

20MCA136

Networking and Administration Lab Record

Submitted by:

Sreya M

Roll No:24

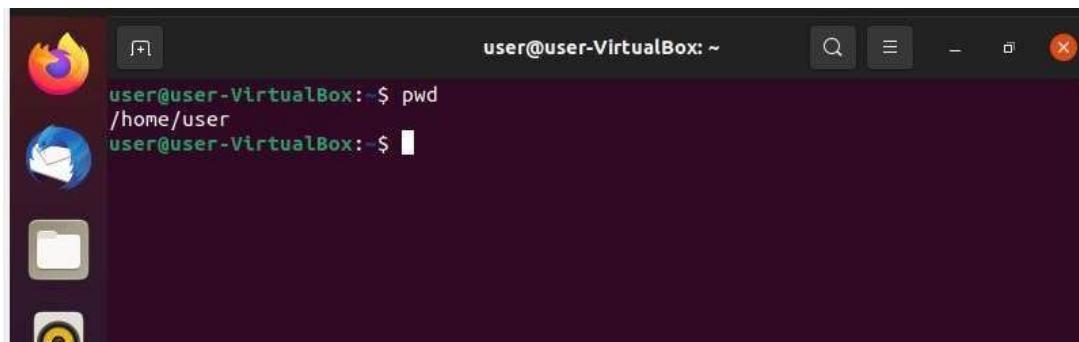
RMCA-B

TABLE OF CONTENT

EXP NO	EXPERIMENT	PAG NO
01	BASIC LINUX COMMANDS	03
02	NETWORK COMMANDS	32
03	LAMP INSTALLATION	53
04	TCPDUMP INSTALLATION	65
05	ANSIBLE INSTALLATION	68
06	SHELL SCRIPTING	70
07	WIRESHARK INSTALLATION	83
08	DOCKER INSTALLATION	87

1. pwd command

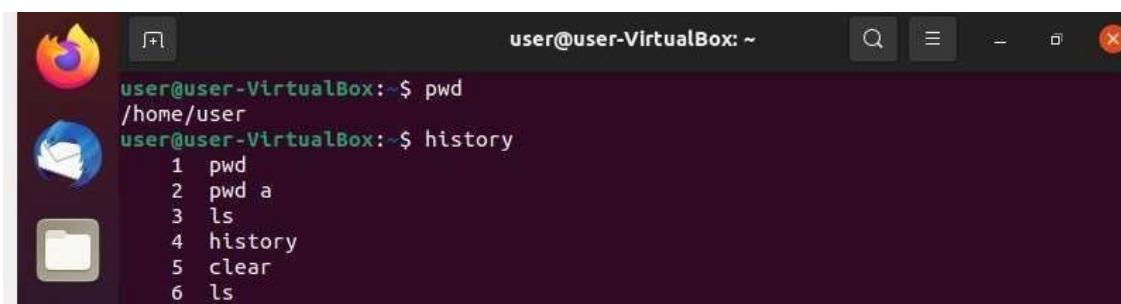
Use the pwd command to find out the path of the current working directory (folder) you're in.



A screenshot of a Linux desktop environment showing a terminal window. The terminal window has a dark purple background and a dark grey header bar. In the header bar, there is a search icon, a maximize/minimize icon, and a close button. The terminal window title is "user@user-VirtualBox: ~". The terminal window contains the following text:
user@user-VirtualBox:~\$ pwd
/home/user
user@user-VirtualBox:~\$

2. history

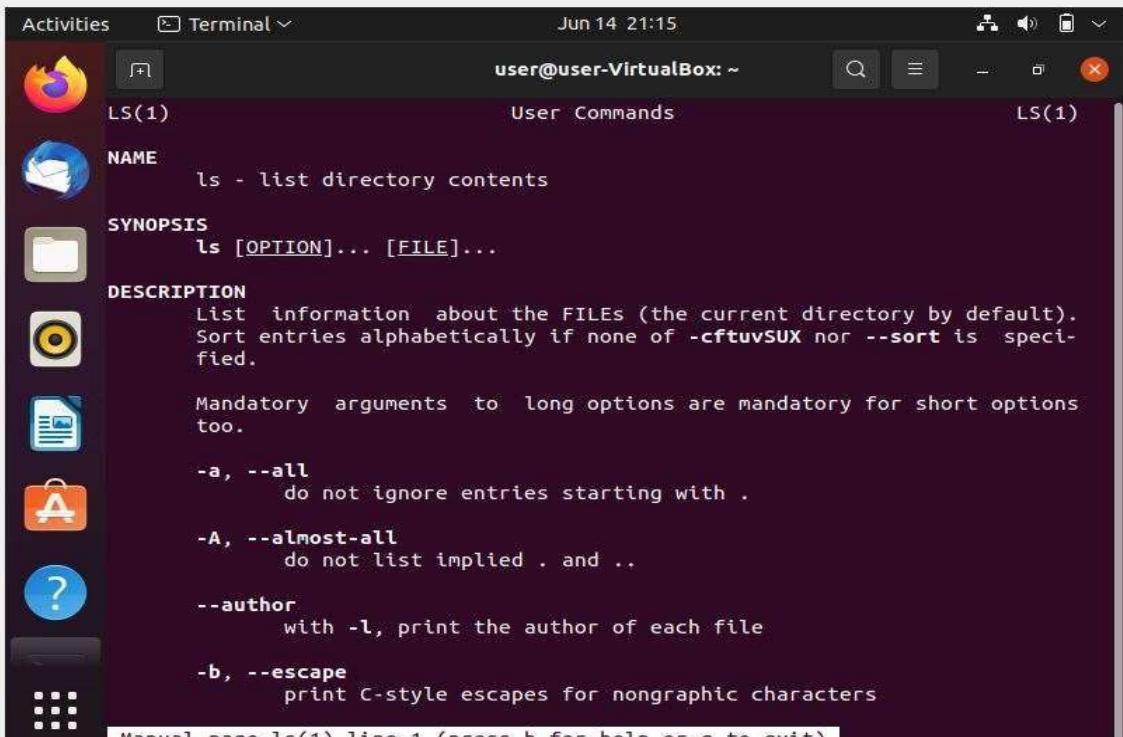
When you have been using Linux for a certain period of time, you will quickly notice that you can run hundreds of commands every day. As such, running history command is particularly useful if you want to review the commands you have entered before.



A screenshot of a Linux desktop environment showing a terminal window. The terminal window has a dark purple background and a dark grey header bar. The terminal window title is "user@user-VirtualBox: ~". The terminal window contains the following text:
user@user-VirtualBox:~\$ pwd
/home/user
user@user-VirtualBox:~\$ history
1 pwd
2 pwd a
3 ls
4 history
5 clear
6 ls

3. man

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



The screenshot shows a terminal window titled "Terminal" with the command "ls(1)" entered. The output displays the manual page for the ls command, which lists its name, synopsis, description, and various options. The terminal interface includes a dock on the left with icons for the desktop environment and a status bar at the bottom.

```
Activities Terminal Jun 14 21:15
user@user-VirtualBox: ~ User Commands LS(1)

NAME
    ls - list directory contents

SYNOPSIS
    ls [OPTION]... [FILE]...

DESCRIPTION
    List information about the FILEs (the current directory by default).
    Sort entries alphabetically if none of -cftuvSUX nor --sort is specified.

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

    -a, --all
        do not ignore entries starting with .

    -A, --almost-all
        do not list implied . and ..

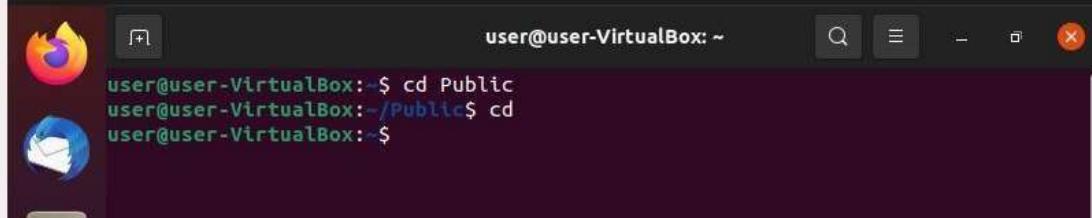
    --author
        with -l, print the author of each file

    -b, --escape
        print C-style escapes for nongraphic characters

Manual page ls(1) line 1 (press h for help or q to quit)
```

4. cd

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



The screenshot shows a terminal window with the command "cd Public" entered and executed. The user is navigating from their home directory to the "Public" directory. The terminal interface includes a dock on the left with icons for the desktop environment and a status bar at the bottom.

```
user@user-VirtualBox:~$ cd Public
user@user-VirtualBox:~/Public$ cd
user@user-VirtualBox:~$
```

5. ls

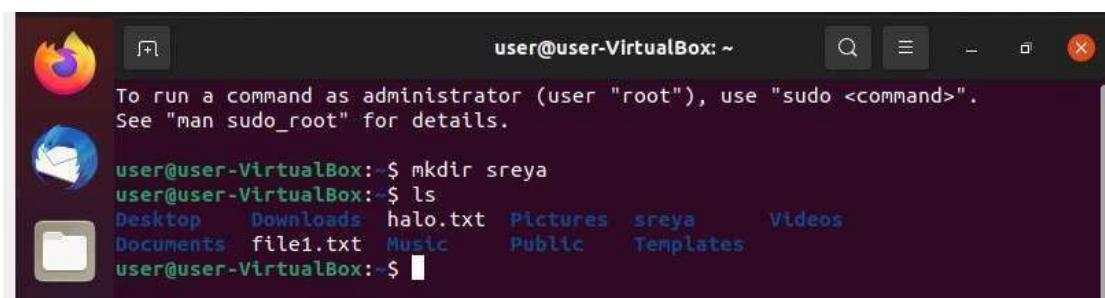
The ls command is used to view the contents of a directory. By default, this command will display the contents of your current working directory.



```
user@user-VirtualBox:~/Public$ cd
user@user-VirtualBox:~$ ls
Desktop Documents Downloads Music Pictures Public Templates Videos
user@user-VirtualBox:~$ ls -R
.:
Desktop Documents Downloads Music Pictures Public Templates Videos
./Desktop:
./Documents:
./Downloads:
./Music:
./Pictures:
./Public:
```

6. mkdir

Use mkdir command to make a new directory .

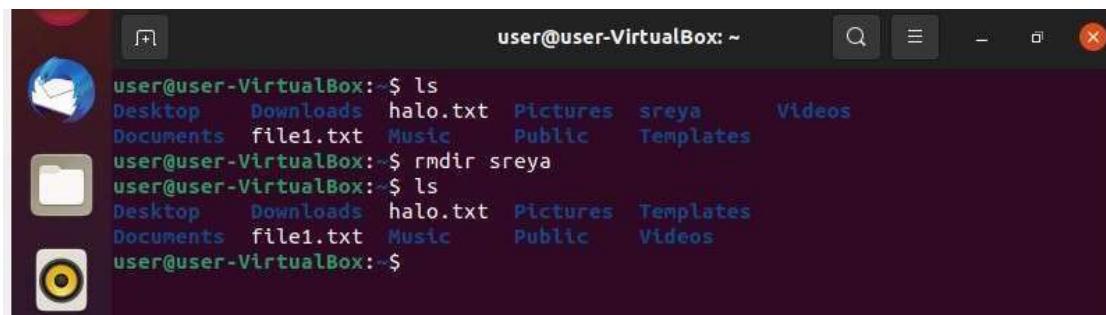


```
To run a command as administrator (user "root"), use "sudo <command>".
See "man sudo_root" for details.

user@user-VirtualBox:~$ mkdir sreya
user@user-VirtualBox:~$ ls
Desktop Downloads halo.txt Pictures sreya Videos
Documents file1.txt Music Public Templates
user@user-VirtualBox:~$
```

7. rmdir

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

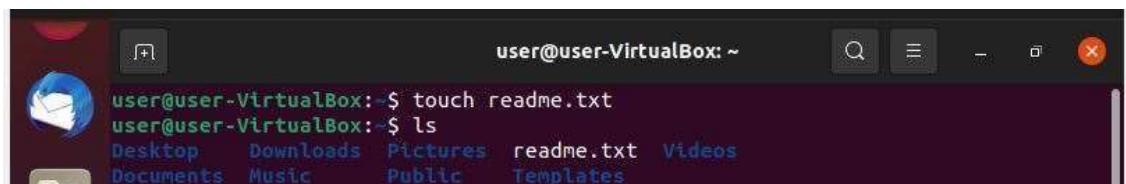


A screenshot of a Linux terminal window titled "user@user-VirtualBox: ~". The terminal shows the following session:

```
user@user-VirtualBox:~$ ls
Desktop  Downloads  halo.txt  Pictures  sreya      Videos
Documents  file1.txt  Music    Public    Templates
user@user-VirtualBox:~$ rmdir sreya
user@user-VirtualBox:~$ ls
Desktop  Downloads  halo.txt  Pictures  Templates
Documents  file1.txt  Music    Public    Videos
user@user-VirtualBox:~$
```

8. touch

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

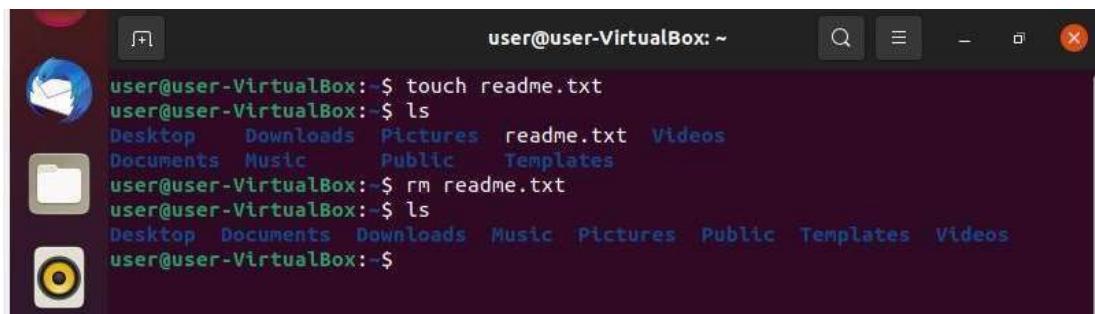


A screenshot of a Linux terminal window titled "user@user-VirtualBox: ~". The terminal shows the following session:

```
user@user-VirtualBox:~$ touch readme.txt
user@user-VirtualBox:~$ ls
Desktop  Downloads  Pictures  readme.txt  Videos
Documents  Music    Public    Templates
```

9. rm

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



A screenshot of a Linux terminal window titled "user@user-VirtualBox: ~". The terminal shows the following session:

```
user@user-VirtualBox:~$ touch readme.txt
user@user-VirtualBox:~$ ls
Desktop  Downloads  Pictures  readme.txt  Videos
Documents  Music    Public    Templates
user@user-VirtualBox:~$ rm readme.txt
user@user-VirtualBox:~$ ls
Desktop  Documents  Downloads  Music    Pictures  Public  Templates  Videos
user@user-VirtualBox:~$
```

10. cat

cat (short for concatenate) is one of the most frequently used commands in Linux. It is used to list the contents of a file on the standard output stdout .

To run this command, type cat followed by the file's name and its extension. For instance: cat file.txt.



The screenshot shows a terminal window titled "user@user-VirtualBox: ~". The user runs the command "cat > file1.txt" and types "hiii" followed by a carriage return. The user then runs "cat file1.txt" and sees the output "hiii" again. Finally, the user runs "cat file1.txt | tr a-z A-Z" and sees the output "HIII".

```
user@user-VirtualBox:~$ cat > file1.txt
hiii
how are you
^Z
[1]+  Stopped                  cat > file1.txt
user@user-VirtualBox:~$ cat file1.txt
hiii
how are you
user@user-VirtualBox:~$ cat file1.txt | tr a-z A-Z
HIII
HOW ARE YOU
user@user-VirtualBox:~$
```

ECHO

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

If you want to add the text, “Hello, my name is John” into a file called name.txt, you would type echo Hello, my name is John >> name.txt



The screenshot shows a terminal window titled "user@user-VirtualBox: ~". The user runs "echo my name is sreya>>name.txt" and then "ls" to list the files in the directory. The output shows "Desktop", "Downloads", "Music", "Pictures", "sample.txt", "Videos", "Documents", "halo.txt", "name.txt", "Public", and "Templates".

```
user@user-VirtualBox:~$ echo my name is sreya>>name.txt
user@user-VirtualBox:~$ ls
Desktop  Downloads  Music    Pictures  sample.txt  Videos
Documents  halo.txt  name.txt  Public    Templates
user@user-VirtualBox:~$
```

HEAD

The head command is used to view the first lines of any text file.

By default, it will show the first ten lines, but you can change this

number to your liking.

If you only want to show the first five lines, type head -n 5 filename.txt

```
user@user-VirtualBox: $ head -n 5 name.txt
my name is sreya
my name is sreya
user@user-VirtualBox: $
```

TAIL

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

tail -n filename.txt

```
user@user-VirtualBox: $ tail -n 1 name.txt
my name is sreya
user@user-VirtualBox: $
```

READ

read the contents of a line into a variable.

The read command can be used with and without arguments

read command is used to read [options] [name...]

\$read

\$read var1 var2 var3

\$echo "[var1] [var2] [var3]"

```
user@user-VirtualBox: $ read name
sreya
user@user-VirtualBox: $ read name1
M
user@user-VirtualBox: $ echo $name $name1
sreya M
user@user-VirtualBox: $
```

MORE

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

Enter key: To scroll down page line by

line.Space bar: To go to next page.

b key: To go to the backward page.

/ key: Lets you search the string.

Syntax: more

more /etc/passwd

```
user@user-VirtualBox:~$ more /etc/passwd
root:x:0:0:root:/root:/bin/bash
daemon:x:1:1:daemon:/usr/sbin:/usr/sbin/nologin
bin:x:2:2:bin:/bin:/usr/sbin/nologin
sys:x:3:3:sys:/dev:/usr/sbin/nologin
sync:x:4:65534:sync:/bin:/sync
games:x:5:60:games:/usr/games:/usr/sbin/nologin
man:x:6:12:man:/var/cache/man:/usr/sbin/nologin
lp:x:7:7:lp:/var/spool/lpd:/usr/sbin/nologin
mail:x:8:8:mail:/var/mail:/usr/sbin/nologin
news:x:9:9:news:/var/spool/news:/usr/sbin/nologin
uucp:x:10:10:uucp:/var/spool/uucp:/usr/sbin/nologin
proxy:x:13:13:proxy:/bin:/usr/sbin/nologin
www-data:x:33:33:www-data:/var/www:/usr/sbin/nologin
backup:x:34:34:backup:/var/backups:/usr/sbin/nologin
list:x:38:38:Mailing List Manager:/var/list:/usr/sbin/nologin
irc:x:39:39:ircd:/run/ircd:/usr/sbin/nologin
gnats:x:41:41:Gnats Bug-Reporting System (admin):/var/lib/gnats:/usr/sbin/nologin
nobody:x:65534:65534:nobody:/nonexistent:/usr/sbin/nologin
systemd-network:x:100:102:systemd Network Management,,,,:/run/systemd:/usr/sbin/nologin
systemd-resolve:x:101:103:systemd Resolver,,,,:/run/systemd:/usr/sbin/nologin
systemd-timesync:x:102:104:systemd Time Synchronization,,,,:/run/systemd:/usr/sbin/nologin
messagebus:x:103:106::/nonexistent:/usr/sbin/nologin
syslog:x:104:110::/home/syslog:/usr/sbin/nologin
```

LESS

The 'less' command is same as 'more' command but include some more features.

It automatically adjust with the width and height of the terminal window, while 'more' command cuts the content as the width of the

terminal window get shorter.

less

```
$less /etc/passwd
```

```
root:x:0:0:root:/root:/bin/bash
daemon:x:1:1:daemon:/usr/sbin:/usr/sbin/nologin
bin:x:2:2:bin:/bin:/usr/sbin/nologin
sys:x:3:3:sys:/dev:/usr/sbin/nologin
sync:x:4:65534:sync:/bin:/sync
games:x:5:60:games:/usr/games:/usr/sbin/nologin
man:x:6:12:man:/var/cache/man:/usr/sbin/nologin
lp:x:7:7:lp:/var/spool/lpd:/usr/sbin/nologin
mail:x:8:8:mail:/var/mail:/usr/sbin/nologin
news:x:9:9:news:/var/spool/news:/usr/sbin/nologin
uucp:x:10:10:uucp:/var/spool/uucp:/usr/sbin/nologin
proxy:x:13:13:proxy:/bin:/usr/sbin/nologin
www-data:x:33:33:www-data:/var/www:/usr/sbin/nologin
backup:x:34:34:backup:/var/backups:/usr/sbin/nologin
list:x:38:38:Mailing List Manager:/var/list:/usr/sbin/nologin
irc:x:39:39:ircd:/run/ircd:/usr/sbin/nologin
gnats:x:41:41:Gnats Bug-Reporting System (admin):/var/lib/gnats:/usr/sbin/nologin
nobody:x:65534:65534:nobody:/nonexistent:/usr/sbin/nologin
systemd-network:x:100:102:systemd Network Management,,,:/run/systemd:/usr/sbin/nologin
systemd-resolve:x:101:103:systemd Resolver,,,:/run/systemd:/usr/sbin/nologin
systemd-timesync:x:102:104:systemd Time Synchronization,,,:/run/systemd:/usr/sbin/nologin
messagebus:x:103:106::/nonexistent:/usr/sbin/nologin
syslog:x:104:110::/home/syslog:/usr/sbin/nologin
_apt:x:105:65534::/nonexistent:/usr/sbin/nologin
tss:x:106:111:TPM software stack,,,:/var/lib/tpm:/bin/false
:
```

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

`cut OPTION... [FILE]...`

`$cut -b 1,2,3 state.txt`

```
user@user-VirtualBox: $ cut -b 1,2,3 name.txt
my
my
user@user-VirtualBox: $
```

PASTE

It is used to join files horizontally (parallel merging) by outputting lines consisting of lines from each file specified, separated by tab as delimiter, to the standard output.

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

```
$ paste state.txt capital.txt
```

```
user@user-VirtualBox:~$ paste name.txt new.txt
my name is sreya
my name is sreya
user@user-VirtualBox:~$
```

UNAME

The uname command, short for Unix Name, will print detailed information about your Linux system like the machine name, operating system, kernel, and so on.

```
$uname
```

```
$uname -r
```

```
user@user-VirtualBox:~$ uname
Linux
user@user-VirtualBox:~$ uname -r
5.11.0-18-generic
user@user-VirtualBox:~$
```

CP

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

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

cp -p will preserve source files' mode, ownership and timestamp.

cp -r will copy directories recursively.

cp -u copies files only if the destination file is not existing or the source file is newer than the destination file.

```
user@user-VirtualBox: $ cp name.txt Pictures
user@user-VirtualBox: $ ls
Desktop  Downloads  halo.txt  name.txt  Pictures  sample.txt  Videos
Documents  files      Music    new.txt   Public    Templates
user@user-VirtualBox: $ cd Pictures
user@user-VirtualBox:~/Pictures$ ls
name.txt
user@user-VirtualBox:~/Pictures$
```

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.

```
user@user-VirtualBox:~$ ls
Desktop  Downloads  halo.txt  Pictures  Templates
Documents  file.txt  Music    Public    Videos
user@user-VirtualBox:~$ mv file.txt Public
user@user-VirtualBox:~$ cd Public
user@user-VirtualBox:~/Public$ ls
adarsh  file.txt  Music
user@user-VirtualBox:~/Public$
```

LOCATE

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

```
user@user-VirtualBox:~$ locate file.txt
Command 'locate' not found, but can be installed with:
sudo apt install mlocate # version 0.26-5ubuntu1, or
sudo apt install plocate # version 1.1.7-1
user@user-VirtualBox:~$
```

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.

```
user@user-VirtualBox:~$ find halo.txt
halo.txt
user@user-VirtualBox:~$
```

GREP

Another basic Linux command that is undoubtedly helpful for everyday use is grep. It lets you search through all the text in a given file.

To illustrate, grep blue notepad.txt will search for the word blue in the notepad file. Lines that contain the searched word will be displayed fully usually output of a previous command is piped into the grep command. For example ls -l | grep "kernel".

```
user@user-VirtualBox:~$ ls
Desktop  Downloads  Music  Public  Templates
Documents  halo.txt  Pictures  sample.txt  Videos
user@user-VirtualBox:~$ cat sample.txt
Halo how are you
user@user-VirtualBox:~$ grep Halo sample.txt
Halo how are you
user@user-VirtualBox:~$
```

DF

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

```
user@user-VirtualBox:~$ df
Filesystem      1K-blocks    Used Available Use% Mounted on
tmpfs            402160     1344    400816   1% /run
/dev/sda3        20038480  8114952   10882584  43% /
tmpfs            2010796      0    2010796   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            402156     116    402040   1% /run/user/1000
user@user-VirtualBox:~$
```

DS

If you want to check how much space a file or a directory takes, the du (Disk Usage) command is the answer. However, the disk usage summary will show disk block numbers instead of the usual size format.

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

\$du -h

```
user@user-VirtualBox: $ du -h
4.0K    ./Public/adarsh
16K     ./Public
4.0K     ./Downloads
4.0K     ./ssh
8.0K     ./config/dconf
4.0K     ./config/nautilus
84K      ./config/pulse
8.0K     ./config/gtk-3.0
4.0K     ./config/enchant
16K     ./config/evolution/sources
20K     ./config/evolution
4.0K     ./config/update-notifier
16K     ./config/ibus/bus
20K     ./config/ibus
4.0K     ./config/gnome-session/saved-session
8.0K     ./config/gnome-session
8.0K     ./config/gedit
4.0K     ./config/goa-1.0
188K    ./config
4.0K     ./Templates
4.0K     ./Music
4.0K     ./Desktop
4.0K     ./local/share/ibus-table
4.0K     ./local/share/nautilus/scripts
8.0K     ./local/share/nautilus
8.0K     ./local/share/gnome-shell
4.0K    / local/share/flatpak/db
```

USERADD

This is available only to system admins. Since Linux is a multi-user system, this means more than one person can interact with the same system at the same time.

useradd is used to create a new user, while passwd is adding a password to that user's

account To add a new person named John type, useradd John and then to add his password type, passwd 123456789

```
user@user-VirtualBox: $ sudo useradd sreya
[sudo] password for user:
Sorry, try again.
[sudo] password for user:
user@user-VirtualBox:~$ sudo useradd sreya
useradd: user 'sreya' already exists
user@user-VirtualBox:~$
```

USERDEL

Remove a user is very similar to adding a new user To delete the users

account type,

userdel UserName

```
user@user-VirtualBox:~$ sudo userdel sreya
user@user-VirtualBox:~$ sudo userdel sreya
userdel: user 'sreya' does not exist
user@user-VirtualBox:~$
```

SUDO

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

`sudo useradd maria`

```
user@user-VirtualBox:~$ sudo useradd sreya
[sudo] password for user:
Sorry, try again.
[sudo] password for user:
user@user-VirtualBox:~$ sudo useradd sreya
useradd: user 'sreya' already exists
user@user-VirtualBox:~$
```

PASSWD

Changes passwords for user accounts

A normal user may only change the password for their own account, while the superuser may change the password for any account.

`passwd[option] [username]`

`passwd`

`passwd user1`

```
user@user-VirtualBox:~$ sudo passwd sreya
New password:
BAD PASSWORD: The password fails the dictionary check - it is too simplistic/stupid
Retype new password:
passwd: password updated successfully
user@user-VirtualBox:~$
```

1. usermod

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

The screenshot shows a terminal window titled "Ubuntu [Running] - Oracle VM VirtualBox". The terminal session starts with:

```
sreya@sreya-VirtualBox:~$ sudo useradd sre
[sudo] password for sreya:
```

Then it runs the id command:

```
sreya@sreya-VirtualBox:~$ id sre
uid=1001(sre) gid=1002(sre) groups=1002(sre)
```

Next, it runs the id command for the user sreya:

```
sreya@sreya-VirtualBox:~$ id sreya
uid=1000(sreya) gid=1000(sreya) groups=1000(sreya),4(adm),24(cdrom),27(sudo),30(dip),46(plugdev),121(lpadmin),132(lxd),133(sambashare)
```

Finally, it runs the usermod --help command:

```
sreya@sreya-VirtualBox:~$ usermod --help
Usage: usermod [options] LOGIN

Options:
  -b, --badnames          allow bad names
  -c, --comment COMMENT   new value of the GECOS field
  -d, --home HOME_DIR     new home directory for the user account
  -e, --expiredate EXPIRE_DATE
  -f, --inactive INACTIVE
  -g, --gid GROUP         force use GROUP as new primary group
  -G, --groups GROUPS    new list of supplementary GROUPS
  -a, --append             append the user to the supplemental GROUPS
                           mentioned by the -G option without removing
                           the user from other groups
  -h, --help               display this help message and exit
  -l, --login NEW_LOGIN   new value of the login name
  -L, --lock                lock the user account
  -m, --move-home          move contents of the home directory to the
                           new location (use only with -d)
  -o, --non-unique          allow using duplicate (non-unique) UID
  -p, --password PASSWORD  use encrypted password for the new password
```

At the bottom, it shows the result of modifying the user sre to have a UID of 2000:

```
sreya@sreya-VirtualBox:~$ sudo usermod -u 2000 sre
sreya@sreya-VirtualBox:~$ id sre
uid=2000(sre) gid=1002(sre) groups=1002(sre)
```

2. groupadd

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

```
sreya@sreya-VirtualBox:~$ sudo groupadd mca
```

3.groups

- print the groups a user is in
- #groups alice

```
sre : sre
sreya@sreya-VirtualBox:~$ sudo usermod -G mca sre
sreya@sreya-VirtualBox:~$ groups sre
sre : sre mca
```

4.groupdel

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

```
sreya@sreya-VirtualBox:~$ sudo groupadd student
[sudo] password for sreya:
sreya@sreya-VirtualBox:~$ groups sreya
sreya : sreya adm cdrom sudo dip plugdev lpadmin lxd sambashare
sreya@sreya-VirtualBox:~$ sudo groupdel student
sreya@sreya-VirtualBox:~$
```

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

```
See 'snap info <snapname>' for additional versions.
sreya@sreya-VirtualBox:~$ sudo groupmod -n student2 student1
sreya@sreya-VirtualBox:~$
```

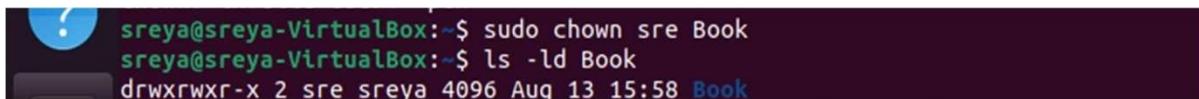
6.chmod

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

```
? sreya@sreya-VirtualBox:~$ chmod +rwx Book
sreya@sreya-VirtualBox:~$ ls -ld Book
drwxrwxr-x 2 sreya sreya 4096 Aug 13 15:58 Book
```

7.chown

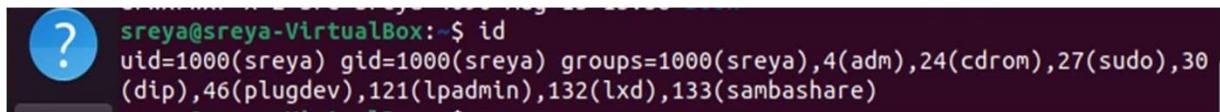
- The chown command allows you to change the user and/or group ownership of a given file, directory.
- #chown Tom Test



```
sreya@sreya-VirtualBox:~$ sudo chown sre Book
sreya@sreya-VirtualBox:~$ ls -ld Book
drwxrwxr-x 2 sre sreya 4096 Aug 13 15:58 Book
```

8.id

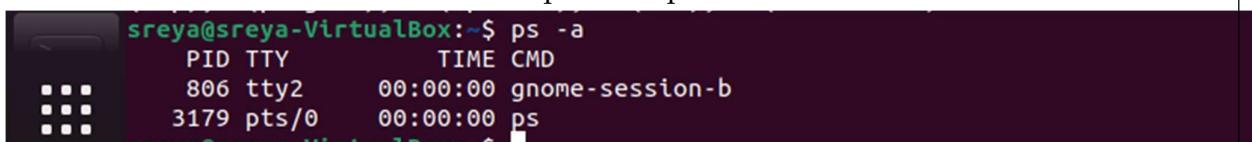
- id command in Linux is used to find out user and group names and numeric ID's (UID or group ID) of the current user. •
- #id



```
sreya@sreya-VirtualBox:~$ id
uid=1000(sreya) gid=1000(sreya) groups=1000(sreya),4(adm),24(cdrom),27(sudo),30(dip),46(plugdev),121(lpadmin),132(lxd),133(sambashare)
```

9. ps

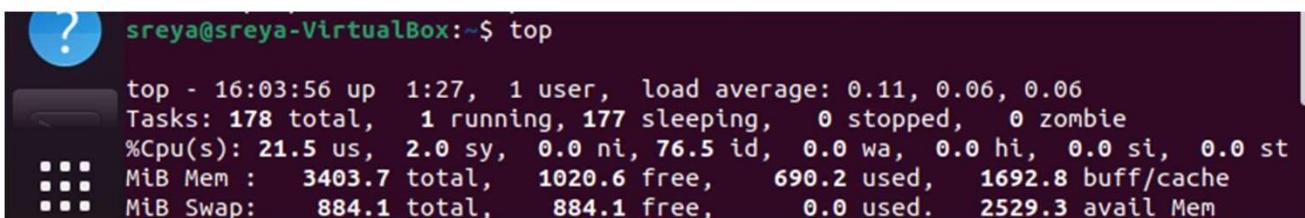
- The ps command, short for Process Status, is a command line utility that is used to display or view information related to the processes running in a Linux system.
- PID – This is the unique process ID
- TTY – This is the type of terminal that the user is logged in to
- TIME – This is the time in minutes and seconds that the process has been running
- CMD – The command that launched the process #ps -a 5



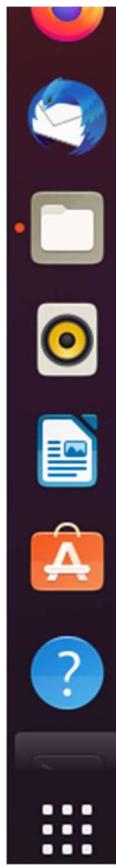
```
sreya@sreya-VirtualBox:~$ ps -a
  PID TTY      TIME CMD
 806 tty2    00:00:00 gnome-session-b
 3179 pts/0    00:00:00 ps
```

10. Top

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



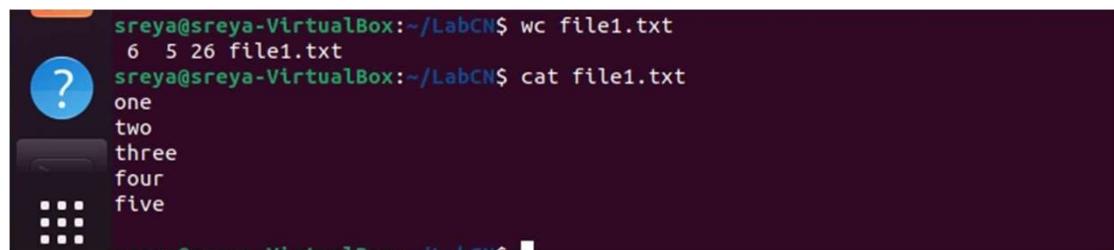
```
sreya@sreya-VirtualBox:~$ top
top - 16:03:56 up 1:27, 1 user, load average: 0.11, 0.06, 0.06
Tasks: 178 total, 1 running, 177 sleeping, 0 stopped, 0 zombie
%Cpu(s): 21.5 us, 2.0 sy, 0.0 ni, 76.5 id, 0.0 wa, 0.0 hi, 0.0 si, 0.0 st
MiB Mem : 3403.7 total, 1020.6 free, 690.2 used, 1692.8 buff/cache
MiB Swap: 884.1 total, 884.1 free, 0.0 used. 2529.3 avail Mem
```



PID	USER	PR	NI	VIRT	RES	SHR	S	%CPU	%MEM	TIME+	COMMAND
947	sreya	20	0	4030664	359028	126900	S	29.5	10.3	1:42.51	gnome+-
2895	sreya	20	0	411192	49596	37920	S	9.9	1.4	0:06.39	gnome+-
3209	sreya	20	0	21440	3860	3328	R	0.7	0.1	0:00.07	top
24	root	20	0	0	0	0	S	0.3	0.0	0:00.84	kcompa+
2887	root	20	0	0	0	0	I	0.3	0.0	0:01.31	kworke+
2991	root	20	0	0	0	0	I	0.3	0.0	0:00.06	kworke+
1	root	20	0	100280	12316	7872	S	0.0	0.4	0:07.59	systemd
2	root	20	0	0	0	0	S	0.0	0.0	0:00.00	kthrea+
3	root	0	-20	0	0	0	I	0.0	0.0	0:00.00	rcu_gp
4	root	0	-20	0	0	0	I	0.0	0.0	0:00.00	rcu_pa+
6	root	0	-20	0	0	0	I	0.0	0.0	0:00.00	kworke+
9	root	0	-20	0	0	0	I	0.0	0.0	0:00.00	mm_per+
10	root	20	0	0	0	0	S	0.0	0.0	0:00.00	rcu_ta+
11	root	20	0	0	0	0	S	0.0	0.0	0:00.00	rcu_ta+
12	root	20	0	0	0	0	S	0.0	0.0	0:01.19	ksofti+
13	root	20	0	0	0	0	I	0.0	0.0	0:01.02	rcu_sc+
14	root	rt	0	0	0	0	S	0.0	0.0	0:00.13	migrat+
15	root	-51	0	0	0	0	S	0.0	0.0	0:00.00	idle_i+
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	kdevtm+
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	inetd

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



```
sreya@sreya-VirtualBox:~/LabCN$ wc file1.txt
6 5 26 file1.txt
sreya@sreya-VirtualBox:~/LabCN$ cat file1.txt
one
two
three
four
five
```

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

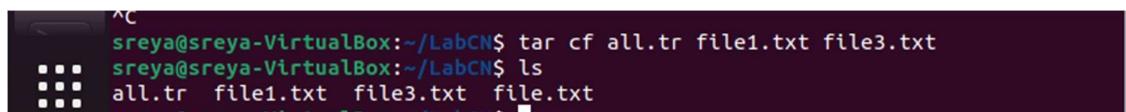
-z : zip, tells tar command that creates tar file using gzip

-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



```
sreya@sreya-VirtualBox:~/LabCN$ tar cf all.tr file1.txt file3.txt
sreya@sreya-VirtualBox:~/LabCN$ ls
all.tr file1.txt file3.txt file.txt
```

A screenshot of a terminal window titled '^C'. It shows a user named 'sreya' at a prompt 'sreya@sreya-VirtualBox:~/LabCN\$'. The user runs the command 'tar cf all.tr file1.txt file3.txt', which creates a tar archive named 'all.tr'. Then, the user runs 'ls' to list the contents of the current directory, which includes 'all.tr', 'file1.txt', 'file3.txt', and 'file.txt'. The terminal has a dark background with light-colored text.

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

```
sreya@sreya-VirtualBox:~/LabCN$ expr 10+2
10+2
sreya@sreya-VirtualBox:~/LabCN$ expr 10 + 2
12
```

4. Redirections & Piping

- A pipe is a form of redirection to send the output of one command / program / process to another command / program / process for further processing.
 - Pipe is used to combine two or more commands, the output of one command acts as input to another command, and this command's output may act as input to the next command and so on.
- #ls -l | wc -l #cat /etc/passwd.txt | head -7 | tail -5

```
sreya@sreya-VirtualBox:~/LabCN$ ls -l|wc -l
5
```

5. ssh

- ssh stands for "Secure Shell".
 - It is a protocol used to securely connect to a remote server / system.
 - ssh is secure in the sense that it transfers the data in encrypted form between the host and the client.
 - It transfers inputs from the client to the host and relays back the output. ssh runs at TCP / IP port 22.
- #ssh user_name@host(IP/Domain_name)#ssh
-X root@server1.example.com

```
sreya@sreya-VirtualBox:~/LabCN$ ssh --help
unknown option -- -
usage: ssh [-46AaCfGgKkMNnqsTtVvXxYy] [-B bind_interface]
           [-b bind_address] [-c cipher_spec] [-D [bind_address:]port]
           [-E log_file] [-e escape_char] [-F configfile] [-I pkcs11]
           [-i identity_file] [-J [user@]host[:port]] [-L address]
           [-l login_name] [-m mac_spec] [-O ctl_cmd] [-o option] [-p port]
           [-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

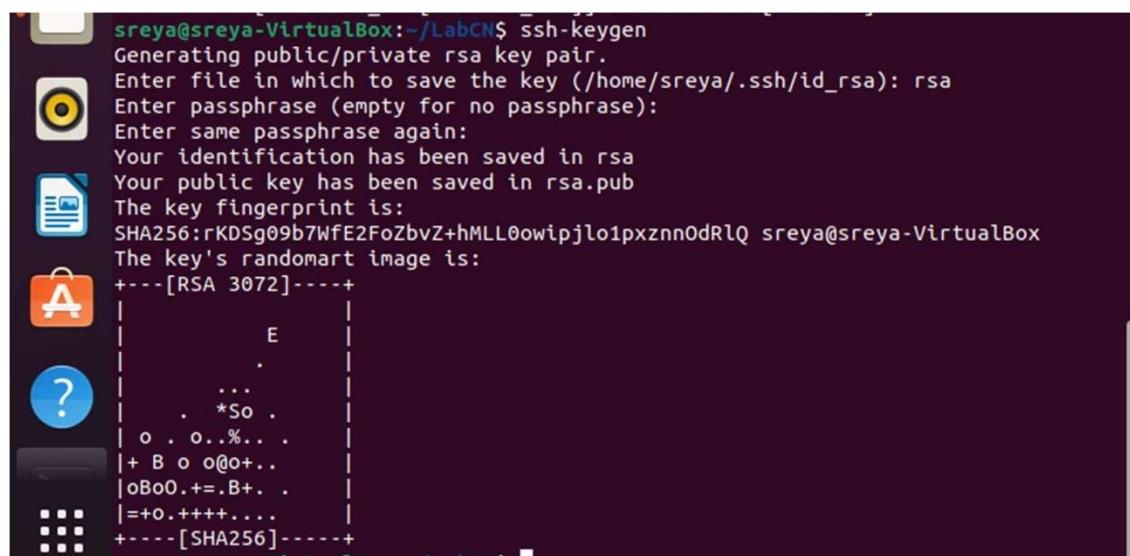
Syntax:

```
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
```

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
```



```
sreya@sreya-VirtualBox:~/LabCN$ ssh-keygen
Generating public/private rsa key pair.
Enter file in which to save the key (/home/sreya/.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:rKDSg09b7WfE2FoZbvZ+hMLL0owipjlo1pxznn0dRlQ sreya@sreya-VirtualBox
The key's randomart image is:
+---[RSA 3072]---+
|           E
|           .
|   . *So .
|   o . o..%...
| + B o o@o+..
| oBoO.+-.B+.. .
| =+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
```

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

```
sreya@sreya-VirtualBox:~$ touch song1.mp3 song2.mp3 song3.mp3 song4.mp3 song4.m  
p3 song5.mp3 song6.mp3
```

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

```
sreya@sreya-VirtualBox:~$ touch snap1.jpg snap2.jpg snap3.jpg snap4.jpg snap5.j  
pg snap6.jpg
```

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

```
sreya@sreya-VirtualBox:~$ touch film1.mp4 film2.mp4 film3.mp4 film4.mp4 film5.m  
p4 film6.mp4
```

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

```
sreya@sreya-VirtualBox:~$ mv *.mp3 ./Music/  
sreya@sreya-VirtualBox:~$ mv *.jpg ./Pictures/  
sreya@sreya-VirtualBox:~$ mv *.mp4 ./Videos/  
sreya@sreya-VirtualBox:~$
```

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

```
sreya@sreya-VirtualBox:~$ mkdir -p {friends,family,work}
```

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

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

```
sreya@sreya-VirtualBox:~$ cp /home/sreya/Pictures/ snap1.jpg snap2.jpg snap3.  
jpg snap4.jpg snap.jpg snap.jpg /home/sreya/family/
```

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

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

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

```
sreya@sreya-VirtualBox:~$ rm -r friends family
```

7. Redirect a long listing of all home directory files, including hidden, into a

filenamed allfiles.txt. Confirm that the file contains the listing.

```
? sreya@sreya-VirtualBox:~$ ls -a > allfiles.txt
```

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

```
sreya@sreya-VirtualBox:~$ date  
Tuesday 17 August 2021 09:34:14 PM IST
```

9. Add the user Juliet

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

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

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

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

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

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

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

13. Create a supplementary group called artists.

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

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

```
sreya@sreya-VirtualBox:~$ less /etc/group
```

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

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

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

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

17. Add Romeo and Hamlet to the Shakespeare group.

```
sreya@sreya-VirtualBox:~$ sudo useradd Romeo  
sreya@sreya-VirtualBox:~$ sudo useradd Hamlet  
sreya@sreya-VirtualBox:~$ sudo usermod -G Shakespeare Romeo  
sreya@sreya-VirtualBox:~$ sudo usermod -G Shakespeare Hamlet
```

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

```
sreya@sreya-VirtualBox:~$ sudo useradd Reba
sreya@sreya-VirtualBox:~$ sudo useradd Dolly
sreya@sreya-VirtualBox:~$ sudo useradd Elvis
sreya@sreya-VirtualBox:~$ sudo usermod -G artist R
Reba  Romeo
sreya@sreya-VirtualBox:~$ sudo usermod -G artist Reba
sreya@sreya-VirtualBox:~$ sudo usermod -G artist Dolly
sreya@sreya-VirtualBox:~$ sudo usermod -G artist Elvis
```

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

```
? Juliet:x:2001:
? Shakespeare:x:30000:Juliet,Romeo,Hamlet
? artist:x:30001:Reba,Dolly,Elvis
? Romeo:x:2002:
? Hamlet:x:2003:
? Reba:x:2004:
? Dolly:x:2005:
? Elvis:x:2006:
```

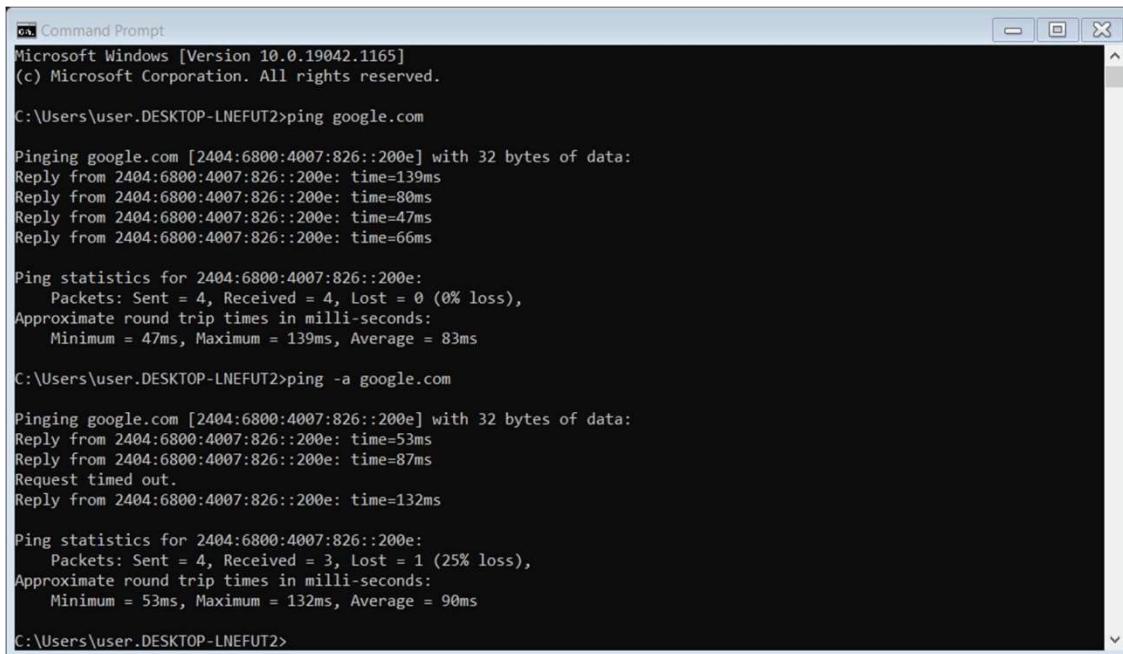
20. Attempt to remove user Dolly.

```
sreya@sreya-VirtualBox:~$ sudo userdel Dolly
```

1. Try out these network commands in Window as well as in Linux and perform at least 4 options with each command:

1. ping: Ping is an old Unix tool that has been around for a long time but many PC users are unfamiliar with the Windows version. Ping sends out a packet to a designated internet host or network computer and measures its response time.

Windows



```
Administrator: Command Prompt
Microsoft Windows [Version 10.0.19042.1165]
(c) Microsoft Corporation. All rights reserved.

C:\Users\user\Desktop-LNEFUT2>ping google.com

Pinging google.com [2404:6800:4007:826::200e] with 32 bytes of data:
Reply from 2404:6800:4007:826::200e: time=139ms
Reply from 2404:6800:4007:826::200e: time=80ms
Reply from 2404:6800:4007:826::200e: time=47ms
Reply from 2404:6800:4007:826::200e: time=66ms

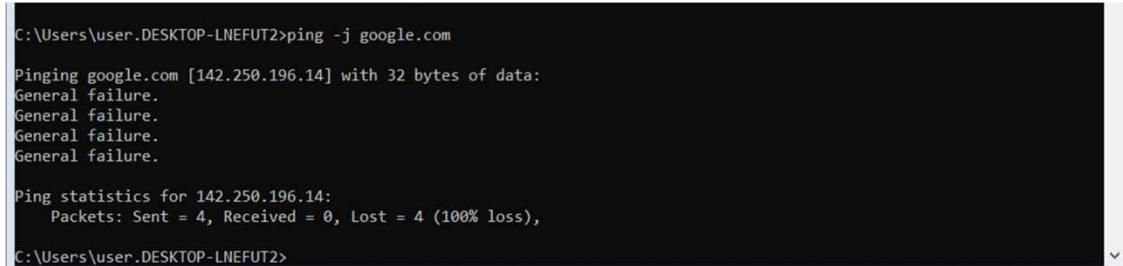
Ping statistics for 2404:6800:4007:826::200e:
    Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
Approximate round trip times in milli-seconds:
    Minimum = 47ms, Maximum = 139ms, Average = 83ms

C:\Users\user\Desktop-LNEFUT2>ping -a google.com

Pinging google.com [2404:6800:4007:826::200e] with 32 bytes of data:
Reply from 2404:6800:4007:826::200e: time=53ms
Reply from 2404:6800:4007:826::200e: time=87ms
Request timed out.
Reply from 2404:6800:4007:826::200e: time=132ms

Ping statistics for 2404:6800:4007:826::200e:
    Packets: Sent = 4, Received = 3, Lost = 1 (25% loss),
Approximate round trip times in milli-seconds:
    Minimum = 53ms, Maximum = 132ms, Average = 90ms

C:\Users\user\Desktop-LNEFUT2>
```



```
C:\Users\user\Desktop-LNEFUT2>ping -j google.com

Pinging google.com [142.250.196.14] with 32 bytes of data:
General failure.
General failure.
General failure.
General failure.

Ping statistics for 142.250.196.14:
    Packets: Sent = 4, Received = 0, Lost = 4 (100% loss),

C:\Users\user\Desktop-LNEFUT2>
```

Linux

```
user@user-VirtualBox: $ ping google.com
PING google.com (142.250.195.110) 56(84) bytes of data.
64 bytes from maa03s39-in-f14.1e100.net (142.250.195.110): icmp_seq=1 ttl=115 time=27.2 ms
64 bytes from maa03s39-in-f14.1e100.net (142.250.195.110): icmp_seq=2 ttl=115 time=22.6 ms
64 bytes from maa03s39-in-f14.1e100.net (142.250.195.110): icmp_seq=3 ttl=115 time=21.9 ms
64 bytes from maa03s39-in-f14.1e100.net (142.250.195.110): icmp_seq=4 ttl=115 time=23.6 ms
64 bytes from maa03s39-in-f14.1e100.net (142.250.195.110): icmp_seq=5 ttl=115 time=23.3 ms
64 bytes from maa03s39-in-f14.1e100.net (142.250.195.110): icmp_seq=6 ttl=115 time=27.0 ms
```

```
user@user-VirtualBox: $ ping -a google.com
PING google.com (142.250.195.110) 56(84) bytes of data.
64 bytes from maa03s39-in-f14.1e100.net (142.250.195.110): icmp_seq=1 ttl=115 time=24.0 ms
64 bytes from maa03s39-in-f14.1e100.net (142.250.195.110): icmp_seq=2 ttl=115 time=25.2 ms
64 bytes from maa03s39-in-f14.1e100.net (142.250.195.110): icmp_seq=3 ttl=115 time=25.0 ms
64 bytes from maa03s39-in-f14.1e100.net (142.250.195.110): icmp_seq=4 ttl=115 time=22.1 ms
64 bytes from maa03s39-in-f14.1e100.net (142.250.195.110): icmp_seq=5 ttl=115 time=23.8 ms
64 bytes from maa03s39-in-f14.1e100.net (142.250.195.110): icmp_seq=6 ttl=115 time=22.8 ms
64 bytes from maa03s39-in-f14.1e100.net (142.250.195.110): icmp_seq=7 ttl=115 time=21.9 ms
```

```
user@user-VirtualBox: $ ping -b google.com
PING google.com (142.250.195.110) 56(84) bytes of data.
64 bytes from maa03s39-in-f14.1e100.net (142.250.195.110): icmp_seq=1 ttl=115 time=22.2 ms
64 bytes from maa03s39-in-f14.1e100.net (142.250.195.110): icmp_seq=2 ttl=115 time=21.6 ms
64 bytes from maa03s39-in-f14.1e100.net (142.250.195.110): icmp_seq=3 ttl=115 time=22.3 ms
64 bytes from maa03s39-in-f14.1e100.net (142.250.195.110): icmp_seq=4 ttl=115 time=22.0 ms
64 bytes from maa03s39-in-f14.1e100.net (142.250.195.110): icmp_seq=5 ttl=115 time=24.6 ms
```

```

user@user-VirtualBox: $ ping -v google.com
PING google.com (142.250.195.110) 56(84) bytes of data.
64 bytes from maa03s39-in-f14.1e100.net (142.250.195.110): icmp_seq=1 ttl=115 time=22.2 ms
64 bytes from maa03s39-in-f14.1e100.net (142.250.195.110): icmp_seq=2 ttl=115 time=22.4 ms
64 bytes from maa03s39-in-f14.1e100.net (142.250.195.110): icmp_seq=3 ttl=115 time=21.4 ms
64 bytes from maa03s39-in-f14.1e100.net (142.250.195.110): icmp_seq=4 ttl=115 time=23.1 ms
64 bytes from maa03s39-in-f14.1e100.net (142.250.195.110): icmp_seq=5 ttl=115 time=22.3 ms
64 bytes from maa03s39-in-f14.1e100.net (142.250.195.110): icmp_seq=6 ttl=115 time=22.0 ms

```

2. Route

In computing, route is a command used to view and manipulate the IP routing table in Unix-like and Microsoft Windows[1] operating systems and also in IBM OS/2 and ReactOS.[2] Manual manipulation of the routing table is characteristic of static routing.

Windows

```

C:\Users\user\Desktop-LNEFUT2>route print
=====
Interface List
0...04 0e 3c f0 0a e7 ....Realtek PCIe GbE Family Controller
2...0a 00 27 00 00 02 ....VirtualBox Host-Only Ethernet Adapter
5...c2 e4 34 14 fe 21 ....Microsoft Wi-Fi Direct Virtual Adapter
8...c0 e4 34 14 fe 21 ....Microsoft Wi-Fi Direct Virtual Adapter #2
16...c0 e4 34 14 fe 21 ....Realtek RTL8723DE 802.11b/g/n PCIe Adapter
13...c0 e4 34 14 fe 20 ....Bluetooth Device (Personal Area Network)
1..... ....Software Loopback Interface 1
=====

IPv4 Route Table
=====
Active Routes:
Network Destination      Netmask        Gateway        Interface Metric
          0.0.0.0          0.0.0.0    172.20.10.1    172.20.10.3    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
        172.20.10.0      255.255.255.240  On-link        172.20.10.3    311
        172.20.10.3      255.255.255.255  On-link        172.20.10.3    311
       172.20.10.15     255.255.255.255  On-link        172.20.10.3    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        172.20.10.3    311
 255.255.255.255        255.255.255.255  On-link        127.0.0.1    331

```

```
ok Command Prompt
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    172.20.10.3   311
=====
Persistent Routes:
  None

IPv6 Route Table
=====
Active Routes:
If Metric Network Destination      Gateway
16   311 ::/0                      fe80::107c:a013:8651:17
1    331 ::1/128                   On-link
16   311 2401:4900:32f7:1c9::/64  On-link
16   311 2401:4900:32f7:1c9:4c48:477f:16a0:1971/128
                                         On-link
16   311 2401:4900:32f7:1c9:a97c:15a6:16dd:a341/128
                                         On-link
2    281 fe80::/64                 On-link
16   311 fe80::/64                 On-link
2    281 fe80::5c7:f216:be28:e9b3/128
                                         On-link
16   311 fe80::4c48:477f:16a0:1971/128
                                         On-link
1    331 ff00::/8                  On-link
2    281 ff00::/8                  On-link
16   311 ff00::/8                  On-link
=====
Persistent Routes:
  None
```

```
ok Command Prompt
None

C:\Users\user.DESKTOP-LNEFUT2>
C:\Users\user.DESKTOP-LNEFUT2>route print *153
=====
Interface List
9...04 0e 3c f0 0a e7 ....Realtek PCIe GbE Family Controller
2...0a 00 27 00 00 02 ....VirtualBox Host-Only Ethernet Adapter
5...c2 e4 34 14 fe 21 ....Microsoft Wi-Fi Direct Virtual Adapter
8...c0 e4 34 14 fe 21 ....Microsoft Wi-Fi Direct Virtual Adapter #2
16...c0 e4 34 14 fe 21 ....Realtek RTL8723DE 802.11b/g/n PCIe Adapter
13...c0 e4 34 14 fe 20 ....Bluetooth Device (Personal Area Network)
1.....Software Loopback Interface 1
=====

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

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

C:\Users\user.DESKTOP-LNEFUT2>
```

```

C:\> Command Prompt
Microsoft Windows [Version 10.0.19042.1165]
(c) Microsoft Corporation. All rights reserved.

C:\Users\user\Desktop\lnefut2>route print -4

Interface List
 9...04 0e 3c f0 0a e7 ....Realtek PCIe GbE Family Controller
 2...00 00 27 00 00 02 ....VirtualBox Host-Only Ethernet Adapter
 5...c2 ed 34 14 fe 21 ....Microsoft Wi-Fi Direct Virtual Adapter
 8...c0 ed 34 14 fe 21 ....Microsoft Wi-Fi Direct Virtual Adapter #2
 16...c0 ed 34 14 fe 21 ....Realtek RT8723DE 802.11b/g/n PCIe Adapter
 13...c0 ed 34 14 fe 20 ....Bluetooth Device (Personal Area Network)
 1.....Software Loopback Interface 1

IPV4 Route Table
 Active Routes:
Network Destination      Netmask          Gateway        Interface Metric
 0.0.0.0                 0.0.0.0         172.20.10.1   172.20.10.3     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
 172.20.10.0               255.255.255.255  On-link        172.20.10.3    311
 172.20.10.15              255.255.255.255  On-link        172.20.10.3    311
 192.168.56.0                255.255.255.255  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                 255.255.255.255  On-link        192.168.56.1   281
 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        172.20.10.3    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        172.20.10.3    311

Persistent Routes:
 None

C:\Users\user\Desktop\lnefut2>

```

```

C:\> Command Prompt
 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 172.20.10.3 311
 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 172.20.10.3 311

Persistent Routes:
 None

C:\Users\user\Desktop\lnefut2>route print -6

Interface List
 9...04 0e 3c f0 0a e7 ....Realtek PCIe GbE Family Controller
 2...00 00 27 00 00 02 ....VirtualBox Host-Only Ethernet Adapter
 5...c2 ed 34 14 fe 21 ....Microsoft Wi-Fi Direct Virtual Adapter
 8...c0 ed 34 14 fe 21 ....Microsoft Wi-Fi Direct Virtual Adapter #2
 16...c0 ed 34 14 fe 21 ....Realtek RT8723DE 802.11b/g/n PCIe Adapter
 13...c0 ed 34 14 fe 20 ....Bluetooth Device (Personal Area Network)
 1.....Software Loopback Interface 1

IPV6 Route Table
 Active Routes:
 11 Metric Network Destination      Gateway
 16 311 ::/0                         fe80::107c:a013:8651:17
 1  331 ::1/128                      On-link
 16 311 fe80::/64                     On-link
 16 311 2401:4900:32f7:1c9:4c48:47ff:16a0:1971/128
 16 311 2401:4900:32f7:1c9:4c48:47ff:16a0:1971/128
 16 311 fe80::/64                     On-link
 2  281 fe80::/64                     On-link
 16 311 fe80::/64                     On-link
 2  281 fe80::5c7:f216:be28:e9b3/128
 16 311 fe80::4c48:47ff:16a0:1971/128
 1  331 ff00::/8                      On-link
 2  281 ff00::/8                      On-link
 16 311 ff00::/8                      On-link

Persistent Routes:
 None

C:\Users\user\Desktop\lnefut2>

```

Linux

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

3. Traceroute

Tracert (traceroute) is another old tool borrowed from Unix. The actual path between two computers on the Internet is not a straight line but consists of numerous segments or "hops" from one intermediate computer to another. Tracert shows each step of the path taken. It can be interesting to see just how convoluted it is. The times for each hop and the IP addresses for each intermediate computer are displayed. Tracert shows up to 30 hops. It is convenient for finding if there is one particular segment that is causing a slow or bad connection. A typical command might be "tracert dell.com".

Windows

```
cmd Command Prompt
=====
Active Routes:
None
Persistent Routes:
None

C:\Users\user\Desktop-LNEFUT2>tracert 192.168.1.2

Tracing route to 192.168.1.2 over a maximum of 30 hops
1  3 ms    3 ms    3 ms  172.20.10.1
2  30 ms   16 ms   27 ms  117.96.121.161
3  140 ms   99 ms   99 ms  dsl-tn-dynamic-013.223.22.125.airtelbroadband.in [125.22.223.13]
4  *        *        *        Request timed out.
5  *        *        *        Request timed out.
6  *        *        *        Request timed out.
7  *        *        *        Request timed out.
8  *        *        *        Request timed out.
9  *        *        *        Request timed out.
10 *       *       *       Request timed out.
11 *       *       *       Request timed out.
12 *       *       *       Request timed out.
13 *       *       *       Request timed out.
14 *       *       *       Request timed out.
15 *       *       *       Request timed out.
16 *       *       *       Request timed out.
17 *       *       *       Request timed out.
18 *       *       *       Request timed out.
19 *       *       *       Request timed out.
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 *       *       *       Request timed out.
28 *       *       *       Request timed out.
29 *       *       *       Request timed out.
30 *       *       *       Request timed out.

Trace complete.

C:\Users\user\Desktop-LNEFUT2>
```

```
cmd Command Prompt
=====
Trace complete.

C:\Users\user\Desktop-LNEFUT2>tracert -d www.linkedin.com

Tracing route to 1-0005.l-msedge.net [2620:1ec:21::14]
over a maximum of 30 hops:

1  694 ms    3 ms    4 ms  2401:4900:32f7:1c9:1462:4612:489c:363e
2  *          *          *        Request timed out.
3  157 ms    99 ms   131 ms  2404:a800:3a00:207::19
4  94 ms     57 ms   88 ms  2404:a800::92
5  *          *          *        Request timed out.
6  733 ms    *          39 ms  2a01:111:2000:2:8000::10ae
7  113 ms    57 ms   96 ms  2603:1060:2:12::f1d6
8  123 ms    61 ms   72 ms  2603:1060:2:10::f20e
9  124 ms    92 ms   73 ms  2603:1060:2:12::f311
10 126 ms   44 ms   86 ms  2a01:111:2000:2:8000::c45
11 89 ms     96 ms   48 ms  2a01:111:224:119::72
12 *          *          *        Request timed out.
13 *          *          *        Request timed out.
14 *          *          *        Request timed out.
15 60 ms     95 ms   103 ms  2620:1ec:21::14

Trace complete.

C:\Users\user\Desktop-LNEFUT2>
```

```
Command Prompt
None

C:\Users\user\Desktop-LNEFUT2>tracert google.com

Tracing route to google.com [2404:6800:4007:826::200e]
over a maximum of 30 hops:

 1   12 ms    4 ms    3 ms  2401:4900:32f7:1c9:1462:4612:489c:363e
 2   *         *         * Request timed out.
 3   114 ms   99 ms   95 ms  2404:a800:3a00:207::15
 4   183 ms   53 ms   48 ms  2404:a800::92
 5   43 ms    36 ms   37 ms  2001:4860:1:1::160e
 6   53 ms    37 ms   86 ms  2404:6800:8131::1
 7   47 ms    70 ms   79 ms  2001:4860:0:1::55cc
 8   146 ms   152 ms  78 ms  2001:4860:0:1::55e5
 9   100 ms   72 ms   78 ms  maa03s41-in-x0e.1e100.net [2404:6800:4007:826::200e]

Trace complete.

C:\Users\user\Desktop-LNEFUT2>
```

```
Command Prompt
None

C:\Users\user\Desktop-LNEFUT2>tracert 192.168.1.1

Tracing route to 192.168.1.1 over a maximum of 30 hops

 1   35 ms    3 ms    5 ms  172.20.10.1
 2   95 ms    33 ms   73 ms  117.96.121.161
 3   56 ms    36 ms   76 ms  dsl-tn-dynamic-013.223.22.125.airtelbroadband.in [125.22.223.13]
 4  182.79.152.176 reports: Destination net unreachable.

Trace complete.

C:\Users\user\Desktop-LNEFUT2>
```

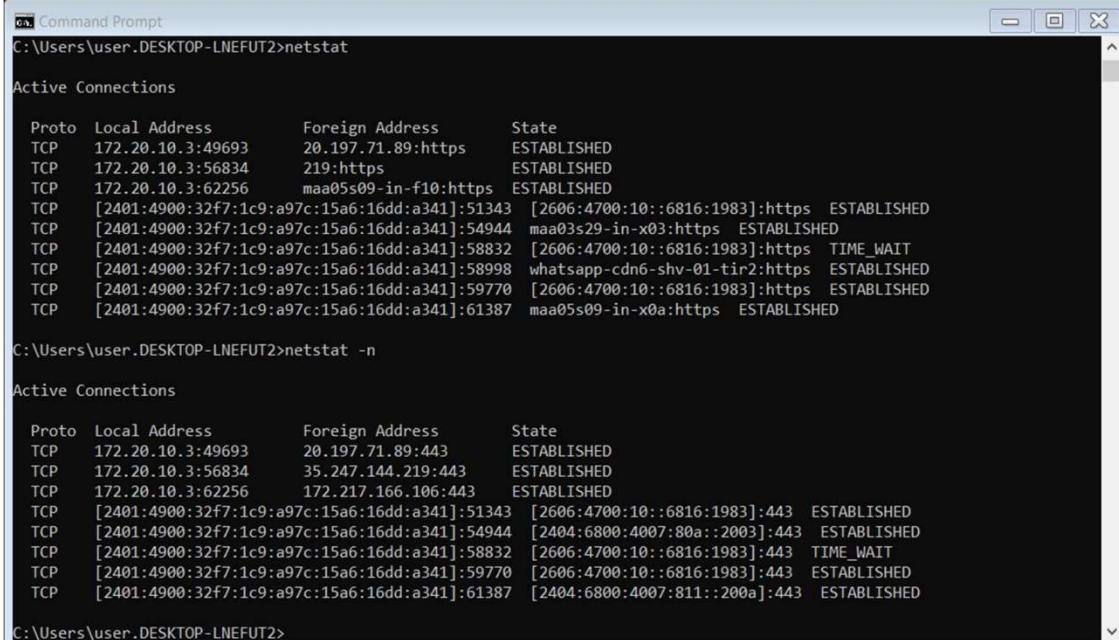
Linux

```
user@user-VirtualBox:~$ traceroute google.com
traceroute to google.com (142.250.195.110), 64 hops max
 1  10.0.2.2  0.321ms  0.269ms  0.213ms
 2  * * *
 3  * * *
 4  * * *
 5  * * *
 6  * * *
```

4. Netstat

Netstat displays the active TCP connections and ports on which the computer is listening, Ethernet statistics, the IP routing table, statistics for the IP, ICMP, TCP, and UDP protocols. It comes with a number of switches for displaying a variety of properties of the network and TCP connections

Windows



The screenshot shows a Windows Command Prompt window titled "Command Prompt". The command "netstat" is run twice. The first run shows "Active Connections" with many entries for TCP ports 443, 80, and 445. The second run shows "Active Connections" with fewer entries, likely due to a different filter or state. Both runs show detailed information for each connection, including local and foreign addresses, ports, and states like ESTABLISHED and TIME_WAIT.

```
C:\Users\user.DESKTOP-LNEFUT2>netstat
C:\Users\user.DESKTOP-LNEFUT2>netstat -n

Active Connections

Proto  Local Address          Foreign Address        State
TCP    172.20.10.3:49693      20.197.71.89:https    ESTABLISHED
TCP    172.20.10.3:56834      219:https            ESTABLISHED
TCP    172.20.10.3:62256      maa05s09-in-f10:https ESTABLISHED
TCP    [2401:4900:32f7:1c9:a97c:15a6:16dd:a341]:51343  [2606:4700:10::6816:1983]:https ESTABLISHED
TCP    [2401:4900:32f7:1c9:a97c:15a6:16dd:a341]:54944  maa03s29-in-x03:https ESTABLISHED
TCP    [2401:4900:32f7:1c9:a97c:15a6:16dd:a341]:58932  [2606:4700:10::6816:1983]:https TIME_WAIT
TCP    [2401:4900:32f7:1c9:a97c:15a6:16dd:a341]:58998  whatsapp-cdn6-shv-01-tir2:https ESTABLISHED
TCP    [2401:4900:32f7:1c9:a97c:15a6:16dd:a341]:59770  [2606:4700:10::6816:1983]:https ESTABLISHED
TCP    [2401:4900:32f7:1c9:a97c:15a6:16dd:a341]:61387  maa05s09-in-x0a:https ESTABLISHED

C:\Users\user.DESKTOP-LNEFUT2>netstat -n

Active Connections

Proto  Local Address          Foreign Address        State
TCP    172.20.10.3:49693      20.197.71.89:443    ESTABLISHED
TCP    172.20.10.3:56834      35.247.144.219:443  ESTABLISHED
TCP    172.20.10.3:62256      172.217.166.106:443  ESTABLISHED
TCP    [2401:4900:32f7:1c9:a97c:15a6:16dd:a341]:51343  [2606:4700:10::6816:1983]:443 ESTABLISHED
TCP    [2401:4900:32f7:1c9:a97c:15a6:16dd:a341]:54944  [2404:6800:4007:80a::2003]:443 ESTABLISHED
TCP    [2401:4900:32f7:1c9:a97c:15a6:16dd:a341]:58932  [2606:4700:10::6816:1983]:443 TIME_WAIT
TCP    [2401:4900:32f7:1c9:a97c:15a6:16dd:a341]:59770  [2606:4700:10::6816:1983]:443 ESTABLISHED
TCP    [2401:4900:32f7:1c9:a97c:15a6:16dd:a341]:61387  [2404:6800:4007:811::200a]:443 ESTABLISHED
```

```

C:\> Command Prompt
google.com  nameserver= ns2.google.com
C:\Users\user\Desktop-LNEFUT2>netstat -a

Active Connections

Proto Local Address          Foreign Address        State
TCP  0.0.0.0:135              DESKTOP-LNEFUT2:0    LISTENING
TCP  0.0.0.0:445              DESKTOP-LNEFUT2:0    LISTENING
TCP  0.0.0.0:808              DESKTOP-LNEFUT2:0    LISTENING
TCP  0.0.0.0:5040             DESKTOP-LNEFUT2:0    LISTENING
TCP  0.0.0.0:5337             DESKTOP-LNEFUT2:0    LISTENING
TCP  0.0.0.0:6646             DESKTOP-LNEFUT2:0    LISTENING
TCP  0.0.0.0:8054              DESKTOP-LNEFUT2:0    LISTENING
TCP  0.0.0.0:49665             DESKTOP-LNEFUT2:0    LISTENING
TCP  0.0.0.0:49666             DESKTOP-LNEFUT2:0    LISTENING
TCP  0.0.0.0:49667             DESKTOP-LNEFUT2:0    LISTENING
TCP  0.0.0.0:49668             DESKTOP-LNEFUT2:0    LISTENING
TCP  0.0.0.0:49670             DESKTOP-LNEFUT2:0    LISTENING
TCP  172.20.10.3:135           DESKTOP-LNEFUT2:0    LISTENING
TCP  172.20.10.3:49693          20.197.71.89:https  ESTABLISHED
TCP  172.20.10.3:50971          219:https            TIME_WAIT
TCP  172.20.10.3:50973          117.18.237.29:http  CLOSE_WAIT
TCP  172.20.10.3:64144          204.79.197.219:https ESTABLISHED
TCP  172.20.10.3:65921          200.70.137.109:443   ESTABLISHED
TCP  192.168.56.1:139           DESKTOP-LNEFUT2:0    LISTENING
TCP  [::]:135                  DESKTOP-LNEFUT2:0    LISTENING
TCP  [::]:1445                 DESKTOP-LNEFUT2:0    LISTENING
TCP  [::]:1446                 DESKTOP-LNEFUT2:0    LISTENING
TCP  [::]:1448                 DESKTOP-LNEFUT2:0    LISTENING
TCP  [::]:1449                 DESKTOP-LNEFUT2:0    LISTENING
TCP  [::]:1450                 DESKTOP-LNEFUT2:0    LISTENING
TCP  [::]:1451                 DESKTOP-LNEFUT2:0    LISTENING
TCP  [::]:1452                 DESKTOP-LNEFUT2:0    LISTENING
TCP  [::]:49664                DESKTOP-LNEFUT2:0    LISTENING
TCP  [::]:49665                DESKTOP-LNEFUT2:0    LISTENING
TCP  [::]:49666                DESKTOP-LNEFUT2:0    LISTENING
TCP  [::]:49667                DESKTOP-LNEFUT2:0    LISTENING
TCP  [::]:49668                DESKTOP-LNEFUT2:0    LISTENING
TCP  [::]:49669                DESKTOP-LNEFUT2:0    LISTENING
TCP  [::]:49670                DESKTOP-LNEFUT2:0    LISTENING
TCP  [2401:4980:32f7:1c9:a97c:15a6:16dd:a341]:59972 [2f60:1026:301:2a::2]:https ESTABLISHED
TCP  [2401:4980:32f7:1c9:a97c:15a6:16dd:a341]:59978 [2f60:4700:10::6816:1983]:https ESTABLISHED
UDP  0.0.0.0:5000               *.*.
UDP  0.0.0.0:3702               *.*.
UDP  0.0.0.0:3702               *.*.
UDP  0.0.0.0:3702               *.*.
UDP  0.0.0.0:3702               *.*.
UDP  0.0.0.0:4500               *.*.
UDP  0.0.0.0:5050               *.*.
UDP  0.0.0.0:5353               *.*.
UDP  0.0.0.0:5353               *.*.
UDP  0.0.0.0:5353               *.*.

```

```

C:\> Trace complete.
C:\Users\user\Desktop-LNEFUT2>netstat -n 5

Active Connections

Proto Local Address          Foreign Address        State
TCP  172.20.10.3:49693          20.197.71.89:443  ESTABLISHED
TCP  172.20.10.3:50971          35.247.144.219:443 TIME_WAIT
TCP  172.20.10.3:50973          117.18.237.29:80  CLOSE_WAIT
TCP  172.20.10.3:50974          204.79.197.203:443 ESTABLISHED
TCP  172.20.10.3:64144          204.79.197.219:443 ESTABLISHED
TCP  172.20.10.3:65921          204.79.197.219:443 ESTABLISHED
TCP  [2401:4980:32f7:1c9:a97c:15a6:16dd:a341]:59972 [2f60:1026:301:2a::2]:443 ESTABLISHED
TCP  [2401:4980:32f7:1c9:a97c:15a6:16dd:a341]:59978 [2f60:4700:10::6816:1983]:443 ESTABLISHED

Active Connections

Proto Local Address          Foreign Address        State
TCP  172.20.10.3:49693          20.197.71.89:443  ESTABLISHED
TCP  172.20.10.3:50971          35.247.144.219:443 TIME_WAIT
TCP  172.20.10.3:50973          117.18.237.29:80  CLOSE_WAIT
TCP  172.20.10.3:64144          204.79.197.219:443 ESTABLISHED
TCP  172.20.10.3:65921          204.79.197.219:443 ESTABLISHED
TCP  [2401:4980:32f7:1c9:a97c:15a6:16dd:a341]:59972 [2f60:1026:301:2a::2]:443 ESTABLISHED
TCP  [2401:4980:32f7:1c9:a97c:15a6:16dd:a341]:59978 [2f60:4700:10::6816:1983]:443 ESTABLISHED

Active Connections

Proto Local Address          Foreign Address        State
TCP  172.20.10.3:49693          20.197.71.89:443  ESTABLISHED
TCP  172.20.10.3:50971          35.247.144.219:443 TIME_WAIT
TCP  172.20.10.3:50973          117.18.237.29:80  CLOSE_WAIT
TCP  172.20.10.3:64144          204.79.197.219:443 ESTABLISHED
TCP  172.20.10.3:65921          204.79.197.219:443 ESTABLISHED
TCP  [2401:4980:32f7:1c9:a97c:15a6:16dd:a341]:59972 [2f60:1026:301:2a::2]:443 ESTABLISHED
TCP  [2401:4980:32f7:1c9:a97c:15a6:16dd:a341]:59978 [2f60:4700:10::6816:1983]:443 ESTABLISHED

Active Connections

```

Linux

```
user@user-VirtualBox: $ netstat
Active Internet connections (w/o servers)
Proto Recv-Q Send-Q Local Address          Foreign Address        State
tcp      0      0 user-VirtualBox:36056   32.121.122.34.bc.g:http ESTABLISHED
tcp      0      1 user-VirtualBox:36058   32.121.122.34.bc.g:http SYN_SENT
tcp      0      1 user-VirtualBox:36060   32.121.122.34.bc.g:http SYN_SENT
udp      0      0 user-VirtualBox:bootpc _gateway:bootps      ESTABLISHED
Active UNIX domain sockets (w/o servers)
Proto RefCnt Flags       Type      State         I-Node Path
unix  2      [ ]        DGRAM                    19356  /run/user/1000/systemd
md/notify
unix  3      [ ]        DGRAM                    15466  /run/systemd/notify
unix  2      [ ]        DGRAM                    15480  /run/systemd/journal
/syslog
unix 17     [ ]        DGRAM                    15489  /run/systemd/journal
/dev-log
unix  8      [ ]        DGRAM                    15491  /run/systemd/journal
/socket
unix  3      [ ]        STREAM     CONNECTED    17374  /run/systemd/journal
/stdout
unix  3      [ ]        STREAM     CONNECTED    22397  /tmp/dbus-5vaFeHxKbD
unix  3      [ ]        STREAM     CONNECTED    21356
unix  3      [ ]        STREAM     CONNECTED    19824
unix  3      [ ]        STREAM     CONNECTED    22330  /run/user/1000/bus
unix  3      [ ]        STREAM     CONNECTED    20931
unix  3      [ ]        STREAM     CONNECTED    19662
unix  3      [ ]        STREAM     CONNECTED    16658
unix  3      [ ]        STREAM     CONNECTED    17799
unix  3      [ ]        STREAM     CONNECTED    22395  /run/user/1000/bus
```

```
user@user-VirtualBox: $ netstat -n
Active Internet connections (w/o servers)
Proto Recv-Q Send-Q Local Address          Foreign Address        State
tcp      0      1 10.0.2.15:36074        34.122.121.32:80      SYN_SENT
tcp      0      1 10.0.2.15:36072        34.122.121.32:80      SYN_SENT
tcp      0      0 10.0.2.15:36070        34.122.121.32:80      ESTABLISHED
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                    19356  /run/user/1000/systemd
md/notify
unix  3      [ ]        DGRAM                    15466  /run/systemd/notify
unix  2      [ ]        DGRAM                    15480  /run/systemd/journal
/syslog
unix 17     [ ]        DGRAM                    15489  /run/systemd/journal
/dev-log
unix  8      [ ]        DGRAM                    15491  /run/systemd/journal
/socket
unix  3      [ ]        STREAM     CONNECTED    17374  /run/systemd/journal
/stdout
unix  3      [ ]        STREAM     CONNECTED    22397  /tmp/dbus-5vaFeHxKbD
unix  3      [ ]        STREAM     CONNECTED    21356
unix  3      [ ]        STREAM     CONNECTED    19824
unix  3      [ ]        STREAM     CONNECTED    22330  /run/user/1000/bus
unix  3      [ ]        STREAM     CONNECTED    20931
unix  3      [ ]        STREAM     CONNECTED    19662
unix  3      [ ]        STREAM     CONNECTED    16658
unix  3      [ ]        STREAM     CONNECTED    17799
unix  3      [ ]        STREAM     CONNECTED    22395  /run/user/1000/bus
```

```

user@user-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                    19356   /run/user/1000/systemd
md/notify
unix    3      [ ]     DGRAM                    15466   /run/systemd/notify
unix    2      [ ]     DGRAM                    15480   /run/systemd/journal
/syslog
unix  17      [ ]     DGRAM                    15489   /run/systemd/journal
/dev-log
unix    8      [ ]     DGRAM                    15491   /run/systemd/journal
/socket
unix    3      [ ]     STREAM     CONNECTED    17374   /run/systemd/journal
/stdout
unix    3      [ ]     STREAM     CONNECTED    22397   /tmp/dbus-5vaFeHxKbD
unix    3      [ ]     STREAM     CONNECTED    21356
unix    3      [ ]     STREAM     CONNECTED    19824
unix    3      [ ]     STREAM     CONNECTED    22330   /run/user/1000/bus
unix    3      [ ]     STREAM     CONNECTED    20931
unix    3      [ ]     STREAM     CONNECTED    19662
unix    3      [ ]     STREAM     CONNECTED    16658
unix    3      [ ]     STREAM     CONNECTED    17799
unix    3      [ ]     STREAM     CONNECTED    22395   /run/user/1000/bus
unix    3      [ ]     STREAM     CONNECTED    21156

```

5. Nslookup

This command helps diagnose the Domain Name System (DNS) infrastructure and comes with a number of sub-commands. These are mainly for systems administrators. The primary interest for average PC users is its use to find the computer name corresponding to a numeric IP. For example, if you want to know who is "216.109.112.135" , enter "nslookup 216.109.112.135" and you will find that it is (or was anyway) a Yahoo computer. My firewall keeps a log of the IPs involved in the attempts to probe my computer and I sometimes look a few up to see who they are. (There are also Whois search sites available on the Web as mentioned in the Ipconfig section.)

Windows

```
ca Command Prompt
C:\Users\user\Desktop-LNEFUT2>nslookup
DNS request timed out.
    timeout was 2 seconds.
Default Server: UnKnown
Address: fe80::107c:a013:8651:17

> exit

C:\Users\user\Desktop-LNEFUT2>nslookup google.com
Server: UnKnown
Address: fe80::107c:a013:8651:17

Non-authoritative answer:
Name: google.com
Addresses: 2404:6800:4007:826::200e
           142.250.195.174

C:\Users\user\Desktop-LNEFUT2>nslookup -q=MX google.com
Server: UnKnown
Address: fe80::107c:a013:8651:17

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

C:\Users\user\Desktop-LNEFUT2>
```

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

C:\Users\user\Desktop-LNEFUT2>nslookup -type=ns google.com
Server: UnKnown
Address: fe80::107c:a013:8651:17

Non-authoritative answer:
google.com      nameserver = ns4.google.com
google.com      nameserver = ns1.google.com
google.com      nameserver = ns3.google.com
google.com      nameserver = ns2.google.com

C:\Users\user\Desktop-LNEFUT2>
```

Linux

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

Non-authoritative answer:
Name:   google.com
Address: 142.250.195.110
Name:   google.com
Address: 2404:6800:4007:824::200e
```

```
user@user-VirtualBox:~$ nslookup -q=MX google.com
Server:      127.0.0.53
Address:     127.0.0.53#53

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

Authoritative answers can be found from:
```

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

Non-authoritative answer:
redhat.com
origin = a1-68.akam.net
mail addr = noc.redhat.com
serial = 2021091002
refresh = 300
retry = 180
expire = 604800
minimum = 14400
```

```
Authoritative answers can be found from:
```

6.ipconfig

The Windows IP Configuration tool (ipconfig) is the command-line equivalent of the accessory "Winipcfg" that was present in Windows 9X/Me. It is used to display the TCP/IP network configuration values. To open it, enter "ipconfig" in the command prompt. If you are connected directly to the Internet, you will obtain your IP address.

Windows

```
Administrator: Command Prompt
TCP [2401:4900:32f7:1c9:a97c:15a6:16dd:a341]:61387 [2404:6800:4007:811::200a]:443 ESTABLISHED
C:\Users\user\Desktop-LNEFUT2>ipconfig

Windows IP Configuration

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

Ethernet adapter VirtualBox Host-Only Network:
  Connection-specific DNS Suffix . :
  Link-local IPv6 Address . . . . . : fe80::5c7:f216:be28:e9b3%2
  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 . . . . . : 2401:4900:32f7:1c9:4c48:477f:16a0:1971
  Temporary IPv6 Address . . . . . : 2401:4900:32f7:1c9:a97c:15a6:16dd:a341
  Link-local IPv6 Address . . . . . : fe80::4c48:477f:16a0:1971%16
  IPv4 Address . . . . . : 172.20.10.3
  Subnet Mask . . . . . : 255.255.255.240
  Default Gateway . . . . . : fe80::107c:a013:8651:17%16
  172.20.10.1

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

C:\Users\user\Desktop-LNEFUT2>
```

```
Administrator: Command Prompt
C:\Users\user\Desktop-LNEFUT2>ipconfig/displaydns

Error: unrecognized or incomplete command line.

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

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

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

```
ok Command Prompt
/displaydns      Display the contents of the DNS Resolver Cache.
/showclassid    Displays all the dhcp class IDs allowed for adapter.
/setclassid     Modifies the dhcp class id.
/showclassid6   Displays all the IPv6 DHCP class IDs allowed for adapter.
/setclassid6   Modifies the IPv6 DHCP class id.

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

For Release and Renew, if no adapter name is specified, then the IP address
leases for all adapters bound to TCP/IP will be released or renewed.

For Setclassid and Setclassid6, if no ClassId is specified, then the ClassId is removed.

Examples:
> ipconfig           ... Show information
> ipconfig /all       ... Show detailed information
> ipconfig /renew     ... renew all adapters
> ipconfig /renew EL* ... renew any connection that has its
                        name starting with EL
> ipconfig /release *Con* ... release all matching connections,
                            eg. "Wired Ethernet Connection 1" or
                                "Wired Ethernet Connection 2"
> ipconfig /allcompartments ... Show information about all
                                compartments
> ipconfig /allcompartments /all ... Show detailed information about all
                                compartments

C:\Users\user.DESKTOP-LNEFUT2>
```

```
ok Command Prompt
C:\Users\user.DESKTOP-LNEFUT2>ipconfig/release

Windows IP Configuration

No operation can be performed on Ethernet while it has its media disconnected.
No operation can be performed on Local Area Connection* 1 while it has its media disconnected.
No operation can be performed on Local Area Connection* 2 while it has its media disconnected.
No operation can be performed on Bluetooth Network Connection while it has its media disconnected.

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

Ethernet adapter VirtualBox Host-Only Network:
Connection-specific DNS Suffix . :
Link-local IPv6 Address . . . . . : fe80::5c7:f216:be28:e9b3%2
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 . . . . . : 2401:4900:32f7:1c9:4c48:477f:16a0:1971
Temporary IPv6 Address . . . . . : 2401:4900:32f7:1c9:497c:15a6:16dd:a341
Link-local IPv6 Address . . . . . : fe80::4c48:477f:16a0:1971%16
Default Gateway . . . . . : fe80::107c:4013:8693:17a1%5

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

C:\Users\user.DESKTOP-LNEFUT2>
```

Linux

```
user@user-VirtualBox:~$ ifconfig
enp0s3: flags=4163<UP,BROADCAST,RUNNING,MULTICAST> mtu 1500
        inet 10.0.2.15 netmask 255.255.255.0 broadcast 10.0.2.255
        inet6 fe80::ff04:8b9d:ceb:69c6 prefixlen 64 scopeid 0x20<link>
          ether 08:00:27:eb:25:92 txqueuelen 1000 (Ethernet)
            RX packets 1058 bytes 1060445 (1.0 MB)
            RX errors 0 dropped 0 overruns 0 frame 0
            TX packets 701 bytes 73185 (73.1 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 572 bytes 54137 (54.1 KB)
            RX errors 0 dropped 0 overruns 0 frame 0
            TX packets 572 bytes 54137 (54.1 KB)
            TX errors 0 dropped 0 overruns 0 carrier 0 collisions 0
```

```
user@user-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::ff04:8b9d:ceb:69c6 prefixlen 64 scopeid 0x20<link>
          ether 08:00:27:eb:25:92 txqueuelen 1000 (Ethernet)
            RX packets 1058 bytes 1060445 (1.0 MB)
            RX errors 0 dropped 0 overruns 0 frame 0
            TX packets 699 bytes 72991 (72.9 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 571 bytes 54064 (54.0 KB)
            RX errors 0 dropped 0 overruns 0 frame 0
            TX packets 571 bytes 54064 (54.0 KB)
            TX errors 0 dropped 0 overruns 0 carrier 0 collisions 0
```

```
user@user-VirtualBox:~$ ifconfig -s
Iface      MTU     RX-OK RX-ERR RX-DRP RX-OVR      TX-OK TX-ERR TX-DRP TX-OVR Flg
enp0s3    1500     1059     0     0 0       707     0     0 0      BMRU
lo        65536     572     0     0 0       572     0     0 0      LRU
```

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

1. 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.

remote host's IP address to the ARP -A command.

```
C:\ Command Prompt  
C:\Users\user\Desktop-LNEFUT2>arp -a  
  
Interface: 192.168.56.1 --- 0x2  
  Internet Address      Physical Address      Type  
    224.0.0.22            01-00-5e-00-00-16    static  
    224.0.0.251           01-00-5e-00-00-fb    static  
    224.0.0.252           01-00-5e-00-00-fc    static  
    239.255.255.250       01-00-5e-7f-ff-fa    static  
  
Interface: 172.20.10.3 --- 0x10  
  Internet Address      Physical Address      Type  
    172.20.10.1           be-a9-20-99-97-64    dynamic  
    172.20.10.15          ff-ff-ff-ff-ff-ff    static  
    224.0.0.22            01-00-5e-00-00-16    static  
    224.0.0.251           01-00-5e-00-00-fb    static  
    224.0.0.252           01-00-5e-00-00-fc    static  
    239.255.255.250       01-00-5e-7f-ff-fa    static  
    255.255.255.255       ff-ff-ff-ff-ff-ff    static  
  
C:\Users\user\Desktop-LNEFUT2>
```

2. 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.

```
C:\Users\user\Desktop-LNEFUT2>nbtstat -r
NetBIOS Names Resolution and Registration Statistics
-----
Resolved By Broadcast      = 0
Resolved By Name Server   = 0
Registered By Broadcast   = 15
Registered By Name Server = 0
C:\Users\user\Desktop-LNEFUT2>
```

3. 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:\Users\user\Desktop-LNEFUT2>hostname  
DESKTOP-LNEFUT2
```

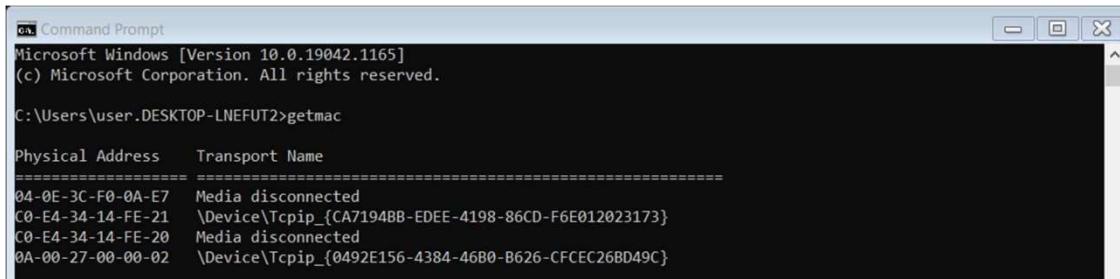
4 PathPing

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:\Users\user\Desktop-LNEFUT2>pathping  
Usage: pathping [-g host-list] [-h maximum_hops] [-i address] [-n]  
                 [-p period] [-q num_queries] [-w timeout]  
                 [-4] [-6] target_name  
  
Options:  
  -g host-list      Loose source route along host-list.  
  -h maximum_hops  Maximum number of hops to search for target.  
  -i address        Use the specified source address.  
  -n               Do not resolve addresses to hostnames.  
  -p period         Wait period milliseconds between pings.  
  -q num_queries   Number of queries per hop.  
  -w timeout       Wait timeout milliseconds for each reply.  
  -4               Force using IPv4.  
  -6               Force using IPv6.  
  
C:\Users\user\Desktop-LNEFUT2>
```

5. getmac

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



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

C:\Users\user\Desktop-LNEFUT2>getmac

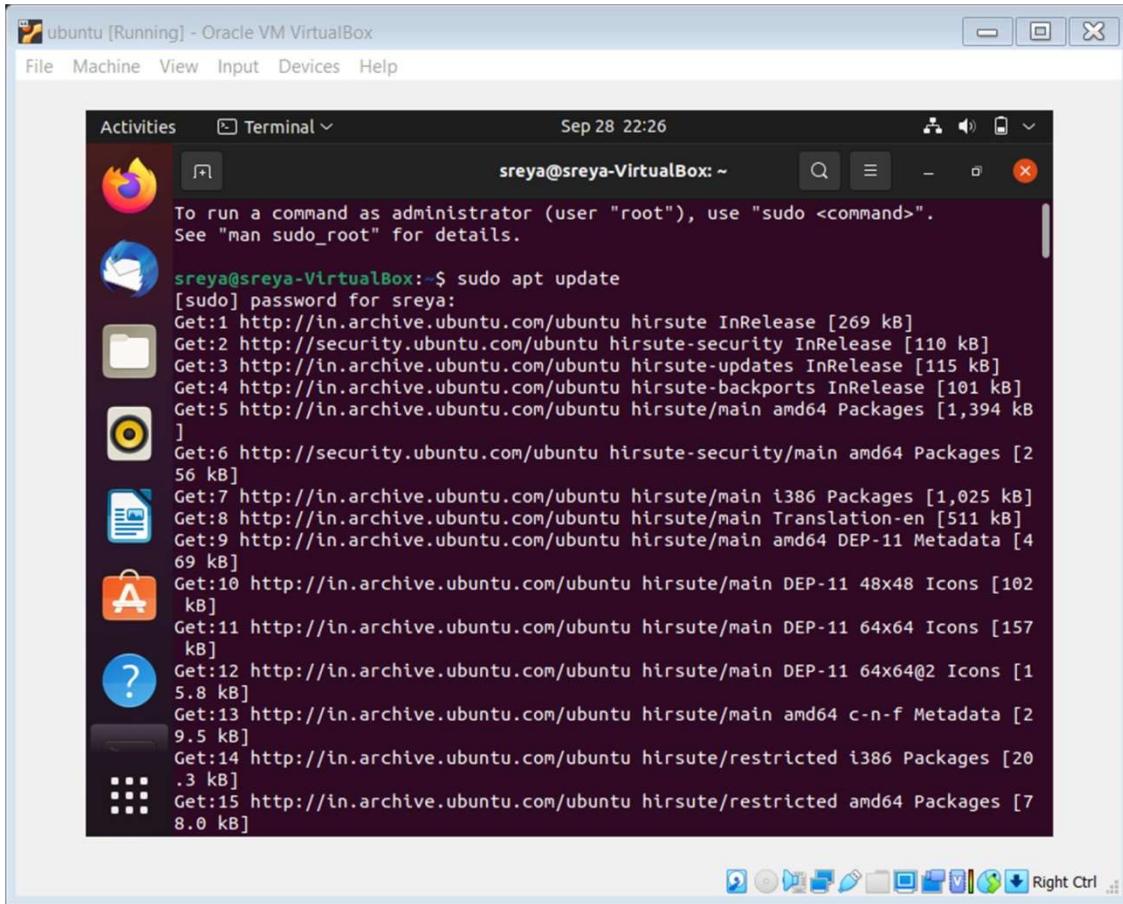
Physical Address      Transport Name
===== =====
04-0E-3C-F0-0A-E7    Media disconnected
C0-E4-34-14-FE-21    \Device\Tcpip_{CA71948B-EDEE-4198-86CD-F6E012023173}
C0-E4-34-14-FE-20    Media disconnected
0A-00-27-00-00-02    \Device\Tcpip_{0492E156-4384-46B0-B626-CFCEC26BD49C}
```

LAMP INSTALLATION

Install apache

- Update your system

```
sudo apt update
```

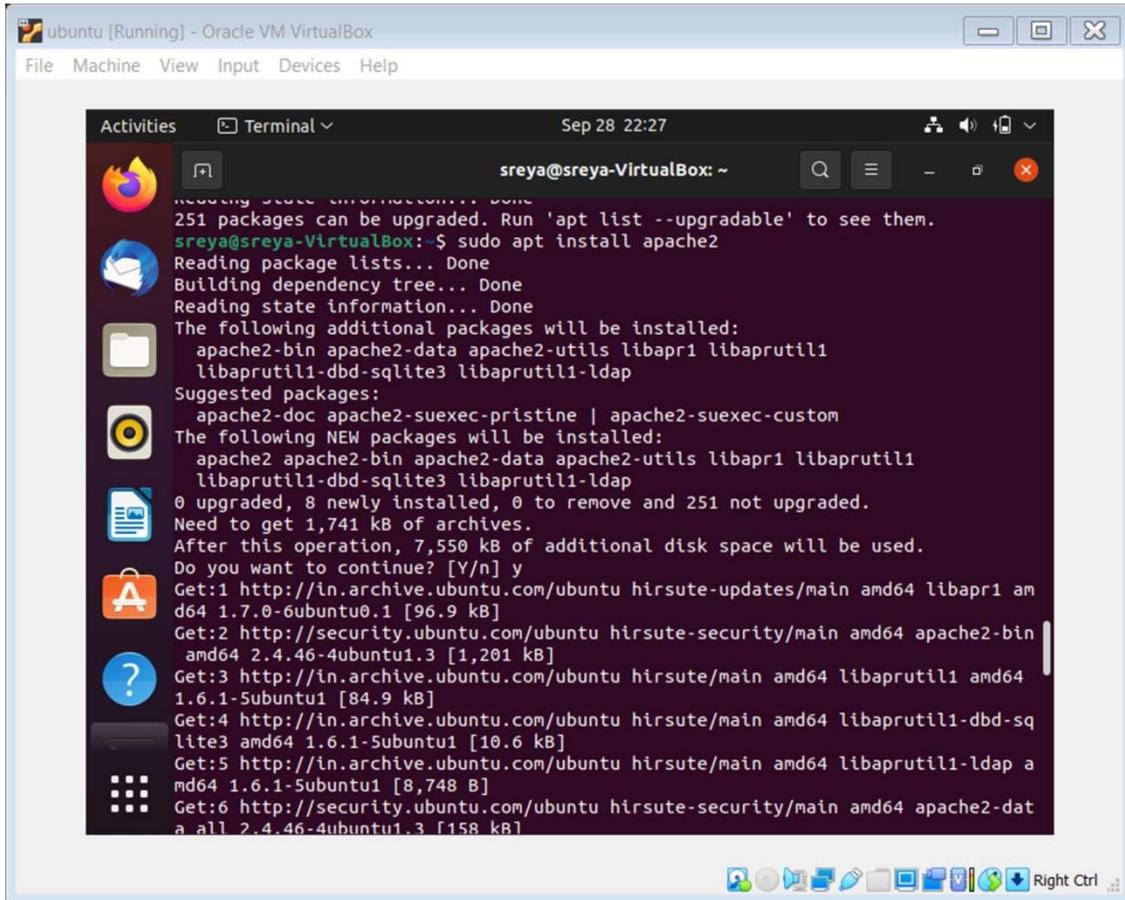


The screenshot shows a terminal window titled "ubuntu [Running] - Oracle VM VirtualBox". The window has a dark theme with icons on the left. The terminal shows the command "sudo apt update" being run by user "sreya". The output lists various package downloads from the "http://in.archive.ubuntu.com/ubuntu" repository, including Release files, security updates, and icon packages for the "hirsute" release.

```
sreya@sreya-VirtualBox:~$ sudo apt update
[sudo] password for sreya:
Get:1 http://in.archive.ubuntu.com/ubuntu hirsute InRelease [269 kB]
Get:2 http://security.ubuntu.com/ubuntu hirsute-security InRelease [110 kB]
Get:3 http://in.archive.ubuntu.com/ubuntu hirsute-updates InRelease [115 kB]
Get:4 http://in.archive.ubuntu.com/ubuntu hirsute-backports InRelease [101 kB]
Get:5 http://in.archive.ubuntu.com/ubuntu hirsute/main amd64 Packages [1,394 kB]
]
Get:6 http://security.ubuntu.com/ubuntu hirsute-security/main amd64 Packages [2
56 kB]
Get:7 http://in.archive.ubuntu.com/ubuntu hirsute/main i386 Packages [1,025 kB]
Get:8 http://in.archive.ubuntu.com/ubuntu hirsute/main Translation-en [511 kB]
Get:9 http://in.archive.ubuntu.com/ubuntu hirsute/main amd64 DEP-11 Metadata [4
69 kB]
Get:10 http://in.archive.ubuntu.com/ubuntu hirsute/main DEP-11 48x48 Icons [102
kB]
Get:11 http://in.archive.ubuntu.com/ubuntu hirsute/main DEP-11 64x64 Icons [157
kB]
Get:12 http://in.archive.ubuntu.com/ubuntu hirsute/main DEP-11 64x64@2 Icons [1
5.8 kB]
Get:13 http://in.archive.ubuntu.com/ubuntu hirsute/main amd64 c-n-f Metadata [2
9.5 kB]
Get:14 http://in.archive.ubuntu.com/ubuntu hirsute/restricted i386 Packages [20
.3 kB]
Get:15 http://in.archive.ubuntu.com/ubuntu hirsute/restricted amd64 Packages [7
8.0 kB]
```

- **Install Apache using apt:**

```
sudo apt install apache2
```

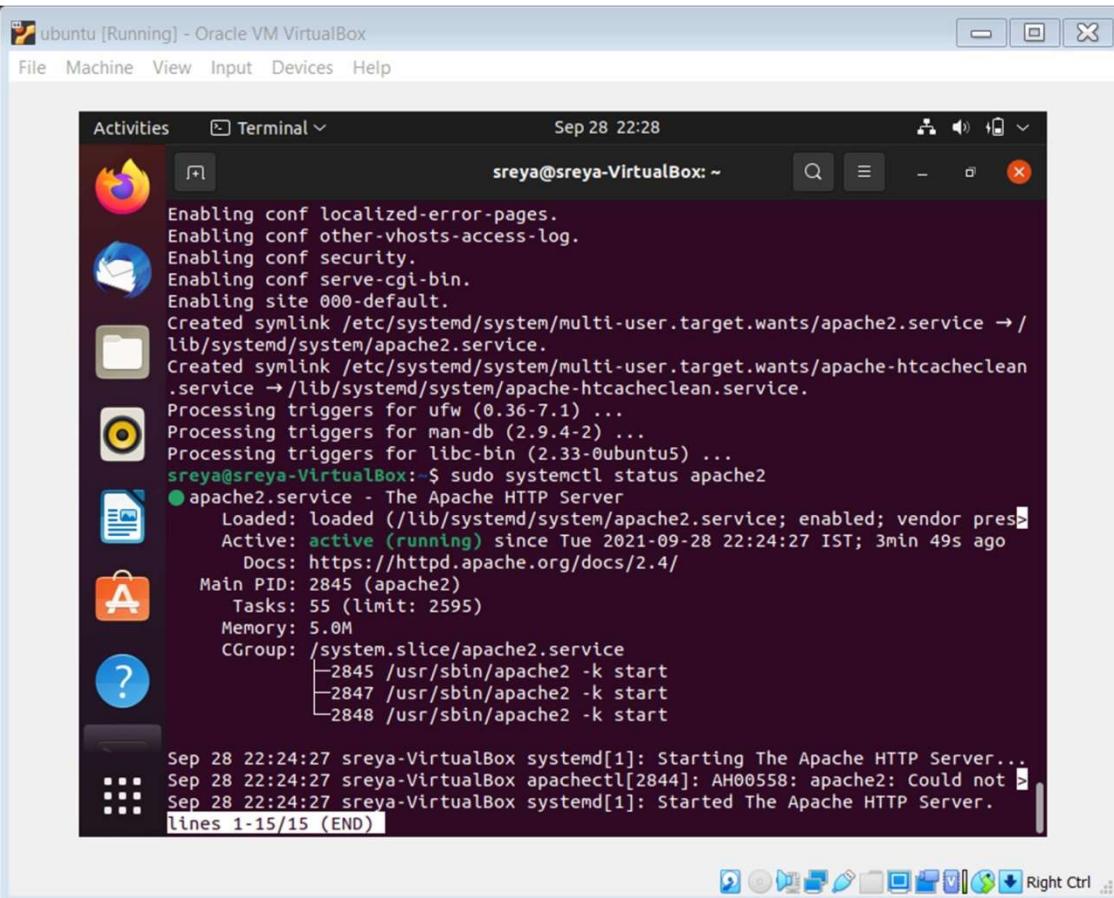


The screenshot shows a terminal window titled "ubuntu [Running] - Oracle VM VirtualBox". The terminal session starts with a message about upgrading packages, followed by the command "sudo apt install apache2". The output shows the package lists being read, dependencies being built, and state information being updated. It then lists additional packages to be installed (apache2-bin, apache2-data, apache2-utils, libapr1, libaprutil1, libaprutil1-dbd-sqlite3, libaprutil1-ldap) and suggested packages (apache2-doc, apache2-suexec-pristine, apache2-suexec-custom). It also lists NEW packages to be installed (apache2, apache2-bin, apache2-data, apache2-utils, libapr1, libaprutil1, libaprutil1-dbd-sqlite3, libaprutil1-ldap). The total number of packages is summarized as 0 upgraded, 8 newly installed, 0 to remove, and 251 not upgraded. The operation will use 1,741 kB of disk space. The user is prompted with "Do you want to continue? [Y/n] y". The terminal then shows the download progress for six packages from the Ubuntu archive, including libapr1, libaprutil1, apache2-bin, apache2-data, libaprutil1-dbd-sqlite3, and apache2-utils.

```
Reading state information... done
251 packages can be upgraded. Run 'apt list --upgradable' to see them.
[sreya@sreya-VirtualBox: ~]$ sudo apt install apache2
Reading package lists... Done
Building dependency tree... Done
Reading state information... Done
The following additional packages will be installed:
  apache2-bin apache2-data apache2-utils libapr1 libaprutil1
  libaprutil1-dbd-sqlite3 libaprutil1-ldap
Suggested packages:
  apache2-doc apache2-suexec-pristine | apache2-suexec-custom
The following NEW packages will be installed:
  apache2 apache2-bin apache2-data apache2-utils libapr1 libaprutil1
  libaprutil1-dbd-sqlite3 libaprutil1-ldap
0 upgraded, 8 newly installed, 0 to remove and 251 not upgraded.
Need to get 1,741 kB of archives.
After this operation, 7,550 kB of additional disk space will be used.
Do you want to continue? [Y/n] y
Get:1 http://in.archive.ubuntu.com/ubuntu hirsute-updates/main amd64 libapr1 amd64 1.7.0-6ubuntu0.1 [96.9 kB]
Get:2 http://security.ubuntu.com/ubuntu hirsute-security/main amd64 apache2-bin amd64 2.4.46-4ubuntu1.3 [1,201 kB]
Get:3 http://in.archive.ubuntu.com/ubuntu hirsute/main amd64 libaprutil1 amd64 1.6.1-5ubuntu1 [84.9 kB]
Get:4 http://in.archive.ubuntu.com/ubuntu hirsute/main amd64 libaprutil1-dbd-sqlite3 amd64 1.6.1-5ubuntu1 [10.6 kB]
Get:5 http://in.archive.ubuntu.com/ubuntu hirsute/main amd64 libaprutil1-ldap amd64 1.6.1-5ubuntu1 [8,748 B]
Get:6 http://security.ubuntu.com/ubuntu hirsute-security/main amd64 apache2-data all 2.4.46-4ubuntu1.3 [158 kB]
```

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

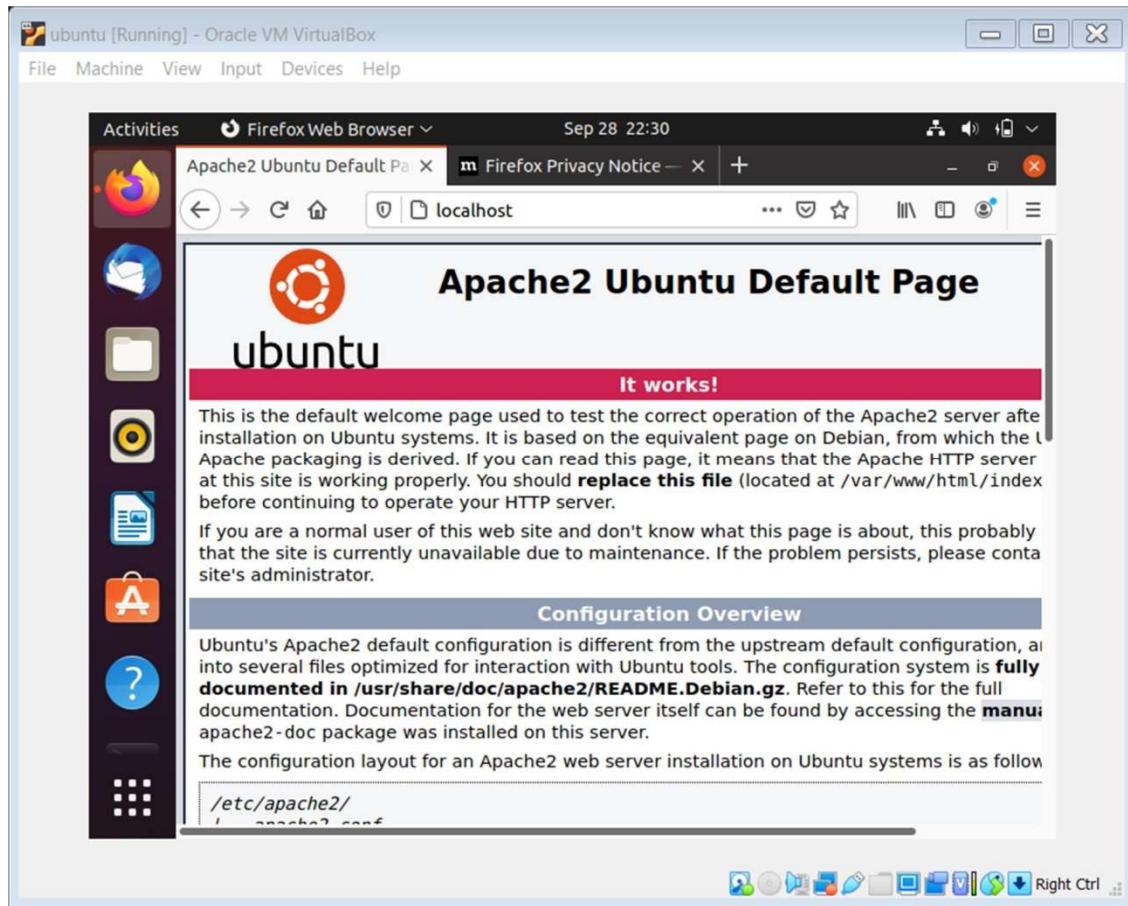
```
sudo systemctl status apache2
```



The screenshot shows a terminal window titled "ubuntu [Running] - Oracle VM VirtualBox". The terminal displays the output of the command "sudo systemctl status apache2". The output shows that the apache2 service is active (running) since September 28, 2021, at 22:24:27 IST, with a duration of 3min 49s ago. It provides details about the service's state, main PID, tasks, memory usage, and cgroup information. The terminal also shows the start of the Apache HTTP Server and its children processes.

```
Enabling conf localized-error-pages.
Enabling conf other-vhosts-access-log.
Enabling conf security.
Enabling conf serve-cgi-bin.
Enabling site 000-default.
Created symlink /etc/systemd/system/multi-user.target.wants/apache2.service → /
lib/systemd/system/apache2.service.
Created symlink /etc/systemd/system/multi-user.target.wants/apache-htcacheclean
.service → /lib/systemd/system/apache-htcacheclean.service.
Processing triggers for ufw (0.36-7.1) ...
Processing triggers for man-db (2.9.4-2) ...
Processing triggers for libc-bin (2.33-0ubuntu5) ...
sreya@sreya-VirtualBox: $ sudo systemctl status apache2
● apache2.service - The Apache HTTP Server
   Loaded: loaded (/lib/systemd/system/apache2.service; enabled; vendor pres>
     Active: active (running) since Tue 2021-09-28 22:24:27 IST; 3min 49s ago
       Docs: https://httpd.apache.org/docs/2.4/
 Main PID: 2845 (apache2)
    Tasks: 55 (limit: 2595)
   Memory: 5.0M
      CGroup: /system.slice/apache2.service
              ├─2845 /usr/sbin/apache2 -k start
              ├─2847 /usr/sbin/apache2 -k start
              └─2848 /usr/sbin/apache2 -k start

Sep 28 22:24:27 sreya-VirtualBox systemd[1]: Starting The Apache HTTP Server...
Sep 28 22:24:27 sreya-VirtualBox apachectl[2844]: AH00558: apache2: Could not >
Sep 28 22:24:27 sreya-VirtualBox systemd[1]: Started The Apache HTTP Server.
Lines 1-15/15 (END)
```



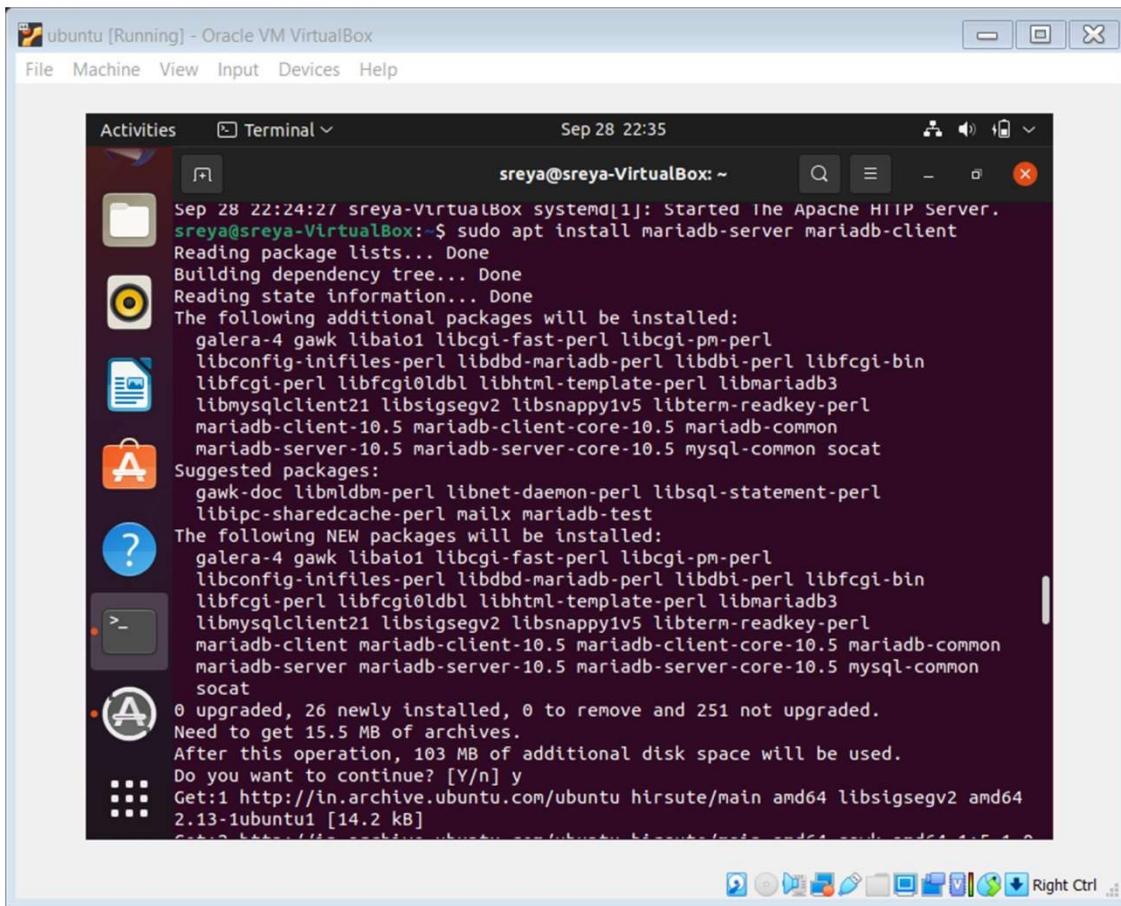
- **if it is not working**

```
sudo systemctl start apache2
```

Install mariadb

- **Install mariaDB**

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



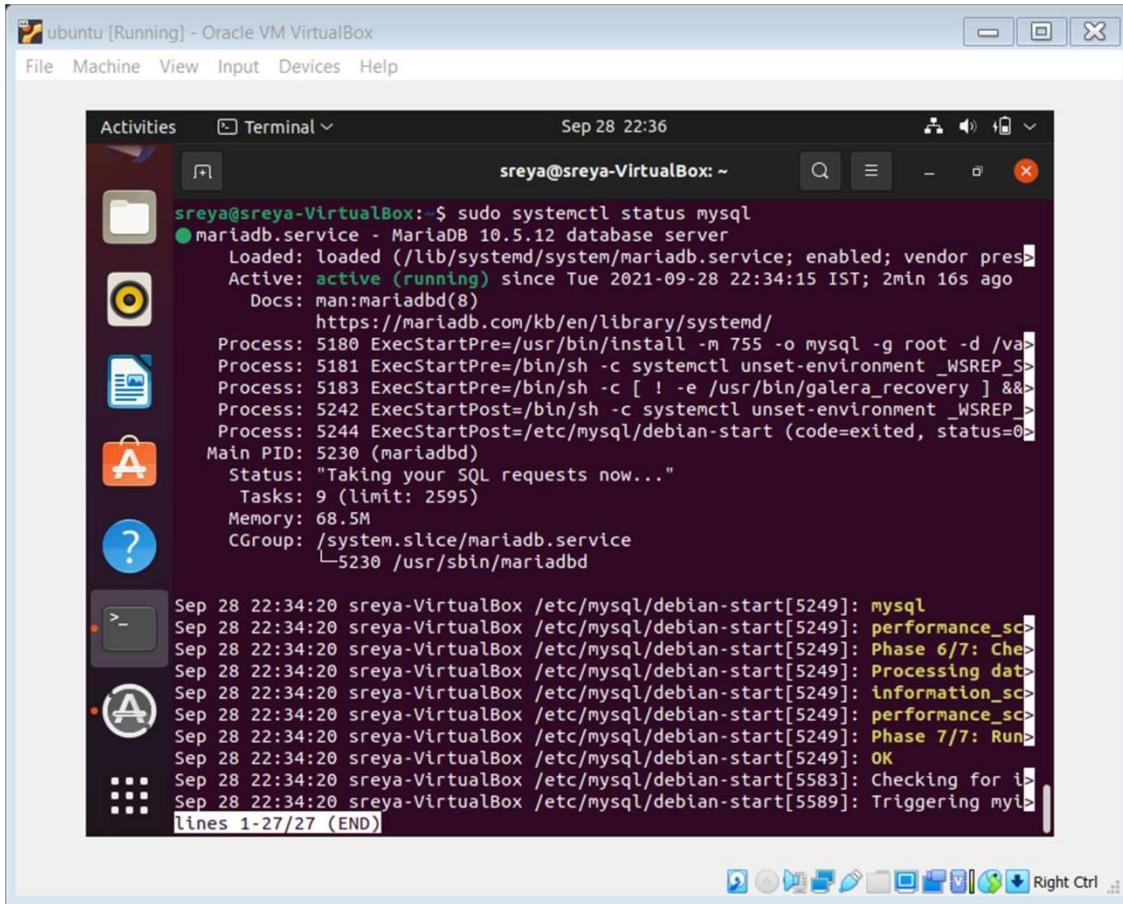
The screenshot shows a terminal window titled "ubuntu [Running] - Oracle VM VirtualBox". The terminal output is as follows:

```
Sep 28 22:24:27 sreya-VirtualBox systemd[1]: Started The Apache HTTP Server.
sreya@sreya-VirtualBox:~$ sudo apt install mariadb-server mariadb-client
Reading package lists... Done
Building dependency tree... Done
Reading state information... Done
The following additional packages will be installed:
  galera-4 gawk libaio1 libcgi-fast-perl libcgi-pm-perl
  libconfig-inifiles-perl libdbd-mariadb-perl libdbi-perl libfcgi-bin
  libfcgi-perl libfcgi0ldbl libhtml-template-perl libmariadb3
  libmysqlclient21 libsigsegv2 libsnappy1v5 libterm-readkey-perl
  mariadb-client-10.5 mariadb-client-core-10.5 mariadb-common
  mariadb-server-10.5 mariadb-server-core-10.5 mysql-common socat
Suggested packages:
  gawk-doc libldb-perl libnet-daemon-perl libsql-statement-perl
  libipc-sharedcache-perl mailx mariadb-test
The following NEW packages will be installed:
  galera-4 gawk libaio1 libcgi-fast-perl libcgi-pm-perl
  libconfig-inifiles-perl libdbd-mariadb-perl libdbi-perl libfcgi-bin
  libfcgi-perl libfcgi0ldbl libhtml-template-perl libmariadb3
  libmysqlclient21 libsigsegv2 libsnappy1v5 libterm-readkey-perl
  mariadb-client mariadb-client-10.5 mariadb-client-core-10.5 mariadb-common
  mariadb-server mariadb-server-10.5 mariadb-server-core-10.5 mysql-common
  socat
0 upgraded, 26 newly installed, 0 to remove and 251 not upgraded.
Need to get 15.5 MB of archives.
After this operation, 103 MB of additional disk space will be used.
Do you want to continue? [Y/n] y
Get:1 http://in.archive.ubuntu.com/ubuntu hirsute/main amd64 libsigsegv2 amd64
  2.13-1ubuntu1 [14.2 kB]
```

- Check mariadb Installation

```
sudo systemctl status mysql
```

(if it is not working sudo systemctl start mysql)



```
sreya@sreya-VirtualBox: ~$ sudo systemctl status mysql
● mariadb.service - MariaDB 10.5.12 database server
   Loaded: loaded (/lib/systemd/system/mariadb.service; enabled; vendor pres>
   Active: active (running) since Tue 2021-09-28 22:34:15 IST; 2min 16s ago
     Docs: man:mariadb(8)
           https://mariadb.com/kb/en/library/systemd/
  Process: 5180 ExecStartPre=/usr/bin/install -m 755 -o mysql -g root -d /va>
  Process: 5181 ExecStartPre=/bin/sh -c systemctl unset-environment _WSREP_S>
  Process: 5183 ExecStartPre=/bin/sh -c [ ! -e /usr/bin/galera_recovery ] &&>
  Process: 5242 ExecStartPost=/bin/sh -c systemctl unset-environment _WSREP_>
  Process: 5244 ExecStartPost=/etc/mysql/debian-start (code=exited, status=0>
 Main PID: 5230 (mariadbd)
   Status: "Taking your SQL requests now..."
      Tasks: 9 (limit: 2595)
     Memory: 68.5M
        CGroup: /system.slice/mariadb.service
                  └─5230 /usr/sbin/mariadbd

Sep 28 22:34:20 sreya-VirtualBox /etc/mysql/debian-start[5249]: mysql
Sep 28 22:34:20 sreya-VirtualBox /etc/mysql/debian-start[5249]: performance_sc>
Sep 28 22:34:20 sreya-VirtualBox /etc/mysql/debian-start[5249]: Phase 6/7: Che>
Sep 28 22:34:20 sreya-VirtualBox /etc/mysql/debian-start[5249]: Processing dat>
Sep 28 22:34:20 sreya-VirtualBox /etc/mysql/debian-start[5249]: information_sc>
Sep 28 22:34:20 sreya-VirtualBox /etc/mysql/debian-start[5249]: performance_sc>
Sep 28 22:34:20 sreya-VirtualBox /etc/mysql/debian-start[5249]: Phase 7/7: Run>
Sep 28 22:34:20 sreya-VirtualBox /etc/mysql/debian-start[5249]: OK
Sep 28 22:34:20 sreya-VirtualBox /etc/mysql/debian-start[5583]: Checking for i>
Sep 28 22:34:20 sreya-VirtualBox /etc/mysql/debian-start[5589]: Triggering myi>
lines 1-27/27 (END)
```

Install PHP

- **Install PHP**

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

- **Restart apache2**

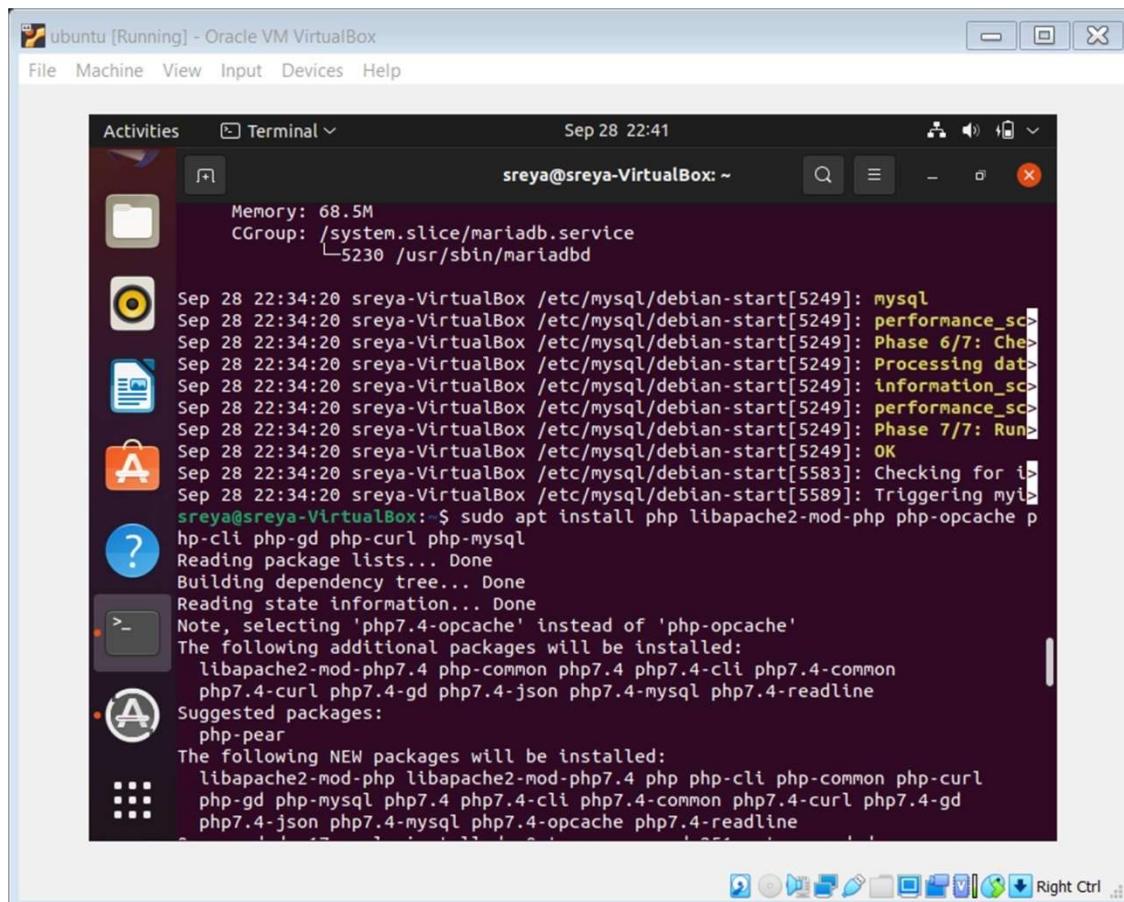
```
sudo systemctl restart apache2
```

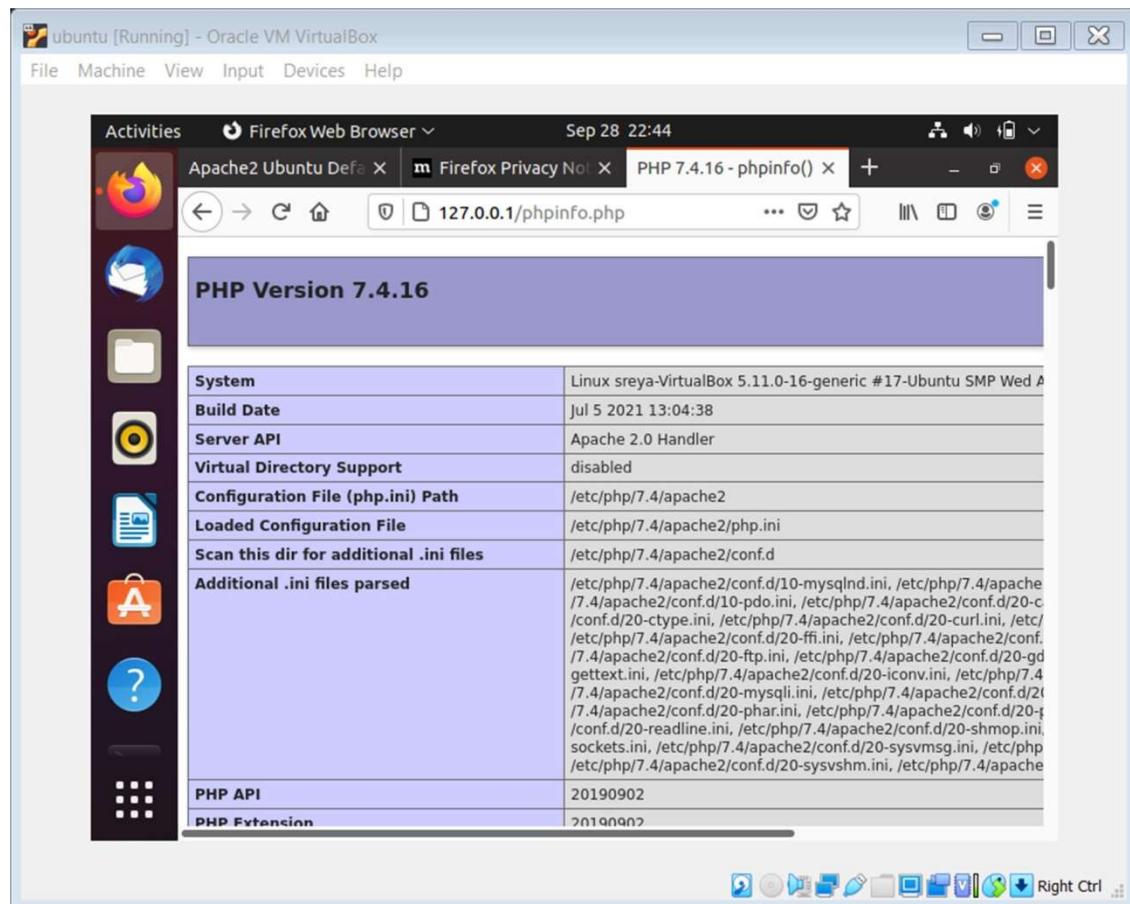
- **Now you can check php installation**

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

- **Open a browser**

<http://127.0.0.1/phpinfo.php>





Install PHP

- **Install PHP**

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

- **Restart apache2**

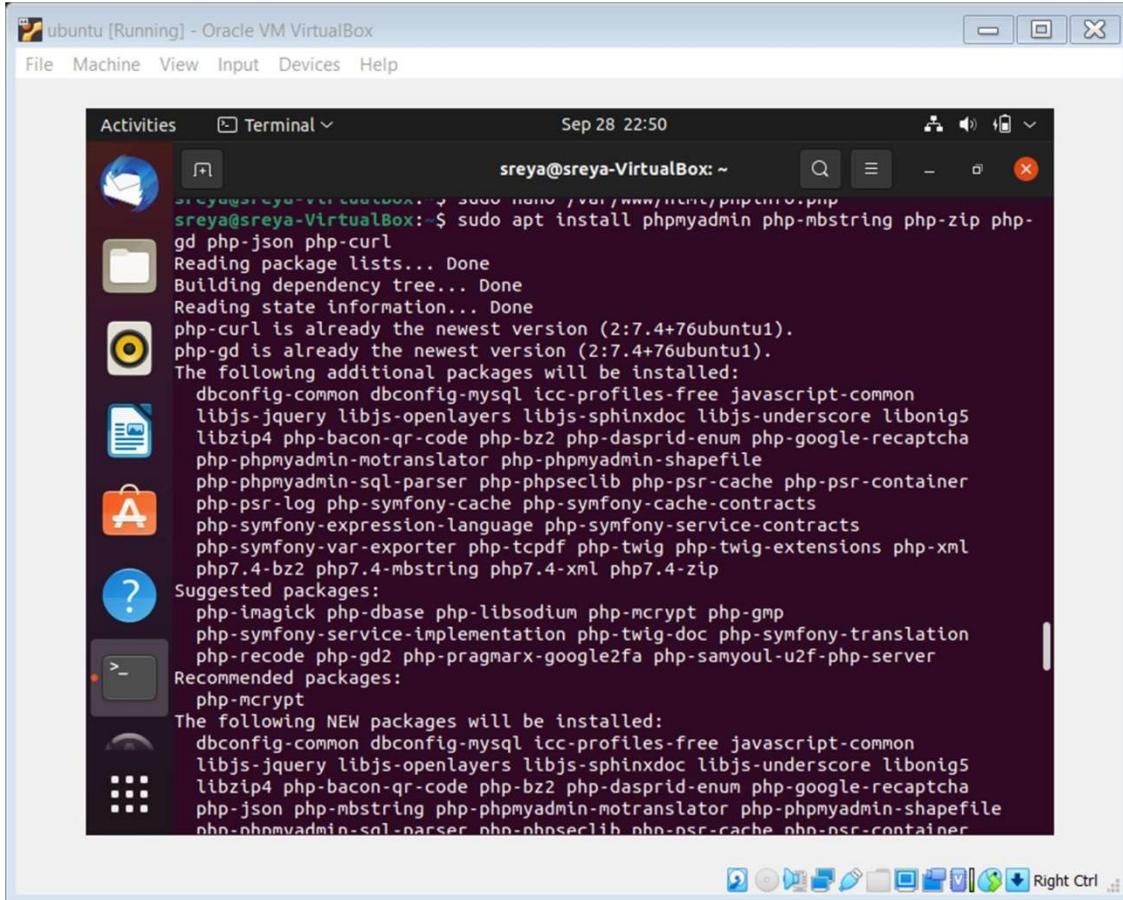
```
sudo systemctl restart apache2
```

- **Now you can check php installation**

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

- **Open a browser**

<http://127.0.0.1/phpinfo.php>



The screenshot shows a terminal window titled "ubuntu [Running] - Oracle VM VirtualBox". The terminal is running on an Ubuntu system with the user "sreya". The command entered was "sudo apt install phpmyadmin php-mbstring php-zip php-gd php-json php-curl". The output shows that "php-curl" and "php-gd" are already the newest version. It lists several additional packages that will be installed, including dbconfig-common, dbconfig-mysql, etc. It also lists suggested and recommended packages like php-imagick, php-dbase, etc.

```
sreya@sreya-VirtualBox: ~
sreya@sreya-VirtualBox: $ sudo apt install phpmyadmin php-mbstring php-zip php-
gd php-json php-curl
Reading package lists... Done
Building dependency tree... Done
Reading state information... Done
php-curl is already the newest version (2:7.4+76ubuntu1).
php-gd is already the newest version (2:7.4+76ubuntu1).
The following additional packages will be installed:
  dbconfig-common dbconfig-mysql icc-profiles-free javascript-common
  libjs-jquery libjs-openlayers libjs-sphinxdoc libjs-underscore libonig5
  libzip4 php-bacon-qr-code php-bz2 php-dasprid-enum php-google-recaptcha
  php-phpmyadmin-motranslator php-phpmyadmin-shapefile
  php-phpmyadmin-sql-parser php-phraseclib php-psr-cache php-psr-container
  php-psr-log php-symfony-cache php-symfony-cache-contracts
  php-symfony-expression-language php-symfony-service-contracts
  php-symfony-var-exporter php-tcpdf php-twig php-twig-extensions php-xml
  php7.4-bz2 php7.4-mbstring php7.4-xml php7.4-zip
Suggested packages:
  php-imagick php-dbase php-libsodium php-mcrypt php-gmp
  php-symfony-service-implementation php-twig-doc php-symfony-translation
  php-recode php-gd2 php-pragmarx-google2fa php-samyoul-u2f-php-server
Recommended packages:
  php-mcrypt
The following NEW packages will be installed:
  dbconfig-common dbconfig-mysql icc-profiles-free javascript-common
  libjs-jquery libjs-openlayers libjs-sphinxdoc libjs-underscore libonig5
  libzip4 php-bacon-qr-code php-bz2 php-dasprid-enum php-google-recaptcha
  php-json php-mbstring php-phpmyadmin-motranslator php-phpmyadmin-shapefile
  php-pharphpmyadmin-sql-parser php-phraseclib php-psr-cache php-psr-container
```

ubuntu [Running] - Oracle VM VirtualBox

File Machine View Input Devices Help

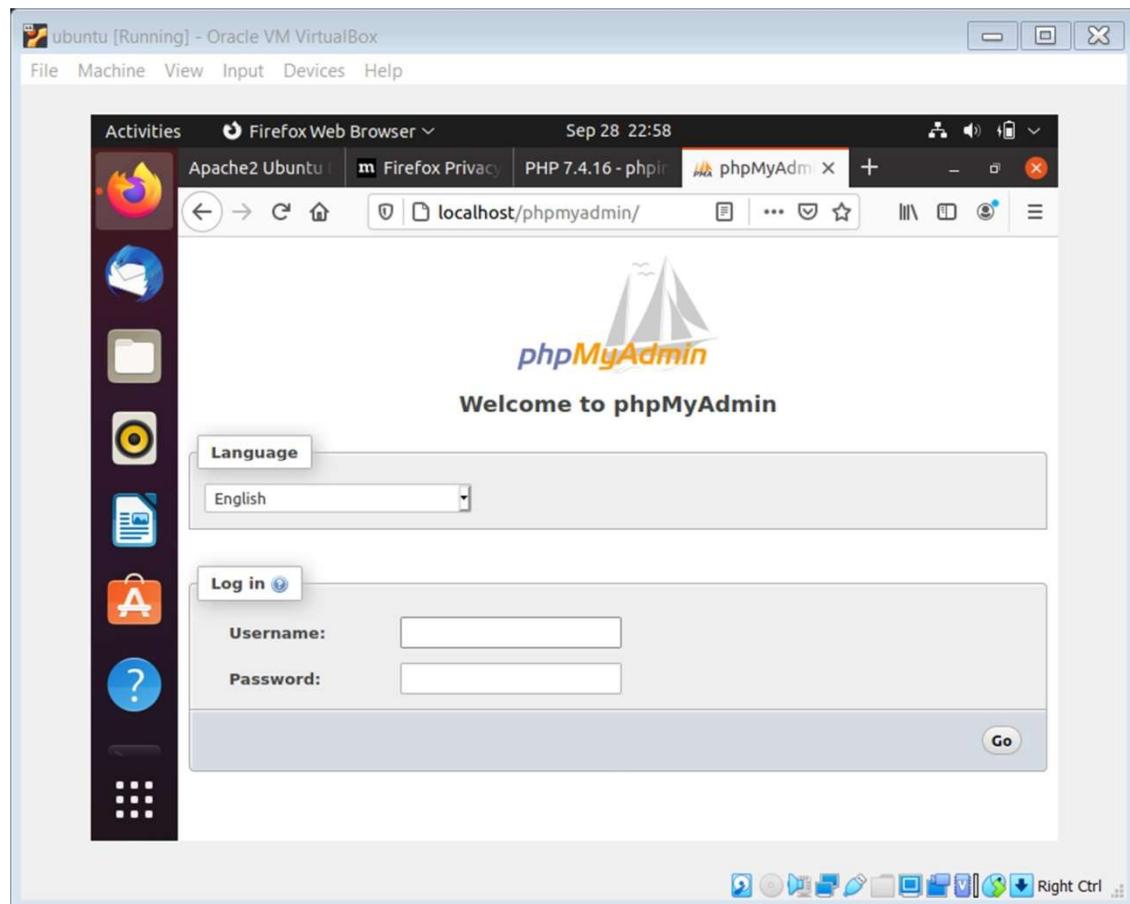
Activities Terminal Sep 28 22:51 sreya@sreya-VirtualBox: ~

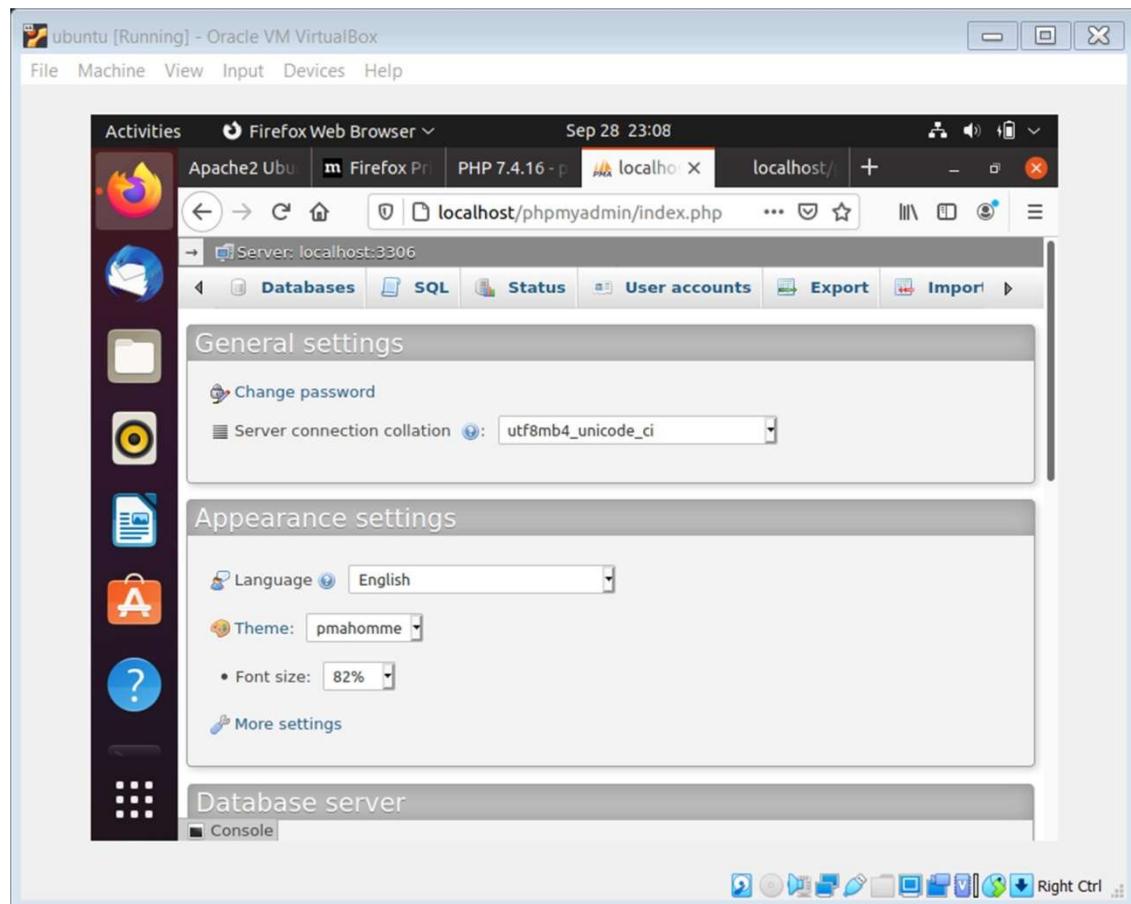
```
Setting up php-symfony-expression-language (4.4.19+dfsg-1) ...
Setting up php-phpmyadmin-sql-parser (5.4.1-1) ...
Setting up php-twig (2.14.3-1) ...
Setting up libjs-sphinxdoc (3.5.4-1) ...
Setting up php-twig-extensions (1.5.4-2) ...
Setting up php-phpmyadmin-motranslator (5.2.0-1) ...
Setting up phpmyadmin (4:4.9.7+dfsg1-1) ...
Determining localhost credentials from /etc/mysql/debian.cnf: succeeded.
dbconfig-common: writing config to /etc/dbconfig-common/phpmyadmin.conf

Creating config file /etc/dbconfig-common/phpmyadmin.conf with new version

Creating config file /etc/phpmyadmin/config-db.php with new version
checking privileges on database phpmyadmin for phpmyadmin@localhost: user creation needed.
granting access to database phpmyadmin for phpmyadmin@localhost: success.
verifying access for phpmyadmin@localhost: success.
creating database phpmyadmin: success.
verifying database phpmyadmin exists: success.
populating database via sql... done.
dbconfig-common: flushing administrative password
Processing triggers for libapache2-mod-php7.4 (7.4.16-1ubuntu2.1) ...
Processing triggers for hicolor-icon-theme (0.17-2) ...
Processing triggers for libc-bin (2.33-0ubuntu5) ...
Processing triggers for man-db (2.9.4-2) ...
Processing triggers for php7.4-cli (7.4.16-1ubuntu2.1) ...
sreya@sreya-VirtualBox:~$ sudo systemctl restart apache2
sreya@sreya-VirtualBox:~$
```

Right Ctrl





TCPDUMP

Execute tcpdump and its options on your own system, and submit the output screenshot as a document.

```
user@user-VirtualBox:~$ sudo apt update
Hit:1 http://in.archive.ubuntu.com/ubuntu hirsute InRelease
Get:2 http://in.archive.ubuntu.com/ubuntu hirsute-updates InRelease [115 kB]
Get:3 http://security.ubuntu.com/ubuntu hirsute-security InRelease [110 kB]
Get:4 http://in.archive.ubuntu.com/ubuntu hirsute-backports InRelease [101 kB]
Get:5 http://in.archive.ubuntu.com/ubuntu hirsute-updates/main amd64 Packages [387 kB]
Get:6 http://security.ubuntu.com/ubuntu hirsute-security/main amd64 Packages [256 kB]
Get:7 http://in.archive.ubuntu.com/ubuntu hirsute-updates/main i386 Packages [196 kB]
Get:8 http://security.ubuntu.com/ubuntu hirsute-security/main i386 Packages [109 kB]
Get:9 http://security.ubuntu.com/ubuntu hirsute-security/main Translation-en [65.8 kB]
Get:10 http://security.ubuntu.com/ubuntu hirsute-security/main amd64 DEP-11 Metadata [9,692 B]
Get:11 http://security.ubuntu.com/ubuntu hirsute-security/main DEP-11 48x48 Icons [7,781 B]
Get:12 http://security.ubuntu.com/ubuntu hirsute-security/main DEP-11 64x64 Icons [19.5 kB]
Get:13 http://security.ubuntu.com/ubuntu hirsute-security/main DEP-11 64x64@2 Icons [29 B]
Get:14 http://security.ubuntu.com/ubuntu hirsute-security/main amd64 c-n-f Metadata [4,364 B]
Get:15 http://security.ubuntu.com/ubuntu hirsute-security/restricted i386 Packages [19.6 kB]
Get:16 http://security.ubuntu.com/ubuntu hirsute-security/restricted amd64 Packages [193 kB]

user@user-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).
tcpdump set to manually installed.
0 upgraded, 0 newly installed, 0 to remove and 261 not upgraded.
```

```
user@user-VirtualBox: $ sudo tcpdump
tcpdump: verbose output suppressed, use -v or -vv for full protocol decode
listening on enp0s3, link-type EN10MB (Ethernet), capture size 262144 bytes
22:35:43.096496 IP user-VirtualBox.52756 > 192.168.43.61.domain: 14990+ AAAA? c
onnectivity-check.ubuntu.com. (47)
22:35:43.099177 IP user-VirtualBox.47396 > 192.168.43.61.domain: 56609+ PTR? 61
.43.168.192.in-addr.arpa. (44)
22:35:43.102774 IP 192.168.43.61.domain > user-VirtualBox.52756: 14990 0/0/0 (4
7)
22:35:43.103651 IP user-VirtualBox.42351 > 192.168.43.61.domain: 10733+ AAAA? c
onnectivity-check.ubuntu.com. (47)
22:35:43.104566 IP 192.168.43.61.domain > user-VirtualBox.47396: 56609 NXDomain
0/0/0 (44)
22:35:43.104872 IP user-VirtualBox.46334 > 192.168.43.61.domain: 14226+ PTR? 15
.2.0.10.in-addr.arpa. (40)
22:35:43.110878 IP 192.168.43.61.domain > user-VirtualBox.42351: 10733 0/0/0 (4
7)
22:35:43.111069 IP 192.168.43.61.domain > user-VirtualBox.46334: 14226 NXDomain
0/0/0 (40)
22:35:48.178317 ARP, Request who-has _gateway tell user-VirtualBox, length 28
22:35:48.178789 ARP, Reply _gateway is-at 52:54:00:12:35:02 (oui Unknown), leng
th 46
22:35:48.179357 IP user-VirtualBox.38508 > 192.168.43.61.domain: 13786+ PTR? 2.
2.0.10.in-addr.arpa. (39)
22:35:48.185684 IP 192.168.43.61.domain > user-VirtualBox.38508: 13786 NXDomain
0/0/0 (39)
22:36:30.814802 IP user-VirtualBox.48226 > golem.canonical.com.ntp: NTPv4, Cli
ent, length 48
22:36:30.815449 IP user-VirtualBox.50479 > 192.168.43.61.domain: 55817+ PTR? 19
```

```
user@user-VirtualBox: $ 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]
user@user-VirtualBox: $ sudo tcpdump -i enp0s3
tcpdump: verbose output suppressed, use -v or -vv for full protocol decode
listening on enp0s3, link-type EN10MB (Ethernet), capture size 262144 bytes
22:50:43.144460 IP user-VirtualBox.60535 > 192.168.43.61.domain: 14178+ AAAA? c
onnectivity-check.ubuntu.com. (47)
22:50:43.147672 IP user-VirtualBox.55157 > 192.168.43.61.domain: 31041+ PTR? 61
.43.168.192.in-addr.arpa. (44)
22:50:43.153932 IP 192.168.43.61.domain > user-VirtualBox.55157: 31041 NXDomain
0/0/0 (44)
22:50:43.153999 IP 192.168.43.61.domain > user-VirtualBox.60535: 14178 0/0/0 (4
7)
22:50:43.158000 IP user-VirtualBox.35252 > 192.168.43.61.domain: 5270+ AAAA? co
nnectivity-check.ubuntu.com. (47)
22:50:43.158935 IP user-VirtualBox.38348 > 192.168.43.61.domain: 31898+ PTR? 15
.2.0.10.in-addr.arpa. (40)
22:50:43.163687 IP 192.168.43.61.domain > user-VirtualBox.38348: 31898 NXDomain
0/0/0 (40)
22:50:43.163840 IP 192.168.43.61.domain > user-VirtualBox.35252: 5270 0/0/0 (47
)
^C
8 packets captured
8 packets received by filter
0 packets dropped by kernel
user@user-VirtualBox: $
```

```
user@user-VirtualBox:~$ sudo tcpdump -c 5
tcpdump: verbose output suppressed, use -v or -vv for full protocol decode
listening on enp0s3, link-type EN10MB (Ethernet), capture size 262144 bytes
22:53:02.839791 IP user-VirtualBox.35832 > 17.111.232.35.bc.googleusercontent.com.http: Flags [S], seq 2252282441, win 64240, options [mss 1460,sackOK,TS val 1355810980 ecr 0,nop,wscale 7], length 0
22:53:02.843585 IP user-VirtualBox.52447 > 192.168.43.61.domain: 15047+ PTR? 17.111.232.35.in-addr.arpa. (44)
22:53:03.181668 IP 192.168.43.61.domain > user-VirtualBox.52447: 15047 1/0/0 PTR 17.111.232.35.bc.googleusercontent.com. (96)
22:53:03.181767 IP 17.111.232.35.bc.googleusercontent.com.http > user-VirtualBox.35832: Flags [S.], seq 25792001, ack 2252282442, win 65535, options [mss 1460], length 0
22:53:03.181861 IP user-VirtualBox.35832 > 17.111.232.35.bc.googleusercontent.com.http: Flags [.], ack 1, win 64240, length 0
5 packets captured
11 packets received by filter
0 packets dropped by kernel
user@user-VirtualBox:~$ 
user@user-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
22:58:02.929149 IP user-VirtualBox.56544 > 32.121.122.34.bc.googleusercontent.com.http: Flags [S], seq 2618927208, win 64240, options [mss 1460,sackOK,TS val 2857115208 ecr 0,nop,wscale 7], length 0
22:58:03.954216 IP user-VirtualBox.56544 > 32.121.122.34.bc.googleusercontent.com.http: Flags [S], seq 2618927208, win 64240, options [mss 1460,sackOK,TS val 2857116233 ecr 0,nop,wscale 7], length 0
22:58:05.970401 IP user-VirtualBox.56544 > 32.121.122.34.bc.googleusercontent.com.http: Flags [S], seq 2618927208, win 64240, options [mss 1460,sackOK,TS val 2857118249 ecr 0,nop,wscale 7], length 0
22:58:06.329693 IP 32.121.122.34.bc.googleusercontent.com.http > user-VirtualBox.56544: Flags [S.], seq 27584001, ack 2618927209, win 65535, options [mss 1460], length 0
22:58:06.329956 IP user-VirtualBox.56544 > 32.121.122.34.bc.googleusercontent.com.http: Flags [.], ack 1, win 64240, length 0
5 packets captured
5 packets received by filter
0 packets dropped by kernel
user@user-VirtualBox:~$ 
```

```
user@user-VirtualBox: $ sudo tcpdump host 10.0.2.15
tcpdump: verbose output suppressed, use -v or -vv for full protocol decode
listening on enp0s3, link-type EN10MB (Ethernet), capture size 262144 bytes
23:00:43.069082 IP user-VirtualBox.57588 > 192.168.43.61.domain: 53290+ AAAA? c
onnectivity-check.ubuntu.com. (47)
23:00:43.073490 IP user-VirtualBox.39199 > 192.168.43.61.domain: 61578+ PTR? 61
.43.168.192.in-addr.arpa. (44)
23:00:43.080177 IP 192.168.43.61.domain > user-VirtualBox.39199: 61578 NXDomain
0/0/0 (44)
23:00:43.082492 IP user-VirtualBox.59530 > 192.168.43.61.domain: 13935+ PTR? 15
.2.0.10.in-addr.arpa. (40)
23:00:43.090704 IP 192.168.43.61.domain > user-VirtualBox.59530: 13935 NXDomain
0/0/0 (40)
23:00:43.160474 IP 192.168.43.61.domain > user-VirtualBox.57588: 53290 0/1/0 (1
08)
23:00:43.164263 IP user-VirtualBox.49922 > 192.168.43.61.domain: 10927+ AAAA? c
onnectivity-check.ubuntu.com. (47)
23:00:43.172960 IP 192.168.43.61.domain > user-VirtualBox.49922: 10927 0/0/0 (4
7)
23:00:48.082871 ARP, Request who-has _gateway tell user-VirtualBox, length 28
23:00:48.083799 ARP, Reply _gateway is-at 52:54:00:12:35:02 (oui Unknown), leng
th 46
23:00:48.084889 IP user-VirtualBox.41862 > 192.168.43.61.domain: 52243+ PTR? 2.
2.0.10.in-addr.arpa. (39)
23:00:48.095696 IP 192.168.43.61.domain > user-VirtualBox.41862: 52243 NXDomain
0/0/0 (39)
^C
12 packets captured
12 packets received by filter
```



ANSIBLE INSTALLATION

1. sudo apt-get install ansible

```
user@user-VirtualBox:~$ sudo apt-get install ansible
[sudo] password for user:
Reading package lists... Done
Building dependency tree... Done
Reading state information... Done
The following additional packages will be installed:
  ansible-base ieee-data python3-argcomplete python3-distutils
  python3-dnspython python3-ecdsa python3-jinja2 python3-jmespath
  python3-kerberos python3-lib2to3 python3-libcloud python3-netaddr
  python3-ntlm-auth python3-packaging python3-pycryptodome python3-pyparsing
  python3-requests-kerberos python3-requests-ntlm python3-selinux
  python3-winrm python3-xmldict
Suggested packages:
  cowsay sshpass python-jinja2-doc ipython3 python-netaddr-docs
  python-pyparsing-doc
The following NEW packages will be installed:
  ansible ansible-base ieee-data python3-argcomplete python3-distutils
  python3-dnspython python3-ecdsa python3-jinja2 python3-jmespath
  python3-kerberos python3-libcloud python3-netaddr python3-ntlm-auth
  python3-packaging python3-pycryptodome python3-pyparsing
  python3-requests-kerberos python3-requests-ntlm python3-selinux
  python3-winrm python3-xmldict
The following packages will be upgraded:
  python3-lib2to3
1 upgraded, 21 newly installed, 0 to remove and 235 not upgraded.
Need to get 31.8 MB of archives.
After this operation, 275 MB of additional disk space will be used.
Do you want to continue? [Y/n] y
Get:1 http://in.archive.ubuntu.com/ubuntu hirsute/main amd64 python3-jinja2 all
```

2. ansible --version

```
user@user-VirtualBox:~$ ansible --version
ansible 2.10.5
  config file = None
  configured module search path = ['/home/user/.ansible/plugins/modules', '/usr/share/ansible/plugins/modules']
  ansible python module location = /usr/lib/python3/dist-packages/ansible
  executable location = /usr/bin/ansible
  python version = 3.9.4 (default, Apr  4 2021, 19:38:44) [GCC 10.2.1 20210401]
```

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 and  
View"echo  
"===== "  
  
echo Enter your Name  
read name echo  
Enter your College  
nameread college  
clear  
echo Details you  
enteredecho Name:  
$name  
echo College: $college
```

```
user@user-VirtualBox: ~ bash 1.sh  
enter details and view  
enter your name  
sreya  
enter your college name  
amal jyothi college
```

```
Details you entered  
Name:sreya  
College:amal jyothi college  
user@user-VirtualBox: ~
```

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

```
#!/bin/bash  
  
echo "Display value of a Variable  
"  
echo
```

```
"=====
```

```
a=10  
echo "$a"
```

```
user@user-VirtualBox:~$ bash 2.sh  
Display value of a variable  
50
```

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

```
#!/bin/bash  
  
echo "ARITHMETIC  
OPERATIONS"  
echo  
"=====."  
  
echo "Enter a  
number"  
read a  
  
echo "Enter another number"  
  
read b  
  
echo "Enter operation needed"  
  
echo "\n1.Addition\n2.Subtraction\n3.Multiplication\n4.Division"  
  
read op  
  
case "$op" in  
"1") echo "a+b=\"$((a+b))";;  
"2") echo "a-b=\"$((a-b))";;  
"3") echo "a*b=\"$((a*b))";;  
"4") echo "a/b=\"$((a/b))";;  
esac
```

```
user@user-VirtualBox:~$ bash 3.sh
enter a number
5
enter another number
6
enter operation
\n1.addition \n2.subtraction \n3.multiplication \n4.division
1
a+b=11
```

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 "Finding a number"
echo
"====="

echo "Enter a
number"read a if [ $a
== 10 ]; then
echo "Number found
;)"else
echo "Number NOT found
!"fi
```

```
user@user-VirtualBox:~$ bash 4.sh
enter a number
10
number found
```

5. Write a shell script to display current date,

```
calendar.#!/bin/bash

echo "Time and Calendar"
echo
"====="

echo "Today is
$(date)"echo ""

echo "Calendar :"
```

```
cal
```

```
user@user-VirtualBox:~$ bash 5.sh
Today is Saturday 02 October 2021 05:53:45 PM IST
calender:
    October 2021
Su Mo Tu We Th Fr Sa
        1  2
3  4  5  6  7  8  9
10 11 12 13 14 15 16
17 18 19 20 21 22 23
24 25 26 27 28 29 30
31
```

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

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

```
user@user-VirtualBox: $ bash 6.sh
enter a number
9
number is odd
```

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

```
#!/bin/bash
echo "Comparing numbers"
```

```
echo "====="

echo "Enter first
number"read a

echo "Enter second
number"read b

if [ $a -gt $b ];
then

echo "$a is greater"

elif [ $b -gt $a ];
then

echo "$b is greater"

else

echo "Both are Equal" fi
```

```
user@user-VirtualBox:~$ bash 7.sh
enter first number
23
enter second number
22
23 is larger
```

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

```
numbers.#!/bin/bash

echo "Sum of Numbers

"echo

"====="

s=0

for (( i=1;i<=10;i++ ))

do s=`expr $s + $i` 

done

echo "Sum of first 10 numbers = $s"
```

```
user@user-VirtualBox:~$ bash 8.sh
sum of first 10 numbers=55
```

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

```
#!/bin/bash
echo "AVG, SUM & Product of 4
No." echo
=====
echo "Please enter your first number:
"read a
echo "Second number:
"read b
```

```

echo "Third number:
"read c

echo "Fourth number:
"read d

sum=$((a + b + c + d))

avg=$(echo $sum / 4 | bc
-l)prod=$((a * b * c * d))

echo "The sum of these numbers is: " $sum
echo "The average of these numbers is: "
$avg echo "The product of these numbers is:
" $prod

```

```

user@user-VirtualBox:~$ bash 9.sh
please enter your first number
1
please enter your second number
2
please enter your third number
3
please enter your fourth number
4
the sum is:10
the average is:2.500000000000000000000000
the product is:24

```

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

numbers.

```

#!/bin/bash

echo "LARGEST OF THREE"
echo "=====
echo "Enter first
number"read a
echo "Enter second
number"read b
echo "Enter third

```

```
number"read c
```

```
if [$a -gt $b];
```

```
then
```

```
if [$a -gt
```

```
$c];then
```

```
echo "$a is big"
```

```
else e
```

```
cho "$c is
```

```
big"fi
```

```
elif [$b -gt $c];
```

```
then
```

```
echo "$b is big"
```

```
else
```

```
echo "$c is big" fi
```

```
user@user-VirtualBox:~$ bash 10.sh
enter first number
5
enter second number
6
enter third number
7
5 is smallest
```

11. Write a shell program to find factorial of given

number.#!/bin/bash

```
echo "Factorial"
```

```
echo "=====
```

```
echo "Enter a
```

```
number"read num
```

```
fact=1
```

```
for((i=2;i<=num;i++))
```

```
{
```

```
fact=$((fact * i)) #fact = fact * i
```

```
echo "Factorial is $fact"
```

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

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

```
#!/bin/bash
```

```
echo "Palindrome or Not"
```

```
echo
```

```
"=====
```

```
echo "Enter number to
```

```
check"read n
```

```
rev=$(echo $n |
```

```
rev)if [ $n -eq $rev
```

```
]; then
```

```
echo "Number is
```

```
Palindrome"else
```

```
echo "Number is not Palindrome" fi
```

```
user@user-VirtualBox:~$ bash 12.sh
enter a number
121
number is palindrome
```

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 n i=1
```

sum=0

```

echo "Enter
Numbers"while [ $i -
le $n ]
do
read num
sum=$((sum +
num))i=$((i + 1))
done
avg=$(echo $sum / $n | bc
-l)

```

echo \$avg

```

user@user-VirtualBox: $ bash 13.sh
enter size
5
enter numbers
6
7
8
9
4
average is 6.80000000000000000000000000000000

```

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

```

#!/bin/bash
echo "Sum of all digits"
echo
"====="
echo "Enter a
number:"read num
sum=0 while [ $num -
gt 0 ]

```

```

do

mod=$((num % 10))

sum=$((sum +mod))

num=$((num/ 10))

done

echo "Sum of digits is $sum"

```

```

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

```

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

```

#!/bin/bash

echo "LEAP YEAR OR

NOT"echo

"====="

echo "Enter the year"

read y a=`expr $y % 4` b=`expr $y % 100` c=`expr $y %

400`if [ $a -eq 0 -a $b -ne 0 -o $c -eq 0 ];

then

echo "$y is leap year" else echo "$y is not leap

year"fi

```

```

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

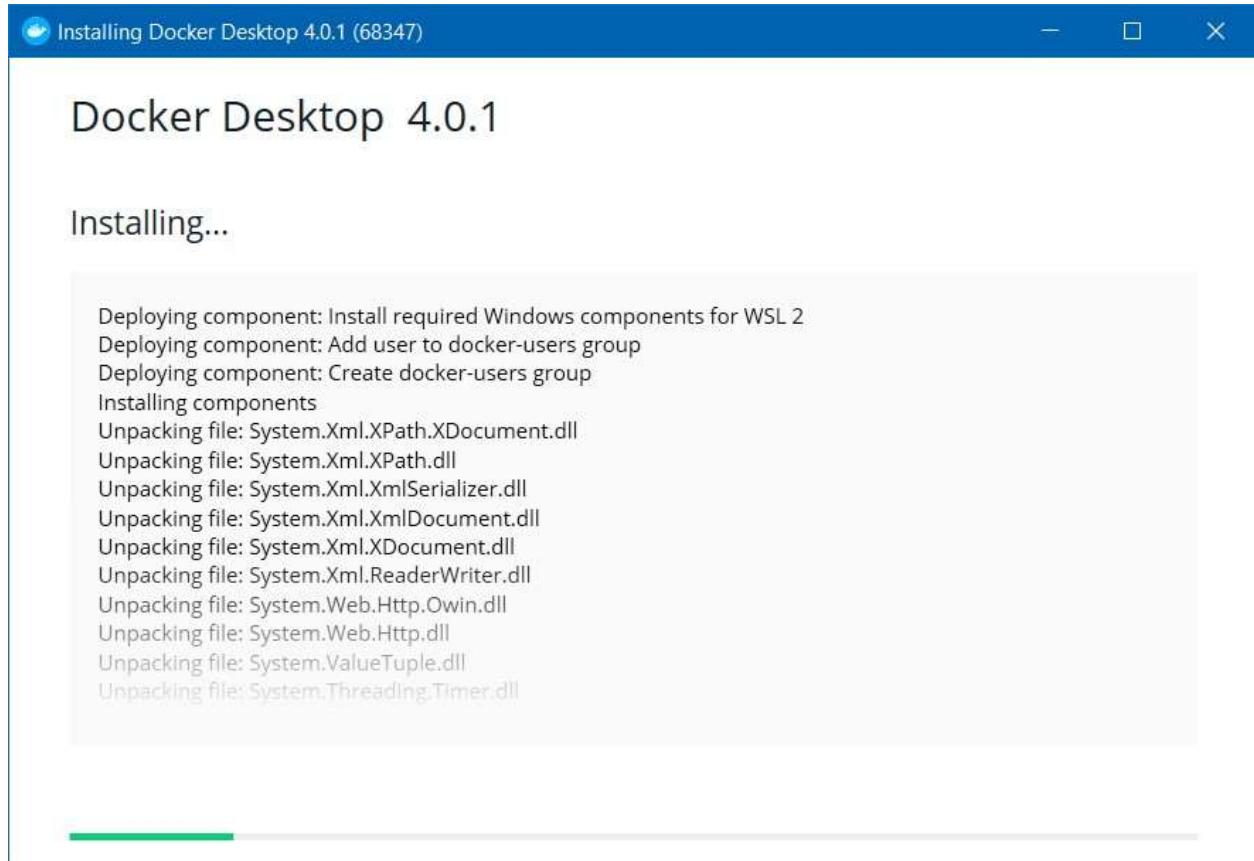
```

Docker Installation

Download Docker Desktop installer for Windows from
<https://desktop.docker.com/win/main/amd64/Docker%20Desktop%20Installer.exe>

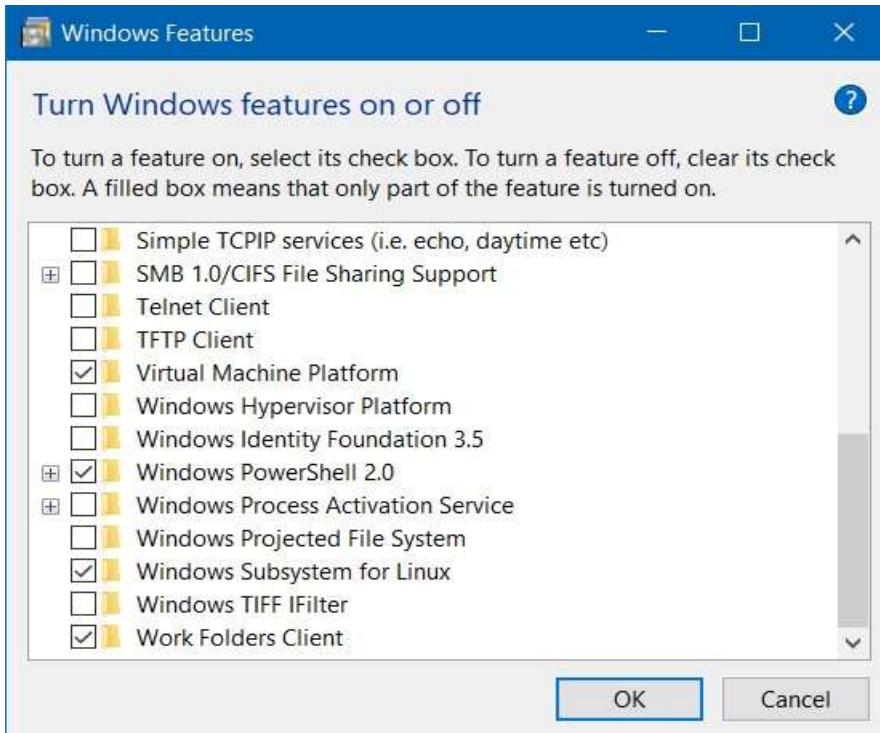


Open the .exe file and follow the steps after clicking install button.

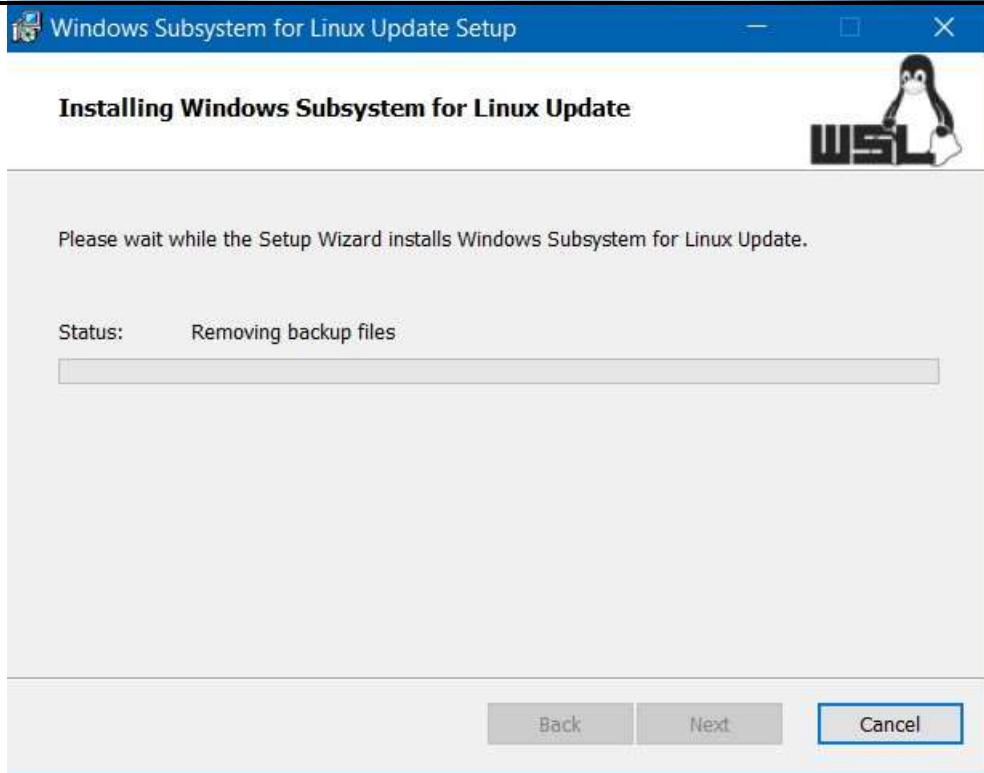


Once installed go to programs and features and click turn on windows features on or off .

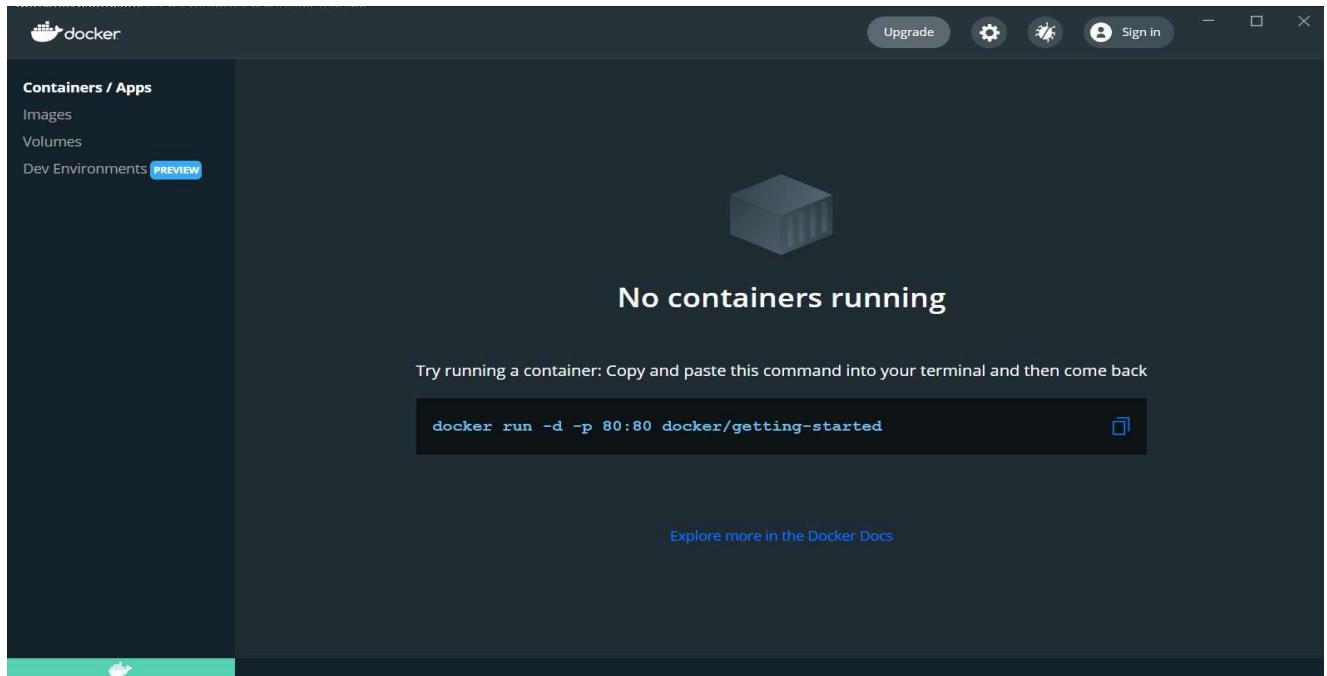
Scroll to the bottom and select windows subsystem for Linux



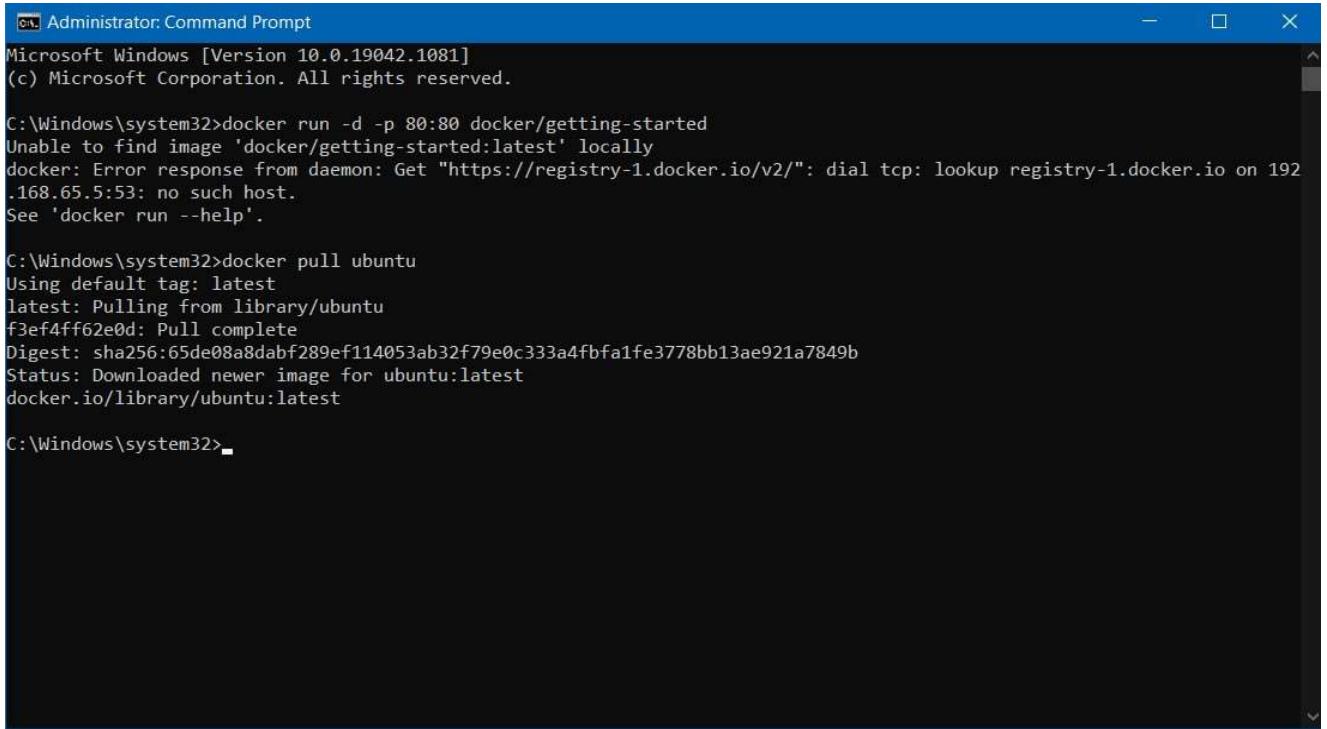
If any WSL 2 error occurs download windows subsystem for linux update package and install the .exe file, after the installation restart the windows device.



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



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

A screenshot of an Administrator Command Prompt window on Windows. The window title is "Administrator: Command Prompt". The text output shows the following commands and their results:

```
Microsoft Windows [Version 10.0.19042.1081]
(c) Microsoft Corporation. All rights reserved.

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

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

C:\Windows\system32>
```

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

Containers / Apps

Images

Volumes

Dev Environments [PREVIEW](#)

Images on disk

1 images

Total size: 72.78 MB

IN USE

UNUSED

[Clean up...](#)

LOCAL

REMOTE REPOSITORIES

Search

In Use only

NAME ↑	TAG	IMAGE ID	CREATED	SIZE
ubuntu	latest	597ce1600cf4	about 8 hours ago	72.78 MB

Wireshark

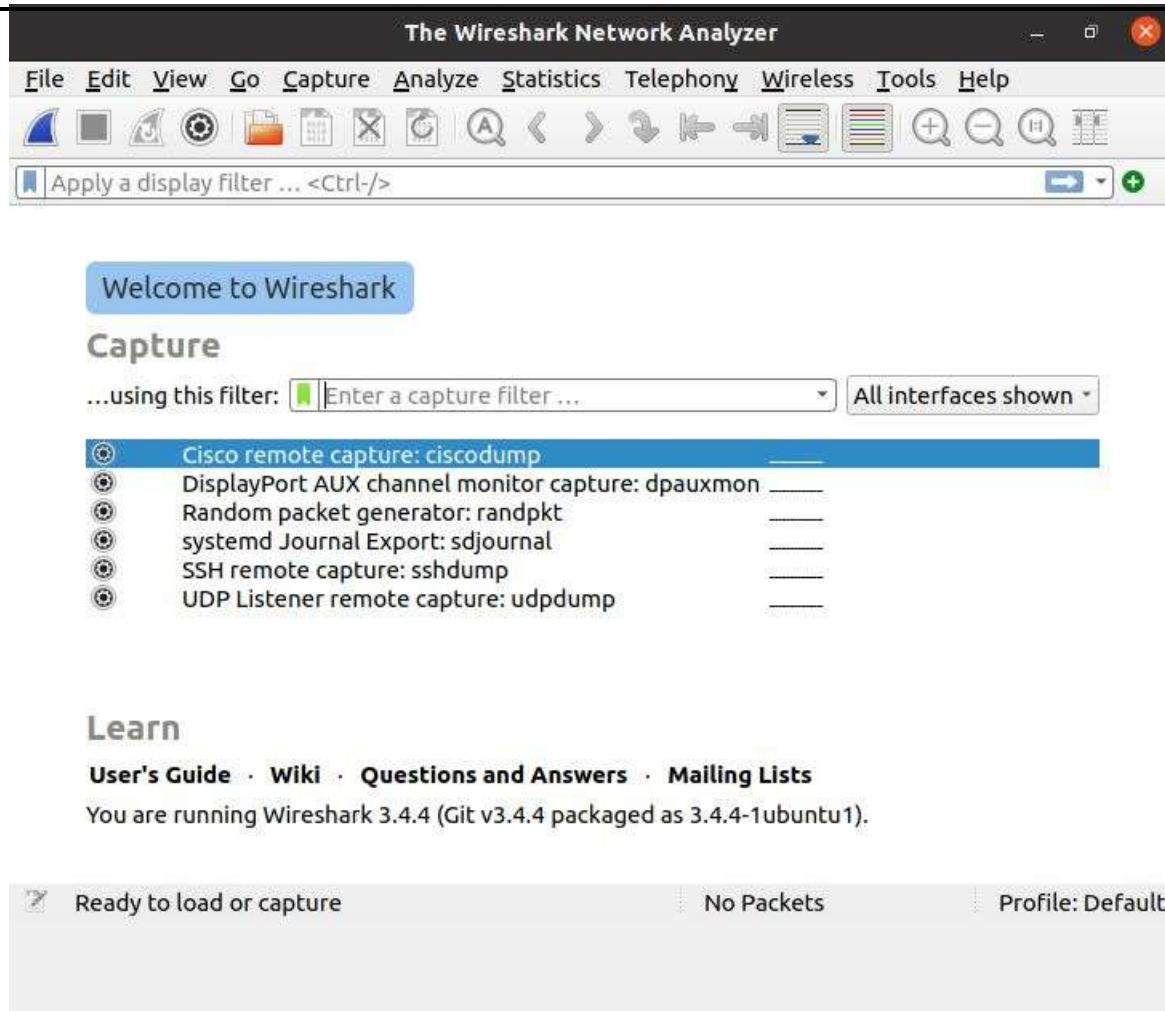
Installing Wireshark on Linux can be a little different depending on the Linux distribution. If you aren't running one of the following distros, please double-check the commands.

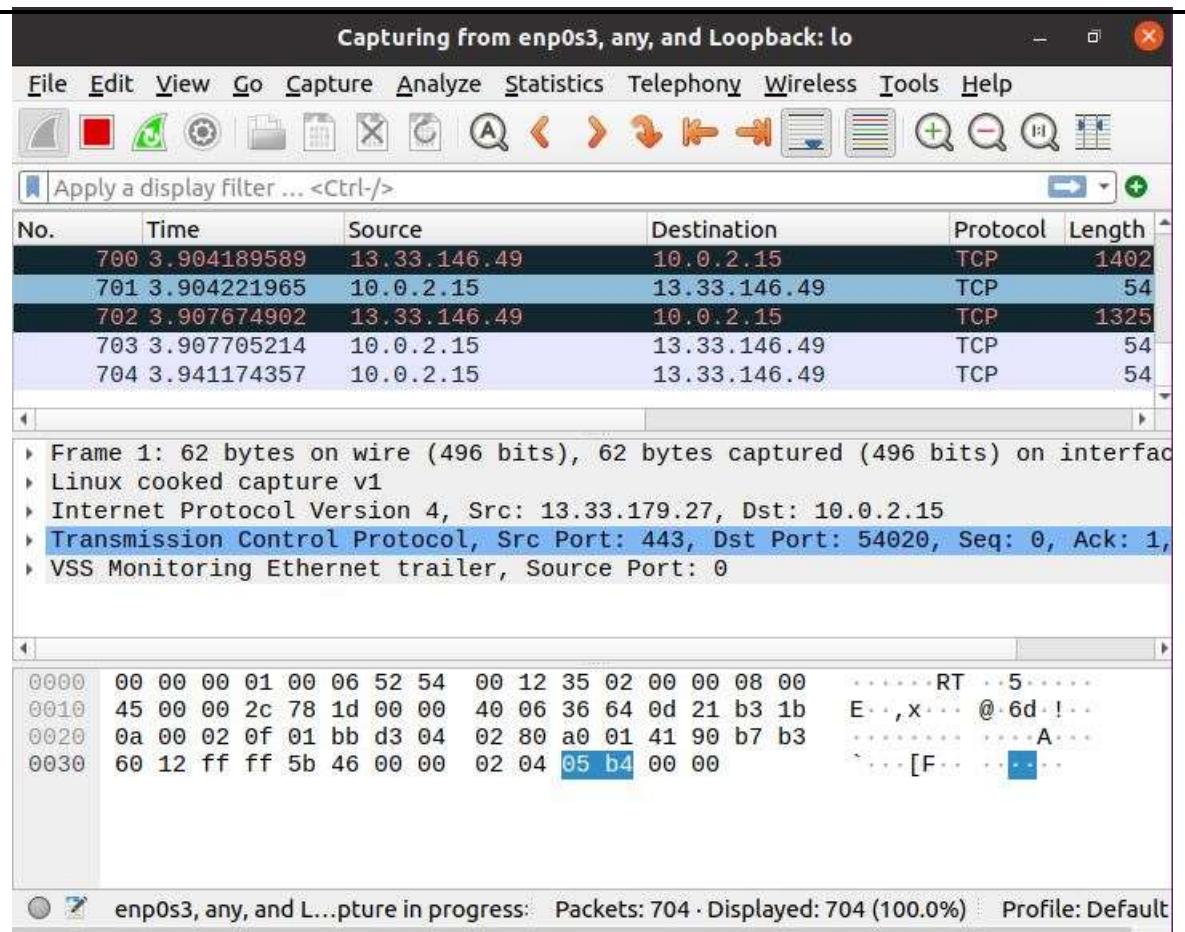
Ubuntu

- From a terminal prompt, run these commands:
- `sudo apt-get install wireshark`
- `sudo dpkg-reconfigure wireshark-common`
- `sudo adduser $USER wireshark`

```
user@user-VirtualBox:~$ sudo apt-get install wireshark
[sudo] password for user:
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 libqt5multimediasupport5
 libqt5multimediacomposition5 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 qtwayland5 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-conversion3 liblua5.2-0 libmd4c0
 libminizip1 libpcre2-16-0 libqt5core5a libqt5dbus5 libqt5gui5
 libqt5multimedia5 libqt5multimedia5-plugins libqt5multimediasupport5
 libqt5multimediacomposition5 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 261 not upgraded.
Need to get 34.0 MB of archives.
After this operation, 170 MB of additional disk space will be used.
```

```
Setting up libwsutil12:amd64 (3.4.4-1ubuntu1) ...
Setting up libqt5core5a:amd64 (5.15.2+dfsg-5ubuntu1) ...
Setting up libwireshark-data (3.4.4-1ubuntu1) ...
Setting up liblua5.2-0:amd64 (5.2.4-1.1build3) ...
Setting up libqt5dbus5:amd64 (5.15.2+dfsg-5ubuntu1) ...
Setting up libmd4c0:amd64 (0.4.7-1) ...
Setting up libqt5network5:amd64 (5.15.2+dfsg-5ubuntu1) ...
Setting up libwiredtap11:amd64 (3.4.4-1ubuntu1) ...
Setting up libwireshark14:amd64 (3.4.4-1ubuntu1) ...
Setting up wireshark-common (3.4.4-1ubuntu1) ...
Setting up libqt5gui5:amd64 (5.15.2+dfsg-5ubuntu1) ...
Setting up libqt5widgets5:amd64 (5.15.2+dfsg-5ubuntu1) ...
Setting up qt5-gtk-platformtheme:amd64 (5.15.2+dfsg-5ubuntu1)
Setting up libqt5multimedia5:amd64 (5.15.2-3) ...
Setting up libqt5printsupport5:amd64 (5.15.2+dfsg-5ubuntu1)
Setting up libqt5multimediacomponents5:amd64 (5.15.2-3) ...
Setting up libqt5multimediacomposition5:amd64 (5.15.2-3) ...
Setting up libqt5multimedia5-plugins:amd64 (5.15.2-3) ...
Setting up libqt5svg5:amd64 (5.15.2-3) ...
Setting up wireshark-qt (3.4.4-1ubuntu1) ...
Setting up wireshark (3.4.4-1ubuntu1) ...
Processing triggers for libc-bin (2.33-0ubuntu5) ...
Processing triggers for man-db (2.9.4-2) ...
Processing triggers for shared-mime-info (2.0-1) ...
Processing triggers for mailcap (3.68ubuntu1) ...
Processing triggers for desktop-file-utils (0.26-1ubuntu1) .
Processing triggers for hicolor-icon-theme (0.17-2) ...
Processing triggers for gnome-menus (3.36.0-1ubuntu1) ...
sangeetha@sangeetha-VirtualBox:~$ █
sangeetha@sangeetha-VirtualBox:~$ sudo adduser $USER wireshark
Adding user `sangeetha' to group `wireshark' ...
Adding user sangeetha to group wireshark
Done.
sangeetha@sangeetha-VirtualBox:~$ █
```





```
user@user-VirtualBox:~$ nc -z -v 10.0.2.15 20-80
nc: connect to 10.0.2.15 port 20 (tcp) failed: Connection refused
nc: connect to 10.0.2.15 port 21 (tcp) failed: Connection refused
nc: connect to 10.0.2.15 port 22 (tcp) failed: Connection refused
nc: connect to 10.0.2.15 port 23 (tcp) failed: Connection refused
nc: connect to 10.0.2.15 port 24 (tcp) failed: Connection refused
nc: connect to 10.0.2.15 port 25 (tcp) failed: Connection refused
nc: connect to 10.0.2.15 port 26 (tcp) failed: Connection refused
nc: connect to 10.0.2.15 port 27 (tcp) failed: Connection refused
nc: connect to 10.0.2.15 port 28 (tcp) failed: Connection refused
nc: connect to 10.0.2.15 port 29 (tcp) failed: Connection refused
nc: connect to 10.0.2.15 port 30 (tcp) failed: Connection refused
nc: connect to 10.0.2.15 port 31 (tcp) failed: Connection refused
nc: connect to 10.0.2.15 port 32 (tcp) failed: Connection refused
nc: connect to 10.0.2.15 port 33 (tcp) failed: Connection refused
nc: connect to 10.0.2.15 port 34 (tcp) failed: Connection refused
nc: connect to 10.0.2.15 port 35 (tcp) failed: Connection refused
nc: connect to 10.0.2.15 port 36 (tcp) failed: Connection refused
nc: connect to 10.0.2.15 port 37 (tcp) failed: Connection refused
nc: connect to 10.0.2.15 port 38 (tcp) failed: Connection refused
nc: connect to 10.0.2.15 port 39 (tcp) failed: Connection refused
nc: connect to 10.0.2.15 port 40 (tcp) failed: Connection refused
nc: connect to 10.0.2.15 port 41 (tcp) failed: Connection refused
nc: connect to 10.0.2.15 port 42 (tcp) failed: Connection refused
nc: connect to 10.0.2.15 port 43 (tcp) failed: Connection refused
nc: connect to 10.0.2.15 port 44 (tcp) failed: Connection refused
nc: connect to 10.0.2.15 port 45 (tcp) failed: Connection refused
```

- When you open Wireshark, you see a screen that shows you a list of all of the network connections you can monitor. You also have a capture filter field, so you only capture the network traffic you want to see.
- You can select one or more of the network interfaces using “shift left-click.” Once you have the network interface selected, you can start the capture, and there are several ways to do that.
- Click the first button on the toolbar, titled “Start Capturing Packets.”