

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.



SMPS is an essential component of modern computers that 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 HDDs.



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

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

Procedure

1. man

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 ls

Output:

```

ls(1)                               User Commands                            ls(1)

NAME
    ls - list directory contents

SYNOPSIS
    ls [OPTION]... [FILE]...

DESCRIPTION
    List information about the FILEs (the current directory by default). Sort entries alphabetically if none of -cftuvSUX nor --sort
    is specified.

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

    -a, --all
        do not ignore entries starting with .

    -A, --almost-all
        do not list implied . and ..

```

2. ls, echo, read

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

Syntax: \$ls

Output:

```
mca@t2:~$ ls
c.txt  Desktop  Documents  Downloads  file1  Music  output.txt  Pictures  profile  Public  Templates  tinu
```

Options of ls command.

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

Syntax: \$ ls -R

Output:

```
mca@t2:~$ ls -R
.:
c.txt Desktop Documents Downloads file1 Music output.txt

./Desktop:
tinu
```

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

Syntax: \$ ls -l

Output:

```
mca@t2:~$ ls -l
total 56
-rw-rw-r-- 1 mca mca 16 Mar 7 16:42 c.txt
drwxr-xr-x 3 mca mca 4096 Mar 7 16:56 Desktop
drwxr-xr-x 2 mca mca 4096 Jun 17 2022 Documents
drwxr-xr-x 2 mca mca 4096 Jun 17 2022 Downloads
-rw-rw-r-- 1 mca mca 41 Mar 7 16:44 file1
drwxr-xr-x 2 mca mca 4096 Jun 17 2022 Music
-rw-rw-r-- 1 mca mca 41 Mar 7 16:46 output.txt
drwxr-xr-x 2 mca mca 4096 Jun 17 2022 Pictures
-rw-rw-r-- 1 mca mca 83 Mar 13 11:33 profile
drwxr-xr-x 2 mca mca 4096 Jun 17 2022 Public
drwxr-xr-x 2 mca mca 4096 Jun 17 2022 Templates
-rw-rw-r-- 1 mca mca 43 Mar 7 16:32 tinu
-rw-rw-r-- 1 mca mca 15 Mar 7 16:37 tinusample
drwxr-xr-x 2 mca mca 4096 Jun 17 2022 Videos
```

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

Syntax: \$ ls -a

Output:

```
mca@t2:~$ ls -a
. .bash_logout .config Documents
.. .bashrc c.txt Downloads
.bash_history .cache Desktop file1
```

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

Syntax: \$ ls -al

Output:

```
mca@t2:~$ ls -al
total 104
drwxr-xr-x 16 mca mca 4096 Mar 13 11:32 .
drwxr-xr-x 6 root root 4096 Jun 17 2022 ..
-rw----- 1 mca mca 716 Mar 13 11:05 .bash_history
-rw-r--r-- 1 mca mca 220 Jun 17 2022 .bash_logout
-rw-r--r-- 1 mca mca 3771 Jun 17 2022 .bashrc
drwxr-xr-x 14 mca mca 4096 Mar 7 16:48 .cache
drwxr-xr-x 13 mca mca 4096 Mar 13 11:16 .config
-rw-rw-r-- 1 mca mca 16 Mar 7 16:42 c.txt
drwxr-xr-x 3 mca mca 4096 Mar 7 16:56 Desktop
drwxr-xr-x 2 mca mca 4096 Jun 17 2022 Documents
drwxr-xr-x 2 mca mca 4096 Jun 17 2022 Downloads
-rw-rw-r-- 1 mca mca 41 Mar 7 16:44 file1
drwxr----- 3 mca mca 4096 Mar 13 10:55 .gnupg
drwxr-xr-x 3 mca mca 4096 Jun 17 2022 .local
drwxr-xr-x 2 mca mca 4096 Jun 17 2022 Music
-rw-rw-r-- 1 mca mca 41 Mar 7 16:46 output.txt
drwxr-xr-x 2 mca mca 4096 Jun 17 2022 Pictures
drwxr----- 3 mca mca 4096 Mar 7 16:05 .pki
```

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

Syntax: \$ ls -t

Output:

```
mca@t2:~$ ls -t
Desktop    file1  tinusample  Documents  Music    Public    Videos
output.txt  c.txt  tinu        Downloads  Pictures  Templates
```

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

Syntax: \$ ls -r

Output:

```
mca@t2:~$ ls -r
Videos      tinu      Public    output.txt  file1      Documents  c.txt
tinusample  Templates Pictures  Music       Downloads  Desktop
```

echo - allows users to display lines of text or strings that are passed as arguments.

Syntax: \$ echo \$variablename

Output:

```
mca@t2:~$ echo "[${var1}][${var2}][${var3}]"
[computer][networking][and system administration]
```

read – To read the content of the line, we use read command. This line read the command into a variable

Options of read command

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

Syntax: \$ read

Computer network and system administration

\$ echo \$REPLY

Output:

```
mca@t2:~$ read
computer network and system administration
mca@t2:~$ echo $REPLY
```

- b) **read <variable_name>**-Declare variables to store data.

Syntax: \$ read var1 var2 var3

Computer network and system administration

\$ echo “[var1][var2][var3]”

Output:

```
mca@t2:~$ read var1 var2 var3
computer networking and system administration
```

```
mca@t2:~$ echo "[${var1}][${var2}][${var3}]"
[computer][networking][and system administration]
```

- c) **To read contents through multiple lines we use ”\” at the end of each line.**

Syntax:

\$ read

Computer \

network and\

```
system\
administration
$ echo $REPLY
```

Output:

```
mca@t2:~$ read
computer \
> networking and \
> system \
> administration
mca@t2:~$ echo $REPLY
computer networking and system administration
```

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

Syntax: \$ read -p “[Prompt message]”

Output:

```
mca@t2:~$ read -p "ENTER YOUR NAME"
ENTER YOUR NAME TINU
mca@t2:~$ echo "My name is $REPLY"
My name is TINU
```

- e) **read -n** - Specifies the limit of characters that can be read

Syntax: \$ read -n <limit> -p

Output:

```
mca@t2:~$ read -n 7 -p "Enter 6 characters only"
Enter 6 characters only Emmanumca@t2:~$
```

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

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

Output:

```
mca@t2:~$ read -s -p "Enter the password"
Enter the passwordmca@t2:~$ echo "Password is $REPLY"
Password is 112325
```

3. more - The more command is similar to cat command. Used to display the content. The only difference is that in case of larger files cat command output will scroll off your screen while more command display output one screenful at a time.

Options of more command

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

Syntax: more filename.txt

Output:

```
student@t2:~$ more corona.txt
```

Tasks
Analyses, develops, interprets and evaluates complex system design and architecture specifications, data models and diagrams in the development, configuration and integration of computer systems.

Researches, analyses, evaluates and monitors network infrastructure to ensure networks are configured to operate at optimal performance.

Assesses and recommends improvements to network operations and integrated hardware, software, communications and operating systems.

Computer Network and Systems Engineers plan, develop, deploy, test and optimise network and system services, taking responsibility for configuration.

--More--(52%)

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

Syntax: \$ more +20 filename.txt

Output:

```
student@t2:~$ more +20 corona.txt
```

A bachelor or postgraduate degree in a related information technology field (such as computer science, network engineering or computer systems) is usually needed to work as a Computer Network and Systems Engineer. Some workers have Vocational Education and Training (VET) qualifications. There are also a wide range of vendor and industry certifications available that may substitute for formal qualifications.

Tasks
--More--(91%)

Activate

- c) **more +/- [word to be searched] [filename.txt]** - This option is used to search the string inside your text document. We can view all the instances by navigating through the result.

Syntax: \$ more +/-Human corona.txt

Output:

```
student@t2:~$ more +/-Human corona.txt

...skipping
as not realized at the time that these three different viruses were related.[20
][12]

Human coronaviruses were discovered in the 1960s[21][22] using two different me
thods in the United Kingdom and the United States.[23] E.C. Kendall, Malcolm By
```

- d) **more -d <filename>** – Helps the user to navigate according to the instruction. "Space key" to continue and "q" to quit.

Syntax: \$ more -d corona.txt

Output:

```
student@t2:~$ more -d corona.txt
```

Researches, analyses, evaluates and monitors network infrastructure to ensure networks are configured to operate at optimal performance.
Assesses and recommends improvements to network operations and integrated hardware, software, communications and operating systems. Windows
Computer Network and Systems Engineers plan, develop, deploy, and manage network and system services, taking responsibility for configu
--More--(52%)[Press space to continue, 'q' to quit.]

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

Syntax: \$ more -p sample.txt

Output:

A bachelor or postgraduate degree in a related information technology field (such as computer science, network engineering or computer systems) is usually needed to work as a Computer Network and Systems Engineer. Some workers have Vocational Education and Training (VET) qualifications. There are also a wide range of vendor and industry certifications available that may substitute for formal qualifications.

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 – To view, create, concatenate files

Options of cat commands:

- a) **cat > <filename>** – To create a new blank file and add contents to the file.

Syntax: \$ cat ><filename>

Output:

```
mca@t2:~$ cat > tinu
TINU CLARA EMMANUEL
AJCE
MCA
^Z
[1]+  Stopped                  cat > tinu
```

- b) **cat <filename>** – To view

Syntax: \$ cat <filename>

Output:

```
mca@t2:~$ cat tinu
TINU CLARA EMMANUEL
AJCE
MCA
```

- c) **cat >> <filename>** – To append the contents to a file.

Syntax: \$ cat >><filename>

Output:

```
mca@t2:~$ cat >> tinu
kanjirappally
^Z
[2]+  Stopped                  cat >> tinu
mca@t2:~$ cat tinu
TINU CLARA EMMANUEL
AJCE
MCA
kanjirappally
```

- d) **cat <filename> <filename> > <filename>** – To store the contents of the two files to another file.

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

Output:

```
mca@t2:~$ cat tinu
TINU CLARA EMMANUEL
AJCE
MCA
kanjirappally
```

```
mca@t2:~$ cat > tinusample
minu
anu
sebin
^Z
[3]+  Stopped                  cat > tinusample
mca@t2:~$ cat tinu tinusample > c.txt
mca@t2:~$ cat c.txt
TINU CLARA EMMANUEL
AJCE
MCA
kanjirappally
minu
anu
sebin
```

- e) **cat -n <filename>**– To display the contents with line numbers

Syntax: \$ cat -n <filename>

Output:

```
mca@t2:~$ cat -n c.txt
      1  TINU CLARA EMMANUEL
      2  AJCE
      3  MCA
      4  kanjirappally
      5  minu
      6  anu
      7  sebin
```

- f) **cat -b <filename>**– To remove the empty line number

Syntax: \$ cat -n <filename>

Output:

```
mca@t2:~$ cat file1
anu
minu
tinu
sebin
happy family
```

```
time
mca@t2:~$ cat -b file1
      1  anu
      2  minu
      3  tinu
      4  sebin
      5  happy family
```

6 time

- g) **cat <filename> | tr a-z A-Z > <filename>**– To change the contents to capital letters

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

Output:

```
mca@t2:~$ cat file1|tr a-z A-Z > output.txt
mca@t2:~$ cat output.txt
ANU
MINU
TINU
SEBIN
HAPPY FAMTL Y
```

4. cd –Used to navigate through directory.

Options of cd commands:

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

Syntax: \$ cd

Output:

```
mca@t2:~$ cd
```

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

Syntax: \$ cd <directory_path>

Output:

```
mca@t2:~$ cd new
```

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

Syntax: \$ cd ..

Output:

```
mca@t2:~/new$ cd ..
```

mkdir – To create a new directory

Syntax: \$ mkdir<directory_name>

Output:

```
mca@t2:~$ mkdir new
mca@t2:~$ cd new
mca@t2:~/new$ ls
mca@t2:~/new$ cd ..
mca@t2:~$ ls
Desktop Documents Downloads Music new Pictures Public Templates Videos
```

pwd-The path of the current working directory

Syntax: \$pwd

Output:

```
mca@t2:~$ pwd
/home/mca
```

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"

5. **mv** – Used for moving a file from one location to another. Its a way of replacing the file. Already written files will be overwritten.

Options of mv command:

- a) **mv [file1] [file2]** -To move contents from one file to another

Syntax: \$ mv [file1] [file2]

Output:

```
mca@t2:~/new$ ls
demo details details.txt
mca@t2:~/new$ mv demo details.txt
mca@t2:~/new$ cat details.txt
1
2
3
4
5
6
7
8
9

10
34
56
67
78
89
mca@t2:~/new$ cat demo
cat: demo: No such file or directory
mca@t2:~/new$ ls
details details.txt
```

- b) **mv -b**– Back-up contents in a file

Syntax: \$ mv -b [file1] [file2]

Output:

```
mca@t2:~/new$ cat >profile
hello
how are
you
^Z
[7]+  Stopped                  cat > profile
mca@t2:~/new$ mv -b details.txt profile
mca@t2:~/new$ ls
details profile profile~
mca@t2:~/new$ cat profile~
hello
how are
you
```

- c) **mv -i [file1] [file2]** – To display the prompt message

Syntax: \$ mv -i [file1] [file2]

Output:

```
mca@t2:~/new$ cat > profile1
Amal Jyothi clg
kanjirappally
kottayam
^Z
[8]+  Stopped                  cat > profile1
mca@t2:~/new$ mv -i profile profile1
mv: overwrite 'profile1'? ■
```

cp - To copy the content to a new file

Options of mv command

- a) **cp <file1> <file2>**-To copy file1 contents to file2

Syntax: \$ cp file1 file2

Output:

```
ubuntu@Tinu:~/newfile$ cp fill1 fill2
ubuntu@Tinu:~/newfile$ cat fill2
colours-green,red,black,blue
numbers-3,24,29,45
```

- b) **cp -r** -to copy the directory along with its sub directories

Syntax: \$ cp -r new newfile

Output:

```
ubuntu@Tinu:~$ cp -r new newfile
ubuntu@Tinu:~$ cd newfile
ubuntu@Tinu:~/newfile$
```

6. wc -To display number of lines, number of words, number of bytes, filename

Options of wc commands

- a) **wc filename**-To display number of lines, number of words, number of bytes, filename

Syntax: \$ wc profile.txt

Output:

```
mca@t2:~$ cat > profile
My name is TINU
Student of Amal Jyothi College of Engineering
Koovappally
Kottayam
^Z
[1]+  Stopped                  cat > profile
mca@t2:~$ wc profile
 4 13 83 profile
```

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

Syntax: \$ wc -l profile.txt

Output:

```
mca@t2:~$ wc -l profile
 4 profile
```

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

Syntax: \$ wc -m profile.txt

Output:

```
mca@t2:~$ wc -m profile
83 profile
```

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

Syntax: \$ wc -c profile.txt

Output:

```
mca@t2:~$ wc -c profile
83 profile
```

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

Syntax: \$ wc -w profile.txt

Output:

```
mca@t2:~$ wc -w profile
13 profile
```

- e) **wc -L filename** – Print the length of the longest line

Syntax: \$ wc-L profile.txt

Output:

```
mca@t2:~$ wc -L profile
45 profile
```

cut-For cutting out sections from each line of files and writing the result to standard output

Options of cut command

- a) **\$cut -b1 filename**-cut by byte position

Syntax: \$ cut -b1 <filename>

Output:

```
ubuntu@Tinu:~/newfile$ cat > fil1
colours-green,red,black,blue
numbers-3,24,29,45
```

```
ubuntu@Tinu:~/newfile$ cut -b1 fil1
c
n
```

- b) **\$cut -c3 filename**-cut by character position

Syntax: \$ cut -c3<filename>

Output:

```
ubuntu@Tinu:~/newfile$ cut -c3 fil1
l
m
```

- c) **cut -d - -f1 filename:** cut command to just print the first field of the file using the delimiter “-”

Syntax: \$ cut -d - -f1 <filename>

Output:

```
ubuntu@Tinu:~/newfile$ cut -d - -f1 fill1
colours
numbers
```

```
ubuntu@Tinu:~/newfile$ cut -d - -f2 fill1
green,red,black,blue
3,24,29,45
```

- d) **cut -c-** cut command to cut and print the specified character position

Syntax: \$ cut -c 1,4,6 <filename>

Output:

```
ubuntu@Tinu:~/newfile$ cut -c 1,4,6 fill1
cor
nbr
```

- e) **cut -d ‘ ‘-f filename** - cut command to just print the first field of the file using the empty delimiter “ ”

Syntax: \$ cut -d ‘ ‘ -f1 <filename>

Output:

```
ubuntu@Tinu:~/newfile$ cut -d ' ' -f1 fill1
colours-green,red,black,blue
numbers-3,24,29,45
```

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

Options of paste command

- a) **paste file1 file2**-To paste file1 contents in file2

Syntax: \$ paste <filename><filename>

Output:

```
ubuntu@Tinu:~/newfile$ cat > fill1
colours-green,red,black,blue
numbers-3,24,29,45
^Z
[1]+ Stopped cat > fill1
```

```
ubuntu@Tinu:~/newfile$ cat > fill2
year-2021,2022,2023,2024
months-jan,feb,march,april
^Z
[2]+ Stopped cat > fill2
ubuntu@Tinu:~/newfile$ paste fill1 fill2
colours-green,red,black,blue year-2021,2022,2023,2024
numbers-3,24,29,45 months-jan,feb,march,april
```

- b) **paste file1 file2 >file3**-To paste file1 and file2 contents in a new file

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

Output:

```
ubuntu@Tinu:~/newfile$ paste fil1 fil2 > fil3
ubuntu@Tinu:~/newfile$ cat fil3
colours-green,red,black,blue      year-2021,2022,2023,2024
numbers-3,24,29,45      months-jan,feb,march,april
```

- c) **paste -d ‘%’ file1 file2**- By specifying the delimiter, we can also split the lines into columns with specified delimiter.

Syntax: \$ paste -d ‘%’<filename><filename>

Output:

```
ubuntu@Tinu:~/newfile$ paste -d "%" fil1 fil2
colours-green,red,black,blue%year-2021,2022,2023,2024
numbers-3,24,29,45%months-jan,feb,march,april
```

- d) **paste -s file1**- Helps to display the contents in the file in a horizontal format

Syntax: \$ paste -s <filename>

Output:

```
ubuntu@Tinu:~/newfile$ cat > fil1
colours-green,red,black,blue
numbers-3,24,29,45
^Z
[1]+  Stopped                  cat > fil1
```

```
ubuntu@Tinu:~/newfile$ paste -s fil1
colours-green,red,black,blue      numbers-3,24,29,45
```

7.head – To display the top contents of the file. By default it displays first 10 lines.

Options of head command.

- a) **head [filename]**-To display the first 10 lines of the file

Syntax: \$ head demo

Output:

```
mca@t2:~/new$ head demo
1
2
3
4
5
6
7
8
9
```

- b) **head -[limit] [filename]**-To display the contents of the file upto a specified limit

Syntax: \$ head -5 demo

Output:

```
mca@t2:~/new$ head -5 demo
1
2
3
4
5
```

tail – To display the last contents of the file

Options of tail command.

- a) **tail [filename]**-To display last 10 lines

Syntax: \$ tail demo

Output:

```
mca@t2:~/new$ tail demo
7
8
9

10
34
56
67
78
89
```

- b) **tail -[limit] [filename]**-To display the last contents of the file upto a specified limit

Syntax: \$ tail -5 demo

Output:

```
mca@t2:~/new$ tail -5 demo
34
56
67
78
89
```

grep – Used to filter the content which makes our search easy

Options of grep command

- a) **grep [search word] [filename]** -To search for a specific content

Syntax:\$ grep 40 details.txt

Output:

```
mca@t2:~/new$ cat > details.txt
maths 50
english 40
science45
hindi 34
social 49
^Z
[3]+  Stopped                  cat > details.txt
mca@t2:~/new$ grep 40 details.txt
english 40
```

-
- b) grep -i [search word] [filename] -Its a case insensitive search

Syntax: \$ grep -i english details.txt

Output:

```
mca@t2:~/new$ grep -i english details.txt
english 40
```

- c) grep -v [search word] [filename] – All the contents except the searched content will be displayed

Syntax:\$ grep -v 49 details.txt

Output:

```
mca@t2:~/new$ grep -v 49 details.txt
maths 50
english 40
science45
hindi 34
```

- d) grep -A1 [search word] [filename] – View the content with one line after

Syntax: \$ grep -A1 english details.txt

Output:

```
mca@t2:~/new$ grep -A1 english details.txt
english 40
science45
```

- e) grep -B1 [search word] [filename] - View the content with one line before

Syntax: \$ grep -B1 social details.txt

Output:

```
mca@t2:~/new$ grep -B1 social details.txt
hindi 34
social 49
```

- f) grep -C1 [search word] [filename] -View the content with one line before and after.

Syntax: \$ grep -C1 science details.txt

Output:

```
mca@t2:~/new$ grep -C1 science details.txt
english 40
science45
hindi 34
```

expr-To calculate the expression and print the 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>

d) expr – division

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

Output:

```
mca@t2:~$ expr 12 \* 3
36
mca@t2:~$ expr 12 + 8
20
mca@t2:~$ expr 12 - 8
4
```

```
mca@t2:~$ expr 12 / 4
3
```

e) expr- read from console

Syntax: \$ read x

\$ read y

\$ expr \$x + \$y

Output:

```
mca@t2:~$ read x
20
mca@t2:~$ read y
25
mca@t2:~$ expr $x + $y
45
```

8. **chmod** -Used to change the access permissions or files and directories. It stands for change mode-(read(r), write(w),execute(x))

Here writing permission is denied

```
ubuntu@Tinu:~/newfile$ chmod -wx fil1
ubuntu@Tinu:~/newfile$ cat >> fil1
-bash: fil1: Permission denied
```

Here writing permission is granted

```
ubuntu@Tinu:~/newfile$ chmod +wx fil1
ubuntu@Tinu:~/newfile$ cat >> fil1
name-tinu sara riya jenny
^Z
[3]+  Stopped                  cat >> fil1
```

chown [username] [filename]-Used to change a file ownership or directory ownership for a user or a group . Chown stands for change owner.

Syntax: \$ chown<username><filename>

Output:

```
mca@t2:~$ sudo chown tinu new2.txt
mca@t2:~$ chmod +rwx new2.txt
chmod: changing permissions of 'new2.txt': Operation not permitted
mca@t2:~$ ls -l new2.txt
-rw-rw-r-- 1 tinu mca 37 Mar 13 11:50 new2.txt
```

9.useradd [username]-Add or create a user

Syntax: \$ sudo useradd<username>

Output:

```
mca@t2:~$ sudo useradd tinu
[sudo] password for mca:
mca@t2:~$ sudo useradd tinu
useradd: user 'tinu' already exists
```

usermod -G [group name] [username]-To add the user to the specified group

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

Output:

```
mca@t2:~$ sudo usermod -G mcadept tinu
```

userdel username-to delete the user

Syntax: \$ userdel<username>

Output:

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

passwd [username]- To update password

Syntax: \$ sudo passwd <username>

Output:

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

10. df-It is used to get a report on system space usage

Syntax: \$ df

Output:

Filesystem	1K-blocks	Used	Available	Use%	Mounted on
udev	3966888	0	3966888	0%	/dev
tmpfs	799004	1732	797272	1%	/run
/dev/sda6	143135900	23654704	112140604	18%	/
tmpfs	3995016	17880	3977136	1%	/dev/shm
tmpfs	5120	4	5116	1%	/run/lock
tmpfs	3995016	0	3995016	0%	/sys/fs/cgroup
/dev/loop0	63488	63488	0	100%	/snap/core20/1518
/dev/loop1	128	128	0	100%	/snap/bare/5
/dev/loop3	64896	64896	0	100%	/snap/core20/1828

ps - Stands for Process. Currently running programs and running instances.

Options of ps command:

- a) \$ps – displays currently running programs or instances

Syntax: \$ ps

Output:

END OF ENCRYPTION PRIVATE KEY			
mca@t2:~\$ ps			
PID	TTY	TIME	CMD
7271	pts/1	00:00:00	bash
8446	pts/1	00:00:00	ps

- b) ps –u [user] :- Display all running processes of a particular user

Syntax: \$ ps –u <username>

Output:

END OF ENCRYPTION PRIVATE KEY			
mca@t2:~\$ ps -u mca			
PID	TTY	TIME	CMD
1377	?	00:00:00	systemd
1387	?	00:00:00	(sd-pam)
1395	?	00:00:00	pulseaudio
1397	?	00:00:00	tracker-miner-f
1400	?	00:00:00	dbus-daemon
1405	?	00:00:00	gnome-keyring-d
1408	?	00:00:00	gvfsd
1413	?	00:00:00	gvfsd-fuse
1432	?	00:00:00	gvfs-udisks2-vo
1437	?	00:00:00	gvfs-mtp-volume
1442	?	00:00:00	gvfs-goa-volume
1446	?	00:00:00	goa-daemon
1454	?	00:00:00	goa-identity-se
1459	?	00:00:00	gvfs-gphoto2-vo
1464	?	00:00:00	gvfs-afc-volume
1471	tty2	00:00:00	gdm-x-session
1473	tty2	00:00:53	Xorg
1497	tty2	00:00:00	gnome-session-b
1575	?	00:00:00	ssh-agent
1592	?	00:00:03	ibus-daemon
1599	?	00:00:00	ibus-dconf
1600	?	00:00:00	ibus-ui-gtk3
1603	?	00:00:01	ibus-extension-
1609	?	00:00:00	ibus-x11
1612	?	00:00:00	ibus-portal
1613	?	00:00:00	at-spi-bus-laun
1622	?	00:00:00	dbus-daemon
1631	?	00:00:00	at-spi2-registr
1639	?	00:00:00	xdg-desktop-por
1644	?	00:00:00	gnome-session-c
1652	?	00:00:00	xdg-document-po
1655	?	00:00:00	xdg-permission-
1664	?	00:00:00	gnome-session-h

c) **ps -C** :- Specific process

Syntax: \$ ps -C chrome

Output:

```
mca@t2:~$ ps -C chrome
 PID TTY      TIME CMD
 2979 ?        00:00:48 chrome
 2996 ?        00:00:08 chrome
 2997 ?        00:00:08 chrome
 3001 ?        00:00:08 chrome
 3024 ?        00:00:37 chrome
 3025 ?        00:00:28 chrome
 3049 ?        00:00:08 chrome
 3271 ?        00:00:08 chrome
 3496 ?        00:00:38 chrome
 3588 ?        00:00:56 chrome
 7677 ?        00:00:04 chrome
 7758 ?        00:00:08 chrome
 8127 ?        00:00:08 chrome
```

d) **ps -f -p <PID>** :- List the process by id

Syntax: \$ ps -f -p 2979

Output:

```
mca@t2:~$ ps -f -p 2979
UID      PID  PPID C STIME TTY      TIME CMD
mca      2979  1708  1 14:58 ?        00:00:49 /opt/google/chrome/chrome --enable-crashpad
```

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

12. ssh - Stands for Secure Shell Protocol used to securely connect to a remote server or system. ssh is secure in the sense that it transfers data in encrypted form between host and client.

a) **ssh<username> @ <ip_address>**

Syntax: \$ ssh mca@192.168.6.29

Output:

```
mca@t2:~$ ssh mca@192.168.6.29
ssh: connect to host 192.168.6.29 port 22: Connection refused
```

b) **sudo apt-get install openssh -server** :- Update port ,if already taken.

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

Output:

```
mca@t2:~$ sudo apt-get update
[sudo] password for mca:
Get:1 https://dl.google.com/linux/chrome/deb stable InRelease [1,811 B]
Get:2 http://ppa.launchpad.net/marten-fonville/android-studio/ubuntu focal InRelease [17.6 kB]
Hit:3 http://in.archive.ubuntu.com/ubuntu focal InRelease
Get:4 http://security.ubuntu.com/ubuntu focal-security InRelease [114 kB]
Get:5 https://dl.google.com/linux/chrome/deb stable/main amd64 Packages [1,079 B]
Get:6 http://in.archive.ubuntu.com/ubuntu focal-updates InRelease [114 kB]
Get:7 http://ppa.launchpad.net/marten-fonville/android-studio/ubuntu focal/main amd64 Packages [2,052 B]
Get:8 http://ppa.launchpad.net/marten-fonville/android-studio/ubuntu focal/main Translation-en [324 kB]
Get:9 http://in.archive.ubuntu.com/ubuntu focal-backports InRelease [108 kB]
Get:10 http://in.archive.ubuntu.com/ubuntu focal-updates/main amd64 Packages [2,428 kB]
Get:11 http://security.ubuntu.com/ubuntu focal-security/main i386 Packages [568 kB]
Get:12 http://in.archive.ubuntu.com/ubuntu focal-updates/main i386 Packages [797 kB]
Get:13 http://in.archive.ubuntu.com/ubuntu focal-updates/main Translation-en [415 kB]
Get:14 http://in.archive.ubuntu.com/ubuntu focal-updates/main amd64 DEP-11 Metadata [275 kB]
Get:15 http://in.archive.ubuntu.com/ubuntu focal-updates/main amd64 c-n-f Metadata [16.2 kB]
Get:16 http://in.archive.ubuntu.com/ubuntu focal-updates/restricted i386 Packages [30.5 kB]
Get:17 http://in.archive.ubuntu.com/ubuntu focal-updates/restricted amd64 Packages [1,671 kB]
Get:18 http://in.archive.ubuntu.com/ubuntu focal-updates/restricted Translation-en [235 kB]
Get:19 http://security.ubuntu.com/ubuntu focal-security/main amd64 Packages [2,046 kB]
Get:20 http://in.archive.ubuntu.com/ubuntu focal-updates/restricted amd64 c-n-f Metadata [620 B]
Get:21 http://in.archive.ubuntu.com/ubuntu focal-updates/universe i386 Packages [718 kB]
Get:22 http://security.ubuntu.com/ubuntu focal-security/main Translation-en [333 kB]
Get:23 http://security.ubuntu.com/ubuntu focal-security/main amd64 DEP-11 Metadata [59.8 kB]
Get:24 http://security.ubuntu.com/ubuntu focal-security/main amd64 c-n-f Metadata [12.3 kB]
Get:25 http://security.ubuntu.com/ubuntu focal-security/restricted i386 Packages [29.1 kB]
Get:26 http://security.ubuntu.com/ubuntu focal-security/restricted amd64 Packages [1,556 kB]
Get:27 http://in.archive.ubuntu.com/ubuntu focal-updates/universe amd64 Packages [1,038 kB]
Get:28 http://security.ubuntu.com/ubuntu focal-security/restricted Translation-en [219 kB]
Get:29 http://security.ubuntu.com/ubuntu focal-security/restricted amd64 c-n-f Metadata [624 B]
Get:30 http://security.ubuntu.com/ubuntu focal-security/universe i386 Packages [588 kB]
Get:31 http://in.archive.ubuntu.com/ubuntu focal-updates/universe Translation-en [243 kB]
Get:32 http://in.archive.ubuntu.com/ubuntu focal-updates/universe amd64 DEP-11 Metadata [410 kB]
Get:33 http://in.archive.ubuntu.com/ubuntu focal-updates/universe amd64 c-n-f Metadata [23.8 kB]
```

```
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
  1 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.
Do you want to continue? [Y/n] y
Get:1 http://in.archive.ubuntu.com/ubuntu focal-updates/main amd64 openssh-client amd64 1:8.2p1-4ubuntu0.5 [671 kB]
Get:2 http://in.archive.ubuntu.com/ubuntu focal/main amd64 ncurses-term all 6.2-0ubuntu2 [249 kB]
Get:3 http://in.archive.ubuntu.com/ubuntu focal-updates/main amd64 openssh-sftp-server amd64 1:8.2p1-4ubuntu0.5 [51.5 kB]
Get:4 http://in.archive.ubuntu.com/ubuntu focal-updates/main amd64 openssh-server amd64 1:8.2p1-4ubuntu0.5 [377 kB]
Get:5 http://in.archive.ubuntu.com/ubuntu focal/main amd64 ssh-import-id all 5.10-0ubuntu1 [10.0 kB]
Fetched 1,359 KB in 5s (281 kB/s)
Preconfiguring packages ...
(Reading database ... 157949 files and directories currently installed.)
Preparing to unpack .../openssh-client_1%3a8.2p1-4ubuntu0.5_amd64.deb ...
Unpacking openssh-client (1:8.2p1-4ubuntu0.5) over (1:8.2p1-4) ...
Selecting previously unselected package ncurses-term.
Preparing to unpack .../ncurses-term_6.2-0ubuntu2_all.deb ...
Unpacking ncurses-term (6.2-0ubuntu2) ...
Selecting previously unselected package openssh-sftp-server.
Preparing to unpack .../openssh-sftp-server_1%3a8.2p1-4ubuntu0.5_amd64.deb ...
```

- 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@192.168.6.28**– connecting to remote server

Syntax: \$ sshmca @ 192.168.6.28

Output:

```
mca@t2:~$ ssh mca@192.168.6.23
mca@192.168.6.23'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.

The programs included with the Ubuntu system are free software;
the exact distribution terms for each program are described in the
individual files in /usr/share/doc/*copyright.

Ubuntu comes with ABSOLUTELY NO WARRANTY, to the extent permitted by
applicable law.

mca@t2:~$ ls
Desktop Documents Downloads Music Pictures Public riju1 Templates Videos
mca@t2:~$
```

ssh-keygen :- Generating a key for secure shell

Syntax: \$ ssh – keygen

Output:

```
mca@t2:~$ ssh-keygen
Generating public/private rsa key pair.
Enter file in which to save the key (/home/mca/.ssh/id_rsa): abc.txt
Enter passphrase (empty for no passphrase):
Enter same passphrase again:
Your identification has been saved in abc.txt
Your public key has been saved in abc.txt.pub
The key fingerprint is:
SHA256:d2kI+wkB9Z1VikEHqJB1xeote2eXKJ0IwWAymAxC4ow mca@t2
The key's randomart image is:
+---[RSA 3072]----+
|+oo o .+o ==.o..|
|* + oo+ o...* . |
|Eo     .+=...+ . |
|       .*... . |
|       S.+.+ |
|=o+. |
|+oo o . |
|.o.+o.. |
|..o . |
+---[ SHA256]----+
mca@t2:~$ █
```

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 trouble shooting .

Procedure

1. /root-Contains all other directories and files

2. /bin-Essential binary files which are accessible to all users.These files are required for basic functioning and for various system operations and user interactions.

3. /boot-Files required for boot process including kernel,boot loader and initial Ram disk. We want to load the Operating System and prepare the system for use. All the files required for booting are stored in boot directory.

4. /dev- Device files representing the physical and virtual devices such as hard drives,printers,CPU etc.

5. /etc-The system configuration files for various applications and services.Configuration files determine the behaviour functionalities and the appearance of the software.

6. /home-Home is a home directory for regular users.

7./lib-Libraries required by binaries in /bin

8. /media,/mnt-Temporary mounted files

9. /media-Temporary attaching file system.For example, external drives, network shares.

10. /media-Removable media. Temporary mount system for removable media such as USB, optical disk or external hard drives.

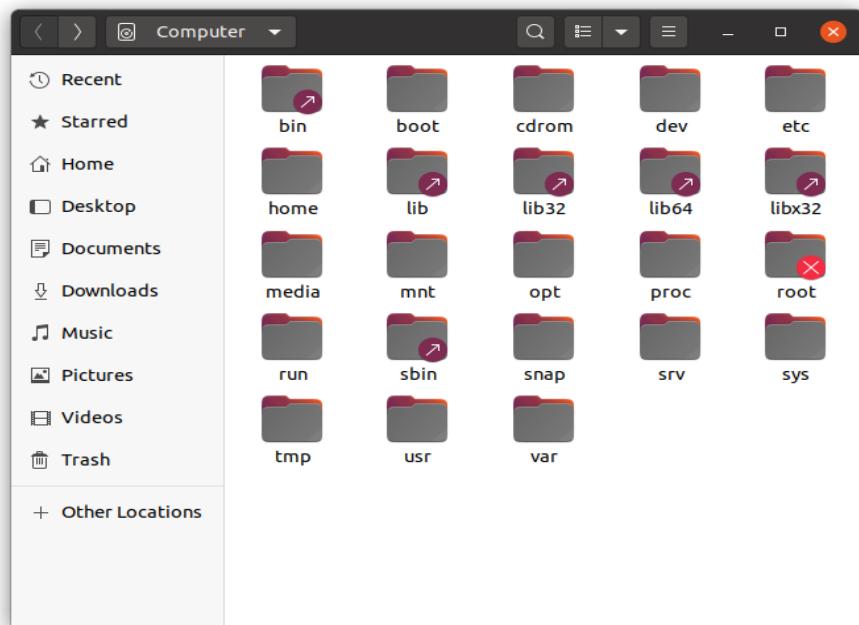
11. /opt-For storing optional software packages.

12. /sys-Exposes information about system hardware and devices.

13. /tmp-Temporary files created by users and applications.

14. /usr-Basically user programs and libraries.

15. /var-var is a variable data that changes frequently such as log files and cache files



sudo su - To become the root user

```
mca@u45:~$ sudo su
[sudo] password for mca:
```

tree - To check whether tree is already installed

```
root@u45:/home/mca# tree
.
Command 'tree' not found, but can be installed with:
:snap install tree # version 1.8.0+pkg-3fd6, or
:apt install tree # version 1.8.0-1
See 'snap info tree' for additional versions.
```

updating

```
root@u45:/home/mca# apt update
Hit:1 http://in.archive.ubuntu.com/ubuntu focal InRelease
Get:2 http://security.ubuntu.com/ubuntu focal-security InRelease [114 kB]
Get:3 http://in.archive.ubuntu.com/ubuntu focal-updates InRelease [114 kB]
Get:4 http://security.ubuntu.com/ubuntu focal-security/main i386 Packages [620 kB]
Get:5 http://in.archive.ubuntu.com/ubuntu focal-backports InRelease [108 kB]
Get:6 http://in.archive.ubuntu.com/ubuntu focal-updates/main i386 Packages [851 kB]
Get:7 http://security.ubuntu.com/ubuntu focal-security/main amd64 Packages [2,304 kB]
Get:8 http://in.archive.ubuntu.com/ubuntu focal-updates/main amd64 Packages [2,6
```

Install tree

```
$ apt install tree
```

```
root@u45:/home/mca# 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:
  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
Use 'sudo apt autoremove' to remove them.
The following NEW packages will be installed:
  tree
0 upgraded, 1 newly installed, 0 to remove and 317 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 (44.8 kB/s)
```

Run tree

```
$ tree
```

```
root@u45:/home/mca# tree
*
├── 192.168.6.255.netbios-dgm:
│   ├── 192.168.6.255.netbios-ns:
│   ├── 224.0.0.252.hostmon:
│   ├── 239.255.255.250.1900:
│   ├── ab.txt
│   ├── An Introduction to Local Area Networks.pdf
│   ├── armstrong.sh
│   ├── capital.sh
│   ├── dc
│   │   └── Justice
│   ├── Dc
│   │   ├── dc
│   │   │   ├── JusticeLeague.txt
│   │   │   ├── Woman.txt
│   │   │   └── Wonder
│   │   ├── file1.txt
│   │   ├── Justice
│   │   ├── Woman.txt
│   │   └── Wonder
│   └── DC
│       ├── Justice
│       └── League.txt
```

Display files in hierarchy in root directory

```
$ tree /
```

```
mca@u15:~$ tree /
```

Tree /[directory_name]-to scrutinize each directory

```
root@u45:/home/mca# 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
    aplaymidi
    ...
root@u45:/home/mca# tree /home
/home
└── ajce
    ├── Desktop
    ├── Documents
    ├── Downloads
    │   └── xampp-linux-x64-8.1.17-0-installer.run
    ├── Music
    ├── Pictures
    ├── Public
    ├── PycharmProjects
    │   └── pythonProject
    │       ├── main.py
    │       └── venv
    │           └── bin
    │               ├── activate
    │               ├── activate.csh
    │               ├── activate.fish
    │               ├── activate.nu
    │               ├── activate.ps1
    │               └── activate_this.py
```

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.

1. Write a shell script to count lines and words in a file
2. Shell Script to check a number is even or odd
3. Shell script to check whether a number is positive or negative
4. Shell script to find the greatest of three numbers
5. Shell Script to demonstrate String Operators
6. Shell Script to analyze people of certain age groups who are eligible for getting a suitable job if their condition and norms get satisfied using nested if statement.
7. Write a shell script to display the capital of a state using case...esac statement.
8. Write a shell script to count the number in reverse direction.
9. Write a shell script to check whether the number is palindrome or not
10. Write a shell script to check whether a given number is Armstrong or not
11. Write a shell script to check whether a number is prime or not
12. Write a shell script for factorial of a number
13. Write a shell Script to print Fibonacci series
14. Write a shell script to check if the current year is a leap year or not

CO4

Write shell scripts required for system administration.

Procedure**1.Shell Script to count lines and words of the file**

```
#!/usr/bin/bash
file_path=/home/ubuntu/secondprogram.sh
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

```
total parameters: 3
ubuntu@Tinu:~$ readlink -f secondprogram.sh
/home/ubuntu/secondprogram.sh
ubuntu@Tinu:~$ vi countwords2.sh
ubuntu@Tinu:~$ chmod +x countwords2.sh
ubuntu@Tinu:~$ ./countwords2.sh
Number of lines:4
Number of words: 13
```

2. Shell script to check whether a number is odd or even

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

Output

```
ubuntu@Tinu:~$ vi odd_or_even.sh
ubuntu@Tinu:~$ chmod +x odd_or_even.sh
ubuntu@Tinu:~$ ./odd_or_even.sh
Enter a number: 20
Number is even
ubuntu@Tinu:~$ vi odd_or_even.sh
ubuntu@Tinu:~$ ./odd_or_even.sh
Enter a number: 13
Number is odd
```

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

```
#!/bin/bash
read -p "Enter a number: " a
if((a > 0))
then
    echo "Number is positive"
elif((a < 0))
then
    echo "Number is negative"
else
    echo "The number is zero"
fi
```

Output

```
ubuntu@Tinu:~$ vi positive_or_not.sh
ubuntu@Tinu:~$ chmod +x positive_or_not.sh
ubuntu@Tinu:~$ ./positive_or_not.sh
Enter a number: 20
Number is positive
ubuntu@Tinu:~$ ./positive_or_not.sh
Enter a number: -2
Number is negative
ubuntu@Tinu:~$ ./positive_or_not.sh
Enter a number: 0
The number is zero
```

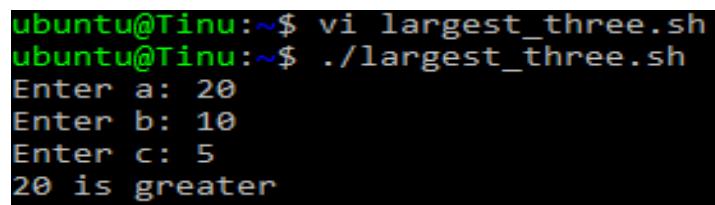
4. Shell script to find largest among three numbers

```
#!/bin/bash
read -p "Enter a: " a
read -p "Enter b: " b
read -p "Enter c: " c
if(($a > $b && $a > $c))
```

```

then
echo "$a is greater"
elif($b > $a && $b > $c)
then
echo "$b is greater"
else
echo "$c is greater"
fi

```

Output


```

ubuntu@Tinu:~$ vi largest_three.sh
ubuntu@Tinu:~$ ./largest_three.sh
Enter a: 20
Enter b: 10
Enter c: 5
20 is greater

```

5. Shell script to demonstrate String operators (Equal, Not Equals, Size is zero, Size is non-zero, Empty string) by taking user input

```

#!/bin/bash
read -p "Enter 1st string: " a
read -p "Enter 2nd string: " b
if(( $a==$b ))
then
echo "Both strings are equal"
else
echo "Both strings are not equal"
fi
if [ $a != $b ]
then
echo "Both strings are not equal"
else
echo "Both strings are equal"
fi
if [ -z $a ]
then
echo "String size is zero"
else
echo "String size is not zero"
fi
if [ -n$a ]
then
echo "String size is non zero"
else
echo "String size is zero"
fi
if (( $a ))
then
echo "String is empty"
else

```

```
echo "String is not empty"
fi
```

Output

```
ubuntu@Tinu:~$ vi string.sh
ubuntu@Tinu:~$ chmod +x string.sh
ubuntu@Tinu:~$ ./string.sh
Enter 1st string: anu
Enter 2nd string: tinu
Both strings are not equal
Both strings are equal
String size is not zero
String size is zero
String is not empty
```

6. Shell Script to analyze 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

```
ubuntu@Tinu:~$ vi job.sh
ubuntu@Tinu:~$ chmod +x job.sh
ubuntu@Tinu:~$ ./job.sh
Enter your age: 26
You are eligible for the job.
Enter your age: 11
You are not eligible for the job.
```

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): " state
case "$state" in
    "Tamil Nadu") echo "Chennai";;
    "Kerala") echo "Thiruvananthapuram";;
    "Karnataka") echo "Bangalore";;
esac
```

Output

```
mca@u45:~$ vi capital.sh
mca@u45:~$ chmod +x capital.sh
mca@u45:~$ ./capital.sh
Enter the state:Kerala
Thiruvananthapuram
```

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

```
#!/bin/bash
```

```
for (( i=10 ; i>=1 ; i-- ))
do
    echo $i
done
```

Output

```
mca@u45:~$ vi displaynumrev.sh
mca@u45:~$ chmod +x displaynumrev.sh
mca@u45:~$ ./displaynumrev.sh
10
9
8
7
6
5
4
3
2
1
```

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

```
ubuntu@Tinu:~$ vi palindrome.sh
ubuntu@Tinu:~$ chmod +x palindrome.sh
ubuntu@Tinu:~$ ./palindrome.sh
Enter the number: 121
121 is a palindrome number
ubuntu@Tinu:~$ ./palindrome.sh
Enter the number: 371
371 is not a palindrome number
```

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 Amstrong number"
else
    echo "$n is not an Armstrong number"
fi

```

Output

```

ubuntu@Tinu:~$ vi armstrong.sh
ubuntu@Tinu:~$ chmod +x armstrong.sh
ubuntu@Tinu:~$ ./armstrong.sh
Enter a number: 371
371 is an Amstrong number
ubuntu@Tinu:~$ ./armstrong.sh
Enter a number: 370
370 is an Amstrong number
ubuntu@Tinu:~$ ./armstrong.sh
Enter a number: 222
222 is not an Armstrong number

```

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

```

#!/bin/bash
read -p "Enter a number: " n
for((i=2; i<=$n/2; i++))
do
    ans=$(( n%i ))
    if [ $ans -eq 0 ]
    then
        echo "$n is not a prime number."
        exit 0
    fi
done
echo "$n is a prime number"

```

Output

```

ubuntu@Tinu:~$ vi prime.sh
ubuntu@Tinu:~$ ./prime.sh
Enter a number: 6
6 is not a prime number.
ubuntu@Tinu:~$ ./prime.sh
Enter a number: 5
5 is a prime number.

```

12. Write a shell script for factorial of a number

```
#!/bin/bash
read -p "Enter the number whose factorial is to be finded: " num
fact=1
while [ $num -gt 1 ]
do
    fact=$((fact * num))
    num=$((num - 1))
done
echo $fact
```

Output

```
ubuntu@Tinu:~$ vi factorial.sh
ubuntu@Tinu:~$ ./factorial.sh
Enter the number whose factorial is to be finded: 6
720
```

13. Write a shell Script to print Fibonacci series

```
#!/bin/bash
read -p "Enter the Number: " number
x=0
y=1
i=2
echo "Fibonacci Series Upto $number Number: "
echo "$x"
echo "$y"
while [ $i -lt $number ]
do
    i=`expr $i + 1`
    z=`expr $x + $y`
    echo "$z"
    x=$y
    y=$z
done
```

Output

```
ubuntu@Tinu:~$ vi fibonacci.sh
ubuntu@Tinu:~$ chmod +x fibonacci.sh
ubuntu@Tinu:~$ ./fibonacci.sh
Enter the Number: 6
Fibonacci Series Upto 6 Number:
0
1
1
2
3
5
```

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

```
#!/bin/bash
read -p "Enter the year: " a
if(( $a%4==0 & $a%100!=0 ))
then
```

```
echo "$a is a leap year"
elif(( $a%100==0 | $a%400==0 ))
then
    echo "$a is a leap year"
else
    echo "$a is not a leap year"
fi
```

Output

```
mca@t2:~$ vi leap.sh
mca@t2:~$ chmod +x leap.sh
mca@t2:~$ ./leap.sh
Enter the year: 2024
2024 is a leap year
mca@t2:~$ ./leap.sh
Enter the year: 1992
1992 is a leap year
mca@t2:~$ ./leap.sh
Enter the year: 2023
2023 is not a leap year
```

Result

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

Experiment No.: 5**Aim**

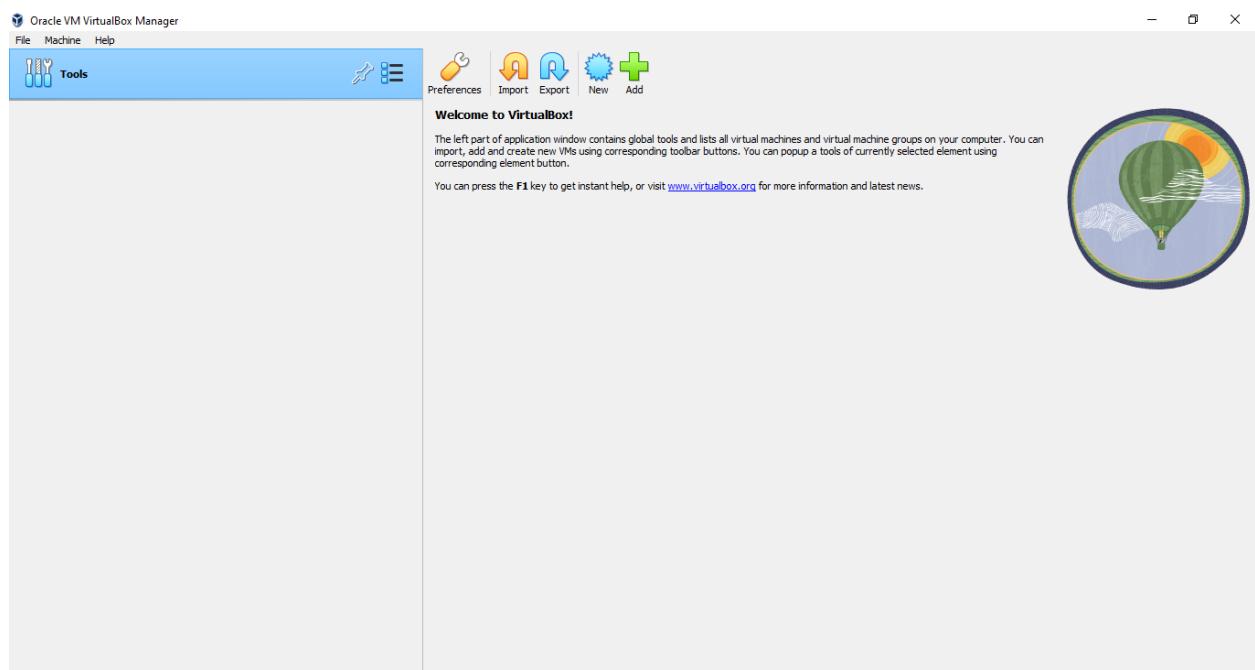
Install latest version of Ubuntu on a virtual box

CO1

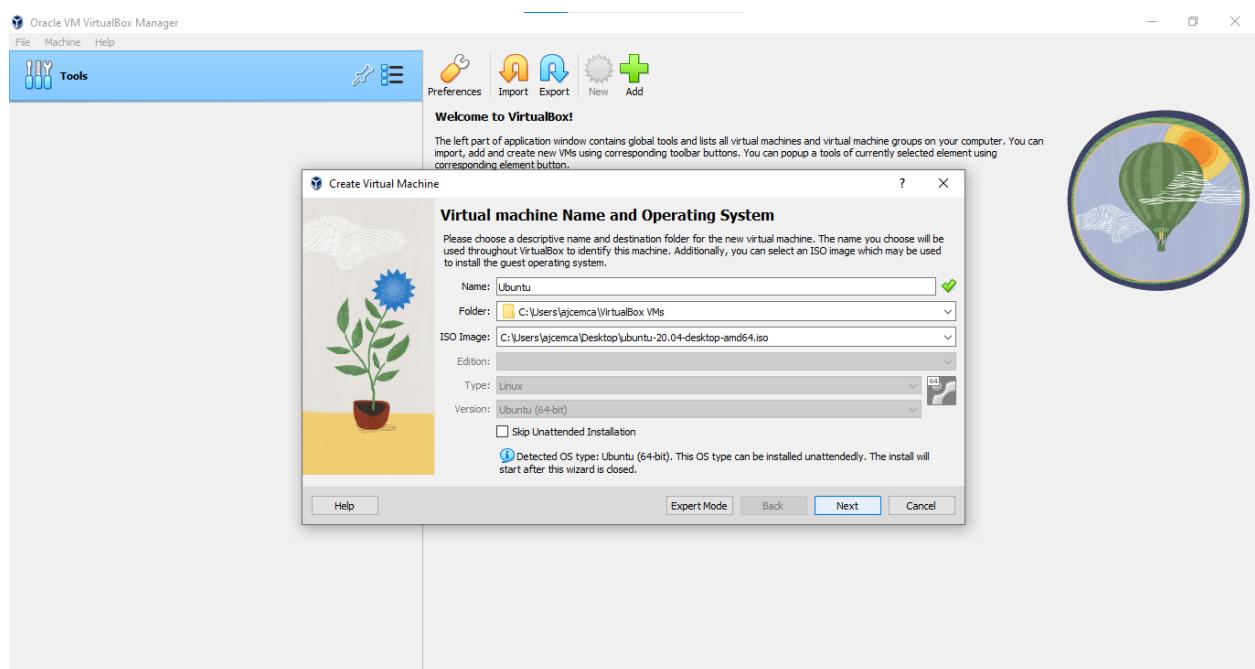
Install and configure common operating systems in virtual environment.

Procedure

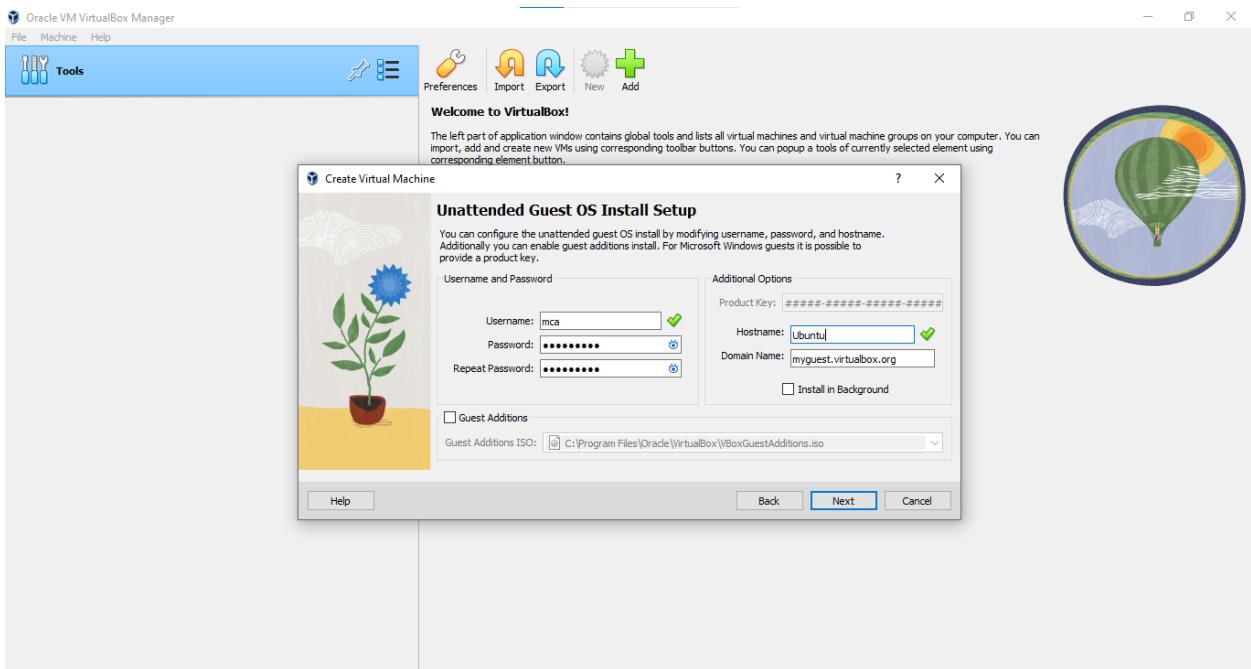
1. Download and Install Oracle Virtual Box



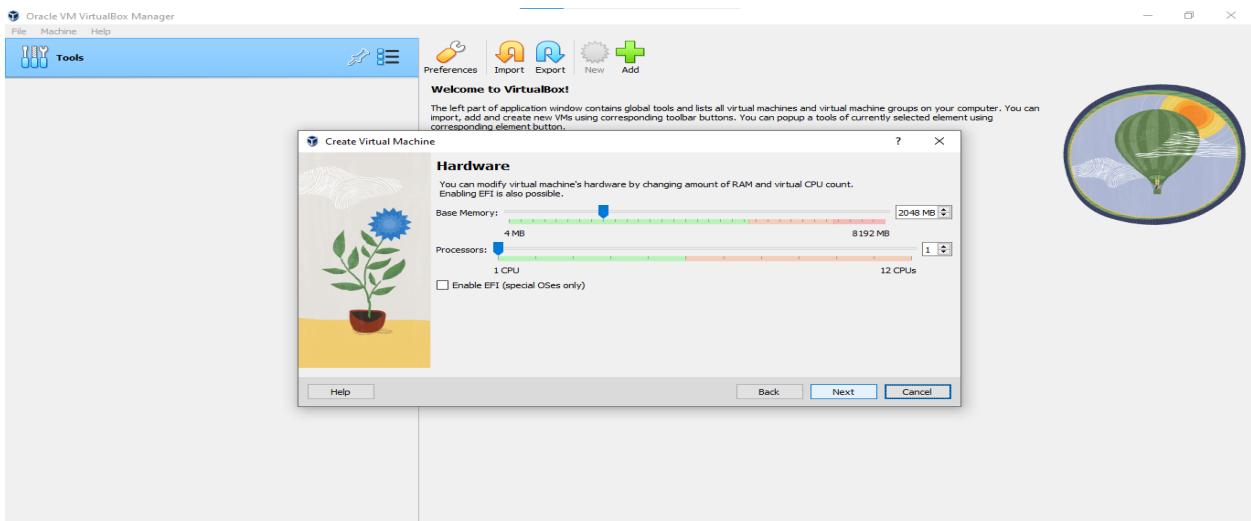
2. Create New Virtual Machine – Configure Name and OS



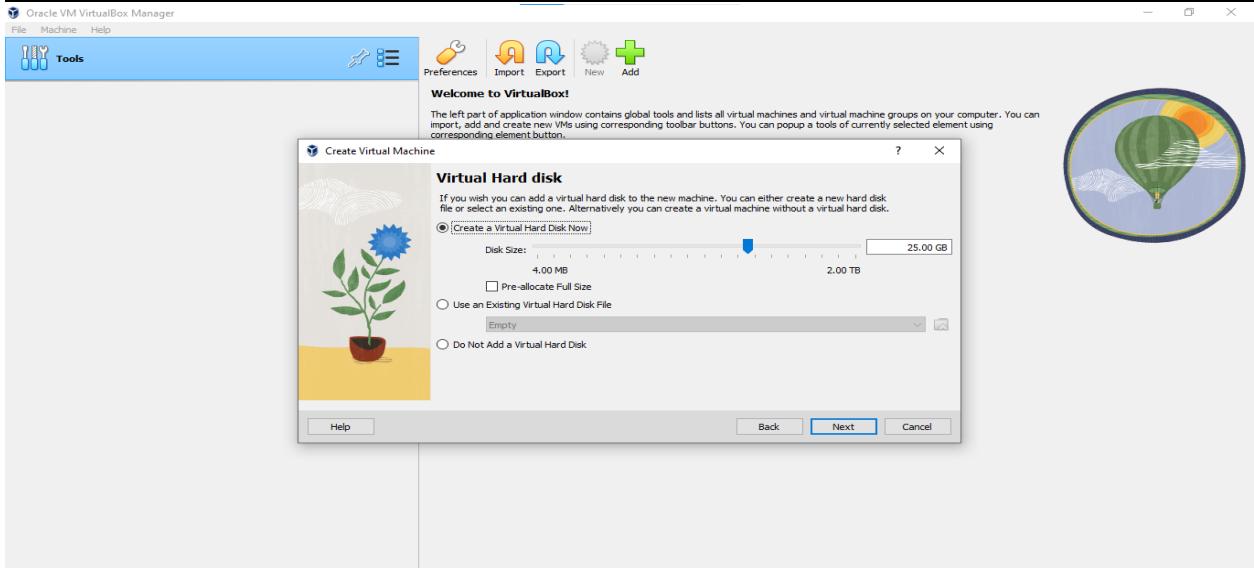
3. OS Setup – Configuration



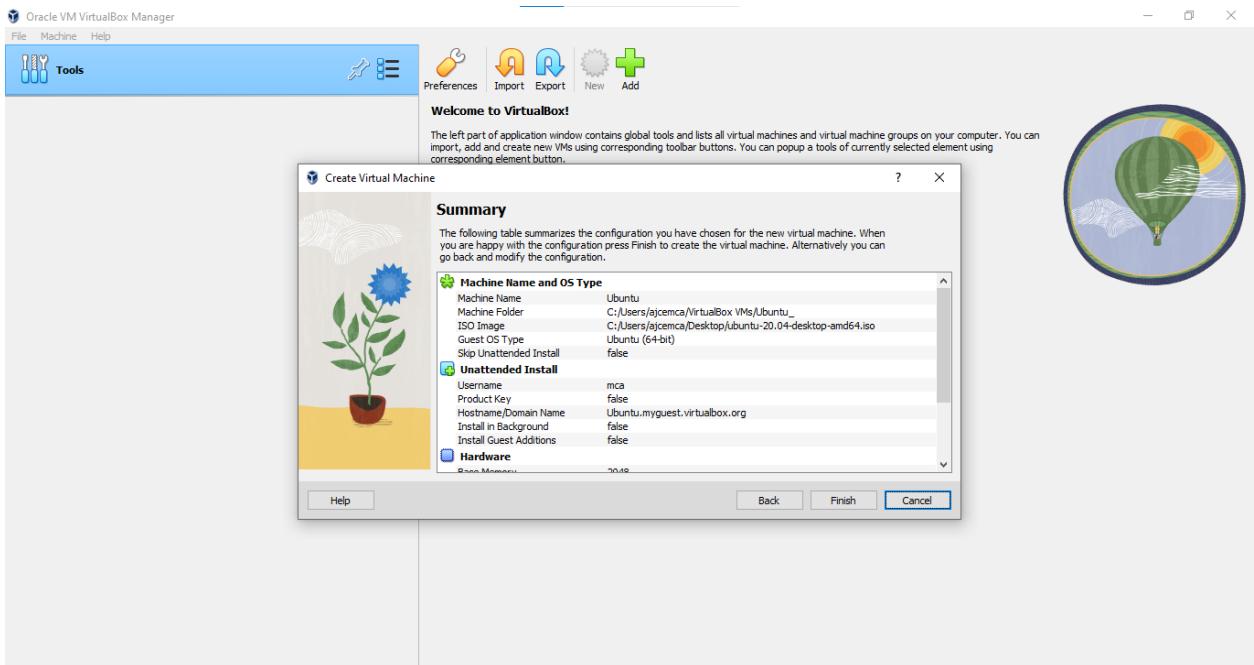
4. Hardware Configuration



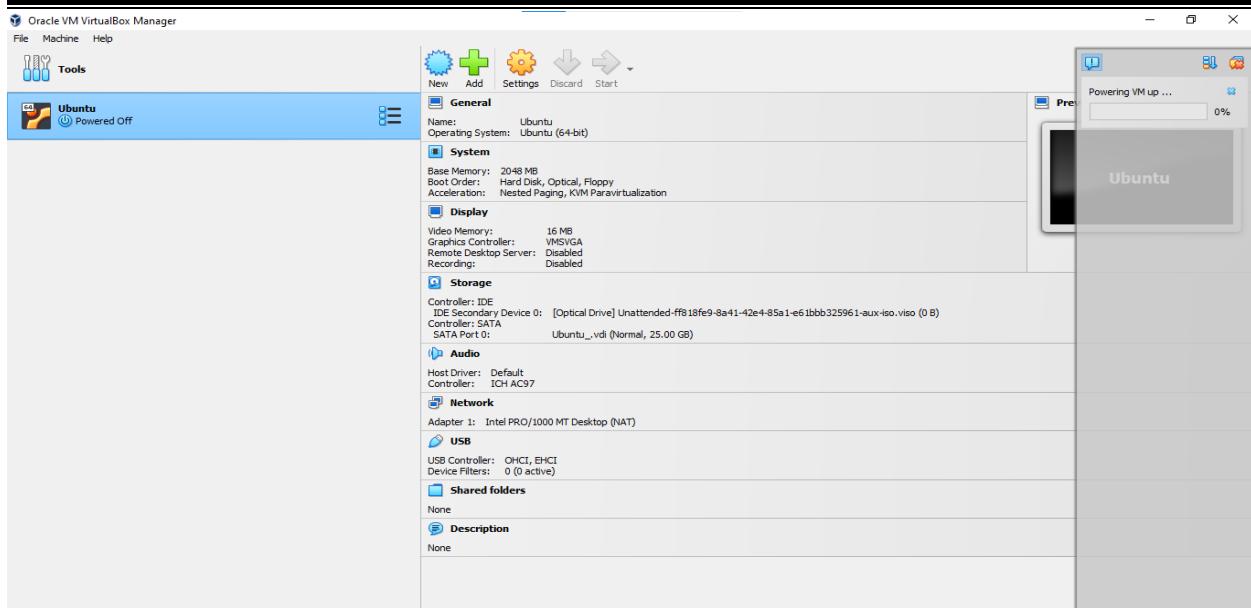
5. Disk Configuration



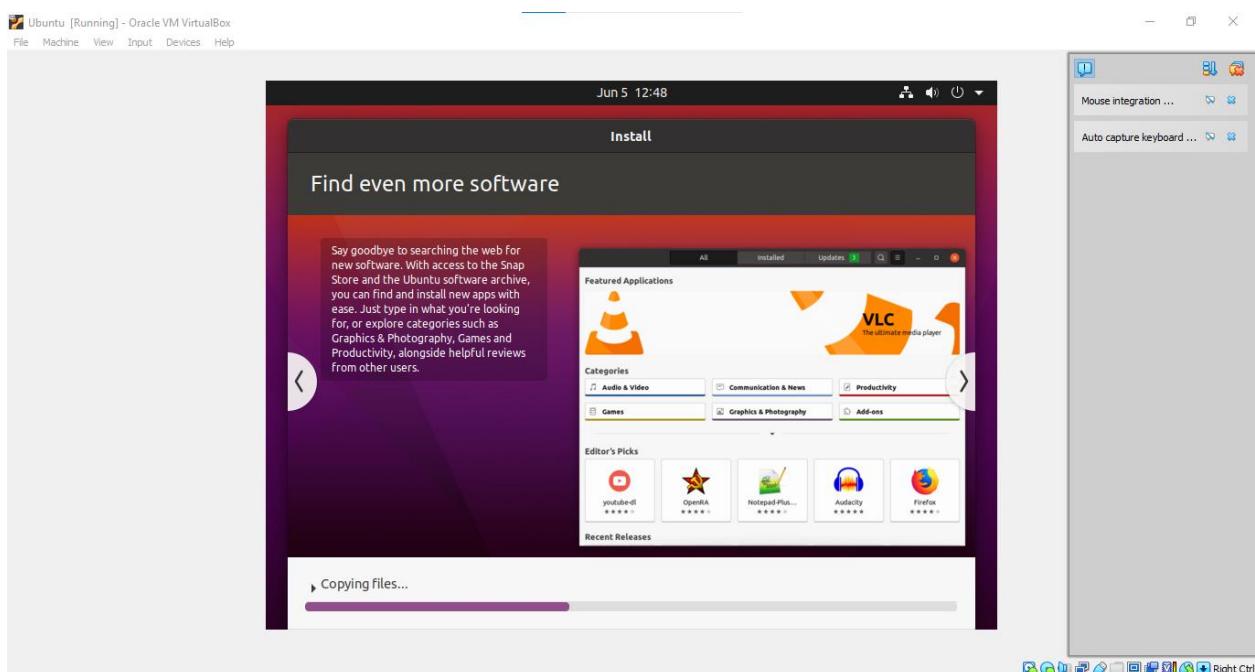
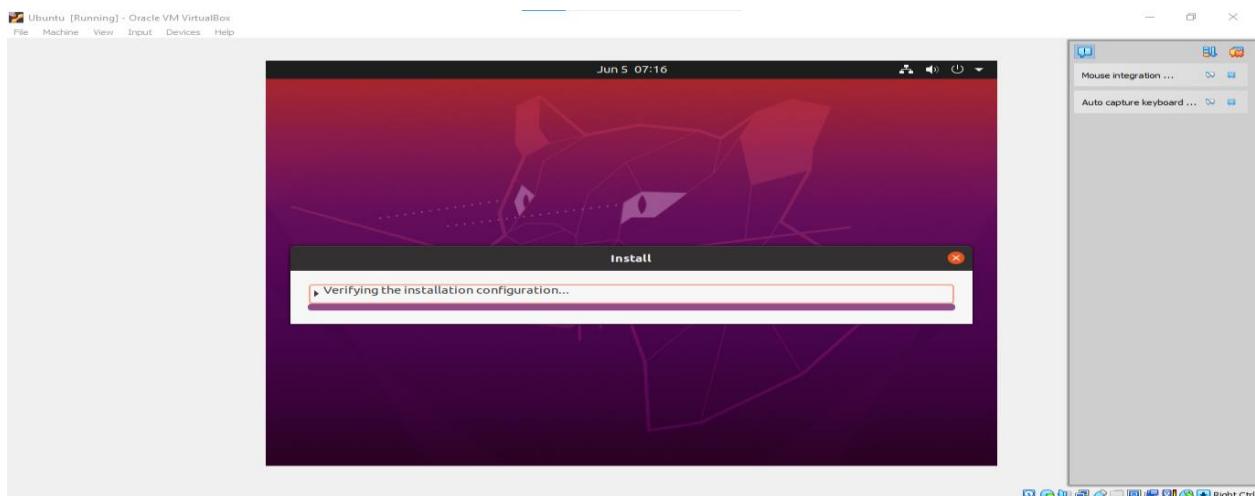
6. Verify Configuration



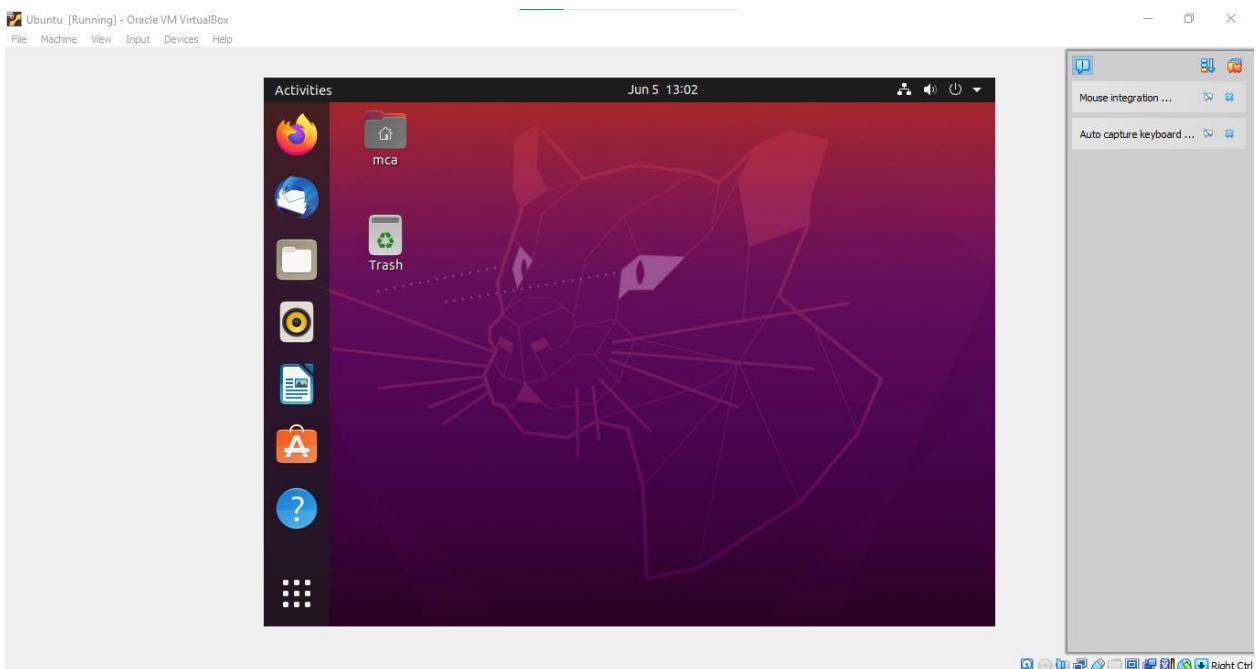
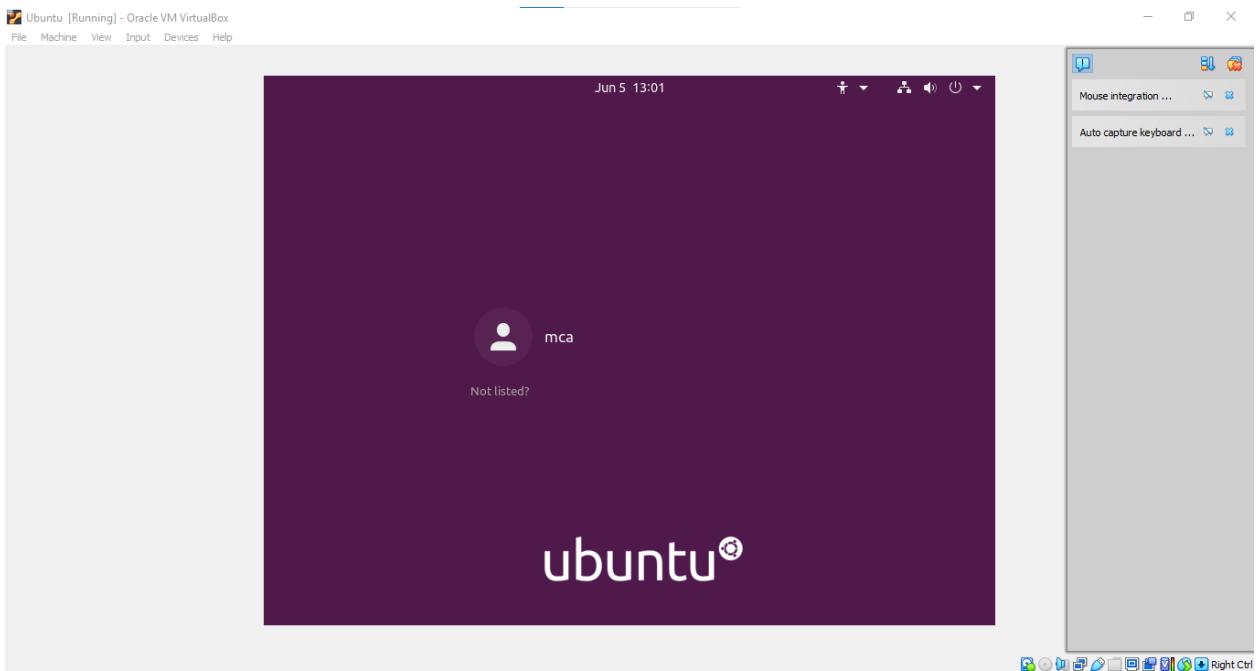
7. Preview the VM Configuration



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

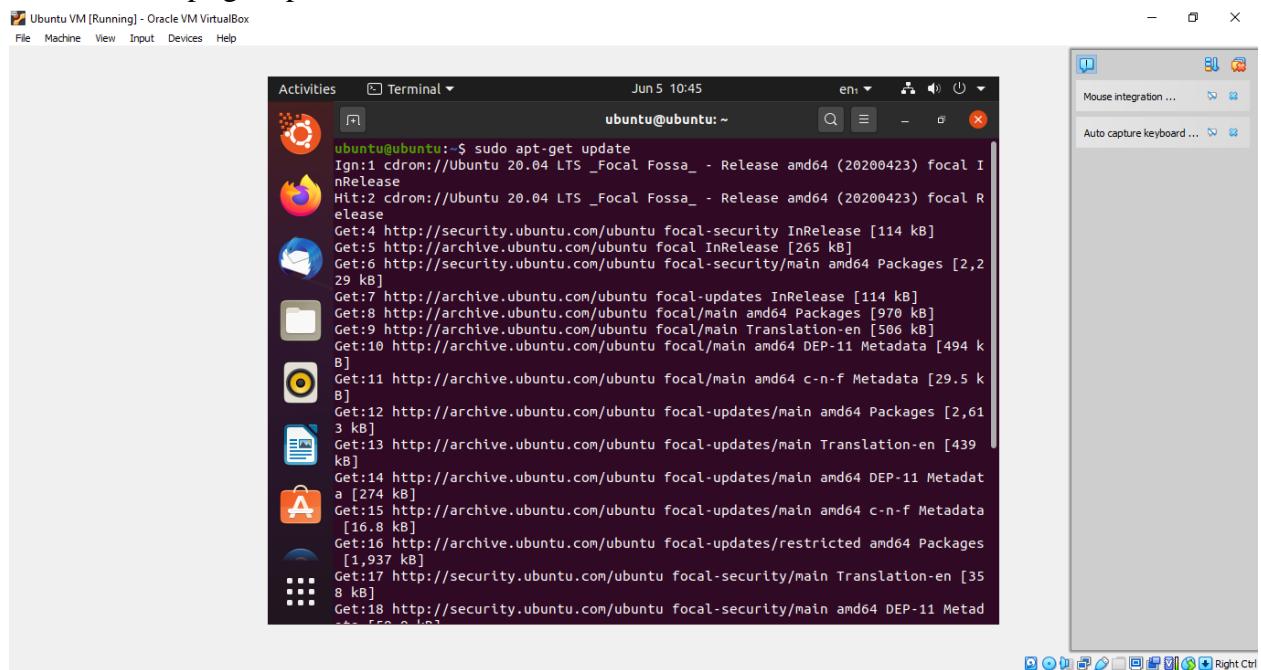
Installation and configuration of LAMP stack. Deploy an open source application such as phpmyadmin
CO3

Install and manage servers for web applications.

Procedure

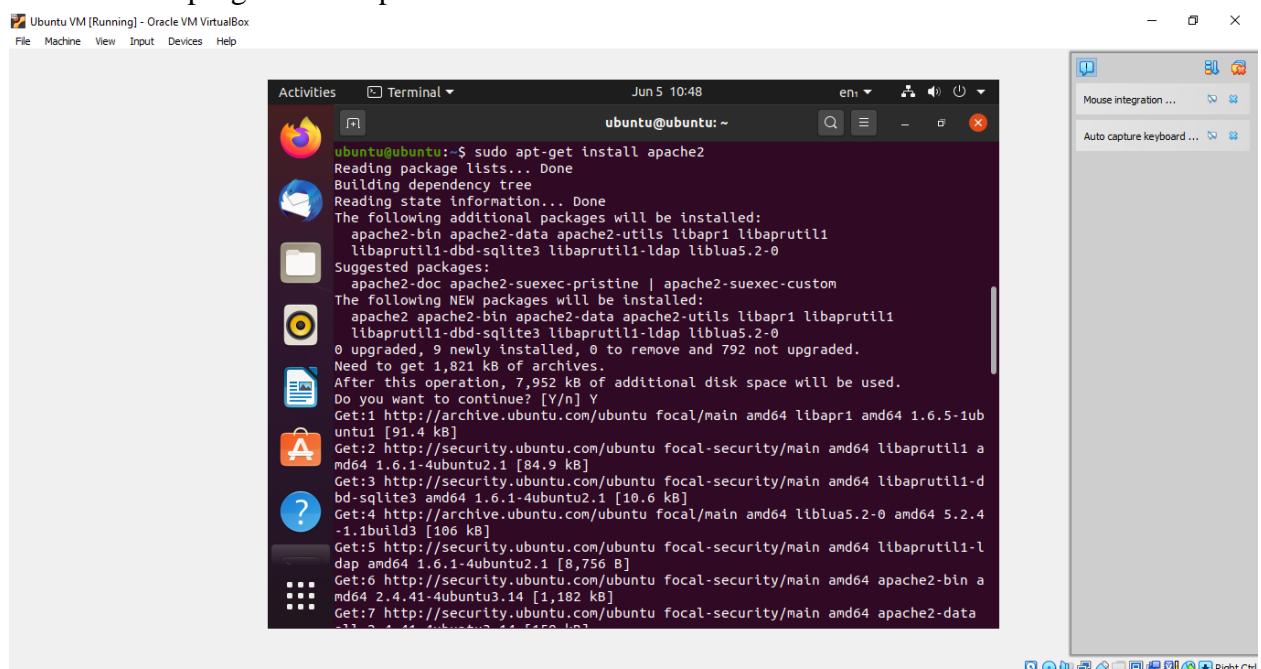
Install Apache

1. sudo apt-get update



```
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
0 upgraded, 9 newly installed, 0 to remove and 792 not upgraded.
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 1.6.5-1ubuntu1 [91.4 kB]
Get:2 http://security.ubuntu.com/ubuntu focal-security/main amd64 libaprutil1 amd64 1.6.1-4ubuntu2.1 [84.9 kB]
Get:3 http://security.ubuntu.com/ubuntu focal-security/main amd64 libaprutil1-dbd-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-ldap amd64 1.6.1-4ubuntu2.1 [8,756 B]
Get:6 http://security.ubuntu.com/ubuntu focal-security/main amd64 apache2-bin amd64 2.4.41-4ubuntu3.14 [1,182 kB]
Get:7 http://security.ubuntu.com/ubuntu focal-security/main amd64 apache2-data amd64 2.4.41-4ubuntu3.14 [556 kB]
```

3. sudo service apache2 start

```

Activities Terminal Jun 5 10:56
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:a8:00:ab 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:~$ 

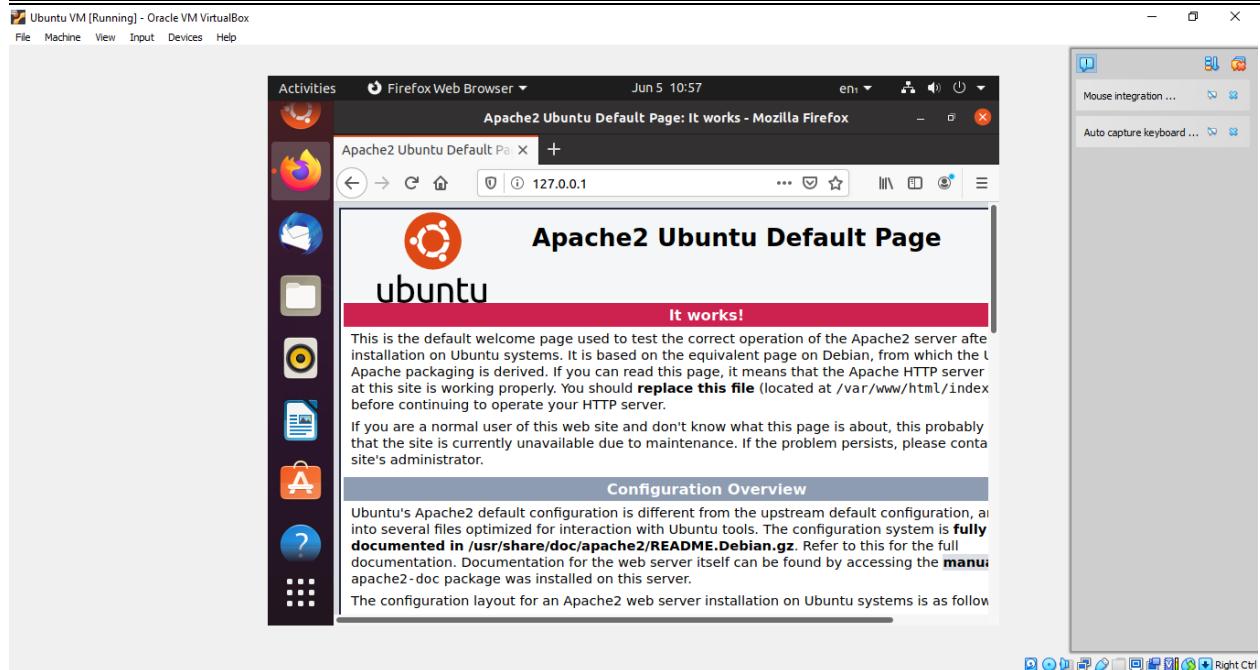
```

4. Apache Accessed successful
5. which apache2
6. systemctl status apache2

```

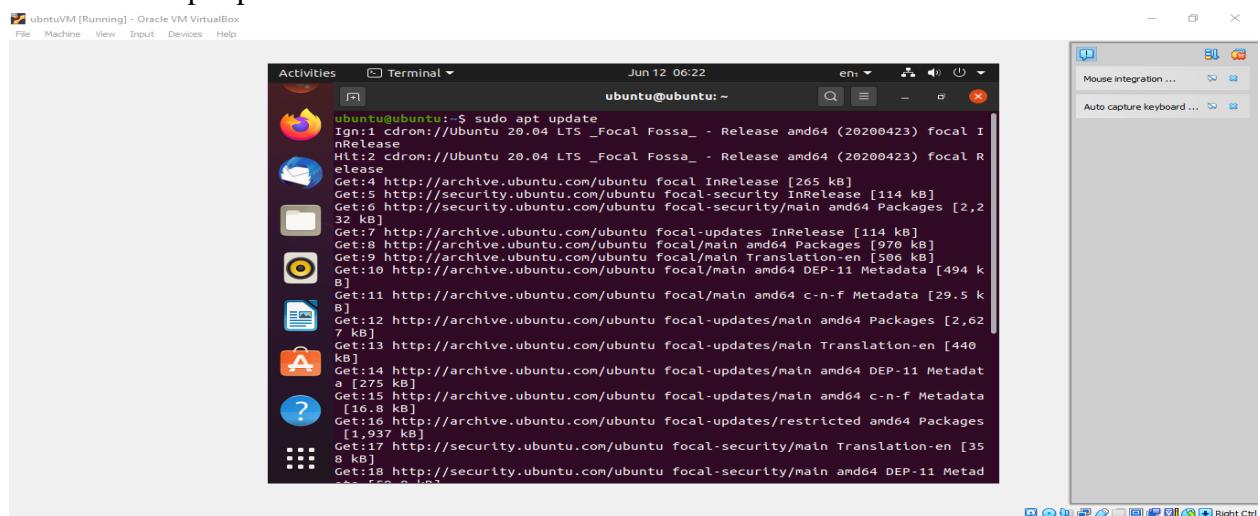
Activities Terminal Jun 21 16:03
root@mca:/home/mca 
root@mca:~ 
Try: apt install <deb name>
root@mca:/home/mca# which apache
root@mca:/home/mca# which apache2
/usr/sbin/apache2
root@mca:/home/mca# systemctl status apache2
● apache2.service - The Apache HTTP Server
   Loaded: loaded (/lib/systemd/system/apache2.service; 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 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# 

```

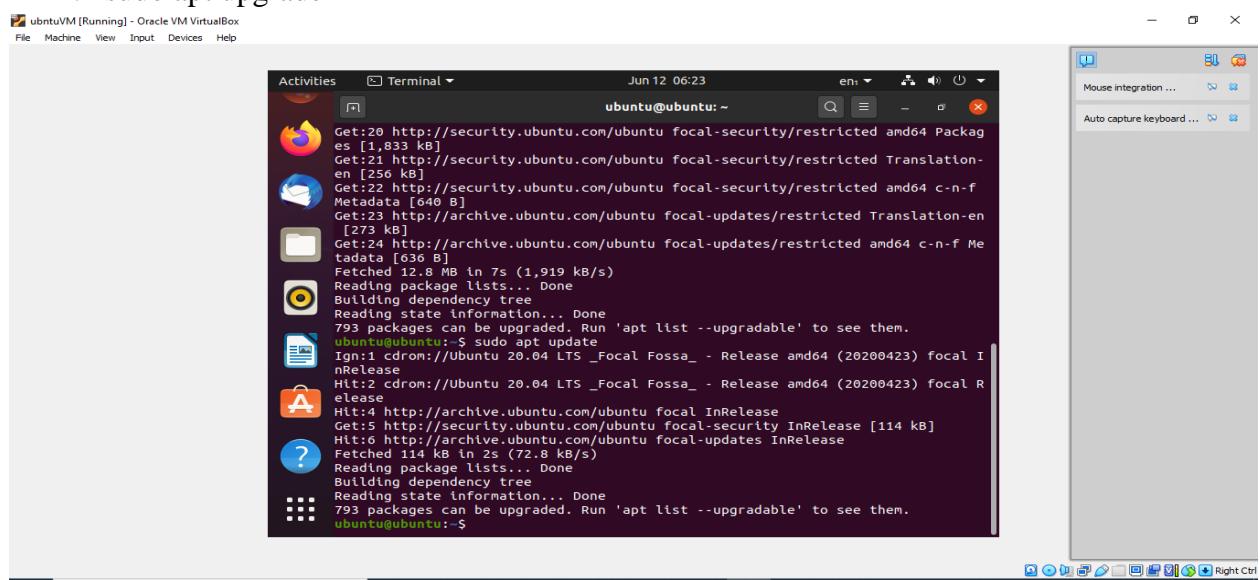


Install MySql

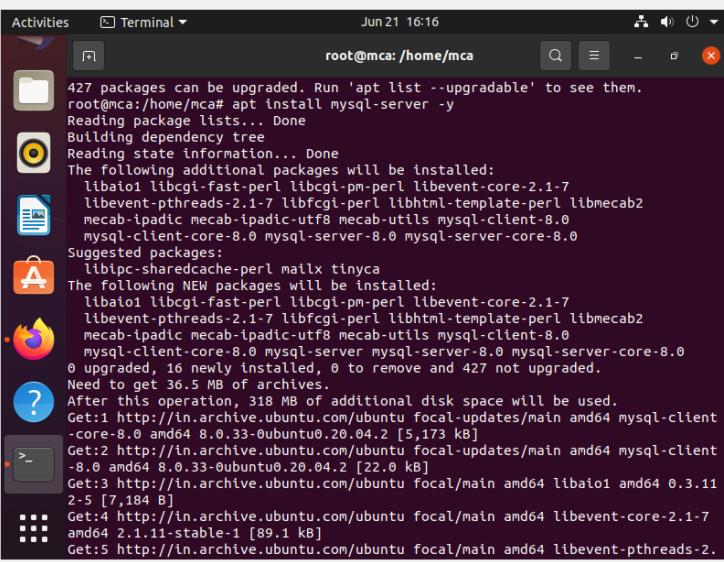
1. sudo apt update



2. sudo apt upgrade



3. sudo apt install mysql-server -y

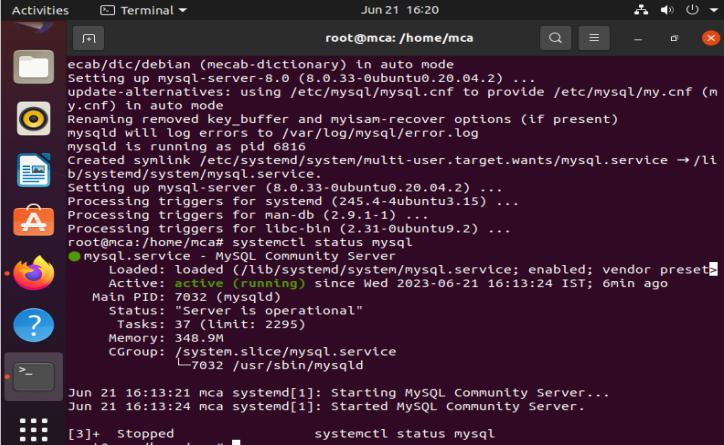


```

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 libcgi-fast-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 libcgi-fast-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 [89.1 kB]

```

4. systemctl status mysql



```

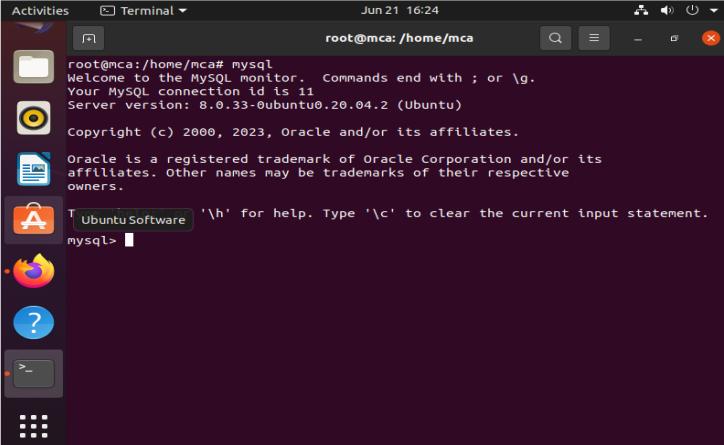
root@mca:/home/mca# systemctl status mysql
● mysql.service - MySQL Community Server
   Loaded: loaded (/lib/systemd/system/mysql.service; enabled; vendor preset: enabled)
   Active: active (running) since Wed 2023-06-21 16:13:24 IST; 6min ago
     Main PID: 7032 (mysqld)
        Tasks: 37 (limit: 2295)
       Memory: 348.9M
          CPU: 0.000 CPU(s) since start
         CGroup: /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



```

root@mca:/home/mca# mysql
Welcome to the MySQL monitor. Commands end with ; or \g.
Your MySQL connection id is 11
Server version: 8.0.33-0ubuntu0.20.04.2 (Ubuntu)

Copyright (c) 2000, 2023, Oracle and/or its affiliates.

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

T_UbuntuSoftware '\h' for help. Type '\c' to clear the current input statement.
mysql> 

```

1. Install PHP

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

```
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
```

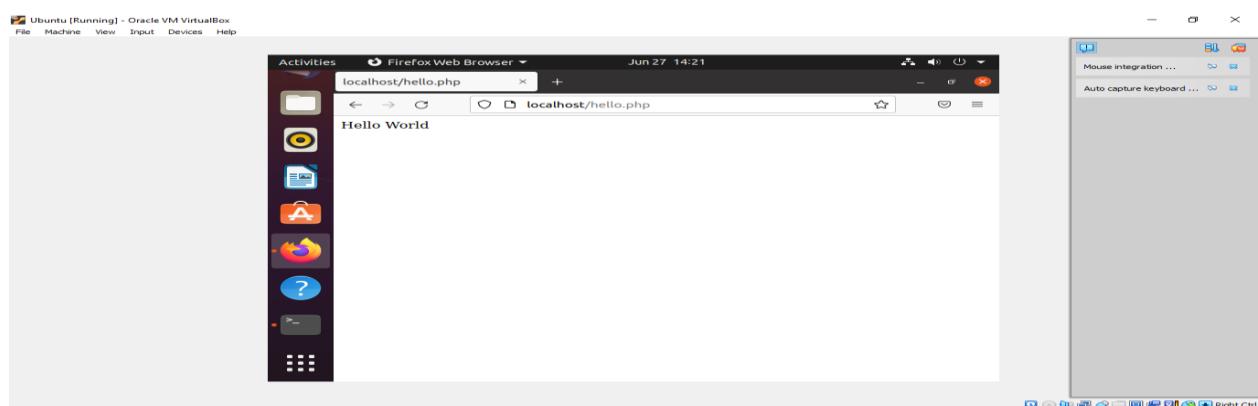
3. Check PHP version

```
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

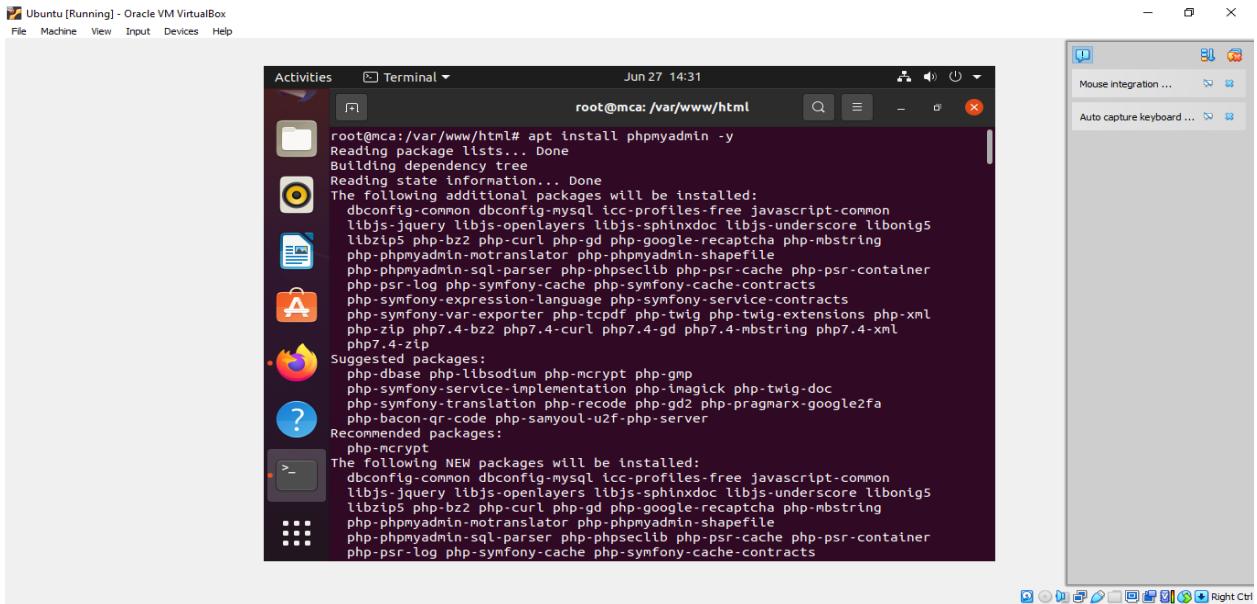
```
root@mca:/# cd /var
root@mca:/var# cd www
root@mca:/var/www# cd html
root@mca:/var/www/html# cat > hello.php
<?php
echo "Hello World";
?>
^Z
[4]+  Stopped                  cat > hello.php
```

5. Run .php file

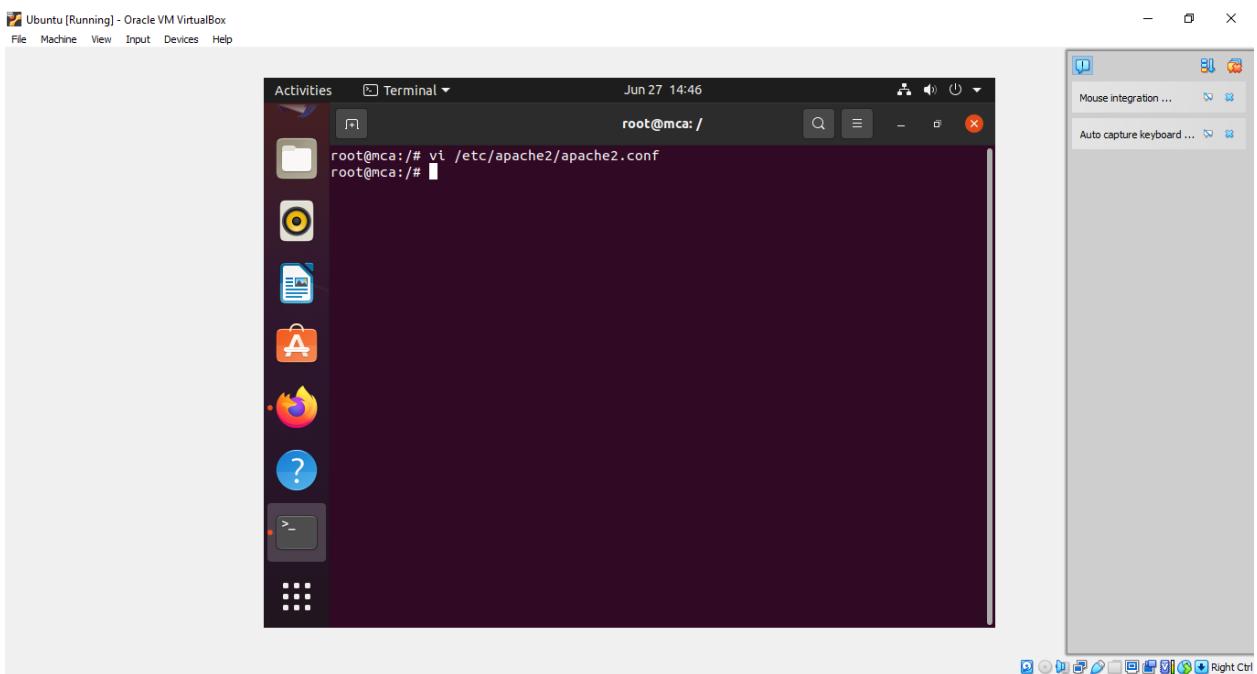


6. Install phpmyadmin

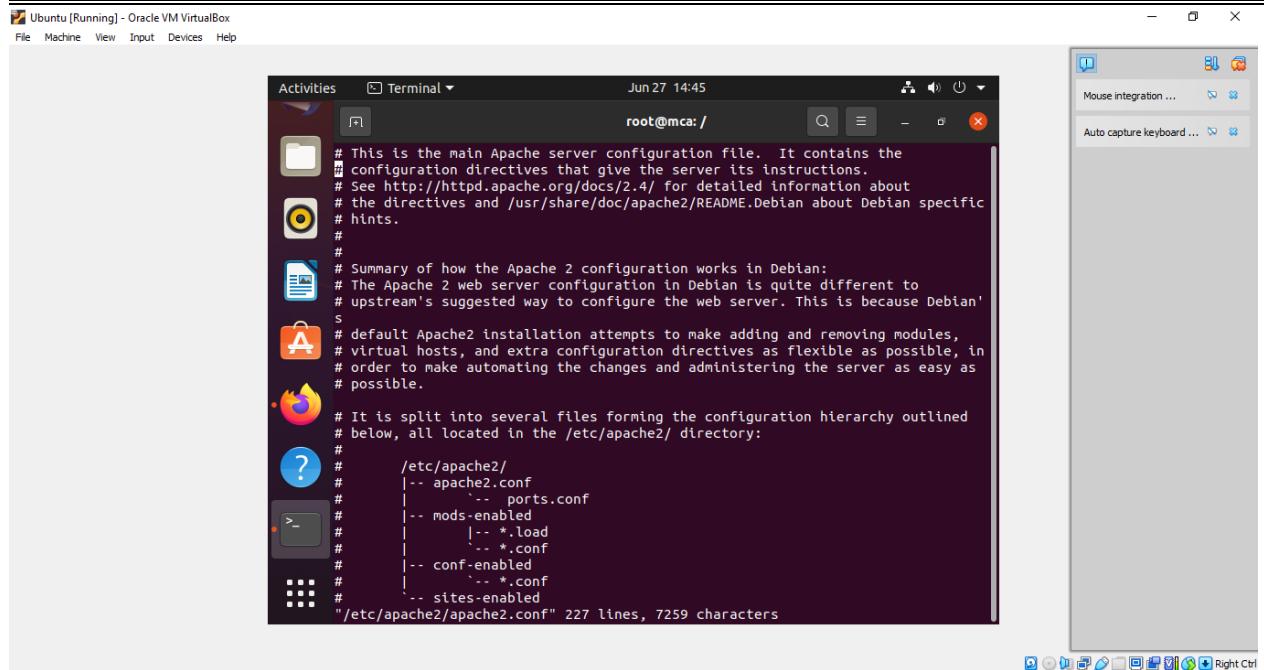
```
apt install phpmyadmin -y
```



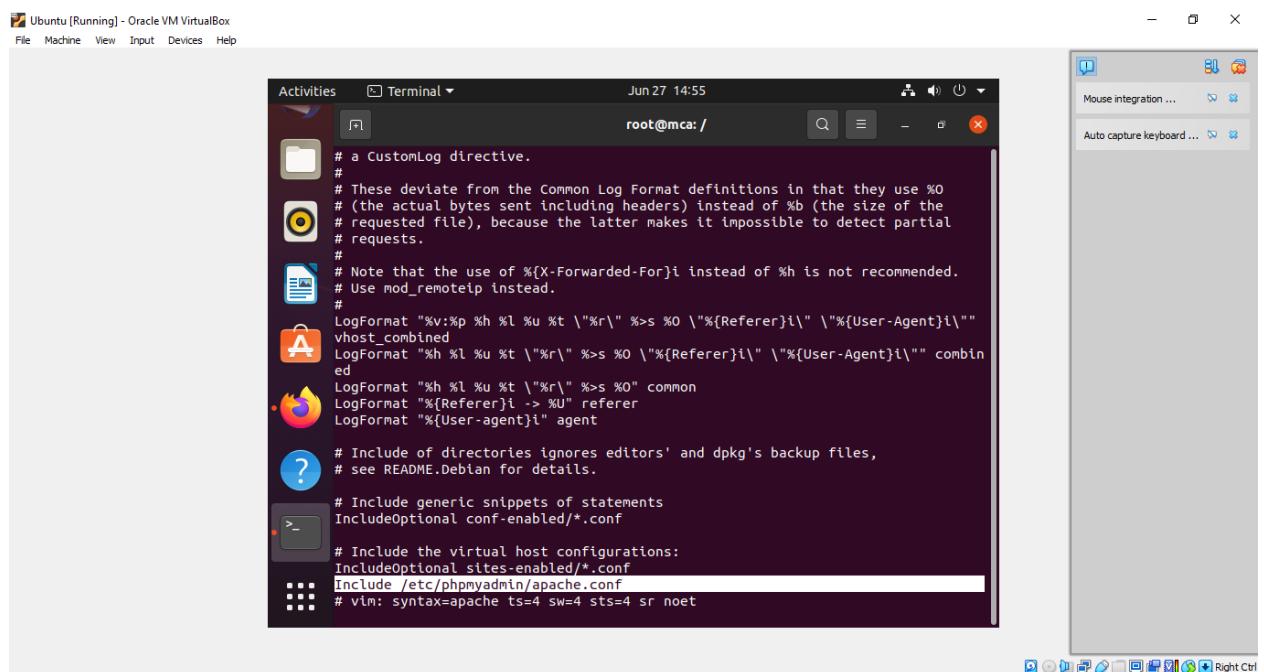
7. vi /etc/apache2/apache2.conf



8. include /etc/phpmyadmin/apache.conf

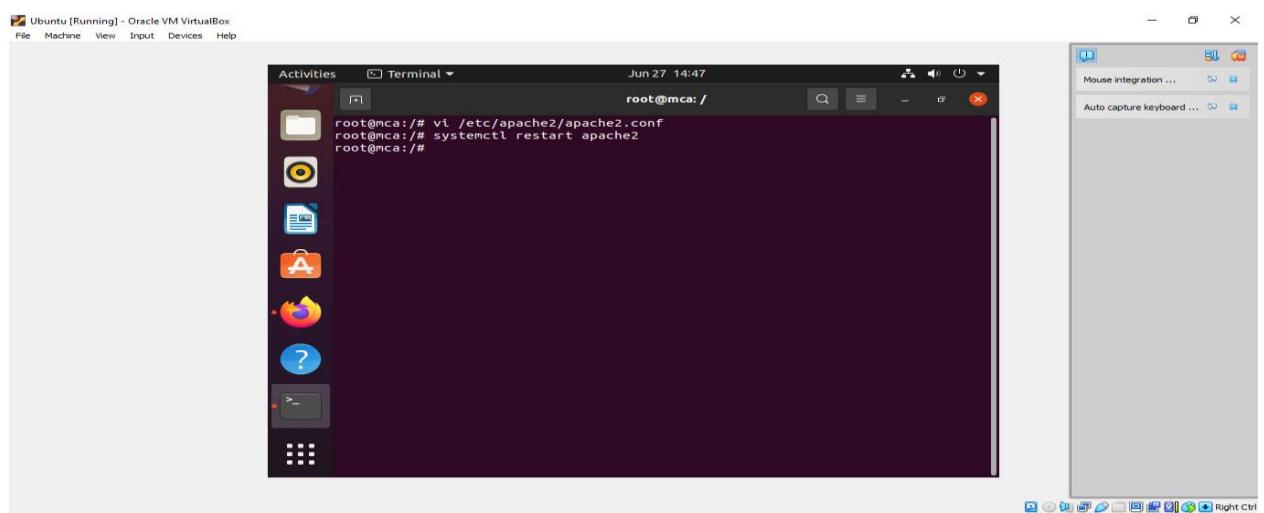


```
# This is the main Apache server configuration file. It contains the
# configuration directives that give the server its instructions.
# See http://httpd.apache.org/docs/2.4/ for detailed information about
# the directives and /usr/share/doc/apache2/README.Debian about Debian specific
# hints.
#
# 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
#                      '-- sites-available
#                          '-- *.*.conf
#                          '-- sites-enabled
# "/etc/apache2/apache2.conf" 227 lines, 7259 characters
```



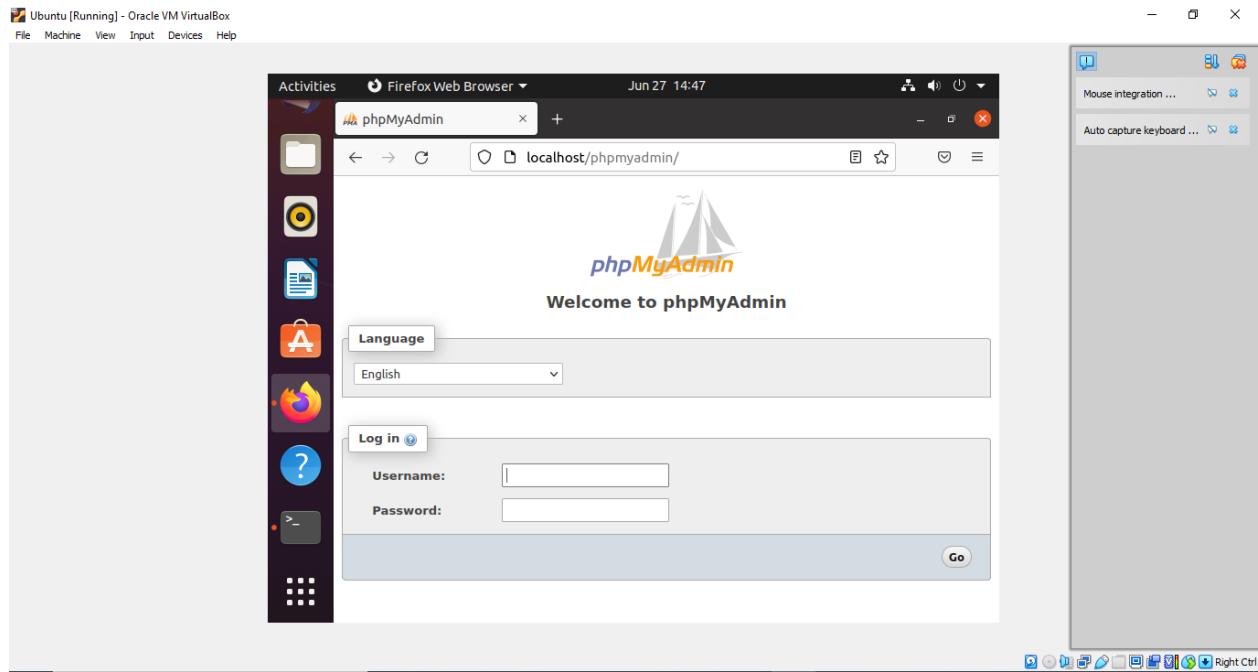
```
# a CustomLog directive.
#
# These deviate from the Common Log Format definitions in that they use %o
# (the actual bytes sent including headers) instead of %b (the size of the
# requested file), because the latter makes it impossible to detect partial
# requests.
#
# Note that the use of %{X-Forwarded-For}i 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 %0" 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
# vim: syntax=apache ts=4 sw=4 sts=4 sr noet
```

9. systemctl restart apache2



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

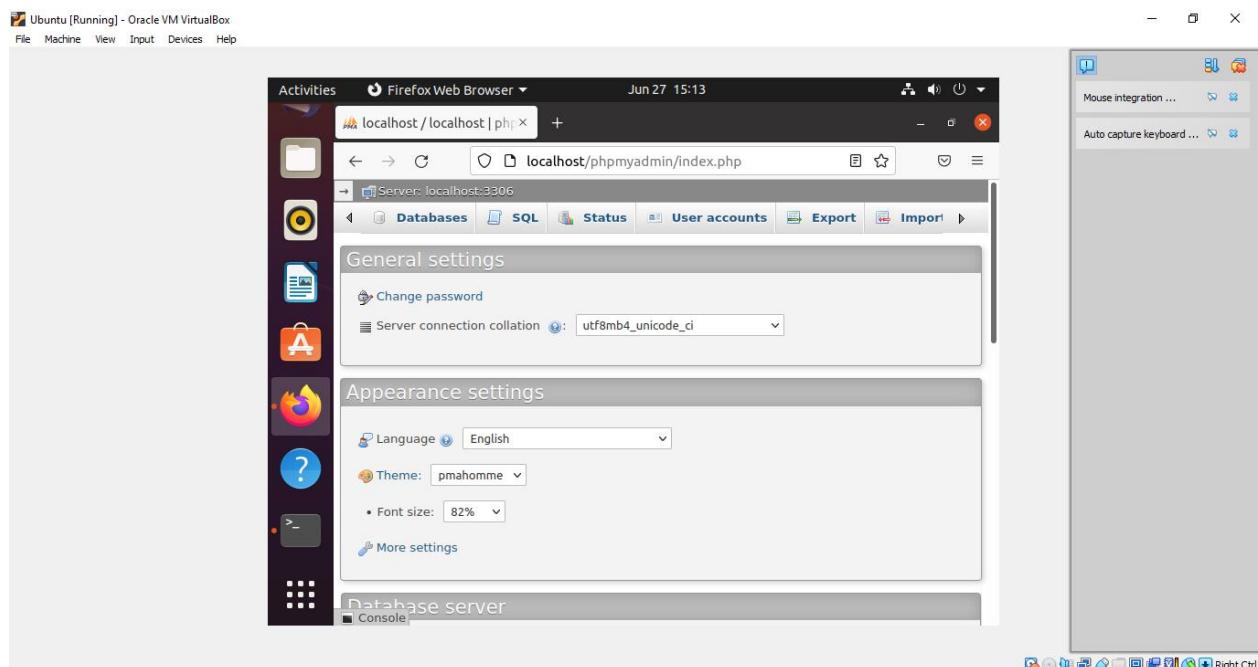
10. Open phpmyadmin



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.

1. Write a program to find factorial of a number using make utility
2. Write a program to add two numbers using cmake utility

CO4

Write shell scripts required for system administration.

Procedure

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

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;
}
```

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);
```

MakeFile

```
all:
```

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

Output

```
mca@u45:~/Desktop/tinu$ make
g++ main.cpp function1.cpp function2.cpp -o hello
mca@u45:~/Desktop/tinu$ ls
function1.cpp  function2.cpp  functions.h  hello  main.cpp  Makefile
mca@u45:~/Desktop/tinu$ ./hello
Hello World
the factorial of 5 is 120
```

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

main.cpp

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

add.cpp

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

add.h

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

CMakeLists.txt

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

Output

```
mca@u45:~/Desktop/cmake$ make
Scanning dependencies of target result.out
[ 33%] Building CXX object CMakeFiles/result.out.dir/main.cpp.o
[ 66%] Building CXX object CMakeFiles/result.out.dir/add.cpp.o
[100%] Linking CXX executable result.out
[100%] Built target result.out
```

```
mca@u45 :~/Desktop/cmake$ ./result.out
Sum of 20 and 30: 50
```

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
```

```
mca@u45:~$ sudo apt update
[sudo] password for mca:
Get:1 http://in.archive.ubuntu.com/ubuntu focal InRelease
Get:2 http://security.ubuntu.com/ubuntu focal-security InRelease [114 kB]
Get:3 http://in.archive.ubuntu.com/ubuntu focal-updates InRelease [114 kB]
Get:4 http://in.archive.ubuntu.com/ubuntu focal-backports InRelease [108 kB]
Get:5 http://in.archive.ubuntu.com/ubuntu focal-updates/main i386 Packages [838 kB]
Get:6 http://security.ubuntu.com/ubuntu focal-security/main i386 Packages [607 kB]
Get:7 http://in.archive.ubuntu.com/ubuntu focal-updates/main amd64 Packages [2,616 kB]
Get:8 http://in.archive.ubuntu.com/ubuntu focal-updates/main Translation-en [440 kB]
Get:9 http://in.archive.ubuntu.com/ubuntu focal-updates/main amd64 DEP-11 Metadata [275 kB]
Get:10 http://in.archive.ubuntu.com/ubuntu focal-updates/main amd64 c-n-f Metadata [16.8 kB]
Get:11 http://in.archive.ubuntu.com/ubuntu focal-updates/restricted amd64 Packages [1,941 kB]
Get:12 http://in.archive.ubuntu.com/ubuntu focal-updates/restricted Translation-en [272 kB]
Get:13 http://in.archive.ubuntu.com/ubuntu focal-updates/universe amd64 Packages [1,071 kB]
Get:14 http://security.ubuntu.com/ubuntu focal-security/main amd64 Packages [2,232 kB]
Get:15 http://in.archive.ubuntu.com/ubuntu focal-updates/universe i386 Packages [732 kB]
Get:16 http://security.ubuntu.com/ubuntu focal-security/main Translation-en [359 kB]
Get:17 http://security.ubuntu.com/ubuntu focal-security/main amd64 DEP-11 Metadata [59.9 kB]
Get:18 http://security.ubuntu.com/ubuntu focal-security/main amd64 c-n-f Metadata [13.0 kB]
Get:19 http://security.ubuntu.com/ubuntu focal-security/restricted amd64 Packages [1,833 kB]
Get:20 http://security.ubuntu.com/ubuntu focal-security/restricted Translation-en [256 kB]
Get:21 http://security.ubuntu.com/ubuntu focal-security/universe i386 Packages [601 kB]
Get:22 http://security.ubuntu.com/ubuntu focal-security/universe amd64 Packages [844 kB]
Get:23 http://security.ubuntu.com/ubuntu focal-security/universe Translation-en [174 kB]
Get:24 http://security.ubuntu.com/ubuntu focal-security/universe amd64 DEP-11 Metadata [95.8 kB]
Get:25 http://in.archive.ubuntu.com/ubuntu focal-updates/universe Translation-en [255 kB]
Get:26 http://in.archive.ubuntu.com/ubuntu focal-updates/universe amd64 DEP-11 Metadata [409 kB]
```

2) Install net-tools

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

```
mca@u45:~$ sudo apt install net-tools
Reading package lists... Done
Building dependency tree
Reading state information... Done
The following NEW packages will be installed:
  net-tools
0 upgraded, 1 newly installed, 0 to remove and 696 not upgraded.
Need to get 196 kB of archives.
After this operation, 864 kB of additional disk space will be used.
Get:1 http://in.archive.ubuntu.com/ubuntu focal/main amd64 net-tools amd64 1.60+git20180626.aebd88e~ubuntu1 [196 kB]
Fetched 196 kB in 0s (132 kB/s)
Selecting previously unselected package net-tools.
(Reading database ... 153306 files and directories currently installed.)
Preparing to unpack .../net-tools_1.60+git20180626.aebd88e~ubuntu1_amd64.deb ...
Unpacking net-tools (1.60+git20180626.aebd88e~ubuntu1) ...
Setting up net-tools (1.60+git20180626.aebd88e~ubuntu1) ...
Processing triggers for man-db (2.9.1-1) ...
mca@u45:~$ ifconfig
enp5s0: flags=4163<UP,BROADCAST,RUNNING,MULTICAST> mtu 1500
      link layer
      brd 00:0c:9d:92:0e:7d
      RX packets 1221935 bytes 1832505846 (1.0 GB)
      RX errors 0 dropped 30 overruns 0 frame 0
      TX packets 201482 bytes 13471147 (13.4 MB)
      TX errors 0 dropped 0 overruns 0 carrier 0 collisions 0

lo: flags=73<UP,LOOPBACK,RUNNING> mtu 65536
      link layer
      brd 00:00:00:00:00:00
      RX packets 338 bytes 29600 (29.6 kB)
      RX errors 0 dropped 0 overruns 0 frame 0
      TX packets 338 bytes 29600 (29.6 kB)
      TX errors 0 dropped 0 overruns 0 carrier 0 collisions 0
```

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

```
mca@u45:~$ ifconfig
enp5s0: flags=4163<UP,BROADCAST,RUNNING,MULTICAST> mtu 1500
        inet 192.168.6.115 netmask 255.255.255.0 broadcast 192.168.6.255
        inet6 fe80::724e:f66f:c414:1316 prefixlen 64 scopeid 0x20<link>
          ether 0c:9d:92:0e:7d:c6 txqueuelen 1000 (Ethernet)
            RX packets 1221935 bytes 1832505046 (1.8 GB)
            RX errors 0 dropped 30 overruns 0 frame 0
            TX packets 201482 bytes 13471147 (13.4 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 338 bytes 29600 (29.6 KB)
            RX errors 0 dropped 0 overruns 0 frame 0
            TX packets 338 bytes 29600 (29.6 KB)
            TX errors 0 dropped 0 overruns 0 carrier 0 collisions 0
```

- 4) Ifup/Ifdown
- ifup – used to up the network interface
\$ sudoifup en5s0
 - ifdown – used to down the network interface
\$ sudiifdown en5s0

```
mca@u45:~$ sudo apt install ifupdown
Reading package lists... Done
Building dependency tree...
Reading state information... Done
Suggested packages:
  rdnssd
The following NEW packages will be installed:
  ifupdown
0 upgraded, 1 newly installed, 0 to remove and 0 to upgrade.
Need to get 0.5 kB of archives.
After this operation, 234 kB of additional disk space will be used.
Get:1 http://ln.archive.ubuntu.com/ubuntu focal/universe amd64 ifupdown amd64 0.8.35ubuntu1 [0.5 kB]
Fetched 0.5 kB in 0s (33.5 kB/s)
Selecting previously unselected package ifupdown.
(Reading database ... 153355 files and directories currently installed.)
Preparing to unpack .../ifupdown_0.8.35ubuntu1_amd64.deb ...
Unpacking ifupdown (0.8.35ubuntu1) ...
Setting up ifupdown (0.8.35ubuntu1) ...
Creating /etc/network/interfaces...
Created symlink /etc/systemd/system/multi-user.target.wants/networking.service → /lib/systemd/system/networking.service.
Created symlink /etc/systemd/system/network-online.target.wants/networking.service → /lib/systemd/system/networking.service.
Processing triggers for man-db (2.9.1-1) ...
```

- 5) ping – used to detect connectivity between host and the server. It is used for detecting devices on a network and for troubleshooting problems
- ping <url>
\$ ping google.com
 - ping <ip address>
\$ ping 142.250.182.78
 - \$ ping -c 5 google.com- To specify the number of lines

```
mca@u3:~$ ping google.com
PING google.com (142.250.182.78) 56(84) bytes of data.
64 bytes from maa05s20-in-f14.1e100.net (142.250.182.78): icmp_seq=1 ttl=248 time=16.0 ms
64 bytes from maa05s20-in-f14.1e100.net (142.250.182.78): icmp_seq=2 ttl=248 time=16.0 ms
64 bytes from maa05s20-in-f14.1e100.net (142.250.182.78): icmp_seq=3 ttl=248 time=15.9 ms
^Z
[8]+ Stopped                  ping google.com
mca@u3:~$ ping 192.168.6.174
PING 192.168.6.174 (192.168.6.174) 56(84) bytes of data.
64 bytes from 192.168.6.174: icmp_seq=1 ttl=64 time=0.399 ms
^Z
[9]+ Stopped                  ping 192.168.6.174
mca@u3:~$ ping -c 2 142.250.193.110
PING 142.250.193.110 (142.250.193.110) 56(84) bytes of data.
64 bytes from 142.250.193.110: icmp_seq=1 ttl=248 time=15.2 ms
64 bytes from 142.250.193.110: icmp_seq=2 ttl=248 time=15.2 ms
...
--- 142.250.193.110 ping statistics ---
2 packets transmitted, 2 received, 0% packet loss, time 1001ms
```

6) Traceroute- It is used to identify the route taken by the packet to reach the destination.

a) \$ sudo traceroute google.com

```
mca@u3:~$ traceroute google.com
traceroute to google.com (142.250.182.78), 30 hops max, 60 byte packets
 1  _gateway (192.168.6.100)  0.139 ms  0.125 ms  0.134 ms
 2  136.232.57.109 (136.232.57.109)  1.465 ms  1.436 ms  1.542 ms
 3  172.20.97.57 (172.20.97.57)  14.543 ms  14.491 ms  14.631 ms
 4  172.27.9.126 (172.27.9.126)  16.426 ms  16.373 ms  16.530 ms
 5  172.27.9.125 (172.27.9.125)  16.476 ms  17.274 ms  16.555 ms
 6  172.27.109.51 (172.27.109.51)  16.698 ms  16.086 ms  16.066 ms
```

7) Install whois

\$ sudo apt install whois

```
mca@u45:~$ sudo apt install whois
Reading package lists... Done
Building dependency tree
Reading state information... Done
The following NEW packages will be installed:
  whois
0 upgraded, 1 newly installed, 0 to remove and 696 not upgraded.
Need to get 44.7 kB of archives.
After this operation, 279 kB of additional disk space will be used.
Get:1 http://in.archive.ubuntu.com/ubuntu focal/main amd64 whois amd64 5.5.6 [44.7 kB]
Fetched 44.7 kB in 1s (42.0 kB/s)
Selecting previously unselected package whois.
(Reading database ... 153414 files and directories currently installed.)
Preparing to unpack .../archives/whois_5.5.6_amd64.deb ...
Unpacking whois (5.5.6) ...
Setting up whois (5.5.6) ...
Processing triggers for man-db (2.9.1-1) ...
```

a) \$ whois google.com

```
mca@u45:~$ 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: 2023-06-13T09:17:43Z <<<

For more information on Whois status codes, please visit https://icann.org/epp

NOTICE: The expiration date displayed in this record is the date the
registrar's sponsorship of the domain name registration in the registry is
currently set to expire. This date does not necessarily reflect the expiration
date of the domain name registrant's agreement with the sponsoring
registrar. Users may consult the sponsoring registrar's Whois database to
view the registrar's reported date of expiration for this registration.

TERMS OF USE: You are not authorized to access or query our Whois
database through the use of electronic processes that are high-volume and
automated except as reasonably necessary to register domain names or
```

- 8) Nslookup- used to check DNS records propagation and resolution using different servers, and perform other troubleshooting steps
 - a) \$ nslookup 103.148.156.198

```
mca@u45:~$ nslookup 142.250.182.78
78.182.250.142.in-addr.arpa      name = maa05s20-in-f14.1e100.net.

Authoritative answers can be found from:
```

Result

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

Experiment No.: 9

Aim

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

c05

Acquire skill sets required for a DevOps.

Procedure

tcpdump: used to capture the packets of the current network interface.

a) **tcpdump -D**: used to display the current network interfaces.

```
mca@u45:~$ 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]
```

b) **tcpdump -c 5 -i**: used to capture packets from one interface.

```
mca@u3:~$ sudo tcpdump -c 5 -i enp5s0
tcpdump: verbose output suppressed, use -v or -vv for full protocol decode
listening on enp5s0, link-type EN10MB (Ethernet), capture size 262144 bytes
15:51:16.708365 ARP, Request who-has 192.168.6.146 tell _gateway, length 46
15:51:16.710108 IP u3.35210 > dns.google.domain: 34499+ [1au] PTR? 146.6.168.192.in-addr.arpa. (55)
15:51:16.725954 IP dns.google.domain > u3.35210: 34499 NXDomain 0/0/1 (55)
15:51:16.726189 IP u3.35210 > dns.google.domain: 34499+ PTR? 146.6.168.192.in-addr.arpa. (44)
15:51:16.735420 ARP, Request who-has 192.168.6.95 tell 192.168.6.56, length 46
5 packets captured
22 packets received by filter
0 packets dropped by kernel
```

c) **tcpdump -A -i**: to capture packets in ASCII format.

```
macbook:~ sode tcpdump -A -t enp5s0
tcpdump: verbose output suppressed, use -v or -vv for full protocol decode
listening on enp5s0, link-type EN10MB (Ethernet), capture size 262144 bytes
15:26:15.028783 IP 192.168.6.93.6771 > 239.192.152.143.6771: UDP, length 137
E.....8...J.....8...UBT-SEARCH * HTTP/1.1
Host: 239.192.152.143:6771
Port: 239.152.143:6771
Infohash: 47f043691fd7b9b40362c104b68995a94475e405
cookie: 21a5e596

15:26:15.030411 IP u45.43678 > dns.google.domain: 10500+ [au] PTR! 143.152.192.239.in-addr.arpa. (57)
E..0.#0.0.....5.A.).....143.152.192.239.in-addr.arpa. .....
15:26:15.0708215 IP dns.google.domain > u45.43678: 10500 NXDomain 0/1/1 (114)
E..o....zt.....5.2[.].....143.152.192.239.in-addr.arpa. ....sns.dns.icann.org..noc.>x. .....
...
15:26:15.070493 IP u45.43678 > dns.google.domain: 10500+ PTR! 143.152.192.239.in-addr.arpa. (46)
E..3.20.0.....5.6.).....143.152.192.239.in-addr.arpa. .....
15:26:15.087368 IP dns.google.domain > u45.43678: 10500 NXDomain 0/1/0 (103)
E..3....H.....5.6.).....143.152.192.239.in-addr.arpa. ....sns.dns.icann.org..noc.>x. .....
15:26:15.088735 IP u45.51997 > dns.google.domain: 5839+ [lau] PTR? 93.6.108.192.in-addr.arpa. (54)
E..R.0#0.0.....5.7.....93.6.108.192.in-addr.arpa. .....
15:26:15.185287 IP dns.google.domain > u45.51997: 5839 NXDomain 0/0/1 (54)
E..n.....8...J.....8...UBT-SEARCH * HTTP/1.1
```

d) **tcpdump -XX -i**: to capture packets in hexadecimal format.

```
mca@u451-5 sudo tcpdump -XX -i enp5s0
tcpdump: verbose output suppressed, use -v or -vv for full protocol decode
listening on enp5s0, link-type EN10MB (Ethernet), capture size 262144 bytes
15:29:13.941615 ARP, Request who-has 192.168.6.108 tell 192.168.6.126, length 46
  0x0000: ffff ffff ffff 8862 66c7 ce0e 8806 0001 .....bf.....
  0x0010: 0000 0004 0001 8862 66c7 ce0e c0a8 007e .....bf.....
  0x0020: 0000 0000 0000 c0a8 000c 0000 0000 0006 .....l.....
  0x0030: 0000 0000 0000 0000 0000 0000 0000 0000 .....l.....
15:29:13.943246 IP u45.50610 > dns.google.domain: 33104+ [iau] PTR? 108.6.168.192.in-addr.arp
  0x0000: 001a 8c6b 54cf 8c9d 920e 7dc6 0000 4580 ....kT....E.
  0x0010: 0053 0f19 4000 4011 53f2 c0a8 00d7 0008 .5..@.0.5.....
  0x0020: 0088 c5b2 0035 003f d7df 8150 0100 0001 .....5.7...P...
  0x0030: 0000 0000 0001 0331 3038 0136 0331 3638 .....108.6.168
  0x0040: 0331 3932 0769 6e2d 6164 6472 0461 7270 .192.in-addr.arp
  0x0050: 6106 000c 0001 0000 2902 0000 0000 0006 a.....).
  0x0060: 00
15:29:13.958762 IP dns.google.domain > u45.50610: 33104 NXDomain 0/0/1 (55)
  0x0000: 8c9d 920e 7dc6 001a 8c6b 54cf 0000 4580 ....kT....E.
  0x0010: 0053 3754 0000 f811 9336 0000 0000 c0a8 .SWT....6.....
  0x0020: 00d7 0035 c5b2 003f 7869 8150 0183 0001 ..5...?xi.P...
  0x0030: 0000 0000 0001 0331 3038 0136 0331 3638 .....108.6.168
  0x0040: 0331 3932 0769 6e2d 6164 6472 0461 7270 .192.in-addr.arp
  0x0050: 6106 000c 0001 0000 2902 0000 0000 0006 a.....).
  0x0060: 00
```

e) **tcpdump -w filename -i enp5s0**: used to write the data on a file.

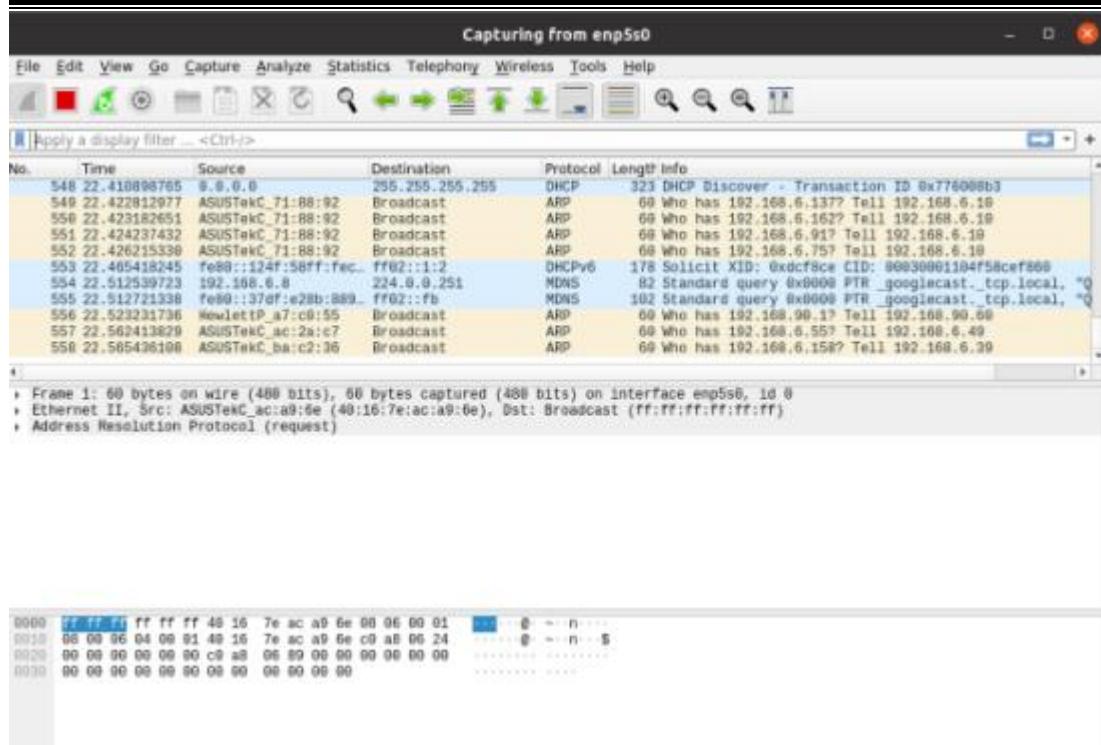
```
mca@u45:~$ sudo tcpdump -w ab.txt -i enp5s0
tcpdump: listening on enp5s0, link-type EN10MB (Ethernet), capture size 262144 bytes
```



wireshark: is a network protocol analyzer, or an application that captures packets from a network connection

```
mcguire45:~ $ sudo apt install Wireshark
Reading package lists... Done
Building dependency tree
Reading state information... Done
The following additional packages will be installed:
  libbz2-1.0.8 liblouis2-2.0 libqt5multimedia5-plugins libqt5multimedtagstools5 libqt5multimedawidgets5 libqt5opengl5
  libsnappy1b1 libspandsp2 libssh-gcrypt-4 libwireshark-data libwireshark3 libwtretap0 libwsutil1 libwireshark-common
  wireshark-qt
Suggested packages:
  semp-tmb-downloader geoipupdate geoip-database geoip-database-extra libjs-leaflet libjs-leaflet.markercluster wireshark-doc
The following NEW packages will be installed:
  libbz2-1.0.8 liblouis2-2.0 libqt5multimedia5-plugins libqt5multimedagstools5 libqt5multimedawidgets5 libqt5opengl5
  libsnappy1b1 libspandsp2 libssh-gcrypt-4 libwireshark-data libwireshark3 libwtretap0 libwsutil1 libwireshark wireshark-
```

```
mca@u45:~$ sudo wireshark
QStandardPaths: XDG_RUNTIME_DIR not set, defaulting to '/tmp/runtime-root'
mca@u45:~$
```



Output Screenshot

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

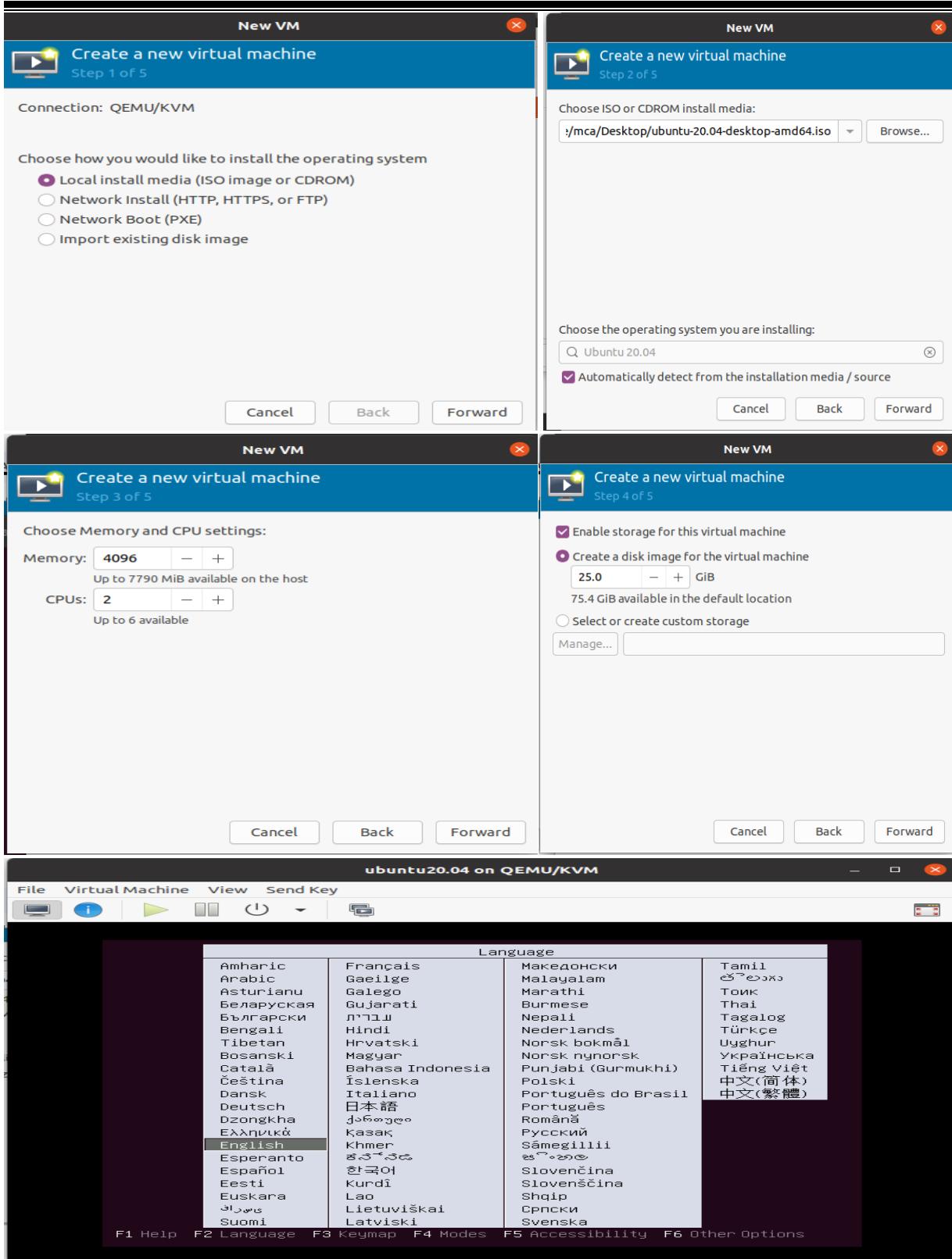
- **egrep -c '(vmx|svm)' /proc/cpuinfo:** it gives the cpu information. If the output is greater than 0, then your system is compactable.
- **kvm -ok:** check whether the CPU we're running on supports KVM acceleration.
- **apt -get install qemu qemu-kvm libvirt-daemon-system bridge-utils virt-manager virt-viewer -y:** installing kvm

```
mca@u45:~$ sudo apt install qemu-kvm libvirt-daemon-system libvirt-clients bridge-utils
Reading package lists... Done
Building dependency tree
Reading state information... Done
bridge-utils is already the newest version (1.6-2ubuntu1).
libvirt-clients is already the newest version (0.6.0-0ubuntu8.16).
libvirt-daemon-system is already the newest version (0.6.0-0ubuntu8.16).
qemu-kvm is already the newest version (1:4.2-3ubuntu0.27).
0 upgraded, 0 newly installed, 0 to remove and 319 not upgraded.

mca@u45:~$ sudo systemctl status libvirtd
● libvirtd.service - Virtualization daemon
   Loaded: loaded (/lib/systemd/system/libvirtd.service; enabled; vendor preset: enabled)
   Active: active (running) since Tue 2023-06-20 19:27:25 IST; 3h 46min left
     TriggeredBy: ● libvirtd-admin.socket
     ● libvirtd.socket
     ● libvirtd-ro.socket
       Docs: man:libvirtd()
         https://libvirt.org
   Main PID: 917 (libvirtd)
     Tasks: 20 (limit: 32768)
    Memory: 38.2M
      CGroup: /system.slice/libvirtd.service
              └─ 917 /usr/sbin/libvirtd
                  ├─ 1293 /usr/sbin/dnsmasq --conf-file=/var/lib/libvirt/dnsmasq/default.conf --leasefile-ro --dhcp-script=/usr/lib/libvirt/libvirt-dnsmasq
                  ├─ 1294 /usr/sbin/dnsmasq --conf-file=/var/lib/libvirt/dnsmasq/default.conf --leasefile-ro --dhcp-script=/usr/lib/libvirt/libvirt-dnsmasq
                  ...
                  [Jun 20 14:14:43 u45 libvirtd[917]: dnsmasq[1294]: read "/etc/resolv.conf" already exists with file 02000000-0000-0000-0000-070000000000
Jun 20 14:24:39 u45 libvirtd[917]: dnsmasq: failed: split: /etc/resolv.conf: cannot write file 02000000-0000-0000-0000-070000000000
Jun 20 14:29:32 u45 dnsmasq-dhcp[1293]: DHCPDISCOVER(virbr0) 52:54:00:00:3b:79
Jun 20 14:29:32 u45 dnsmasq-dhcp[1293]: DHCPOFFER(virbr0) 192.168.122.94 52:54:00:00:3b:79
Jun 20 14:29:32 u45 dnsmasq-dhcp[1293]: DHCPDISCOVER(virbr0) 52:54:00:00:3b:79
Jun 20 14:29:32 u45 dnsmasq-dhcp[1293]: DHCPOFFER(virbr0) 192.168.122.94 52:54:00:00:3b:79
Jun 20 14:29:32 u45 dnsmasq-dhcp[1293]: DHCPREQUEST(virbr0) 192.168.122.94 52:54:00:00:3b:79
Jun 20 14:29:32 u45 dnsmasq-dhcp[1293]: DHCPACK(virbr0) 192.168.122.94 52:54:00:00:3b:79. ubuntu
Jun 20 14:42:53 u45 libvirtd[917]: Failed to open file '/home/mca/.ssh/authorized_keys': No such file or directory
Jun 20 15:04:37 u45 libvirtd[917]: Internal error: bad or file from genp module
Lines 1-26/26 (END)
```

- **libvirt:** library, used to interface with different virtualisation technologies.
- **virt-manager:** a graphical user front end for the libvirt library which provides vm management services.
- **virt-viewer:** displaying the graphical console of a guest user.

```
mca@u45:~$ sudo systemctl enable --now libvirtd
mca@u45:~$ sudo apt install virt-manager
Reading package lists... Done
Building dependency tree
Reading state information... Done
virt-manager is already the newest version (1:2.2.1-3ubuntu2.1).
0 upgraded, 0 newly installed, 0 to remove and 319 not upgraded.
```

virsh(virtual shell): flexible command line utility for managing vm controlled by libvirt.

KVM COMMANDS

sudo virsh list

```
virsh # list
 Id   Name          State
 -----
 2    ubuntu20.04-2  running
```

sudo virsh list --all

```
virsh # list --all
 Id   Name          State
 -----
 1    ubuntu20.04    running
 2    ubuntu20.04-2  running
```

sudo virsh nodeinfo

```
virsh # nodeinfo
CPU model:           x86_64
CPU(s):              6
CPU frequency:       871 MHz
CPU socket(s):       1
Core(s) per socket: 6
Thread(s) per core: 1
NUMA cell(s):        1
Memory size:         7977500 KiB
```

sudo virsh help list

```
virsh # help list
NAME
  list - list domains

SYNOPSIS
  list [--inactive] [--all] [--transient] [--persistent] [--with-snapshot] [--without-snapshot] [--with-checkpoint] [--without-checkpoint] [
  --state-running] [--state-paused] [--state-shutoff] [--state-other] [--autostart] [--no-autostart] [--with-managed-save] [--without-managed-sa
ve] [--uuid] [--name] [--table] [--managed-save] [--title]

DESCRIPTION
  Returns list of domains.

OPTIONS
  --inactive      list inactive domains
  --all           list inactive & active domains
  --transient     list transient domains
  --persistent    list persistent domains
  --with-snapshot list domains with existing snapshot
  --without-snapshot list domains without a snapshot
  --with-checkpoint list domains with existing checkpoint
  --without-checkpoint list domains without a checkpoint
  --state-running list domains in running state
  --state-paused   list domains in paused state
  --state-shutoff  list domains in shutoff state
  --state-other    list domains in other states
  --autostart     list domains with autostart enabled
  --no-autostart  list domains with autostart disabled
  --with-managed-save list domains with managed save state
  --without-managed-save list domains without managed save
  --uuid          list uuid's only
  --name          list domain names only
  --table         list table (default)
```

sudo virsh start <vmname>

```
virsh # start ubuntu20.04
error: Domain is already active
```

sudo virsh reboot <vmname>

```
virsh # reboot ubuntu20.04
Domain ubuntu20.04 is being rebooted
```

sudo virsh dominfo <vmname>

```
virsh # dominfo ubuntu20.04
Id: 1
Name: ubuntu20.04
UUID: 3f4b34f8-72d7-41d1-97a0-afaf3e531cb0
OS Type: hvm
State: running
CPU(s): 2
CPU time: 27.2s
Max memory: 4194304 KiB
Used memory: 4194304 KiB
Persistent: yes
Autostart: disable
Managed save: no
Security model: apparmor
Security DOI: 0
Security label: libvirt-3f4b34f8-72d7-41d1-97a0-afaf3e531cb0 (enforcing)
```

sudo virsh suspend <vmname>

```
virsh # suspend ubuntu20.04
Domain ubuntu20.04 suspended
```

sudo virsh resume <vmname>

```
virsh # resume ubuntu20.04
Domain ubuntu20.04 resumed
```

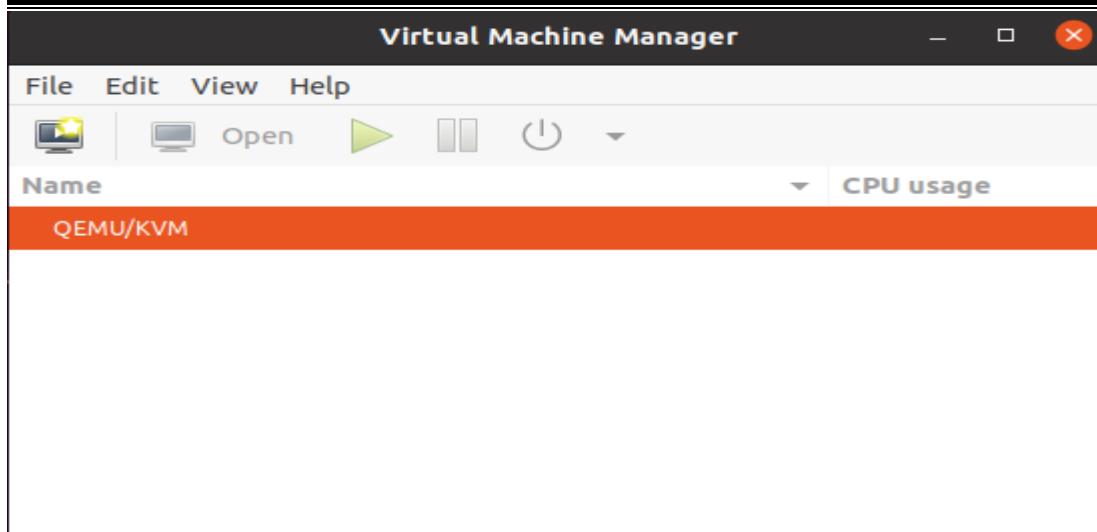
sudo virsh destroy <vmname>

```
virsh # destroy ubuntu20.04
Domain ubuntu20.04 destroyed

virsh # list
 Id  Name          State
 -----
 2   ubuntu20.04-2  running
```

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

```
virsh # undefine --domain ubuntu20.04 --remove-all-storage
Domain ubuntu20.04 has been undefined
Volume 'vda'(/var/lib/libvirt/images/ubuntu20.04.qcow2) removed.
```



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 instance

```
root@ip-172-31-33-80:/home/ec2-user
Microsoft Windows [Version 10.0.19045.3086]
(c) Microsoft Corporation. All rights reserved.

C:\Users\ajcemca\Downloads>ssh -i "dockerimg.pem" ec2-user@ec2-13-234-17-45.ap-south-1.compute.amazonaws.com
The authenticity of host 'ec2-13-234-17-45.ap-south-1.compute.amazonaws.com (13.234.17.45)' can't be established.
ECDSA key fingerprint is SHA256:SN6E4d2FOG8gIxCNo+4o3v6+8P4epc0LkvkGMH3Ra8.
Are you sure you want to continue connecting (yes/no/[fingerprint])? Yes
Warning: Permanently added 'ec2-13-234-17-45.ap-south-1.compute.amazonaws.com,13.234.17.45' (ECDSA) to the list of known hosts.

      _|_(_|_ / 
      _\|_|_|_|

https://aws.amazon.com/amazon-linux-2/
[ec2-user@ip-172-31-33-80 ~]$ pwd
/home/ec2-user
```

2.**which docker:** used to locate docker

```
[root@ip-172-31-37-95 ec2-user]# which docker
/usr/bin/which: no docker in (/sbin:/bin:/usr/sbin:/usr/bin)
```

3.**yum install docker -y:** Installing docker

```
[root@ip-172-31-37-95 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.amzn2.0.1 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 0:1.1.7-1.amzn2 will be installed
--> Finished Dependency Resolution

Dependencies Resolved
```

4.**docker --version:** to check the version

```
[root@ip-172-31-37-95 ec2-user]# docker --version
Docker version 20.10.23, build 7155243
```

5.**service docker start:** to start docker

```
[root@ip-172-31-37-95 ec2-user]# service docker start
Redirecting to /bin/systemctl start docker.service
```

6.docker images: This command is used to list all the Docker images that are currently available on your system.

```
[root@ip-172-31-33-80 ec2-user]# docker images
REPOSITORY      TAG      IMAGE ID      CREATED      SIZE
[root@ip-172-31-33-80 ec2-user]# docker ps -a
CONTAINER ID      IMAGE      COMMAND      CREATED      STATUS      PORTS      NAMES
[root@ip-172-31-33-80 ec2-user]# docker ps
CONTAINER ID      IMAGE      COMMAND      CREATED      STATUS      PORTS      NAMES
```

7.docker pull Ubuntu: This command is used to download a Docker image(Ubuntu) from a registry.

```
[root@ip-172-31-37-95 ec2-user]# docker pull ubuntu
Using default tag: latest
latest: Pulling from library/ubuntu
6b851dcae6ca: Pull complete
Digest: sha256:6120be6a2b7ce665d0cbddc3ce6eae60fe94637c6a66985312d1f02f63cc0bcd
Status: Downloaded newer image for ubuntu:latest
docker.io/library/ubuntu:latest
```

8.docker run -it - -name <name> <image> /bin/bash: This command is used to download a Docker image from a registry if it is not available and then creates the container.

run: creates container

-it: iterative terminal

```
[root@ip-172-31-37-95 ec2-user]# docker run -it --name tinu ubuntu /bin/bash
root@e6843c1ecce4:/# docker ps
bash: docker: command not found
root@e6843c1ecce4:/# docker ps -a
bash: docker: command not found
root@e6843c1ecce4:/# exit
exit
[root@ip-172-31-37-95 ec2-user]# docker ps -a
CONTAINER ID      IMAGE      COMMAND      CREATED      STATUS      PORTS      NAMES
e6843c1ecce4      ubuntu      "/bin/bash"   About a minute ago   Exited (127)  12 seconds ago
root@e6843c1ecce4:/#
```

9.docker ps -a: This command is used to list all the Docker containers.

ps: process

-a: all

```
CONTAINER ID      IMAGE      COMMAND      CREATED      STATUS      PORTS      NAMES
[root@ip-172-31-37-95 ec2-user]# docker ps -a
CONTAINER ID      IMAGE      COMMAND      CREATED      STATUS      PORTS      NAMES
e6843c1ecce4      ubuntu      "/bin/bash"   5 minutes ago   Exited (0)  16 seconds ago
root@e6843c1ecce4:/#
```

10.docker start <container name>: starts the specified container

```
[root@ip-172-31-37-95 ec2-user]# docker start tinu
tinu
```

11.docker attach <container name>:attach local standard input, output, and error streams to a running container.

```
[root@ip-172-31-37-95 ec2-user]# docker start tinu
tinu
```

12.cat > dfile.txt: creating a file inside the container and adding contents.

13.ls: listing the contents in the container

```
root@e6843c1ecce4:/# cat > tinufile.txt
tinu
clara
emmanuel
^C
root@e6843c1ecce4:/# ls
bin boot dev etc home lib lib32 lib64 libx32 media mnt opt proc root run sbin srv sys tinufile.txt usr var
root@e6843c1ecce4:/# cat tinufile.txt
tinu
clara
emmanuel
```

14.apt install apache2: installing apache in the container

```
root@e6843c1ecce4:/# 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-db libsqlite3 libaprutil1-ldap libbrotli1 libcurl4
  libexpat1 libgdm-compat4 libgdm6 libicu70 libjansson4 libldap-2.5-0 libldap-common liblua5.3-0 libmagic-mgc libmagic1 libnnghttp2-14 libperl1.34
  libpsl5 librmp1 libsasl2-2 libsasl2-modules-db libsqlite3-0 libssh-4 libxml2 mailcap media-types mime-support netbase openssl
  perl perl-modules-5.34 publicsuffix ssl-cert xz-utils
Suggested packages:
  apache2-doc apache2-suexec-pristine | apache2-suexec-custom www-browser ufw bzip2-doc gdm-l10n libsasl2-modules-gssapi-mit
  | libsasl2-modules-gssapi-heimdal libsasl2-modules-ldap libsasl2-modules-otp libsasl2-modules-sql perl-doc libterm-readline-gnu-perl
  | libterm-readline-perl-perl make libtap-harness-archive-perl
The following NEW packages will be installed:
  apache2 apache2-bin apache2-data apache2-utils bzip2 ca-certificates file libapr1 libaprutil1 libaprutil1-db libsqlite3 libaprutil1-ldap libbrotli1
  libcurl4 libexpat1 libgdm-compat4 libgdm6 libicu70 libjansson4 libldap-2.5-0 libldap-common liblua5.3-0 libmagic-mgc libmagic1 libnnghttp2-14
  libperl1.34 libpsl5 librmp1 libsasl2-2 libsasl2-modules-db libsqlite3-0 libssh-4 libxml2 mailcap media-types mime-support
  netbase openssl perl perl-modules-5.34 publicsuffix ssl-cert xz-utils
0 upgraded, 43 newly installed, 0 to remove and 1 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 5.34.0-3ubuntul.2 [2977 kB]
```

15.which apache2: file path

```
root@e6843c1ecce4:/# which apache2
/usr/sbin/apache2
```

16.docker ps : This command is used to list all the running Docker containers.

ps: process

18.tree: displays contents in tree structure

```
root@abe30239acd1:/dir1# which apache2
/usr/sbin/apache2
root@abe30239acd1:/dir1# tree
.
`-- file

0 directories, 1 file
```

19.docker rename <current container name> <new container name>: renames the container name.

CONTAINER ID	IMAGE	COMMAND	CREATED	STATUS	PORTS	NAMES
41699f5f4796	image-jenny	"/bin/bash"	4 days ago	Exited (0) 4 days ago		j-container

CONTAINER ID	IMAGE	COMMAND	CREATED	STATUS	PORTS	NAMES
41699f5f4796	image-jenny	"/bin/bash"	4 days ago	Exited (0) 4 days ago		container-j

20.docker commit <container name> <imagename>: to convert a container as an image

21.docker run -it -name <new container name> <image name>: creating a container using the image

```

root@c08bfbf19117:/dir1# docker commit tinu_container tinu_image
bash: docker: command not found
root@c08bfbf19117:/dir1# docker commit tinu_container tinu
bash: docker: command not found
root@c08bfbf19117:/dir1# exit
exit
[root@ip-172-31-37-95 ec2-user]# docker commit tinu_container tinu_image
sha256:8b6b639aa4e29dfc073629ba16c3ad3fb478ae25f8cf7b85b39d5ea86d169b4
[root@ip-172-31-37-95 ec2-user]# docker images
REPOSITORY TAG IMAGE ID CREATED SIZE
tinu image latest 8b6b639aa4e2 6 seconds ago 227MB
ubuntu latest 99284ca6cea0 4 weeks ago 77.8MB
[root@ip-172-31-37-95 ec2-user]# docker run -it --name new_container tinu_image /bin/bash
root@abe30239acd1:/# docker start new_container
bash: docker: command not found
root@abe30239acd1:# ls
bin boot dev dir lib lib32 lib64 libx32 media mnt opt proc root run sbin srv sys tmp usr var
root@abe30239acd1:# cd dir1
root@abe30239acd1:/dir1# ls
file

```

22.docker login:login to docker hub

```

[root@ip-172-31-37-95 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, head over to https://hub.docker.com to create one.
Username: tinuclara16
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

```

23.docker tag image_name username/new_image: tagging image in docker hub

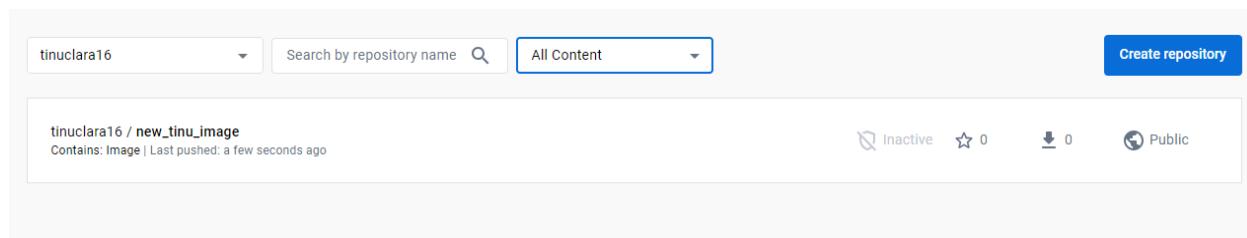
24.docker push username/new_image: pushing image to dockerhub.

```

root@abe30239acd1:/dir1# exit
exit
[root@ip-172-31-37-95 ec2-user]# docker tag tinu_image tinuclara16/new_tinu_image

[root@ip-172-31-37-95 ec2-user]# docker push tinuclara16/new_tinu_image
Using default tag: latest
The push refers to repository [docker.io/tinuclara16/new_tinu_image]
b84a1028aa0f: Pushed
cdd7c7392317: Mounted from library/ubuntu
latest: digest: sha256:8864bdf5619bc007794020ee6a4f77b214a34fb337bdbe644fec8c9600750981 size: 741

```



The pushed image is pulled using another instance

Install and start docker in new instance

```

aws | Services | Q Search [Alt+S] | 
[ec2-user@ip-172-31-32-4 ~]$ sudo su
[root@ip-172-31-32-4 ec2-user]# service docker start
Redirecting to /bin/systemctl start docker.service
Failed to start docker.service: Unit not found.
[root@ip-172-31-32-4 ec2-user]# which docker
/usr/bin/which: no docker in (/sbin:/bin:/usr/sbin:/usr/bin)
[root@ip-172-31-32-4 ec2-user]# yum update
Loaded plugins: extras_suggestions, langpacks, priorities, update-motd
No packages marked for update
[root@ip-172-31-32-4 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

```

25.docker login:login to docker

```
[root@ip-172-31-36-203 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, head over to https://hub.docker.com to create one.
Username: jennyjohnson0013
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
```

26.docker pull username/new_image_name: pulling image from docker hub

```
Run 'docker image COMMAND --help' for more information on a command.
[root@ip-172-31-35-228 ec2-user]# docker images
REPOSITORY TAG IMAGE ID CREATED SIZE
[root@ip-172-31-35-228 ec2-user]# docker pull tinuclara16/new_tinu_image
Using default tag: latest
latest: Pulling from tinuclara16/new_tinu_image
6b851dcae6ca: Pull complete
9f260566d52f: Pull complete
Digest: sha256:8864bdf5619bc007794020ee6a4f77b214a34fb337bdb644fec8c9600750981
Status: Downloaded newer image for tinuclara16/new_tinu_image:latest
docker.io/tinuclara16/new_tinu_image:latest
[root@ip-172-31-35-228 ec2-user]# docker images
REPOSITORY TAG IMAGE ID CREATED SIZE
tinuclara16/new_tinu_image latest 8b6b639aa4e2 39 minutes ago 227MB
[root@ip-172-31-35-228 ec2-user]# docker run -it --name tinuclara16/new_tinu_image /bin/bash
docker: invalid reference format.
See 'docker run --help'.
[root@ip-172-31-35-228 ec2-user]# docker run -it --name tinu tinuclara16/new_tinu_image /bin/bash
root@0ddf82a3a625:/# which apache2
root@0ddf82a3a625:/# which apache2
/usr/sbin/apache2
root@0ddf82a3a625:/# ls
bin boot dev dirl etc file home lib lib32 lib64 libx32 media mnt opt proc root run sbin srv sys tmp usr var
root@0ddf82a3a625:/# cd dir1
root@0ddf82a3a625:/dir1# ls
file
```

27:docker run -it –name container_name username/new_image_name: creating new container using the pulled image from docker hub

```
[root@ip-172-31-32-4 ec2-user]# docker run -it --name jenny jennyjohnson0013/new_image_jen
root@3df4dc701296:/# ls
bin boot dev etc home jen lib lib32 lib64 libx32 media mnt opt proc root run sbin srv sys tmp usr var
root@3df4dc701296:/# cd tmp
root@3df4dc701296:/tmp# ls
f1.txt f2.txt jenny
root@3df4dc701296:/tmp# exit
exit
```

28.docker rm <container name>: removing container

29.docker rmi username/new_image_name:removing image

```
root@0ddf82a3a625:/dir1# tree
:
-- file

0 directories, 1 file
root@0ddf82a3a625:/dir1# exit
[root@ip-172-31-35-228 ec2-user]# docker rmi tinuclara16/new_tinu_image
Error response from daemon: conflict: unable to remove repository reference "tinuclara16/new_tinu_image" (must force) - container 0ddf82a3a625 is using its referenced image 8b6b639aa4e2
[root@ip-172-31-35-228 ec2-user]# docker rmi tinuclara16/new_tinu_image
Error response from daemon: conflict: unable to remove repository reference "tinuclara16/new_tinu_image" (must force) - container 0ddf82a3a625 is using its referenced image 8b6b639aa4e2
[root@ip-172-31-35-228 ec2-user]# docker rmi tinu
Error: No such image: tinu
[root@ip-172-31-35-228 ec2-user]# docker rm tinu
tinu
[root@ip-172-31-35-228 ec2-user]# docker rmi tinuclara16/new_tinu_image
Untagged: tinuclara16/new_tinu_image:latest
Untagged: tinuclara16/new_tinu_image@sha256:8864bdf5619bc007794020ee6a4f77b214a34fb337bdb644fec8c9600750981
Deleted: sha256:8b6b639aa4e29dfc073629ba16c3ad3fb478ae25f8cf7fb85b39d5ea86d169b4
Deleted: sha256:17ec52f36800e3386ecdd1a3742d2743645193933a9bd5e5085b59c2bf3059fb9
Deleted: sha256:cdd7c73923174e45ea648d66996665c288e1b17a0f45efdbeac860f6dafdf731
```

30.Making docker repository private

Features and controls that help you uncover, understand, and fix issues with your container images in Docker Hub

 Advanced image analysis is provided by Docker Scout (Early Access). [Learn more](#) and [upgrade](#).
This account is on the Docker Scout Free tier. Upgrade for increased image analysis limits and additional software supply chain features.

Advanced image analysis provides you with insights into your images. Know when new CVEs impact your images.

Basic Hub vulnerability scanning. Images will be scanned once when pushed to the Docker Hub.

None

Visibility Settings: tinuclara16/new_tinu_image

This repository will not appear in Docker Hub search results, and will only be accessible to you, or members of your organization.

Please type the name of your repository to make it private: `new_tinu_image`

`new_tinu_image`

[Cancel](#) [Make private](#)

Visibility settings

Using 0 of 1 private repositories. [Get started](#)

Make this repository private. Private repositories are only available to you or members of your organization.

[Make private](#)

Result

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