN_COM-VRSN
Registrar WHOIS Server: whois.markmonitor.com
Registrar URL: http://www.markmonitor.com
Updated Date: 2019-09-09T15:39:04Z
Creation Date: 1997-09-15T04:00:00Z
Registry Expiry Date: 2028-09-14T04:00:00Z
Registrar: MarkMonitor Inc.
Registrar IANA ID: 292
Registrar Abuse Contact Email: abusecomplaints@markmonitor.com
Registrar Abuse Contact Phone: +1.2086851750
Domain Status: clientDeleteProhibited https://icann.org/epp#clientDeleteProhibited
Domain Status: clientTransferProhibited https://icann.org/epp#clientTransferProhibited
Domain Status: clientUpdateProhibited https://icann.org/epp#clientUpdateProhibited
Domain Status: serverDeleteProhibited https://icann.org/epp#serverDeleteProhibited
Domain Status: serverTransferProhibited https://icann.org/epp#serverTransferProhibited
Domain Status: serverUpdateProhibited https://icann.org/epp#serverUpdateProhibited
Name Server: NS1.GOOGLE.COM
Name Server: NS2.GOOGLE.COM
Name Server: NS3.GOOGLE.COM
Name Server: NS4.GOOGLE.COM
DNSSEC: unsigned
URL of the ICANN Whois Inaccuracy Complaint Form: https://www.icann.org/wicf/
>>> Last update of whois database: 2023-06-13T09:19:59Z <<
```

8) Nslookup

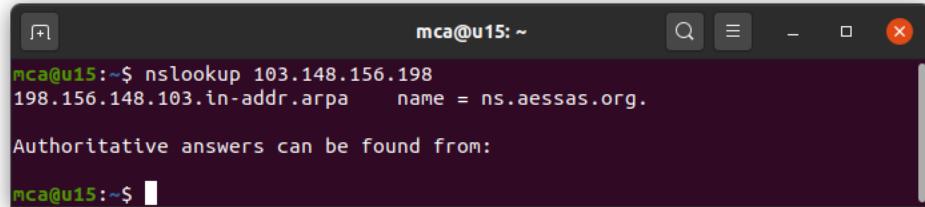
```
a) $ nslookup aesajce.in
```

```
mca@u15:~$ nslookup aesajce.in
Server:      127.0.0.53
Address:     127.0.0.53#53

Non-authoritative answer:
Name:   aesajce.in
Address: 103.148.156.198

mca@u15:~$
```

b) \$ nslookup 103.148.156.198



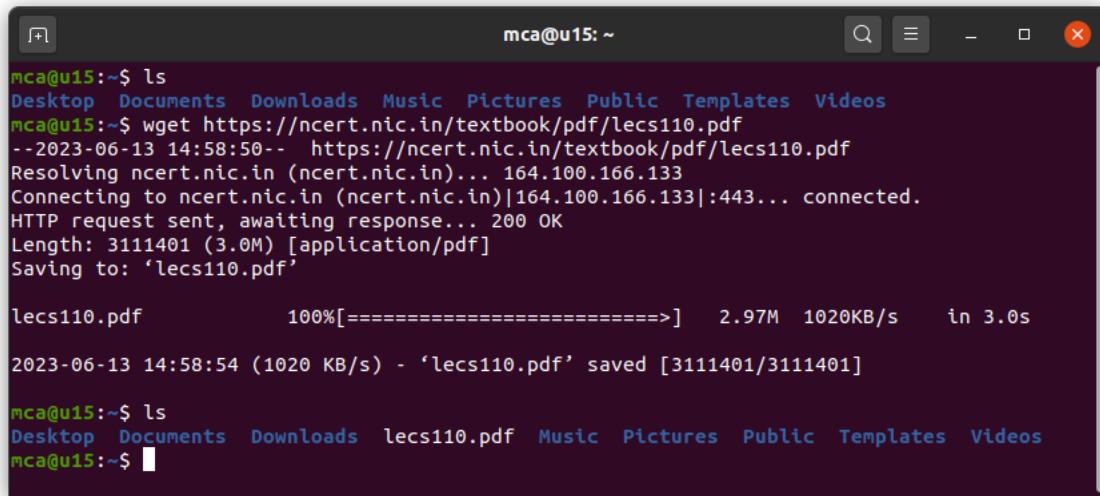
```
mca@u15:~$ nslookup 103.148.156.198
198.156.148.103.in-addr.arpa    name = ns.aessas.org.

Authoritative answers can be found from:
mca@u15:~$
```

A terminal window titled "mca@u15: ~". It displays the command "nslookup 103.148.156.198" followed by its output. The output shows an authoritative answer for the domain "ns.aessas.org." from the IP address "198.156.148.103". The window has standard Linux terminal icons at the top.

9) wget

\$ wget <https://bjpcjp.github.ip/pdfs/devops/linux-commands-handbook.pdf>



```
mca@u15:~$ ls
Desktop  Documents  Downloads  Music  Pictures  Public  Templates  Videos
mca@u15:~$ wget https://ncert.nic.in/textbook/pdf/lecs110.pdf
--2023-06-13 14:58:50--  https://ncert.nic.in/textbook/pdf/lecs110.pdf
Resolving ncert.nic.in (ncert.nic.in)... 164.100.166.133
Connecting to ncert.nic.in (ncert.nic.in)|164.100.166.133|:443... connected.
HTTP request sent, awaiting response... 200 OK
Length: 3111401 (3.0M) [application/pdf]
Saving to: 'lecs110.pdf'

lecs110.pdf          100%[=====] 2.97M 1020KB/s   in 3.0s
2023-06-13 14:58:54 (1020 KB/s) - 'lecs110.pdf' saved [3111401/3111401]

mca@u15:~$ ls
Desktop  Documents  Downloads  lecs110.pdf  Music  Pictures  Public  Templates  Videos
mca@u15:~$
```

A terminal window titled "mca@u15: ~". It shows the execution of the "wget" command to download a PDF file named "lecs110.pdf" from the URL "https://ncert.nic.in/textbook/pdf/lecs110.pdf". The progress bar indicates the download is complete at 100%. The window then lists the contents of the current directory, which includes the downloaded PDF file. The window has standard Linux terminal icons at the top.

Result

The program was executed and the result was successfully obtained. Thus CO5 was obtained.

Experiment No.: 9

Aim

Analysing network packet stream using tcpdump and wireshark. Perform basic network service tests using nc.

CO5

Acquire skill sets required for a DevOps.

Procedure

tcpdump – capture packets of current network in terface along with time

a) \$ sudo tcpdump

```
mca@u15:~$ sudo tcpdump
[sudo] password for mca:
tcpdump: verbose output suppressed, use -v or -vv for full protocol decode
listening on enp5s0, link-type EN10MB (Ethernet), capture size 262144 bytes
15:10:36.967767 ARP, Request who-has 192.168.1.1 tell 192.168.1.1, length 46
15:10:36.969867 ARP, Reply 192.168.1.1 is-at d8:94:03:38:83:40 (oui Unknown), length 46
15:10:36.970949 IP u15.42943 > dns.google.domain: 42239+ [1au] PTR? 1.1.168.192.in-addr.arpa. (53)
15:10:36.973368 ARP, Request who-has 192.168.6.143 tell 192.168.6.137, length 46
15:10:36.987006 IP dns.google.domain > u15.42943: 42239 NXDomain 0/0/1 (53)
15:10:36.987237 IP u15.42943 > dns.google.domain: 42239+ PTR? 1.1.168.192.in-addr.arpa. (42)
15:10:37.003049 IP dns.google.domain > u15.42943: 42239 NXDomain 0/0/0 (42)
15:10:37.004280 IP u15.51078 > dns.google.domain: 33953+ [1au] PTR? 8.8.8.8.in-addr.arpa. (49)
15:10:37.020003 IP dns.google.domain > u15.51078: 33953 1/0/1 PTR dns.google. (73)
15:10:37.020929 IP u15.41518 > dns.google.domain: 34358+ [1au] PTR? 185.6.168.192.in-addr.arpa. (55)
15:10:37.022584 IP 192.168.6.126.netbios-dgm > 192.168.6.255.netbios-dgm: UDP, length 201
```

b) \$ sudo tcpdump -D

```
mca@u15:~$ sudo tcpdump -D
1.enp5s0 [Up, Running]
2.lo [Up, Running, Loopback]
3.any (Pseudo-device that captures on all interfaces) [Up, Running]
4.bluetooth-monitor (Bluetooth Linux Monitor) [none]
5.nflog (Linux netfilter log (NFLOG) interface) [none]
6.nfqueue (Linux netfilter queue (NFQUEUE) interface) [none]
```

c) \$ sudo -c 3 -i enp5s0

```
mca@u15:~$ sudo -c 3 -i enp5s0
usage: sudo -h | -K | -k | -V
usage: sudo -v [-AknS] [-g group] [-h host] [-p prompt] [-u user]
usage: sudo -l [-AknS] [-g group] [-h host] [-p prompt] [-U user] [-u user] [command]
usage: sudo [-AbEHknPS] [-r role] [-t type] [-C num] [-g group] [-h host] [-p prompt] [-T timeout]
          [-u user] [VAR=value] [-i|-s] [<command>]
usage: sudo -e [-AknS] [-r role] [-t type] [-C num] [-g group] [-h host] [-p prompt] [-T timeout]
          [-u user] file ...
```

S

d) \$ sudo tcpdump -A -i en5s0

```
mca@u15:~$ sudo tcpdump -A -i en5s0
tcpdump: verbose output suppressed, use -v or -vv for full protocol decode
listening on en5s0, link-type EN10MB (Ethernet), capture size 262144 bytes
15:27:48.524146 ARP, Request who-has 192.168.6.145 tell 192.168.6.56, length 46
.....x$...i...8.....
15:27:48.524754 ARP, Request who-has 192.168.6.2 tell _gateway, length 46
.....kT....d.....
15:27:48.525466 ARP, Request who-has 192.168.6.110 tell _gateway, length 46
.....kT....d....n.....
15:27:48.525762 IP u15.44232 > dns.google.domain: 61178+ [1au] PTR? 145.6.168.192.in-addr.arpa. (55)
E..S..@.j0.....5.?.....145.6.168.192.in-addr.arpa.....).
15:27:48.542661 IP dns.google.domain > u15.44232: 61178 NXDomain 0/0/1 (55)
E..S.....5....?.....145.6.168.192.in-addr.arpa.....).
15:27:48.542900 IP u15.44232 > dns.google.domain: 61178+ PTR? 145.6.168.192.in-addr.arpa. (44)
E..H..@.j.....5.4.....145.6.168.192.in-addr.arpa.....
```

e) \$ sudo tcpdump -XX -i en5s0

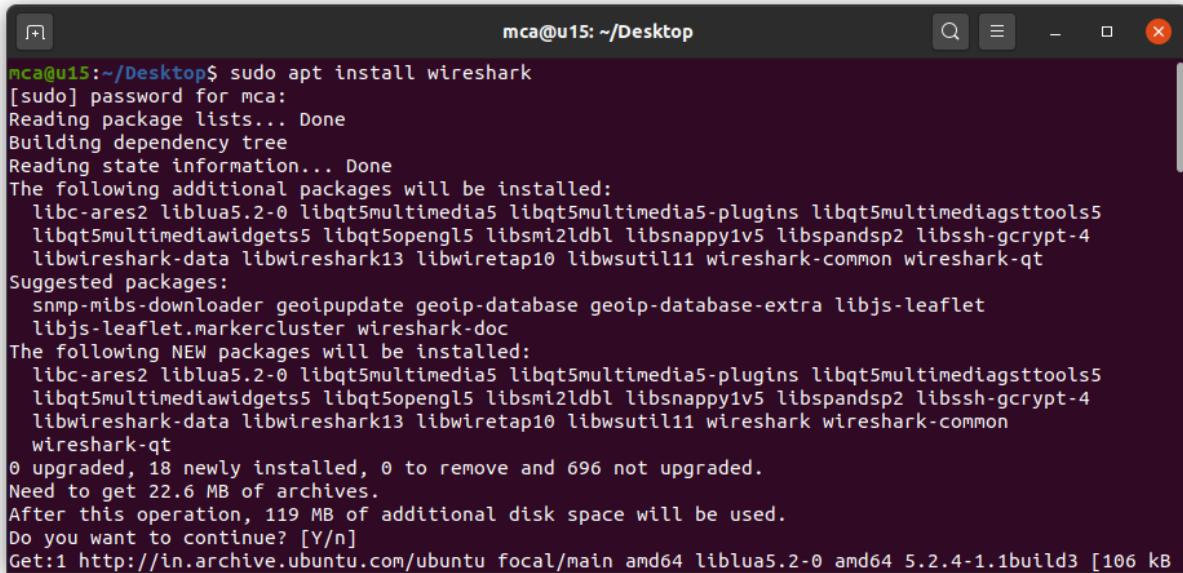
```
mca@u15:~$ sudo tcpdump -XX -i en5s0
tcpdump: verbose output suppressed, use -v or -vv for full protocol decode
listening on en5s0, link-type EN10MB (Ethernet), capture size 262144 bytes
15:28:33.525444 ARP, Request who-has 192.168.6.145 tell _gateway, length 46
    0x0000: ffff ffff 001a 8c6b 54cf 0806 0001 .....kT....
    0x0010: 0800 0604 0001 001a 8c6b 54cf c0a8 0664 .....kT....d
    0x0020: 0000 0000 0000 c0a8 0691 0000 0000 0000 .....n.....
    0x0030: 0000 0000 0000 0000 0000 0000 0000 0000 .....n.....
15:28:33.526959 IP u15.35469 > dns.google.domain: 51013+ [1au] PTR? 145.6.168.192.in-addr.arpa. (55)
    0x0000: 001a 8c6b 54cf 0c9d 920e 8e08 0800 4500 ...kT.....E.
    0x0010: 0053 1c9c 4000 4011 468d c0a8 06b9 0808 .S..@.F.....
    0x0020: 0808 8a8d 0035 003f d7c1 c745 0100 0001 .....5.?..E....
    0x0030: 0000 0000 0001 0331 3435 0136 0331 3638 .....145.6.168
    0x0040: 0331 3932 0769 6e2d 6164 6472 0461 7270 .192.in-addr.arp
    0x0050: 6100 000c 0001 0000 2902 0000 0000 0000 a.....).
    0x0060: 00 ..
```

f) \$ sudo tcpdump -w log.text -i en5s0

```
mca@u15:~$ sudo tcpdump -w log.text -i en5s0
tcpdump: listening on en5s0, link-type EN10MB (Ethernet), capture size 262144 bytes
^Z
[5]+  Stopped                  sudo tcpdump -w log.text -i en5s0
mca@u15:~$
```

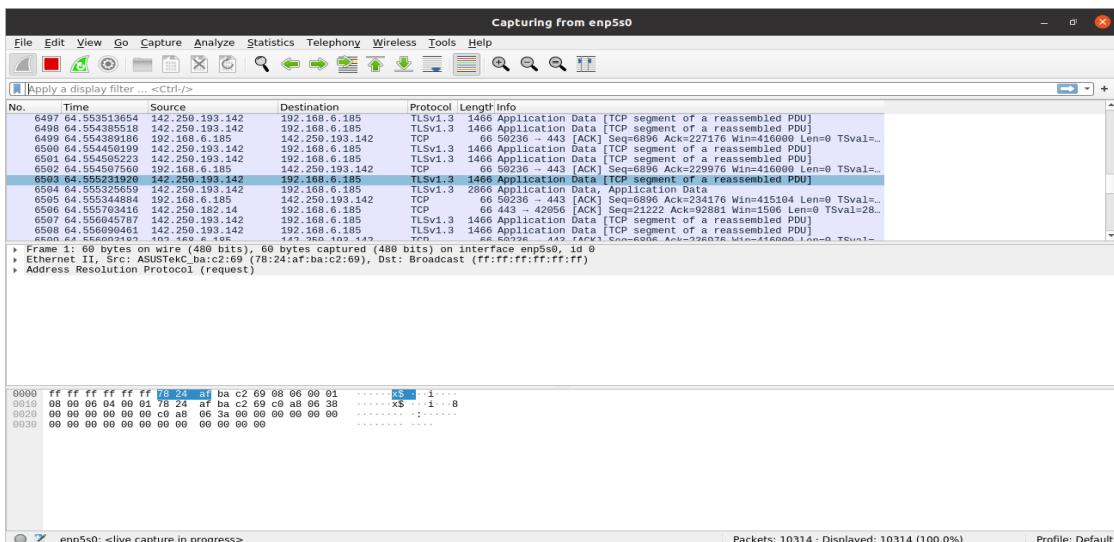
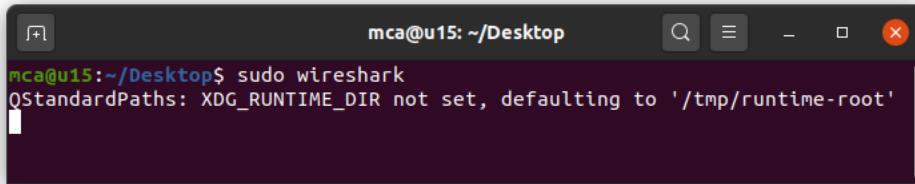
Install Wireshark

a) \$ sudo apt install wireshark



```
mca@u15:~/Desktop$ sudo apt install wireshark
[sudo] password for mca:
Reading package lists... Done
Building dependency tree
Reading state information... Done
The following additional packages will be installed:
  libc-ares2 libblua5.2-0 libqt5multimedia5 libqt5multimedia5-plugins libqt5multimediasstools5
  libqt5multimediacwidget5 libqt5opengl5 libsmi2ldbl libsnappy1v5 libspandsp2 libssh-gcrypt-4
  libwireshark-data libwireshark13 libwiretap10 libwsutil11 wireshark-common wireshark-qt
Suggested packages:
  snmp-mibs-downloader geoipupdate geoip-database geoip-database-extra libjs-leaflet
  libjs-leaflet.markercluster wireshark-doc
The following NEW packages will be installed:
  libc-ares2 libblua5.2-0 libqt5multimedia5 libqt5multimedia5-plugins libqt5multimediasstools5
  libqt5multimediacwidget5 libqt5opengl5 libsmi2ldbl libsnappy1v5 libspandsp2 libssh-gcrypt-4
  libwireshark-data libwireshark13 libwiretap10 libwsutil11 wireshark wireshark-common
  wireshark-qt
0 upgraded, 18 newly installed, 0 to remove and 696 not upgraded.
Need to get 22.6 MB of archives.
After this operation, 119 MB of additional disk space will be used.
Do you want to continue? [Y/n]
Get:1 http://in.archive.ubuntu.com/ubuntu focal/main amd64 libblua5.2-0 amd64 5.2.4-1.1build3 [106 kB]
```

b) \$ sudo wireshark



Result

The program was executed and the result was successfully obtained. Thus CO5 was obtained.

Experiment No.: 10

Aim

Installation of KVM and perform basic KVM Commands

CO3

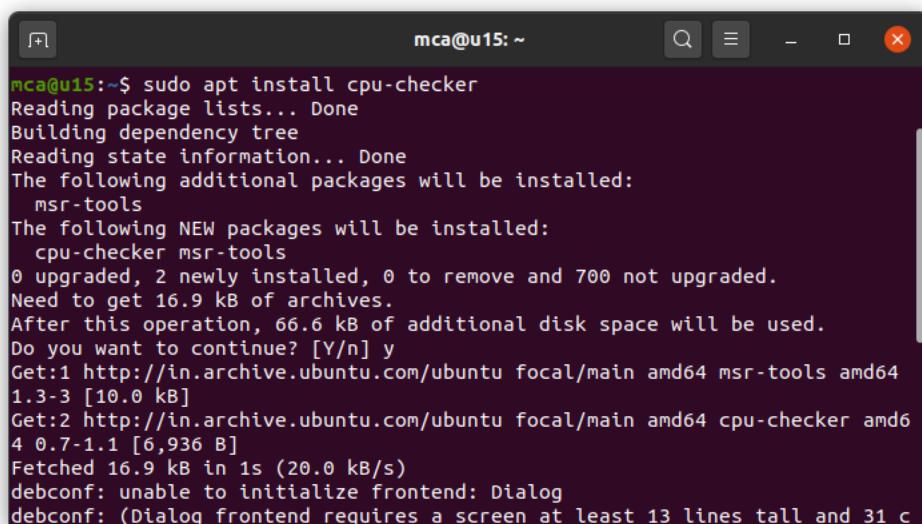
Install and manage servers for web applications.

Procedure

Installing KVM/QEMU

1. Install CPU Info Checker

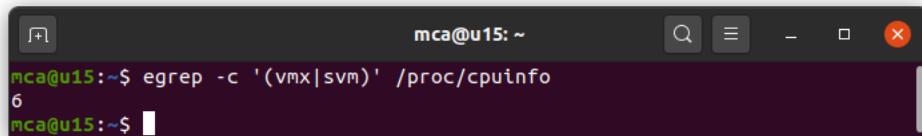
```
$ sudo apt install cpu-checker
```



```
mca@u15:~$ sudo apt install cpu-checker
Reading package lists... Done
Building dependency tree
Reading state information... Done
The following additional packages will be installed:
  msr-tools
The following NEW packages will be installed:
  cpu-checker msr-tools
0 upgraded, 2 newly installed, 0 to remove and 700 not upgraded.
Need to get 16.9 kB of archives.
After this operation, 66.6 kB of additional disk space will be used.
Do you want to continue? [Y/n] y
Get:1 http://in.archive.ubuntu.com/ubuntu focal/main amd64 msr-tools amd64 1.3-3 [10.0 kB]
Get:2 http://in.archive.ubuntu.com/ubuntu focal/main amd64 cpu-checker amd64 4.0.7-1.1 [6,936 B]
Fetched 16.9 kB in 1s (20.0 kB/s)
debconf: unable to initialize frontend: Dialog
debconf: (Dialog frontend requires a screen at least 13 lines tall and 31 c
```

2. Check CPU Info

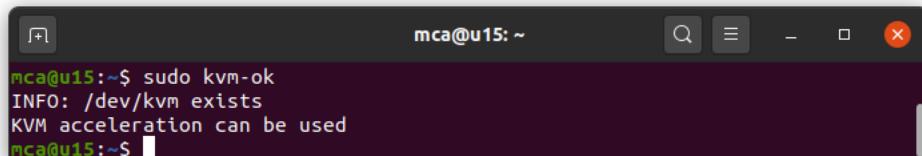
```
$ egrep -c '(vmx|svm)' /proc/cpuinfo
```



```
mca@u15:~$ egrep -c '(vmx|svm)' /proc/cpuinfo
6
mca@u15:~$
```

3. Check KVM Status

```
$ sudo kvm-ok
```



```
mca@u15:~$ sudo kvm-ok
INFO: /dev/kvm exists
KVM acceleration can be used
mca@u15:~$
```

4. Install QEMU/KVM and libvirt

```
$ sudo apt install qemu-kvm libvirt-daemon-system libvirt-clients bridge-utils
```

```
mca@u15:~$ sudo apt install qemu-kvm libvirt-daemon-system libvirt-clients bridge-utils
Reading package lists... Done
Building dependency tree
Reading state information... Done
The following additional packages will be installed:
dmeventd ibverbs-providers ipxe-qemu ipxe-qemu-256k-compat-efi-roms libaio1 libcacard0
libdevmapper-event1.02.1 libfdt1 libibverbs1 libiscsi1 liblvm2cmd2.03
libnss-mymachines libnss-systemd libpmem1 librados2 librbd1 librdmacm1
libreadline5 libslirp0 libspice-server1 libsystemd0 libusbredirparser1
libvirglrenderer1 libvirt-daemon libvirt-daemon-driver-qemu
libvirt-daemon-storage-rbd libvirt-daemon-systemd libvirt0 libxml2-utils
lvm2 ovmf qemu-block-extra qemu-system-common qemu-system-data qemu-system-gui
qemu-system-x86 qemu-utils seabios sharutils systemd systemd-container systemd-sysv
systemd-timesyncd thin-provisioning-tools
Suggested packages:
gstreamer1.0-plugins-ugly libvirt-daemon-driver-lxc libvirt-daemon-driver-vbox
```

5. Enable libvirt

```
$ sudo systemctl enable --now libvirtd
```

6. Check libvirt Status

```
$ sudo systemctl status libvirtd
```

```
mca@u15:~$ sudo systemctl status libvirtd
● libvirtd.service - Virtualization daemon
   Loaded: loaded (/lib/systemd/system/libvirtd.service; enabled; vendor preset: enabled)
   Active: active (running) since Thu 2023-06-15 12:11:50 IST; 7min ago
TriggeredBy: ● libvirtd-ro.socket
● libvirtd-admin.socket
● libvirtd.socket
   Docs: man:libvirtd(8)
         https://libvirt.org
 Main PID: 7777 (libvirtd)
   Tasks: 19 (limit: 32768)
  Memory: 16.8M
 CGroup: /system.slice/libvirtd.service
         └─7777 /usr/sbin/libvirtd
              ├─7936 /usr/sbin/dnsmasq --conf-file=/var/lib/libvirt/dnsmasq/default.conf --leasefile-ro --dhcp-script=/usr/lib/libvirt/libvirt-dnsmasq
              ├─7937 /usr/sbin/dnsmasq --conf-file=/var/lib/libvirt/dnsmasq/default.conf --leasefile-ro --dhcp-script=/usr/lib/libvirt/libvirt-dnsmasq
```

7. Install virt-manager

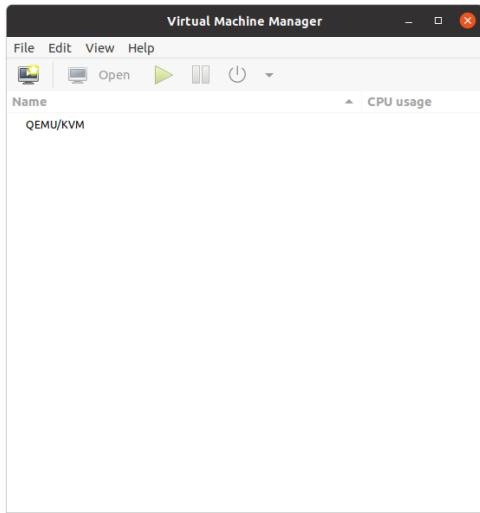
```
$ sudo apt install virt-manager
```

```
mca@u15:~$ sudo apt install virt-manager
Reading package lists... Done
Building dependency tree
Reading state information... Done
The following additional packages will be installed:
gir1.2-appindicator3.0-0.1 gir1.2-glib-1.0 gir1.2-spiceclientglib-2.0
gir1.2-spiceclientglib-2.0-0 gir1.2-spiceclientglib-2.0-0 libgovirt-common libgovirt2 libgtk-vnc-2.0-0 libgvnc-1.0-0
libigdgmm11 libllvm12 libosinfo-1.0-0 libphodav-2.0-0 libphodav-2.0-0-common libspice-client-glib-2.0-8 libspice-client-gtk-3.0-5
libusbredirhost1 libvba-x11-2 libvba2 libvirt-glib-1.0-0 mesa-va-drivers osinfo-db python3-distutils python3-lib2to3 python3-libvirt
python3-libxml2 spice-client-glib-usb-acl-helper va-driver-all virt-viewer virtinst
Suggested packages:
i965-va-driver-shaders libosinfo-l10n gstreamer1.0-libav gstreamer1.0-plugins-bad python3-guestfs ssh-askpass
The following NEW packages will be installed:
gir1.2-appindicator3.0-0.1 gir1.2-glib-1.0 gir1.2-spiceclientglib-2.0
gir1.2-spiceclientglib-2.0-0 gir1.2-spiceclientglib-2.0-0 libgovirt2 libgtk-vnc-2.0-0 libgvnc-1.0-0 libigdgmm11
libllvm12 libosinfo-1.0-0 libphodav-2.0-0 libphodav-2.0-0-common libspice-client-glib-2.0-8 libspice-client-gtk-3.0-5 libusbredirhost1
libvba-x11-2 libvba2 libvirt-glib-1.0-0 mesa-va-drivers osinfo-db python3-distutils python3-libvirt python3-libxml2
spice-client-glib-usb-acl-helper va-driver-all virt-manager virt-viewer virtinst
The following packages will be upgraded:
```

8. Launch virt-manager

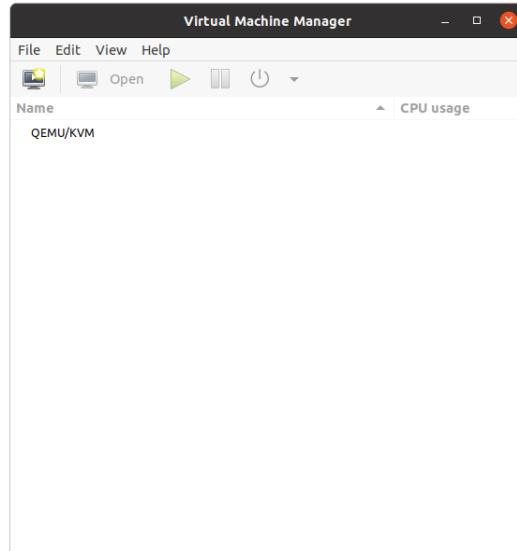
```
$ sudo virt-manager
```

```
mca@u15:~$ sudo virt-manager
mca@u15:~$
```

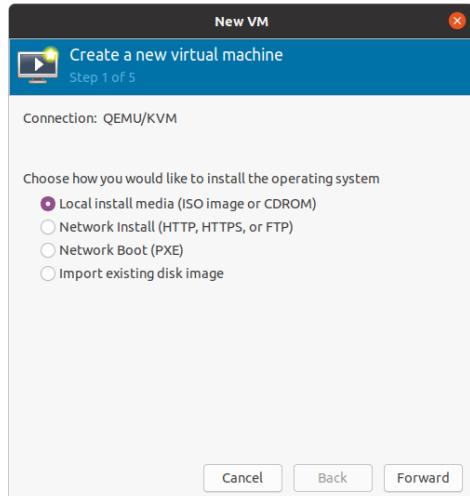


Installing VM - using ISO image

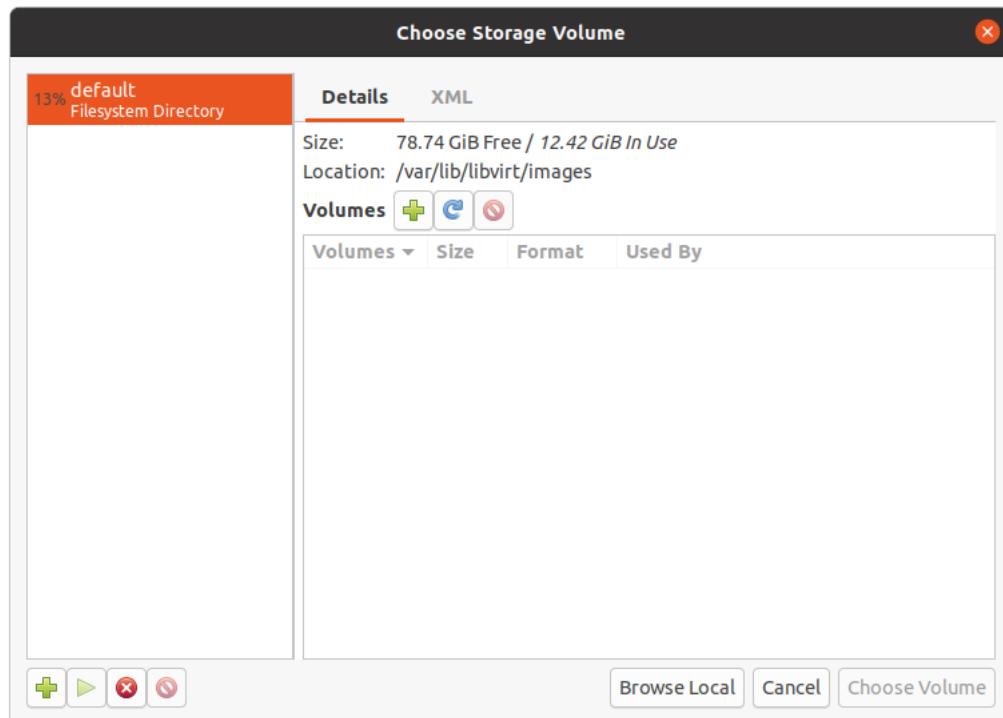
1. Launch QEMU/KVM



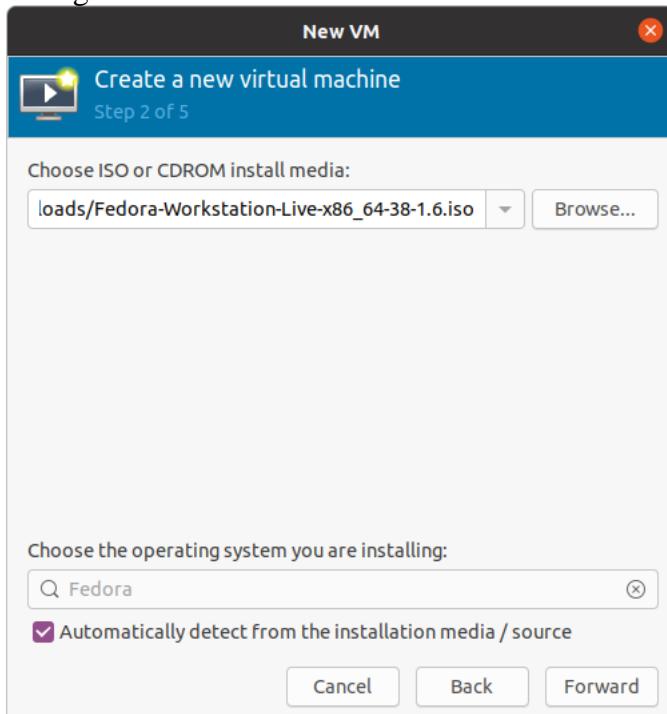
2. Create new Virtual Machine



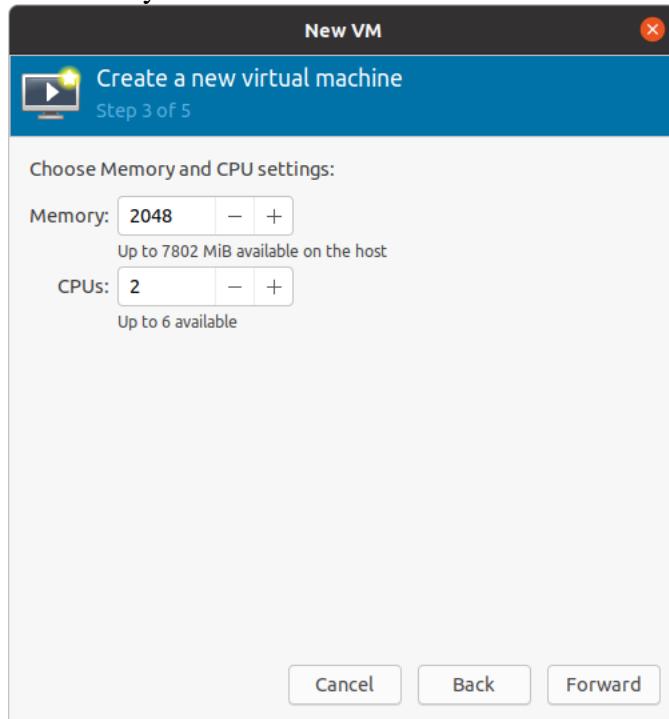
3. Choose Storage Volume



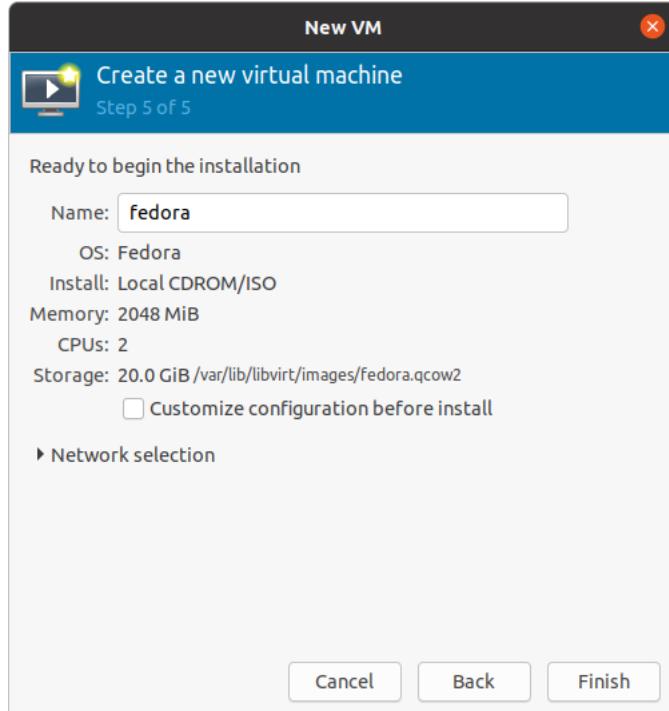
4. Choose the ISO Image to Install



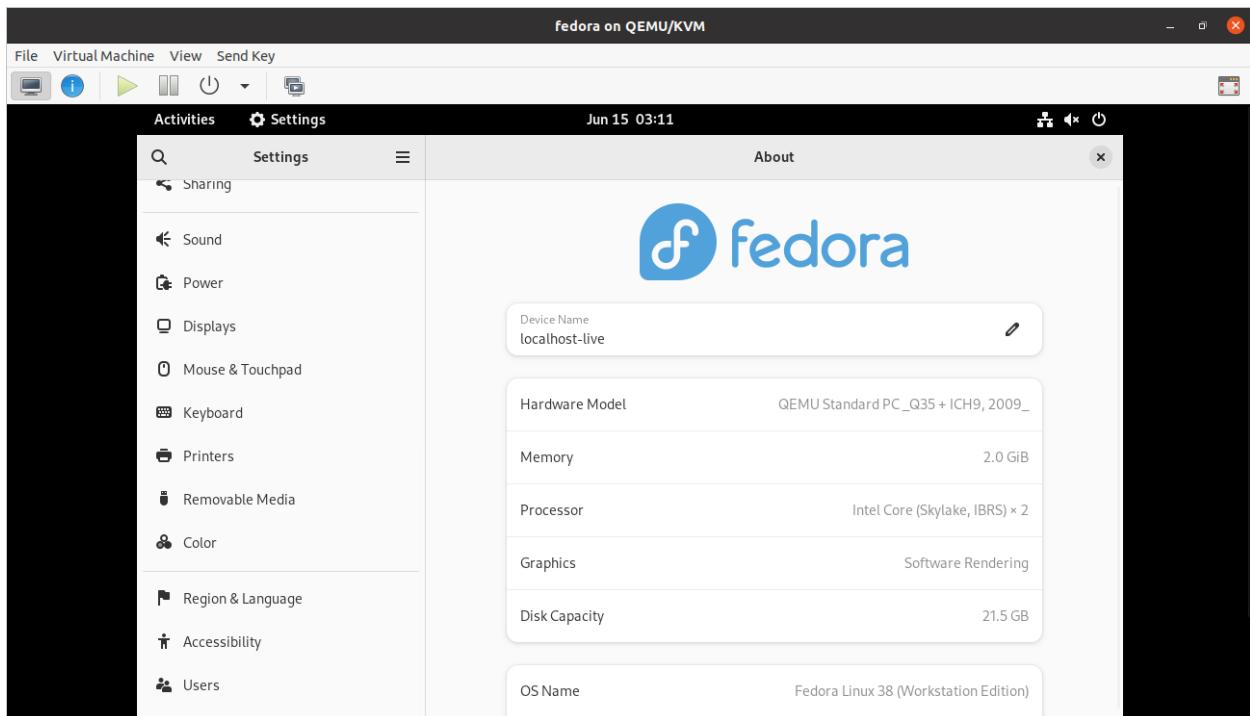
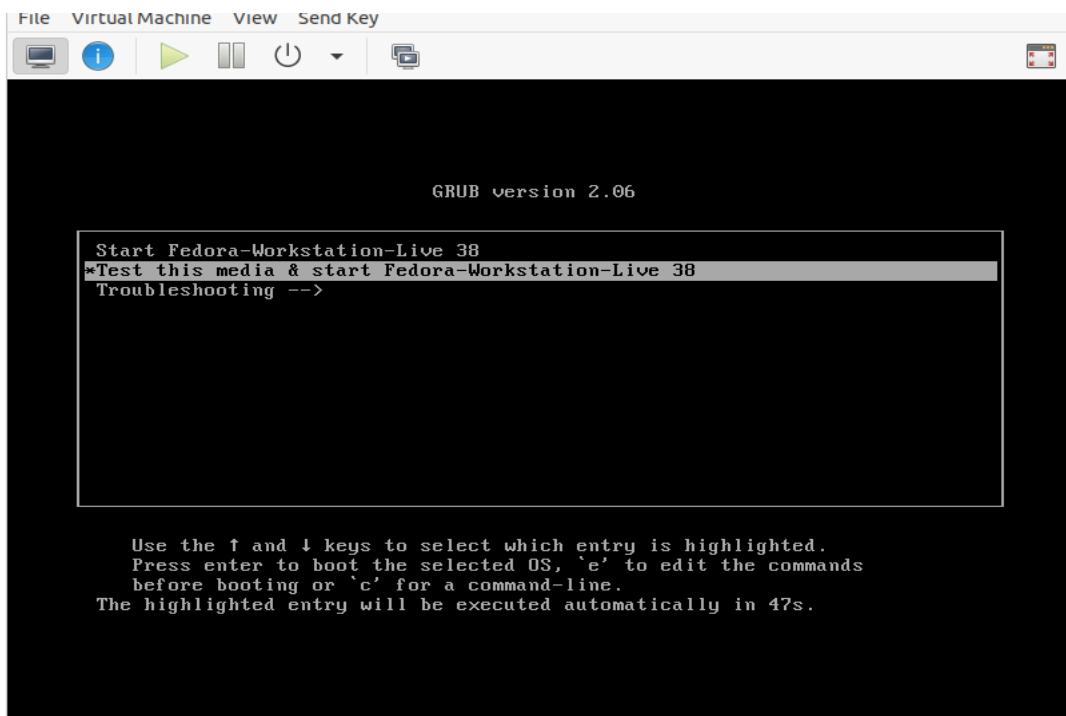
5. Configure Memory and CPU



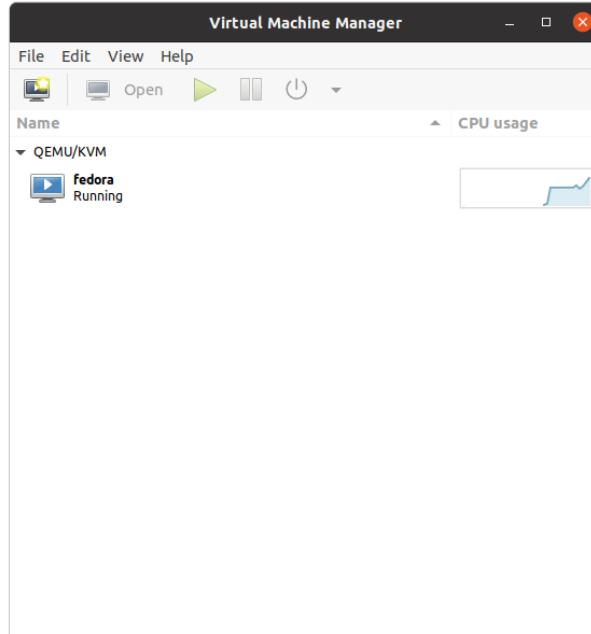
6. Configure the VM Name



7. Installation



8. Virt-Manger Status



Managing VMs using Virt-Manager

1. List all VMs

```
$ sudo virsh list --all
```

```
mca@u53:~$ sudo virsh list --all
Id  Name      State
--- 
-   debian-vm  shut off
-   ubuntu     shut off
```

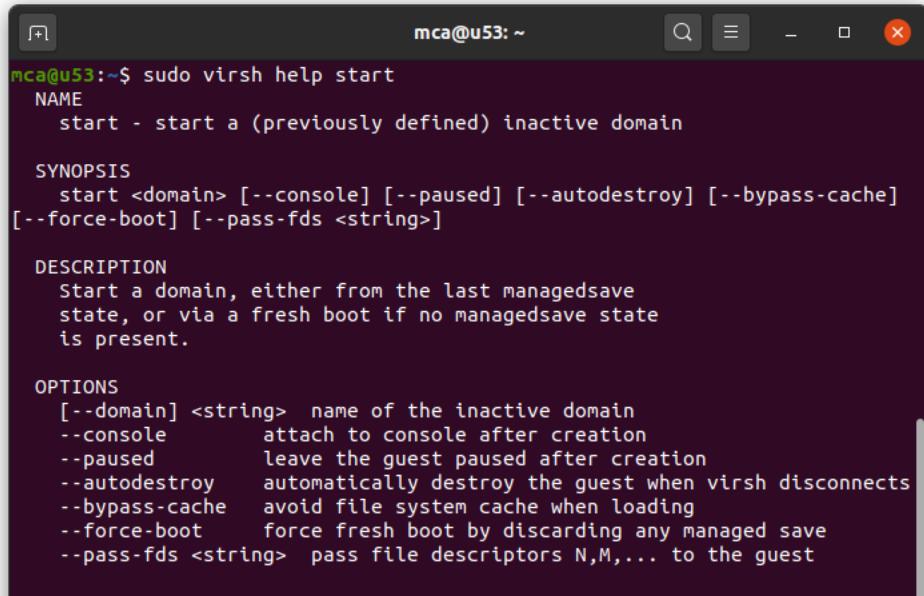
2. Display the Node Information

```
$ sudo virsh nodeinfo
```

```
mca@u53:~$ sudo virsh nodeinfo
CPU model:          x86_64
CPU(s):             6
CPU frequency:     2800 MHz
CPU socket(s):     1
Core(s) per socket: 6
Thread(s) per core: 1
NUMA cell(s):       1
Memory size:        7977500 KiB
```

3. Display Help Options

```
$ sudo virsh help start
```



```
mca@u53:~$ sudo virsh help start
NAME
  start - start a (previously defined) inactive domain

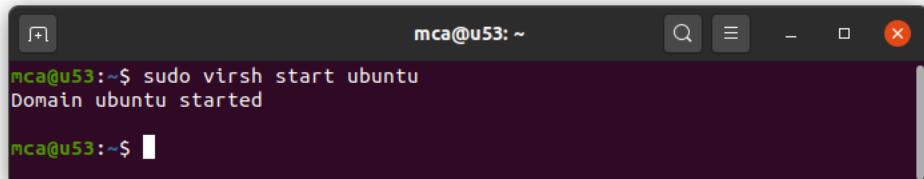
SYNOPSIS
  start <domain> [--console] [--paused] [--autodestroy] [--bypass-cache]
  [--force-boot] [--pass-fds <string>]

DESCRIPTION
  Start a domain, either from the last managedsave
  state, or via a fresh boot if no managedsave state
  is present.

OPTIONS
  [--domain] <string>  name of the inactive domain
  --console          attach to console after creation
  --paused           leave the guest paused after creation
  --autodestroy      automatically destroy the guest when virsh disconnects
  --bypass-cache    avoid file system cache when loading
  --force-boot       force fresh boot by discarding any managed save
  --pass-fds <string>  pass file descriptors N,M,... to the guest
```

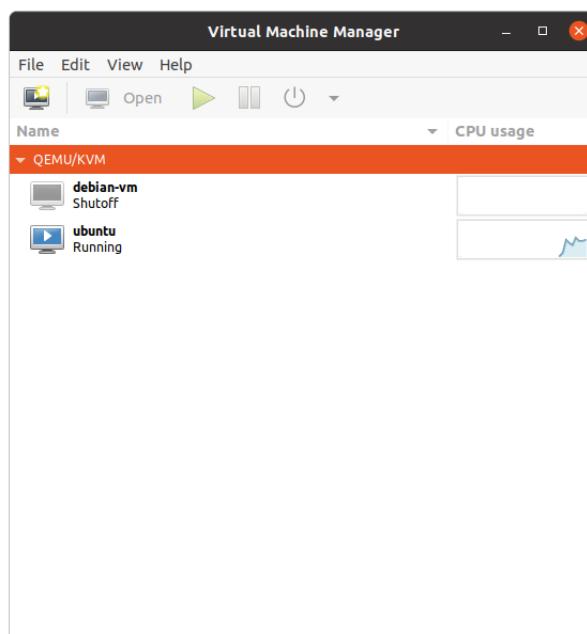
4. Start a VM

```
$ sudo virsh start <vmname>
```



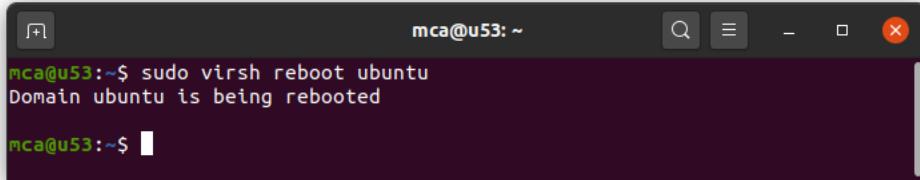
```
mca@u53:~$ sudo virsh start ubuntu
Domain ubuntu started

mca@u53:~$
```



5. Reboot VM

```
$ sudo virsh reboot <vmname>
```

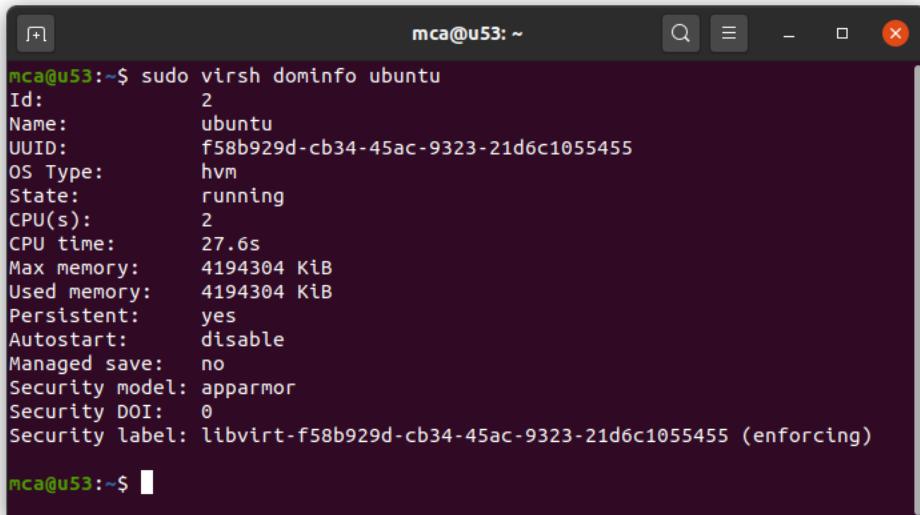


```
mca@u53:~$ sudo virsh reboot ubuntu
Domain ubuntu is being rebooted

mca@u53:~$
```

6. Display Domain Info

```
$ sudo virsh dominfo <vmname>
```

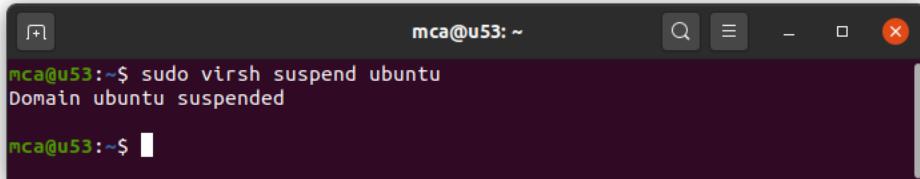


```
mca@u53:~$ sudo virsh dominfo ubuntu
Id: 2
Name: ubuntu
UUID: f58b929d-cb34-45ac-9323-21d6c1055455
OS Type: hvm
State: running
CPU(s): 2
CPU time: 27.6s
Max memory: 4194304 KiB
Used memory: 4194304 KiB
Persistent: yes
Autostart: disable
Managed save: no
Security model: apparmor
Security DOI: 0
Security label: libvirt-f58b929d-cb34-45ac-9323-21d6c1055455 (enforcing)

mca@u53:~$
```

7. Suspend VM

```
$ sudo virsh suspend <vmname>
```

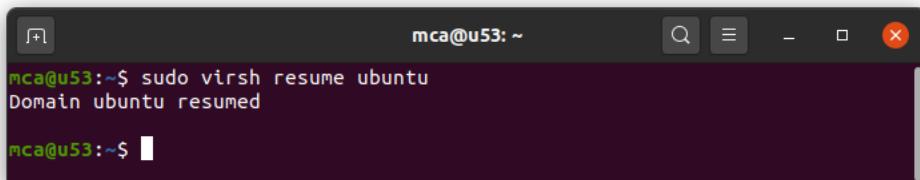


```
mca@u53:~$ sudo virsh suspend ubuntu
Domain ubuntu suspended

mca@u53:~$
```

8. Resume VM

```
$ sudo virsh resume <vmname>
```

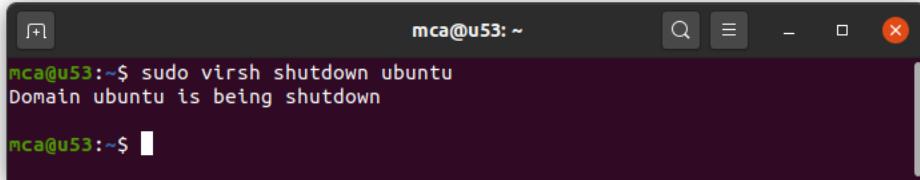


```
mca@u53:~$ sudo virsh resume ubuntu
Domain ubuntu resumed

mca@u53:~$
```

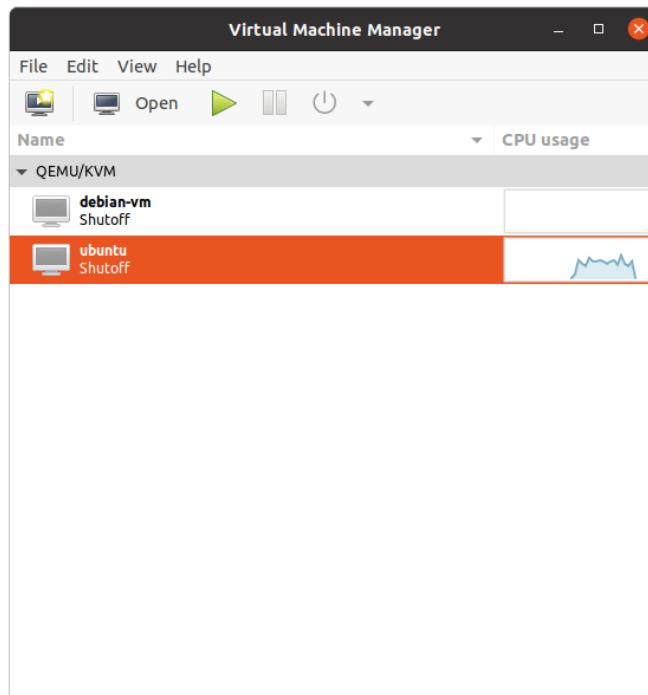
9. Shutdown VM

```
$ sudo virsh shutdown <vmname>
```

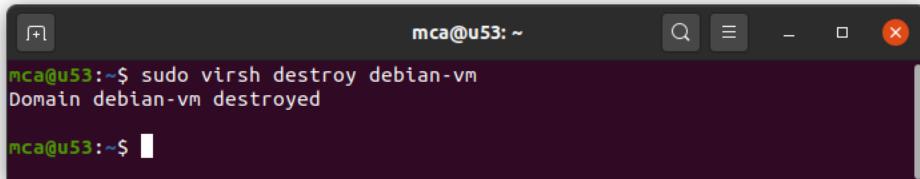


```
mca@u53:~$ sudo virsh shutdown ubuntu
Domain ubuntu is being shutdown

mca@u53:~$
```

**10. Destroy VM**

```
$ sudo virsh destroy <vmname>
```

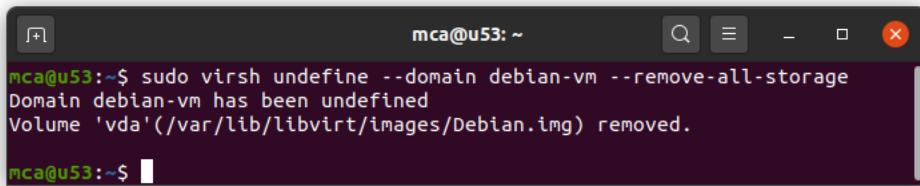


```
mca@u53:~$ sudo virsh destroy debian-vm
Domain debian-vm destroyed

mca@u53:~$
```

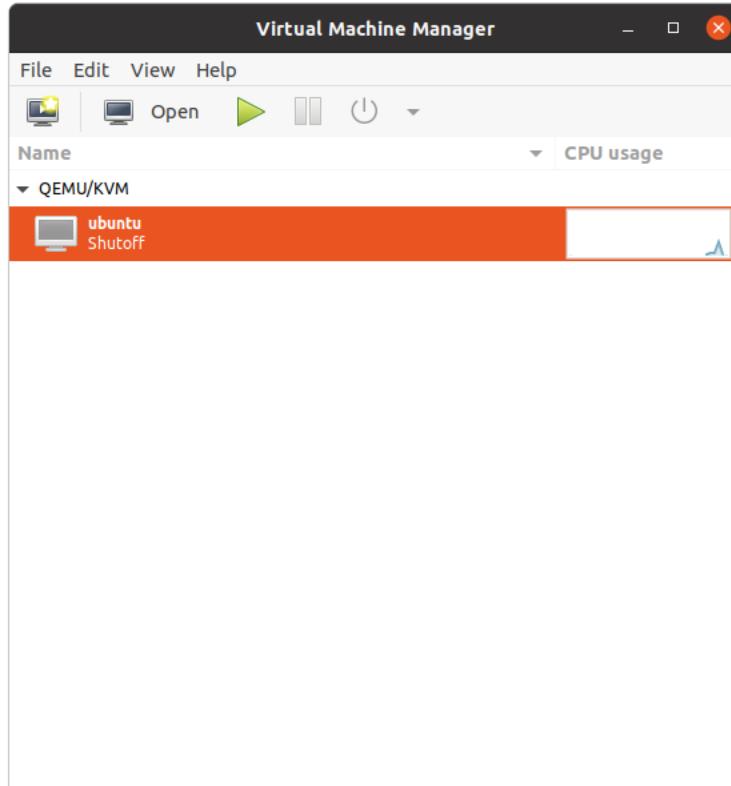
11. Undefine VM

```
$ sudo virsh undefine --domain <vmname> --remove-all-storage
```



```
mca@u53:~$ sudo virsh undefine --domain debian-vm --remove-all-storage
Domain debian-vm has been undefined
Volume 'vda'(/var/lib/libvirt/images/Debian.img) removed.

mca@u53:~$
```



Result

The program was executed and the result was successfully obtained. Thus, CO3 was obtained.

Experiment No.: 11

Aim

Docker, installation and deployment

CO3

Install and manage servers for web applications.

Procedure

1. Connect to AWS EC2 Instance (ap-south-1: Mumbai).

```
C:\Users\vishal\Downloads>ssh -i "newkey.pem" ec2-user@ec2-13-127-130-170.ap-south-1.compute.amazonaws.com
The authenticity of host 'ec2-13-127-130-170.ap-south-1.compute.amazonaws.com' (ECDSA key fingerprint is SHA256:sa8m7CVI6XegCKfLbXXx+WKdRImErQGT+i+VIwBWusQ).
Are you sure you want to continue connecting (yes/no/[fingerprint])? yes
Warning: Permanently added 'ec2-13-127-130-170.ap-south-1.compute.amazonaws.com' (ECDSA) to the list of known hosts.

[ec2-user@ip-172-31-37-59 ~]$
```

2. Docker Installation

```
$ sudo su
# yum install docker -y
```

```
[ec2-user@ip-172-31-37-59 ~]$ sudo su
[root@ip-172-31-37-59 ec2-user]# yum install docker -y
Loaded plugins: extras_suggestions, langpacks, priorities, update-motd
Resolving Dependencies
--> Running transaction check
--> Package docker.x86_64 0:20.10.23-1.amzn2.0.1 will be installed
--> Processing Dependency: runc >= 1.0.0 for package: docker-20.10.23-1.amzn2.0.1.x86_64
--> Processing Dependency: libcgroup >= 0.40.rc1-5.15 for package: docker-20.10.23-1.amzn2.0.1.x86_64
--> Processing Dependency: containerd >= 1.3.2 for package: docker-20.10.23-1.amzn2.0.1.x86_64
--> Processing Dependency: pigz for package: docker-20.10.23-1.amzn2.0.1.x86_64
--> Running transaction check
--> Package containerd.x86_64 0:1.6.19-1.amzn2.0.3 will be installed
--> Package libcgroup.x86_64 0:0.41-21.amzn2 will be installed
--> Package pigz.x86_64 0:2.3.4-1.amzn2.0.1 will be installed
--> Package runc.x86_64 0:1.1.7-3.amzn2 will be installed
--> Finished Dependency Resolution

Dependencies Resolved

=====
Size
=====
docker           x86_64      20.10.23-1.amzn2.0.1          amzn2extra-docker      41 M
Installing for dependencies:
containerd       x86_64      1.6.19-1.amzn2.0.3          amzn2extra-docker      28 M
libcgroup        x86_64      0.41-21.amzn2              amzn2-core               66 k
pigz             x86_64      2.3.4-1.amzn2.0.1          amzn2-core               81 k
runc             x86_64      1.1.7-3.amzn2              amzn2extra-docker      3.0 M

Transaction Summary
=====
```

3. Docker Version

```
# docker --version
```

```
[root@ip-172-31-37-59 ec2-user]# docker --version
Docker version 20.10.23, build 7155243
[root@ip-172-31-37-59 ec2-user]# -
```

4. Docker Path

```
# which docker
```

```
[root@ip-172-31-37-59 ec2-user]# which docker
/bin/docker
[root@ip-172-31-37-59 ec2-user]# -
```

5. Start Docker service

```
# service docker start
```

```
[root@ip-172-31-37-59 ec2-user]# service docker start
Redirecting to /bin/systemctl start docker.service
[root@ip-172-31-37-59 ec2-user]# -
```

6. Check Docker status

```
# service docker status
```

```
[root@ip-172-31-37-59 ec2-user]# service docker status
Redirecting to /bin/systemctl status docker.service
● docker.service - Docker Application Container Engine
  Loaded: loaded (/usr/lib/systemd/system/docker.service; disabled; vendor preset: disabled)
    Active: active (running) since Wed 2023-08-30 15:23:51 UTC; 1min 21s ago
      Docs: https://docs.docker.com
    Process: 3549 ExecStartPre=/usr/libexec/docker/docker-setup-runtimes.sh (code=exited, status=0/SUCCESS)
    Process: 3548 ExecStartPre=/bin/mkdir -p /run/docker (code=exited, status=0/SUCCESS)
    Main PID: 3552 (dockerd)
      Tasks: 7
     Memory: 20.7M
       CGroup: /system.slice/docker.service
               └─3552 /usr/bin/dockerd -H fd:// --containerd=/run/containerd/containerd.sock

Aug 30 15:23:50 ip-172-31-37-59.ap-south-1.compute.internal dockerd[3552]: time="2023-0...
Aug 30 15:23:51 ip-172-31-37-59.ap-south-1.compute.internal dockerd[3552]: time="2023-0...
```

7. Display Docker images

```
# docker images
```

```
[root@ip-172-31-37-59 ec2-user]# docker images
REPOSITORY TAG IMAGE ID CREATED SIZE
[root@ip-172-31-37-59 ec2-user]# -
```

8. Pull a Docker Image from Docker Hub

```
# docker pull ubuntu
```

```
[root@ip-172-31-37-59 ec2-user]# docker pull ubuntu
Using default tag: latest
latest: Pulling from library/ubuntu
b237fe92c417: Pull complete
Digest: sha256:ec050c32e4a6085b423d36ecd025c0d3ff00c38ab93a3
Status: Downloaded newer image for ubuntu:latest
docker.io/library/ubuntu:latest
[root@ip-172-31-37-59 ec2-user]#
```

9. Display Docker Images

```
#docker images
```

```
[root@ip-172-31-37-59 ec2-user]# docker images
REPOSITORY      TAG      IMAGE ID      CREATED      SIZE
ubuntu          latest   01f29b872827   3 weeks ago   77.8MB
[root@ip-172-31-37-59 ec2-user]#
```

10. Run docker image

```
# docker run ubuntu
```

```
[root@ip-172-31-37-59 ec2-user]# docker run ubuntu
[root@ip-172-31-37-59 ec2-user]# -
```

11. Display Process Status of Docker

```
# docker ps -a
```

```
[root@ip-172-31-37-59 ec2-user]# docker ps -a
CONTAINER ID        IMAGE           COMMAND       CREATED          STATUS          PORTS          NAMES
c7f7134d1322        ubuntu          "/bin/bash"   About a minute ago   Exited (0)   About a minute ago   affectionate_kalam
[root@ip-172-31-37-59 ec2-user]#
```

12. Pull and Run an interactive Container with custom naming the Container

```
# docker run -it --name demoUBUNTU ubuntu /bin/bash
```

```
[root@ip-172-31-37-59 ec2-user]# docker run -it --name demoUBUNTU ubuntu /bin/bash
```

13. Display Process Status of Docker

```
# docker ps -a
```

```
[root@ip-172-31-37-59 ec2-user]# docker ps -a
CONTAINER ID   IMAGE     COMMAND      CREATED       STATUS          PORTS   NAMES
b2bdc8e2962f   ubuntu    "/bin/bash"   51 seconds ago  Exited (127) 9 seconds ago
1bbf8e1700db   ubuntu    "/bin/bash"   16 minutes ago  Up 16 minutes
c7f7134d1322   ubuntu    "/bin/bash"   42 minutes ago  Exited (0) 42 minutes ago
[root@ip-172-31-37-59 ec2-user]#
```

14. Start Docker

```
# docker start demoUBUNTU
```

```
[root@ip-172-31-37-59 ec2-user]# docker start demoUBUNTU
demoUBUNTU
[root@ip-172-31-37-59 ec2-user]#
```

15. Attach Docker

```
# docker attach demoUBUNTU
```

```
[root@ip-172-31-37-59 ec2-user]# docker attach demoUBUNTU
root@b2bdc8e2962f:/#
```

16. List Files and Directories in the Container

```
# ls
```

```
root@b2bdc8e2962f:/# ls
bin  boot  dev  etc  home  lib  lib32  lib64  libx32  media  mnt  opt
root@b2bdc8e2962f:/#
```

17. Create a file in the Container

```
# cat > demofile.txt
```

```
[root@ip-172-31-37-59 ec2-user]# docker attach demoUBUNTU
root@b2bdc8e2962f:/# cat > demofile.txt
creating a file in container
^C
root@b2bdc8e2962f:/#
```

18. List all the files and directories in the current directory

```
# ls
```

```
root@b2bdc8e2962f:/# ls
bin  boot  demofile.txt  dev  etc  home  lib  lib32  lib64  libx32  media  mnt
root@b2bdc8e2962f:/#
```

19. Update the package index files on the system, ie. Container

```
# apt-get update
```

```
root@b2bdc8e2962f:/# apt update
Get:1 http://archive.ubuntu.com/ubuntu jammy InRelease [270 kB]
Get:2 http://security.ubuntu.com/ubuntu jammy-security InRelease [110 kB]
Get:3 http://archive.ubuntu.com/ubuntu jammy-updates InRelease [119 kB]
Get:4 http://archive.ubuntu.com/ubuntu jammy-backports InRelease [109 kB]
Get:5 http://archive.ubuntu.com/ubuntu jammy/main amd64 Packages [1792 kB]
Get:6 http://security.ubuntu.com/ubuntu jammy/universe amd64 Packages [990 kB]
Get:7 http://archive.ubuntu.com/ubuntu jammy/universe amd64 Packages [17.5 MB]
Get:8 http://security.ubuntu.com/ubuntu jammy-security/restricted amd64 Packages [984 kB]
Get:9 http://security.ubuntu.com/ubuntu jammy-security/main amd64 Packages [909 kB]
Get:10 http://security.ubuntu.com/ubuntu jammy-security/multiverse amd64 Packages [44.0 kB]
Get:11 http://archive.ubuntu.com/ubuntu jammy/restricted amd64 Packages [164 kB]
Get:12 http://archive.ubuntu.com/ubuntu jammy/multiverse amd64 Packages [266 kB]
Get:13 http://archive.ubuntu.com/ubuntu jammy-updates/restricted amd64 Packages [1010 kB]
Get:14 http://archive.ubuntu.com/ubuntu jammy-updates/universe amd64 Packages [1251 kB]
Get:15 http://archive.ubuntu.com/ubuntu jammy-updates/multiverse amd64 Packages [49.8 kB]
Get:16 http://archive.ubuntu.com/ubuntu jammy-updates/main amd64 Packages [1182 kB]
Get:17 http://archive.ubuntu.com/ubuntu jammy-backports/universe amd64 Packages [25.6 kB]
Get:18 http://archive.ubuntu.com/ubuntu jammy-backports/main amd64 Packages [49.2 kB]
Fetched 26.8 MB in 4s (6312 kB/s)
Reading package lists... Done
Building dependency tree... Done
Reading state information... Done
2 packages can be upgraded. Run 'apt list --upgradable' to see them.
root@b2bdc8e2962f:/#
```

20. Install Apache in Container

```
# apt install apache2
```

```
root@b2bdc8e2962f:/# apt install apache2
Reading package lists... Done
Building dependency tree... Done
Reading state information... Done
The following additional packages will be installed:
  apache2-bin apache2-data apache2-utils bzip2 ca-certificates file libapr1 libaprutil1 libaprutil1-dbd-
  libgdbm-compat4 libgdbm6 libicu70 libjansson4 libldap-2.5-0 libldap-common liblua5.3-0 libmagic-mgc li
  libasasl2-modules libasasl2-modules-db libsqlite3-0 libssh-4 libxml2 mailcap media-types mime-support ne
  xz-utils
Suggested packages:
  apache2-doc apache2-suexec-pristine | apache2-suexec-custom www-browser ufw bzip2-doc gdbm-l10n libsa
  libasasl2-modules-ldap libasasl2-modules-otp libasasl2-modules-sql perl-doc libterm-readline-gnu-perl | l
The following NEW packages will be installed:
  apache2 apache2-bin apache2-data apache2-utils bzip2 ca-certificates file libapr1 libaprutil1 libaprutil1-dbd-
  libgdbm-compat4 libgdbm6 libicu70 libjansson4 libldap-2.5-0 libldap-common liblua5.3-0 libmagic-mgc li
  libasasl2-modules libasasl2-modules-db libsqlite3-0 libssh-4 libxml2 mailcap media-types mime-support ne
  xz-utils
0 upgraded, 43 newly installed, 0 to remove and 2 not upgraded.
Need to get 25.6 MB of archives.
After this operation, 111 MB of additional disk space will be used.
Do you want to continue? [Y/n] y
Get:1 http://archive.ubuntu.com/ubuntu jammy-updates/main amd64 perl-modules-5.34 all 5.34.0-3ubuntu1.2
Get:2 http://archive.ubuntu.com/ubuntu jammy/main amd64 libgdbm6 amd64 1.23-1 [33.9 kB]
Get:3 http://archive.ubuntu.com/ubuntu jammy/main amd64 libgdbm-compat4 amd64 1.23-1 [6606 B]
```

21. Display Apache Version

```
# apachectl -v
```

```
root@b2bdc8e2962f:/# apachectl -v
Server version: Apache/2.4.52 (Ubuntu)
Server built:   2023-05-03T20:02:51
root@b2bdc8e2962f:/#
```

22. Install Tree in Container

```
# apt install tree
```

```
root@b2bdc8e2962f:/# apt install tree
Reading package lists... Done
Building dependency tree... Done
Reading state information... Done
The following NEW packages will be installed:
  tree
0 upgraded, 1 newly installed, 0 to remove and 2 not upgraded.
Need to get 47.9 kB of archives.
After this operation, 116 kB of additional disk space will be used.
Get:1 http://archive.ubuntu.com/ubuntu jammy/universe amd64 tree amd64 2.0.2-1 [47.
Fetched 47.9 kB in 1s (60.5 kB/s)
debconf: delaying package configuration, since apt-utils is not installed
Selecting previously unselected package tree.
(Reading database ... 7860 files and directories currently installed.)
Preparing to unpack .../tree_2.0.2-1_amd64.deb ...
Unpacking tree (2.0.2-1) ...
Setting up tree (2.0.2-1) ...
root@b2bdc8e2962f:/#
```

23. View directory using Tree

```
# tree
```

```
root@dcc23c4c7357:/newfolder# tree
.
|-- file1.txt
|-- file2.txt
|-- newfolder
   |-- file1.txt
   '-- file2.txt

1 directory, 4 files
root@dcc23c4c7357:/newfolder#
```

24. Rename Container

```
# docker rename demoUBUNTU UBUDemo
```

```
[root@ip-172-31-37-59 ec2-user]# docker rename demoUBUNTU UBUDemo
[root@ip-172-31-37-59 ec2-user]# docker ps -a
CONTAINER ID  IMAGE      COMMAND     CREATED        STATUS          PORTS      NAMES
b2bdc8e2962f  ubuntu    "/bin/bash"  32 minutes ago  Exited (127) 36 seconds ago  UBUDemo
1bbf8e1700db  ubuntu    "/bin/bash"  48 minutes ago  Up 48 minutes   demoUBU
c7f7134d1322  ubuntu    "/bin/bash"  About an hour ago  Exited (0)  About an hour ago  affectionate_kalam
[root@ip-172-31-37-59 ec2-user]#
```

25. Create Docker Image

```
# docker commit <container_name><new_imagename>
```

```
[root@ip-172-31-37-59 ec2-user]# docker commit UBUDemo ubuimage
sha256:878805570700c78207c12dc7401451b7e53fd511879cf09c8e2c166e73ee3d78
[root@ip-172-31-37-59 ec2-user]# docker images
REPOSITORY      TAG      IMAGE ID      CREATED        SIZE
ubuimage        latest   878805570700  14 seconds ago  229MB
ubuntu          latest   01f29b872827  3 weeks ago   77.8MB
[root@ip-172-31-37-59 ec2-user]#
```

26. Create a Container using Docker Image created in previous step

```
# docker run -it -name ubucontainer ubuimage /bin/bash
```

```
[root@ip-172-31-37-59 ec2-user]# docker run -it --name ubucontainer ubuimage /bin/bash
root@7805c63f4779:/# ls
bin  boot  demofile.txt  dev  etc  home  lib  lib32  lib64  libx32  media  mnt  opt  proc
root@7805c63f4779:/#
```

27. Push Docker Image to Docker Hub

- Login into Docker Hub
docker login

```
[root@ip-172-31-37-59 ec2-user]# docker login
Login with your Docker ID to push and pull images from Docker Hub. If you don't have a Docker ID,
Username: vishalcvswam
Password:
WARNING! Your password will be stored unencrypted in /root/.docker/config.json.
Configure a credential helper to remove this warning. See
https://docs.docker.com/engine/reference/commandline/login/#credentials-store

Login Succeeded
[root@ip-172-31-37-59 ec2-user]#
```

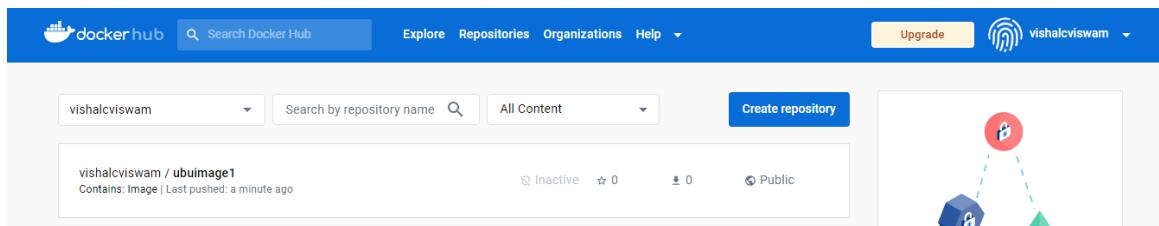
- Tag Docker Image
docker tag ubuimage vishalcvswam/ubuimage1

```
[root@ip-172-31-37-59 ec2-user]# docker tag ubuimage vishalcvswam/ubuimage1
[root@ip-172-31-37-59 ec2-user]#
```

28. Push Docker Image to Docker Hub

docker push vishalcvswam/ubuimage1

```
[root@ip-172-31-37-59 ec2-user]# docker push vishalcvswam/ubuimage1
Using default tag: latest
The push refers to repository [docker.io/vishalcvswam/ubuimage1]
e80c153e4d44: Pushed
bce45ce613d3: Mounted from library/ubuntu
latest: digest: sha256:b10557587813610c528f8310023b215533862d3ff4f2835cab70a8a1da60e1c7 size: 741
[root@ip-172-31-37-59 ec2-user]#
```



29. Pull the pushed Docker Image from another ec2 Instance – When Image is Public

- Connect to the ec2 Instance (ap-northeast-1 : Tokyo)

```
C:\Users\vishal\Downloads>ssh -i "key1.pem" ec2-user@ec2-54-248-57-171.ap-northeast-1.compute.
The authenticity of host 'ec2-54-248-57-171.ap-northeast-1.compute.amazonaws.com (54.248.57.17
ECDSA key fingerprint is SHA256:hDTdrfyY35TZFWHWBeC7+d61tpSNiI5qwzVuUGWqNFE8.
Are you sure you want to continue connecting (yes/no/[fingerprint])? yes
Warning: Permanently added 'ec2-54-248-57-171.ap-northeast-1.compute.amazonaws.com,54.248.57.1
known hosts.

              _\   _ )
             _\  (   /
             \_\|_|_|_|
Amazon Linux 2 AMI

https://aws.amazon.com/amazon-linux-2/
[ec2-user@ip-172-31-34-250 ~]$
```

- b) Install Docker and Start Service
- c) Pull and Run Container using the Image from Docker Hub

```
[root@ip-172-31-34-250 ec2-user]# docker run -it --name ubuimageX vishalcvismam/ubuimage1 /bin/bash
Unable to find image 'vishalcvismam/ubuimage1:latest' locally
latest: Pulling from vishalcvismam/ubuimage1
b237fe92c417: Already exists
3854f3abb8a8: Pull complete
Digest: sha256:b10557587813610c528f8310023b215533862d3ff4f2835cab70a8a1da60e1c7
Status: Downloaded newer image for vishalcvismam/ubuimage1:latest
root@5ad366f69afdf:/#
```

- d) Display Images pulled from Docker Hub

```
[root@ip-172-31-34-250 ec2-user]# docker images
REPOSITORY          TAG      IMAGE ID      CREATED       SIZE
vishalcvismam/ubuimage1   latest   878805570700  55 minutes ago  229MB
ubuntu              latest   01f29b872827  3 weeks ago   77.8MB
[root@ip-172-31-34-250 ec2-user]# docker ps -a
CONTAINER ID        IMAGE               COMMAND             CREATED            STATUS              PORTS           NAMES
5ad366f69afdf   vishalcvismam/ubuimage1   "/bin/bash"         2 minutes ago    Exited (127)   55 seconds ago   ubuimageX
[root@ip-172-31-34-250 ec2-user]#
```

30. Pull the pushed Docker Image from another ec2 Instance – When Image is Private

- a) Pull and Run Container using the Image from Docker Hub

```
[ec2-user@ip-172-31-34-250 ~]$ docker run -it --name ubuimageX vishalcvismam/ubuimage1 /bin/bash
docker: Got permission denied while trying to connect to the Docker daemon socket at unix:///var/run/docker.sock:
rs/create?name=ubuimageX": dial unix /var/run/docker.sock: connect: permission denied.
See 'docker run --help'.
[ec2-user@ip-172-31-34-250 ~]$
```

- b) Login into Docker Hub

```
[root@ip-172-31-34-250 ec2-user]# docker login
Login with your Docker ID to push and pull images from Docker Hub. If you don't have a Docker ID,
Username: vishalcvismam
Password:
WARNING! Your password will be stored unencrypted in /root/.docker/config.json.
Configure a credential helper to remove this warning. See
https://docs.docker.com/engine/reference/commandline/login/#credentials-store

Login Succeeded
[root@ip-172-31-34-250 ec2-user]#
```

- c) Pull and Run Container using the Image from Docker Hub

```
[root@ip-172-31-34-250 ec2-user]# docker run -it --name ubuimageX vishalcvismam/ubuimage1 /bin/bash
Unable to find image 'vishalcvismam/ubuimage1:latest' locally
latest: Pulling from vishalcvismam/ubuimage1
b237fe92c417: Already exists
3854f3abb8a8: Pull complete
Digest: sha256:b10557587813610c528f8310023b215533862d3ff4f2835cab70a8a1da60e1c7
Status: Downloaded newer image for vishalcvismam/ubuimage1:latest
root@5ad366f69afdf:/#
```

- d) Display all Docker Images pulled from Docker Hub

```
[root@ip-172-31-34-250 ec2-user]# docker images
REPOSITORY          TAG      IMAGE ID      CREATED        SIZE
vishalcvismam/ubuimage1  latest   878805570700  55 minutes ago  229MB
ubuntu              latest   01f29b872827  3 weeks ago   77.8MB
[root@ip-172-31-34-250 ec2-user]# docker ps -a
CONTAINER ID   IMAGE           COMMAND       CREATED        STATUS          PORTS     NAMES
5ad366f69af9   vishalcvismam/ubuimage1   "/bin/bash"   2 minutes ago  Exited (127)  55 seconds ago
[root@ip-172-31-34-250 ec2-user]#
```

31. Exit Container

exit

```
[root@ip-172-31-34-250 ec2-user]# exit
exit
[ec2-user@ip-172-31-34-250 ~]$ exit
logout
There are stopped jobs.
[ec2-user@ip-172-31-34-250 ~]$
```

32. Delete Containers

docker rm <container_name/container_id>

```
[root@ip-172-31-34-250 ec2-user]# docker rm ubuimageX
ubuimageX
[root@ip-172-31-34-250 ec2-user]# docker ps -a
CONTAINER ID   IMAGE           COMMAND       CREATED        STATUS          PORTS     NAMES
[root@ip-172-31-34-250 ec2-user]#
```

33. Delete Docker Image

docker rmi <dockerimage_name/dockerimage_id>

```
[root@ip-172-31-34-250 ec2-user]# docker images
REPOSITORY          TAG      IMAGE ID      CREATED        SIZE
vishalcvismam/ubuimage1  latest   878805570700  2 hours ago  229MB
redis              latest   506734eb5e71  13 days ago   138MB
ubuntu              latest   01f29b872827  3 weeks ago   77.8MB
[root@ip-172-31-34-250 ec2-user]# docker rmi 878805570700
Untagged: vishalcvismam/ubuimage1:latest
Untagged: vishalcvismam/ubuimage1@sha256:b10557587813610c528f8310023b215533862d3ff4f2835cab70a8a1da60e1c7
Deleted: sha256:878805570700c78207c12dc7401451b7e53fd511879cf09c8e2c166e73ee3d78
Deleted: sha256:7c1f0a05428199adbc3a9ec03352963525db1c187b57ca04d6df4ec0a1973700
[root@ip-172-31-34-250 ec2-user]# docker images
REPOSITORY          TAG      IMAGE ID      CREATED        SIZE
redis              latest   506734eb5e71  13 days ago   138MB
ubuntu              latest   01f29b872827  3 weeks ago   77.8MB
[root@ip-172-31-34-250 ec2-user]#
```

34. Exit EC2 Instance

exit

```
[ec2-user@ip-172-31-34-250 ~]$ exit
logout
Connection to ec2-54-248-57-171.ap-northeast-1.compute.amazonaws.com closed.

C:\Users\vishal\Downloads>
```

Result

The program was executed and the result was successfully obtained. Thus, CO3 was obtained.

