

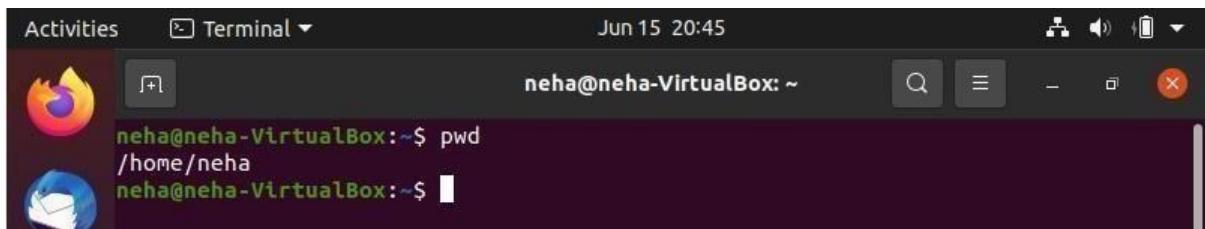
# **Networking & System Administration Lab Record**

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Roll no:10

# BASIC LINUX COMMANDS PART-1

## 1. pwd

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

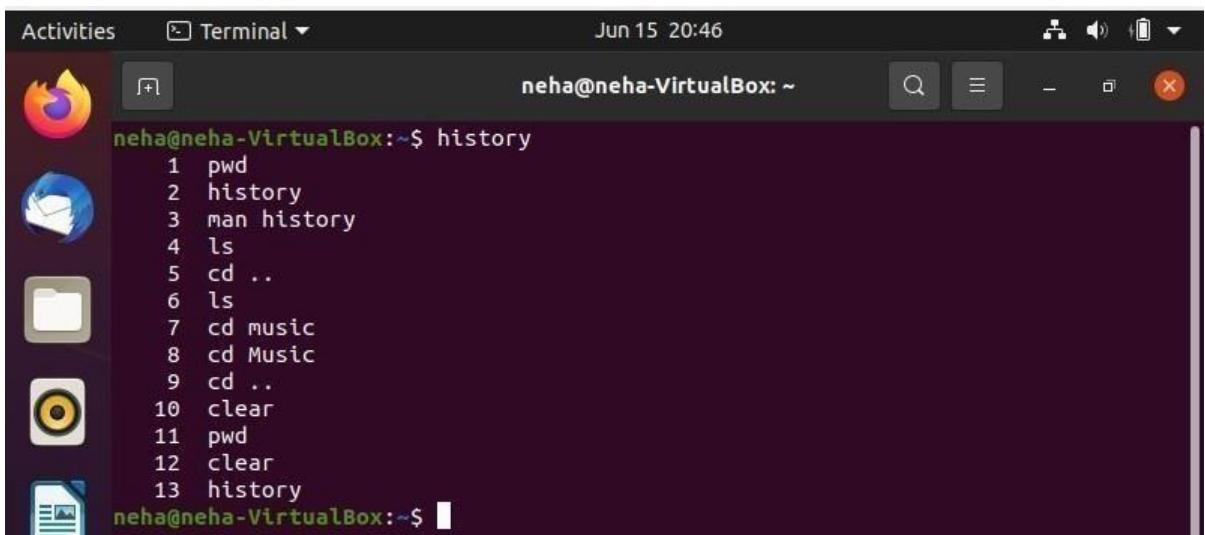


A screenshot of a Linux desktop environment showing a terminal window. The terminal title is "Terminal". The date and time are "Jun 15 20:45". The user is "neha@neha-VirtualBox: ~". The terminal shows the command "pwd" being run, followed by the output "/home/neha". There are icons for the desktop environment on the left, and standard window controls on the right.

```
Activities Terminal Jun 15 20:45
neha@neha-VirtualBox:~$ pwd
/home/neha
neha@neha-VirtualBox:~$
```

## 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**.



A screenshot of a Linux desktop environment showing a terminal window. The terminal title is "Terminal". The date and time are "Jun 15 20:46". The user is "neha@neha-VirtualBox: ~". The terminal shows the command "history" being run, followed by a list of 13 commands: 1. pwd, 2. history, 3. man history, 4. ls, 5. cd .., 6. ls, 7. cd music, 8. cd Music, 9. cd .., 10. clear, 11. pwd, 12. clear, 13. history. There are icons for the desktop environment on the left, and standard window controls on the right.

```
Activities Terminal Jun 15 20:46
neha@neha-VirtualBox:~$ history
1  pwd
2  history
3  man history
4  ls
5  cd ..
6  ls
7  cd music
8  cd Music
9  cd ..
10  clear
11  pwd
12  clear
13  history
neha@neha-VirtualBox:~$
```

## 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.

```
Activities Terminal ▾ Jun 15 20:47
neha@neha-VirtualBox: ~
HISTORY(3) Library Functions Manual HISTORY(3)

NAME
    history - GNU History Library

COPYRIGHT
    The GNU History Library is Copyright (C) 1989-2017 by the Free Software Foundation, Inc.

DESCRIPTION
    Many programs read input from the user a line at a time. The GNU History library is able to keep track of those lines, associate arbitrary data with each line, and utilize information from previous lines in composing new ones.

HISTORY EXPANSION
    The history library supports a history expansion feature that is identical to the history expansion in bash. This section describes what syntax features are available.

History expansions introduce words from the history list into the input stream, making it easy to repeat commands, insert the arguments to a previous command into the current input line, or fix errors in previous commands quickly.

History expansion is usually performed immediately after a complete line is read. It takes place in two parts. The first is to determine which line from the history list to use during substitution. The second part is to substitute the word in the input stream with the line from the history list. This is done by matching the beginning of the word against the beginning of the line in the history list. If there is a match, the line is substituted. If there is no match, the word is left unchanged.

Manual page history(3) readline line 1 (press h for help or q to quit)
```

#### 4. cd

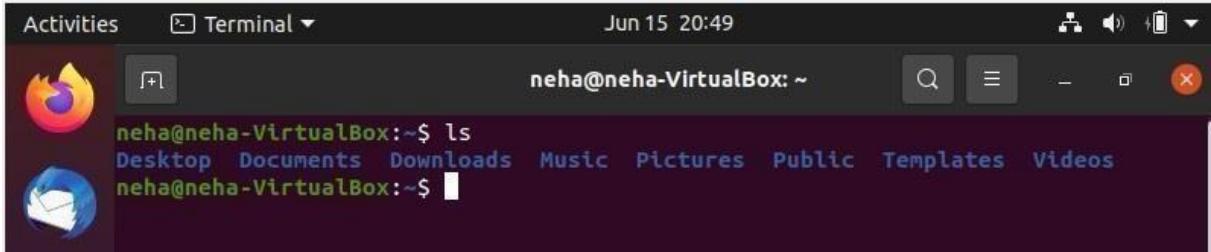
The **cd** (“change directory”) command is used to change the current working directory in Linux and other Unix-like operating systems. It is one of the most basic and frequently used commands when working on the Linux terminal. The current working directory is the directory (folder) in which the user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

```
Activities Terminal ▾ Jun 15 20:48
neha@neha-VirtualBox: ~$ cd Documents
neha@neha-VirtualBox: ~/Documents$ cd Music
bash: cd: Music: No such file or directory
neha@neha-VirtualBox: ~/Documents$ cd ..
neha@neha-VirtualBox: ~$
```

#### 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.

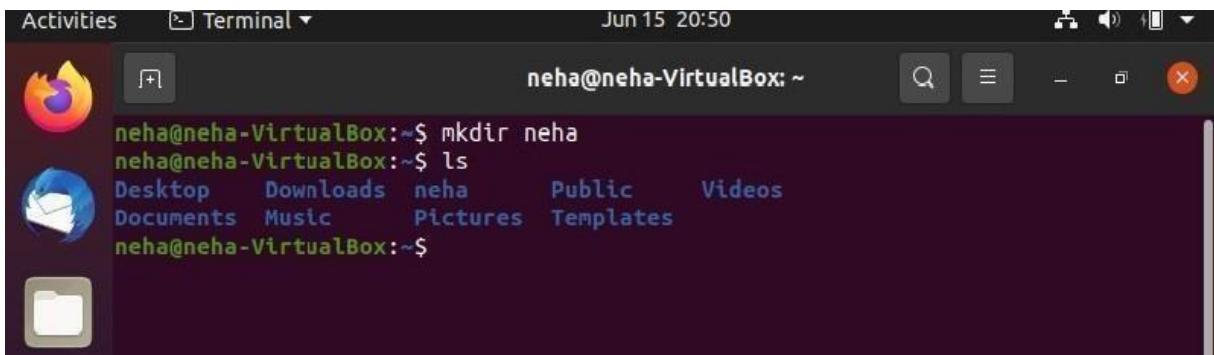


A screenshot of a Linux desktop environment showing a terminal window. The terminal title is "Terminal". The date and time are "Jun 15 20:49". The user is "neha@neha-VirtualBox: ~". The terminal shows the command "ls" being run, followed by a list of directories: Desktop, Documents, Downloads, Music, Pictures, Public, Templates, and Videos. The terminal window has a dark theme with icons for the desktop environment.

```
Activities Terminal Jun 15 20:49
neha@neha-VirtualBox:~$ ls
Desktop Documents Downloads Music Pictures Public Templates Videos
neha@neha-VirtualBox:~$
```

## 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.

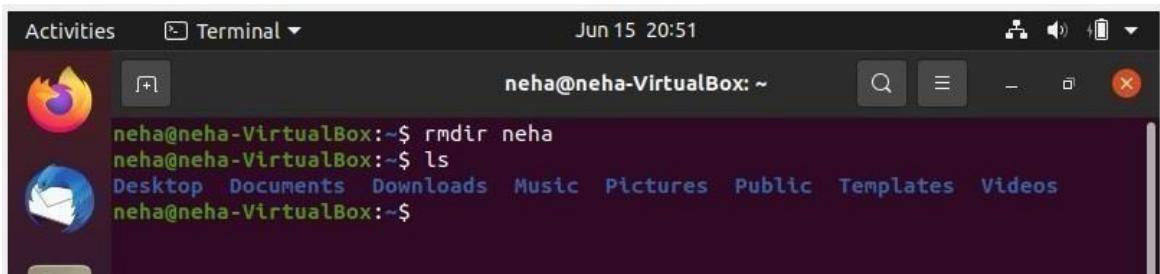


A screenshot of a Linux desktop environment showing a terminal window. The terminal title is "Terminal". The date and time are "Jun 15 20:50". The user is "neha@neha-VirtualBox: ~". The terminal shows the command "mkdir neha" being run, followed by the command "ls" which lists the new directory "neha" along with other existing directories: Desktop, Downloads, Public, Videos, Documents, Music, Pictures, and Templates. The terminal window has a dark theme with icons for the desktop environment.

```
Activities Terminal Jun 15 20:50
neha@neha-VirtualBox:~$ mkdir neha
neha@neha-VirtualBox:~$ ls
Desktop Downloads neha Public Videos
Documents Music Pictures Templates
neha@neha-VirtualBox:~$
```

## 7. rmdir

**rmdir** command is used to 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.



A screenshot of a Linux desktop environment showing a terminal window. The terminal title is "Terminal". The date and time are "Jun 15 20:51". The user is "neha@neha-VirtualBox: ~". The terminal shows the command "rmdir neha" being run, followed by the command "ls" which lists the directory "neha" along with other existing directories: Desktop, Documents, Downloads, Music, Pictures, Public, Templates, and Videos. The terminal window has a dark theme with icons for the desktop environment.

```
Activities Terminal Jun 15 20:51
neha@neha-VirtualBox:~$ rmdir neha
neha@neha-VirtualBox:~$ ls
Desktop Documents Downloads Music Pictures Public Templates Videos
neha@neha-VirtualBox:~$
```

## 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:

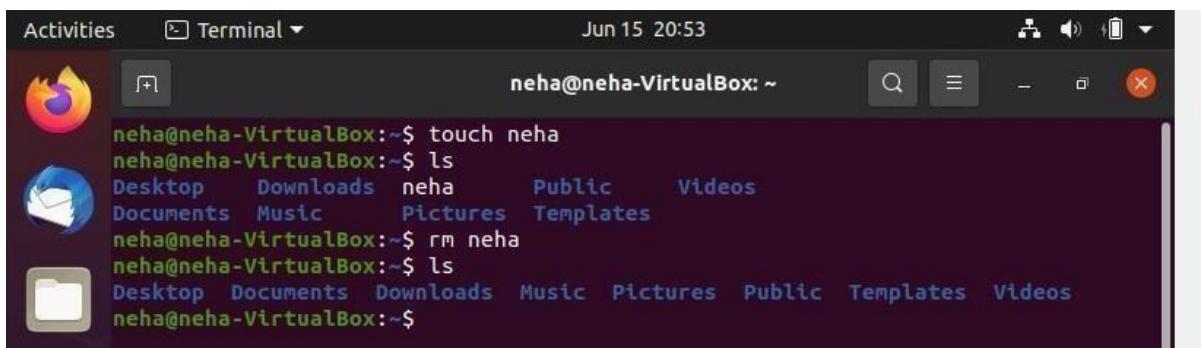
- **cat command:** It is used to create the file with content.
- **touch command:** It is used to create a file without any content. The file created using touch command is empty. This command can be used when the user doesn't have data to store at the time of file creation.



A screenshot of a Linux desktop environment showing a terminal window. The terminal title is "Terminal". The date and time are "Jun 15 20:52". The terminal window contains the following text:  
neha@neha-VirtualBox:~\$ touch neha  
neha@neha-VirtualBox:~\$ ls  
Desktop Downloads neha Public Videos  
Documents Music Pictures Templates  
neha@neha-VirtualBox:~\$

## 9. rm

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

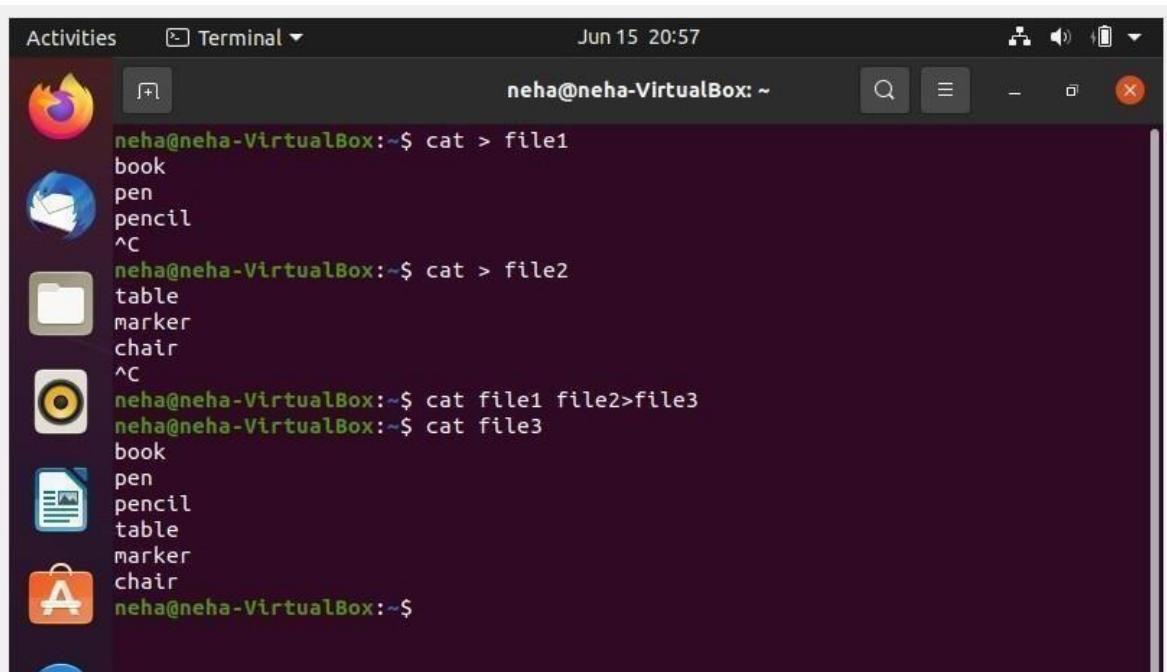


A screenshot of a Linux desktop environment showing a terminal window. The terminal title is "Terminal". The date and time are "Jun 15 20:53". The terminal window contains the following text:  
neha@neha-VirtualBox:~\$ touch neha  
neha@neha-VirtualBox:~\$ ls  
Desktop Downloads neha Public Videos  
Documents Music Pictures Templates  
neha@neha-VirtualBox:~\$ rm neha  
neha@neha-VirtualBox:~\$ ls  
Desktop Documents Downloads Music Pictures Public Templates Videos  
neha@neha-VirtualBox:~\$

## 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.

Activities Terminal ▾ Jun 15 20:57

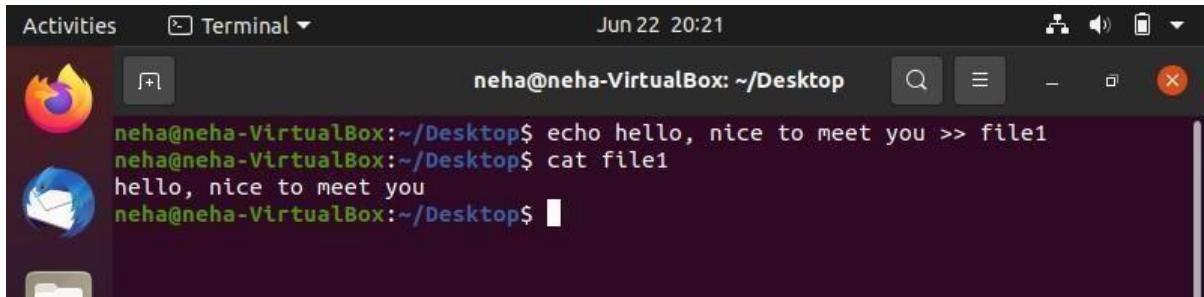


neha@neha-VirtualBox:~\$ cat > file1  
book  
pen  
pencil  
^C  
neha@neha-VirtualBox:~\$ cat > file2  
table  
marker  
chair  
^C  
neha@neha-VirtualBox:~\$ cat file1 file2>file3  
neha@neha-VirtualBox:~\$ cat file3  
book  
pen  
pencil  
table  
marker  
chair  
neha@neha-VirtualBox:~\$

## 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.

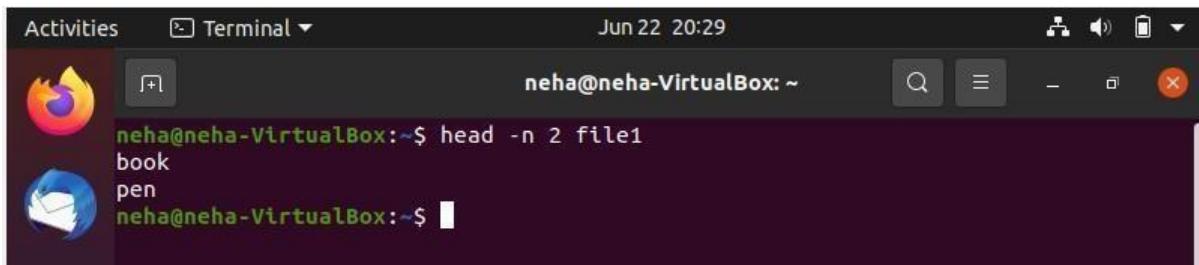


The screenshot shows a terminal window titled "Terminal" with the command "neha@neha-VirtualBox: ~/Desktop". The user runs "echo hello, nice to meet you >> file1" which creates a file named "file1" containing "hello, nice to meet you". Then, they run "cat file1" to display the contents of the file.

```
Activities Terminal Jun 22 20:21
neha@neha-VirtualBox:~/Desktop$ echo hello, nice to meet you >> file1
neha@neha-VirtualBox:~/Desktop$ cat file1
hello, nice to meet you
neha@neha-VirtualBox:~/Desktop$
```

### 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.

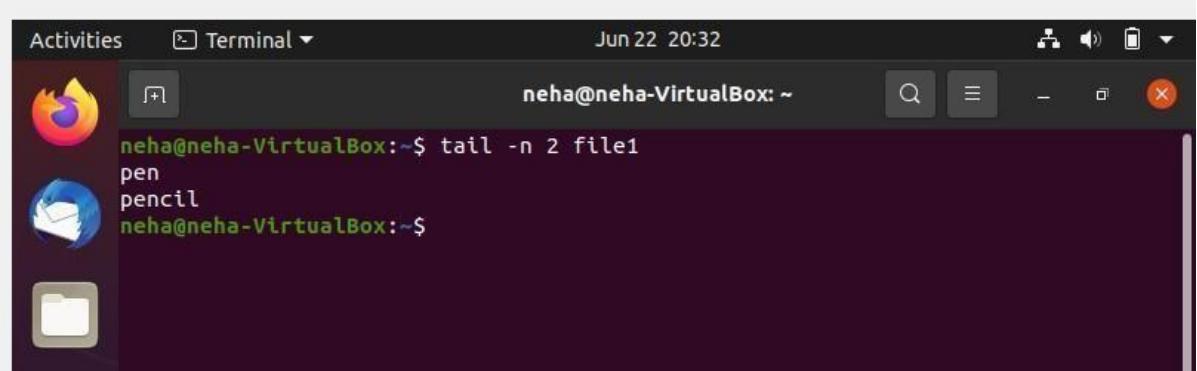


The screenshot shows a terminal window titled "Terminal" with the command "neha@neha-VirtualBox: ~". The user runs "head -n 2 file1" which prints the first two lines of the file "file1" which contains "book" and "pen".

```
Activities Terminal Jun 22 20:29
neha@neha-VirtualBox: ~$ head -n 2 file1
book
pen
neha@neha-VirtualBox: ~$
```

### 3. tail

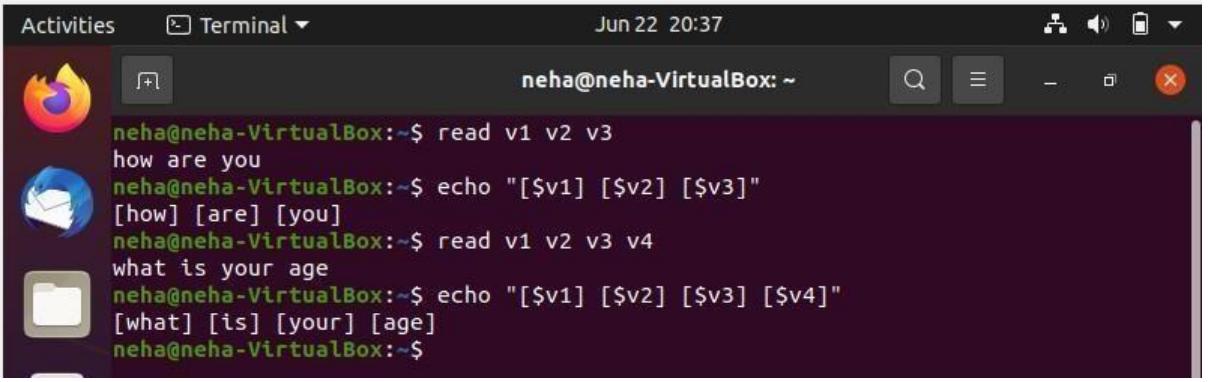
It is the complementary of head command. The tail command, as the name implies, print the last N number of data of the given input. By default it prints the last 10 lines of the specified files. If more than one file name is provided then data from each file is precedes by its file name.



```
Activities Terminal Jun 22 20:32
neha@neha-VirtualBox:~$ tail -n 2 file1
pen
pencil
neha@neha-VirtualBox:~$
```

#### 4. read

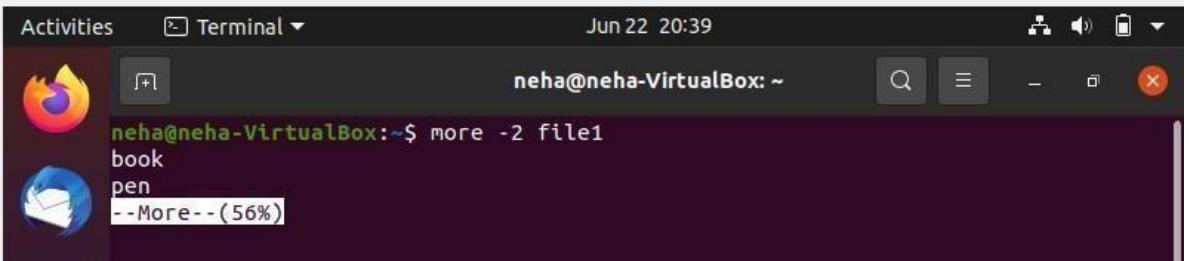
Read command in Linux system is used to read from a file descriptor. Basically, this command read up the total number of bytes from the specified file descriptor into the buffer. If the number or count is zero then this command may detect the errors. But on success, it returns the number of bytes read.



```
Activities Terminal Jun 22 20:37
neha@neha-VirtualBox:~$ read v1 v2 v3
how are you
neha@neha-VirtualBox:~$ echo "[\$v1] [\$v2] [\$v3]"
[how] [are] [you]
neha@neha-VirtualBox:~$ read v1 v2 v3 v4
what is your age
neha@neha-VirtualBox:~$ echo "[\$v1] [\$v2] [\$v3] [\$v4]"
[what] [is] [your] [age]
neha@neha-VirtualBox:~$
```

#### 5. more:

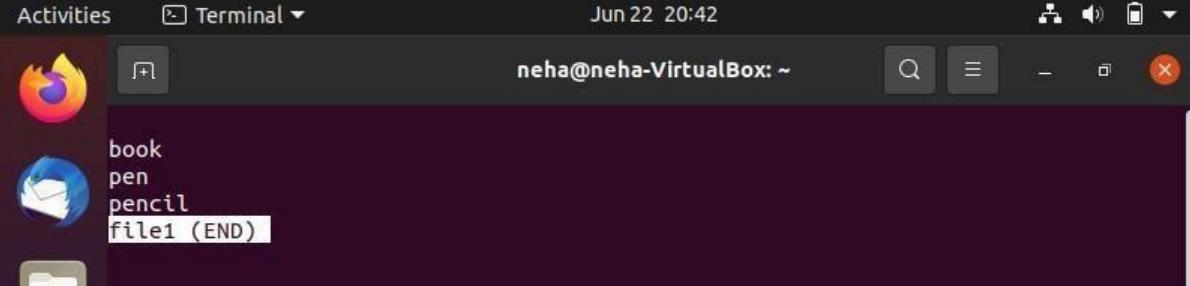
**more** command is used to view the text files in the command prompt, displaying one screen at a time in case the file is large (For example log files). The more command also allows the user do scroll up and down through the page. The syntax along with options and command is as follows. Another application 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.



```
Activities Terminal Jun 22 20:39
neha@neha-VirtualBox:~$ more -2 file1
book
pen
--More-- (56%)
```

## 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.

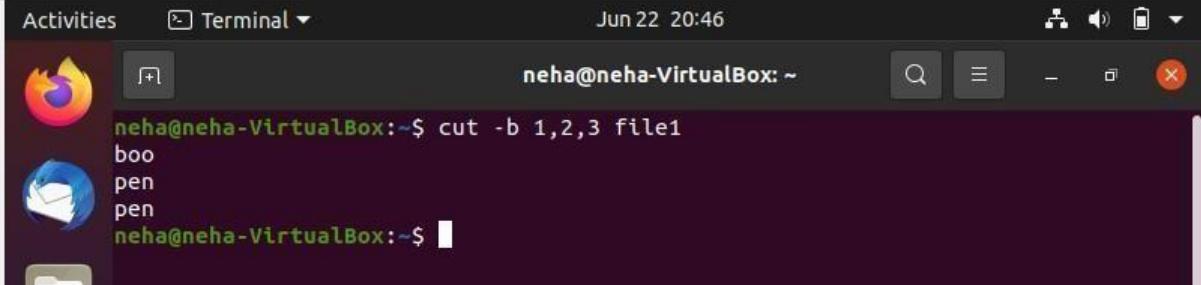


A screenshot of a Linux desktop environment showing a terminal window titled "Terminal". The terminal window has a dark purple background. At the top, there is a header bar with the date "Jun 22 20:42" and the user "neha@neha-VirtualBox: ~". On the left side of the terminal, there is a vertical list of icons: a Firefox icon, a "book" icon, a "pen" icon, a "pencil" icon, and a "file1 (END)" icon. The main area of the terminal shows the output of the "less" command:

```
book
pen
pencil
file1 (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.

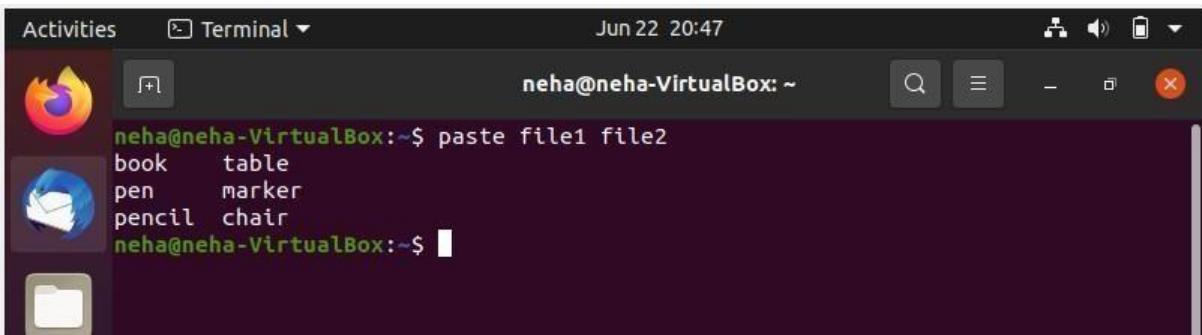


A screenshot of a Linux desktop environment showing a terminal window titled "Terminal". The terminal window has a dark purple background. At the top, there is a header bar with the date "Jun 22 20:46" and the user "neha@neha-VirtualBox: ~". On the left side of the terminal, there is a vertical list of icons: a Firefox icon, a "book" icon, a "pen" icon, a "pencil" icon, and a "file1" icon. The main area of the terminal shows the output of the "cut" command:

```
neha@neha-VirtualBox:~$ cut -b 1,2,3 file1
boo
pen
pen
neha@neha-VirtualBox:~$
```

## 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.

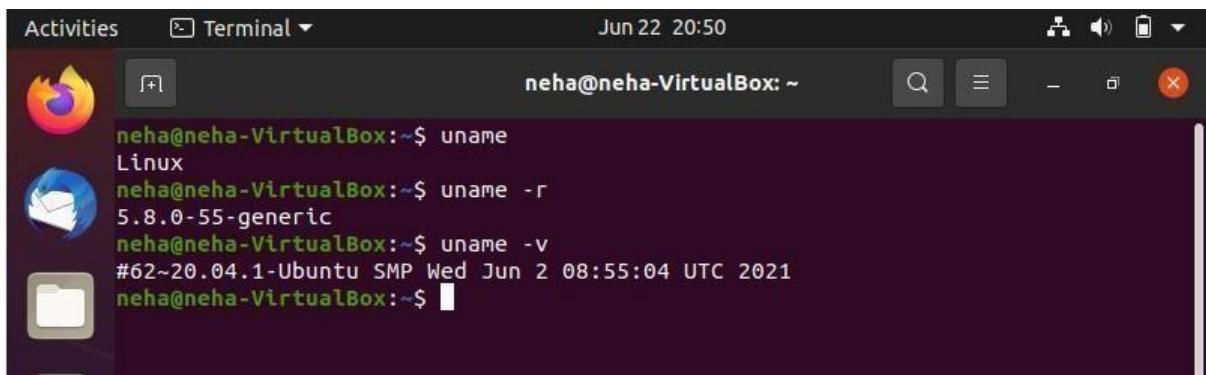


A screenshot of a Linux desktop environment, likely Ubuntu, showing a terminal window. The terminal window title is "Terminal" and the status bar shows the date and time as "Jun 22 20:47". The user is running the command "paste file1 file2" which outputs:

```
neha@neha-VirtualBox:~$ paste file1 file2
book    table
pen     marker
pencil   chair
neha@neha-VirtualBox:~$
```

## 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.

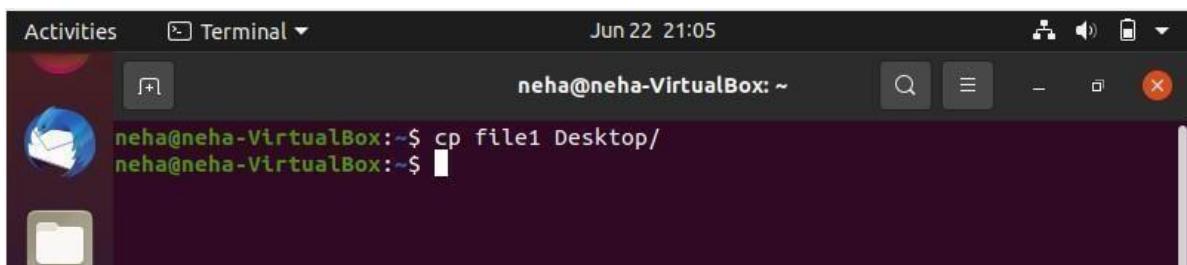


A screenshot of a Linux desktop environment, likely Ubuntu, showing a terminal window. The terminal window title is "Terminal" and the status bar shows the date and time as "Jun 22 20:50". The user is running the command "uname" followed by "-r" and "-v" which outputs:

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

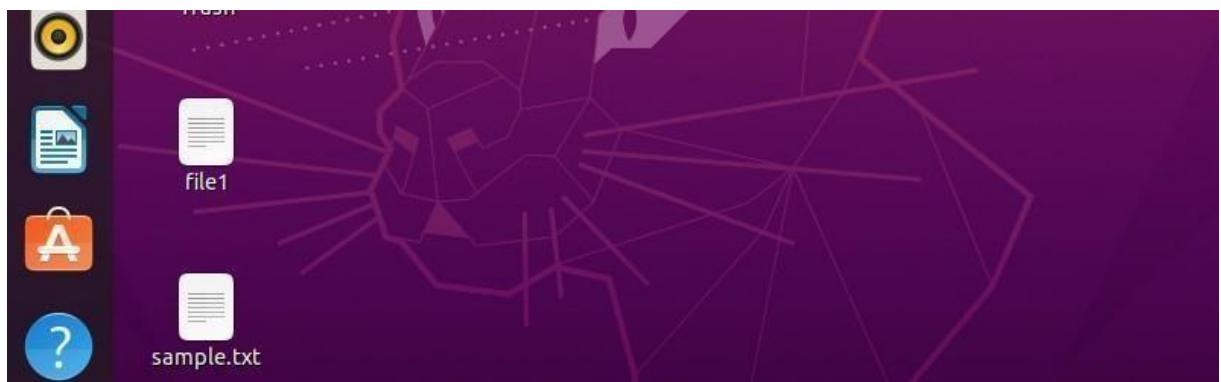
## 10. cp

**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.



A screenshot of a Linux desktop environment, likely Ubuntu, showing a terminal window. The terminal window title is "Terminal" and the status bar shows the date and time as "Jun 22 21:05". The user is running the command "cp file1 Desktop/" which outputs:

```
neha@neha-VirtualBox:~$ cp file1 Desktop/
neha@neha-VirtualBox:~$
```

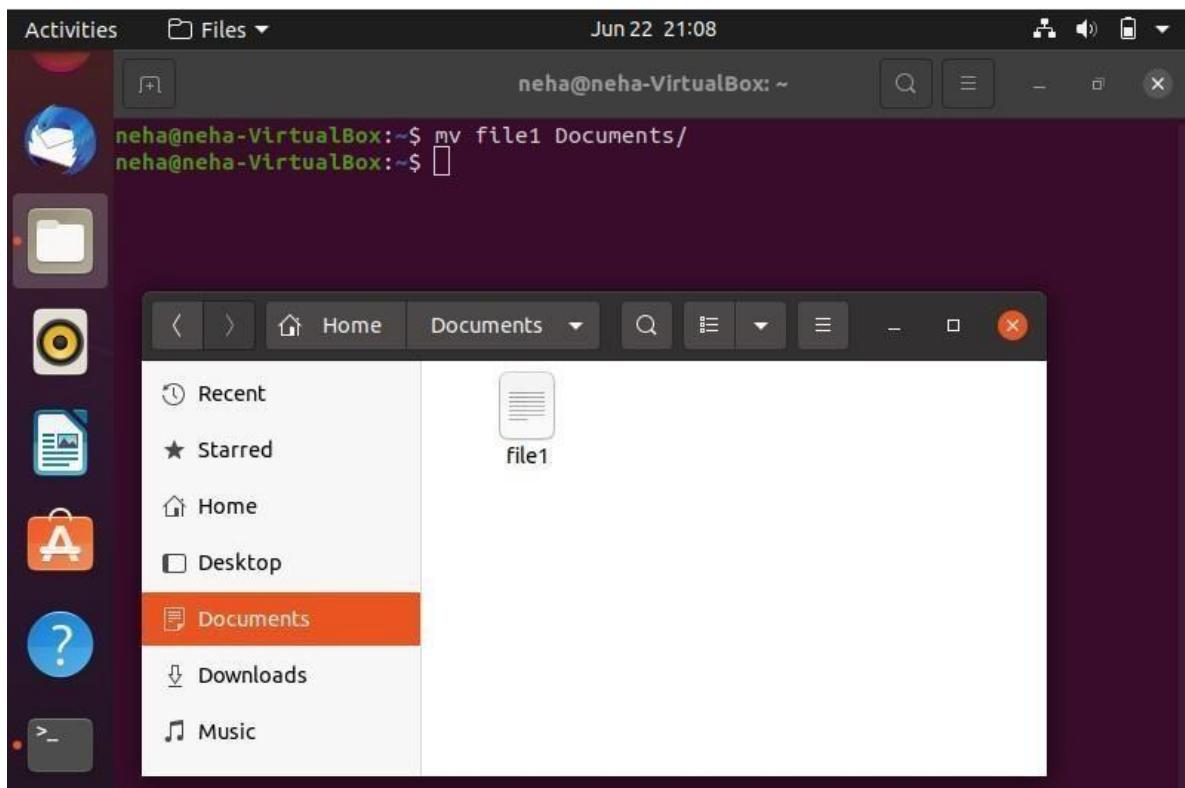


## 11. mv

**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:

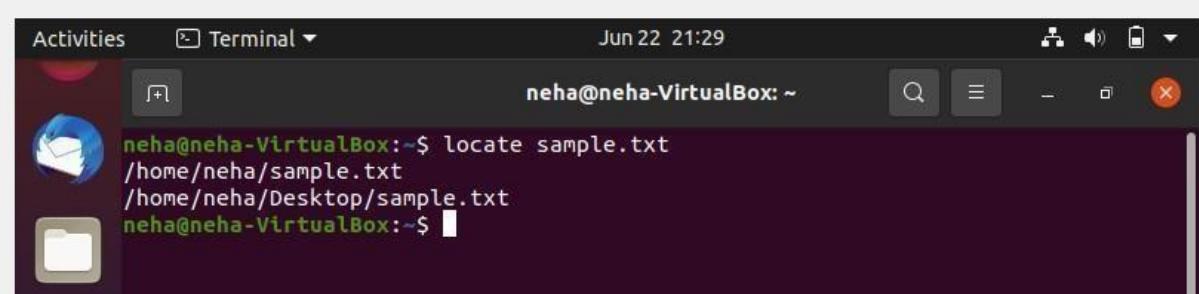
1. It renames a file or folder.
2. It moves a group of files to a different directory.

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



## 12. locate

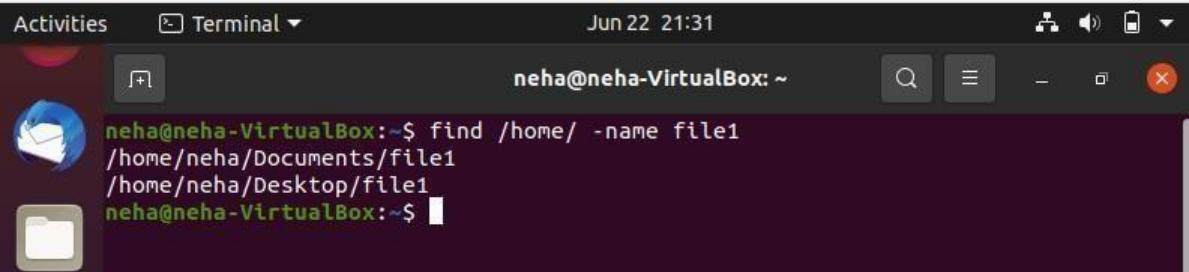
The locate command and find command is used to search a file by name. But, the difference between both commands is that locate command is a background process and searches the file in the database whereas, find command searches in the filesystem. The locate command is much faster than find command.



A screenshot of a Linux desktop environment showing a terminal window. The terminal title is "Terminal". The date and time at the top right are "Jun 22 21:29". The user is "neha@neha-VirtualBox: ~". The terminal shows the following command and output:  
neha@neha-VirtualBox:~\$ locate sample.txt  
/home/neha/sample.txt  
/home/neha/Desktop/sample.txt  
neha@neha-VirtualBox:~\$

## 13. find

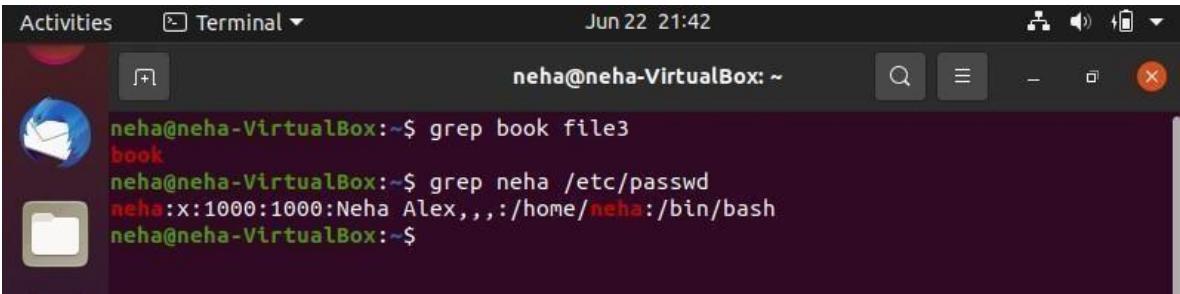
The **find** command in UNIX is a command line utility for walking a file hierarchy. It can be used to find files and directories and perform subsequent operations on them. It supports searching by file, folder, name, creation date, modification date, owner and permissions. By using the '-exec' other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



A screenshot of a Linux desktop environment showing a terminal window. The terminal title is "Terminal". The date and time at the top right are "Jun 22 21:31". The user is "neha@neha-VirtualBox: ~". The terminal shows the following command and output:  
neha@neha-VirtualBox:~\$ find /home/ -name file1  
/home/neha/Documents/file1  
/home/neha/Desktop/file1  
neha@neha-VirtualBox:~\$

## 14. grep

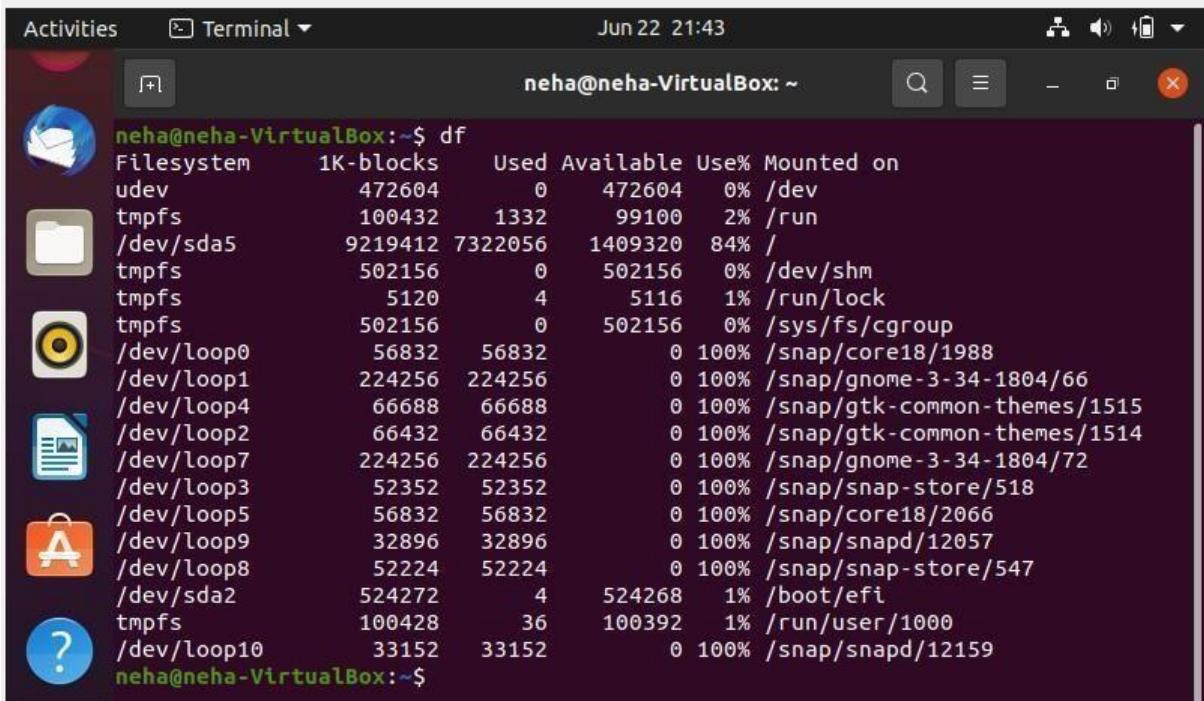
The grep filter searches a file for a particular pattern of characters, and displays all lines that contain that pattern. The pattern that is searched in the file is referred to as the regular expression (grep stands for globally search for regular expression and print out).



A screenshot of a Linux desktop environment showing a terminal window. The terminal title is "Terminal". The date and time at the top right are "Jun 22 21:42". The user is "neha@neha-VirtualBox: ~". The terminal shows the following command and output:  
neha@neha-VirtualBox:~\$ grep book file3  
book  
neha@neha-VirtualBox:~\$ grep neha /etc/passwd  
neha:x:1000:1000:Neha Alex,,,:/home/neha:/bin/bash  
neha@neha-VirtualBox:~\$

## 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.



A screenshot of a Linux desktop environment showing a terminal window. The terminal window title is 'Terminal' and the date and time are 'Jun 22 21:43'. The user is 'neha@neha-VirtualBox: ~'. The terminal displays the output of the 'df' command:

Filesystem	1K-blocks	Used	Available	Use%	Mounted on
udev	472604	0	472604	0%	/dev
tmpfs	100432	1332	99100	2%	/run
/dev/sda5	9219412	7322056	1409320	84%	/
tmpfs	502156	0	502156	0%	/dev/shm
tmpfs	5120	4	5116	1%	/run/lock
tmpfs	502156	0	502156	0%	/sys/fs/cgroup
/dev/loop0	56832	56832	0	100%	/snap/core18/1988
/dev/loop1	224256	224256	0	100%	/snap/gnome-3-34-1804/66
/dev/loop4	66688	66688	0	100%	/snap/gtk-common-themes/1515
/dev/loop2	66432	66432	0	100%	/snap/gtk-common-themes/1514
/dev/loop7	224256	224256	0	100%	/snap/gnome-3-34-1804/72
/dev/loop3	52352	52352	0	100%	/snap/snap-store/518
/dev/loop5	56832	56832	0	100%	/snap/core18/2066
/dev/loop9	32896	32896	0	100%	/snap/snapd/12057
/dev/loop8	52224	52224	0	100%	/snap/snap-store/547
/dev/sda2	524272	4	524268	1%	/boot/efi
tmpfs	100428	36	100392	1%	/run/user/1000
/dev/loop10	33152	33152	0	100%	/snap/snapd/12159

The terminal prompt is 'neha@neha-VirtualBox: ~\$'

## 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.

Activities

Terminal •

Jun 22 21:44

neha@neha-VirtualBox: ~

```
      fi du
4     ./Temp1ates
4     ./Music
8     ./Documents
4     ./conf1g /enchant
84    ./conf1g /put se
8     ./conf1g /tbus /bus
12    ./conf1g /1bus
4     ./conf1g/goa -1. 0
8     ./conf1g /evo1ult on/ sour ces
12    ./conf1g/evo\utton
4     ./conf1g/nauttlus
8     ./conf1g/dconf
8     ./config/gedit
4     ./conf1g/upd a te - not l fter
8     ./config/gtk-3.0
4     ./conf1g/gnone - sess on/ saved - sess on
8     ./conf1g/gnone - sess on
172   ./conf1g
4     ./Pictures
4     ./Vtdeos
8     ./Desktop
4     ./Downloads
7444  ./cache/t racker
4     ./cache/l bus - table
20    ./cache/tbus/bus
...   24   ./cache/l bus
///   8    ./cache/neshadercache/c9
8     ./cache/nesa_s hader_c a che/ df
```

Activities

Terminal

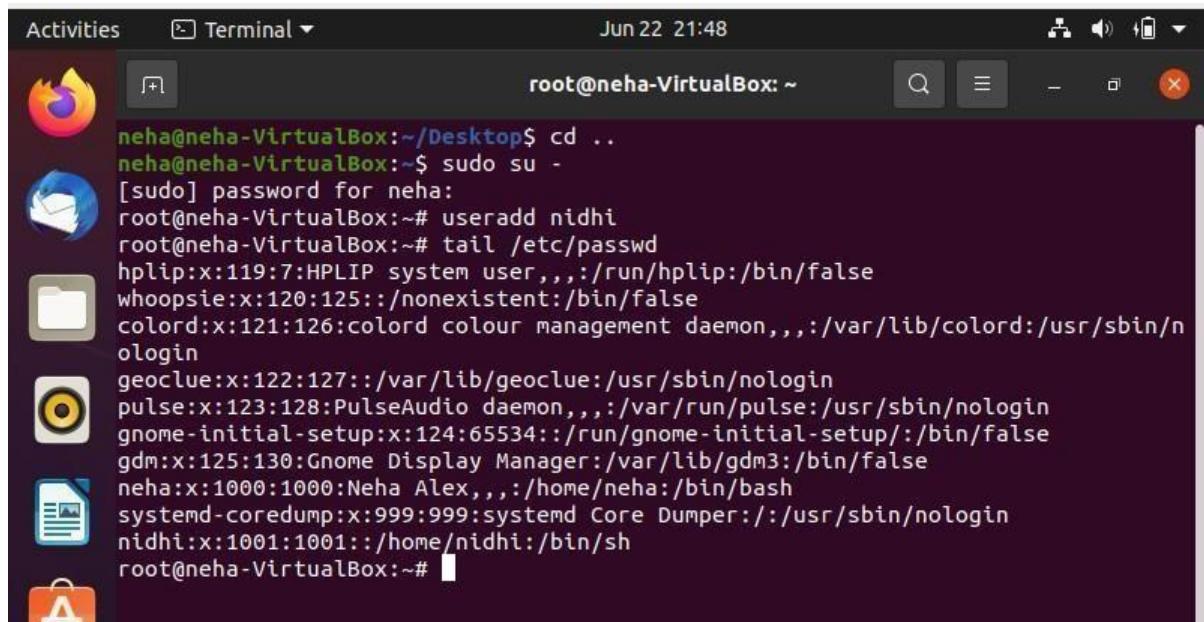
Jun 22 21:44

neha@neha-VirtuatBox: ~

```
W 12   ./local/share/keyrings
4    ./local/share/evolution/addressbook/trash
4    ./local/share/evolution/addressbook/system/photos
92   ./local/share/evolution/addressbook/system
100  ./local/share/evolution/addressbook
4    ./local/share/evolution/tasks/trash
8    ./local/share/evolution/tasks/system
16   ./local/share/evolution/tasks
4    ./local/share/evolution/calendar/trash
8    ./local/share/evolution/calendar/system
16   ./local/share/evolution/calendar
4    ./local/share/evolution/mail/trash
8    ./local/share/evolution/mail
4    ./local/share/evolution/memos/trash
8    ./local/share/evolution/memos
152  J. locat/share J evo tu ti on
4    J. tocaT/share/nauttlus/s cripts
8    ./locat/share/nauttlus
112  ./locat/share/gvfs - netadata
4    ./locat/share/sounds
4    ./local/share/gnone settngs - daenon
8    ./local/share/gnome-shell
4    ./local/share/applications
628  ./local/share
632  ./local
4    ./gnupg/private-keys-v1.d
8    ./gnupg
9696
```

## 17. useradd

Create a new user or update default new user information.



A screenshot of a Linux desktop environment, likely Ubuntu, showing a terminal window. The terminal window title is "Terminal" and the date and time are "Jun 22 21:48". The terminal content shows the following command and its output:

```
root@neha-VirtualBox:~# cd ..  
root@neha-VirtualBox:~$ sudo su -  
[sudo] password for neha:  
root@neha-VirtualBox:~# useradd nidhi  
root@neha-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  
neha:x:1000:1000:Neha Alex,,,:/home/neha:/bin/bash  
systemd-coredump:x:999:999:systemd Core Dumper:/:/usr/sbin/nologin  
nidhi:x:1001:1001::/home/nidhi:/bin/sh  
root@neha-VirtualBox:~#
```

## 18. userdel

Delete a user account and related files.

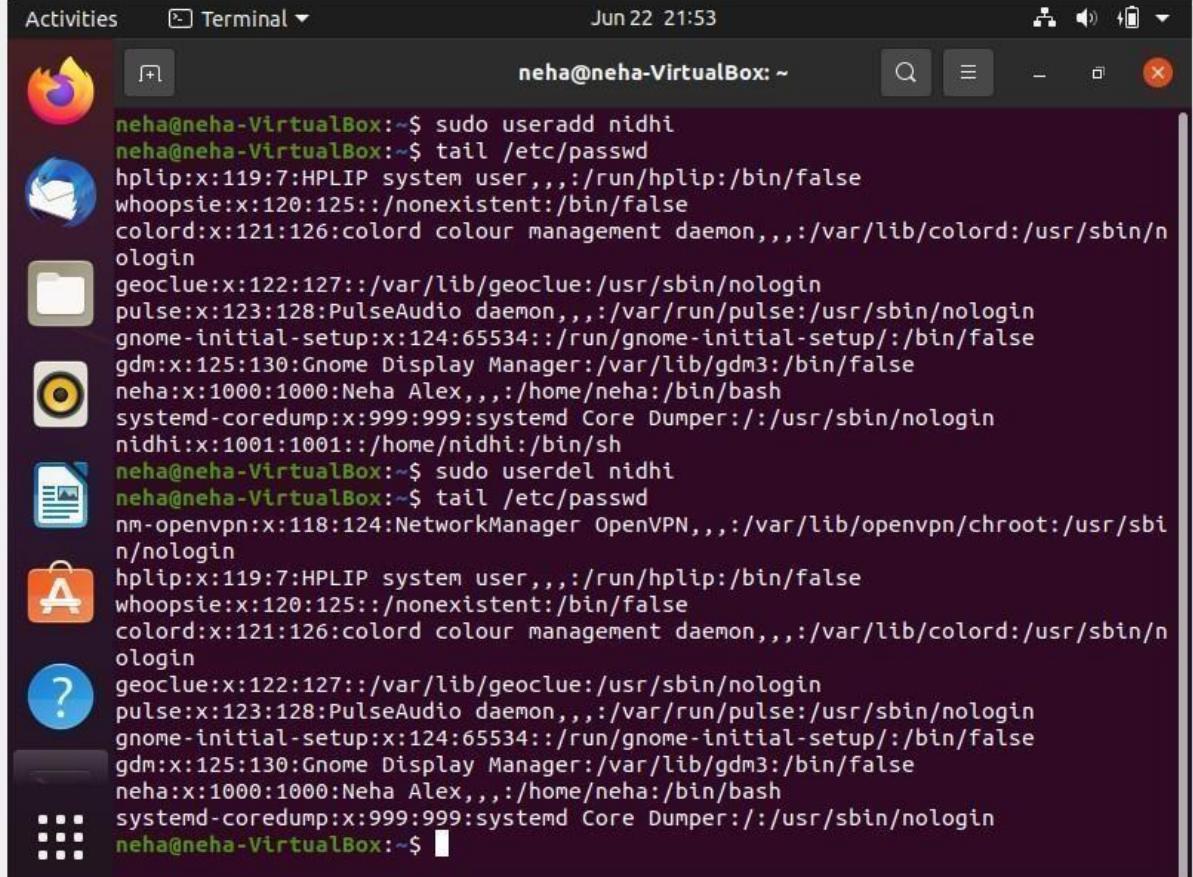


A screenshot of a Linux desktop environment, likely Ubuntu, showing a terminal window. The terminal window title is "Terminal" and the date and time are "Jun 22 21:48". The terminal content shows the following command and its output:

```
root@neha-VirtualBox:~# userdel nidhi  
root@neha-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  
neha:x:1000:1000:Neha Alex,,,:/home/neha:/bin/bash  
systemd-coredump:x:999:999:systemd Core Dumper:/:/usr/sbin/nologin  
root@neha-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.

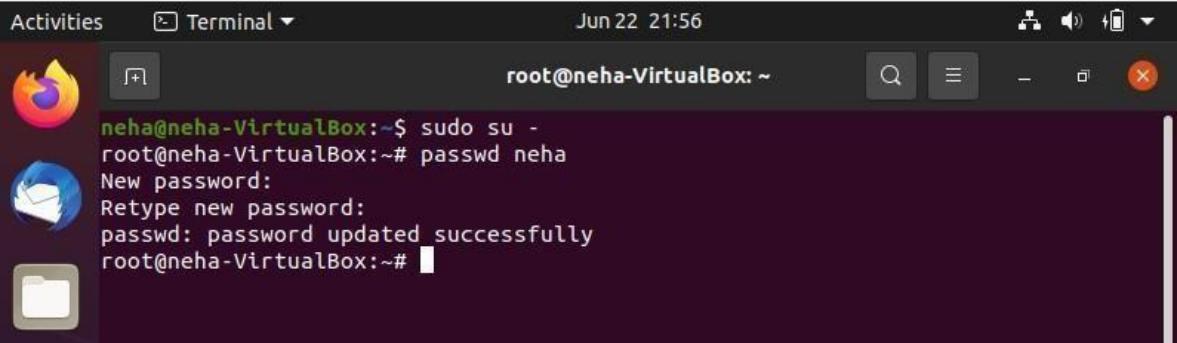


A screenshot of an Ubuntu desktop environment. In the top left corner, there's an 'Activities' button and a 'Terminal' button. The terminal window is open and shows a command-line session. The session starts with the user 'neha' logging in at 21:53 on Jun 22. The user runs the command 'sudo useradd nidhi'. The terminal then displays the contents of the '/etc/passwd' file, which includes entries for various system users like 'hplip', 'whoopsie', 'colord', 'gdm', 'neha', and 'systemd'. The user then runs 'sudo userdel nidhi', followed by another display of the '/etc/passwd' file. Finally, the user runs 'nm-openvpn', which outputs a long list of network configuration details.

```
Activities Terminal ▾ Jun 22 21:53 neha@neha-VirtualBox: ~
neha@neha-VirtualBox:~$ sudo useradd nidhi
neha@neha-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
neha:x:1000:1000:Neha Alex,,,:/home/neha:/bin/bash
systemd-coredump:x:999:999:systemd Core Dumper:/:/usr/sbin/nologin
nidhi:x:1001:1001::/home/nidhi:/bin/sh
neha@neha-VirtualBox:~$ sudo userdel nidhi
neha@neha-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
neha:x:1000:1000:Neha Alex,,,:/home/neha:/bin/bash
systemd-coredump:x:999:999:systemd Core Dumper:/:/usr/sbin/nologin
neha@neha-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.



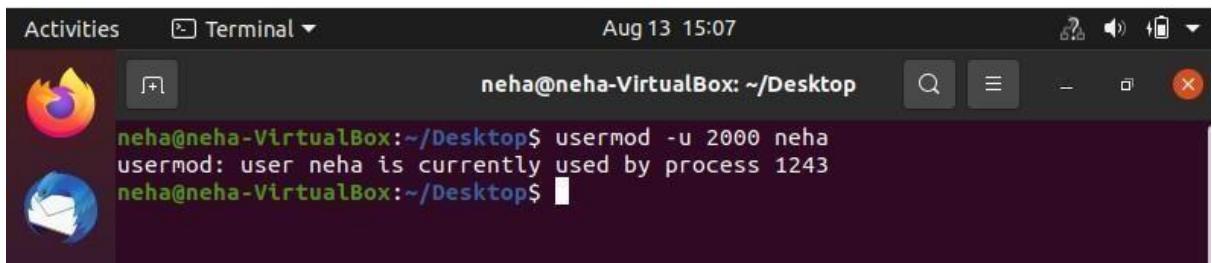
A screenshot of an Ubuntu desktop environment. In the top left corner, there's an 'Activities' button and a 'Terminal' button. The terminal window is open and shows a command-line session. The session starts with the user 'neha' logging in at 21:56 on Jun 22. The user runs the command 'sudo su -' to become root. Once root, the user runs 'passwd neha'. They are prompted for a new password and asked to retype it. The message 'passwd: password updated successfully' is displayed, indicating the password was updated.

```
Activities Terminal ▾ Jun 22 21:56
root@neha-VirtualBox: ~
neha@neha-VirtualBox:~$ sudo su -
root@neha-VirtualBox:~# passwd neha
New password:
Retype new password:
passwd: password updated successfully
root@neha-VirtualBox:~#
```

## **BASIC LINUX COMMANDS PART-3**

### **1. usermode**

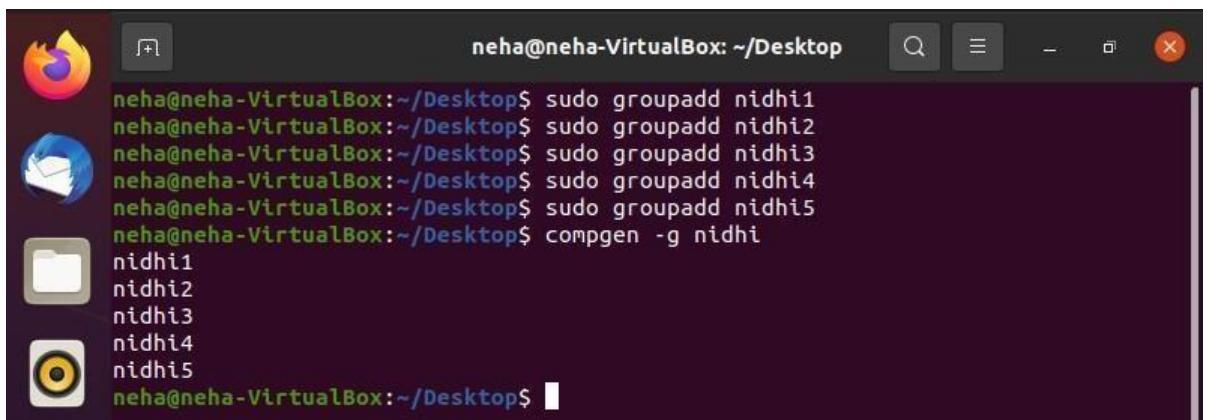
usermod command or modify user is a command in Linux that is used to change the properties of a user in Linux through the command line. After creating a user we have to sometimes change their attributes like password or login directory etc. so in order to do that we use the Usermod command.



```
Activities Terminal Aug 13 15:07
neha@neha-VirtualBox: ~/Desktop
neha@neha-VirtualBox:~/Desktop$ usermod -u 2000 neha
usermod: user neha is currently used by process 1243
neha@neha-VirtualBox:~/Desktop$
```

### **2. groupadd**

groupmod command in Linux is used to modify or change the existing group on Linux system. It can be handled by superuser or root user. Basically, it modifies a group definition on the system by modifying the right entry in the database of the group.



```
Activities Terminal Aug 13 15:07
neha@neha-VirtualBox: ~/Desktop
neha@neha-VirtualBox:~/Desktop$ sudo groupadd nidhi1
neha@neha-VirtualBox:~/Desktop$ sudo groupadd nidhi2
neha@neha-VirtualBox:~/Desktop$ sudo groupadd nidhi3
neha@neha-VirtualBox:~/Desktop$ sudo groupadd nidhi4
neha@neha-VirtualBox:~/Desktop$ sudo groupadd nidhi5
neha@neha-VirtualBox:~/Desktop$ compgen -g nidhi
nidhi1
nidhi2
nidhi3
nidhi4
nidhi5
neha@neha-VirtualBox:~/Desktop$
```

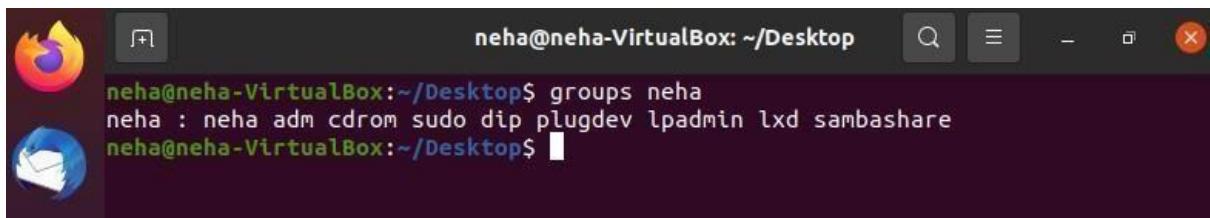
### **3. groups**

In linux, there can be multiple users(those who use/operate the system), and groups are nothing but the collection of users. Groups

make it easy to manage users with the same security and access privileges. A user can be part of different groups.

### IMPORTANT POINTS:

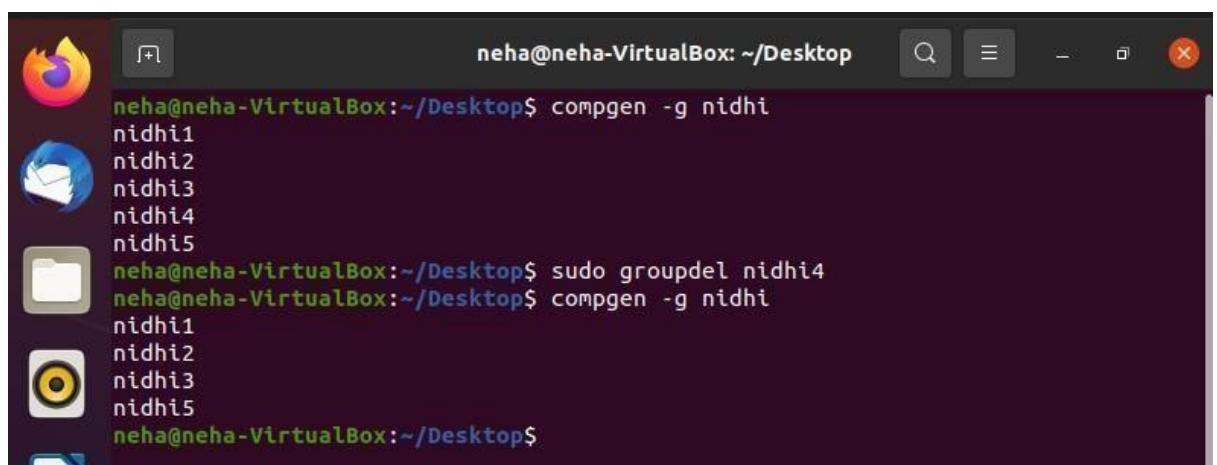
- Groups command prints the names of the primary and any supplementary groups for each given username, or the current process if no names are given.
- If more than one name is given, the name of each user is printed before the list of that user's groups and the username is separated from the group list by a colon.



```
neha@neha-VirtualBox:~/Desktop$ groups neha
neha : neha adm cdrom sudo dip plugdev lpadmin lxd sambashare
neha@neha-VirtualBox:~/Desktop$
```

### 4. groupdel

*groupdel* command is used to delete a existing group. It will delete all entry that refers to the group, modifies the system account files, and it is handled by superuser or root user.



```
neha@neha-VirtualBox:~/Desktop$ compgen -g nidhi
nidhi1
nidhi2
nidhi3
nidhi4
nidhi5
neha@neha-VirtualBox:~/Desktop$ sudo groupdel nidhi4
neha@neha-VirtualBox:~/Desktop$ compgen -g nidhi
nidhi1
nidhi2
nidhi3
nidhi5
neha@neha-VirtualBox:~/Desktop$
```

### 5. groupmod

groupmod command in Linux is used to modify or change the existing group on Linux system. It can be handled by superuser or root user. Basically, it modifies a group definition on the system by modifying the right entry in the database of the group.



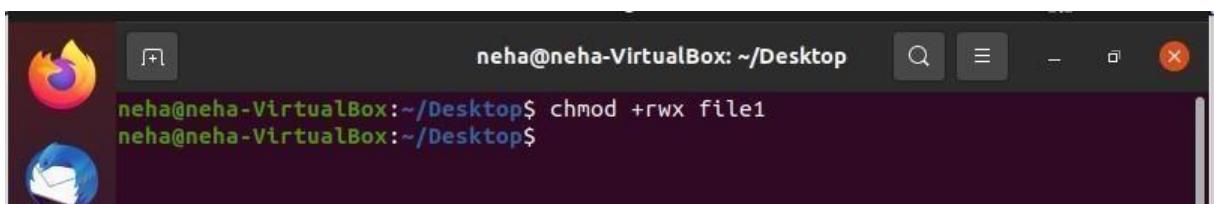
The screenshot shows a terminal window with a dark theme. The title bar says "neha@neha-VirtualBox: ~/Desktop". The terminal window contains the following text:

```
neha@neha-VirtualBox:~/Desktop$ compgen -g nidhi
nidhi1
nidhi2
nidhi3
nidhi5
neha@neha-VirtualBox:~/Desktop$ sudo groupmod -n new_group nidhi1
neha@neha-VirtualBox:~/Desktop$ compgen -g nidhi
nidhi2
nidhi3
nidhi5
neha@neha-VirtualBox:~/Desktop$ compgen -g new_group
new_group
neha@neha-VirtualBox:~/Desktop$
```

## 6. chmod

In Unix-like operating systems, the **chmod** command is used to change the access mode of a file.

The name is an abbreviation of **change mode**.

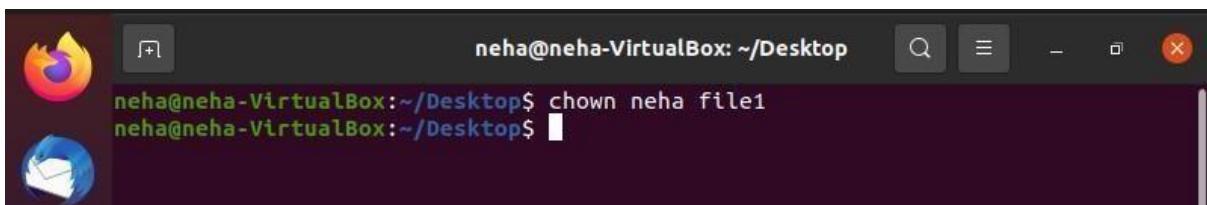


The screenshot shows a terminal window with a dark theme. The title bar says "neha@neha-VirtualBox: ~/Desktop". The terminal window contains the following text:

```
neha@neha-VirtualBox:~/Desktop$ chmod +rwx file1
neha@neha-VirtualBox:~/Desktop$
```

## 7. chown

chown command is used to change the file Owner or group. Whenever you want to change ownership, you can use chown command.

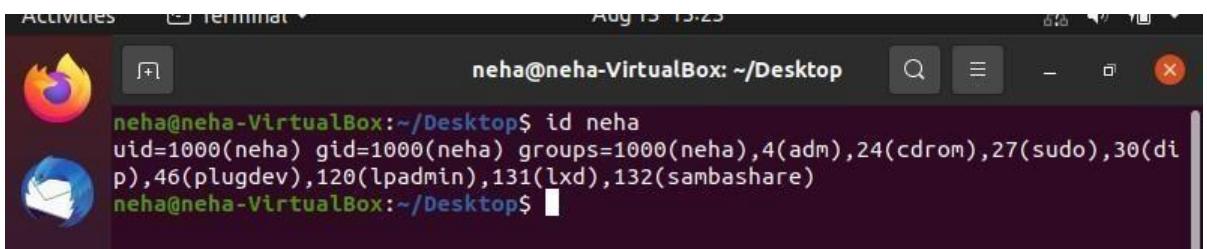


The screenshot shows a terminal window with a dark theme. The title bar says "neha@neha-VirtualBox: ~/Desktop". The terminal window contains the following text:

```
neha@neha-VirtualBox:~/Desktop$ chown neha file1
neha@neha-VirtualBox:~/Desktop$
```

## 8. id

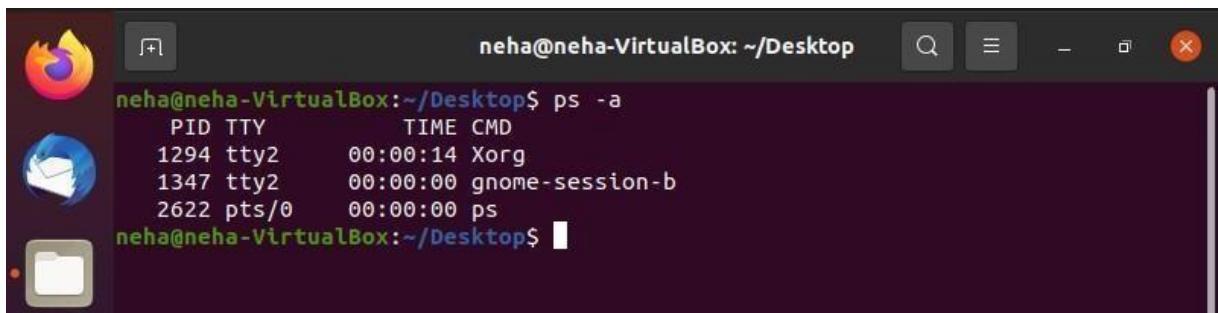
id command in Linux is used to find out user and group names and numeric ID's (UID or group ID) of the current user or any other user in the server.



```
Activities Terminal Aug 13 15:23
neha@neha-VirtualBox: ~/Desktop$ id neha
uid=1000(neha) gid=1000(neha) groups=1000(neha),4(adm),24(cdrom),27(sudo),30(dip),46(plugdev),120(lpadmin),131(lxd),132(sambashare)
neha@neha-VirtualBox: ~/Desktop$
```

## 9. ps

Abbreviation for “**Process Status**”. ps command is used to list the currently running processes and their PIDs along with some other information depends on different options. It reads the process information from the virtual files in **/proc** file-system. /proc contains virtual files, this is the reason it’s referred as a virtual file system.



```
Activities Terminal Aug 13 15:23
neha@neha-VirtualBox: ~/Desktop$ ps -a
  PID TTY      TIME CMD
 1294 tty2    00:00:14 Xorg
 1347 tty2    00:00:00 gnome-session-b
 2622 pts/0    00:00:00 ps
neha@neha-VirtualBox: ~/Desktop$
```

## 10. top

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

neha@neha-VirtualBox: ~/Desktop\$ top

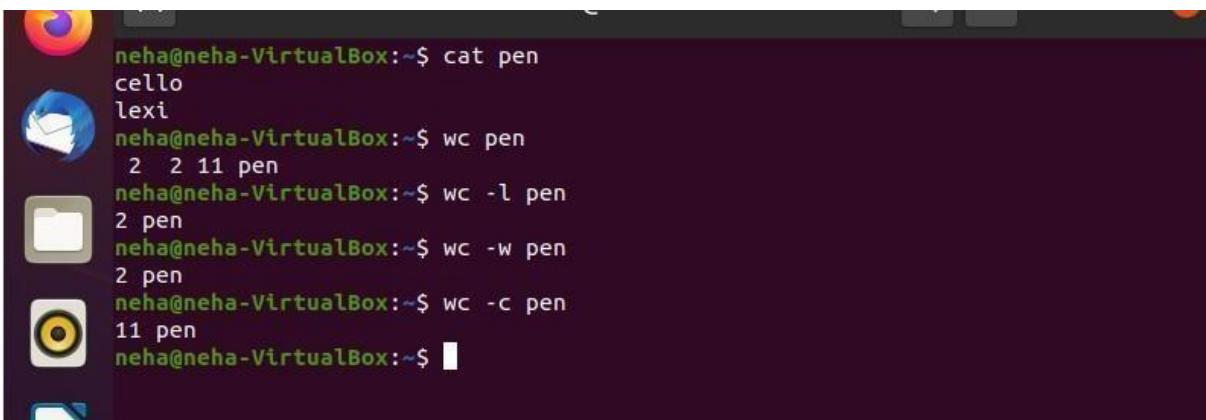
Aug 13 15:27

PID	USER	PR	NI	VIRT	RES	SHE	%CPU	BJTM	TIPtE+	COHJtANC
1294	neha	20	0	536728	29032	15488	S	2.0	2.9	0:15.89 Xorg
1481	neha	20	0	3691280	250996	76320	S	1.7	25.0	0:40.87 gnome--+
2183	neha	20	0	823268	49896	37436	S	1.7	5.0	0:06.01 gnome--+
1524	neha	20	0	162912	5816	5616	S	0.3	0.6	0:00.12 at-spi+
2603	root	20	0	0	0	0	I	0.3	0.0	0:00.36 kworker+
1	root	20	0	167624	8816	6500	S	0.0	0.9	0:03.23 systemd
2	root	20	0	0	0	0	S	0.0	0.0	0:00.00 kthrea+
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+
7	root	20	0	0	0	0	I	0.0	0.0	0:01.50 kworker+
9	root	0	-20	0	0	0	I	0.0	0.0	0:00.00 mm_per+
10	root	20	0	0	0	0	S	0.0	0.0	0:00.24 ksoftti+
11	root	20	0	0	0	0	I	0.0	0.0	0:01.21 rcu_sc+
12	root	rt	0	0	0	0	S	0.0	0.0	0:00.06 migrat+
13	root	-51	0	0	0	0	S	0.0	0.0	0:00.00 idle_i+
14	root	20	0	0	0	0	S	0.0	0.0	0:00.00 cpuhp/0
15	root	20	0	0	0	0	S	0.0	0.0	0:00.00 kdevtm+
16	root	0	-20	0	0	0	I	0.0	0.0	0:00.00 netns
17	root	20	0	0	0	0	S	0.0	0.0	0:00.00 rcu_ta+
18	root	20	0	0	0	0	S	0.0	0.0	0:00.00 rcu_ta+
19	root	20	0	0	0	0	S	0.0	0.0	0:00.00 rcu_ta+

## **BASIC LINUX COMMANDS PART-4**

### 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.



```
neha@neha-VirtualBox:~$ cat pen
cello
lexi
neha@neha-VirtualBox:~$ wc pen
2 2 11 pen
neha@neha-VirtualBox:~$ wc -l pen
2 pen
neha@neha-VirtualBox:~$ wc -w pen
2 pen
neha@neha-VirtualBox:~$ wc -c pen
11 pen
neha@neha-VirtualBox:~$
```

### 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

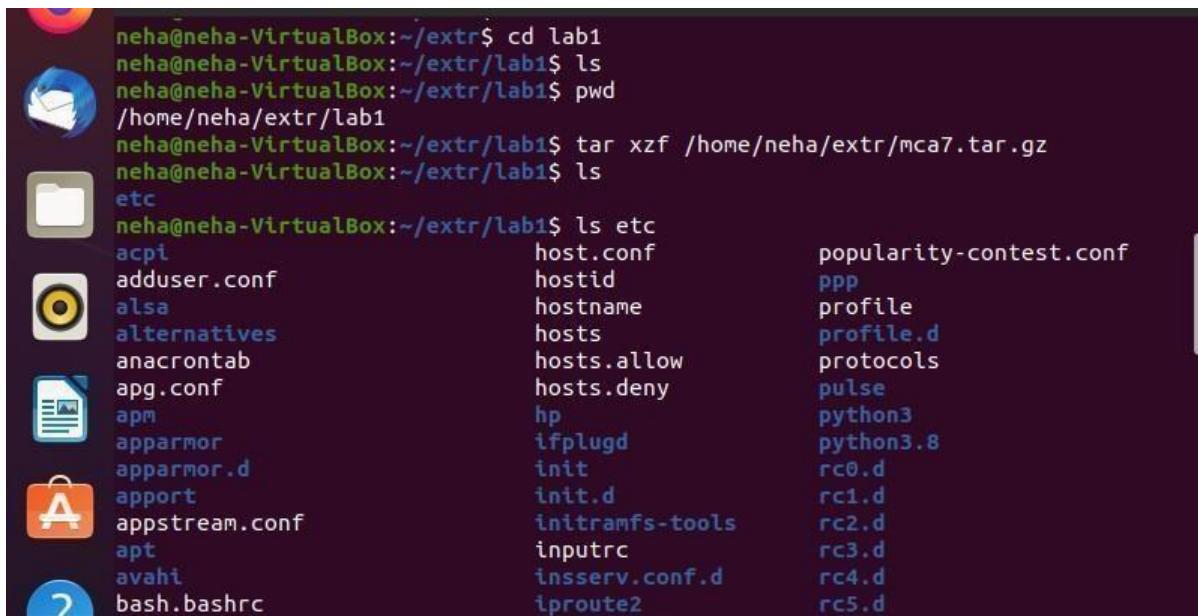
## Tar command

```
neha@neha-VirtualBox:~$ tar cf archive.tar pen table
neha@neha-VirtualBox:~$ ls archive.tar
archive.tar
neha@neha-VirtualBox:~$ ls
animals      chair     ex      extrac   Music      sample.txt
archieve.tar  Desktop   exact    extract  pen       table
archive.tar   Documents ext     file2    Pictures  Templates
archuve.tar   Downloads extra   file3    Public    Videos
neha@neha-VirtualBox:~$ tar tf archive.tar
pen
table
neha@neha-VirtualBox:~$ mkdir extr
neha@neha-VirtualBox:~$ cd extr
neha@neha-VirtualBox:~/extr$ pwd
/home/neha/extr
neha@neha-VirtualBox:~/extr$ tar xf /home/neha/archive.tar
neha@neha-VirtualBox:~/extr$ ls
pen table
neha@neha-VirtualBox:~/extr$ sudo tar czf mca7.tar.gz /etc
[sudo] password for neha:
tar: Removing leading `/' from member names
neha@neha-VirtualBox:~/extr$ ls
mca7.tar.gz pen table
```

## Compressing files using gz,bz2, xz

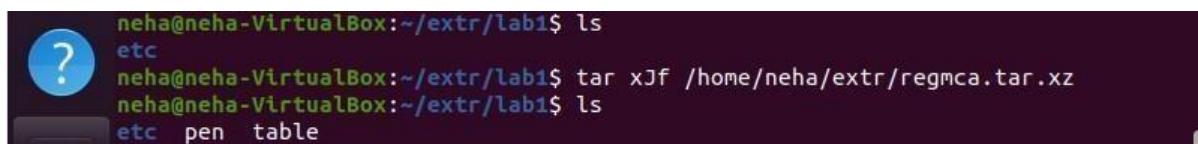
```
Activities Terminal ▾ Aug 13 18:50 •
neha@neha-VirtualBox:~/extr$ ls
pen table
neha@neha-VirtualBox:~/extr$ sudo tar czf mca7.tar.gz /etc
[sudo] password for neha:
tar: Removing leading `/' from member names
neha@neha-VirtualBox:~/extr$ ls
mca7.tar.gz pen table
neha@neha-VirtualBox:~/extr$ ls
mca7.tar.gz pen table
neha@neha-VirtualBox:~/extr$ cd ..
neha@neha-VirtualBox:~$ cd extr
neha@neha-VirtualBox:~/extr$ sudo tar cJf regmca8.tar.gz /etc
tar: Removing leading `/' from member names
neha@neha-VirtualBox:~/extr$ ls
mca7.tar.gz pen regmca8.tar.gz table
neha@neha-VirtualBox:~/extr$ sudo tar cJf regmca8.tar.bz2 pen table
neha@neha-VirtualBox:~/extr$ ls
mca7.tar.gz pen regmca8.tar.bz2 regmca8.tar.gz table
neha@neha-VirtualBox:~/extr$ sudo tar cJf regmca8.tar.bz2 pen table
neha@neha-VirtualBox:~/extr$ ls
mca7.tar.gz pen regmca8.tar.bzz regmca8.tar.gz table
neha@neha-VirtualBox:~/extr$ sudo tar cJf regmca8.tar.xz pen table
neha@neha-VirtualBox:~/extr$ ls
mca7.tar.gz regmca8.tar.bzz regmca8.tar.gz table
pen      regmca8.tar.bz2 regmca8.tar.xz
neha@neha-VirtualBox:~/extr$ mkdir lab1
```

## Extracting using gz



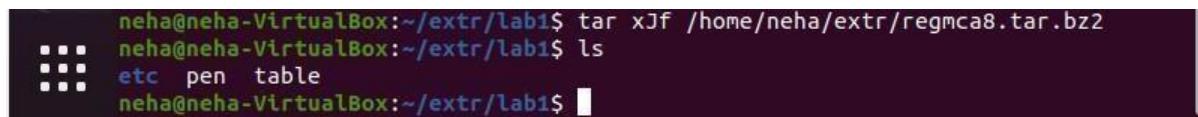
```
neha@neha-VirtualBox:~/extr$ cd lab1
neha@neha-VirtualBox:~/extr/lab1$ ls
neha@neha-VirtualBox:~/extr/lab1$ pwd
/home/neha/extr/lab1
neha@neha-VirtualBox:~/extr/lab1$ tar xzf /home/neha/extr/mca7.tar.gz
neha@neha-VirtualBox:~/extr/lab1$ ls
etc
neha@neha-VirtualBox:~/extr/lab1$ ls etc
acpi host.conf popularity-contest.conf
adduser.conf hostid ppp
alsa hostname profile
alternatives hosts protocols
anacrontab hosts.allow pulse
apg.conf hp python3
apm ifplugd python3.8
apparmor init rc0.d
apparmor.d init.d rc1.d
apport initramfs-tools rc2.d
appstream.conf inputrc rc3.d
apt inserv.conf.d rc4.d
avahi iproute2 rc5.d
bash.bashrc
```

## Extracting using xz



```
neha@neha-VirtualBox:~/extr/lab1$ ls
etc
neha@neha-VirtualBox:~/extr/lab1$ tar xJf /home/neha/extr/regmca.tar.xz
neha@neha-VirtualBox:~/extr/lab1$ ls
etc pen table
```

## Extracting using bz2

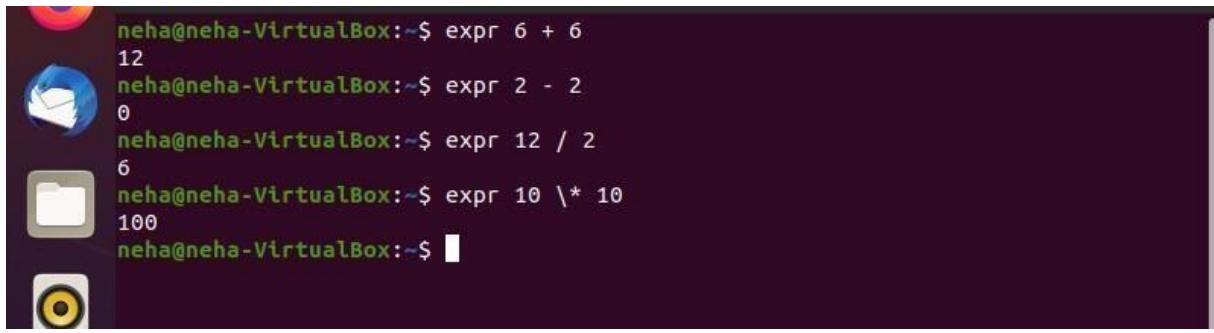


```
neha@neha-VirtualBox:~/extr/lab1$ tar xJf /home/neha/extr/regmca8.tar.bz2
neha@neha-VirtualBox:~/extr/lab1$ ls
etc pen table
neha@neha-VirtualBox:~/extr/lab1$
```

## 3. expr

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

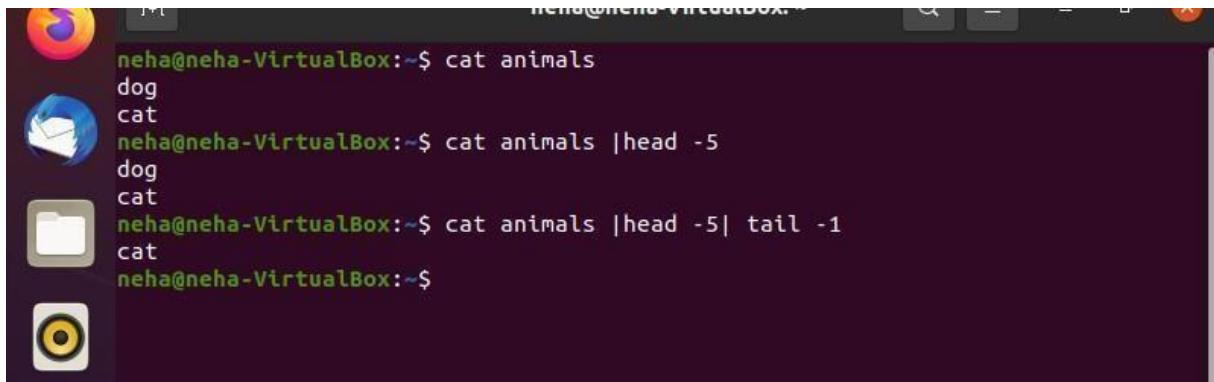
- Basic operations like addition, subtraction, multiplication, division, and modulus on integers.
- Evaluating regular expressions, string operations like substring, length of strings etc.



```
neha@neha-VirtualBox:~$ expr 6 + 6
12
neha@neha-VirtualBox:~$ expr 2 - 2
0
neha@neha-VirtualBox:~$ expr 12 / 2
6
neha@neha-VirtualBox:~$ expr 10 \* 10
100
neha@neha-VirtualBox:~$
```

## 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.



```
neha@neha-VirtualBox:~$ cat animals
dog
cat
neha@neha-VirtualBox:~$ cat animals |head -5
dog
cat
neha@neha-VirtualBox:~$ cat animals |head -5| tail -1
cat
neha@neha-VirtualBox:~$
```

## 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.

```
neha@neha-VirtualBox:~$ sudo apt install openssh-client
[sudo] password for neha:
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-clie
nt amd64 1:8.2p1-4ubuntu0.2 [671 kB]
Fetched 671 kB in 1s (590 kB/s)
(Reading database ... 182839 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) ...
neha@neha-VirtualBox:~$ ssh localhost
ssh: connect to host localhost port 22: Connection refused
neha@neha-VirtualBox:~$ sudo apt install openssh-server ii
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
Suggested packages:
```

```
Processing triggers for man-db (2.9.1-1) ...
Processing triggers for ufw (0.36-6) ...
neha@neha-VirtualBox:~$ ssh localhost
The authenticity of host 'localhost (127.0.0.1)' can't be established.
ECDSA key fingerprint is SHA256:lNuwumRVlnzw4Wnv43+HsUc4ayyDQVfnBV+7da8uW2s.
Are you sure you want to continue connecting (yes/no/[fingerprint])? yes
Warning: Permanently added 'localhost' (ECDSA) to the list of known hosts.
neha@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

217 updates can be installed immediately.
91 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.

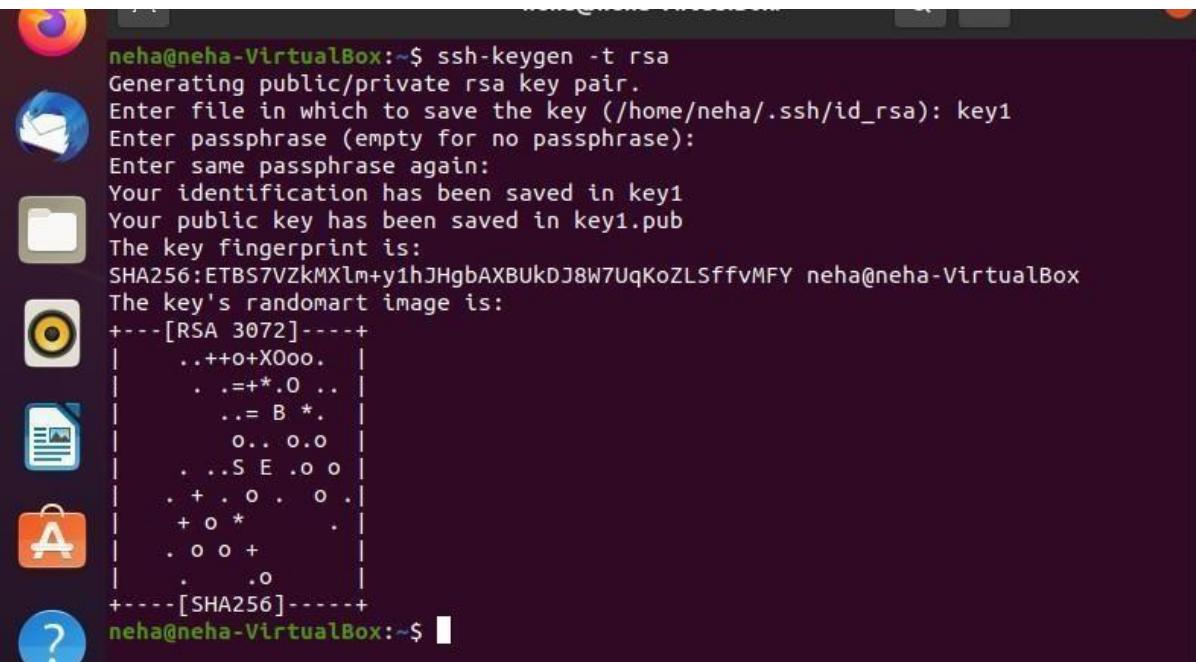
neha@neha-VirtualBox:~$
```

## 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.



```
neha@neha-VirtualBox:~$ ssh-keygen -t rsa
Generating public/private rsa key pair.
Enter file in which to save the key (/home/neha/.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:ETBS7VZkMXLm+y1hJHgbAXBkDJ8W7UqKoZLSffvMFY neha@neha-VirtualBox
The key's randomart image is:
+---[RSA 3072]---+
| ..++o+X0oo. |
| . .=+*.O .. |
| ..= B *.. |
| o.. o.o |
| . ..S E .o o |
| . + . o . o . |
| + o * . . |
| . o o + |
| . .o |
+---[SHA256]---+
neha@neha-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 passwordless, automatic login process.
- The **ssh-copy-id** command is part of OpenSSH, a tool for performing remote system administrations using encrypted SSH connections.

## Lab Exercises

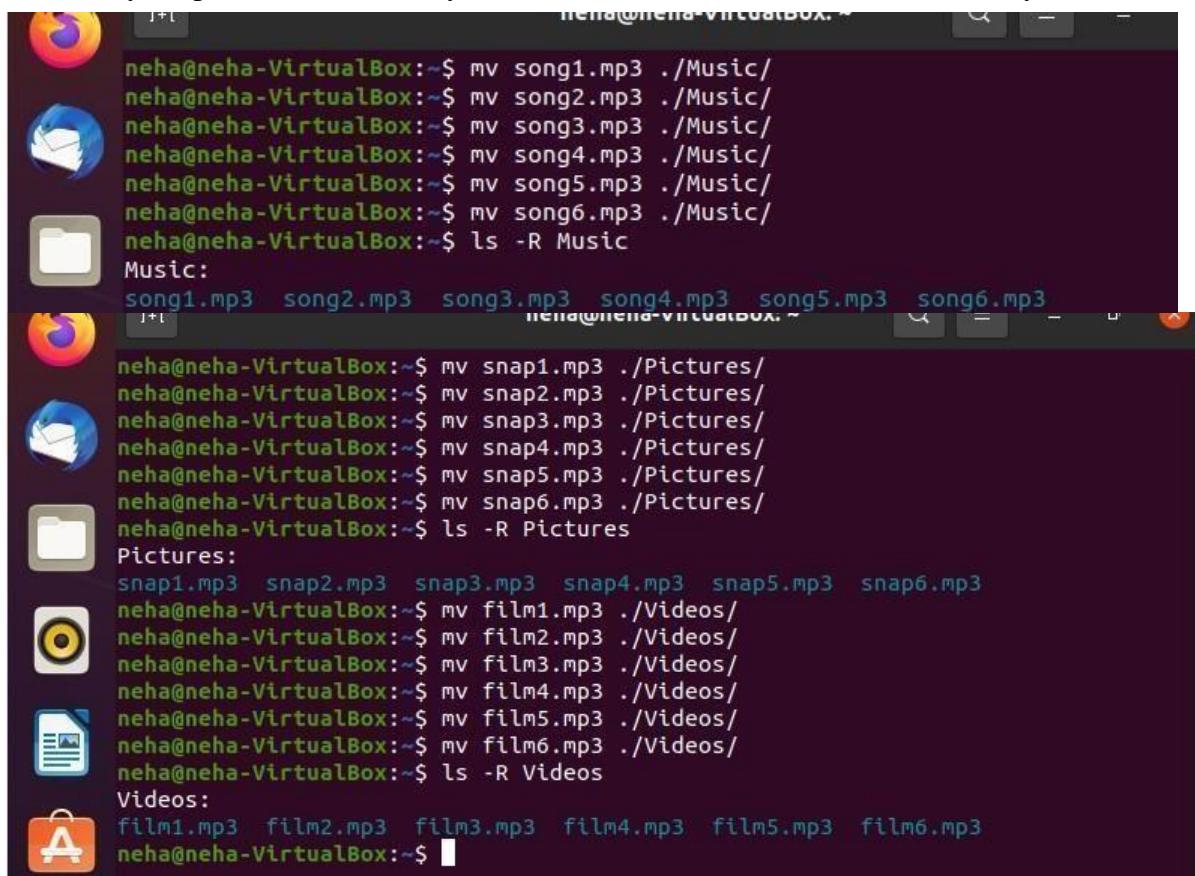
- 1.a. Create six files with name of the form songX.mp3.
- b. Create six files with name of the form snapX.mp3.
- c. Create six files with name of the form filmX.mp3 (In each set, replace X with the numbers 1 through 6).

```
Activities Terminal ▾ Aug 17 20:26 • neha@neha-VirtualBox: ~
+ neha@neha-VirtualBox:~$ touch song1.mp3
neha@neha-VirtualBox:~$ touch song2.mp3
neha@neha-VirtualBox:~$ touch song3.mp3
neha@neha-VirtualBox:~$ touch song4.mp3
neha@neha-VirtualBox:~$ touch song5.mp3
neha@neha-VirtualBox:~$ touch song6.mp3
neha@neha-VirtualBox:~$ ls
animals      Desktop    ext       file2      pen       song2.mp3  table
archive.tar   Documents   extr     file3      Pictures  song3.mp3  Templates
archive.tar   Downloads   extra    key1      Public    song4.mp3  Videos
archuve.tar   ex         exact   extract   Music    sample.txt  song5.mp3
chair        ext        exact   extract   Music    song1.mp3  song6.mp3
neha@neha-VirtualBox:~$
```

```
Activities Terminal ▾ Aug 17 20:28 • neha@neha-VirtualBox: ~
+ neha@neha-VirtualBox:~$ touch snap1.mp3
neha@neha-VirtualBox:~$ touch snap2.mp3
neha@neha-VirtualBox:~$ touch snap3.mp3
neha@neha-VirtualBox:~$ touch snap4.mp3
neha@neha-VirtualBox:~$ touch snap5.mp3
neha@neha-VirtualBox:~$ touch snap6.mp3
neha@neha-VirtualBox:~$ ls
animals      Documents   extra    key1.pub   snap1.mp3  song1.mp3  table
archive.tar  Downloads   extrac   Music     snap2.mp3  song2.mp3  Templates
archive.tar  ex         extract  file2     snap3.mp3  song3.mp3  Videos
archuve.tar  exact      exact   file3     Pictures  snap4.mp3  song4.mp3
chair        ext        exact   file3     Public    snap5.mp3  song5.mp3
Desktop      extr      key1    sample.txt snap6.mp3  song6.mp3
neha@neha-VirtualBox:~$
```

```
Activities Terminal ▾ neha@neha-VirtualBox: ~
+ neha@neha-VirtualBox:~$ touch film1.mp3
neha@neha-VirtualBox:~$ touch film2.mp3
neha@neha-VirtualBox:~$ touch film3.mp3
neha@neha-VirtualBox:~$ touch film4.mp3
neha@neha-VirtualBox:~$ touch film5.mp3
neha@neha-VirtualBox:~$ touch film6.mp3
neha@neha-VirtualBox:~$ ls
animals      ex        file3    key1.pub   snap3.mp3  song5.mp3
archive.tar  exact     film1.mp3 Music    snap4.mp3  song6.mp3
archive.tar  ext       film2.mp3 pen     snap5.mp3  table
archuve.tar  extr     film3.mp3 Pictures  snap6.mp3  Templates
chair        extra    film4.mp3 Public   song1.mp3  Videos
Desktop      extrac   film5.mp3 sample.txt song2.mp3
Documents    extract  film6.mp3 snap1.mp3  song3.mp3
Downloads   file2     key1    snap2.mp3  song4.mp3
neha@neha-VirtualBox:~$
```

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.

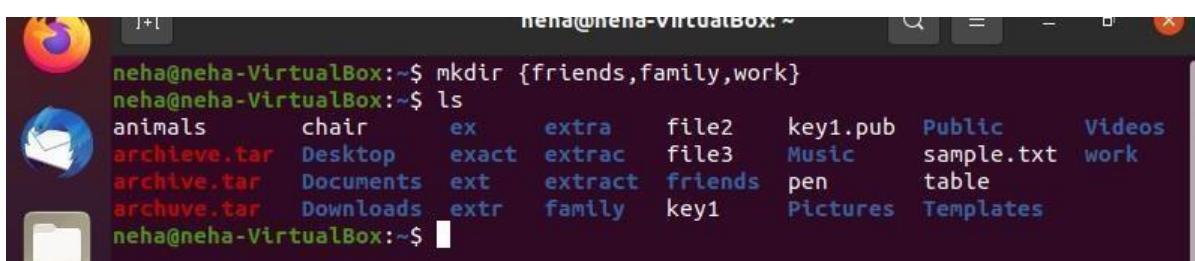


```
neha@neha-VirtualBox:~$ mv song1.mp3 ./Music/
neha@neha-VirtualBox:~$ mv song2.mp3 ./Music/
neha@neha-VirtualBox:~$ mv song3.mp3 ./Music/
neha@neha-VirtualBox:~$ mv song4.mp3 ./Music/
neha@neha-VirtualBox:~$ mv song5.mp3 ./Music/
neha@neha-VirtualBox:~$ mv song6.mp3 ./Music/
neha@neha-VirtualBox:~$ ls -R Music
Music:
song1.mp3  song2.mp3  song3.mp3  song4.mp3  song5.mp3  song6.mp3

neha@neha-VirtualBox:~$ mv snap1.mp3 ./Pictures/
neha@neha-VirtualBox:~$ mv snap2.mp3 ./Pictures/
neha@neha-VirtualBox:~$ mv snap3.mp3 ./Pictures/
neha@neha-VirtualBox:~$ mv snap4.mp3 ./Pictures/
neha@neha-VirtualBox:~$ mv snap5.mp3 ./Pictures/
neha@neha-VirtualBox:~$ mv snap6.mp3 ./Pictures/
neha@neha-VirtualBox:~$ ls -R Pictures
Pictures:
snap1.mp3  snap2.mp3  snap3.mp3  snap4.mp3  snap5.mp3  snap6.mp3

neha@neha-VirtualBox:~$ mv film1.mp3 ./Videos/
neha@neha-VirtualBox:~$ mv film2.mp3 ./Videos/
neha@neha-VirtualBox:~$ mv film3.mp3 ./Videos/
neha@neha-VirtualBox:~$ mv film4.mp3 ./Videos/
neha@neha-VirtualBox:~$ mv film5.mp3 ./Videos/
neha@neha-VirtualBox:~$ mv film6.mp3 ./Videos/
neha@neha-VirtualBox:~$ ls -R Videos
Videos:
film1.mp3  film2.mp3  film3.mp3  film4.mp3  film5.mp3  film6.mp3
```

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.



```
neha@neha-VirtualBox:~$ mkdir {friends,family,work}
neha@neha-VirtualBox:~$ ls
animals      chair      ex      extra    file2    key1.pub  Public      Videos
archieve.tar  Desktop    exact   extract  file3    Music     sample.txt  work
archive.tar   Documents  ext    extract  friends  pen      table
archuve.tar   Downloads  extr   family   key1    Pictures  Templates
neha@neha-VirtualBox:~$
```

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

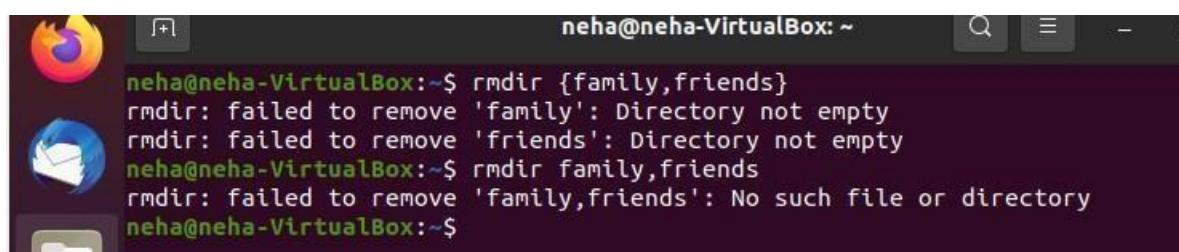


```
neha@neha-VirtualBox:~$ ls
animals    chair    ex    extra   file2   key1.pub  Public    Videos
archieve.tar Desktop  exact  extrac  file3   Music     sample.txt work
archive.tar  Documents ext   extract friends pen      table
archuve.tar  Downloads extr  family   key1    Pictures  Templates
neha@neha-VirtualBox:~$ cp Music/song1.mp3 friends
neha@neha-VirtualBox:~$ cp Music/song2.mp3 friends
neha@neha-VirtualBox:~$ cp Music/song3.mp3 friends
neha@neha-VirtualBox:~$ cp Music/song4.mp3 friends
neha@neha-VirtualBox:~$ cp Music/song5.mp3 friends
neha@neha-VirtualBox:~$ cp Music/song6.mp3 friends
neha@neha-VirtualBox:~$ ls -R friends
friends:
song1.mp3  song2.mp3  song3.mp3  song4.mp3  song5.mp3  song6.mp3
```



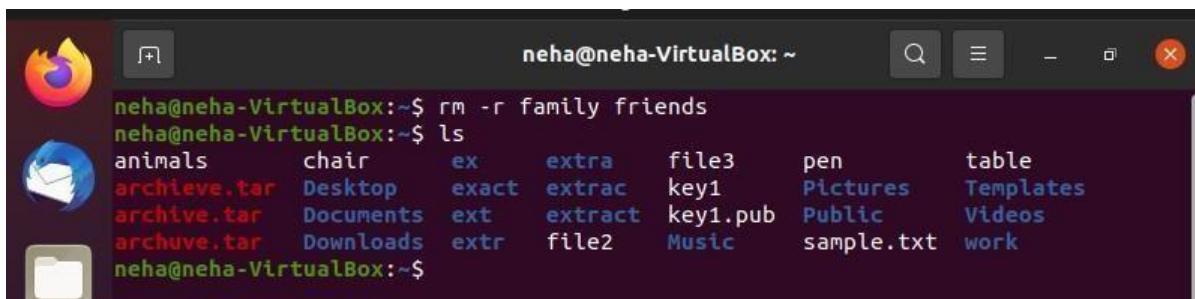
```
neha@neha-VirtualBox:~$ cp Pictures/snap1.mp3 family
neha@neha-VirtualBox:~$ cp Pictures/snap2.mp3 family
neha@neha-VirtualBox:~$ cp Pictures/snap3.mp3 family
neha@neha-VirtualBox:~$ cp Pictures/snap4.mp3 family
neha@neha-VirtualBox:~$ cp Pictures/snap5.mp3 family
neha@neha-VirtualBox:~$ cp Pictures/snap6.mp3 family
neha@neha-VirtualBox:~$ ls -R family
family:
snap1.mp3  snap2.mp3  snap3.mp3  snap4.mp3  snap5.mp3  snap6.mp3
neha@neha-VirtualBox:~$
```

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



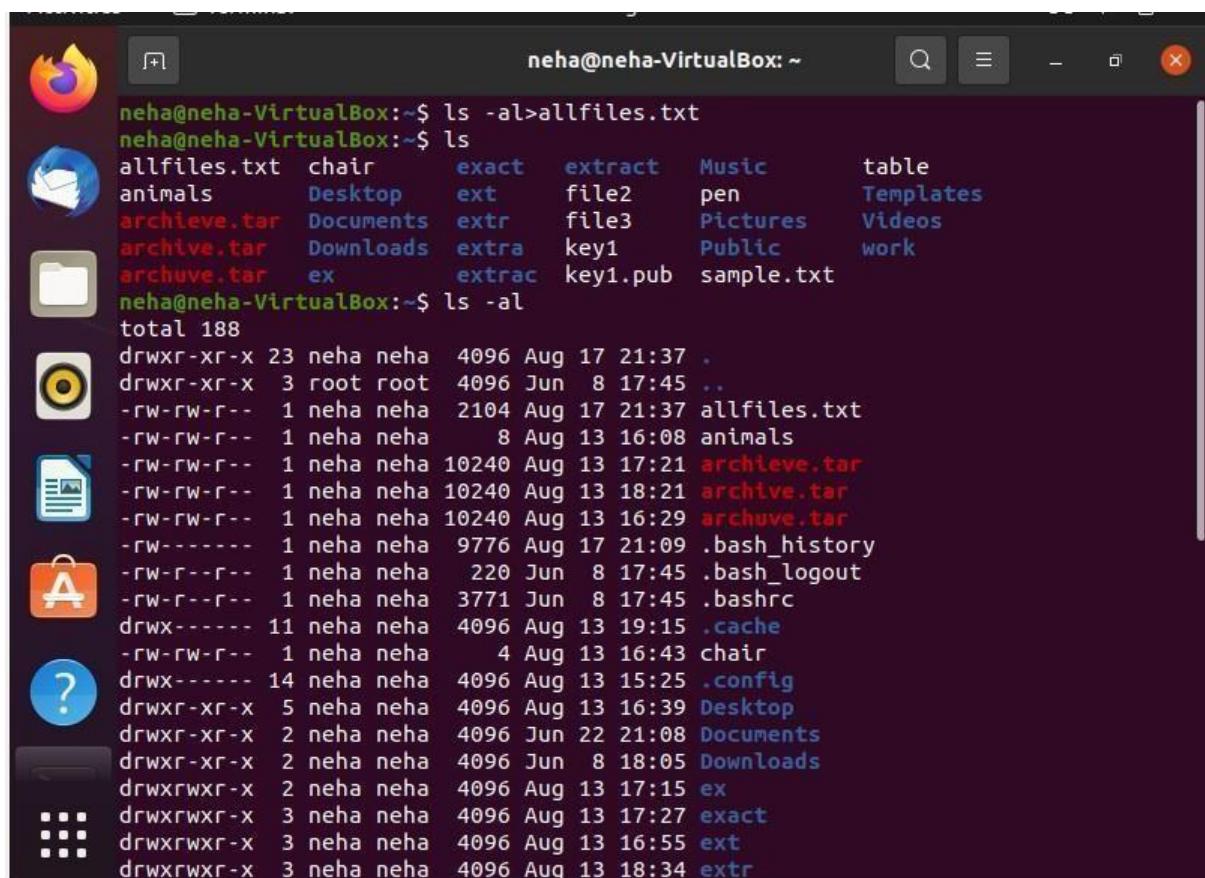
```
neha@neha-VirtualBox:~$ rmdir {family,friends}
rmdir: failed to remove 'family': Directory not empty
rmdir: failed to remove 'friends': Directory not empty
neha@neha-VirtualBox:~$ rmdir family,friends
rmdir: failed to remove 'family,friends': No such file or directory
neha@neha-VirtualBox:~$
```

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



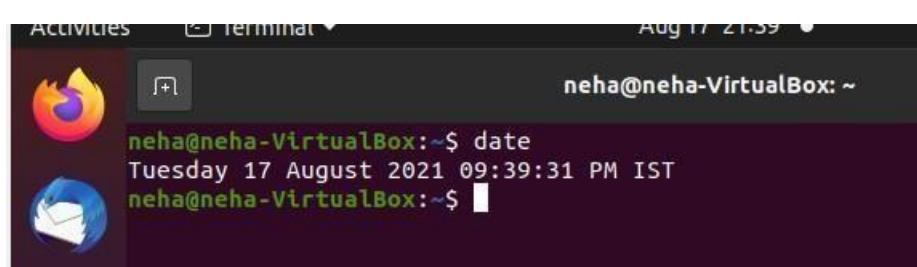
```
neha@neha-VirtualBox:~$ rm -r family friends
neha@neha-VirtualBox:~$ ls
animals      chair      ex      extra      file3      pen      table
archive.tar  Desktop    exact    extract    key1      Pictures  Templates
archtve.tar   Documents  ext     extract    key1.pub   Public    Videos
archuve.tar  Downloads  extr    file2     Music     sample.txt work
neha@neha-VirtualBox:~$
```

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.



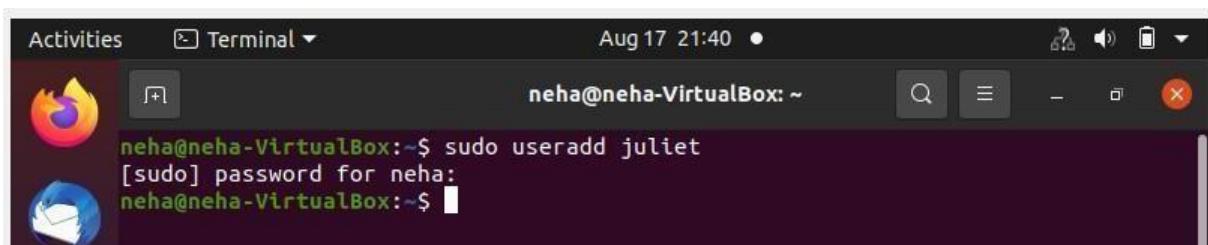
```
neha@neha-VirtualBox:~$ ls -al>allfiles.txt
neha@neha-VirtualBox:~$ ls
allfiles.txt  chair      exact    extract    Music      table
animals       Desktop    ext      file2     file3     pen      Templates
archive.tar   Documents  extr    extract    key1      Pictures  Videos
archive.tar   Downloads  extra   key1.pub   sample.txt work
archuve.tar  ex        extrac   key1.pub   table
neha@neha-VirtualBox:~$ ls -al
total 188
drwxr-xr-x  23 neha neha  4096 Aug 17 21:37 .
drwxr-xr-x  3 root root  4096 Jun  8 17:45 ..
-rw-rw-r--  1 neha neha  2104 Aug 17 21:37 allfiles.txt
-rw-rw-r--  1 neha neha   8 Aug 13 16:08 animals
-rw-rw-r--  1 neha neha 10240 Aug 13 17:21 archive.tar
-rw-rw-r--  1 neha neha 10240 Aug 13 18:21 archive.tar
-rw-rw-r--  1 neha neha 10240 Aug 13 16:29 archuve.tar
-rw-----  1 neha neha  9776 Aug 17 21:09 .bash_history
-rw-r--r--  1 neha neha  220 Jun  8 17:45 .bash_logout
-rw-r--r--  1 neha neha 3771 Jun  8 17:45 .bashrc
drwx----- 11 neha neha  4096 Aug 13 19:15 .cache
-rw-rw-r--  1 neha neha    4 Aug 13 16:43 chair
drwx----- 14 neha neha  4096 Aug 13 15:25 .config
drwxr-xr-x  5 neha neha  4096 Aug 13 16:39 Desktop
drwxr-xr-x  2 neha neha  4096 Jun 22 21:08 Documents
drwxr-xr-x  2 neha neha  4096 Jun  8 18:05 Downloads
drwxrwxr-x  2 neha neha  4096 Aug 13 17:15 ex
drwxrwxr-x  3 neha neha  4096 Aug 13 17:27 exact
drwxrwxr-x  3 neha neha  4096 Aug 13 16:55 ext
drwxrwxr-x  3 neha neha  4096 Aug 13 18:34 extr
```

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



```
Activities  Terminal  Aug 17 21:59
neha@neha-VirtualBox:~$ date
Tuesday 17 August 2021 09:39:31 PM IST
neha@neha-VirtualBox:~$
```

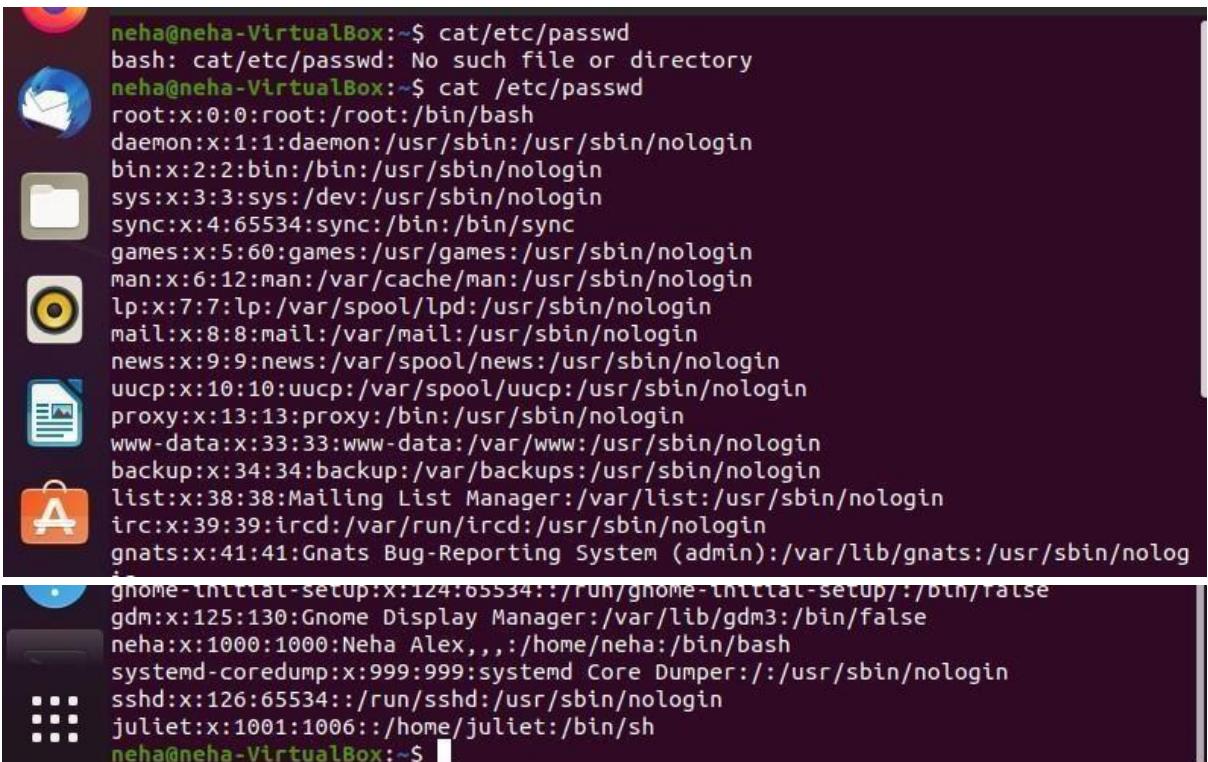
9. Add the user Juliet.



A screenshot of an Ubuntu desktop environment. A terminal window titled "Terminal" is open at the top of the screen. The terminal shows the command "sudo useradd juliet" being run by user "neha". It prompts for a password and then confirms the addition of the user "juliet".

```
Activities Terminal Aug 17 21:40 • neha@neha-VirtualBox: ~
neha@neha-VirtualBox:~$ sudo useradd juliet
[sudo] password for neha:
neha@neha-VirtualBox:~$
```

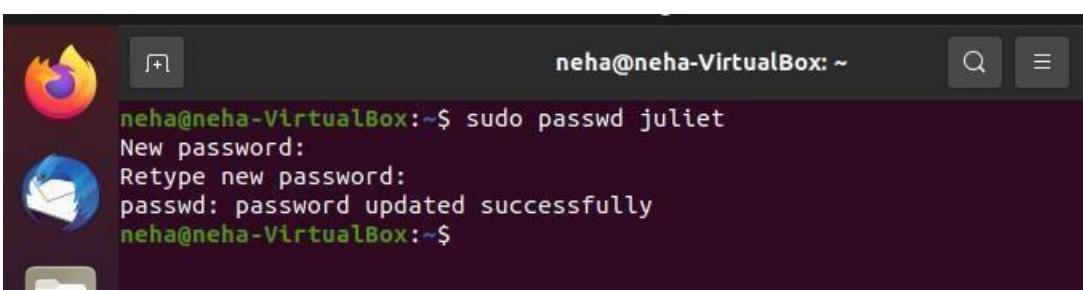
10. Confirm that Juliet has been added by examining the /etc/passwd file.



A screenshot of an Ubuntu desktop environment. A terminal window titled "Terminal" is open at the top of the screen. The terminal displays the contents of the "/etc/passwd" file. The file lists various system users and their details, including "juliet" which was recently added.

```
neha@neha-VirtualBox:~$ cat/etc/passwd
bash: cat/etc/passwd: No such file or directory
neha@neha-VirtualBox:~$ cat /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:/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:/var/run/ircd:/usr/sbin/nologin
gnats:x:41:41:Gnats Bug-Reporting System (admin):/var/lib/gnats:/usr/sbin/nologin
gnome-initiat-setup:X:124:65534::/run/gnome-initiat-setup/:/bin/false
gdm:x:125:130:Gnome Display Manager:/var/lib/gdm3:/bin/false
neha:x:1000:1000:Neha Alex,,,:/home/neha:/bin/bash
systemd-coredump:x:999:999:systemd Core Dumper:/:/usr/sbin/nologin
sshd:x:126:65534::/run/sshd:/usr/sbin/nologin
juliet:x:1001:1006::/home/juliet:/bin/sh
neha@neha-VirtualBox:~$
```

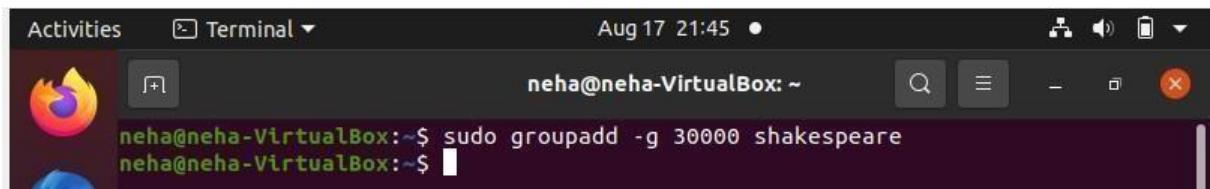
11. Use the passwd command to initialize Juliet's password.



A screenshot of an Ubuntu desktop environment. A terminal window titled "Terminal" is open at the top of the screen. The terminal shows the command "sudo passwd juliet" being run by user "neha". It prompts for a new password and then confirms that the password was updated successfully.

```
Activities Terminal neha@neha-VirtualBox: ~
neha@neha-VirtualBox:~$ sudo passwd juliet
New password:
Retype new password:
passwd: password updated successfully
neha@neha-VirtualBox:~$
```

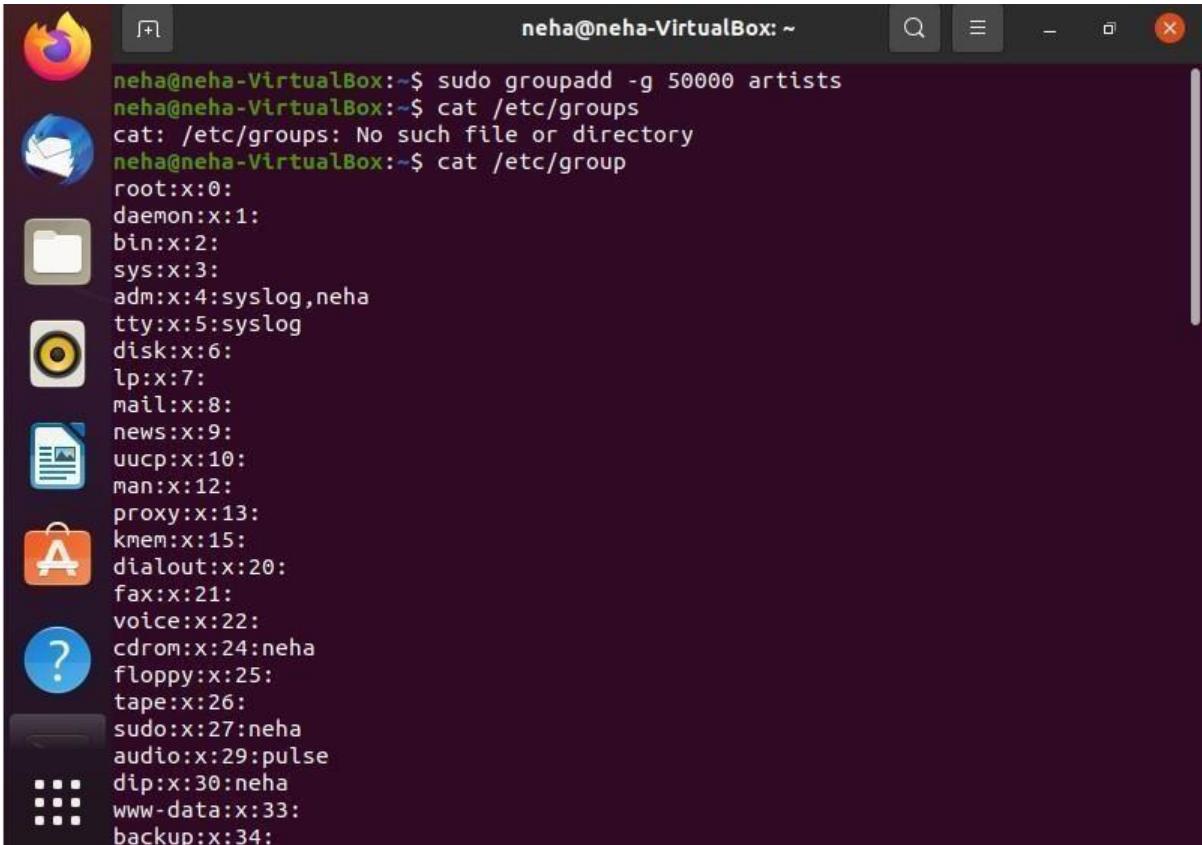
12. Create a supplementary group called Shakespeare with a group id of 30000



A screenshot of a Linux desktop environment, likely Ubuntu, showing a terminal window. The terminal window title bar says "Terminal". The terminal window shows the command "sudo groupadd -g 30000 shakespeare" being run by the user "neha" at the prompt "neha@neha-VirtualBox:~". The output of the command is "shakespeare". The desktop background is visible behind the terminal window.

```
Activities Terminal Aug 17 21:45 neha@neha-VirtualBox: ~
neha@neha-VirtualBox:~$ sudo groupadd -g 30000 shakespeare
neha@neha-VirtualBox:~$
```

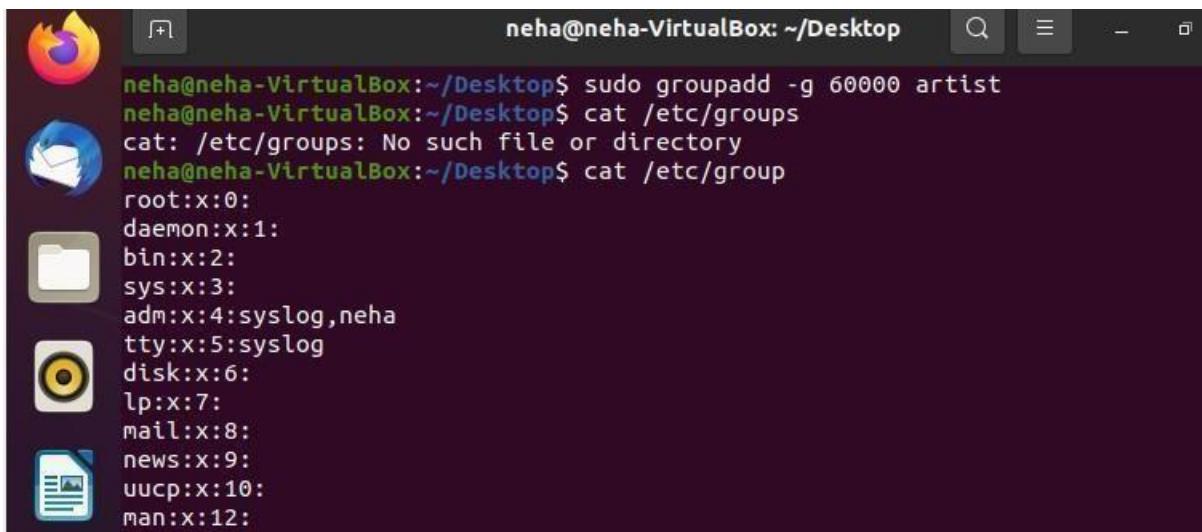
13. Create a supplementary group called artists.



A screenshot of a Linux desktop environment, likely Ubuntu, showing a terminal window. The terminal window title bar says "Terminal". The terminal window shows the command "sudo groupadd -g 50000 artists" being run by the user "neha" at the prompt "neha@neha-VirtualBox:~". The output of the command is "artists". The terminal then shows the command "cat /etc/groups" which outputs "cat: /etc/groups: No such file or directory". Finally, the command "cat /etc/group" is run, displaying a list of groups and their group IDs. The list includes root, daemon, bin, sys, adm, tty, disk, lp, mail, news, uucp, man, proxy, kmem, dialout, fax, voice, cdrom, floppy, tape, sudo, audio, dip, www-data, and backup.

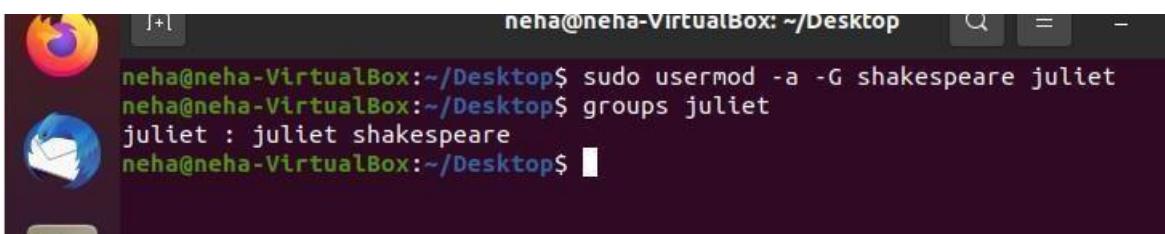
```
neha@neha-VirtualBox:~$ sudo groupadd -g 50000 artists
neha@neha-VirtualBox:~$ cat /etc/groups
cat: /etc/groups: No such file or directory
neha@neha-VirtualBox:~$ cat /etc/group
root:x:0:
daemon:x:1:
bin:x:2:
sys:x:3:
adm:x:4:syslog,neha
tty:x:5:syslog
disk:x:6:
lp:x:7:
mail:x:8:
news:x:9:
uucp:x:10:
man:x:12:
proxy:x:13:
kmem:x:15:
dialout:x:20:
fax:x:21:
voice:x:22:
cdrom:x:24:neha
floppy:x:25:
tape:x:26:
sudo:x:27:neha
audio:x:29:pulse
dip:x:30:neha
www-data:x:33:
backup:x:34:
```

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



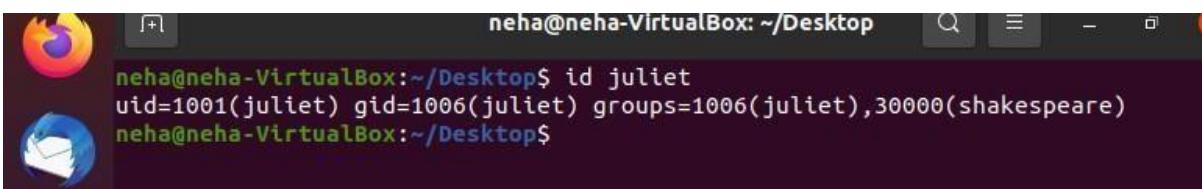
```
neha@neha-VirtualBox:~/Desktop$ sudo groupadd -g 60000 artist
neha@neha-VirtualBox:~/Desktop$ cat /etc/groups
cat: /etc/groups: No such file or directory
neha@neha-VirtualBox:~/Desktop$ cat /etc/group
root:x:0:
daemon:x:1:
bin:x:2:
sys:x:3:
adm:x:4:syslog,neha
tty:x:5:syslog
disk:x:6:
lp:x:7:
mail:x:8:
news:x:9:
uucp:x:10:
man:x:12:
```

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



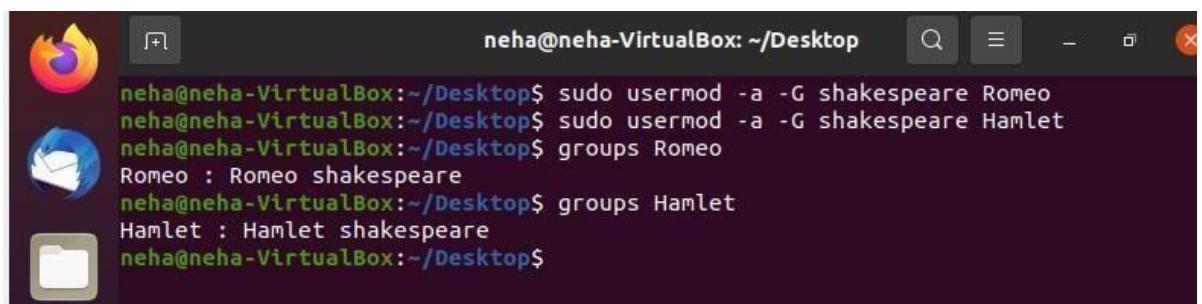
```
neha@neha-VirtualBox:~/Desktop$ sudo usermod -a -G shakespeare juliet
neha@neha-VirtualBox:~/Desktop$ groups juliet
juliet : juliet shakespeare
neha@neha-VirtualBox:~/Desktop$
```

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



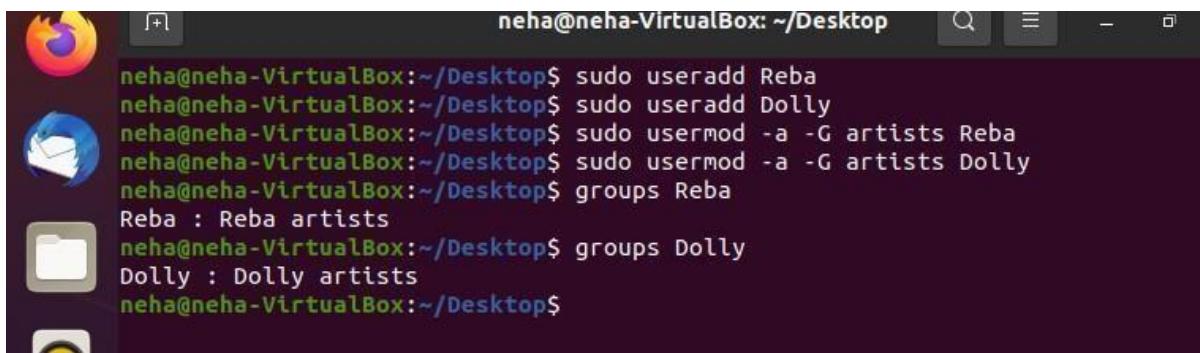
```
neha@neha-VirtualBox:~/Desktop$ id juliet
uid=1001(juliet) gid=1006(juliet) groups=1006(juliet),30000(shakespeare)
neha@neha-VirtualBox:~/Desktop$
```

17. Add Romeo and Hamlet to the Shakespeare group.



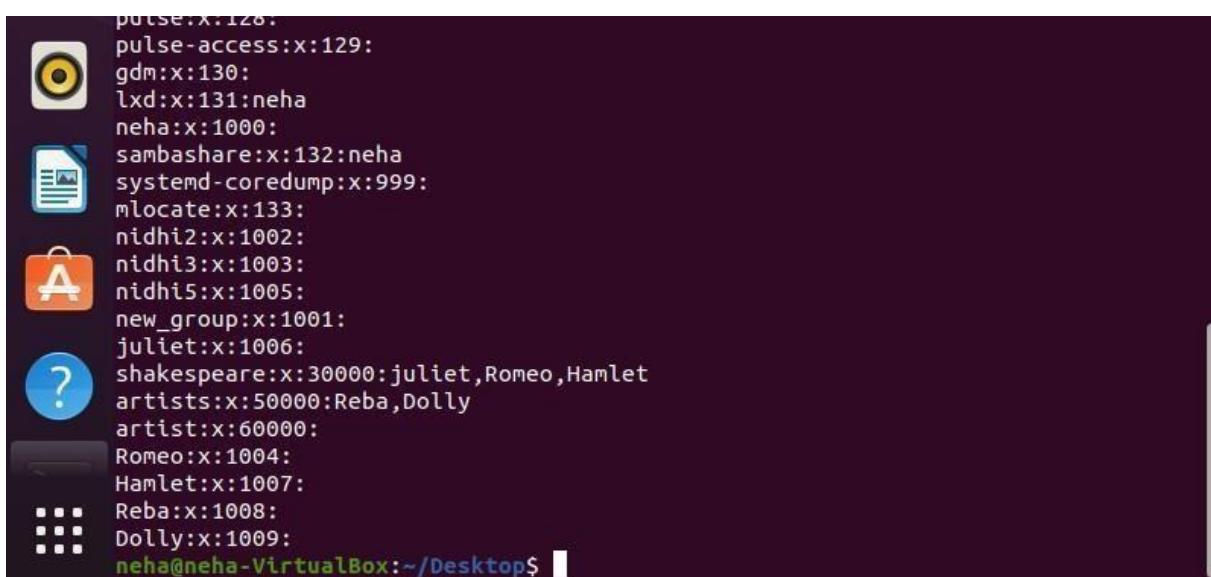
```
neha@neha-VirtualBox:~/Desktop$ sudo usermod -a -G shakespeare Romeo
neha@neha-VirtualBox:~/Desktop$ sudo usermod -a -G shakespeare Hamlet
neha@neha-VirtualBox:~/Desktop$ groups Romeo
Romeo : Romeo shakespeare
neha@neha-VirtualBox:~/Desktop$ groups Hamlet
Hamlet : Hamlet shakespeare
neha@neha-VirtualBox:~/Desktop$
```

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



```
neha@neha-VirtualBox:~/Desktop$ sudo useradd Reba
neha@neha-VirtualBox:~/Desktop$ sudo useradd Dolly
neha@neha-VirtualBox:~/Desktop$ sudo usermod -a -G artists Reba
neha@neha-VirtualBox:~/Desktop$ sudo usermod -a -G artists Dolly
neha@neha-VirtualBox:~/Desktop$ groups Reba
Reba : Reba artists
neha@neha-VirtualBox:~/Desktop$ groups Dolly
Dolly : Dolly artists
neha@neha-VirtualBox:~/Desktop$
```

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



```
pulse:x:128:
pulse-access:x:129:
gdm:x:130:
lxde:x:131:neha
neha:x:1000:
sambashare:x:132:neha
systemd-coredump:x:999:
mlocate:x:133:
nidhi2:x:1002:
nidhi3:x:1003:
nidhi5:x:1005:
new_group:x:1001:
juliet:x:1006:
shakespeare:x:30000:juliet,Romeo,Hamlet
artists:x:50000:Reba,Dolly
artist:x:60000:
Romeo:x:1004:
Hamlet:x:1007:
Reba:x:1008:
Dolly:x:1009:
neha@neha-VirtualBox:~/Desktop$
```

20. Attempt to remove user Dolly.



```
gdm:x:130:
lxde:x:131:neha
neha:x:1000:
sambashare:x:132:neha
systemd-coredump:x:999:
mlocate:x:133:
nidhi2:x:1002:
nidhi3:x:1003:
nidhi5:x:1005:
new_group:x:1001:
juliet:x:1006:
shakespeare:x:30000:juliet,Romeo,Hamlet
artists:x:50000:Reba
artist:x:60000:
Romeo:x:1004:
Hamlet:x:1007:
Reba:x:1008:
neha@neha-VirtualBox:~/Desktop$
```

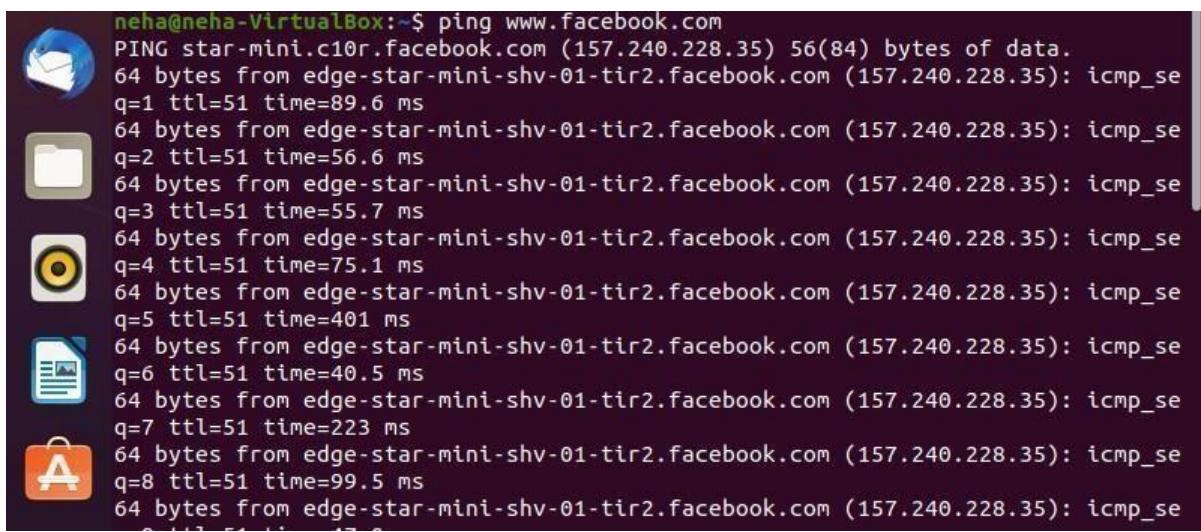
## Lab Exercise

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

#### LINUX

##### 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.



```
neha@neha-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=51 time=89.6 ms
64 bytes from edge-star-mini-shv-01-tir2.facebook.com (157.240.228.35): icmp_se
q=2 ttl=51 time=56.6 ms
64 bytes from edge-star-mini-shv-01-tir2.facebook.com (157.240.228.35): icmp_se
q=3 ttl=51 time=55.7 ms
64 bytes from edge-star-mini-shv-01-tir2.facebook.com (157.240.228.35): icmp_se
q=4 ttl=51 time=75.1 ms
64 bytes from edge-star-mini-shv-01-tir2.facebook.com (157.240.228.35): icmp_se
q=5 ttl=51 time=401 ms
64 bytes from edge-star-mini-shv-01-tir2.facebook.com (157.240.228.35): icmp_se
q=6 ttl=51 time=40.5 ms
64 bytes from edge-star-mini-shv-01-tir2.facebook.com (157.240.228.35): icmp_se
q=7 ttl=51 time=223 ms
64 bytes from edge-star-mini-shv-01-tir2.facebook.com (157.240.228.35): icmp_se
q=8 ttl=51 time=99.5 ms
64 bytes from edge-star-mini-shv-01-tir2.facebook.com (157.240.228.35): icmp_se
q=9 ttl=51 time=17.6 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.

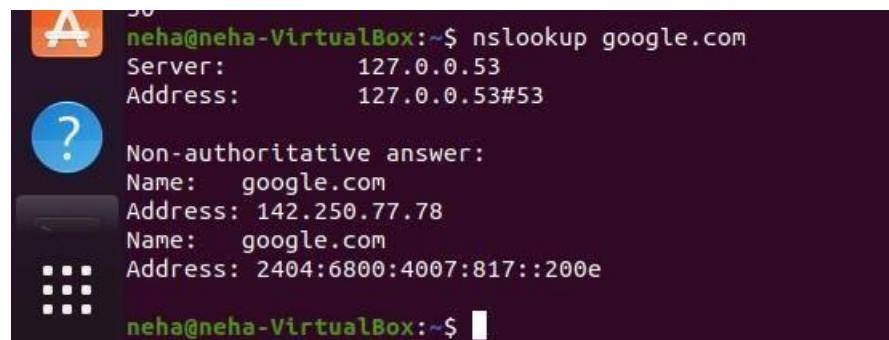
The difference between **tracert(windows)** and **traceroute(linux)** is that: tracert(windows) will only use ICMP echo requests. traceroute(linux) [and somewhat dependent on linux distro] default to UDP echo requests.



```
neha@neha-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) 1.637 ms 1.587 ms 1.572 ms
2 * * *
3 * * *
```

### 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.



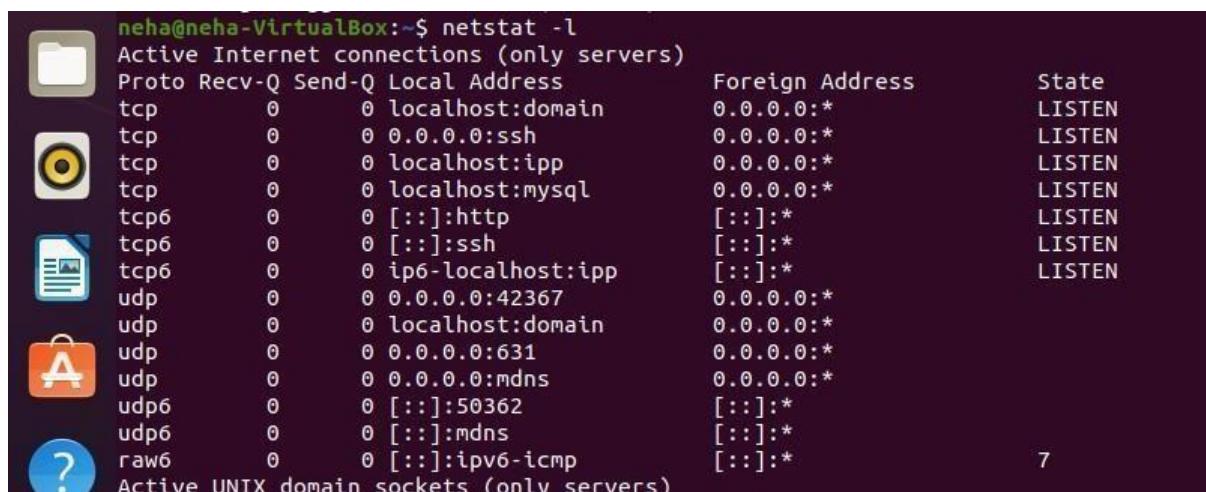
```
neha@neha-VirtualBox:~$ nslookup google.com
Server:      127.0.0.53
Address:     127.0.0.53#53

Non-authoritative answer:
Name:   google.com
Address: 142.250.77.78
Name:   google.com
Address: 2404:6800:4007:817::200e

neha@neha-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.



```
neha@neha-VirtualBox:~$ netstat -l
Active Internet connections (only servers)
Proto Recv-Q Send-Q Local Address          Foreign Address        State
tcp     0      0 localhost:domain        0.0.0.0:*
tcp     0      0 0.0.0.0:ssh            0.0.0.0:*
tcp     0      0 localhost:ipp           0.0.0.0:*
tcp     0      0 localhost:mysql         0.0.0.0:*
tcp6    0      0 [::]:http             [::]:*
tcp6    0      0 [::]:ssh              [::]:*
tcp6    0      0 ip6-localhost:ipp       [::]:*
udp     0      0 0.0.0.0:42367        0.0.0.0:*
udp     0      0 localhost:domain        0.0.0.0:*
udp     0      0 0.0.0.0:631           0.0.0.0:*
udp     0      0 0.0.0.0:mdns          0.0.0.0:*
udp6    0      0 [::]:50362           [::]:*
udp6    0      0 [::]:mdns            [::]:*
raw6   0      0 [::]:ipv6-icmp        [::]:*               7

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.



```
neha@neha-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
neha@neha-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.



```
neha@neha-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::489e:132d:1851:53c1 prefixlen 64 scopeid 0x20<link>
                    ether 08:00:27:36:c3:14 txqueuelen 1000 (Ethernet)
                      RX packets 583 bytes 322769 (322.7 KB)
                      RX errors 0 dropped 0 overruns 0 frame 0
                      TX packets 674 bytes 64127 (64.1 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 232 bytes 19598 (19.5 KB)
                      RX errors 0 dropped 0 overruns 0 frame 0
                      TX packets 232 bytes 19598 (19.5 KB)
                      TX errors 0 dropped 0 overruns 0 carrier 0 collisions 0
```

## WINDOWS

### 1. ping

```
Microsoft Windows [Version 10.0.19043.1165]
(c) Microsoft Corporation. All rights reserved.

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

Pinging star-mini.c10r.facebook.com [157.240.228.35] with 32 bytes of data:
Reply from 157.240.228.35: bytes=32 time=45ms TTL=52
Reply from 157.240.228.35: bytes=32 time=237ms TTL=52
Reply from 157.240.228.35: bytes=32 time=48ms TTL=52
Reply from 157.240.228.35: bytes=32 time=78ms TTL=52

Ping statistics for 157.240.228.35:
    Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
    Approximate round trip times in milli-seconds:
        Minimum = 45ms, Maximum = 237ms, Average = 102ms

C:\Users\HP>
```

### 2. route

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

Tracing route to star-mini.c10r.facebook.com [157.240.228.35]
over a maximum of 30 hops:

 1   3 ms    4 ms    4 ms  192.168.165.250
 2   *         *         *      Request timed out.
 3  187 ms   45 ms   45 ms  56.8.124.129
 4   73 ms   47 ms   44 ms  172.26.104.196
 5   53 ms   43 ms   45 ms  172.26.104.210
 6   40 ms   31 ms   27 ms  192.168.14.38
 7   50 ms   33 ms   36 ms  192.168.14.37
 8  511 ms   45 ms  103 ms  172.16.3.14
 9   48 ms   59 ms   61 ms  172.16.81.0
10   47 ms   46 ms   43 ms  172.16.0.159
11   61 ms   43 ms   50 ms  172.16.3.15
12   35 ms   47 ms   53 ms  172.16.5.70
13   49 ms   46 ms   56 ms  po101.psw02.tir2.tfbnw.net [129.134.101.65]
14  366 ms   66 ms   52 ms  173.252.67.55
15   52 ms   49 ms   66 ms  edge-star-mini-shv-01-tir2.facebook.com [157.240.228.35]

Trace complete.
```

### 4. netstat

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

Active Connections

  Proto  Local Address          Foreign Address        State
  TCP    0.0.0.0:80            LAPTOP-KGJUI9DS:0    LISTENING
  TCP    0.0.0.0:135           LAPTOP-KGJUI9DS:0    LISTENING
  TCP    0.0.0.0:443           LAPTOP-KGJUI9DS:0    LISTENING
  TCP    0.0.0.0:445           LAPTOP-KGJUI9DS:0    LISTENING
  TCP    0.0.0.0:1035          LAPTOP-KGJUI9DS:0    LISTENING
  TCP    0.0.0.0:3306          LAPTOP-KGJUI9DS:0    LISTENING
  TCP    0.0.0.0:5040          LAPTOP-KGJUI9DS:0    LISTENING
  TCP    0.0.0.0:5357          LAPTOP-KGJUI9DS:0    LISTENING
  TCP    0.0.0.0:7680          LAPTOP-KGJUI9DS:0    LISTENING
  TCP    0.0.0.0:49664          LAPTOP-KGJUI9DS:0    LISTENING
  TCP    0.0.0.0:49665          LAPTOP-KGJUI9DS:0    LISTENING
  TCP    0.0.0.0:49666          LAPTOP-KGJUI9DS:0    LISTENING
  TCP    0.0.0.0:49667          LAPTOP-KGJUI9DS:0    LISTENING
  TCP    0.0.0.0:49668          LAPTOP-KGJUI9DS:0    LISTENING
```

## 5. ipconfig

```
C:\Users\HP>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::2595:97cb:42b4:f620%13
    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
```

## 6. nslookup

```
C:\Users\HP>nslookup google.com
Server: UnKnown
Address: 192.168.165.250

Non-authoritative answer:
Name: google.com
Addresses: 2404:6800:4009:80a::200e
           142.250.77.46

C:\Users\HP>
```

## 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.

```
C:\Users\HP>hostname  
LAPTOP-KGJUI9DS  
  
C:\Users\HP>
```

### 2. getmac

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

```
C:\Users\HP>getmac  
  
Physical Address      Transport Name  
=====  =====  
80-E8-2C-92-B2-34    Media disconnected  
80-91-33-17-7D-05    \Device\Tcpip_{15C6CB68-346D-4907-A7B9-241A01947235}  
0A-00-27-00-00-0D    \Device\Tcpip_{57E3975C-CF59-410F-BDA8-C0A4145AA6EA}  
  
C:\Users\HP>
```

### 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\HP>arp -a

Interface: 192.168.165.221 --- 0x3
  Internet Address      Physical Address      Type
  192.168.165.250        a2-29-6b-ca-51-51    dynamic
  192.168.165.255        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

Interface: 192.168.56.1 --- 0xd
  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
  255.255.255.255         ff-ff-ff-ff-ff-ff    static

C:\Users\HP>
```

### 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\HP>nbtstat -r

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

Registered By Broadcast   = 551
Registered By Name Server = 0

C:\Users\HP>
```

## 5. path ping

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\HP>pathping www.facebook.com

Tracing route to star-mini.c10r.facebook.com [157.240.228.35]
over a maximum of 30 hops:
  0  LAPTOP-KGJUI9DS [192.168.165.221]
  1  192.168.165.250
  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%  LAPTOP-KGJUI9DS [192.168.165.221]
  1    3ms      0/ 100 =  0%      0/ 100 =  0%  192.168.165.250

Trace complete.

C:\Users\HP>
```

# LAMP INSTALLATION

## Install apache

- Update your system

```
sudo apt update
```

- Install Apache using apt:

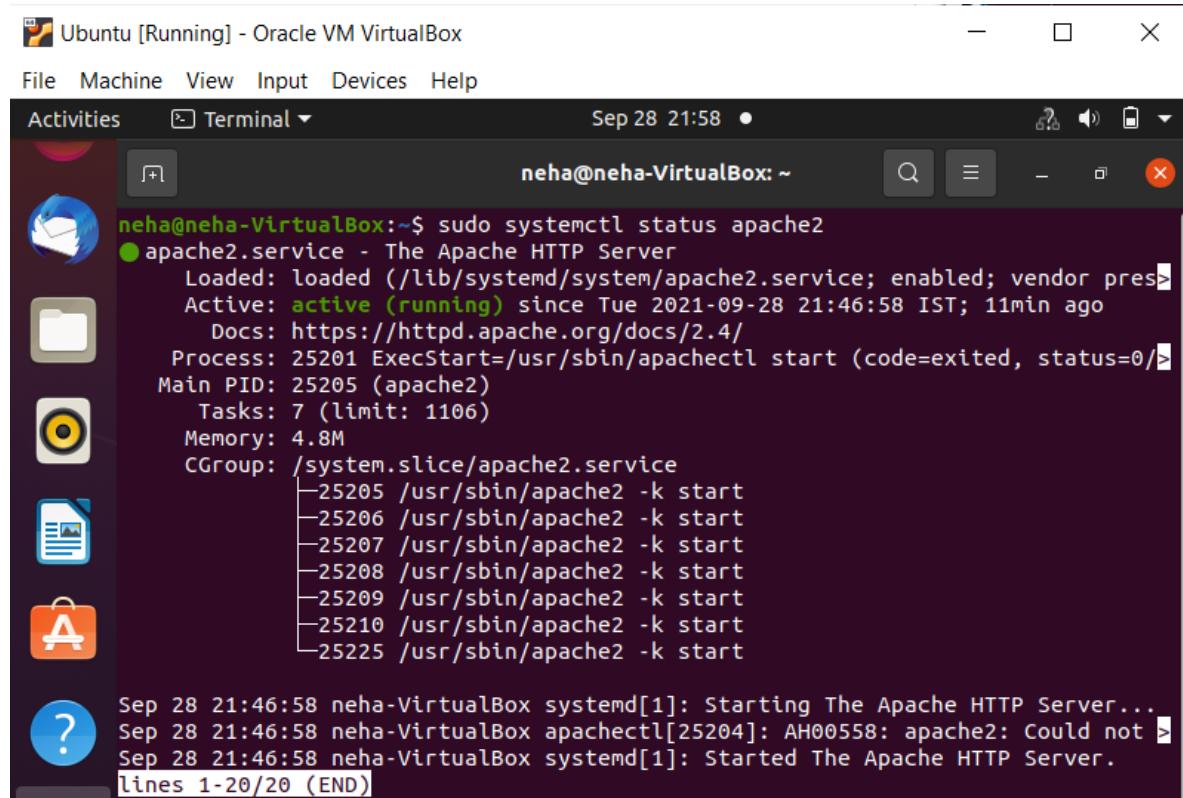
```
sudo apt install apache2
```

- Confirm that Apache is now running with the following command:

```
sudo systemctl status apache2
```

- if it is not working

```
sudo systemctl start apache2
```



```
Ubuntu [Running] - Oracle VM VirtualBox
File Machine View Input Devices Help
Activities Terminal Sep 28 21:58 •
neha@neha-VirtualBox: ~
neha@neha-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 Tue 2021-09-28 21:46:58 IST; 11min ago
     Docs: https://httpd.apache.org/docs/2.4/
   Process: 25201 ExecStart=/usr/sbin/apachectl start (code=exited, status=0/>
 Main PID: 25205 (apache2)
   Tasks: 7 (limit: 1106)
   Memory: 4.8M
      CPU: 0.000 CPU(s) since start
     CGroup: /system.slice/apache2.service
             └─25205 /usr/sbin/apache2 -k start
                 ├─25206 /usr/sbin/apache2 -k start
                 ├─25207 /usr/sbin/apache2 -k start
                 ├─25208 /usr/sbin/apache2 -k start
                 ├─25209 /usr/sbin/apache2 -k start
                 ├─25210 /usr/sbin/apache2 -k start
                 └─25225 /usr/sbin/apache2 -k start

Sep 28 21:46:58 neha-VirtualBox systemd[1]: Starting The Apache HTTP Server...
Sep 28 21:46:58 neha-VirtualBox apachectl[25204]: AH00558: apache2: Could not >
Sep 28 21:46:58 neha-VirtualBox systemd[1]: Started The Apache HTTP Server.
lines 1-20/20 (END)
```

## Install mariadb

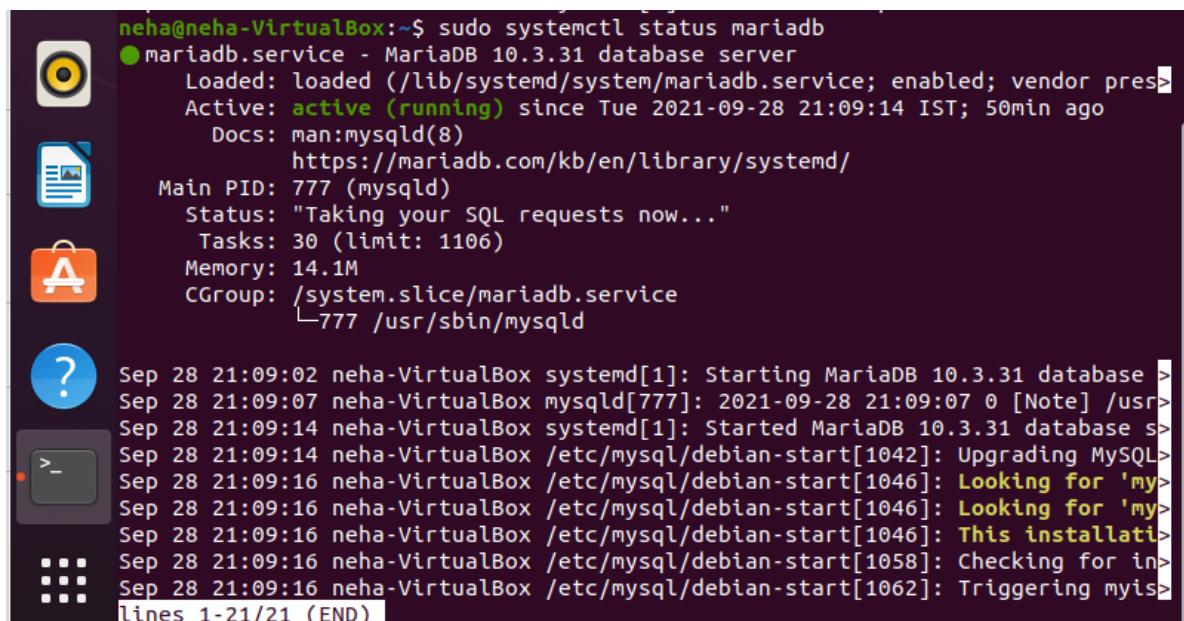
- **Install mariaDB**

```
sudo apt install mariadb-server mariadb-client
```

- **Check mariadb Installation**

```
sudo systemctl status mysql
```

(if it is not working sudo systemctl start mysql )



```
neha@neha-VirtualBox:~$ sudo systemctl status mariadb
● 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 21:09:14 IST; 50min ago
    Docs: man:mysqld(8)
          https://mariadb.com/kb/en/library/systemd/
   Main PID: 777 (mysqld)
     Status: "Taking your SQL requests now..."
      Tasks: 30 (limit: 1106)
    Memory: 14.1M
       CGroup: /system.slice/mariadb.service
                 └─777 /usr/sbin/mysqld

Sep 28 21:09:02 neha-VirtualBox systemd[1]: Starting MariaDB 10.3.31 database >
Sep 28 21:09:07 neha-VirtualBox mysqld[777]: 2021-09-28 21:09:07 0 [Note] /usr>
Sep 28 21:09:14 neha-VirtualBox systemd[1]: Started MariaDB 10.3.31 database s>
Sep 28 21:09:14 neha-VirtualBox /etc/mysql/debian-start[1042]: Upgrading MySQL>
Sep 28 21:09:16 neha-VirtualBox /etc/mysql/debian-start[1046]: Looking for 'my>
Sep 28 21:09:16 neha-VirtualBox /etc/mysql/debian-start[1046]: Looking for 'my>
Sep 28 21:09:16 neha-VirtualBox /etc/mysql/debian-start[1046]: This installati>
Sep 28 21:09:16 neha-VirtualBox /etc/mysql/debian-start[1058]: Checking for in>
Sep 28 21:09:16 neha-VirtualBox /etc/mysql/debian-start[1062]: Triggering myis>
lines 1-21/21 (END)
```

## Install PHP

- **Install PHP**

```
sudo apt install php libapache2-mod-php php-opcache php-cli php-gd php-curl php-mysql
```

- **Restart apache2**

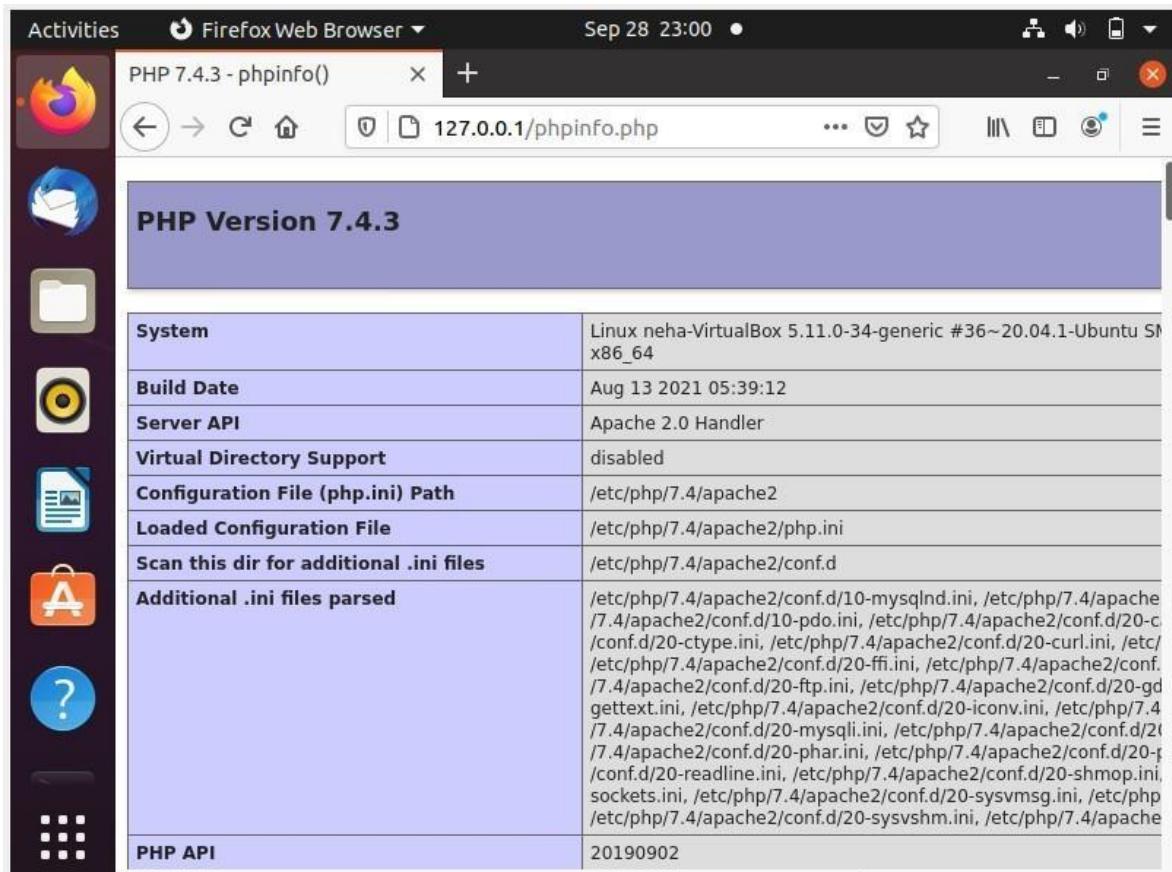
```
sudo systemctl restart apache2
```

- **Now you can check php installation**

```
sudo echo "<?php phpinfo(); ?>" | sudo tee -a /var/www/html/phpinfo.php >/dev/null
```

- **Open a browser**

```
http://127.0.0.1/phpinfo.php
```



## Install phpmyadmin

- **Install phpmyadmin**

```
sudo apt install phpmyadmin php-mbstring php-zip php-gd php-json php-curl
```

( It ask for webserver select apache2, select db configuration and set password )

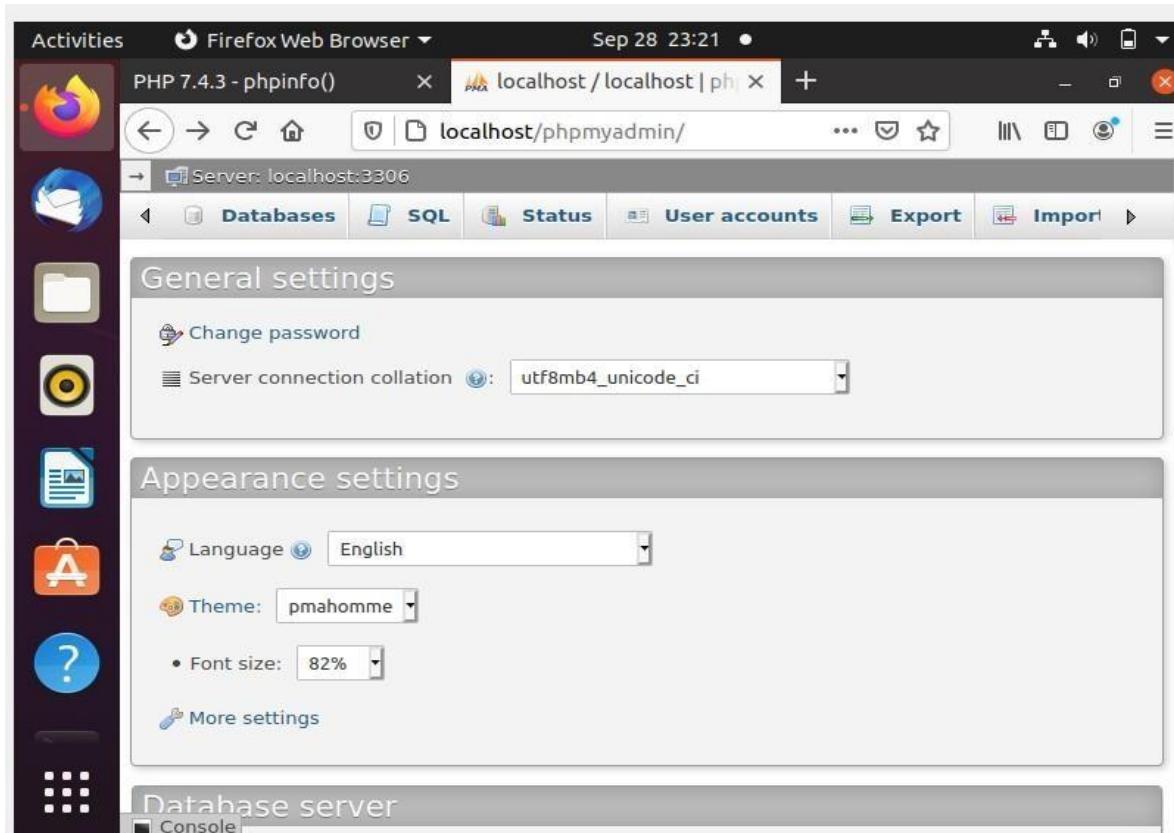
- **Restart apache2**

```
sudo systemctl restart apache2
```

- **Check phpmyadmin**

- **Open a browser**

<http://localhost/phpmyadmin>



# ANSIBLE INSTALLATION

## Step 1: sudo apt install ansible

```
neha@neha-VirtualBox:~$ sudo apt install ansible
Reading package lists... Done
Building dependency tree
Reading state information... Done
The following package was automatically installed and is no longer required:
  distro-info
Use 'sudo apt autoremove' to remove it.
The following additional packages will be installed:
  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
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
0 upgraded, 17 newly installed, 0 to remove and 165 not upgraded.
Need to get 9,865 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 A
Setting up python3-winrm (0.3.0-2) ...
Setting up ansible (2.9.6+dfsg-1) ...
Processing triggers for man-db (2.9.1-1) ...
```

## INSTALLATION CHECK

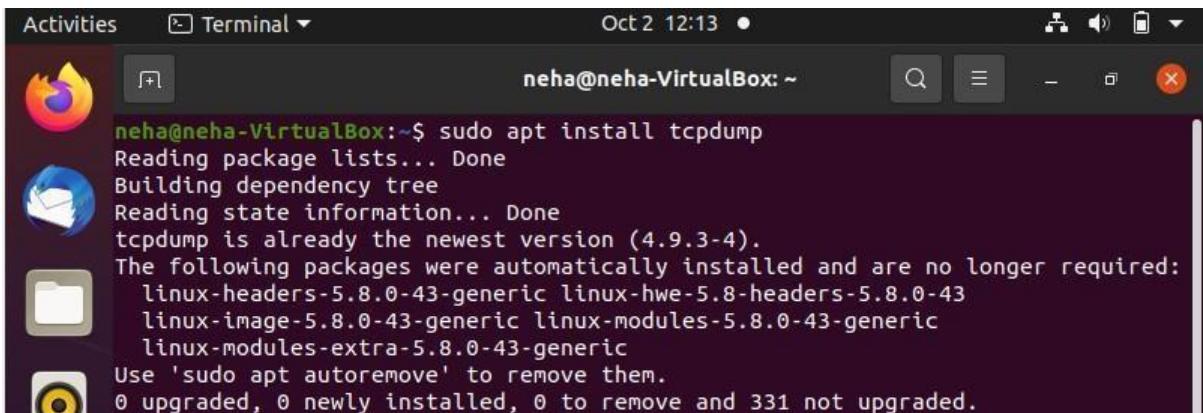
### Step 2: sudo ansible –version

```
neha@neha-VirtualBox :~$ sudo ansible --version
ansible 2.9.6
  config file = /etc/ansible/ansible.cfg
  configured module search path = ['/root/.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, May 27 2021, 13:30:53) [GCC 9.3.0]
```

## ANALYZING NETWORK PACKET STREAM USING tcpdump

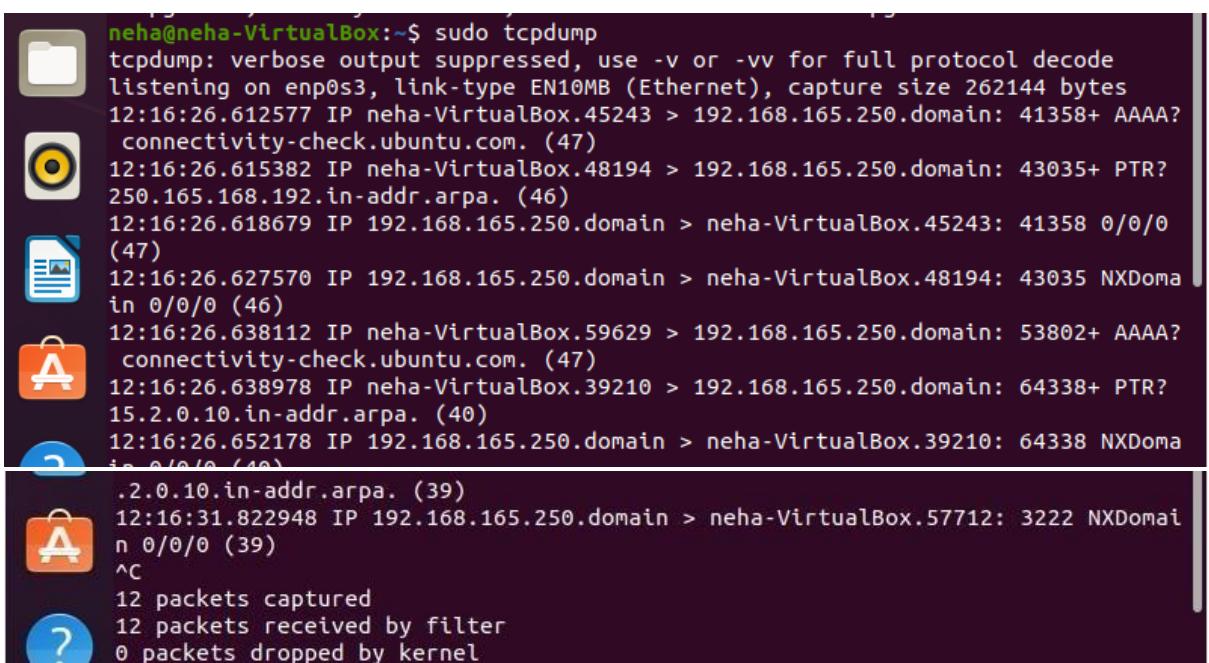
### tcpdump installation:

- sudo apt install tcpdump



```
Activities Terminal Oct 2 12:13 •
neha@neha-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).
The following packages were automatically installed and are no longer required:
  linux-headers-5.8.0-43-generic linux-hwe-5.8-headers-5.8.0-43
  linux-image-5.8.0-43-generic linux-modules-5.8.0-43-generic
  linux-modules-extra-5.8.0-43-generic
Use 'sudo apt autoremove' to remove them.
0 upgraded, 0 newly installed, 0 to remove and 331 not upgraded.
```

- sudo tcpdump



```
neha@neha-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
12:16:26.612577 IP neha-VirtualBox.45243 > 192.168.165.250.domain: 41358+ AAAA?
connectivity-check.ubuntu.com. (47)
12:16:26.615382 IP neha-VirtualBox.48194 > 192.168.165.250.domain: 43035+ PTR?
250.165.168.192.in-addr.arpa. (46)
12:16:26.618679 IP 192.168.165.250.domain > neha-VirtualBox.45243: 41358 0/0/0
(47)
12:16:26.627570 IP 192.168.165.250.domain > neha-VirtualBox.48194: 43035 NXDomain
in 0/0/0 (46)
12:16:26.638112 IP neha-VirtualBox.59629 > 192.168.165.250.domain: 53802+ AAAA?
connectivity-check.ubuntu.com. (47)
12:16:26.638978 IP neha-VirtualBox.39210 > 192.168.165.250.domain: 64338+ PTR?
15.2.0.10.in-addr.arpa. (40)
12:16:26.652178 IP 192.168.165.250.domain > neha-VirtualBox.39210: 64338 NXDomain
in 0/0/0 (40)
.2.0.10.in-addr.arpa. (39)
12:16:31.822948 IP 192.168.165.250.domain > neha-VirtualBox.57712: 3222 NXDomain
in 0/0/0 (39)
^C
12 packets captured
12 packets received by filter
0 packets dropped by kernel
```

- **tcpdump -D**



```
neha@neha-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]
```

- **sudo tcpdump -I enp0s3**
- **sudo tcpdump -c 5**



```
neha@neha-VirtualBox:~$ tcpdump -i enp0s3
tcpdump: enp0s3: You don't have permission to capture on that device
(socket: Operation not permitted)
neha@neha-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
```

- **sudo tcpdump -I enp0s3 -c 5 port 80**



```
neha@neha-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
^C
0 packets captured
0 packets received by filter
0 packets dropped by kernel
```

- **sudo tcpdump host 10.0.2.15**



```
neha@neha-VirtualBox:~$ sudo tcpdump host 10.0.2.15
tcpdump: verbose output suppressed, use -v or -vv for full protocol decode
listening on enp0s3, link-type EN10MB (Ethernet), capture size 262144 bytes
12:32:42.673737 IP neha-VirtualBox.52867 > 192.168.165.250.domain: 51668+ A? co
nnectivity-check.ubuntu.com. (47)
12:32:42.678856 IP neha-VirtualBox.42936 > 192.168.165.250.domain: 46998+ PTR?
250.165.168.192.in-addr.arpa. (46)
12:32:42.961457 IP 192.168.165.250.domain > neha-VirtualBox.42936: 46998 NXDomai
n 0/0/0 (46)
12:32:42.961504 IP 192.168.165.250.domain > neha-VirtualBox.52867: 51668 3/0/0
A 34.122.121.32, A 35.224.170.84, A 35.232.111.17 (95)
12:32:42.964426 IP neha-VirtualBox.51100 > 17.111.232.35.bc.googleusercontent.c
om.http: Flags [S], seq 1615800992, win 64240, options [mss 1460,sackOK,TS val
3821702171 ecr 0,nop,wscale 7], length 0
12:32:42.966115 IP neha-VirtualBox.37163 > 192.168.165.250.domain: 4239+ PTR? 1
5.2.0.10.in-addr.arpa. (40)
12:32:43.063967 IP 192.168.165.250.domain > neha-VirtualBox.37163: 4239 NXDomai
n 0/0/0 (40)
12:32:43.067556 IP neha-VirtualBox.60662 > 192.168.165.250.domain: 48887+ PTR?
17.111.232.35.in-addr.arpa. (44)

X.51100. Flags: [+, ], seq 179, ack 69, win 65535, length 0
^C
19 packets captured
19 packets received by filter
0 packets dropped by kernel
```

- **tcpdump -i eth1 icmp**

```
neha@neha-VirtualBox:~$ tcpdump -i eth1 icmp
tcpdump: eth1: You don't have permission to capture on that device
(socket: Operation not permitted)
```

- **sudo tcpdump -n -i enp0s3 -c 10 -w**

```
neha@neha-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 in|out|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 ]
neha@neha-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
neha
enter your college name
amal jyothi college

Details you entered
Name:neha
College:amal jyothi college
```

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:2.50000000000000000000000000000000
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
```

### OUTPUT:

```
user@user-VirtualBox:~$ bash 12.sh
enter a number
1221
number is palindrome
```

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

```
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 6.80000000000000000000000
```

**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"
```

## OUTPUT:

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

15. Write a shell Script 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 not leap year"
fi
```

## OUTPUT:

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

# Docker installation on Windows 10

## Step-I

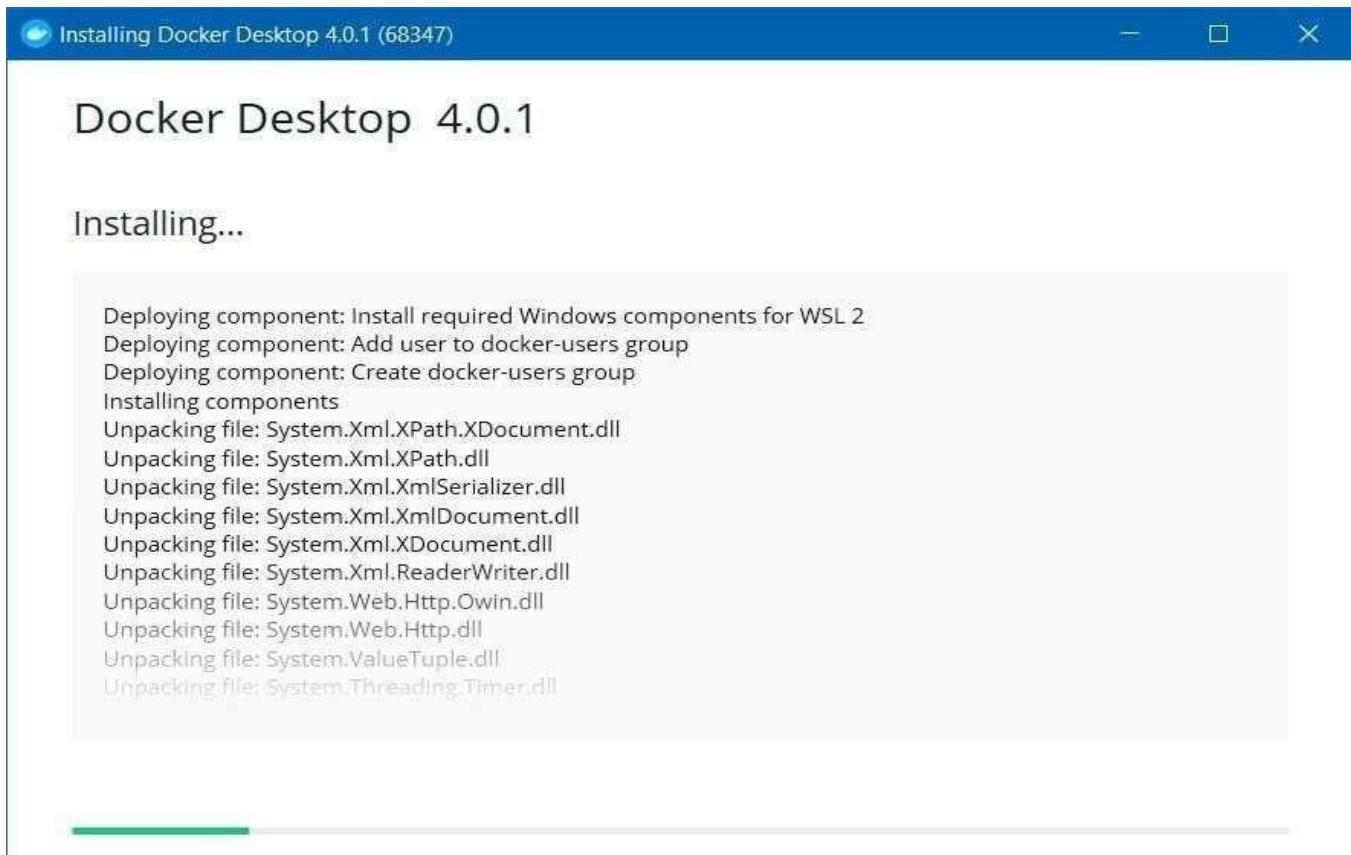
Download Docker desktop Installer for Windows from

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



## Step-II

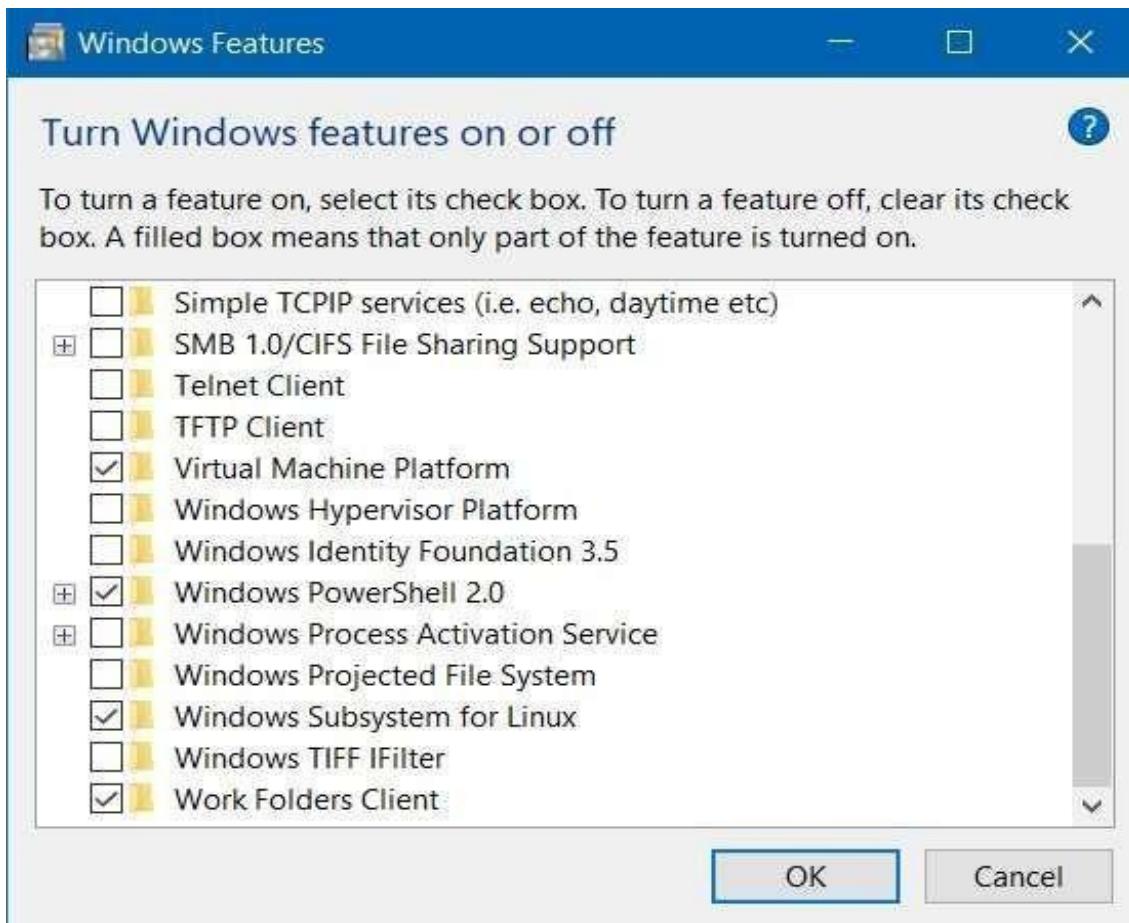
Open the .exe file and follow the steps after clicking install button.



## Step-III

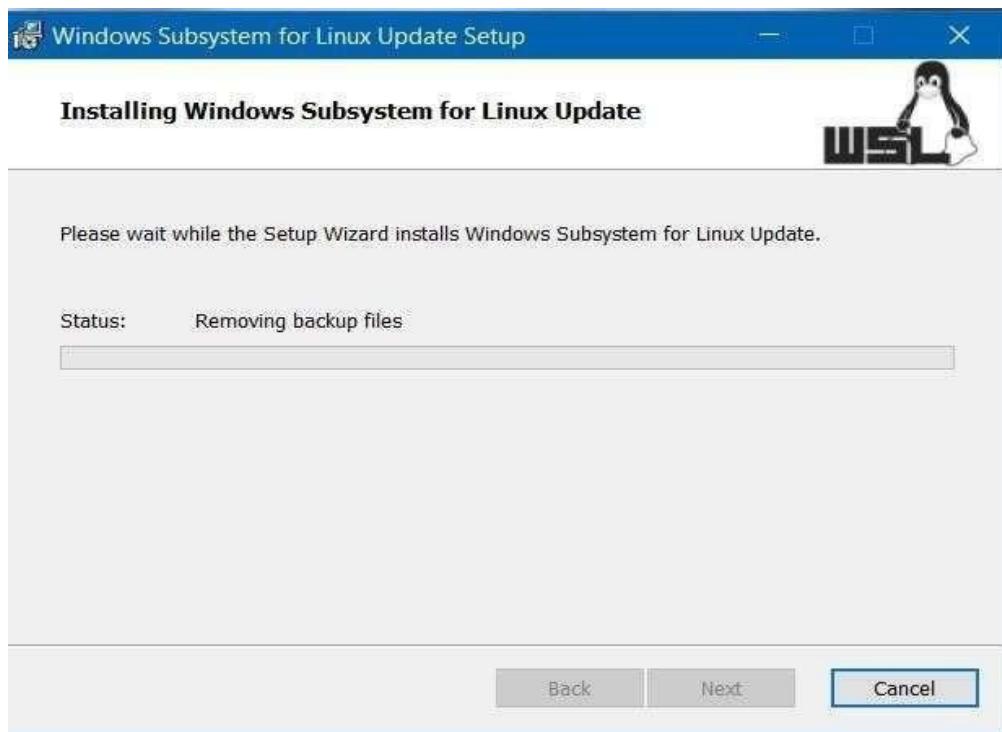
Once installed go to programs and features and click turn on windows features on or off

Scroll to the bottom and select windows subsystem for Linux



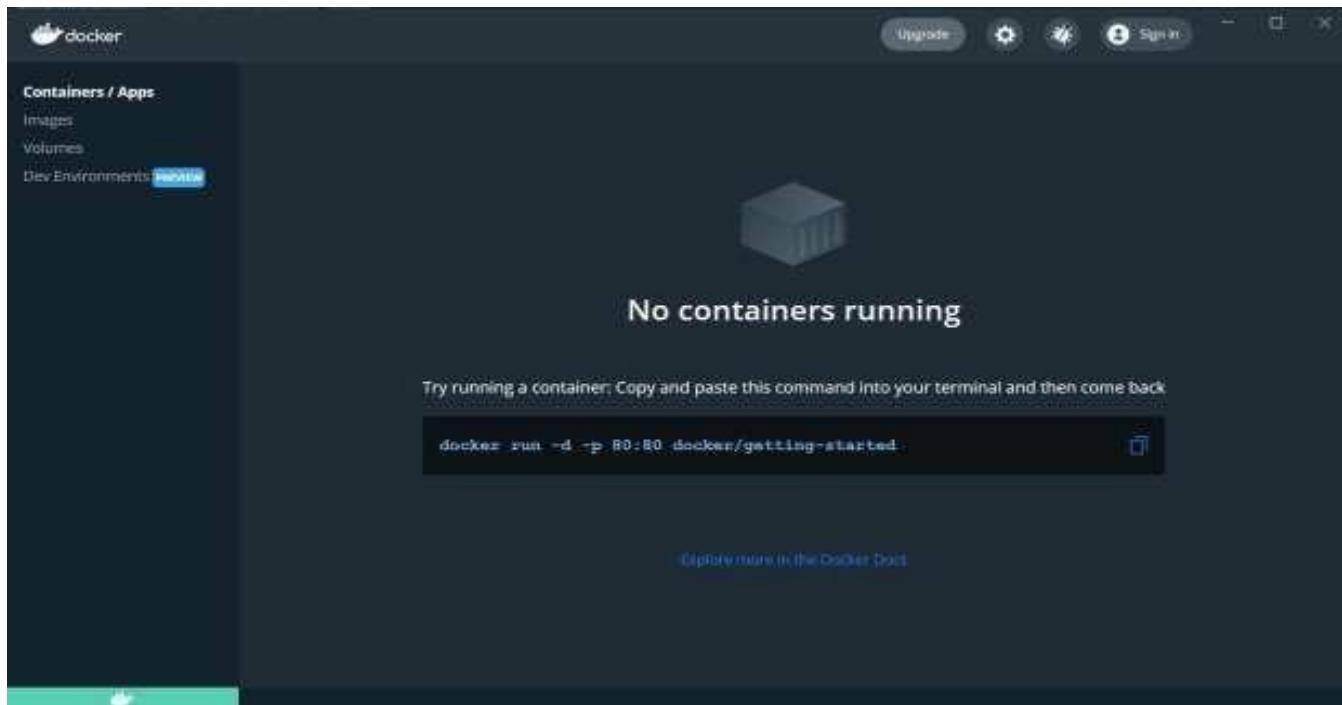
#### Step-IV

If any WSL2 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)

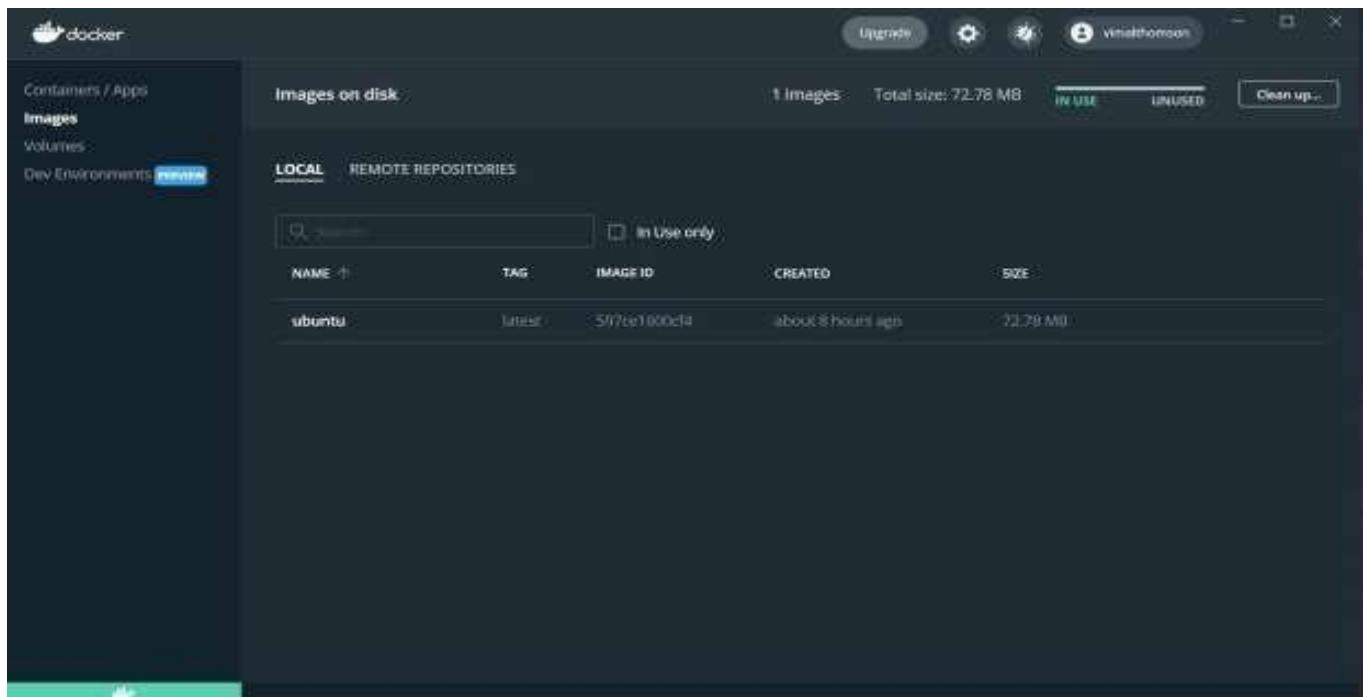
```
Administrator: Command Prompt
Microsoft Windows [Version 10.0.19042.1081]
(c) Microsoft Corporation. All rights reserved.

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 192.168.65.5:53: no such host.
See 'docker run --help'.

C:\Windows\system32>docker pull ubuntu
Using default tag: latest
latest: Pulling from library/ubuntu
f3ef4ff62e0d: Pull complete
Digest: sha256:65de08a8dabf289ef114053ab32f79e0c333a4fbfa1fe3778bb13ae921a7849b
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 using the cli.



# Wireshark installation

1. Command: sudo apt-get install wireshark

```
neha@neha-VirtualBox: ~$ sudo apt-get install wireshark
Reading package lists... Done
Building dependency tree
Reading state information... Done
The following packages were automatically installed and are no longer required:
chromium-codecs-ffmpeg-extra gstreamer1.0-vaapi libgstreamer-plugins-bad1.0-0 libnvidia-cfg1-460 libnvidia-common-460 libnvidia-gt-460 libnvidia-ifr1-460 libva-wayland2 libx11-xcb1:i386 libxnvctrl6 nvidia-compute-utils-460 nvidia-kernel-xserver-xorg-video-nvidia-460
Use 'sudo apt autoremove' to remove them.
The following additional packages will be installed:
libdouble-conversion3 libpcre2-16-0 libqt5core5a libqt5dbus5 libqt5gui5 libqt5multimedia5 libqt5multimedia5-plugins libqt5printsupport5 libqt5svg5 libqt5widgets5 libsmi2lqlb libspandsp2 libwireshark-data libwireshark13 libwireshark18 libwireshark-common wireshark-qt
Suggested packages:
qt5-image-formats-plugins otwayland5 snmp-mibs-downloader geolupdate geolp-database geolp-database-extra libjs-leaflet
The following NEW packages will be installed:
libdouble-conversion3 libpcre2-16-0 libqt5core5a libqt5dbus5 libqt5gui5 libqt5multimedia5 libqt5multimedia5-plugins libqt5printsupport5 libqt5svg5 libqt5widgets5 libsmi2lqlb libspandsp2 libwireshark-data libwireshark13 libwireshark18 libwireshark-common wireshark-qt
0 upgraded, 27 newly installed, 0 to remove and 342 not upgraded.
Need to get 32.6 MB of archives.
After this operation, 162 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/universe amd64 libdouble-conversion3 amd64 3.1.5-4ubuntu1 [37.9 kB]
Get:2 http://in.archive.ubuntu.com/ubuntu focal/main amd64 libpcre2-16-0 amd64 10.34-7 [181 kB]
Get:3 http://in.archive.ubuntu.com/ubuntu focal/universe amd64 libqt5core5a amd64 5.12.8+dfsg-2ubuntu1 [2,005 kB]
Get:4 http://in.archive.ubuntu.com/ubuntu focal/universe amd64 libqt5dbus5 amd64 5.12.8+dfsg-2ubuntu1 [2,004 kB]
```

2. Command: sudo dpkg-reconfigure wireshark-common

```
neha@neha-VirtualBox: ~$ sudo dpkg-reconfigure wireshark-common
neha@neha-VirtualBox: ~$
```

3. Command: Select Yes and press enter



4. Open wireshark from the applist

