



20MCA136-NETWORKING & SYSTEM ADMINISTRATION LAB

LAB RECORD



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Roll No 02

Assignment 1: Basic Linux Commands

1. `pwd` (Print Working Directory)

The `pwd` command is used to find out the path of the current working directory. The command will return an absolute (full) path, which means the path that starts from the root. The root is the base of the Linux file system. basically a path of all the directories that starts with a forward slash (/).

2. `history`

The history command is used to view the previously executed command. It shows the manual pages of the command. For example, `man cd` shows the manual pages of the `cd` command.

3. `man`

The man command is used to display the user manual of any command that we can run on the terminal.

4. `cd`

The `cd` command, also known as change directory, is a command-line shell command used to change the current working directory in various operating systems.

5. `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.

We can see all the hidden files by using the command `ls -a`.

6. `mkdir`

The `mkdir` command is used to make a new directory(folder). Example `mkdir song`

7. `rmdir`

The `rmdir` command is used to delete a directory. However, `rmdir` only allows you to delete empty directories.

8. `rm`

The rm command is used to delete directories and the contents within them. To remove a file use ***rm filename***

9. touch

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

It can be anything, from an empty txt file to an empty zip file

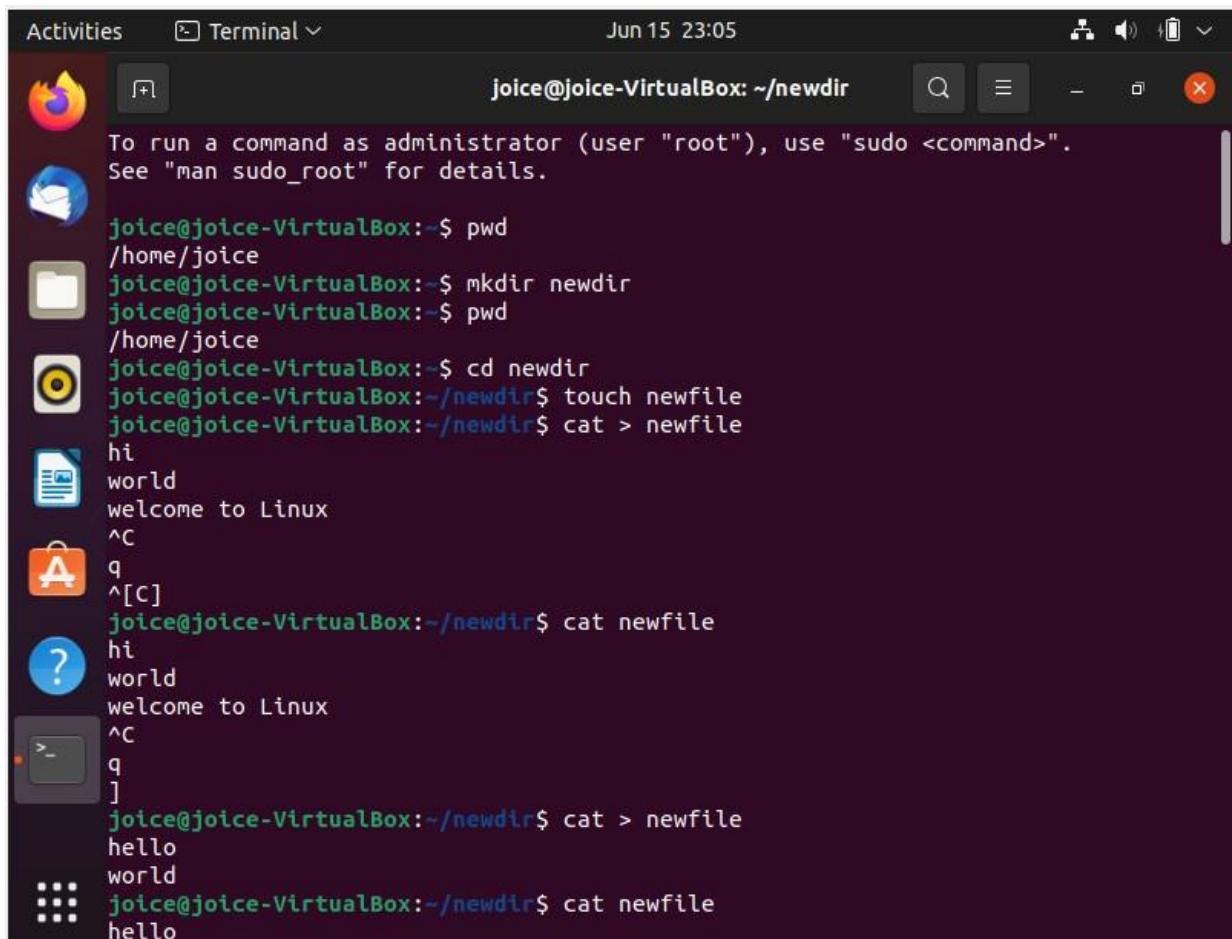
10. cat

It is used to list the contents of a file on the standard output stdout.

cat >filename - creates a new file ***cat >>***

filename - insert data to a file

OUTPUT



The screenshot shows a terminal window with a dark background and light-colored text. The terminal title is "Terminal". The date and time at the top right are "Jun 15 23:05". The user prompt is "joice@joice-VirtualBox: ~/newdir". The terminal content is as follows:

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

joice@joice-VirtualBox:~$ pwd
/home/joice
joice@joice-VirtualBox:~$ mkdir newdir
joice@joice-VirtualBox:~$ pwd
/home/joice
joice@joice-VirtualBox:~$ cd newdir
joice@joice-VirtualBox:~/newdir$ touch newfile
joice@joice-VirtualBox:~/newdir$ cat > newfile
hi
world
welcome to Linux
^C
q
^[C]
joice@joice-VirtualBox:~/newdir$ cat newfile
hi
world
welcome to Linux
^C
q
]
joice@joice-VirtualBox:~/newdir$ cat > newfile
hello
world
joice@joice-VirtualBox:~/newdir$ cat newfile
hello
```

Activities Terminal Jun 15 23:06

```
joice@joice-VirtualBox: ~/newdir
hello
world
joice@joice-VirtualBox:~/newdir$ cat >> newfile
welcome to Linux
joice@joice-VirtualBox:~/newdir$ cat newfile
hello
world
welcome to Linux
joice@joice-VirtualBox:~/newdir$ ls
newfile
joice@joice-VirtualBox:~/newdir$ ls -l
total 4
-rw-rw-r-- 1 joice joice 30 Jun 15 22:56 newfile
joice@joice-VirtualBox:~/newdir$ ls -d
.
joice@joice-VirtualBox:~/newdir$ ls -ld
drwxrwxr-x 2 joice joice 4096 Jun 15 22:47 .
joice@joice-VirtualBox:~/newdir$ ls -a
. ... newfile
joice@joice-VirtualBox:~/newdir$ ls -lt
total 4
-rw-rw-r-- 1 joice joice 30 Jun 15 22:56 newfile
joice@joice-VirtualBox:~/newdir$ ^C
bash: :s^C: substitution failed
joice@joice-VirtualBox:~/newdir$ history
1 pwd
2 -l
3 list -l
4 help
```

Activities Terminal Jun 15 23:06

```
joice@joice-VirtualBox: ~/newdir
5 pwd
6 history
7 list -l
8 clear
9 exit
10 history
11 !
12 help
13 pwd
14 clear
15 history
16 man man
17 man history
18 cd
19 mkdir joice
20 cd joice
21 cd desktop
22 pwd
23 cd ..
24 mkdir john
25 cd -
26 cd
27 pwd
28 cd joice
29 mkdir joice2
30 ls
31 cd -
32 cd ..
33 pwd
34 !
```

Activities Terminal Jun 15 23:07 joice@joice-VirtualBox: ~/newdir

```
79 cat web.html
80 open web.html
81 touch note.txt
82 ls
83 cat >web.html
84 man sudo
85 echo joice
86 ls
87 cd videos
88 cd desktop
89 uname
90 pwd
91 mkdir newdir
92 pwd
93 cd newdir
94 touch newfile
95 cat > newfile
96 cat newfile
97 cat > newfile
98 cat newfile
99 cat >> newfile
100 cat newfile
101 ls
102 ls -l
103 ls -d
104 ls -ld
105 ls -a
106 ls -lt
107 history
```

Activities Terminal Jun 15 23:07 joice@joice-VirtualBox: ~/newdir

```
joice@joice-VirtualBox:~/newdir$ man rm
joice@joice-VirtualBox:~/newdir$ rm newfile
joice@joice-VirtualBox:~/newdir$ ls -l
total 0
joice@joice-VirtualBox:~/newdir$ rmdir newdir
rmdir: failed to remove 'newdir': No such file or directory
joice@joice-VirtualBox:~/newdir$ rmdir
rmdir: missing operand
Try 'rmdir --help' for more information.
joice@joice-VirtualBox:~/newdir$ rmdir --help
Usage: rmdir [OPTION]... DIRECTORY...
Remove the DIRECTORY(ies), if they are empty.

--ignore-fail-on-non-empty
          ignore each failure that is solely because a directory
          is non-empty
-p, --parents  remove DIRECTORY and its ancestors; e.g., 'rmdir -p a/b/c' is
              similar to 'rmdir a/b/c a/b a'
--verbose    output a diagnostic for every directory processed
--help       display this help and exit
--version    output version information and exit

GNU coreutils online help: <https://www.gnu.org/software/coreutils/>
Full documentation <https://www.gnu.org/software/coreutils/rmdir>
or available locally via: info '(coreutils) rmdir invocation'
joice@joice-VirtualBox:~/newdir$ pwd
/home/joice/newdir
joice@joice-VirtualBox:~/newdir$ cd joice
bash: cd: joice: No such file or directory
```

Assignment 2: Basic Linux Commands

1. Echo

The echo command is used to move some data into a file.

Add a text

2. Head

The head command is used to view the first lines of any text file. By default, it will show the first 10 lines, but we can change this number.

3. Tail

The tail command will display the last ten lines of a text file.

4. Read

To read the contents of a line into a variable. The read command can be used with and without arguments.

5. More

The more command is used to view the text files in the command prompt, displaying one screen at a time in case the file is large. The more command also allows the user to scroll up and down through the page.

Enter key : to scroll down page line by line

space bar : to go to next page B key : to go to the backward page

/key : to search string

6. Less

Less command is linux utility which can be used to read contents of text file one page(one screen) per time.

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

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.

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.

10. Cp

The cp command is used to copy files from the current directory to a different directory.

Cp -i (will ask for user's consent in case of a potential file overwrite.)

Cp -p (will preserve source file mode, ownership and time stamp)

Cp -r (will copy directories recursively)

Cp -u (copies files only if the destination file is not existing or the source file is newer Than the destination file)

11. Mv

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.

12. Locate

To locate a file, just like the search command in windows.

Locate -i filename (make it case insensitive you can search file if you don't remember its Exact name)

* (to search for a file that contains two or more words)

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.

Find. -name filename (to find files in the current directory)

14. Grep

Helpful for everyday use is grep. It helps to search through all the text in a given file

15. Df

To get a report on the system's disk space usage, shown in Percentage and kbs. If we want to see the report in megabytes, type df -m.

16. Du

The du (disk usage) command is used to check how much space a file or a directory takes. However, the disk usage summary will show disk block numbers instead of the usual size format. If we want to see it in bytes, kilobytes, and megabytes, add the -h argument to the command line.

- \$du -h

17. Useradd

The 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.

Available only for system admins.

18. Userdel

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

19. Sudo

Superuser do(sudo) command enables you to perform tasks that require Administrative or root permissions.

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.

OUTPUT

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

joice@joice-VirtualBox:~$ pwd
/home/joice
joice@joice-VirtualBox:~$ cd newdir
joice@joice-VirtualBox:~/newdir$ echo "Enter your name";read name;echo "Hello $name"
Enter your name
Joice John
Hello Joice John
joice@joice-VirtualBox:~/newdir$ touch newfile.txt
joice@joice-VirtualBox:~/newdir$ cat>>number.txt
one
two
three
four
five
six
seven
eight
nine
ten
joice@joice-VirtualBox:~/newdir$ head number.txt
one
two
three
four
five
six
seven
eight
nine
ten
joice@joice-VirtualBox:~/newdir$ head -n 3 number.txt
```

```
tenjoice@joice-VirtualBox:~/newdir$ head -n 3 number.txt
one
two
three
joice@joice-VirtualBox:~/newdir$ tail -n 2 number.txt
nine
tenjoice@joice-VirtualBox:~/newdir$ 
joice@joice-VirtualBox:~/newdir$ read v1 v2 v3
10
joice@joice-VirtualBox:~/newdir$ read v1 v2 v3
10 20 30
joice@joice-VirtualBox:~/newdir$ echo $v2
20
joice@joice-VirtualBox:~/newdir$ echo $v1 $v2 $v3
10 20 30
joice@joice-VirtualBox:~/newdir$ more number.txt
one
two
three
four
five
six
seven
eight
nine
ten
joice@joice-VirtualBox:~/newdir$ less number.txt
joice@joice-VirtualBox:~/newdir$ cat >name.txt
warren buffet
Robert kiyosaki
eicher india
tata power
joice@joice-VirtualBox:~/newdir$ cut -b 1,2,3 name.txt
```

```
joice@joice-VirtualBox:~/newdir$ cut -b 1,2,3 name.txt
war
Rob
eic
tat
joice@joice-VirtualBox:~/newdir$ paste number.txt name.txt
one    warren buffet
two    Robert kiyosaki
three  eicher india
four   tata power
five
six
seven
eight
nine
ten
joice@joice-VirtualBox:~/newdir$ uname
Linux
joice@joice-VirtualBox:~/newdir$ uname -a
Linux joice-VirtualBox 5.11.0-16-generic #17-Ubuntu SMP Wed Apr 14 20:12:43 UTC 2021 x8
6_64 x86_64 x86_64 GNU/Linux
joice@joice-VirtualBox:~/newdir$ uname -s
Linux
joice@joice-VirtualBox:~/newdir$ uname -r
5.11.0-16-generic
joice@joice-VirtualBox:~/newdir$ uname -p
x86_64
joice@joice-VirtualBox:~/newdir$ cp letter.txt number.txt
cp: cannot stat 'letter.txt': No such file or directory
joice@joice-VirtualBox:~/newdir$ touch letter.txt
```

```
joice@joice-VirtualBox:~/newdir$ cat>>number.txt
1
2
3
4
5
6
7
8
9
joice@joice-VirtualBox:~/newdir$ cp  number.txt letter.txt
joice@joice-VirtualBox:~/newdir$ cat letter.txt
1
2
3
4
5
6
7
8
9
joice@joice-VirtualBox:~/newdir$ mv letter.txt name.txt
joice@joice-VirtualBox:~/newdir$ cat name.txt
1
2
3
4
5
6
7
8
9
```

```
joice@joice-VirtualBox:~/newdir$ loate ".txt"
Command 'loate' not found, did you mean:
  command 'locate' from deb mlocate (0.26-5ubuntu1)
Try: sudo apt install <deb name>
joice@joice-VirtualBox:~/newdir$ sudo apt install locate
Reading package lists... Done
Building dependency tree... Done
Reading state information... Done
Package locate is not available, but is referred to by another package.
This may mean that the package is missing, has been obsoleted, or
is only available from another source

E: Package 'locate' has no installation candidate
joice@joice-VirtualBox:~/newdir$ find . -name number.txt
./number.txt
joice@joice-VirtualBox:~/newdir$ grep -i "warren" name.txt
joice@joice-VirtualBox:~/newdir$ grep -i "1" number.txt
1
joice@joice-VirtualBox:~/newdir$ df
Filesystem      1K-blocks   Used   Available  Use% Mounted on
tmpfs            149376    1340    148036   1% /run
/dev/sda3        9735476  6663776   2557448  73% /
tmpfs            746864      0    746864   0% /dev/shm
tmpfs             5120       4     5116   1% /run/lock
tmpfs             4096       0     4096   0% /sys/fs/cgroup
/dev/sda2        524252    5340    518912   2% /boot/efi
tmpfs            149372    112    149260   1% /run/user/1000
joice@joice-VirtualBox:~/newdir$ du
20
.
joice@joice-VirtualBox:~/newdir$ useradd jj
useradd: Permission denied.
useradd: cannot lock /etc/passwd; try again later.
joice@joice-VirtualBox:~/newdir$ cat/etc/passwd
```

```
joice@joice-VirtualBox:~/newdir$ useradd jj
useradd: Permission denied.
useradd: cannot lock /etc/passwd; try again later.
joice@joice-VirtualBox:~/newdir$ cat/etc/passwd
bash: cat/etc/passwd: No such file or directory
joice@joice-VirtualBox:~/newdir$ sudo -V
Sudo version 1.9.5p2
Sudoers policy plugin version 1.9.5p2
Sudoers file grammar version 48
Sudoers I/O plugin version 1.9.5p2
Sudoers audit plugin version 1.9.5p2
joice@joice-VirtualBox:~/newdir$ sudo -l
Matching Defaults entries for joice on joice-VirtualBox:
  env_reset, mail_badpass,
  secure_path=/usr/local/sbin\:/usr/local/bin\:/usr/sbin\:/usr/bin\:/sbin\:/bin\:/snap/bin

User joice may run the following commands on joice-VirtualBox:
  (ALL : ALL) ALL
joice@joice-VirtualBox:~/newdir$ passwd
Changing password for joice.
Current password:
New password:
BAD PASSWORD: The password is shorter than 8 characters
New password:
Retype new password:
passwd: password updated successfully
joice@joice-VirtualBox:~/newdir$ █
```

Assignment 3: Basic Linux Commands

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

1. usermod

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

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 jomee

3. groups

print the groups a user is in

- #groups user

4. groupdel

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

- #groupdel jomee2

```
joice@joice-VirtualBox:~$ sudo usermod -u 2000 joice
usermod: user joice is currently used by process 1125
joice@joice-VirtualBox:~$ sudo useradd deepthi
joice@joice-VirtualBox:~$ sudo usermod -u 2000 deepthi
joice@joice-VirtualBox:~$ sudo groupadd joice
groupadd: group 'joice' already exists
joice@joice-VirtualBox:~$ sudo groupadd deepthi
groupadd: group 'deepthi' already exists
joice@joice-VirtualBox:~$ sudo groupadd joice1
joice@joice-VirtualBox:~$ sudo groupadd joice2
joice@joice-VirtualBox:~$ compgen -g joice
joice
joice1
joice2
joice@joice-VirtualBox:~$ sudo groupadd deepthi1
joice@joice-VirtualBox:~$ compgen -g deepthi
deepthi
deepthi1
joice@joice-VirtualBox:~$ groups user
groups: 'user': no such user
joice@joice-VirtualBox:~$ groups joice
joice : joice adm cdrom sudo dip plugdev lpadmin lxd sambashare
joice@joice-VirtualBox:~$ sudo groupdel joice2
joice@joice-VirtualBox:~$ compgen -g joice
joice
joice1
```

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

```
joice@joice-VirtualBox:~$ sudo groupmod -n john joice1
joice@joice-VirtualBox:~$ compgen -g joice
joice
joice@joice-VirtualBox:~$ compgen -g john
john
```

6. chmod

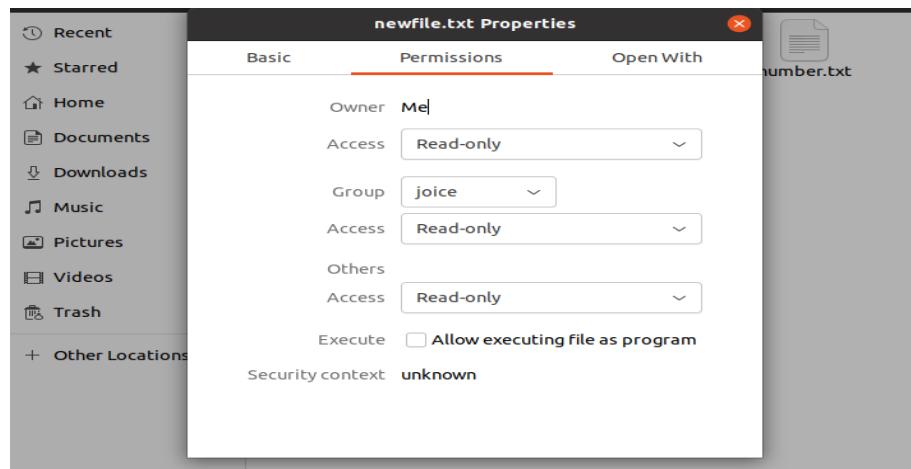
To change directory permissions of file/ Directory in Linux.

#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

```
joice@joice-VirtualBox:~$ cd newdir
joice@joice-VirtualBox:~/newdir$ chmod +rwx newfile.txt
joice@joice-VirtualBox:~/newdir$ chmod -r newfile.txt
joice@joice-VirtualBox:~/newdir$ chmod +r newfile.txt
joice@joice-VirtualBox:~/newdir$ chmod +r newfile.txt
joice@joice-VirtualBox:~/newdir$ chmod -wx newfile.txt
```



7. chown

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

#chown user jomeesh.txt

```
joice@joice-VirtualBox:~/newdir$ chown deepthi newfile.txt
chown: changing ownership of 'newfile.txt': Operation not permitted
joice@joice-VirtualBox:~/newdir$ sudo chown deepthi newfile.txt
[sudo] password for joice:
joice@joice-VirtualBox:~/newdir$ ls -l newfile.txt
-r--r--r-- 1 deepthi joice 204 Jun 22 22:29 newfile.txt
```

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

```
joice@joice-VirtualBox:~/newdir$ id joice
uid=1000(joice) gid=1000(joice) groups=1000(joice),4(adm),24(cdrom),27(sudo),30(dip),46(plugdev),121(lpadmin),132(lxd),133(sambashare)
joice@joice-VirtualBox:~/newdir$ ps -a
  PID TTY      TIME CMD
 1171 tty2    00:00:00 gnome-session-b
 2195 pts/0    00:00:00 ps
```

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

```
user@user-VirtualBox:~/Desktop/network$ ps -a
  PID TTY      TIME CMD
  796 tty2    00:00:10 Xorg
  904 tty2    00:00:00 gnome-session-b
 2287 pts/0    00:00:00 ps
```

10.top

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

#top –u user

```
joice@joice-VirtualBox:~/newdir$ top
top - 01:03:23 up 1:10, 1 user, load average: 0.06, 0.04, 0.03
Tasks: 177 total, 1 running, 176 sleeping, 0 stopped, 0 zombie
%Cpu(s): 2.1 us, 0.7 sy, 0.0 ni, 97.3 id, 0.0 wa, 0.0 hi, 0.0 si, 0.0 st
MiB Mem : 1458.7 total, 215.4 free, 640.5 used, 602.8 buff/cache
MiB Swap: 448.4 total, 448.4 free, 0.0 used. 654.7 avail Mem

      PID USER      PR  NI    VIRT    RES    SHR S %CPU %MEM     TIME+ COMMAND
 1292 joice     20   0 4026500 348804 126936 S  2.6 23.4  1:26.50 gnome-s+
 2196 joice     20   0  21440   3860   3324 R  0.7  0.3  0:00.59 top
 1720 joice     20   0 411188 49652  37944 S  0.3  3.3  0:10.54 gnome-t+
  1 root      20   0 164524 10928   7896 S  0.0  0.7  0:20.58 systemd
  2 root      20   0      0      0      0 S  0.0  0.0  0:00.00 kthreadd
  3 root      0 -20      0      0      0 I  0.0  0.0  0:00.00 rcu_gp
  4 root      0 -20      0      0      0 I  0.0  0.0  0:00.00 rcu_par+
  6 root      0 -20      0      0      0 I  0.0  0.0  0:00.00 kworker+
  8 root      0 -20      0      0      0 I  0.0  0.0  0:00.00 mm_perc+
  9 root      20   0      0      0      0 S  0.0  0.0  0:00.00 rcu_tas+
 10 root     20   0      0      0      0 S  0.0  0.0  0:00.00 rcu_tas+
 11 root     20   0      0      0      0 S  0.0  0.0  0:00.23 ksoftir+
 12 root     20   0      0      0      0 I  0.0  0.0  0:00.70 rcu_sch+
 13 root      rt   0      0      0      0 S  0.0  0.0  0:00.06 migrati+
 14 root     -51   0      0      0      0 S  0.0  0.0  0:00.00 idle_in+
 16 root     20   0      0      0      0 S  0.0  0.0  0:00.00 cpuhp/0
 17 root     20   0      0      0      0 S  0.0  0.0  0:00.00 kdevtmpf+
 18 root      0 -20      0      0      0 I  0.0  0.0  0:00.00 netns
 19 root      0 -20      0      0      0 I  0.0  0.0  0:00.00 inet_fr+
 20 root     20   0      0      0      0 S  0.0  0.0  0:00.00 kauditfd
```

Assignment 4: 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 6 8 54 state.txt
```

```
#wc state.txt capital.txt
```

```
wc -l state.txt
```

```
wc -w state.txt capital.txt
```

```
wc -c state.txt
```

```
wc -m state.txt
```

```
joice@joice-VirtualBox:~$ cd newdir
joice@joice-VirtualBox:~/newdir$ cat > lab4.txt
hampi
munnar
banglore
joice@joice-VirtualBox:~/newdir$ cat > lab4a.txt
nature
waterfall
joice@joice-VirtualBox:~/newdir$ wc lab4.txt
3 3 22 lab4.txt
joice@joice-VirtualBox:~/newdir$ wc lab4a.txt
2 2 17 lab4a.txt
joice@joice-VirtualBox:~/newdir$ wc -l lab4.txt
3 lab4.txt
joice@joice-VirtualBox:~/newdir$ wc -w lab4.txt lab4a.txt
3 lab4.txt
2 lab4a.txt
5 total
joice@joice-VirtualBox:~/newdir$ wc -c lab4.txt
22 lab4.txt
joice@joice-VirtualBox:~/newdir$ wc -m lab4.txt
22 lab4.txt
```

2. Tar

- The Linux ‘tar’ stands for tape archive, is used to create Archive and extract the Archive files
- Linux tar command to create compressed or uncompressed Archive files

Options:

-c : Creates Archive

-x : Extract the archive

-f : creates archive with given filename

-t: displays or lists files in archived file

-u: archives and adds to an existing archive file

-v: Displays Verbose Information

-A : Concatenates the archive files

-z : zip, tells tar command that creates tar file using gzip

-j : filter archive tar file using tbzip

-W : Verify a archive file

-r : update or add file or directory in already existed .tar file

```
#tar cf archive.tar state.txt capital.txt //create archive file
```

```
#ls archive.tar
```

```
#tar tf /archive.tar // list contents of tar archive file
```

- Extract an archive created with tar

```
#mkdir backup
#cd backup
#tar xf/home/meera/Documents/Meera_Linux/archive.tar
```

➤ Compression Types

gzip(z), bzip2(j), xz(J) #tar czf /abc.tar.gz /etc

```
#tar cjf /abcd.tar.bz2 /etc
```

```
#tar cJf /abcde.tar.xz /etc
```

➤ Extract an archive

```
#mkdir backup1
```

```
#cd backup1
```

```
#tar xzf /abc.tar.gz
```

```
#mkdir backup2
```

```
#cd backup2
```

```
#tar xjf /abcd.tar.bz2
```

```
#mkdir backup3
```

```
#cd backup3
```

```
#tar xJf /abcde.tar.xz
```

```
joice@joice-VirtualBox:~/newdir$ tar czf archiev1.tar.gz lab4.txt
joice@joice-VirtualBox:~/newdir$ ls
archiev1.tar.gz  lab4.txt  newfile      newfile.txt
lab4a.txt        name.txt  newfile2.txt  number.txt
joice@joice-VirtualBox:~/newdir$ tar xzf archiev1.tar.gz
joice@joice-VirtualBox:~/newdir$ ls
archiev1.tar.gz  lab4.txt  newfile      newfile.txt
lab4a.txt        name.txt  newfile2.txt  number.txt
joice@joice-VirtualBox:~/newdir$ tar cjf archiev2.tar.bz2 lab4.txt
joice@joice-VirtualBox:~/newdir$ ls
archiev1.tar.gz  lab4a.txt  name.txt  newfile2.txt  number.txt
archiev2.tar.bz2 lab4.txt   newfile   newfile.txt
joice@joice-VirtualBox:~/newdir$ tar xjf archiev2.tar.bz2
joice@joice-VirtualBox:~/newdir$ tar cjf arciev3.tar.x2 lab4.txt
joice@joice-VirtualBox:~/newdir$ ls
archiev1.tar.gz  arciev3.tar.x2  lab4.txt  newfile      newfile.txt
archiev2.tar.bz2 lab4a.txt   name.txt  newfile2.txt  number.txt
joice@joice-VirtualBox:~/newdir$ tar xjf archiev3.tar.x2
tar (child): archiev3.tar.x2: Cannot open: No such file or directory
tar (child): Error is not recoverable: exiting now
tar: Child returned status 2
tar: Error is not recoverable: exiting now
joice@joice-VirtualBox:~/newdir$ tar xjf arciev3.tar.x2
joice@joice-VirtualBox:~/newdir$
```

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
```

```
joice@joice-VirtualBox:~/newdir$ expr 12 + 10
22
joice@joice-VirtualBox:~/newdir$ expr 27 \+ 10
37
joice@joice-VirtualBox:~/newdir$ expr 27 \* 10
270
```

4. Redirecting & 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
```

```
joice@joice-VirtualBox:~/newdir$ cat /etc/lab4.txt | head -5 | tail -3
cat: /etc: Is a directory
hampi
munnar
banglore
```

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
```

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

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
```

```
joice@joice-VirtualBox:~/newdir$ ssh joice@joice-VirtualBox
ssh: connect to host joice-virtualbox port 22: Connection refused
```

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
```

```
joice@joice-VirtualBox:~/newdir$ ssh-keygen
Generating public/private rsa key pair.
Enter file in which to save the key (/home/joice/.ssh/id_rsa): rsa
Enter passphrase (empty for no passphrase):
Enter same passphrase again:
Your identification has been saved in rsa
Your public key has been saved in rsa.pub
The key fingerprint is:
SHA256:YLPHD9zIHBZJ+iuq6Dfx8iKNQ7JEPsaqBcRYhtakPAs joice@joice-VirtualBox
The key's randomart image is:
+---[RSA 3072]----+
| .. . o .
| =+.. ...
| E* = o
| o.o . @ +
| =. . S .
| .o . . +
| *.= o . .
| o* * o .
| =.=.*.
+---[SHA256]----+
```

8. ssh-copy-id

The ssh-copy-id command allows you to install an SSH key on a remote server's authorized keys.

This command facilitates SSH key login, which removes the need for a password for each login, thus ensuring a password-less, automatic login process.

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

Assignment 5: Lab Exercises

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

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

```
joice@joice-VirtualBox:~$ mkdir netlab
joice@joice-VirtualBox:~$ cd netlab
joice@joice-VirtualBox:~/netlab$ touch song1.mp3 song2.mp3 song3.mp3 song4.mp3 song5.mp3 song6.mp3
joice@joice-VirtualBox:~/netlab$ touch snap1.jpg snap2.jpg snap3.jpg snap4.jpg snap5.jpg snap6.jpg
joice@joice-VirtualBox:~/netlab$ touch film1.mp4 film2.mp4 film3.mp4 film4.mp4 film5.mp4 film6.mp4
joice@joice-VirtualBox:~/netlab$ ls
film1.mp4 film4.mp4 snap1.jpg snap4.jpg song1.mp3 song4.mp3
film2.mp4 film5.mp4 snap2.jpg snap5.jpg song2.mp3 song5.mp3
film3.mp4 film6.mp4 snap3.jpg snap6.jpg song3.mp3 song6.mp3
```

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

```
joice@joice-VirtualBox:~/netlab$ cd
joice@joice-VirtualBox:~$ mv ./netlab/*.jpg ./Pictures/
joice@joice-VirtualBox:~$ mv ./netlab/*.mp3 ./Music/
joice@joice-VirtualBox:~$ mv ./netlab/*.mp3 ./Videos/
mv: cannot stat './netlab/*.mp3': No such file or directory
joice@joice-VirtualBox:~$ mv ./netlab/*.mp4 ./Videos/
```

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

```
joice@joice-VirtualBox:~$ mkdir -p {friends,family,work}
joice@joice-VirtualBox:~$ ls
Desktop Downloads friends netlab Pictures Templates work
Documents family Music newdir Public Videos
joice@joice-VirtualBox:~$
```

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

```
joice@joice-VirtualBox:~$ cp /home/joice/Music/*.mp3 /home/joice/friends/
joice@joice-VirtualBox:~$ cp /home/joice/Pictures/*.jpg /home/joice/family/
```

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

```
joice@joice-VirtualBox:~$ rmdir -p {family,friends}
rmdir: failed to remove 'family': Directory not empty
rmdir: failed to remove 'friends': Directory not empty
```

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

```
joice@joice-VirtualBox:~$ rm -r friends family
joice@joice-VirtualBox:~$ ls
Desktop Downloads netlab Pictures Templates work
Documents Music newdir Public Videos
```

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

```
joice@joice-VirtualBox:~$ ls -a > allfiles.txt
joice@joice-VirtualBox:~$ ls -a
.           .bashrc   Downloads  netlab    .ssh
..          .cache    .gnupg    newdir    .sudo_as_admin_successful
allfiles.txt .config   .local    Pictures  Templates
.bash_history Desktop  .mozilla .profile  Videos
.bash_logout Documents Music    Public    work
```

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

```
joice@joice-VirtualBox:~$ date "+%A %B %d %Y"
Tuesday August 17 2021
```

9. Add the user Juliet

```
joice@joice-VirtualBox:~$ sudo useradd Juliet
[sudo] password for joice:
joice@joice-VirtualBox:~$
```

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

```
joice@joice-VirtualBox:~$ cat /etc/passwd | grep Juliet
Juliet:x:2001:2001::/home/Juliet:/bin/sh
```

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

```
joice@joice-VirtualBox:~$ sudo passwd Juliet
New password:
Retype new password:
passwd: password updated successfully
joice@joice-VirtualBox:~$
```

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

```
joice@joice-VirtualBox:~$ sudo groupadd -g 30000 Shakespeare
```

13. Create a supplementary group called artists.

```
joice@joice-VirtualBox:~$ sudo groupadd artists
```

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

```
joice@joice-VirtualBox:~$ less /etc/group
...
systemd-coredump:x:999:
deepthi:x:1001:
deepthi1:x:1004:
john:x:1002:
Juliet:x:2001:
Shakespeare:x:30000:
artists:x:30001:
(END)
```

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

```
joice@joice-VirtualBox:~$ sudo usermod -G Shakespeare Juliet
```

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

```
joice@joice-VirtualBox:~$ id Juliet
uid=2001(Juliet) gid=2001(Juliet) groups=2001(Juliet),30000(Shakespeare)
```

17. Add Romeo and Hamlet to the Shakespeare group.

```
joice@joice-VirtualBox:~$ sudo useradd Romeo
joice@joice-VirtualBox:~$ sudo useradd Hamlet
joice@joice-VirtualBox:~$ sudo usermod -G Shakespeare Romeo
joice@joice-VirtualBox:~$ sudo usermod -G Shakespeare Hamlet
joice@joice-VirtualBox:~$ id Romeo
uid=2002(Romeo) gid=2002(Romeo) groups=2002(Romeo),30000(Shakespeare)
joice@joice-VirtualBox:~$ id Hamlet
uid=2003(Hamlet) gid=2003(Hamlet) groups=2003(Hamlet),30000(Shakespeare)
```

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

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

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

```
joice@joice-VirtualBox:~$ less /etc/group
Juliet:x:2001:
Shakespeare:x:30000:Juliet,Romeo,Hamlet
artists:x:30001:Reba,Dolly,Elvis
Romeo:x:2002:
Hamlet:x:2003:
Reba:x:2004:
Dolly:x:2005:
Elvis:x:2006:
(END)
```

20. Attempt to remove user Dolly.

```
joice@joice-VirtualBox:~$ sudo userdel Dolly
joice@joice-VirtualBox:~$ id Dolly
id: 'Dolly': no such user
joice@joice-VirtualBox:~$
```

Assignment 6: Network Commands

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.

- ping

Ping google.com

```
C:\> Administrator: Command Prompt
Microsoft Windows [Version 10.0.19043.1237]
(c) Microsoft Corporation. All rights reserved.

C:\WINDOWS\system32>ping google.com

Pinging google.com [2404:6800:4007:819::200e] with 32 bytes of data:
Reply from 2404:6800:4007:819::200e: time=60ms
Reply from 2404:6800:4007:819::200e: time=86ms
Reply from 2404:6800:4007:819::200e: time=79ms
Reply from 2404:6800:4007:819::200e: time=154ms

Ping statistics for 2404:6800:4007:819::200e:
    Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
Approximate round trip times in milli-seconds:
    Minimum = 60ms, Maximum = 154ms, Average = 94ms

C:\WINDOWS\system32>ping -a google.com

Pinging google.com [2404:6800:4007:819::200e] with 32 bytes of data:
Reply from 2404:6800:4007:819::200e: time=61ms
Reply from 2404:6800:4007:819::200e: time=84ms
Reply from 2404:6800:4007:819::200e: time=89ms
Reply from 2404:6800:4007:819::200e: time=89ms

Ping statistics for 2404:6800:4007:819::200e:
    Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
Approximate round trip times in milli-seconds:
    Minimum = 61ms, Maximum = 89ms, Average = 80ms
```

ping -t google.com

```
C:\WINDOWS\system32>ping -t google.com

Pinging google.com [2404:6800:4007:819::200e] with 32 bytes of data:
Reply from 2404:6800:4007:819::200e: time=83ms
Reply from 2404:6800:4007:819::200e: time=74ms
Reply from 2404:6800:4007:819::200e: time=46ms

Ping statistics for 2404:6800:4007:819::200e:
    Packets: Sent = 3, Received = 3, Lost = 0 (0% loss),
Approximate round trip times in milli-seconds:
    Minimum = 46ms, Maximum = 83ms, Average = 67ms
Control-C
^C
```

ping -j google.com

```
C:\WINDOWS\system32>ping -j google.com

Pinging google.com [142.250.182.14] with 32 bytes of data:
General failure.
General failure.
General failure.
General failure.

Ping statistics for 142.250.182.14:
    Packets: Sent = 4, Received = 0, Lost = 4 (100% loss),

C:\WINDOWS\system32>
```

```
ping -4 google.com
```

```
C:\WINDOWS\system32>ping -4 google.com

Pinging google.com [142.250.182.14] with 32 bytes of data:
Reply from 142.250.182.14: bytes=32 time=47ms TTL=112
Reply from 142.250.182.14: bytes=32 time=49ms TTL=112
Reply from 142.250.182.14: bytes=32 time=47ms TTL=112
Reply from 142.250.182.14: bytes=32 time=52ms TTL=112

Ping statistics for 142.250.182.14:
    Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
Approximate round trip times in milli-seconds:
    Minimum = 47ms, Maximum = 52ms, Average = 48ms
```

- **route**

```
route print
```

```
C:\WINDOWS\system32>route print
=====
Interface List
22...00 26 b9 db 40 58 ....Intel(R) 82577LM Gigabit Network Connection
11...0a 00 27 00 00 0b ....VirtualBox Host-Only Ethernet Adapter
16...c6 46 19 25 28 d5 ....Microsoft Wi-Fi Direct Virtual Adapter
4...c6 46 19 25 20 d5 ....Microsoft Wi-Fi Direct Virtual Adapter #2
7...c4 46 19 25 28 d5 ....Broadcom 802.11n Network Adapter
2...f0 7b cb a8 48 b9 ....Bluetooth Device (Personal Area Network) #2
1.....Software Loopback Interface 1
=====

IPv4 Route Table
=====
Active Routes:
Network Destination      Netmask        Gateway        Interface Metric
          0.0.0.0        0.0.0.0    192.168.43.1  192.168.43.95    55
         127.0.0.0    255.0.0.0        On-link       127.0.0.1    331
         127.0.0.1    255.255.255.255        On-link       127.0.0.1    331
 127.255.255.255    255.255.255.255        On-link       127.0.0.1    331
        192.168.43.0    255.255.255.0        On-link     192.168.43.95    311
        192.168.43.95    255.255.255.255        On-link     192.168.43.95    311
        192.168.43.255    255.255.255.255        On-link     192.168.43.95    311
        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     192.168.43.95    311
 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     192.168.43.95    311
=====
Persistent Routes:
  None
```

route print -4

```
C:\WINDOWS\system32>route print -4
=====
Interface List
22...00 26 b9 db 40 58 .... Intel(R) 82577LM Gigabit Network Connection
11...0a 00 27 00 00 0b .... VirtualBox Host-Only Ethernet Adapter
16...c6 46 19 25 28 d5 .... Microsoft Wi-Fi Direct Virtual Adapter
4...c6 46 19 25 20 d5 .... Microsoft Wi-Fi Direct Virtual Adapter #2
7...c4 46 19 25 28 d5 .... Broadcom 802.11n Network Adapter
2...f0 7b cb a8 48 b9 .... Bluetooth Device (Personal Area Network) #2
1..... Software Loopback Interface 1
=====

IPv4 Route Table
=====
Active Routes:
Network Destination      Netmask        Gateway       Interface Metric
          0.0.0.0          0.0.0.0    192.168.43.1  192.168.43.95  55
         127.0.0.0        255.0.0.0   On-link        127.0.0.1   331
         127.0.0.1        255.255.255.255  On-link        127.0.0.1   331
 127.255.255.255        255.255.255.255  On-link        127.0.0.1   331
         192.168.43.0      255.255.255.0   On-link      192.168.43.95  311
        192.168.43.95      255.255.255.255  On-link      192.168.43.95  311
        192.168.43.255      255.255.255.255  On-link      192.168.43.95  311
        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      192.168.43.95  311
 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      192.168.43.95  311
=====
Persistent Routes:
  None
```

route print -6

```
C:\WINDOWS\system32>route print -6
=====
Interface List
22...00 26 b9 db 40 58 .... Intel(R) 82577LM Gigabit Network Connection
11...0a 00 27 00 00 0b .... VirtualBox Host-Only Ethernet Adapter
16...c6 46 19 25 28 d5 .... Microsoft Wi-Fi Direct Virtual Adapter
4...c6 46 19 25 20 d5 .... Microsoft Wi-Fi Direct Virtual Adapter #2
7...c4 46 19 25 28 d5 .... Broadcom 802.11n Network Adapter
2...f0 7b cb a8 48 b9 .... Bluetooth Device (Personal Area Network) #2
1..... Software Loopback Interface 1
=====

IPv6 Route Table
=====
Active Routes:
If Metric Network Destination      Gateway
 7     311 ::/0           fe80::26f:64ff:fe7a:4298
 1     331 ::1/128        On-link
 7     311 2409:4073:41e:e961:1556:32b6:6e0f:b53d/128
          On-link
 7     311 2409:4073:41e:e961:e8c5:ecd6:bd17:2101/128
          On-link
11     281 fe80::/64        On-link
 7     311 fe80::/64        On-link
 7     311 fe80::1556:32b6:6e0f:b53d/128
          On-link
11     281 fe80::e952:ba9d:d692:58c9/128
          On-link
 1     331 ff00::/8         On-link
11     281 ff00::/8         On-link
 7     311 ff00::/8         On-link
=====
Persistent Routes:
  None

C:\WINDOWS\system32>
```

```
route print *153
```

```
C:\WINDOWS\system32>route print *153
=====
Interface List
 22...00 26 b9 db 40 58 ....Intel(R) 82577LM Gigabit Network Connection
 11...0a 00 27 00 00 0b ....VirtualBox Host-Only Ethernet Adapter
 16...c6 46 19 25 28 d5 ....Microsoft Wi-Fi Direct Virtual Adapter
 4...c6 46 19 25 20 d5 ....Microsoft Wi-Fi Direct Virtual Adapter #2
 7...c4 46 19 25 28 d5 ....Broadcom 802.11n Network Adapter
 2...f0 7b cb a8 48 b9 ....Bluetooth Device (Personal Area Network) #2
 1.....
                           Software Loopback Interface 1
=====

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

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

• tracert

```
tracert 192.168.1.2
```

```
C:\WINDOWS\system32>tracert 192.168.1.2

Tracing route to 192.168.1.2 over a maximum of 30 hops

  1      4 ms      3 ms      2 ms  192.168.43.1
  2      *          *          *      Request timed out.
  3     47 ms     34 ms     55 ms  56.8.126.41
  4     89 ms     48 ms     37 ms  172.26.104.196
  5     88 ms     53 ms     60 ms  172.26.104.210
  6    116 ms     43 ms     58 ms  192.168.14.38
  7    135 ms     65 ms     67 ms  192.168.14.37
  8     93 ms     67 ms     68 ms  172.16.3.14
  9     95 ms     50 ms     65 ms  172.16.81.0
 10    109 ms     57 ms     76 ms  172.16.0.159
 11    139 ms     68 ms     85 ms  172.16.3.15
 12    112 ms     71 ms     76 ms  172.16.5.70
 13      *          *          *      Request timed out.
```

```
tracert 192.168.1.1
```

```
C:\WINDOWS\system32>tracert 192.168.1.1

Tracing route to 192.168.1.1 over a maximum of 30 hops

  1      2 ms      4 ms      4 ms  192.168.43.1
  2      *          No resources.

Trace complete.
```

```
tracert 22.110.0.1
```

```
C:\WINDOWS\system32>tracert 22.110.0.1

Tracing route to 22.110.0.1 over a maximum of 30 hops

 1      3 ms      3 ms      2 ms  192.168.43.1
 2      *          *          *      Request timed out.
 3    80 ms      45 ms      55 ms  56.8.126.81
 4    45 ms      50 ms      38 ms  172.26.104.196
 5    57 ms      85 ms      46 ms  172.26.104.210
 6    49 ms     163 ms      54 ms  192.168.14.34
 7   102 ms      83 ms      61 ms  192.168.14.33
 8    57 ms      56 ms      56 ms  172.16.21.21
 9   120 ms      57 ms      76 ms  172.16.81.4
10    91 ms      58 ms      56 ms  172.16.3.91
11   107 ms      69 ms      79 ms  172.16.21.20
12   106 ms      77 ms      74 ms  172.16.2.58
13   341 ms     315 ms     318 ms  103.198.140.29
14   253 ms     192 ms     412 ms  103.198.140.106
15   205 ms     472 ms     188 ms  hurricane.mrs.franceix.net [37.49.232.13]
16   191 ms     239 ms     188 ms  port-channel1.core2.mrs1.he.net [184.104.197.42]
17   229 ms     238 ms     434 ms  ve952.core1.bio1.he.net [184.104.196.78]
18      *          *          331 ms  100ge0-30.core1.orf2.he.net [184.105.64.122]
19   483 ms     310 ms     312 ms  100ge15-1.core2.ash1.he.net [184.105.64.121]
20      *          *          *      Request timed out.
21      *          *          *      Request timed out.
22      *          *          *      Request timed out.
23      *          *          *      Request timed out.
24      *          *          *      Request timed out.
25      *          *          *      Request timed out.
26      *          *          *      Request timed out.
27 General failure.

Trace complete.
```

tracert google.com

```
C:\WINDOWS\system32>tracert google.com

Tracing route to google.com [2404:6800:4009:824::200e]
over a maximum of 30 hops:

 1      2 ms      2 ms      4 ms  fe80::cc07:a5ff:fe79:a926
 2      *          *          *      Request timed out.
 3    133 ms      46 ms      62 ms  2405:200:365:eeee:20::356
 4    86 ms      79 ms      54 ms  2405:200:801:1100::3de
 5    94 ms      53 ms      69 ms  2405:200:801:1100::3dd
 6   136 ms      57 ms      59 ms  2405:200:100::1:0:37e
 7      *          *          *      Request timed out.
 8      *          *          *      Request timed out.
 9      *          *          *      Request timed out.
10   103 ms      78 ms      80 ms  2001:4860:0:1::ac6
11    78 ms          *          *      2001:4860:0:1340::8
12    97 ms     124 ms     110 ms  2001:4860::9:4000:d772
13      *     100 ms          *      2001:4860::12:0:b974
14    77 ms      80 ms      72 ms  2001:4860:0:1::4fed
15    82 ms      78 ms      87 ms  bom07s31-in-x0e.1e100.net [2404:6800:4009:824::200
]

Trace complete.
```

- nslookup

nslookup

```
C:\WINDOWS\system32>nslookup
Default Server: Unknown
Address: 2405:200:800::1
```

```
> -
```

```
nslookup -q=MX google.com
```

```
C:\WINDOWS\system32>nslookup -q=MX google.com
Server: Unknown
Address: 2405:200:800::1

Non-authoritative answer:
google.com      MX preference = 10, mail exchanger = aspmx.l.google.com
google.com      MX preference = 20, mail exchanger = alt1.aspmx.l.google.com
google.com      MX preference = 30, mail exchanger = alt2.aspmx.l.google.com
google.com      MX preference = 40, mail exchanger = alt3.aspmx.l.google.com
google.com      MX preference = 50, mail exchanger = alt4.aspmx.l.google.com
```

- ipconfig

```
C:\WINDOWS\system32>ipconfig

Windows IP Configuration

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

Ethernet adapter Ethernet 5:
  Connection-specific DNS Suffix . . .
  Link-local IPv6 Address . . . . . : fe80::e952:ba9d:d692:58c9%11
  IPv4 Address . . . . . : 192.168.56.1
  Subnet Mask . . . . . : 255.255.255.0
  Default Gateway . . . . .

Wireless LAN adapter Local Area Connection* 1:
  Media State . . . . . : Media disconnected
  Connection-specific DNS Suffix . . .

Wireless LAN adapter Local Area Connection* 2:
  Media State . . . . . : Media disconnected
  Connection-specific DNS Suffix . . .

Wireless LAN adapter Wi-Fi:
  Connection-specific DNS Suffix . . .
  IPv6 Address . . . . . : 2409:4073:4e1b:724e:1556:32b6:6e0f:b53d
  Temporary IPv6 Address . . . . . : 2409:4073:4e1b:724e:6025:5913:484b:1f45
  Link-local IPv6 Address . . . . . : fe80::1556:32b6:6e0f:b53d%7
  IPv4 Address . . . . . : 192.168.43.218
  Subnet Mask . . . . . : 255.255.255.0
  Default Gateway . . . . . : fe80::b4a2:4f28:d517:18d2%7
                                         192.168.43.1

Ethernet adapter Bluetooth Network Connection 2:
  Media State . . . . . : Media disconnected
  Connection-specific DNS Suffix . . .
```

ipconfig/displaydns

```
C:\WINDOWS\system32>ipconfig/displaydns

Windows IP Configuration

 95.43.168.192.in-addr.arpa
  -----
  Record Name . . . . . : 95.43.168.192.in-addr.arpa.
  Record Type . . . . . : 12
  Time To Live . . . . . : 549719
  Data Length . . . . . : 8
  Section . . . . . : Answer
  PTR Record . . . . . : host.docker.internal

  Record Name . . . . . : 95.43.168.192.in-addr.arpa.
  Record Type . . . . . : 12
  Time To Live . . . . . : 549719
  Data Length . . . . . : 8
  Section . . . . . : Answer
```

netstat

```
C:\WINDOWS\system32>netstat

Active Connections

  Proto  Local Address          Foreign Address        State
  TCP    192.168.43.218:50611  20.198.162.78:https  ESTABLISHED
  TCP    192.168.43.218:50641  91.108.56.128:https  ESTABLISHED
  TCP    192.168.43.218:50665  91.108.23.100:https  ESTABLISHED
  TCP    192.168.43.218:50674  52.231.199.126:https ESTABLISHED
```

netstat -n 5

```
C:\WINDOWS\system32>netstat -n 5

Active Connections

  Proto  Local Address          Foreign Address        State
  TCP    192.168.43.218:50611  20.198.162.78:443   ESTABLISHED
  TCP    192.168.43.218:50641  91.108.56.128:443   ESTABLISHED
  TCP    192.168.43.218:50674  52.231.199.126:443  TIME_WAIT
  TCP    192.168.43.218:50677  91.108.23.100:443   ESTABLISHED

Active Connections

  Proto  Local Address          Foreign Address        State
  TCP    192.168.43.218:50611  20.198.162.78:443   ESTABLISHED
  TCP    192.168.43.218:50641  91.108.56.128:443   ESTABLISHED
  TCP    192.168.43.218:50674  52.231.199.126:443  TIME_WAIT
  TCP    192.168.43.218:50677  91.108.23.100:443   ESTABLISHED
```

UBUNTU

- ping

```
joice@joice-VirtualBox:~$ ping google.com
PING google.com (142.250.192.206) 56(84) bytes of data.
64 bytes from del11s12-in-f14.1e100.net (142.250.192.206): icmp_seq=1 ttl=112 time=122 ms
64 bytes from del11s12-in-f14.1e100.net (142.250.192.206): icmp_seq=2 ttl=112 time=103 ms
^C
--- google.com ping statistics ---
2 packets transmitted, 2 received, 0% packet loss, time 1001ms
rtt min/avg/max/mdev = 102.998/112.345/121.693/9.347 ms
joice@joice-VirtualBox:~$ ping -a google.com
PING google.com (142.250.192.206) 56(84) bytes of data.
64 bytes from del11s12-in-f14.1e100.net (142.250.192.206): icmp_seq=1 ttl=112 time=137 ms
64 bytes from del11s12-in-f14.1e100.net (142.250.192.206): icmp_seq=2 ttl=112 time=98.1 ms
^C
--- google.com ping statistics ---
2 packets transmitted, 2 received, 0% packet loss, time 1002ms
rtt min/avg/max/mdev = 98.112/117.679/137.247/19.567 ms
joice@joice-VirtualBox:~$ ping -V
ping from iputils 20210202
joice@joice-VirtualBox:~$ ping -b google.com
PING google.com (142.250.192.206) 56(84) bytes of data.
64 bytes from del11s12-in-f14.1e100.net (142.250.192.206): icmp_seq=1 ttl=112 time=114 ms
64 bytes from del11s12-in-f14.1e100.net (142.250.192.206): icmp_seq=2 ttl=112 time=112 ms
^C
```

- route

```
joice@joice-VirtualBox:~$ route
Kernel IP routing table
Destination     Gateway         Genmask        Flags Metric Ref    Use Iface
default         _gateway       0.0.0.0        UG    100    0        0 enp0s3
10.0.2.0        0.0.0.0        255.255.255.0   U      100    0        0 enp0s3
link-local      0.0.0.0        255.255.0.0    U      1000   0        0 enp0s3
joice@joice-VirtualBox:~$ route -n
Kernel IP routing table
Destination     Gateway         Genmask        Flags Metric Ref    Use Iface
0.0.0.0         10.0.2.2      0.0.0.0        UG    100    0        0 enp0s3
10.0.2.0        0.0.0.0        255.255.255.0   U      100    0        0 enp0s3
169.254.0.0     0.0.0.0        255.255.0.0    U      1000   0        0 enp0s3
joice@joice-VirtualBox:~$ route -Cn
Kernel IP routing cache
Source          Destination     Gateway         Flags Metric Ref    Use Iface
joice@joice-VirtualBox:~$ ip route
default via 10.0.2.2 dev enp0s3 proto dhcp metric 100
10.0.2.0/24 dev enp0s3 proto kernel scope link src 10.0.2.15 metric 100
169.254.0.0/16 dev enp0s3 scope link metric 1000
joice@joice-VirtualBox:~$
```

- traceroute

```
joice@joice-VirtualBox:~$ traceroute google.com
traceroute to google.com (142.250.207.238), 30 hops max, 60 byte packets
 1 _gateway (10.0.2.2)  0.617 ms  0.472 ms  0.425 ms
 2 * * *
 3 * * *
 4 * * *
 5 * * *
 6 * * *
 7 * * *
 8 * * *
 9 * * *
10 * * *
11 * * *
12 * * *
13 * * *
14 * * *
15 * * *
16 * * *
17 * * *
18 * * *
19 * * *
20 * * *
21 * * *
22 * * *
23 * * *
24 * * *
25 * * *
```

traceroute google.com

```
joice@joice-VirtualBox:~$ traceroute -4 google.com
traceroute to google.com (142.250.182.110), 30 hops max, 60 byte packets
 1 _gateway (10.0.2.2)  0.706 ms  0.448 ms  0.814 ms
 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 * * *
```

- nslookup

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

Non-authoritative answer:
Name:   google.com
Address: 142.250.182.110
Name:   google.com
Address: 2404:6800:4002:821::200e

joice@joice-VirtualBox:~$ nslookup -q=MX google.com
*** Invalid option: q-MX
Server:      127.0.0.53
Address:     127.0.0.53#53

Non-authoritative answer:
Name:   google.com
Address: 142.250.182.110
Name:   google.com
Address: 2404:6800:4002:821::200e
```

```
joice@joice-VirtualBox:~$ nslookup -type=soa google.com
Server:      127.0.0.53
Address:     127.0.0.53#53

Non-authoritative answer:
google.com
    origin = ns1.google.com
    mail addr = dns-admin.google.com
    serial = 400154089
    refresh = 900
    retry = 900
    expire = 1800
    minimum = 60

Authoritative answers can be found from:

joice@joice-VirtualBox:~$ nslookup -type=a google.com
Server:      127.0.0.53
Address:     127.0.0.53#53

Non-authoritative answer:
Name:   google.com
Address: 142.250.182.110
```

- ifconfig

```
joice@joice-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::98fa:6f6a:835f:c240  prefixlen 64  scopeid 0x20<link>
          ether 08:00:27:d0:9e:60  txqueuelen 1000  (Ethernet)
            RX packets 712  bytes 88764 (88.7 KB)
            RX errors 0  dropped 0  overruns 0  frame 0
            TX packets 1161  bytes 104627 (104.6 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 504  bytes 45070 (45.0 KB)
            RX errors 0  dropped 0  overruns 0  frame 0
            TX packets 504  bytes 45070 (45.0 KB)
            TX errors 0  dropped 0  overruns 0  carrier 0  collisions 0
```

```
joice@joice-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::98fa:6f6a:835f:c240 prefixlen 64 scopeid 0x20<link>
          ether 08:00:27:d0:9e:60 txqueuelen 1000 (Ethernet)
            RX packets 712 bytes 88764 (88.7 KB)
            RX errors 0 dropped 0 overruns 0 frame 0
            TX packets 1161 bytes 104627 (104.6 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 504 bytes 45070 (45.0 KB)
            RX errors 0 dropped 0 overruns 0 frame 0
            TX packets 504 bytes 45070 (45.0 KB)
            TX errors 0 dropped 0 overruns 0 carrier 0 collisions 0
```

```
joice@joice-VirtualBox:~$ ifconfig -a
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::98fa:6f6a:835f:c240 prefixlen 64 scopeid 0x20<link>
          ether 08:00:27:d0:9e:60 txqueuelen 1000 (Ethernet)
            RX packets 712 bytes 88764 (88.7 KB)
            RX errors 0 dropped 0 overruns 0 frame 0
            TX packets 1161 bytes 104627 (104.6 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 504 bytes 45070 (45.0 KB)
            RX errors 0 dropped 0 overruns 0 frame 0
            TX packets 504 bytes 45070 (45.0 KB)
            TX errors 0 dropped 0 overruns 0 carrier 0 collisions 0
```

```
joice@joice-VirtualBox:~$ ifconfig -s
Iface      MTU     RX-OK RX-ERR RX-DRP RX-OVR      TX-OK TX-ERR TX-DRP TX-OVR Flg
enp0s3    1500      718     0     0 0       1167     0     0     0 BMRU
lo       65536      504     0     0 0       504     0     0     0 LRU
joice@joice-VirtualBox:~$ ifconfig -v
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::98fa:6f6a:835f:c240 prefixlen 64 scopeid 0x20<link>
          ether 08:00:27:d0:9e:60 txqueuelen 1000 (Ethernet)
            RX packets 718 bytes 89343 (89.3 KB)
            RX errors 0 dropped 0 overruns 0 frame 0
            TX packets 1167 bytes 105111 (105.1 KB)
            TX errors 0 dropped 0 overruns 0 carrier 0 collisions 0

lo: flags=73<UP,LOOPBACK,RUNNING> mtu 65536
        inet 127.0.0.1 netmask 255.0.0.0
        inet6 ::1 prefixlen 128 scopeid 0x10<host>
          loop txqueuelen 1000 (Local Loopback)
            RX packets 504 bytes 45070 (45.0 KB)
            RX errors 0 dropped 0 overruns 0 frame 0
            TX packets 504 bytes 45070 (45.0 KB)
            TX errors 0 dropped 0 overruns 0 carrier 0 collisions 0
```

- netstat

```
joice@joice-VirtualBox:~$ netstat
Active Internet connections (w/o servers)
Proto Recv-Q Send-Q Local Address           Foreign Address             State
udp      0      0 joice-VirtualBox:bootpc _gateway:bootps          ESTABLISHED
Active UNIX domain sockets (w/o servers)
Proto RefCnt Flags     Type      State         I-Node    Path
unix    2      [ ]      DGRAM                    24314    /run/user/1000/system
d/notify
unix    3      [ ]      DGRAM                    15447    /run/systemd/notify
unix    2      [ ]      DGRAM                    15461    /run/systemd/journal/
syslog
unix   17      [ ]      DGRAM                    15470    /run/systemd/journal/
dev-log
unix    8      [ ]      DGRAM                    15472    /run/systemd/journal/
```

```
joice@joice-VirtualBox:~$ netstat -n
Active Internet connections (w/o servers)
Proto Recv-Q Send-Q Local Address           Foreign Address             State
udp      0      0 10.0.2.15:68              10.0.2.2:67          ESTABLISHED
Active UNIX domain sockets (w/o servers)
Proto RefCnt Flags     Type      State         I-Node    Path
unix    2      [ ]      DGRAM                    24314    /run/user/1000/system
d/notify
unix    3      [ ]      DGRAM                    15447    /run/systemd/notify
unix    2      [ ]      DGRAM                    15461    /run/systemd/journal/
syslog
unix   17      [ ]      DGRAM                    15470    /run/systemd/journal/
dev-log
unix    8      [ ]      DGRAM                    15472    /run/systemd/journal/
socket
```

```
joice@joice-VirtualBox:~$ netstat -n 5
Active Internet connections (w/o servers)
Proto Recv-Q Send-Q Local Address           Foreign Address             State
udp      0      0 10.0.2.15:68              10.0.2.2:67          ESTABLISHED
Active UNIX domain sockets (w/o servers)
Proto RefCnt Flags     Type      State         I-Node    Path
unix    2      [ ]      DGRAM                    24314    /run/user/1000/system
d/notify
unix    3      [ ]      DGRAM                    15447    /run/systemd/notify
unix    2      [ ]      DGRAM                    15461    /run/systemd/journal/
syslog
unix   17      [ ]      DGRAM                    15470    /run/systemd/journal/
dev-log
unix    8      [ ]      DGRAM                    15472    /run/systemd/journal/
socket
```

```
joice@joice-VirtualBox:~$ netstat -a
Active Internet connections (servers and established)
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                [::]:*
tcp6     0      0 ip6-localhost:ipp        [::]:*
udp      0      0 0.0.0.0:631              0.0.0.0:*
udp      0      0 0.0.0.0:60450             0.0.0.0:*
udp      0      0 localhost:domain          0.0.0.0:*
udp      0      0 joice-VirtualBox:bootpc _gateway:bootps          ESTABLISHED
udp      0      0 0.0.0.0:mdns              0.0.0.0:*
udp6     0      0 [::]:43314               [::]:*
udp6     0      0 [::]:mdns                [::]:*
raw6    0      0 [::]:ipv6-icmp            [::]:*
```

2. Identify and perform 5 more network commands and it's working.

a) ARP

The ARP command corresponds to the Address Resolution Protocol. Although it is easy to think of network communications in terms of IP addressing, packet delivery is ultimately dependent on the Media Access Control (MAC) address of the device's network adapter. This is where the Address Resolution Protocol comes into play. Its job is to map IP addresses to MAC addresses. Windows devices maintain an ARP cache, which contains the results of recent ARP queries.

You can see the contents of this cache by using the ARP -A command. If you are having problems communicating with one specific host, you can append the remote host's IP address to the ARP -A command.

```
joice@joice-VirtualBox:~$ arp -a
_gateway (10.0.2.2) at 52:54:00:12:35:02 [ether] on enp0s3
```

b) NbtStat

As I am sure you probably know, computers that are running a Windows operating system are assigned a computer name. Oftentimes, there is a domain name or a workgroup name that is also assigned to the computer. The computer name is sometimes referred to as the NetBIOS name. Windows uses several different methods to map NetBIOS names to IP addresses, such as broadcast, LMHost lookup, or even using the nearly extinct method of querying a WINS server. Of course, NetBIOS over TCP/IP can occasionally break down. The NbtStat command can help you to diagnose and correct such problems. The NbtStat -n command for example, shows the NetBIOS names that are in use by a device. The NbtStat -r command shows how many NetBIOS names the device has been able to resolve recently.

```
Microsoft Windows [Version 10.0.19043.1237]
(c) Microsoft Corporation. All rights reserved.

C:\WINDOWS\system32>nbtstat -r

NetBIOS Names Resolution and Registration Statistics
-----

Resolved By Broadcast      = 0
Resolved By Name Server    = 0

Registered By Broadcast   = 90
Registered By Name Server = 0
```

c) Hostname

The previously discussed NbtStat command can provide you with the host name that has been assigned to a Windows device, if you know which switch to use with the command. However, if you're just looking for a fast and easy way of verifying a computer's name, then try using the Hostname command. Typing Hostname at the command prompt returns the local computer name.

```
C:\WINDOWS\system32>hostname
DESKTOP-VQK7AGK
```

d) PathPing

Earlier, I talked about the Ping utility and the Tracert utility, and the similarities between them. As you might have guessed, the PathPing tool is a utility that combines the best aspects of Tracert and Ping. Entering the PathPing command followed by a host name initiates what looks like a somewhat standard Tracert process. Once this process completes however, the tool takes 300 seconds (five minutes) to gather statistics, and then reports latency and packet loss statistics that are more detailed than those provided by Ping or Tracert.

```
C:\WINDOWS\system32>pathping www.google.com

Tracing route to www.google.com [2404:6800:4009:81c::2004]
over a maximum of 30 hops:
  0 DESKTOP-VQK7AGK [2409:4073:4e1b:724e:d06:1d6d:3349:2491]
  1 fe80::cc07:a5ff:fe79:a926
  2 * * *
Computing statistics for 25 seconds...
      Source to Here   This Node/Link
Hop  RTT     Lost/Sent = Pct  Lost/Sent = Pct  Address
  0          DESKTOP-VQK7AGK [2409:4073:4e1b:724e:d06:1d6d:3349:2491]
                                0/ 100 = 0%    |
  1     2ms      0/ 100 = 0%      0/ 100 = 0%  fe80::cc07:a5ff:fe79:a926

Trace complete.
```

e) getmac

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

```
C:\WINDOWS\system32>getmac

Physical Address      Transport Name
=====
00-26-B9-DB-40-58    Media disconnected
C4-46-19-25-28-D5    \Device\Tcpip_{3FE2DA3B-E9EA-4501-AD48-3838FFEDED49}
F0-7B-CB-A8-48-B9    Media disconnected
0A-00-27-00-00-0B    \Device\Tcpip_{55E73D7B-EB34-4661-AD28-DB817A05B61A}
```

F) Dig

Linux dig command stands for Domain Information Groper. This command is used in DNS lookup to query the DNS name server. It is also used to troubleshoot DNS related issues. It is mainly used to verify DNS mappings, MX Records, host addresses, and all other DNS records for a better understanding of the DNS topography. This command is an improvised version of nslookup command.

```
joice@joice-VirtualBox:~$ dig google.com

<>>> DiG 9.16.8-Ubuntu <>>> google.com
; global options: +cmd
; Got answer:
; ->>HEADER<- opcode: QUERY, status: NOERROR, id: 2490
; flags: qr rd ra; QUERY: 1, ANSWER: 1, AUTHORITY: 0, ADDITIONAL: 1

; OPT PSEUDOSECTION:
; EDNS: version: 0, flags:; udp: 65494
; QUESTION SECTION:
google.com.           IN      A

; ANSWER SECTION:
google.com.        187     IN      A      142.250.194.142

; Query time: 48 msec
; SERVER: 127.0.0.53#53(127.0.0.53)
; WHEN: Sat Oct 02 14:41:48 IST 2021
; MSG SIZE  rcvd: 55
```

g)iwconfig

Linux iwconfig is used to configure the wireless network interface. It is used to set and view the basic WI-FI details like SSID and encryption. To know more about this command, refer to the man page.

```
joice@joice-VirtualBox:~$ iwconfig
lo      no wireless extensions.

enp0s3   no wireless extensions.
```

h)whois

Linux whois command is used to fetch all the information related to a website. You can get all the information about a website including the registration and the owner information.

```
joice@joice-VirtualBox:~$ whois google.com
Domain Name: GOOGLE.COM
Registry Domain ID: 2138514_DOMAIN_COM-VRSN
Registrar WHOIS Server: whois.markmonitor.com
Registrar URL: http://www.markmonitor.com
Updated Date: 2019-09-09T15:39:04Z
Creation Date: 1997-09-15T04:00:00Z
Registry Expiry Date: 2028-09-14T04:00:00Z
Registrar: MarkMonitor Inc.
Registrar IANA ID: 292
Registrar Abuse Contact Email: abusecomplaints@markmonitor.com
Registrar Abuse Contact Phone: +1.2083895740
Domain Status: clientDeleteProhibited https://icann.org/epp#clientDeleteProhibited
Domain Status: clientTransferProhibited https://icann.org/epp#clientTransferProhibited
Domain Status: clientUpdateProhibited https://icann.org/epp#clientUpdateProhibited
Domain Status: serverDeleteProhibited https://icann.org/epp#serverDeleteProhibited
Domain Status: serverTransferProhibited https://icann.org/epp#serverTransferProhibited
Domain Status: serverUpdateProhibited https://icann.org/epp#serverUpdateProhibited
Name Server: NS1.GOOGLE.COM
Name Server: NS2.GOOGLE.COM
Name Server: NS3.GOOGLE.COM
Name Server: NS4.GOOGLE.COM
```

LAMP INSTALLATION PROCEDURE

Install Apache

.Update your system

```
sudo apt update
```

. Install Apache using apt:

```
sudo apt install apache2
```

. Confirm that Apache is now running with the following

command:

```
sudo systemctl status apache2
```

if it is not working

```
sudo systemctl start apache2
```

```
joice@joice-VirtualBox:~$ sudo systemctl status apache2
[sudo] password for joice:
● apache2.service - The Apache HTTP Server
   Loaded: loaded (/lib/systemd/system/apache2.service; enabled; vendor prese...
   Active: active (running) since Thu 2021-09-30 13:59:54 IST; 14min ago
     Docs: https://httpd.apache.org/docs/2.4/
   Process: 656 ExecStart=/usr/sbin/apachectl start (code=exited, status=0/SUC...
 Main PID: 844 (apache2)
    Tasks: 6 (limit: 1672)
   Memory: 18.3M
      CPU: 0.000 CPU(s) since start
     CGroup: /system.slice/apache2.service
             └─844 /usr/sbin/apache2 -k start
                 ├─877 /usr/sbin/apache2 -k start
                 ├─878 /usr/sbin/apache2 -k start
                 ├─879 /usr/sbin/apache2 -k start
                 ├─880 /usr/sbin/apache2 -k start
                 └─881 /usr/sbin/apache2 -k start

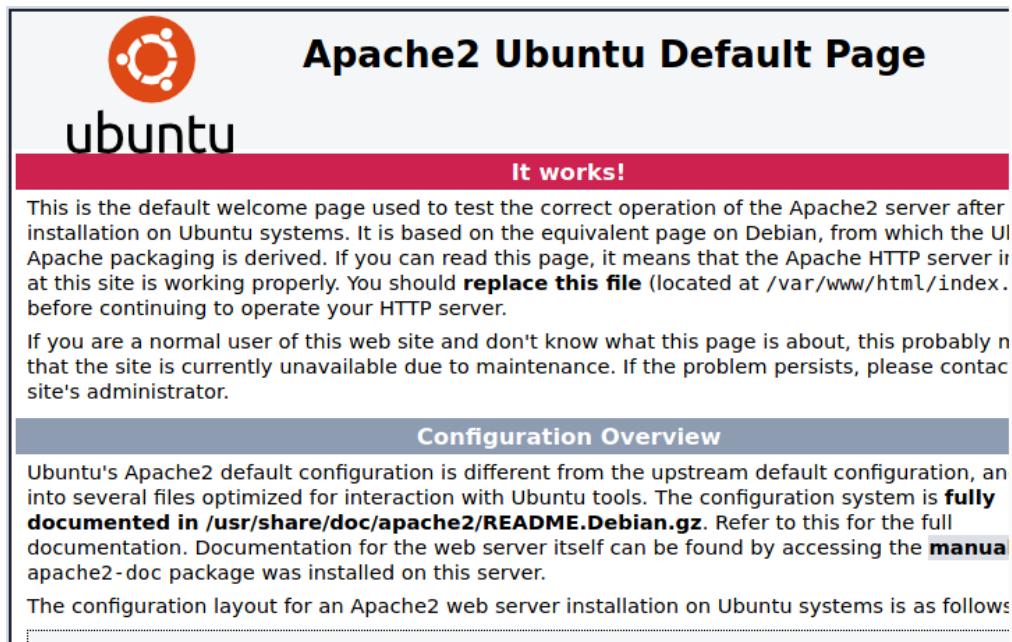
Sep 30 13:59:45 joice-VirtualBox systemd[1]: Starting The Apache HTTP Server...
Sep 30 13:59:54 joice-VirtualBox apachectl[706]: AH00558: apache2: Could not re...
Sep 30 13:59:54 joice-VirtualBox systemd[1]: Started The Apache HTTP Server.
lines 1-19/19 (END)
```

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

browser:

http://youripaddress

(find out your ipaddress using ifconfig)



2. Install mariadb

sudo apt install mariadb-server mariadb-client

Check mariadb Installation

sudo systemctl status mysql

(if it is not working sudo systemctl start mysql)

```
joice@joice-VirtualBox:~$ sudo systemctl status mysql
● mariadb.service - MariaDB 10.5.12 database server
   Loaded: loaded (/lib/systemd/system/mariadb.service; enabled; vendor preset: enabled)
   Active: active (running) since Thu 2021-09-30 13:59:58 IST; 18min ago
     Docs: man:mariadb(8)
           https://mariadb.com/kb/en/library/systemd/
   Main PID: 763 (mariadb)
      Status: "Taking your SQL requests now..."
      Tasks: 8 (limit: 1672)
     Memory: 51.6M
        CGroup: /system.slice/mariadb.service
                  └─763 /usr/sbin/mariadb

Sep 30 13:59:58 joice-VirtualBox mariadb[763]: 2021-09-30 13:59:58 0 [Note] Ad...
Sep 30 13:59:58 joice-VirtualBox mariadb[763]: 2021-09-30 13:59:58 0 [Note] /u...
Sep 30 13:59:58 joice-VirtualBox mariadb[763]: Version: '10.5.12-MariaDB-0ubuntu...
Sep 30 13:59:58 joice-VirtualBox systemd[1]: Started MariaDB 10.5.12 database se...
Sep 30 13:59:58 joice-VirtualBox /etc/mysql/debian-start[940]: Upgrading MySQL >
Sep 30 14:00:00 joice-VirtualBox /etc/mysql/debian-start[946]: Looking for 'mys...
Sep 30 14:00:00 joice-VirtualBox /etc/mysql/debian-start[946]: Looking for 'mys...
Sep 30 14:00:00 joice-VirtualBox /etc/mysql/debian-start[946]: This installatio...
Sep 30 14:00:00 joice-VirtualBox /etc/mysql/debian-start[980]: Checking for ins...
Sep 30 14:00:00 joice-VirtualBox /etc/mysql/debian-start[984]: Triggering myisa...
lines 1-22/22 (END)
```

3. Install PHP and commonly used modules

```
sudo apt install php libapache2-mod-php php-occache
```

php-cli php-gd php-curl php-mysql

Restart apache2

```
sudo systemctl restart apache2
```

Now you can check php installation

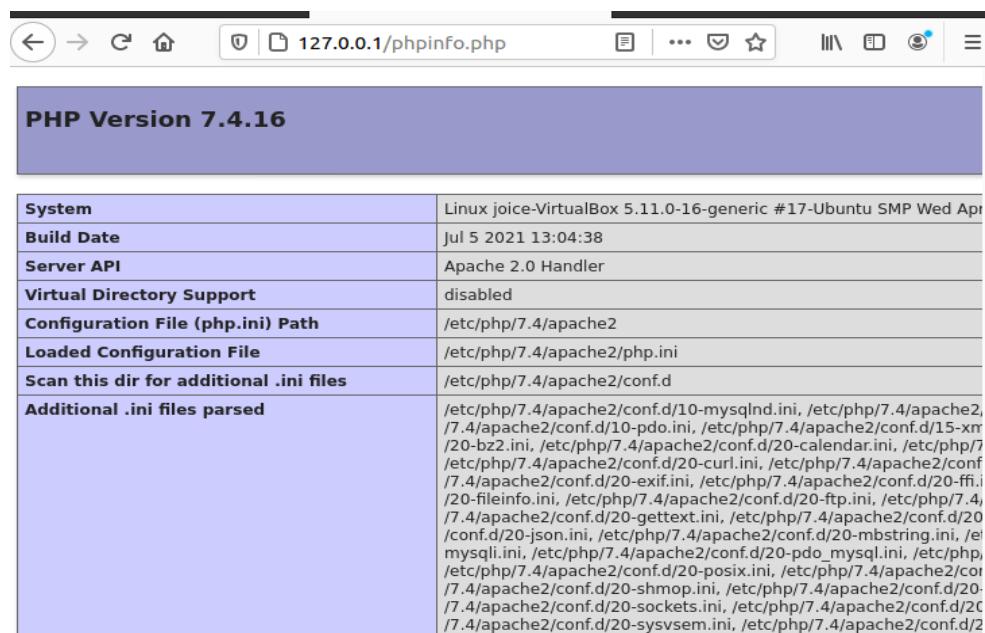
```
sudo echo "<?php phpinfo(); ?>" | sudo tee -a
```

/var/www/html/phpinfo.php > /dev/null

```
joice@joice-VirtualBox:~$ sudo systemctl restart apache2  
joice@joice-VirtualBox:~$ sudo echo "<?php phpinfo(); ?>" | sudo tee -a /var/www/html/phpinfo.php > /dev/null
```

Open a browser

<http://127.0.0.1/phpinfo.php>



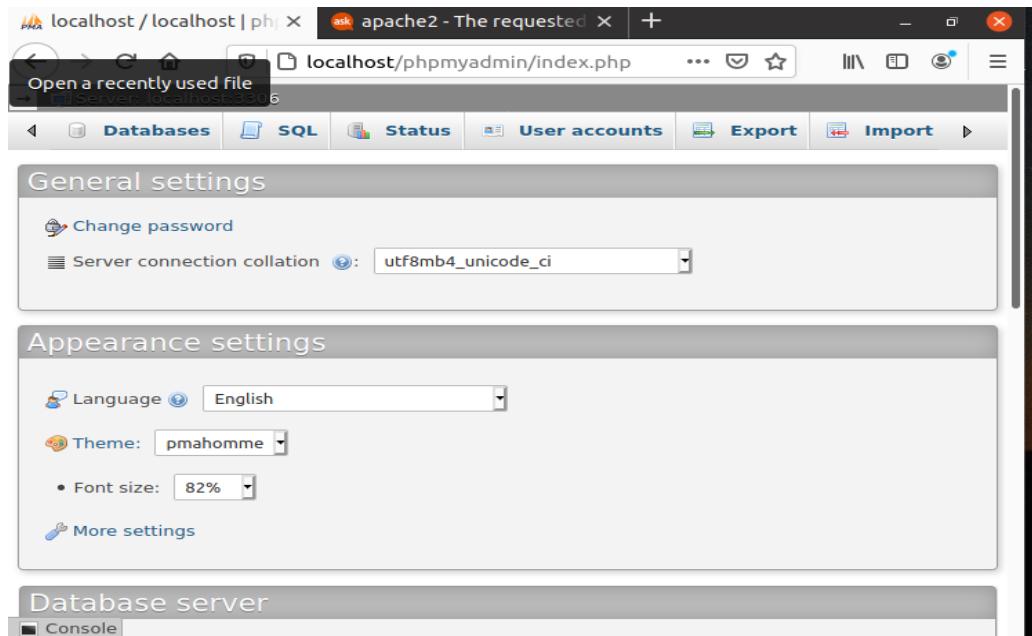
Check phpmyadmin

Open a browser

http://localhost/phpmyadmin

username : root

password : yourpassword



Ansible installation

- sudo apt install ansible

Check the version

- ansible --version

```
joice@joice-VirtualBox:~$ sudo apt install ansible
[sudo] password for joice:
Reading package lists... Done
Building dependency tree... Done
Reading state information... Done
ansible is already the newest version (2.10.7-1).
0 upgraded, 0 newly installed, 0 to remove and 152 not upgraded.
joice@joice-VirtualBox:~$ ansible --version
ansible 2.10.5
  config file = None
  configured module search path = ['/home/joice/.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 = 3.9.5 (default, May 11 2021, 08:20:37) [GCC 10.3.0]
joice@joice-VirtualBox:~$ █
```

Tcpdump Installation

On Debian based distributions tcpdump can be installed with the APT command:

Sudo apt install tcpdump

```
joice@joice-VirtualBox:~$ sudo apt install tcpdump
Reading package lists... Done
Building dependency tree... Done
Reading state information... Done
tcpdump is already the newest version (4.9.3-7).
0 upgraded, 0 newly installed, 0 to remove and 155 not upgraded.
```

tcpdump command options

You need to be root to run tcpdump. It includes many options and filters. Running tcpdump without any options will capture all packets flowing through the default interface. To see the list of network interfaces available on the system and on which tcpdump can capture packets.

sudo tcpdump -D

```
joice@joice-VirtualBox:~$ sudo tcpdump -D
1.enp0s3 [Up, Running]
2.any (Pseudo-device that captures on all interfaces) [Up, Running]
3.lo [Up, Running, Loopback]
4.bluetooth-monitor (Bluetooth Linux Monitor) [none]
5.nflog (Linux netfilter log (NFLOG) interface) [none]
6.nfqueue (Linux netfilter queue (NFQUEUE) interface) [none]
7 dbus-system (D-Bus system bus) [none]
8 dbus-session (D-Bus session bus) [none]
```

host filter

To capture all packets arriving at or leaving from the host with IP address of 10.0.2.15:

Sudo tcpdump host 10.0.2.15

```
joice@joice-VirtualBox:~$ sudo tcpdump host 10.0.2.15
[sudo] password for joice:
tcpdump: verbose output suppressed, use -v or -vv for full protocol decode
listening on enp0s3, link-type EN10MB (Ethernet), capture size 262144 bytes
21:25:27.881516 IP joice-VirtualBox.45710 > oscp-router01.gnome.org.https: Flags
[P.], seq 866184572:866184603, ack 199442689, win 65535, length 31
21:25:27.882171 IP joice-VirtualBox.45710 > oscp-router01.gnome.org.https: Flags
[R.], seq 31, ack 1, win 65535, length 0
21:25:27.882641 IP oscp-router01.gnome.org.https > joice-VirtualBox.45710: Flags
[.], ack 31, win 65535, length 0
21:25:27.882678 IP joice-VirtualBox.45710 > oscp-router01.gnome.org.https: Flags
[R], seq 866184603, win 0, length 0
21:25:27.883384 IP oscp-router01.gnome.org.https > joice-VirtualBox.45710: Flags
[R.], seq 4095524608, ack 31, win 0, length 0
21:25:27.885837 IP joice-VirtualBox.42060 > 192.168.43.1.domain: 34888+ PTR? 15.
2.0.10.in-addr.arpa. (40)
21:25:27.890503 IP 192.168.43.1.domain > joice-VirtualBox.42060: 34888 NXDomain
0/0/0 (40)
21:25:27.892530 IP joice-VirtualBox.39441 > 192.168.43.1.domain: 19265+ PTR? 1.4
3.168.192.in-addr.arpa. (43)
21:25:27.895975 IP 192.168.43.1.domain > joice-VirtualBox.39441: 19265 NXDomain
0/0/0 (43)
^C
9 packets captured
9 packets received by filter
0 packets dropped by kernel
```

```
sudo tcpdump -l enp0s3 -c 5 port 80
```

```
joice@joice-VirtualBox: ~ $ sudo tcpdump -i enp0s3 -c 5 port 80
tcpdump: verbose output suppressed, use -v or -vv for full protocol decode
listening on enp0s3, link-type EN10MB (Ethernet), capture size 262144 bytes
21:33:06.002154 IP joice-VirtualBox.43626 > a184-84-176-10.deploy.static.akamai
technologies.com.http: Flags [S], seq 3895351402, win 64240, options [mss 1460,s
ckOK,TS val 896833423 ecr 0,nop,wscale 7], length 0
21:33:06.005348 IP joice-VirtualBox.43626 > a184-84-176-10.deploy.static.akamai
technologies.com.http: Flags [S], seq 2395285257, win 64240, options [mss 1460,s
ckOK,TS val 896833426 ecr 0,nop,wscale 7], length 0
21:33:06.005994 IP joice-VirtualBox.43628 > a184-84-176-10.deploy.static.akamai
technologies.com.http: Flags [S], seq 832438118, win 64240, options [mss 1460,s
ckOK,TS val 896833427 ecr 0,nop,wscale 7], length 0
21:33:06.045651 IP a184-84-176-10.deploy.static.akamaitechnologies.com.http >
joice-VirtualBox.43628: Flags [S.], seq 231232001, ack 832438119, win 65535, opti
ns [mss 1460], length 0
21:33:06.045725 IP joice-VirtualBox.43628 > a184-84-176-10.deploy.static.akamai
technologies.com.http: Flags [., ack 1, win 64240, length 0
5 packets captured
13 packets received by filter
0 Show Applications d by kernel
```

Sudo tcpdump -n net 10.0

```
joice@joice-VirtualBox:~$ sudo tcpdump -n net 10.0
tcpdump: verbose output suppressed, use -v or -vv for full protocol decode
listening on enp0s3, link-type EN10MB (Ethernet), capture size 262144 bytes
21:49:13.025333 IP 13.249.220.39.443 > 10.0.2.15.59590: Flags [P.], seq 35392509
5:353925157, ack 3171873236, win 65535, length 62
21:49:13.025384 IP 10.0.2.15.59590 > 13.249.220.39.443: Flags [.], ack 62, win 6
2780, length 0
```

```
5, win 0, length 0
21:49:14.662861 IP 10.0.2.15.59600 > 13.249.220.39.443: Flags [P.], seq 252:276,
  ack 5164, win 62780, length 24
21:49:14.663466 IP 13.249.220.39.443 > 10.0.2.15.59600: Flags [.], ack 276, win
65535, length 0
^C
187 packets captured
187 packets received by filter
0 packets dropped by kernel
```

```
Sudo tcpdump -n -l enpos3 src 10.0.2.15 and dst port 80
```

```
joice@joice-VirtualBox:~$ sudo tcpdump -n -i enp0s3 src 10.0.2.15 and dst 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
8 packets received by filter
0 packets dropped by kernel
```

Sudo tcpdump -n -l enpos3 src 10.0.2.15 or dst port 80

```
joice@joice-VirtualBox:~$ sudo tcpdump -n -i enp0s3 src 10.0.2.15 or dst 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
21:57:30.198778 IP 10.0.2.15.56352 > 192.168.43.1.53: 24679+ A? www.amazon.in. (31)
21:57:30.202784 IP 10.0.2.15.51888 > 99.86.15.179.443: Flags [P.], seq 308681921
3:3086819503, ack 353744626, win 65535, length 290
21:57:30.217484 IP 10.0.2.15.57996 > 63.33.0.117.443: Flags [P.], seq 627106592:
627107002, ack 354333273, win 62780, length 410

21:57:34.754839 IP 10.0.2.15.59280 > 54.239.32.228.443: Flags [..], ack 6301, win
62780, length 0
^C
65 packets captured
65 packets received by filter
0 packets dropped by kernel
```

```
Sudo tcpdump -l enp0s3 -c 10 -w icmp.pcap
```

```
joice@joice-VirtualBox:~$ sudo tcpdump -l enp0s3 -c 10 -w icmp.pcap
tcpdump: listening on enp0s3, link-type EN10MB (Ethernet), capture size 262144 bytes
10 packets captured
10 packets received by filter
0 packets dropped by kernel
```

```
Sudo tcpdump -r icmp.pcap
```

```
joice@joice-VirtualBox:~$ sudo tcpdump -r icmp.pcap
reading from file icmp.pcap, link-type EN10MB (Ethernet)
22:00:20.878918 IP joice-VirtualBox.51888 > server-99-86-15-179.blr50.r.cloudfront.net.https: Flags [P.], seq 3086819838:3086819877, ack 353746015, win 65535, length 39
22:00:20.879601 IP server-99-86-15-179.blr50.r.cloudfront.net.https > joice-VirtualBox.51888: Flags [.], ack 39, win 65535, length 0
22:00:20.881830 IP joice-VirtualBox.51888 > server-99-86-15-179.blr50.r.cloudfront.net.https: Flags [P.], seq 39:63, ack 1, win 65535, length 24
22:00:20.882260 IP server-99-86-15-179.blr50.r.cloudfront.net.https > joice-VirtualBox.51888: Flags [.], ack 63, win 65535, length 0
22:00:20.882858 IP joice-VirtualBox.51888 > server-99-86-15-179.blr50.r.cloudfront.net.https: Flags [F.], seq 63, ack 1, win 65535, length 0
2 Help 20.883253 IP server-99-86-15-179.blr50.r.cloudfront.net.https > joice-VirtualBox.51888: Flags [.], ack 64, win 65535, length 0
22:00:21.428938 IP maa05s23-in-f10.1e100.net.https > joice-VirtualBox.53906: Flags [F.], seq 441218690, ack 1086974314, win 65535, length 0
22:00:21.429023 IP joice-VirtualBox.53906 > maa05s23-in-f10.1e100.net.https: Flags [.], ack 1, win 62780, length 0
22:00:23.698401 IP server-99-86-15-179.blr50.r.cloudfront.net.https > joice-VirtualBox.51888: Flags [F.], seq 1, ack 64, win 65535, length 0
22:00:23.698458 IP joice-VirtualBox.51888 > server-99-86-15-179.blr50.r.cloudfront.net.https: Flags [.], ack 2, win 52248, length 0
```

```
sudo tcpdump -c10 -i enp0s3 -n -A port 80
```

```
joice@joice-VirtualBox:~$ sudo tcpdump -c10 -i enp0s3 -n -A 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
22:05:26.630182 IP 10.0.2.15.49804 > 35.232.111.17.80: Flags [F.], seq 3211879419, ack 477248002, win 64240, length 0
E..(.f@.@@b
...#.o....P.qc..r:.P....".
22:05:26.630909 IP 35.232.111.17.80 > 10.0.2.15.49804: Flags [.], ack 1, win 65535, length 0
E..({...@.`#.o.
....P....r...qc.P.....
22:05:26.840654 IP 10.0.2.15.52562 > 35.224.170.84.80: Flags [S], seq 3895594008, win 64240, options [mss 1460,sackOK,TS val 968417637 ecr 0,nop,wscale 7], length 0
E..<...@.@@...
...#.T.R.P.2.....q.....
9.....
2 Help 27.640340 IP 10.0.2.15.52564 > 35.224.170.84.80: Flags [S], seq 642712374, ack 4240, options [mss 1460,sackOK,TS val 968418436 ecr 0,nop,wscale 7], length 0
E..<'b@.@@.9.
...#.T.T.P&O.6.....q.....
9.....
22:05:27.874225 IP 10.0.2.15.52562 > 35.224.170.84.80: Flags [S], seq 3895594008, win 64240, options [mss 1460,sackOK,TS val 968418670 ecr 0,nop,wscale 7], length 0
E..<...@.@@...
...#.T.T.P&O.6.....q.....
9.....
```

Shell Scripting

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

```
#!/bin/bash
echo Enter Details
echo ****
echo Enter Name
read n
echo Enter College
read c
echo Details Entered
echo Name: $n
echo College: $c
```

```
joice@joice-VirtualBox:~$ bash 1.sh
Enter Details
*****
Enter Name
joice
Enter College
ajce
Details Entered
Name: joice
College: ajce
```

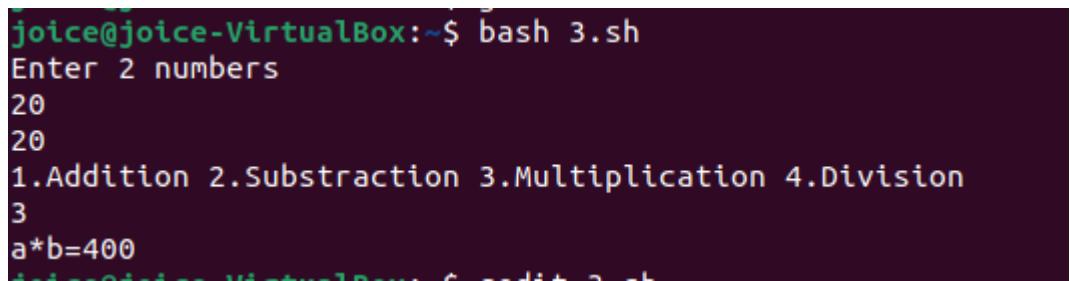
2. Write a shell script to set a value for a variable and display it on command line interface.

```
#!/bin/bash
echo Enter value
echo ****
a=10
echo Entered value
echo $a
```

```
joice@joice-VirtualBox:~$ bash 2.sh
Enter value
*****
Entered value
10
```

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

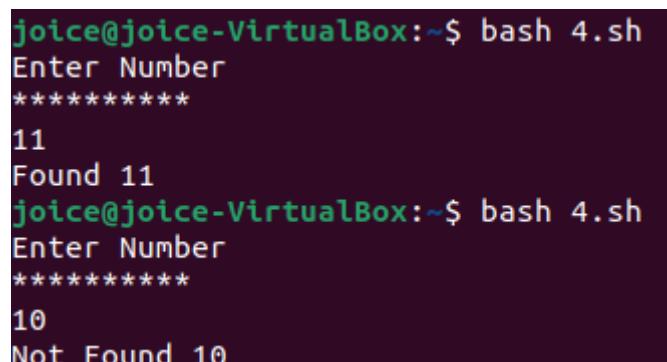
```
#!/bin/bash
echo "Enter 2 numbers"
read a
read b
echo "1.Addition 2.Substraction 3.Multiplication 4.Division"
read op
case "$op" in
"1") echo "a+b=$((a+b));"
"2") echo "a-b=$((a-b));"
"3") echo "a*b=$((a*b));"
"4") echo "a/b=$((a/b));"
esac
```



```
joice@joice-VirtualBox:~$ bash 3.sh
Enter 2 numbers
20
20
1.Addition 2.Substraction 3.Multiplication 4.Division
3
a*b=400
```

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

```
#!/bin/bash
echo Enter Number
echo *****
read a
if [ $a == 11 ]; then
    echo Found $a
else
    echo Not Found $a
fi
```



```
joice@joice-VirtualBox:~$ bash 4.sh
Enter Number
*****
11
Found 11
joice@joice-VirtualBox:~$ bash 4.sh
Enter Number
*****
10
Not Found 10
```

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

```
#!/bin/bash
echo Date:$(date)
$(cal)
```

```
joice@joice-VirtualBox:~$ bash 5.sh
Date:Sunday 03 October 2021 11:40:36 AM IST
          October 2021
Su Mo Tu We Th Fr Sa
              1   2
 3   4   5   6   7   8   9
10  11  12  13  14  15  16
17  18  19  20  21  22  23
24  25  26  27  28  29  30
31
```

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

```
#!/bin/bash
echo Enter No
echo *****
read n
x=$((n%2))
if [ $x -eq 0 ]; then
    echo Even
else
    echo Odd
fi
```

```
joice@joice-VirtualBox:~$ bash 6.sh
Enter No
*****
4
Even
joice@joice-VirtualBox:~$ bash 6.sh
Enter No
*****
3
Odd
```

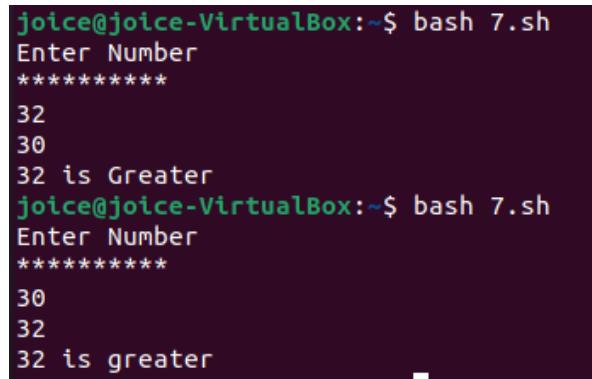
7. Write a shell script to check a number is greater than, less than or equal to another number.

```
#!/bin/bash
echo Enter Number
echo *****
read n1
```

```

read n2
if [ $n1 -gt $n2 ]; then
    echo $n1 is Greater
else
    echo $n2 is greater
fi

```



```

joice@joice-VirtualBox:~$ bash 7.sh
Enter Number
*****
32
30
32 is Greater
joice@joice-VirtualBox:~$ bash 7.sh
Enter Number
*****
30
32
32 is greater

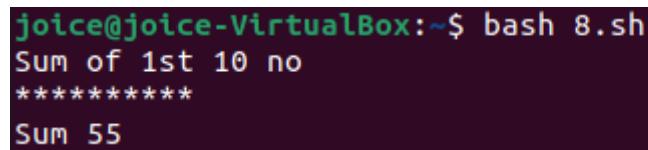
```

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

```

#!/bin/bash
echo Sum of 1st 10 no
echo *****
s=0
for ((i=1;i<=10;i++))
do
s=`expr $s + $i`
done
echo Sum $s

```



```

joice@joice-VirtualBox:~$ bash 8.sh
Sum of 1st 10 no
*****
Sum 55

```

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

```

#!/bin/bash
echo Enter Numbers
read n1
read n2
read n3
read n4
sum=$(( $n1 + $n2 + $n3 + $n4 ))
avg=$( echo $sum / 4 |bc -l )
pdt=$(( $n1 * $n2 * $n3 * $n4 ))
echo Sum: $sum
echo Average: $avg

```

echo Product: \$pdt

```
joice@joice-VirtualBox:~$ bash 9.sh
Enter Numbers
1 2 3 4
Sum: 10
Average: 2.50000000000000000000000000000000
Product: 24
```

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

```
#!/bin/bash
echo Enter 3 nos
read a
read b
read c
if [ $a -gt $b ]; then
    if [ $a -gt $c ]; then
        echo $a is Big
    else
        echo $c is Big
    fi
elif [ $b -gt $c ]; then
    echo $b is Big
else
    echo $c is Big
fi
```

```
joice@joice-VirtualBox:~$ bash 10.sh
ENter 3 nos
-2
3
0
3 is Big
joice@joice-VirtualBox:~$ bash 10.sh
ENter 3 nos
3
-2
0
3 is Big
joice@joice-VirtualBox:~$ bash 10.sh
ENter 3 nos
0
-2
3
3 is Big
```

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

```
#!/bin/bash
echo Factorial
echo Enter No
read n
```

```

f=1
for((i=2;i<=n;i++))
{
    f=$((f * i)) #f=f*i
}
echo Factorial: $f

```

```

joice@joice-VirtualBox:~$ bash 11.sh
Factorial
Enter No
3
Factorial: 6
joice@joice-VirtualBox:~$ bash 11.sh
Factorial
Enter No
4
Factorial: 24

```

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

```

#!/bin/bash
echo Enter Number
echo *****
echo enter number
read n
r=$(echo $n | rev)
if [ $n -eq $r ]; then
    echo Paalindrome
else
    echo Not Paalindrome
fi

```

```

joice@joice-VirtualBox:~$ bash 12.sh
Enter Number
*****
enter number
121
Paalindrome
joice@joice-VirtualBox:~$ bash 12.sh
Enter Number
*****
enter number
120
Not Paalindrome

```

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

```

#!/bin/bash
echo Average of N numbers
echo *****
echo Enter Size
read s

```

```

sum=0
echo Enter numbers
for(( i=0;i<s;i++ ))
do
read num
sum=$((sum + num))
done
avg=$(( $sum/$s))
echo Average:$avg

```

```

joice@joice-VirtualBox:~$ bash 13.sh
Average of N numbers
*****
Enter Size
4
Enter numbers
10
20
20
30
Average:20

```

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

```

#!/bin/bash
echo "Sum of digits"
echo Enter Number
read n
s=0

while [ $n -gt 0 ]
do
mod=$((n % 10))
s=$((s + mod))
n=$((n / 10))
done
echo Sum: $s

```

```
joice@joice-VirtualBox:~$ bash 14.sh
Sum of digits
Enter Number
123
Sum: 6
```

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

```
#!/bin/bash
echo LEAP YEAR or NOT
echo Year
read y
a=`expr $y % 4`
b=`expr $y % 100`
c=`expr $y % 400`
if [ $a -eq 0 -a $b -ne 0 -o $c -eq 0 ]; then
    echo $y is Leap year
else
    echo Not Leap year
fi
```

```
joice@joice-VirtualBox:~$ bash 15.sh
LEAP YEAR or NOT
Year
2000
2000 is Leap year
joice@joice-VirtualBox:~$ bash 15.sh
LEAP YEAR or NOT
Year
2001
Not Leap year
joice@joice-VirtualBox:~$
```

Installation and deployment of Docker

Step-I

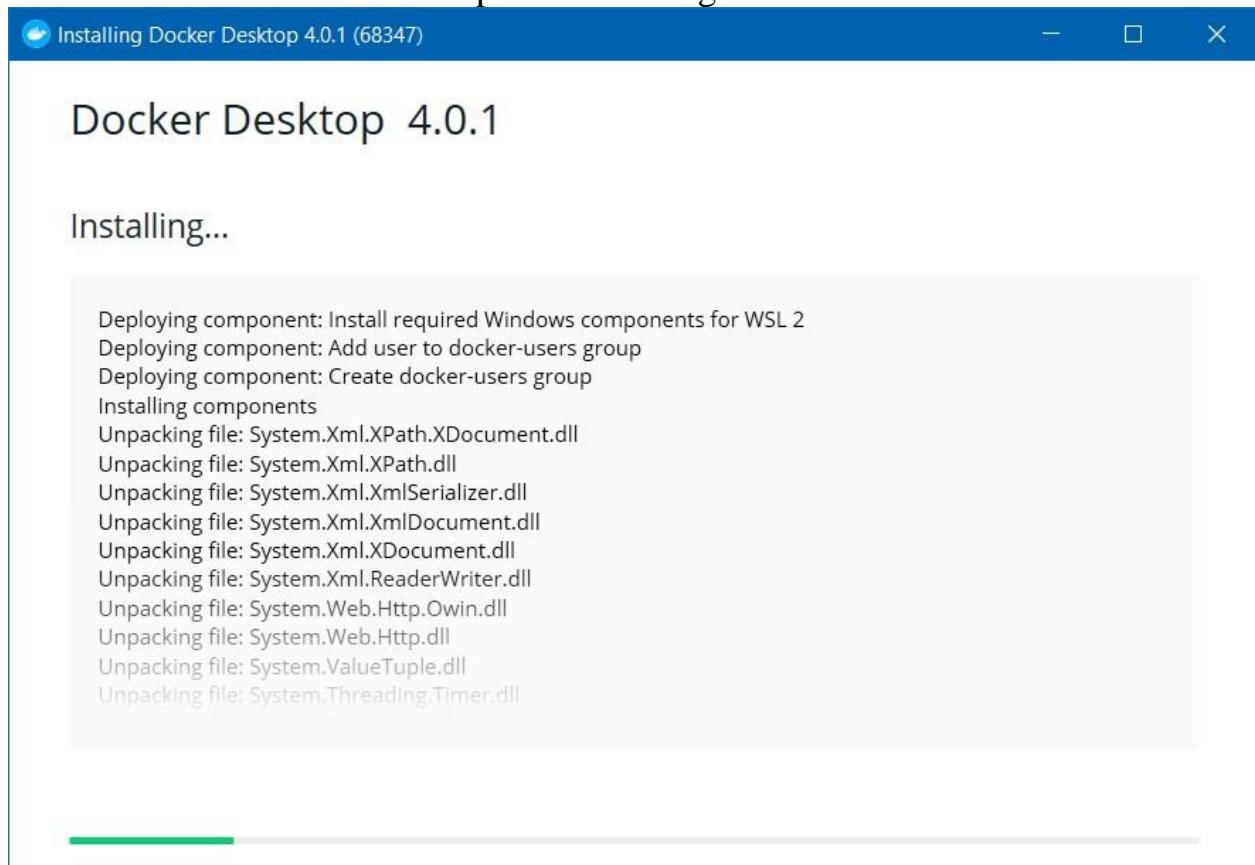
Download Docker Desktop installer for Windows from

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

 Docker Desktop Installer	9/29/2021 2:51 PM	Application	522,896 KB
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Step-II

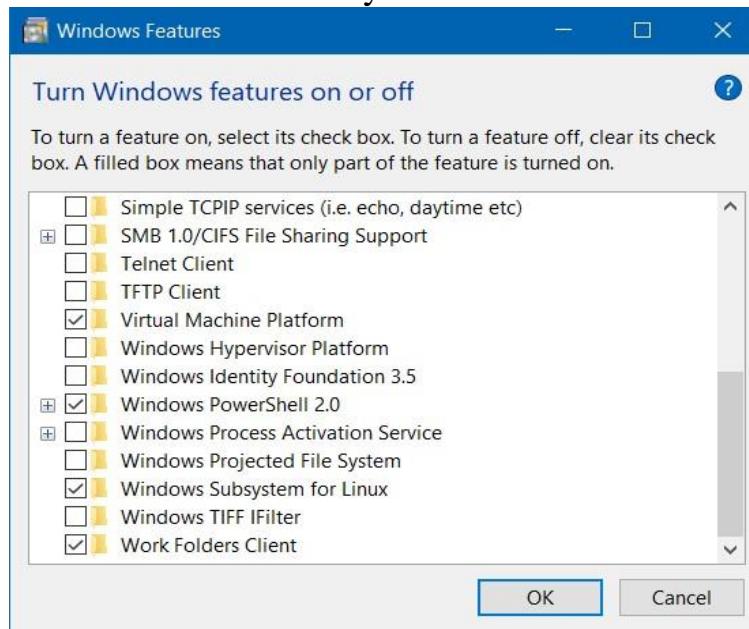
Open the .exe file and follow the steps after clicking install button.



Step-III

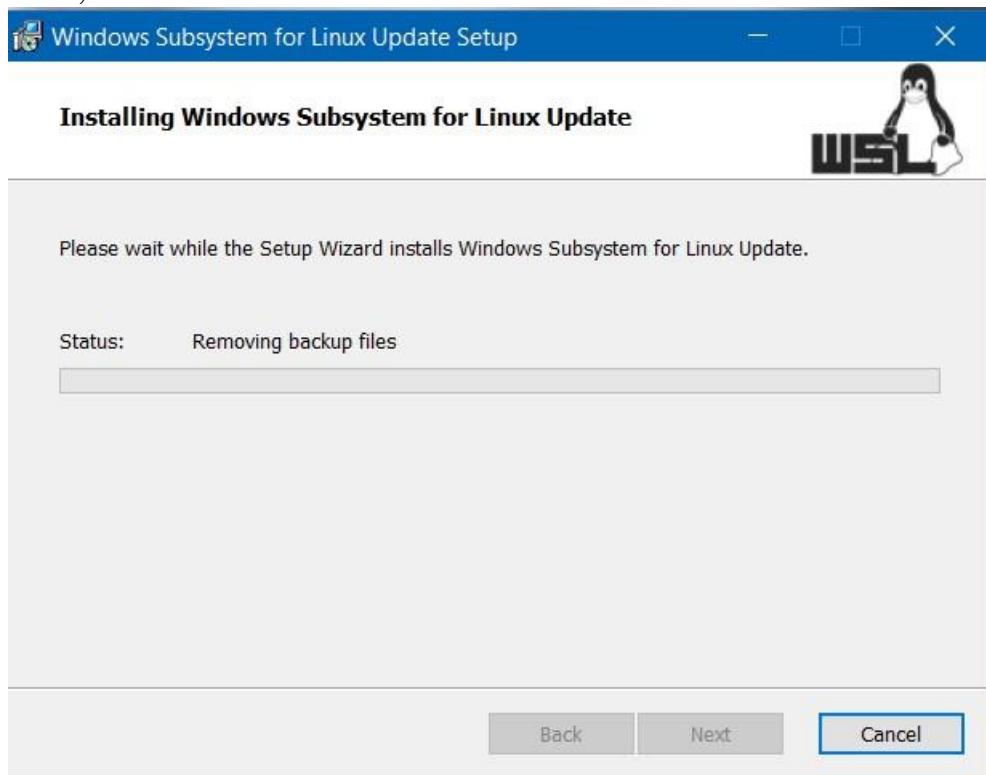
Once installed go to programs and features and click turn on windows features on or off

Scroll to the bottom and select windows subsystem for Linux



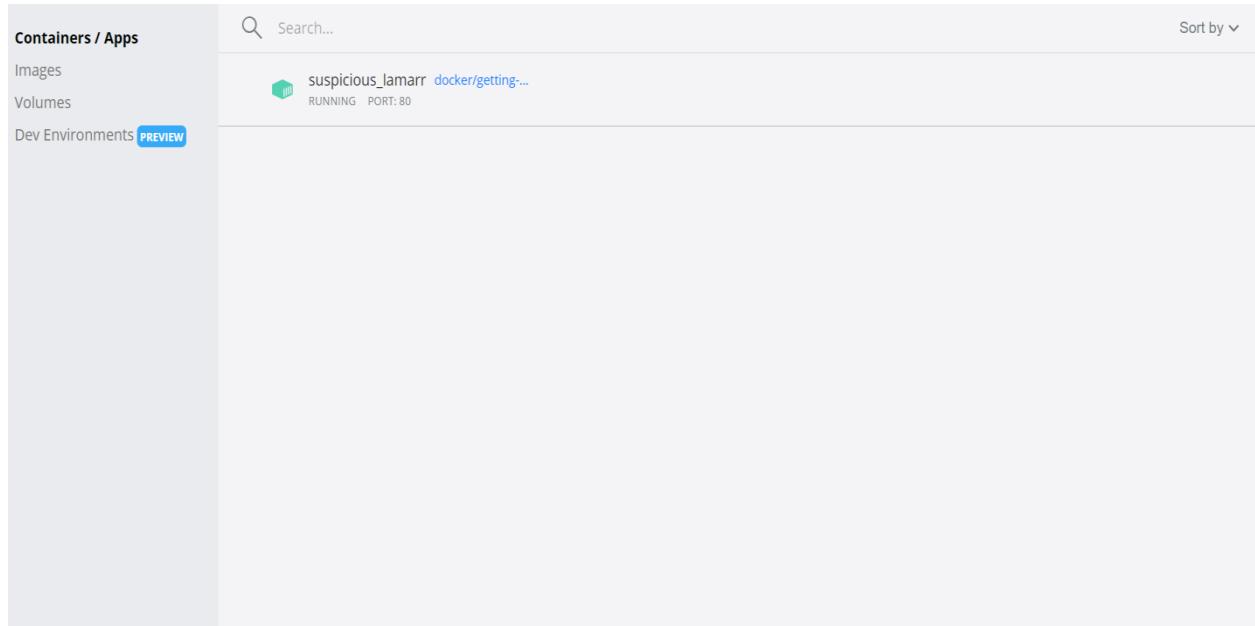
Step-IV

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)

A screenshot of a Windows Command Prompt window titled 'Administrator: Command Prompt'. The window shows the following command history:

```
C:\Windows\system32>docker run -d -p 80:80 docker/getting-started
Unable to find image 'docker/getting-started:latest' locally
docker: Error response from daemon: Get "https://registry-1.docker.io/v2/": dial tcp: lookup registry-1.docker.io on 192.168.65.5:53: no such host.
See 'docker run --help'.

C:\Windows\system32>docker pull ubuntu
Using default tag: latest
latest: Pulling from library/ubuntu
f3ef4ff62e0d: Pull complete
Digest: sha256:65de08a8dabf289ef114053ab32f79e0c333a4fbfa1fe3778bb13ae921a7849b
Status: Downloaded newer image for ubuntu:latest
docker.io/library/ubuntu:latest

C:\Windows\system32>
```

The window has a blue header bar and standard window controls (minimize, maximize, close) in the top right corner.

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

The screenshot shows the Docker desktop application interface. The left sidebar has tabs for 'Containers / Apps', 'Images' (which is selected), 'Volumes', and 'Dev Environments' (with a 'PREVIEW' badge). The main area is titled 'Images on disk' and shows '2 images' with a total size of '100.76 MB'. A progress bar indicates 'IN USE' (green) and 'UNUSED' (grey). Below this, there are two rows of information:

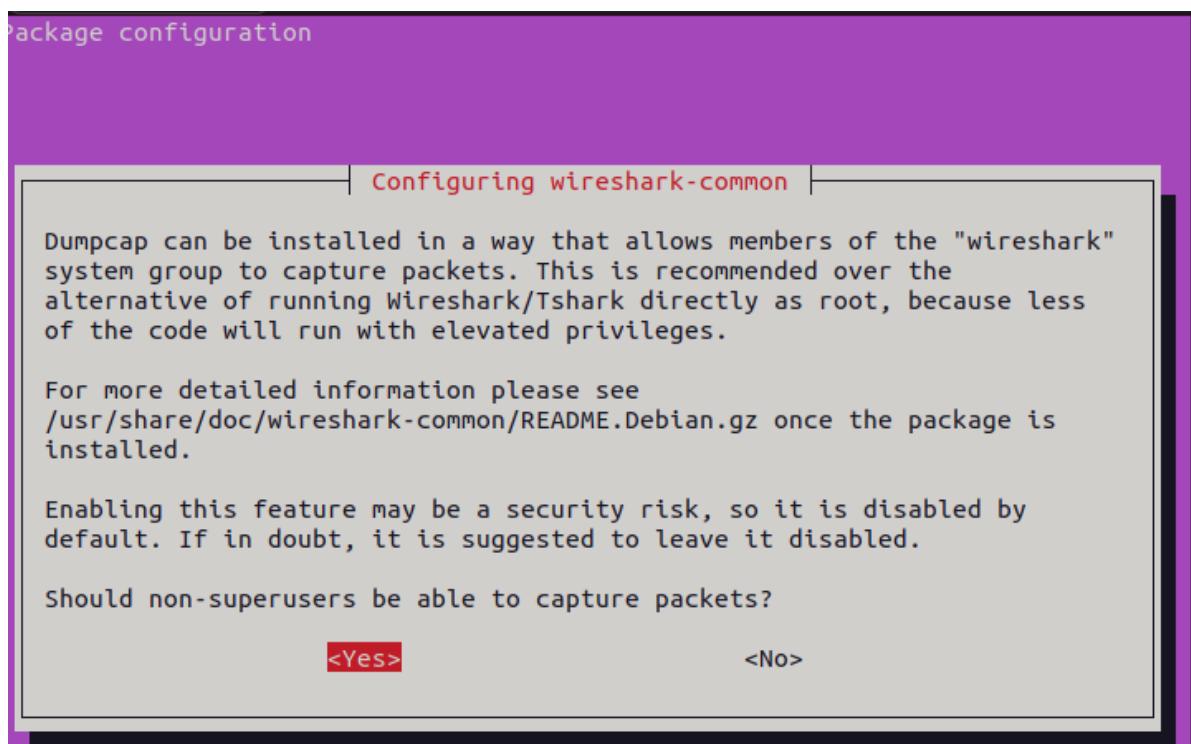
NAME	TAG	IMAGE ID	CREATED	SIZE
docker/getting-started	latest	083d7564d904	4 months ago	27.99 MB
ubuntu	latest	597ce1600cf4	2 days ago	72.78 MB

There is also a search bar and a checkbox for 'In Use only'.

Analysing network packet stream using nc and wireshark

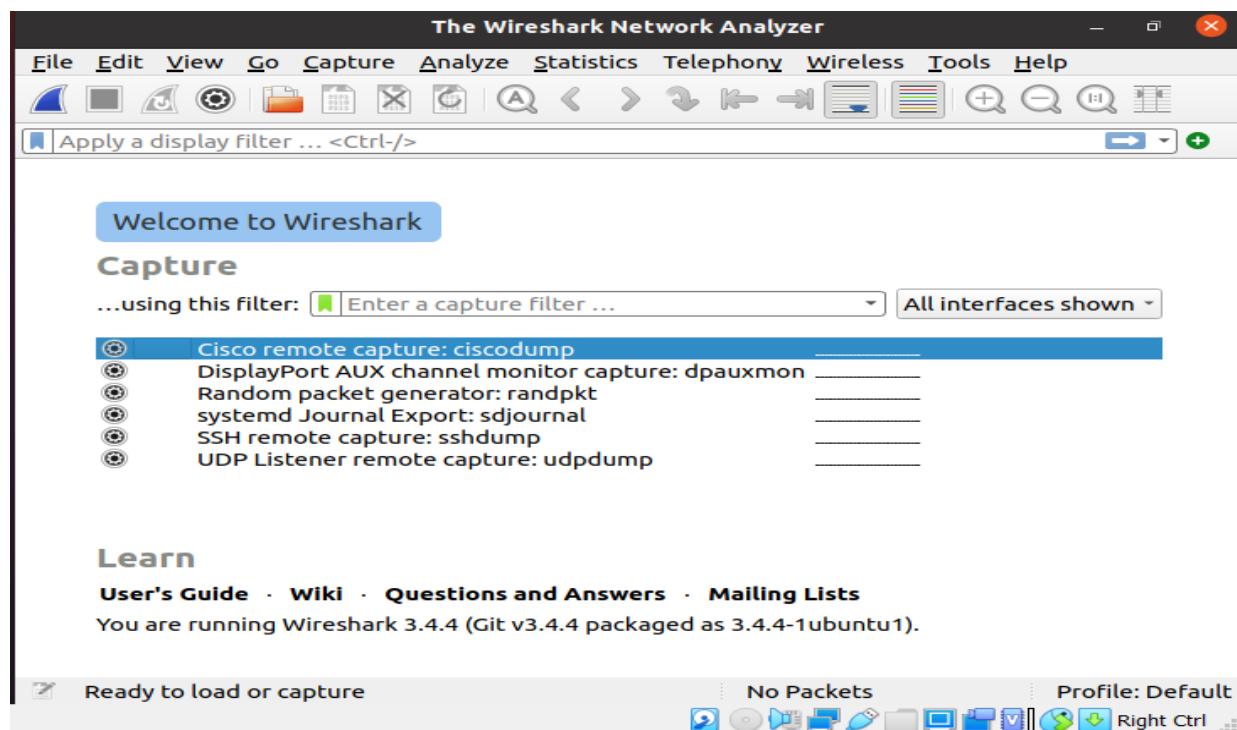
- sudo apt-get install wireshark

```
Activities Terminal Oct 4 21:06
joice@joice-VirtualBox:~$ sudo apt-get install wireshark
[sudo] password for joice:
S Thunderbird Mail 1.
[sudo] password for joice:
Reading package lists... Done
Building dependency tree... Done
Reading state information... Done
The following additional packages will be installed:
  libbcg729-0 libc-ares2 libdouble-conversion3 liblua5.2-0 libmd4c0
  libminizip1 libpcre2-16-0 libqt5core5a libqt5dbus5 libqt5gui5
  libqt5multimedia5 libqt5multimedia5-plugins libqt5multimediasupports5
  libqt5multimediacore5 libqt5network5 libqt5printsupport5 libqt5svg5
  libqt5widgets5 libsmi2ldbl libspandsp2 libssh-gcrypt-4 libwireshark-data
  libwireshark14 libwiretap11 libwsutil12 libxcb-xinerama0 libxcb-xinput0
  qt5-gtk-platformtheme qttranslations5-l10n wireshark-common wireshark-qt
Suggested packages:
  qt5-image-formats-plugins qtwaylands5 snmp-mibs-downloader geoipupdate
  geoip-database geoip-database-extra libjs-leaflet
  libjs-leaflet.markercluster wireshark-doc
The following NEW packages will be installed:
  libbcg729-0 libc-ares2 libdouble-conversions3 liblua5.2-0 libmd4c0
  libminizip1 libpcre2-16-0 libqt5core5a libqt5dbus5 libqt5gui5
  libqt5multimedia5 libqt5multimedia5-plugins libqt5multimediasupports5
  libqt5multimediacore5 libqt5network5 libqt5printsupport5 libqt5svg5
  libqt5widgets5 libsmi2ldbl libspandsp2 libssh-gcrypt-4 libwireshark-data
  libwireshark14 libwiretap11 libwsutil12 libxcb-xinerama0 libxcb-xinput0
  qt5-gtk-platformtheme qttranslations5-l10n wireshark wireshark-common
  wireshark-qt
0 upgraded, 32 newly installed, 0 to remove and 155 not upgraded.
```



- sudo dpkg-reconfigure wireshark-common

```
Processing triggers for gnome-menus (3.36.0-1ubuntu1) ...
joice@joice-VirtualBox:~$ sudo dpkg-reconfigure wireshark-common
[sudo] password for joice:
joice@joice-VirtualBox:~$
```



- nc -z -v 10.0.2.255 20-80

```
ani@KAJ:~$ nc -z -v 10.0.2.255 20-80
nc: connect to 10.0.2.255 port 20 (tcp) failed: Connection refused
nc: connect to 10.0.2.255 port 21 (tcp) failed: Connection refused
nc: connect to 10.0.2.255 port 22 (tcp) failed: Connection refused
nc: connect to 10.0.2.255 port 23 (tcp) failed: Connection refused
nc: connect to 10.0.2.255 port 24 (tcp) failed: Connection refused
nc: connect to 10.0.2.255 port 25 (tcp) failed: Connection refused
nc: connect to 10.0.2.255 port 26 (tcp) failed: Connection refused
nc: connect to 10.0.2.255 port 27 (tcp) failed: Connection refused
nc: connect to 10.0.2.255 port 28 (tcp) failed: Connection refused
nc: connect to 10.0.2.255 port 29 (tcp) failed: Connection refused
nc: connect to 10.0.2.255 port 30 (tcp) failed: Connection refused
nc: connect to 10.0.2.255 port 31 (tcp) failed: Connection refused
nc: connect to 10.0.2.255 port 32 (tcp) failed: Connection refused
nc: connect to 10.0.2.255 port 33 (tcp) failed: Connection refused
nc: connect to 10.0.2.255 port 34 (tcp) failed: Connection refused
nc: connect to 10.0.2.255 port 35 (tcp) failed: Connection refused
```