

Networking & System Administration Lab Record

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Mca batch A

NETWORKING & SYSTEM ADMINISTRATION LAB ASSIGNMENT (LINUX COMMANDS)

1. Basic Linux Commands Explain Linux commands pwd, history, man, ls, cd, mkdir, rmdir, touch, rm, cat with Examples

pwd

Linux pwd (print working directory) command displays your location currently you are working on. It will give the whole path starting from the root ending to the directory.

```
fersana@dak-VivoBook-15-ASUS-Laptop-X540MA-X540MA:~$ pwd
/home/fersana
fersana@dak-VivoBook-15-ASUS-Laptop-X540MA-X540MA:~$
```

history

history command is used to view the previously executed command.

```
fersana@dak-VivoBook-15-ASUS-Laptop-X540MA-X540MA:~$ history
1  pwd
2  history
fersana@dak-VivoBook-15-ASUS-Laptop-X540MA-X540MA:~$
```

man

The "man" is a short term for manual page. A user can request to display a man page by simply typing man followed by a space and then argument. Here its argument can be a command, utility or function. A manual page associated with each of these arguments is displayed.

```
fersana@dak-VivoBook-15-ASUS-Laptop-X540MA-X540MA:~$ man ls
fersana@dak-VivoBook-15-ASUS-Laptop-X540MA-X540MA:~$
```

ls

The ls is the list command in Linux. It will show the full list or content of your directory. Just type ls and press the enter key.

```
fersana@dak-VivoBook-15-ASUS-Laptop-X540MA-X540MA:~$ ls
Desktop  Downloads      Music    Public    Videos
Documents examples.desktop Pictures  Templates
fersana@dak-VivoBook-15-ASUS-Laptop-X540MA-X540MA:~$
```

cd

The cd command stands for (change directory). It is used to change to the directory you want to work from the present directory.

```
fersana@dak-VivoBook-15-ASUS-Laptop-X540MA-X540MA:~$ cd /
fersana@dak-VivoBook-15-ASUS-Laptop-X540MA-X540MA:/$ pwd
/
fersana@dak-VivoBook-15-ASUS-Laptop-X540MA-X540MA:/$
```

mkdir

With mkdir command you can create your own directory.

```
fersana@dak-VivoBook-15-ASUS-Laptop-X540MA-X540MA:~$ mkdir farsana
fersana@dak-VivoBook-15-ASUS-Laptop-X540MA-X540MA:~$ ls
Desktop  Downloads      farsana  Pictures  Templates
Documents examples.desktop Music     Public    Videos
fersana@dak-VivoBook-15-ASUS-Laptop-X540MA-X540MA:~$
```

rmdir

The rmdir command is used to remove a directory from your system.

```
fersana@dak-VivoBook-15-ASUS-Laptop-X540MA-X540MA:~$ rmdir farsana
fersana@dak-VivoBook-15-ASUS-Laptop-X540MA-X540MA:~$ ls
Desktop  Downloads      Music    Public    Videos
Documents examples.desktop Pictures  Templates
fersana@dak-VivoBook-15-ASUS-Laptop-X540MA-X540MA:~$
```

touch

touch command is a way to create empty files. You can update the modification and access time of each file with the help of touch command.

```
fersana@dak-VivoBook-15-ASUS-Laptop-X540MA-X540MA:~$ touch farsana
fersana@dak-VivoBook-15-ASUS-Laptop-X540MA-X540MA:~$ ls
Desktop    Downloads      farsana  Pictures  Templates
Documents  examples.desktop Music     Public    Videos
fersana@dak-VivoBook-15-ASUS-Laptop-X540MA-X540MA:~$
```

rm

The 'rm' means remove. This command is used to remove a file. The command line doesn't have a recycle bin or trash unlike other GUI's to recover the files. Hence, be very much careful while using this command. Once you have deleted a file, it is removed permanently.

```
fersana@dak-VivoBook-15-ASUS-Laptop-X540MA-X540MA:~$ rm farsana
fersana@dak-VivoBook-15-ASUS-Laptop-X540MA-X540MA:~$ ls
Desktop    Downloads      Music     Public    Videos
Documents  examples.desktop Pictures  Templates
fersana@dak-VivoBook-15-ASUS-Laptop-X540MA-X540MA:~$
```

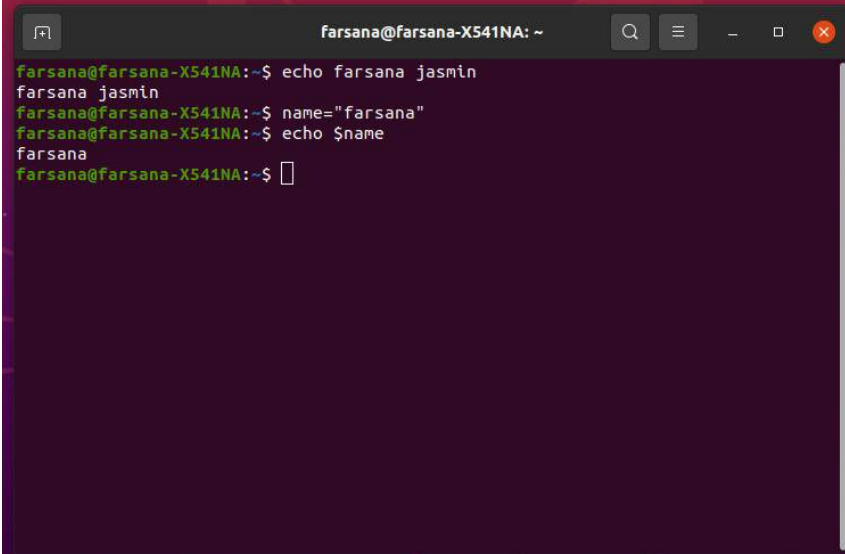
cat

Cat(concatenate) command is very frequently used in Linux. It reads data from the file and gives their content as output. It helps us to create, view, concatenate files. So let us see some frequently used cat commands.

```
fersana@dak-VivoBook-15-ASUS-Laptop-X540MA-X540MA:~$ cat >farsana
hi i am farsana
fersana@dak-VivoBook-15-ASUS-Laptop-X540MA-X540MA:~$ cat >farsana
hallo
fersana@dak-VivoBook-15-ASUS-Laptop-X540MA-X540MA:~$ cat >farsana1
how are you?
fersana@dak-VivoBook-15-ASUS-Laptop-X540MA-X540MA:~$ cat farsana farsana1
hallo
how are you?
fersana@dak-VivoBook-15-ASUS-Laptop-X540MA-X540MA:~$
```

1) echo

- to move some data into a file
- to add a text

A terminal window with a dark purple background and a title bar that reads "farsana@farsana-X541NA: ~". The terminal shows the following commands and their outputs:

```
farsana@farsana-X541NA:~$ echo farsana jasmin
farsana jasmin
farsana@farsana-X541NA:~$ name="farsana"
farsana@farsana-X541NA:~$ echo $name
farsana
farsana@farsana-X541NA:~$
```

2) head

- used to view the first lines of any text file
- default it shows 10 lines

```
have a nice day
farsana@farsana-X541NA:~$ head hey.txt
hi
hello
how are you
have a nice day
farsana@farsana-X541NA:~$ head -n2 hey.txt
hi
hello
farsana@farsana-X541NA:~$ tail hey.txt
```

3) tail

- will display the last ten lines of a text files

```
hello
farsana@farsana-X541NA:~$ tail hey.txt
hi
hello
how are you
have a nice day
```

4) read

- read the contents of a line into a variable

A terminal window with a dark purple background. The prompt is 'farsana@farsana-X541NA: ~'. The user enters 'read v1 v2 v3'. The terminal shows 'hi hey hello' on the next line. Then the user enters 'echo \${v1} \${v2} \${v3}' and the terminal shows '[] [hey] [hello]'. Finally, the user enters 'echo \${v1} \${v2} \${v3}' and the terminal shows '[hi] [hey] [hello]'.

```
farsana@farsana-X541NA:~$ read v1 v2 v3
hi hey hello
farsana@farsana-X541NA:~$ echo ${v1} ${v2} ${v3}
[] [hey] [hello]
farsana@farsana-X541NA:~$ echo ${v1} ${v2} ${v3}
[hi] [hey] [hello]
```

5) more

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

Enter key : to scroll down page line by line

- Space bar : to go to next page
- b key : to go to the backward page
- /key : to search string

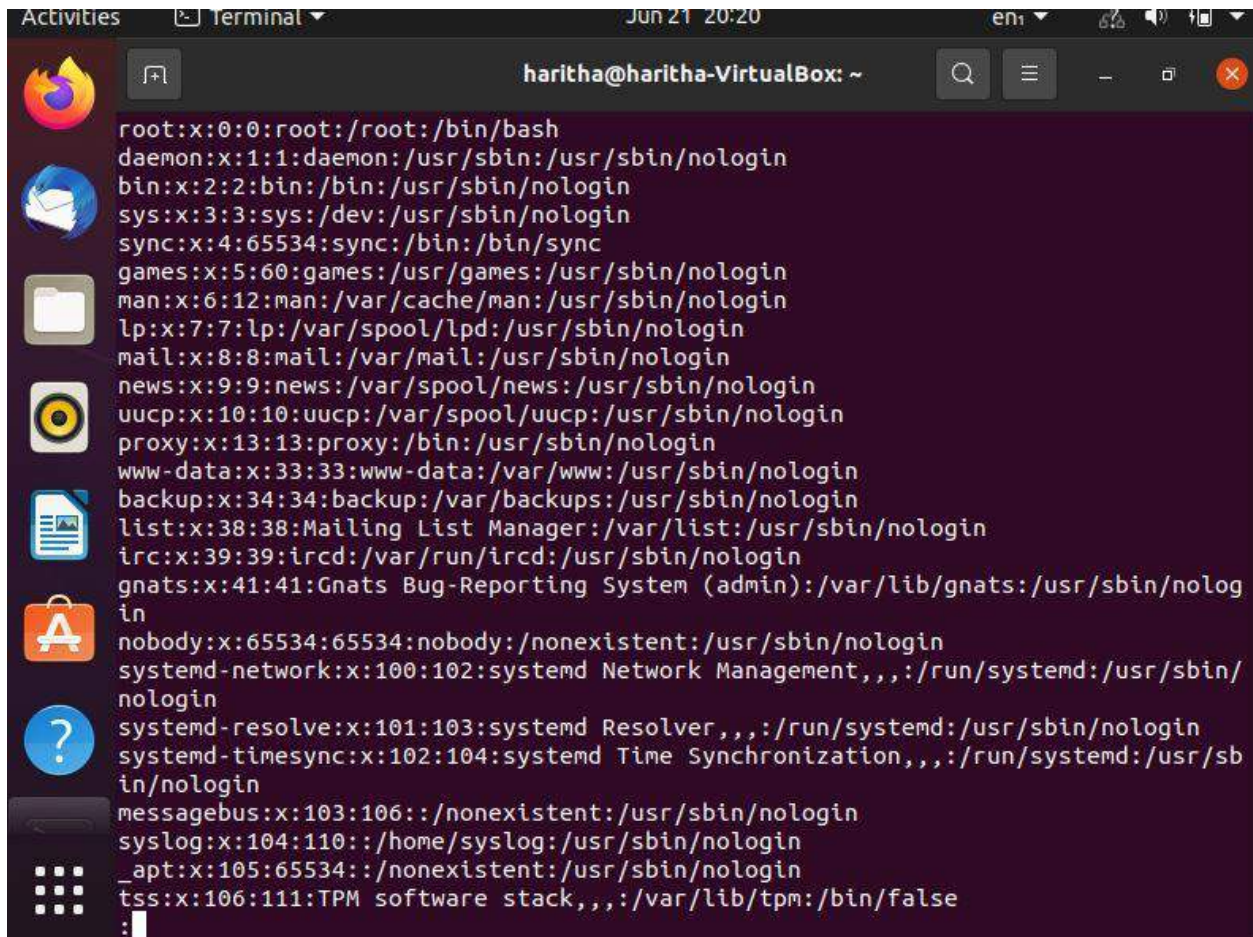

```

farsana@farsana-X541NA:~$ more /etc/passwd
root:x:0:0:root:/root:/bin/bash
daemon:x:1:1:daemon:/usr/sbin:/usr/sbin/nologin
bin:x:2:2:bin:/bin:/usr/sbin/nologin
sys:x:3:3:sys:/dev:/usr/sbin/nologin
sync:x:4:65534:sync:/bin:/bin/sync
games:x:5:60:games:/usr/games:/usr/sbin/nologin
man:x:6:12:man:/var/cache/man:/usr/sbin/nologin
lp:x:7:7:lp:/var/spool/lpd:/usr/sbin/nologin
mail:x:8:8:mail:/var/mail:/usr/sbin/nologin
news:x:9:9:news:/var/spool/news:/usr/sbin/nologin
uucp:x:10:10:uucp:/var/spool/uucp:/usr/sbin/nologin
proxy:x:13:13:proxy:/bin:/usr/sbin/nologin
www-data:x:33:33:www-data:/var/www:/usr/sbin/nologin
backup:x:34:34:backup:/var/backups:/usr/sbin/nologin
list:x:38:38:Mailing List Manager:/var/list:/usr/sbin/nologin
irc:x:39:39:ircd:/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:systemd Network Management,,,:/run/systemd:/usr/sbin/nologin
systemd-resolve:x:101:103:systemd Resolver,,,:/run/systemd:/usr/sbin/nologin
systemd-timesync:x:102:104:systemd Time Synchronization,,,:/run/systemd:/usr/sbin/nologin
...skipping 1 line
messagebus:x:103:106:nonexistent:/usr/sbin/nologin
syslog:x:104:110:syslog:/home/syslog:/usr/sbin/nologin
_apt:x:105:65534:apt:/nonexistent:/usr/sbin/nologin
tss:x:106:111:TPM software stack,,,:/var/lib/tpm:/bin/false
uidd:x:107:114:uidd:/run/uidd:/usr/sbin/nologin
tcpdump:x:108:115:tcpdump:/usr/sbin/nologin

```

6) less

- Automatically adjust with the width and height of terminal window



```
root:x:0:0:root:/root:/bin/bash
daemon:x:1:1:daemon:/usr/sbin:/usr/sbin/nologin
bin:x:2:2:bin:/bin:/usr/sbin/nologin
sys:x:3:3:sys:/dev:/usr/sbin/nologin
sync:x:4:65534:sync:/bin:/bin/sync
games:x:5:60:games:/usr/games:/usr/sbin/nologin
man:x:6:12:man:/var/cache/man:/usr/sbin/nologin
lp:x:7:7:lp:/var/spool/lpd:/usr/sbin/nologin
mail:x:8:8:mail:/var/mail:/usr/sbin/nologin
news:x:9:9:news:/var/spool/news:/usr/sbin/nologin
uucp:x:10:10:uucp:/var/spool/uucp:/usr/sbin/nologin
proxy:x:13:13:proxy:/bin:/usr/sbin/nologin
www-data:x:33:33:www-data:/var/www:/usr/sbin/nologin
backup:x:34:34:backup:/var/backups:/usr/sbin/nologin
list:x:38:38:Mailing List Manager:/var/list:/usr/sbin/nologin
irc:x:39:39:ircd:/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:systemd Network Management,,,:/run/systemd:/usr/sbin/nologin
systemd-resolve:x:101:103:systemd Resolver,,,:/run/systemd:/usr/sbin/nologin
systemd-timesync:x:102:104:systemd Time Synchronization,,,:/run/systemd:/usr/sbin/nologin
messagebus:x:103:106:/:/nonexistent:/usr/sbin/nologin
syslog:x:104:110:/:/home/syslog:/usr/sbin/nologin
_apt:x:105:65534:/:/nonexistent:/usr/sbin/nologin
tss:x:106:111:TPM software stack,,,:/var/lib/tpm:/bin/false
```

7) cut

- used for cutting out the section from each lines of files and writing the standard output.
- It can be used to cut parts of a line by byte position character and field

```
farsana@farsana-X541NA: ~  
farsana@farsana-X541NA:~$ cut -b 1,2 hey.txt  
hi  
he  
ho  
ha
```

8) paste

- used to join files horizontally by outputting lines consisting of lines from each file specified, separated by tab as delimiter, to the standard output.

```
no  
farsana@farsana-X541NA:~$ paste file2.txt hey.txt  
hi      hi  
hello   hello  
how are you    how are you  
have a nice day have a nice day
```

9) uname

- will print detailed information about your linux system like machine name, operating system, kernel etc..

```
farsana@farsana-X541NA:~$ uname -r
5.8.0-43-generic
farsana@farsana-X541NA:~$ uname -a
Linux farsana-X541NA 5.8.0-43-generic #49~20.04.1-Ubuntu SMP Fri Feb 5 09:57:56 UTC 2021 x86_64 x86_64 x86_64 GNU/Linux
farsana@farsana-X541NA:~$ uname -v
#49~20.04.1-Ubuntu SMP Fri Feb 5 09:57:56 UTC 2021
farsana@farsana-X541NA:~$ uname -i
x86_64
farsana@farsana-X541NA:~$ uname -n
farsana-X541NA
```

10) cp

- used to copy files from the current directory to a different directory
- cp -i (will ask for user's consent in case of a potential file overwrite.)
- cp -p (will preserve source file mode, ownership and time stamp)
- cp -r (will copy directories recursively)
- cp -u (copies files only if the destination file is not existing or the source file is newer than the destination file)

11) mv

- to move files
- rename files

12) locate

- to find a file
- locate -i filename (make it case insensitive you can search file if you don't remember its exact name)
- * (to search for a file that contains two or more words)

```
farsana@farsana-X541NA: ~  
farsana@farsana-X541NA:~$ locate -i hey.txt  
/home/farsana/hey.txt
```

13) find

- To search for files or directories
- Find. -name filename (to find files in the current directory)

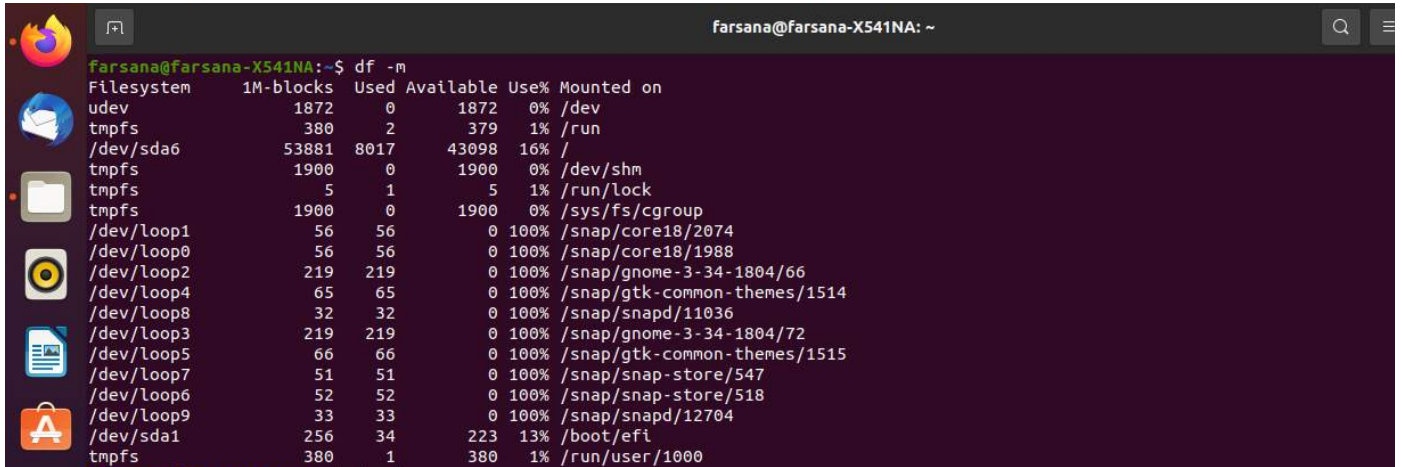
```
farsana@farsana-X541NA:~$ find hey.txt  
hey.txt  
farsana@farsana-X541NA:~$ grep 'hey' hey.txt
```

14) grep

- Search through all the text in a given file

15) df

- To get report on the system's disk space usage shows in percentage and kbs.



```
farsana@farsana-X541NA:~$ df -m
Filesystem      1M-blocks  Used Available Use% Mounted on
udev             1872      0     1872   0% /dev
tmpfs             380      2       379   1% /run
/dev/sda6        53881   8017   43098  16% /
tmpfs            1900      0     1900   0% /dev/shm
tmpfs              5      1        5   1% /run/lock
tmpfs            1900      0     1900   0% /sys/fs/cgroup
/dev/loop1        56      56      0 100% /snap/core18/2074
/dev/loop0        56      56      0 100% /snap/core18/1988
/dev/loop2       219     219      0 100% /snap/gnome-3-34-1804/66
/dev/loop4        65      65      0 100% /snap/gtk-common-themes/1514
/dev/loop8        32      32      0 100% /snap/snapd/11036
/dev/loop3       219     219      0 100% /snap/gnome-3-34-1804/72
/dev/loop5        66      66      0 100% /snap/gtk-common-themes/1515
/dev/loop7        51      51      0 100% /snap/snap-store/547
/dev/loop6        52      52      0 100% /snap/snap-store/518
/dev/loop9        33      33      0 100% /snap/snapd/12704
/dev/sda1        256     34     223  13% /boot/efi
tmpfs             380      1     380   1% /run/user/1000
```

16) du

- to check how many space a file or directory takes.



```
farsana@farsana-X541NA:~$ du -h
12K  ./cache/mesa_shader_cache/0a
8.0K ./cache/mesa_shader_cache/4a
12K  ./cache/mesa_shader_cache/5e
8.0K ./cache/mesa_shader_cache/90
8.0K ./cache/mesa_shader_cache/7c
8.0K ./cache/mesa_shader_cache/6b
8.0K ./cache/mesa_shader_cache/2f
8.0K ./cache/mesa_shader_cache/11
8.0K ./cache/mesa_shader_cache/a8
8.0K ./cache/mesa_shader_cache/52
8.0K ./cache/mesa_shader_cache/f7
8.0K ./cache/mesa_shader_cache/c7
8.0K ./cache/mesa_shader_cache/38
8.0K ./cache/mesa_shader_cache/60
8.0K ./cache/mesa_shader_cache/ad
8.0K ./cache/mesa_shader_cache/ae
8.0K ./cache/mesa_shader_cache/3c
```

17) useradd

- available only for system admins.
- To create new user

```
farsana@farsana-X541NA:~$ useradd jas
useradd: Permission denied.
useradd: cannot lock /etc/passwd; try again later.
farsana@farsana-X541NA:~$ userdel
```

18) userdel

- remove user or delete user account

```
farsana@farsana-X541NA:~$ 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
                       directory to chroot into
  -P, --prefix PREFIX_DIR
                       prefix directory where are located the /etc/* files
  --extrausers         Use the extra users database
  -Z, --selinux-user   remove any SELinux user mapping for the user
```

19) sudo

- SuperUserDo ,enables you to perform tasks that require administrativeq or root permissions.

20) passwd

- to change passwords for user account.

1. usermod

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

```
farsana@farsana-XS41NA: ~$ usermod --help
Usage: usermod [options] LOGIN

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

farsana@farsana-XS41NA:~$ usermod -u 2000 farsana
usermod: user farsana is currently used by process 1322
farsana@farsana-XS41NA:~$
```

2. groupadd

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

```
farsana@farsana-XS41NA:~$ sudo groupadd student
[sudo] password for farsana:
```

3. groups

print the groups a user is in

- #groups alice

```
farsana@farsana-XS41NA:~$ groups farsana
farsana : farsana adm cdrom sudo dip plugdev lpadmin lxd sambashare
```

4. groupdel

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

```
farsana@farsana-X541NA:~$ sudo groupdel student
```

5. groupmod

- The groupmod command modifies the definition of the specified group by modifying the appropriate entry in the group database.
- # groupmod -n group1 group2

```
farsana@farsana-X541NA:~$ sudo groupadd student
farsana@farsana-X541NA:~$ sudo groupmod -n student2 student
farsana@farsana-X541NA:~$ cd farsana
```

6. chmod

- To change directory permissions of file/ Directory in Linux.
- #chmod whowhatwhich file/directory
- **chmod +rwx filename** To add permissions.
 - **chmod -rwx directoryname** To remove permissions.
 - **chmod +x filename** To allow executable permissions.
 - **chmod -wx filename** to take out write and executable permissions.
- #chmod u+x test
#chmod g-rwx test
#chmod o-r test

```
farsana@farsana-X541NA:~/Desktop/jasmin$ chmod +rwx name.txt
farsana@farsana-X541NA:~/Desktop/jasmin$ cd farsana
```

7. chown

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

#chown Tom Test

```
farsana@farsana-X541NA:~/Desktop/jasmin$ chown farsana name.txt
farsana@farsana-X541NA:~/Desktop/jasmin$ id
```

8. id

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

#id

```
farsana@farsana-X541NA:~/Desktop/jasmin$ id
uid=1000(farsana) gid=1000(farsana) groups=1000(farsana),4(adm),24(cdrom),27(sudo),30(dip),46(plugdev),120(lpadmin),131(lxd),132(sambash
farsana@farsana-X541NA:~/Desktop/jasmin$ ps -a
```

9. ps

- The ps command, **short for Process Status**, is a command line utility that is used to display or view information related to the processes running in a Linux system.
- PID – This is the unique process ID
- TTY – This is the type of terminal that the user is logged in to
- TIME – This is the time in minutes and seconds that the process has been running
- CMD – The command that launched the process

#ps -a

```
farsana@farsana-X541NA:~/Desktop/jasmin$ ps -a
PID TTY          TIME CMD
1411 tty2        00:00:16 Xorg
1436 tty2        00:00:00 gnome-session-b
2363 pts/0        00:00:00 ps
```

10. top

• **top** command is used to show the Linux processes. It provides a dynamic real-time view of the running system

#top -u rose

```
farsana@farsana-XS41NA:~/Desktop/jasmin$ top -u farsana
top - 17:10:36 up 19 min,  1 user,  load average: 0.11, 0.22, 0.26
Tasks: 205 total,  1 running, 204 sleeping,  0 stopped,  0 zombie
%Cpu(s):  0.4 us,  0.4 sy,  0.0 ni, 99.1 id,  0.0 wa,  0.0 hi,  0.1 si,  0.0 st
MiB Mem :  3799.2 total,  2353.3 free,   651.3 used,   794.6 buff/cache
MiB Swap:  2048.0 total,  2048.0 free,    0.0 used,  2746.1 avail Mem

  PID USER      PR  NI   VIRT   RES   SHR  S  %CPU  %MEM     TIME+ COMMAND
 1411 farsana    20   0 849588 69408 43544 S   1.7   1.8   0:17.23 Xorg
 1561 farsana    20   0 4460100 251720 100720 S   0.7   6.5   0:28.72 gnome-shell
 1875 farsana    20   0 823340 51312 38764 S   0.7   1.3   0:05.05 gnome-terminal-
 2364 farsana    20   0  20504   3740  3172 R   0.7   0.1   0:00.10 top
```

1. wc

- wc stands for word count.
- Used for counting purpose.
- It is used to find out number of lines, word count, byte and characters count in the files specified in the file arguments.
- #wc state.txt
6 8 54 state.txt
- #wc state.txt capital.txt
- wc -l state.txt
- wc -w state.txt capital.txt
- wc -c state.txt
- wc -m state.txt



```
farsana@farsana-X541NA:~/Desktop/jasmin$ wc rare.txt
13 11 68 rare.txt
```

2. tar

- The Linux 'tar' stands for tape archive, is used to create Archive and extract the Archive files
- Linux tar command to create compressed or uncompressed Archive files
- Options:
 - c : Creates Archive
 - x : Extract the archive
 - f : creates archive with given filename

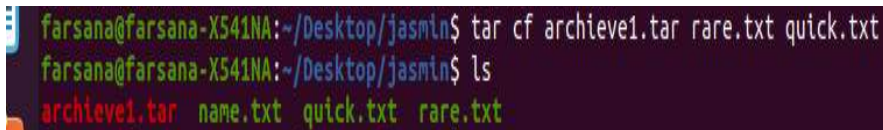
-t : displays or lists files in archived file
-u : archives and adds to an existing archive file
-v : Displays Verbose Information
-A : Concatenates the archive files
-z : zip, tells tar command that creates tar file using gzip
-j : filter archive tar file using tbzip
-W : Verify a archive file
-r : update or add file or directory in already existed .tar file
#tar cf archive.tar state.txt capital.txt //create archive file
#ls archive.tar
#tar tf /archive.tar // list contents of tar archive file
• Extract an archive created with tar
#mkdir backup
#cd backup
#tar xf/home/meera/Documents/Meera_Linux/archive.tar

• **Compression Types**

gzip(z),bzip2(j), xz(J)
#tar czf /abc.tar.gz /etc
#tar cjf /abcd.tar.bz2 /etc
#tar cJf /abcde.tar.xz /etc

Extract an archive

#mkdir backup1
#cd backup1
#tar xzf /abc.tar.gz
#mkdir backup2
#cd backup2
#tar xjf /abcd.tar.bz2
#mkdir backup3
#cd backup3
#tar xJf /abcde.tar.xz



```
farsana@farsana-X541NA:~/Desktop/jasmin$ tar cf archieve1.tar rare.txt quick.txt
farsana@farsana-X541NA:~/Desktop/jasmin$ ls
archievel.tar  name.txt  quick.txt  rare.txt
```

3.expr

- The expr command evaluates a given expression and displays its corresponding output. It is used for:
- Basic operations like addition, subtraction, multiplication, division,

and modulus on integers.

- Evaluating regular expressions, string operations like substring, length of strings etc.
- Performing operations on variables inside a shell script

```
#expr 10 + 2
```

```
archive1.tar name.txt quick.txt rare.txt
farsana@farsana-X541NA:~/Desktop/jasmin$ expr 10 + 2
12
```

4. Redirections & Piping

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

```
#ls -l | wc -l
```

```
#cat /etc.passwd.txt | head -7 | tail -5
```

```
farsana@farsana-X541NA:~/Desktop/jasmin$ ls -l|wc -l
5
```

5. ssh

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

```
#ssh user_name@host(IP/Domain_name)
```

```
#ssh -X root@server1.example.com
```

```
Farsana@Farsana-XS41NA:~/Desktop/jasmin$ ssh --help
unknown option -- -
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]
          [-O query_option] [-R address] [-S ctl_path] [-W host:port]
```

6. scp

- SCP (secure copy) is a command-line utility that allows you to securely
- copy files and directories between two locations.
- With scp, you can copy a file or directory:
- From your local system to a remote system.
- From a remote system to your local system.
- Between two remote systems from your local system.
- Remote file system locations are specified in format [user@]host:/path

Syntax:

```
scp [OPTION] [user@]SRC_HOST:]file1 [user@]DEST_HOST:]file2
```

```
$scp/etc/yum.config/etc/hosts ServerX:/home/student
```

```
$scp ServerX:/etc/hostname /home/student
```

```
Bad escape character 'ygen':
farsana@farsana-X541NA:~/Desktop/jasmin$ ssh farsana@farsana-X541NA
ssh: connect to host farsana-x541na port 22: Connection refused
farsana@farsana-X541NA:~/Desktop/jasmin$ ssh -keygen
```

7.ssh-keygen

- `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.

```
$ssh-keygen -t rsa
```

```

Generating public/private rsa key pair.
Enter file in which to save the key (/home/farsana/.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:zVNoONKzFRBwycGp/d3lXUqpE5czv7HdWKOoaOIto farsana@farsana-X541NA
The key's randomart image is:
[+]-----[RSA 3672]-----
|
|  . . . . . o . x x x
|  . . . . . o . x x
|  . . . . . o . x
|  . . . . . S . . . . .
|  . . . . . o . . . . .
|  . . . . . o b . . . . .
|E . . . . . . . . . .
|  . . . . . + . . . . .
|-----[SHA256]-----

```

8. ssh-copy-id

- The ssh-copy-id command 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.

```
$ssh-copy-id username@remote_host
```

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

```
farsana@farsana-X541NA:~$ touch song2.mp3
farsana@farsana-X541NA:~$ touch song3.mp3
farsana@farsana-X541NA:~$ touch song4.mp3
farsana@farsana-X541NA:~$ touch song5.mp3
farsana@farsana-X541NA:~$ touch song6.mp3
farsana@farsana-X541NA:~$ touch snap1.mp3
farsana@farsana-X541NA:~$ touch snap2.mp3
farsana@farsana-X541NA:~$ touch snap3.mp3
farsana@farsana-X541NA:~$ touch snap4.mp3
farsana@farsana-X541NA:~$ touch snap5.mp3
farsana@farsana-X541NA:~$ touch snap6.mp3
farsana@farsana-X541NA:~$ touch film1.mp3
farsana@farsana-X541NA:~$ touch film2.mp3
farsana@farsana-X541NA:~$ touch film3.mp3
farsana@farsana-X541NA:~$ touch film4.mp3
farsana@farsana-X541NA:~$ touch film5.mp3
farsana@farsana-X541NA:~$ touch film6.mp3
farsana@farsana-X541NA:~$ ls
all folder  Documents  film1.mp3  film4.mp3  hey.txt    Public    snap3.mp3  snap6.mp3  song3.mp3  song6.mp3
all.tr     Downloads  film2.mp3  film5.mp3  Music      snap1.mp3 snap4.mp3  song1.mp3  song4.mp3  Templates
Desktop    farsana   film3.mp3  film6.mp3  Pictures   snap2.mp3 snap5.mp3  song2.mp3  song5.mp3  Videos
```

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

```
farsana@farsana-X541NA:~$ mv song1.mp3 ./Music/
farsana@farsana-X541NA:~$ mv song2.mp3 ./Music/
farsana@farsana-X541NA:~$ mv song3.mp3 ./Music/
farsana@farsana-X541NA:~$ mv song4.mp3 ./Music/
farsana@farsana-X541NA:~$ mv song5.mp3 ./Music/
farsana@farsana-X541NA:~$ mv song6.mp3 ./Music/
farsana@farsana-X541NA:~$ mv snap1.mp3 ./Pictures/
farsana@farsana-X541NA:~$ mv snap2.mp3 ./Pictures/
farsana@farsana-X541NA:~$ mv snap3.mp3 ./Pictures/
farsana@farsana-X541NA:~$ mv snap4.mp3 ./Pictures/
farsana@farsana-X541NA:~$ mv snap5.mp3 ./Pictures/
farsana@farsana-X541NA:~$ mv snap6.mp3 ./Pictures/
farsana@farsana-X541NA:~$ mv film1.mp3 ./Videos/
farsana@farsana-X541NA:~$ mv film2.mp3 ./Videos/
farsana@farsana-X541NA:~$ mv film3.mp3 ./Videos/
farsana@farsana-X541NA:~$ mv film4.mp3 ./Videos/
farsana@farsana-X541NA:~$ mv film5.mp3 ./Videos/
farsana@farsana-X541NA:~$ mv film6.mp3 ./Videos/
```

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

```
farsana@farsana-X541NA:~$ mkdir friends family work
```

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

```
farsana@farsana-X541NA:~$ cp Music/song2.mp3 Music/song3.mp3 Music/song4.mp3 Music/song5.mp3 Music/song6.mp3 friends
farsana@farsana-X541NA:~$ cp pictures/snap1.mp3 pictures/snap2.mp3 pictures/snap3.mp3 pictures/snap4.mp3 pictures/snap5.mp3 pictures/snap6.mp3 family
```

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

```
farsana@farsana-X541NA:~$ rmdir family friends
rmdir: failed to remove 'family': Directory not empty
rmdir: failed to remove 'friends': Directory not empty
```

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

```
farsana@farsana-X541NA:~$ rm -r family friends
```

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.

```
farsana@farsana-X541NA:~$ ls -a | >allfiles.txt
farsana@farsana-X541NA:~$ ls
```

```
farsana@farsana-X541NA:~$ ls -al
total 104
drwxr-xr-x 17 farsana farsana 4096 Aug 17 16:26 .
drwxr-xr-x  3 root    root    4096 Aug  5 22:20 ..
-rw-rw-r--  1 farsana farsana 1515 Aug 17 16:27 allfiles.txt
drwxrwxr-x  2 farsana farsana 4096 Aug  6 14:59 allfolder
-rw-rw-r--  1 farsana farsana 10240 Aug  6 14:58 all.tr
-rw-rw-r--  1 farsana farsana 2083 Aug 12 19:17 .bash_history
-rw-r--r--  1 farsana farsana  220 Aug  5 22:20 .bash_logout
-rw-r--r--  1 farsana farsana 3771 Aug  5 22:20 .bashrc
drwxr-xr-x 15 farsana farsana 4096 Aug  8 15:26 .cache
drwx----- 15 farsana farsana 4096 Aug 12 17:45 .config
drwxr-xr-x  3 farsana farsana 4096 Aug 12 19:02 Desktop
drwxr-xr-x  2 farsana farsana 4096 Aug 12 19:02 Documents
drwxr-xr-x  2 farsana farsana 4096 Aug 12 19:17 Downloads
-rw-rw-r--  1 farsana farsana  0 Aug  6 14:49 farsana
drwx-----  3 farsana farsana 4096 Aug  6 04:02 .gnupg
-rw-rw-r--  1 farsana farsana  37 Aug  8 14:52 hey.txt
drwxr-xr-x  3 farsana farsana 4096 Aug  6 04:02 .local
drwx-----  5 farsana farsana 4096 Aug  8 15:26 .mozilla
drwxr-xr-x  3 farsana farsana 4096 Aug 18 2021 Music
drwxr-xr-x  2 farsana farsana 4096 Aug 17 16:14 Pictures
-rw-r--r--  1 farsana farsana 807 Aug  5 22:20 .profile
drwxr-xr-x  2 farsana farsana 4096 Aug  6 04:02 Public
-rw-r--r--  1 farsana farsana  0 Aug  5 22:34 .sudo_as_admin_successful
drwxr-xr-x  2 farsana farsana 4096 Aug  6 04:02 templates
drwxr-xr-x  2 farsana farsana 4096 Aug 18 2021 Videos
drwxrwxr-x  2 farsana farsana 4096 Aug 18 2021 work
```

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

```
farsana@farsana-X541NA:~$ date
Tuesday 17 August 2021 04:32:38 PM IST
```

9. Add the user Juliet

```
farsana@farsana-X541NA:~$ sudo useradd juliet
[sudo] password for farsana:
```


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

```
farsana@farsana-X541NA:~$ 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
kubernet:x:36:36:kubernetes:/var/lib/containers/daemon:/usr/sbin/nologin
colord:x:121:120:colord colour management daemon,,,:/var/lib/colord:/usr/sbin/nologin
geoclue:x:122:127:/:/var/lib/geoclue:/usr/sbin/nologin
pulse:x:123:128:PulseAudio daemon,,,:/var/run/pulse:/usr/sbin/nologin
gnome-initial-setup:x:124:65534:/:run/gnome-initial-setup:/bin/false
gdm:x:125:130:Gnome Display Manager:/var/lib/gdm3:/bin/false
farsana:x:1000:1000:farsana,,,:/home/farsana:/bin/bash
systemd-coredump:x:999:999:systemd Core Dumper:/:/usr/sbin/nologin
juliet:x:1001:1002:/:/home/juliet:/bin/sh
farsana@farsana-X541NA:~$ sudo passwd juliet
```

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

```
farsana@farsana-X541NA:~$ sudo passwd juliet
New password:
Retype new password:
passwd: password updated successfully
```

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

```
farsana@farsana-X541NA:~$ sudo groupadd -g 30000 Shakespeare
```

13. Create a supplementary group called artists.

```
farsana@farsana-X541NA:~$ sudo groupadd -g 30000 Shakespeare
farsana@farsana-X541NA:~$ sudo groupadd -g 20000 artists
farsana@farsana-X541NA:~$ cat /etc/group
root:x:0:
daemon:x:1:
bin:x:2:
sys:x:3:
adm:x:4:syslog,farsana
tty:x:5:syslog
disk:x:6:
lp:x:7:
```

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

```
farsana@farsana-X541NA:~$ cat /etc/group
root:x:0:
daemon:x:1:
bin:x:2:
sys:x:3:
adm:x:4:syslog,farsana
tty:x:5:syslog
disk:x:6:
lp:x:7:
```

```
windupster:x:125:
colord:x:126:
geoclue:x:127:
pulse:x:128:
pulse-access:x:129:
gdm:x:130:
lxd:x:131:farsana
farsana:x:1000:
sanbashare:x:132:farsana
systemd-coredump:x:999:
mlocate:x:133:
student2:x:1001:
juliet:x:1002:
Shakespeare:x:30000:
artists:x:20000:
```

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

```
farsana@farsana-X541NA:~$ groups juliet
juliet : juliet
farsana@farsana-X541NA:~$ sudo usermod -a -G Shakespeare juliet
[sudo] password for farsana:
```

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

```
farsana@farsana-X541NA:~$ id juliet
uid=1001(juliet) gid=1002(juliet) groups=1002(juliet),30000(Shakespeare)
```

17. Add Romeo and Hamlet to the Shakespeare group.

```
farsana@farsana-X541NA:~$ sudo useradd Romeo
farsana@farsana-X541NA:~$ sudo useradd Hamlet
farsana@farsana-X541NA:~$ sudo usermod -a -G Shakespeare Romeo
farsana@farsana-X541NA:~$ sudo usermod -a -G Shakespeare Hamlet
farsana@farsana-X541NA:~$ id Romeo
uid=1002(Romeo) gid=30001(Romeo) groups=30001(Romeo),30000(Shakespeare)
farsana@farsana-X541NA:~$ id Hamlet
uid=1003(Hamlet) gid=1003(Hamlet) groups=1003(Hamlet),30000(Shakespeare)
```

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

```
farsana@farsana-X541NA:~$ sudo useradd Reba
farsana@farsana-X541NA:~$ sudo useradd Dolly
farsana@farsana-X541NA:~$ sudo useradd Elvis
farsana@farsana-X541NA:~$ sudo usermod -a -G artists Reba
farsana@farsana-X541NA:~$ sudo usermod -a -G artists Dolly
farsana@farsana-X541NA:~$ sudo usermod -a -G artists Elvis
farsana@farsana-X541NA:~$ id Reba
uid=1004(Reba) gid=1004(Reba) groups=1004(Reba),20000(artists)
farsana@farsana-X541NA:~$ id Dolly
uid=1005(Dolly) gid=1005(Dolly) groups=1005(Dolly),20000(artists)
farsana@farsana-X541NA:~$ id Elvis
uid=1006(Elvis) gid=1006(Elvis) groups=1006(Elvis),20000(artists)
```

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

```
Farsana@Farsana-X541NA:~$ cat /etc/group
```

```
root:x:0:
daemon:x:1:
bin:x:2:
sys:x:3:
adm:x:4:syslog,farsana
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:
knew:x:15:
dialout:x:20:
fax:x:21:
voice:x:22:
cdrom:x:24:farsana
floppy:x:25:
tape:x:26:
sudo:x:27:farsana
audio:x:29:pulse
dip:x:30:farsana
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:
sasl:x:45:
plugdev:x:46:farsana
staff:x:50:
games:x:60:
```

```
crontab:x:105:
messagebus:x:106:
input:x:107:
kvm:x:108:
render:x:109:
syslog:x:110:
tss:x:111:
bluetooth:x:112:
ssl-cert:x:113:
uuidd:x:114:
tcpdump:x:115:
avahi-autoipd:x:116:
rtkit:x:117:
ssh:x:118:
netdev:x:119:
lpadmin:x:120:farsana
avahi:x:121:
scanner:x:122:saned
saned:x:123:
nm-openvpn:x:124:
whoopsie:x:125:
colord:x:126:
geoclue:x:127:
pulse:x:128:
pulse-access:x:129:
gdm:x:130:
lxd:x:131:farsana
farsana:x:1000:
sambashare:x:132:farsana
systemd-coredump:x:999:
nlocate:x:133:
student2:x:1001:
juliet:x:1002:
```

20. Attempt to remove user Dolly.

```
cat: file: No such file or directory
Farsana@Farsana-X541NA:~$ userdel -r Dolly
userdel: Permission denied.
userdel: cannot lock /etc/passwd; try again later.
```

ping ,route, traceroute, nslookup,Ip Config, NetStat .

1.ping

```
Microsoft Windows [Version 10.0.19042.1165]
(c) Microsoft Corporation. All rights reserved.

C:\Users\gafoor>ping

Usage: ping [-t] [-a] [-n count] [-l size] [-f] [-i TTL] [-v TOS]
           [-r count] [-s count] [[-j host-list] | [-k host-list]]
           [-w timeout] [-R] [-S srcaddr] [-c compartment] [-p]
           [-4] [-6] target_name

Options:
  -t           Ping the specified host until stopped.
               To see statistics and continue - type Control-Break;
               To stop - type Control-C.
  -a           Resolve addresses to hostnames.
  -n count     Number of echo requests to send.
  -l size      Send buffer size.
  -f          Set Don't Fragment flag in packet (IPv4-only).
  -i TTL       Time To Live.
  -v TOS       Type Of Service (IPv4-only. This setting has been deprecated
               and has no effect on the type of service field in the IP
               Header).
  -r count     Record route for count hops (IPv4-only).
  -s count     Timestamp for count hops (IPv4-only).
  -j host-list Loose source route along host-list (IPv4-only).
  -k host-list Strict source route along host-list (IPv4-only).
  -w timeout   Timeout in milliseconds to wait for each reply.
  -R          Use routing header to test reverse route also (IPv6-only).
               Per RFC 5095 the use of this routing header has been
               deprecated. Some systems may drop echo requests if
               this header is used.
  -S srcaddr   Source address to use.
  -c compartment Routing compartment identifier.
  -p          Ping a Hyper-V Network Virtualization provider address.
  -4          Force using IPv4.
  -6          Force using IPv6.
```

```
rtt min/avg/max/mdev = 46.436/53.837/88.410/7.783 ms
fersanag@fersana-K541NA:~$ ping www.facebook.com
PING star-mini.c10r.facebook.com (157.240.228.35) 56(84) bytes of data:
64 bytes from edge-star-mini-shv-01-tir2.facebook.com (157.240.228.35): icmp_seq=1 ttl=52 time=51.7 ms
64 bytes from edge-star-mini-shv-01-tir2.facebook.com (157.240.228.35): icmp_seq=2 ttl=52 time=54.4 ms
64 bytes from edge-star-mini-shv-01-tir2.facebook.com (157.240.228.35): icmp_seq=3 ttl=52 time=46.5 ms
64 bytes from edge-star-mini-shv-01-tir2.facebook.com (157.240.228.35): icmp_seq=4 ttl=52 time=70.4 ms
64 bytes from edge-star-mini-shv-01-tir2.facebook.com (157.240.228.35): icmp_seq=5 ttl=52 time=51.1 ms
^C
--- star-mini.c10r.facebook.com ping statistics ---
5 packets transmitted, 5 received, 0% packet loss, time 4007ms
rtt min/avg/max/mdev = 46.539/54.851/70.433/8.194 ms
```

2.route

```
C:\Users\gafoor>route

Manipulates network routing tables.

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

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

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

-4          Force using IPv4.

-6          Force using IPv6.

command     One of these:
            PRINT      Prints a route
            ADD        Adds a route
            DELETE     Deletes a route
            CHANGE     Modifies an existing route

destination Specifies the host.

MASK         Specifies that the next parameter is the 'netmask' value.

netmask      Specifies a subnet mask value for this route entry.
            If not specified, it defaults to 255.255.255.255.

gateway      Specifies gateway.

interface    the interface number for the specified route.

METRIC       specifies the metric, ie. cost for the destination.

All symbolic names used for destination are looked up in the network database
file NETWORKS. The symbolic names for gateway are looked up in the host name
database file HOSTS.

If the command is PRINT or DELETE. Destination or gateway can be a wildcard,
(wildcard is specified as a star '*'), or the gateway argument may be omitted.

If Dest contains a * or ?, it is treated as a shell pattern, and only
matching destination routes are printed. The '*' matches any string,
and '?' matches any one char. Examples: 157.*.1, 157.*, 127.*, *224*.
```

```
farsana@farsana-X541NA:~$ sudo route
[sudo] password for farsana:
Kernel IP routing table
Destination      Gateway           Genmask           Flags Metric Ref    Use Iface
default          _gateway         0.0.0.0           UG    600    0      0 wlp2s0
link-local       0.0.0.0          255.255.0.0       U     1000   0      0 wlp2s0
192.168.8.0      0.0.0.0          255.255.255.0     U     600    0      0 wlp2s0
farsana@farsana-X541NA:~$
```

3. traceroute

```
C:\Users\gafoor>tracert

Usage: tracert [-d] [-h maximum_hops] [-j host-list] [-w timeout]
              [-R] [-S srcaddr] [-4] [-6] target_name

Options:
  -d          Do not resolve addresses to hostnames.
  -h maximum_hops Maximum number of hops to search for target.
  -j host-list Loose source route along host-list (IPv4-only).
  -w timeout   Wait timeout milliseconds for each reply.
  -R          Trace round-trip path (IPv6-only).
  -S srcaddr   Source address to use (IPv6-only).
  -4          Force using IPv4.
  -6          Force using IPv6.
```

```
farsana@farsana-X541NA:~$ sudo apt install traceroute
Reading package lists... Done
Building dependency tree
Reading state information... Done
The following NEW packages will be installed:
  traceroute
0 upgraded, 1 newly installed, 0 to remove and 323 not upgraded.
Need to get 45.4 kB of archives.
After this operation, 152 kB of additional disk space will be used.
Get:1 http://in.archive.ubuntu.com/ubuntu focal/universe amd64 traceroute amd64 1:2.1.0-2 [45.4 kB]
Fetched 45.4 kB in 1s (43.8 kB/s)
Selecting previously unselected package traceroute.
(Reading database ... 152263 files and directories currently installed.)
Preparing to unpack .../traceroute_1%3a2.1.0-2_amd64.deb ...
Unpacking traceroute (1:2.1.0-2) ...
Setting up traceroute (1:2.1.0-2) ...
update-alternatives: using /usr/bin/traceroute.db to provide /usr/bin/traceroute (traceroute) in auto mode
update-alternatives: using /usr/bin/lft.db to provide /usr/bin/lft (lft) in auto mode
update-alternatives: using /usr/bin/traceproto.db to provide /usr/bin/traceproto (traceproto) in auto mode
update-alternatives: using /usr/sbin/tcptraceroute.db to provide /usr/sbin/tcptraceroute (tcptraceroute) in auto mode
Processing triggers for man-db (2.9.1-1) ...
```

4. nslookup

```
C:\Users\gafoor>nslookup
Default Server:  Unknown
Address:  192.168.8.1
>
```

```
farsana@farsana-X541NA:~$ nslookup google.com
Server:      127.0.0.53
Address:     127.0.0.53#53

Non-authoritative answer:
Name:   google.com
Address: 142.250.193.110
Name:   google.com
Address: 2404:6800:4007:822::200e
```

5.Ip Config

```
> ipconfig
Server:  Unknown
Address: 192.168.8.1

*** Unknown can't find ipconfig: Non-existent domain
>
```

```
farsana@farsana-X541NA:~$ ifconfig
enp1s0: flags=4099<UP,BROADCAST,MULTICAST>  mtu 1500
        ether 2c:fd:a1:aa:c3:a3  txqueuelen 1000  (Ethernet)
        RX packets 0  bytes 0 (0.0 B)
        RX errors 0  dropped 0  overruns 0  frame 0
        TX packets 0  bytes 0 (0.0 B)
        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 155  bytes 13323 (13.3 KB)
    RX errors 0  dropped 0  overruns 0  frame 0
    TX packets 155  bytes 13323 (13.3 KB)
    TX errors 0  dropped 0 overruns 0  carrier 0  collisions 0

wlp2s0: flags=4163<UP,BROADCAST,RUNNING,MULTICAST>  mtu 1500
    inet 192.168.8.100  netmask 255.255.255.0  broadcast 192.168.8.255
    inet6 fe80::76b6:2119:8d49:e091  prefixlen 64  scopeid 0x20<link>
    ether 98:22:ef:32:5e:09  txqueuelen 1000  (Ethernet)
    RX packets 153  bytes 62747 (62.7 KB)
    RX errors 0  dropped 0  overruns 0  frame 0
    TX packets 230  bytes 33688 (33.6 KB)
    TX errors 0  dropped 0 overruns 0  carrier 0  collisions 0

farsana@farsana-X541NA:~$
```


6.NetStat

```
>
C:\Users\gafoor>NetStat

Active Connections

Proto Local Address           Foreign Address         State
TCP    192.168.8.100:49365       server-13-33-146-35:https CLOSE_WAIT
TCP    192.168.8.100:49446       maa05s17-in-f19:https  TIME_WAIT
TCP    192.168.8.100:49514       93.184.216.34:http     TIME_WAIT
```

```
farsana@farsana-X541NA:~$ netstat -l
Active Internet connections (only servers)
Proto Recv-Q Send-Q Local Address           Foreign Address         State
tcp    0      0 localhost:ipp            0.0.0.0:*               LISTEN
tcp    0      0 localhost:mysql          0.0.0.0:*               LISTEN
tcp    0      0 localhost:domain        0.0.0.0:*               LISTEN
tcp6   0      0 tp6-localhost:ipp       [::]:*                  LISTEN
tcp6   0      0 [::]:http                [::]:*                  LISTEN
udp    0      0 localhost:domain        0.0.0.0:*               LISTEN
udp    0      0 0.0.0.0:57889           0.0.0.0:*               LISTEN
udp    0      0 0.0.0.0:631             0.0.0.0:*               LISTEN
udp    0      0 0.0.0.0:mdns            0.0.0.0:*               LISTEN
udp6   0      0 [::]:49772              [::]:*                  LISTEN
udp6   0      0 [::]:mdns                [::]:*                  LISTEN
raw6   0      0 [::]:lpx6-lcmp          [::]:*                  LISTEN
Active UNIX domain sockets (only servers)
Proto RefCnt Flags   Type       State         I-Node  Path
unix  2      [ ACC ] STREAM    LISTENING    37942   @/tmp/.ICE-unix/1433
unix  2      [ ACC ] SEQPACKET LISTENING    16140   /run/udev/control
unix  2      [ ACC ] STREAM    LISTENING    35133   /run/user/1000/systemd/private
unix  2      [ ACC ] STREAM    LISTENING    35235   /run/user/1000/bus
unix  2      [ ACC ] STREAM    LISTENING    33987   @/tmp/dbus-adrGOKyJ
unix  2      [ ACC ] STREAM    LISTENING    35236   /run/user/1000/gnupg/s.dirmngr
unix  2      [ ACC ] STREAM    LISTENING    35237   /run/user/1000/gnupg/s.gpg-agent.browser
unix  2      [ ACC ] STREAM    LISTENING    35238   /run/user/1000/gnupg/s.gpg-agent.extra
unix  2      [ ACC ] STREAM    LISTENING    36224   /tmp/.X11-unix/X0
unix  2      [ ACC ] STREAM    LISTENING    35239   /run/user/1000/gnupg/s.gpg-agent.ssh
unix  2      [ ACC ] STREAM    LISTENING    35240   /run/user/1000/gnupg/s.gpg-agent
unix  2      [ ACC ] STREAM    LISTENING    35241   /run/user/1000/pk-debconf-socket
unix  2      [ ACC ] STREAM    LISTENING    35242   /run/user/1000/pulse/native
unix  2      [ ACC ] STREAM    LISTENING    35243   /run/user/1000/snapd-session-agent.socket
unix  2      [ ACC ] STREAM    LISTENING    35829   @/tmp/dbus-qfghRMTNDB
unix  2      [ ACC ] STREAM    LISTENING    32476   /run/user/1000/keyring/control
unix  2      [ ACC ] STREAM    LISTENING    36364   /tmp/ssh-8tWXSrWlHg4V/agent.1323
unix  2      [ ACC ] STREAM    LISTENING    37121   @/home/farsana/.cache/ibus/dbus-s0abbGsv
unix  2      [ ACC ] STREAM    LISTENING    36223   @/tmp/.X11-unix/X0
unix  2      [ ACC ] STREAM    LISTENING    37943   /tmp/.ICE-unix/1433
unix  2      [ ACC ] STREAM    LISTENING    36964   /run/user/1000/keyring/pkcs11
```

5 more network commands

1.arp

Displays and modifies entries in the Address Resolution Protocol (ARP) cache, which contains one or more tables that are used to store IP addresses and their resolved Ethernet or Token Ring physical addresses. There is a separate table for each Ethernet or Token Ring network adapter installed on your computer.

```
C:\Users\gafoor>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.
        Same as -a.
-g      Displays current ARP entries in verbose mode. All invalid
        entries and entries on the loop-back interface will be shown.
-v      Specifies an Internet address.
inet_addr Displays the ARP entries for the network interface specified
        by if_addr.
-N if_addr
-d      Deletes the host specified by inet_addr. inet_addr may be
        wildcarded with * to delete all hosts.
-s      Adds the host and associates the Internet address inet_addr
        with the Physical address eth_addr. The Physical address is
        given as 6 hexadecimal bytes separated by hyphens. The entry
        is permanent.
eth_addr Specifies a physical address.
if_addr  If present, this specifies the Internet address of the
        interface whose address translation table should be modified.
        If not present, the first applicable interface will be used.

Example:
> arp -s 157.55.85.212 00-aa-00-62-c6-09 .... Adds a static entry.
> arp -a .... Displays the arp table.
```

2.Nbstat

Displays NetBIOS over TCP/IP (NetBT) protocol statistics

NetBIOS name tables for both the local computer and remote computers, and the NetBIOS name cache. Nbtstat allows a refresh of the NetBIOS name cache and the names registered with Windows Internet Name Service (WINS).

Nbtstat command-line parameters are case-sensitive.

```

C:\Users\gafoor>nbstat

Displays protocol statistics and current TCP/IP connections using NBT
(NetBIOS over TCP/IP).

NBTSTAT [ [-a RemoteName] [-A IP address] [-c] [-n]
          [-r] [-R] [-RR] [-s] [-S] [interval] ]

-a (adapter status) Lists the remote machine's name table given its name
-A (Adapter status) Lists the remote machine's name table given its
                      IP address.
-c (cache)           Lists NBT's cache of remote [machine] names and their IP addresses
-n (names)           Lists local NetBIOS names.
-r (resolved)        Lists names resolved by broadcast and via WINS
-R (Reload)          Purges and reloads the remote cache name table
-S (Sessions)        Lists sessions table with the destination IP addresses
-s (sessions)        Lists sessions table converting destination IP
                      addresses to computer NETBIOS names.
-RR (ReleaseRefresh) Sends Name Release packets to WINS and then, starts Refresh

RemoteName  Remote host machine name.
IP address  Dotted decimal representation of the IP address.
interval    Redisplay selected statistics, pausing interval seconds
            between each display. Press Ctrl+C to stop redisplaying
            statistics.

```

3. winipcfg

This utility allows users or administrators to see the current IP address and other useful information about your network configuration. You can reset one or more IP addresses. The Release or Renew buttons allow you to release or renew one IP address. If you want to release or renew all IP addresses click Release All or Renew All. When one of these buttons is clicked, a new IP address is obtained from either the DHCP service or from the computer assigning itself an automatic private IP address. To use the winipcfg utility:

Click Start, and then click Run and type winipcfg

Click More Info.

- To see the addresses of the DNS servers the computer is configured to use, click the ellipsis (...) button to the right of DNS Servers.
- To see address information for your network adapter(s), select an adapter from the list in Ethernet Adapter Information.

4. hostname

it simply displays the computer's host name. For example:

```

C:\Users\gafoor>hostname
DESKTOP-05GE70G

```

5. getmac

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

```
PC:\Users\gafoor>getmac

Physical Address      Transport Name
-----
2C-FD-A1-AA-C3-A3    Media disconnected
98-22-EF-32-5E-09    Media disconnected
98-22-EF-32-9F-1D    Media disconnected
```

Install Apache

- Update your system
`sudo apt update`
- Install Apache using apt:
`sudo apt install apache2`
- Confirm that Apache is now running with the following command:
`sudo systemctl status apache2`
- if it is not working
`sudo systemctl start apache2`

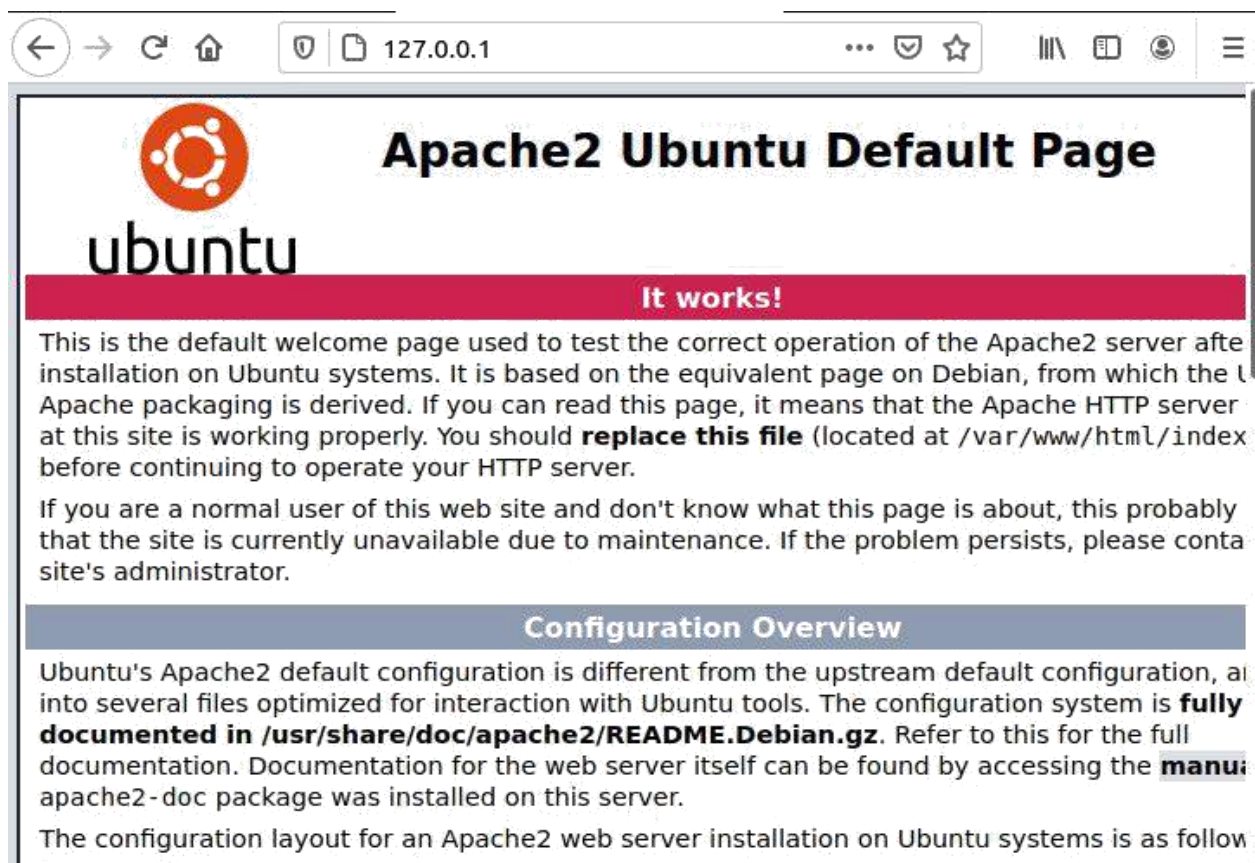
```
farsana@farsana-X541NA:~$ sudo systemctl status apache2
[sudo] password for farsana:
● apache2.service - The Apache HTTP Server
   Loaded: loaded (/lib/systemd/system/apache2.service; enabled; vendor preset: enabled)
   Active: active (running) since Thu 2021-09-30 20:16:02 IST; 3min 1s ago
     Docs: https://httpd.apache.org/docs/2.4/
   Process: 825 ExecStart=/usr/sbin/apachectl start (code=exited, status=0/SUCCESS)
  Main PID: 983 (apache2)
    Tasks: 6 (limit: 4496)
   Memory: 20.5M
    CGroup: /system.slice/apache2.service
            └─ 983 /usr/sbin/apache2 -k start
               1009 /usr/sbin/apache2 -k start
               1010 /usr/sbin/apache2 -k start
               1011 /usr/sbin/apache2 -k start
               1012 /usr/sbin/apache2 -k start
               1013 /usr/sbin/apache2 -k start

Sep 30 20:15:53 farsana-X541NA systemd[1]: Starting The Apache HTTP Server...
Sep 30 20:16:02 farsana-X541NA apachectl[869]: AH00557: apache2: apr_sockaddr_info_get() failed
Sep 30 20:16:02 farsana-X541NA apachectl[869]: AH00558: apache2: Could not reliably determine the server's fully qualified domain name, using 127.0.0.1. Set the 'ServerName' directive globally to suppress this message
Sep 30 20:16:02 farsana-X541NA systemd[1]: Started The Apache HTTP Server.
lines 1-20/20 (END) ...skipping...
● apache2.service - The Apache HTTP Server
```

- Once installed, test by accessing your server's IP in your browser:

http://youripaddress

(find out your ip address using ifconfig)



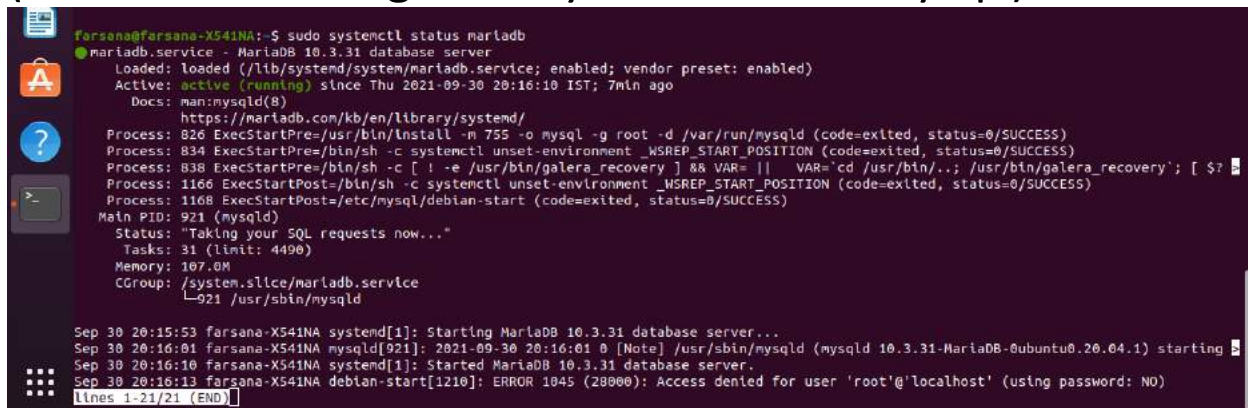
Install MariaDB

- Install mariaDB

`sudo apt install mariadb-server mariadb-client`

- Check mariadb Installatio
- `sudo systemctl status mysql`

(if it is not working `sudo systemctl start mysql`)



```
farsana@farsana-X541NA:~$ sudo systemctl status mariadb
● mariadb.service - MariaDB 10.3.31 database server
   Loaded: loaded (/lib/systemd/system/mariadb.service; enabled; vendor preset: enabled)
   Active: active (running) since Thu 2021-09-30 20:16:10 IST; 7min ago
     Docs: man:mysqld(8)
           https://mariadb.com/kb/en/library/systemd/
   Process: 826 ExecStartPre=/usr/bin/install -m 755 -o mysql -g root -d /var/run/mysqld (code=exited, status=0/SUCCESS)
   Process: 834 ExecStartPre=/bin/sh -c systemctl unset-environment _WSREP_START_POSITION (code=exited, status=0/SUCCESS)
   Process: 838 ExecStartPre=/bin/sh -c [ ! -e /usr/bin/galera_recovery ] && VAR= || VAR='cd /usr/bin/..; /usr/bin/galera_recovery'; [ $?
   Process: 1166 ExecStartPost=/bin/sh -c systemctl unset-environment _WSREP_START_POSITION (code=exited, status=0/SUCCESS)
   Process: 1168 ExecStartPost=/etc/mysql/debian-start (code=exited, status=0/SUCCESS)
  Main PID: 921 (mysqld)
    Status: "Taking your SQL requests now..."
     Tasks: 31 (limit: 4490)
   Memory: 107.0M
   CGroup: /system.slice/mariadb.service
           └─921 /usr/sbin/mysqld

Sep 30 20:15:53 farsana-X541NA systemd[1]: Starting MariaDB 10.3.31 database server...
Sep 30 20:16:01 farsana-X541NA mysqld[921]: 2021-09-30 20:16:01 0 [Note] /usr/sbin/mysqld (mysqld 10.3.31-MariaDB-0ubuntu0.20.04.1) starting
Sep 30 20:16:10 farsana-X541NA systemd[1]: Started MariaDB 10.3.31 database server.
Sep 30 20:16:13 farsana-X541NA debian-start[1210]: ERROR 1045 (28000): Access denied for user 'root'@'localhost' (using password: NO)
lines 1-21/21 (END)
```


Install PHP and commonly used modules

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

- Restart apache2
 - sudo systemctl restart apache2
- Now you can check php installation

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

- /dev/null
- Open a browser
 - <http://127.0.0.1/phpinfo.php>

```

farsana@farsana-X541NA:~$ sudo systemctl status mariadb
● mariadb.service - MariaDB 10.3.31 database server
   Loaded: loaded (/lib/systemd/system/mariadb.service; enabled; vendor preset: enabled)
   Active: active (running) since Thu 2021-09-30 20:16:10 IST; 7min ago
     Docs: man:mysqld(8)
           https://mariadb.com/kb/en/library/systemd/
   Process: 826 ExecStartPre=/usr/bin/install -m 755 -o mysql -g root -d /var/run/mysqld (code=exited, status=0/SUCCESS)
   Process: 834 ExecStartPre=/bin/sh -c systemctl unset-environment _WSREP_START_POSITION (code=exited, status=0/SUCCESS)
   Process: 838 ExecStartPre=/bin/sh -c [ ! -e /usr/bin/galera_recovery ] && VAR= || VAR=`cd /usr/bin/..; /usr/bin/galera_recovery`; [ $? =
   Process: 1166 ExecStartPost=/bin/sh -c systemctl unset-environment _WSREP_START_POSITION (code=exited, status=0/SUCCESS)
   Process: 1168 ExecStartPost=/etc/mysql/debian-start (code=exited, status=0/SUCCESS)
 Main PID: 921 (mysqld)
   Status: "Taking your SQL requests now..."
    Tasks: 31 (limit: 4496)
  Memory: 107.0M
   CGroup: /system.slice/mariadb.service
           └─921 /usr/sbin/mysqld

Sep 30 20:15:53 farsana-X541NA systemd[1]: Starting MariaDB 10.3.31 database server...
Sep 30 20:16:01 farsana-X541NA mysqld[921]: 2021-09-30 20:16:01 0 [Note] /usr/sbin/mysqld (mysqld 10.3.31-MariaDB-0ubuntu0.20.04.1) starting
Sep 30 20:16:10 farsana-X541NA systemd[1]: Started MariaDB 10.3.31 database server.
Sep 30 20:16:13 farsana-X541NA debian-start[1210]: ERROR 1045 (28000): Access denied for user 'root'@'localhost' (using password: NO)

farsana@farsana-X541NA:~$ php -v
PHP 7.4.3 (cli) (built: Jul  5 2021 15:13:35) ( NTS )
Copyright (c) The PHP Group
Zend Engine v3.4.0, Copyright (c) Zend Technologies
    with Zend OPcache v7.4.3, Copyright (c), by Zend Technologies
farsana@farsana-X541NA:~$

```

PHP Version 7.4.3



System	Linux farsana-X541NA 5.8.0-43-generic #49~20.04.1-Ubuntu SMP Fri Feb 5 09:57:56 UTC 2021 x86_64
Build Date	Jul 5 2021 15:13:35
Server API	Apache 2.0 Handler
Virtual Directory Support	disabled
Configuration File (php.ini) Path	/etc/php/7.4/apache2
Loaded Configuration File	/etc/php/7.4/apache2/php.ini
Scan this dir for additional .ini files	/etc/php/7.4/apache2/conf.d
Additional .ini files parsed	/etc/php/7.4/apache2/conf.d/10-mysqlnd.ini, /etc/php/7.4/apache2/conf.d/10-opcache.ini, /etc/php/7.4/apache2/conf.d/10-pdo.ini, /etc/php/7.4/apache2/conf.d/15-xml.ini, /etc/php/7.4/apache2/conf.d/20-bz2.ini, /etc/php/7.4/apache2/conf.d/20-calendar.ini, /etc/php/7.4/apache2/conf.d/20-ctype.ini, /etc/php/7.4/apache2/conf.d/20-curl.ini, /etc/php/7.4/apache2/conf.d/20-dom.ini, /etc/php/7.4/apache2/conf.d/20-ffi.ini, /etc/php/7.4/apache2/conf.d/20-fileinfo.ini, /etc/php/7.4/apache2/conf.d/20-ftp.ini, /etc/php/7.4/apache2/conf.d/20-gd.ini, /etc/php/7.4/apache2/conf.d/20-gettext.ini, /etc/php/7.4/apache2/conf.d/20-iconv.ini, /etc/php/7.4/apache2/conf.d/20-json.ini, /etc/php/7.4/apache2/conf.d/20-mbstring.ini, /etc/php/7.4/apache2/conf.d/20-mysqli.ini, /etc/php/7.4/apache2/conf.d/20-pdo_mysql.ini, /etc/php/7.4/apache2/conf.d/20-phar.ini, /etc/php/7.4/apache2/conf.d/20-posix.ini, /etc/php/7.4/apache2/conf.d/20-readline.ini, /etc/php/7.4/apache2/conf.d/20-shmop.ini, /etc/php/7.4/apache2/conf.d/20-simplexml.ini, /etc/php/7.4/apache2/conf.d/20-sockets.ini, /etc/php/7.4/apache2/conf.d/20-sysmsg.ini, /etc/php/7.4/apache2/conf.d/20-syssem.ini, /etc/php/7.4/apache2/conf.d/20-sysshm.ini, /etc/php/7.4/apache2/conf.d/20-tokenizer.ini, /etc/php/7.4/apache2/conf.d/20-xmlreader.ini, /etc/php/7.4/apache2/conf.d/20-xmlwriter.ini, /etc/php/7.4/apache2/conf.d/20-xsl.ini, /etc/php/7.4/apache2/conf.d/20-zip.ini
PHP API	20190902
PHP Extension	20190902
Zend Extension	320190902
Zend Extension Build	API320190902.NTS
PHP Extension Build	API20190902.NTS

Install phpmyadmin

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

(It asks for webserver select apache2, select db-configuration and set

password)

- Restart apache2

```
sudo systemctl restart apache2
```

- Check phpmyadmin

Open a browser

<http://localhost/phpmyadmin>

username : root

password : yourpassword

