

# **NETWORKINH AND SYSTEM ADMINISTRATION LAB RECORD**

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## BASIC LINUX COMMANDS

### 1. pwd

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

```
To run a command as administrator (user "root"), use "sudo <command>".  
See "man sudo_root" for details.
```

```
shifana@shifana-VirtualBox:~/Documents$ pwd  
/home/shifana/Documents
```

### 2. history

In Linux, there is a very useful **command** to show all of the last **commands** that have been recently used. The **command** is simply called **history**.

```
shifana@shifana-VirtualBox:~/Documents$ history  
1  pwd  
2  history  
3  #command  
4  hostory  
5  history  
shifana@shifana-VirtualBox:~/Documents$ #history  
shifana@shifana-VirtualBox:~/Documents$ ! 2  
2: command not found  
shifana@shifana-VirtualBox:~/Documents$ !1  
pwd  
/home/shifana/Documents
```

### 3. man

**man** command in Linux is used to display the user manual of any command that we can run on the terminal. It provides a detailed view of the command which includes NAME, SYNOPSIS, DESCRIPTION, OPTIONS, EXIT STATUS, RETURN VALUES, ERRORS, FILES, VERSIONS, EXAMPLES, AUTHORS and SEE ALSO.

```
/home/shifana/Documents  
shifana@shifana-VirtualBox:~/Documents$ man pwd  
shifana@shifana-VirtualBox:~/Documents$ man history  
shifana@shifana-VirtualBox:~/Documents$ man man  
shifana@shifana-VirtualBox:~/Documents$ man clear  
shifana@shifana-VirtualBox:~/Documents$ pwd
```

```
shifana@shifana-VirtualBox: ~/Documents
```

PWD(1) User Commands PWD(1)

**NAME**  
pwd - print name of current/working directory

**SYNOPSIS**  
pwd [OPTION]...

**DESCRIPTION**  
Print the full filename of the current working directory.

-L, --logical  
use PWD from environment, even if it contains symlinks

-P, --physical  
avoid all symlinks

--help display this help and exit

--version  
output version information and exit

If no option is specified, -P is assumed.

NOTE: your shell may have its own version of pwd, which usually supersedes the version described here. Please refer to your shell's documentation for details about the options it supports.

#### 4. cd

The cd (“change directory”) command is used to change the current working directory in Linux and other Unix-like operating systems. It is one of the most basic and frequently used commands when working on the Linux terminal. The current working directory is the directory (folder) in which the user is currently working in. Each time

```
shifana@shifana-VirtualBox:~$ cd
shifana@shifana-VirtualBox:~$ cd Documents
shifana@shifana-VirtualBox:~/Documents$ cd
shifana@shifana-VirtualBox:~$ cd ..
shifana@shifana-VirtualBox:/home$ cd Documents
```

you interact with your command prompt, you are working within a directory.

## 5. ls

The **ls** command is one of the basic **commands** that any Linux user should know. It is used to list information about files and directories within the file system.

The **ls** utility is a part of the GNU core utilities package which is installed on all Linux distributions.

```
shifana@shifana-VirtualBox:~/Documents$ ls
ajce mca
shifana@shifana-VirtualBox:~/Documents$ ls -t
mca ajce
shifana@shifana-VirtualBox:~/Documents$ ls -r
mca ajce
```

## 6. mkdir

**mkdir** command in Linux allows the user to create directories (also referred to as folders in some operating systems). This command can create multiple directories at once as well as set the permissions for the directories. It is important to note that the user executing this command must have enough permissions to create a directory in the parent directory, or he/she may receive a ‘permission denied’ error.

```
/home/shifana/Documents
shifana@shifana-VirtualBox:~/Documents$ ls
shifana@shifana-VirtualBox:~/Documents$ mkdir ajce
shifana@shifana-VirtualBox:~/Documents$ ls
ajce
```

## 7. rmdir

**rmdir** command is used remove empty directories from the file system in Linux.

The **rmdir** command removes each and every directory specified in the **command** line only if these directories are empty. So if the specified directory has some directories or files in it then this cannot be removed by **rmdir** command.

```
shifana@shifana-VirtualBox:~/Documents$ ls
ajce mca
shifana@shifana-VirtualBox:~/Documents$ rmdir mca
shifana@shifana-VirtualBox:~/Documents$ ls
ajce
```

## 8 .touch

The **touch** command is a standard command used in UNIX/Linux operating system which is used to create, change and modify timestamps of a file. Basically, there are two different commands to create a file in the Linux system which is as follows:

- **cat command:** It is used to create the file with content.
- **touch command:** It is used to create a file without any content. The file created using touch command is empty. This command can be used when the user doesn't have data to store at the time of file creation.

```
shifana@shifana-VirtualBox:~/Documents$ touch music
shifana@shifana-VirtualBox:~/Documents$ ls
ajce mca music
shifana@shifana-VirtualBox:~/Documents$
```

## 9 .rm

rm stands for **remove** . rm command is used to remove files.

```
shifana@shifana-VirtualBox:~/Documents$ rm arya
shifana@shifana-VirtualBox:~/Documents$ ls
ajce mca music names sanu
shifana@shifana-VirtualBox:~/Documents$
```

## 10. cat

The cat command is one of the most widely used commands in Linux. The name of the cat command comes from its functionality to **concatenate** files. It can read, concatenate, and write file contents to the standard output.

```
shifana@shifana-VirtualBox:~/Documents$ cat > arya
anu
alina
shon
^C
shifana@shifana-VirtualBox:~/Documents$ cat > sanu
engineer
doctor
mechanic
^C
shifana@shifana-VirtualBox:~/Documents$ cat arya sanu>names
shifana@shifana-VirtualBox:~/Documents$ cat names
anu
alina
shon
engineer
doctor
mechanic
shifana@shifana-VirtualBox:~/Documents$
```

## BASIC LINUX COMMANDS PART-2

### 1. echo

**echo command in linux** is used to display line of text/string that are passed as an argument . This is a built in **command** that is mostly used in shell scripts and batch files to output status text to the screen or a file.

```
shifana@shifana-VirtualBox:~/Documents$ cat > arjun
hello,arjun
^C
shifana@shifana-VirtualBox:~/Documents$ cat arjun
hello,arjun
shifana@shifana-VirtualBox:~/Documents$ echo arjun
arjun
shifana@shifana-VirtualBox:~/Documents$ echo how are you >> arjun
shifana@shifana-VirtualBox:~/Documents$ cat arjun
hello,arjun
how are you
shifana@shifana-VirtualBox:~/Documents$
```

### 2. head

It is the complementary of Tail command. The head command, as the name implies, print the top N number of data of the given input. By default, it prints the first 10 lines of the specified files. If more than one file name is provided then data from each file is preceded by its file name.

```
shifana@shifana-VirtualBox:~/Documents$ cat names
anu
alina
shon
engineer
doctor
mechanic
shifana@shifana-VirtualBox:~/Documents$ head -n 3 names
anu
alina
shon
shifana@shifana-VirtualBox:~/Documents$
```

### 3. tail

It is the complementary of head command. The tail command, as the name implies, print the last N number of data of the given input. By default it prints the last 10 lines of the specified files. If more than one file name is provided then data from each file is precedes by its file name.

```
shifana@shifana-VirtualBox:~/Documents$ cat names
anu
alina
shon
engineer
doctor
mechanic
shifana@shifana-VirtualBox:~/Documents$ tail -n 3 names
engineer
doctor
mechanic
shifana@shifana-VirtualBox:~/Documents$
```

#### 4. read

Read command in Linux system is used to read from a file descriptor. Basically, this command read up the total number of bytes from the specified file descriptor into the buffer. If the number or count is zero then this command may detect the errors. But on success, it returns the number of bytes read.

```
[are] [ ] [ ]
shifana@shifana-VirtualBox:~/Documents$ read v1 v2 v3
who are you
shifana@shifana-VirtualBox:~/Documents$ echo "[\$v1] [\$v2] [\$v3]"
[who] [are] [you]
shifana@shifana-VirtualBox:~/Documents$
```

#### 5. more

**more** command is used to view the text files in the command prompt, displaying one screen at a time in case the file is large (For example log files). The more command also allows the user do scroll up and down through the page. The syntax along with options and command is as follows. Another application of more is to use it with some other command after a pipe. When the output is large, we can use more command to see output one by one.

```
shifana@shifana-VirtualBox:~/Documents$ more names
anu
alina
shon
engineer
doctor
mechanic
shifana@shifana-VirtualBox:~/Documents$ more -2 names
anu
alina
--More--(25%)
```

#### 6. less

Less command is linux utility which can be used to read contents of text file one page (one screen) per time. It has faster access because if file is large, it don't access complete file, but access it page by page.

```
anu
alina
shon
engineer
doctor
mechanic
names (END)
```

## 7. cut

The cut command in UNIX is a command for cutting out the sections from each line of files and writing the result to standard output. It can be used to cut parts of a line by **byte position, character and field**. Basically the cut command slices a line and extracts the text. It is necessary to specify option with command otherwise it gives error. If more than one file name is provided then data from each file is **not precedes** by its file name.

```
shifana@shifana-VirtualBox:~/Documents$ cut -b 1,2,3 names
anu
ali
sho
eng
doc
mec
shifana@shifana-VirtualBox:~/Documents$
```

## 8. paste

Paste command is one of the useful commands in Unix or Linux operating system. It is used to join files horizontally (parallel merging) by outputting lines consisting of lines from each file specified, separated by **tab** as delimiter, to the standard output. When no file is specified, or put dash (“-”) instead of file name, paste reads from standard input and gives output as it is until a interrupt command [**Ctrl-c**] is given.

```
now are you  
shifana@shifana-VirtualBox:~/Documents$ cat names  
anu  
alina  
shon  
engineer  
doctor  
mechanic  
shifana@shifana-VirtualBox:~/Documents$ paste names arjun  
anu      hello,arjun  
alina    how are you  
shon  
engineer  
doctor  
mechanic  
shifana@shifana-VirtualBox:~/Documents$
```

#### 9. uname

The **uname** tool is most commonly used to determine the processor architecture, the system hostname and the version of the kernel running on the system.

```
shifana@shifana-VirtualBox:~/Documents$ uname  
Linux  
shifana@shifana-VirtualBox:~/Documents$ uname -r  
5.8.0-55-generic  
shifana@shifana-VirtualBox:~/Documents$ uname -v  
#62~20.04.1-Ubuntu SMP Wed Jun 2 08:55:04 UTC 2021  
shifana@shifana-VirtualBox:~/Documents$
```

#### 10. cp

**cp** stands for **copy**. This command is used to copy files or group of files or directory. It creates an exact image of a file on a disk with different file name. **cp** command require at least two filenames in its arguments.

```
shifana@shifana-VirtualBox:~$ touch file1.txt  
shifana@shifana-VirtualBox:~$ cp file1.txt Desktop/  
shifana@shifana-VirtualBox:~$
```



## 11. mv

**mv** stands for **move**. **mv** is used to move one or more files or directories from one place to another in a file system like UNIX. It has two distinct functions:

1. It renames a file or folder.
2. It moves a group of files to a different directory.

No additional space is consumed on a disk during renaming. This command normally **works silently** means no prompt for confirmation.

```
shifana@shifana-VirtualBox:~/Desktop$ cd ..  
shifana@shifana-VirtualBox:~$ mv file1.txt Documents/  
shifana@shifana-VirtualBox:~$
```



## 12. locate

The **locate** command and **find** command is used to search a file by name. But, the difference between both commands is that **locate** command is a background process and searches the file in the database whereas, **find** command searches in the filesystem. The **locate** command is much faster than **find** command.

```
shifana@shifana-VirtualBox:~$ locate names  
Command 'locate' not found, but can be installed with:  
sudo apt install mlocate  
  
shifana@shifana-VirtualBox:~$ sudo apt install mlocate  
Reading package lists... Done  
Building dependency tree  
Reading state information... Done  
Suggested packages:  
  nocache  
The following NEW packages will be installed:  
  mlocate  
0 upgraded, 1 newly installed, 0 to remove and 224 not upgraded.  
Need to get 50.1 kB of archives.  
After this operation, 258 kB of additional disk space will be used.  
Err:1 http://in.archive.ubuntu.com/ubuntu focal/main amd64 mlocate amd64 0.26-3  
ubuntu3  
  Temporary failure resolving 'in.archive.ubuntu.com'  
E: Failed to fetch http://in.archive.ubuntu.com/ubuntu/pool/main/m/mlocate/mlocate_0.26-3ubuntu3_amd64.deb  Temporary failure resolving 'in.archive.ubuntu.com'  
E: Unable to fetch some archives, maybe run apt-get update or try with --fix-missing?  
shifana@shifana-VirtualBox:~$
```

### 13. find

The **find** command in UNIX is a command line utility for walking a file hierarchy. It can be used to find files and directories and perform subsequent operations on them. It supports searching by file, folder, name, creation date, modification date, owner and permissions. By using the ‘-exec’ other UNIX commands can be executed on files or folders found.

```
shifana@shifana-VirtualBox:~/Documents$ find /home/ -name names
/home/shifana/Documents/names
shifana@shifana-VirtualBox:~/Documents$ find /home/ -name exam.txt
/home/shifana/Documents/exam.txt
shifana@shifana-VirtualBox:~/Documents$ find /home/ -name ajce
/home/shifana/Desktop/ajce
/home/shifana/Documents/ajce
```

### 14. grep

The grep filter searches a file for a particular pattern of characters, and displays all lines that contain that pattern. The pattern that is searched in the file is referred to as the regular expression (grep stands for globally search for regular expression and print out).

```
shifana@shifana-VirtualBox:~/Documents$ cat names
anu
alina
shon
engineer
doctor
mechanic
shifana@shifana-VirtualBox:~/Documents$ grep shon names
shon
shifana@shifana-VirtualBox:~/Documents$ grep shifana /etc/passwd
shifana:x:1000:1000:shifana,,,,:/home/shifana:/bin/bash
shifana@shifana-VirtualBox:~/Documents$
```

### 15. df

**Linux df command** is used to display the disk space used in the file system. The 'df' stands for "disk filesystem." It defines the number of blocks used, the number of blocks available, and the directory where the file system is mounted.

```
shifana@shifana-VirtualBox:~/Documents$ df -m
Filesystem      1M-blocks  Used  Available Use% Mounted on
udev              462     0     462    0% /dev
tmpfs             99     2     97    2% /run
/dev/sda5        9509   6539    2468   73% /
tmpfs             491     0     491    0% /dev/shm
tmpfs              5     1      5    1% /run/lock
tmpfs             491     0     491    0% /sys/fs/cgroup
/dev/loop2         219    219      0  100% /snap/gnome-3-34-1804/66
/dev/loop0          52     52      0  100% /snap/snap-store/518
/dev/loop3          56     56      0  100% /snap/core18/1988
/dev/loop4          32     32      0  100% /snap/snapd/11036
/dev/loop1          65     65      0  100% /snap/gtk-common-themes/1514
/dev/sda1         511     1     511    1% /boot/efi
tmpfs             99     1     99    1% /run/user/1000
shifana@shifana-VirtualBox:~/Documents$
```

## 16. du

The **du** command is a standard Linux/Unix command that allows a user to gain disk usage information quickly. It is best applied to specific directories and allows many variations for customizing the output to meet your needs.

```
shifana@shifana-VirtualBox:~/Documents$ du -h
4.0K    ./mca
4.0K    ./ajce
36K    .
shifana@shifana-VirtualBox:~/Documents$
```

## 17. useradd

Create a new user or update default new user information.

```
shifana@shifana-VirtualBox:~/Documents$ sudo su -
root@shifana-VirtualBox:~# useradd shifu
root@shifana-VirtualBox:~# tail /etc/passwd
hplip:x:119:7:HPLIP system user,,,:/run/hplip:/bin/false
whoopsie:x:120:125::/nonexistent:/bin/false
colord:x:121:126:colord colour management daemon,,,:/var/lib/colord:/usr/sbin/nologin
geoclue:x:122:127::/var/lib/geoclue:/usr/sbin/nologin
pulse:x:123:128:PulseAudio daemon,,,:/var/run/pulse:/usr/sbin/nologin
gnome-initial-setup:x:124:65534::/run/gnome-initial-setup:/bin/false
gdm:x:125:130:Gnome Display Manager:/var/lib/gdm3:/bin/false
shifana:x:1000:1000:shifana,,,:/home/shifana:/bin/bash
systemd-coredump:x:999:999:systemd Core Dumper:/:/usr/sbin/nologin
shifu:x:1001:1001::/home/shifu:/bin/sh
root@shifana-VirtualBox:~#
```

## 18. userdel

Delete a user account and related files.

```
root@shifana-VirtualBox:~# userdel shifu
root@shifana-VirtualBox:~# tail /etc/passwd
nm-openvpn:x:118:124:NetworkManager OpenVPN,,,:/var/lib/openvpn/chroot:/usr/sbin/nologin
hplip:x:119:7:HPLIP system user,,,:/run/hplip:/bin/false
whoopsie:x:120:125::/nonexistent:/bin/false
colord:x:121:126:colord colour management daemon,,,:/var/lib/colord:/usr/sbin/nologin
geoclue:x:122:127::/var/lib/geoclue:/usr/sbin/nologin
pulse:x:123:128:PulseAudio daemon,,,:/var/run/pulse:/usr/sbin/nologin
gnome-initial-setup:x:124:65534::/run/gnome-initial-setup:/bin/false
gdm:x:125:130:Gnome Display Manager:/var/lib/gdm3:/bin/false
shifana:x:1000:1000:shifana,,,:/home/shifana:/bin/bash
systemd-coredump:x:999:999:systemd Core Dumper:/:/usr/sbin/nologin
root@shifana-VirtualBox:~#
```

## 19. sudo

The sudo command allows you to run programs with the security privileges of another user (by default, as the superuser). It prompts you for your personal password and confirms your request to execute a command by checking a file, called sudoers, which the system administrator configures.

```
root@shifana-VirtualBox:~# sudo useradd shifu
root@shifana-VirtualBox:~# tail /etc/passwd
hplip:x:119:7:HPLIP system user,,,:/run/hplip:/bin/false
whoopsie:x:120:125::/nonexistent:/bin/false
colord:x:121:126:colord colour management daemon,,,:/var/lib/colord:/usr/sbin/nologin
geoclue:x:122:127::/var/lib/geoclue:/usr/sbin/nologin
pulse:x:123:128:PulseAudio daemon,,,:/var/run/pulse:/usr/sbin/nologin
gnome-initial-setup:x:124:65534::/run/gnome-initial-setup:/bin/false
gdm:x:125:130:Gnome Display Manager:/var/lib/gdm3:/bin/false
shifana:x:1000:1000:shifana,,,:/home/shifana:/bin/bash
systemd-coredump:x:999:999:systemd Core Dumper:/:/usr/sbin/nologin
shifu:x:1001:1001::/home/shifu:/bin/sh
root@shifana-VirtualBox:~#
```

## 20. passwd

The passwd command changes passwords for user accounts. A normal user may only change the password for their own account, while the superuser may change the password for any account. passwd also changes the account or associated password validity period.

```
root@shifana-VirtualBox:~# sudo su -
root@shifana-VirtualBox:~# useradd shifana
useradd: user 'shifana' already exists
root@shifana-VirtualBox:~# passwd shifana
New password:
Retype new password:
passwd: password updated successfully
root@shifana-VirtualBox:~#
```

Explain linux commands usermod, groupadd, groups, groupmod, groupdel, chmod, chown, id, ps, top with examples

### 1. usermod

- usermod command is used to change the properties of a user in Linux through the command line
- command-line utility that allows you to modify a user's login information
- #usermod --help
- #usermod -u 2000 shifu

```
shifana@shifana-VirtualBox:~/Documents$ sudo usermod -u 2000 shifu
shifana@shifana-VirtualBox:~/Documents$ id shifu
uid=2000(shifu) gid=1001(shifu) groups=1001(shifu)
shifana@shifana-VirtualBox:~/Documents$ sudo usermod -u 2000 shifu
usermod: no changes
shifana@shifana-VirtualBox:~/Documents$ █
```

### 2. groupadd

- groupadd command creates a new group account using the values specified on the command line and the default values from the system.
- #groupadd student

```
shifana@shifana-VirtualBox:~$ sudo groupadd student
shifana@shifana-VirtualBox:~$ sudo groupadd student
groupadd: group 'student' already exists
shifana@shifana-VirtualBox:~$ sudo groupadd student1
shifana@shifana-VirtualBox:~$ sudo groupadd student2
shifana@shifana-VirtualBox:~$ compgen -g student
student
student1
student2
shifana@shifana-VirtualBox:~$ █
```

### 3. groups - print the groups a user is in

- #groups shifu

```
shifana@shifana-VirtualBox:~$ groups
shifana adm cdrom sudo dip plugdev lpadmin lxd sambashare
shifana@shifana-VirtualBox:~$ groups shifu
shifu : shifu
shifana@shifana-VirtualBox:~$ █
```

4. groupdel - groupdel command modifies the system account files, deleting all entries that refer to group. The named group must exist

- #groupdel student1

```
shifana@shifana-VirtualBox:~$ compgen -g student
student
student1
student2
shifana@shifana-VirtualBox:~$ sudo groupdel student1
[sudo] password for shifana:
Sorry, try again.
[sudo] password for shifana:
shifana@shifana-VirtualBox:~$ compgen -g student
student
student2
shifana@shifana-VirtualBox:~$ █
```

5. groupmod - The groupmod command modifies the definition of the specified group by modifying the appropriate entry in the group database.

```
# groupmod -n group1 group2
```

6. chmod - To change directory permissions of file/ Directory in Linux.

- #chmod whowhatwhich file/directory
- chmod +rwx filename to add permissions.
- chmod -rwx directoryname to remove permissions.
- chmod +x filename to allow executable permissions.
- chmod -wx filename to take out write and executable permissions.

```
#chmod u+x test #chmod g-rwx test #chmod o-r test
```

```
shifana@shifana-VirtualBox:~$ mkdir books
shifana@shifana-VirtualBox:~$ ls books
shifana@shifana-VirtualBox:~$ ls -l books
total 0
shifana@shifana-VirtualBox:~$ ls -ld books
drwxrwxr-x 2 shifana shifana 4096 Aug 12 23:06 books
shifana@shifana-VirtualBox:~$ chmod g-w books
shifana@shifana-VirtualBox:~$ ls -ld books
drwxr-xr-x 2 shifana shifana 4096 Aug 12 23:06 books
shifana@shifana-VirtualBox:~$ chmod o+w books
shifana@shifana-VirtualBox:~$ ls -ld books
drwxr-xrwx 2 shifana shifana 4096 Aug 12 23:06 books
shifana@shifana-VirtualBox:~$ ls
books  Documents  Music  Public  Templates
Desktop  Downloads  Pictures  shifu.txt  Videos
shifana@shifana-VirtualBox:~$
```

7. chown - The chown command allows you to change the user and/or group ownership of a given file, directory.

```
#chown shifu books
```

```
shifana@shifana-VirtualBox:~$ sudo chown shifu books
shifana@shifana-VirtualBox:~$ ls -ld books
drwxr-xrwx 2 shifu shifana 4096 Aug 12 23:06 books
shifana@shifana-VirtualBox:~$
```

8. id - id command in Linux is used to find out user and group names and numeric ID's (UID or group ID) of the current user. #id

```
shifana@shifana-VirtualBox:~$ id
uid=1000(shifana) gid=1000(shifana) groups=1000(shifana),4(adm),24(cdrom),27(sudo),30(dip),46(plugdev),120(lpadmin),131(lxd),132(sambashare)
shifana@shifana-VirtualBox:~$
```

9. ps - The ps command, short for Process Status, is a command line utility that is used to display or view information related to the processes running in a Linux system.

- PID – This is the unique process ID
- TTY – This is the type of terminal that the user is logged in to
- TIME – This is the time in minutes and seconds that the process has been running
- CMD – The command that launched the process #ps -a

```
shifana@shifana-VirtualBox:~$ ps
  PID TTY      TIME CMD
 1501 pts/1    00:00:00 bash
 1941 pts/1    00:00:00 ps
shifana@shifana-VirtualBox:~$ ps -a
  PID TTY      TIME CMD
 754 tty2    00:00:29 Xorg
 862 tty2    00:00:00 gnome-session-b
 1942 pts/1    00:00:00 ps
shifana@shifana-VirtualBox:~$
```

10. top - top command is used to show the Linux processes.

It provides a dynamic real-time view of the running system

```
#top -u shifu
```

```
shifana@shifana-VirtualBox:~$ top -u shifu

top - 23:20:51 up  1:07,  1 user,  load average: 0.09, 0.05, 0.01
Tasks: 164 total,   1 running, 163 sleeping,   0 stopped,   0 zombie
%Cpu(s): 2.0 us,  0.3 sy,  0.0 ni, 97.6 id,  0.0 wa,  0.0 hi,  0.0 si,  0.0 st
MiB Mem :  980.8 total,    99.8 free,   585.1 used,   295.9 buff/cache
MiB Swap:  448.5 total,   351.6 free,   96.9 used.   245.2 avail Mem

          PID USER      PR  NI      VIRT      RES      SHR S %CPU %MEM     TIME+ COMMAND

```

## 1. Wc

wc stands for **word count**. As the name implies, it is mainly used for counting purpose. It is used to find out number of lines, word count, byte and characters count in the files specified in the file arguments.

```
shifana@shifana-VirtualBox:~/Documents$ cat names
anu
alina
shon
engineer
doctor
mechanic
shifana@shifana-VirtualBox:~/Documents$ wc names
6 6 40 names
shifana@shifana-VirtualBox:~/Documents$ wc -l names
6 names
shifana@shifana-VirtualBox:~/Documents$ wc -w names
6 names
shifana@shifana-VirtualBox:~/Documents$ wc -c names
40 names
shifana@shifana-VirtualBox:~/Documents$
```

## 2. tar

The Linux ‘tar’ stands for tape archive, is used to create Archive and extract the Archive files. tar command in Linux is one of the important command which provides archiving functionality in Linux. We can use Linux tar command to create compressed or uncompressed Archive files and also maintain and modify them.

### OPTIONS:

- c : Creates Archive
- x : Extract the archive
- f : creates archive with given filename
- t : displays or lists files in archived file
- u : archives and adds to an existing archive file
- v : Displays Verbose Information
- A : Concatenates the archive files
- z : zip, tells tar command that creates tar file using gzip
- j : filter archive tar file using tbzip
- W : Verify a archive file
- r : update or add file or directory in already existed .tar file

## Tar command

```
shifana@shifana-VirtualBox:~/Documents$ ls
ajce  arun  exam1.txt  file1.txt  music  sanu
arjun  arya  example.txt  mca      names
shifana@shifana-VirtualBox:~/Documents$ tar cf archive.tar sanu names
shifana@shifana-VirtualBox:~/Documents$ ls archive.tar
archive.tar
shifana@shifana-VirtualBox:~/Documents$ ls
ajce      arjun  arya      example.txt  mca      names
archive.tar  arun  exam1.txt  file1.txt  music  sanu
shifana@shifana-VirtualBox:~/Documents$ tar tf archive.tar
sanu
names
shifana@shifana-VirtualBox:~/Documents$ mkdir extract
shifana@shifana-VirtualBox:~/Documents$ cd extract
shifana@shifana-VirtualBox:~/Documents/extract$ pwd
/home/shifana/Documents/extract
shifana@shifana-VirtualBox:~/Documents/extract$ tar xf /home/shifana/archive.ta
r
tar: /home/shifana/archive.tar: Cannot open: No such file or directory
tar: Error is not recoverable: exiting now
shifana@shifana-VirtualBox:~/Documents/extract$ tar xf /home/shifana/Documents/
archive.tar
shifana@shifana-VirtualBox:~/Documents/extract$ ls
names  sanu
shifana@shifana-VirtualBox:~/Documents/extract$ sudo tar czf mca1.tar.gz /etc
[sudo] password for shifana:
tar: Removing leading `/' from member names
shifana@shifana-VirtualBox:~/Documents/extract$ ls
mca1.tar.gz  names  sanu
```

## Compressing files using gz,bz2, xz

```
shifana@shifana-VirtualBox:~/Documents/extract$ ls
mca1.tar.gz  names  sanu
shifana@shifana-VirtualBox:~/Documents/extract$ cd ..
shifana@shifana-VirtualBox:~/Documents$ cd shifana
bash: cd: shifana: No such file or directory
shifana@shifana-VirtualBox:~/Documents$ cd extract
shifana@shifana-VirtualBox:~/Documents/extract$ sudo tar cjf regmca.tar.gz /etc
tar: Removing leading '/' from member names
shifana@shifana-VirtualBox:~/Documents/extract$ ls
mca1.tar.gz  names  regmca.tar.gz  sanu
shifana@shifana-VirtualBox:~/Documents/extract$ sudo tar cJf regmca.tar.bz2 san
u names
shifana@shifana-VirtualBox:~/Documents/extract$ ls
mca1.tar.gz  names  regmca.tar.bz2  regmca.tar.gz  sanu
shifana@shifana-VirtualBox:~/Documents/extract$ sudo tar cJf regmca.tar.bzz san
u names
shifana@shifana-VirtualBox:~/Documents/extract$ ls
mca1.tar.gz  names  regmca.tar.bzz  regmca.tar.bzzZ  regmca.tar.gz  sanu
shifana@shifana-VirtualBox:~/Documents/extract$ sudo tar cJf regmca.tar.bzz san
u names
shifana@shifana-VirtualBox:~/Documents/extract$ ls
mca1.tar.gz  names  regmca.tar.bzz  regmca.tar.bzzZ  regmca.tar.gz  sanu
shifana@shifana-VirtualBox:~/Documents/extract$ sudo tar cJf regmca.tar.xz sanu
names
shifana@shifana-VirtualBox:~/Documents/extract$ ls
mca1.tar.gz  regmca.tar.bzz  regmca.tar.gz  sanu
names      regmca.tar.bzz  regmca.tar.xz
shifana@shifana-VirtualBox:~/Documents/extract$ █
```

## Extracting using gz

```
shifana@shifana-VirtualBox:~/Documents/extract$ mkdir lab
shifana@shifana-VirtualBox:~/Documents/extract$ cd lab
shifana@shifana-VirtualBox:~/Documents/extract/lab$ ls
shifana@shifana-VirtualBox:~/Documents/extract/lab$ pwd
/home/shifana/Documents/extract/lab
shifana@shifana-VirtualBox:~/Documents/extract/lab$ tar xzf /home/shifana/Documents/extract/mca1.tar.gz
shifana@shifana-VirtualBox:~/Documents/extract/lab$ ls
etc
shifana@shifana-VirtualBox:~/Documents/extract/lab$ ls etc
acpi          hparm.conf      pnm2ppa.conf
adduser.conf   host.conf      polkit-1
alsa          hostid         popularity-contest.conf
alternatives   hostname       ppp
anacrontab    hosts          profile
apg.conf      hosts.allow    profile.d
apm           hosts.deny    protocols
apparmor      hp             pulse
apparmor.d    ifplugd        python3
apport         init           python3.8
appstream.conf init.d         rc0.d
apt           initramfs-tools rc1.d
avahi          inputrc        rc2.d
bash.bashrc    inserv.conf.d rc3.d
bash_completion iproute2       rc4.d
bash_completion.d issue         rc5.d
bindresvport.blacklist issue.net    rc6.d
binfmt.d       kernel         rcS.d
bluetooth     kernel-img.conf resolv.conf
brlapi.key     kerneloops.conf rmt
brltty         ldap           rpc
brltty.conf    ld.so.cache    rsyslog.conf
ca-certificates ld.so.conf    rsyslog.d
ca-certificates.conf ld.so.conf.d rygel.conf
```

## Extracting using xz

```
gshadow-          pcmcia          xattr.conf
gss              perl            xdg
gtk-2.0          pki             xml
gtk-3.0          pm              zsh_command_not_found
shifana@shifana-VirtualBox:~/Documents/extract/lab$ ls
etc
shifana@shifana-VirtualBox:~/Documents/extract/lab$ tar xJf /home/shifana/Documents/extract/regmca.tar.xz
shifana@shifana-VirtualBox:~/Documents/extract/lab$ ls
etc names sanu
shifana@shifana-VirtualBox:~/Documents/extract/lab$
```

## Extracting using bz2

```
etc names sanu
shifana@shifana-VirtualBox:~/Documents/extract/lab$ tar xJf /home/shifana/Documents/extract/regmca.tar.bz2
shifana@shifana-VirtualBox:~/Documents/extract/lab$ ls
etc names sanu
shifana@shifana-VirtualBox:~/Documents/extract/lab$ █
```

## 3. expr

The **expr** command in Unix evaluates a given expression and displays its corresponding output.

- Basic operations like addition, subtraction, multiplication, division, and modulus on integers.
- Evaluating regular expressions, string operations like substring, length of strings etc.

```
shifana@shifana-VirtualBox:~/Documents/extract/lab$ expr 5 + 5
10
shifana@shifana-VirtualBox:~/Documents/extract/lab$ expr 2 - 2
0
shifana@shifana-VirtualBox:~/Documents/extract/lab$ expr 6 / 2
3
shifana@shifana-VirtualBox:~/Documents/extract/lab$ expr 20 \* 20
400
shifana@shifana-VirtualBox:~/Documents/extract/lab$ █
```

## 4. redirection and piping

Pipe is used to combine two or more commands, and in this, 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.

```
shifana@shifana-VirtualBox:~/Documents/extract/lab$ cat names
anu
alina
shon
engineer
doctor
mechanic
shifana@shifana-VirtualBox:~/Documents/extract/lab$ cat names |head -3
anu
alina
shon
shifana@shifana-VirtualBox:~/Documents/extract/lab$ cat names |head -3| tail -2
alina
shon
shifana@shifana-VirtualBox:~/Documents/extract/lab$ █
```

## 5. Ssh

**ssh** stands for “**Secure Shell**”. It is a protocol used to securely connect to a remote server/system. **ssh** is secure in the sense that it transfers the data in encrypted form between the host and the client. It transfers inputs from the client to the host and relays back the output. **ssh** runs at TCP/IP port 22.

```
shifana@shifana-VirtualBox:~/Documents/extract/lab$ sudo apt install openssh-client
Reading package lists... Done
Building dependency tree
Reading state information... Done
Suggested packages:
  keychain libpam-ssh monkeysphere ssh-askpass
The following packages will be upgraded:
  openssh-client
1 upgraded, 0 newly installed, 0 to remove and 223 not upgraded.
Need to get 671 kB of archives.
After this operation, 0 B of additional disk space will be used.
Get:1 http://in.archive.ubuntu.com/ubuntu focal-updates/main amd64 openssh-client amd64 1:8.2p1-4ubuntu0.2 [671 kB]
Fetched 671 kB in 8s (81.5 kB/s)
(Reading database ... 182821 files and directories currently installed.)
Preparing to unpack .../openssh-client_1%3a8.2p1-4ubuntu0.2_amd64.deb ...
Unpacking openssh-client (1:8.2p1-4ubuntu0.2) over (1:8.2p1-4ubuntu0.1) ...
Setting up openssh-client (1:8.2p1-4ubuntu0.2) ...
Processing triggers for man-db (2.9.1-1) ...
shifana@shifana-VirtualBox:~/Documents/extract/lab$ ssh localhost
ssh: connect to host localhost port 22: Connection refused
shifana@shifana-VirtualBox:~/Documents/extract/lab$ sudo apt install openssh-server
Reading package lists... Done
Building dependency tree
Reading state information... Done
The following additional packages will be installed:
  ncurses-term openssh-sftp-server ssh-import-id
```

```
Processing triggers for systemd (245.4-4ubuntu3.4) ...
Processing triggers for man-db (2.9.1-1) ...
Processing triggers for ufw (0.36-6) ...
shifana@shifana-VirtualBox:~/Documents/extract/lab$ ssh localhost
The authenticity of host 'localhost (127.0.0.1)' can't be established.
ECDSA key fingerprint is SHA256:7cBe2xAv5Y4zllRy0W1QVr6s9sz0lJCI71/zAx+jdiY.
Are you sure you want to continue connecting (yes/no/[fingerprint])? yes
Warning: Permanently added 'localhost' (ECDSA) to the list of known hosts.
shifana@localhost's password:
Welcome to Ubuntu 20.04.2 LTS (GNU/Linux 5.8.0-55-generic x86_64)

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

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

Your Hardware Enablement Stack (HWE) is supported until April 2025.

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

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

shifana@shifana-VirtualBox:~$
```

## 6. Scp

**scp** (secure copy) command in Linux system is used to copy file(s) between servers in a secure way.

## 7. ssh-keygen

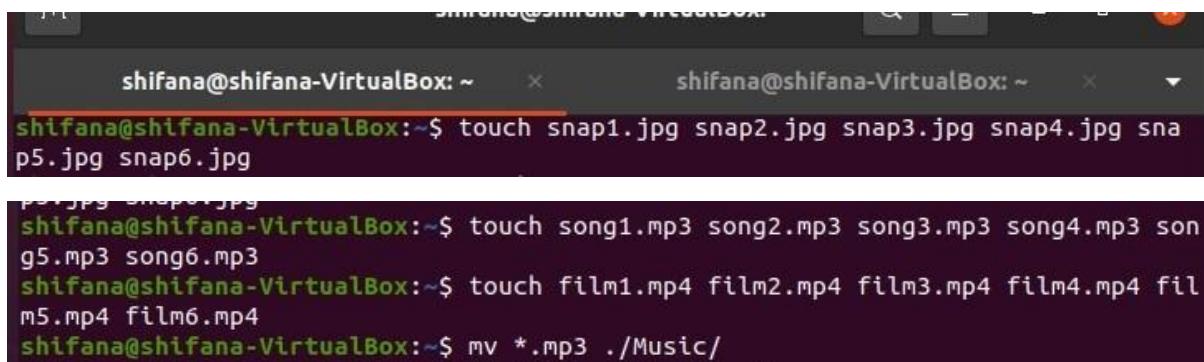
Use the ssh-keygen command to generate a public/private authentication key pair. Authentication keys allow a user to connect to a remote system without supplying a password. Keys must be generated for each user separately. If you generate key pairs as the root user, only the root can use the keys.

```
shifana@shifana-VirtualBox:~$ ssh-keygen -t rsa
ssh: Could not resolve hostname keygen: Temporary failure in name resolution
shifana@shifana-VirtualBox:~$ ssh-keygen -t rsa
Generating public/private rsa key pair.
Enter file in which to save the key (/home/shifana/.ssh/id_rsa): key1
Enter passphrase (empty for no passphrase):
Enter same passphrase again:
Your identification has been saved in key1
Your public key has been saved in key1.pub
The key fingerprint is:
SHA256:qqMy5Y2KxvcZrnworzM8U0w4FyTfSmCv+6LXAxDLTY0 shifana@shifana-VirtualBox
The key's randomart image is:
+---[RSA 3072]----+
| ... .o |
|+o.oE . |
|.Bo.. |
|.*.. |
| * .o S |
|+.* . |
|+=.=... |
|+@=o*oo |
|**%*=*
+---[ SHA256 ]-----+
shifana@shifana-VirtualBox:~$
```

## 8. ssh-copy-id

- The ssh-copy-id command is a simple tool that allows you to install an SSH key on a remote server's authorized keys.
- This command facilitates SSH key login, which removes the need for a password for each login, thus ensuring a password-less, automatic login process.
- The ssh-copy-id command is part of OpenSSH, a tool for performing remote system administrations using encrypted SSH connections.

- 1.a. Create six files with name of the form songX.mp3
- b. Create six files with name of the form snapX.jpg
- c. Create six files with name of the form filmX.mp4 (In each set, replace X with the numbers 1 through 6)



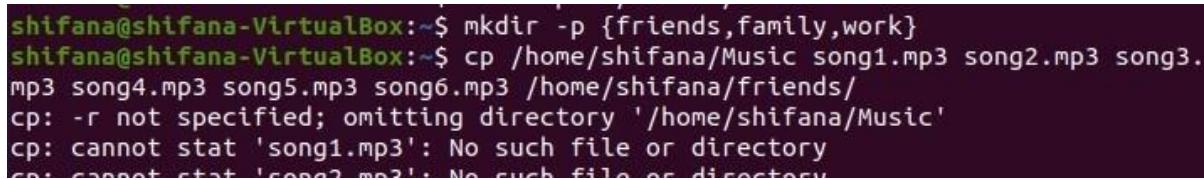
```
shifana@shifana-VirtualBox:~$ touch snap1.jpg snap2.jpg snap3.jpg snap4.jpg snap5.jpg snap6.jpg
shifana@shifana-VirtualBox:~$ touch song1.mp3 song2.mp3 song3.mp3 song4.mp3 song5.mp3 song6.mp3
shifana@shifana-VirtualBox:~$ touch film1.mp4 film2.mp4 film3.mp4 film4.mp4 film5.mp4 film6.mp4
shifana@shifana-VirtualBox:~$ mv *.mp3 ./Music/
```

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.



```
shifana@shifana-VirtualBox:~$ touch film1.mp4 film2.mp4 film3.mp4 film4.mp4 film5.mp4 film6.mp4
shifana@shifana-VirtualBox:~$ mv *.mp3 ./Music/
shifana@shifana-VirtualBox:~$ mv *.jpg ./Pictures/
shifana@shifana-VirtualBox:~$ mv *.mp4 ./Videos/
```

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.



```
shifana@shifana-VirtualBox:~$ mkdir -p {friends,family,work}
shifana@shifana-VirtualBox:~$ cp /home/shifana/Music song1.mp3 song2.mp3 song3.mp3 song4.mp3 song5.mp3 song6.mp3 /home/shifana/friends/
cp: -r not specified; omitting directory '/home/shifana/Music'
cp: cannot stat 'song1.mp3': No such file or directory
cp: cannot stat 'song2.mp3': No such file or directory
```

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

```
shifana@shifana-VirtualBox:~$ cp Music/song1.mp3 friends
shifana@shifana-VirtualBox:~$ cp Music/song2.mp3 friends
shifana@shifana-VirtualBox:~$ cp Music/song3.mp3 friends
shifana@shifana-VirtualBox:~$ cp Music/song4.mp3 friends
shifana@shifana-VirtualBox:~$ cp Music/song5.mp3 friends
shifana@shifana-VirtualBox:~$ cp Music/song6.mp3 friends
shifana@shifana-VirtualBox:~$ ls -R friends
friends:
song1.mp3 song2.mp3 song3.mp3 song4.mp3 song5.mp3 song6.mp3
shifana@shifana-VirtualBox:~$ cp Pictures/snap.jpg family
cp: cannot stat 'Pictures/snap.jpg': No such file or directory
shifana@shifana-VirtualBox:~$ cp Pictures/snap1.jpg family
shifana@shifana-VirtualBox:~$ cp Pictures/snap2.jpg family
shifana@shifana-VirtualBox:~$ cp Pictures/snap3.jpg family
shifana@shifana-VirtualBox:~$ cp Pictures/snap4.jpg family
shifana@shifana-VirtualBox:~$ cp Pictures/snap5.jpg family
shifana@shifana-VirtualBox:~$ cp Pictures/snap6.jpg family
shifana@shifana-VirtualBox:~$ ls -R family
family:
snap1.jpg snap2.jpg snap3.jpg snap4.jpg snap5.jpg snap6.jpg
```

5. Attempt to delete both family and friends projects with a single rmdir command
6. Use another command that will succeed in deleting both the family and friends folder.

```
shifana@shifana-VirtualBox:~$ rmdir {famiy,friends}
rmdir: failed to remove 'famiy': No such file or directory
rmdir: failed to remove 'friends': Directory not empty
shifana@shifana-VirtualBox:~$ rm -r friends family
shifana@shifana-VirtualBox:~$ ls
books    Documents  key1      Music      Public     Templates  work
Desktop  Downloads  key1.pub   Pictures   shifu.txt  Videos
```

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

```
shifana@shifana-VirtualBox:~$ ls -al>allfiles.txt
shifana@shifana-VirtualBox:~$ ls
allfiles.txt  Desktop  Downloads  key1.pub  Pictures  shifu.txt  Videos
books        Documents key1      Music     Public    Templates work
shifana@shifana-VirtualBox:~$ ls -al
total 100
drwxr-xr-x  18 shifana shifana 4096 Aug 17 21:56 .
drwxr-xr-x  3 root   root    4096 Jun 14 21:47 ..
-rw-rw-r--  1 shifana shifana 1481 Aug 17 21:56 allfiles.txt
-rw-----  1 shifana shifana 3504 Aug 13 19:35 .bash_history
-rw-r--r--  1 shifana shifana 220 Jun 14 21:47 .bash_logout
-rw-r--r--  1 shifana shifana 3771 Jun 14 21:47 .bashrc
drwxr-xrwx  2 shifu  shifana 4096 Aug 12 23:06 books
drwx----- 11 shifana shifana 4096 Aug 13 19:27 .cache
drwx----- 14 shifana shifana 4096 Aug 12 23:23 .config
drwxr-xr-x  3 shifana shifana 4096 Jun 22 19:48 Desktop
drwxr-xr-x  6 shifana shifana 4096 Aug 17 21:20 Documents
drwxr-xr-x  3 shifana shifana 4096 Aug 17 21:23 Downloads
drwx----- 3 shifana shifana 4096 Aug 17 21:24 .gnupg
-rw-----  1 shifana shifana 2610 Aug 13 19:31 key1
-rw-r--r--  1 shifana shifana 580 Aug 13 19:31 key1.pub
drwx----- 3 shifana shifana 4096 Jun 14 22:13 .local
drwxr-xr-x  2 shifana shifana 4096 Aug 17 21:41 Music
drwxr-xr-x  2 shifana shifana 4096 Aug 17 21:41 Pictures
```

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

```
shifana@shifana-VirtualBox: ~          shifana@shifana-VirtualBo
drwxrwxr-x  2 shifana shifana 4096 Aug 17 21:42 work
shifana@shifana-VirtualBox:~$ date
Tuesday 17 August 2021 09:56:29 PM IST
```

9. Add the user Juliet

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

```
shifana@shifana-VirtualBox:~$ sudo useradd juliet
[sudo] password for shifana:
Sorry, try again.
[sudo] password for shifana:
Sorry, try again.
[sudo] password for shifana:
shifana@shifana-VirtualBox:~$ cat /etc/passwd | grep juliet
juliet:x:2001:2001:::/home/juliet:/bin/sh
```

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

```
juliet:x:2001:2001::/home/juliet:/bin/sh
shifana@shifana-VirtualBox:~$ sudo passwd juliet
New password:
Retype new password:
passwd: password updated successfully
shifana@shifana-VirtualBox:~$ sudo groupadd -g 30000 Shakespeare
```

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

13. Create a supplementary group called artists

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

```
shifana@shifana-VirtualBox:~$ sudo groupadd -g 30000 Shakespeare
shifana@shifana-VirtualBox:~$ sudo groupadd -g 50000 artists
shifana@shifana-VirtualBox:~$ cat /etc/groups
cat: /etc/groups: No such file or directory
shifana@shifana-VirtualBox:~$ cat /etc/group
root:x:0:
daemon:x:1:
bin:x:2:
sys:x:3:
adm:x:4:syslog,shifana
tty:x:5:syslog
disk:x:6:
lp:x:7:
mail:x:8:
news:x:9:
uucp:x:10:
man:x:12:
proxy:x:13:
kmem:x:15:
dialout:x:20:
fax:x:21:
voice:x:22:
cdrom:x:24:shifana
floppy:x:25:
tape:x:26:
sudo:x:27:shifana
```

```
scanner:x:122:saned
saned:x:123:
nm-openvpn:x:124:
whoopsie:x:125:
colord:x:126:
geoclue:x:127:
pulse:x:128:
pulse-access:x:129:
gdm:x:130:
lxde:x:131:shifana
shifana:x:1000:
sambashare:x:132:shifana
systemd-coredump:x:999:
shifu:x:1001:
student:x:1002:
new_group:x:1004:
juliet:x:2001:
Shakespheare:x:30000:
artists:x:50000:
```

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

```
shifana@shifana-VirtualBox: ~ × shifana@shifana-VirtualBox: ~ ×
shifana@shifana-VirtualBox:~$ sudo usermod -a -G Shakespeare juliet
shifana@shifana-VirtualBox:~$ groups juliet
juliet : juliet Shakespeare
shifana@shifana-VirtualBox:~$ id juliet
```

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

```
shifana@shifana-VirtualBox:~$ groups juliet
juliet : juliet Shakespeare
shifana@shifana-VirtualBox:~$ id juliet
uid=2001(juliet) gid=2001(juliet) groups=2001(juliet),30000(Shakespeare)
shifana@shifana-VirtualBox:~$ sudo usermod -a -G Shakespeare Romeo
usermod: user 'Romeo' does not exist
```

17. Add Romeo and Hamlet to the Shakespeare group

```
shifana@shifana-VirtualBox:~$ sudo useradd Romeo
shifana@shifana-VirtualBox:~$ sudo useradd Hamlet
shifana@shifana-VirtualBox:~$ sudo usermod -G Shakespeare Romeo
shifana@shifana-VirtualBox:~$ sudo usermod -G Shakespeare Hamlet
shifana@shifana-VirtualBox:~$ groups Romeo
Romeo : Romeo Shakespeare
shifana@shifana-VirtualBox:~$ groups Hamlet
Hamlet : Hamlet Shakespeare
shifana@shifana-VirtualBox:~$ groups Romeo
Romeo : Romeo Shakespeare
shifana@shifana-VirtualBox:~$ groups Hamlet
Hamlet : Hamlet Shakespeare
```

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

```
shifana@shifana-VirtualBox:~$ sudo useradd Reba
shifana@shifana-VirtualBox:~$ sudo useradd Dolly
shifana@shifana-VirtualBox:~$ sudo usermod -a -G artists Reba
shifana@shifana-VirtualBox:~$ sudo usermod -a -G artists Dolly
shifana@shifana-VirtualBox:~$ groups Reba
Reba : Reba artists
shifana@shifana-VirtualBox:~$ groups Dolly
Dolly : Dolly artists
shifana@shifana-VirtualBox:~$ less /etc/group
```

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

20. Attempt to remove user Dolly.

```
shifana@shifana-VirtualBox:~$ less /etc/group
shifana@shifana-VirtualBox:~$ sudo userdel Dolly
shifana@shifana-VirtualBox:~$ █
```

# Q1. Ping, route, traceroute, nslookup, IpConfig, NetStat

## 1. Ping

ping is the primary TCP/IP command used to troubleshoot connectivity, reachability, and name resolution. Used without parameters, this command displays Help content.

```
shifana@shifana-VirtualBox:~$ ping www.facebook.com
PING star-mini.c10r.facebook.com (157.240.228.35) 56(84) bytes of data.
64 bytes from edge-star-mini-shv-01-tir2.facebook.com (157.240.228.35): icmp_se
q=1 ttl=56 time=182 ms
64 bytes from edge-star-mini-shv-01-tir2.facebook.com (157.240.228.35): icmp_se
q=2 ttl=56 time=419 ms
64 bytes from edge-star-mini-shv-01-tir2.facebook.com (157.240.228.35): icmp_se
q=3 ttl=56 time=430 ms
64 bytes from edge-star-mini-shv-01-tir2.facebook.com (157.240.228.35): icmp_se
q=4 ttl=56 time=660 ms
64 bytes from edge-star-mini-shv-01-tir2.facebook.com (157.240.228.35): icmp_se
q=5 ttl=56 time=169 ms
64 bytes from edge-star-mini-shv-01-tir2.facebook.com (157.240.228.35): icmp_se
q=6 ttl=56 time=119 ms
64 bytes from edge-star-mini-shv-01-tir2.facebook.com (157.240.228.35): icmp_se
q=7 ttl=56 time=360 ms
64 bytes from edge-star-mini-shv-01-tir2.facebook.com (157.240.228.35): icmp_se
q=8 ttl=56 time=398 ms
64 bytes from edge-star-mini-shv-01-tir2.facebook.com (157.240.228.35): icmp_se
q=9 ttl=56 time=359 ms
64 bytes from edge-star-mini-shv-01-tir2.facebook.com (157.240.228.35): icmp_se
q=10 ttl=56 time=278 ms
```

## 2. traceroute

Traceroute is a network diagnostic tool used to track in real-time the pathway taken by a packet on an IP network from source to destination, reporting the IP addresses of all the routers it pinged in between. Traceroute also records the time taken for each hop the packet makes during its route to the destination.

The difference between **tracert(windows)** and **traceroute(linux)** is that: tracert(windows) will only use ICMP echo requests. traceroute(linux) [and somewhat dependent on linux distro] default to UDP echo requests.

```
shifana@shifana-VirtualBox:~$ traceroute www.facebook.com
traceroute to www.facebook.com (157.240.228.35), 30 hops max, 60 byte packets
 1 _gateway (10.0.2.2)  0.935 ms  0.380 ms  0.262 ms
 2 _gateway (10.0.2.2)  12.102 ms  12.002 ms  11.704 ms
shifana@shifana-VirtualBox:~$
```

### 3. nslookup

Nslookup (stands for “Name Server Lookup”) is a **useful command for getting information from DNS server**. It is a network administration tool for querying the Domain Name System (DNS) to obtain domain name or IP address mapping or any other specific DNS record.

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

Non-authoritative answer:
Name:   google.com
Address: 142.250.196.14
Name:   google.com
Address: 2404:6800:4007:826::200e

shifana@shifana-VirtualBox:~$
```

### 4. netstat -l

The netstat command symbolically **displays the contents of various network-related data structures for active connections**. The Interval parameter, which is specified in seconds, continuously displays information regarding packet traffic on the configured network interfaces.

```
shifana@shifana-VirtualBox:~$ netstat -l
Active Internet connections (only servers)
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 localhost:domain        0.0.0.0:*
                                         LISTEN
udp      0      0 0.0.0.0:631           0.0.0.0:*
                                         LISTEN
udp      0      0 0.0.0.0:49798         0.0.0.0:*
                                         LISTEN
udp      0      0 0.0.0.0:mdns          0.0.0.0:*
                                         LISTEN
udp6     0      0 [::]:mdns           [::]:*
                                         LISTEN
udp6     0      0 [::]:45315          [::]:*
                                         LISTEN
raw6    0      0 [::]:ipv6-icmp        [::]:*
                                         LISTEN
Active UNIX domain sockets (only servers)
```

## 5. Route

The route command allows **you to make manual entries into the network routing tables**. The route command distinguishes between routes to hosts and routes to networks by interpreting the network address of the Destination variable, which can be specified either by symbolic name or numeric address.

```
shifana@shifana-VirtualBox:~$ sudo 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
shifana@shifana-VirtualBox:~$
```

## 6. Ipconfig

- ipconfig (standing for "Internet Protocol configuration") is a console application program of some computer operating systems that displays all current TCP/IP network configuration values and refreshes Dynamic Host Configuration Protocol (DHCP) and Domain Name System (DNS) settings.
- Ifconfig (interface configuration) command is used to configure the kernel-resident network interfaces. It is used at the boot time to set up the interfaces as necessary. After that, it is usually used when needed during debugging or when you need system tuning. Also, this command is used to assign the IP address and netmask to an interface or to enable or disable a given interface.
- The ifconfig command is supported by Unix-based operating systems. Functionality: The ipconfig command **displays all the currently connected network interfaces whether they are active or not**. On the other hand, the ifconfig command displays only the enabled network interfaces that are connected to the system.

```

shifana@shifana-VirtualBox:~$ sudo 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::cb03:20fb:434b:280c prefixlen 64 scopeid 0x20<link>
          ether 08:00:27:c9:3b:4c txqueuelen 1000 (Ethernet)
            RX packets 686 bytes 340023 (340.0 KB)
            RX errors 0 dropped 0 overruns 0 frame 0
            TX packets 652 bytes 71619 (71.6 KB)
            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 214 bytes 18424 (18.4 KB)
            RX errors 0 dropped 0 overruns 0 frame 0
            TX packets 214 bytes 18424 (18.4 KB)
            TX errors 0 dropped 0 overruns 0 carrier 0 collisions 0

```

shifana@shifana-VirtualBox:~\$

## **WINDOWS**

### **1. ping**

```

C:\Users\USER>ping www.facebook.com

Pinging star-mini.c10r.facebook.com [2a03:2880:f168:81:face:b00c:0:25de] with 32 bytes of data:
Reply from 2a03:2880:f168:81:face:b00c:0:25de: time=64ms
Reply from 2a03:2880:f168:81:face:b00c:0:25de: time=49ms
Reply from 2a03:2880:f168:81:face:b00c:0:25de: time=62ms
Reply from 2a03:2880:f168:81:face:b00c:0:25de: time=61ms

Ping statistics for 2a03:2880:f168:81:face:b00c:0:25de:
  Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
Approximate round trip times in milli-seconds:
    Minimum = 49ms, Maximum = 64ms, Average = 59ms

C:\Users\USER>

```

### **2. route**

```

C:\Users\USER>route www.facebook.com

Manipulates network routing tables.

ROUTE [-f] [-p] [-4|-6] command [destination]
          [MASK netmask] [gateway] [METRIC metric] [IF interface]

  -f      Clears the routing tables of all gateway entries. If this is
          used in conjunction with one of the commands, the tables are
          cleared prior to running the command.

  -p      When used with the ADD command, makes a route persistent across
          boots of the system. By default, routes are not preserved
          when the system is restarted. Ignored for all other commands,
          which always affect the appropriate persistent routes.

  -4      Force using IPv4.

  -6      Force using IPv6.

```

### 3. tracert

```
C:\Users\USER>tracert www.facebook.com

Tracing route to star-mini.c10r.facebook.com [2a03:2880:f168:81:face:b00c:0:25de]
over a maximum of 30 hops:

 1   3 ms    2 ms    2 ms  2401:4900:22da:f295::b0
 2   *         *         * Request timed out.
 3   41 ms   38 ms   96 ms  2404:a800:3a00:207::d
 4   92 ms   219 ms   52 ms  2404:a800::92
 5   85 ms   75 ms  118 ms  ae5.pr01.tir1.tfbnw.net [2620:0:1cff:dead:beee::952]
 6   84 ms   75 ms   75 ms  po101.psw03.tir2.tfbnw.net [2620:0:1cff:dead:bef0::797]
 7   82 ms   58 ms   72 ms  po7.msw1an.01.tir2.tfbnw.net [2a03:2880:f06d:ffff::153]
 8  170 ms   60 ms  100 ms  edge-star-mini6-shv-01-tir2.facebook.com [2a03:2880:f168:81:face:b00c:0:25de]

Trace complete.

C:\Users\USER>
```

### 4. netstat

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

Active Connections

  Proto  Local Address          Foreign Address        State
  TCP    0.0.0.0:135           DESKTOP-SC0QFQD:0      LISTENING
  TCP    0.0.0.0:445           DESKTOP-SC0QFQD:0      LISTENING
  TCP    0.0.0.0:2869          DESKTOP-SC0QFQD:0      LISTENING
  TCP    0.0.0.0:5040          DESKTOP-SC0QFQD:0      LISTENING
  TCP    0.0.0.0:49664          DESKTOP-SC0QFQD:0      LISTENING
  TCP    0.0.0.0:49665          DESKTOP-SC0QFQD:0      LISTENING
  TCP    0.0.0.0:49666          DESKTOP-SC0QFQD:0      LISTENING
  TCP    0.0.0.0:49667          DESKTOP-SC0QFQD:0      LISTENING
  TCP    0.0.0.0:49668          DESKTOP-SC0QFQD:0      LISTENING
  TCP    0.0.0.0:49699          DESKTOP-SC0QFQD:0      LISTENING
  TCP    127.0.0.1:49681        DESKTOP-SC0QFQD:49682    ESTABLISHED
  TCP    127.0.0.1:49682        DESKTOP-SC0QFQD:49681    ESTABLISHED
  TCP    127.0.0.1:56627        DESKTOP-SC0QFQD:56628    ESTABLISHED
  TCP    127.0.0.1:56628        DESKTOP-SC0QFQD:56627    ESTABLISHED
  TCP    127.0.0.1:56649        DESKTOP-SC0QFQD:56650    ESTABLISHED
  TCP    127.0.0.1:56650        DESKTOP-SC0QFQD:56649    ESTABLISHED
  TCP    127.0.0.1:56673        DESKTOP-SC0QFQD:56674    ESTABLISHED
  TCP    127.0.0.1:56674        DESKTOP-SC0QFQD:56673    ESTABLISHED
  TCP    127.0.0.1:57001        DESKTOP-SC0QFQD:57000    TIME_WAIT
  TCP    127.0.0.1:57003        DESKTOP-SC0QFQD:57002    TIME_WAIT
  TCP    127.0.0.1:57005        DESKTOP-SC0QFQD:57004    TIME_WAIT
  TCP    127.0.0.1:59821        DESKTOP-SC0QFQD:59822    ESTABLISHED
  TCP    127.0.0.1:59822        DESKTOP-SC0QFQD:59821    ESTABLISHED
  TCP    127.0.0.1:60889        DESKTOP-SC0QFQD:60890    ESTABLISHED
```

## 5. Ipconfig

```
C:\Users\USER>ipconfig

Windows IP Configuration

Ethernet adapter Ethernet:

    Media State . . . . . : Media disconnected
    Connection-specific DNS Suffix  . : INBLR.AILPONSSPXE1

Unknown adapter Local Area Connection:

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

Ethernet adapter VirtualBox Host-Only Network:

    Connection-specific DNS Suffix  . :
    Link-local IPv6 Address . . . . . : fe80::5c3a:c0e9:2c43:f32e%6
    IPv4 Address. . . . . : 192.168.56.1
    Subnet Mask . . . . . : 255.255.255.0
    Default Gateway . . . . . :
```

## 6. nslookup

```
C:\Users\USER>nslookup google.com
DNS request timed out.
    timeout was 2 seconds.
Server:  UnKnown
Address: 192.168.43.1

Non-authoritative answer:
Name:      google.com
Addresses: 2404:6800:4007:826::200e
          142.250.195.174

C:\Users\USER>
```

## **Q2. Identify and perform 5 more network commands**

### **1. Hostname**

A very simple command that displays the host name of your machine. This is much quicker than going to the control panel>system route.

```
142.250.195.174  
C:\Users\USER>hostname  
DESKTOP-SC0QFQD  
C:\Users\USER>getmac
```

### **2. getmac**

Another very simple command that shows the MAC address of your network interfaces.

```
C:\Users\USER>getmac  
  
Physical Address      Transport Name  
=====  =====  
D4-3B-04-10-B1-D3    Media disconnected  
80-FA-5B-68-6A-5D    Media disconnected  
D4-3B-04-10-B1-CF    \Device\Tcpip_{99F7E820-7B29-48BA-962A-93D070F9C54B}  
0A-00-27-00-00-06    \Device\Tcpip_{46E28028-8E89-476D-BA38-8F5F08960DC5}  
00-FF-85-B2-73-57    Media disconnected
```

### 3. arp

This is used for showing the **address resolution cache**. This command must be used with a command line switch **arp -a** is the most common.

```
C:\Users\USER>arp -a

Interface: 192.168.56.1 --- 0x6
  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: 192.168.43.175 --- 0x10
  Internet Address      Physical Address      Type
  192.168.43.1          06-bd-bf-96-e8-08    dynamic
  192.168.43.255        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
  255.255.255.255        ff-ff-ff-ff-ff-ff    static
```

### 4. nbtstat

The nbtstat command is a **diagnostic tool for NetBIOS over TCP/IP**. Its primary design is to help troubleshoot NetBIOS name resolution problems. The command is included in several versions of Microsoft Windows. When a network is functioning normally, NetBIOS over TCP/IP (NetBT) resolves NetBIOS names to IP addresses.

```
C:\Users\USER>nbtstat -r

      NetBIOS Names Resolution and Registration Statistics
-----
Resolved By Broadcast      = 0
Resolved By Name Server    = 0

Registered By Broadcast   = 195
Registered By Name Server = 0
```

## 5. pathping

The pathping command which provides a combination of the best aspects of Tracert and Ping. This command takes 300 seconds to gather statistics and then returns reports on latency and packet loss statistics at intermediate hops between the source and the target in more detail than those reports provided by Ping or Tracert commands.

```
C:\Users\USER>pathping www.facebook.com

Tracing route to star-mini.c10r.facebook.com [2a03:2880:f168:81:face:b00c:0:25de]
over a maximum of 30 hops:
  0  DESKTOP-SC0QFQD [2401:4900:22da:f295:7cdf:8b19:4b7e:fd57]
  1  2401:4900:22da:f295::b0
  2  *       *       *
Computing statistics for 25 seconds...
          Source to Here  This Node/Link
Hop  RTT     Lost/Sent = Pct  Lost/Sent = Pct  Address
  0          0/ 100 =  0%          0/ 100 =  0%  DESKTOP-SC0QFQD [2401:4900:22da:f295:7cdf:8b19:4b7e:fd57]
  1  8ms     0/ 100 =  0%          0/ 100 =  0%  2401:4900:22da:f295::b0

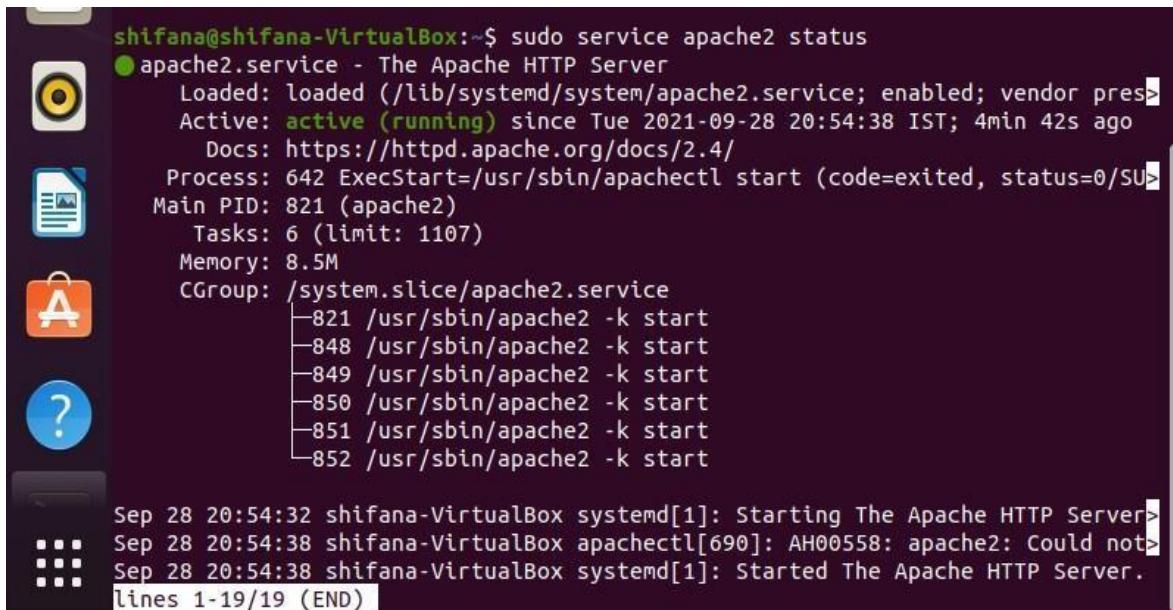
Trace complete.

C:\Users\USER>
```

## INSTALL LAMP IN UBUNTU

### Install Apache2

- **Update your system**  
[Sudo apt update](#)
- **Install Apache using apt**  
[Sudo apt install apache2](#)
- **Confirm that Apache is now running with the following command**  
[Sudo systemctl status apache2](#)

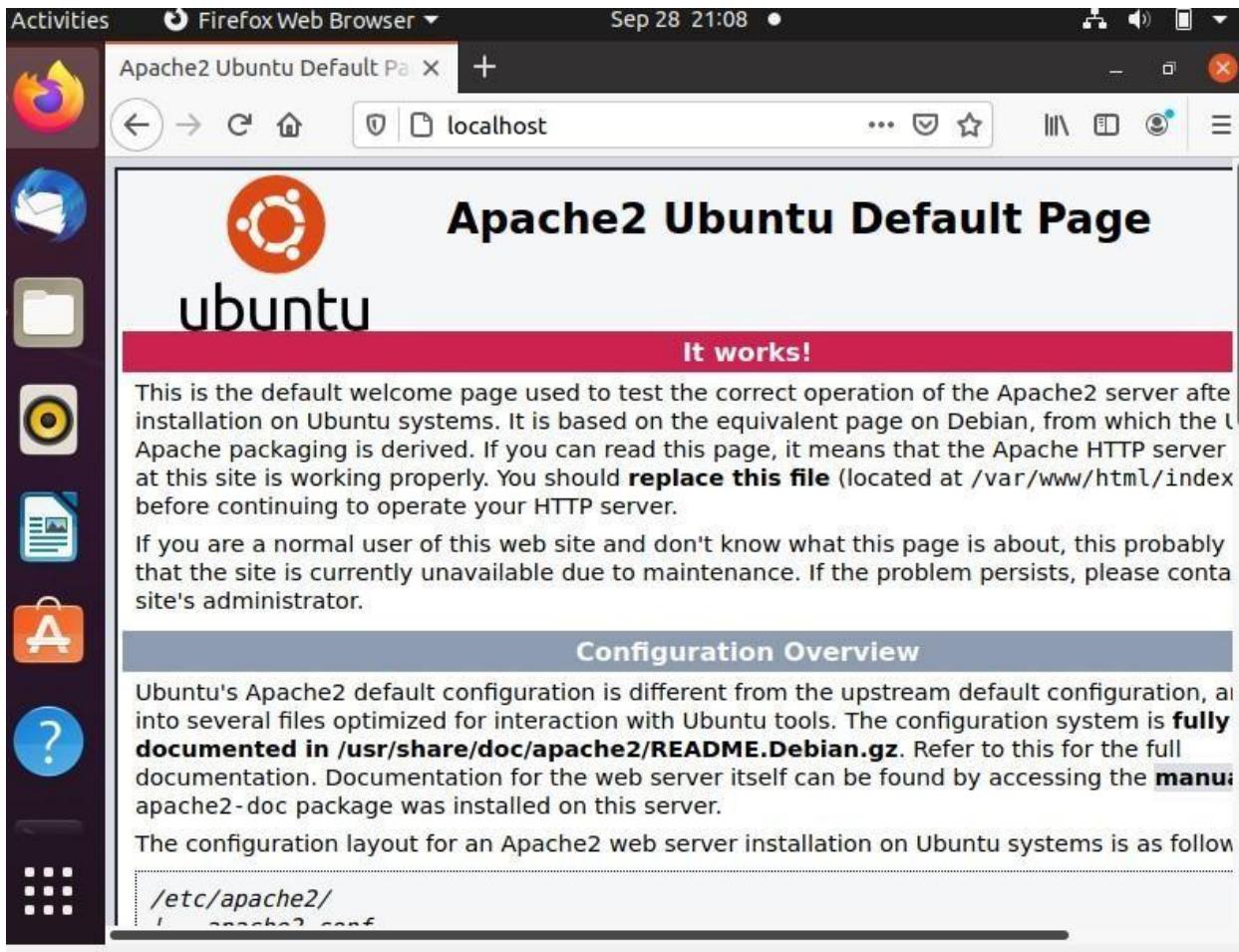


```
shifana@shifana-VirtualBox:~$ sudo service apache2 status
● apache2.service - The Apache HTTP Server
   Loaded: loaded (/lib/systemd/system/apache2.service; enabled; vendor pres>
   Active: active (running) since Tue 2021-09-28 20:54:38 IST; 4min 42s ago
     Docs: https://httpd.apache.org/docs/2.4/
   Process: 642 ExecStart=/usr/sbin/apachectl start (code=exited, status=0/SU>
 Main PID: 821 (apache2)
   Tasks: 6 (limit: 1107)
  Memory: 8.5M
    CGroup: /system.slice/apache2.service
            ├─821 /usr/sbin/apache2 -k start
            ├─848 /usr/sbin/apache2 -k start
            ├─849 /usr/sbin/apache2 -k start
            ├─850 /usr/sbin/apache2 -k start
            ├─851 /usr/sbin/apache2 -k start
            └─852 /usr/sbin/apache2 -k start

Sep 28 20:54:32 shifana-VirtualBox systemd[1]: Starting The Apache HTTP Server>
Sep 28 20:54:38 shifana-VirtualBox apachectl[690]: AH00558: apache2: Could not>
Sep 28 20:54:38 shifana-VirtualBox systemd[1]: Started The Apache HTTP Server.
lines 1-19/19 (END)
```

- Once installed test by accessing your servers IP in your browser

<http://localhost>

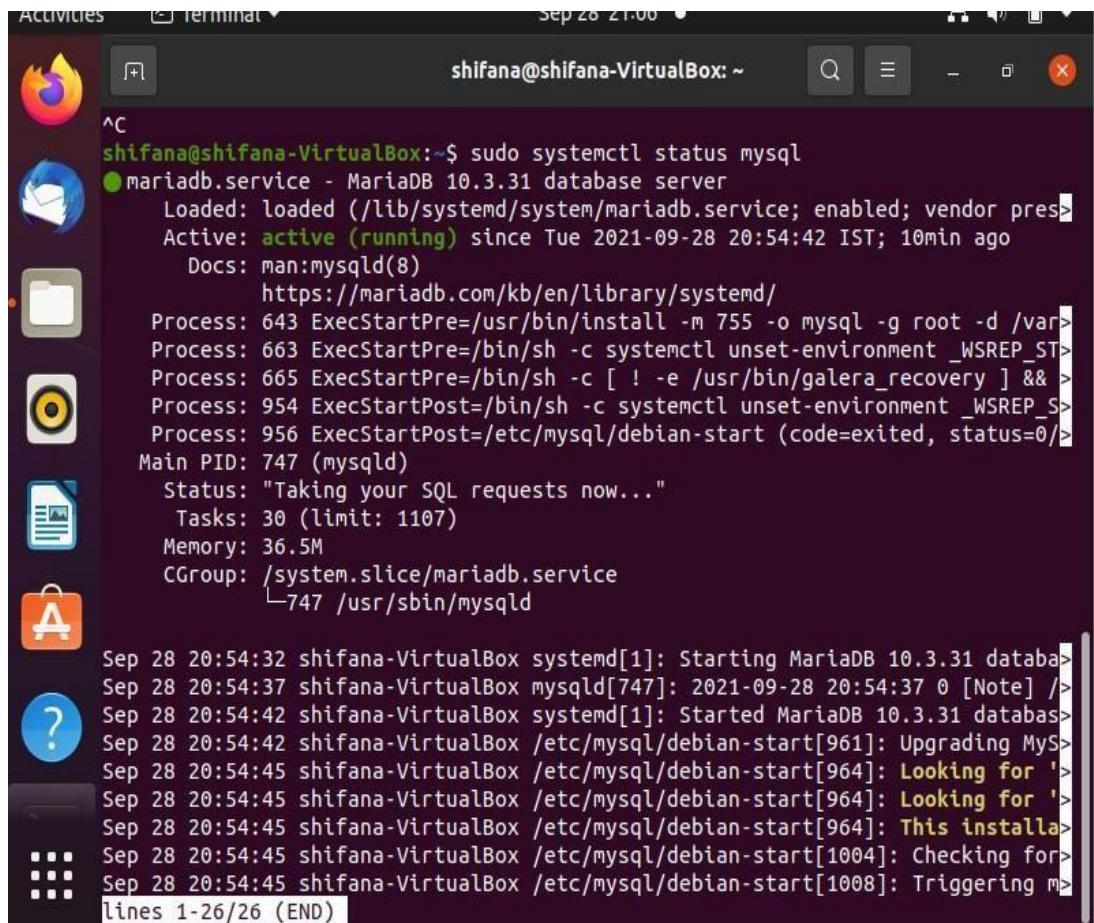


## Install mariadb

Sudo apt install mariadb-server mariadb-client

➤ To check status

Sudo systemctl status mysql



A screenshot of an Ubuntu desktop environment. On the left is a dock with icons for various applications like the Dash, Home, and System Settings. In the center is a terminal window titled 'Terminal' with the command 'shifana@shifana-VirtualBox: ~'. The terminal shows the output of the command 'sudo systemctl status mysql'. It indicates that the mariadb.service is active (running) since September 28, 2021, at 20:54:42 IST, for 10 minutes. The process ID is 747 (mysqld). The status message says "Taking your SQL requests now...". Below this, there is a log of MySQL startup messages from September 28, 2021, at 20:54:32, detailing the start of the MariaDB database and the upgrade process.

```
shifana@shifana-VirtualBox:~$ sudo systemctl status mysql
● mariadb.service - MariaDB 10.3.31 database server
   Loaded: loaded (/lib/systemd/system/mariadb.service; enabled; vendor pres>
   Active: active (running) since Tue 2021-09-28 20:54:42 IST; 10min ago
     Docs: man:mysqld(8)
           https://mariadb.com/kb/en/library/systemd/
  Process: 643 ExecStartPre=/usr/bin/install -m 755 -o mysql -g root -d /var>
  Process: 663 ExecStartPre=/bin/sh -c systemctl unset-environment _WSREP_ST>
  Process: 665 ExecStartPre=/bin/sh -c [ ! -e /usr/bin/galera_recovery ] && >
  Process: 954 ExecStartPost=/bin/sh -c systemctl unset-environment _WSREP_S>
  Process: 956 ExecStartPost=/etc/mysql/debian-start (code=exited, status=0/>
 Main PID: 747 (mysqld)
   Status: "Taking your SQL requests now..."
      Tasks: 30 (limit: 1107)
     Memory: 36.5M
        CGroup: /system.slice/mariadb.service
                  └─747 /usr/sbin/mysqld

Sep 28 20:54:32 shifana-VirtualBox systemd[1]: Starting MariaDB 10.3.31 database>
Sep 28 20:54:37 shifana-VirtualBox mysqld[747]: 2021-09-28 20:54:37 0 [Note] />
Sep 28 20:54:42 shifana-VirtualBox systemd[1]: Started MariaDB 10.3.31 database>
Sep 28 20:54:42 shifana-VirtualBox /etc/mysql/debian-start[961]: Upgrading MyS>
Sep 28 20:54:45 shifana-VirtualBox /etc/mysql/debian-start[964]: Looking for '>
Sep 28 20:54:45 shifana-VirtualBox /etc/mysql/debian-start[964]: Looking for '>
Sep 28 20:54:45 shifana-VirtualBox /etc/mysql/debian-start[964]: This installa>
Sep 28 20:54:45 shifana-VirtualBox /etc/mysql/debian-start[1004]: Checking for>
Sep 28 20:54:45 shifana-VirtualBox /etc/mysql/debian-start[1008]: Triggering m>
lines 1-26/26 (END)
```

- Secure your newly installed mariadb service  
[Sudo mysql\\_secure\\_installation](#)

## Install PHP and commonly used modules

[Sudo apt install php libapache2-mod-php php-ocache php-cli php-gd php-curl php-mysql](#)

- [Sudo systemctl restart apache2](#)
- Test PHP processing on web server  
[Sudo nano /var/www/html/phpinfo.php](#)
- Inside the file,type in valid php code  

```
<?php
    phpinfo ();
?>
```
- [http://localhost/phpinfo.php](#)

The screenshot shows a Firefox browser window with the title "PHP 7.4.3 - phpinfo()". The address bar indicates the URL is "127.0.0.1/phpinfo.php". The main content area displays the "PHP Version 7.4.3" page. A table lists several PHP configuration parameters:

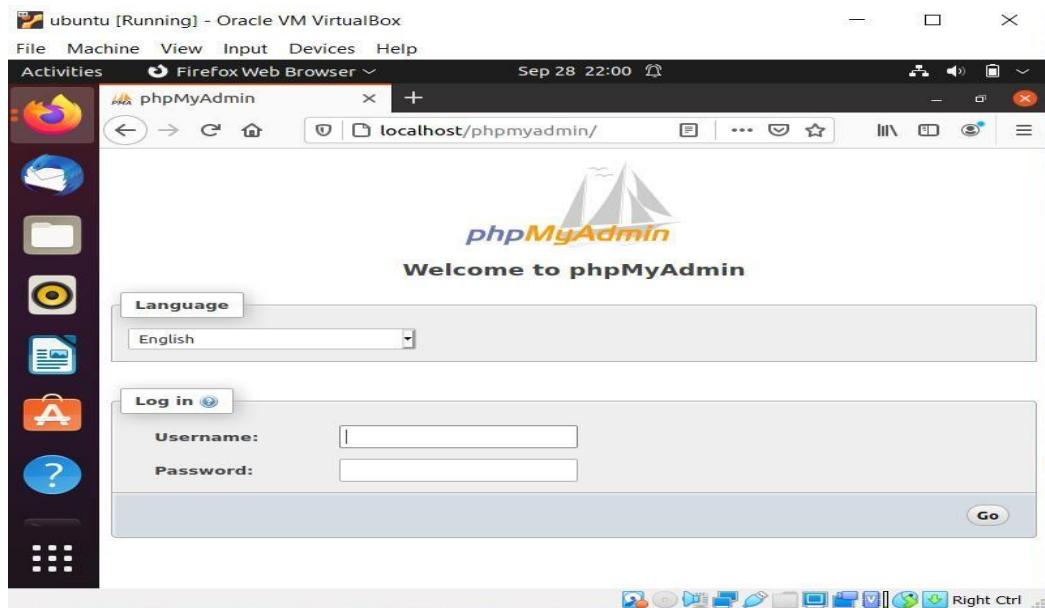
<b>System</b>	Linux shifana-VirtualBox 5.8.0-55-generic #62~20.04.1-Ubuntu x86_64
<b>Build Date</b>	Jul 5 2021 15:13:35
<b>Server API</b>	Apache 2.0 Handler
<b>Virtual Directory Support</b>	disabled
<b>Configuration File (php.ini) Path</b>	/etc/php/7.4/apache2
<b>Loaded Configuration File</b>	/etc/php/7.4/apache2/php.ini
<b>Scan this dir for additional .ini files</b>	/etc/php/7.4/apache2/conf.d
<b>Additional .ini files parsed</b>	/etc/php/7.4/apache2/conf.d/10-mysqli.ini, /etc/php/7.4/apache2/conf.d/10-pdo.ini, /etc/php/7.4/apache2/conf.d/15-x20-bz2.ini, /etc/php/7.4/apache2/conf.d/20-calendar.ini, /etc/php/7.4/apache2/conf.d/20-curl.ini, /etc/php/7.4/apache2/conf.d/20-exif.ini, /etc/php/7.4/apache2/conf.d/20-ff20-finfo.ini, /etc/php/7.4/apache2/conf.d/20-ftp.ini, /etc/php/7.4/apache2/conf.d/20-gettext.ini, /etc/php/7.4/apache2/conf.d/20-json.ini, /etc/php/7.4/apache2/conf.d/20-mbstring.ini, /etc/php/7.4/apache2/conf.d/20-pdo_mysql.ini, /etc/php/7.4/apache2/conf.d/20-posix.ini, /etc/php/7.4/apache2/conf.d/20-shmop.ini, /etc/php/7.4/apache2/conf.d/20-sockets.ini, /etc/php/7.4/apache2/conf.d/20-sysvsem.ini, /etc/php/7.4/apache2/conf.d/20-sysvshm.ini

## Install phpmyadmin

Sudo apt install phpmyadmin php-mbstring php-zip php-gd php-json php-curl

```
shifana@shifana-VirtualBox:~$ sudo apt-get install phpmyadmin
Reading package lists... Done
Building dependency tree
Reading state information... Done
phpmyadmin is already the newest version (4:4.9.5+dfsg1-2).
0 upgraded, 0 newly installed, 0 to remove and 317 not upgraded.
shifana@shifana-VirtualBox:~$ sudo systemctl restart apache2
shifana@shifana-VirtualBox:~$ sudo nano /etc/apache2/apache2.conf
shifana@shifana-VirtualBox:~$ sudo systemctl restart apache2
shifana@shifana-VirtualBox:~$ sudo /etc/init.d/apache2 restart
Restarting apache2 (via systemctl): apache2.service.
```

- Sudo systemctl restart apache2
  - http://localhost/phpmyadmin  
username: root  
password: your password
  - if phpmyadmin page not found
  - sudo nano /etc/apache2/apache2.conf
- Add this line to last of the line
- Include /etc/phpmyadmin/apache.conf
  - Restart apache2
  - Sudo systemctl restart apache2-now try
  - http://localhost/phpmyadmin
  - If any problem for login run the following command  
 Sudo mysql  
 ALTER USER root@localhost IDENTIFIED BY "yourpassword";



@ 127.0.0.1 / localhost | p X

++ C' 6 a 0 127.0.0.1/phmyadmin/index.php ... !Z/ 0 III1 EEI @ E

¥ Databases SQL i@ Status .!...! user accounts Export ImpoU #

Change password



Server connection collation : uLF8mb4 unicode ci



@ Language @ English



Theme: pmahamme

• Font size: 82%

Flare settings

Console

## **STEPS FOR THE INSTALLATION OF ANSIBLE**

### **Command**

Sudo apt-get install ansible

```
shifana@shifana-VirtualBox:~$ sudo apt-get install ansible
Reading package lists... Done
Building dependency tree
Reading state information... Done
The following additional packages will be installed:
  ieee-data python3-argcomplete python3-crypto python3-distutils
  python3-dnspython python3-jinja2 python3-jmespath python3-kerberos
  python3-lib2to3 python3-libcloud python3-netaddr python3-ntlm-auth
  python3-requests-kerberos python3-requests-ntlm python3-selinux
  python3-winrm python3-xmldict
Suggested packages:
  cowsay sshpass python-jinja2-doc ipython3 python-netaddr-docs
The following NEW packages will be installed:
  ansible ieee-data python3-argcomplete python3-crypto python3-distutils
  python3-dnspython python3-jinja2 python3-jmespath python3-kerberos
  python3-libcloud python3-netaddr python3-ntlm-auth
  python3-requests-kerberos python3-requests-ntlm python3-selinux
  python3-winrm python3-xmldict
The following packages will be upgraded:
  python3-lib2to3
1 upgraded, 17 newly installed, 0 to remove and 316 not upgraded.
Need to get 9,942 kB of archives.
After this operation, 92.0 MB of additional disk space will be used.
Do you want to continue? [Y/n] y
Get:1 http://in.archive.ubuntu.com/ubuntu focal/main amd64 python3-jinja2 all 2
.10.1-2 [95.5 kB]
Get:2 http://in.archive.ubuntu.com/ubuntu focal/main amd64 python3-crypto amd64
 2.6.1-13ubuntu2 [237 kB]
```

### **Command**

ansible version

```
shifana@shifana-VirtualBox:~$ ansible --version
ansible 2.9.6
  config file = /etc/ansible/ansible.cfg
  configured module search path = ['/home/shifana/.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 = 3.8.5 (default, Jul 28 2020, 12:59:40) [GCC 9.3.0]
shifana@shifana-VirtualBox:~$
```

## Tcpdump installation

- Sudo apt install tcpdump
- Sudo tcpdump

```
shifana@shifana-VirtualBox:~$ sudo apt install tcpdump
Reading package lists... Done
Building dependency tree
Reading state information... Done
tcpdump is already the newest version (4.9.3-4).
0 upgraded, 0 newly installed, 0 to remove and 316 not upgraded.
shifana@shifana-VirtualBox:~$ sudo tcpdump
tcpdump: verbose output suppressed, use -v or -vv for full protocol decode
listening on enp0s3, link-type EN10MB (Ethernet), capture size 262144 bytes
07:39:23.109296 IP shifana-VirtualBox.36374 > golem.canonical.com.ntp: NTPv4, C
lient, length 48
07:39:23.141532 IP shifana-VirtualBox.47832 > 192.168.43.1.domain: 11314+ [1au]
    PTR? 199.89.189.91.in-addr.arpa. (55)
07:39:23.359254 IP 192.168.43.1.domain > shifana-VirtualBox.47832: 11314 1/0/1
    PTR golem.canonical.com. (88)
07:39:23.359254 IP golem.canonical.com.ntp > shifana-VirtualBox.36374: NTPv4, S
erver, length 48
07:39:21.618816 IP shifana-VirtualBox.35615 > 192.168.43.1.domain: 44084+ [1au]
    PTR? 15.2.0.10.in-addr.arpa. (51)
07:39:21.672195 IP 192.168.43.1.domain > shifana-VirtualBox.35615: 44084 NXDoma
in 0/1/1 (128)
07:39:21.674444 IP shifana-VirtualBox.35615 > 192.168.43.1.domain: 44084+ PTR?
    15.2.0.10.in-addr.arpa. (40)
07:39:21.677096 IP 192.168.43.1.domain > shifana-VirtualBox.35615: 44084 NXDoma
in 0/0/0 (40)
07:39:21.704387 IP shifana-VirtualBox.35757 > 192.168.43.1.domain: 41254+ [1au]
    PTR? 1.43.168.192.in-addr.arpa. (54)
07:39:21.799889 IP 192.168.43.1.domain > shifana-VirtualBox.35757: 41254 NXDoma
in 0/1/1 (131)
```

- `tcpdump -D`
- `tcpdump -i enp0s3`
- `sudo tcpdump -c 5`
- `Sudo tcpdump -i enp0s3 -c 5 port 80`

```

07:55:29.934420 ARP, Reply _gateway is-at 52:54:00:12:35:02 (oui Unknown), length 46
07:55:52.779718 IP golem.canonical.com.ntp > shifana-VirtualBox.35947: NTPv4, Server, length 48
^C
305 packets captured
305 packets received by filter
0 packets dropped by kernel
shifana@shifana-VirtualBox:~$ tcpdump -D
1.enp0s3 [Up, Running]
2.lo [Up, Running, Loopback]
3.any (Pseudo-device that captures on all interfaces) [Up, Running]
4.bluetooth-monitor (Bluetooth Linux Monitor) [none]
5.nflog (Linux netfilter log (NFLOG) interface) [none]
6.nfqueue (Linux netfilter queue (NFQUEUE) interface) [none]
shifana@shifana-VirtualBox:~$ tcpdump -i enp0s3
tcpdump: enp0s3: You don't have permission to capture on that device
(socket: Operation not permitted)
shifana@shifana-VirtualBox:~$ sudo tcpdump -c 5
[sudo] password for shifana:
tcpdump: verbose output suppressed, use -v or -vv for full protocol decode
listening on enp0s3, link-type EN10MB (Ethernet), capture size 262144 bytes
^C
0 packets captured
0 packets received by filter
0 packets dropped by kernel
shifana@shifana-VirtualBox:~$ sudo tcpdump -i enp0s3 -c 5 port 80
tcpdump: verbose output suppressed, use -v or -vv for full protocol decode
listening on enp0s3, link-type EN10MB (Ethernet), capture size 262144 bytes

```

- tcpdump host 10.0.2.15
- tcpdump -I eth1 icmp  
Sudo tcpdump -n -i enp0s3 -c 10 -w icmp.pcap

```
0 packets dropped by kernel
shifana@shifana-VirtualBox:~$ tcpdump host 10.0.2.15
tcpdump: enp0s3: You don't have permission to capture on that device
(socket: Operation not permitted)
shifana@shifana-VirtualBox:~$ tcpdump -i eth1 icmp
tcpdump: eth1: You don't have permission to capture on that device
(socket: Operation not permitted)
shifana@shifana-VirtualBox:~$ sudo tcpdump -c 5
tcpdump: verbose output suppressed, use -v or -vv for full protocol decode
listening on enp0s3, link-type EN10MB (Ethernet), capture size 262144 bytes
^C
0 packets captured
0 packets received by filter
0 packets dropped by kernel
shifana@shifana-VirtualBox:~$ sudo tcpdump -n -i enp0s3 -c 10 -w
tcpdump: option requires an argument -- 'w'
tcpdump version 4.9.3
libpcap version 1.9.1 (with TPACKET_V3)
OpenSSL 1.1.1f  31 Mar 2020
Usage: tcpdump [ -aAbdDefhHIJKLMNOPqStuUvxX# ] [ -B size ] [ -c count ]
        [ -C file_size ] [ -E algo:secret ] [ -F file ] [ -G seconds ]
        [ -i interface ] [ -j tstamptype ] [ -M secret ] [ --number ]
        [ -Q inout|inout ]
        [ -r file ] [ -s snaplen ] [ --time-stamp-precision precision ]
        [ --immediate-mode ] [ -T type ] [ --version ] [ -V file ]
        [ -w file ] [ -W filecount ] [ -y datalinktype ] [ -z postrotat
e-command ]
        [ -Z user ] [ expression ]
shifana@shifana-VirtualBox:~$ █
```

## SHELL SCRIPTING

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

```
echo "enter details and view"
echo enter your name
read name
echo enter your college name
read c
clear
echo Details you entered
echo Name:$name
echo College:$c
```

### OUTPUT:

```
user@user-VirtualBox:~$ bash 1.sh
enter details and view
enter your name
sreya
enter your college name
amal jyothi college
```

```
Details you entered
Name:sreya
College:amal jyothi college
user@user-VirtualBox:~$
```

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

```
echo "Display value of a variable"
a=50
echo $a
```

### OUTPUT:

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

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

```
echo enter a number
read a
echo enter another number
read b
echo enter operation
echo "\n1.addition\n2.subtraction\n3.multiplication\n4.division"
read op
case "$op" in
"1") echo "a+b=$((a+b));;
"2") echo "a-b=$((a-b));;
"3") echo "a*b=$((a*b));;
"4") echo "a/b=$((a/b));;
esac
```

*OUTPUT:*

```
user@user-VirtualBox:~$ bash 3.sh
enter a number
7
enter another number
8
enter operation
\n1.addition \n2.subtraction \n3.multiplication \n4.division
2
a-b=-1
```

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

```
echo enter a number
read a
if[$a -eq 10];
then
echo "number found"
else
echo "not found"
fi
```

## OUTPUT:

```
user@user-VirtualBox:~$ bash 4.sh
enter a number
9
not found
```

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

```
echo "Today is $(date)"
echo "calender:"
cal
```

## OUTPUT:

```
user@user-VirtualBox:~$ bash 5.sh
Today is Saturday 02 October 2021 05:53:45 PM IST
calender:
      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
```

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

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

```
echo enter a number
read n
x=$(( $n % 2 ))
if [ $x -eq 0 ];
then
echo "number is even"
else
echo "number is odd"
fi
```

## OUTPUT:

```
user@user-VirtualBox:~$ bash 6.sh
enter a number
4
number is even
```

## 7. Write a shell script to check a number is greater than, less

*than or equal to another number.*

```
echo enter first number
read a
echo enter second number
read b
if [ $a -gt $b ];
then
echo "$a is larger"
elif [ $b -gt $a ];
then
echo "$b is larger"
else
echo "both are equal"
fi
```

**OUTPUT:**

```
user@user-VirtualBox:~$ bash 7.sh
enter first number
54
enter second number
34
54 is larger
```

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

```
s=0
for ((i=0;i<=10;i++))
do
s=`expr $s + $i`
done
echo "sum of first 10 numbers=$s"
```

**OUTPUT:**

```
user@user-VirtualBox:~$ bash 8.sh
sum of first 10 numbers=55
```

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

```
echo please enter your first number
read a
echo please enter your second number
```

```
read b
echo please enter your third number
read c
echo please enter your fourth number
read d
sum=$((a + b + c + d))
prod=$((a * b * c * d))
avg=$(echo $sum/4 | bc -l)
echo "the sum is:$sum"
echo "the average is:$avg"
echo "the product is:$prod"
```

### OUTPUT:

```
user@user-VirtualBox:~$ bash 9.sh
please enter your first number
1
please enter your second number
2
please enter your third number
3
please enter your fourth number
4
the sum is:10
the average is:2.50000000000000000000000000
the product is:24
```

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

```
echo enter first number
read a
echo enter second number
read b
echo enter third number
read c
if[$a-lt$b];
then
if[$a-lt$c];
then
echo "$a is smallest"
fi
elif[$b-lt$c];
then
echo "$b is smallest"
else
echo "$c is smallest";
fi
```

## **OUTPUT:**

```
user@user-VirtualBox:~$ bash 10.sh
enter first number
5
enter second number
2
enter third number
6
2 is smallest
```

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

```
echo enter a number
read n
f=1
for ((i=2;i<=n;i++))
do
f=$(($f*$i))
done
echo "factorial is $f"
```

## **OUTPUT:**

```
user@user-VirtualBox:~$ bash 11.sh
enter a number
5
factorial is 120
```

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

```
echo enter a number
read n
rev=$(echo $n | rev)
if [ $n -eq $rev ];
then
echo "number is palindrome"
else
echo "number is not palindrome"
fi
```

*13. Write a shell script to find the average of the numbers entered in commandline.*

```
echo enter size
read n
i=1
s=0
echo "enter numbers"
while [ $i -le $n ]
do
read num
s=$((s+num))
i=$((i+1))
done
avg=$(echo $s/$n | bc -l)
echo "average is $avg"
```

**OUTPUT:**

```
user@user-VirtualBox:~$ bash 13.sh
enter size
5
enter numbers
6
7
8
9
4
average is 6.800000000000000000000000
```

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

```
echo enter a number
read n
s=0
while [ $n -gt 0 ]
do
mod=$((n%10))
s=$((s+mod))
n=$((n/10))
done
echo "sum of digit is $s"
```

```
user@user-VirtualBox:~$ bash 14.sh
enter a number
678
sum of digit is 21
```

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

```
echo enter year
read y
a=$((y%4))
b=$((y%100))
c=$((y%400))
if [ $a -eq 0 -a $b -ne 0 -o $c -eq 0 ];
then
echo "$y is leap year"
else
echo "$y is leap year"
fi
```

```
user@user-VirtualBox:~$ bash 15.sh
enter year
1994
1994 is leap year
```

# Docker installation on Windows 10

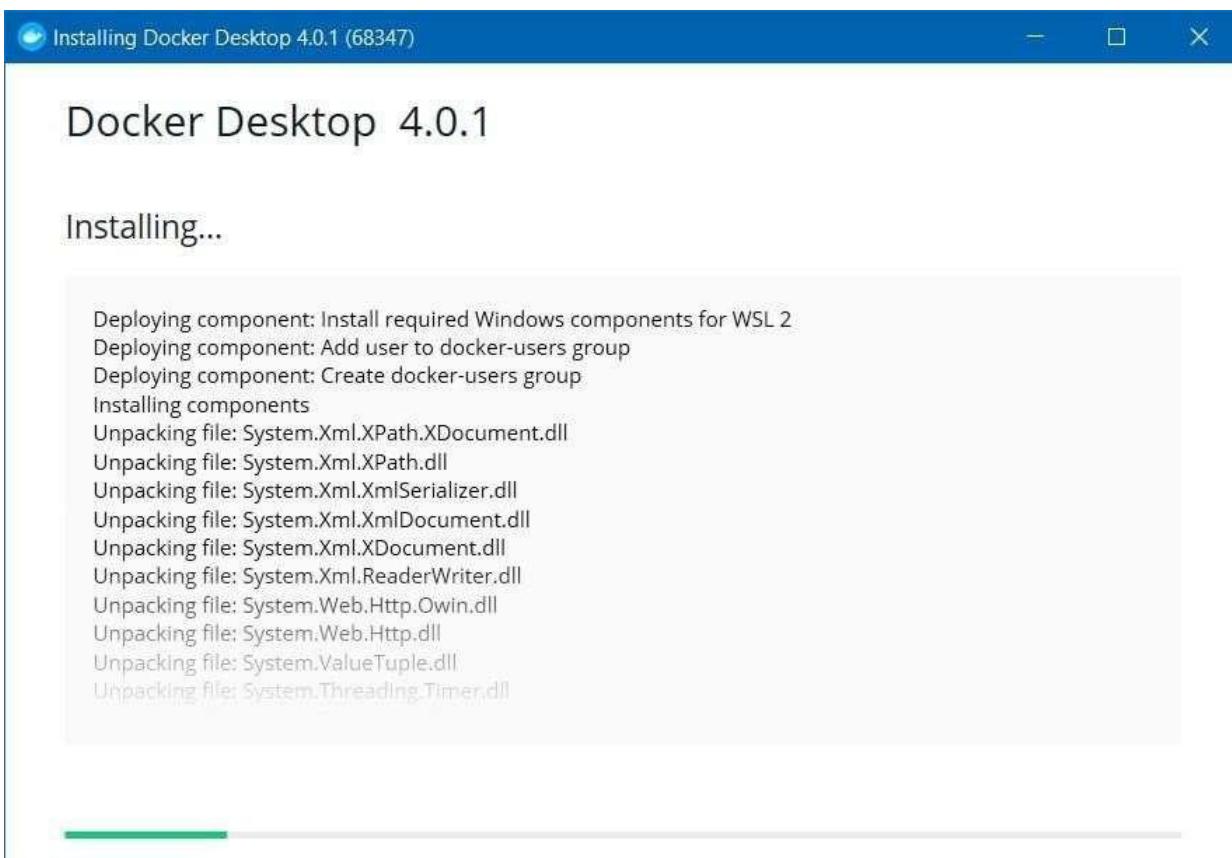
## Step-I

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



## Step-II

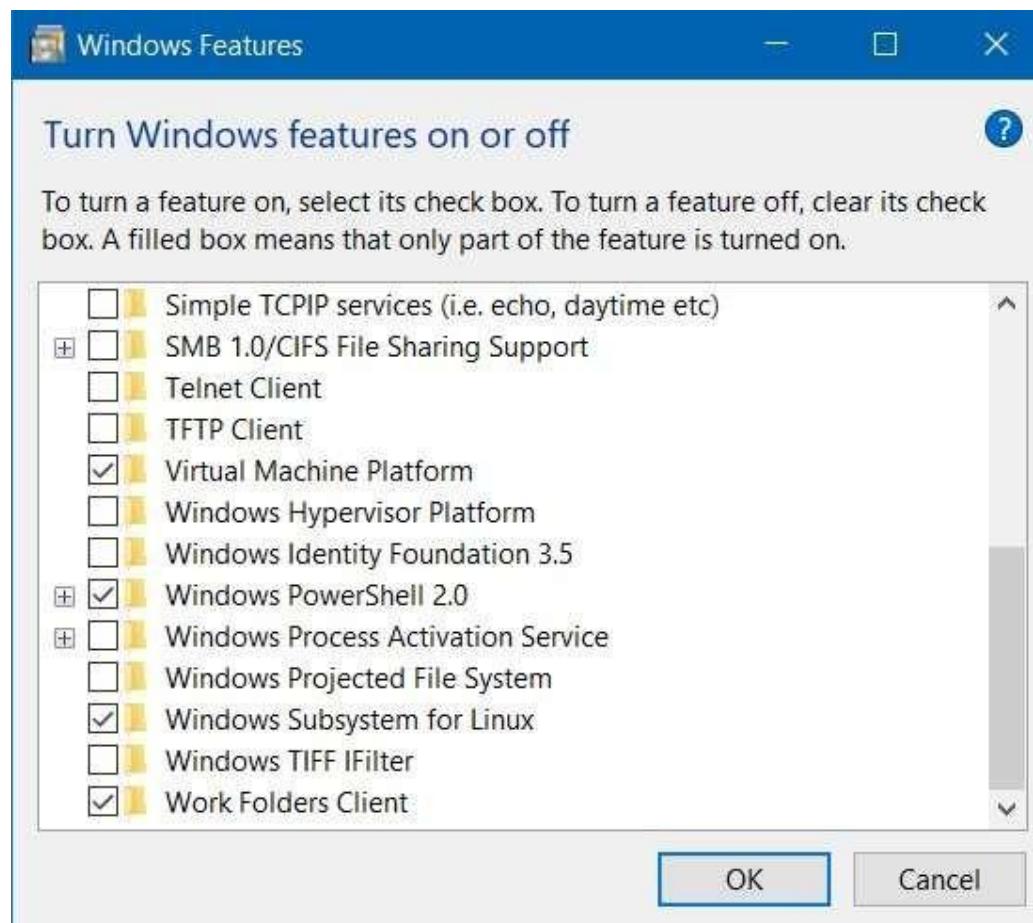
Open the .exe file and follow the steps after clicking install button.



## Step-III

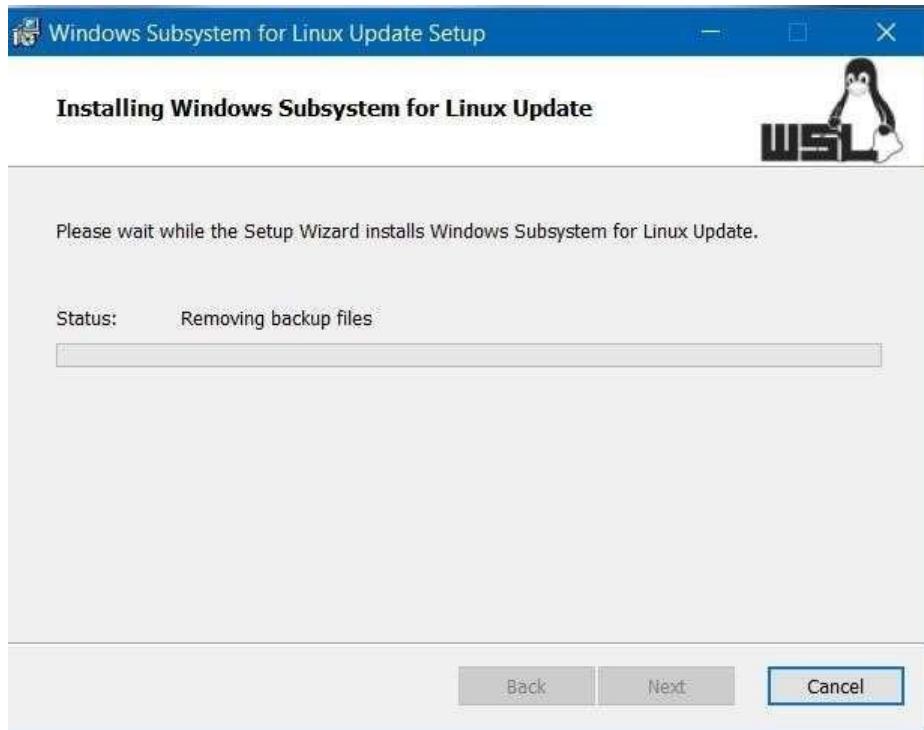
Once installed go to programs and features and click turn on windows features on or off

Scroll to the bottom and select windows subsystem for Linux



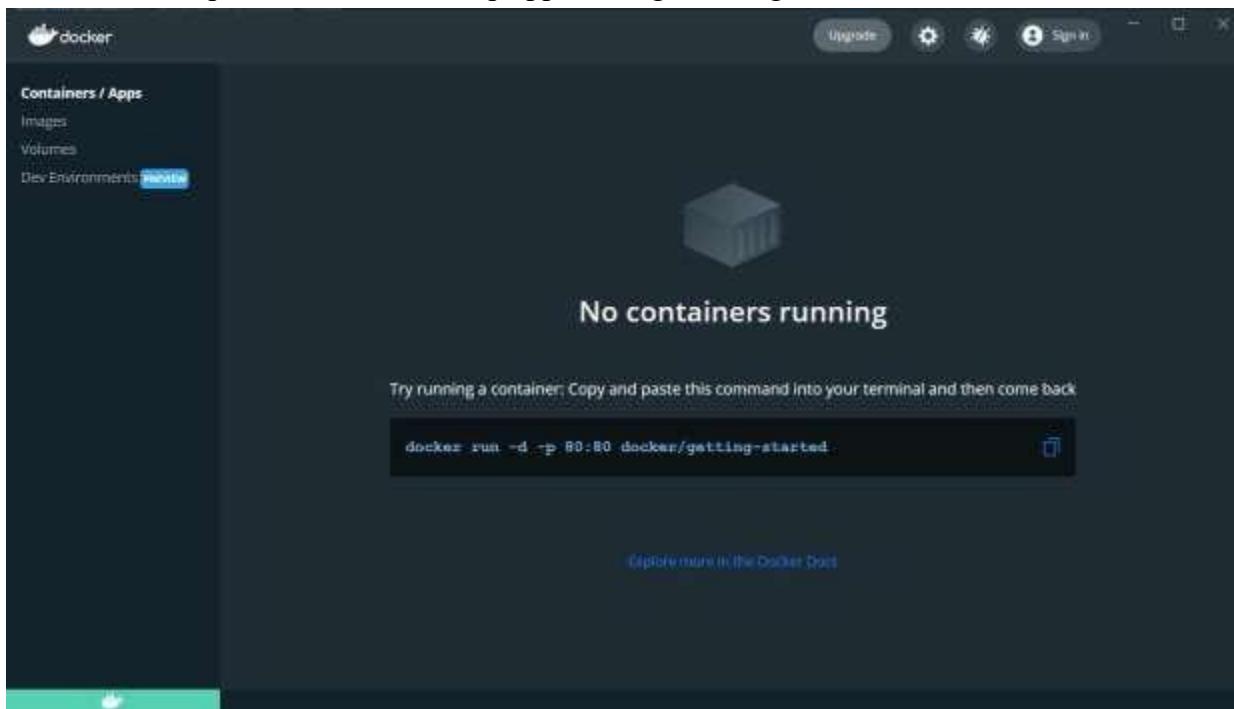
#### Step-IV

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-V

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



## Step-VI

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

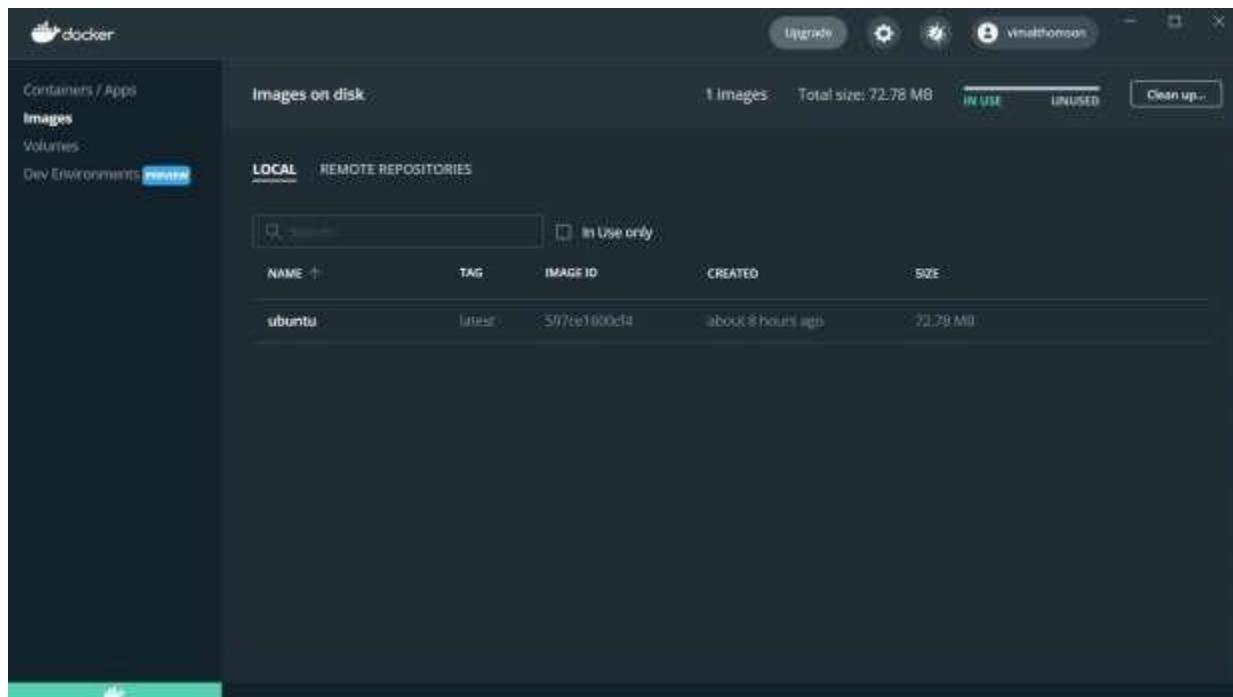
```
Administrator: Command Prompt
Microsoft Windows [Version 10.0.19042.1081]
(c) Microsoft Corporation. All rights reserved.

C:\Windows\system32>docker run -d -p 80:80 docker/getting-started
Unable to find image 'docker/getting-started:latest' locally
docker: Error response from daemon: Get "https://registry-1.docker.io/v2/": dial tcp: lookup registry-1.docker.io on 192.168.65.53: no such host.
See 'docker run --help'.

C:\Windows\system32>docker pull ubuntu
Using default tag: latest
latest: Pulling from library/ubuntu
F3ef4fff62e0d: Pull complete
Digest: sha256:65de08a8dabf289ef114053eb32f79e0c333a4fbfa1fe3778bb13ae921a7849b
Status: Downloaded newer image for ubuntu:latest
docker.io/library/ubuntu:latest

C:\Windows\system32>
```

Now in the images tab an image of ubuntu will be displayed, we can run the ubuntu instance usin



## Wireshark installation

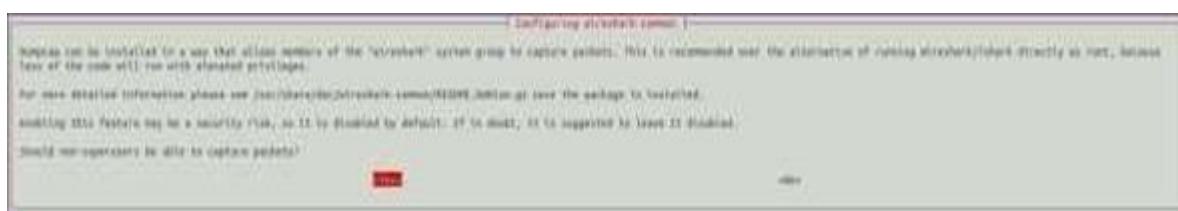
1. Command:sudo apt-get install wireshark

```
shifana@shifana-VirtualBox:~$ sudo apt-get install wireshark
Reading package lists... Done
Building dependency tree
Reading state information... Done
The following additional packages will be installed:
  libc-ares2 libdouble-conversion3 libpcre2-16-0 libqt5core5a libqt5dbus5
  libqt5gui5 libqt5multimedia5 libqt5multimedia5-plugins
  libqt5multimediasettings5 libqt5multimediawidgets5 libqt5network5
  libqt5opengl5 libqt5printsupport5 libqt5svg5 libqt5widgets5 libsmi2l
  libspandsp2 libssh-gcrypt-4 libwireshark-data libwireshark13 libwireshark10
  libwsutil11 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:
  libc-ares2 libdouble-conversion3 libpcre2-16-0 libqt5core5a libqt5dbus5
  libqt5gui5 libqt5multimedia5 libqt5multimedia5-plugins
  libqt5multimediasettings5 libqt5multimediawidgets5 libqt5network5
  libqt5opengl5 libqt5printsupport5 libqt5svg5 libqt5widgets5 libsmi2l
  libspandsp2 libssh-gcrypt-4 libwireshark-data libwireshark13 libwireshark10
  libwsutil11 libxcb-xinerama0 libxcb-xinput0 qt5-gtk-platformtheme
  qttranslations5-l10n wireshark wireshark-common wireshark-qt
0 upgraded, 29 newly installed, 0 to remove and 316 not upgraded.
Need to get 32.8 MB of archives.
```

2. Command:sudo dpkg-reconfigure wireshark-common

```
d64 3.2.3-1 [199 kB]
Get:24 http://in.archive.ubuntu.com/ubuntu focal/universe amd64 libwireshark13 amd64 3.2.3-1 [15.2 MB]
77% [24 libwireshark13 13.1 MB/15.2 MB 86%] ^C
shifana@shifana-VirtualBox:~$ sudo dpkg-reconfigure wireshark-common
dpkg-reconfigure: warning: configuration file /etc/wireshark/wireshark.conf not found
```

3. Command:Select Yes and press enter



4. Open wireshark from the applist

