
**20MCA136 – NETWORKING & SYSTEM
ADMINISTRATION
LAB RECORD**

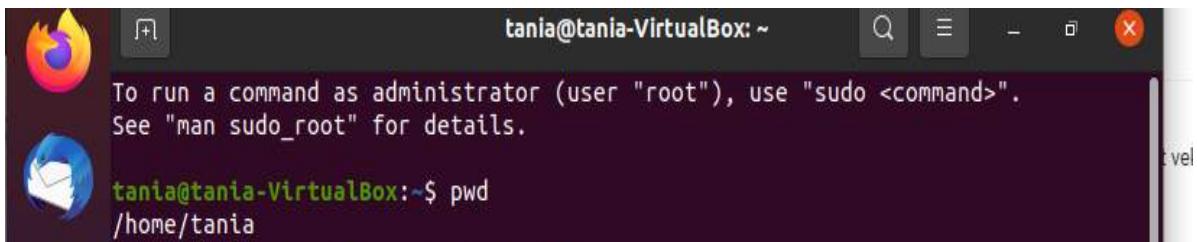
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1. pwd (Print Working Directory)

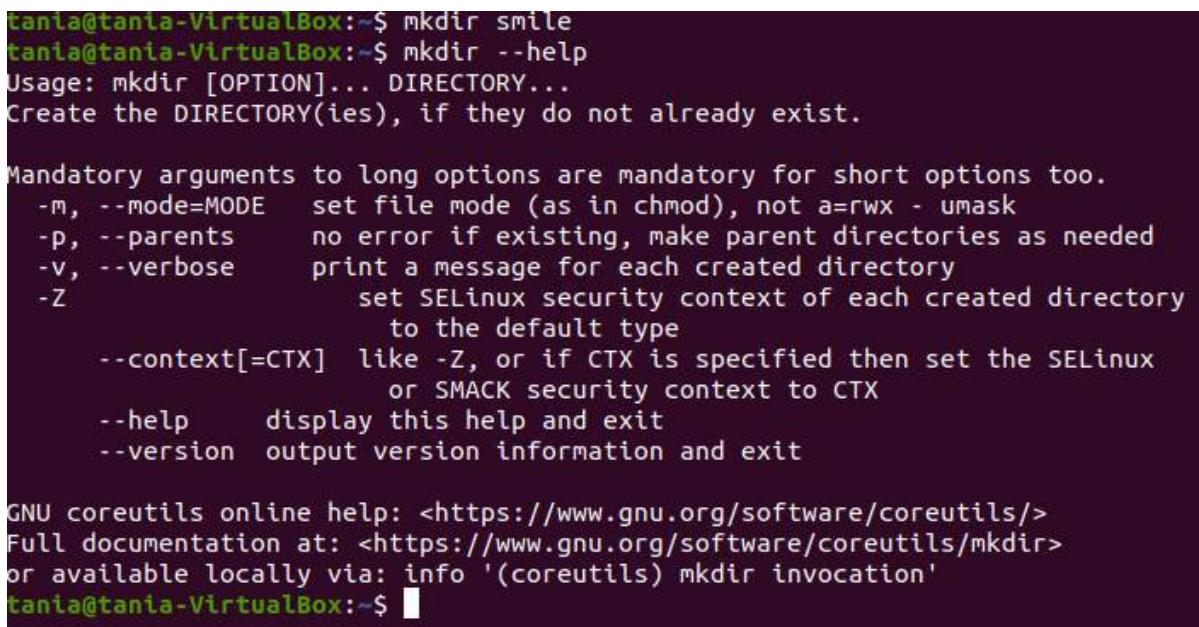
The `pwd` command to find out the path of the current working directory (folder) you're in. The command will return an absolute (full) path, which is basically a path of all the directories that starts with a forward slash (/).



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

2.mkdir

- Use `mkdir` command to make a new directory. To generate a new directory inside another directory, use this Linux basic command `mkdir Music/Newfile`



```
tania@tania-VirtualBox:~$ mkdir smile
tania@tania-VirtualBox:~$ mkdir --help
Usage: mkdir [OPTION]... DIRECTORY...
Create the DIRECTORY(ies), if they do not already exist.

Mandatory arguments to long options are mandatory for short options too.
 -m, --mode=MODE    set file mode (as in chmod), not a=rwx - umask
 -p, --parents      no error if existing, make parent directories as needed
 -v, --verbose      print a message for each created directory
 -Z                 set SELinux security context of each created directory
                   to the default type
 --context[=CTX]   like -Z, or if CTX is specified then set the SELinux
                   or SMACK security context to CTX
 --help            display this help and exit
 --version         output version information and exit

GNU coreutils online help: <https://www.gnu.org/software/coreutils/>
Full documentation at: <https://www.gnu.org/software/coreutils/mkdir>
or available locally via: info '(coreutils) mkdir invocation'
tania@tania-VirtualBox:~$
```



```
tania@tania-VirtualBox:~$ Written by David MacKenzie.
tania@tania-VirtualBox:~$ mkdir -v sample
mkdir: created directory 'sample'
tania@tania-VirtualBox:~$ mkdir sample/exm1
tania@tania-VirtualBox:~$ mkdir -p sample/2020/exm1
```

3. history

- When you have been using Linux for a certain period of time, you will quickly notice that you can run hundreds of commands every day. As such, running history command is particularly useful if you want to review the commands you have entered before.

```
tania@tania-VirtualBox:~$ history
 1  pwd
 2  pwd
 3  mkdir songs
 4  mkdir --version
 5  mkdir --help
 6  mkdir -v[directories]
 7  mkdir -v[DIRECTORIES]
 8  mkdir -v songs
 9  mkdir songs/Newfile
10  mkdir -v songs
11  mkdir -v music
12  mkdir songs/sing
13  mkdir -p songs/poem/sing
14  history
15  pwd
16  mkdir smile
17  mkdir --help
18  mkdir --version
19  mkdir -v sample
20  mkdir sample/exm1
21  mkdir -p sample/2020/exm1
22  history
tania@tania-VirtualBox:~$
```

4. ls

- 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 are variations you can use with the ls command:

- **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. Usually used in combination with other switches such as **ls -tr**. This will reverse the time-wise listing.

```
tania@tania-VirtualBox:~$ ls
Desktop  Downloads  Pictures  sample  snap      Videos
Documents  Music    Public    smile    Templates
tania@tania-VirtualBox:~$ ls -t
sample  Desktop  Documents  Music    Public    Videos
smile   snap     Downloads  Pictures  Templates
tania@tania-VirtualBox:~$ ls -l
total 44
drwxr-xr-x 4 tania tania 4096 Jun 14 09:24 Desktop
drwxr-xr-x 2 tania tania 4096 Jun  7 23:56 Documents
drwxr-xr-x 2 tania tania 4096 Jun  7 23:56 Downloads
drwxr-xr-x 2 tania tania 4096 Jun  7 23:56 Music
drwxr-xr-x 2 tania tania 4096 Jun  7 23:56 Pictures
drwxr-xr-x 2 tania tania 4096 Jun  7 23:56 Public
drwxrwxr-x 4 tania tania 4096 Jun 14 21:43 sample
drwxrwxr-x 2 tania tania 4096 Jun 14 21:31 smile
drwxr-xr-x 3 tania tania 4096 Jun  8 16:25 snap
drwxr-xr-x 2 tania tania 4096 Jun  7 23:56 Templates
drwxr-xr-x 2 tania tania 4096 Jun  7 23:56 Videos
tania@tania-VirtualBox:~$ ls -a
.          .bashrc  Documents  Music    sample  Templates
..         .cache   Downloads  Pictures  smile   Videos
.bash_history .config  .gnupg   .profile  snap
.bash_logout  Desktop  .local   Public    .ssh
tania@tania-VirtualBox:~$
```

5. cd

- To navigate through the Linux files and directories, use the **cd**. It requires either the full path or the name of the directory, depending on the current working directory that you're in.

```
tania@tania-VirtualBox:~$ cd sample
tania@tania-VirtualBox:~/sample$ cd ..
tania@tania-VirtualBox:~$ touch demo.txt
```

6. touch

- The touch command allows you to create a blank new file through the Linux command line.

```
tania@tania-VirtualBox:~$ touch demo.txt
```

7. man

- Confused about the function of certain Linux commands? Don't worry, you can easily learn how to use them right from Linux's shell by using the man command. For instance, entering man tail will show the manual instruction of the tail command

```
TOUCH(1)                               User Commands                TOUCH(1)

NAME
    touch - change file timestamps

SYNOPSIS
    touch [OPTION]... FILE...

DESCRIPTION
    Update the access and modification times of each FILE to the current
    time.

    A FILE argument that does not exist is created empty, unless -c or -h
    is supplied.

    A FILE argument string of - is handled specially and causes touch to
    change the times of the file associated with standard output.

    Mandatory arguments to long options are mandatory for short options
    too.

    -a      change only the access time

    -c, --no-create
        do not create any files

    -d, --date=STRING
        parse STRING and use it instead of current time
Manual page touch(1) line 1/84 28% (press h for help or q to quit)
```

8. rmdir

- If you need to delete a directory, use the rmdir command. However, rmdir only allows you to delete empty directories.

```
tania@tania-VirtualBox:~$ rmdir smile  
tania@tania-VirtualBox:~$ █
```

9. rm

- The rm command is used to delete directories and the contents within them. If you only want to delete the directory — as an alternative to rmdir — use

```
tania@tania-VirtualBox:~$ rm anju  
tania@tania-VirtualBox:~$ █
```

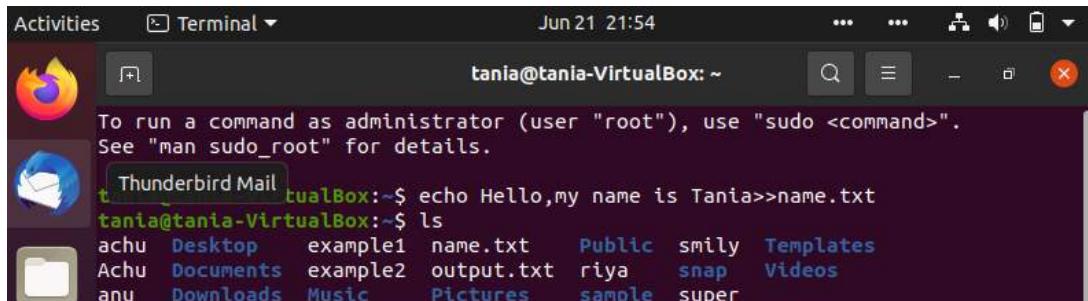
10. cat

- cat (short for concatenate) is one of the most frequently used commands in Linux. It is used to list the contents of a file on the standard output stdout . To run this command, type cat followed by the file's name and its extension. For instance: cat file.txt.

```
tania@tania-VirtualBox:~$ cat > anju  
r Files  
liya  
roshmi  
^C  
tania@tania-VirtualBox:~$ cat > anu  
hi  
mouse  
hello  
^C  
tania@tania-VirtualBox:~$ cat anu anju>riya  
tania@tania-VirtualBox:~$ cat riya  
hi  
mouse  
hello  
rahi  
liya  
roshmi  
tania@tania-VirtualBox:~$ cat anu | tr a-z A-Z >Achu  
tania@tania-VirtualBox:~$ cat Achu  
HI  
MOUSE  
HELLO
```

1.echo

echo command is used to move some data into a file .You would type echo
Hello, my name is John>> name.txt

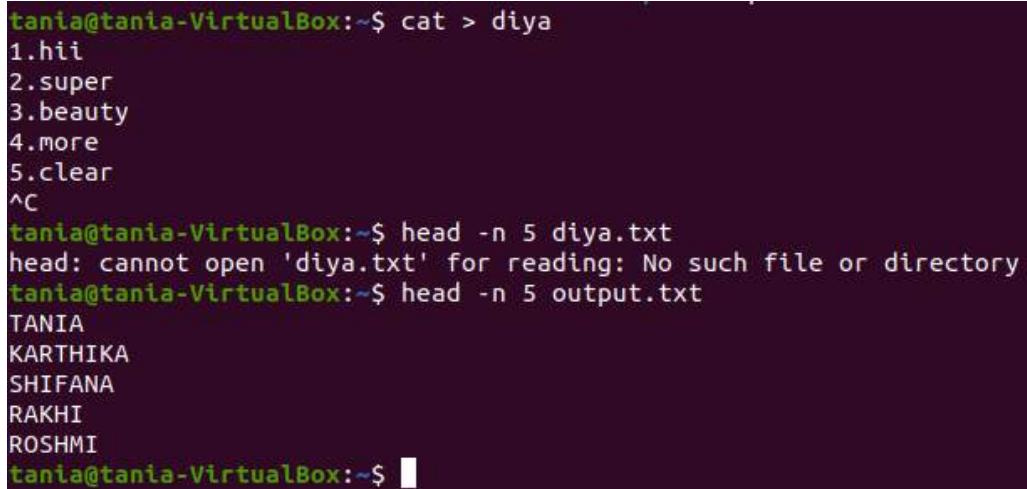


A screenshot of a Linux desktop environment showing a terminal window. The terminal window title is "tania@tania-VirtualBox: ~". The terminal content shows the user running the "echo" command to create a file named "name.txt" containing the text "Hello, my name is Tania". The user then runs the "ls" command to list files in the directory, showing files like "Desktop", "example1", "name.txt", "Public", "smily", "Templates", "Achu", "Documents", "example2", "output.txt", "riya", "snap", "Videos", "anu", "Downloads", "Music", "Pictures", "sample", and "super".

```
tania@tania-VirtualBox:~$ echo Hello, my name is Tania>>name.txt
tania@tania-VirtualBox:~$ ls
achu Desktop example1 name.txt Public smily Templates
Achu Documents example2 output.txt riya snap Videos
anu Downloads Music Pictures sample super
```

2. head

- The head command is used to view the first lines of any text file .By default, it will show the first ten lines, but you can change this number to your liking



A screenshot of a Linux terminal window showing the use of the "head" command. The user first creates a file named "diya" using the "cat >" command, entering several lines of text. Then, they attempt to run "head -n 5 diya.txt", which fails because the file does not exist. Finally, they run "head -n 5 output.txt", which displays the first five lines of the "output.txt" file.

```
tania@tania-VirtualBox:~$ cat > diya
1.hii
2.super
3.beauty
4.more
5.clear
^C
tania@tania-VirtualBox:~$ head -n 5 diya.txt
head: cannot open 'diya.txt' for reading: No such file or directory
tania@tania-VirtualBox:~$ head -n 5 output.txt
TANIA
KARTHIKA
SHIFANA
RAKHI
ROSHMI
tania@tania-VirtualBox:~$
```

3. tail

- This one has a similar function to the head command, but instead of showing the first lines, the tail command will display the last ten lines of a text file

.tail n filename txt

```
tania@tania-VirtualBox:~$ tail -6 muthuu
yellow
blue
white
sandle
candle
bright
tania@tania-VirtualBox:~$
```

4. read

- read the contents of a line into a variable
- The read command can be used with and without arguments
- read command is used to read [options][name]
- \$read
- \$readvar1var2var3
- \$echo"[\$var1][\$var2][\$var3]"

```
tania@tania-VirtualBox:~$ read
hello world
tania@tania-VirtualBox:~$ read v1 v2 v3
h Thunderbird Mail tualBox:~$ echo [$v1] [$v2] [$v3]
[hai] [he] [how]
tania@tania-VirtualBox:~$ cat > muthuu
hii
great
sooper
nice
rose
orange
red
yellow
blue
white
sandle
candle
bright
^C
```

5. more

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

.Enter key To scroll down page line by line

```
tania@tania-VirtualBox:~$ more seban
1
2
3
4
5
6
7
8
9
10
11
12
13
14
15
16
tania@tania-VirtualBox:~$ █
```

6. less

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

• **less<filename>**

• **\$less/etc/passwd**

7. cut

The cut command is used for cutting out the sections from each line of files and writing the result to standard output It can be used to cut parts of a line by byte position,character and field

```
tania@tania-VirtualBox:~$ cut -b 1,2,3 diya
1.h
2.s
3.b
4.m
5.c
tania@tania-VirtualBox:~$
```

8.paste

- 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

.paste[OPTION]...[FILES]...

•\$pastestate.txtcapital.txt

```
tania@tania-VirtualBox:~$ paste seban muthuu
1      hii
2      great
3      sooper
4      nice
5      rose
6      orange
7      red
8      yellow
9      blue
10     white
11     sandle
12     candle
13     bright
14
15
16
tania@tania-VirtualBox:~$ paste seban muthuu diya
1      hii      1.hii
2      great    2.super
3      sooper   3.beauty
4      nice     4.more
5      rose     5.clear
6      orange
7      red
8      yellow
9      blue
10     white
11     sandle
```

9.uname

- The uname command, short for Unix Name, will print detailed information about

your Linux system like the machine name, operating system, kernel, and so on

- \$uname

- \$uname-r

```
tania@tania-VirtualBox:~$ uname  
Linux  
tania@tania-VirtualBox:~$ uname -r  
5.8.0-43-generic  
tania@tania-VirtualBox:~$
```

10.cp

- cp command is used to copy files from the current directory to a different directory For instance, the command cp scenery jpg /home/username/Pictures would create a copy of scenery jpg (from your current directory) into the Pictures directory

- cp -i will ask for user's consent in case of a potential file overwrite

- cp -p will preserve source files' mode, ownership and timestamp
- cp -r will copy directories recursively

- cp -u copies files only if the destination file is not existing or the source file is newerthan the destination file

```
or available locally via: info '(coreutils) cp invocation'
tania@tania-VirtualBox:~$ cp muthuu -i
cp: missing destination file operand after 'muthuu'
Try 'cp --help' for more information.
tania@tania-VirtualBox:~$ cp -2 muthuu -i
cp: invalid option -- '2'
Try 'cp --help' for more information.
tania@tania-VirtualBox:~$ cp da.txt diya/
cp: failed to access 'diya/': Not a directory
tania@tania-VirtualBox:~$ cp da.txt sample/
cp: cannot stat 'da.txt': No such file or directory
tania@tania-VirtualBox:~$ cp music sample/
cp: cannot stat 'music': No such file or directory
tania@tania-VirtualBox:~$ cp Music sample/
cp: -r not specified; omitting directory 'Music'
tania@tania-VirtualBox:~$ touch da.txt da1.txt
tania@tania-VirtualBox:~$ ls
achu    da.txt    Downloads  muthuu      Public  sebastian  Templates
Achu    Desktop   example1  name.txt    riya    smily     Videos
anu     diya     example2  output.txt  sample   snap
da1.txt  Documents Music    Pictures   seban    super
tania@tania-VirtualBox:~$ ls ajce
ls: cannot access 'ajce': No such file or directory
tania@tania-VirtualBox:~$ ls sample
2020  exm1
tania@tania-VirtualBox:~$ cp da.txt sample/
tania@tania-VirtualBox:~$ ls sample
2020  da.txt  exm1
tania@tania-VirtualBox:~$
```

11.mv

- The primary use of the mv command is to move files, it can also be used to rename

files The arguments in mv are similar to the cp command You need to type mv, the

file's name, and the destination's directory

•mv file txt /home/username/Documents

•To rename files, the Linux is mv oldname ext newname ext

```
tania@tania-VirtualBox:~$ mv diya kripa
tania@tania-VirtualBox:~$ ls
achu    da.txt    example1  muthuu      Public  sebastian  Templates
Achu    Desktop   example2  name.txt    riya    smily     Videos
anu    Documents kripa    output.txt  sample  snap
da1.txt  Downloads Music    Pictures   seban   super
tania@tania-VirtualBox:~$ mv kripa /home/username/Documents
mv: cannot move 'kripa' to '/home/username/Documents': No such file or directory
tania@tania-VirtualBox:~$ mv kripa /sample/
mv: cannot move 'kripa' to '/sample/': Not a directory
tania@tania-VirtualBox:~$ mv kripa sample
tania@tania-VirtualBox:~$ ls sample
2020  da.txt  exm1  kripa
tania@tania-VirtualBox:~$
```

12.locate

- To locate a file, just like the search command in Windows
- What's more, using the i argument along with this command will make it case insensitive, so you can search for a file even if you don't remember its exact name
- To search for a file that contains two or more words, use an asterisk
- For example, locate i school*note command will search for any file that contains the word “ and “ whether it is uppercase or lowercase

```
Need to get 50.1 kB of archives.  
After this operation, 258 kB of additional disk space will be used.  
G Files http://in.archive.ubuntu.com/ubuntu focal/main amd64 mlocate  
ubuntu3 [50.1 kB]  
Fetched 50.1 kB in 6s (8,983 B/s)  
Selecting previously unselected package mlocate.  
(Reading database ... 144996 files and directories currently installed)  
Preparing to unpack .../mlocate_0.26-3ubuntu3_amd64.deb ...  
Unpacking mlocate (0.26-3ubuntu3) ...  
Setting up mlocate (0.26-3ubuntu3) ...  
update-alternatives: using /usr/bin/mlocate to provide /usr/bin/locate  
in auto mode  
Adding group `mlocate' (GID 133) ...  
Done.  
Initializing mlocate database; this may take some time... done  
Processing triggers for man-db (2.9.1-1) ...  
tania@tania-VirtualBox:~$ locate -i blue*orange  
tania@tania-VirtualBox:~$ ls  
achu da.txt example1 name.txt riya smily Vt  
Achu Desktop example2 output.txt sample snap  
anu Documents Music Pictures seban super  
da1.txt Downloads muthuu Public sebastian Templates  
tania@tania-VirtualBox:~$ locate achu  
/home/tania/achu  
tania@tania-VirtualBox:~$ locate kripa  
/home/tania/sample/kripa  
tania@tania-VirtualBox:~$
```

13.find

- Similar to the locate command, using find also searches for files and directories
- The difference is, you use the find command to locate files within a given directory
- As an example, find / name notes txt command will search for a file called notes txt within the home directory and its subdirectories
- Other variations when using the find are
 - To find files in the current directory use, find name notes txt
 - To look for directories use, type d name notes txt

```
tania@tania-VirtualBox:~$ find /home/ -name riya  
/home/tania/riya  
tania@tania-VirtualBox:~$ find /home/ -name seban  
/home/tania/seban  
tania@tania-VirtualBox:~$
```

14.grep

- Another basic Linux command that is undoubtedly helpful for everyday use

Is grep It lets you search through all the text in a given file

- To illustrate, grep blue notepad txt will search for the word blue in the notepad file

Lines that contain the searched word will be displayed fully Usually output of a

previous command is piped into the grep command For example ls | grep “

```
tania@tania-VirtualBox:~$ grep red muthuu  
red  
tania@tania-VirtualBox:~$ grep great muthuu  
great  
tania@tania-VirtualBox:~$
```

15.df

- Use df command to get a report on the system's disk space usage, shown in percentage and KBs If you want to see the report in megabytes, type df -m

```
t@Rhythmbox:~$ df -m
Filesystem      1M-blocks  Used Available Use% Mounted on
udev              462     0      462   0% /dev
tmpfs             99     2      97   2% /run
/dev/sda5        9004   6541    1987  77% /
tmpfs             491     0      491   0% /dev/shm
tmpfs              5     1       5   1% /run/lock
tmpfs             491     0      491   0% /sys/fs/cgroup
/dev/loop1         219    219      0 100% /snap/gnome-3-34-1804/72
/dev/loop0         56     56      0 100% /snap/core18/2066
/dev/loop2         219    219      0 100% /snap/gnome-3-34-1804/66
/dev/loop5          66    66      0 100% /snap/gtk-common-themes/1515
/dev/loop3          56    56      0 100% /snap/core18/1988
/dev/loop6          52    52      0 100% /snap/snap-store/518
/dev/loop4          65    65      0 100% /snap/gtk-common-themes/1514
/dev/loop8          33    33      0 100% /snap/snapd/12057
/dev/sda2         512     1      512   1% /boot/efi
tmpfs             99     1      99   1% /run/user/1000
/dev/loop9          33    33      0 100% /snap/snapd/12159
/dev/loop7          51    51      0 100% /snap/snap-store/547
tania@tania-VirtualBox:~$
```

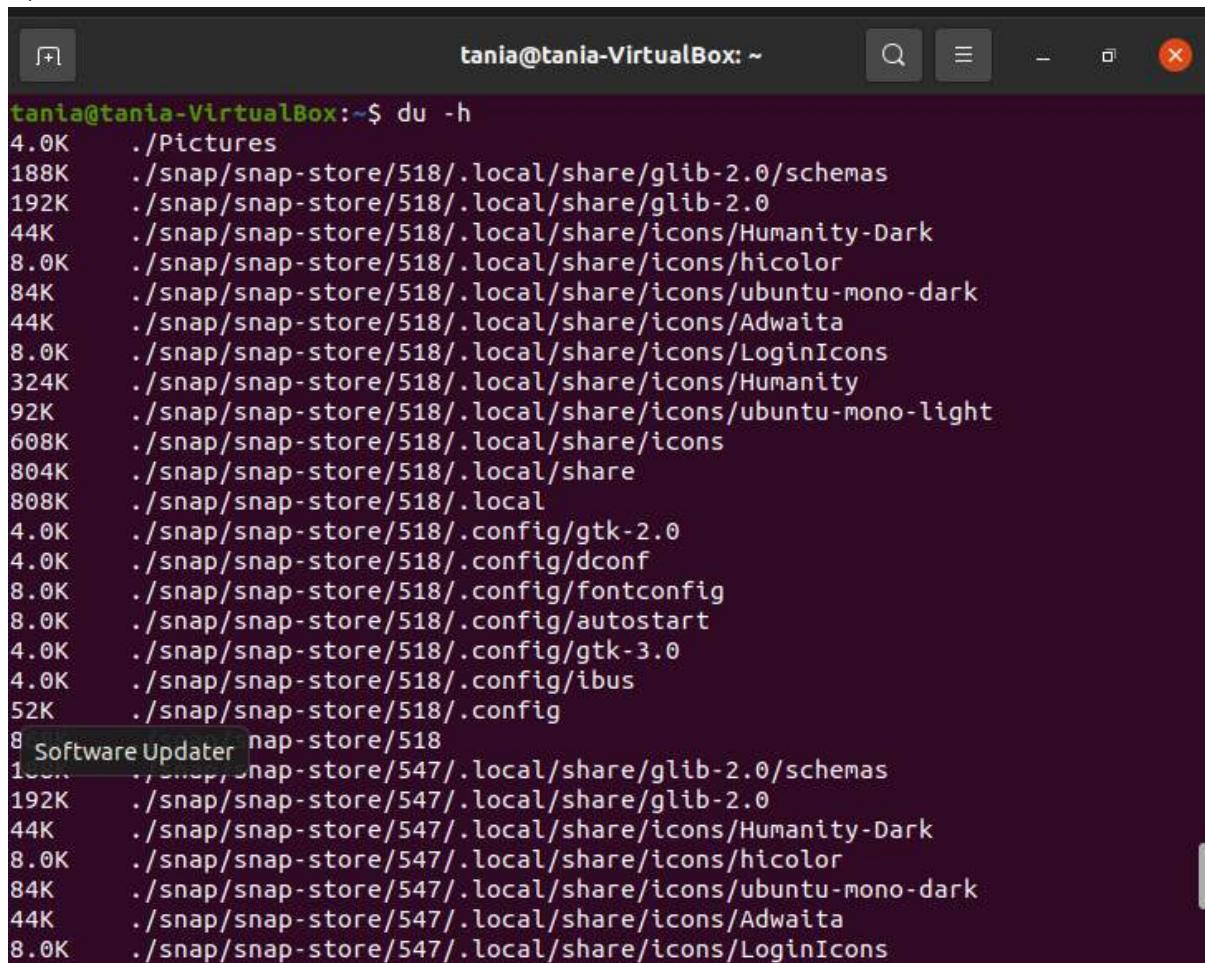
16.du

- If you want to check how much space a file or a directory takes, the du (Disk Usage)

command is the answer However, the disk usage summary will show disk block numbers instead of the usual size format

- If you want to see it in bytes, kilobytes, and megabytes, add the h argument to the command line

• \$du-h



tania@tania-VirtualBox:~\$ du -h

```
4.0K    ./Pictures
188K   ./snap/snap-store/518/.local/share/glib-2.0/schemas
192K   ./snap/snap-store/518/.local/share/glib-2.0
44K    ./snap/snap-store/518/.local/share/icons/Humanity-Dark
8.0K   ./snap/snap-store/518/.local/share/icons/hicolor
84K    ./snap/snap-store/518/.local/share/icons/ubuntu-mono-dark
44K    ./snap/snap-store/518/.local/share/icons/Adwaita
8.0K   ./snap/snap-store/518/.local/share/icons/LoginIcons
324K   ./snap/snap-store/518/.local/share/icons/Humanity
92K    ./snap/snap-store/518/.local/share/icons/ubuntu-mono-light
608K   ./snap/snap-store/518/.local/share/icons
804K   ./snap/snap-store/518/.local/share
808K   ./snap/snap-store/518/.local
4.0K    ./snap/snap-store/518/.config/gtk-2.0
4.0K    ./snap/snap-store/518/.config/dconf
8.0K   ./snap/snap-store/518/.config/fontconfig
8.0K   ./snap/snap-store/518/.config/autostart
4.0K    ./snap/snap-store/518/.config/gtk-3.0
4.0K    ./snap/snap-store/518/.config/ibus
52K    ./snap/snap-store/518/.config
8 Software Updater nap-store/518
192K   ./snap/snap-store/547/.local/share/glib-2.0/schemas
192K   ./snap/snap-store/547/.local/share/glib-2.0
44K    ./snap/snap-store/547/.local/share/icons/Humanity-Dark
8.0K   ./snap/snap-store/547/.local/share/icons/hicolor
84K    ./snap/snap-store/547/.local/share/icons/ubuntu-mono-dark
44K    ./snap/snap-store/547/.local/share/icons/Adwaita
8.0K   ./snap/snap-store/547/.local/share/icons/LoginIcons
```

17.useradd

- This is available only to system admins
- Since Linux is a multi user system, this means more than one person can interact with the same system at the same time
- useradd is used to create a new user, while passwd is adding a password to that user's account To add a new person named John type, useradd John and then to add his password type, passwd 123456789

18.userdel

- Remove a user is very similar to adding a new user To delete the users account type, userdel UserName

19.sudo

- Short for SuperUser Do”, this command enables you to perform tasks that require administrative or root permissions You must have sufficient permissions to use this command
- sudo useradd maria

```
tania@tania-VirtualBox:~$ sudo su -
[sudo] password for tania:
root@tania-VirtualBox:~# useradd achu
useradd: user 'achu' already exists
root@tania-VirtualBox:~# userdel achu
root@tania-VirtualBox:~# exit
logout
tania@tania-VirtualBox:~$ useradd achu
useradd: Permission denied.
useradd: cannot lock /etc/passwd; try again later.
tania@tania-VirtualBox:~$ sudo useradd achu
tania@tania-VirtualBox:~$ useradd achu
useradd: user 'achu' already exists
tania@tania-VirtualBox:~$ sudo userdel achu
tania@tania-VirtualBox:~$ sudo su -
root@tania-VirtualBox:~# useradd achu
root@tania-VirtualBox:~# tail /etc/passwd
hplip:x:119:7:HPLIP system user,,,:/run/hplip:/bin/false
whoopsie:x:120:125::/nonexistent:/bin/false
colord:x:121:126:colord colour management daemon,,,:/var/lib/colord:/usr/sbin/nologin
geoclue:x:122:127::/var/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
tania:x:1000:1000:tania,,,:/home/tania:/bin/bash
systemd-coredump:x:999:999:systemd Core Dumper:/:/usr/sbin/nologin
achu:x:1001:1001:/home/achu:/bin/sh
root@tania-VirtualBox:~# exit
```

20.passwd

- Changes passwords for user accounts
- A normal user may only change the password for their own account, while the superuser may change the password for any account

.passwd[option][username]

•passwd

•passwduser1

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

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

```
tania@tania-VirtualBox:~$ 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/* f
iles
  -s, --shell SHELL         new login shell for the user account
  -u, --uid UID             new UID for the user account
  -U, --unlock               unlock the user account
  -v, --add-subuids FIRST-LAST add range of subordinate uids
  -W, --del-subuids FIRST-LAST remove range of subordinate gids
  -Z, --selinux-user SEUSER   new SELinux user mapping for the user account

tania@tania-VirtualBox:~$ usermod -u 2000 tania
usermod: user tania is currently used by process 740
tania@tania-VirtualBox:~$
```

#usermod -u 2000 Tania

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

```
tania@tania-VirtualBox:~$ sudo groupadd student
[sudo] password for tania:
tania@tania-VirtualBox:~$
```

3. groups - print the groups a user is in

- #groups alice

```
tania@tania-VirtualBox:~$ groups tania
tania : tania 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

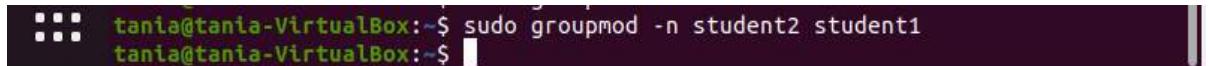
- #groupdel marketing

```
tania@tania-VirtualBox:~$ sudo groupdel student
tania@tania-VirtualBox:~$ sudo groupmod -n student2 student1
```

5. groupmod

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

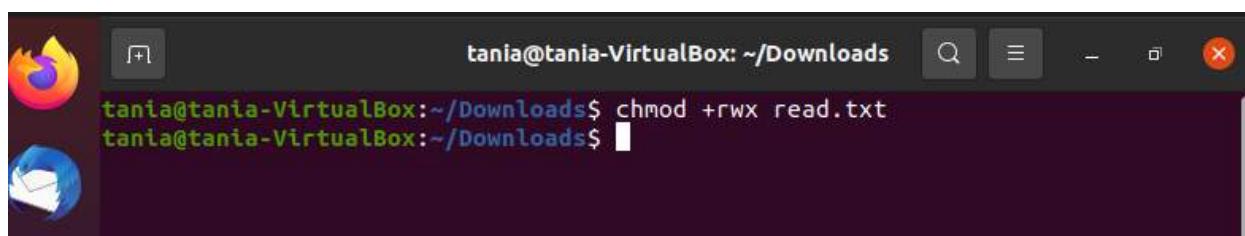
```
# groupmod -n group1 group2
```



```
tania@tania-VirtualBox:~$ sudo groupmod -n student2 student1
tania@tania-VirtualBox:~$
```

6.chmod

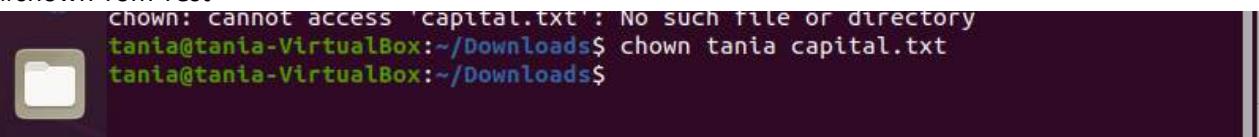
- To change directory permissions of file/ Directory in Linux.
- #chmod whowhatwhich file/directory
- chmod +rwx filename to add permissions.
- chmod -rwx directoryname to remove permissions.
- chmod +x filename to allow executable permissions.
- chmod -wx filename to take out write and executable permissions.
- #chmod u+x test
- #chmod g-rwx test #chmod o-r test 4



7.chown

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

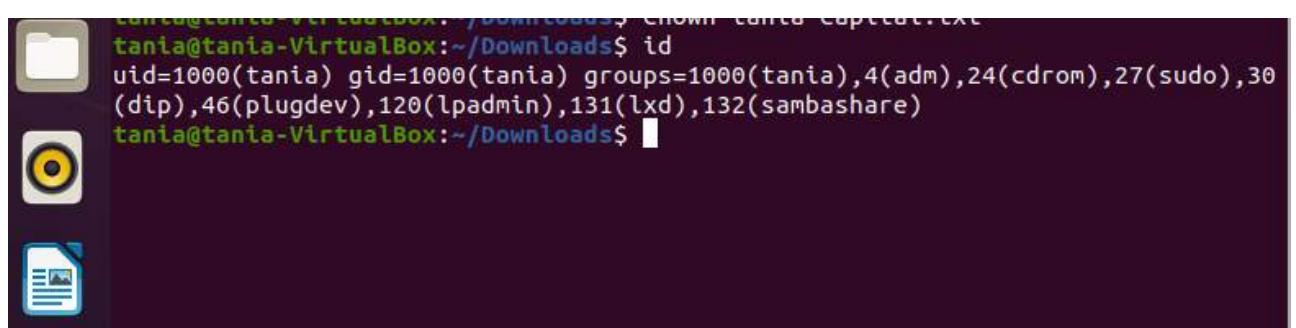
```
#chown Tom Test
```



```
chown: cannot access 'capital.txt': No such file or directory
tania@tania-VirtualBox:~/Downloads$ chown tania capital.txt
tania@tania-VirtualBox:~/Downloads$
```

8.id

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



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 5
```

```
tania@tania-VirtualBox:~/Downloads$ ps -a
  PID TTY      TIME CMD
  785 tty2    00:00:23 Xorg
  888 tty2    00:00:00 gnome-session-b
 1984 pts/0    00:00:00 ps
tania@tania-VirtualBox:~/Downloads$
```

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
```

```
tania@tania-VirtualBox:~/Downloads$ top

top - 23:09:53 up 33 min,  1 user,  load average: 0.09, 0.11, 0.27
Tasks: 169 total,  1 running, 168 sleeping,  0 stopped,  0 zombie
%Cpu(s):  5.1 us,  1.0 sy,  0.0 ni, 93.8 id,  0.0 wa,  0.0 hi,  0.0 si,  0.0 st
MiB Mem :  980.9 total,   108.8 free,   535.5 used,   336.5 buff/cache
MiB Swap:  424.5 total,   306.5 free,   118.0 used.   301.4 avail Mem

      PID USER      PR  NI    VIRT    RES    SHR S %CPU %MEM     TIME+ COMMAND
 1028 tania     20   0 3690392 245076  75984 S  4.6 24.4  1:24.09 gnome-
  777 root      20   0        0      0      0 I  0.3  0.0  0:01.25 kworker+
  962 tania     20   0   6040    456      0 S  0.3  0.0  0:00.03 ssh-ag-
 1384 tania     20   0 505148 32884  23216 S  0.3  3.3  0:00.81 update-
 1920 tania     20   0 823300 49872  37372 S  0.3  5.0  0:03.66 gnome-
```

BASIC LINUX COMMANDS

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
 - #wc state.txt capital.txt
 - wc -l state.txt
 - wc -w state.txt capital.txt
 - wc -c state.txt
 - wc -m state.txt

```
tania@tania-VirtualBox:~/Downloads$ cat >>simple.txt
achu
muth
kunje
tinu
tobina
^C
tania@tania-VirtualBox:~/Downloads$ cat simple.txt
achu
muth
kunje
tinu
tobina
tania@tania-VirtualBox:~/Downloads$ wc simple.txt
 5 5 28 simple.txt
tania@tania-VirtualBox:~/Downloads$ 
tania@tania-VirtualBox:~/Downloads$ wc state.txt simple.txt
4 4 20 state.txt
5 5 28 simple.txt
9 9 48 total
tania@tania-VirtualBox:~/Downloads$ wc -l state.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/kaj/Documents/Kaj_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

```

■ tar commands

```

tania@tania-VirtualBox:~/Downloads$ tar cf archive.tar ab.txt state.txt
tania@tania-VirtualBox:~/Downloads$ ls archive.tar
archive.tar
tania@tania-VirtualBox:~/Downloads$ ls
ab.txt all.tar archive.tar class.txt simple.txt
Achu anu capital.txt read.txt state.txt
tania@tania-VirtualBox:~/Downloads$ tar tf archive.tar
tar: Old option 'f' requires an argument.
Try 'tar --help' or 'tar --usage' for more information.
tania@tania-VirtualBox:~/Downloads$ tar tf archive.tar
ab.txt
state.txt
tania@tania-VirtualBox:~/Downloads$ mkdir Extracted
tania@tania-VirtualBox:~/Downloads$ cd Extracted/
tania@tania-VirtualBox:~/Downloads/Extracted$ pwd
/home/tania/Downloads/Extracted
tania@tania-VirtualBox:~/Downloads/Extracted$ tar xf /home/tania/Downloads/archive.tar
tania@tania-VirtualBox:~/Downloads/Extracted$ ls
ab.txt state.txt
tania@tania-VirtualBox:~/Downloads/Extracted$ 

```

■ Compressing using gz, bz2 and xz

```

Achu anu capital.txt Extracted simple.txt
tania@tania-VirtualBox:~/Downloads$ sudo tar czf mca.tar.gz /etc
[sudo] password for tania:
tar: Removing leading '/' from member names
tania@tania-VirtualBox:~/Downloads$ ls
ab.txt all.tar archive.tar class.txt mca.tar.gz simple.txt
Achu anu capital.txt Extracted read.txt state.txt
tania@tania-VirtualBox:~/Downloads$ sudo tar cjf mcareg.tar.gz /etc
tar: Removing leading '/' from member names
tania@tania-VirtualBox:~/Downloads$ ls
ab.txt all.tar archive.tar class.txt mcareg.tar.gz read.txt state.txt
Achu anu capital.txt Extracted mca.tar.gz simple.txt
tania@tania-VirtualBox:~/Downloads$ sudo tar cjf mcareg.tar.bz2 abc.txt
tar: abc.txt: Cannot stat: No such file or directory
tar: Exiting with failure status due to previous errors
tania@tania-VirtualBox:~/Downloads$ cat >>cd
tty
uio
kol
^C
tania@tania-VirtualBox:~/Downloads$ sudo tar cjf mcareg.tar.bz2 ab.txt cd.txt
tar: cd.txt: Cannot stat: No such file or directory
tar: Exiting with failure status due to previous errors
tania@tania-VirtualBox:~/Downloads$ sudo tar cjf mcareg.tar.bz2 ab.txt cd
tania@tania-VirtualBox:~/Downloads$ ls
ab.txt anu cd mcareg.tar.bz2 read.txt
Achu archive.tar class.txt mcareg.tar.gz simple.txt
all.tar capital.txt Extracted mca.tar.gz state.txt
tania@tania-VirtualBox:~/Downloads$ 

```

● Extract using gzip

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

● Extract using bz2

```
tania@tania-VirtualBox:~/Downloads/lab$ tar xjf /home/tania/Downloads/mcareg.tar.bz2
tania@tania-VirtualBox:~/Downloads/lab$ ls
ab.txt  cd  etc
tania@tania-VirtualBox:~/Downloads/lab$
```

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
```

```
tania@tania-VirtualBox:~/Downloads$ expr --version
expr (GNU coreutils) 8.30
Copyright (C) 2018 Free Software Foundation, Inc.
License GPLv3+: GNU GPL version 3 or later <https://gnu.org/licenses/gpl.html>.
This is free software: you are free to change and redistribute it.
There is NO WARRANTY, to the extent permitted by law.

Written by Mike Parker, James Youngman, and Paul Eggert.
tania@tania-VirtualBox:~/Downloads$ expr 10 + 5
15
tania@tania-VirtualBox:~/Downloads$ expr 10 \* 5
50
tania@tania-VirtualBox:~/Downloads$ expr 10 / 5
2
tania@tania-VirtualBox:~/Downloads$ expr 10 - 5
5
tania@tania-VirtualBox:~/Downloads$ expr 11 % 5
1
tania@tania-VirtualBox:~/Downloads$ expr length "tania" "<" 5 "|" 19 - 6 ">" 10
1
tania@tania-VirtualBox:~/Downloads$ expr length "tania" "<" 5 "|" 19 - 6 ">" 20
>
> ^C
tania@tania-VirtualBox:~/Downloads$
```

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
```

```
tania@tania-VirtualBox:~/Downloads$ ls -l
total 2296
-rw-rw-r-- 1 tania tania 24 Aug 13 17:56 ab.txt
-rw-rw-r-- 1 tania tania 51 Aug 12 23:13 Achu
-rw-rw-r-- 1 tania tania 10240 Aug 12 23:47 all.tar
-rw-rw-r-- 1 tania tania 15 Jun 15 08:20 anu
-rw-rw-r-- 1 tania tania 10240 Aug 13 17:57 archtive.tar
drwxrwxr-x 2 tania tania 4096 Aug 12 23:05 capital.txt
-rw-rw-r-- 1 tania tania 12 Aug 13 18:12 cd
-rw-rw-r-- 1 tania tania 27 Aug 12 23:20 class.txt
drwxrwxr-x 2 tania tania 4096 Aug 13 18:01 Extracted
drwxrwxr-x 3 tania tania 4096 Aug 13 18:24 lab
-rw-r--r-- 1 root root 193 Aug 13 18:14 mcareg.tar.bz2
-rw-r--r-- 1 root root 1047150 Aug 13 18:08 mcareg.tar.gz
-rw-r--r-- 1 root root 1225754 Aug 13 18:06 mca.tar.gz
drwxrwxr-x 3 tania tania 4096 Aug 12 23:04 read.txt
-rw-rw-r-- 1 tania tania 28 Aug 12 23:22 simple.txt
-rw-rw-r-- 1 tania tania 20 Aug 12 23:32 state.txt
tania@tania-VirtualBox:~/Downloads$ ls | wc -m -w
16 145
tania@tania-VirtualBox:~/Downloads$ cat ab.txt | head -s | tail -5
head: invalid option -- 's'
Try 'head --help' for more information.
tania@tania-VirtualBox:~/Downloads$ cat ab.txt | head -5 | tail -5
trf
posy
limit
get
free
```

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
```

```
tania@tania-VirtualBox:~$ sudo apt install openssh-client
[sudo] password for tania:
Reading package lists... Done
Building dependency tree
Reading state information... Done
Suggested packages:
  keychain libpam-ssh monkeysphere ssh-askpass
The following packages will be upgraded:
  openssh-client
1 upgraded, 0 newly installed, 0 to remove and 231 not upgraded.
Need to get 671 kB of archives.
After this operation, 0 B of additional disk space will be used.
Ign:1 http://in.archive.ubuntu.com/ubuntu focal-updates/main amd64 openssh-client amd64 1:8.2p1-4ubuntu0.2
Err:1 http://security.ubuntu.com/ubuntu focal-updates/main amd64 openssh-client amd64 1:8.2p1-4ubuntu0.2
  Temporary failure resolving 'in.archive.ubuntu.com'
E: Failed to fetch http://security.ubuntu.com/ubuntu/pool/main/o/openssh/openssh-client_8.2p1-4ubuntu0.2_amd64.deb  Temporary failure resolving 'in.archive.ubuntu.com'
E: Unable to fetch some archives, maybe run apt-get update or try with --fix-missing?
tania@tania-VirtualBox:~$ ssh localhost
ssh: connect to host localhost port 22: Connection refused
tania@tania-VirtualBox:~$ sudo apt-get install openssh-server ii
Reading package lists... Done
Building dependency tree
Reading state information... Done
The following additional packages will be installed:
```

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
```

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
```

```
tania@tania-VirtualBox:~$ ssh-keygen -t rsa
Generating public/private rsa key pair.
Enter file in which to save the key (/home/tania/.ssh/id_rsa): key1
Enter passphrase (empty for no passphrase):
Enter same passphrase again:
Your identification has been saved in key1
Your public key has been saved in key1.pub
The key fingerprint is:
SHA256:yzcT5RVkJ2/w1YSN2A7ix2hLbhsCaKgsO604f7o+k1g tania@tania-VirtualBox
The key's randomart image is:
+---[RSA 3072]----+
|          +*==|
|          . o.+B+|
|   . . . +.o. +|
| . . o . =oo... |
|= . .S+.o. |
|= E     ...=.
|o= .    oo+o |
|= + .    ..o |
| +=*   |
+---[SHA256]----+
tania@tania-VirtualBox:~$ ls
achu    da.txt    example1  Music      Pictures    seban      super
Achu   Desktop   example2  muthuu    Public     sebastian  Templates
anu    Documents  key1     name.txt   riya      smily      Videos
da1.txt Downloads key1.pub  output.txt sample    snap
tania@tania-VirtualBox:~$
```

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.jpg

c) Create six files with name of the form filmX.mp4

```
tania@tania-VirtualBox:~$ touch song1.mp3 song2.mp3 song3.mp3 song4.mp3 song4.mp3  
song5.mp3 song6.mp3  
tania@tania-VirtualBox:~$ touch snap1.jpg snap2.jpg snap3.jpg snap4.jpg snap5.jpg  
snap5.jpg snap6.jpg  
tania@tania-VirtualBox:~$ touch film1.mp4 film2.mp4 film3.mp4 film4.mp4 film5.mp4  
film6.mp4  
tania@tania-VirtualBox:~$ ls  
achu Downloads film5.mp4 output.txt smily snap6.jpg super  
Achu example1 film6.mp4 Pictures snap song1.mp3 Templates  
anu example2 key1 Public snap1.jpg song2.mp3 Videos  
da1.txt film1.mp4 key1.pub riya snap2.jpg song3.mp3  
da.txt film2.mp4 Music sample snap3.jpg song4.mp3  
Desktop film3.mp4 muthuu seban snap4.jpg song5.mp3  
Documents film4.mp4 name.txt sebastian snap5.jpg song6.mp3  
tania@tania-VirtualBox:~$
```

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

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

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

```
tania@tania-VirtualBox:~$ mkdir {friends,family,work}  
tania@tania-VirtualBox:~$ ls  
achu Desktop family muthuu riya snap  
Achu Documents friends name.txt sample super  
anu Downloads key1 output.txt seban Templates  
da1.txt example1 key1.pub Pictures sebastian Videos  
da.txt example2 Music Public smily work  
tania@tania-VirtualBox:~$
```

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

```
tania@tania-VirtualBox:~$ cp Music/song1.mp3 friends  
tania@tania-VirtualBox:~$ cp Music/song2.mp3 friends  
tania@tania-VirtualBox:~$ cp Music/song3.mp3 friends  
tania@tania-VirtualBox:~$ cp Music/song4.mp3 friends  
tania@tania-VirtualBox:~$ cp Music/song5.mp3 friends  
tania@tania-VirtualBox:~$ cp Music/song6.mp3 friends  
tania@tania-VirtualBox:~$ ls -R friends  
friends:  
song1.mp3 song2.mp3 song3.mp3 song4.mp3 song5.mp3 song6.mp3  
tania@tania-VirtualBox:~$ cp Pictures/snap1.jpg family  
tania@tania-VirtualBox:~$ cp Pictures/snap2.jpg family  
tania@tania-VirtualBox:~$ cp Pictures/snap3.jpg family  
tania@tania-VirtualBox:~$ cp Pictures/snap4.jpg family  
tania@tania-VirtualBox:~$ cp Pictures/snap5.jpg family  
tania@tania-VirtualBox:~$ cp Pictures/snap6.jpg family  
tania@tania-VirtualBox:~$ ls -R family  
family:  
snap1.jpg snap2.jpg snap3.jpg snap4.jpg snap5.jpg snap6.jpg
```

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

```
tania@tania-VirtualBox:~$ rmdir {friends,family}
```

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

```
tania@tania-VirtualBox:~$ rm -r family friends
tania@tania-VirtualBox:~$ ls
achu      da.txt      example1  Music       Pictures   seban      super
Achu      Desktop     example2  muthuu    Public     sebastian Templates
anu       Documents   key1     name.txt   riya      smily      Videos
da1.txt    Downloads  key1.pub  output.txt sample    snap       work
tania@tania-VirtualBox:~$
```

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

```
tania@tania-VirtualBox:~$ ls -al>allfiles.txt
tania@tania-VirtualBox:~$ ls
achu      da.txt      example2  name.txt   sample      super
Achu      Desktop     key1     output.txt seban      Templates
allfiles.txt  Documents   key1.pub  Pictures   sebastian Videos
anu       Downloads  Music      Public     smily      work
da1.txt    example1  muthuu    riya      snap
tania@tania-VirtualBox:~$ ls -al
total 152
drwxr-xr-x 18 tania tania 4096 Aug 17 21:44 .
drwxr-xr-x  3 root  root  4096 Jun  7 23:39 ..
-rw-rw-r--  1 tania tania   15 Jun 14 22:59 achu
-rw-rw-r--  1 tania tania   51 Aug 12 23:13 Achu
-rw-rw-r--  1 tania tania 2194 Aug 17 21:44 allfiles.txt
-rw-rw-r--  1 tania tania   15 Jun 15 08:20 anu
-rw-----  1 tania tania 3818 Aug 17 17:41 .bash_history
-rw-r--r--  1 tania tania  220 Jun  7 23:39 .bash_logout
-rw-r--r--  1 tania tania 3771 Jun  7 23:39 .bashrc
drwx----- 11 tania tania 4096 Jun  7 23:57 .cache
drwx----- 14 tania tania 4096 Aug 12 23:13 .config
-rw-rw-r--  1 tania tania   0 Jun 21 22:38 da1.txt
-rw-rw-r--  1 tania tania   0 Jun 21 22:38 da.txt
drwxr-xr-x  4 tania tania 4096 Aug 17 16:58 Desktop
drwxr-xr-x  2 tania tania 4096 Jun  7 23:56 Documents
drwxr-xr-x  6 tania tania 4096 Aug 13 18:18 Downloads
-rw-rw-r--  1 tania tania   41 Jun 14 22:40 example1
-rw-rw-r--  1 tania tania   9 Jun 14 22:45 example2
drwx-----  3 tania tania 4096 Aug 17 21:08 .gnupg
```

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

```
tania@tania-VirtualBox:~$ date
Tuesday 17 August 2021 09:46:18 PM IST
tania@tania-VirtualBox:~$
```

- Add the user Juliet

```
tania@tania-VirtualBox:~$ sudo useradd juliet
[sudo] password for tania:
tania@tania-VirtualBox:~$
```

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

```
tania@tania-VirtualBox:~$ cat /etc/passwd | grep juliet
juliet:x:1002:1003::/home/juliet:/bin/sh
tania@tania-VirtualBox:~$
```

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

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

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

```
tania@tania-VirtualBox:~$ sudo groupadd -g 30000 Shakesphere
```

13. Create a supplementary group called artists

```
tania@tania-VirtualBox:~$ sudo groupadd artist
```

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

```
tania@tania-VirtualBox:~$ less /etc/group  
tania:x:1000:  
sambashare:x:132:tania  
systemd-coredump:x:999:  
mlocate:x:133:  
achu:x:1001:  
student2:x:1002:  
juliet:x:1003:  
Shakesphere:x:30000:  
artist:x:30001:
```

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

```
tania@tania-VirtualBox:~$ usermod -G Shakesphere Juliet
```

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

```
tania@tania-VirtualBox:~$ id juliet  
uid=1002(juliet) gid=1003(juliet) groups=1003(juliet)
```

17. Add Romeo and Hamlet to the Shakespeare group.

```
tania@tania-VirtualBox:~$ sudo useradd Romeo  
[sudo] password for tania:  
tania@tania-VirtualBox:~$ sudo useradd Hamelt  
tania@tania-VirtualBox:~$ sudo usermod -G Shakespeare Romeo  
tania@tania-VirtualBox:~$ sudo usermod -G Shakesphere Hamelt
```

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

```
tania@tania-VirtualBox:~$ sudo useradd reba  
tania@tania-VirtualBox:~$ sudo useradd dolly  
tania@tania-VirtualBox:~$ sudo useradd elvis  
tania@tania-VirtualBox:~$ sudo useradd -G artist reba  
sudo: useradd: command not found  
tania@tania-VirtualBox:~$ sudo usermod -G artist reba  
usermod: user 'reba' already exists  
tania@tania-VirtualBox:~$ sudo usermod -G artist reba  
tania@tania-VirtualBox:~$ sudo usermod -G artist dolly  
tania@tania-VirtualBox:~$ sudo usermod -G artist elvis
```

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

```
tania@tania-VirtualBox:~$ less etc/group
juliet:x:1003:
Shakessphere:x:30000:
artist:x:30001:reba,elvis
Romeo:x:30002:
Hamelt:x:1004:
reba:x:1005:
elvis:x:1007:
```

20. Attempt to remove user Dolly.

```
tania@tania-VirtualBox:~$ sudo userdel dolly
tania@tania-VirtualBox:~$
```

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

WINDOWS

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.

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.

Ping:

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

C:\Users\DOCTOR PC>ping google.com

Pinging google.com [216.58.196.174] with 32 bytes of data:
Reply from 216.58.196.174: bytes=32 time=18ms TTL=119
Reply from 216.58.196.174: bytes=32 time=21ms TTL=119
Reply from 216.58.196.174: bytes=32 time=20ms TTL=119
Reply from 216.58.196.174: bytes=32 time=22ms TTL=119

Ping statistics for 216.58.196.174:
    Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
Approximate round trip times in milli-seconds:
    Minimum = 18ms, Maximum = 22ms, Average = 20ms

C:\Users\DOCTOR PC>
```

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

Pinging google.com [142.250.67.46] with 32 bytes of data:
Reply from 142.250.67.46: bytes=32 time=20ms TTL=119
Reply from 142.250.67.46: bytes=32 time=21ms TTL=119
Reply from 142.250.67.46: bytes=32 time=20ms TTL=119
Reply from 142.250.67.46: bytes=32 time=20ms TTL=119

Ping statistics for 142.250.67.46:
    Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
Approximate round trip times in milli-seconds:
    Minimum = 20ms, Maximum = 21ms, Average = 20ms

C:\Users\DOCTOR PC>
```

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

Pinging google.com [142.250.67.46] with 32 bytes of data:
Reply from 142.250.67.46: bytes=32 time=20ms TTL=119
Reply from 142.250.67.46: bytes=32 time=21ms TTL=119
Reply from 142.250.67.46: bytes=32 time=19ms TTL=119
Reply from 142.250.67.46: bytes=32 time=94ms TTL=119
Reply from 142.250.67.46: bytes=32 time=21ms TTL=119
Reply from 142.250.67.46: bytes=32 time=21ms TTL=119
Reply from 142.250.67.46: bytes=32 time=32ms TTL=119
Reply from 142.250.67.46: bytes=32 time=20ms TTL=119
Reply from 142.250.67.46: bytes=32 time=21ms TTL=119
Reply from 142.250.67.46: bytes=32 time=19ms TTL=119
Reply from 142.250.67.46: bytes=32 time=20ms TTL=119
Reply from 142.250.67.46: bytes=32 time=26ms TTL=119
Reply from 142.250.67.46: bytes=32 time=21ms TTL=119
Reply from 142.250.67.46: bytes=32 time=20ms TTL=119
Reply from 142.250.67.46: bytes=32 time=21ms TTL=119
Reply from 142.250.67.46: bytes=32 time=21ms TTL=119

Ping statistics for 142.250.67.46:
    Packets: Sent = 16, Received = 16, Lost = 0 (0% loss),
Approximate round trip times in milli-seconds:
    Minimum = 19ms, Maximum = 94ms, Average = 26ms
Control-C
^C

C:\Users\DOCTOR PC>
```

```
C:\Users\DOCTOR PC>ping -j google.com

Pinging google.com [142.250.67.46] with 32 bytes of data:
General failure.
General failure.
General failure.
General failure.

Ping statistics for 142.250.67.46:
  Packets: Sent = 4, Received = 0, Lost = 4 (100% loss),

C:\Users\DOCTOR PC>
```

```
C:\Users\DOCTOR PC>ping -4 google.com

Pinging google.com [142.250.67.46] with 32 bytes of data:
Reply from 142.250.67.46: bytes=32 time=19ms TTL=119
Reply from 142.250.67.46: bytes=32 time=23ms TTL=119
Reply from 142.250.67.46: bytes=32 time=21ms TTL=119
Reply from 142.250.67.46: bytes=32 time=21ms TTL=119

Ping statistics for 142.250.67.46:
  Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
Approximate round trip times in milli-seconds:
  Minimum = 19ms, Maximum = 23ms, Average = 21ms

C:\Users\DOCTOR PC>
```

Route

```
C:\Users\DOCTOR PC>route print
=====
Interface List
 5...8c 16 45 de 97 1b ....Realtek PCIe GBE Family Controller
 17...0a 00 27 00 00 11 ....VirtualBox Host-Only Ethernet Adapter
 6...32 d1 6b fb 66 59 ....Microsoft Wi-Fi Direct Virtual Adapter
 7...42 d1 6b fb 66 59 ....Microsoft Wi-Fi Direct Virtual Adapter #2
 15...00 ff 68 e1 be f0 ....Kaspersky Security Data Escort Adapter
 16...30 d1 6b fb 66 59 ....Qualcomm Atheros QCA9377 Wireless Network Adapter
 20...30 d1 6b fb 66 5a ....Bluetooth Device (Personal Area Network)
 1.....Software Loopback Interface 1
=====

IPv4 Route Table
=====
Active Routes:
Network Destination      Netmask         Gateway       Interface Metric
          0.0.0.0        0.0.0.0   192.168.1.1  192.168.1.8    50
         127.0.0.0    255.0.0.0        On-link      127.0.0.1    331
         127.0.0.1    255.255.255        On-link      127.0.0.1    331
 127.255.255.255  255.255.255.255        On-link      127.0.0.1    331
         192.168.1.0  255.255.255.0        On-link    192.168.1.8    306
         192.168.1.8  255.255.255.255        On-link    192.168.1.8    306
 192.168.1.255   255.255.255.255        On-link    192.168.1.8    306
         192.168.56.0  255.255.255.0        On-link  192.168.56.1    281
         192.168.56.1  255.255.255.255        On-link  192.168.56.1    281
 192.168.56.255   255.255.255.255        On-link  192.168.56.1    281
         224.0.0.0     240.0.0.0        On-link      127.0.0.1    331
         224.0.0.0     240.0.0.0        On-link  192.168.56.1    281
         224.0.0.0     240.0.0.0        On-link    192.168.1.8    306
 255.255.255.255  255.255.255.255        On-link      127.0.0.1    331
 255.255.255.255  255.255.255.255        On-link  192.168.56.1    281
 255.255.255.255  255.255.255.255        On-link  192.168.1.8    306
=====
Persistent Routes:
  None
=====
```

```
C:\Users\DOCTOR PC>route print -4
=====
Interface List
 5...8c 16 45 de 97 1b ....Realtek PCIe GBE Family Controller
 17...0a 00 27 00 00 11 ....VirtualBox Host-Only Ethernet Adapter
 6...32 d1 6b fb 66 59 ....Microsoft Wi-Fi Direct Virtual Adapter
 7...42 d1 6b fb 66 59 ....Microsoft Wi-Fi Direct Virtual Adapter #2
 15...00 ff 68 e1 be f0 ....Kaspersky Security Data Escort Adapter
 16...30 d1 6b fb 66 59 ....Qualcomm Atheros QCA9377 Wireless Network Adapter
 20...30 d1 6b fb 66 5a ....Bluetooth Device (Personal Area Network)
 1.....Software Loopback Interface 1
=====

IPv4 Route Table
=====
Active Routes:
Network Destination      Netmask         Gateway       Interface Metric
          0.0.0.0        0.0.0.0   192.168.1.1  192.168.1.8    50
         127.0.0.0    255.0.0.0        On-link      127.0.0.1    331
         127.0.0.1    255.255.255        On-link      127.0.0.1    331
 127.255.255.255  255.255.255.255        On-link      127.0.0.1    331
         192.168.1.0  255.255.255.0        On-link    192.168.1.8    306
         192.168.1.8  255.255.255.255        On-link    192.168.1.8    306
 192.168.1.255   255.255.255.255        On-link    192.168.1.8    306
         192.168.56.0  255.255.255.0        On-link  192.168.56.1    281
         192.168.56.1  255.255.255.255        On-link  192.168.56.1    281
 192.168.56.255   255.255.255.255        On-link  192.168.56.1    281
         224.0.0.0     240.0.0.0        On-link      127.0.0.1    331
         224.0.0.0     240.0.0.0        On-link  192.168.56.1    281
         224.0.0.0     240.0.0.0        On-link    192.168.1.8    306
 255.255.255.255  255.255.255.255        On-link      127.0.0.1    331
 255.255.255.255  255.255.255.255        On-link  192.168.56.1    281
 255.255.255.255  255.255.255.255        On-link  192.168.1.8    306
=====
Persistent Routes:
  None
C:\Users\DOCTOR PC>
```

```
C:\Users\DOCTOR PC>route -6

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.
```

```
C:\Users\DOCTOR PC>route print *157
=====
Interface List
 5...8c 16 45 de 97 1b ....Realtek PCIe GBE Family Controller
 17...0a 00 27 00 00 11 ....VirtualBox Host-Only Ethernet Adapter
 6...32 d1 6b fb 66 59 ....Microsoft Wi-Fi Direct Virtual Adapter
 7...42 d1 6b fb 66 59 ....Microsoft Wi-Fi Direct Virtual Adapter #2
 15...00 ff 68 e1 be f0 ....Kaspersky Security Data Escort Adapter
 16...30 d1 6b fb 66 59 ....Qualcomm Atheros QCA9377 Wireless Network Adapter
 20...30 d1 6b fb 66 5a ....Bluetooth Device (Personal Area Network)
 1.....Software Loopback Interface 1
=====

IPv4 Route Table
=====
Active Routes:
  None
Persistent Routes:
  None

IPv6 Route Table
=====
Active Routes:
  None
Persistent Routes:
  None

C:\Users\DOCTOR PC>
```

```
C:\Users\DOCTOR PC>tracert 192.168.1.1

Tracing route to 192.168.1.1 over a maximum of 30 hops
```

```
 1      5 ms      4 ms      4 ms  192.168.1.1
```

```
Trace complete.
```

```
C:\Users\DOCTOR PC>
```

```
Tracing route to www.google.com [142.250.77.164]
over a maximum of 30 hops:

 1      3 ms      4 ms      4 ms  192.168.1.1
 2     16 ms     12 ms      8 ms  100.108.0.1
 3     20 ms     80 ms     47 ms  10.1.5.17
 4     24 ms     19 ms     23 ms  45.120.251.127
 5     18 ms     18 ms     19 ms  74.125.242.145
 6     20 ms     19 ms     20 ms  209.85.142.247
 7     20 ms     20 ms     19 ms  maa05s17-in-f4.1e100.net [142.250.77.164]
```

```
Trace complete.
```

```
C:\Users\DOCTOR PC>
```

```
C:\Users\DOCTOR PC>tracert -d www.google.com

Tracing route to www.google.com [142.250.77.164]
over a maximum of 30 hops:

 1       6 ms      4 ms      4 ms  192.168.1.1
 2      10 ms     10 ms      8 ms  100.108.0.1
 3      84 ms     33 ms     20 ms  10.1.5.17
 4      19 ms     19 ms     20 ms  45.120.251.127
 5      20 ms     28 ms     19 ms  74.125.242.145
 6      20 ms     20 ms     27 ms  209.85.142.247
 7      21 ms     19 ms     19 ms  142.250.77.164

Trace complete.

C:\Users\DOCTOR PC>
```

```
C:\Users\DOCTOR PC>tracert 22.110.0.1

Tracing route to 22.110.0.1 over a maximum of 30 hops

 1      4 ms      4 ms      4 ms  192.168.1.1
 2      9 ms     11 ms      9 ms  100.108.0.1
 3      9 ms      8 ms     12 ms  122.15.23.162
 4     38 ms     38 ms     38 ms  182.19.106.200
 5    142 ms    140 ms    140 ms  ae11-100-xcr1.mar.cw.net [213.185.219.53]
 6      *     162 ms    160 ms  ae10-xcr1.ptl.cw.net [195.2.30.213]
 7    162 ms    175 ms    161 ms  10gigabitethernet-2-2.par2.he.net [195.42.144.104]
 8   213 ms    213 ms    213 ms  100ge12-2.core2.ash1.he.net [184.104.196.241]
 9      *      *      ^C

C:\Users\DOCTOR PC>
```

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:\Users\DOCTOR PC>nslookup
Default Server: kvbl-vm-sr1-dns-erm.195.160.103.in-addr.arpa
Address: 103.160.195.230

>
```

- ⑤ 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
- ⑥ 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.

```
C:\Users\DOCTOR PC>nslookup -g=MX google.com
*** Invalid option: g=MX
Server: kvbl-vm-sr1-dns-erm.195.160.103.in-addr.arpa
Address: 103.160.195.230

Non-authoritative answer:
Name: google.com
Address: 142.250.67.46

C:\Users\DOCTOR PC>
```

Ipcfg:

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.

PARAMETERS:

/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.

/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.

/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.

/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.

```
C:\Users\DOCTOR PC>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::a5b9:122c:e36a:4591%17
    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* 3:

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

Ethernet adapter Ethernet 2:

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

Wireless LAN adapter Wi-Fi:

    Connection-specific DNS Suffix . :
    Link-local IPv6 Address . . . . . : fe80::9c10:e5f0:c812:b5e0%16
    IPv4 Address. . . . . : 192.168.1.8
    Subnet Mask . . . . . : 255.255.255.0
    Default Gateway . . . . . : 192.168.1.1

Ethernet adapter Bluetooth Network Connection:

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

C:\Users\DOCTOR PC>
```

```
C:\Users\DOCTOR PC>ipconfig/displaying

Error: unrecognized or incomplete command line.

USAGE:
  ipconfig [/allcompartments] [/? | /all |
                           /renew [adapter] | /release [adapter] |
                           /renew6 [adapter] | /release6 [adapter] |
                           /flushdns | /displaydns | /registerdns |
                           /showclassid adapter |
                           /setclassid adapter [classid] |
                           /showclassid6 adapter |
                           /setclassid6 adapter [classid] ]

where
  adapter          Connection name
                  (wildcard characters * and ? allowed, see examples)

  Options:
    /?              Display this help message
    /all            Display full configuration information.
    /release        Release the IPv4 address for the specified adapter.
    /release6       Release the IPv6 address for the specified adapter.
    /renew          Renew the IPv4 address for the specified adapter.
    /renew6         Renew the IPv6 address for the specified adapter.
    /flushdns       Purges the DNS Resolver cache.
    /registerdns   Refreshes all DHCP leases and re-registers DNS names
    /displaydns    Displays the contents of the DNS Resolver Cache.
    /showclassid   Displays all the dhcp class IDs allowed for adapter.
    /setclassid    Modifies the dhcp class id.
    /showclassid6  Displays all the IPv6 DHCP class IDs allowed for adapter.
    /setclassid6   Modifies the IPv6 DHCP class id.

The default is to display only the IP address, subnet mask and
default gateway for each adapter bound to TCP/IP.
```

NetSat:

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:\Users\DOCTOR PC>netstat  
  
Active Connections  
  
Proto Local Address Foreign Address State  
TCP 127.0.0.1:49339 DESKTOP-MVGV1R8:49677 ESTABLISHED  
TCP 127.0.0.1:49542 DESKTOP-MVGV1R8:49677 ESTABLISHED  
TCP 127.0.0.1:49671 DESKTOP-MVGV1R8:49672 ESTABLISHED  
TCP 127.0.0.1:49672 DESKTOP-MVGV1R8:49671 ESTABLISHED  
TCP 127.0.0.1:49677 DESKTOP-MVGV1R8:49339 ESTABLISHED  
TCP 127.0.0.1:49677 DESKTOP-MVGV1R8:49542 ESTABLISHED  
TCP 127.0.0.1:49677 DESKTOP-MVGV1R8:51124 ESTABLISHED  
TCP 127.0.0.1:49677 DESKTOP-MVGV1R8:53985 ESTABLISHED  
TCP 127.0.0.1:49677 DESKTOP-MVGV1R8:54945 ESTABLISHED  
TCP 127.0.0.1:49677 DESKTOP-MVGV1R8:57591 ESTABLISHED  
TCP 127.0.0.1:49677 DESKTOP-MVGV1R8:60465 ESTABLISHED  
TCP 127.0.0.1:49677 DESKTOP-MVGV1R8:60646 ESTABLISHED
```

netstat -n

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

```
C:\Users\DOCTOR PC>netstat -n  
  
Active Connections  
  
Proto Local Address Foreign Address State  
TCP 127.0.0.1:49339 127.0.0.1:49677 ESTABLISHED  
TCP 127.0.0.1:49542 127.0.0.1:49677 ESTABLISHED  
TCP 127.0.0.1:49671 127.0.0.1:49672 ESTABLISHED  
TCP 127.0.0.1:49672 127.0.0.1:49671 ESTABLISHED  
TCP 127.0.0.1:49677 127.0.0.1:49339 ESTABLISHED  
TCP 127.0.0.1:49677 127.0.0.1:49542 ESTABLISHED  
TCP 127.0.0.1:49677 127.0.0.1:51124 ESTABLISHED  
TCP 127.0.0.1:49677 127.0.0.1:53985 ESTABLISHED  
TCP 127.0.0.1:49677 127.0.0.1:54945 ESTABLISHED  
TCP 127.0.0.1:49677 127.0.0.1:57591 ESTABLISHED  
TCP 127.0.0.1:49677 127.0.0.1:60465 ESTABLISHED  
TCP 127.0.0.1:49677 127.0.0.1:60646 ESTABLISHED
```

netstat -n INTERVAL

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

```
C:\Users\DOCTOR PC>netstat -n 5

Active Connections

  Proto  Local Address          Foreign Address        State
  TCP    127.0.0.1:49339        127.0.0.1:49677      ESTABLISHED
  TCP    127.0.0.1:49542        127.0.0.1:49677      ESTABLISHED
  TCP    127.0.0.1:49671        127.0.0.1:49672      ESTABLISHED
  TCP    127.0.0.1:49672        127.0.0.1:49671      ESTABLISHED
  TCP    127.0.0.1:49677        127.0.0.1:49339      ESTABLISHED
  TCP    127.0.0.1:49677        127.0.0.1:49542      ESTABLISHED
  TCP    127.0.0.1:49677        127.0.0.1:51124      ESTABLISHED
  TCP    127.0.0.1:49677        127.0.0.1:53985      ESTABLISHED
  TCP    127.0.0.1:49677        127.0.0.1:54945      ESTABLISHED
```

netstat -a

The netstat -a command displays all active and inactive connections, and the TCP and UDP ports the device is currently listening.

```
C:\Users\DOCTOR PC>netstat -a

Active Connections

  Proto  Local Address          Foreign Address        State
  TCP    0.0.0.0:135            DESKTOP-MVGV1R8:0    LISTENING
  TCP    0.0.0.0:445            DESKTOP-MVGV1R8:0    LISTENING
  TCP    0.0.0.0:5040           DESKTOP-MVGV1R8:0    LISTENING
  TCP    0.0.0.0:7680           DESKTOP-MVGV1R8:0    LISTENING
  TCP    0.0.0.0:49664           DESKTOP-MVGV1R8:0    LISTENING
  TCP    0.0.0.0:49665           DESKTOP-MVGV1R8:0    LISTENING
  TCP    0.0.0.0:49666           DESKTOP-MVGV1R8:0    LISTENING
  TCP    0.0.0.0:49667           DESKTOP-MVGV1R8:0    LISTENING
  TCP    0.0.0.0:49668           DESKTOP-MVGV1R8:0    LISTENING
```

netstat -b

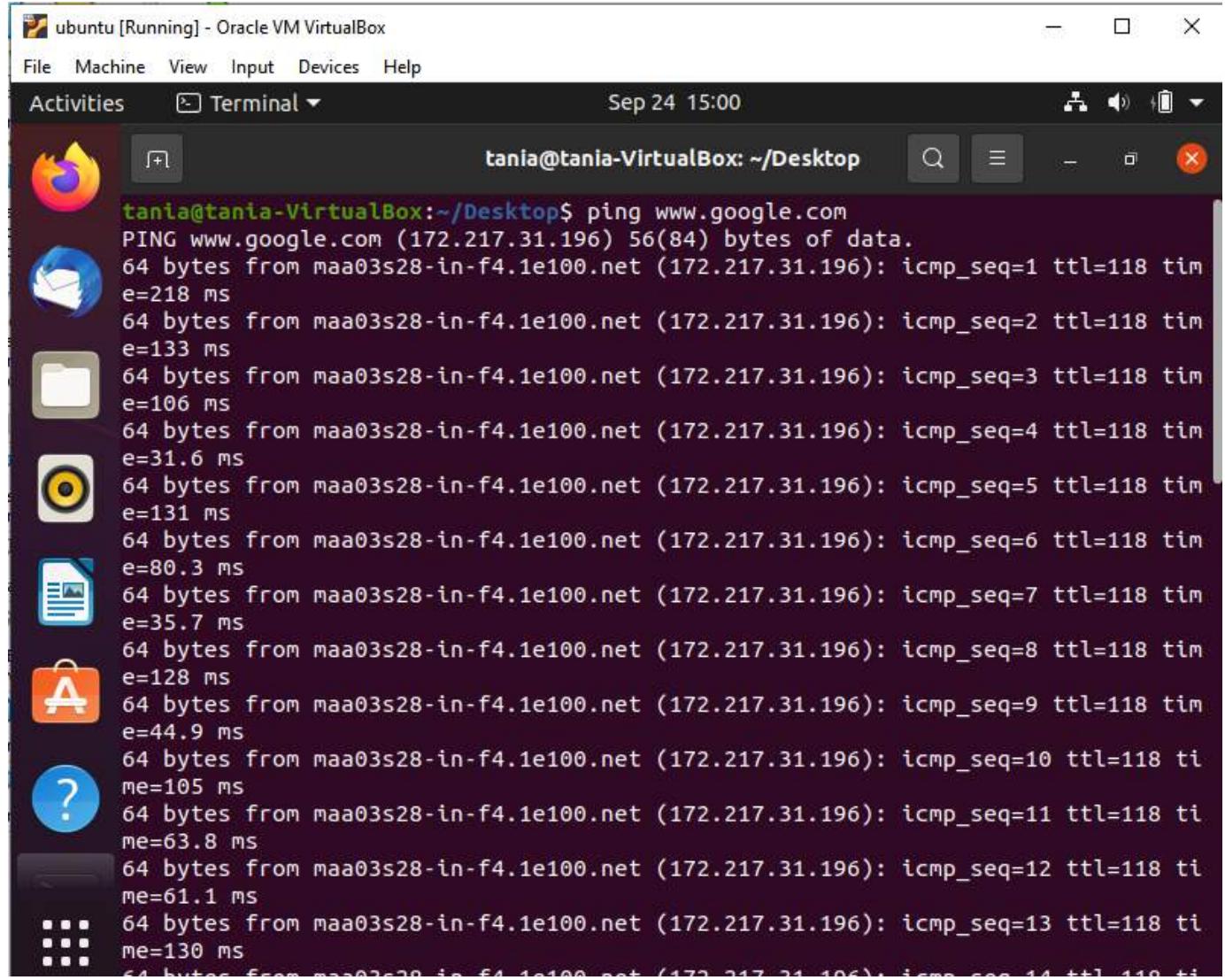
The netstat -b command lists all the executables (applications) associated with each connection. Sometimes, applications may open multiple connections.

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 you troubleshoot networking problems.

LINUX

PING



A screenshot of a Linux desktop environment showing a terminal window. The window title is "ubuntu [Running] - Oracle VM VirtualBox". The terminal tab is active, and the prompt shows the user is at "tania@tania-VirtualBox: ~/Desktop". The command entered is "ping www.google.com". The terminal displays the results of the ping command, showing multiple packets being sent to the IP address 172.217.31.196. Each packet is 64 bytes, with the first byte being 'P'. The output includes the sequence number (icmp_seq), time-to-live (ttl), and round-trip time (time) for each response.

```
tania@tania-VirtualBox:~/Desktop$ ping www.google.com
PING www.google.com (172.217.31.196) 56(84) bytes of data.
64 bytes from maa03s28-in-f4.1e100.net (172.217.31.196): icmp_seq=1 ttl=118 time=218 ms
64 bytes from maa03s28-in-f4.1e100.net (172.217.31.196): icmp_seq=2 ttl=118 time=133 ms
64 bytes from maa03s28-in-f4.1e100.net (172.217.31.196): icmp_seq=3 ttl=118 time=106 ms
64 bytes from maa03s28-in-f4.1e100.net (172.217.31.196): icmp_seq=4 ttl=118 time=31.6 ms
64 bytes from maa03s28-in-f4.1e100.net (172.217.31.196): icmp_seq=5 ttl=118 time=131 ms
64 bytes from maa03s28-in-f4.1e100.net (172.217.31.196): icmp_seq=6 ttl=118 time=80.3 ms
64 bytes from maa03s28-in-f4.1e100.net (172.217.31.196): icmp_seq=7 ttl=118 time=35.7 ms
64 bytes from maa03s28-in-f4.1e100.net (172.217.31.196): icmp_seq=8 ttl=118 time=128 ms
64 bytes from maa03s28-in-f4.1e100.net (172.217.31.196): icmp_seq=9 ttl=118 time=44.9 ms
64 bytes from maa03s28-in-f4.1e100.net (172.217.31.196): icmp_seq=10 ttl=118 time=105 ms
64 bytes from maa03s28-in-f4.1e100.net (172.217.31.196): icmp_seq=11 ttl=118 time=63.8 ms
64 bytes from maa03s28-in-f4.1e100.net (172.217.31.196): icmp_seq=12 ttl=118 time=61.1 ms
64 bytes from maa03s28-in-f4.1e100.net (172.217.31.196): icmp_seq=13 ttl=118 time=130 ms
64 bytes from maa03s28-in-f4.1e100.net (172.217.31.196): icmp_seq=14 ttl=118 time=119 ms
```

```
tania@tania-VirtualBox:~/Desktop$ ping -a google.com
PING google.com (142.250.193.110) 56(84) bytes of data.
64 bytes from maa05s24-in-f14.1e100.net (142.250.193.110): icmp_seq=1 ttl=118 time=32.0 ms
64 bytes from maa05s24-in-f14.1e100.net (142.250.193.110): icmp_seq=2 ttl=118 time=113 ms
64 bytes from maa05s24-in-f14.1e100.net (142.250.193.110): icmp_seq=3 ttl=118 time=31.5 ms
64 bytes from maa05s24-in-f14.1e100.net (142.250.193.110): icmp_seq=4 ttl=118 time=72.3 ms
64 bytes from maa05s24-in-f14.1e100.net (142.250.193.110): icmp_seq=5 ttl=118 time=148 ms
64 bytes from maa05s24-in-f14.1e100.net (142.250.193.110): icmp_seq=6 ttl=118 time=78.1 ms
64 bytes from maa05s24-in-f14.1e100.net (142.250.193.110): icmp_seq=7 ttl=118 time=144 ms
^C
--- google.com ping statistics ---
7 packets transmitted, 7 received, 0% packet loss, time 6011ms
rtt min/avg/max/mdev = 31.488/88.423/148.384/44.859 ms
tania@tania-VirtualBox:~/Desktop$
```

```
tania@tania-VirtualBox:~/Desktop$ ping -v google.com
PING google.com (142.250.193.110) 56(84) bytes of data.
64 bytes from maa05s24-in-f14.1e100.net (142.250.193.110): icmp_seq=1 ttl=118 time=30.5 ms
64 bytes from maa05s24-in-f14.1e100.net (142.250.193.110): icmp_seq=2 ttl=118 time=41.8 ms
64 bytes from maa05s24-in-f14.1e100.net (142.250.193.110): icmp_seq=3 ttl=118 time=43.8 ms
64 bytes from maa05s24-in-f14.1e100.net (142.250.193.110): icmp_seq=4 ttl=118 time=44.9 ms
64 bytes from maa05s24-in-f14.1e100.net (142.250.193.110): icmp_seq=5 ttl=118 time=40.0 ms
^C
--- google.com ping statistics ---
5 packets transmitted, 5 received, 0% packet loss, time 4005ms
rtt min/avg/max/mdev = 30.465/40.196/44.885/5.147 ms
tania@tania-VirtualBox:~/Desktop$
```

Netstat -l

```
tania@tania-VirtualBox:~/Desktop$ netstat -l
Active Internet connections (only servers)
Proto Recv-Q Send-Q Local Address           Foreign Address         State
tcp      0      0 localhost:mysql          0.0.0.0:*
tcp      0      0 localhost:domain        0.0.0.0:*
tcp      0      0 localhost:ipp           0.0.0.0:*
tcp6     0      0 [::]:http              [::]:*                LISTEN
tcp6     0      0 ip6-localhost:ipp       [::]:*                LISTEN
udp      0      0 localhost:domain        0.0.0.0:*
udp      0      0 0.0.0.0:631            0.0.0.0:*
udp      0      0 0.0.0.0:mdns           0.0.0.0:*
udp      0      0 0.0.0.0:60778          0.0.0.0:*
udp6     0      0 [::]:mdns             [::]:*                LISTEN
udp6     0      0 [::]:36239            [::]:*                LISTEN
raw6    0      0 [::]:ipv6-icmp         [::]:*                7
Active UNIX domain sockets (only servers)
Proto RefCnt Flags       Type      State         I-Node Path
unix    2      [ ACC ]     STREAM   LISTENING    27169  /run/mysqld/mysqld.s
ock
unix    2      [ ACC ]     STREAM   LISTENING    29476  @/tmp/.ICE-unix/1187
unix    2      [ ACC ]     SEQPACKET LISTENING   15166  /run/udpd/ucontrol
```

ifconfig

```
tania@tania-VirtualBox:~/Desktop$ 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::4bf9:42ca:4858:1a10  prefixlen 64  scopeid 0x20<link>
          ether 08:00:27:65:0a:34  txqueuelen 1000  (Ethernet)
            RX packets 423  bytes 118104 (118.1 KB)
            RX errors 0  dropped 0  overruns 0  frame 0
            TX packets 636  bytes 60679 (60.6 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 419  bytes 37793 (37.7 KB)
            RX errors 0  dropped 0  overruns 0  frame 0
            TX packets 419  bytes 37793 (37.7 KB)
            TX errors 0  dropped 0  overruns 0  carrier 0  collisions 0
```

route

```
tania@tania-VirtualBox:~/Desktop$ sudo route
[sudo] password for tania:
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
tania@tania-VirtualBox:~/Desktop$
```

nslookup

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

Non-authoritative answer:
Name:   google.com
Address: 142.250.77.174
Name:   google.com
Address: 2404:6800:4007:818::200e
```

2. identify and perform 5 more 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

```
C:\Users\DOCTOR PC>net
The syntax of this command is:

NET
[ ACCOUNTS | COMPUTER | CONFIG | CONTINUE | FILE | GROUP | HELP |
  HELPMMSG | LOCALGROUP | PAUSE | SESSION | SHARE | START |
  STATISTICS | STOP | TIME | USE | USER | VIEW ]


C:\Users\DOCTOR PC>
```

```
C:\Users\DOCTOR PC>nbtstat

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   Redisplays selected statistics, pausing interval seconds
           between each display. Press Ctrl+C to stop redisplaying
           statistics.
```

```
C:\Users\DOCTOR PC>
```

```
C:\Users\DOCTOR PC>getmac
```

Physical Address	Transport Name
00-FF-68-E1-BE-F0	Media disconnected
8C-16-45-DE-97-1B	Media disconnected
30-D1-6B-FB-66-59	\Device\Tcpip_{6B2FB950-B0E0-4661-8DB2-C9CCBD319AE7}
30-D1-6B-FB-66-5A	Media disconnected
0A-00-27-00-00-11	\Device\Tcpip_{910AABE7-FA4F-48AA-ACCC-94E918D7BAB9}

```
C:\Users\DOCTOR PC>
```

INSTALL LAMP IN UBUNTU

Install Apache2

- **Update your system**

Sudo apt update

```
tania@tania-VirtualBox:~$ sudo apt update
[sudo] password for tania:
Get:1 http://security.ubuntu.com/ubuntu focal-security InRelease [114 kB]
Hit:2 http://in.archive.ubuntu.com/ubuntu focal InRelease
Get:3 http://in.archive.ubuntu.com/ubuntu focal-updates InRelease [114 kB]
Get:4 http://in.archive.ubuntu.com/ubuntu focal-backports InRelease [101 kB]
Get:5 http://in.archive.ubuntu.com/ubuntu focal-updates/main amd64 Packages [1,
253 kB]
Ign:6 http://in.archive.ubuntu.com/ubuntu focal-updates/main i386 Packages
Get:7 http://in.archive.ubuntu.com/ubuntu focal-updates/main Translation-en [26
4 kB]
Ign:8 http://in.archive.ubuntu.com/ubuntu focal-updates/main amd64 DEP-11 Metad
ata
Get:9 http://security.ubuntu.com/ubuntu focal-security/main i386 Packages [289
kB]
Get:10 http://in.archive.ubuntu.com/ubuntu focal-updates/main DEP-11 48x48 Icon
s [603 kB]
```

- **Install Apache using apt**

Sudo apt install apache2

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

Sudo systemctl status apache2

```
tania@tania-VirtualBox:~$ sudo systemctl status apache2
● apache2.service - The Apache HTTP Server
  Loaded: loaded (/lib/systemd/system/apache2.service; enabled; vendor pres>
  Active: active (running) since Tue 2021-09-28 18:12:40 IST; 25min ago
    Docs: https://httpd.apache.org/docs/2.4/
   Process: 661 ExecStart=/usr/sbin/apachectl start (code=exited, status=0/SU>
 Main PID: 767 (apache2)
     Tasks: 55 (limit: 1108)
    Memory: 3.4M
   CGroup: /system.slice/apache2.service
           ├─767 /usr/sbin/apache2 -k start
           ├─768 /usr/sbin/apache2 -k start
           └─769 /usr/sbin/apache2 -k start

Sep 28 18:12:25 tania-VirtualBox systemd[1]: Starting The Apache HTTP Server...
Sep 28 18:12:40 tania-VirtualBox apachectl[696]: AH00558: apache2: Could not r>
Sep 28 18:12:40 tania-VirtualBox systemd[1]: Started The Apache HTTP Server.
```

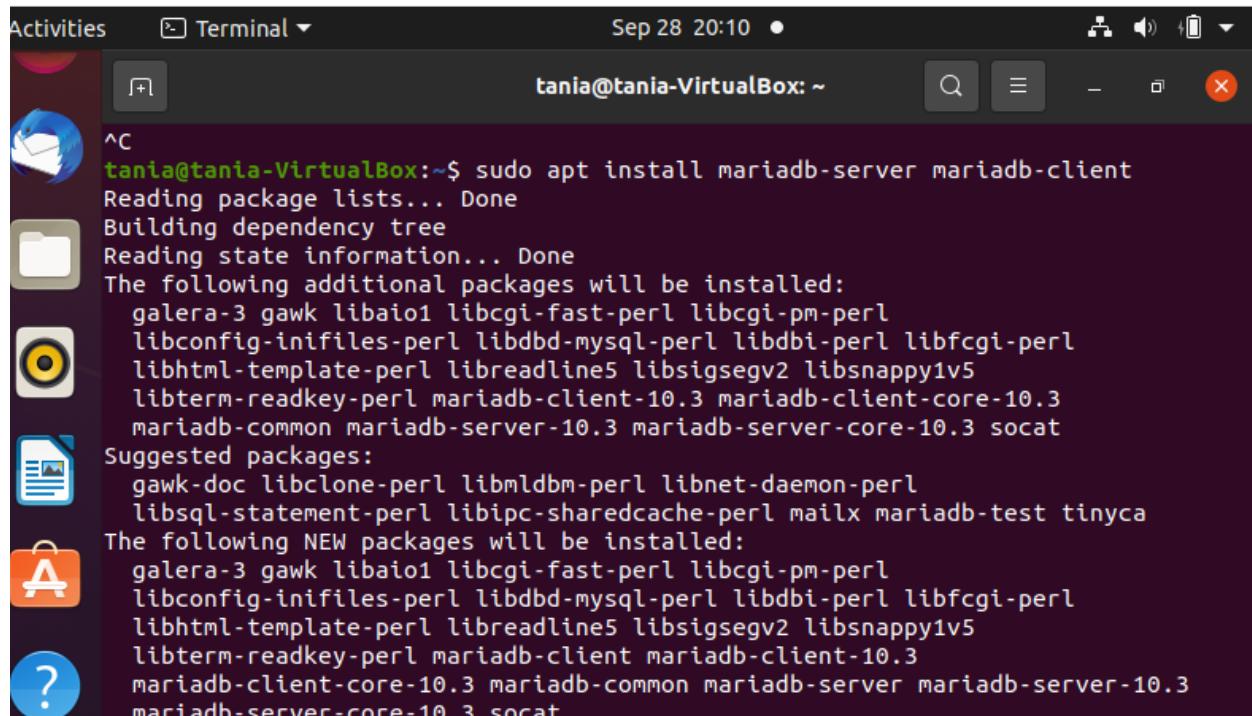
- Once installed test by accessing your servers IP in your browser <http://localhost>

```
tania@tania-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::4bf9:42ca:4858:1a10 prefixlen 64 scopeid 0x20<link>
          ether 08:00:27:65:0a:34 txqueuelen 1000 (Ethernet)
            RX packets 89016 bytes 129296681 (129.2 MB)
            RX errors 0 dropped 0 overruns 0 frame 0
            TX packets 44103 bytes 2941944 (2.9 MB)
            TX errors 0 dropped 0 overruns 0 carrier 0 collisions 0
```



Install mariadb

Sudo apt install mariadb-server mariadb-client

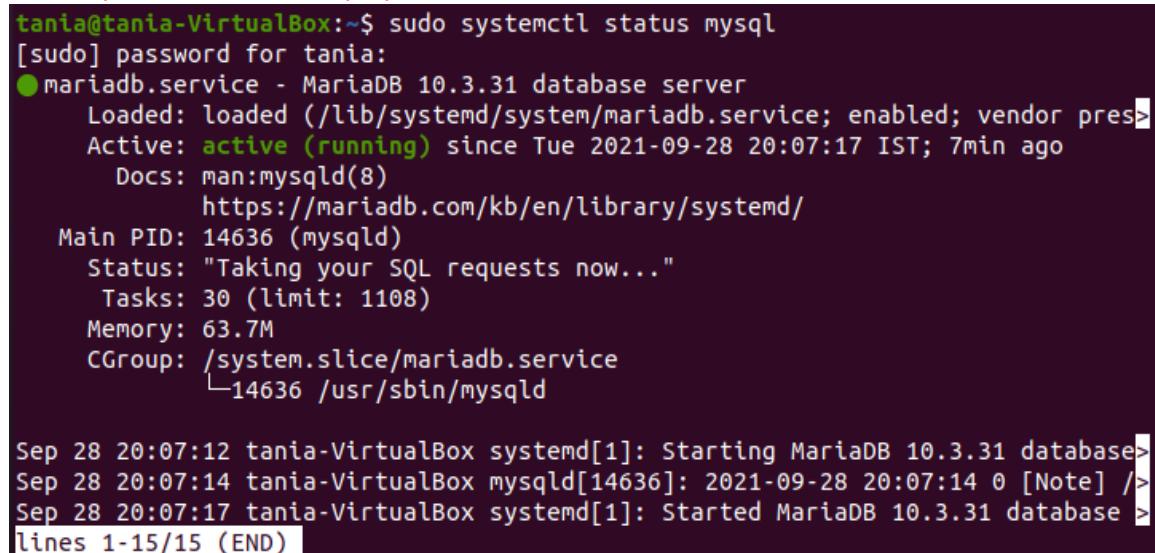


A screenshot of a Linux desktop environment, likely Ubuntu, showing a terminal window. The terminal window title is "Terminal" and the date and time are "Sep 28 20:10". The user is running the command "sudo apt install mariadb-server mariadb-client". The output shows the package lists being read, dependency tree building, state information, and a list of additional packages to be installed, including various Perl modules and MySQL components like galera-3, gawk, libaio1, libcgifast-perl, libcgipm-perl, libconfig-inifiles-perl, libdbd-mysql-perl, libdbi-perl, libfcgi-perl, libhtml-template-perl, libreadline5, libsigsegv2, libsnappy1v5, libterm-readkey-perl, mariadb-client-10.3, mariadb-client-core-10.3, mariadb-common, mariadb-server-10.3, mariadb-server-core-10.3, and socat. It also lists suggested packages and the NEW packages to be installed.

```
tania@tania-VirtualBox:~$ sudo apt install mariadb-server mariadb-client
Reading package lists... Done
Building dependency tree
Reading state information... Done
The following additional packages will be installed:
  galera-3 gawk libaio1 libcgifast-perl libcgipm-perl
  libconfig-inifiles-perl libdbd-mysql-perl libdbi-perl libfcgi-perl
  libhtml-template-perl libreadline5 libsigsegv2 libsnappy1v5
  libterm-readkey-perl mariadb-client-10.3 mariadb-client-core-10.3
  mariadb-common mariadb-server-10.3 mariadb-server-core-10.3 socat
Suggested packages:
  gawk-doc libclone-perl libmldbpm-perl libnet-daemon-perl
  libsql-statement-perl libipc-sharedcache-perl mailx mariadb-test tinyca
The following NEW packages will be installed:
  galera-3 gawk libaio1 libcgifast-perl libcgipm-perl
  libconfig-inifiles-perl libdbd-mysql-perl libdbi-perl libfcgi-perl
  libhtml-template-perl libreadline5 libsigsegv2 libsnappy1v5
  libterm-readkey-perl mariadb-client mariadb-client-10.3
  mariadb-client-core-10.3 mariadb-common mariadb-server mariadb-server-10.3
  mariadb-server-core-10.3 socat
```

➤ **To check status**

Sudo systemctl status mysql



A screenshot of a terminal window showing the status of the MariaDB service. The command run is "sudo systemctl status mysql". The output shows the service is active (running) since the previous day at 20:07:17 IST, with a main PID of 14636 and it is taking SQL requests. It also lists tasks, memory usage, and CGroup information. Log messages at the bottom indicate the service was starting, mysqld was 2021-09-28 20:07:14 0 [Note] /, and it was started at 20:07:17.

```
tania@tania-VirtualBox:~$ sudo systemctl status mysql
[sudo] password for tania:
● mariadb.service - MariaDB 10.3.31 database server
   Loaded: loaded (/lib/systemd/system/mariadb.service; enabled; vendor pres>
   Active: active (running) since Tue 2021-09-28 20:07:17 IST; 7min ago
     Docs: man:mysqld(8)
           https://mariadb.com/kb/en/library/systemd/
   Main PID: 14636 (mysqld)
      Status: "Taking your SQL requests now..."
      Tasks: 30 (limit: 1108)
     Memory: 63.7M
        CPU: 0.000 CPU(s) since start
       CGroup: /system.slice/mariadb.service
               └─14636 /usr/sbin/mysqld

Sep 28 20:07:12 tania-VirtualBox systemd[1]: Starting MariaDB 10.3.31 database>
Sep 28 20:07:14 tania-VirtualBox mysqld[14636]: 2021-09-28 20:07:14 0 [Note] />
Sep 28 20:07:17 tania-VirtualBox systemd[1]: Started MariaDB 10.3.31 database >
lines 1-15/15 (END)
```

➤ **Secure your newly installed mariadb service**

Sudo mysql_secure_installation

Install PHP and commonly used modules

Sudo apt install php libapache2-mod-php php-ocache php-cli php-gd php-curl php-mysql

```
tania@tania-VirtualBox:~$ sudo apt install php libapache2-mod-php php-ocpache p
hp-cli php-gd php-curl php-mysql
Reading package lists... Done
Building dependency tree
Reading state information... Done
Note, selecting 'php7.4-ocpache' instead of 'php-ocpache'
libapache2-mod-php is already the newest version (2:7.4+75).
php is already the newest version (2:7.4+75).
php-cli is already the newest version (2:7.4+75).
php-curl is already the newest version (2:7.4+75).
php-gd is already the newest version (2:7.4+75).
php-mysql is already the newest version (2:7.4+75).
The following additional packages will be installed:
  libapache2-mod-php7.4 php7.4-cli php7.4-common php7.4-curl php7.4-gd
    php7.4-json php7.4-mysql php7.4-readline
Suggested packages:
```

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

```
<?php
    phpinfo ();
?>
```

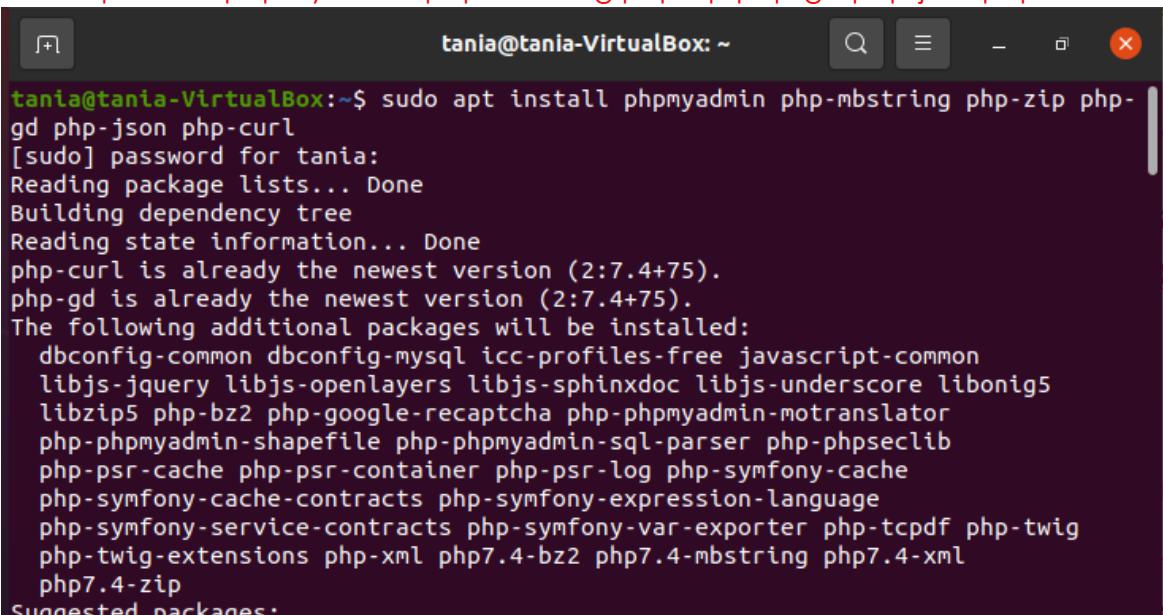
```
tania@tania-VirtualBox:~$ sudo systemctl restart apache2
tania@tania-VirtualBox:~$ sudo nano /var/www/html/phpinfo.php
```

- http://localhost/phpinfo.php

PHP Version 7.4.3	
System	Linux tania-VirtualBox 5.8.0-43-generic #49~20.04.1-Ubuntu SMP x86_64
Build Date	Aug 13 2021 05:39:12
Server API	Apache 2.0 Handler
Virtual Directory Support	disabled
Configuration File (php.ini) Path	/etc/php/7.4/apache2
Loaded Configuration File	/etc/php/7.4/apache2/php.ini
Scan this dir for additional .ini files	/etc/php/7.4/apache2/conf.d
Additional .ini files parsed	/etc/php/7.4/apache2/conf.d/10-mysqlnd.ini, /etc/php/7.4/apache2/conf.d/10-pdo.ini, /etc/php/7.4/apache2/conf.d/20-c ctype.ini, /etc/php/7.4/apache2/conf.d/20-curl.ini, /etc/php/7.4/apache2/conf.d/20-ffi.ini, /etc/php/7.4/apache2/conf.d/20-ftp.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-mysqli.ini, /etc/php/7.4/apache2/conf.d/20-phar.ini, /etc/php/7.4/apache2/conf.d/20-readline.ini, /etc/php/7.4/apache2/conf.d/20-shmop.ini

Install phpmyadmin

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

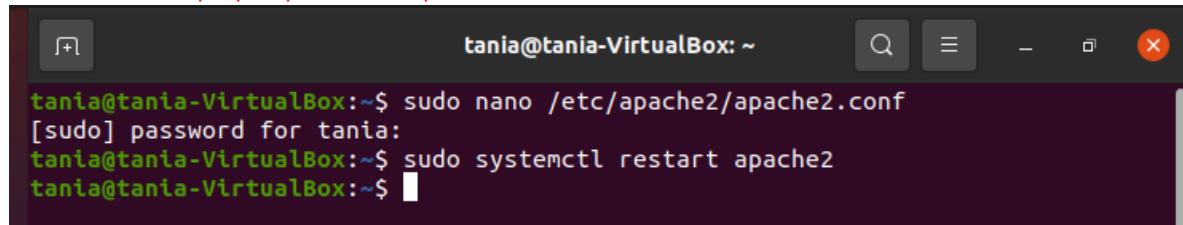


```
tania@tania-VirtualBox:~$ sudo apt install phpmyadmin php-mbstring php-zip php-gd php-json php-curl
[sudo] password for tania:
Reading package lists... Done
Building dependency tree
Reading state information... Done
php-curl is already the newest version (2:7.4+75).
php-gd is already the newest version (2:7.4+75).
The following additional packages will be installed:
  dbconfig-common dbconfig-mysql icc-profiles-free javascript-common
  libjs-jquery libjs-openlayers libjs-sphinxdoc libjs-underscore libonig5
  libzip5 php-bz2 php-google-recaptcha php-phpmyadmin-motranslator
  php-phpmyadmin-shapefile php-phpmyadmin-sql-parser php-phpseclib
  php-psr-cache php-psr-container php-psr-log php-symfony-cache
  php-symfony-cache-contracts php-symfony-expression-language
  php-symfony-service-contracts php-symfony-var-exporter php-tcpdf php-twigi
  php-twigi-extensions php-xml php7.4-bz2 php7.4-mbstring php7.4-xml
  php7.4-zip
Suggested packages:
```

- Sudo systemctl restart apache2
- <http://localhost/phpmyadmin>
- username: root
- password: your password
- if phpmyadmin page not found
- sudo nano /etc/apache2/apache2.conf

Add this line to last of the line

- Include /etc/phpmyadmin/apache.conf



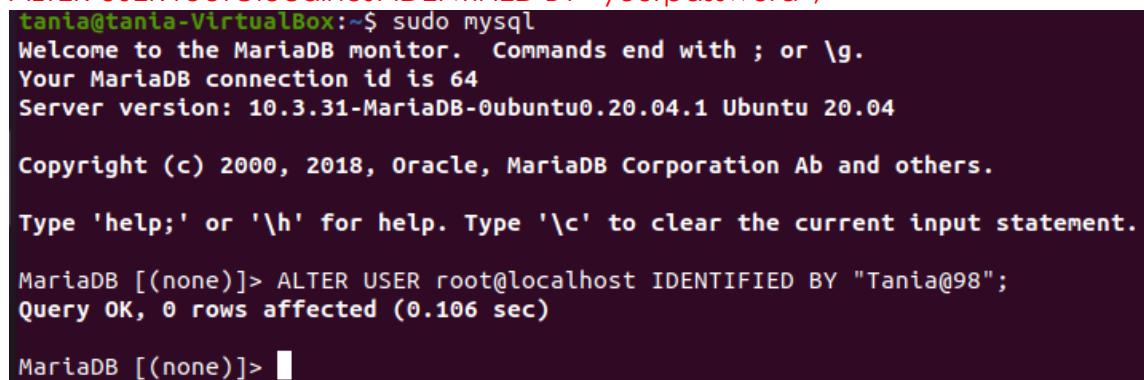
```
tania@tania-VirtualBox:~$ sudo nano /etc/apache2/apache2.conf
[sudo] password for tania:
tania@tania-VirtualBox:~$ sudo systemctl restart apache2
tania@tania-VirtualBox:~$
```

- Restart apache2
- Sudo systemctl restart apache2-now try
- <http://localhost/phpmyadmin>

- If any problem for login run the following command

Sudo mysql

ALTER USER root@localhost IDENTIFIED BY "yourpassword";



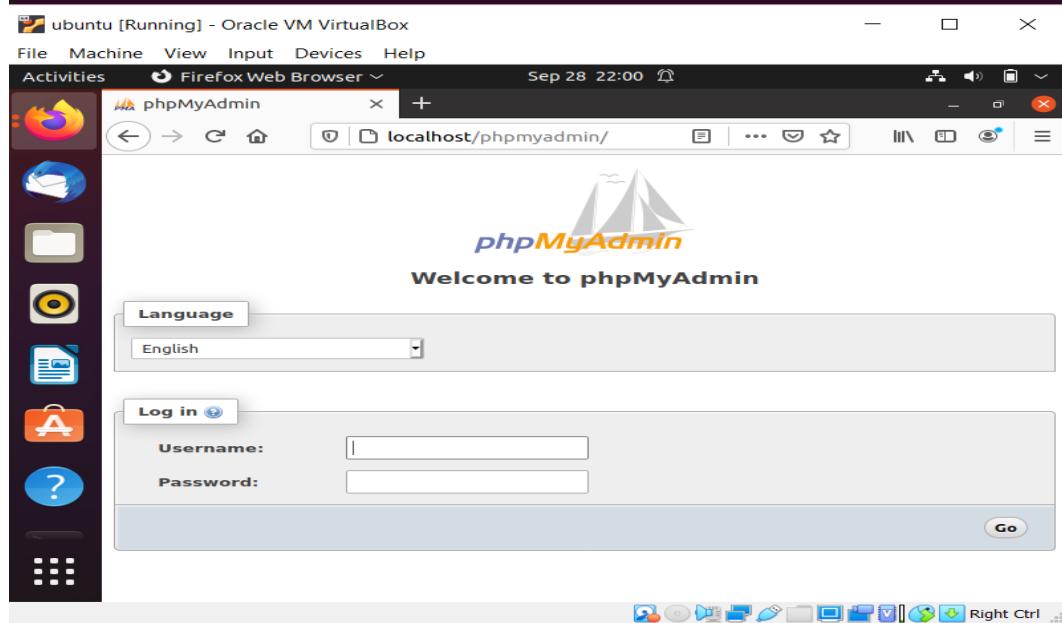
```
tania@tania-VirtualBox:~$ sudo mysql
Welcome to the MariaDB monitor. Commands end with ; or \g.
Your MariaDB connection id is 64
Server version: 10.3.31-MariaDB-0ubuntu0.20.04.1 Ubuntu 20.04

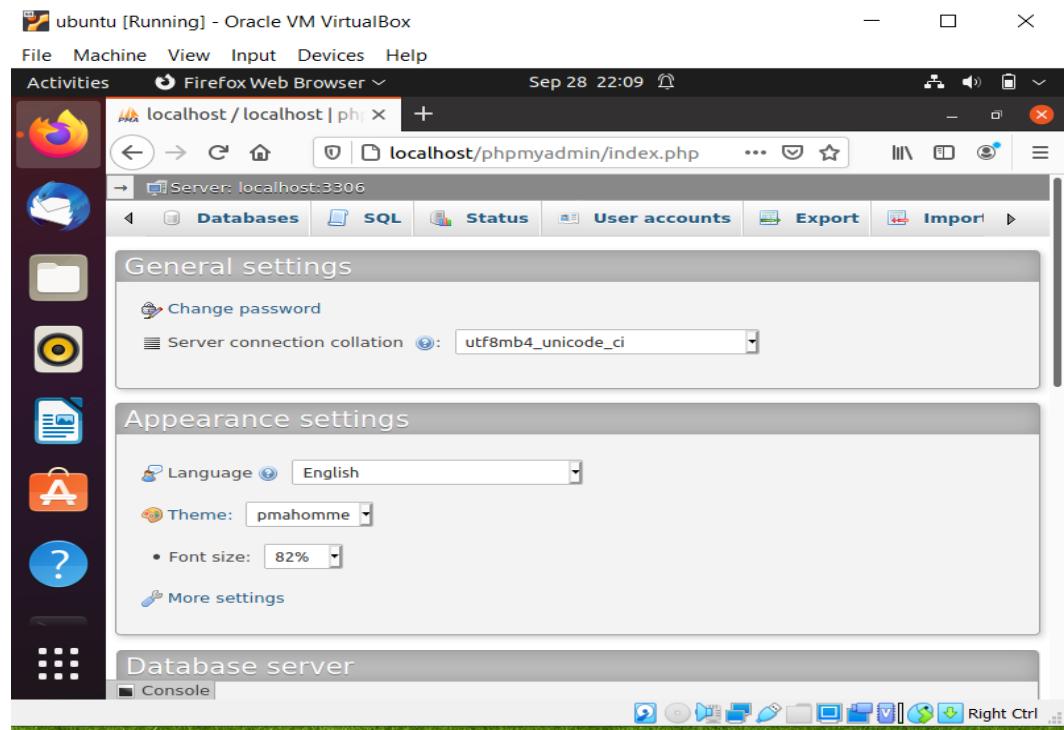
Copyright (c) 2000, 2018, Oracle, MariaDB Corporation Ab and others.

Type 'help;' or '\h' for help. Type '\c' to clear the current input statement.

MariaDB [(none)]> ALTER USER root@localhost IDENTIFIED BY "Tania@98";
Query OK, 0 rows affected (0.106 sec)

MariaDB [(none)]>
```





1.Explain the steps for the installation of ansible with your own screenshots.

■ sudo apt update

■ sudo apt-get install ansible

```
tania@tania-VirtualBox:~/Desktop$ sudo apt-get install ansible
Reading package lists... Done
Building dependency tree
Reading state information... Done
The following additional packages will be installed:
  ieee-data python3-argcomplete python3-crypto python3-distutils
  python3-dnspython python3-jinja2 python3-jmespath python3-kerberos
  python3-lib2to3 python3-libcloud python3-netaddr python3-ntlm-auth
  python3-requests-kerberos python3-requests-ntlm python3-selinux
  python3-winrm python3-xmldict
Suggested packages:
  cowsay sshpass python-jinja2-doc ipython3 python-netaddr-docs
The following NEW packages will be installed:
  ansible ieee-data python3-argcomplete python3-crypto python3-distutils
  python3-dnspython python3-jinja2 python3-jmespath python3-kerberos
  python3-libcloud python3-netaddr python3-ntlm-auth
  python3-requests-kerberos python3-requests-ntlm python3-selinux
  python3-winrm python3-xmldict
The following packages will be upgraded:
  python3-lib2to3
1 upgraded, 17 newly installed, 0 to remove and 291 not upgraded.
Need to get 237 kB/9,942 kB of archives.
After this operation, 92.0 MB of additional disk space will be used.
Do you want to continue? [Y/n] y
Get:1 http://in.archive.ubuntu.com/ubuntu focal/main amd64 python3-crypto amd64
 2.6.1-13ubuntu2 [237 kB]
```

■ ansible --version

```
tania@tania-VirtualBox:~/Desktop$ ansible --version
ansible 2.9.6
  config file = /etc/ansible/ansible.cfg
  configured module search path = ['/home/tania/.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]
tania@tania-VirtualBox:~/Desktop$
```

1. Tcpdump installation

- Sudo apt install tcpdump
- Sudo tcpdump

```
tania@tania-VirtualBox:~/Desktop$ sudo apt install tcpdump
[sudo] password for tania:
Reading package lists... Done
Building dependency tree
Reading state information... Done
tcpdump is already the newest version (4.9.3-4).
tcpdump set to manually installed.
0 upgraded, 0 newly installed, 0 to remove and 291 not upgraded.
tania@tania-VirtualBox:~/Desktop$ sudo tcpdump
tcpdump: verbose output suppressed, use -v or -vv for full protocol decode
listening on enp0s3, link-type EN10MB (Ethernet), capture size 262144 bytes
12:03:42.248708 IP tania-VirtualBox.42134 > pugot.canonical.com.ntp: NTPv4, Client, length 48
12:03:42.288511 IP tania-VirtualBox.39097 > 192.168.0.1.domain: 19748+ [1au] PTR
R? 4.94.189.91.in-addr.arpa. (53)
12:03:42.389955 IP 192.168.0.1.domain > tania-VirtualBox.39097: 19748 1/0/1 PTR
pugot.canonical.com. (86)
12:03:42.391159 IP tania-VirtualBox.49514 > 192.168.0.1.domain: 2550+ [1au] PTR
? 15.2.0.10.in-addr.arpa. (51)
12:03:42.408344 IP 192.168.0.1.domain > tania-VirtualBox.49514: 2550 NXDomain*
0/1/1 (101)
12:03:42.408654 IP tania-VirtualBox.49514 > 192.168.0.1.domain: 2550+ PTR? 15.2
.0.10.in-addr.arpa. (40)
12:03:42.433386 IP pugot.canonical.com.ntp > tania-VirtualBox.42134: NTPv4, Server, length 48
12:03:42.495300 IP 192.168.0.1.domain > tania-VirtualBox.49514: 2550 NXDomain*
0/1/0 (90)
12:03:42.526624 IP tania-VirtualBox.47767 > 192.168.0.1.domain: 42807+ [1au] PTR
R? 1.0.168.192.in-addr.arpa. (53)
```

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

```
tania@tania-VirtualBox:~/Desktop$ tcpdump -D
1.enp0s3 [Up, Running]
2.lo [Up, Running, Loopback]
3.any (Pseudo-device that captures on all interfaces) [Up, Running]
4.bluetooth-monitor (Bluetooth Linux Monitor) [none]
5.nflog (Linux netfilter log (NFLOG) interface) [none]
6.nfqueue (Linux netfilter queue (NFQUEUE) interface) [none]
tania@tania-VirtualBox:~/Desktop$ tcpdump -i enp0s3
tcpdump: enp0s3: You don't have permission to capture on that device
(socket: Operation not permitted)
tania@tania-VirtualBox:~/Desktop$ sudo tcpdump -c 5
tcpdump: verbose output suppressed, use -v or -vv for full protocol decode
listening on enp0s3, link-type EN10MB (Ethernet), capture size 262144 bytes
^C
0 packets captured
0 packets received by filter
0 packets dropped by kernel
tania@tania-VirtualBox:~/Desktop$ sudo tcpdump -i enp0s3 -c 5 port 80
tcpdump: verbose output suppressed, use -v or -vv for full protocol decode
listening on enp0s3, link-type EN10MB (Ethernet), capture size 262144 bytes
^C
0 packets captured
0 packets received by filter
0 packets dropped by kernel
tania@tania-VirtualBox:~/Desktop$
```

- tcpdump host 10.0.2.15
- tcpdump -l eth1 icmp
- Sudo tcpdump -n -i enp0s3 -c 10 -w

```
tania@tania-VirtualBox:~/Desktop$ tcpdump host 10.0.2.15
tcpdump: enp0s3: You don't have permission to capture on that device
(socket: Operation not permitted)
tania@tania-VirtualBox:~/Desktop$ tcpdump -i eth1 icmp
tcpdump: eth1: You don't have permission to capture on that device
(socket: Operation not permitted)
tania@tania-VirtualBox:~/Desktop$ sudo tcpdump -n -i enp0s3 -c 10 -w
tcpdump: option requires an argument -- 'w'
tcpdump version 4.9.3
libpcap version 1.9.1 (with TPACKET_V3)
OpenSSL 1.1.1f  31 Mar 2020
Usage: tcpdump [-aAbdDefhHIJKLMNOPqStuUvxX#] [ -B size ] [ -c count ]
           [ -C file_size ] [ -E algo:secret ] [ -F file ] [ -G seconds ]
           [ -i interface ] [ -j tstamptype ] [ -M secret ] [ --number ]
           [ -Q injout|inout ]
           [ -r file ] [ -s snaplen ] [ --time-stamp-precision precision ]
           [ --immediate-mode ] [ -T type ] [ --version ] [ -V file ]
           [ -w file ] [ -W filecount ] [ -y datalinktype ] [ -z postrotat
e-command ]
           [ -Z user ] [ expression ]
tania@tania-VirtualBox:~/Desktop$ █
```

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

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

OUTPUT:

```
tania@tania-VirtualBox:~/Desktop$ ./profile.sh
./profile.sh: line 1: !#/bin/bash/: No such file or directory
Enter your name
Tania
enter your college name
Amal jyothi college
Name:
college:Amal jyothi college
tania@tania-VirtualBox:~/Desktop$
```

```
deatils you entered
Name:Tania
College:Amal Jyothi college
tania@tania-VirtualBox:~$
```

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

```
echo "Display value of a variable"
a=10
echo $a
```

OUTPUT:

```
tania@tania-VirtualBox:~$ vi vari.sh
tania@tania-VirtualBox:~$ chmod +x vari.sh
tania@tania-VirtualBox:~$ ./vari.sh
./vari.sh: line 1: !#/bin/bash: No such file or directory
display the variable
10
tania@tania-VirtualBox:~$
```

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

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

OUTPUT:

```
tania@tania-VirtualBox:~$ vi num.sh
tania@tania-VirtualBox:~$ ./num.sh
./num.sh: line 1: !#/bin/bash: No such file or directory
enter the number
5
enter another number
6
enter operation
\n1.addition \n2.subtraction \n3.multiplication \n4.division
1
a+b=11
tania@tania-VirtualBox:~$
```

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

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

OUTPUT:

```
tania@tania-VirtualBox:~$ vi find.sh
tania@tania-VirtualBox:~$ chmod +x find.sh
tania@tania-VirtualBox:~$ ./find.sh
./find.sh: line 1: !#/bin/bash: No such file or directory
enter a number
10
number found
tania@tania-VirtualBox:~$
```

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

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

OUTPUT:

```
tania@tania-VirtualBox:~$ vi da.sh
tania@tania-VirtualBox:~$ chmod +x da.sh
tania@tania-VirtualBox:~$ ./da.sh
./da.sh: line 1: !#/bin/bash: No such file or directory
Today is Sunday 03 October 2021 01:36:47 PM IST
calender
      October 2021
Su Mo Tu We Th Fr Sa
          1  2
3  4  5  6  7  8  9
10 11 12 13 14 15 16
17 18 19 20 21 22 23
24 25 26 27 28 29 30
31
tania@tania-VirtualBox:~$
```

6. Write a shell script to check a number is even or odd. #!/bin/bash

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

OUTPUT:

```
tania@tania-VirtualBox:~$ vi ev.sh
tania@tania-VirtualBox:~$ ./ev.sh
enter a number
6
number even
tania@tania-VirtualBox:~$
```

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

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

OUTPUT:

```
tania@tania-VirtualBox:~$ vi gr.sh
tania@tania-VirtualBox:~$ chmod +x gr.sh
tania@tania-VirtualBox:~$ ./gr.sh
enter first number
10
enter second number
18
18 is larger
tania@tania-VirtualBox:~$
```

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

```
#!/bin/bash
echo "enter the number"
read n
i=1
sum=0
echo "enter numbers"
while [ $i -le $n ]
do
read num
sum=$((sum + num))
i=$((i + 1))
done
echo "sum of first 10 numbers= $sum"
```

OUTPUT:

```
tania@tania-VirtualBox:~$ vi sum.sh
tania@tania-VirtualBox:~$ ./sum.sh
enter the number
10
enter numbers
1
2
3
4
5
6
7
8
9
10
sum of first 10 numbers= 55
tania@tania-VirtualBox:~$
```

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

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

OUTPUT:

```
user@user-VirtualBox:~$ bash 9.sh
please enter your first number
1
please enter your second number
2
please enter your third number
3
please enter your fourth number
4
the sum is:10
the average is:2.5000000000000000000000000000000
the product is:24
```

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

```
#!/bin/bash
echo "Enter the 3 numbers"
read a b c
s=$a
if [ $b -lt $s ]
then
s=$b
fi
if [ $c -lt $s ]
then
s Rhythmbox
fi
echo Smallest of $a $b $c is $s
~
```

OUTPUT:

```
tania@tania-VirtualBox:~$ vi three.sh
tania@tania-VirtualBox:~$ chmod +x three.sh
tania@tania-VirtualBox:~$ ./three.sh
Enter the 3 numbers
20 78 90
Smallest of 20 78 90 is 20
tania@tania-VirtualBox:~$
```

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

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

OUTPUT:

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

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

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

OUTPUT:

```
tania@tania-VirtualBox:~$ vi pal.sh
tania@tania-VirtualBox:~$ ./pal.sh
enter the number
121
number is palindrome
tania@tania-VirtualBox:~$
```

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

```
echo enter size
read n
i=1
s=0
echo "enter numbers"
while [ $i -le $n ]
```

```
do
read num
s=$((s+num))
i=$((i+1))
done
avg=$(echo $s/$n | bc -l)
echo "average is $avg"
```

OUTPUT:

```
tania@tania-VirtualBox:~$ vi avg.sh
tania@tania-VirtualBox:~$ ./avg.sh
enter size
5
enter numbers
12
34
10
20
5
average is 16.200000000000000000000000000000
tania@tania-VirtualBox:~$
```

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

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

OUTPUT:

```
tania@tania-VirtualBox:~$ vi di.sh
tania@tania-VirtualBox:~$ chmod +x di.sh
tania@tania-VirtualBox:~$ ./di.sh
enter the no
345
sum of digit is 12
tania@tania-VirtualBox:~$
```

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

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

OUTPUT:

```
tania@tania-VirtualBox:~$ vi leap.sh
tania@tania-VirtualBox:~$ chmod +x leap.sh
tania@tania-VirtualBox:~$ ./leap.sh
enter year
1994
1994 is leap year
tania@tania-VirtualBox:~$ █
```

Docker installation on Windows 10

Step-I

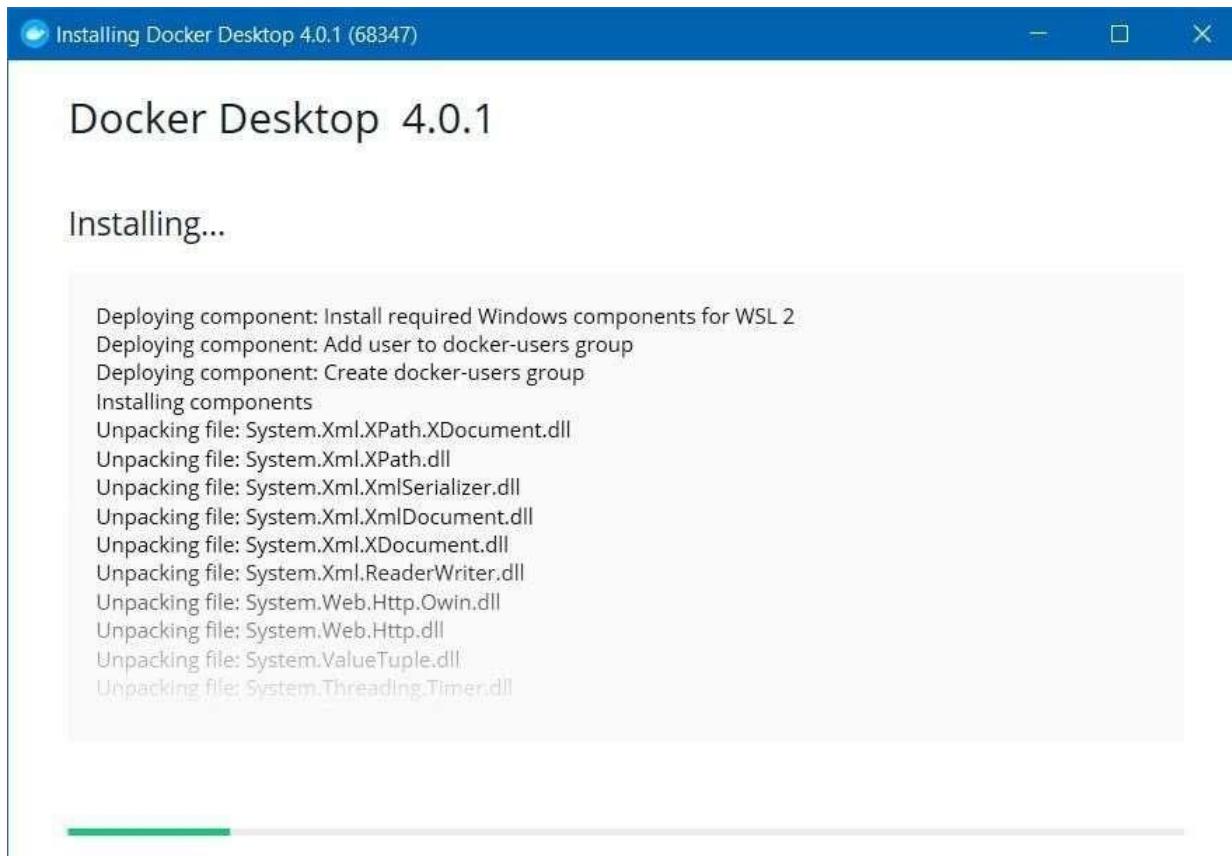
Download Docker desktop Installer for Windows from

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



Step-II

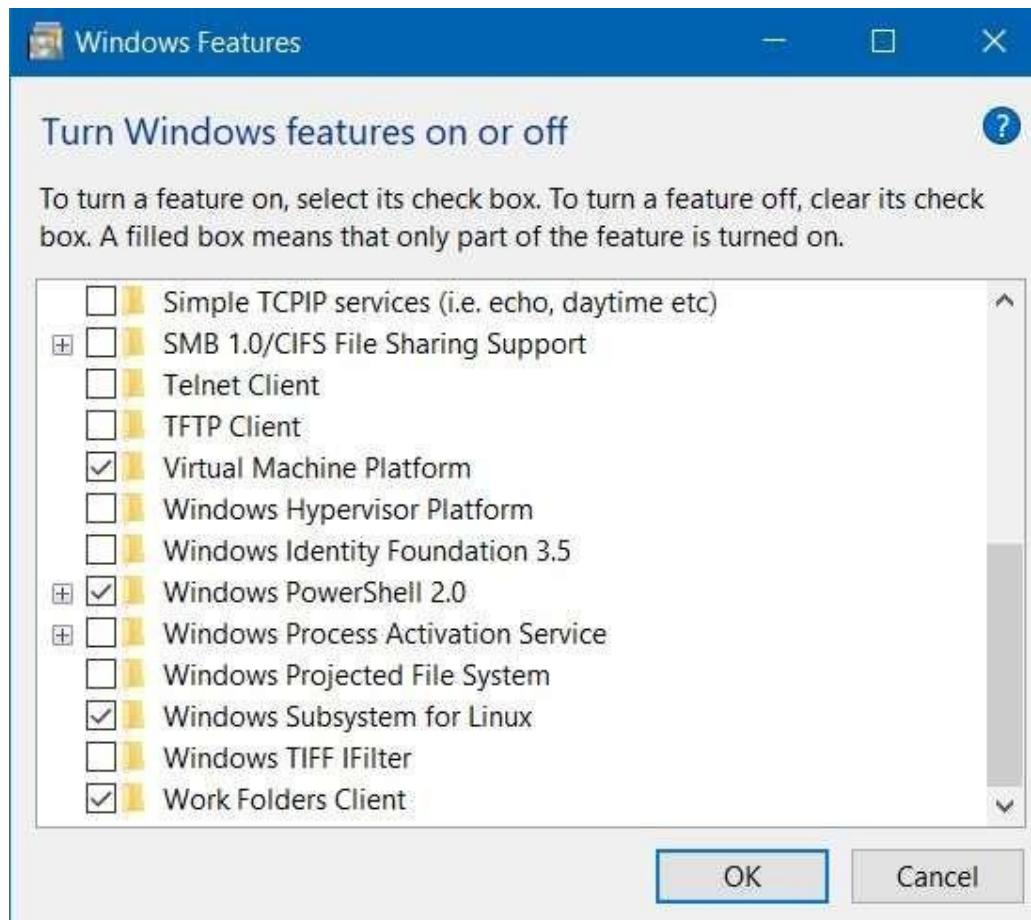
Open the .exe file and follow the steps after clicking install button.



Step-III

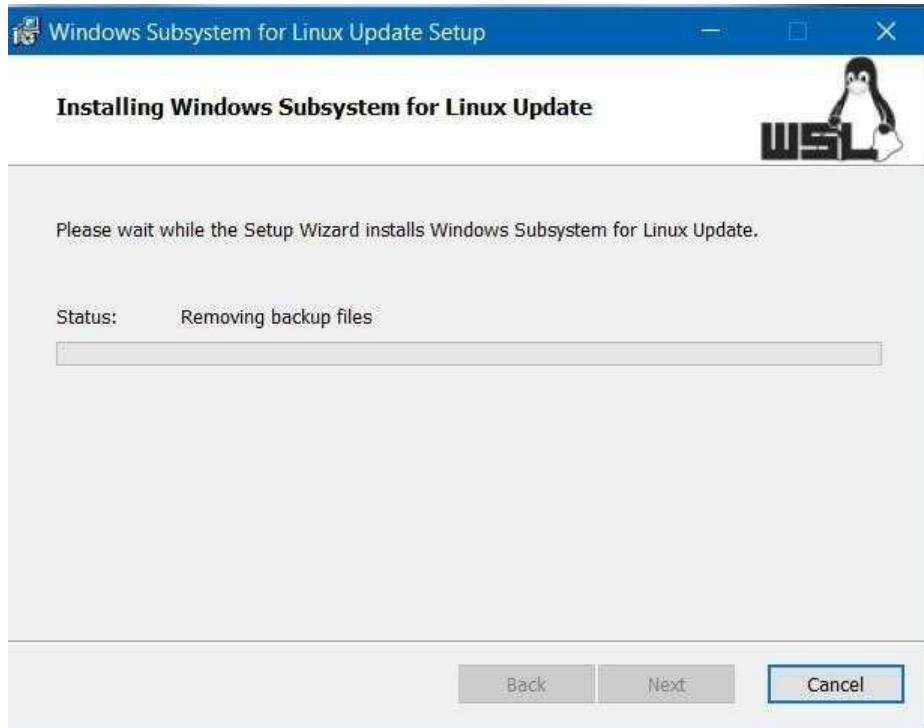
Once installed go to programs and features and click turn on windows features on or off

Scroll to the bottom and select windows subsystem for Linux



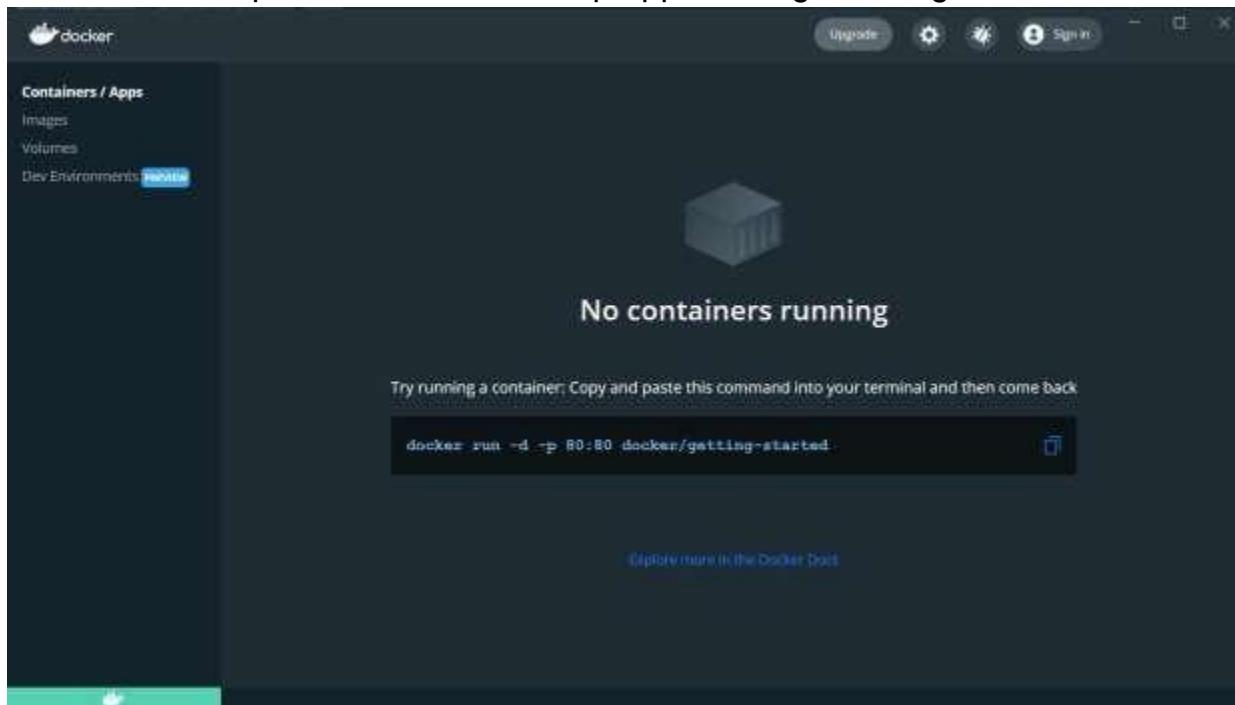
Step-IV

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



Step-V

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



Step-VI

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

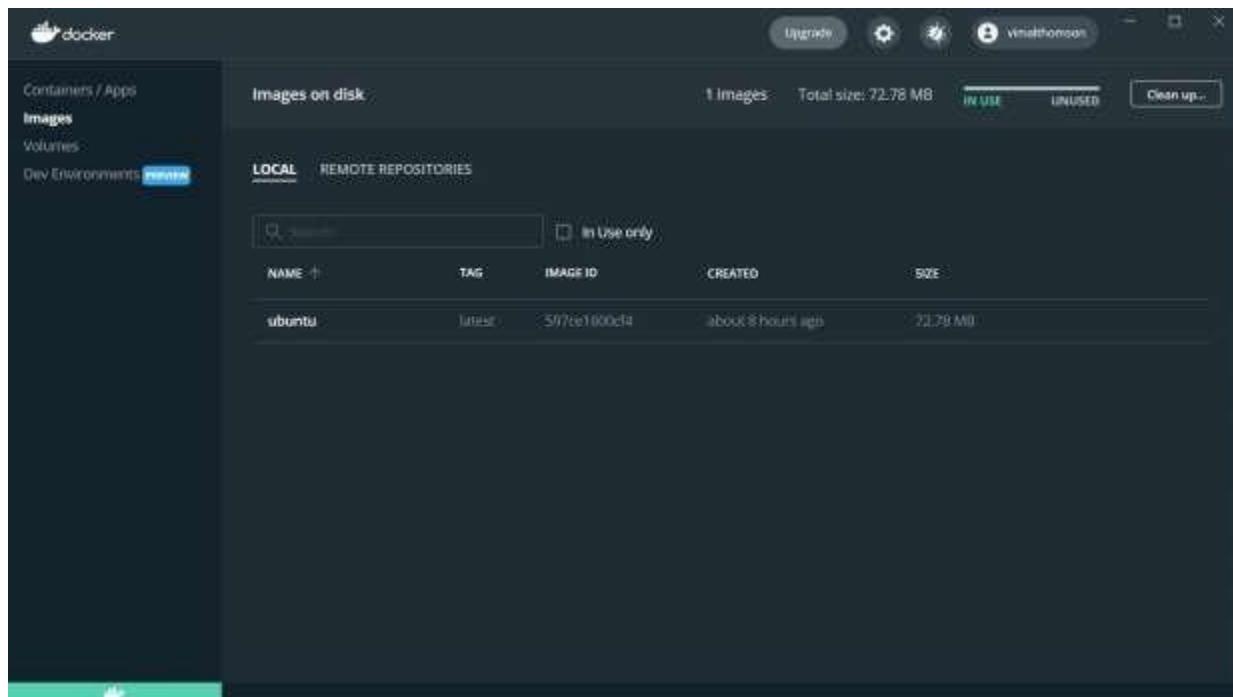
```
Administrator: Command Prompt
Microsoft Windows [Version 10.0.19042.1081]
(c) Microsoft Corporation. All rights reserved.

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

C:\Windows\system32>docker pull ubuntu
Using default tag: latest
latest: Pulling from library/ubuntu
F3ef4ff62e0d: Pull complete
Digest: sha256:65de08a8dabf289ef114053ab32f79e0c333a4fbfa1fe3778bb13ae921a7849b
Status: Downloaded newer image for ubuntu:latest
docker.io/library/ubuntu:latest

C:\Windows\system32>
```

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



Wireshark installation

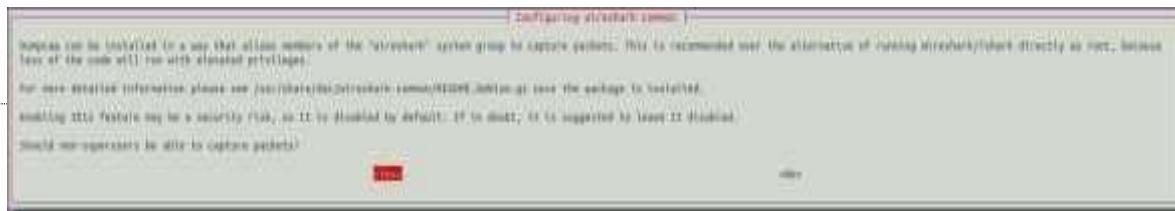
1.Command: sudo apt-get install wireshark

```
tania@tania-VirtualBox:~$ sudo apt-get install wireshark
Reading package lists... Done
Building dependency tree
Reading state information... Done
The following additional packages will be installed:
  libc-ares2 libdouble-conversion3 libpcre2-16-0 libqt5core5a libqt5dbus5
  libqt5gui5 libqt5multimedia5 libqt5multimedia5-plugins
  libqt5multimeddiagsttools5 libqt5multimedawidgets5 libqt5network5
  libqt5opengl5 libqt5printsupport5 libqt5svg5 libqt5widgets5 libsmi2l dbl
  libspandsp2 libssh-gcrypt-4 libwireshark-data libwireshark13 libwiretap10
  libwsutil11 libxcb-xinerama0 libxcb-xinput0 qt5-gtk-platformtheme
  qttranslations5-l10n wireshark-common wireshark-qt
Suggested packages:
  qt5-image-formats-plugins qtwaylands snmp-mibs-downloader geoipupdate
  geoip-database geoip-database-extra libjs-leaflet
  libjs-leaflet.markercluster wireshark-doc
The following NEW packages will be installed:
  libc-ares2 libdouble-conversion3 libpcre2-16-0 libqt5core5a libqt5dbus5
  libqt5gui5 libqt5multimedia5 libqt5multimedia5-plugins
  libqt5multimeddiagsttools5 libqt5multimedawidgets5 libqt5network5
  libqt5opengl5 libqt5printsupport5 libqt5svg5 libqt5widgets5 libsmi2l dbl
  libspandsp2 libssh-gcrypt-4 libwireshark-data libwireshark13 libwiretap10
  libwsutil11 libxcb-xinerama0 libxcb-xinput0 qt5-gtk-platformtheme
  qttranslations5-l10n wireshark wireshark-common wireshark-qt
0 upgraded, 29 newly installed, 0 to remove and 289 not upgraded.
```

2.Command: sudo dpkg-reconfigure wireshark-common

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

3.Command: Select Yes and press enter



4. Open wireshark from the applist

