

20MCA136

Networking & System Administration Lab

LAB RECORD

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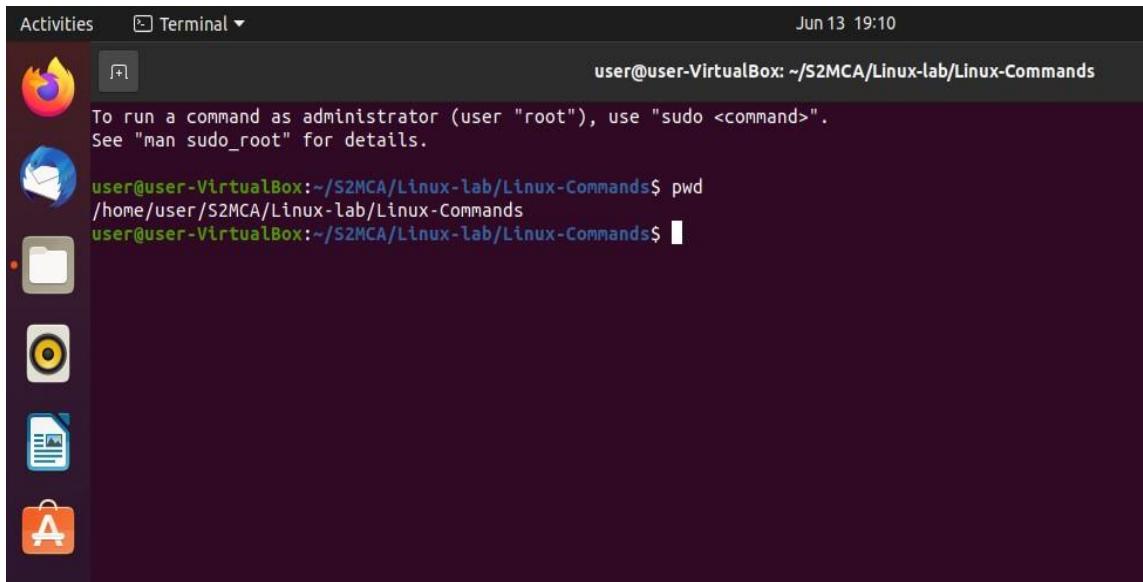
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RMCA-2020-S2

Basic Linux Commands

1. pwd Command

PWD stands for present working directory. This command is used to find out the path of the current working directory.



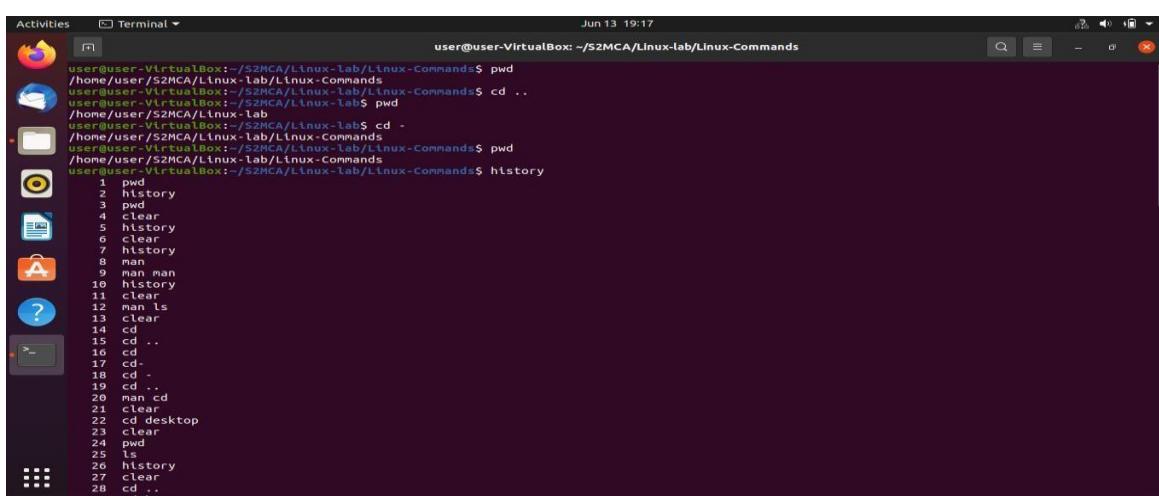
A screenshot of a Linux desktop environment. On the left is a dock with icons for the Dash, Home, Applications, and Help. The main area shows a terminal window titled "Terminal". The terminal output is as follows:

```
Activities Terminal Jun 13 19:10
user@user-VirtualBox: ~/S2MCA/Linux-lab/Linux-Commands
To run a command as administrator (user "root"), use "sudo <command>".
See "man sudo_root" for details.

user@user-VirtualBox:~/S2MCA/Linux-lab/Linux-Commands$ pwd
/home/user/S2MCA/Linux-lab/Linux-Commands
user@user-VirtualBox:~/S2MCA/Linux-lab/Linux-Commands$
```

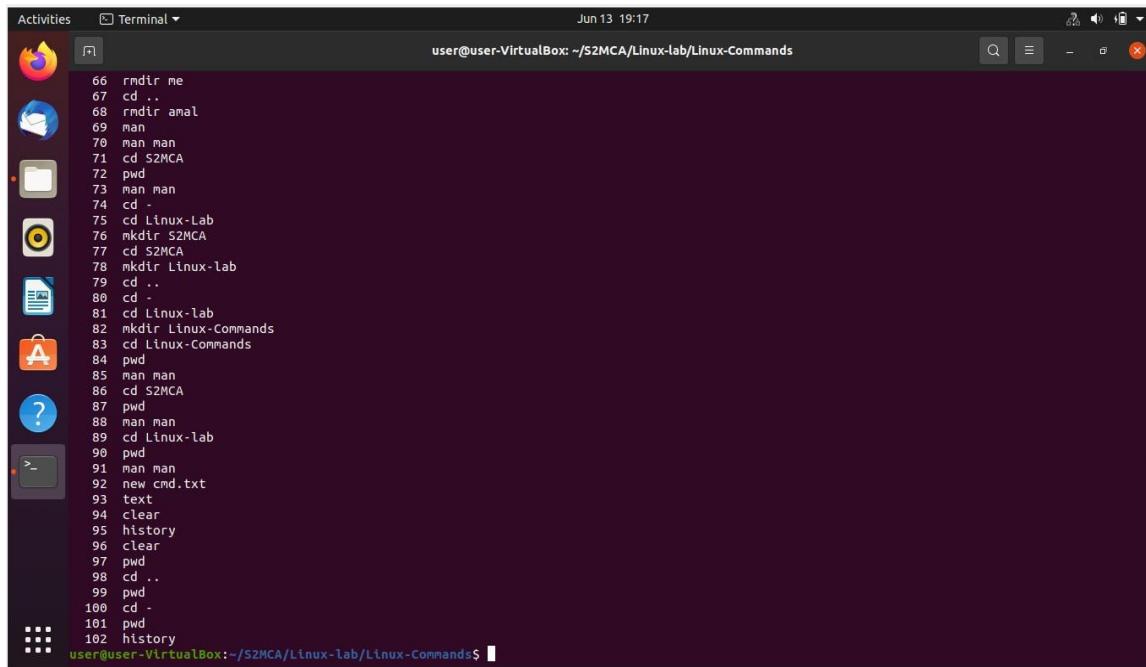
2. history Command

In Linux the history command is used to display all the commands executed by the user. It helps in reviewing a previously executed command.



A screenshot of a Linux desktop environment. On the left is a dock with icons for the Dash, Home, Applications, and Help. The main area shows a terminal window titled "Terminal". The terminal output is as follows:

```
Activities Terminal Jun 13 19:17
user@user-VirtualBox: ~/S2MCA/Linux-lab/Linux-Commands
/home/user/S2MCA/Linux-lab/Linux-Commands
user@user-VirtualBox:~/S2MCA/Linux-lab/Linux-Commands$ cd ..
/home/user/S2MCA/Linux-lab
user@user-VirtualBox:~/S2MCA/Linux-lab$ pwd
/home/user/S2MCA/Linux-lab
user@user-VirtualBox:~/S2MCA/Linux-lab$ cd -
/home/user/S2MCA/Linux-lab/Linux-Commands
user@user-VirtualBox:~/S2MCA/Linux-lab/Linux-Commands$ pwd
/home/user/S2MCA/Linux-lab/Linux-Commands
user@user-VirtualBox:~/S2MCA/Linux-lab/Linux-Commands$ history
  1  pwd
  2  history
  3  pwd
  4  clear
  5  history
  6  clear
  7  history
  8  man
  9  man man
 10 man history
 11 clear
 12 man ls
 13 clear
 14 cd
 15 cd ..
 16 cd --
 17 cd-
 18 cd -
 19 cd ..
 20 man cd
 21 clear
 22 cd desktop
 23 clear
 24 pwd
 25 clear
 26 history
 27 clear
 28 cd ..
 29 cd ..
```

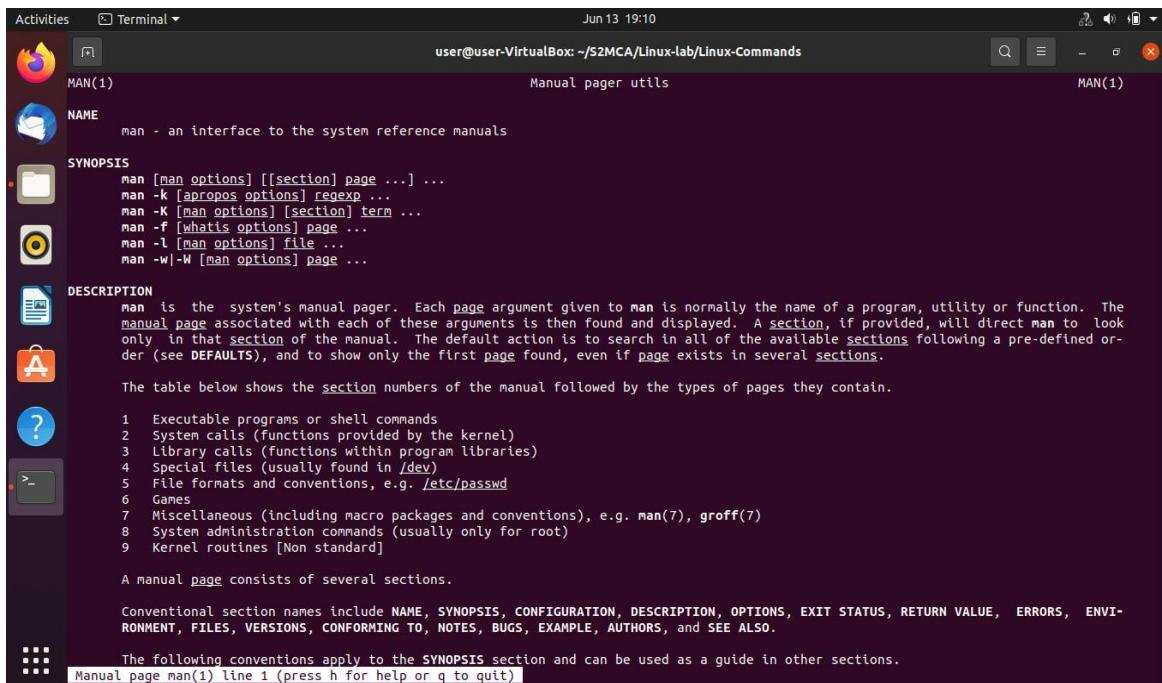


A screenshot of an Ubuntu desktop environment. On the left is a dock with icons for the Dash, Home, Applications, and other system tools. A terminal window is open in the center, titled "Terminal". The title bar shows the date and time as "Jun 13 19:17" and the user as "user@user-VirtualBox: ~/S2MCA/Linux-lab/Linux-Commands". The terminal window displays a command-line session with a history of 102 commands. The commands include navigating between directories (cd), removing files (rm), displaying help (man), and listing current directory (pwd). The session ends with a "history" command.

```
66 rmdir me
67 cd ..
68 rmdir amal
69 man
70 man man
71 cd S2MCA
72 pwd
73 man man
74 cd -
75 cd Linux-Lab
76 mkdir S2MCA
77 cd S2MCA
78 mkdir Linux-lab
79 cd ..
80 cd -
81 cd Linux-lab
82 mkdir Linux-Commands
83 cd Linux-Commands
84 pwd
85 man man
86 cd S2MCA
87 pwd
88 man man
89 cd Linux-lab
90 pwd
91 man man
92 new cmd.txt
93 text
94 clear
95 history
96 clear
97 pwd
98 cd ..
99 pwd
100 cd -
101 pwd
102 history
```

3. man command

man command is used to display the manual for any Linux command that we can run on terminal. It displays a detailed description of the command which includes Name, Synopsis, Description, Options, Exit status, Return Values, Errors, Versions, Examples, Author etc.



A screenshot of an Ubuntu desktop environment. A terminal window is open, showing the output of the "man man" command. The title bar shows the date and time as "Jun 13 19:10" and the user as "user@user-VirtualBox: ~/S2MCA/Linux-lab/Linux-Commands". The terminal window displays the manual page for the "man" command. It includes sections for NAME, SYNOPSIS, DESCRIPTION, and a table of section numbers. The "DESCRIPTION" section provides a detailed explanation of what the "man" command does. The "SYNOPSIS" section lists various options and arguments. The "DESCRIPTION" section also includes a table of section numbers and a note about conventional section names.

```
MAN(1)                                         Manual pager utils                                         MAN(1)

NAME
      man - an interface to the system reference manuals

SYNOPSIS
      man [man options] [[section] page ...] ...
      man -k [apropos options] regexp ...
      man -K [man options] [section] term ...
      man -f [whatis options] page ...
      man -l [man options] file ...
      man -w|-W [man options] page ...

DESCRIPTION
      man is the system's manual pager.  Each page argument given to man is normally the name of a program, utility or function.  The manual page associated with each of these arguments is then found and displayed.  A section, if provided, will direct man to look only in that section of the manual.  The default action is to search in all of the available sections following a pre-defined order (see DEFAULTS), and to show only the first page found, even if page exists in several sections.

      The table below shows the section numbers of the manual followed by the types of pages they contain.

      1 Executable programs or shell commands
      2 System calls (functions provided by the kernel)
      3 Library calls (functions within program libraries)
      4 Special files (usually found in /dev)
      5 File formats and conventions, e.g. /etc/passwd
      6 Games
      7 Miscellaneous (including macro packages and conventions), e.g. man(7), groff(7)
      8 System administration commands (usually only for root)
      9 Kernel routines [Non standard]

      A manual page consists of several sections.

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

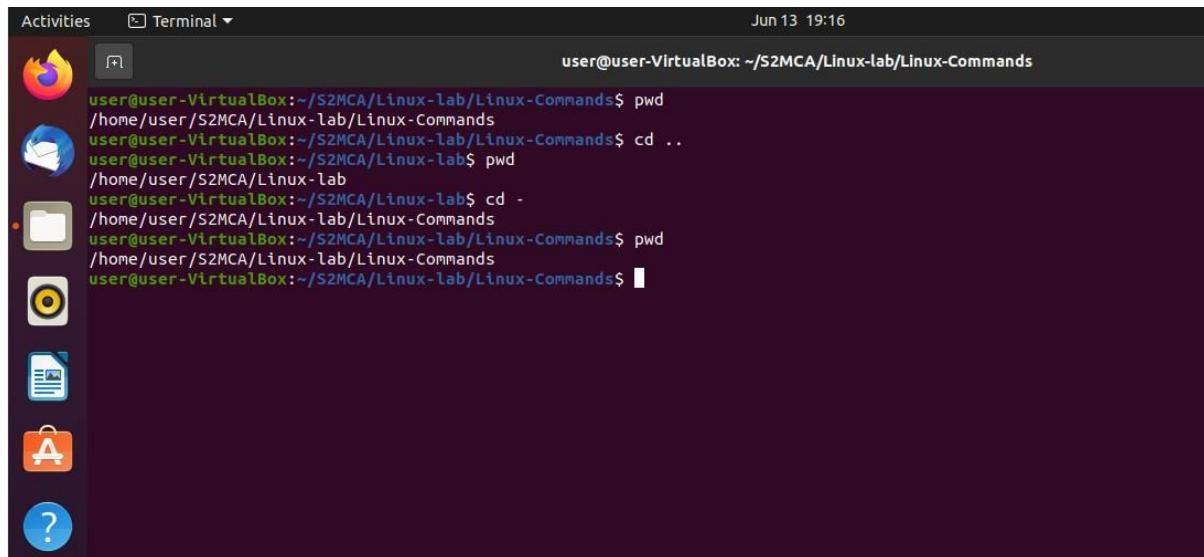
      The following conventions apply to the SYNOPSIS section and can be used as a guide in other sections.
      Manual page man(1) line 1 (press h for help or q to quit)
```

4. cd Command

Command cd is used to navigate between directories in Linux. cd stands for change directory. It enables you to change the working directory from the current directory to the desired directory that you wish to navigate.

The options of the cd command are,

- cd .. To move one directory up.
- cd To go straight to the home folder.
- cd- To move to your previous directory.



A screenshot of a Linux desktop environment showing a terminal window. The terminal window title is "Terminal" and the status bar shows the date and time as "Jun 13 19:16". The terminal content is as follows:

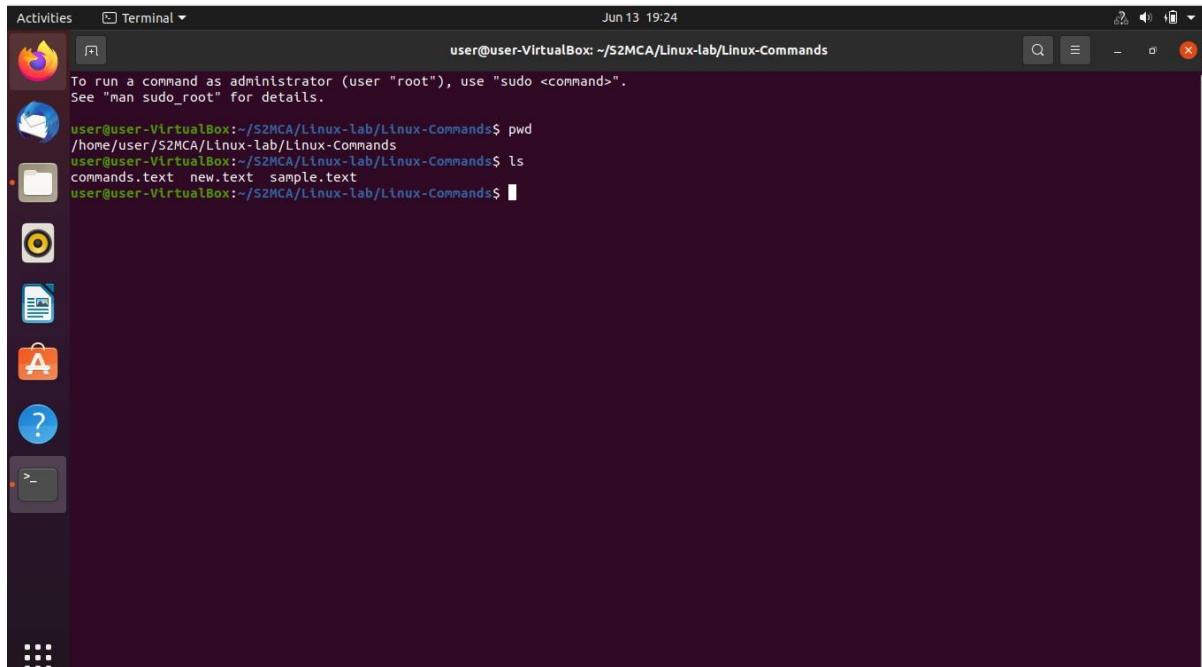
```
user@user-VirtualBox:~/S2MCA/Linux-lab/Linux-Commands$ pwd
/home/user/S2MCA/Linux-lab/Linux-Commands
user@user-VirtualBox:~/S2MCA/Linux-lab/Linux-Commands$ cd ..
user@user-VirtualBox:~/S2MCA/Linux-lab$ pwd
/home/user/S2MCA/Linux-lab
user@user-VirtualBox:~/S2MCA/Linux-lab$ cd -
user@user-VirtualBox:~/S2MCA/Linux-lab$ pwd
/home/user/S2MCA/Linux-lab/Linux-Commands
user@user-VirtualBox:~/S2MCA/Linux-lab/Linux-Commands$
```

5. ls Command

The ls command is used to view the contents of a directory. By default, this command will display the contents of your current working directory.

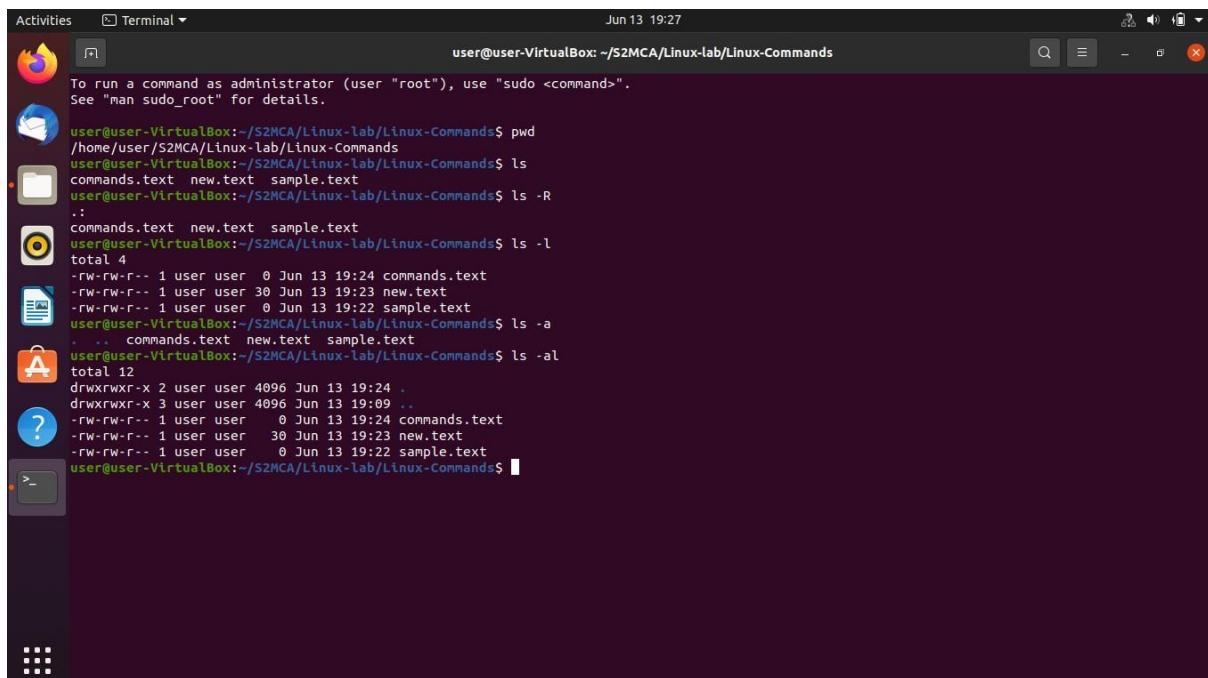
There options of the ls command are,

- ls -R will list all the files in the sub-directories as well
- ls -l long listing • ls -a will show the hidden files
- ls -al will list the files and directories with detailed information like the permissions, size, owner, etc.
- ls -t lists files sorted in the order of “last modified” □ ls -r option will reverse the natural sorting order.



A screenshot of an Ubuntu desktop environment. On the left is a vertical dock with icons for Dash, Home, Applications, Files, Activities, Help, and a terminal. A terminal window titled "Terminal" is open in the Activities dock, showing the command line interface. The terminal window has a dark purple background and white text. It displays the following session:

```
user@user-VirtualBox: ~/S2MCA/Linux-lab/Linux-Commands$ pwd
/home/user/S2MCA/Linux-lab/Linux-Commands
user@user-VirtualBox:~/S2MCA/Linux-lab/Linux-Commands$ ls
commands.text new.text sample.text
user@user-VirtualBox:~/S2MCA/Linux-lab/Linux-Commands$
```

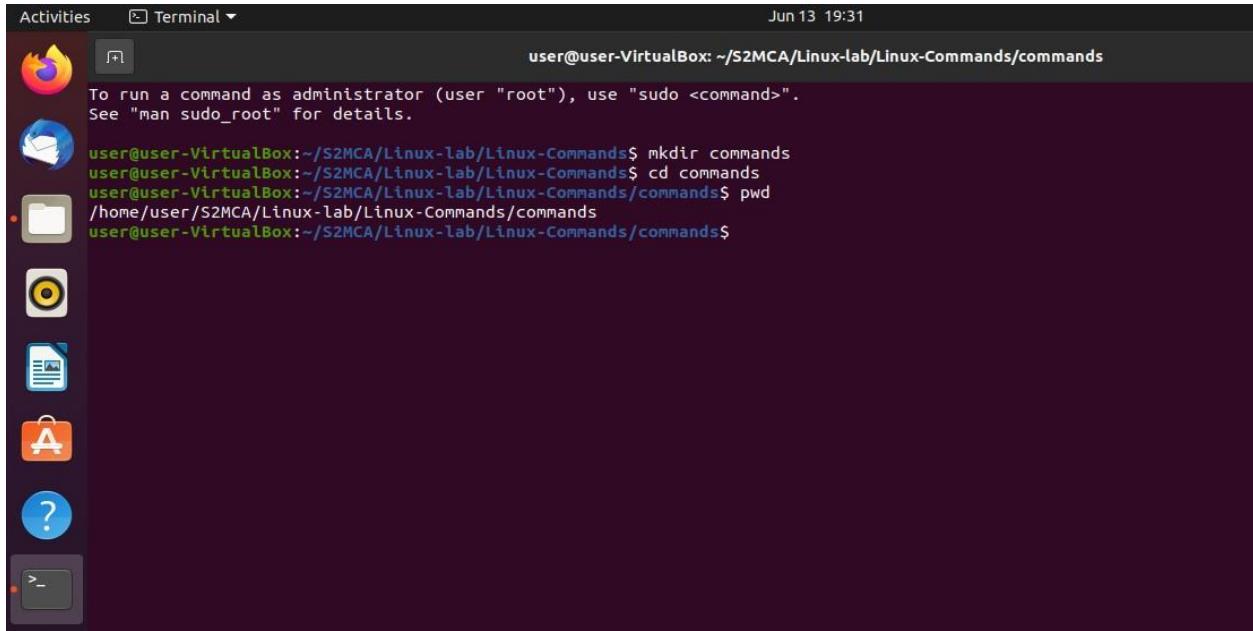


A screenshot of an Ubuntu desktop environment, similar to the one above. The terminal window shows the results of running the "ls" command with various options to list files and their details.

```
user@user-VirtualBox:~/S2MCA/Linux-lab/Linux-Commands$ pwd
/home/user/S2MCA/Linux-lab/Linux-Commands
user@user-VirtualBox:~/S2MCA/Linux-lab/Linux-Commands$ ls
commands.text new.text sample.text
user@user-VirtualBox:~/S2MCA/Linux-lab/Linux-Commands$ ls -R .
.
commands.text new.text sample.text
user@user-VirtualBox:~/S2MCA/Linux-lab/Linux-Commands$ ls -l
total 4
-rw-rw-r-- 1 user user 0 Jun 13 19:24 commands.text
-rw-rw-r-- 1 user user 30 Jun 13 19:23 new.text
-rw-rw-r-- 1 user user 0 Jun 13 19:22 sample.text
user@user-VirtualBox:~/S2MCA/Linux-lab/Linux-Commands$ ls -a
.
..
commands.text new.text sample.text
user@user-VirtualBox:~/S2MCA/Linux-lab/Linux-Commands$ ls -al
total 12
drwxrwxr-x 2 user user 4096 Jun 13 19:24 .
drwxrwxr-x 3 user user 4096 Jun 13 19:09 ..
-rw-rw-r-- 1 user user 0 Jun 13 19:24 commands.text
-rw-rw-r-- 1 user user 30 Jun 13 19:23 new.text
-rw-rw-r-- 1 user user 0 Jun 13 19:22 sample.text
user@user-VirtualBox:~/S2MCA/Linux-lab/Linux-Commands$
```

6. mkdir Command

This command allows the user to create directories. Can be used to create multiple directories at the same time and to generate a new directory inside another directory.



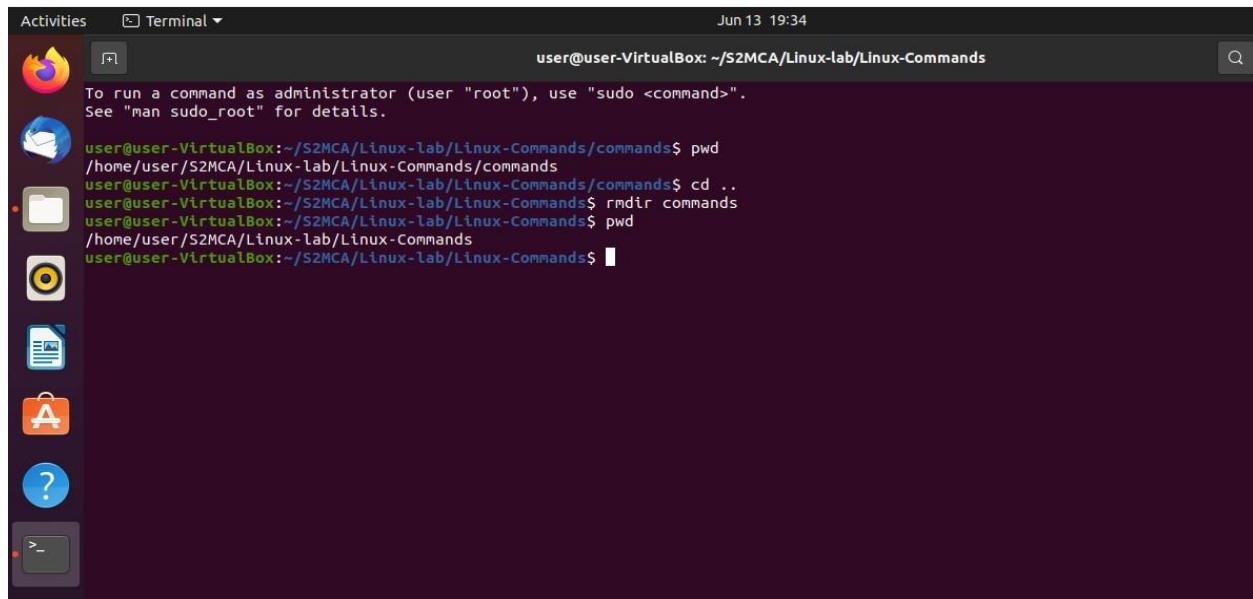
A screenshot of a Linux desktop environment, likely Ubuntu, showing a terminal window. The terminal window is titled "Terminal" and has a dark purple background. It displays the following command-line session:

```
user@user-VirtualBox:~/S2MCA/Linux-lab/Linux-Commands/commands
To run a command as administrator (user "root"), use "sudo <command>".
See "man sudo_root" for details.

user@user-VirtualBox:~/S2MCA/Linux-lab/Linux-Commands$ mkdir commands
user@user-VirtualBox:~/S2MCA/Linux-lab/Linux-Commands$ cd commands
user@user-VirtualBox:~/S2MCA/Linux-lab/Linux-Commands/commands$ pwd
/home/user/S2MCA/Linux-lab/Linux-Commands/commands
user@user-VirtualBox:~/S2MCA/Linux-lab/Linux-Commands/commands$
```

7. rmdir Command

If we want to delete a directory, the rmdir command can be used. However, rmdir only allows you to delete empty directories. We can specify the name of the directory along with the rmdir command for deletion.



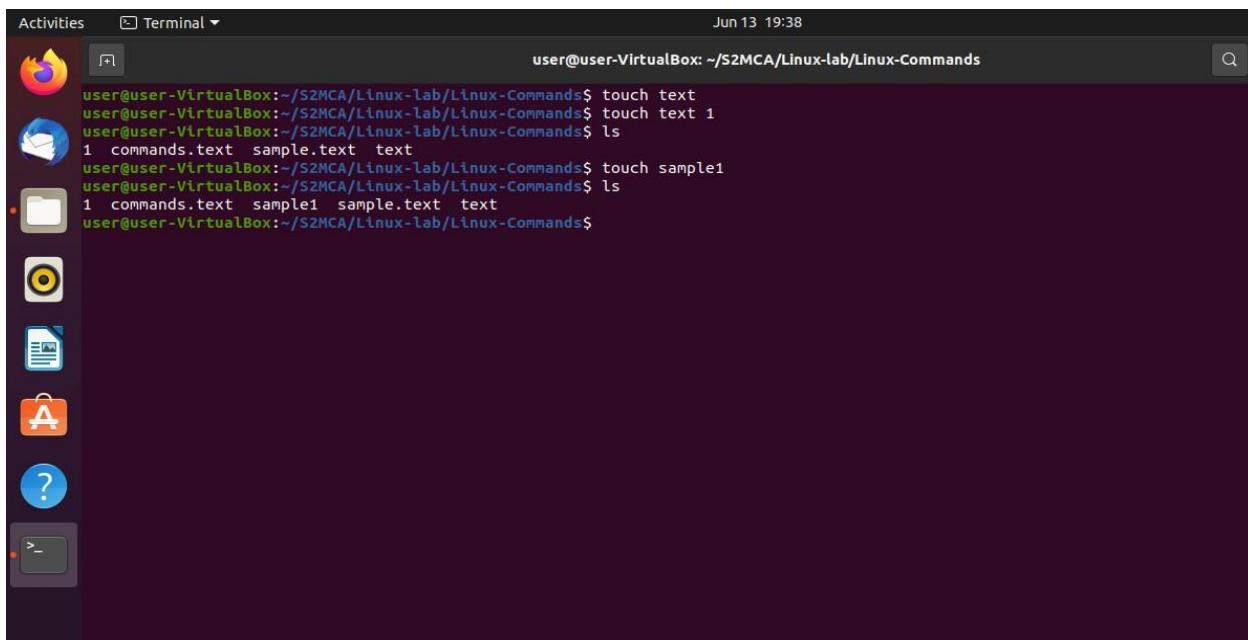
A screenshot of a Linux desktop environment, likely Ubuntu, showing a terminal window. The terminal window is titled "Terminal" and has a dark purple background. It displays the following command-line session:

```
user@user-VirtualBox:~/S2MCA/Linux-lab/Linux-Commands/commands
To run a command as administrator (user "root"), use "sudo <command>".
See "man sudo_root" for details.

user@user-VirtualBox:~/S2MCA/Linux-lab/Linux-Commands$ pwd
/home/user/S2MCA/Linux-lab/Linux-Commands/commands
user@user-VirtualBox:~/S2MCA/Linux-lab/Linux-Commands/commands$ cd ..
user@user-VirtualBox:~/S2MCA/Linux-lab/Linux-Commands$ rmdir commands
user@user-VirtualBox:~/S2MCA/Linux-lab/Linux-Commands$ pwd
/home/user/S2MCA/Linux-lab/Linux-Commands
user@user-VirtualBox:~/S2MCA/Linux-lab/Linux-Commands$
```

8. touch Command

The touch command allows us to create a blank new file through the Linux command line. It is used for changing file time stamps.

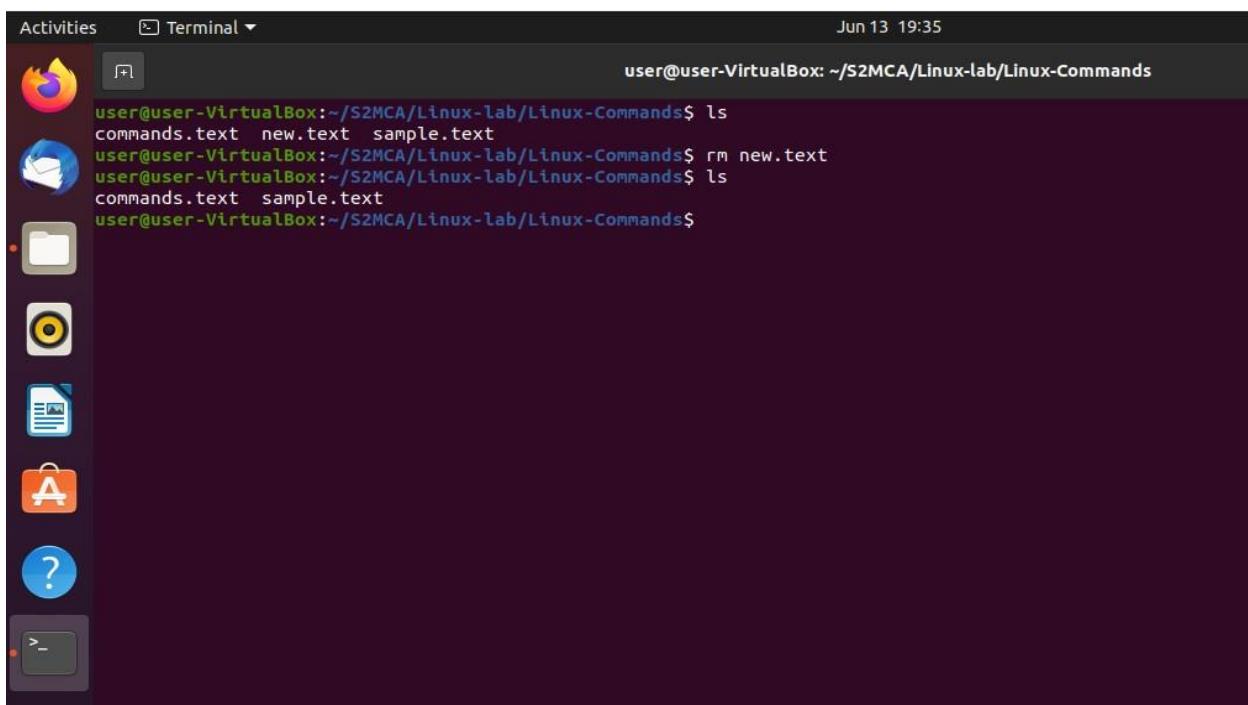


A screenshot of an Ubuntu desktop environment. On the left is a dock with icons for the Dash, Home, Applications, and Help. The main window is a terminal window titled "Terminal". The terminal shows the following command-line session:

```
user@user-VirtualBox:~/S2MCA/Linux-lab/Linux-Commands$ touch text
user@user-VirtualBox:~/S2MCA/Linux-lab/Linux-Commands$ touch text 1
user@user-VirtualBox:~/S2MCA/Linux-lab/Linux-Commands$ ls
1 commands.text sample.text text
user@user-VirtualBox:~/S2MCA/Linux-lab/Linux-Commands$ touch sample1
user@user-VirtualBox:~/S2MCA/Linux-lab/Linux-Commands$ ls
1 commands.text sample1 sample.text text
user@user-VirtualBox:~/S2MCA/Linux-lab/Linux-Commands$
```

9. rm Command

The rm command is used to delete directories and the contents within them.

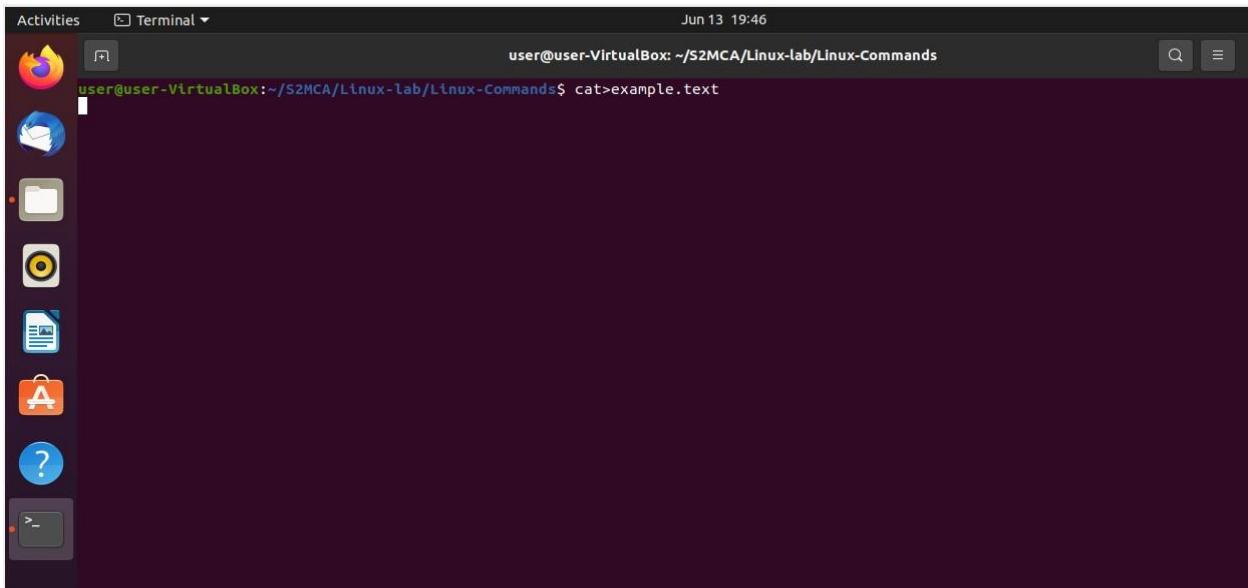


A screenshot of an Ubuntu desktop environment. On the left is a dock with icons for the Dash, Home, Applications, and Help. The main window is a terminal window titled "Terminal". The terminal shows the following command-line session:

```
user@user-VirtualBox:~/S2MCA/Linux-lab/Linux-Commands$ ls
commands.text new.text sample.text
user@user-VirtualBox:~/S2MCA/Linux-lab/Linux-Commands$ rm new.text
user@user-VirtualBox:~/S2MCA/Linux-lab/Linux-Commands$ ls
commands.text sample.text
user@user-VirtualBox:~/S2MCA/Linux-lab/Linux-Commands$
```

10. cat Command

Cat is one of the most frequently used commands in Linux. It is used to list the contents of a file on the standard output.



11.echo

The 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.

12.head

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.

13.tail

The tail command in Unix or Linux system is used to print the last N lines from the file on the terminal. Tail command is especially used with log files to read the last few lines to know about the error messages.

14.read

The read command in Linux is a way for the users to interact with input taken from the keyboard, which you might see referred to as stdin (standard input) or other similar descriptions. In other words, if you want that your bash script takes input from the user, you'll have to use the read command.

15.more

The 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.

16.less

The 'less' command is same as 'more' command but include some more features. It automatically adjust with the width and height of the terminal window, while 'more' command cuts the content as the width of the terminal window get shorter.

17.cut

The cut command is a command-line utility for cutting sections from each line of a file. It writes the result to the standard output. It's worth noting that it does not modify the file, but only works on a copy of the content.

18.paste

The paste command is one of the useful commands in 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.

19.uname

The uname command is used to display the software and hardware information in current running Linux system.

20.cp

The cp command is used to copy the files and directories from one local place to another using command line. cp command is available in linux like operating systems

21.mv

The mv is one of the must know commands in Linux. mv stands for move and is essentially used for moving files or directories from one location to another.

locate

The locate command in Linux is used to find the files by name. There are two most widely used file searching utilities accessible to users are called find and locate.

22.find

The find command is the best command for searching your filesystem for files, based on a variety of attributes.

23.grep

Grep is a Linux / UNIX command-line tool used to search for a string of characters in a specified file. The text search pattern is called a regular expression. When it finds a match, it prints the line with the result.

24.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.

25.du

The du command, short for disk usage, is used to estimate file space usage. The du command can be used to track the files and directories which are consuming excessive amount of space on hard disk drive.

26. useradd

The useradd is a command in Linux that is used to add user accounts to your system.

27.userdel

The userdel command in Linux system is used to delete a user account and related files. This command basically modifies the system account files, deleting all the entries which refer to the username login.

28.sudo

The Sudo stands for superuser DO and is used to access restricted files and operations. By default, Linux restricts access to certain parts of the system preventing sensitive files from being compromised. The sudo command temporarily elevates privileges allowing users to complete sensitive tasks without logging in as the root user.

29.passwd

The Passwd command in Linux is used to change the user account passwords. The root user reserves the privilege to change the password for any user on the system, while a normal user can only change the account password for his or her own account.

```
user@user-VirtualBox:~/S2MCA/Linux-lab/Linux-Commands$ ls
commands.txt example.txt Join.txt sample1.txt sample.txt state.txt
user@user-VirtualBox:~/S2MCA/Linux-lab/Linux-Commands$ echo sample.txt
sample.txt
user@user-VirtualBox:~/S2MCA/Linux-lab/Linux-Commands$ echo My name is Amal Vijayan >>sample.txt
user@user-VirtualBox:~/S2MCA/Linux-lab/Linux-Commands$ cat sample.txt
My name is Amal Vijayan
user@user-VirtualBox:~/S2MCA/Linux-lab/Linux-Commands$ cat > sample.txt
I am from Kerala
^C
user@user-VirtualBox:~/S2MCA/Linux-lab/Linux-Commands$ cat sample.txt
I am from Kerala
user@user-VirtualBox:~/S2MCA/Linux-lab/Linux-Commands$ echo My name is Amal Vijayan >>sample.txt
user@user-VirtualBox:~/S2MCA/Linux-lab/Linux-Commands$ cat sample.txt
I am from Kerala
My name is Amal Vijayan
user@user-VirtualBox:~/S2MCA/Linux-lab/Linux-Commands$ read v1 v2 v3
Hai Hello How
user@user-VirtualBox:~/S2MCA/Linux-lab/Linux-Commands$ echo ["$v1"]["$v2"]["$v3"]
[Hai][Hello][How]
user@user-VirtualBox:~/S2MCA/Linux-lab/Linux-Commands$
```

```
user@user-VirtualBox:~/S2MCA/Linux-lab/Linux-Commands$ ls
commands.txt example.txt Join.txt sample1.txt sample.txt state.txt
user@user-VirtualBox:~/S2MCA/Linux-lab/Linux-Commands$ cat state.txt
Kerala
Karnataka
Tamil Nadu
Andhra Pradesh
Assam
Goa
Bihar
Manipur
Nagaland
Punjab
user@user-VirtualBox:~/S2MCA/Linux-lab/Linux-Commands$ head state.txt
Kerala
Karnataka
Tamil Nadu
Andhra Pradesh
Assam
Goa
Bihar
Manipur
Nagaland
Punjab
user@user-VirtualBox:~/S2MCA/Linux-lab/Linux-Commands$ head -n 5 state.txt
Kerala
Karnataka
Tamil Nadu
Andhra Pradesh
Assam
```

```
user@user-VirtualBox:~/S2MCA/Linux-lab/Linux-Commands$ cat state.txt
Kerala
Karnataka
Tamil Nadu
Andhra Pradesh
Assam
Goa
Bihar
Manipur
Nagaland
Punjab
user@user-VirtualBox:~/S2MCA/Linux-lab/Linux-Commands$ tail state.txt
Kerala
Karnataka
Tamil Nadu
Andhra Pradesh
Assam
Goa
Bihar
Manipur
Nagaland
Punjab
user@user-VirtualBox:~/S2MCA/Linux-lab/Linux-Commands$ tail -n 3 state.txt
Manipur
Nagaland
Punjab
user@user-VirtualBox:~/S2MCA/Linux-lab/Linux-Commands$ tail -n 6 state.txt
tail: cannot open '6' for reading: No such file or directory
=> state.txt <==
Kerala
Karnataka
Tamil Nadu
Andhra Pradesh
Assam
Goa
Bihar
Manipur
Nagaland
```

```
Hai Hello How
user@user-VirtualBox:~/S2MCA/Linux-lab/Linux-Commands$ echo ["$v1"]["$v2"]["$v3"]
[Hai][Hello][How]
user@user-VirtualBox:~/S2MCA/Linux-lab/Linux-Commands$ cut -b 1,2 sample.txt
I
My
user@user-VirtualBox:~/S2MCA/Linux-lab/Linux-Commands$ cat state.txt
Kerala
Karnataka
Tamil Nadu
user@user-VirtualBox:~/S2MCA/Linux-lab/Linux-Commands$ paste sample.txt state.txt
I am from Kerala                   Kerala
My name is Amal Vijayan Karnataka
                                      Tamil Nadu
user@user-VirtualBox:~/S2MCA/Linux-lab/Linux-Commands$ uname
Linux
user@user-VirtualBox:~/S2MCA/Linux-lab/Linux-Commands$ uname -r
5.8.0-55-generic
user@user-VirtualBox:~/S2MCA/Linux-lab/Linux-Commands$ uname -v
#62~20.04.1-Ubuntu SMP Wed Jun 2 08:55:04 UTC 2021
user@user-VirtualBox:~/S2MCA/Linux-lab/Linux-Commands$ uname -p
x86_64
user@user-VirtualBox:~/S2MCA/Linux-lab/Linux-Commands$ ls
commands.txt example.txt Join.txt sample1.txt sample.txt state.txt
user@user-VirtualBox:~/S2MCA/Linux-lab/Linux-Commands$ find /home/ -name sample.txt
/home/user/S2MCA/Linux-lab/Linux-Commands/sample.txt
/home/user/.local/share/Trash/files/sample.txt
user@user-VirtualBox:~/S2MCA/Linux-lab/Linux-Commands$ cp sample.txt /home/S2MCA/Linux-lab
cp: cannot create regular file '/home/S2MCA/Linux-lab': No such file or directory
user@user-VirtualBox:~/S2MCA/Linux-lab/Linux-Commands$ ls /home/S2MCA
ls: cannot access '/home/S2MCA': No such file or directory
user@user-VirtualBox:~/S2MCA/Linux-lab/Linux-Commands$ du -h
```

```
cp: cannot create regular file '/home/S2MCA/Linux-lab': No such file or directory
user@user-VirtualBox:~/S2MCA/Linux-lab/Linux-Commands$ ls /home/S2MCA
ls: cannot access '/home/S2MCA': No such file or directory
user@user-VirtualBox:~/S2MCA/Linux-lab/Linux-Commands$ du -h
16K .
user@user-VirtualBox:~/S2MCA/Linux-lab/Linux-Commands$ df -m
Filesystem 1M-blocks Used Available Use% Mounted on
udev 1468 0 1468 0% /dev
tmpfs 300 2 298 1% /run
/dev/sda5 20440 7185 12195 38% /
tmpfs 1497 0 1497 0% /dev/shm
tmpfs 5 1 5 1% /run/lock
tmpfs 1497 0 1497 0% /sys/fs/cgroup
/dev/loop0 56 56 0 100% /snap/core18/1988
/dev/loop2 219 219 0 100% /snap/gnome-3-34-1804/66
/dev/loop3 52 52 0 100% /snap/snap-store/518
/dev/loop1 65 65 0 100% /snap/gtk-common-themes/1514
/dev/loop4 32 32 0 100% /snap/snaps/11036
/dev/sda1 511 1 511 1% /boot/efi
tmpfs 300 1 300 1% /run/user/1000
user@user-VirtualBox:~/S2MCA/Linux-lab/Linux-Commands$ grep sas sample.txt
user@user-VirtualBox:~/S2MCA/Linux-lab/Linux-Commands$ sudo add Appu
[sudo] password for user:
Sorry, try again.
[sudo] password for user:
Sorry, try again.
[sudo] password for user:
[sudo] password for user:
Changing password for user.
Current password:
```

```
user@user-VirtualBox:~/S2MCA/Linux-lab/Linux-Commands$ passwd: Authentication token manipulation error
passwd: password unchanged
user@user-VirtualBox:~/S2MCA/Linux-lab/Linux-Commands$ 
user@user-VirtualBox:~/S2MCA/Linux-lab/Linux-Commands$ sudo passwd
[sudo] password for user:
user@user-VirtualBox:~/S2MCA/Linux-lab/Linux-Commands$ userdel
Usage: userdel [options] LOGIN

Options:
-f, --force          force removal of files,
                     even if not owned by user
-h, --help           display this help message and exit
-r, --remove          remove home directory and mail spool
-R, --root CHROOT_DIR
-P, --prefix PREFIX_DIR
--extrausers         prefix directory where are located the /etc/* files
                     Use the extra users database
-Z, --selinux-user   remove any SELinux user mapping for the user

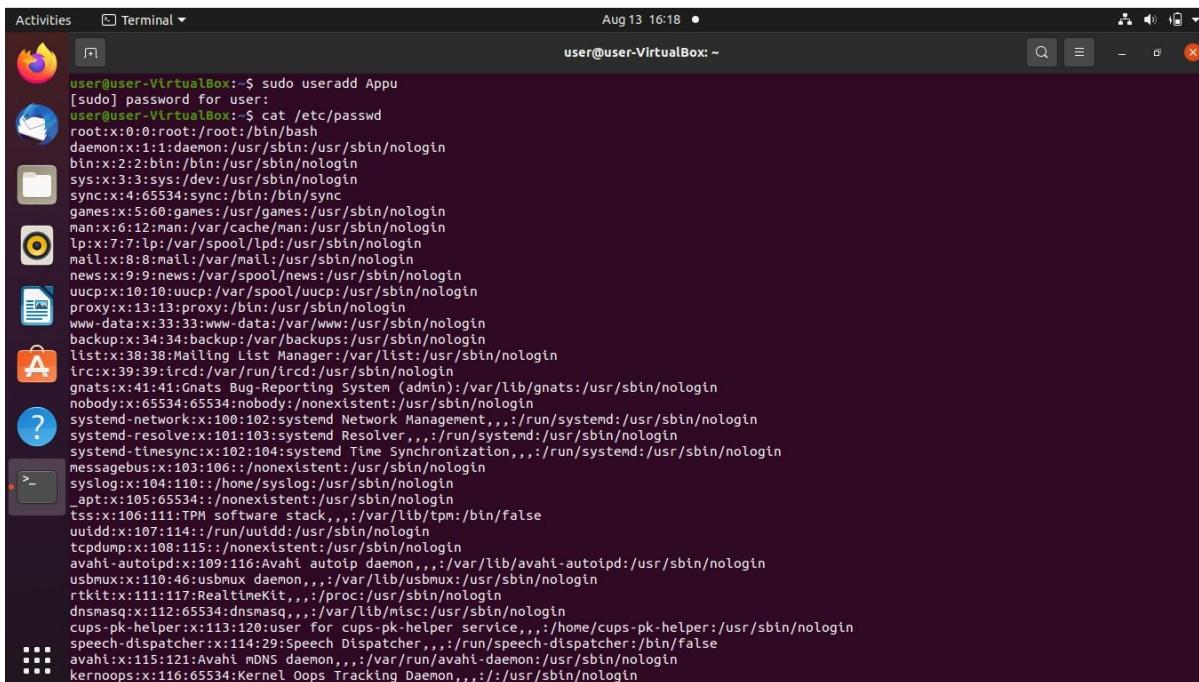
user@user-VirtualBox:~/S2MCA/Linux-lab/Linux-Commands$ userdel Appu
userdel: user 'Appu' does not exist
user@user-VirtualBox:~/S2MCA/Linux-lab/Linux-Commands$ 
user@user-VirtualBox:~/S2MCA/Linux-lab/Linux-Commands$
```

30.Usermod

The 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.

Options

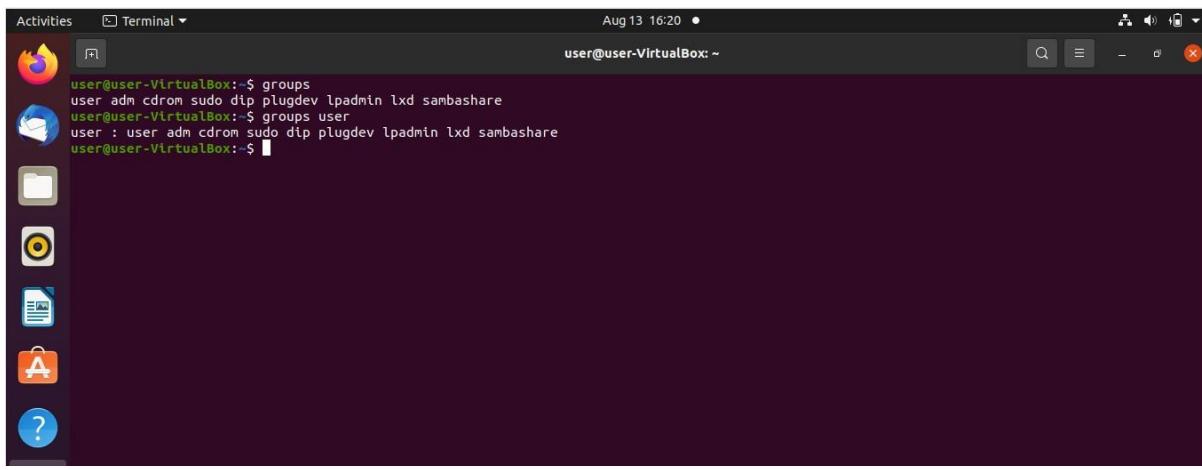
- c = we can add comment field for the user account.
- d = used to modify the directory for any existing user account.
- e = Using this option we can make the account expiry in specific period.
- g = Change the primary group for a User.
- G = used to add a supplementary groups.
- a = used to add anyone of the group to a secondary group.
- I = The name of the user will be changed from login to new login. Nothing else will change.
- L = To lock the user account. This will lock the password so we can't use the account.
- m = moving the contents of the home directory from existing home directory to new Directory.



```
user@user-VirtualBox:~$ sudo useradd Appu
[sudo] password for user:
user@user-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:/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
ircd: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
nobody:x:65534:65534:nobody:/nonexistent:/usr/sbin/nologin
systemd-network:x:100:102:system Network Management,,,:/run/systemd:/usr/sbin/nologin
systemd-resolve:x:101:103:system Resolver,,,:/run/systemd:/usr/sbin/nologin
systemd-timesync:x:102:104:system Time Synchronization,,,:/run/systemd:/usr/sbin/nologin
messagebus:x:103:106::/nonexistent:/usr/sbin/nologin
syslog:x:104:110:/home/syslog:/usr/sbin/nologin
_apt:x:105:65534::/nonexistent:/usr/sbin/nologin
tss:x:106:111:TPM software stack,,,:/var/lib/tpm:/bin/false
uuid:x:107:114::/run/uuid:/usr/sbin/nologin
tcpdump:x:108:15::/nonexistent:/usr/sbin/nologin
avahi-autoipd:x:109:116:Avahi autoip daemon,,,:/var/lib/avahi-autoipd:/usr/sbin/nologin
usbmux:x:110:46:usbmux daemon,,,:/var/lib/usbmux:/usr/sbin/nologin
rtkit:x:111:117:RealtimeKit,,,:/proc:/usr/sbin/nologin
dnsmasq:x:112:65534:dnsmasq,,,:/var/lib/misc:/usr/sbin/nologin
cups-pk-helper:x:113:120:user for cups-pk-helper service,,,:/home/cups-pk-helper:/usr/sbin/nologin
speech-dispatcher:x:114:29:Speech Dispatcher,,,:/run/speech-dispatcher:/bin/false
avahi:x:115:121:Avahi mDNS daemon,,,:/var/run/avahi-daemon:/usr/sbin/nologin
kernoops:x:116:65534:Kernel Oops Tracking Daemon,,,:/usr/sbin/nologin
```

31.Groups

The 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.

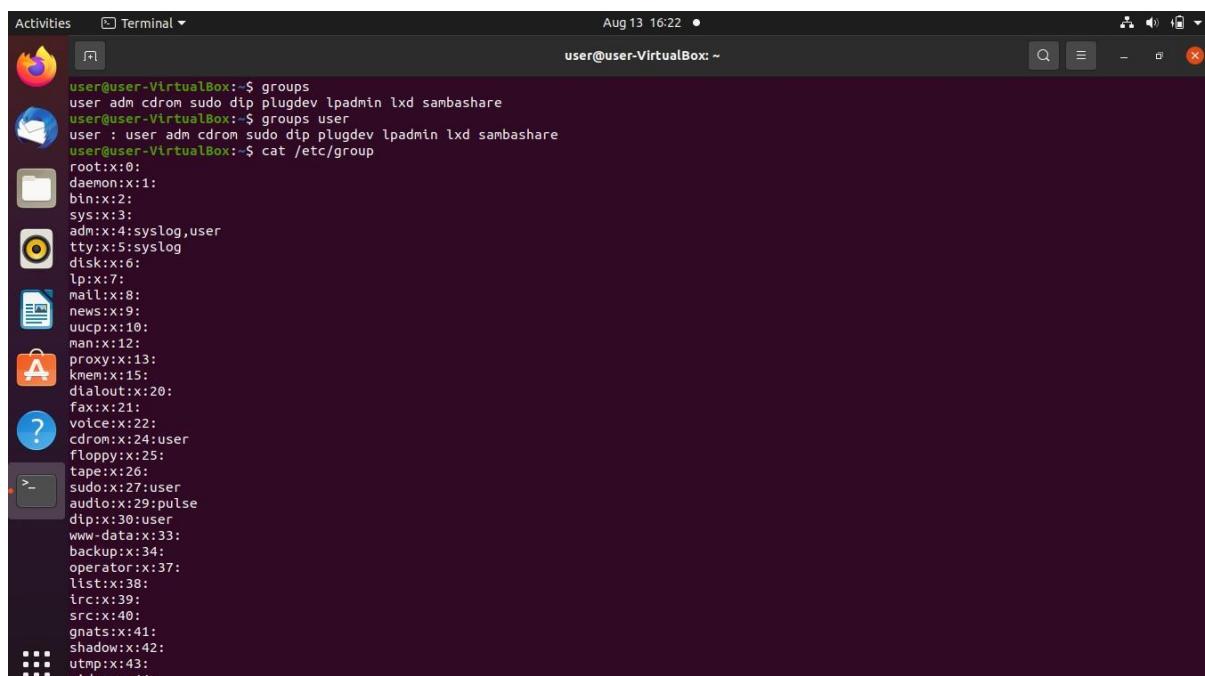


A screenshot of a Linux desktop environment, likely Ubuntu, showing a terminal window. The terminal window title is "Terminal" and the status bar shows the date and time as "Aug 13 16:20". The terminal content displays the output of the "groups" command, which shows the user is part of several groups: adm, cdrom, sudo, dip, plugdev, lpadmin, lxd, and sambashare. The terminal prompt is "user@user-VirtualBox:~\$".

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

32.Groupadd

The groupadd command is used for create a new group to create a new group in Linux.



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 "Aug 13 16:22". The terminal content displays the output of the "cat /etc/group" command, which lists all existing groups on the system. The output includes entries for 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, backup, operator, list, irc, src, gnats, shadow, utmp, and video. The terminal prompt is "user@user-VirtualBox:~\$".

```
user@user-VirtualBox:~$ groups
user adm cdrom sudo dip plugdev lpadmin lxd sambashare
user@user-VirtualBox:~$ groups user
user : user adm cdrom sudo dip plugdev lpadmin lxd sambashare
user@user-VirtualBox:~$ cat /etc/group
root:x:0:
daemon:x:1:
bin:x:2:
sys:x:3:
adm:x:4:syslog,user
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:user
floppy:x:25:
tape:x:26:
sudo:x:27:user
audio:x:29:pulse
dip:x:30:user
www-data:x:33:
backup:x:34:
operator:x:37:
list:x:38:
irc:x:39:
src:x:40:
gnats:x:41:
shadow:x:42:
utmp:x:43:
video:x:44:
```

33.Groupmod

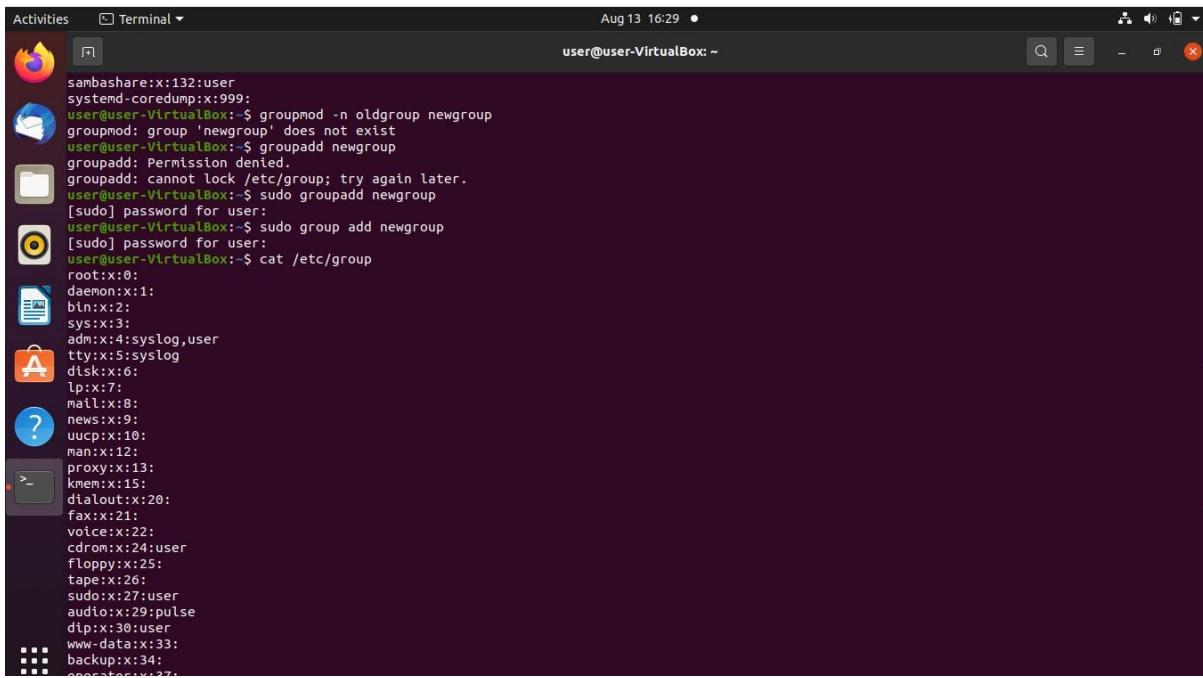
The groupmod command in Linux is used to modify or change the existing group on Linux system. It can be handled by superuser or root user. Basically, it modifies a group definition on the system by modifying the right entry in the database of the group. Syntax: groupmod [option] GROUP.

The *groupmod* command has following files.

/etc/group: Group Account Information.

/etc/gshadow: Secured group account information.

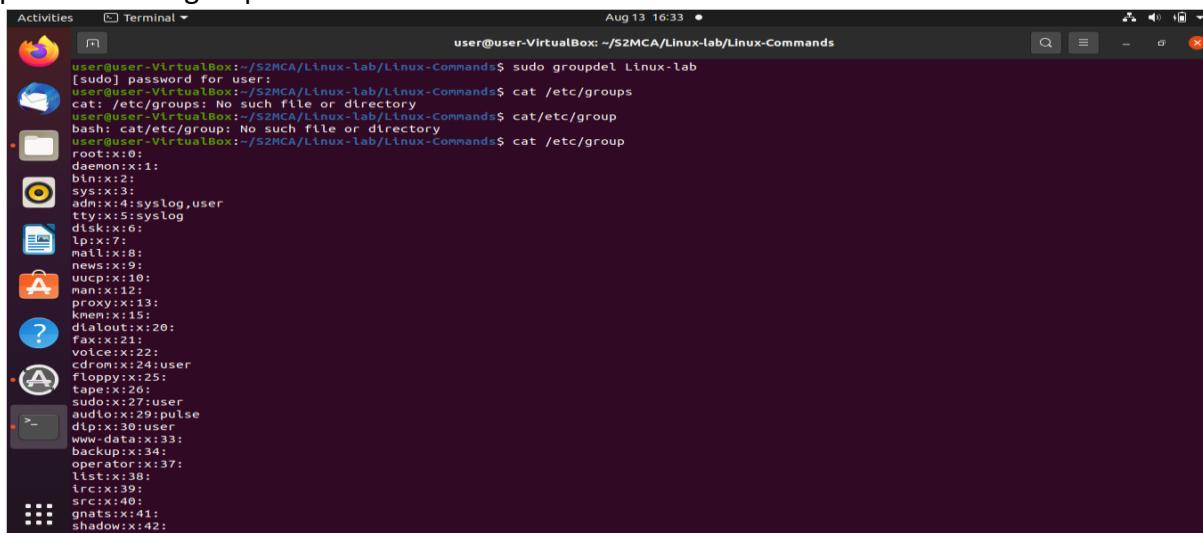
/etc/login.def: Shadow passwd suite configuration. **/etc/passwd:** User account information.



```
sambashare:x:132:user
systemd-coredump:x:999:
user@user-VirtualBox:~$ groupmod -n oldgroup newgroup
groupmod: group 'newgroup' does not exist
user@user-VirtualBox:~$ groupadd newgroup
groupadd: Permission denied.
groupadd: cannot lock /etc/group; try again later.
user@user-VirtualBox:~$ sudo groupadd newgroup
[sudo] password for user:
[sudo] password for user:
user@user-VirtualBox:~$ cat /etc/group
root:x:0:
daemon:x:1:
bin:x:2:
sys:x:3:
adm:x:4:syslog,user
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:user
floppy:x:25:
tape:x:26:
sudo:x:27:user
audio:x:29:pulse
dip:x:30:user
www-data:x:33:
backup:x:34:
operator:x:37:
irc:x:39:
src:x:40:
gnats:x:41:
shadow:x:42:
```

34. Groupdel

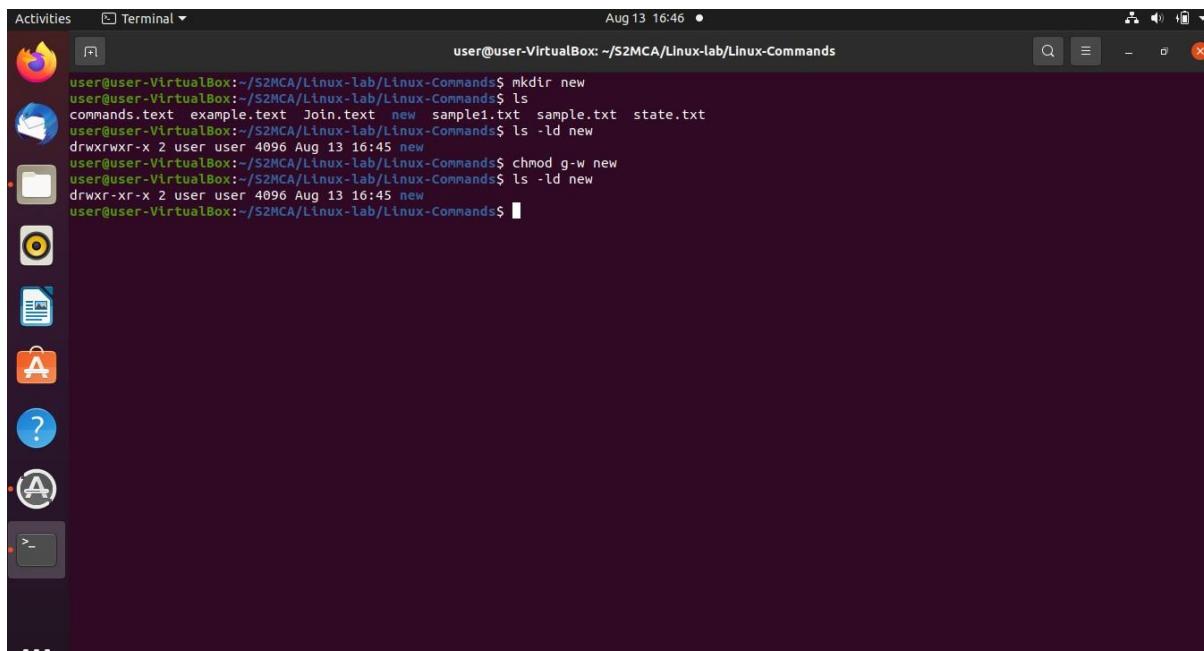
The groupdel command modifies the system account files, deleting all entries that refer to group. The named group must exist.



```
user@user-VirtualBox:~/S2MCA/Linux-lab/Linux-Commands$ sudo groupdel Linux-lab
[sudo] password for user:
user@user-VirtualBox:~/S2MCA/Linux-lab/Linux-Commands$ cat /etc/groups
user:::0:root
user:::1:daemon
user:::2:bin
user:::3:sys
user:::4:syslog,user
user:::5:syslog
user@user-VirtualBox:~/S2MCA/Linux-lab/Linux-Commands$ cat /etc/group
root:x:0:
daemon:x:1:
bin:x:2:
sys:x:3:
adm:x:4:syslog,user
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:user
floppy:x:25:
tape:x:26:
sudo:x:27:user
audio:x:29:pulse
dip:x:30:user
www-data:x:33:
backup:x:34:
operator:x:37:
irc:x:39:
src:x:40:
gnats:x:41:
shadow:x:42:
```

35. Chmod

The chmod command is used to change the access mode of a file.

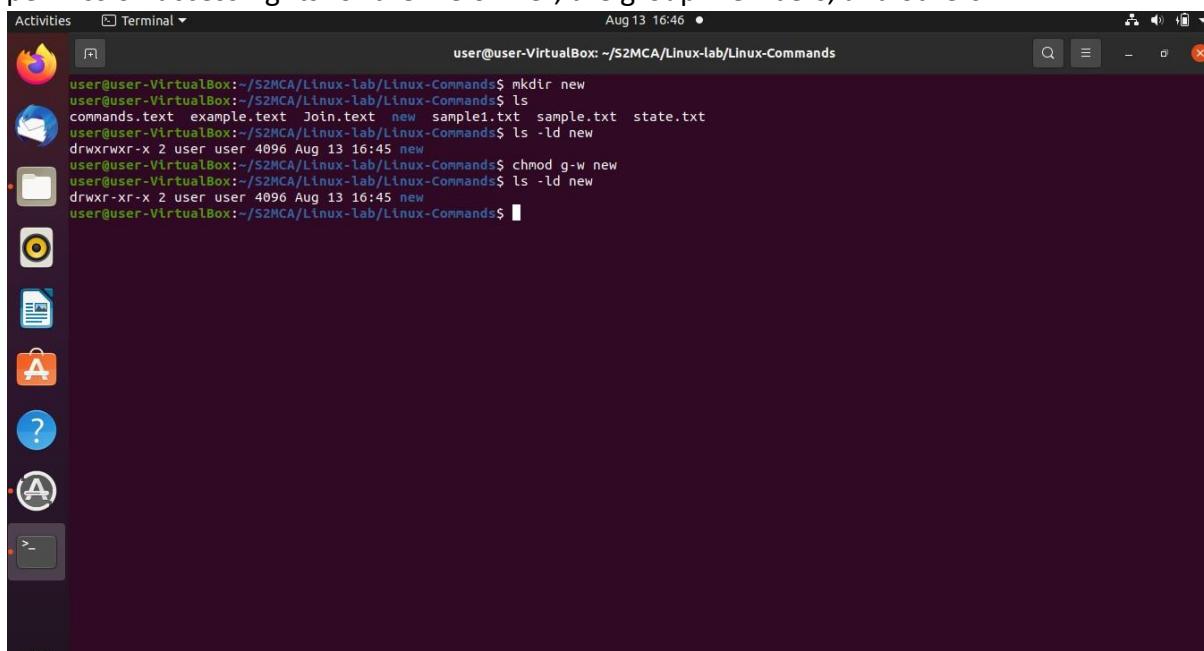


A screenshot of an Ubuntu desktop environment. On the left is a dock with icons for the Dash, Home, Applications, Help, and Terminal. The main area shows a terminal window titled "Terminal" with the command line "user@user-VirtualBox: ~/S2MCA/Linux-lab/Linux-Commands". The terminal displays the following commands and output:

```
user@user-VirtualBox:~/S2MCA/Linux-lab/Linux-Commands$ mkdir new
user@user-VirtualBox:~/S2MCA/Linux-lab/Linux-Commands$ ls
commands.txt example.txt Join.text new sample1.txt sample.txt state.txt
user@user-VirtualBox:~/S2MCA/Linux-lab/Linux-Commands$ ls -ld new
drwxrwxr-x 2 user user 4096 Aug 13 16:45 new
user@user-VirtualBox:~/S2MCA/Linux-lab/Linux-Commands$ chmod g-w new
user@user-VirtualBox:~/S2MCA/Linux-lab/Linux-Commands$ ls -ld new
drwxr-xr-x 2 user user 4096 Aug 13 16:45 new
user@user-VirtualBox:~/S2MCA/Linux-lab/Linux-Commands$
```

36.Chown

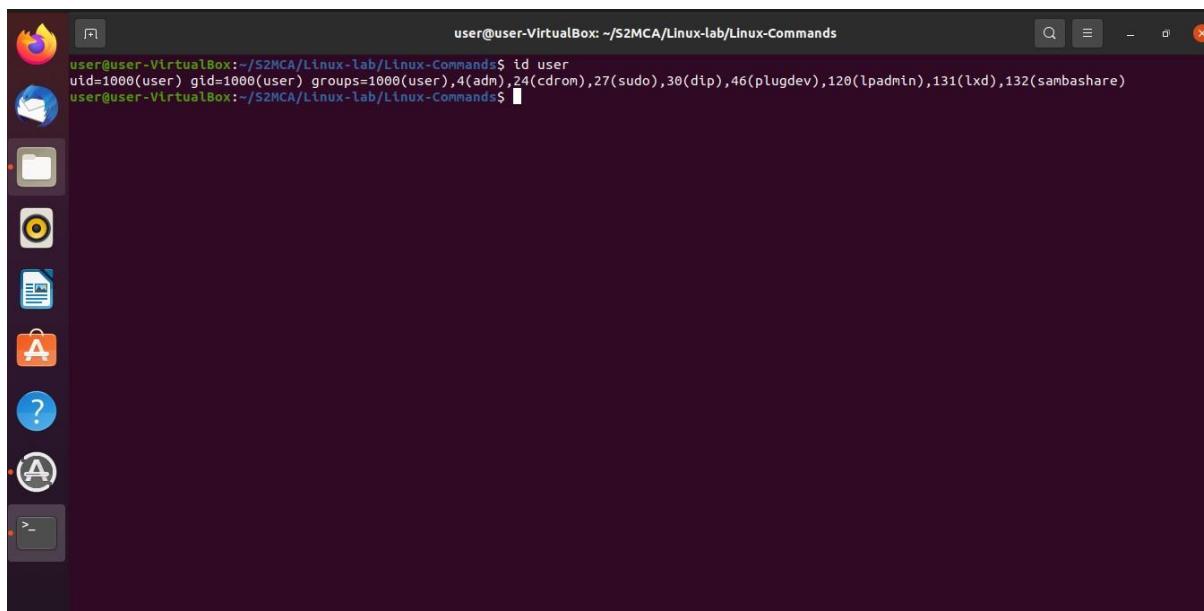
The chown command allows you to change the user and/or group ownership of a given file, directory, or symbolic link. In Linux, all files are associated with an owner and a group and assigned with permission access rights for the file owner, the group members, and others.



A screenshot of an Ubuntu desktop environment, identical to the one above, showing a terminal window titled "Terminal" with the command line "user@user-VirtualBox: ~/S2MCA/Linux-lab/Linux-Commands". The terminal displays the same commands and output as the previous screenshot, demonstrating the use of the chown command.

37.Id

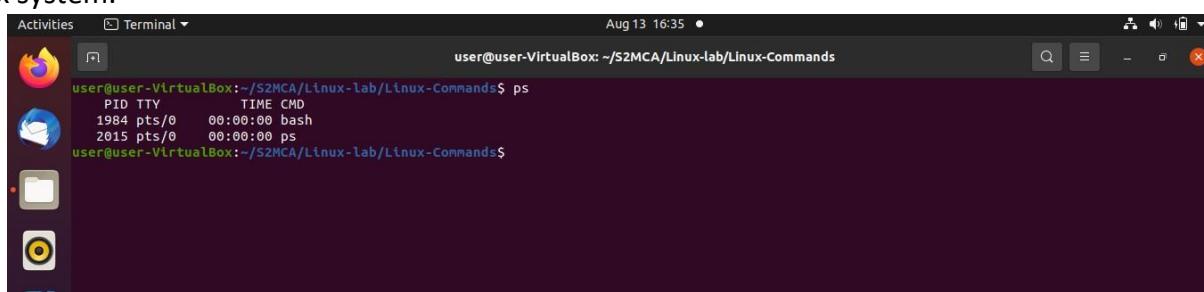
The id command in Linux is used to find out user and group names and numeric ID's (UID or group ID) of the current user or any other user in the server. This command is useful to find out the following information as listed below: User name and real user id.

A screenshot of an Ubuntu desktop environment. On the left is a dock with icons for various applications like Dash, Home, File Explorer, Terminal, Help, and others. A terminal window is open in the center, showing the command 'id user' and its output: 'uid=1000(user) gid=1000(user) groups=1000(user),4(adm),24(cdrom),27(sudo),30(dip),46(plugdev),120(lpadmin),131(lxd),132(sambashare)'.

```
user@user-VirtualBox:~/S2MCA/Linux-lab/Linux-Commands$ id user
uid=1000(user) gid=1000(user) groups=1000(user),4(adm),24(cdrom),27(sudo),30(dip),46(plugdev),120(lpadmin),131(lxd),132(sambashare)
user@user-VirtualBox:~/S2MCA/Linux-lab/Linux-Commands$
```

38.Ps

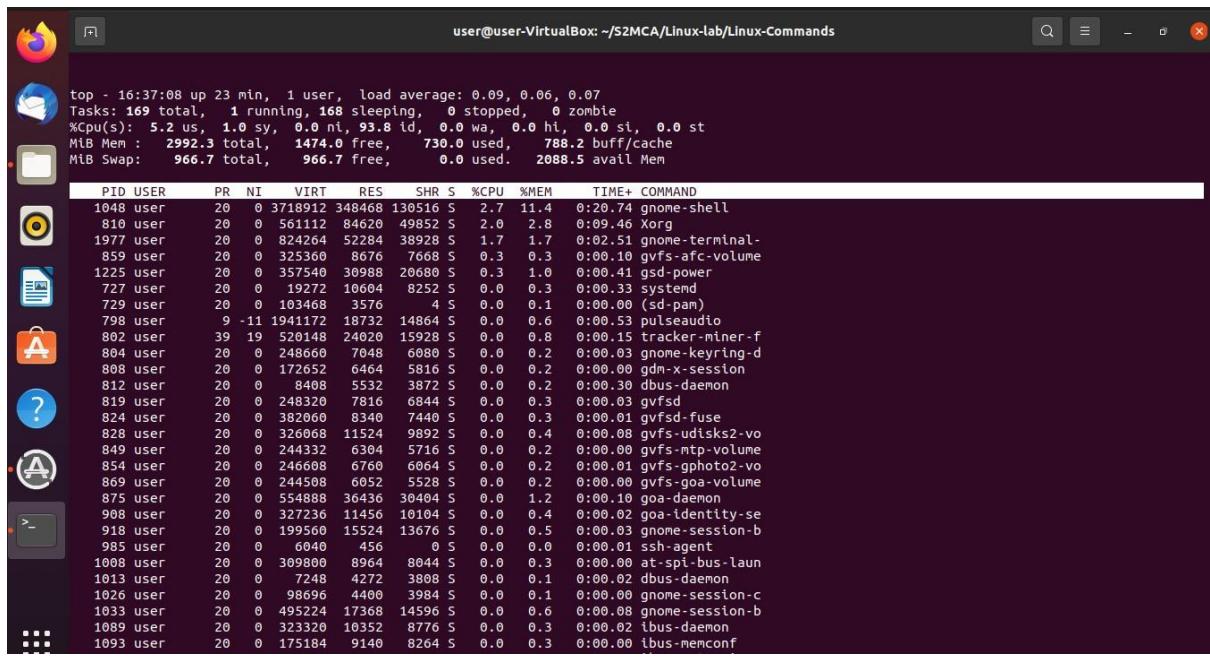
The ps command in Linux is used to display about running processes on the system. You can get information like process ID (PID) for the processes you or any other user is running on the same Linux system.

A screenshot of an Ubuntu desktop environment. On the left is a dock with icons for Dash, Home, File Explorer, Terminal, Help, and others. A terminal window is open in the center, showing the command 'ps' and its output: 'PID TTY TIME CMD' followed by two entries: '1984 pts/0 00:00:00 bash' and '2015 pts/0 00:00:00 ps'.

```
Activities Terminal Aug 13 16:35 •
user@user-VirtualBox:~/S2MCA/Linux-lab/Linux-Commands$ ps
PID TTY TIME CMD
1984 pts/0 00:00:00 bash
2015 pts/0 00:00:00 ps
user@user-VirtualBox:~/S2MCA/Linux-lab/Linux-Commands$
```

39.Top

The Linux top command shows the running processes within your Linux environment that consume the most system resources.



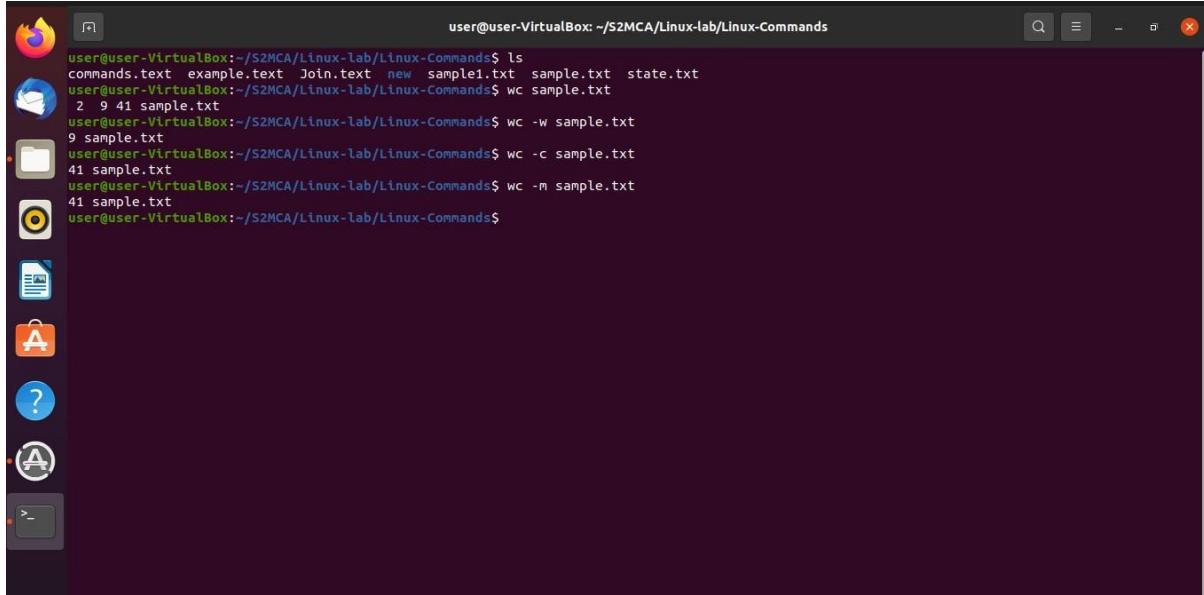
user@user-VirtualBox: ~/S2MCA/Linux-lab/Linux-Commands

```
top - 16:37:08 up 23 min, 1 user, load average: 0.09, 0.06, 0.07
Tasks: 169 total, 1 running, 168 sleeping, 0 stopped, 0 zombie
%Cpu(s): 5.2 us, 1.0 sy, 0.0 ni, 93.8 id, 0.0 wa, 0.0 hi, 0.0 si, 0.0 st
MiB Mem : 2992.3 total, 1474.0 free, 730.0 used, 788.2 buff/cache
MiB Swap: 966.7 total, 966.7 free, 0.0 used. 2088.5 avail Mem
```

PID	USER	PR	NI	VIRT	RES	SHR	S	%CPU	%MEM	TIME+	COMMAND
1048	user	20	0	3718912	348468	130516	S	2.7	11.4	0:26.74	gnome-shell
810	user	20	0	561112	84620	49852	S	2.0	2.8	0:09.46	Xorg
1977	user	20	0	824264	52284	38928	S	1.7	1.7	0:02.51	gnome-terminal
859	user	20	0	325360	8676	7668	S	0.3	0.3	0:00.10	gvfs-afc-volume
1225	user	20	0	357540	30988	20680	S	0.3	1.0	0:00.41	gsd-power
727	user	20	0	19272	10604	8252	S	0.0	0.3	0:00.33	systemd
729	user	20	0	103468	3576	4	S	0.0	0.1	0:00.00	(sd-pam)
798	user	9	-11	1941172	18732	14864	S	0.0	0.6	0:00.53	pulseaudio
802	user	39	19	520148	24020	15928	S	0.0	0.8	0:00.15	tracker-miner-f
804	user	20	0	248660	7048	6080	S	0.0	0.2	0:00.03	gnome-keyring-d
808	user	20	0	172652	6464	5816	S	0.0	0.2	0:00.00	gdm-x-session
812	user	20	0	8408	5532	3872	S	0.0	0.2	0:00.30	dbus-daemon
819	user	20	0	248320	7816	6844	S	0.0	0.3	0:00.03	gvfsd
824	user	20	0	382060	8340	7440	S	0.0	0.3	0:00.01	gvfsd-fuse
828	user	20	0	326068	11524	9892	S	0.0	0.4	0:00.08	gvfs-udisks2-vo
849	user	20	0	244332	6304	5716	S	0.0	0.2	0:00.00	gvfs-mtp-volume
854	user	20	0	246688	6760	6064	S	0.0	0.2	0:00.01	gvfs-gphoto2-vo
869	user	20	0	244508	6052	5528	S	0.0	0.2	0:00.00	gvfs-goa-volume
875	user	20	0	554888	36436	38494	S	0.0	1.2	0:00.10	goa-daemon
908	user	20	0	327236	11456	10184	S	0.0	0.4	0:00.02	goa-identity-se
918	user	20	0	199560	15524	13676	S	0.0	0.5	0:00.03	gnome-session-b
985	user	20	0	6040	456	0	S	0.0	0.0	0:00.01	ssh-agent
1008	user	20	0	309800	8964	8044	S	0.0	0.3	0:00.00	at-spi-bus-laun
1013	user	20	0	7248	4272	3808	S	0.0	0.1	0:00.02	dbus-daemon
1026	user	20	0	98696	4400	3984	S	0.0	0.1	0:00.00	gnome-session-c
1033	user	20	0	495224	17368	14596	S	0.0	0.6	0:00.08	gnome-session-b
1089	user	20	0	323320	10352	8776	S	0.0	0.3	0:00.02	ibus-daemon
1093	user	20	0	175184	9140	8264	S	0.0	0.3	0:00.00	ibus-memconf

40.Wc

The wc command in Linux with examples It is used to find out number of lines, word count, byte and characters count in the files specified in the file.

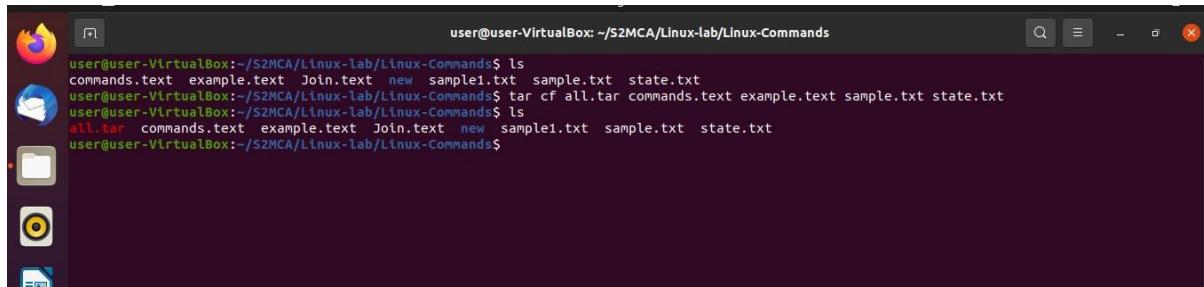


A screenshot of a Linux terminal window titled "user@user-VirtualBox: ~/S2MCA/Linux-lab/Linux-Commands". The terminal shows the following command execution:

```
user@user-VirtualBox:~/S2MCA/Linux-lab/Linux-Commands$ ls commands.txt example.txt Join.text new sample1.txt sample.txt state.txt
user@user-VirtualBox:~/S2MCA/Linux-lab/Linux-Commands$ wc -w sample.txt
2 9 41 sample.txt
user@user-VirtualBox:~/S2MCA/Linux-lab/Linux-Commands$ wc -c sample.txt
9 sample.txt
user@user-VirtualBox:~/S2MCA/Linux-lab/Linux-Commands$ wc -m sample.txt
41 sample.txt
user@user-VirtualBox:~/S2MCA/Linux-lab/Linux-Commands$
```

41.tar

The Linux “tar” stands for tape archive, which is used by large number of Linux/Unix system administrators to deal with tape drives backup. The tar command used to rip a collection of files and directories into highly compressed archive file commonly called tarball or tar, gzip and bzip in Linux.



A screenshot of a Linux terminal window titled "user@user-VirtualBox: ~/S2MCA/Linux-lab/Linux-Commands". The terminal shows the following command execution:

```
user@user-VirtualBox:~/S2MCA/Linux-lab/Linux-Commands$ ls commands.txt example.txt Join.text new sample1.txt sample.txt state.txt
user@user-VirtualBox:~/S2MCA/Linux-lab/Linux-Commands$ tar cf all.tar commands.txt example.txt sample.txt state.txt
user@user-VirtualBox:~/S2MCA/Linux-lab/Linux-Commands$ ls
all.tar commands.txt example.txt Join.text new sample1.txt sample.txt state.txt
user@user-VirtualBox:~/S2MCA/Linux-lab/Linux-Commands$
```

Creation and extraction methods

□ Gzip

A file that ends in .tar.gz or .tgz is a Tar archive compressed with Gzip. Gzip is most often used to compress text files, Tar archives, and web pages. Do not use Gzip to compress images, audio, PDF documents, and other binary files as they are already compressed.

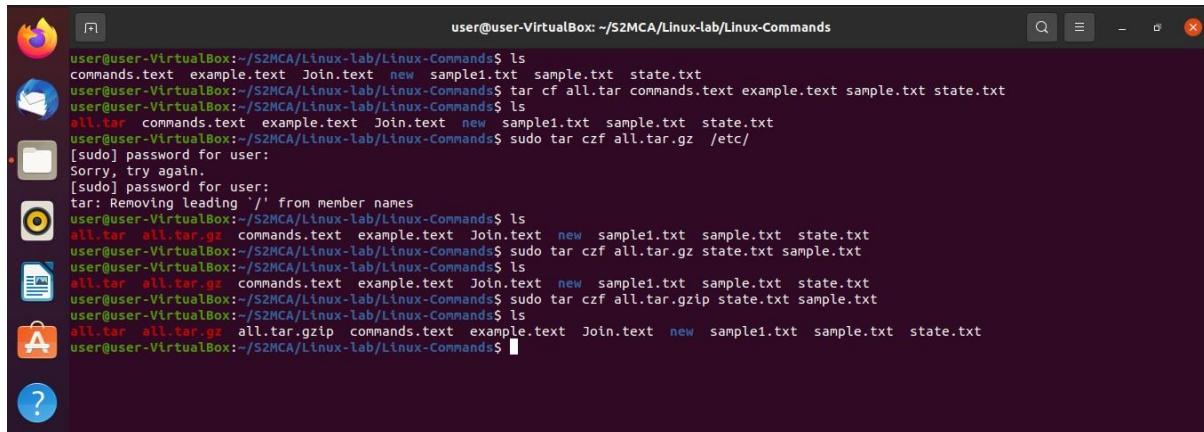
□ Bz2

The .bz2 extension suffix tells us it has been compressed using the bzip2 command. Bzip2 command in Linux is used to compress and decompress the files i.e. it helps in binding the files into a single file which takes less storage space as the original file use to take. It has a slower decompression time and higher memory use.

Gz

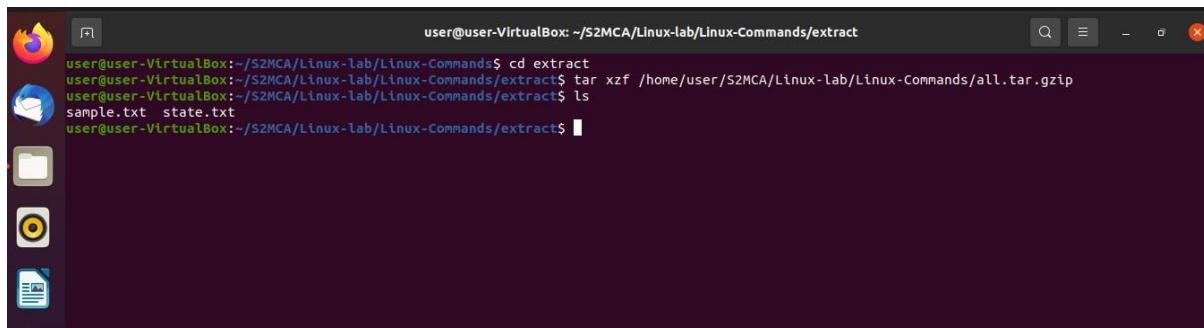
You need to use the tar command which can create and manipulate archive files in .tar.gz under UNIX like operating systems. It is very useful for archiving multiple files together into a single archive file. It allows us to restore files individually.

Creation using Gzip,bz2,gz



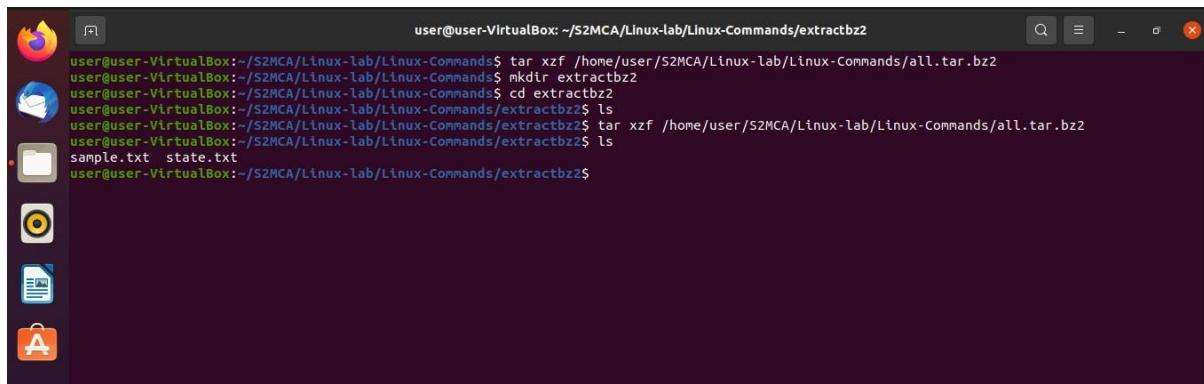
```
user@user-VirtualBox:~/S2MCA/Linux-lab/Linux-Commands$ ls
commands.text example.text Join.text new sample1.txt sample.txt state.txt
user@user-VirtualBox:~/S2MCA/Linux-lab/Linux-Commands$ tar cf all.tar commands.text example.text sample.txt state.txt
user@user-VirtualBox:~/S2MCA/Linux-lab/Linux-Commands$ ls
all.tar commands.text example.text Join.text new sample1.txt sample.txt state.txt
user@user-VirtualBox:~/S2MCA/Linux-lab/Linux-Commands$ sudo tar czf all.tar.gz /etc/
[sudo] password for user:
Sorry, try again.
[sudo] password for user:
tar: Removing leading '/' from member names
user@user-VirtualBox:~/S2MCA/Linux-lab/Linux-Commands$ ls
all.tar all.tar.gz commands.text example.text Join.text new sample1.txt sample.txt state.txt
user@user-VirtualBox:~/S2MCA/Linux-lab/Linux-Commands$ sudo tar czf all.tar.gz state.txt sample.txt
user@user-VirtualBox:~/S2MCA/Linux-lab/Linux-Commands$ ls
all.tar all.tar.gz commands.text example.text Join.text new sample1.txt sample.txt state.txt
user@user-VirtualBox:~/S2MCA/Linux-lab/Linux-Commands$ sudo tar czf all.tar.gz state.txt sample.txt
user@user-VirtualBox:~/S2MCA/Linux-lab/Linux-Commands$ ls
all.tar all.tar.gz all.tar.gz commands.text example.text Join.text new sample1.txt sample.txt state.txt
user@user-VirtualBox:~/S2MCA/Linux-lab/Linux-Commands$
```

Extracting using Gzip



```
user@user-VirtualBox:~/S2MCA/Linux-lab/Linux-Commands$ cd extract
user@user-VirtualBox:~/S2MCA/Linux-lab/Linux-Commands/extract$ tar xzf /home/user/S2MCA/Linux-lab/Linux-Commands/all.tar.gz
user@user-VirtualBox:~/S2MCA/Linux-lab/Linux-Commands/extract$ ls
sample.txt state.txt
user@user-VirtualBox:~/S2MCA/Linux-lab/Linux-Commands/extract$
```

Extracting using Bz2



```
user@user-VirtualBox:~/S2MCA/Linux-lab/Linux-Commands$ tar xzf /home/user/S2MCA/Linux-lab/Linux-Commands/all.tar.bz2
user@user-VirtualBox:~/S2MCA/Linux-lab/Linux-Commands$ mkdir extractbz2
user@user-VirtualBox:~/S2MCA/Linux-lab/Linux-Commands$ cd extractbz2
user@user-VirtualBox:~/S2MCA/Linux-lab/Linux-Commands$ extractbz2$ ls
user@user-VirtualBox:~/S2MCA/Linux-lab/Linux-Commands$ extractbz2$ tar xzf /home/user/S2MCA/Linux-lab/Linux-Commands/all.tar.bz2
user@user-VirtualBox:~/S2MCA/Linux-lab/Linux-Commands$ extractbz2$ ls
sample.txt state.txt
user@user-VirtualBox:~/S2MCA/Linux-lab/Linux-Commands$ extractbz2$
```

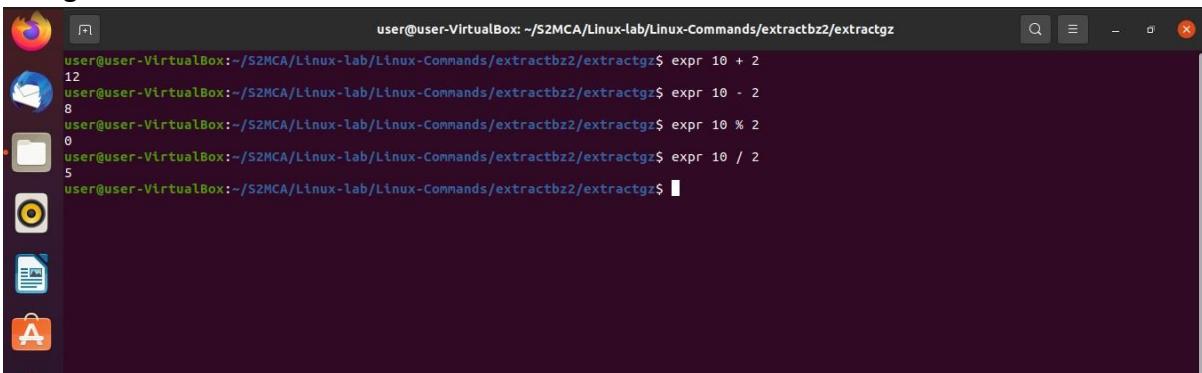
Extracting using Gz



```
user@user-VirtualBox:~/S2MCA/Linux-lab/Linux-Commands/extractbz2$ mkdir extractgz
user@user-VirtualBox:~/S2MCA/Linux-lab/Linux-Commands/extractbz2$ cd extractgz
user@user-VirtualBox:~/S2MCA/Linux-lab/Linux-Commands/extractbz2$ ls
user@user-VirtualBox:~/S2MCA/Linux-lab/Linux-Commands/extractbz2$ extractgz$ ls
user@user-VirtualBox:~/S2MCA/Linux-lab/Linux-Commands/extractbz2$ tar xzf /home/user/S2MCA/Linux-lab/Linux-Commands/all.tar.gz
sample.txt state.txt
user@user-VirtualBox:~/S2MCA/Linux-lab/Linux-Commands/extractbz2$ extractgz$
```

42.Expr

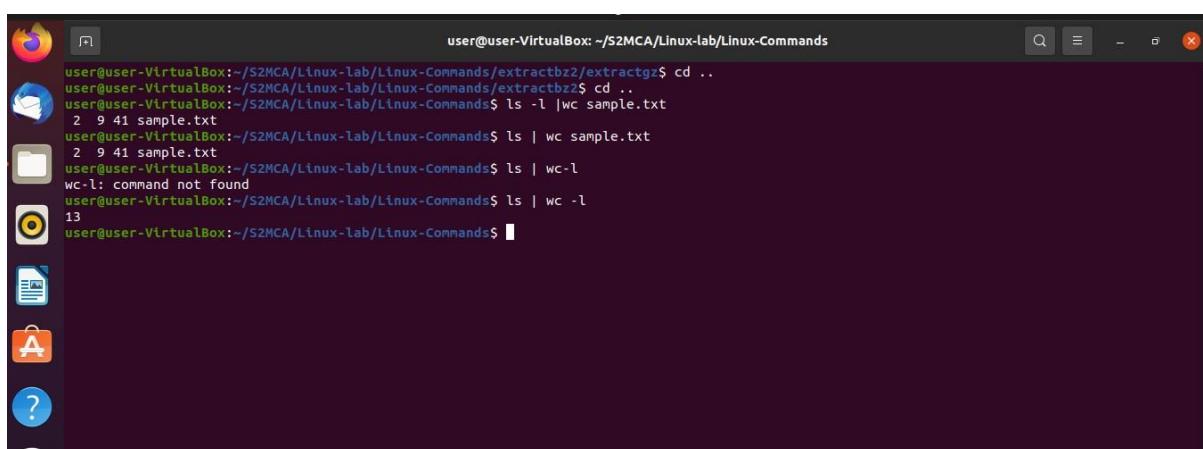
The expr command supports the following operators: for integer: addition, subtraction, multiplication, division, and modulus. For strings: regular expression, set of characters in a string.



```
user@user-VirtualBox:~/S2MCA/Linux-lab/Linux-Commands/extractbz2$ expr 10 + 2
12
user@user-VirtualBox:~/S2MCA/Linux-lab/Linux-Commands/extractbz2$ expr 10 - 2
8
user@user-VirtualBox:~/S2MCA/Linux-lab/Linux-Commands/extractbz2$ expr 10 % 2
0
user@user-VirtualBox:~/S2MCA/Linux-lab/Linux-Commands/extractbz2$ expr 10 / 2
5
user@user-VirtualBox:~/S2MCA/Linux-lab/Linux-Commands/extractbz2$
```

43.redirections and piping

The pipe command denoted by the symbol | allows you to send output of one command to another for further processing. It can redirect the standard output, input, or error of one process to another.

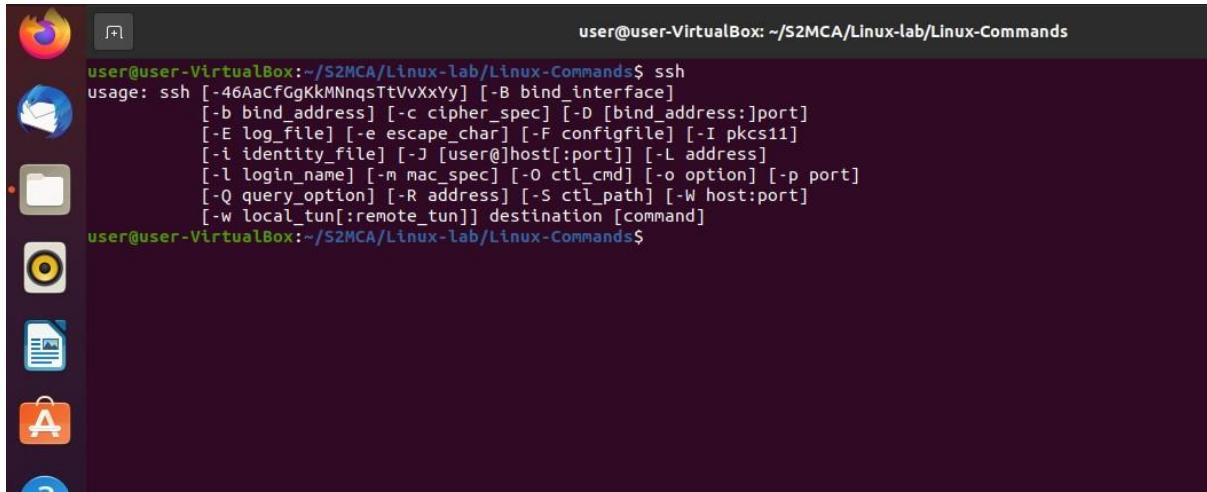


```
user@user-VirtualBox:~/S2MCA/Linux-lab/Linux-Commands$ cd ..
user@user-VirtualBox:~/S2MCA/Linux-lab/Linux-Commands$ cd ..
user@user-VirtualBox:~/S2MCA/Linux-lab/Linux-Commands$ ls -l | wc sample.txt
2 9 41 sample.txt
user@user-VirtualBox:~/S2MCA/Linux-lab/Linux-Commands$ ls | wc sample.txt
2 9 41 sample.txt
user@user-VirtualBox:~/S2MCA/Linux-lab/Linux-Commands$ ls | wc -l
wc: command not found
user@user-VirtualBox:~/S2MCA/Linux-lab/Linux-Commands$ ls | wc -l
13
user@user-VirtualBox:~/S2MCA/Linux-lab/Linux-Commands$
```

44.ssh

In Linux, ssh is a protocol, which stands for S ecure Shell or S ecure Socket Shell. The secure shell is useful for security while connecting to a remote server. The ssh command uses a ssh protocol, which

is a secure protocol, as the data transfer between the client and the host takes place in encrypted form.



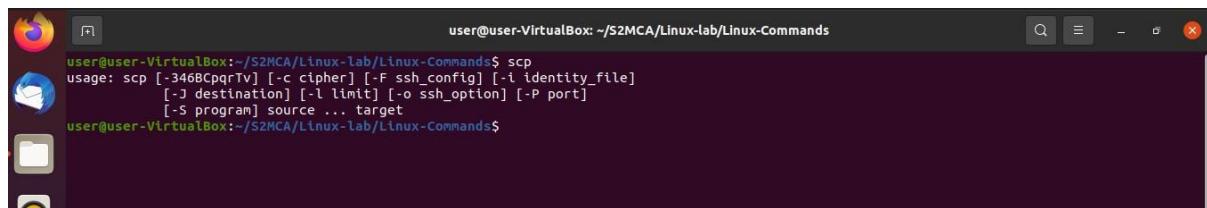
```
user@user-VirtualBox:~/S2MCA/Linux-lab/Linux-Commands$ ssh
usage: ssh [-46AacfGgKkMNnqsTtVvxxYy] [-B bind_interface]
           [-b bind_address] [-c cipher_spec] [-D [bind_address:]port]
           [-E log_file] [-e escape_char] [-F configfile] [-I pkcs11]
           [-i identity_file] [-J [user@]host[:port]] [-L address]
           [-l login_name] [-m mac_spec] [-O ctl_cmd] [-o option] [-P port]
           [-Q query_option] [-R address] [-S ctl_path] [-W host:port]
           [-w local_tun[:remote_tun]] destination [command]
user@user-VirtualBox:~/S2MCA/Linux-lab/Linux-Commands$
```

45.ssh-keygen

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.

46scp

The scp (secure copy) command in Linux system is used to copy file (s) between servers in a secure way. The SCP command or secure copy allows secure transferring of files in between the local host and the remote host or between two remote hosts. It uses the same authentication and security as it is used in the Secure Shell (SSH) protocol.



```
user@user-VirtualBox:~/S2MCA/Linux-lab/Linux-Commands$ scp
usage: scp [-346BCpqrv] [-c cipher] [-F ssh_config] [-i identity_file]
           [-J destination] [-l limit] [-o ssh_option] [-P port]
           [-S program] source ... target
user@user-VirtualBox:~/S2MCA/Linux-lab/Linux-Commands$
```

47.ssh-copy-id

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

A vertical column of standard Ubuntu desktop icons on the left side of the terminal window.

```
user@user-VirtualBox:~$ ssh-keygen -t rsa -b 4096 -C "amal@domain.com"
Generating public/private rsa key pair.
Enter file in which to save the key (/home/user/.ssh/id_rsa): rsa
Enter passphrase (empty for no passphrase):
Enter same passphrase again:
Your identification has been saved in rsa
Your public key has been saved in rsa.pub
The key fingerprint is:
SHA256:1N+JoS0cgAVSBCFqnm73xkSW0mDWz07GYq7rDqE516E amal@domain.com
The key's randomart image is:
+---[RSA 4096]----+
| . +=B.. |
| ... = * . |
| ..o = o . . |
| o .. * + . o + . |
| .o B S o o o |
| oo = * . . |
| =oE.* |
| oo...o |
| o=o .. |
+---[SHA256]----+
user@user-VirtualBox:~$
```

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

1.

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

```
user@user-VirtualBox:~/labworks$ cat > song1.mp3
^C
user@user-VirtualBox:~/labworks$ cat > song2.mp3
^C
user@user-VirtualBox:~/labworks$ cat > song3.mp3
^C
user@user-VirtualBox:~/labworks$ cat > song4.mp3
^C
user@user-VirtualBox:~/labworks$ cat > song5.mp3
^C
user@user-VirtualBox:~/labworks$ cat > song6.mp3
^C
user@user-VirtualBox:~/labworks$
```

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

```
user@user-VirtualBox:~/labworks$ cat > snap1.mp3
^C
user@user-VirtualBox:~/labworks$ cat > snap2.mp3
^C
user@user-VirtualBox:~/labworks$ cat > snap3.mp3
^C
user@user-VirtualBox:~/labworks$ cat > snap4.mp3
^C
user@user-VirtualBox:~/labworks$ cat > snap5.mp3
^C
user@user-VirtualBox:~/labworks$ cat > snap6.mp3
^C
user@user-VirtualBox:~/labworks$
```

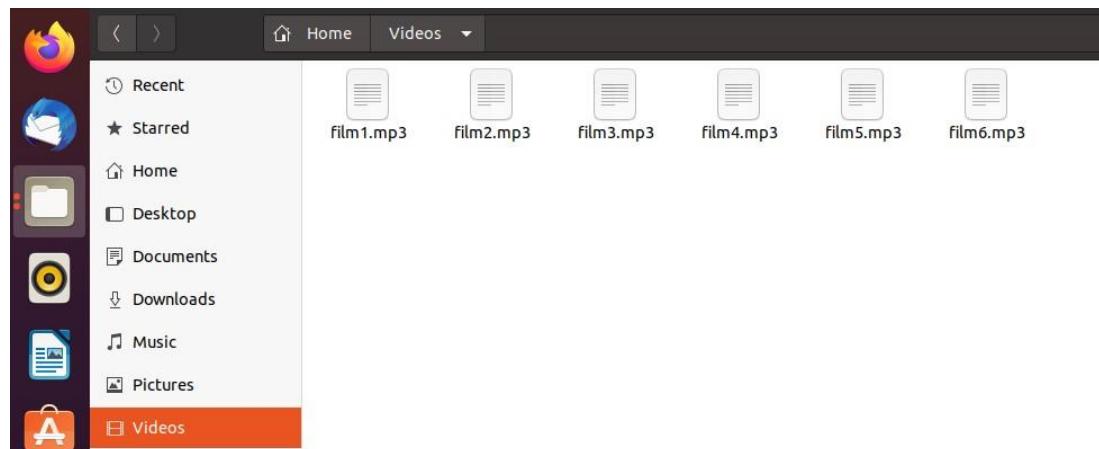
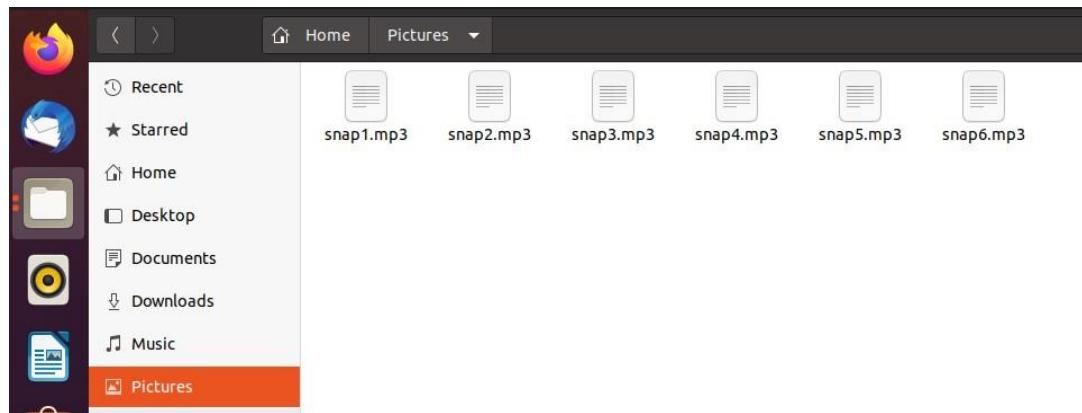
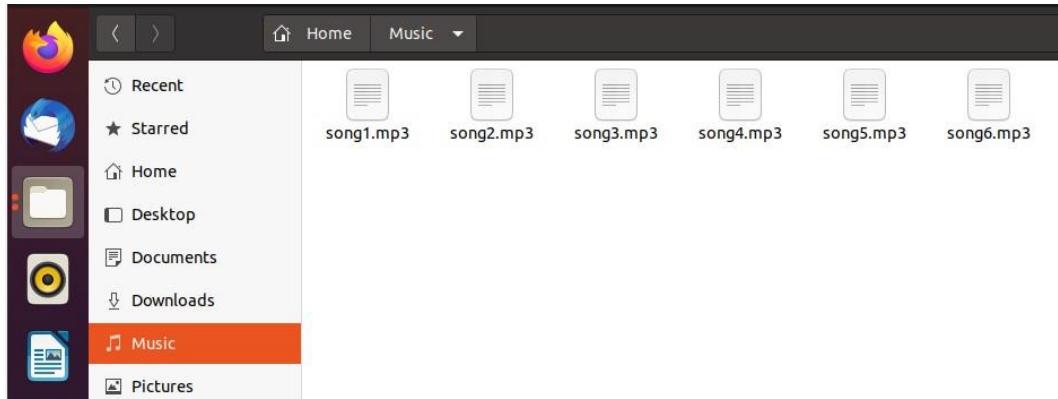
- c. Create six files with name of the form filmX.mp3

(In each set, replace X with the numbers 1 through 6)

```
user@user-VirtualBox:~/labworks$ cat > film1.mp3
^C
user@user-VirtualBox:~/labworks$ cat > film2.mp3
^C
user@user-VirtualBox:~/labworks$ cat > film3.mp3
^C
user@user-VirtualBox:~/labworks$ cat > film4.mp3
^C
user@user-VirtualBox:~/labworks$ cat > film5.mp3
^C
user@user-VirtualBox:~/labworks$ cat > film6.mp3
^C
user@user-VirtualBox:~/labworks$
```

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.

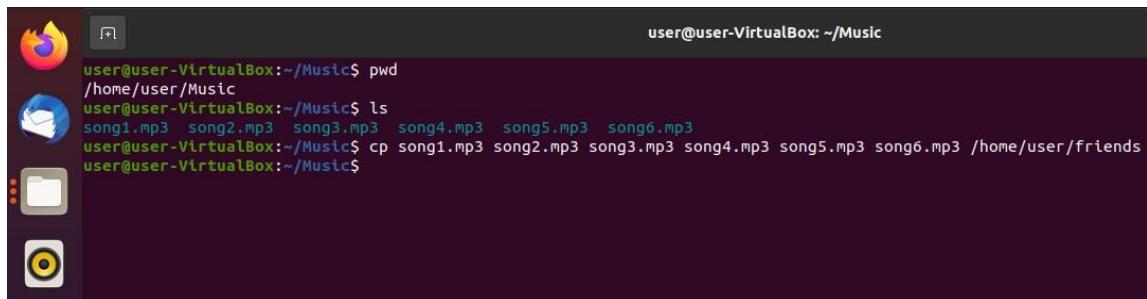
```
user@user-VirtualBox:~/labworks$ ls
film1.mp3  film3.mp3  film5.mp3  snap1.mp3  snap3.mp3  snap5.mp3  song1.mp3  song3.mp3  song5.mp3
film2.mp3  film4.mp3  film6.mp3  snap2.mp3  snap4.mp3  snap6.mp3  song2.mp3  song4.mp3  song6.mp3
user@user-VirtualBox:~/labworks$ mv song1.mp3 song2.mp3 song3.mp3 song4.mp3 song5.mp3 song6.mp3 /home/user/Music
user@user-VirtualBox:~/labworks$ mv snap1.mp3 snap2.mp3 snap3.mp3 snap4.mp3 snap5.mp3 snap6.mp3 /home/user/Pictures
user@user-VirtualBox:~/labworks$ mv film1.mp3 film2.mp3 film3.mp3 film4.mp3 film5.mp3 film6.mp3 /home/user/Videos
user@user-VirtualBox:~/labworks$
```



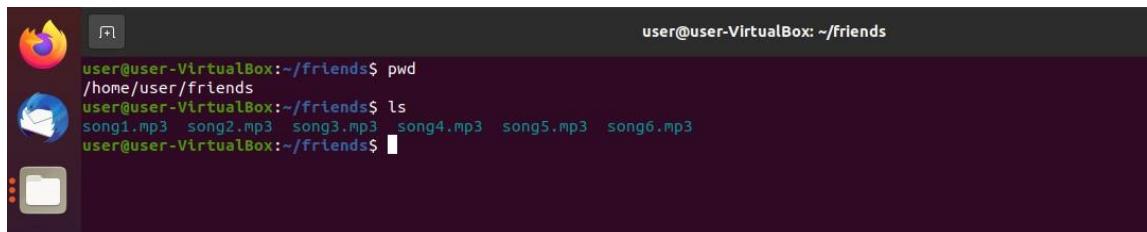
3. In your home directory, create three subdirectories for organizing your files. Call these directories friends, family, and work. Create all three with one command.

A screenshot of a terminal window on a Linux system. The prompt shows "user@user-VirtualBox: ~". The user runs the command "mkdir friends family work". After pressing Enter, they run "ls" to list the contents of the current directory, which includes class.txt, Desktop, Documents, Downloads, family, friends, labworks, Music, Pictures, and Pub. The terminal window has a dark background with light-colored text and icons.

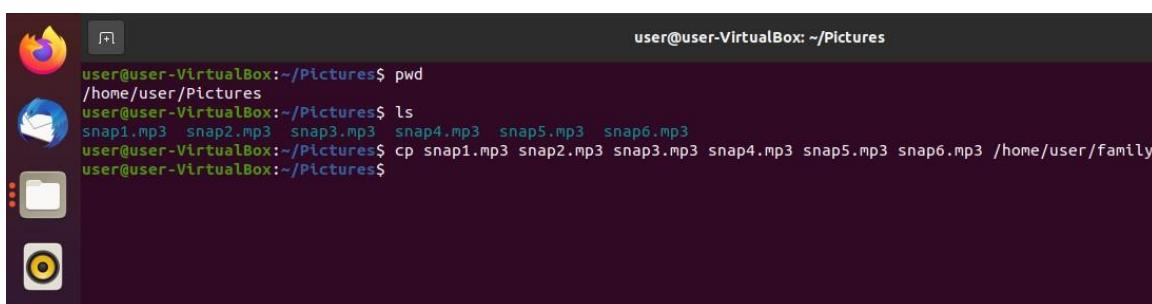
4. Copy song files to the friends folder and snap files to family folder.



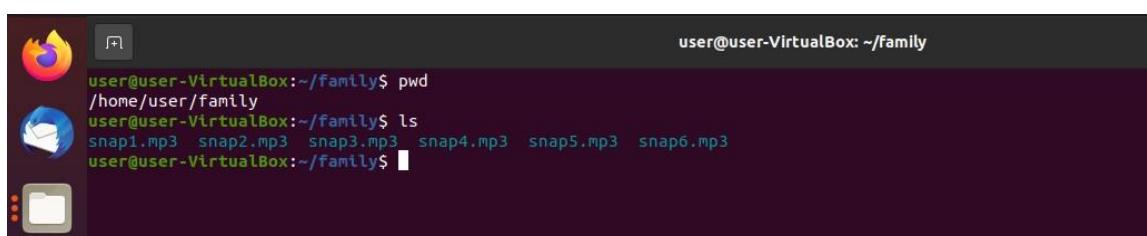
```
user@user-VirtualBox:~/Music$ pwd  
/home/user/Music  
user@user-VirtualBox:~/Music$ ls  
song1.mp3 song2.mp3 song3.mp3 song4.mp3 song5.mp3 song6.mp3  
user@user-VirtualBox:~/Music$ cp song1.mp3 song2.mp3 song3.mp3 song4.mp3 song5.mp3 song6.mp3 /home/user/friends  
user@user-VirtualBox:~/Music$
```



```
user@user-VirtualBox:~/friends$ pwd  
/home/user/friends  
user@user-VirtualBox:~/friends$ ls  
song1.mp3 song2.mp3 song3.mp3 song4.mp3 song5.mp3 song6.mp3  
user@user-VirtualBox:~/friends$
```

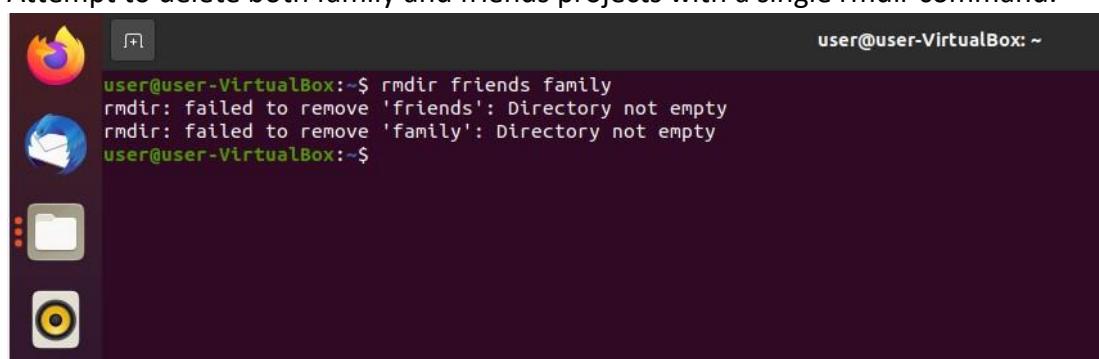


```
user@user-VirtualBox:~/Pictures$ pwd  
/home/user/Pictures  
user@user-VirtualBox:~/Pictures$ ls  
snap1.mp3 snap2.mp3 snap3.mp3 snap4.mp3 snap5.mp3 snap6.mp3  
user@user-VirtualBox:~/Pictures$ cp snap1.mp3 snap2.mp3 snap3.mp3 snap4.mp3 snap5.mp3 snap6.mp3 /home/user/family  
user@user-VirtualBox:~/Pictures$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



```
user@user-VirtualBox:~/family$ pwd  
/home/user/family  
user@user-VirtualBox:~/family$ ls  
snap1.mp3 snap2.mp3 snap3.mp3 snap4.mp3 snap5.mp3 snap6.mp3  
user@user-VirtualBox:~/family$
```

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



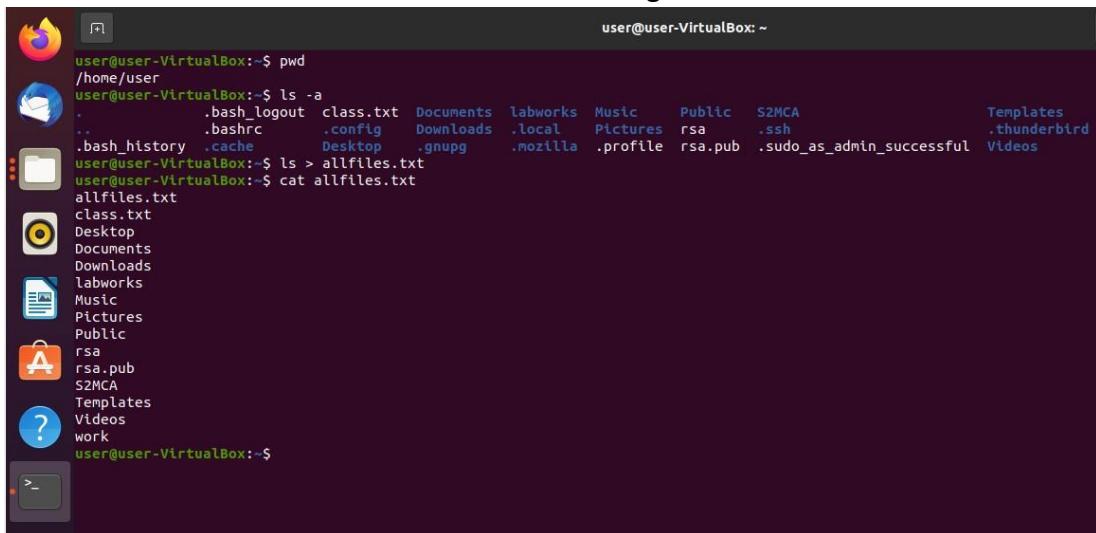
```
user@user-VirtualBox:~$ rmdir friends family  
rmdir: failed to remove 'friends': Directory not empty  
rmdir: failed to remove 'family': Directory not empty  
user@user-VirtualBox:~$
```

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



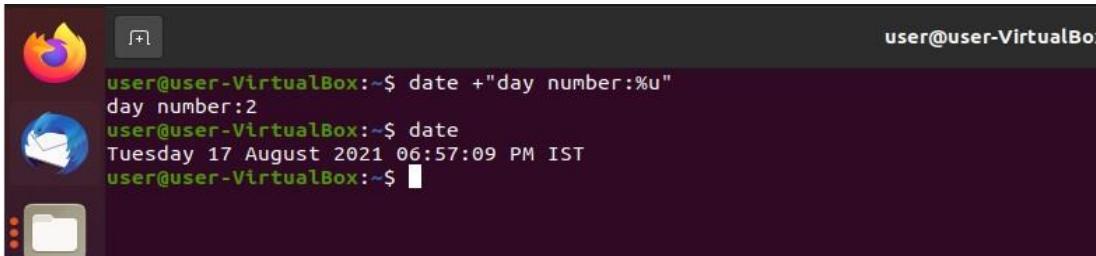
```
user@user-VirtualBox:~$ pwd  
/home/user  
user@user-VirtualBox:~$ ls  
class.txt Desktop Documents Downloads family friends labworks Music Pictures Public rsa rsa.pub S2MCA Templates  
user@user-VirtualBox:~$ rm -rf friends family  
user@user-VirtualBox:~$ ls  
class.txt Desktop Documents Downloads labworks Music Pictures Public rsa rsa.pub S2MCA Templates Videos work  
user@user-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.



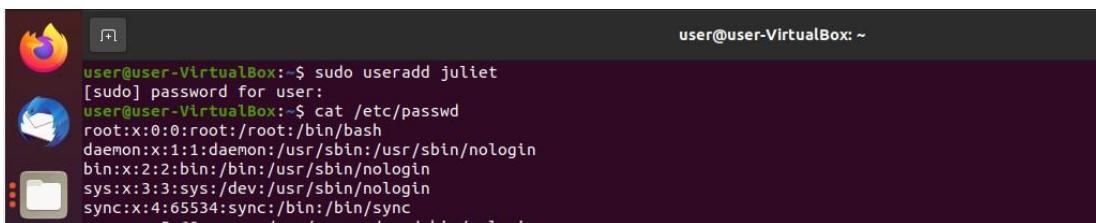
```
user@user-VirtualBox:~$ pwd
/home/user
user@user-VirtualBox:~$ ls -a
. .bash_logout class.txt Documents labworks Music Public S2MCA
.. .bashrc .config Downloads .local Pictures rsa .ssh Templates
.bash_history .cache Desktop .gnupg .mozilla .profile rsa.pub .sudo_as_admin_successful Videos
user@user-VirtualBox:~$ ls > allfiles.txt
user@user-VirtualBox:~$ cat allfiles.txt
allfiles.txt
class.txt
Desktop
Documents
Downloads
labworks
Music
Pictures
Public
rsa
rsa.pub
S2MCA
Templates
Videos
work
user@user-VirtualBox:~$
```

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



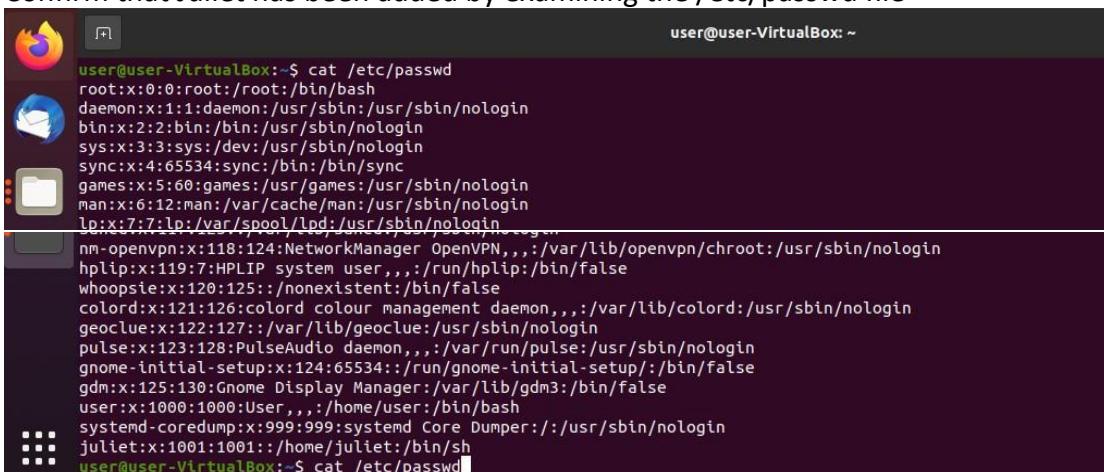
```
user@user-VirtualBox:~$ date +"day number:%u"
day number:2
user@user-VirtualBox:~$ date
Tuesday 17 August 2021 06:57:09 PM IST
user@user-VirtualBox:~$
```

9. Add the user Juliet.



```
user@user-VirtualBox:~$ sudo useradd juliet
[sudo] password for user:
user@user-VirtualBox:~$ cat /etc/passwd
root:x:0:0:root:/root:/bin/bash
daemon:x:1:1:daemon:/usr/sbin/nologin
bin:x:2:2:bin:/bin:/usr/sbin/nologin
sys:x:3:3:sys:/dev:/usr/sbin/nologin
sync:x:4:65534:sync:/bin:/bin/sync
games:x:5:60:games:/usr/games:/usr/sbin/nologin
man:x:6:12:man:/var/cache/man:/usr/sbin/nologin
lp:x:7:1lp:/var/spool/lpd:/usr/sbin/nologin
...
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
colorl:x:121:126:colorl colour management daemon,,,:/var/lib/colorl:/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
user:x:1000:1000:User,,,:/home/user:/bin/bash
systemd-coredump:x:999:999:systemd Core Dumper:/:/usr/sbin/nologin
juliet:x:1001:1001::/home/juliet:/bin/sh
user@user-VirtualBox:~$ cat /etc/passwd
```

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



```
user@user-VirtualBox:~$ cat /etc/passwd
root:x:0:0:root:/root:/bin/bash
daemon:x:1:1:daemon:/usr/sbin/nologin
bin:x:2:2:bin:/bin:/usr/sbin/nologin
sys:x:3:3:sys:/dev:/usr/sbin/nologin
sync:x:4:65534:sync:/bin:/bin/sync
games:x:5:60:games:/usr/games:/usr/sbin/nologin
man:x:6:12:man:/var/cache/man:/usr/sbin/nologin
lp:x:7:1lp:/var/spool/lpd:/usr/sbin/nologin
...
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
colorl:x:121:126:colorl colour management daemon,,,:/var/lib/colorl:/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
user:x:1000:1000:User,,,:/home/user:/bin/bash
systemd-coredump:x:999:999:systemd Core Dumper:/:/usr/sbin/nologin
juliet:x:1001:1001::/home/juliet:/bin/sh
user@user-VirtualBox:~$ cat /etc/passwd
```

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



```
user@user-VirtualBox:~$ sudo passwd -S juliet
juliet L 08/17/2021 0 99999 7 -1
user@user-VirtualBox:~$ sudo passwd juliet
New password:
Retype new password:
passwd: password updated successfully
user@user-VirtualBox:~$
```

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



```
user@user-VirtualBox:~$ sudo groupadd -g 30000 shakespeare
user@user-VirtualBox:~$ cat /etc/group
root:x:0:
daemon:x:1:
bin:x:2:
sys:x:3:
adm:x:4:syslog,user
tty:x:5:syslog
user:x:6:
```

13. Create a supplementary group called artists.



```
user@user-VirtualBox:~$ sudo groupadd artists
user@user-VirtualBox:~$ cat /etc/group
root:x:0:
daemon:x:1:
bin:x:2:
sys:x:3:
adm:x:4:syslog,user
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:
```

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



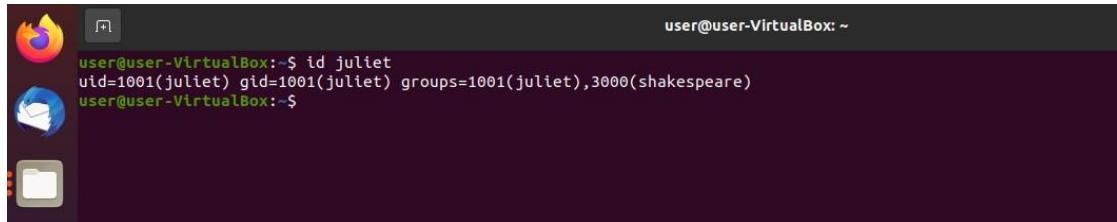
```
user@user-VirtualBox:~$ cat /etc/group
root:x:0:
daemon:x:1:
bin:x:2:
sys:x:3:
adm:x:4:syslog,user
tty:x:5:syslog
disk:x:6:
gdm:x:130:
lxd:x:131:user
user:x:1000:
sambashare:x:132:user
systemd-coredump:x:999:
Shakespeare:x:30000:
juliet:x:1001:
shakespeare:x:3000:
artists:x:30001:
user@user-VirtualBox:~$
```

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



```
user@user-VirtualBox:~$ sudo usermod -a -G shakespeare juliet
user@user-VirtualBox:~$ groups juliet
juliet : juliet shakespeare
user@user-VirtualBox:~$
```

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



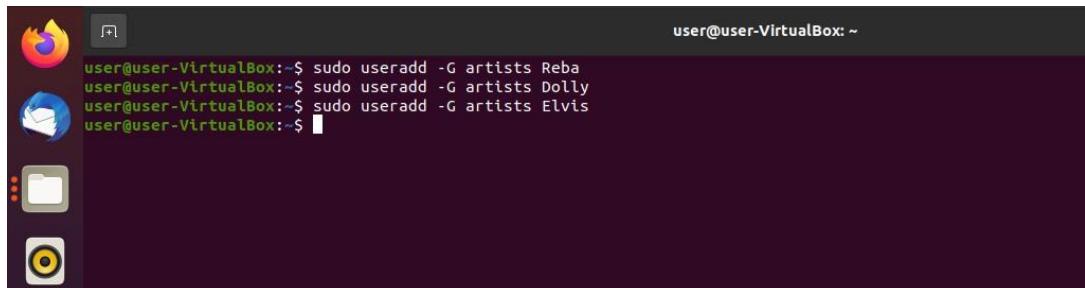
```
user@user-VirtualBox:~$ id juliet
uid=1001(juliet) gid=1001(juliet) groups=1001(juliet),3000(shakespeare)
user@user-VirtualBox:~$
```

17. Add Romeo and Hamlet to the Shakespeare group.



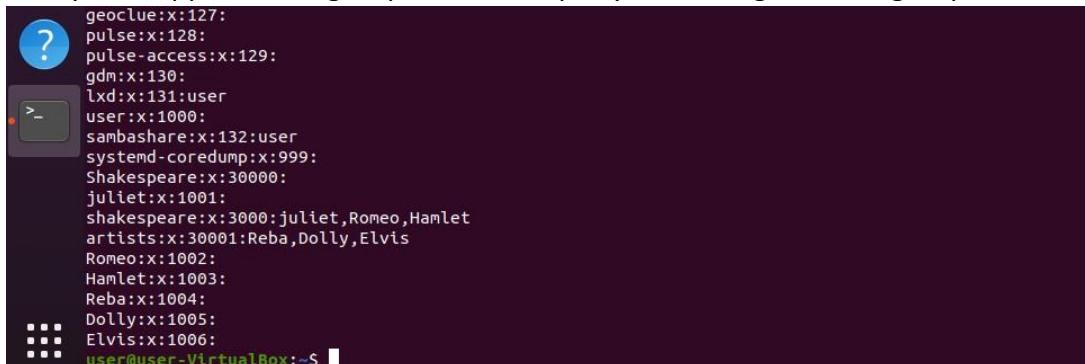
```
user@user-VirtualBox:~$ sudo useradd -G artists Reba
user@user-VirtualBox:~$ sudo useradd -G artists Dolly
user@user-VirtualBox:~$ sudo useradd -G artists Elvis
user@user-VirtualBox:~$
```

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



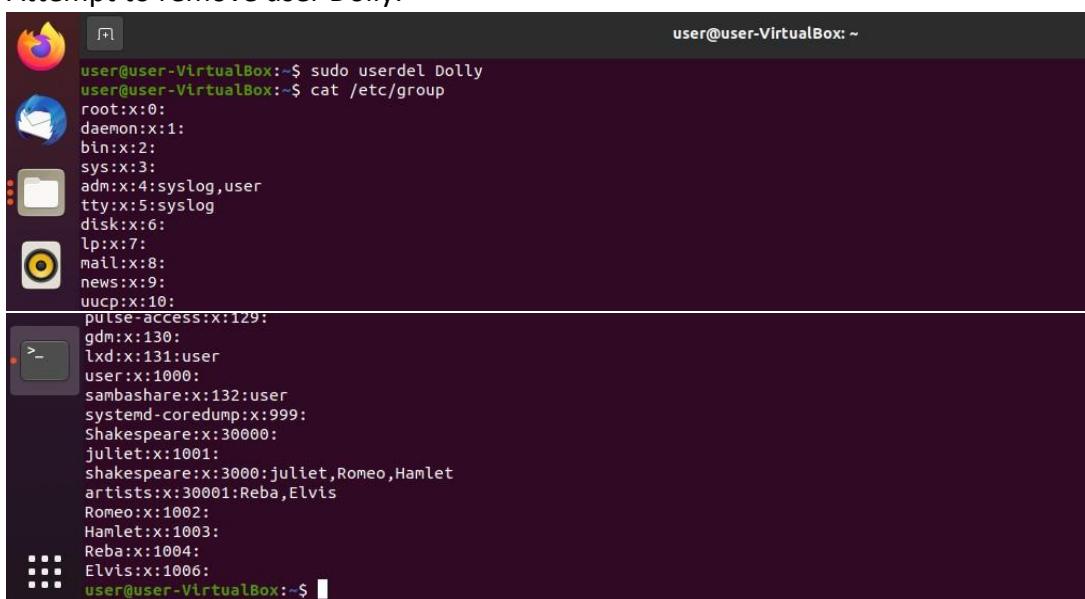
```
user@user-VirtualBox:~$ sudo useradd -G artists Reba
user@user-VirtualBox:~$ sudo useradd -G artists Dolly
user@user-VirtualBox:~$ sudo useradd -G artists Elvis
user@user-VirtualBox:~$
```

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



```
geoclue:x:127:
pulse:x:128:
pulse-access:x:129:
gdm:x::130:
lxde:x:131:user
user:x:1000:
sambashare:x:132:user
systemd-coredump:x:999:
Shakespeare:x:30000:
juliet:x:1001:
shakespeare:x:3000:juliet,Romeo,Hamlet
artists:x:30001:Reba,Dolly,Elvis
Romeo:x:1002:
Hamlet:x:1003:
Reba:x:1004:
Dolly:x:1005:
Elvis:x:1006:
user@user-VirtualBox:~$
```

20. Attempt to remove user Dolly.

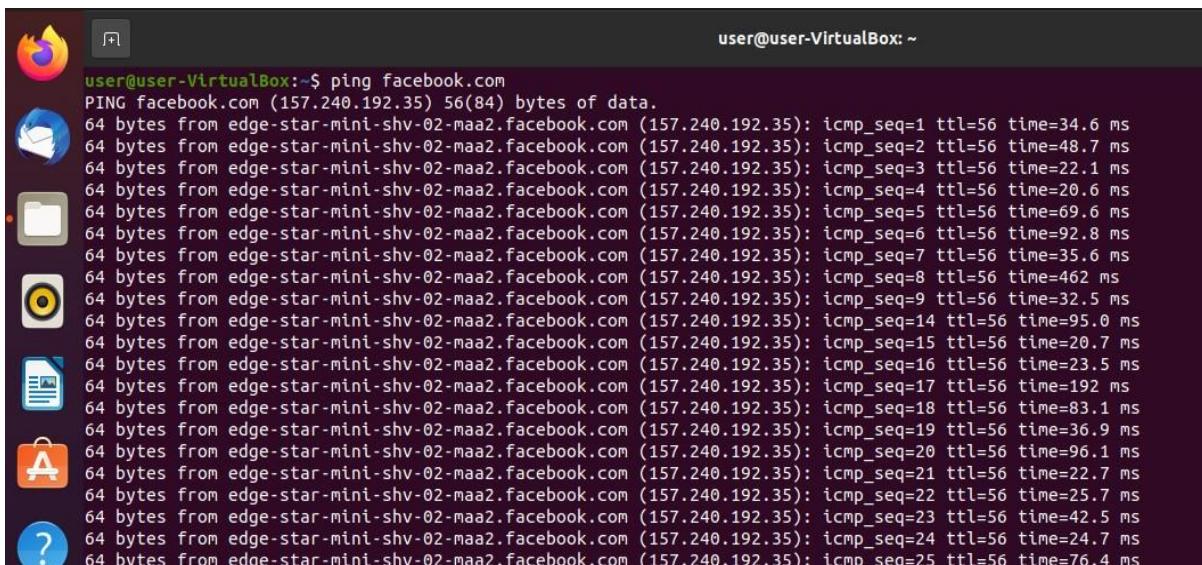


```
user@user-VirtualBox:~$ sudo userdel Dolly
user@user-VirtualBox:~$ cat /etc/group
root:x:0:
daemon:x:1:
bin:x:2:
sys:x:3:
adm:x:4:syslog,user
tty:x:5:syslog
disk:x:6:
lp:x:7:
mail:x:8:
news:x:9:
uucp:x:10:
pulse-access:x:129:
gdm:x:130:
lxde:x:131:user
user:x:1000:
sambashare:x:132:user
systemd-coredump:x:999:
Shakespeare:x:30000:
juliet:x:1001:
shakespeare:x:3000:juliet,Romeo,Hamlet
artists:x:30001:Reba,Elvis
Romeo:x:1002:
Hamlet:x:1003:
Reba:x:1004:
Elvis:x:1006:
user@user-VirtualBox:~$
```

Network Commands

Ping Command

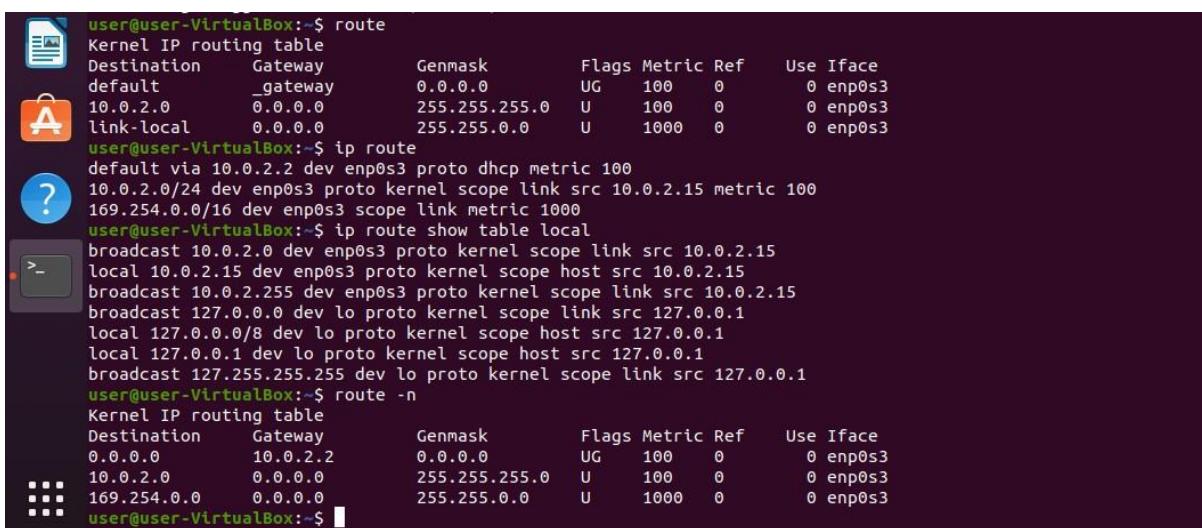
PING (Packet Internet Groper) command is used to check the network connectivity between host and server/host. This command takes as input the IP address or the URL and sends a data packet to the specified address with the message “PING” and get a response from the server/host this time is recorded which is called latency. Fast ping low latency means faster connection.



```
user@user-VirtualBox:~$ ping facebook.com
PING facebook.com (157.240.192.35) 56(84) bytes of data.
64 bytes from edge-star-mini-shv-02-maa2.facebook.com (157.240.192.35): icmp_seq=1 ttl=56 time=34.6 ms
64 bytes from edge-star-mini-shv-02-maa2.facebook.com (157.240.192.35): icmp_seq=2 ttl=56 time=48.7 ms
64 bytes from edge-star-mini-shv-02-maa2.facebook.com (157.240.192.35): icmp_seq=3 ttl=56 time=22.1 ms
64 bytes from edge-star-mini-shv-02-maa2.facebook.com (157.240.192.35): icmp_seq=4 ttl=56 time=20.6 ms
64 bytes from edge-star-mini-shv-02-maa2.facebook.com (157.240.192.35): icmp_seq=5 ttl=56 time=69.6 ms
64 bytes from edge-star-mini-shv-02-maa2.facebook.com (157.240.192.35): icmp_seq=6 ttl=56 time=92.8 ms
64 bytes from edge-star-mini-shv-02-maa2.facebook.com (157.240.192.35): icmp_seq=7 ttl=56 time=35.6 ms
64 bytes from edge-star-mini-shv-02-maa2.facebook.com (157.240.192.35): icmp_seq=8 ttl=56 time=462 ms
64 bytes from edge-star-mini-shv-02-maa2.facebook.com (157.240.192.35): icmp_seq=9 ttl=56 time=32.5 ms
64 bytes from edge-star-mini-shv-02-maa2.facebook.com (157.240.192.35): icmp_seq=14 ttl=56 time=95.0 ms
64 bytes from edge-star-mini-shv-02-maa2.facebook.com (157.240.192.35): icmp_seq=15 ttl=56 time=20.7 ms
64 bytes from edge-star-mini-shv-02-maa2.facebook.com (157.240.192.35): icmp_seq=16 ttl=56 time=23.5 ms
64 bytes from edge-star-mini-shv-02-maa2.facebook.com (157.240.192.35): icmp_seq=17 ttl=56 time=192 ms
64 bytes from edge-star-mini-shv-02-maa2.facebook.com (157.240.192.35): icmp_seq=18 ttl=56 time=83.1 ms
64 bytes from edge-star-mini-shv-02-maa2.facebook.com (157.240.192.35): icmp_seq=19 ttl=56 time=36.9 ms
64 bytes from edge-star-mini-shv-02-maa2.facebook.com (157.240.192.35): icmp_seq=20 ttl=56 time=96.1 ms
64 bytes from edge-star-mini-shv-02-maa2.facebook.com (157.240.192.35): icmp_seq=21 ttl=56 time=22.7 ms
64 bytes from edge-star-mini-shv-02-maa2.facebook.com (157.240.192.35): icmp_seq=22 ttl=56 time=25.7 ms
64 bytes from edge-star-mini-shv-02-maa2.facebook.com (157.240.192.35): icmp_seq=23 ttl=56 time=42.5 ms
64 bytes from edge-star-mini-shv-02-maa2.facebook.com (157.240.192.35): icmp_seq=24 ttl=56 time=24.7 ms
64 bytes from edge-star-mini-shv-02-maa2.facebook.com (157.240.192.35): icmp_seq=25 ttl=56 time=76.4 ms
```

Route command

Route command in Linux is used when you want to work with the IP/kernel routing table. It is mainly used to set up static routes to specific hosts or networks via an interface. It is used for showing or update the IP/kernel routing table.



```
user@user-VirtualBox:~$ route
Kernel IP routing table
Destination     Gateway         Genmask        Flags Metric Ref    Use Iface
default         _gateway       0.0.0.0        UG    100    0        0 enp0s3
10.0.2.0        0.0.0.0        255.255.255.0   U     100    0        0 enp0s3
link-local      0.0.0.0        255.255.0.0    U     1000   0        0 enp0s3
user@user-VirtualBox:~$ ip route
default via 10.0.2.2 dev enp0s3 proto dhcp metric 100
10.0.2.0/24 dev enp0s3 proto kernel scope link src 10.0.2.15 metric 100
169.254.0.0/16 dev enp0s3 scope link metric 1000
user@user-VirtualBox:~$ ip route show table local
broadcast 10.0.2.0 dev enp0s3 proto kernel scope link src 10.0.2.15
local 10.0.2.15 dev enp0s3 proto kernel scope host src 10.0.2.15
broadcast 10.0.2.255 dev enp0s3 proto kernel scope link src 10.0.2.15
broadcast 127.0.0.0 dev lo proto kernel scope link src 127.0.0.1
local 127.0.0.0/8 dev lo proto kernel scope host src 127.0.0.1
local 127.0.0.1 dev lo proto kernel scope host src 127.0.0.1
broadcast 127.255.255.255 dev lo proto kernel scope link src 127.0.0.1
user@user-VirtualBox:~$ route -n
Kernel IP routing table
Destination     Gateway         Genmask        Flags Metric Ref    Use Iface
0.0.0.0         10.0.2.2       0.0.0.0        UG    100    0        0 enp0s3
10.0.2.0        0.0.0.0        255.255.255.0   U     100    0        0 enp0s3
169.254.0.0     0.0.0.0        255.255.0.0    U     1000   0        0 enp0s3
```

Traceroute command

Traceroute command in Linux prints the route that a packet takes to reach the host. This command is useful when you want to know about the route and about all the hops that a packet takes. Below image depicts how traceroute command is used to reach the Google (172.217.26.206) host from the local machine and it also prints detail about all the hops that it visits in between.

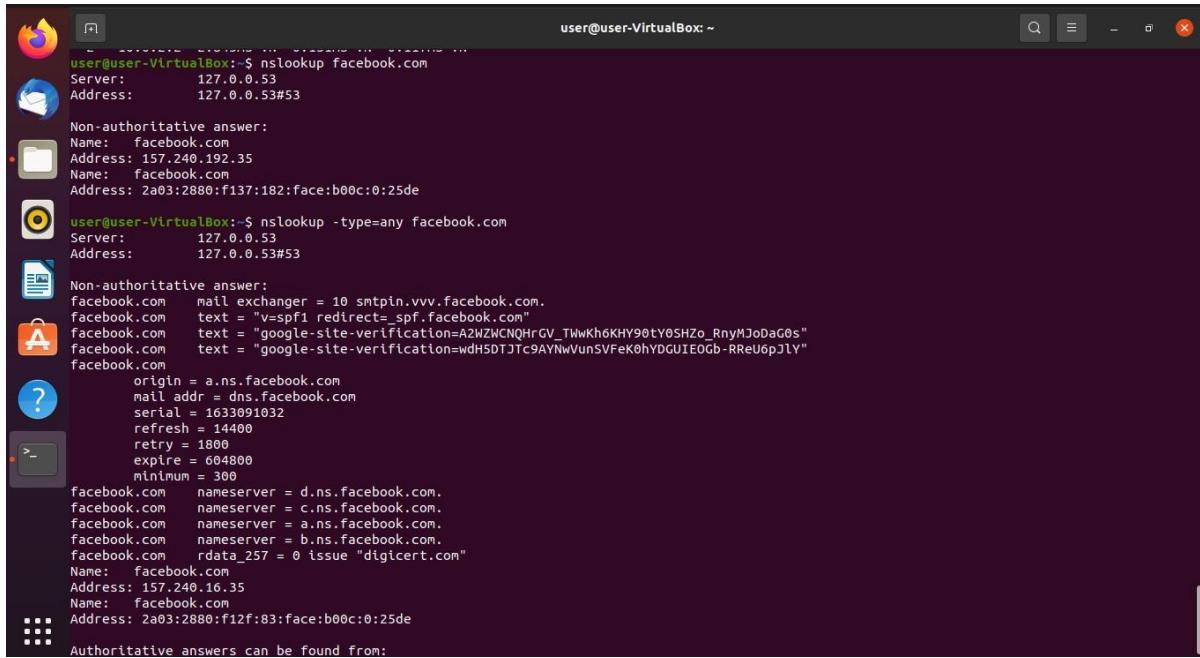
```
Processing triggers for man-db (2.9.1-1) ...
user@user-VirtualBox:~$ traceroute facebook.com
traceroute to facebook.com (31.13.79.35), 64 hops max
 1  10.0.2.2  0.194ms  0.170ms  0.312ms
 2  *  *  *
 3  *  *  *
 4  *  *  *
 5  *  *  *
 6  *  *  *
 7  *
 *
 8  *  *  *
 9  *  *  *
10  *  *  *
11  *  *  *
```

```
user@user-VirtualBox:~$ traceroute -q 1 facebook.com
traceroute to facebook.com (157.240.192.35), 64 hops max
 1  10.0.2.2  0.222ms
 2  *
 3  *
 4  *
 5  *
 6  *
 7  *
 8  *
 9  *
10  *
11  *
12  *
13  *
14  *
15  *
16  *
17  *
18  *
19  *
20  *
21  *
22  *
```

```
29  *
30  *
31  *
32  *
^C
user@user-VirtualBox:~$ traceroute facebook.com 100
traceroute to 100 (0.0.0.100), 64 hops max
 1  10.0.2.2  0.571ms  0.226ms  0.180ms
 2  10.0.2.2  2.845ms !N  0.131ms !N  0.117ms !N
user@user-VirtualBox:~$
```

Nslookup command

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.



```
user@user-VirtualBox:~$ nslookup facebook.com
Server: 127.0.0.53
Address: 127.0.0.53#53

Non-authoritative answer:
Name: facebook.com
Address: 157.240.192.35
Name: facebook.com
Address: 2a03:2880:f137:182:face:b00c:0:25de

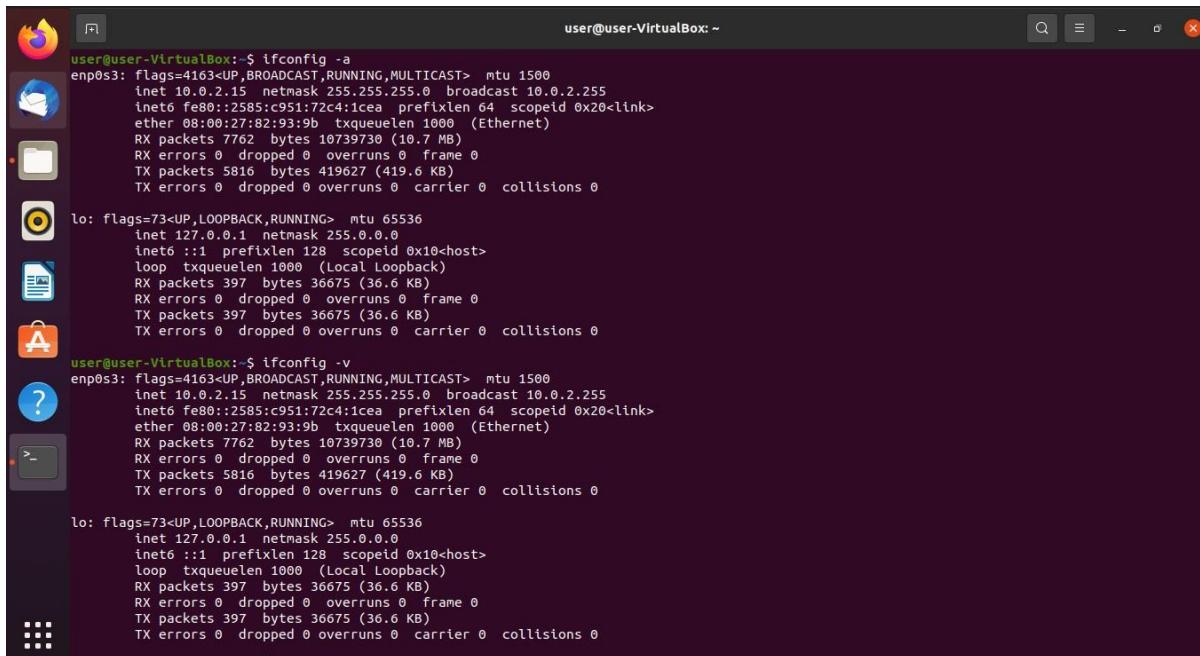
user@user-VirtualBox:~$ nslookup -type=any facebook.com
Server: 127.0.0.53
Address: 127.0.0.53#53

Non-authoritative answer:
facebook.com mail exchanger = 10 smtpin.vvv.facebook.com.
facebook.com text = "v=spf1 redirect=_spf.facebook.com"
facebook.com text = "google-site-verification=A2ZWZWCNQHrGV_TWwKh6KHY90tY0SHZo_RnyMJoDaG0s"
facebook.com text = "google-site-verification=wdH5DTJtc9AYNwVunSVFeK0hYDGUIEOGb-RReU6pJlY"
facebook.com
    origin = a.ns.facebook.com
    mail addr = dns.facebook.com
    serial = 1633091032
    refresh = 14400
    retry = 1800
    expire = 604800
    minimum = 300
facebook.com nameserver = d.ns.facebook.com.
facebook.com nameserver = c.ns.facebook.com.
facebook.com nameserver = a.ns.facebook.com.
facebook.com nameserver = b.ns.facebook.com.
facebook.com rdata_257 = 0 issue "digicert.com"
Name: facebook.com
Address: 157.240.16.35
Name: Facebook.com
Address: 2a03:2880:f12f:83:face:b00c:0:25de

Authoritative answers can be found from:
```

ifconfig(interface configuration) command

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.



```
user@user-VirtualBox:~$ ifconfig -
enp0s3: flags=4163<UP,BROADCAST,RUNNING,MULTICAST> mtu 1500
        inet 10.0.2.15 netmask 255.255.255.0 broadcast 10.0.2.255
        inet6 fe80::2b0:2fffe%enp0s3 brd fe80::ff:feff%enp0s3 mngtmpd on
          ether 08:00:27:82:93:9b txqueuelen 1000 (Ethernet)
            RX packets 7762 bytes 10739730 (10.7 MB)
            RX errors 0 dropped 0 overruns 0 frame 0
            TX packets 5816 bytes 419627 (419.6 KB)
            TX errors 0 dropped 0 overruns 0 carrier 0 collisions 0

lo: flags=73<UP,LOOPBACK,RUNNING> mtu 65536
        inet 127.0.0.1 netmask 255.0.0.0
        inet6 ::1 prefixlen 128 scopeid 0x10<host>
          loop txqueuelen 1000 (Local Loopback)
            RX packets 397 bytes 36675 (36.6 KB)
            RX errors 0 dropped 0 overruns 0 frame 0
            TX packets 397 bytes 36675 (36.6 KB)
            TX errors 0 dropped 0 overruns 0 carrier 0 collisions 0

user@user-VirtualBox:~$ ifconfig -
enp0s3: flags=4163<UP,BROADCAST,RUNNING,MULTICAST> mtu 1500
        inet 10.0.2.15 netmask 255.255.255.0 broadcast 10.0.2.255
        inet6 fe80::2b0:2fffe%enp0s3 brd fe80::ff:feff%enp0s3 mngtmpd on
          ether 08:00:27:82:93:9b txqueuelen 1000 (Ethernet)
            RX packets 7762 bytes 10739730 (10.7 MB)
            RX errors 0 dropped 0 overruns 0 frame 0
            TX packets 5816 bytes 419627 (419.6 KB)
            TX errors 0 dropped 0 overruns 0 carrier 0 collisions 0

lo: flags=73<UP,LOOPBACK,RUNNING> mtu 65536
        inet 127.0.0.1 netmask 255.0.0.0
        inet6 ::1 prefixlen 128 scopeid 0x10<host>
          loop txqueuelen 1000 (Local Loopback)
            RX packets 397 bytes 36675 (36.6 KB)
            RX errors 0 dropped 0 overruns 0 frame 0
            TX packets 397 bytes 36675 (36.6 KB)
            TX errors 0 dropped 0 overruns 0 carrier 0 collisions 0
```

Netstat command

Netstat command displays various network related information such as network connections, routing tables, interface statistics, masquerade connections, multicast memberships etc.

```
user@user-VirtualBox:~$ netstat -at
Active Internet connections (servers and established)
Proto Recv-Q Send-Q Local Address          Foreign Address        State
tcp      0      0 localhost:domain        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 ip6-localhost:ipp       [::]:*
tcp6     0      0 [::]:http              [::]:*
user@user-VirtualBox:~$ netstat -au
Active Internet connections (servers and established)
Proto Recv-Q Send-Q Local Address          Foreign Address        State
udp      0      0 0.0.0.0:631            0.0.0.0:*
udp      0      0 0.0.0.0:33852          0.0.0.0:*
udp      0      0 0.0.0.0:mdns          0.0.0.0:*
udp      0      0 localhost:domain       0.0.0.0:*
udp      0      0 user-VirtualBox:bootpc _gateway:bootps      ESTABLISHED
udp6     0      0 [::]:mdns             [::]:*
udp6     0      0 [::]:38892            [::]:*
user@user-VirtualBox:~$
```

```
user@user-VirtualBox:~$ netstat -a
Active Internet connections (servers and established)
Proto Recv-Q Send-Q Local Address          Foreign Address        State
tcp      0      0 localhost:domain        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 ip6-localhost:ipp       [::]:*
tcp6     0      0 [::]:http              [::]:*
udp      0      0 0.0.0.0:631            0.0.0.0:*
udp      0      0 0.0.0.0:33852          0.0.0.0:*
udp      0      0 0.0.0.0:mdns          0.0.0.0:*
udp      0      0 localhost:domain       0.0.0.0:*
udp      0      0 user-VirtualBox:bootpc _gateway:bootps      ESTABLISHED
udp6     0      0 [::]:mdns             [::]:*
udp6     0      0 [::]:38892            [::]:*
raw6    0      0 [::]:ipv6-icmp         [::]:*                7
Active UNIX domain sockets (servers and established)
Proto RefCnt Flags      Type      State      I-Node  Path
unix    2      [ ACC ]   STREAM   LISTENING  28780   /tmp/.X11-unix/X0
unix    2      [ ]        DGRAM    LISTENING  28471   /run/user/1000/systemd/notify
unix    2      [ ACC ]   STREAM   LISTENING  26905   @/tmp/dbus-HSqvLAJE
unix    2      [ ACC ]   STREAM   LISTENING  28474   /run/user/1000/systemd/private
unix    2      [ ACC ]   STREAM   LISTENING  28483   /run/user/1000/bus
unix    2      [ ACC ]   STREAM   LISTENING  26906   @/tmp/dbus-WabPD7y4
unix    2      [ ACC ]   STREAM   LISTENING  28484   /run/user/1000/gnupg/S.dirmngr
unix    2      [ ACC ]   STREAM   LISTENING  28485   /run/user/1000/gnupg/S.gpg-agent.browser
unix    2      [ ACC ]   STREAM   LISTENING  28486   /run/user/1000/gnupg/S.gpg-agent.extra
unix    2      [ ACC ]   STREAM   LISTENING  28487   /run/user/1000/gnupg/S.gpg-agent.ssh
unix    2      [ ACC ]   STREAM   LISTENING  28488   /run/user/1000/gnupg/S.gpg-agent
unix    2      [ ACC ]   STREAM   LISTENING  28522   /run/user/1000/pk-debconf-socket
unix    2      [ ACC ]   STREAM   LISTENING  28858   /run/mysqld/mysqld.sock
unix    2      [ ACC ]   STREAM   LISTENING  28523   /run/user/1000/pulse/native
unix    2      [ ACC ]   STREAM   LISTENING  28524   /run/user/1000/snapsession-agent.socket
unix    2      [ ACC ]   STREAM   LISTENING  31121   @/tmp/.ICE-unix/1305
unix    2      [ ACC ]   STREAM   LISTENING  28661   /run/user/1000/keyring/control
unix    2      [ ACC ]   STREAM   LISTENING  28779   @/tmp/.X11-unix/X0
unix    2      [ ACC ]   STREAM   LISTENING  30577   /tmp/ssh-edesjpgJ60s4/agent.1183
unix    2      [ ACC ]   STREAM   LISTENING  31122   /tmp/.ICE-unix/1305
```

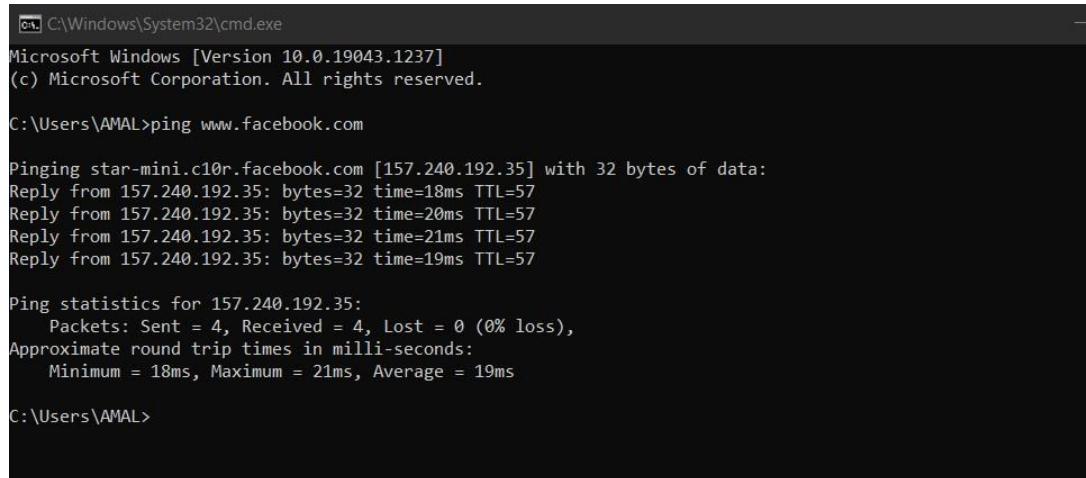
WINDOWS COMMANDS

1. Ping & traceroute tests

Ping and Trace Route tests can help to identify any connection issues between your network and a specified server (or website) address. PING test:

The PING command is used to test the connection and latency between two network connections.

The PING command sends packets of information to a specified IP Address and then measures the time it takes to get a response from the specified computer or device.



```
C:\Windows\System32\cmd.exe
Microsoft Windows [Version 10.0.19043.1237]
(c) Microsoft Corporation. All rights reserved.

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

Pinging star-mini.c10r.facebook.com [157.240.192.35] with 32 bytes of data:
Reply from 157.240.192.35: bytes=32 time=18ms TTL=57
Reply from 157.240.192.35: bytes=32 time=20ms TTL=57
Reply from 157.240.192.35: bytes=32 time=21ms TTL=57
Reply from 157.240.192.35: bytes=32 time=19ms TTL=57

Ping statistics for 157.240.192.35:
    Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
    Approximate round trip times in milli-seconds:
        Minimum = 18ms, Maximum = 21ms, Average = 19ms

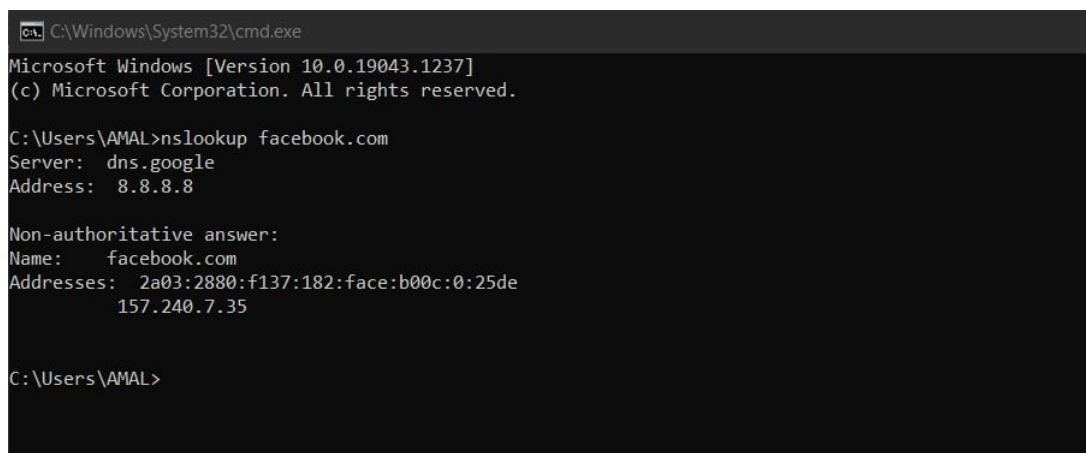
C:\Users\AMAL>
```

Trace Route test:

The TRACERT command is used to conduct a similar test to PING, but instead of displaying the time it takes to connect, it looks at the exact server hops required to connect your computer to the server. You should already have the CMD prompt dialogue box open, after performing the PING test above.

2. Nslookup

Microsoft Windows includes a tool called NSLOOKUP that you can use via the command prompt. This tool can be used to check DNS records propagation and resolution using different servers, and perform other troubleshooting steps.



```
C:\Windows\System32\cmd.exe
Microsoft Windows [Version 10.0.19043.1237]
(c) Microsoft Corporation. All rights reserved.

C:\Users\AMAL>nslookup facebook.com
Server: dns.google
Address: 8.8.8.8

Non-authoritative answer:
Name: facebook.com
Addresses: 2a03:2880:f137:182:face:b00c:0:25de
          157.240.7.35

C:\Users\AMAL>
```

- Type nslookup -q=XX where XX is a type of a DNS record. Some of the available types are MX, A, CNAME, and TXT. The records are then displayed, to exit the tool type exit.

```
C:\Windows\System32\cmd.exe
Microsoft Windows [Version 10.0.19043.1237]
(c) Microsoft Corporation. All rights reserved.

C:\Users\AMAL>nslookup facebook.com
Server: dns.google
Address: 8.8.8.8

Non-authoritative answer:
Name: facebook.com
Addresses: 2a03:2880:f137:182:face:b00c:0:25de
           157.240.7.35

C:\Users\AMAL>nslookup -type=ns facebook.com
Server: dns.google
Address: 8.8.8.8

Non-authoritative answer:
facebook.com nameserver = d.ns.facebook.com
facebook.com nameserver = c.ns.facebook.com
facebook.com nameserver = b.ns.facebook.com
facebook.com nameserver = a.ns.facebook.com

C:\Users\AMAL>
```

- To use nslookup as a troubleshooting tool, you can set the specific type of record to lookup for a domain by using the -type=record_type where record_type is A, CNAME, MX, PTR, NS, ANY. Type nslookup -type=ns domain_name where domain_name is the domain for your query and hit Enter. Now the tool will display the name servers for the domain you specified.

3. Netstat

On Windows 10, netstat (network statistics) has been around for a long time, and it's a command-line tool that you can use in Command prompt to display statistics for all network connections. It allows you to understand open and connected ports to monitor and troubleshoot networking problems for system or applications.

```
C:\Windows\System32\cmd.exe - netstat

C:\Users\AMAL>nslookup -type=ns facebook.com
Server: dns.google
Address: 8.8.8.8

Non-authoritative answer:
facebook.com nameserver = d.ns.facebook.com
facebook.com nameserver = c.ns.facebook.com
facebook.com nameserver = b.ns.facebook.com
facebook.com nameserver = a.ns.facebook.com

C:\Users\AMAL>netstat

Active Connections

  Proto  Local Address          Foreign Address        State
  TCP    127.0.0.1:52246        LAPTOP-5GEAB7TG:64542  ESTABLISHED
  TCP    127.0.0.1:64536        LAPTOP-5GEAB7TG:65001  ESTABLISHED
  TCP    127.0.0.1:64542        LAPTOP-5GEAB7TG:52246  ESTABLISHED
  TCP    127.0.0.1:65001        LAPTOP-5GEAB7TG:64536  ESTABLISHED
  TCP    192.168.48.115:49653   13.68.168.63:https   ESTABLISHED
  TCP    192.168.48.115:53182   20.197.71.89:https  FIN_WAIT_1
  TCP    192.168.48.115:55103   11140-26803:751      ESTABLISHED
```

- **netstat -n:**

Command to display active connections showing numeric IP address and port number instead of trying to determine the names.

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

Active Connections

Proto Local Address          Foreign Address        State
TCP   127.0.0.1:52246        127.0.0.1:64542      ESTABLISHED
TCP   127.0.0.1:64536        127.0.0.1:65001      ESTABLISHED
TCP   127.0.0.1:64542        127.0.0.1:52246      ESTABLISHED
TCP   127.0.0.1:65001        127.0.0.1:64536      ESTABLISHED
TCP   192.168.48.115:49653    13.68.168.63:443    ESTABLISHED
TCP   192.168.48.115:55103    185.25.50.237:751   ESTABLISHED
TCP   192.168.48.115:55104    13.88.181.35:443    ESTABLISHED
TCP   192.168.48.115:55116    20.198.162.78:443   ESTABLISHED
TCP   192.168.48.115:55118    20.44.229.112:443   TIME_WAIT
TCP   192.168.48.115:55121    20.44.229.112:443   ESTABLISHED
TCP   192.168.48.115:55122    104.85.155.36:80     TIME_WAIT
TCP   192.168.48.115:55123    49.44.194.58:80     TIME_WAIT
TCP   192.168.48.115:55124    52.109.124.51:443   ESTABLISHED
TCP   192.168.48.115:58096    52.98.63.34:443    ESTABLISHED
```

C:\Users\AMAL>

- **netstat -n:**

INTERVAL In the command, make sure to replace INTERVAL for the number (in seconds) you want to redisplay the information.

- **netstat -n:**

Command to display active connections showing numeric IP address and port number instead of trying to determine the names. netstat -n INTERVAL In the command, make sure to replace INTERVAL for the number (in seconds) you want to redisplay the information.

```
C:\Windows\System32\cmd.exe

TCP   192.168.48.115:55124    52.109.124.51:443   ESTABLISHED
TCP   192.168.48.115:58096    52.98.63.34:443    ESTABLISHED

C:\Users\AMAL>netstat -n 5

Active Connections

Proto Local Address          Foreign Address        State
TCP   127.0.0.1:52246        127.0.0.1:64542      ESTABLISHED
TCP   127.0.0.1:64536        127.0.0.1:65001      ESTABLISHED
TCP   127.0.0.1:64542        127.0.0.1:52246      ESTABLISHED
TCP   127.0.0.1:65001        127.0.0.1:64536      ESTABLISHED
TCP   192.168.48.115:49653    13.68.168.63:443    ESTABLISHED
TCP   192.168.48.115:55103    185.25.50.237:751   ESTABLISHED
TCP   192.168.48.115:55104    13.88.181.35:443    ESTABLISHED
TCP   192.168.48.115:55116    20.198.162.78:443   ESTABLISHED
TCP   192.168.48.115:55121    20.44.229.112:443   TIME_WAIT
TCP   192.168.48.115:55122    104.85.155.36:80     TIME_WAIT
TCP   192.168.48.115:55123    49.44.194.58:80     TIME_WAIT
TCP   192.168.48.115:58096    52.98.63.34:443    ESTABLISHED

Active Connections

Proto Local Address          Foreign Address        State
TCP   127.0.0.1:52246        127.0.0.1:64542      ESTABLISHED
TCP   127.0.0.1:64536        127.0.0.1:65001      ESTABLISHED
TCP   127.0.0.1:64542        127.0.0.1:52246      ESTABLISHED
TCP   127.0.0.1:65001        127.0.0.1:64536      ESTABLISHED
TCP   192.168.48.115:49653    13.68.168.63:443    ESTABLISHED
TCP   192.168.48.115:55103    185.25.50.237:751   ESTABLISHED
```

- **netstat -b**

The netstat -b command lists all the executables (applications) associated with each connection. Sometimes, applications may open multiple connections.

- **netstat -e**

The netstat -e command generates a statistic of the network interface, which shows information like the number of bytes, unicast and non-unicast sent and received packets. You can also see discarded packets and errors and unknown protocols, which can help you troubleshoot networking problems.

```
C:\Windows\System32\cmd.exe
TCP    127.0.0.1:65001      127.0.0.1:64536      ESTABLISHED
TCP    192.168.48.115:49653  13.68.168.63:443      ESTABLISHED
TCP    192.168.48.115:55103  185.25.50.237:751      ESTABLISHED
TCP    192.168.48.115:55116  20.198.162.78:443      ESTABLISHED
TCP    192.168.48.115:55121  20.44.229.112:443      TIME_WAIT
TCP    192.168.48.115:55122  104.85.155.36:80       TIME_WAIT
TCP    192.168.48.115:55123  49.44.194.58:80       TIME_WAIT
TCP    192.168.48.115:58096  52.98.63.34:443      ESTABLISHED
^C
C:\Users\AMAL>netstat -b
The requested operation requires elevation.

C:\Users\AMAL>netstat -e
Interface Statistics

                    Received          Sent
Bytes            550926286      350735168
Unicast packets   1216795        666709
Non-unicast packets  2574          7792
Discards          0              0
Errors            0              0
Unknown protocols 0              0

C:\Users\AMAL>
```

4. ipconfig

Displays all current TCP/IP network configuration values and refreshes Dynamic Host Configuration Protocol (DHCP) and Domain Name System (DNS) settings. Used without parameters, ipconfig displays Internet Protocol version 4 (IPv4) and IPv6 addresses, subnet mask, and default gateway for all adapters.

```
C:\Windows\System32\cmd.exe
TCP    192.168.48.115:55116  20.198.162.78:https  ESTABLISHED
^C
C:\Users\AMAL>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::6ccc:e1ce:b996:7871%10
    IPv4 Address. . . . . : 192.168.56.1
    Subnet Mask . . . . . : 255.255.255.0
    Default Gateway . . . . . : 

Wireless LAN adapter Local Area Connection* 1:

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

Wireless LAN adapter Local Area Connection* 2:

    Connection-specific DNS Suffix . . . . . :
    Link-local IPv6 Address . . . . . : fe80::7485:728a:fdde:4ae0%17
```

- **/all:**

Displays the full TCP/IP configuration for all adapters. Adapters can represent physical interfaces, such as installed network adapters, or logical interfaces, such as dial-up connections.

```
C:\Windows\System32\cmd.exe
^C
C:\Users\AMAL>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::6ccc:e1ce:b996:7871%10
    IPv4 Address. . . . . : 192.168.56.1
    Subnet Mask . . . . . : 255.255.255.0
    Default Gateway . . . . . : 

Wireless LAN adapter Local Area Connection* 1:

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

Wireless LAN adapter Local Area Connection* 2:

    Connection-specific DNS Suffix . . . . . :
    Link-local IPv6 Address . . . . . : fe80::7485:728a:fdde:4ae0%17
    IPv4 Address. . . . . : 192.168.137.1
    Subnet Mask . . . . . : 255.255.255.0
```

- **/registerdns:**

Initiates manual dynamic registration for the DNS names and IP addresses that are configured at a computer. You can use this parameter to troubleshoot a failed DNS name registration or resolve a dynamic update problem between a client and the DNS server without rebooting the client computer. The DNS settings in the advanced properties of the TCP/IP protocol determine which names are registered in DNS.

- **/displaydns:**

Displays the contents of the DNS client resolver cache, which includes both entries preloaded from the local Hosts file and any recently obtained resource records for name queries resolved by the computer. The DNS Client service uses this information to resolve frequently queried names quickly, before querying its configured DNS servers.

```
C:\Windows\System32\cmd.exe
C:\Users\AMAL>ipconfig /displaydns

Windows IP Configuration

203.137.168.192.in-addr.arpa
-----
Record Name . . . . . : 203.137.168.192.in-addr.arpa.
Record Type . . . . . : 12
Time To Live . . . . . : 3243
Data Length . . . . . : 8
Section . . . . . . . : Answer
PTR Record . . . . . : LAPTOP-OF9SBL90.mshome.net

ucmetrixa.info
-----
Record Name . . . . . : ucmetrixa.info
Record Type . . . . . : 1
Time To Live . . . . . : 1176
Data Length . . . . . : 4
Section . . . . . . . : Answer
A (Host) Record . . . . : 194.180.158.55

ucmetrixb.info
-----
Record Name . . . . . : ucmetrixb.info
Record Type . . . . . : 1
Time To Live . . . . . : 754
```

- **/flushdns:**

Flushes and resets the contents of the DNS client resolver cache. During DNS troubleshooting, you can use this procedure to discard negative cache entries from the cache, as well as any other entries that have been added dynamically.

```
C:\Windows\System32\cmd.exe

C:\Users\AMAL>ipconfig /flushdns

Windows IP Configuration

Successfully flushed the DNS Resolver Cache.

C:\Users\AMAL>
```

Other Networking Commands

1. Hostname Command

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

2. getmac Command

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

3. arp Command

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.

4. Nbtstat

Diagnostic tool for troubleshooting NetBIOS problems. 5. Net Command Used for managing users, service, shares etc.

5. Net Command

Used for managing users, service, shares etc.

```
C:\Windows\System32\cmd.exe

C:\Users\AMAL>hostname
LAPTOP-5GEAB7TG

C:\Users\AMAL>getmac

Physical Address      Transport Name
===== =====
08-97-98-BD-91-D0    Media disconnected
62-47-E7-44-3B-99    \Device\Tcpip_{05C2EF50-39C6-4AE2-B9CA-75248A053EFA}
CA-E2-65-9E-66-D7    \Device\Tcpip_{C34D272F-3434-400A-A959-A603B0A9E2B1}
0A-00-27-00-00-0A    \Device\Tcpip_{8645ADE5-D08B-4462-91DB-4F473BC63589}

C:\Users\AMAL>arp

Displays and modifies the IP-to-Physical address translation tables used by
address resolution protocol (ARP).

ARP -s inet_addr eth_addr [if_addr]
ARP -d inet_addr [if_addr]
ARP -a [inet_addr] [-N if_addr] [-v]

-a          Displays current ARP entries by interrogating the current
           protocol data. If inet_addr is specified, the IP and Physical
           addresses for only the specified computer are displayed. If
           more than one network interface uses ARP, entries for each ARP
           table are displayed.
-g          Same as -a.
-v          Displays current ARP entries in verbose mode. All invalid
           entries and entries on the loop-back interface will be shown.
```

LAMP installation

Apache Installation

Steps

1. Update your system

Update the system using command **sudo apt update**

2. Install Apache using apt:

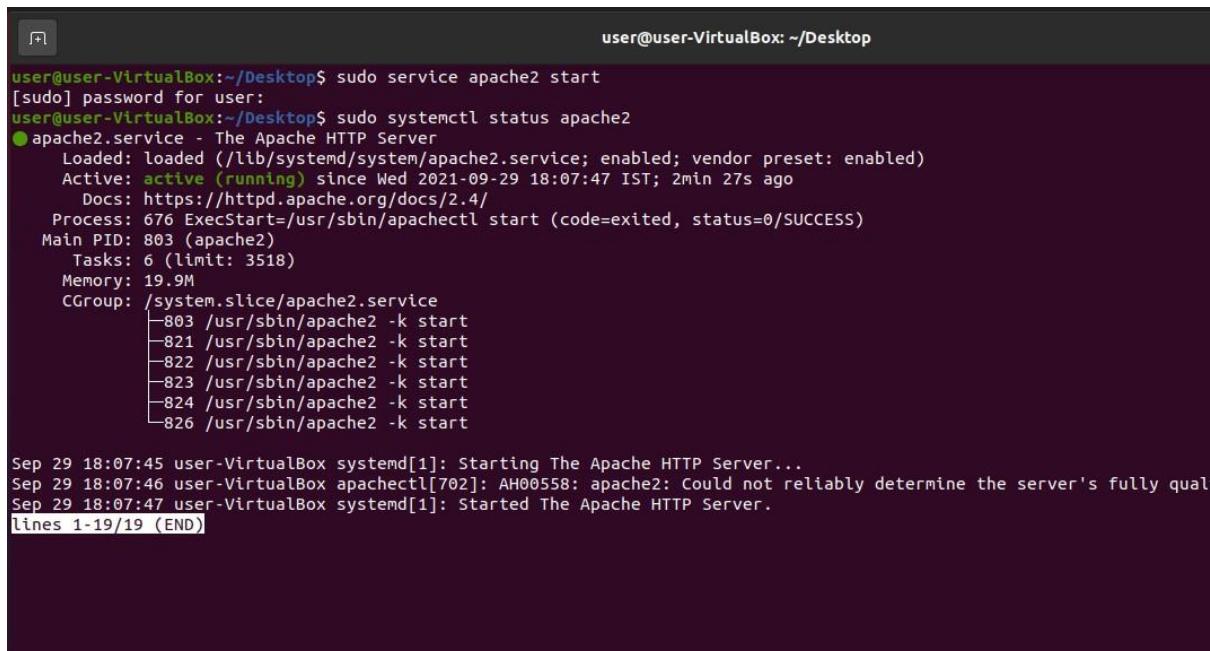
Install apache using the command **sudo apt install apache2**

3. Start apache

Using the command **sudo service apache2 start**

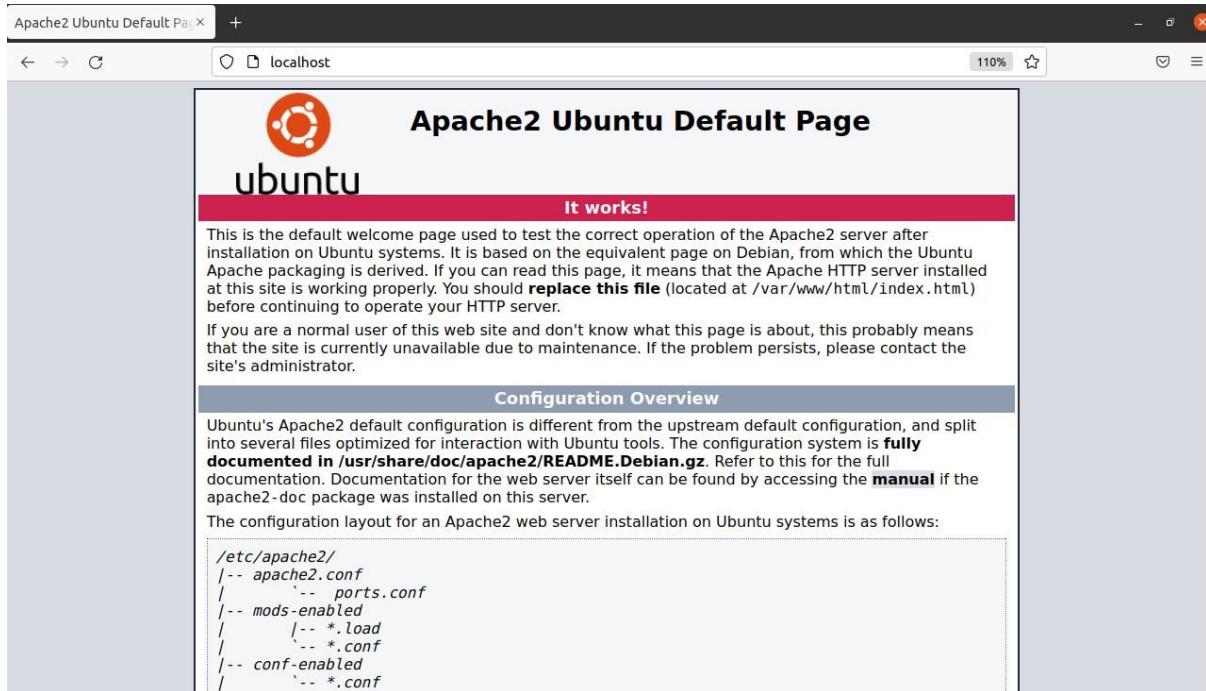
4. Confirm that Apache is now running with the following command:

Check the status of apache **sudo systemctl status apache2**



```
user@user-VirtualBox:~/Desktop$ sudo service apache2 start
[sudo] password for user:
user@user-VirtualBox:~/Desktop$ sudo systemctl status apache2
● apache2.service - The Apache HTTP Server
   Loaded: loaded (/lib/systemd/system/apache2.service; enabled; vendor preset: enabled)
   Active: active (running) since Wed 2021-09-29 18:07:47 IST; 2min 27s ago
     Docs: https://httpd.apache.org/docs/2.4/
   Process: 676 ExecStart=/usr/sbin/apachectl start (code=exited, status=0/SUCCESS)
 Main PID: 803 (apache2)
    Tasks: 6 (limit: 3518)
   Memory: 19.9M
      CPU: 0.000 CPU(s) used
      CGroup: /system.slice/apache2.service
              └─803 /usr/sbin/apache2 -k start
                  ├─821 /usr/sbin/apache2 -k start
                  ├─822 /usr/sbin/apache2 -k start
                  ├─823 /usr/sbin/apache2 -k start
                  ├─824 /usr/sbin/apache2 -k start
                  ├─826 /usr/sbin/apache2 -k start

Sep 29 18:07:45 user-VirtualBox systemd[1]: Starting The Apache HTTP Server...
Sep 29 18:07:46 user-VirtualBox apachectl[702]: AH00558: apache2: Could not reliably determine the server's fully qual-
Sep 29 18:07:47 user-VirtualBox systemd[1]: Started The Apache HTTP Server.
lines 1-19/19 (END)
```



Maria dB Installation Steps

1. Install Maria dB using the command **sudo apt install mariadb-server mariadb-client**
2. Check the status of the Maria dB using **sudo systemctl status mysql**

```
user@user-VirtualBox:~/Desktop$ sudo systemctl start mysql
user@user-VirtualBox:~/Desktop$ sudo systemctl status mysql
● mariadb.service - MariaDB 10.3.31 database server
   Loaded: loaded (/lib/systemd/system/mariadb.service; enabled; vendor preset: enabled)
   Active: active (running) since Wed 2021-09-29 18:07:49 IST; 4min 30s ago
     Docs: man:mysqld(8)
           https://mariadb.com/kb/en/library/systemd/
  Process: 679 ExecStartPre=/usr/bin/install -m 755 -o mysql -g root -d /var/run/mysql (code=exited, status=0/SUCCESS)
  Process: 708 ExecStartPre=/bin/sh -c systemctl unset-environment _WSREP_START_POSITION (code=exited, status=0/SUCCESS)
  Process: 714 ExecStartPre=/bin/sh -c [ ! -e /usr/bin/galera_recovery ] && VAR= || VAR= cd /usr/bin/..; /usr/bin/galera_recovery` ; [ $? -eq 0 ]
  Process: 978 ExecStartPost=/bin/sh -c systemctl unset-environment _WSREP_START_POSITION (code=exited, status=0/SUCCESS)
  Process: 1000 ExecStartPost=/etc/mysql/debian-start (code=exited, status=0/SUCCESS)
 Main PID: 801 (mysqld)
   Status: "Taking your SQL requests now..."
    Tasks: 31 (limit: 3518)
   Memory: 97.1M
      CGroup: /system.slice/mariadb.service
              └─801 /usr/sbin/mysqld

Sep 29 18:07:47 user-VirtualBox mysqld[801]: 2021-09-29 18:07:47 [Note] /usr/sbin/mysqld (mysqld 10.3.31-MariaDB-0ubuntu0.20.04.1) starting...
Sep 29 18:07:49 user-VirtualBox systemd[1]: Started MariaDB 10.3.31 database server.
Sep 29 18:07:49 user-VirtualBox /etc/mysql/debian-start[1013]: Upgrading MySQL tables if necessary.
Sep 29 18:07:49 user-VirtualBox /etc/mysql/debian-start[1017]: Looking for 'mysql' as: /usr/bin/mysql
Sep 29 18:07:49 user-VirtualBox /etc/mysql/debian-start[1017]: Looking for 'mysqlcheck' as: /usr/bin/mysqlcheck
Sep 29 18:07:49 user-VirtualBox /etc/mysql/debian-start[1017]: Version check failed. Got the following error when calling the 'mysql' command:
Sep 29 18:07:49 user-VirtualBox /etc/mysql/debian-start[1017]: ERROR 1045 (28000): Access denied for user 'root'@'localhost' (using password: NO)
Sep 29 18:07:49 user-VirtualBox /etc/mysql/debian-start[1017]: FATAL ERROR: Upgrade failed
Sep 29 18:07:49 user-VirtualBox /etc/mysql/debian-start[1050]: Checking for insecure root accounts.
Sep 29 18:07:49 user-VirtualBox debian-start[1054]: ERROR 1045 (28000): Access denied for user 'root'@'localhost' (using password: NO)
[Lines 1-27/27 (END)]
```

Installing PHP and commonly used modules

1. Install php using **sudo apt install php libapache2-mod-php php-ocpache php-cli php-gd php-curl php-mysql**
2. Restart apache2 using the command **sudo systemctl restart apache2**
3. Check the php installation by using **localhost/phpinfo.php**

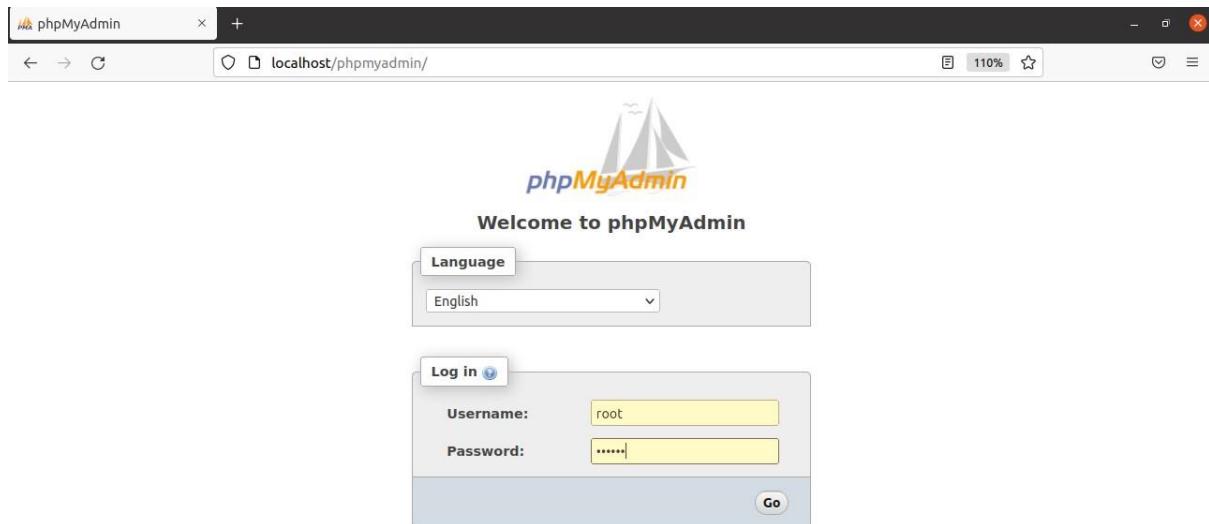
The screenshot shows a web browser window with the title "PHP 8.0.11 - phpinfo()". The URL in the address bar is "localhost/phpinfo.php". The page content is titled "PHP Version 8.0.11" and features the PHP logo. It contains a table with the following data:

System	Linux user-VirtualBox 5.11.0-37-generic #41~20.04.2-Ubuntu SMP Fri Sep 24 09:06:38 UTC 2021 x86_64
Build Date	Sep 23 2021 21:26:24
Build System	Linux
Server API	Apache 2.0 Handler
Virtual Directory Support	disabled
Configuration File (php.ini) Path	/etc/php/8.0/apache2
Loaded Configuration File	/etc/php/8.0/apache2/php.ini
Scan this dir for additional .ini files	/etc/php/8.0/apache2/conf.d
Additional .ini files parsed	/etc/php/8.0/apache2/conf.d/10-mysqlind.ini, /etc/php/8.0/apache2/conf.d/10-opcache.ini, /etc/php/8.0/apache2/conf.d/10-pdo.ini, /etc/php/8.0/apache2/conf.d/15-xml.ini, /etc/php/8.0/apache2/conf.d/20-bz2.ini, /etc/php/8.0/apache2/conf.d/20-calendar.ini, /etc/php/8.0/apache2/conf.d/20-ctype.ini, /etc/php/8.0/apache2/conf.d/20-curl.ini, /etc/php/8.0/apache2/conf.d/20-dom.ini, /etc/php/8.0/apache2/conf.d/20-exif.ini, /etc/php/8.0/apache2/conf.d/20-ffi.ini, /etc/php/8.0/apache2/conf.d/20-fileinfo.ini, /etc/php/8.0/apache2/conf.d/20-ftp.ini, /etc/php/8.0/apache2/conf.d/20-gd.ini, /etc/php/8.0/apache2/conf.d/20-mbstring.ini, /etc/php/8.0/apache2/conf.d/20-gettext.ini, /etc/php/8.0/apache2/conf.d/20-iconv.ini, /etc/php/8.0/apache2/conf.d/20-phar.ini, /etc/php/8.0/apache2/conf.d/20-mcrypt.ini, /etc/php/8.0/apache2/conf.d/20-phar.ini, /etc/php/8.0/apache2/conf.d/20-pdo_mysql.ini, /etc/php/8.0/apache2/conf.d/20-posix.ini, /etc/php/8.0/apache2/conf.d/20-readline.ini, /etc/php/8.0/apache2/conf.d/20-shmop.ini, /etc/php/8.0/apache2/conf.d/20-simplexml.ini, /etc/php/8.0/apache2/conf.d/20-sockets.ini, /etc/php/8.0/apache2/conf.d/20-sysvmsg.ini, /etc/php/8.0/apache2/conf.d/20-sysvsem.ini, /etc/php/8.0/apache2/conf.d/20-sysvshm.ini, /etc/php/8.0/apache2/conf.d/20-tokenizer.ini, /etc/php/8.0/apache2/conf.d/20-xmlreader.ini, /etc/php/8.0/apache2/conf.d/20-xmlwriter.ini, /etc/php/8.0/apache2/conf.d/20-xsl.ini, /etc/php/8.0/apache2/conf.d/20-zip.ini
PHP API	20200930

```
user@user-VirtualBox:~/Desktop$ php -version
PHP 8.0.11 (cli) (built: Sep 23 2021 21:26:24) ( NTS )
Copyright (c) The PHP Group
Zend Engine v4.0.11, Copyright (c) Zend Technologies
    with Zend OPcache v8.0.11, Copyright (c), by Zend Technologies
user@user-VirtualBox:~/Desktop$
```

Installing phpmyadmin

1. Install phpmyadmin using **sudo apt install phpmyadmin php-mbstring php-zip phpgd php-json php-curl**
2. Restart apache2 **sudo systemctl restart apache2**
3. Check phpmyadmin by opening a browser and typing <http://localhost/phpmyadmin>

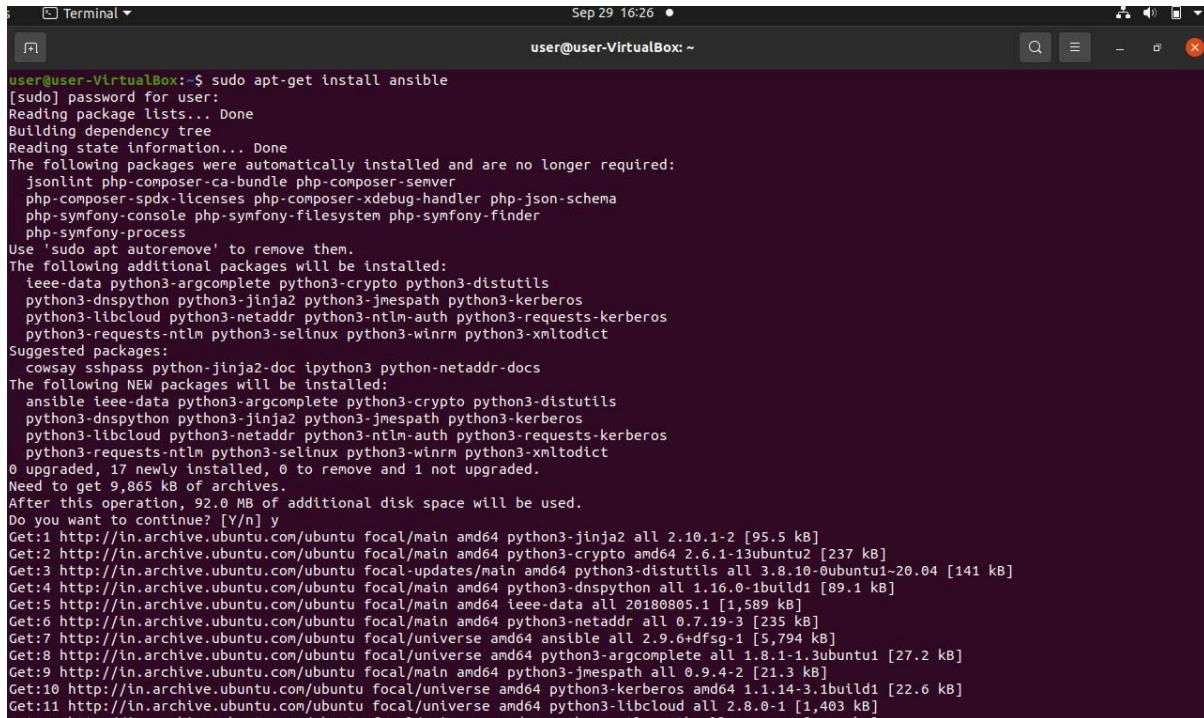


This screenshot shows the main configuration page of phpMyAdmin. On the left, a sidebar lists databases: "New", "information_schema", "mysql", "performance_schema", and "phpmyadmin". The main area has several sections: "General settings" (Change password, Server connection collation set to "utf8mb4_unicode_ci"), "Appearance settings" (Language set to English, Theme set to "pmahomme", Font size set to 82%), and "Database server" (details about the MariaDB server). Other sections include "Web server" (Apache 2.4.41, PHP 8.0.11) and "phpMyAdmin" (version 4.9.5deb2).

ANSIBLE INSTALLATION

Step 1:

Install Ansible using **sudo apt-get install ansible**



```
Sep 29 16:26 ● user@user-VirtualBox: ~
user@user-VirtualBox:~$ sudo apt-get install ansible
[sudo] password for user:
Reading package lists... Done
Building dependency tree
Reading state information... Done
The following packages were automatically installed and are no longer required:
  jsonlint php-composer-ca-bundle php-composer-server
  php-composer-splx-licenses php-composer-xdebug-handler php-json-schema
  php-symfony-console php-symfony-filesystem php-symfony-finder
  php-symfony-process
Use 'sudo apt autoremove' to remove them.
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 1 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 2.6.1-13ubuntu2 [237 kB]
Get:3 http://in.archive.ubuntu.com/ubuntu focal/main amd64 python3-distutils all 3.8.10-0ubuntu1-20.04 [141 kB]
Get:4 http://in.archive.ubuntu.com/ubuntu focal/main amd64 python3-dnspython all 1.16.0-1build1 [89.1 kB]
Get:5 http://in.archive.ubuntu.com/ubuntu focal/main amd64 ieee-data all 20180805.1 [1,589 kB]
Get:6 http://in.archive.ubuntu.com/ubuntu focal/main amd64 python3-netaddr all 0.7.19-3 [235 kB]
Get:7 http://in.archive.ubuntu.com/ubuntu focal/universe amd64 ansible all 2.9.6+dfsg-1 [5,794 kB]
Get:8 http://in.archive.ubuntu.com/ubuntu focal/universe amd64 python3-argcomplete all 1.8.1-1.3ubuntu1 [27.2 kB]
Get:9 http://in.archive.ubuntu.com/ubuntu focal/main amd64 python3-jmespath all 0.9.4-2 [21.3 kB]
Get:10 http://in.archive.ubuntu.com/ubuntu focal/universe amd64 python3-kerberos amd64 1.1.14-3.1build1 [22.6 kB]
Get:11 http://in.archive.ubuntu.com/ubuntu focal/universe amd64 python3-libcloud all 2.8.0-1 [1,403 kB]
```

Step 2:

Check ansible version using **ansible --version**



```
Setting up python3-requests-kerberos (0.12.0-2) ...
Setting up ieee-data (20180805.1) ...
Setting up python3-dnspython (1.16.0-1build1) ...
Setting up python3-selinux (3.0-1build2) ...
Setting up python3-crypto (2.6.1-13ubuntu2) ...
Setting up python3-argcomplete (1.8.1-1.3ubuntu1) ...
Setting up python3-requests-ntlm (1.1.0-1) ...
Setting up python3-libcloud (2.8.0-1) ...
Setting up python3-netaddr (0.7.19-3) ...
/usr/lib/python3/dist-packages/netaddr/strategy/__init__.py:189: SyntaxWarning: "is not" with a literal. Did you mean "!="?
  if word_sep is not '':
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) ...
user@user-VirtualBox:~$ ansible --version
ansible 2.9.6
  config file = /etc/ansible/ansible.cfg
  configured module search path = ['/home/user/.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 = 3.8.10 (default, Jun  2 2021, 10:49:15) [GCC 9.4.0]
user@user-VirtualBox:~$
```

Shell Programming

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

```
#!/bin/bash echo "Personal  
Details" echo  
***** echo  
"Enter your name" read name  
echo "Enter your College" read  
college echo "Personal Details"  
echo "Name:$name" echo  
"College:$college"
```

The screenshot shows a terminal window on a Linux desktop environment. The terminal window has a dark background with light-colored text. It displays the following command-line session:

```
user@user-VirtualBox:~/work$ vi personaldetails.sh  
user@user-VirtualBox:~/work$ chmod +x personaldetails.sh  
user@user-VirtualBox:~/work$ ./personaldetails.sh  
Personal Details  
*****  
Enter your name  
Amal Vijayan  
Enter your College  
AmalJyothi College  
Personal Details  
Name:Amal Vijayan  
College:AmalJyothi College  
user@user-VirtualBox:~/work$
```

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

```
#!/bin/bash echo "Variable  
Value" echo  
***** a=10  
echo variable is 'a' echo  
"Value is $a"
```

The screenshot shows a terminal window on a Linux desktop environment. The terminal window has a dark background with light-colored text. It displays the following command-line session:

```
user@user-VirtualBox:~/work$ vi variablevalue.sh  
user@user-VirtualBox:~/work$ chmod +x variablevalue.sh  
user@user-VirtualBox:~/work$ ./variablevalue.sh  
Variable Value  
*****  
variable is a  
Value is 10  
user@user-VirtualBox:~/work$
```

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

```
#!/bin/bash  
echo "Arithmetic Operations"  
echo "....."  
echo "Enter the first number" read a  
echo "Enter the second number" read b  
echo "Select the operation"
```

```

echo "1.Addition 2.Substraction 3.Multiplication 4.Division" read
operation case "$operation" in "1")echo "a+b=$((a+b));;
"2")echo "a-b=$((a-b));;
"3")echo "a*b=$((a*b));;
"4")echo "a/b=$((a/b));;
Esac

```

```

user@user-VirtualBox:~/work$ vi operations.sh
user@user-VirtualBox:~/work$ chmod +x operations.sh
user@user-VirtualBox:~/work$ ./operations.sh
Arithmetic Operations
.....
Enter the first number
10
Enter the second number
2
Select the operation
1.Addition 2.Substraction 3.Multiplication 4.Division
1
>-
a+b=12
user@user-VirtualBox:~/work$ ./operations.sh
Arithmetic Operations
.....
Enter the first number
10
Enter the second number
2
Select the operation
1.Addition 2.Substraction 3.Multiplication 4.Division
4
a/b=5
user@user-VirtualBox:~/work$ 

```

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

```

#!/bin/bash echo "Find a
number"
echo "....."
echo "Enter a number" read a
if [ $a == 10 ]; then
echo "Number found ;)"
else
echo "Number NOT found !" fi

```

```

user@user-VirtualBox:~/work$ vi findnumber.sh
user@user-VirtualBox:~/work$ chmod +x findnumber.sh
user@user-VirtualBox:~/work$ ./findnumber.sh
Find a number
.....
Enter a number
5
Number NOT found !
user@user-VirtualBox:~/work$ ./findnumber.sh
Find a number
.....
Enter a number
10
Number found ;)
user@user-VirtualBox:~/work$ 

```

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

```
#!/bin/bash echo "Time and  
Calendar" echo  
"*****" echo  
"Today is $(date)" echo ""
```

```
user@user-VirtualBox:~/work$ vi date.sh  
user@user-VirtualBox:~/work$ ./date.sh  
Time and Calendar  
*****  
Today is Saturday 02 October 2021 06:35:23 PM IST  
  
user@user-VirtualBox:~/work$ █
```

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

```
#!/bin/bash  
echo "EVEN OR ODD" echo  
"-----" echo "Enter a  
number"  
read n  
x=$((n%2))  
if [ $x -eq 0 ]; then echo "Entered  
number is Even" else  
echo "Entered Number is odd" fi
```

```
user@user-VirtualBox:~/work$ vi oddoreven.sh  
user@user-VirtualBox:~/work$ chmod +x oddoreven.sh  
user@user-VirtualBox:~/work$ ./oddoreven.sh  
EVEN OR ODD  
-----  
Enter a number  
10  
Entered number is Even  
user@user-VirtualBox:~/work$ ./oddoreven.sh  
EVEN OR ODD  
-----  
Enter a number  
9  
Entered Number is odd  
user@user-VirtualBox:~/work$ █
```

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

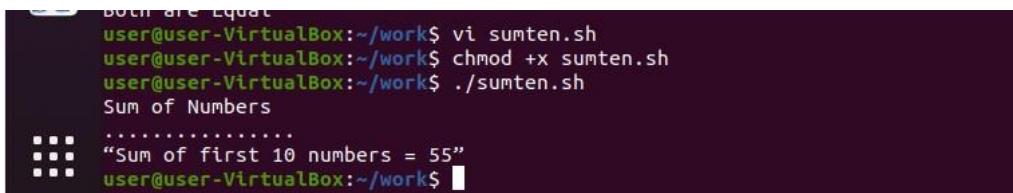
```
#!/bin/bash echo "Comparing numbers" echo  
"*****" echo "Enter the first  
number" read aecho "Enter the second  
number" read b if [ $a -gt $b ]; then echo "$a  
is greater" elif [ $b -gt $a ];then echo "$b is  
greater" else  
echo "Both are Equal" fi
```



```
user@user-VirtualBox:~/work$ vi greaterorless.sh
user@user-VirtualBox:~/work$ chmod +x greaterorless.sh
user@user-VirtualBox:~/work$ ./greaterorless.sh
Comparing numbers
*****
Enter the first number
50
>-
Enter the second number
35
50 is greater
user@user-VirtualBox:~/work$ vi greaterorless.sh
user@user-VirtualBox:~/work$ ./greaterorless.sh
Comparing numbers
*****
Enter the first number
10
Enter the second number
10
Both are Equal
user@user-VirtualBox:~/work$
```

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

```
#!/bin/bash echo "Sum of
Numbers " echo "....."
s=0
for (( i=1;i<=10;i++ ))
do s=`expr $s + $i`
done
echo "Sum of first 10 numbers = $s"
```



```
user@user-VirtualBox:~/work$ vi sumten.sh
user@user-VirtualBox:~/work$ chmod +x sumten.sh
user@user-VirtualBox:~/work$ ./sumten.sh
Sum of Numbers
.....
"Sum of first 10 numbers = 55"
user@user-VirtualBox:~/work$
```

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

```
#!/bin/bash
echo "AVG, SUM & Product of 4 No." echo
"*****" echo
"Please enter the first number: " read a
echo "Second number: " read b
echo "Third number: " read c
echo "Fourth number: " read d sum=$((a + b + c +
$d)) avg=$(echo $sum / 4 | bc -l ) prod=$((a * $b *
$c * $d)) echo "The sum of these numbers is: " $sum
echo "The average of these numbers is: " $avg echo
"The product of these numbers is: " $prod
```

```

user@user-VirtualBox:~/work$ vi average.sh
user@user-VirtualBox:~/work$ chmod +x average.sh
user@user-VirtualBox:~/work$ ./average.sh
AVG, SUM & Product of 4 No.
*****
Please enter the first number:
10
Second number:
20
Third number:
30
Fourth number:
40
The sum of these numbers is: 100
The average of these numbers is: 25.000000000000000000000000000000
The product of these numbers is: 240000
user@user-VirtualBox:~/work$
```

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

```

#!/bin/bash
echo "LARGEST OF THREE" echo
"*****" echo "Enter
first number" read a
echo "Enter second number" read b
echo "Enter third number"
read c if [ $a -gt $b]; then
if [ $a -gt $c]; then echo
"$a is big"else
echo "$c is big"
fi
elif [ $b -gt $c];then echo
"$b is big" else echo "$c
is big" fi
```

```

user@user-VirtualBox:~/work$ vi smallofthree.sh
user@user-VirtualBox:~/work$ vi smallofthree.sh
user@user-VirtualBox:~/work$ chmod +x smallofthree.sh
user@user-VirtualBox:~/work$ ./smallofthree.sh
LARGEST OF THREE
*****
Enter first number
10
Enter second number
20
Enter third number
50
./smallofthree.sh: line 10: [10: command not found
./smallofthree.sh: line 16: [20: command not found
50 is big
user@user-VirtualBox:~/work$ vi smallofthree.sh
user@user-VirtualBox:~/work$
```

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

```

#!/bin/bash echo "Factorial"
echo "===== echo
"Enter a number" read num
fact=1
for((i=2;i<=num;i++))
{
    fact=$((fact * i)) #fact = fact * i
} echo "Factorial is $fact"
```

```
user@user-VirtualBox:~/work$ vi factorial.sh
user@user-VirtualBox:~/work$ chmod +x factorial.sh
user@user-VirtualBox:~/work$ ./factorial.sh
Factorial
=====
Enter a number
5
Factorial is 120
user@user-VirtualBox:~/work$
```

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

```
#!/bin/bash echo "Palindrome or
Not" echo "=====
echo "Enter number to check"
read n rev=$(echo $n | rev)
if [ $n -eq $rev ]; then
echo "Number is Palindrome" else
echo "Number is not Palindrome" fi
```

```
user@user-VirtualBox:~/work$ vi palindrome.sh
user@user-VirtualBox:~/work$ chmod +x palindrome.sh
user@user-VirtualBox:~/work$ ./palindrome.sh
Palindrome or Not
=====
Enter number to check
20
Number is not Palindrome
user@user-VirtualBox:~/work$ ./palindrome.sh
Palindrome or Not
=====
Enter number to check
22
Number is Palindrome
user@user-VirtualBox:~/work$
```

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

```
#!/bin/bash
echo "Average of N numbers"
echo "=====
"Enter Size" read n i=1 sum=0 echo
"Enter Numbers" while [ $i -le $n ]
do read num sum=$((sum +
num))
i=$((i + 1))
done
avg=$(echo $sum / $n | bc -l) echo
$avg
```

```

user@user-VirtualBox:~/work$ vi averges.sh
user@user-VirtualBox:~/work$ chmod +x averges.sh
user@user-VirtualBox:~/work$ ./averges.sh
Average of N numbers
=====
Enter Size
2
Enter Numbers
5
10
7.50000000000000000000000000000000
user@user-VirtualBox:~/work$ █

```

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

```

#!/bin/bash echo "Sum of all
digits"
echo "===== echo
"Enter a number:" read num
sum=0
while [ $num -gt 0 ] do
mod=$((num % 10))
sum=$((sum + mod))
num=$((num / 10)) done
echo "Sum of digits is $sum"

```

```

user@user-VirtualBox:~/work$ vi sumdigit.sh
user@user-VirtualBox:~/work$ chmod +x sumdigit.sh
user@user-VirtualBox:~/work$ ./sumdigit.sh
Sum of all digits
=====
Enter a number:
5
Sum of digits is 5
user@user-VirtualBox:~/work$ ./sumdigit.sh
Sum of all digits
=====
Enter a number:
364
Sum of digits is 13
user@user-VirtualBox:~/work$ █

```

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

```

#!/bin/bash
echo "LEAP YEAR OR NOT"
echo "_____ echo
"Enter the year" read y
a=`expr $y % 4` b=`expr $y % 100` c=`expr $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

```

```
user@user-VirtualBox:~/work$ vi leapyear.sh
user@user-VirtualBox:~/work$ chmod +x leapyear.sh
user@user-VirtualBox:~/work$ ./leapyear.sh
LEAP YEAR OR NOT

Enter the year
2021
2021 is not leap year
user@user-VirtualBox:~/work$ ./leapyear.sh
LEAP YEAR OR NOT

Enter the year
2000
2000 is leap year
user@user-VirtualBox:~/work$
```