

**20MCA136-Networking & System
Administration Lab
Record**

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Roll No : 18

S2 RMCA A

Linux Commands

1) pwd : stands for Print Working Directory. It prints the path of the working directory, starting from the root.

```
kunjuzz@kunjuzz-VirtualBox:~$ pwd  
/home/kunjuzz
```

2) history : used to view the previously executed command.

```
kunjuzz@kunjuzz-VirtualBox:~/Documents$ history  
 1  pwd  
 2  man  
 3  man man  
 4  pwd  
 5  man man  
 6  ls  
 7  ls -R  
 8  ls -l  
 9  ls -a  
10  ls -t  
11  ls --  
12  ls -1  
13  ls -lh  
14  ls -i  
15  cd Documents  
16  pwd  
17  cd ~  
18  cd Music/  
19  cd ..  
20  cd Documents  
21  mkdir files  
22  ls  
23  mkdir -v  
24  mkdir files/file1  
25  cd files  
26  ls  
27  rmdir file1  
28  ls
```

```
29  cd ..  
30  ls  
31  touch file1.txt  
32  cat file2.txt  
33  cat > file2.txt  
34  cat file2.txt  
35  touch file3.txt file4.txt  
36  ls  
37  cd file3.txt  
38  cat > file3.txt  
39  cat file2.txt  file3.txt  
40  cat file2.txt  file3.txt > file4.txt  
41* cat file4.txt  
42  cat file2.txt|tr A-Z  
43  cat file2.txt|tr a-z  
  
44  cat file2.txt|tr a-z A-Z  
45  cat file2.txt|tr A-Z a-z  
46  rm file1.txt  
47  ls  
48  history
```

- !command number to run a command from history

```
kunjuzz@kunjuzz-VirtualBox:~/Documents$ !31
touch file1.txt
```

- 3) man :** used to display the user manual of any command that we can run on the terminal.

```
9 Kernel routines [Non standard]

A manual page consists of several sections.

Conventional section names include NAME, SYNOPSIS, CONFIGURATION, DESCRIPTION, OPTIONS, EXIT STATUS, RETURN VALUE, ERRORS, ENVIRONMENT, FILES, VERSIONS, CONFORMING TO, NOTES, BUGS, EXAMPLE, AUTHORS, and SEE ALSO.

The following conventions apply to the SYNOPSIS section and can be used as a guide in other sections.

bold text type exactly as shown.
italic text replace with appropriate argument.
[-abc] any or all arguments within [ ] are optional.
-a|-b options delimited by | cannot be used together.
argument ... argument is repeatable.
[expression] ... entire expression within [ ] is repeatable.

Exact rendering may vary depending on the output device. For instance, man will usually not be able to render italics when running in a terminal, and will typically use underlined or coloured text instead.

The command or function illustration is a pattern that should match all possible invocations. In some cases it is advisable to illustrate several exclusive invocations as is shown in the SYNOPSIS section of this manual page.

Manual page man(1) line 36 (press h for help or q to quit)
```

- 4) ls :** the list command in Linux. It will show the full list or content of your directory.

```
kunjuzz@kunjuzz-VirtualBox:~$ ls
Desktop Documents Downloads Music Pictures Public Templates Videos
```

- ls -l :** It will show the list in a long list format.

```
kunjuzz@kunjuzz-VirtualBox:~$ ls -l
total 32
drwxr-xr-x 2 kunjuzz kunjuzz 4096 Jun  2 18:24 Desktop
drwxr-xr-x 2 kunjuzz kunjuzz 4096 Jun  2 18:24 Documents
drwxr-xr-x 2 kunjuzz kunjuzz 4096 Jun  2 18:24 Downloads
drwxr-xr-x 2 kunjuzz kunjuzz 4096 Jun  2 18:24 Music
drwxr-xr-x 2 kunjuzz kunjuzz 4096 Jun 13 21:26 Pictures
drwxr-xr-x 2 kunjuzz kunjuzz 4096 Jun  2 18:24 Public
drwxr-xr-x 2 kunjuzz kunjuzz 4096 Jun  2 18:24 Templates
drwxr-xr-x 2 kunjuzz kunjuzz 4096 Jun  2 18:24 Videos
kunjuzz@kunjuzz-VirtualBox:~$
```

- **ls -R** : It will display the content of the sub-directories also.

```
kunjuzz@kunjuzz-VirtualBox:~$ ls -R
:-
Desktop  Documents  Downloads  Music  Pictures  Public  Templates  Videos

./Desktop:
./Documents:
./Downloads:
./Music:
./Pictures:
'Screenshot from 2021-06-13 21-18-15.png'
'Screenshot from 2021-06-13 21-18-25.png'

./Public:
./Templates:
./Videos:
```

- **ls -a** : hidden files start with . (dot) symbol and they are not visible in the regular directory. The command will enlist the whole list of the current directory including the hidden files.

```
kunjuzz@kunjuzz-VirtualBox:~$ ls -a
.          .bash_logout  .config      Downloads  Music      Public      Videos
..         .bashrc       Desktop     .gnupg     Pictures   .ssh
.bash_history .cache      Documents   .local     .profile  Templates
```

- **ls -lh** : This command will show you the file sizes in human readable format. Size of the file is very difficult to read when displayed in terms of byte.

```
kunjuzz@kunjuzz-VirtualBox:~$ ls -lh
total 32K
drwxr-xr-x 2 kunjuzz kunjuzz 4.0K Jun  2 18:24 Desktop
drwxr-xr-x 2 kunjuzz kunjuzz 4.0K Jun  2 18:24 Documents
drwxr-xr-x 2 kunjuzz kunjuzz 4.0K Jun  2 18:24 Downloads
drwxr-xr-x 2 kunjuzz kunjuzz 4.0K Jun  2 18:24 Music
drwxr-xr-x 2 kunjuzz kunjuzz 4.0K Jun 13 21:38 Pictures
drwxr-xr-x 2 kunjuzz kunjuzz 4.0K Jun  2 18:24 Public
drwxr-xr-x 2 kunjuzz kunjuzz 4.0K Jun  2 18:24 Templates
drwxr-xr-x 2 kunjuzz kunjuzz 4.0K Jun  2 18:24 Videos
kunjuzz@kunjuzz-VirtualBox:~$ ls -i
25101 Desktop    25102 Downloads  25107 Pictures   25103 Templates
25105 Documents  25106 Music     25104 Public    25108 Videos
kunjuzz@kunjuzz-VirtualBox:~$
```

- **ls -1** : It will show one file as per line

```
kunjuzz@kunjuzz-VirtualBox:~$ ls -1
Desktop
Documents
Downloads
Music
Pictures
Public
Templates
Videos
```

- **ls -t** : It sorts the file by modification time, showing the last edited file first.

```
kunjuzz@kunjuzz-VirtualBox:~$ ls -t
Pictures  Desktop  Documents  Downloads  Music  Public  Templates  Videos
```

5) cd : used to change the current working directory.

```
kunjuzz@kunjuzz-VirtualBox:~$ cd Documents  
kunjuzz@kunjuzz-VirtualBox:~/Documents$ pwd  
/home/kunjuzz/Documents
```

- **cd ~** : To change the directory to home directory from the current working directory.

```
kunjuzz@kunjuzz-VirtualBox:~/Documents$ cd ~  
kunjuzz@kunjuzz-VirtualBox:~$ cd Music/
```

- **cd ..** : To change the directory to parent directory of the current working directory.

```
kunjuzz@kunjuzz-VirtualBox:~/Music$ cd ..  
kunjuzz@kunjuzz-VirtualBox:~$ cd Documents
```

6) mkdir : create a new directory wherever you want in your system.

```
kunjuzz@kunjuzz-VirtualBox:~/Documents$ mkdir files  
kunjuzz@kunjuzz-VirtualBox:~/Documents$ ls  
files
```

- **mkdir <dirname> /<dirname>** : create a new directory inside the directory.

```
kunjuzz@kunjuzz-VirtualBox:~/Documents$ mkdir files/file1  
kunjuzz@kunjuzz-VirtualBox:~/Documents$ cd files  
kunjuzz@kunjuzz-VirtualBox:~/Documents/files$ ls  
file1
```

7) rmdir : This command is used to delete a directory. But will not be able to delete a directory including a sub-directory. It means, a directory has to be empty to be deleted.

```
kunjuzz@kunjuzz-VirtualBox:~/Documents/files$ rmdir file1  
kunjuzz@kunjuzz-VirtualBox:~/Documents/files$ ls  
kunjuzz@kunjuzz-VirtualBox:~/Documents/files$ cd ..  
kunjuzz@kunjuzz-VirtualBox:~/Documents$ ls  
files
```

8) touch : To create empty files. We can update the modification and access time of each file with the help of touch command.

```
kunjuzz@kunjuzz-VirtualBox:~/Documents$ touch file1.txt
```

- **touch <filename1> <filename2> :** To create multiple files just type all the file names with a single touch command followed by enter key.

```
kunjuzz@kunjuzz-VirtualBox:~/Documents$ touch file3.txt file4.txt  
kunjuzz@kunjuzz-VirtualBox:~/Documents$ ls  
file1.txt file2.txt file3.txt file4.txt files
```

9) rm : This command is used to remove a file. The command line doesn't have a recycle bin or trash unlike other GUI's to recover the files.

```
kunjuzz@kunjuzz-VirtualBox:~/Documents$ rm file1.txt  
kunjuzz@kunjuzz-VirtualBox:~/Documents$ ls  
file2.txt file3.txt file4.txt files  
kunjuzz@kunjuzz-VirtualBox:~/Documents$
```

10)cat : It can be used to display the content of a file, copy content from one file to another, concatenate the contents of multiple files, display the line number, display \$ at the end of the line, etc.

- **cat > filename :** To create a file.

```
kunjuzz@kunjuzz-VirtualBox:~/Documents$ cat > file2.txt  
Hello World  
I am Anjali C Abraham  
^C
```

- **cat <filename> :** used to display the content of a file.

```
kunjuzz@kunjuzz-VirtualBox:~/Documents$ cat file2.txt  
Hello World  
I am Anjali C Abraham
```

- **cat [file1 file2 and so on] > [new file name] :** To concatenate contents of multiple files into one.

```
kunjuzz@kunjuzz-VirtualBox:~/Documents$ cat file2.txt file3.txt > file4.txt  
kunjuzz@kunjuzz-VirtualBox:~/Documents$ cat file4.txt  
Hello World  
I am Anjali C Abraham  
I am 23 years old  
I study at Amal Jyothi College Of Engineering
```

- **cat [filename1] [filename2] ...** : used to concatenate the contents of multiple files in a single new file.

```
kunjuzz@kunjuzz-VirtualBox:~/Documents$ cat file2.txt  file3.txt
Hello World
I am Anjali C Abraham
I am 23 years old
I study at Amal Jyothi College Of Engineering
```

- **To convert the contents of file into uppercase or lowercase**

```
kunjuzz@kunjuzz-VirtualBox:~/Documents$ cat file2.txt|tr a-z A-Z
HELLO WORLD
I AM ANJALI C ABRAHAM
```

```
kunjuzz@kunjuzz-VirtualBox:~/Documents$ cat file2.txt|tr A-Z a-z
hello world
i am anjali c abraham
```

Basic Linux Commands

1. **echo** : it is used to move some data into a file.

```
kunjuzz@kunjuzz-VirtualBox:~/Documents$ echo *
file1.txt file2.txt file3.txt file4.txt files
kunjuzz@kunjuzz-VirtualBox:~/Documents$ echo "My name is Anjali."
My name is Anjali.
kunjuzz@kunjuzz-VirtualBox:~/Documents$ echo -e "My \tname \tis \tAnjali."
My      name     is      Anjali.
kunjuzz@kunjuzz-VirtualBox:~/Documents$ echo -e "My \nname \nis \nAnjali."
My
name
is
Anjali.
kunjuzz@kunjuzz-VirtualBox:~/Documents$ echo -e "My \vname \vis \vAnjali."
My
name
is
Anjali.
kunjuzz@kunjuzz-VirtualBox:~/Documents$ echo -n "My name is Anjali."
My name is Anjali.kunjuzz@kunjuzz-VirtualBox:~/Documents$ █
```

2. **head** : used to view the first lines of any text file.

```
kunjuzz@kunjuzz-VirtualBox:~/Documents$ cat > states
KERALA
TAMIL NADU
GOA
MIZORAM
ASSAM
BIHAR
ANDHRA PRADESH
GUJARAT
MANIPUR
NAGALAND
PUNJAB
SIKKIM
WEST BENGAL
UTTARAKHAND
ODISHA
MANIPUR^C
kunjuzz@kunjuzz-VirtualBox:~/Documents$ head states
KERALA
TAMIL NADU
GOA
MIZORAM
ASSAM
BIHAR
ANDHRA PRADESH
GUJARAT
MANIPUR
NAGALAND
kunjuzz@kunjuzz-VirtualBox:~/Documents$ █
```

```
kunjuzz@kunjuzz-VirtualBox:~/Documents$ head -n 3 states
KERALA
TAMIL NADU
GOA
kunjuzz@kunjuzz-VirtualBox:~/Documents$ head -v states
==> states <==
KERALA
TAMIL NADU
GOA
MIZORAM
ASSAM
BIHAR
ANDHRA PRADESH
GUJARAT
MANIPUR
NAGALAND
kunjuzz@kunjuzz-VirtualBox:~/Documents$
```

3. tail : By default , it display the last ten lines of a text file.

```
kunjuzz@kunjuzz-VirtualBox:~/Documents$ tail states
BIHAR
ANDHRA PRADESH
GUJARAT
MANIPUR
NAGALAND
PUNJAB
SIKKIM
WEST BENGAL
UTTARAKHAND
ODISHA
kunjuzz@kunjuzz-VirtualBox:~/Documents$ tail -n 3 states
WEST BENGAL
UTTARAKHAND
ODISHA
kunjuzz@kunjuzz-VirtualBox:~/Documents$ tail -c 3 states
HA
kunjuzz@kunjuzz-VirtualBox:~/Documents$ tail -c 10 states
ND
ODISHA
kunjuzz@kunjuzz-VirtualBox:~/Documents$
```

4. read : read the contents of a line into a variable.

```
Anjali@kunjuzz-VirtualBox:~/Documents$ read -p "Enter your Name:" REPLY
Enter your Name:Anjali
kunjuzz@kunjuzz-VirtualBox:~/Documents$ echo "My name is $REPLY"
My name is Anjali
kunjuzz@kunjuzz-VirtualBox:~/Documents$
```

5. more : Like cat command, more command displays the content of a file. Only difference is that, in case of larger files, 'cat' command output will scroll off your screen while 'more' command displays output one screenful at a time.

```
kunjuzz@kunjuzz-VirtualBox:~$ more /etc/passwd
root:x:0:0:root:/root:/bin/bash
daemon:x:1:1:daemon:/usr/sbin:/usr/sbin/nologin
bin:x:2:2:bin:/bin:/usr/sbin/nologin
sys:x:3:3:sys:/dev:/usr/sbin/nologin
sync:x:4:65534:sync:/bin:/bin sync
games:x:5:60:games:/usr/games:/usr/sbin/nologin
man:x:6:12:man:/var/cache/man:/usr/sbin/nologin
lp:x:7:7:lp:/var/spool/lpd:/usr/sbin/nologin
mail:x:8:8:mail:/var/mail:/usr/sbin/nologin
news:x:9:9:news:/var/spool/news:/usr/sbin/nologin
uucp:x:10:10:uucp:/var/spool/uucp:/usr/sbin/nologin
proxy:x:13:13:proxy:/bin:/usr/sbin/nologin
www-data:x:33:33:www-data:/var/www:/usr/sbin/nologin
backup:x:34:34:backup:/var/backups:/usr/sbin/nologin
list:x:38:38:Mailing List Manager:/var/list:/usr/sbin/nologin
irc:x:39:39:ircd:/run/ircd:/usr/sbin/nologin
gnats:x:41:41:Gnats Bug-Reporting System (admin):/var/lib/gnats:/usr/sbin/nologin
nobody:x:65534:65534:nobody:/nonexistent:/usr/sbin/nologin
systemd-network:x:100:102:systemd Network Management,,,:/run/systemd:/usr/sbin/nologin
systemd-resolve:x:101:103:systemd Resolver,,,:/run/systemd:/usr/sbin/nologin
systemd-timesync:x:102:104:systemd Time Synchronization,,,:/run/systemd:/usr/sbin/nologin
messagebus:x:103:106::/nonexistent:/usr/sbin/nologin
syslog:x:104:110::/home/syslog:/usr/sbin/nologin
```

6. less : It automatically adjust with the width and height of the terminal window.

```
root:x:0:0:root:/root:/bin/bash
daemon:x:1:1:daemon:/usr/sbin:/usr/sbin/nologin
bin:x:2:2:bin:/bin:/usr/sbin/nologin
sys:x:3:3:sys:/dev:/usr/sbin/nologin
sync:x:4:65534:sync:/bin:/bin sync
games:x:5:60:games:/usr/games:/usr/sbin/nologin
man:x:6:12:man:/var/cache/man:/usr/sbin/nologin
lp:x:7:7:lp:/var/spool/lpd:/usr/sbin/nologin
mail:x:8:8:mail:/var/mail:/usr/sbin/nologin
news:x:9:9:news:/var/spool/news:/usr/sbin/nologin
uucp:x:10:10:uucp:/var/spool/uucp:/usr/sbin/nologin
proxy:x:13:13:proxy:/bin:/usr/sbin/nologin
www-data:x:33:33:www-data:/var/www:/usr/sbin/nologin
backup:x:34:34:backup:/var/backups:/usr/sbin/nologin
list:x:38:38:Mailing List Manager:/var/list:/usr/sbin/nologin
irc:x:39:39:ircd:/run/ircd:/usr/sbin/nologin
gnats:x:41:41:Gnats Bug-Reporting System (admin):/var/lib/gnats:/usr/sbin/nologin
nobody:x:65534:65534:nobody:/nonexistent:/usr/sbin/nologin
systemd-network:x:100:102:systemd Network Management,,,:/run/systemd:/usr/sbin/nologin
systemd-resolve:x:101:103:systemd Resolver,,,:/run/systemd:/usr/sbin/nologin
systemd-timesync:x:102:104:systemd Time Synchronization,,,:/run/systemd:/usr/sbin/nologin
messagebus:x:103:106::/nonexistent:/usr/sbin/nologin
syslog:x:104:110::/home/syslog:/usr/sbin/nologin
_apt:x:105:65534::/nonexistent:/usr/sbin/nologin
tss:x:106:111:TPM software stack,,,:/var/lib/tpm:/bin/false
:|
```

7. cut : used for cutting out the sections from each line of files and writing the result to standard output.

```
kunjuzz@kunjuzz-VirtualBox:~/Documents$ cut -b 1,3 states
KR
TM
GA
MZ
AS
BH
AD
GJ
MN
NG
PN
SK
WS
UT
OI
kunjuzz@kunjuzz-VirtualBox:~/Documents$
```

8. paste : It is used to join files horizontally by outputting lines consisting of lines from each file specified, separated by tab as delimiter, to the standard output.

```
kunjuzz@kunjuzz-VirtualBox:~/Documents$ paste -d "|" states Number
KERALA|one
TAMIL NADU|two
GOA|three
MIZORAM|four
ASSAM|five
BIHAR|six
ANDHRA PRADESH|seven
GUJARAT|eight
MANIPUR|nine
NAGALAND|ten
PUNJAB|
SIKKIM|
WEST BENGAL|
UTTARAKHAND|
ODISHA|
```

```
kunjuzz@kunjuzz-VirtualBox:~/Documents$ paste -s states Number
KERALA    TAMIL NADU      GOA      MIZORAM  ASSAM     BIHAR     ANDHRA PRADESH   GUJARAT
MANIPUR  NAGALAND      PUNJAB   SIKKIM    WEST BENGAL  UTTARAKHAND  ODISHA
one       two      three   four     five     six      seven   eight   nine    ten
kunjuzz@kunjuzz-VirtualBox:~/Documents$ paste -d -s states Number
KERALA-one
TAMIL NADU-two
GOA-three
MIZORAM-four
ASSAM-five
BIHAR-six
ANDHRA PRADESH-seven
GUJARAT-eight
MANIPUR-nine
NAGALAND-ten
PUNJAB-
SIKKIM-
WEST BENGAL-
UTTARAKHAND-
ODISHA-
kunjuzz@kunjuzz-VirtualBox:~/Documents$
```

9. uname : it will print detailed information about your Linux system like the machine name, operating system, kernel, and so on.

```
kunjuzz@kunjuzz-VirtualBox:~/Documents$ uname
Linux
kunjuzz@kunjuzz-VirtualBox:~/Documents$ uname -o
GNU/Linux
kunjuzz@kunjuzz-VirtualBox:~/Documents$ uname -r
5.11.0-18-generic
kunjuzz@kunjuzz-VirtualBox:~/Documents$ uname -n
kunjuzz-VirtualBox
kunjuzz@kunjuzz-VirtualBox:~/Documents$ uname -i
x86_64
kunjuzz@kunjuzz-VirtualBox:~/Documents$ uname -a
Linux kunjuzz-VirtualBox 5.11.0-18-generic #19-Ubuntu SMP Fri May 7 14:22:03 UTC 2021 x86_64 x86_64 x86_64 GNU/Linux
kunjuzz@kunjuzz-VirtualBox:~/Documents$ uname -v
#19-Ubuntu SMP Fri May 7 14:22:03 UTC 2021
kunjuzz@kunjuzz-VirtualBox:~/Documents$ █
```

10. cp : used to copy files from the current directory to a different directory.

```
kunjuzz@kunjuzz-VirtualBox:~/Documents$ cat file.txt
KERALA
TAMIL NADU
GOA
MIZORAM
ASSAM
BIHAR
ANDHRA PRADESH
GUJARAT
MANIPUR
NAGALAND
PUNJAB
SIKKIM
WEST BENGAL
UTTARAKHAND
ODISHA
kunjuzz@kunjuzz-VirtualBox:~/Documents$ cp Number file.txt
kunjuzz@kunjuzz-VirtualBox:~/Documents$ cat file.txt
one
two
three
four
five
six
seven
eight
nine
ten
kunjuzz@kunjuzz-VirtualBox:~/Documents$
```

11. mv : used to move existing file or directory from one location to another. It is also used to rename a file or directory.

```
kunjuzz@kunjuzz-VirtualBox:~/Documents$ ls
file1.txt file2.txt file3.txt file4.txt files file.txt Number states
kunjuzz@kunjuzz-VirtualBox:~/Documents$ mv file2.txt Number
kunjuzz@kunjuzz-VirtualBox:~/Documents$ cat Number
Hello World
I am Anjali C Abraham
kunjuzz@kunjuzz-VirtualBox:~/Documents$
```

12. locate : it is a background process and used to search a file by name in the database .

```
kunjuzz@kunjuzz-VirtualBox:~/Documents$ locate states
Command 'locate' not found, but can be installed with:
sudo apt install mlocate # version 0.26-5ubuntu1, or
sudo apt install plocate # version 1.1.7-1
```

13. find : find command searches in the file system.

```
kunjuzz@kunjuzz-VirtualBox:~/Documents$ find -name "file1.txt"
./file1.txt
kunjuzz@kunjuzz-VirtualBox:~/Documents$ find -type d
.
./files
```

14. grep : stands for **global regular expression print**. grep command filters the content of a file which makes our search easy.

```
kunjuzz@kunjuzz-VirtualBox:~/Documents$ cat file2.txt
Hello World
I am Anjali C Abraham
kunjuzz@kunjuzz-VirtualBox:~/Documents$ grep -c Anjali file2.txt
1
kunjuzz@kunjuzz-VirtualBox:~/Documents$ grep -c A file2.txt
1
kunjuzz@kunjuzz-VirtualBox:~/Documents$ grep -i A file2.txt
I am Anjali C Abraham
kunjuzz@kunjuzz-VirtualBox:~/Documents$
```

15. df : used to display the disk space used in the file system.

```
kunjuzz@kunjuzz-VirtualBox:~/Documents$ df
Filesystem      1K-blocks    Used Available Use% Mounted on
tmpfs            99556     1388    98168   2% /run
/dev/sda3        9735476  7593360   1627864  83% /
tmpfs            497772      0    497772   0% /dev/shm
tmpfs             5120       4     5116   1% /run/lock
tmpfs             4096       0     4096   0% /sys/fs/cgroup
/dev/sda2        524252     5340    518912   2% /boot/efi
tmpfs            99552      112    99440   1% /run/user/1000
kunjuzz@kunjuzz-VirtualBox:~/Documents$ df -m
Filesystem      1M-blocks    Used Available Use% Mounted on
tmpfs              98        2       96   2% /run
/dev/sda3        9508     7416     1590  83% /
tmpfs              487       0      487   0% /dev/shm
tmpfs               5        1       5   1% /run/lock
tmpfs               4        0       4   0% /sys/fs/cgroup
/dev/sda2         512        6      507   2% /boot/efi
tmpfs              98        1       98   1% /run/user/1000
kunjuzz@kunjuzz-VirtualBox:~/Documents$
```

16. du : stands for Disk Usage. It is used to check the information of disk usage of files and directories on a system and display a list of all the files along with their respective sizes. By default, size given is in kilobytes.

```
kunjuzz@kunjuzz-VirtualBox:~/Documents$ du
4      ./files
28     .
kunjuzz@kunjuzz-VirtualBox:~/Documents$ du -h
4.0K   ./files
28K    .
kunjuzz@kunjuzz-VirtualBox:~/Documents$
```

17. useradd : used to add user accounts to your system.

```
kunjuzz@kunjuzz-VirtualBox:~/Documents$ useradd anjali
useradd: Permission denied.
useradd: cannot lock /etc/passwd; try again later.
kunjuzz@kunjuzz-VirtualBox:~/Documents$ sudo useradd anjali
[sudo] password for kunjuzz:
kunjuzz@kunjuzz-VirtualBox:~/Documents$
```

18. userdel : used to delete a user account and related files.

```
kunjuzz@kunjuzz-VirtualBox:~/Documents$ sudo userdel anjali
kunjuzz@kunjuzz-VirtualBox:~/Documents$ tail /etc/passwd
sssd:x:119:124:SSSD system user,,,:/var/lib/sssd:/usr/sbin/nologin
saned:x:120:126::/var/lib/saned:/usr/sbin/nologin
colord:x:121:127:colord colour management daemon,,,:/var/lib/colord:/usr/sbin/n
ologin
geoclue:x:122:128::/var/lib/geoclue:/usr/sbin/nologin
pulse:x:123:129:PulseAudio daemon,,,:/var/run/pulse:/usr/sbin/nologin
hplip:x:124:7:HPLIP system user,,,:/run/hplip:/bin/false
gnome-initial-setup:x:125:65534::/run/gnome-initial-setup:/bin/false
gdm:x:126:131:Gnome Display Manager:/var/lib/gdm3:/bin/false
kunjuzz:x:1000:1000:Kunjuzz,,,:/home/kunjuzz:/bin/bash
systemd-coredump:x:999:999:systemd Core Dumper:/:/usr/sbin/nologin
```

19. sudo : command allows you to run programs with the security privileges of another user .

```
kunjuzz@kunjuzz-VirtualBox:~/Documents$ sudo useradd anjali
[sudo] password for kunjuzz:
kunjuzz@kunjuzz-VirtualBox:~/Documents$
```

20. passwd : changes passwords for user accounts.

```
kunjuzz@kunjuzz-VirtualBox:~/Documents$ passwd
Changing password for kunjuzz.
Current password:
New password:
Retype new password:
passwd: password updated successfully
```

Basic Linux Commands

1. usermod : The **usermod** command modifies the system account files to reflect the changes that are specified on the command line.

```
kunjuzz@kunjuzz-VirtualBox:~$ sudo usermod --help
[sudo] password for kunjuzz:
Usage: usermod [options] LOGIN

Options:
  -b, --badnames          allow bad names
  -c, --comment COMMENT   new value of the GECOS field
  -d, --home HOME_DIR     new home directory for the user account
  -e, --expiredate EXPIRE_DATE set account expiration date to EXPIRE_DATE
  -f, --inactive INACTIVE  set password inactive after expiration
                           to INACTIVE
  -g, --gid GROUP          force use GROUP as new primary group
  -G, --groups GROUPS      new list of supplementary GROUPS
  -a, --append               append the user to the supplemental GROUPS
                             mentioned by the -G option without removing
                             the user from other groups
  -h, --help                display this help message and exit
  -l, --login NEW_LOGIN    new value of the login name
  -L, --lock                 lock the user account
  -m, --move-home           move contents of the home directory to the
                           new location (use only with -d)
  -o, --non-unique          allow using duplicate (non-unique) UID
  -p, --password PASSWORD   use encrypted password for the new password
  -R, --root CHROOT_DIR     directory to chroot into
  -P, --prefix PREFIX_DIR    prefix directory where are located the /etc/* f
iles
  -s, --shell SHELL          new login shell for the user account
  -u, --uid UID              new UID for the user account
  -U, --unlock               unlock the user account
```

```
kunjuzz@kunjuzz-VirtualBox:~$ sudo usermod -G mca anjali
kunjuzz@kunjuzz-VirtualBox:~$ groups anjali
anjali : anjali mca
```

2. groupadd : The **groupadd** command creates or add a group in our system.

```
kunjuzz@kunjuzz-VirtualBox:~$ sudo groupadd mca
kunjuzz@kunjuzz-VirtualBox:~$ groups
kunjuzz adm cdrom sudo dip plugdev lpadmin lxd sambashare

group `mca' does not exist
kunjuzz@kunjuzz-VirtualBox:~$ sudo groupadd lion
[sudo] password for kunjuzz:
kunjuzz@kunjuzz-VirtualBox:~$ sudo groupadd tiger
kunjuzz@kunjuzz-VirtualBox:~$ sudo groupadd monkey
kunjuzz@kunjuzz-VirtualBox:~$ groups anjali
```

3. groups : The **group** command tells about the group where current user belongs to.

```
kunjuzz@kunjuzz-VirtualBox:~$ sudo groupadd mca
kunjuzz@kunjuzz-VirtualBox:~$ groups
kunjuzz adm cdrom sudo dip plugdev lpadmin lxd sambashare
kunjuzz@kunjuzz-VirtualBox:~$ groups anjali
anjali : anjali
```

4. groupdel : The command groupdel will delete a group permanently from the system.

```
kunjuzz@kunjuzz-VirtualBox:~$ sudo usermod -G lion,tiger,monkey anjali
kunjuzz@kunjuzz-VirtualBox:~$ groups anjali
anjali : anjali lion tiger monkey
kunjuzz@kunjuzz-VirtualBox:~$ sudo groupdel monkey
kunjuzz@kunjuzz-VirtualBox:~$ groups anjali
anjali : anjali lion tiger
```

5. groupmod : With the help of groupmod command you can change the name of an already existing group.

```
kunjuzz@kunjuzz-VirtualBox:~$ groups anjali
anjali : anjali lion tiger
kunjuzz@kunjuzz-VirtualBox:~$ sudo groupmod -n giraffe tiger
kunjuzz@kunjuzz-VirtualBox:~$ groups anjali
anjali : anjali lion giraffe
```

6. chmod : used to change the access permissions of files and directories. It stands for **change mode**.

```
kunjuzz@kunjuzz-VirtualBox:~$ mkdir student
kunjuzz@kunjuzz-VirtualBox:~$ ls -ld student
drwxrwxr-x 2 kunjuzz kunjuzz 4096 Aug 11 20:37 student
kunjuzz@kunjuzz-VirtualBox:~$ chmod g-w student
kunjuzz@kunjuzz-VirtualBox:~$ ls -ld student
drwxr-xr-x 2 kunjuzz kunjuzz 4096 Aug 11 20:37 student
kunjuzz@kunjuzz-VirtualBox:~$ chmod g+w student
kunjuzz@kunjuzz-VirtualBox:~$ ls -ld student
drwxrwxr-x 2 kunjuzz kunjuzz 4096 Aug 11 20:37 student
kunjuzz@kunjuzz-VirtualBox:~$
```

7. chown : used to change a file's ownership, directory, or symbolic link for a user or group. The chown stands for **change owner**.

```
kunjuzz@kunjuzz-VirtualBox:~$ ls -ld student
drwxrwxr-x 2 kunjuzz kunjuzz 4096 Aug 11 20:37 student
kunjuzz@kunjuzz-VirtualBox:~$ sudo chown anjali student
kunjuzz@kunjuzz-VirtualBox:~$ ls -ld student
drwxrwxr-x 2 anjali kunjuzz 4096 Aug 11 20:37 student
kunjuzz@kunjuzz-VirtualBox:~$
```

8. id : used to print the genuine and effective user ID and group ID. A user ID (UID) is a particular user identity, whereas group IDs (GIDs) can contain more than one user's identity. This command is a useful tool for user management.

```
kunjuzz@kunjuzz-VirtualBox:~$ id anjali  
uid=2000(anjali) gid=1001(anjali) groups=1001(anjali)
```

9. ps : used to view currently running processes on the system. It helps us to determine which process is doing what in our system, how much memory it is using, how much CPU space it occupies, user ID, command name, etc.

```
kunjuzz@kunjuzz-VirtualBox:~$ ps  
  PID TTY          TIME CMD  
2555 pts/0    00:00:00 bash  
2913 pts/0    00:00:00 ps  
kunjuzz@kunjuzz-VirtualBox:~$ ps -a  
  PID TTY          TIME CMD  
1590 tty2    00:00:00 gnome-session-b  
2914 pts/0    00:00:00 ps  
kunjuzz@kunjuzz-VirtualBox:~$ █
```

10. top : displays all the running process within the environment of your system. It helps in monitoring system usage and performances. It is mainly used to detect load on the server by system administrators.

```
top - 20:44:43 up 1:20, 1 user, load average: 0.14, 0.05, 0.01  
Tasks: 178 total, 1 running, 177 sleeping, 0 stopped, 0 zombie  
%Cpu(s): 1.7 us, 0.0 sy, 0.0 ni, 94.5 id, 3.8 wa, 0.0 hi, 0.0 si, 0.0 st  
MiB Mem : 972.2 total, 107.0 free, 598.4 used, 266.8 buff/cache  
MiB Swap: 448.4 total, 279.1 free, 169.4 used. 226.5 avail Mem  


| PID  | USER    | PR  | NI  | VIRT    | RES    | SHR   | S | %CPU | %MEM | TIME+   | COMMAND   |
|------|---------|-----|-----|---------|--------|-------|---|------|------|---------|-----------|
| 1730 | kunjuzz | 20  | 0   | 3740436 | 260060 | 75264 | S | 1.3  | 26.1 | 2:12.61 | gnome--   |
| 2472 | kunjuzz | 20  | 0   | 411292  | 49424  | 37536 | S | 0.3  | 5.0  | 0:06.56 | gnome--   |
| 2899 | root    | 20  | 0   | 0       | 0      | 0     | I | 0.3  | 0.0  | 0:00.03 | kworker+0 |
| 2915 | kunjuzz | 20  | 0   | 21440   | 3872   | 3340  | R | 0.3  | 0.4  | 0:00.05 | top       |
| 1    | root    | 20  | 0   | 165724  | 10420  | 6424  | S | 0.0  | 1.0  | 0:05.21 | systemd   |
| 2    | root    | 20  | 0   | 0       | 0      | 0     | S | 0.0  | 0.0  | 0:00.00 | kthreadd  |
| 3    | root    | 0   | -20 | 0       | 0      | 0     | I | 0.0  | 0.0  | 0:00.00 | rcu_gp    |
| 4    | root    | 0   | -20 | 0       | 0      | 0     | I | 0.0  | 0.0  | 0:00.00 | rcu_pa+   |
| 6    | root    | 0   | -20 | 0       | 0      | 0     | I | 0.0  | 0.0  | 0:00.00 | kworker+1 |
| 9    | root    | 0   | -20 | 0       | 0      | 0     | I | 0.0  | 0.0  | 0:00.00 | mm_perf   |
| 10   | root    | 20  | 0   | 0       | 0      | 0     | S | 0.0  | 0.0  | 0:00.00 | rcu_tas   |
| 11   | root    | 20  | 0   | 0       | 0      | 0     | S | 0.0  | 0.0  | 0:00.00 | rcu_tas   |
| 12   | root    | 20  | 0   | 0       | 0      | 0     | S | 0.0  | 0.0  | 0:00.63 | ksoftirqd |
| 13   | root    | 20  | 0   | 0       | 0      | 0     | I | 0.0  | 0.0  | 0:01.36 | rcu_sched |
| 14   | root    | rt  | 0   | 0       | 0      | 0     | S | 0.0  | 0.0  | 0:00.08 | migrat    |
| 15   | root    | -51 | 0   | 0       | 0      | 0     | S | 0.0  | 0.0  | 0:00.00 | idle_in   |
| 16   | root    | 20  | 0   | 0       | 0      | 0     | S | 0.0  | 0.0  | 0:00.00 | cpuhp/0   |
| 17   | root    | 20  | 0   | 0       | 0      | 0     | S | 0.0  | 0.0  | 0:00.00 | kdevtmpm  |
| 18   | root    | 0   | -20 | 0       | 0      | 0     | I | 0.0  | 0.0  | 0:00.00 | netns     |
| 19   | root    | 0   | -20 | 0       | 0      | 0     | I | 0.0  | 0.0  | 0:00.00 | inet_fq   |
| 20   | root    | 20  | 0   | 0       | 0      | 0     | S | 0.0  | 0.0  | 0:00.00 | kaudit    |
| 21   | root    | 20  | 0   | 0       | 0      | 0     | S | 0.0  | 0.0  | 0:00.00 | khungt    |


```

Basic Linux Commands

1. **WC** : It is used to find out number of lines, word count, byte and characters count in the files specified in the file arguments.

```
kunjuzz@kunjuzz-VirtualBox:~/Documents$ wc -w file3.txt
13 file3.txt
kunjuzz@kunjuzz-VirtualBox:~/Documents$ wc -m file3.txt
64 file3.txt
kunjuzz@kunjuzz-VirtualBox:~/Documents$ wc file2.txt file3.txt file4.txt
 2    7   34 file2.txt
 2   13   64 file3.txt
 4   20   98 file4.txt
 8   40  196 total
kunjuzz@kunjuzz-VirtualBox:~/Documents$ █
```

2. **tar** : The command is short for **tape archive** in Linux. This command is used for creating Archive and extracting the archive files. It is one of the essential commands which facilitate archiving functionality. We can use this command for creating uncompressed and compressed archive files and modify and maintain them .

```
kunjuzz@kunjuzz-VirtualBox:~/Documents$ ls
file1.txt file2.txt file3.txt file4.txt files file.txt states
kunjuzz@kunjuzz-VirtualBox:~/Documents$ tar cf archive.tar file1.txt file2.txt
file3.txt
kunjuzz@kunjuzz-VirtualBox:~/Documents$ ls archive.tar
archive.tar
kunjuzz@kunjuzz-VirtualBox:~/Documents$ ls archive.tar
file2.txt file4.txt file.txt
file1.txt file3.txt files states
kunjuzz@kunjuzz-VirtualBox:~/Documents$ tar tf archive.tar
file1.txt
file2.txt
file3.txt
kunjuzz@kunjuzz-VirtualBox:~/Documents$ pwd
/home/kunjuzz/Documents
kunjuzz@kunjuzz-VirtualBox:~/Documents$ mkdir lab
kunjuzz@kunjuzz-VirtualBox:~/Documents$ cd lab
kunjuzz@kunjuzz-VirtualBox:~/Documents/lab$ tar xf /home/kunjuzz/Documents/archive.tar
kunjuzz@kunjuzz-VirtualBox:~/Documents/lab$ ls
file1.txt file2.txt file3.txt
kunjuzz@kunjuzz-VirtualBox:~/Documents/lab$ █
```

Extracting an archive created with tar

```
kunjuzz@kunjuzz-VirtualBox:~/Documents$ sudo tar czf mca.tar.gz /etc/
[sudo] password for kunjuzz:
tar: Removing leading `/' from member names
kunjuzz@kunjuzz-VirtualBox:~/Documents$ ls
archive.tar file2.txt file4.txt file.txt mca.tar.gz
file1.txt file3.txt files lab states
kunjuzz@kunjuzz-VirtualBox:~/Documents$ sudo tar cjf mcareg.tar.bz2 file1.txt f
ile2.txt file3.txt
kunjuzz@kunjuzz-VirtualBox:~/Documents$ ls
archive.tar file2.txt file4.txt file.txt mcareg.tar.bz2 states
file1.txt file3.txt files lab mca.tar.gz
```

```
kunjuzz@kunjuzz-VirtualBox:~/Documents$ sudo tar cjf mcareg.tar.bz2 /etc/
tar: Removing leading `/' from member names
kunjuzz@kunjuzz-VirtualBox:~/Documents$ ls -l
total 2492
-rw-rw-r-- 1 kunjuzz kunjuzz 10240 Aug 12 13:25 archive.tar
-rw-rw-r-- 1 kunjuzz kunjuzz 0 Jun 13 22:18 file1.txt
-rw-rw-r-- 1 kunjuzz kunjuzz 34 Jun 13 21:59 file2.txt
-rw-rw-r-- 1 kunjuzz kunjuzz 64 Jun 13 22:05 file3.txt
-rw-rw-r-- 1 kunjuzz kunjuzz 98 Jun 13 22:09 file4.txt
drwxrwxr-x 2 kunjuzz kunjuzz 4096 Jun 13 21:51 files
-rw-rw-r-- 1 kunjuzz kunjuzz 49 Jun 20 21:03 file.txt
drwxrwxr-x 2 kunjuzz kunjuzz 4096 Aug 12 13:28 lab
-rw-r--r-- 1 root root 1143115 Aug 12 15:19 mcareg.tar.bz2
-rw-r--r-- 1 root root 1363472 Aug 12 15:16 mca.tar.gz
-rw-rw-r-- 1 kunjuzz kunjuzz 127 Jun 20 20:16 states
kunjuzz@kunjuzz-VirtualBox:~/Documents$ sudo tar cjf mcareg.tar.bz2 /etc/
tar: Removing leading `/' from member names
kunjuzz@kunjuzz-VirtualBox:~/Documents$ sudo tar cjf sample.tar.b22 /etc/
tar: Removing leading `/' from member names
kunjuzz@kunjuzz-VirtualBox:~/Documents$ ls
archive.tar file3.txt file.txt mcareg.tar.b22 states
file1.txt file4.txt lab mca.tar.gz
file2.txt files mcareg.tar.b22 sample.tar.b22
```

```
kunjuzz@kunjuzz-VirtualBox:~/Documents$ sudo tar cjf sample.tar.b22 file1.txt f
ile2.txt
kunjuzz@kunjuzz-VirtualBox:~/Documents$ ls
archive.tar file3.txt file.txt mcareg.tar.b22 states
file1.txt file4.txt lab mca.tar.gz
file2.txt files mcareg.tar.b22 sample.tar.b22
kunjuzz@kunjuzz-VirtualBox:~/Documents$ sudo tar cjf sample.tar.xz file1.txt fi
le2.txt
kunjuzz@kunjuzz-VirtualBox:~/Documents$ ls
archive.tar file3.txt file.txt mcareg.tar.b22 sample.tar.xz
file1.txt file4.txt lab mca.tar.gz states
file2.txt files mcareg.tar.b22 sample.tar.b22
```

```
kunjuzz@kunjuzz-VirtualBox:~/Documents$ mkdir joy
kunjuzz@kunjuzz-VirtualBox:~/Documents$ sudo tar xzf mca.tar.gz
kunjuzz@kunjuzz-VirtualBox:~/Documents$ ls
archive.tar file2.txt files lab mca.tar.gz states
etc file3.txt file.txt mcareg.tar.b22 sample.tar.b22
file1.txt file4.txt joy mcareg.tar.b22 sample.tar.xz
kunjuzz@kunjuzz-VirtualBox:~/Documents$ cd joy
kunjuzz@kunjuzz-VirtualBox:~/Documents/joy$ tar xzf /home/kunjuzz/Documents/mca
.tar.gz
kunjuzz@kunjuzz-VirtualBox:~/Documents/joy$ ls
etc
kunjuzz@kunjuzz-VirtualBox:~/Documents/joy$ ls etc
acpi hostname ppp
adduser.conf hosts profile
alsa hosts.allow profile.d
alternatives hosts.deny protocols
anacrontab hp pulse
apg.conf ifplugd python3
apm init python3.9
apparmor init.d rc0.d
apparmor.d initramfs-tools rc1.d
apport inputrc rc2.d
appstream.conf isserv.conf.d rc3.d
apt ipp-usb rc4.d
avahi iproute2 rc5.d
bash.bashrc issue rc6.d
bash_completion issue.net rcS.d
bash_completion.d kernel resolv.conf
bindresvport.blacklist kernel-img.conf rmt
```

```
kunjuzz@kunjuzz-VirtualBox:~/Documents/books$ tar xjf /home/kunjuzz/Documents/sample.tar.xz
kunjuzz@kunjuzz-VirtualBox:~/Documents/books$ ls
file1.txt file2.txt
kunjuzz@kunjuzz-VirtualBox:~/Documents/books$ tar xjf /home/kunjuzz/Documents/mcareg.tar.bz2
kunjuzz@kunjuzz-VirtualBox:~/Documents/books$ ls
etc file1.txt file2.txt
kunjuzz@kunjuzz-VirtualBox:~/Documents/books$
```

Extracting using gzip, xz, bzip2

3. expr : used to evaluate a given expression and display its standard output. Each separated expression is considered as an argument. These expressions could be integer and string expressions, including regular expressions.

```
kunjuzz@kunjuzz-VirtualBox:~/Documents$ expr 10 + 2
12
kunjuzz@kunjuzz-VirtualBox:~/Documents$ expr 10 \* 4
40
kunjuzz@kunjuzz-VirtualBox:~/Documents$ expr 10 / 4
2
kunjuzz@kunjuzz-VirtualBox:~/Documents$ expr 10 % 4
2
kunjuzz@kunjuzz-VirtualBox:~/Documents$ expr 10 - 4
6
kunjuzz@kunjuzz-VirtualBox:~/Documents$ █
```

4. Redirection & piping : A pipe is a form of redirection to send the output of one command/program/process to another command/program/process for further processing. Pipe is used to combine two or more commands, the output of one command acts as input to another command, and this command's output may act as input to the next command and so on.

```
kunjuzz@kunjuzz-VirtualBox:~/Documents$ ls | wc -m -w
      7      62
kunjuzz@kunjuzz-VirtualBox:~/Documents$ ls -l | wc -l
8
kunjuzz@kunjuzz-VirtualBox:~/Documents$ cat file4.txt | tail -3 file.txt
eight
nine
ten
kunjuzz@kunjuzz-VirtualBox:~/Documents$ █
```

5. ssh : ssh is a protocol, which stands for **Secure Shell** or **Secure Socket Shell**. The secure shell is useful for security while connecting to a remote server. The **ssh command uses a ssh protocol**, which is a secure protocol, as the data transfer between the client and the host takes place in encrypted form. It transfers the input through the client to the host and returns the output transferred by the host. It executes through TCP/IP port 22.

```
kunjuzz@kunjuzz-VirtualBox:~$ sudo apt-get update
[sudo] password for kunjuzz:
Hit:1 http://in.archive.ubuntu.com/ubuntu hirsute InRelease
Hit:2 http://in.archive.ubuntu.com/ubuntu hirsute-updates InRelease
Hit:3 http://in.archive.ubuntu.com/ubuntu hirsute-backports InRelease
Get:4 http://security.ubuntu.com/ubuntu hirsute-security InRelease [101 kB]
Fetched 101 kB in 2s (65.2 kB/s)
Reading package lists... Done
kunjuzz@kunjuzz-VirtualBox:~$ sudo apt install
Reading package lists... Done
Building dependency tree... Done
Reading state information... Done
0 upgraded, 0 newly installed, 0 to remove and 225 not upgraded.
kunjuzz@kunjuzz-VirtualBox:~$ sudo apt install openssh-client
Reading package lists... Done
Building dependency tree... Done
Reading state information... Done
openssh-client is already the newest version (1:8.4p1-5ubuntu1).
0 upgraded, 0 newly installed, 0 to remove and 225 not upgraded.
kunjuzz@kunjuzz-VirtualBox:~$ ssh localhost
ssh: connect to host localhost port 22: Connection refused
```

```
kunjuzz@kunjuzz-VirtualBox:~$ sudo apt-get install openssh-server ii
Reading package lists... Done
Building dependency tree... Done
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:
  ii ncurses-term openssh-client openssh-server openssh-sftp-server
  ssh-import-id
0 upgraded, 6 newly installed, 0 to remove and 225 not upgraded.
Need to get 1,361 kB of archives.
After this operation, 8,747 kB of additional disk space will be used.
Do you want to continue? [Y/n] y
Get:1 http://in.archive.ubuntu.com/ubuntu hirsute-updates/main amd64 openssh-cl
ient amd64 1:8.4p1-5ubuntu1.1 [702 kB]
Get:2 http://in.archive.ubuntu.com/ubuntu hirsute/universe amd64 ii amd64 1.8-2
 [15.3 kB]
Get:3 http://in.archive.ubuntu.com/ubuntu hirsute/main amd64 ncurses-term all 6
 .2+20201114-2build1 [249 kB]
Get:4 http://in.archive.ubuntu.com/ubuntu hirsute-updates/main amd64 openssh-sf
tp-server amd64 1:8.4p1-5ubuntu1.1 [31.7 kB]
Get:5 http://in.archive.ubuntu.com/ubuntu hirsute-updates/main amd64 openssh-se
rver amd64 1:8.4p1-5ubuntu1.1 [353 kB]
Get:6 http://in.archive.ubuntu.com/ubuntu hirsute/main amd64 ssh-import-id all
 5.11-0ubuntu1 [10.1 kB]
```

```
kunjuzz@kunjuzz-VirtualBox:~$ sudo service ssh status
● ssh.service - OpenBSD Secure Shell server
  Loaded: loaded (/lib/systemd/system/ssh.service; enabled; vendor preset: true)
  Active: active (running) since Thu 2021-08-12 17:32:45 IST; 1min 14s ago
    Docs: man:sshd(8)
          man:sshd_config(5)
  Process: 17777 ExecStartPre=/usr/sbin/sshd -t (code=exited, status=0/SUCCESS)
 Main PID: 17778 (sshd)
    Tasks: 1 (limit: 1089)
   Memory: 1.5M
      CGroup: /system.slice/ssh.service
              └─17778 sshd: /usr/sbin/sshd -D [listener] 0 of 10-100 startups

Aug 12 17:32:44 kunjuzz-VirtualBox systemd[1]: Starting OpenBSD Secure Shell se>
Aug 12 17:32:45 kunjuzz-VirtualBox sshd[17778]: Server listening on 0.0.0.0 po>
Aug 12 17:32:45 kunjuzz-VirtualBox sshd[17778]: Server listening on :: port 22.
Aug 12 17:32:45 kunjuzz-VirtualBox systemd[1]: Started OpenBSD Secure Shell se>

kunjuzz@kunjuzz-VirtualBox:~$ ssh localhost
The authenticity of host 'localhost (127.0.0.1)' can't be established.
ECDSA key fingerprint is SHA256:eLg6BlJ2zc53Ipr6AaK09V/9q2Gq44//Gyn/eSUgwZg.
Are you sure you want to continue connecting (yes/no/[fingerprint])? yes
Warning: Permanently added 'localhost' (ECDSA) to the list of known hosts.
kunjuzz@localhost's password:
Welcome to Ubuntu 21.04 (GNU/Linux 5.11.0-18-generic x86_64)

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

6. scp : It is a file transfer client that provides an RCP-like command-line interface.

7. ssh-keygen : It is used to create a key pair for establishing a connection and public key authentication.

```
kunjuzz@kunjuzz-VirtualBox:~/Documents/books$ ssh-keygen -t rsa
Generating public/private rsa key pair.
Enter file in which to save the key (/home/kunjuzz/.ssh/id_rsa): text
Enter passphrase (empty for no passphrase):
Enter same passphrase again:
Your identification has been saved in text
Your public key has been saved in text.pub
The key fingerprint is:
SHA256:6JzqujqDN/PH0Ksb5WDR9wpLvFxuQz1PfBwU01nWMWI kunjuzz@kunjuzz-VirtualBox
The key's randomart image is:
+---[RSA 3072]---+
|          E+=B|
|          . . . +|
|          . . .   |
|          o o o . .|
|          o.* S + o o|
|          ..o.O . + .|
|          .oO.= .|
|          + + o+. .|
|          .=oB*+|
+---[SHA256]---+
kunjuzz@kunjuzz-VirtualBox:~/Documents/books$ ls
doc.txt doc.txt.pub etc file1.txt file2.txt text text.pub
kunjuzz@kunjuzz-VirtualBox:~/Documents/books$ █
```

8. ssh-copy-id : It is used to configure a public key as a valid user on a server.

ASSIGNMENT 5: LAB EXERCISES

Lab Assignment Managing Files, Creating Users and Groups Using Command-line tools

1.

- a) Create six files with name of the form songX.mp3 .

```
kunjuzz@kunjuzz-VirtualBox:~/Lab$ touch song{1..6}.mp3
kunjuzz@kunjuzz-VirtualBox:~/Lab$ ls
song1.mp3  song2.mp3  song3.mp3  song4.mp3  song5.mp3  song6.mp3
```

- b) Create six files with name of the form snapX.mp3 .

```
kunjuzz@kunjuzz-VirtualBox:~/Lab$ touch snap{1..6}.mp3
kunjuzz@kunjuzz-VirtualBox:~/Lab$ ls
snap1.mp3  snap3.mp3  snap5.mp3  song1.mp3  song3.mp3  song5.mp3
snap2.mp3  snap4.mp3  snap6.mp3  song2.mp3  song4.mp3  song6.mp3
```

- c) Create six files with name of the form filmX.mp3 (In each set, replace X with the numbers 1 through 6) .

```
kunjuzz@kunjuzz-VirtualBox:~/Lab$ touch film{1..6}.mp3
kunjuzz@kunjuzz-VirtualBox:~/Lab$ ls
film1.mp3  film4.mp3  snap1.mp3  snap4.mp3  song1.mp3  song4.mp3
film2.mp3  film5.mp3  snap2.mp3  snap5.mp3  song2.mp3  song5.mp3
film3.mp3  film6.mp3  snap3.mp3  snap6.mp3  song3.mp3  song6.mp3
kunjuzz@kunjuzz-VirtualBox:~/Lab$
```

2. From your home directory, move the song files into your music subdirectory, the snapshot files into your pictures subdirectory, and the movie files into videos subdirectory.

```
kunjuzz@kunjuzz-VirtualBox:~/Lab$ mv song{1..6}.mp3 /home/kunjuzz/Music
kunjuzz@kunjuzz-VirtualBox:~/Lab$ mv snap{1..6}.mp3 /home/kunjuzz/Pictures
kunjuzz@kunjuzz-VirtualBox:~/Lab$ mv film{1..6}.mp3 /home/kunjuzz/Videos
kunjuzz@kunjuzz-VirtualBox:~/Lab$ cd ..
kunjuzz@kunjuzz-VirtualBox:~$ ls Music
song1.mp3  song2.mp3  song3.mp3  song4.mp3  song5.mp3  song6.mp3
kunjuzz@kunjuzz-VirtualBox:~$ ls Pictures
snap1.mp3  snap2.mp3  snap3.mp3  snap4.mp3  snap5.mp3  snap6.mp3
kunjuzz@kunjuzz-VirtualBox:~$ ls Videos
film1.mp3  film2.mp3  film3.mp3  film4.mp3  film5.mp3  film6.mp3
kunjuzz@kunjuzz-VirtualBox:~$
```

3. In your home directory, create three subdirectories for organizing your files. Call these directories friends, family, and work. Create all three with one command.

```
kunjuzz@kunjuzz-VirtualBox:~$ mkdir -p Lab/{friends,family,work}
kunjuzz@kunjuzz-VirtualBox:~$ ls Lab
family  friends  work
kunjuzz@kunjuzz-VirtualBox:~$
```

4. Copy song files to the friends folder and snap files to family folder.

```
kunjuzz@kunjuzz-VirtualBox:~$ cp -i Music/* /home/kunjuzz/Lab/friends
kunjuzz@kunjuzz-VirtualBox:~$ ls Lab/friends
song1.mp3 song2.mp3 song3.mp3 song4.mp3 song5.mp3 song6.mp3
kunjuzz@kunjuzz-VirtualBox:~$ cp -i Pictures/* /home/kunjuzz/Lab/family
kunjuzz@kunjuzz-VirtualBox:~$ ls Lab/family
snap1.mp3 snap2.mp3 snap3.mp3 snap4.mp3 snap5.mp3 snap6.mp3
kunjuzz@kunjuzz-VirtualBox:~$ █
```

5. Attempt to delete both family and friends projects with a single rmdir command.

```
kunjuzz@kunjuzz-VirtualBox:~/Lab$ rmdir friends family
rmdir: failed to remove 'friends': Directory not empty
rmdir: failed to remove 'family': Directory not empty
kunjuzz@kunjuzz-VirtualBox:~/Lab$ █
```

6. Use another command that will succeed in deleting both the family and friends folder.

```
kunjuzz@kunjuzz-VirtualBox:~/Lab$ rm -r friends family
kunjuzz@kunjuzz-VirtualBox:~/Lab$ ls
work
kunjuzz@kunjuzz-VirtualBox:~/Lab$ █
```

7. Redirect a long listing of all home directory files, including hidden, into a file named allfiles.txt. Confirm that the file contains the listing.

```
kunjuzz@kunjuzz-VirtualBox:~$ ls -a
.
.. .cache .gnupg Pictures student
.. .config Lab .profile .sudo_as_admin_successful
.bash_history Desktop .local Public Templates
.bash_logout Documents .mozilla snap Videos
.bashrc Downloads Music .ssh
kunjuzz@kunjuzz-VirtualBox:~$ ls -a > allfiles.txt
kunjuzz@kunjuzz-VirtualBox:~$ cat allfiles.txt
.
..
allfiles.txt
.bash_history
.bash_logout
.bashrc
.cache
.config
Desktop
Documents
Downloads
.gnupg
Lab
.local
.mozilla
Music
Pictures
.profile
Public
snap
.ssh
student
.sudo_as_admin_successful
Templates
Videos
kunjuzz@kunjuzz-VirtualBox:~$ █
```

8. In the command window, display today's date with day of the week, month, date and year.

```
kunjuzz@kunjuzz-VirtualBox:~$ date "+%A %B %d %G"
Tuesday August 17 2021
kunjuzz@kunjuzz-VirtualBox:~$ █
```

9. Add the user Juliet.

```
kunjuzz@kunjuzz-VirtualBox:~$ sudo useradd Juliet
[sudo] password for kunjuzz:
kunjuzz@kunjuzz-VirtualBox:~$ █
```

10. Confirm that Juliet has been added by examining the /etc/passwd file.

```
kunjuzz@kunjuzz-VirtualBox:~$ tail -5 /etc/passwd
systemd-coredump:x:999:999:systemd Core Dumper:/:/usr/sbin/nologin
anjali:x:2000:1001:/home/anjali:/bin/sh
sshd:x:127:65534:/run/sshd:/usr/sbin/nologin
mysql:x:128:134:MySQL Server,,,:/nonexistent:/bin/false
Juliet:x:2001:2001:/home/Juliet:/bin/sh
kunjuzz@kunjuzz-VirtualBox:~$ █
```

11. Use the passwd command to initialize Juliet's password.

```
kunjuzz@kunjuzz-VirtualBox:~$ sudo passwd Juliet
New password:
Retype new password:
passwd: password updated successfully
kunjuzz@kunjuzz-VirtualBox:~$ █
```

12. Create a supplementary group called Shakespeare with a group id of 30000.

```
kunjuzz@kunjuzz-VirtualBox:~$ sudo groupadd -g 30000 Shakespeare
kunjuzz@kunjuzz-VirtualBox:~$ tail -3 /etc/group
mysql:x:134:
Juliet:x:2001:
Shakespeare:x:30000:
```

13. Create a supplementary group called artists.

```
kunjuzz@kunjuzz-VirtualBox:~$ sudo groupadd artists
kunjuzz@kunjuzz-VirtualBox:~$ tail -3 /etc/group
Juliet:x:2001:
Shakespeare:x:30000:
artists:x:30001:
```

14. Confirm that Shakespeare and artists have been added by examining the /etc/group file.

```
kunjuzz@kunjuzz-VirtualBox:~$ tail -5 /etc/group
giraffe:x:1004:anjali
mysql:x:134:
Juliet:x:2001:
Shakespeare:x:30000:
artists:x:30001:
kunjuzz@kunjuzz-VirtualBox:~$ █
```

15. Add the Juliet user to the Shakespeare group as a supplementary group.

```
kunjuzz@kunjuzz-VirtualBox:~$ sudo usermod -G Shakespeare Juliet
kunjuzz@kunjuzz-VirtualBox:~$ groups Juliet
Juliet : Juliet Shakespeare
```

16. Confirm that Juliet has been added using the id command.

```
kunjuzz@kunjuzz-VirtualBox:~$ id Juliet
uid=2001(Juliet) gid=2001(Juliet) groups=2001(Juliet),30000(Shakespeare)
```

17. Add Romeo and Hamlet to the Shakespeare group.

```
kunjuzz@kunjuzz-VirtualBox:~$ sudo useradd Romeo
kunjuzz@kunjuzz-VirtualBox:~$ sudo useradd Hamlet
kunjuzz@kunjuzz-VirtualBox:~$ sudo usermod -G Shakespeare Romeo
kunjuzz@kunjuzz-VirtualBox:~$ sudo usermod -G Shakespeare Hamlet
kunjuzz@kunjuzz-VirtualBox:~$ tail -5 /etc/group
Juliet:x:2001:
Shakespeare:x:30000:Juliet,Romeo,Hamlet
artists:x:30001:
Romeo:x:2002:
Hamlet:x:2003:
kunjuzz@kunjuzz-VirtualBox:~$ █
```

18. Add Reba, Dolly and Elvis to the artists group.

```
kunjuzz@kunjuzz-VirtualBox:~$ sudo useradd Reba
kunjuzz@kunjuzz-VirtualBox:~$ sudo useradd Dolly
kunjuzz@kunjuzz-VirtualBox:~$ sudo useradd Elvis
kunjuzz@kunjuzz-VirtualBox:~$ sudo usermod -G artists Reba
kunjuzz@kunjuzz-VirtualBox:~$ sudo usermod -G artists Dolly
kunjuzz@kunjuzz-VirtualBox:~$ sudo usermod -G artists Elvis
kunjuzz@kunjuzz-VirtualBox:~$ tail -10 /etc/group
giraffe:x:1004:anjali
mysql:x:134:
Juliet:x:2001:
Shakespeare:x:30000:Juliet,Romeo,Hamlet
artists:x:30001:Reba,Dolly,Elvis
Romeo:x:2002:
Hamlet:x:2003:
Reba:x:2004:
Dolly:x:2005:
Elvis:x:2006:
kunjuzz@kunjuzz-VirtualBox:~$
```

19. Verify the supplemental group memberships by examining the /etc/group file.

```
kunjuzz@kunjuzz-VirtualBox:~$ tail -8 /etc/group
Juliet:x:2001:
Shakespeare:x:30000:Juliet,Romeo,Hamlet
artists:x:30001:Reba,Dolly,Elvis
Romeo:x:2002:
Hamlet:x:2003:
Reba:x:2004:
Dolly:x:2005:
Elvis:x:2006:
kunjuzz@kunjuzz-VirtualBox:~$ █
```

20. Attempt to remove user Dolly.

```
kunjuzz@kunjuzz-VirtualBox:~$ sudo userdel Dolly
kunjuzz@kunjuzz-VirtualBox:~$ tail -5 /etc/group
artists:x:30001:Reba,Elvis
Romeo:x:2002:
Hamlet:x:2003:
Reba:x:2004:
Elvis:x:2006:
kunjuzz@kunjuzz-VirtualBox:~$ █
```

1. Try out these network commands in Window as well as in Linux and perform at least 4 options with each command: ping route traceroute, nslookup,Ip Config, NetStat .

Windows

a) Ping :

```
C:\Users\anjal>ping google.com

Pinging google.com [2404:6800:4002:826::200e] with 32 bytes of data:
Reply from 2404:6800:4002:826::200e: time=100ms
Reply from 2404:6800:4002:826::200e: time=90ms
Reply from 2404:6800:4002:826::200e: time=85ms
Reply from 2404:6800:4002:826::200e: time=95ms

Ping statistics for 2404:6800:4002:826::200e:
    Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
Approximate round trip times in milli-seconds:
    Minimum = 85ms, Maximum = 100ms, Average = 92ms
```

```
C:\Users\anjal>ping -a google.com

Pinging google.com [2404:6800:4002:826::200e] with 32 bytes of data:
Reply from 2404:6800:4002:826::200e: time=84ms
Reply from 2404:6800:4002:826::200e: time=109ms
Reply from 2404:6800:4002:826::200e: time=86ms
Reply from 2404:6800:4002:826::200e: time=108ms

Ping statistics for 2404:6800:4002:826::200e:
    Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
Approximate round trip times in milli-seconds:
    Minimum = 84ms, Maximum = 109ms, Average = 96ms
```

```
C:\Users\anjal>ping -t google.com

Pinging google.com [2404:6800:4002:826::200e] with 32 bytes of data:
Reply from 2404:6800:4002:826::200e: time=106ms
Reply from 2404:6800:4002:826::200e: time=84ms
Reply from 2404:6800:4002:826::200e: time=93ms
Reply from 2404:6800:4002:826::200e: time=97ms
Reply from 2404:6800:4002:826::200e: time=97ms
Reply from 2404:6800:4002:826::200e: time=102ms
Reply from 2404:6800:4002:826::200e: time=87ms
Reply from 2404:6800:4002:826::200e: time=99ms
Reply from 2404:6800:4002:826::200e: time=98ms
Reply from 2404:6800:4002:826::200e: time=90ms
Reply from 2404:6800:4002:826::200e: time=92ms
Reply from 2404:6800:4002:826::200e: time=99ms
Reply from 2404:6800:4002:826::200e: time=92ms
Reply from 2404:6800:4002:826::200e: time=96ms
Reply from 2404:6800:4002:826::200e: time=102ms
Reply from 2404:6800:4002:826::200e: time=91ms
Reply from 2404:6800:4002:826::200e: time=86ms
Reply from 2404:6800:4002:826::200e: time=88ms
Reply from 2404:6800:4002:826::200e: time=94ms
Reply from 2404:6800:4002:826::200e: time=104ms
Reply from 2404:6800:4002:826::200e: time=108ms
Reply from 2404:6800:4002:826::200e: time=114ms
Reply from 2404:6800:4002:826::200e: time=105ms
Reply from 2404:6800:4002:826::200e: time=118ms

Ping statistics for 2404:6800:4002:826::200e:
    Packets: Sent = 24, Received = 24, Lost = 0 (0% loss),
Approximate round trip times in milli-seconds:
    Minimum = 84ms, Maximum = 118ms, Average = 97ms
```

```
C:\Users\anjali>ping -j google.com
Pinging google.com [142.250.195.142] with 32 bytes of data:
General failure.
General failure.
General failure.
General failure.

Ping statistics for 142.250.195.142:
  Packets: Sent = 4, Received = 0, Lost = 4 (100% loss),
```

```
C:\Users\anjali>ping -f google.com
Pinging google.com [142.250.195.142] with 32 bytes of data:
Reply from 142.250.195.142: bytes=32 time=572ms TTL=112
Reply from 142.250.195.142: bytes=32 time=67ms TTL=112
Reply from 142.250.195.142: bytes=32 time=61ms TTL=112
Reply from 142.250.195.142: bytes=32 time=71ms TTL=112

Ping statistics for 142.250.195.142:
  Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
Approximate round trip times in milli-seconds:
  Minimum = 61ms, Maximum = 572ms, Average = 192ms
```

b) Route:

```
C:\Users\anjali>route print
=====
Interface List
 3...30 d0 42 37 48 2d ....Realtek PCIe FE Family Controller
 12...0a 00 27 00 00 0c ....VirtualBox Host-Only Ethernet Adapter
 7...a6 97 b1 dc f1 4d ....Microsoft Wi-Fi Direct Virtual Adapter
 10...b6 97 b1 dc f1 4d ....Microsoft Wi-Fi Direct Virtual Adapter #2
 13...a4 97 b1 dc f1 4d ....Qualcomm QCA9377 802.11ac Wireless Adapter
 14...a4 97 b1 dc f1 4e ....Bluetooth Device (Personal Area Network)
 1.....Software Loopback Interface 1
=====

IPv4 Route Table
=====
Active Routes:
Network Destination      Netmask        Gateway        Interface Metric
          0.0.0.0      0.0.0.0    192.168.95.120  192.168.95.6    55
        127.0.0.0      255.0.0.0        On-link       127.0.0.1    331
        127.0.0.1  255.255.255.255        On-link       127.0.0.1    331
 127.255.255.255  255.255.255.255        On-link       127.0.0.1    331
 192.168.56.0      255.255.255.0        On-link  192.168.56.1    281
 192.168.56.1      255.255.255.255        On-link  192.168.56.1    281
 192.168.56.255  255.255.255.255        On-link  192.168.56.1    281
 192.168.95.0      255.255.255.0        On-link  192.168.95.6    311
 192.168.95.6      255.255.255.255        On-link  192.168.95.6    311
 192.168.95.255  255.255.255.255        On-link  192.168.95.6    311
 224.0.0.0      240.0.0.0        On-link       127.0.0.1    331
 224.0.0.0      240.0.0.0        On-link  192.168.56.1    281
 224.0.0.0      240.0.0.0        On-link  192.168.95.6    311
 255.255.255.255  255.255.255.255        On-link       127.0.0.1    331
 255.255.255.255  255.255.255.255        On-link  192.168.56.1    281
 255.255.255.255  255.255.255.255        On-link  192.168.95.6    311
=====
Persistent Routes:
  None
```

```
IPv6 Route Table
=====
Active Routes:
If Metric Network Destination      Gateway
 13     71 ::/0          fe80::8c42:19ff:fed0:3ce2
  1     331 :1/128        On-link
 13     71 2409:4073:2189:f3dc::/64 On-link
 13     311 2409:4073:2189:f3dc:2537:744e:a7be:b7b2/128
 13     311 2409:4073:2189:f3dc:bd92:7db6:fccf:9cfb/128
 12     281 fe80::/64        On-link
 13     311 fe80::/64        On-link
 12     281 fe80::a5ba:13df:e5e9:1ef8/128
 13     311 fe80::bd92:7db6:fccf:9cfb/128
  1     331 ff00::/8        On-link
 12     281 ff00::/8        On-link
 13     311 ff00::/8        On-link
=====
Persistent Routes:
  None
```

```
C:\Users\anjal>route print -4
=====
Interface List
 3...30 d0 42 37 48 2d ....Realtek PCIe FE Family Controller
 12...0a 00 27 00 00 0c ....VirtualBox Host-Only Ethernet Adapter
 7...a6 97 b1 dc f1 4d ....Microsoft Wi-Fi Direct Virtual Adapter
 10...b6 97 b1 dc f1 4d ....Microsoft Wi-Fi Direct Virtual Adapter #2
 13...a4 97 b1 dc f1 4d ....Qualcomm QCA9377 802.11ac Wireless Adapter
 14...a4 97 b1 dc f1 4e ....Bluetooth Device (Personal Area Network)
 1.....Software Loopback Interface 1
=====

IPv4 Route Table
=====
Active Routes:
Network Destination      Netmask        Gateway       Interface Metric
          0.0.0.0        0.0.0.0   192.168.95.120    192.168.95.6    55
         127.0.0.0      255.0.0.0        On-link     127.0.0.1    331
         127.0.0.1      255.255.255.255        On-link     127.0.0.1    331
 127.255.255.255      255.255.255.255        On-link     127.0.0.1    331
         192.168.56.0      255.255.255.0        On-link    192.168.56.1    281
         192.168.56.1      255.255.255.255        On-link    192.168.56.1    281
 192.168.56.255      255.255.255.255        On-link    192.168.56.1    281
         192.168.95.0      255.255.255.0        On-link    192.168.95.6    311
         192.168.95.6      255.255.255.255        On-link    192.168.95.6    311
 192.168.95.255      255.255.255.255        On-link    192.168.95.6    311
         224.0.0.0        240.0.0.0        On-link     127.0.0.1    331
         224.0.0.0        240.0.0.0        On-link    192.168.56.1    281
         224.0.0.0        240.0.0.0        On-link    192.168.95.6    311
 255.255.255.255      255.255.255.255        On-link     127.0.0.1    331
 255.255.255.255      255.255.255.255        On-link    192.168.56.1    281
 255.255.255.255      255.255.255.255        On-link    192.168.95.6    311
=====

Persistent Routes:
 None
```

```
C:\Users\anjal>route print -6
=====
Interface List
 3...30 d0 42 37 48 2d ....Realtek PCIe FE Family Controller
 12...0a 00 27 00 00 0c ....VirtualBox Host-Only Ethernet Adapter
 7...a6 97 b1 dc f1 4d ....Microsoft Wi-Fi Direct Virtual Adapter
 10...b6 97 b1 dc f1 4d ....Microsoft Wi-Fi Direct Virtual Adapter #2
 13...a4 97 b1 dc f1 4d ....Qualcomm QCA9377 802.11ac Wireless Adapter
 14...a4 97 b1 dc f1 4e ....Bluetooth Device (Personal Area Network)
 1.....Software Loopback Interface 1
=====

IPv6 Route Table
=====
Active Routes:
If Metric Network Destination      Gateway
13    71 ::/0                      fe80::8c42:19ff:fed0:3ce2
 1    331 ::1/128                  On-link
13    71 2409:4073:2189:f3dc::/64 On-link
13    311 2409:4073:2189:f3dc:2537:744e:a7be:b7b2/128
 13   311 2409:4073:2189:f3dc:bd92:7db6:fccf:9cfb/128
 12   281 fe80::/64                On-link
13    311 fe80::/64                On-link
12    281 fe80::a5ba:13df:e5e9:1ef8/128
 13   311 fe80::bd92:7db6:fccf:9cfb/128
 1    331 ff00::/8                On-link
12    281 ff00::/8                On-link
13    311 ff00::/8                On-link
=====

Persistent Routes:
 None
```

```
C:\Users\anjal>route print -p
=====
Interface List
 3...30 d0 42 37 48 2d ....Realtek PCIe FE Family Controller
 12...0a 00 27 00 00 0c ....VirtualBox Host-Only Ethernet Adapter
 7...a6 97 b1 dc f1 4d ....Microsoft Wi-Fi Direct Virtual Adapter
 10...b6 97 b1 dc f1 4d ....Microsoft Wi-Fi Direct Virtual Adapter #2
 13...a4 97 b1 dc f1 4d ....Qualcomm QCA9377 802.11ac Wireless Adapter
 14...a4 97 b1 dc f1 4e ....Bluetooth Device (Personal Area Network)
 1.....Software Loopback Interface 1
=====

IPv4 Route Table
=====
Active Routes:
Network Destination      Netmask        Gateway       Interface Metric
          0.0.0.0        0.0.0.0   192.168.95.120    192.168.95.6    55
         127.0.0.0      255.0.0.0        On-link     127.0.0.1    331
         127.0.0.1      255.255.255.255        On-link     127.0.0.1    331
 127.255.255.255      255.255.255.255        On-link     127.0.0.1    331
         192.168.56.0      255.255.255.0        On-link    192.168.56.1    281
         192.168.56.1      255.255.255.255        On-link    192.168.56.1    281
 192.168.56.255      255.255.255.255        On-link    192.168.56.1    281
         192.168.95.0      255.255.255.0        On-link    192.168.95.6    311
         192.168.95.6      255.255.255.255        On-link    192.168.95.6    311
 192.168.95.255      255.255.255.255        On-link    192.168.95.6    311
         224.0.0.0        240.0.0.0        On-link     127.0.0.1    331
         224.0.0.0        240.0.0.0        On-link    192.168.56.1    281
         224.0.0.0        240.0.0.0        On-link    192.168.95.6    311
 255.255.255.255      255.255.255.255        On-link     127.0.0.1    331
 255.255.255.255      255.255.255.255        On-link    192.168.56.1    281
 255.255.255.255      255.255.255.255        On-link    192.168.95.6    311
=====

Persistent Routes:
 None

IPv6 Route Table
=====
Active Routes:
If Metric Network Destination      Gateway
13    71 ::/0                      fe80::8c42:19ff:fed0:3ce2
 1    331 ::1/128                  On-link
13    71 2409:4073:2189:f3dc::/64 On-link
13    311 2409:4073:2189:f3dc:2537:744e:a7be:b7b2/128
 13   311 2409:4073:2189:f3dc:bd92:7db6:fccf:9cfb/128
 12   281 fe80::/64                On-link
13    311 fe80::/64                On-link
```

```

12  281 fe80::/64          On-link
13  311 fe80::/64          On-link
12  281 fe80::a5ba:13df:e5e9:1ef8/128
                                On-link
13  311 fe80::bd92:7db6:fccf:9cfb/128
                                On-link
1   331 ff00::/8           On-link
12  281 ff00::/8           On-link
13  311 ff00::/8           On-link
=====
Persistent Routes:
  None

```

c) Tracert:

```
C:\Users\anjali>tracert google.com

Tracing route to google.com [2404:6800:4002:820::200e]
over a maximum of 30 hops:
1   477 ms      5 ms      3 ms  2409:4073:2189:f3dc::c4
2   *           *           *           Request timed out.
3   48 ms       48 ms      48 ms  2405:200:366:a168:4::ff05
4   61 ms       43 ms      58 ms  2405:200:801:3500::1e4
5   68 ms       41 ms      58 ms  2405:200:801:3500::1e7
6   52 ms       62 ms      61 ms  2405:200:801:3500::1e9
7   78 ms       68 ms      58 ms  2001:4860:1:1::171
8   64 ms       54 ms      60 ms  2001:4860:1:1::170
9   60 ms       63 ms      49 ms  2404:6800:810c::1
10  *           *           65 ms  2001:4860:0:1::67e
11  83 ms       68 ms      61 ms  2001:4860:0:e00::a
12  95 ms       104 ms     93 ms  2001:4860::9:4001:67bd
13  *           87 ms      *           2001:4860::1c:4000:eaaf6
14  89 ms       105 ms     92 ms  2001:4860:0:1::53cf
15  102 ms      100 ms     91 ms  del12s03-in-x0e.1e100.net [2404:6800:4002:820::200e]

Trace complete.
```

```
C:\Users\anjali>tracert -d google.com

Tracing route to google.com [2404:6800:4002:820::200e]
over a maximum of 30 hops:
1   4 ms        4 ms      5 ms  2409:4073:2189:f3dc::c4
2   *           *           *           Request timed out.
3   49 ms       46 ms      50 ms  2405:200:366:a168:4::ff05
4   36 ms       50 ms      46 ms  2405:200:801:3500::1e4
5   53 ms       38 ms      38 ms  2405:200:801:3500::1e7
6   52 ms       46 ms      48 ms  2405:200:801:3500::1e9
7   62 ms       59 ms      66 ms  2001:4860:1:1::171
8   65 ms       49 ms      62 ms  2001:4860:1:1::170
9   72 ms       64 ms      51 ms  2404:6800:810c::1
10  84 ms       *           61 ms  2001:4860:0:1::67e
11  65 ms       *           59 ms  2001:4860:0:e00::a
12  97 ms       104 ms     100 ms  2001:4860::9:4001:d9e7
13  *           *           *           Request timed out.
14  86 ms       82 ms      84 ms  2001:4860:0:1::53cd
15  92 ms       96 ms      90 ms  2404:6800:4002:820::200e

Trace complete.
```

```
C:\Users\anjali>tracert -4 google.com

Tracing route to google.com [142.250.195.14]
over a maximum of 30 hops:
1   104 ms      3 ms      3 ms  192.168.95.120
2   *           *           *           Request timed out.
3   49 ms       37 ms      51 ms  10.72.238.165
4   62 ms       48 ms      59 ms  192.168.35.236
5   57 ms       30 ms      47 ms  192.168.35.239
6   54 ms       38 ms      49 ms  172.26.76.4
7   52 ms       50 ms      46 ms  172.26.76.18
8   48 ms       51 ms      55 ms  192.168.64.8
9   46 ms       55 ms      49 ms  192.168.64.9
10  57 ms       55 ms      69 ms  172.31.2.67
11  76 ms       53 ms      57 ms  209.85.175.48
12  58 ms       57 ms      69 ms  74.125.242.129
13  73 ms       58 ms      62 ms  74.125.242.130
14  185 ms      95 ms      90 ms  72.14.239.10
15  94 ms       101 ms     90 ms  108.170.251.97
16  93 ms       102 ms     97 ms  142.251.52.211
17  92 ms       100 ms     98 ms  del12s09-in-f14.1e100.net [142.250.195.14]

Trace complete.
```

```
C:\Users\anjali>tracert -6 google.com

Tracing route to google.com [2404:6800:4007:81d::200e]
over a maximum of 30 hops:
1   99 ms       4 ms      3 ms  2409:4073:2189:f3dc::c4
2   *           *           *           Request timed out.
3   54 ms       64 ms      51 ms  2405:200:366:a168:4::ff05
4   50 ms       37 ms      49 ms  2405:200:801:3500::1e4
5   42 ms       42 ms      58 ms  2405:200:801:3500::1e7
6   54 ms       41 ms      57 ms  2405:200:801:3500::1e9
7   67 ms       59 ms      57 ms  2001:4860:1:1::171
8   76 ms       59 ms      56 ms  2001:4860:1:1::170
9   83 ms       77 ms      59 ms  2404:6800:8123::1
10  *           66 ms      *           2001:4860:0:1::564e
11  48 ms       48 ms      49 ms  2001:4860:0:1::67d
12  92 ms       53 ms      63 ms  maa05s22-in-x0e.1e100.net [2404:6800:4007:81d::200e]

Trace complete.
```

```
C:\Users\anjal>tracert -h 3 google.com
Tracing route to google.com [2404:6800:4002:820::200e]
over a maximum of 3 hops:
  1      4 ms      4 ms      3 ms  2409:4073:2189:f3dc::c4
  2      *         *         * Request timed out.
  3     48 ms     38 ms     60 ms  2405:200:366:a168:4::ff05
Trace complete.
```

d) Nslookup:

```
C:\Users\anjal>nslookup
Default Server:  UnKnown
Address:  192.168.95.120
```

```
C:\Users\anjal>nslookup google.com
Server:  UnKnown
Address:  192.168.95.120

Non-authoritative answer:
Name:      google.com
Addresses:  2404:6800:4007:825::200e
           142.250.183.238
```

```
C:\Users\anjal>nslookup -q=MX google.com
Server:  UnKnown
Address:  192.168.95.120

Non-authoritative answer:
google.com      MX preference = 20, mail exchanger = alt1.aspmx.l.google.com
google.com      MX preference = 40, mail exchanger = alt3.aspmx.l.google.com
google.com      MX preference = 10, mail exchanger = aspmx.l.google.com
google.com      MX preference = 30, mail exchanger = alt2.aspmx.l.google.com
google.com      MX preference = 50, mail exchanger = alt4.aspmx.l.google.com
```

```
C:\Users\anjal>nslookup -type=ns google.com
Server:  UnKnown
Address:  192.168.95.120

Non-authoritative answer:
google.com      nameserver = ns4.google.com
google.com      nameserver = ns3.google.com
google.com      nameserver = ns1.google.com
google.com      nameserver = ns2.google.com
```

e) Ip config :

```
C:\Users\anjal>ipconfig

Windows IP Configuration

Ethernet adapter Ethernet:

    Media State . . . . . : Media disconnected
    Connection-specific DNS Suffix . :

Ethernet adapter VirtualBox Host-Only Network:

    Connection-specific DNS Suffix . :
    Link-local IPv6 Address . . . . . : fe80::a5ba:13df:e5e9:1ef8%1
    IPv4 Address. . . . . : 192.168.56.1
    Subnet Mask . . . . . : 255.255.255.0
    Default Gateway . . . . . :

Wireless LAN adapter Local Area Connection* 1:

    Media State . . . . . : Media disconnected
    Connection-specific DNS Suffix . :

Wireless LAN adapter Local Area Connection* 2:

    Media State . . . . . : Media disconnected
    Connection-specific DNS Suffix . :

Wireless LAN adapter Wi-Fi:

    Connection-specific DNS Suffix . :
    IPv6 Address. . . . . : 2409:4073:2189:f3dc:bd92:7d
    Temporary IPv6 Address. . . . . : 2409:4073:2189:f3dc:1994:32
    Link-local IPv6 Address . . . . . : fe80::bd92:7db6:fccf:9cfb%1
    IPv4 Address. . . . . : 192.168.95.6
    Subnet Mask . . . . . : 255.255.255.0
    Default Gateway . . . . . : fe80::8c42:19ff:fed0:3ce2%1
                                         192.168.95.120

Ethernet adapter Bluetooth Network Connection:

    Media State . . . . . : Media disconnected
    Connection-specific DNS Suffix . :
```

```
Wireless LAN adapter Local Area Connection* 2:

Media State . . . . . : Media disconnected
Connection-specific DNS Suffix . :
Description . . . . . : Microsoft Wi-Fi Direct Virtual Adapter #2
Physical Address. . . . . : B6-97-B1-DC-F1-4D
DHCP Enabled. . . . . : Yes
Autoconfiguration Enabled . . . . . : Yes

Wireless LAN adapter Wi-Fi:

Connection-specific DNS Suffix . . . . . :
Description . . . . . : Qualcomm QCA9377 802.11ac Wireless Adapter
Physical Address. . . . . : A4-97-B1-DC-F1-4D
DHCP Enabled. . . . . : Yes
Autoconfiguration Enabled . . . . . : Yes
IPv6 Address. . . . . : 2409:4073:2189:f3dc:bd92:7db6:fccf:9cfb(Preferred)
Temporary IPv6 Address. . . . . : 2409:4073:2189:f3dc:1994:327f:ede9:a06d(Preferred)
Link-local IPv6 Address . . . . . : fe80::bd92:7db6:fccf:9cfb%13(Preferred)
IPv4 Address. . . . . : 192.168.95.6(Preferred)
Subnet Mask . . . . . : 255.255.255.0
Lease Obtained. . . . . : 13 September 2021 08:08:56
Lease Expires . . . . . : 13 September 2021 09:08:54
Default Gateway . . . . . : fe80::8c42:19ff:fed0:3ce2%13
                                         192.168.95.120
DHCP Server . . . . . : 192.168.95.120
DHCPv6 IAID . . . . . : 145004465
DHCPv6 Client DUID. . . . . : 00-01-00-01-27-95-16-C0-30-D0-42-37-48-2D
DNS Servers . . . . . : 192.168.95.120
NetBIOS over Tcpip. . . . . : Enabled

Ethernet adapter Bluetooth Network Connection:

Media State . . . . . : Media disconnected
Connection-specific DNS Suffix . . . . . :
```

```
C:\Users\anjal>ipconfig /renew
```

Windows IP Configuration

```
No operation can be performed on Ethernet while it has its media disconnected.
No operation can be performed on Local Area Connection* 1 while it has its media disconnected.
No operation can be performed on Local Area Connection* 2 while it has its media disconnected.
No operation can be performed on Bluetooth Network Connection while it has its media disconnected.
```

Ethernet adapter Ethernet:

```
Media State . . . . . : Media disconnected
Connection-specific DNS Suffix . . . . . :
```

Ethernet adapter VirtualBox Host-Only Network:

```
Connection-specific DNS Suffix . . . . . :
Link-local IPv6 Address . . . . . : fe80::a5ba:13df:e5e9:1ef8%12
IPv4 Address. . . . . : 192.168.56.1
Subnet Mask . . . . . : 255.255.255.0
Default Gateway . . . . . :
```

Wireless LAN adapter Local Area Connection* 1:

```
Media State . . . . . : Media disconnected
Connection-specific DNS Suffix . . . . . :
```

Wireless LAN adapter Local Area Connection* 2:

```
Media State . . . . . : Media disconnected
Connection-specific DNS Suffix . . . . . :
```

Wireless LAN adapter Wi-Fi:

```
Connection-specific DNS Suffix . . . . . :
IPv6 Address. . . . . : 2409:4073:2189:f3dc:bd92:7db6:fccf:9cfb
Temporary IPv6 Address. . . . . : 2409:4073:2189:f3dc:1994:327f:ede9:a06d
Link-local IPv6 Address . . . . . : fe80::bd92:7db6:fccf:9cfb%13
IPv4 Address. . . . . : 192.168.95.6
Subnet Mask . . . . . : 255.255.255.0
Default Gateway . . . . . : fe80::8c42:19ff:fed0:3ce2%13
                                         192.168.95.120
```

Ethernet adapter Bluetooth Network Connection:

```
Media State . . . . . : Media disconnected
Connection-specific DNS Suffix . . . . . :
```

```
C:\Users\anjali>ipconfig /flushdns

Windows IP Configuration

Successfully flushed the DNS Resolver Cache.

C:\Users\anjali>_
```

f) Netstat :

```
C:\Users\anjali>netstat

Active Connections

  Proto  Local Address        Foreign Address      State
  TCP    127.0.0.1:49679      Anjali:49680        ESTABLISHED
  TCP    127.0.0.1:49680      Anjali:49679        ESTABLISHED
  TCP    127.0.0.1:49681      Anjali:49682        ESTABLISHED
  TCP    127.0.0.1:49682      Anjali:49681        ESTABLISHED
  TCP    127.0.0.1:60461      Anjali:60462        ESTABLISHED
  TCP    127.0.0.1:60462      Anjali:60461        ESTABLISHED
  TCP    127.0.0.1:60463      Anjali:60464        ESTABLISHED
  TCP    127.0.0.1:60464      Anjali:60463        ESTABLISHED
  TCP    127.0.0.1:60465      Anjali:60466        ESTABLISHED
  TCP    127.0.0.1:60466      Anjali:60465        ESTABLISHED
  TCP    127.0.0.1:60467      Anjali:60468        ESTABLISHED
  TCP    127.0.0.1:60468      Anjali:60467        ESTABLISHED
  TCP    192.168.95.6:49806    relay-5166bfb0:http ESTABLISHED
  TCP    192.168.95.6:51165    52.109.124.39:https TIME_WAIT
  TCP    192.168.95.6:51171    52.109.88.35:https ESTABLISHED
  TCP    192.168.95.6:51172    219:https          ESTABLISHED
  TCP    192.168.95.6:51173    52.109.56.20:https TIME_WAIT
  TCP    192.168.95.6:51475    20.197.71.89:https ESTABLISHED
  TCP    192.168.95.6:59015    23.98.104.196:https ESTABLISHED
  TCP    192.168.95.6:59037    49.44.144.214:https CLOSE_WAIT
  TCP    192.168.95.6:59042    91.108.56.198:https ESTABLISHED
  TCP    192.168.95.6:62568    52.184.220.11:https ESTABLISHED
  TCP    [2409:4073:2189:f3dc:1994:327f:ede9:a06d]:50835  sb-in-f188:5228 ESTABLISHED
  TCP    [2409:4073:2189:f3dc:1994:327f:ede9:a06d]:51157  del03s17-in-x03:https TIME_WAIT
  TCP    [2409:4073:2189:f3dc:1994:327f:ede9:a06d]:62567  del11s18-in-x0e:https ESTABLISHED
```

```
C:\Users\anjali>netstat -n

Active Connections

  Proto  Local Address        Foreign Address      State
  TCP    127.0.0.1:49679      127.0.0.1:49680        ESTABLISHED
  TCP    127.0.0.1:49680      127.0.0.1:49679        ESTABLISHED
  TCP    127.0.0.1:49681      127.0.0.1:49682        ESTABLISHED
  TCP    127.0.0.1:49682      127.0.0.1:49681        ESTABLISHED
  TCP    127.0.0.1:60461      127.0.0.1:60462        ESTABLISHED
  TCP    127.0.0.1:60462      127.0.0.1:60461        ESTABLISHED
  TCP    127.0.0.1:60463      127.0.0.1:60464        ESTABLISHED
  TCP    127.0.0.1:60464      127.0.0.1:60463        ESTABLISHED
  TCP    127.0.0.1:60465      127.0.0.1:60466        ESTABLISHED
  TCP    127.0.0.1:60466      127.0.0.1:60465        ESTABLISHED
  TCP    127.0.0.1:60467      127.0.0.1:60468        ESTABLISHED
  TCP    127.0.0.1:60468      127.0.0.1:60467        ESTABLISHED
  TCP    192.168.95.6:49806    46.4.60.45:80          ESTABLISHED
  TCP    192.168.95.6:51165    52.109.124.39:443     TIME_WAIT
  TCP    192.168.95.6:51172    35.247.144.219:443    ESTABLISHED
  TCP    192.168.95.6:51173    52.109.56.20:443      TIME_WAIT
  TCP    192.168.95.6:51475    20.197.71.89:443      ESTABLISHED
  TCP    192.168.95.6:59015    23.98.104.196:443     ESTABLISHED
  TCP    192.168.95.6:59037    49.44.144.214:443     CLOSE_WAIT
  TCP    192.168.95.6:59042    91.108.56.198:443     ESTABLISHED
  TCP    192.168.95.6:62568    52.184.220.11:443     TIME_WAIT
  TCP    192.168.95.6:62570    13.33.146.4:443      TIME_WAIT
  TCP    192.168.95.6:62571    13.33.146.4:443      TIME_WAIT
  TCP    192.168.95.6:62572    52.184.214.53:443     ESTABLISHED
  TCP    192.168.95.6:62573    52.137.110.235:443    TIME_WAIT
  TCP    [2409:4073:2189:f3dc:1994:327f:ede9:a06d]:50835  [2404:6800:4003:c01::bc]:5228 ESTABLISHED
  TCP    [2409:4073:2189:f3dc:1994:327f:ede9:a06d]:51157  [2404:6800:4002:80c::2003]:443 TIME_WAIT
  TCP    [2409:4073:2189:f3dc:1994:327f:ede9:a06d]:62567  [2404:6800:4002:81d::200e]:443 ESTABLISHED
```

```
C:\Users\anjali>netstat -v

Active Connections

  Proto  Local Address        Foreign Address      State
  TCP    127.0.0.1:49679      Anjali:49680        ESTABLISHED
  TCP    127.0.0.1:49680      Anjali:49679        ESTABLISHED
  TCP    127.0.0.1:49681      Anjali:49682        ESTABLISHED
  TCP    127.0.0.1:49682      Anjali:49681        ESTABLISHED
  TCP    127.0.0.1:60461      Anjali:60462        ESTABLISHED
  TCP    127.0.0.1:60462      Anjali:60461        ESTABLISHED
  TCP    127.0.0.1:60463      Anjali:60464        ESTABLISHED
  TCP    127.0.0.1:60464      Anjali:60463        ESTABLISHED
  TCP    127.0.0.1:60465      Anjali:60466        ESTABLISHED
  TCP    127.0.0.1:60466      Anjali:60465        ESTABLISHED
  TCP    127.0.0.1:60467      Anjali:60468        ESTABLISHED
  TCP    127.0.0.1:60468      Anjali:60467        ESTABLISHED
  TCP    192.168.95.6:49806    relay-5166bfb0:http ESTABLISHED
  TCP    192.168.95.6:51172    219:https          ESTABLISHED
  TCP    192.168.95.6:51475    20.197.71.89:https ESTABLISHED
  TCP    192.168.95.6:59015    23.98.104.196:https ESTABLISHED
  TCP    192.168.95.6:59037    49.44.144.214:https CLOSE_WAIT
  TCP    192.168.95.6:59042    91.108.56.198:https ESTABLISHED
  TCP    192.168.95.6:62574    20.50.73.9:https    TIME_WAIT
  TCP    [2409:4073:2189:f3dc:1994:327f:ede9:a06d]:50835  sb-in-f188:5228 ESTABLISHED
  TCP    [2409:4073:2189:f3dc:1994:327f:ede9:a06d]:62567  del11s18-in-x0e:https CLOSE_WAIT
```

```
C:\Users\anjali>netstat -o
```

Active Connections

Proto	Local Address	Foreign Address	State	PID
TCP	127.0.0.1:49679	Anjali:49680	ESTABLISHED	5600
TCP	127.0.0.1:49680	Anjali:49679	ESTABLISHED	5600
TCP	127.0.0.1:49681	Anjali:49682	ESTABLISHED	5600
TCP	127.0.0.1:49682	Anjali:49681	ESTABLISHED	5600
TCP	127.0.0.1:60461	Anjali:60462	ESTABLISHED	13332
TCP	127.0.0.1:60462	Anjali:60461	ESTABLISHED	13332
TCP	127.0.0.1:60463	Anjali:60464	ESTABLISHED	13332
TCP	127.0.0.1:60464	Anjali:60463	ESTABLISHED	13332
TCP	127.0.0.1:60465	Anjali:60466	ESTABLISHED	13332
TCP	127.0.0.1:60466	Anjali:60465	ESTABLISHED	13332
TCP	127.0.0.1:60467	Anjali:60468	ESTABLISHED	13332
TCP	127.0.0.1:60468	Anjali:60467	ESTABLISHED	13332
TCP	192.168.95.6:49806	relay-5166fb0:http	ESTABLISHED	4304
TCP	192.168.95.6:51172	219:https	ESTABLISHED	8276
TCP	192.168.95.6:51475	20.197.71.89:https	ESTABLISHED	4676
TCP	192.168.95.6:59015	23.98.104.196:https	ESTABLISHED	2308
TCP	192.168.95.6:59037	49.44.144.214:https	CLOSE_WAIT	18492
TCP	192.168.95.6:59042	91.108.56.198:https	ESTABLISHED	18880
TCP	192.168.95.6:62574	20.50.73.9:https	ESTABLISHED	10908
TCP	[2409:4073:2189:f3dc:1994:327f:ede9:a06d]:50835	sb-in-f188:5228	ESTABLISHED	7680
TCP	[2409:4073:2189:f3dc:1994:327f:ede9:a06d]:62567	del11s18-in-x0e:https	CLOSE_WAIT	7680

```
C:\Users\anjali>netstat -a
```

Active Connections

Proto	Local Address	Foreign Address	State
TCP	0.0.0.0:135	Anjali:\0	LISTENING
TCP	0.0.0.0:445	Anjali:\0	LISTENING
TCP	0.0.0.0:3306	Anjali:\0	LISTENING
TCP	0.0.0.0:5040	Anjali:\0	LISTENING
TCP	0.0.0.0:5700	Anjali:\0	LISTENING
TCP	0.0.0.0:6646	Anjali:\0	LISTENING
TCP	0.0.0.0:7070	Anjali:\0	LISTENING
TCP	0.0.0.0:7680	Anjali:\0	LISTENING
TCP	0.0.0.0:33060	Anjali:\0	LISTENING
TCP	0.0.0.0:49664	Anjali:\0	LISTENING
TCP	0.0.0.0:49665	Anjali:\0	LISTENING
TCP	0.0.0.0:49666	Anjali:\0	LISTENING
TCP	0.0.0.0:49667	Anjali:\0	LISTENING
TCP	0.0.0.0:49668	Anjali:\0	LISTENING
TCP	0.0.0.0:49675	Anjali:\0	LISTENING
TCP	127.0.0.1:8884	Anjali:\0	LISTENING
TCP	127.0.0.1:9012	Anjali:\0	LISTENING
TCP	127.0.0.1:27017	Anjali:\0	LISTENING
TCP	127.0.0.1:49679	Anjali:49680	ESTABLISHED
TCP	127.0.0.1:49680	Anjali:49679	ESTABLISHED
TCP	127.0.0.1:49681	Anjali:49682	ESTABLISHED
TCP	127.0.0.1:49682	Anjali:49681	ESTABLISHED
TCP	127.0.0.1:49747	Anjali:\0	LISTENING
TCP	127.0.0.1:60461	Anjali:60462	ESTABLISHED
TCP	127.0.0.1:60462	Anjali:60461	ESTABLISHED
TCP	127.0.0.1:60463	Anjali:60464	ESTABLISHED
TCP	127.0.0.1:60464	Anjali:60463	ESTABLISHED
TCP	127.0.0.1:60465	Anjali:60466	ESTABLISHED
TCP	127.0.0.1:60466	Anjali:60465	ESTABLISHED
TCP	127.0.0.1:60467	Anjali:60468	ESTABLISHED
TCP	127.0.0.1:60468	Anjali:60467	ESTABLISHED
TCP	192.168.56.1:139	Anjali:\0	LISTENING
TCP	192.168.95.6:139	Anjali:\0	LISTENING
TCP	192.168.95.6:49806	relay-5166fb0:https	LISTENING
TCP	192.168.95.6:51172	219:https	ESTABLISHED
TCP	192.168.95.6:51475	20.197.71.89:https	ESTABLISHED
TCP	192.168.95.6:59015	23.98.104.196:https	ESTABLISHED
TCP	192.168.95.6:59037	49.44.214.214:https	CLOSE_WAIT
TCP	192.168.95.6:59042	91.108.56.198:https	ESTABLISHED
TCP	192.168.95.6:62570	server-13-33-146-4:https	TIME_WAIT
TCP	192.168.95.6:62571	server-13-33-146-4:https	TIME_WAIT
TCP	192.168.95.6:62572	52.184.214.53:https	ESTABLISHED
TCP	192.168.95.6:62573	52.137.110.235:https	TIME_WAIT
TCP	[::]:135	Anjali:\0	LISTENING

```
TCP [:]:135 Anjali:0 LISTENING
TCP [:]:445 Anjali:0 LISTENING
TCP [:]:3306 Anjali:0 LISTENING
TCP [:]:5700 Anjali:0 LISTENING
TCP [:]:7680 Anjali:0 LISTENING
TCP [:]:33060 Anjali:0 LISTENING
TCP [:]:49664 Anjali:0 LISTENING
TCP [:]:49665 Anjali:0 LISTENING
TCP [:]:49666 Anjali:0 LISTENING
TCP [:]:49667 Anjali:0 LISTENING
TCP [:]:49668 Anjali:0 LISTENING
TCP [:]:49675 Anjali:0 LISTENING
TCP [2409:4073:2189:f3dc:1994:327f:ede9:a06d]:50835 sb-in-f188:5228 ESTABLISHED
TCP [2409:4073:2189:f3dc:1994:327f:ede9:a06d]:62567 de11s18-in-x0e:https ESTABLISHED
UDP 0.0.0.0:500 *:*
UDP 0.0.0.0:4500 *:*
UDP 0.0.0.0:5050 *:*
UDP 0.0.0.0:5353 *:*
UDP 0.0.0.0:5255 *:*
UDP 0.0.0.0:6646 *:*
UDP 0.0.0.0:50001 *:*
UDP 127.0.0.1:11900 *:*
UDP 127.0.0.1:153510 *:*
UDP 127.0.0.1:60966 *:*
UDP 192.168.56.1:137 *:*
UDP 192.168.56.1:138 *:*
UDP 192.168.56.1:1900 *:*
UDP 192.168.56.1:2177 *:*
UDP 192.168.56.1:60964 *:*
UDP 192.168.95.6:137 *:*
UDP 192.168.95.6:138 *:*
UDP 192.168.95.6:1900 *:*
UDP 192.168.95.6:2177 *:*
UDP 192.168.95.6:60965 *:*
UDP [:]:500 *:*
UDP [:]:4500 *:*
UDP [:]:5353 *:*
UDP [:]:5353 *:*
UDP [:]:5353 *:*
UDP [:]:5355 *:*
UDP [:]:1900 *:*
UDP [:]:60963 *:*
```

```

UDP [::1]:60963      *:*
UDP [2409:4073:2189:f3dc:1994:327f:ede9:a06d]:2177  *:*
UDP [2409:4073:2189:f3dc:bd92:7db6:fcff:9cfb]:2177  *:*
UDP [fe80::a5ba:13df:e5e9:1ef8%12]:1900  *:*
UDP [fe80::a5ba:13df:e5e9:1ef8%12]:2177  *:*
UDP [fe80::a5ba:13df:e5e9:1ef8%12]:60961  *:*
UDP [fe80::bd92:7db6:fcff:9cfb%13]:1900  *:*
UDP [fe80::bd92:7db6:fcff:9cfb%13]:2177  *:*
UDP [fe80::bd92:7db6:fcff:9cfb%13]:60962  *:*

```

Linux

a) Ping :

```

kunjuzz@kunjuzz-VirtualBox:~$ ping google.com
PING google.com (142.250.77.142) 56(84) bytes of data.
64 bytes from maa05s16-in-f14.1e100.net (142.250.77.142): icmp_seq=2 ttl=110 time=1823 ms
64 bytes from maa05s16-in-f14.1e100.net (142.250.77.142): icmp_seq=3 ttl=110 time=1252 ms
64 bytes from maa05s16-in-f14.1e100.net (142.250.77.142): icmp_seq=4 ttl=110 time=480 ms
64 bytes from maa05s16-in-f14.1e100.net (142.250.77.142): icmp_seq=5 ttl=110 time=581 ms
64 bytes from maa05s16-in-f14.1e100.net (142.250.77.142): icmp_seq=6 ttl=110 time=763 ms
64 bytes from maa05s16-in-f14.1e100.net (142.250.77.142): icmp_seq=7 ttl=110 time=459 ms
64 bytes from maa05s16-in-f14.1e100.net (142.250.77.142): icmp_seq=8 ttl=110 time=145 ms
64 bytes from maa05s16-in-f14.1e100.net (142.250.77.142): icmp_seq=9 ttl=110 time=991 ms
64 bytes from maa05s16-in-f14.1e100.net (142.250.77.142): icmp_seq=10 ttl=110 time=601 ms
^C
--- google.com ping statistics ---
11 packets transmitted, 9 received, 18.1818% packet loss, time 10039ms
rtt min/avg/max/mdev = 144.603/788.308/1822.979/474.105 ms, pipe 2
kunjuzz@kunjuzz-VirtualBox:~$ 

```

```

kunjuzz@kunjuzz-VirtualBox:~$ ping -a google.com
PING google.com (142.250.77.142) 56(84) bytes of data.
64 bytes from maa05s16-in-f14.1e100.net (142.250.77.142): icmp_seq=2 ttl=110 time=1500 ms
64 bytes from maa05s16-in-f14.1e100.net (142.250.77.142): icmp_seq=3 ttl=110 time=796 ms
64 bytes from maa05s16-in-f14.1e100.net (142.250.77.142): icmp_seq=4 ttl=110 time=1819 ms
64 bytes from maa05s16-in-f14.1e100.net (142.250.77.142): icmp_seq=5 ttl=110 time=1738 ms
64 bytes from maa05s16-in-f14.1e100.net (142.250.77.142): icmp_seq=13 ttl=110 time=1247 ms
64 bytes from maa05s16-in-f14.1e100.net (142.250.77.142): icmp_seq=14 ttl=110 time=1523 ms
64 bytes from maa05s16-in-f14.1e100.net (142.250.77.142): icmp_seq=15 ttl=110 time=1921 ms
^C
--- google.com ping statistics ---
22 packets transmitted, 7 received, 68.1818% packet loss, time 21329ms
rtt min/avg/max/mdev = 796.249/1506.287/1920.659/357.515 ms, pipe 2
kunjuzz@kunjuzz-VirtualBox:~$ 

```

```

kunjuzz@kunjuzz-VirtualBox:~$ ping -b google.com
PING google.com (142.250.77.142) 56(84) bytes of data.
64 bytes from maa05s16-in-f14.1e100.net (142.250.77.142): icmp_seq=1 ttl=110 time=760 ms
64 bytes from maa05s16-in-f14.1e100.net (142.250.77.142): icmp_seq=2 ttl=110 time=1719 ms
64 bytes from maa05s16-in-f14.1e100.net (142.250.77.142): icmp_seq=3 ttl=110 time=1459 ms
64 bytes from maa05s16-in-f14.1e100.net (142.250.77.142): icmp_seq=4 ttl=110 time=1361 ms
64 bytes from maa05s16-in-f14.1e100.net (142.250.77.142): icmp_seq=5 ttl=110 time=1780 ms
64 bytes from maa05s16-in-f14.1e100.net (142.250.77.142): icmp_seq=6 ttl=110 time=2177 ms
64 bytes from maa05s16-in-f14.1e100.net (142.250.77.142): icmp_seq=7 ttl=110 time=1745 ms
^C
--- google.com ping statistics ---
11 packets transmitted, 7 received, 36.3636% packet loss, time 10082ms
rtt min/avg/max/mdev = 759.545/1571.696/2176.791/410.255 ms, pipe 3
kunjuzz@kunjuzz-VirtualBox:~$ 

```

```
kunjuzz@kunjuzz-VirtualBox:~$ ping -f google.com
PING google.com (142.250.195.142) 56(84) bytes of data.
ping: cannot flood; minimal interval allowed for user is 200ms
kunjuzz@kunjuzz-VirtualBox:~$ █
```

b) Route :

```
kunjuzz@kunjuzz-VirtualBox:~$ route
Kernel IP routing table
Destination     Gateway         Genmask        Flags Metric Ref  Use Iface
default         _gateway       0.0.0.0        UG    100    0      0 enp0s3
10.0.2.0        0.0.0.0        255.255.255.0   U     100    0      0 enp0s3
link-local      0.0.0.0        255.255.0.0    U     1000   0      0 enp0s3
kunjuzz@kunjuzz-VirtualBox:~$ route -n
Kernel IP routing table
Destination     Gateway         Genmask        Flags Metric Ref  Use Iface
0.0.0.0         10.0.2.2      0.0.0.0        UG    100    0      0 enp0s3
10.0.2.0        0.0.0.0        255.255.255.0   U     100    0      0 enp0s3
169.254.0.0     0.0.0.0        255.255.0.0    U     1000   0      0 enp0s3
kunjuzz@kunjuzz-VirtualBox:~$ route -Cn
Kernel IP routing cache
Source          Destination   Gateway        Flags Metric Ref  Use Iface
kunjuzz@kunjuzz-VirtualBox:~$ route -4
Kernel IP routing table
Destination     Gateway         Genmask        Flags Metric Ref  Use Iface
default         _gateway       0.0.0.0        UG    100    0      0 enp0s3
10.0.2.0        0.0.0.0        255.255.255.0   U     100    0      0 enp0s3
link-local      0.0.0.0        255.255.0.0    U     1000   0      0 enp0s3
kunjuzz@kunjuzz-VirtualBox:~$ █
```

c) Traceroute :

```
kunjuzz@kunjuzz-VirtualBox:~$ traceroute google.com
traceroute to google.com (142.250.195.14), 30 hops max, 60 byte packets
 1 _gateway (10.0.2.2)  0.983 ms  0.971 ms  0.961 ms
 2 _gateway (10.0.2.2)  7.700 ms  10.158 ms  10.237 ms
kunjuzz@kunjuzz-VirtualBox:~$ traceroute -4 google.com
traceroute to google.com (142.250.195.14), 30 hops max, 60 byte packets
 1 _gateway (10.0.2.2)  0.258 ms  0.214 ms  0.202 ms
 2 _gateway (10.0.2.2)  6.814 ms  6.803 ms  6.792 ms
kunjuzz@kunjuzz-VirtualBox:~$ traceroute -6 google.com
traceroute to google.com (2404:6800:4002:826::200e), 30 hops max, 80 byte packets
connect: Network is unreachable
kunjuzz@kunjuzz-VirtualBox:~$ traceroute -d google.com
traceroute to google.com (142.250.195.14), 30 hops max, 60 byte packets
setsockopt SO_DEBUG: Permission denied
kunjuzz@kunjuzz-VirtualBox:~$ traceroute -n google.com
traceroute to google.com (142.250.195.14), 30 hops max, 60 byte packets
 1 10.0.2.2  0.220 ms  0.175 ms  0.163 ms
 2 10.0.2.2  8.371 ms  8.307 ms  8.272 ms
kunjuzz@kunjuzz-VirtualBox:~$ █
```

d) Nslookup :

```
kunjuzz@kunjuzz-VirtualBox:~$ nslookup google.com
Server:      127.0.0.53
Address:     127.0.0.53#53

Non-authoritative answer:
Name:   google.com
Address: 142.250.195.14
Name:   google.com
Address: 2404:6800:4007:81e::200e

kunjuzz@kunjuzz-VirtualBox:~$ nslookup -query=mx google.com
Server:      127.0.0.53
Address:     127.0.0.53#53

Non-authoritative answer:
google.com      mail exchanger = 10 aspmx.l.google.com.
google.com      mail exchanger = 40 alt3.aspmx.l.google.com.
google.com      mail exchanger = 50 alt4.aspmx.l.google.com.
google.com      mail exchanger = 20 alt1.aspmx.l.google.com.
google.com      mail exchanger = 30 alt2.aspmx.l.google.com.

Authoritative answers can be found from:
```

```
kunjuzz@kunjuzz-VirtualBox:~$ nslookup -query=ns google.com
Server:      127.0.0.53
Address:     127.0.0.53#53

Non-authoritative answer:
google.com      nameserver = ns4.google.com.
google.com      nameserver = ns3.google.com.
google.com      nameserver = ns1.google.com.
google.com      nameserver = ns2.google.com.

Authoritative answers can be found from:

kunjuzz@kunjuzz-VirtualBox:~$ nslookup -query=soa google.com
Server:      127.0.0.53
Address:     127.0.0.53#53

Non-authoritative answer:
google.com
origin = ns1.google.com
mail addr = dns-admin.google.com
serial = 396194125
refresh = 900
retry = 900
expire = 1800
minimum = 60

Authoritative answers can be found from:
kunjuzz@kunjuzz-VirtualBox:~$
```

e) Ifconfig :

```
kunjuzz@kunjuzz-VirtualBox:~$ ifconfig
enp0s3: flags=4163<UP,BROADCAST,RUNNING,MULTICAST>  mtu 1500
        inet 10.0.2.15  netmask 255.255.255.0  broadcast 10.0.2.255
        inet6 fe80::bb99:f405:33da:69e7  prefixlen 64  scopeid 0x20<link>
          ether 08:00:27:75:8a:2f  txqueuelen 1000  (Ethernet)
            RX packets 157748  bytes 221200924 (221.2 MB)
            RX errors 0  dropped 0  overruns 0  frame 0
            TX packets 60549  bytes 3698300 (3.6 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 507  bytes 49595 (49.5 KB)
        RX errors 0  dropped 0  overruns 0  frame 0
        TX packets 507  bytes 49595 (49.5 KB)
        TX errors 0  dropped 0  overruns 0  carrier 0  collisions 0

kunjuzz@kunjuzz-VirtualBox:~$ █
```

```
kunjuzz@kunjuzz-VirtualBox:~$ ifconfig -a
enp0s3: flags=4163<UP,BROADCAST,RUNNING,MULTICAST> mtu 1500
        inet 10.0.2.15 netmask 255.255.255.0 broadcast 10.0.2.255
        inet6 fe80::bb99:f405:33da:69e7 prefixlen 64 scopeid 0x20<link>
          ether 08:00:27:75:8a:2f txqueuelen 1000 (Ethernet)
            RX packets 157751 bytes 221201223 (221.2 MB)
            RX errors 0 dropped 0 overruns 0 frame 0
            TX packets 60552 bytes 3698538 (3.6 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 509 bytes 49767 (49.7 KB)
            RX errors 0 dropped 0 overruns 0 frame 0
            TX packets 509 bytes 49767 (49.7 KB)
            TX errors 0 dropped 0 overruns 0 carrier 0 collisions 0
```

kunjuzz@kunjuzz-VirtualBox:~\$ █

Iface	MTU	RX-OK	RX-ERR	RX-DRP	RX-OVR	TX-OK	TX-ERR	TX-DRP	TX-OVR	Flg
enp0s3	1500	157758	0	0	0	60560	0	0	0	BMRU
lo	65536	509	0	0	0	509	0	0	0	LRU

kunjuzz@kunjuzz-VirtualBox:~\$ █

```
kunjuzz@kunjuzz-VirtualBox:~$ ifconfig -v
enp0s3: flags=4163<UP,BROADCAST,RUNNING,MULTICAST> mtu 1500
        inet 10.0.2.15 netmask 255.255.255.0 broadcast 10.0.2.255
        inet6 fe80::bb99:f405:33da:69e7 prefixlen 64 scopeid 0x20<link>
          ether 08:00:27:75:8a:2f txqueuelen 1000 (Ethernet)
            RX packets 157752 bytes 221201313 (221.2 MB)
            RX errors 0 dropped 0 overruns 0 frame 0
            TX packets 60553 bytes 3698628 (3.6 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 509 bytes 49767 (49.7 KB)
            RX errors 0 dropped 0 overruns 0 frame 0
            TX packets 509 bytes 49767 (49.7 KB)
            TX errors 0 dropped 0 overruns 0 carrier 0 collisions 0
```

kunjuzz@kunjuzz-VirtualBox:~\$ █

f) Netstat :

```
kunjuzz@kunjuzz-VirtualBox:~$ netstat
Active Internet connections (w/o servers)
Proto Recv-Q Send-Q Local Address           Foreign Address         State
udp        0      0 kunjuzz-VirtualB:bootpc _gateway:bootps
                           ESTABLISHED
Active UNIX domain sockets (w/o servers)
Proto RefCnt Flags       Type      State         I-Node Path
unix    2 [ ]     DGRAM          22063   /run/user/1000/systemd
md/notify
unix    3 [ ]     DGRAM          15440   /run/systemd/notify
unix    2 [ ]     DGRAM          15454   /run/systemd/journal
/syslog
unix   18 [ ]     DGRAM          15463   /run/systemd/journal
/dev-log
unix    8 [ ]     DGRAM          15465   /run/systemd/journal
/socket
unix    3 [ ]     STREAM   CONNECTED      22437
unix    3 [ ]     STREAM   CONNECTED      18843
unix    3 [ ]     STREAM   CONNECTED      26164   /run/systemd/journal
/stdout
unix    3 [ ]     STREAM   CONNECTED      22327
unix    3 [ ]     STREAM   CONNECTED      18690
unix    3 [ ]     STREAM   CONNECTED      25251
unix    3 [ ]     STREAM   CONNECTED      18844   /run/dbus/system_bus
_socket
unix    3 [ ]     STREAM   CONNECTED      25405   /run/dbus/system_bus
_unix  3 [ ]     STREAM   CONNECTED      26153   /run/systemd/journal
```

```
kunjuzz@kunjuzz-VirtualBox:~$ netstat -n
Active Internet connections (w/o servers)
Proto Recv-Q Send-Q Local Address          Foreign Address        State
udp      0      0 10.0.2.15:68              10.0.2.2:67          ESTABLISHED

Active UNIX domain sockets (w/o servers)
Proto RefCnt Flags     Type      State          I-Node Path
unix  2      [ ]    DGRAM           22063   /run/user/1000/systemd
md/notify
unix  3      [ ]    DGRAM           15440   /run/systemd/notify
unix  2      [ ]    DGRAM           15454   /run/systemd/journal
/syslog
unix  18     [ ]    DGRAM           15463   /run/systemd/journal
/dev-log
unix  8      [ ]    DGRAM           15465   /run/systemd/journal
/socket
unix  3      [ ]    STREAM  CONNECTED       22437
unix  3      [ ]    STREAM  CONNECTED       18843
unix  3      [ ]    STREAM  CONNECTED       26164   /run/systemd/journal
/stdout
unix  3      [ ]    STREAM  CONNECTED       22327
unix  3      [ ]    STREAM  CONNECTED       18690
unix  3      [ ]    STREAM  CONNECTED       25251
unix  3      [ ]    STREAM  CONNECTED       18844   /run/dbus/system_bus
_socket
unix  3      [ ]    STREAM  CONNECTED       25405   /run/dbus/system_bus
_socket
unix  3      [ ]    STREAM  CONNECTED       26153   /run/systemd/journal
/stdout
```

```
kunjuzz@kunjuzz-VirtualBox:~$ netstat -o
Active Internet connections (w/o servers)
Proto Recv-Q Send-Q Local Address          Foreign Address        State
  Timer
udp      0      0 kunjuzz-VirtualB:bootpc _gateway:bootps          ESTABLISHED
off (0.00/0/0)

Active UNIX domain sockets (w/o servers)
Proto RefCnt Flags     Type      State          I-Node Path
unix  2      [ ]    DGRAM           22063   /run/user/1000/systemd
md/notify
unix  3      [ ]    DGRAM           15440   /run/systemd/notify
unix  2      [ ]    DGRAM           15454   /run/systemd/journal
/syslog
unix  18     [ ]    DGRAM           15463   /run/systemd/journal
/dev-log
unix  8      [ ]    DGRAM           15465   /run/systemd/journal
/socket
unix  3      [ ]    STREAM  CONNECTED       22437
unix  3      [ ]    STREAM  CONNECTED       18843
unix  3      [ ]    STREAM  CONNECTED       26164   /run/systemd/journal
/stdout
unix  3      [ ]    STREAM  CONNECTED       22327
unix  3      [ ]    STREAM  CONNECTED       18690
unix  3      [ ]    STREAM  CONNECTED       25251
unix  3      [ ]    STREAM  CONNECTED       18844   /run/dbus/system_bus
_socket
unix  3      [ ]    STREAM  CONNECTED       25405   /run/dbus/system_bus
_socket
unix  3      [ ]    STREAM  CONNECTED       26153   /run/systemd/journal
```

```
kunjuzz@kunjuzz-VirtualBox:~$ netstat -a
Active Internet connections (servers and established)
Proto Recv-Q Send-Q Local Address          Foreign Address        State
tcp      0      0 localhost:mysql          0.0.0.0:*          LISTEN
tcp      0      0 localhost:domain        0.0.0.0:*          LISTEN
tcp      0      0 0.0.0.0:ssh           0.0.0.0:*          LISTEN
tcp      0      0 localhost:ipp          0.0.0.0:*          LISTEN
tcp6     0      0 [::]:http            [::]:*             LISTEN
tcp6     0      0 [::]:ssh             [::]:*             LISTEN
tcp6     0      0 ip6-localhost:ipp      [::]:*             LISTEN
udp      0      0 0.0.0.0:631          0.0.0.0:*          LISTEN
udp      0      0 0.0.0.0:43230         0.0.0.0:*          LISTEN
udp      0      0 0.0.0.0:mdns          0.0.0.0:*          LISTEN
udp      0      0 localhost:domain        0.0.0.0:*          LISTEN
udp      0      0 kunjuzz-VirtualB:bootpc _gateway:bootps          ESTABLISHED
udp6     0      0 [::]:mdns            [::]:*             LISTEN
udp6     0      0 [::]:52541           [::]:*             LISTEN
raw6     0      0 [::]:ipv6-icmp        [::]:*             7
Active UNIX domain sockets (servers and established)
Proto RefCnt Flags     Type      State          I-Node Path
unix  2      [ ACC ]   STREAM  LISTENING       25881   @/home/kunjuzz/.cach
e/ibus/dbus-se1hkFvE
unix  2      [ ACC ]   STREAM  LISTENING       23387   @/tmp/.ICE-unix/1461
unix  2      [ ACC ]   STREAM  LISTENING       24117   @/tmp/.X11-unix/X0
unix  2      [ ACC ]   STREAM  LISTENING       24132   @/tmp/.X11-unix/X1
unix  2      [ ACC ]   STREAM  LISTENING       18942   /run/cups/cups.sock
unix  2      [ ]     DGRAM           22063   /run/user/1000/systemd
md/notify
```

2. Identify and perform 5 more network commands and it's working.

- i. **Getmac** : Returns the media access control (MAC) address and list of network protocols associated with each address for all network cards in each computer, either locally or across a network. This command is particularly useful either when you want to enter the MAC address into a network analyzer, or when you need to know what protocols are currently in use on each network adapter on a computer.

```
C:\Users\anjal>getmac

Physical Address      Transport Name
===== =====
30-D0-42-37-48-2D    Media disconnected
A4-97-B1-DC-F1-4D    \Device\Tcpip_{C6600145-9B01-4CD6-94EF-3322C691AE9A}
A4-97-B1-DC-F1-4E    Media disconnected
0A-00-27-00-00-0C    \Device\Tcpip_{ABB6FB59-3912-4755-AB85-78A9651C5341}
```

- ii. **HostName** : The command will simply display the current name of your Windows computer. This is the name your computer uses to identify itself to the other devices and servers on your local network. You can find this name in the System information screen in the GUI, but this command is quicker.

```
C:\Users\anjal>hostname
Anjali
```

- iii. **PathPing** : Provides information about network latency and network loss at intermediate hops between a source and destination. This command sends multiple echo Request messages to each router between a source and destination, over a period of time, and then computes results based on the packets returned from each router. Because this command displays the degree of packet loss at any given router or link, you can determine which routers or subnets might be having network problems. Used without parameters, this command displays help.

```
C:\Users\anjal>pathping google.com

Tracing route to google.com [2404:6800:4007:825::200e]
over a maximum of 30 hops:
  0  Anjali [2409:4073:2189:f3dc:1994:327f:ede9:a06d]
  1  2409:4073:2189:f3dc::9c
  2  *       *       *
Computing statistics for 25 seconds...
               Source to Here   This Node/Link
Hop  RTT     Lost/Sent = Pct  Lost/Sent = Pct  Address
  0                               Anjali [2409:4073:2189:f3dc:1994:327f:ede9:a06d]
                                0/ 100 =  0%  |
  1  10ms     0/ 100 =  0%     0/ 100 =  0%  2409:4073:2189:f3dc::9c

Trace complete.
```

- iv. **Nbtstat** : Displays NetBIOS over TCP/IP (NetBT) protocol statistics, NetBIOS name tables for both the local computer and remote computers, and the NetBIOS name cache. This command also allows a refresh of the NetBIOS name cache and the names registered with Windows Internet Name Service (WINS).

```
C:\Users\anjal>nbtstat -s

VirtualBox Host-Only Network:
NodeIpAddress: [192.168.56.1] Scope Id: []

    No Connections

Ethernet:
NodeIpAddress: [0.0.0.0] Scope Id: []

    No Connections

Bluetooth Network Connection:
NodeIpAddress: [0.0.0.0] Scope Id: []

    No Connections

Wi-Fi:
NodeIpAddress: [192.168.95.6] Scope Id: []

    No Connections

Local Area Connection* 1:
NodeIpAddress: [0.0.0.0] Scope Id: []

    No Connections

Local Area Connection* 2:
NodeIpAddress: [0.0.0.0] Scope Id: []

    No Connections
```

```
C:\Users\anjal>nbtstat -n

VirtualBox Host-Only Network:
NodeIpAddress: [192.168.56.1] Scope Id: []

    NetBIOS Local Name Table

    Name      Type      Status
    -----
    ANJALI    <20>    UNIQUE    Registered
    ANJALI    <00>    UNIQUE    Registered
    WORKGROUP <00>    GROUP     Registered

Ethernet:
NodeIpAddress: [0.0.0.0] Scope Id: []

    No names in cache

Bluetooth Network Connection:
NodeIpAddress: [0.0.0.0] Scope Id: []

    No names in cache

Wi-Fi:
NodeIpAddress: [192.168.95.6] Scope Id: []

    NetBIOS Local Name Table

    Name      Type      Status
    -----
    ANJALI    <20>    UNIQUE    Registered
    ANJALI    <00>    UNIQUE    Registered
    WORKGROUP <00>    GROUP     Registered

Local Area Connection* 1:
NodeIpAddress: [0.0.0.0] Scope Id: []

    No names in cache

Local Area Connection* 2:
NodeIpAddress: [0.0.0.0] Scope Id: []

    No names in cache
```

- v. **Arp** : Displays and modifies entries in the Address Resolution Protocol (ARP) cache. The ARP cache contains one or more tables that are used to store IP addresses and their resolved Ethernet or Token Ring physical addresses. There is a separate table for each Ethernet or Token Ring network adapter installed on your computer. Used without parameters, arp displays help information. The most general parameter is /a, which displays current Arp cache tables for all interfaces.

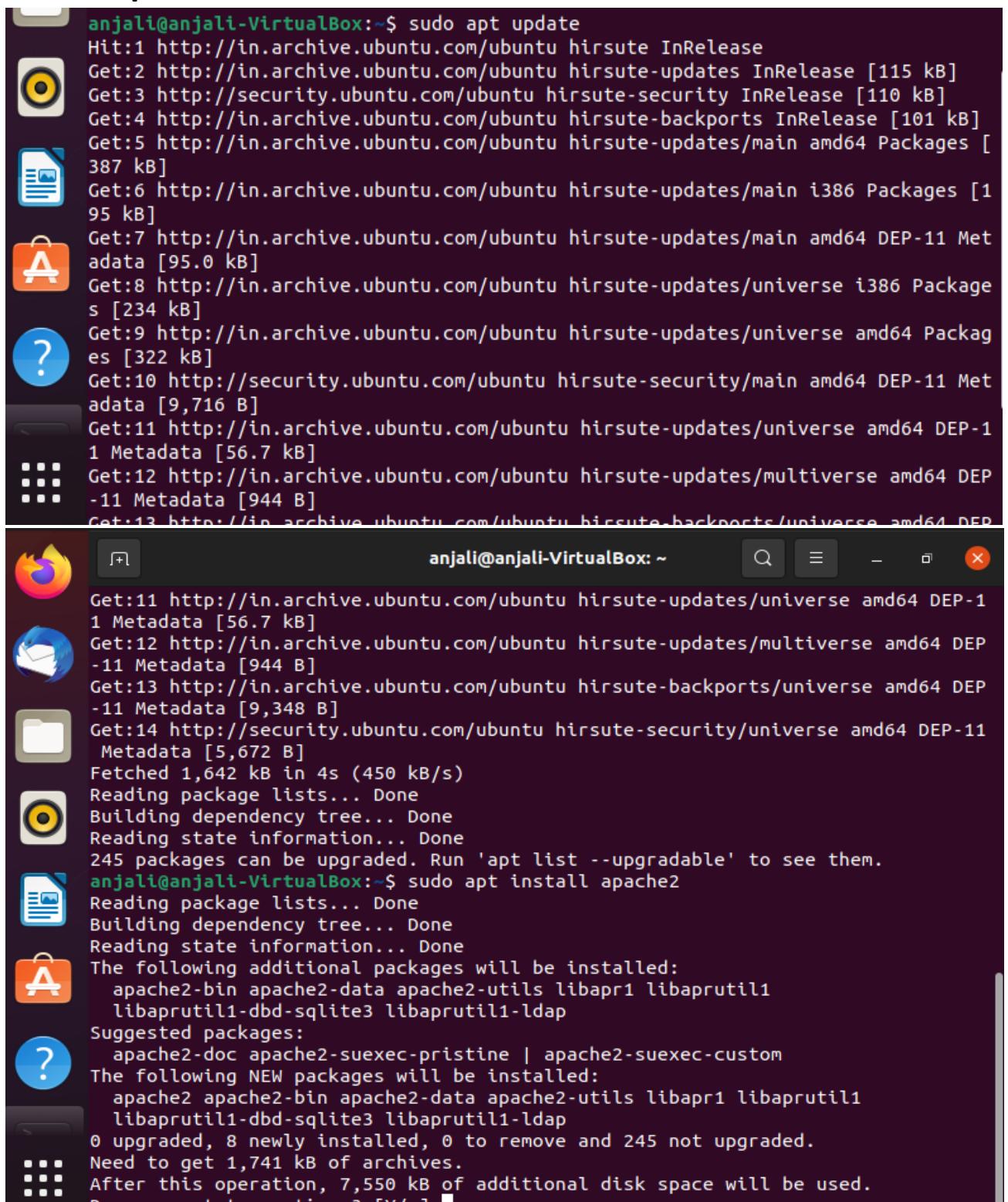
```
C:\Users\anjali>arp /a

Interface: 192.168.56.1 --- 0xc
  Internet Address      Physical Address      Type
  192.168.56.255        ff-ff-ff-ff-ff-ff    static
  224.0.0.22             01-00-5e-00-00-16    static
  224.0.0.251            01-00-5e-00-00-fb    static
  224.0.0.252            01-00-5e-00-00-fc    static
  239.255.255.250        01-00-5e-7f-ff-fa    static

Interface: 192.168.95.6 --- 0xd
  Internet Address      Physical Address      Type
  192.168.95.120        8e-42-19-d0-3c-e2    dynamic
  224.0.0.22             01-00-5e-00-00-16    static
  224.0.0.251            01-00-5e-00-00-fb    static
  224.0.0.252            01-00-5e-00-00-fc    static
  239.255.255.250        01-00-5e-7f-ff-fa    static
  255.255.255.255        ff-ff-ff-ff-ff-ff    static
```

LAMP installation

- **Install Apache**



```
anjali@anjali-VirtualBox:~$ sudo apt update
Hit:1 http://in.archive.ubuntu.com/ubuntu hirsute InRelease
Get:2 http://in.archive.ubuntu.com/ubuntu hirsute-updates InRelease [115 kB]
Get:3 http://security.ubuntu.com/ubuntu hirsute-security InRelease [110 kB]
Get:4 http://in.archive.ubuntu.com/ubuntu hirsute-backports InRelease [101 kB]
Get:5 http://in.archive.ubuntu.com/ubuntu hirsute-updates/main amd64 Packages [387 kB]
Get:6 http://in.archive.ubuntu.com/ubuntu hirsute-updates/main i386 Packages [195 kB]
Get:7 http://in.archive.ubuntu.com/ubuntu hirsute-updates/main amd64 DEP-11 Metadata [95.0 kB]
Get:8 http://in.archive.ubuntu.com/ubuntu hirsute-updates/universe i386 Packages [234 kB]
Get:9 http://in.archive.ubuntu.com/ubuntu hirsute-updates/universe amd64 Packages [322 kB]
Get:10 http://security.ubuntu.com/ubuntu hirsute-security/main amd64 DEP-11 Metadata [9,716 B]
Get:11 http://in.archive.ubuntu.com/ubuntu hirsute-updates/universe amd64 DEP-11 Metadata [56.7 kB]
Get:12 http://in.archive.ubuntu.com/ubuntu hirsute-updates/multiverse amd64 DEP-11 Metadata [944 B]
Get:13 http://in.archive.ubuntu.com/ubuntu hirsute-backports/universe amd64 DEP-11 Metadata [9,348 B]
Get:14 http://security.ubuntu.com/ubuntu hirsute-security/universe amd64 DEP-11 Metadata [5,672 B]
Fetched 1,642 kB in 4s (450 kB/s)
Reading package lists... Done
Building dependency tree... Done
Reading state information... Done
245 packages can be upgraded. Run 'apt list --upgradable' to see them.
anjali@anjali-VirtualBox:~$ sudo 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 libapr1 libaprutil1
    libaprutil1-dbd-sqlite3 libaprutil1-ldap
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
0 upgraded, 8 newly installed, 0 to remove and 245 not upgraded.
Need to get 1,741 kB of archives.
After this operation, 7,550 kB of additional disk space will be used.
Do you want to continue? [Y/n]
```

```
anjali@anjali-VirtualBox: ~
Enabling conf localized-error-pages.
Enabling conf other-vhosts-access-log.
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 (0.36-7.1) ...
Processing triggers for man-db (2.9.4-2) ...
Processing triggers for libc-bin (2.33-0ubuntu5) ...
anjali@anjali-VirtualBox: ~$ sudo systemctl status apache2
● apache2.service - The Apache HTTP Server
    Loaded: loaded (/lib/systemd/system/apache2.service; enabled; vendor pres>
      Active: active (running) since Wed 2021-09-29 19:23:45 IST; 1min 42s ago
        Docs: https://httpd.apache.org/docs/2.4/
   Main PID: 3180 (apache2)
      Tasks: 55 (limit: 2296)
     Memory: 5.0M
       CGroup: /system.slice/apache2.service
               └─3180 /usr/sbin/apache2 -k start
                  ├─3182 /usr/sbin/apache2 -k start
                  ├─3183 /usr/sbin/apache2 -k start
Sep 29 19:23:45 anjali-VirtualBox systemd[1]: Starting The Apache HTTP Server.>
Sep 29 19:23:45 anjali-VirtualBox apachectl[3179]: AH00558: apache2: Could not>
Sep 29 19:23:45 anjali-VirtualBox systemd[1]: Started The Apache HTTP Server.
lines 1-15/15 (END)
```

Apache2 Ubuntu Default Page

localhost

Apache2 Ubuntu Default Page

This is the default welcome page used to test the correct operation of the Apache2 server after installation on Ubuntu systems. It is based on the equivalent page on Debian, from which the Ubuntu Apache packaging is derived. If you can read this page, it means that the Apache HTTP server at this site is working properly. You should **replace this file** (located at `/var/www/html/index.html`) before continuing to operate your HTTP server.

If you are a normal user of this web site and don't know what this page is about, this probably means that the site is currently unavailable due to maintenance. If the problem persists, please contact the site's administrator.

Configuration Overview

Ubuntu's Apache2 default configuration is different from the upstream default configuration, which is split into several files optimized for interaction with Ubuntu tools. The configuration system is **fully documented in `/usr/share/doc/apache2/README.Debian.gz`**. Refer to this for the full documentation. Documentation for the web server itself can be found by accessing the `man apache2-doc` manual page, once the `apache2-doc` package was installed on this server.

The configuration layout for an Apache2 web server installation on Ubuntu systems is as follows:

```
/etc/apache2/
  apache2.conf
```

• Install MariaDB

```
anjali@anjali-VirtualBox: ~
Sep 29 19:23:45 anjali-VirtualBox systemd[1]: Starting The Apache HTTP Server.>
Sep 29 19:23:45 anjali-VirtualBox apachectl[3179]: AH00558: apache2: Could not>
Sep 29 19:23:45 anjali-VirtualBox systemd[1]: Started The Apache HTTP Server.
anjali@anjali-VirtualBox: $ sudo apt install mariadb-server mariadb-client
Reading package lists... Done
Building dependency tree... Done
Reading state information... Done
The following additional packages will be installed:
galera-4 gawk libaio1 libcgi-fast-perl libcgi-pm-perl
libconfig-inifiles-perl libdbd-mariadb-perl libdbi-perl libfcgi-bin
libfcgi-perl libfcgi0ldbl libhtml-template-perl libmariadb3
libmysqlclient21 libsigsegv2 libsnappy1v5 libterm-readkey-perl
mariadb-client-10.5 mariadb-client-core-10.5 mariadb-common
mariadb-server-10.5 mariadb-server-core-10.5 mysql-common socat
Suggested packages:
gawk-doc libldb-perl libnet-daemon-perl libsql-statement-perl
libipc-sharedcache-perl mailx mariadb-test
The following NEW packages will be installed:
galera-4 gawk libaio1 libcgi-fast-perl libcgi-pm-perl
libconfig-inifiles-perl libdbd-mariadb-perl libdbi-perl libfcgi-bin
libfcgi-perl libfcgi0ldbl libhtml-template-perl libmariadb3
libmysqlclient21 libsigsegv2 libsnappy1v5 libterm-readkey-perl
mariadb-client mariadb-client-10.5 mariadb-client-core-10.5 mariadb-common
mariadb-server mariadb-server-10.5 mariadb-server-core-10.5 mysql-common
socat
0 upgraded, 26 newly installed, 0 to remove and 245 not upgraded.
Need to get 15.5 MB of archives.
After this operation, 103 MB of additional disk space will be used.
Do you want to continue? [Y/n] ■
```

```
anjali@anjali-VirtualBox: ~
anjali@anjali-VirtualBox: $ sudo systemctl status mysql
● mariadb.service - MariaDB 10.5.12 database server
   Loaded: loaded (/lib/systemd/system/mariadb.service; enabled; vendor pres
   Active: active (running) since Wed 2021-09-29 19:35:43 IST; 58s ago
     Docs: man:mariadb(8)
           https://mariadb.com/kb/en/library/systemd/
   Process: 6423 ExecStartPre=/usr/bin/install -m 755 -o mysql -g root -d /var
   Process: 6424 ExecStartPre=/bin/sh -c systemctl unset-environment _WSREP_S
   Process: 6426 ExecStartPre=/bin/sh -c [ ! -e /usr/bin/galera_recovery ] &&
   Process: 6485 ExecStartPost=/bin/sh -c systemctl unset-environment _WSREP_>
   Process: 6487 ExecStartPost=/etc/mysql/debian-start (code=exited, status=0>
 Main PID: 6473 (mariadb)
   Status: "Taking your SQL requests now..."
      Tasks: 12 (limit: 2296)
     Memory: 72.7M
      CGroup: /system.slice/mariadb.service
              └─6473 /usr/sbin/mariadb

Sep 29 19:35:47 anjali-VirtualBox /etc/mysql/debian-start[6492]: information_s>
Sep 29 19:35:47 anjali-VirtualBox /etc/mysql/debian-start[6492]: mysql
Sep 29 19:35:47 anjali-VirtualBox /etc/mysql/debian-start[6492]: performance_s>
Sep 29 19:35:47 anjali-VirtualBox /etc/mysql/debian-start[6492]: Phase 6/7: Ch>
Sep 29 19:35:47 anjali-VirtualBox /etc/mysql/debian-start[6492]: Processing da>
Sep 29 19:35:47 anjali-VirtualBox /etc/mysql/debian-start[6492]: information_s>
Sep 29 19:35:47 anjali-VirtualBox /etc/mysql/debian-start[6492]: performance_s>
Sep 29 19:35:47 anjali-VirtualBox /etc/mysql/debian-start[6492]: Phase 7/7: Ru>
Sep 29 19:35:47 anjali-VirtualBox /etc/mysql/debian-start[6492]: OK
Sep 29 19:35:47 anjali-VirtualBox /etc/mysql/debian-start[6906]: Triggering my>
lines 1-27/27 (END)
```

```
anjali@anjali-VirtualBox: ~
Sep 29 19:35:47 anjali-VirtualBox /etc/mysql/debian-start[6492]: information_schema
Sep 29 19:35:47 anjali-VirtualBox /etc/mysql/debian-start[6492]: mysql
Sep 29 19:35:47 anjali-VirtualBox /etc/mysql/debian-start[6492]: performance_schema
Sep 29 19:35:47 anjali-VirtualBox /etc/mysql/debian-start[6492]: Phase 6/7: Ch>
Sep 29 19:35:47 anjali-VirtualBox /etc/mysql/debian-start[6492]: Processing da>
Sep 29 19:35:47 anjali-VirtualBox /etc/mysql/debian-start[6492]: information_s>
Sep 29 19:35:47 anjali-VirtualBox /etc/mysql/debian-start[6492]: performance_s>
Sep 29 19:35:47 anjali-VirtualBox /etc/mysql/debian-start[6492]: Phase 7/7: Ru>
Sep 29 19:35:47 anjali-VirtualBox /etc/mysql/debian-start[6492]: OK
Sep 29 19:35:47 anjali-VirtualBox /etc/mysql/debian-start[6906]: Triggering my>
anjali@anjali-VirtualBox:~$ sudo mysql_secure_installation

NOTE: RUNNING ALL PARTS OF THIS SCRIPT IS RECOMMENDED FOR ALL MariaDB
      SERVERS IN PRODUCTION USE! PLEASE READ EACH STEP CAREFULLY!

In order to log into MariaDB to secure it, we'll need the current
password for the root user. If you've just installed MariaDB, and
haven't set the root password yet, you should just press enter here.

Enter current password for root (enter for none):
OK, successfully used password, moving on...

Setting the root password or using the unix_socket ensures that nobody
can log into the MariaDB root user without the proper authorisation.

You already have your root account protected, so you can safely answer 'n'.

Switch to unix socket authentication [Y/n] v
```

- **Install PHP**

```
anjali@anjali-VirtualBox: ~
ww/html/phpinfo.php>/dev/null
anjali@anjali-VirtualBox:~$ sudo apt install php libapache2-mod-php php-ocpache
  php-cli php-gd php-curl php-mysql
Reading package lists... Done
Building dependency tree... Done
Reading state information... Done
Note, selecting 'php7.4-ocpache' instead of 'php-ocpache'
The following additional packages will be installed:
  libapache2-mod-php7.4 php-common php7.4-cli php7.4-common
  php7.4-curl php7.4-gd php7.4-json php7.4-mysql php7.4-readline
Suggested packages:
  php-pear
The following NEW packages will be installed:
  libapache2-mod-php libapache2-mod-php7.4 php php-cli php-common php-curl
  php-gd php-mysql php7.4 php7.4-cli php7.4-common php7.4-curl php7.4-gd
  php7.4-json php7.4-mysql php7.4-ocpache php7.4-readline
0 upgraded, 17 newly installed, 0 to remove and 245 not upgraded.
Need to get 4,231 kB of archives.
After this operation, 18.9 MB of additional disk space will be used.
Do you want to continue? [Y/n] y
Get:1 http://in.archive.ubuntu.com/ubuntu hirsute/main amd64 php-common all 2:7
6ubuntu1 [12.2 kB]
Get:2 http://in.archive.ubuntu.com/ubuntu hirsute-updates/main amd64 php7.4-com
mon amd64 7.4.16-1ubuntu2.1 [985 kB]
Get:3 http://in.archive.ubuntu.com/ubuntu hirsute-updates/main amd64 php7.4-jso
n amd64 7.4.16-1ubuntu2.1 [19.4 kB]
Get:4 http://in.archive.ubuntu.com/ubuntu hirsute-updates/main amd64 php7.4-opc
ache amd64 7.4.16-1ubuntu2.1 [197 kB]
Get:5 http://in.archive.ubuntu.com/ubuntu hirsute-updates/main amd64 php7.4-re
```

PHP Version 7.4.16

System	Linux anjali-VirtualBox 5.11.0-37-generic #41-Ubuntu SMP Mon S
Build Date	Jul 5 2021 13:04:38
Server API	Apache 2.0 Handler
Virtual Directory Support	disabled
Configuration File (php.ini) Path	/etc/php/7.4/apache2
Loaded Configuration File	/etc/php/7.4/apache2/php.ini
Scan this dir for additional .ini files	/etc/php/7.4/apache2/conf.d
Additional .ini files parsed	/etc/php/7.4/apache2/conf.d/10-mysqlnd.ini, /etc/php/7.4/apache2/conf.d/10-pdo.ini, /etc/php/7.4/apache2/conf.d/20-conf.d/20-ctype.ini, /etc/php/7.4/apache2/conf.d/20-curl.ini, /etc/php/7.4/apache2/conf.d/20-ffi.ini, /etc/php/7.4/apache2/conf.d/20-gd-gettext.ini, /etc/php/7.4/apache2/conf.d/20-iconv.ini, /etc/php/7.4/apache2/conf.d/20-mysqli.ini, /etc/php/7.4/apache2/conf.d/20-phar.ini, /etc/php/7.4/apache2/conf.d/20-sockets.ini, /etc/php/7.4/apache2/conf.d/20-sysvmsg.ini, /etc/php/7.4/apache2/conf.d/20-sysvshm.ini, /etc/php/7.4/apache2/conf.d/20-shmop.ini
PHP API	20190902
PHP Extension	20190902

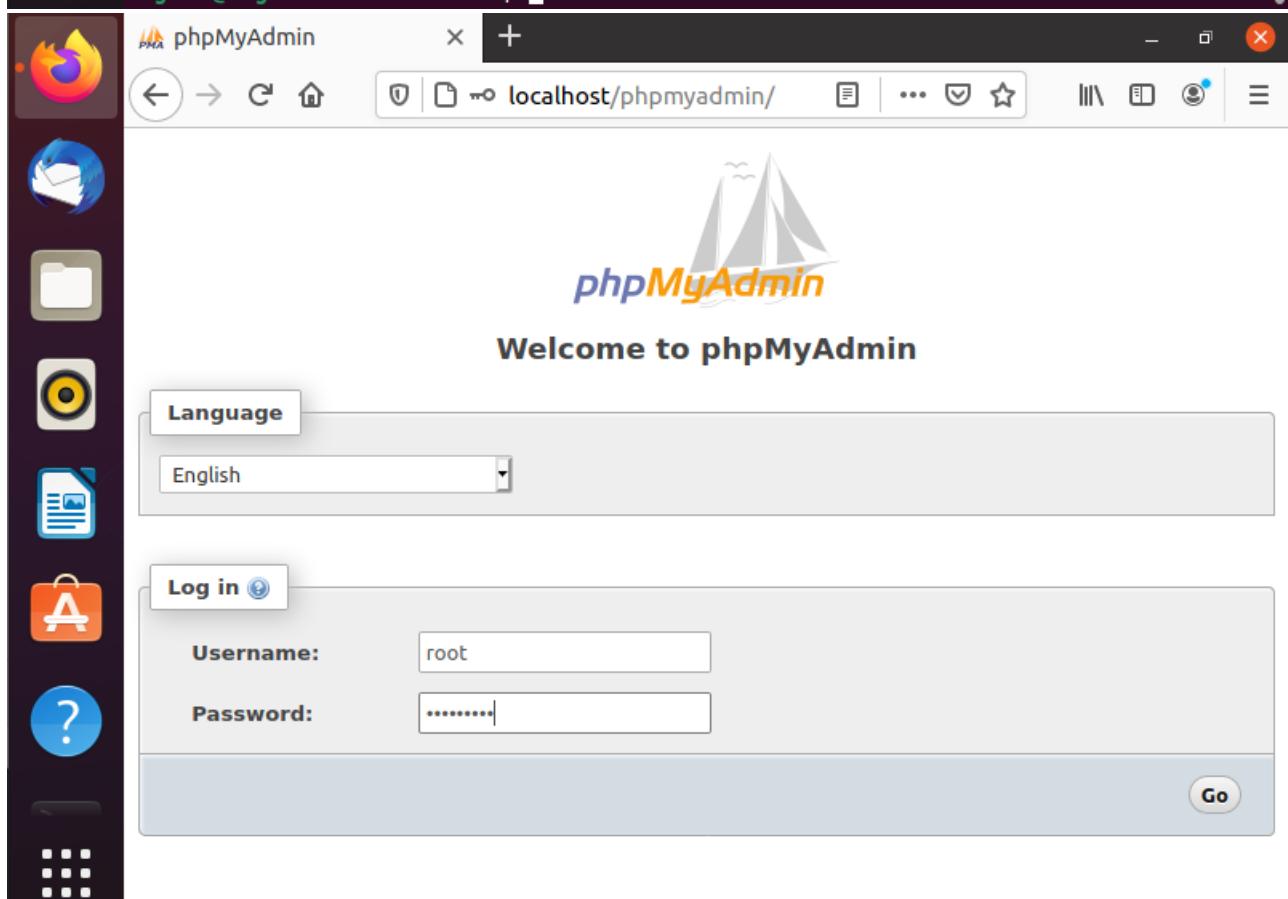
- **Install phpMyAdmin**

```

anjali@anjali-VirtualBox:~$ sudo echo "<?php phpinfo();?>" | sudo tee -a /var/www/html/phpinfo.php>/dev/null
anjali@anjali-VirtualBox:~$ sudo apt install phpmyadmin php-mbstring php-zip php-gd php-json php-curl
Reading package lists... Done
Building dependency tree... Done
Reading state information... Done
php-curl is already the newest version (2:7.4+76ubuntu1).
php-gd is already the newest version (2:7.4+76ubuntu1).
The following additional packages will be installed:
  dbconfig-common dbconfig-mysql icc-profiles-free javascript-common
  libjs-jquery libjs-openlayers libjs-sphinxdoc libjs-underscore libonig5
  libzip4 php-bacon-qr-code php-bz2 php-dasprid-enum php-google-recaptcha
  php-phpmyadmin-motranslator php-phpmyadmin-shapefile
  php-phpmyadmin-sql-parser php-phpseclib php-psr-cache php-psr-container
  php-psr-log php-symfony-cache php-symfony-cache-contracts
  php-symfony-expression-language php-symfony-service-contracts
  php-symfony-var-exporter php-tcpdf php-twig php-twig-extensions php-xml
  php7.4-bz2 php7.4-mbstring php7.4-xml php7.4-zip
Suggested packages:
  php-imagick php-dbase php-libsodium php-mcrypt php-gmp
  php-symfony-service-implementation php-twig-doc php-symfony-translation
  php-recode php-gd2 php-pragmarx-google2fa php-samyoul-u2f-php-server
Recommended packages:
  php-mcrypt
The following NEW packages will be installed:
  dbconfig-common dbconfig-mysql icc-profiles-free javascript-common
  libjs-jquery libjs-openlayers libjs-sphinxdoc libjs-underscore libonig5
  libzip4 php-bacon-qr-code php-bz2 php-dasprid-enum php-google-recaptcha

```

```
anjali@anjali-VirtualBox: ~
checking privileges on database phpmyadmin for phpmyadmin@localhost: user creation needed.
granting access to database phpmyadmin for phpmyadmin@localhost: success.
verifying access for phpmyadmin@localhost: success.
creating database phpmyadmin: success.
verifying database phpmyadmin exists: success.
populating database via sql... done.
dbconfig-common: flushing administrative password
Processing triggers for libapache2-mod-php7.4 (7.4.16-1ubuntu2.1) ...
Processing triggers for hicolor-icon-theme (0.17-2) ...
Processing triggers for libc-bin (2.33-0ubuntu5) ...
Processing triggers for man-db (2.9.4-2) ...
Processing triggers for php7.4-cli (7.4.16-1ubuntu2.1) ...
anjali@anjali-VirtualBox:~$ install phpmyadmin
install: missing destination file operand after 'phpmyadmin'
Try 'install --help' for more information.
anjali@anjali-VirtualBox:~$ sudo apt install phpmyadmin php-mbstring php-zip ph
p-gd php-json php-curl
Reading package lists... Done
Building dependency tree... Done
Reading state information... Done
php-curl is already the newest version (2:7.4+76ubuntu1).
php-gd is already the newest version (2:7.4+76ubuntu1).
php-json is already the newest version (2:7.4+76ubuntu1).
php-mbstring is already the newest version (2:7.4+76ubuntu1).
php-zip is already the newest version (2:7.4+76ubuntu1).
phpmyadmin is already the newest version (4:4.9.7+dfsg1-1).
0 upgraded, 0 newly installed, 0 to remove and 245 not upgraded.
anjali@anjali-VirtualBox:~$
```



The screenshot shows a Firefox browser window with the title "phpMyAdmin". The address bar displays "localhost/phpmyadmin/". The main content area shows the "Welcome to phpMyAdmin" page. At the top, there is a "Language" dropdown set to "English". Below it is a "Log in" form with fields for "Username" (containing "root") and "Password" (containing a masked password). A "Go" button is located at the bottom right of the form. To the left of the browser window, a vertical docked panel contains several icons: a mail icon, a folder icon, a system settings icon, a document icon, a terminal icon, a question mark icon, and a maximize/minimize/iconize window icon.

The screenshot shows the PHPMyAdmin interface on a Linux desktop. The left sidebar contains icons for various applications like Firefox, Evolution, and Nautilus. The main window displays the 'Settings' tab of the configuration interface.

General settings

- [Change password](#)
- Server connection collation: `utf8mb4_unicode_ci`

Appearance settings

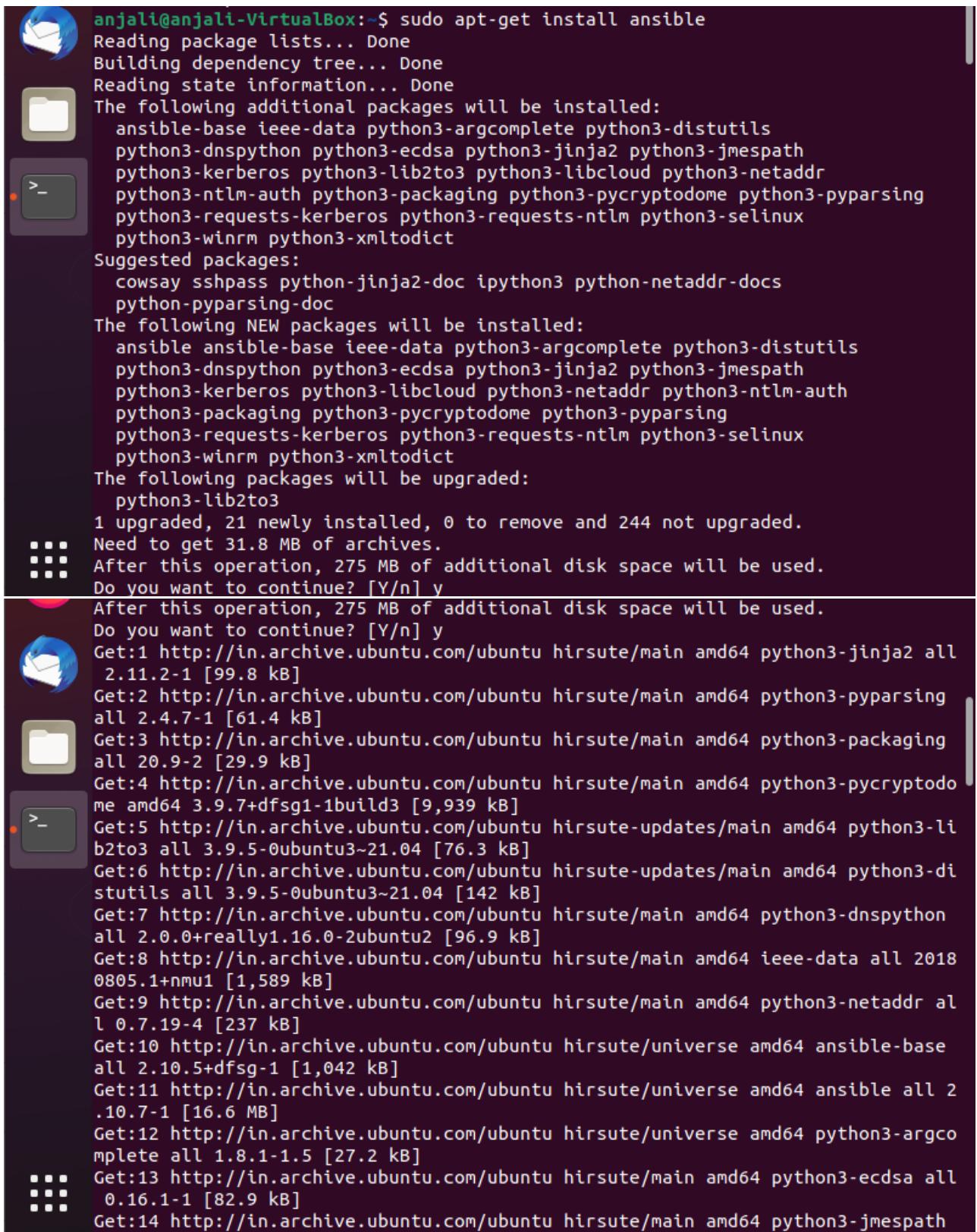
- Language: English
- Theme: pmahomme
- Font size: 82%
- [More settings](#)

Database server

Console

Installation of Ansible

- **sudo apt-get install ansible**



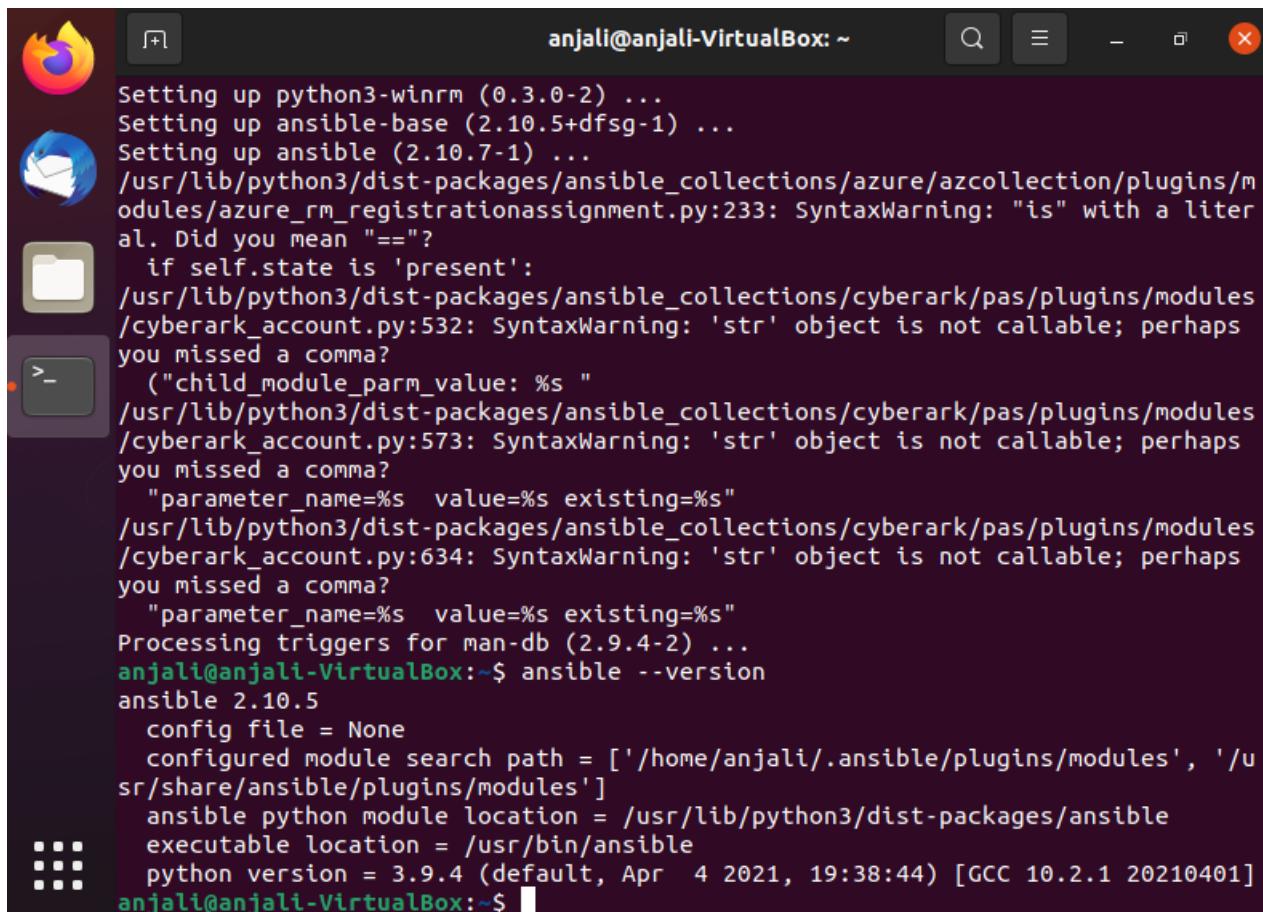
```
anjali@anjali-VirtualBox:~$ sudo apt-get install ansible
Reading package lists... Done
Building dependency tree... Done
Reading state information... Done
The following additional packages will be installed:
  ansible-base ieee-data python3-argcomplete python3-distutils
  python3-dnspython python3-ecdsa python3-jinja2 python3-jmespath
  python3-kerberos python3-lib2to3 python3-libcloud python3-netaddr
  python3-ntlm-auth python3-packaging python3-pycryptodome python3-pyparsing
  python3-requests-kerberos python3-requests-ntlm python3-selinux
  python3-winrm python3-xmldict
Suggested packages:
  cowsay sshpass python-jinja2-doc ipython3 python-netaddr-docs
  python-pyparsing-doc
The following NEW packages will be installed:
  ansible ansible-base ieee-data python3-argcomplete python3-distutils
  python3-dnspython python3-ecdsa python3-jinja2 python3-jmespath
  python3-kerberos python3-libcloud python3-netaddr python3-ntlm-auth
  python3-packaging python3-pycryptodome python3-pyparsing
  python3-requests-kerberos python3-requests-ntlm python3-selinux
  python3-winrm python3-xmldict
The following packages will be upgraded:
  python3-lib2to3
1 upgraded, 21 newly installed, 0 to remove and 244 not upgraded.
Need to get 31.8 MB of archives.
After this operation, 275 MB of additional disk space will be used.
Do you want to continue? [Y/n] y
After this operation, 275 MB of additional disk space will be used.
Do you want to continue? [Y/n] y
Get:1 http://in.archive.ubuntu.com/ubuntu hirsute/main amd64 python3-jinja2 all
 2.11.2-1 [99.8 kB]
Get:2 http://in.archive.ubuntu.com/ubuntu hirsute/main amd64 python3-pyparsing
  all 2.4.7-1 [61.4 kB]
Get:3 http://in.archive.ubuntu.com/ubuntu hirsute/main amd64 python3-packaging
  all 20.9-2 [29.9 kB]
Get:4 http://in.archive.ubuntu.com/ubuntu hirsute/main amd64 python3-pycryptodo
  me amd64 3.9.7+dfsg1-1build3 [9,939 kB]
Get:5 http://in.archive.ubuntu.com/ubuntu hirsute-updates/main amd64 python3-li
  b2to3 all 3.9.5-0ubuntu3~21.04 [76.3 kB]
Get:6 http://in.archive.ubuntu.com/ubuntu hirsute-updates/main amd64 python3-di
  stutils all 3.9.5-0ubuntu3~21.04 [142 kB]
Get:7 http://in.archive.ubuntu.com/ubuntu hirsute/main amd64 python3-dnspython
  all 2.0.0+really1.16.0-2ubuntu2 [96.9 kB]
Get:8 http://in.archive.ubuntu.com/ubuntu hirsute/main amd64 ieee-data all 2018
  0805.1+nmu1 [1,589 kB]
Get:9 http://in.archive.ubuntu.com/ubuntu hirsute/main amd64 python3-netaddr al
  l 0.7.19-4 [237 kB]
Get:10 http://in.archive.ubuntu.com/ubuntu hirsute/universe amd64 ansible-base
  all 2.10.5+dfsg-1 [1,042 kB]
Get:11 http://in.archive.ubuntu.com/ubuntu hirsute/universe amd64 ansible all 2
  .10.7-1 [16.6 MB]
Get:12 http://in.archive.ubuntu.com/ubuntu hirsute/universe amd64 python3-argco
  mplete all 1.8.1-1.5 [27.2 kB]
Get:13 http://in.archive.ubuntu.com/ubuntu hirsute/main amd64 python3-ecdsa all
  0.16.1-1 [82.9 kB]
Get:14 http://in.archive.ubuntu.com/ubuntu hirsute/main amd64 python3-jmespath
```

```
oud all 3.2.0-2 [1,554 kB]
Get:17 http://in.archive.ubuntu.com/ubuntu hirsute/universe amd64 python3-ntlm-
auth all 1.4.0-1 [20.4 kB]
Get:18 http://in.archive.ubuntu.com/ubuntu hirsute/universe amd64 python3-que
sts-kerberos all 0.12.0-2 [11.9 kB]
Get:19 http://in.archive.ubuntu.com/ubuntu hirsute/universe amd64 python3-que
sts-ntlm all 1.1.0-1.1 [6,160 B]
Get:20 http://in.archive.ubuntu.com/ubuntu hirsute/universe amd64 python3-selin
ux amd64 3.1-3build1 [139 kB]
Get:21 http://in.archive.ubuntu.com/ubuntu hirsute/universe amd64 python3-xmlto
dict all 0.12.0-2 [12.6 kB]
Get:22 http://in.archive.ubuntu.com/ubuntu hirsute/universe amd64 python3-winrm
all 0.3.0-2 [21.7 kB]
Fetched 31.8 MB in 54s (590 kB/s)
Selecting previously unselected package python3-jinja2.
(Reading database ... 192115 files and directories currently installed.)
Preparing to unpack .../00-python3-jinja2_2.11.2-1_all.deb ...
Unpacking python3-jinja2 (2.11.2-1) ...
Selecting previously unselected package python3-pyparsing.
Preparing to unpack .../01-python3-pyparsing_2.4.7-1_all.deb ...
Unpacking python3-pyparsing (2.4.7-1) ...
Selecting previously unselected package python3-packaging.
Preparing to unpack .../02-python3-packaging_20.9-2_all.deb ...
Unpacking python3-packaging (20.9-2) ...
Selecting previously unselected package python3-pycryptodome.
Preparing to unpack .../03-python3-pycryptodome_3.9.7+dfsg1-1build3_amd64.deb .
..
Unpacking python3-pycryptodome (3.9.7+dfsg1-1build3) ...
Preparing to unpack .../04-python3-lib2to3_3.9.5-0ubuntu3~21.04_all.deb ...
Unpacking python3-pycryptodome (3.9.7+dfsg1-1build3) ...
Preparing to unpack .../04-python3-lib2to3_3.9.5-0ubuntu3~21.04_all.deb ...
Unpacking python3-lib2to3 (3.9.5-0ubuntu3~21.04) over (3.9.4-0ubuntu1) ...
Selecting previously unselected package python3-distutils.
Preparing to unpack .../05-python3-distutils_3.9.5-0ubuntu3~21.04_all.deb ...
Unpacking python3-distutils (3.9.5-0ubuntu3~21.04) ...
Selecting previously unselected package python3-dnspython.
Preparing to unpack .../06-python3-dnspython_2.0.0+really1.16.0-2ubuntu2_all.de
b ...
Unpacking python3-dnspython (2.0.0+really1.16.0-2ubuntu2) ...
Selecting previously unselected package ieee-data.
Preparing to unpack .../07-ieee-data_20180805.1+nmu1_all.deb ...
Unpacking ieee-data (20180805.1+nmu1) ...
Selecting previously unselected package python3-netaddr.
Preparing to unpack .../08-python3-netaddr_0.7.19-4_all.deb ...
Unpacking python3-netaddr (0.7.19-4) ...
Selecting previously unselected package ansible-base.
Preparing to unpack .../09-ansible-base_2.10.5+dfsg-1_all.deb ...
Unpacking ansible-base (2.10.5+dfsg-1) ...
Selecting previously unselected package ansible.
Preparing to unpack .../10-ansible_2.10.7-1_all.deb ...
Unpacking ansible (2.10.7-1) ...
Selecting previously unselected package python3-argcomplete.
Preparing to unpack .../11-python3-argcomplete_1.8.1-1.5_all.deb ...
Unpacking python3-argcomplete (1.8.1-1.5) ...
Selecting previously unselected package python3-ecdsa.
Preparing to unpack .../12-python3-ecdsa_0.16.1-1_all.deb ...
Unpacking python3-ecdsa (0.16.1-1) ...
Selecting previously unselected package python3-jmespath.
```

```
Unpacking python3-libcloud (3.2.0-2) ...
Selecting previously unselected package python3-ntlm-auth.
Preparing to unpack .../16-python3-ntlm-auth_1.4.0-1_all.deb ...
Unpacking python3-ntlm-auth (1.4.0-1) ...
Selecting previously unselected package python3-requests-kerberos.
Preparing to unpack .../17-python3-requests-kerberos_0.12.0-2_all.deb ...
Unpacking python3-requests-kerberos (0.12.0-2) ...
Selecting previously unselected package python3-requests-ntlm.
Preparing to unpack .../18-python3-requests-ntlm_1.1.0-1.1_all.deb ...
Unpacking python3-requests-ntlm (1.1.0-1.1) ...
Selecting previously unselected package python3-selinux.
Preparing to unpack .../19-python3-selinux_3.1-3build1_amd64.deb ...
Unpacking python3-selinux (3.1-3build1) ...
Selecting previously unselected package python3-xmltodict.
Preparing to unpack .../20-python3-xmltodict_0.12.0-2_all.deb ...
Unpacking python3-xmltodict (0.12.0-2) ...
Selecting previously unselected package python3-winrm.
Preparing to unpack .../21-python3-winrm_0.3.0-2_all.deb ...
Unpacking python3-winrm (0.3.0-2) ...
Setting up python3-ntlm-auth (1.4.0-1) ...
Setting up python3-pycryptodome (3.9.7+dfsg1-1build3) ...
Setting up python3-kerberos (1.1.14-3.1build3) ...
Setting up python3-libcloud (3.2.0-2) ...
Setting up python3-ecdsa (0.16.1-1) ...
Setting up python3-xmltodict (0.12.0-2) ...
Setting up python3-jinja2 (2.11.2-1) ...
Setting up python3-pyparsing (2.4.7-1) ...
Setting up python3-jmespath (0.10.0-1) ...
Setting up python3-requests-kerberos (0.12.0-2) ...
```

```
Setting up python3-jmespath (0.10.0-1) ...
Setting up python3-requests-kerberos (0.12.0-2) ...
Setting up ieee-data (20180805.1+nmu1) ...
Setting up python3-dnspython (2.0.0+really1.16.0-2ubuntu2) ...
Setting up python3-selinux (3.1-3build1) ...
Setting up python3-argcomplete (1.8.1-1.5) ...
Setting up python3-lib2to3 (3.9.5-0ubuntu3~21.04) ...
Setting up python3-distutils (3.9.5-0ubuntu3~21.04) ...
Setting up python3-requests-ntlm (1.1.0-1.1) ...
Setting up python3-packaging (20.9-2) ...
Setting up python3-netaddr (0.7.19-4) ...
Setting up python3-winrm (0.3.0-2) ...
Setting up ansible-base (2.10.5+dfsg-1) ...
Setting up ansible (2.10.7-1) ...
/usr/lib/python3/dist-packages/ansible_collections/azure/azcollection/plugins/modules/azure_rm_registrationassignment.py:233: SyntaxWarning: "is" with a literal. Did you mean "=="?
    if self.state is 'present':
/usr/lib/python3/dist-packages/ansible_collections/cyberark/pas/plugins/modules/cyberark_account.py:532: SyntaxWarning: 'str' object is not callable; perhaps you missed a comma?
        ("child_module_parm_value: %s "
/usr/lib/python3/dist-packages/ansible_collections/cyberark/pas/plugins/modules/cyberark_account.py:573: SyntaxWarning: 'str' object is not callable; perhaps you missed a comma?
        "parameter_name=%s value=%s existing=%s"
/usr/lib/python3/dist-packages/ansible_collections/cyberark/pas/plugins/modules/cyberark_account.py:634: SyntaxWarning: 'str' object is not callable; perhaps you missed a comma?
```

- **ansible --version**



The image shows a screenshot of a Linux desktop environment, likely Ubuntu, with a terminal window open. The terminal window has a dark background and contains the output of the command `ansible --version`. The output shows the following details:

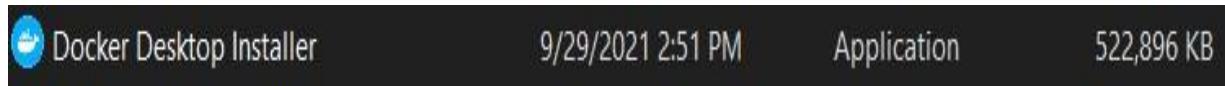
```
Setting up python3-winrm (0.3.0-2) ...
Setting up ansible-base (2.10.5+dfsg-1) ...
Setting up ansible (2.10.7-1) ...
/usr/lib/python3/dist-packages/ansible_collections/azure/azcollection/plugins/modules/azure_rm_registrationassignment.py:233: SyntaxWarning: "is" with a literal. Did you mean "=="?
    if self.state is 'present':
/usr/lib/python3/dist-packages/ansible_collections/cyberark/pas/plugins/modules/cyberark_account.py:532: SyntaxWarning: 'str' object is not callable; perhaps you missed a comma?
    ("child_module_parm_value: %s "
/usr/lib/python3/dist-packages/ansible_collections/cyberark/pas/plugins/modules/cyberark_account.py:573: SyntaxWarning: 'str' object is not callable; perhaps you missed a comma?
    "parameter_name=%s value=%s existing=%s"
/usr/lib/python3/dist-packages/ansible_collections/cyberark/pas/plugins/modules/cyberark_account.py:634: SyntaxWarning: 'str' object is not callable; perhaps you missed a comma?
    "parameter_name=%s value=%s existing=%s"
Processing triggers for man-db (2.9.4-2) ...
anjali@anjali-VirtualBox:~$ ansible --version
ansible 2.10.5
  config file = None
  configured module search path = ['/home/anjali/.ansible/plugins/modules', '/usr/share/ansible/plugins/modules']
  ansible python module location = /usr/lib/python3/dist-packages/ansible
  executable location = /usr/bin/ansible
  python version = 3.9.4 (default, Apr  4 2021, 19:38:44) [GCC 10.2.1 20210401]
anjali@anjali-VirtualBox:~$
```

Docker Installation

Step-1 :-

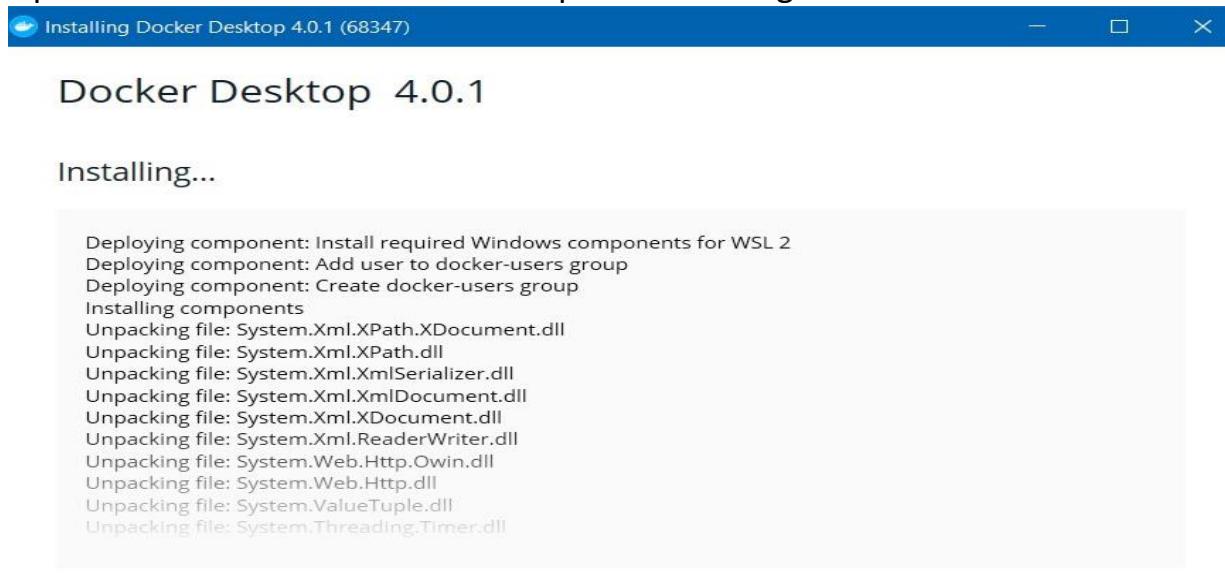
Download Docker Desktop installer for Windows from

<https://desktop.docker.com/win/main/amd64/Docker%20Desktop%20Installer.exe>



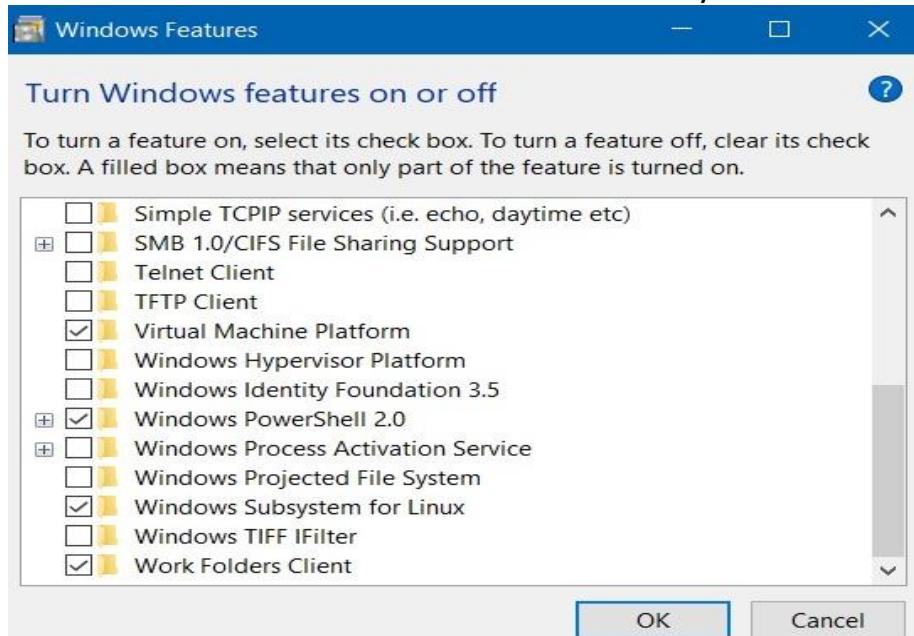
Step-2 :-

Open the .exe file and follow the steps after clicking install button.



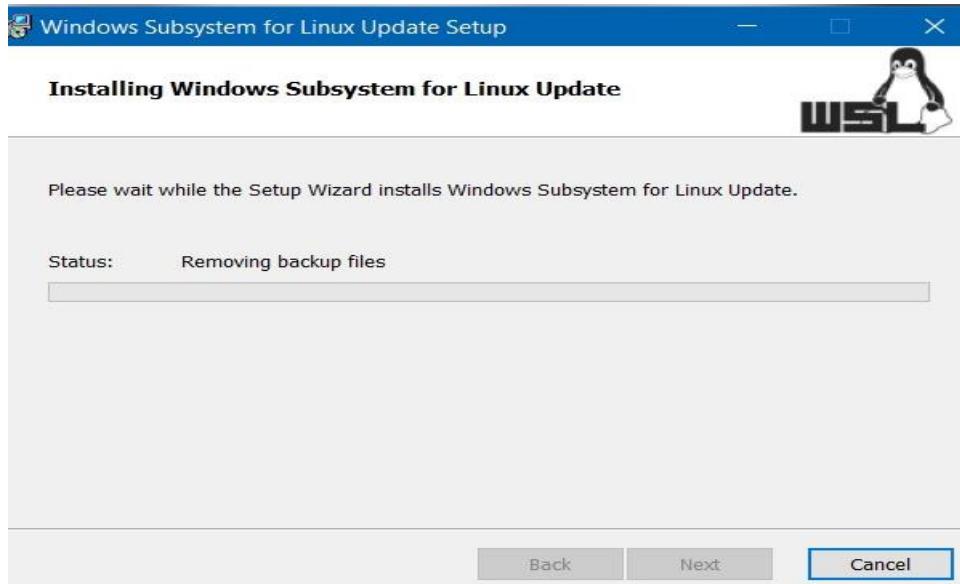
Step-3 :-

Once installed go to programs and features and click turn on windows features on or off
Scroll to the bottom and select windows subsystem for Linux



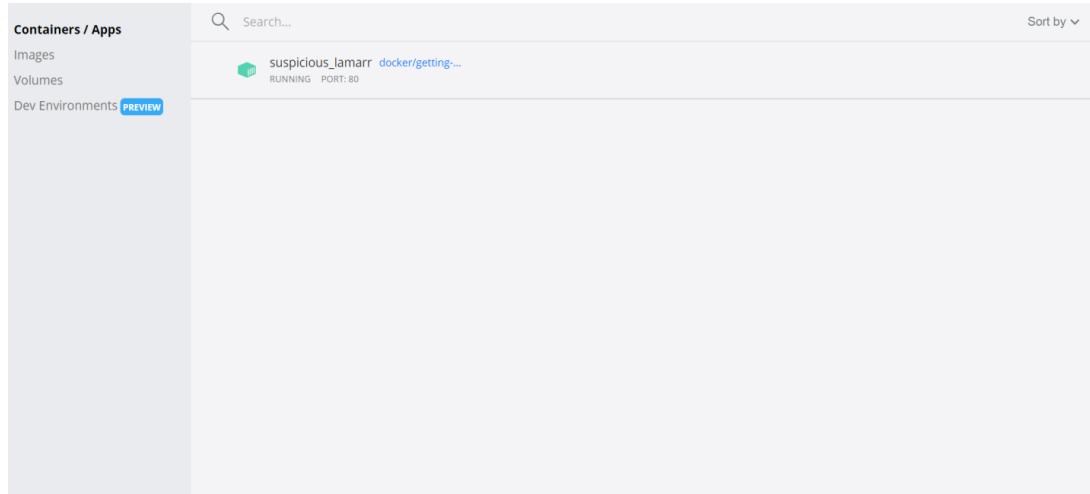
Step-4 :-

If any WSL 2 error occurs download windows subsystem for linux update package and install the .exe file, after the installation restart the windows device.



Step-5 :-

Once installed, open the docker desktop app, and signin using the dockerID



Step-6 :-

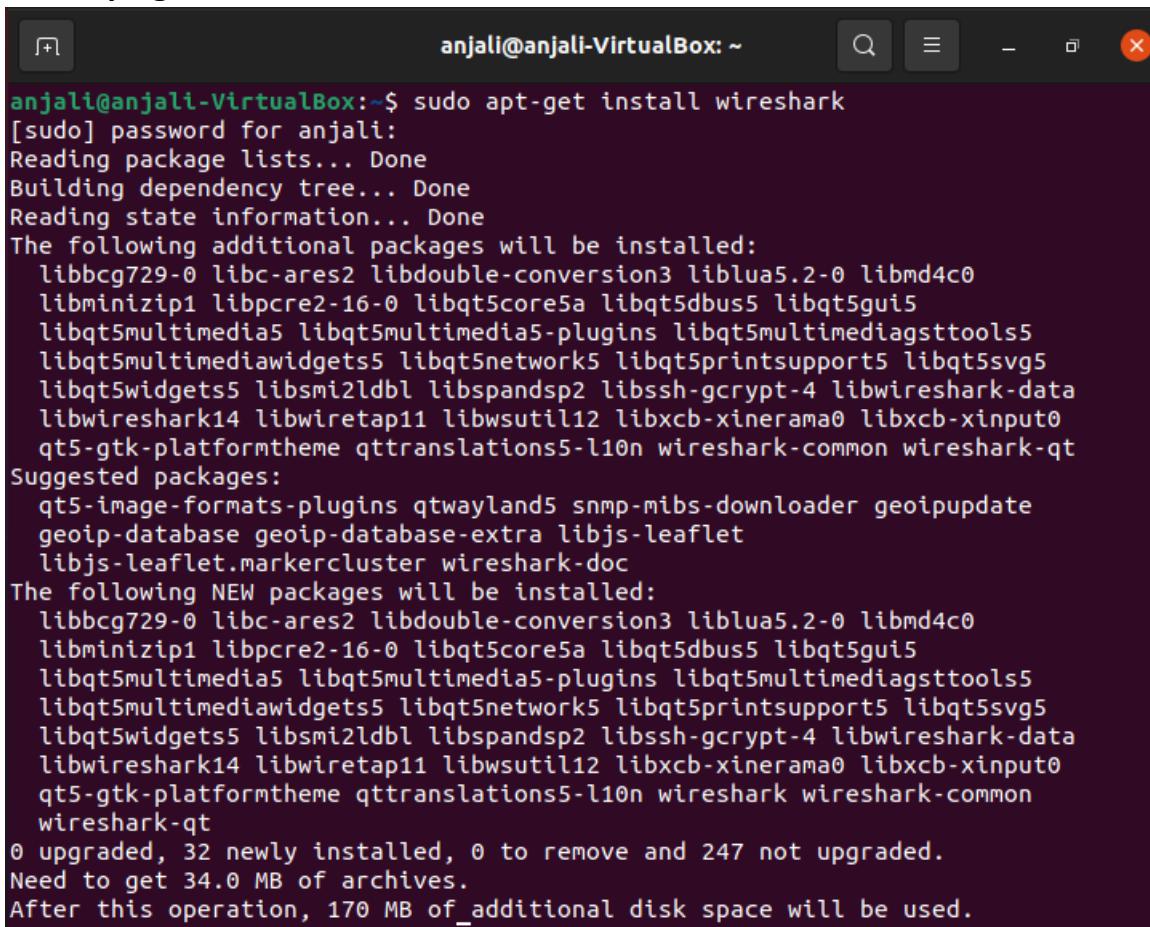
Now pull any image from docker hub using the docker pull command in the command prompt (eg: docker pull ubuntu)

A screenshot of an "Administrator: Command Prompt" window. The command "docker pull ubuntu" is run, and the output shows it pulling the latest version of the Ubuntu image. The terminal window has a blue header bar with the title and standard window controls.

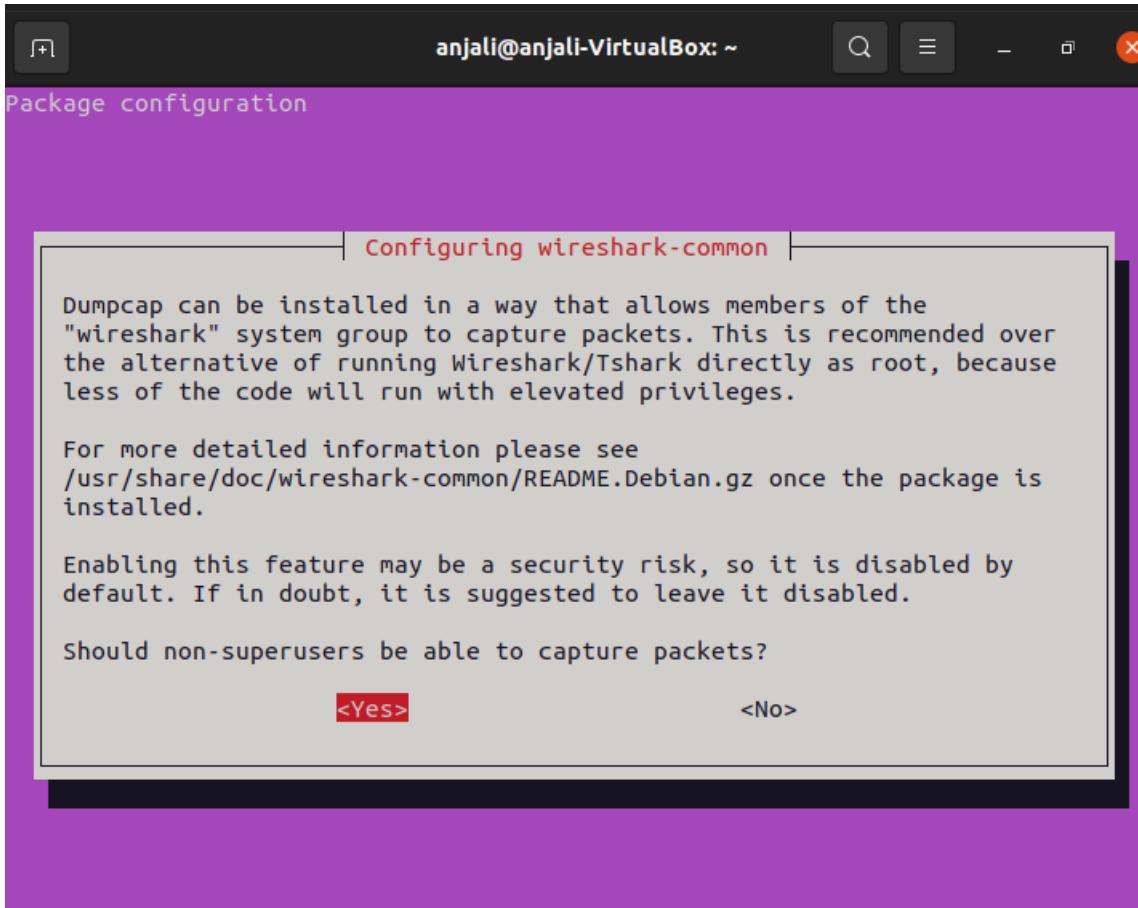
Now an image of ubuntu will be displayed, we can run the ubuntu instance using the cli.

Analyzing network packet stream using nc and wireshark

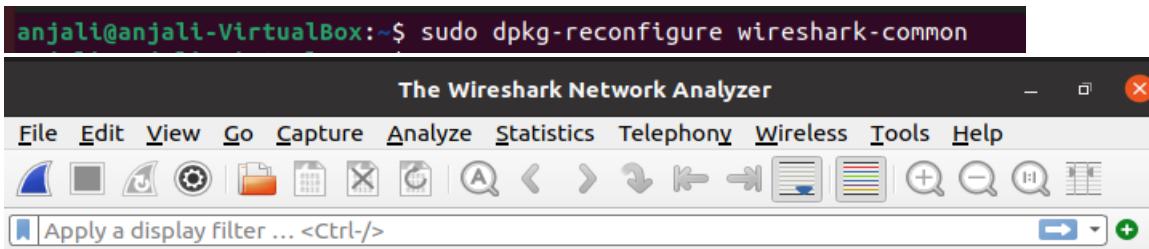
- sudo apt-get install wireshark



```
anjali@anjali-VirtualBox:~$ sudo apt-get install wireshark
[sudo] password for anjali:
Reading package lists... Done
Building dependency tree... Done
Reading state information... Done
The following additional packages will be installed:
libbcg729-0 libc-ares2 libdouble-conversion3 liblua5.2-0 libmd4c0
libminizip1 libpcre2-16-0 libqt5core5a libqt5dbus5 libqt5gui5
libqt5multimedia5 libqt5multimedia5-plugins libqt5multimediasupports5
libqt5multimediawidgets5 libqt5network5 libqt5printsupport5 libqt5svg5
libqt5widgets5 libsmi2ldbl libspandsp2 libssh-gcrypt-4 libwireshark-data
libwireshark14 libwiretap11 libwsutil12 libxcb-xinerama0 libxcb-xinput0
qt5-gtk-platformtheme qttranslations5-l10n wireshark-common wireshark-qt
Suggested packages:
qt5-image-formats-plugins qtwayland5 snmp-mibs-downloader geoipupdate
geoip-database geoip-database-extra libjs-leaflet
libjs-leaflet.markercluster wireshark-doc
The following NEW packages will be installed:
libbcg729-0 libc-ares2 libdouble-conversion3 liblua5.2-0 libmd4c0
libminizip1 libpcre2-16-0 libqt5core5a libqt5dbus5 libqt5gui5
libqt5multimedia5 libqt5multimedia5-plugins libqt5multimediasupports5
libqt5multimediawidgets5 libqt5network5 libqt5printsupport5 libqt5svg5
libqt5widgets5 libsmi2ldbl libspandsp2 libssh-gcrypt-4 libwireshark-data
libwireshark14 libwiretap11 libwsutil12 libxcb-xinerama0 libxcb-xinput0
qt5-gtk-platformtheme qttranslations5-l10n wireshark wireshark-common
wireshark-qt
0 upgraded, 32 newly installed, 0 to remove and 247 not upgraded.
Need to get 34.0 MB of archives.
After this operation, 170 MB of additional disk space will be used.
```



- sudo dpkg-reconfigure wireshark-common



Welcome to Wireshark

Capture

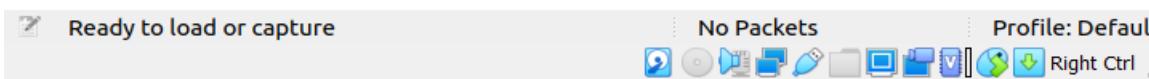
...using this filter: Enter a capture filter ... All interfaces shown

○	Cisco remote capture: ciscodump
○	DisplayPort AUX channel monitor capture: dpauxmon
○	Random packet generator: randpkt
○	systemd Journal Export: sdjournal
○	SSH remote capture: sshdump
○	UDP Listener remote capture: udpdump

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You are running Wireshark 3.4.4 (Git v3.4.4 packaged as 3.4.4-1ubuntu1).



- sudo adduser \$USER wireshark

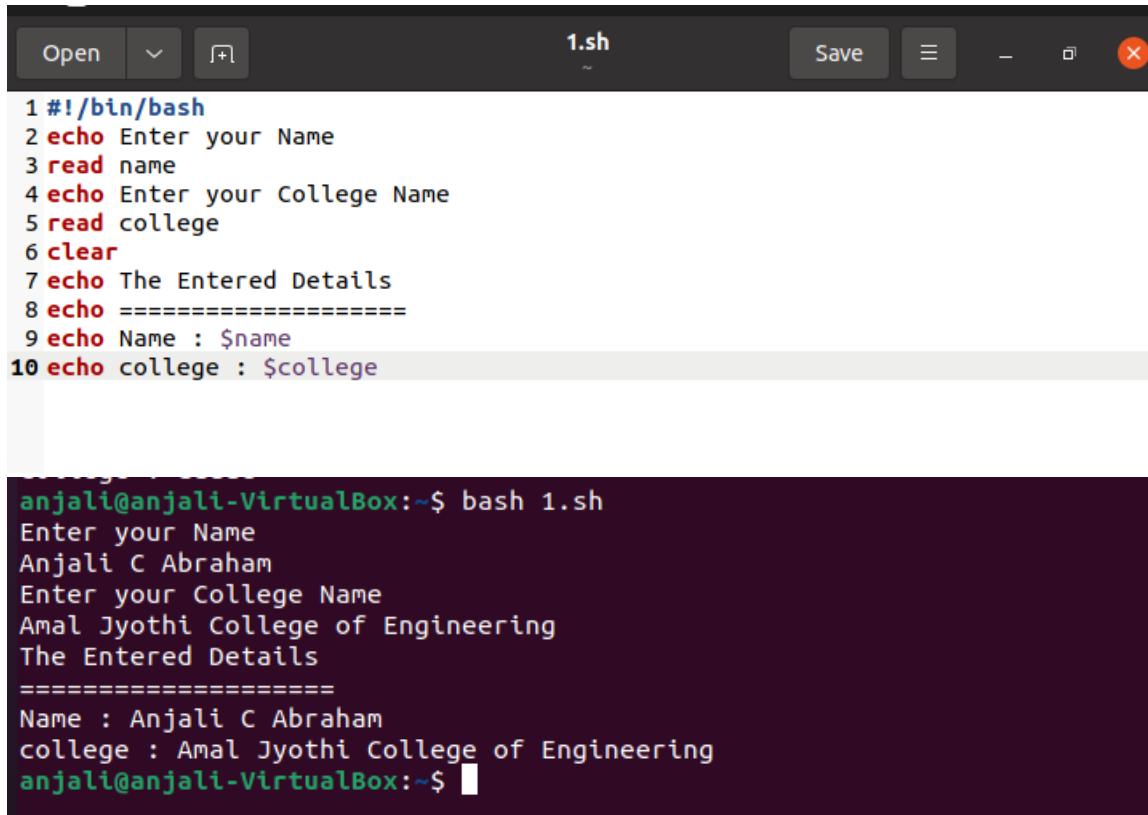
```
anjali@anjali-VirtualBox:~$ sudo adduser $USER wireshark
Adding user `anjali' to group `wireshark' ...
Adding user anjali to group wireshark
Done.
```

- nc -z -c 10.0.2.255 20-80

```
anjali@anjali-VirtualBox:~$ nc -z -v 10.0.2.255 20-80
nc: connect to 10.0.2.255 port 20 (tcp) failed: Network is unreachable
nc: connect to 10.0.2.255 port 21 (tcp) failed: Network is unreachable
nc: connect to 10.0.2.255 port 22 (tcp) failed: Network is unreachable
nc: connect to 10.0.2.255 port 23 (tcp) failed: Network is unreachable
nc: connect to 10.0.2.255 port 24 (tcp) failed: Network is unreachable
nc: connect to 10.0.2.255 port 25 (tcp) failed: Network is unreachable
nc: connect to 10.0.2.255 port 26 (tcp) failed: Network is unreachable
nc: connect to 10.0.2.255 port 27 (tcp) failed: Network is unreachable
nc: connect to 10.0.2.255 port 28 (tcp) failed: Network is unreachable
nc: connect to 10.0.2.255 port 29 (tcp) failed: Network is unreachable
nc: connect to 10.0.2.255 port 30 (tcp) failed: Network is unreachable
nc: connect to 10.0.2.255 port 31 (tcp) failed: Network is unreachable
nc: connect to 10.0.2.255 port 32 (tcp) failed: Network is unreachable
nc: connect to 10.0.2.255 port 33 (tcp) failed: Network is unreachable
nc: connect to 10.0.2.255 port 34 (tcp) failed: Network is unreachable
nc: connect to 10.0.2.255 port 35 (tcp) failed: Network is unreachable
nc: connect to 10.0.2.255 port 36 (tcp) failed: Network is unreachable
nc: connect to 10.0.2.255 port 37 (tcp) failed: Network is unreachable
nc: connect to 10.0.2.255 port 38 (tcp) failed: Network is unreachable
nc: connect to 10.0.2.255 port 39 (tcp) failed: Network is unreachable
nc: connect to 10.0.2.255 port 40 (tcp) failed: Network is unreachable
nc: connect to 10.0.2.255 port 41 (tcp) failed: Network is unreachable
nc: connect to 10.0.2.255 port 42 (tcp) failed: Network is unreachable
nc: connect to 10.0.2.255 port 43 (tcp) failed: Network is unreachable
nc: connect to 10.0.2.255 port 44 (tcp) failed: Network is unreachable
nc: connect to 10.0.2.255 port 45 (tcp) failed: Network is unreachable
nc: connect to 10.0.2.255 port 46 (tcp) failed: Network is unreachable
```

Shell Scripting Lab Assignments

1. Write a shell script to ask your name, and college name and print it on the screen.



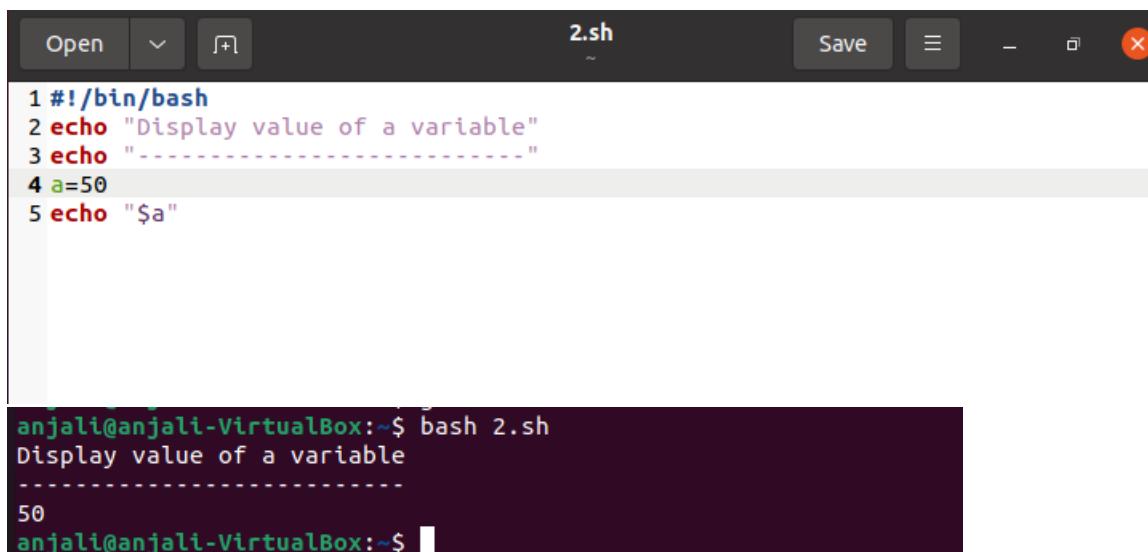
The screenshot shows a terminal window with the following content:

```
1#!/bin/bash
2echo Enter your Name
3read name
4echo Enter your College Name
5read college
6clear
7echo The Entered Details
8echo =====
9echo Name : $name
10echo college : $college
```



```
anjali@anjali-VirtualBox:~$ bash 1.sh
Enter your Name
Anjali C Abraham
Enter your College Name
Amal Jyothi College of Engineering
The Entered Details
=====
Name : Anjali C Abraham
college : Amal Jyothi College of Engineering
anjali@anjali-VirtualBox:~$
```

2. Write a shell script to set a value for a variable and display it on command line interface.



The screenshot shows a terminal window with the following content:

```
1#!/bin/bash
2echo "Display value of a variable"
3echo -----
4a=50
5echo "$a"
```



```
anjali@anjali-VirtualBox:~$ bash 2.sh
Display value of a variable
-----
50
anjali@anjali-VirtualBox:~$
```

3. Write a shell script to perform addition, subtraction, multiplication, division with two numbers that is accepted from user.

```
1 #!/bin/bash
2 echo "ARITHMETIC OPERATIONS"
3 echo "-----"
4 echo "Enter a Number"
5 read a
6 echo "Enter second Number"
7 read b
8 echo -e "\n 1.Addition \n 2.Subtraction \n 3.Multiplication \n 4.Division"
9 read op
10 case "$op" in
11 "1")echo "a+b=\"$((a+b))";;
12 "2")echo "a-b=\"$((a-b))";;
13 "3")echo "a*b=\"$((a*b))";;
14 "4")echo "a/b=\"$((a/b))";;
15 esac

anjali@anjali-VirtualBox:~$ bash 3.sh
ARITHMETIC OPERATIONS
-----
Enter a Number
25
Enter second Number
5

 1.Addition
 2.Subtraction
 3.Multiplication
 4.Division
1
a+b=30
anjali@anjali-VirtualBox:~$
```

4. Write a shell script to check the value of a given number and display whether the number is found or not.

```
1 #!/bin/bash
2 echo "Enter a Number"
3 read a
4 if [ $a == 10 ] ;then
5   echo "Number found "
6 else
7   echo "Number not found "
8 fi
9

anjali@anjali-VirtualBox:~$ gedit 4.sh
anjali@anjali-VirtualBox:~$ bash 4.sh
Enter a Number
5
Number not found
anjali@anjali-VirtualBox:~$
```

5. Write a shell script to display current date, calendar.

```
5.sh
1 #!/bin/bash
2 echo "Time And Calendar"
3 echo -----
4 echo "Today is $(date) "
5 echo ""
6 echo "Calendar :"
7 cal

anjali@anjali-VirtualBox:~$ bash 5.sh
Time And Calendar
-----
Today is Sunday 03 October 2021 07:19:03 PM IST

Calendar :
    October 2021
Su Mo Tu We Th Fr Sa
          1  2
3  4  5  6  7  8  9
10 11 12 13 14 15 16
17 18 19 20 21 22 23
24 25 26 27 28 29 30
31
anjali@anjali-VirtualBox:~$
```

6. Write a shell script to check a number is even or odd.

```
6.sh
1 #!/bin/bash
2 echo "Odd OR Even"
3 echo -----
4 echo "Enter a Number"
5 read n
6 x=$((n % 2 ))
7 if [ $x -eq 0 ] ;then
8     echo "Number is Even"
9 else
10    echo "Number is Odd"
11 fi

anjali@anjali-VirtualBox:~$ bash 6.sh
Odd OR Even
-----
Enter a Number
100
Number is Even
anjali@anjali-VirtualBox:~$ bash 6.sh
Odd OR Even
-----
Enter a Number
125
Number is Odd
anjali@anjali-VirtualBox:~$
```

7. Write a shell script to check a number is greater than, less than or equal to another number.

The terminal window shows the creation of a file named 7.sh using gedit, followed by its execution with bash. The script prompts for two numbers, compares them, and outputs the result.

```
1#!/bin/bash
2echo "Enter first number"
3read a
4echo "Enter second number"
5read b
6if [ $a -gt $b ] ;then
7 echo "$a is Greater"
8elif [ $b -gt $a ] ;then
9 echo "$b is Greater"
10else
11 echo " Both are Equal"
12fi
```

```
anjali@anjali-VirtualBox:~$ gedit 7.sh
anjali@anjali-VirtualBox:~$ bash 7.sh
Enter first number
34
Enter second number
67
67 is Greater
anjali@anjali-VirtualBox:~$
```

8. Write a shell script to find the sum of first 10 numbers.

The terminal window shows the creation of a file named 8.sh using gedit, followed by its execution with bash. The script calculates the sum of the first 10 integers and prints the result.

```
1#!/bin/bash
2echo "Sum of Numbers"
3echo -----
4s=0
5for (( i = 1; i <= 10; i++ ))
6do
7 s=`expr $s + $i`
8done
9echo "Sum of first 10 numbers = $s"
```

```
anjali@anjali-VirtualBox:~$ gedit 8.sh
anjali@anjali-VirtualBox:~$ bash 8.sh
Sum of Numbers
-----
Sum of first 10 numbers = 55
anjali@anjali-VirtualBox:~$
```

9. Write a shell script to find the sum, the average and the product of the four integers entered.

```
Open 9.sh Save ~ - X
1 #!/bin/bash
2 echo " Enter the first Number : "
3 read a
4 echo " Enter the second Number : "
5 read b
6 echo " Enter the third Number : "
7 read c
8 echo " Enter the fourth Number : "
9 read d
10 sum=$((a + b + c + d))
11 avg=$(echo $sum / 4 | bc -l)
12 product=$((a * b * c * d))
13 echo "The sum of numbers : "$sum
14 echo "The average of numbers : "$avg
15 echo "The product of numbers : "$product

anjali@anjali-VirtualBox:~$ gedit 9.sh
anjali@anjali-VirtualBox:~$ bash 9.sh
Enter the first Number :
13
Enter the second Number :
56
Enter the third Number :
23
Enter the fourth Number :
45
The sum of numbers : 137
The average of numbers : 34.250000000000000000000000000000
The product of numbers : 753480
anjali@anjali-VirtualBox:~$
```

10. Write a shell script to find the smallest of three numbers.

```
Open 10.sh Save ~ - X
1 #!/bin/bash
2 echo "Enter first number"
3 read a
4 echo "Enter second number"
5 read b
6 echo "Enter third number"
7 read c
8 if [ $a -gt $b ] ;then
9 if [ $a -gt $c ] ;then
10 echo "$a is big"
11 else
12 echo "$c is big"
13 fi
14 elif [ $b -gt $c ] ;then
15 echo "$b is big"
16 else
17 echo "$c is big"
18 fi
```

```
anjali@anjali-VirtualBox:~$ gedit 10.sh
anjali@anjali-VirtualBox:~$ bash 10.sh
Enter first number
30
Enter second number
69
Enter third number
12
69 is big
anjali@anjali-VirtualBox:~$
```

11. Write a shell program to find factorial of given number.

The screenshot shows a terminal window with the following content:

```
Open ▾ 11.sh Save - X
1 #!/bin/bash
2 echo "Enter a number"
3 read num
4 fact=1
5 for(( i=2; i<=num; i++ ))
6 {
7   fact=$((fact *i)) #fact=fact*i
8 }
9 echo "Factorial is $fact"

anjali@anjali-VirtualBox:~$ bash 11.sh
Enter a number
5
Factorial is 120
anjali@anjali-VirtualBox:~$
```

12. Write a shell program to check a number is palindrome or not.

The screenshot shows a terminal window with the following content:

```
Open ▾ 12.sh Save - X
1 #!/bin/bash
2 echo "Enter number"
3 read n
4 rev=$(echo $n | rev)
5 if [ $n -eq $rev ] ; then
6   echo "Number is Palindrome"
7 else
8   echo "Number is not Palindrome"
9 fi

anjali@anjali-VirtualBox:~$ gedit 12.sh
anjali@anjali-VirtualBox:~$ bash 12.sh
Enter number
123321
Number is Palindrome
anjali@anjali-VirtualBox:~$
```

13. Write a shell script to find the average of the numbers entered in command line.

The screenshot shows a terminal window with the following content:

```
13.sh
1 #!/bin/bash
2 echo "Enter Size"
3 read n
4 i=1
5 sum=0
6 echo "Enter Numbers : "
7 while [ $i -le $n ]
8 do
9   read num
10  sum=$((sum+num))
11  i=$((i+1))
12 done
13 avg=$(echo $sum / $n | bc -l )
14 echo $avg|
```

```
anjali@anjali-VirtualBox:~$ gedit 13.sh
anjali@anjali-VirtualBox:~$ bash 13.sh
Enter Size
3
Enter Numbers :
12
13
14
13.000000000000000000000000000000
anjali@anjali-VirtualBox:~$
```

14. Write a shell program to find the sum of all the digits in a number.

The screenshot shows a terminal window with the following content:

```
14.sh
1 #!/bin/bash
2 echo "Enter a number : "
3 read num
4 sum=0
5 while [ $num -gt 0 ]
6 do
7   mod=$((num%10))
8   sum=$((sum+mod))
9   num=$((num/10))
10 done
11 echo "Sum of digits is $sum"|
```

```
anjali@anjali-VirtualBox:~$ gedit 14.sh
anjali@anjali-VirtualBox:~$ bash 14.sh
Enter a number :
12345
Sum of digits is 15
anjali@anjali-VirtualBox:~$
```

15. Write a shell Script to check whether given year is leap year or not.

The screenshot shows a terminal window with the following content:

```
15.sh
1 #!/bin/bash
2 echo "Enter the year"
3 read y
4 a=`expr $y % 4`
5 b=`expr $y % 100`
6 c=`expr $y % 400`
7 if [ $a -eq 0 -a $b -ne 0 -o $c -eq 0 ] ; then
8   echo "$y is leap year"
9 else
10  echo "$y is not leap year"
11 fi

anjali@anjali-VirtualBox:~$ gedit 15.sh
anjali@anjali-VirtualBox:~$ bash 15.sh
Enter the year
1998
1998 is not leap year
anjali@anjali-VirtualBox:~$ bash 15.sh
Enter the year
2000
2000 is leap year
anjali@anjali-VirtualBox:~$
```