

20MCA136 - Networking & System Administration Lab

LAB RECORD

Submitted by

Abhishek Scariya M B

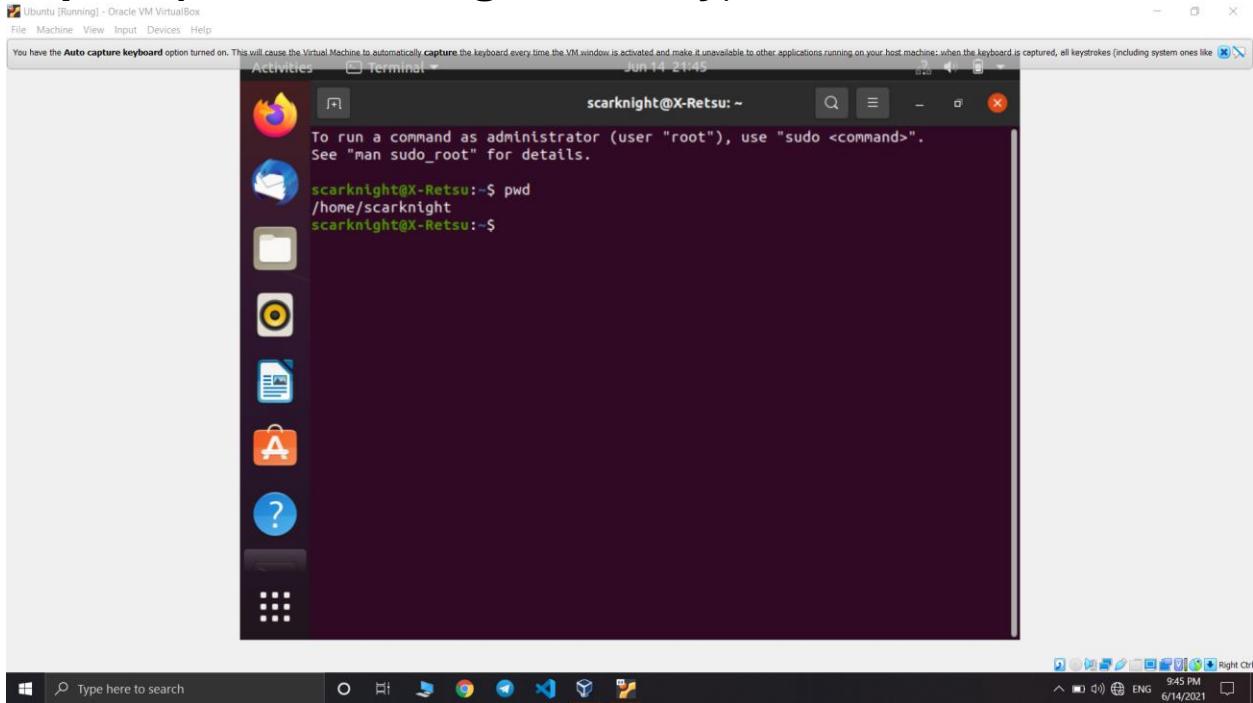
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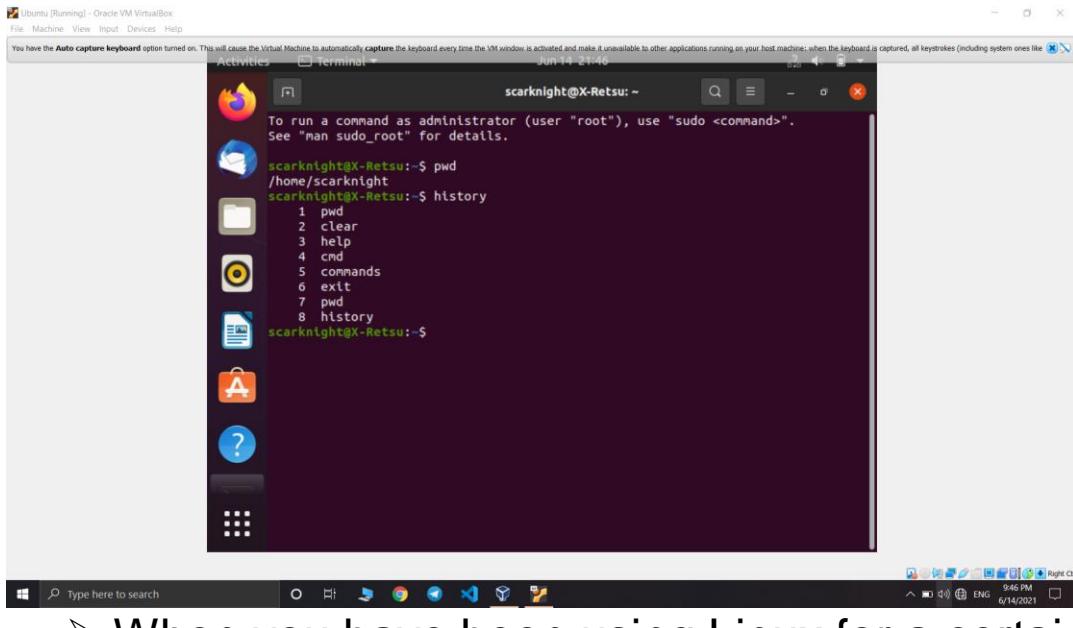
Basic Linux Commands

1. pwd (Print Working Directory)



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

2. history

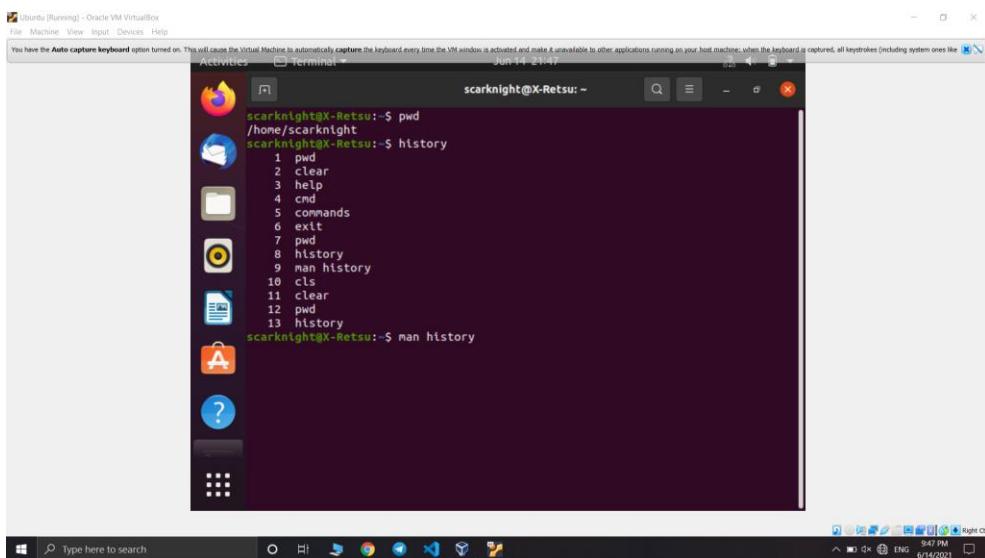


A screenshot of a Linux desktop environment, specifically Ubuntu, running in Oracle VM VirtualBox. The terminal window shows the user's session:

```
scarknight@X-Retsu:~$ pwd  
/home/scarknight  
scarknight@X-Retsu:~$ history  
1 pwd  
2 clear  
3 help  
4 cmd  
5 commands  
6 exit  
7 pwd  
8 history  
scarknight@X-Retsu:~$
```

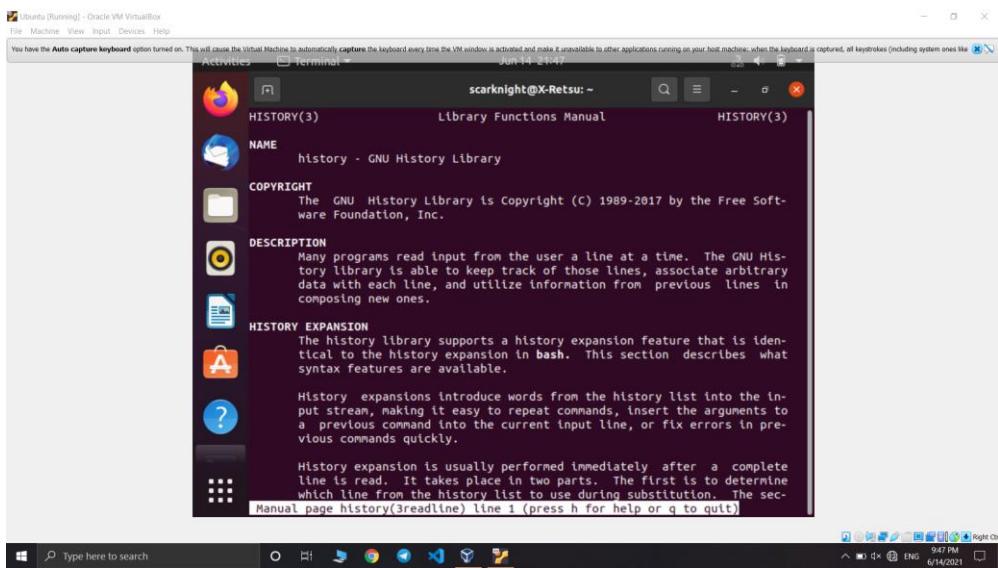
- When you have been using Linux for a certain period of time, you will quickly notice that you can run hundreds of commands everyday. As such, running history command is particularly useful if you want to review the commands you have entered before.
- History
- !command number to run a command from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

3. man



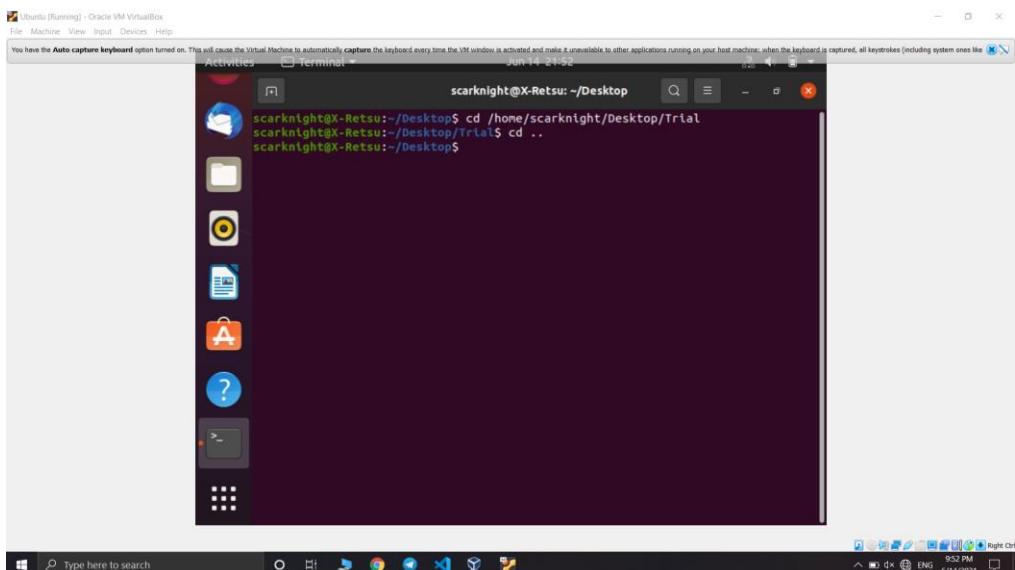
A screenshot of a Linux desktop environment, specifically Ubuntu, running in Oracle VM VirtualBox. The terminal window shows the user's session:

```
scarknight@X-Retsu:~$ pwd  
/home/scarknight  
scarknight@X-Retsu:~$ history  
1 pwd  
2 clear  
3 help  
4 cmd  
5 commands  
6 exit  
7 pwd  
8 history  
9 man history  
10 cls  
11 clear  
12 pwd  
13 history  
scarknight@X-Retsu:~$ man history
```



If we are confused about the function of certain Linux commands we 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.

4. cd

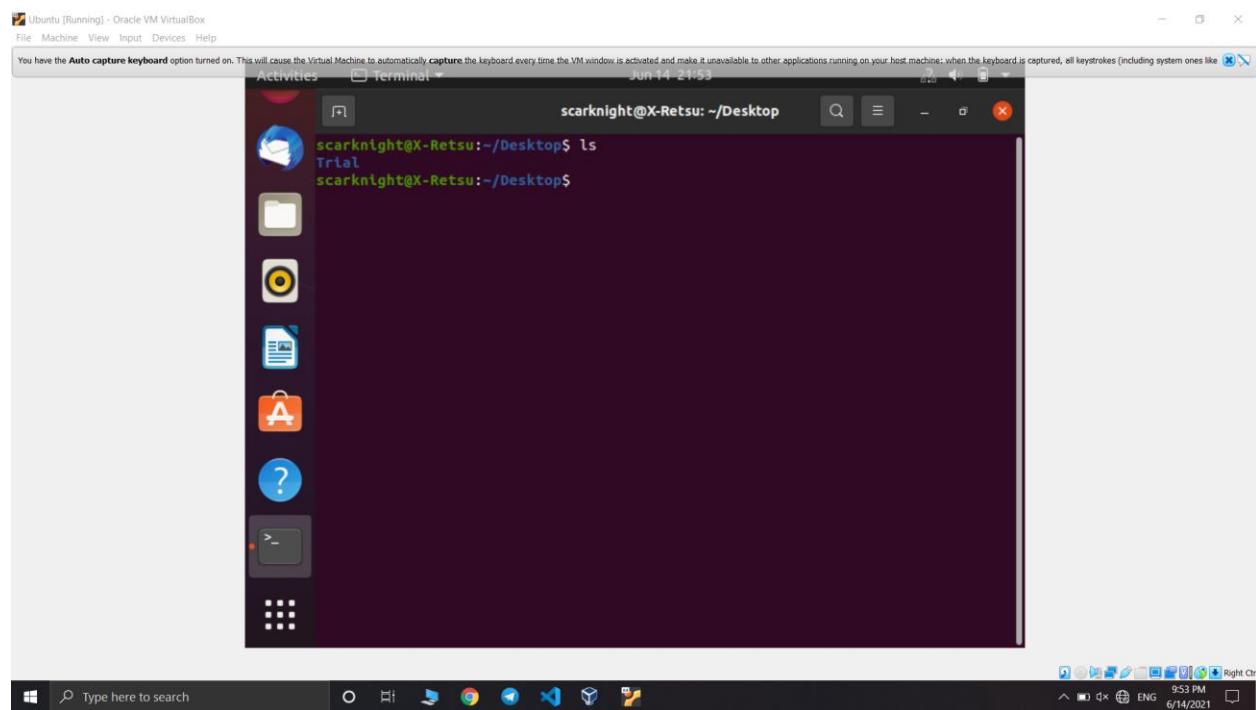


To navigate through the Linux files and directories, use the `cd`. It requires either the full path or the name of the directory, depending on the current working directory that you're in.

Shortcuts to help you navigate quickly:

- `cd ..` (with two dots) to move one directory up
- `cd` to go straight to the home folder
- `cd-` (with a hyphen) to move to your previous directory

5. ls



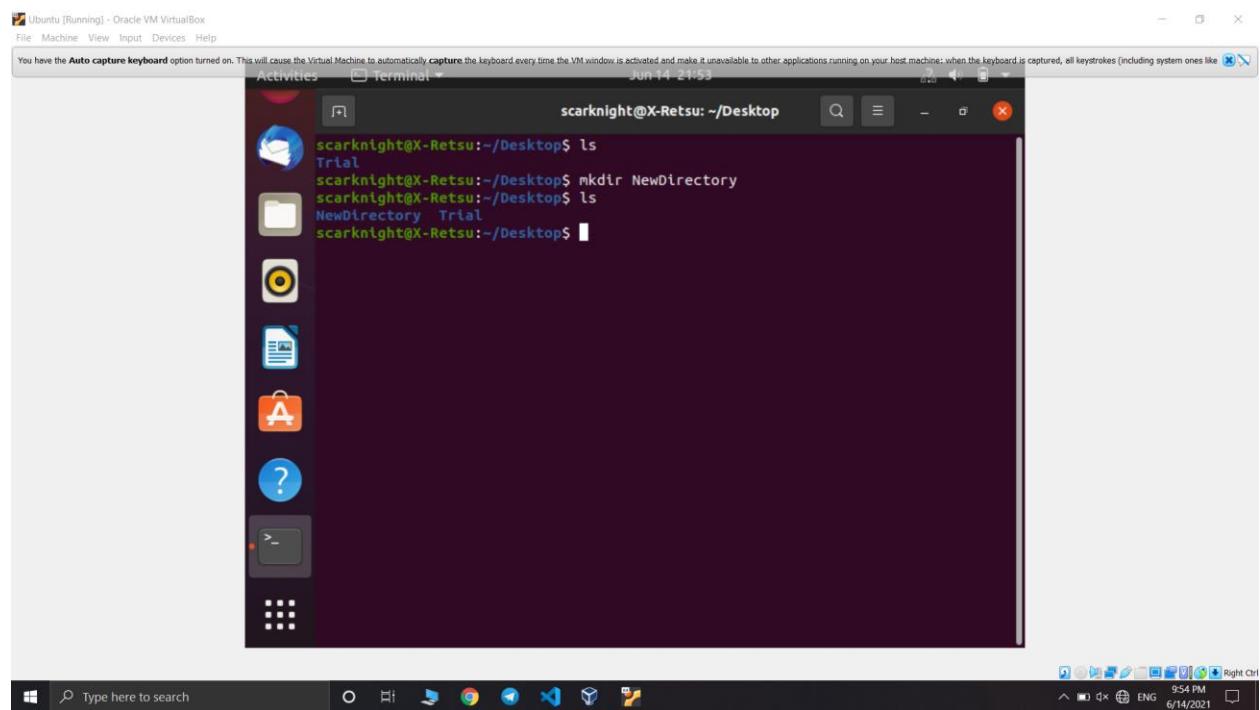
The `ls` command is used to view the contents of a directory.

By default, this command will display the contents of your current working directory.

There are variations you can use with the **ls** command:

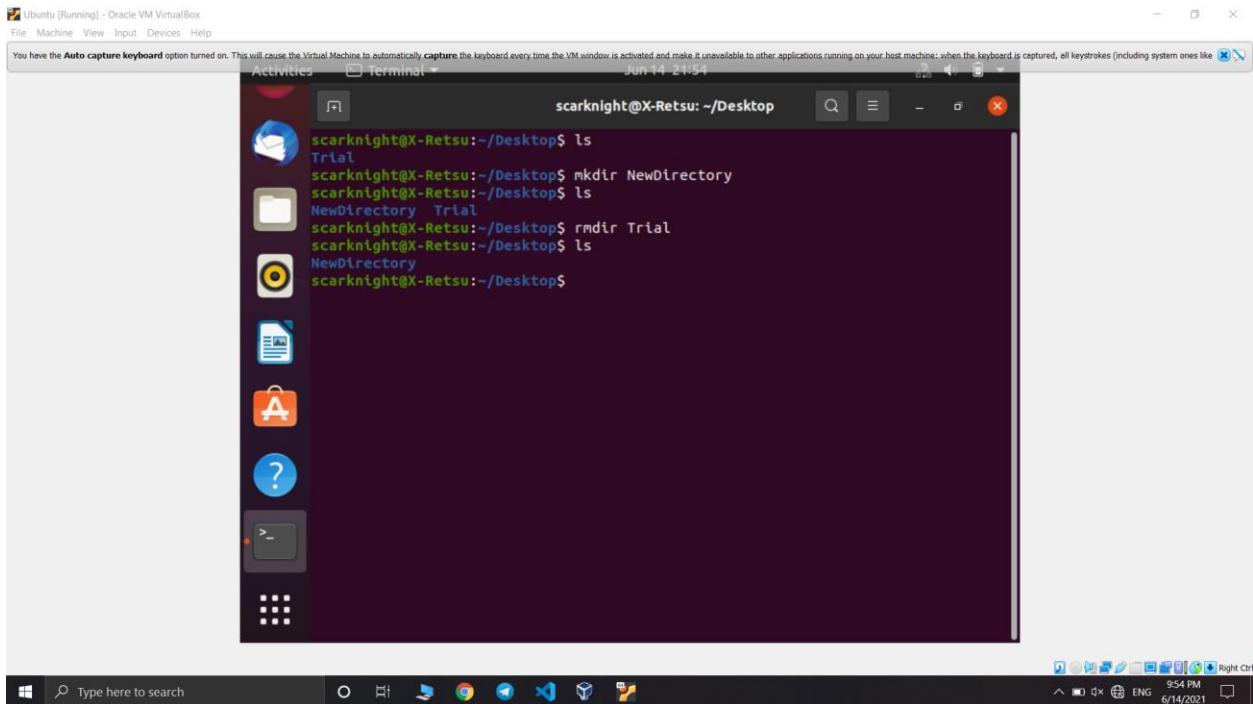
- **ls -R** will list all the files in the sub-directories as well
- **ls -l** – long listing
- **ls -a** will show the hidden files
- **ls -al** will list the files and directories with detailed information like the permissions, size, owner, etc.
- **ls -t** lists files sorted in the order of “last modified”.
- **ls -r** option will reverse the natural sorting order. Usually used in combination with other switches such as **ls -tr**. This will reverse the time-wise listing.

6. mkdir



Use **mkdir** command to make a new directory .
To generate a new directory inside another directory, use this Linux basic command.

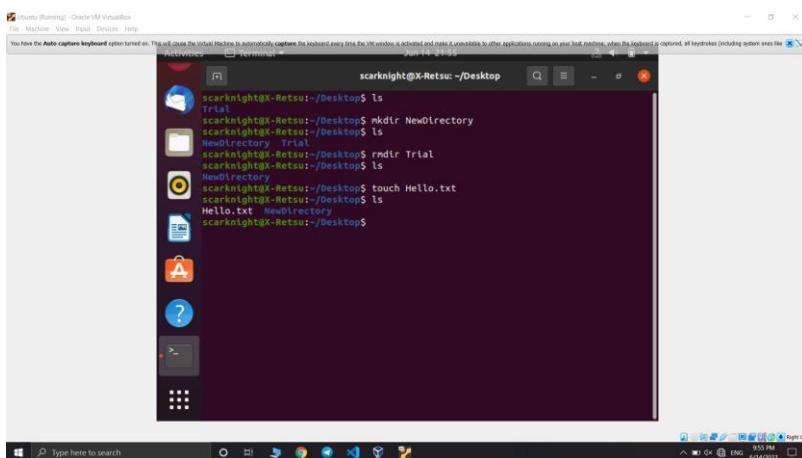
7. rmdir



```
scarknight@X-Retsu:~/Desktop$ ls
Trial
scarknight@X-Retsu:~/Desktop$ mkdir NewDirectory
scarknight@X-Retsu:~/Desktop$ ls
NewDirectory Trial
scarknight@X-Retsu:~/Desktop$ rmdir Trial
scarknight@X-Retsu:~/Desktop$ ls
NewDirectory
scarknight@X-Retsu:~/Desktop$
```

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

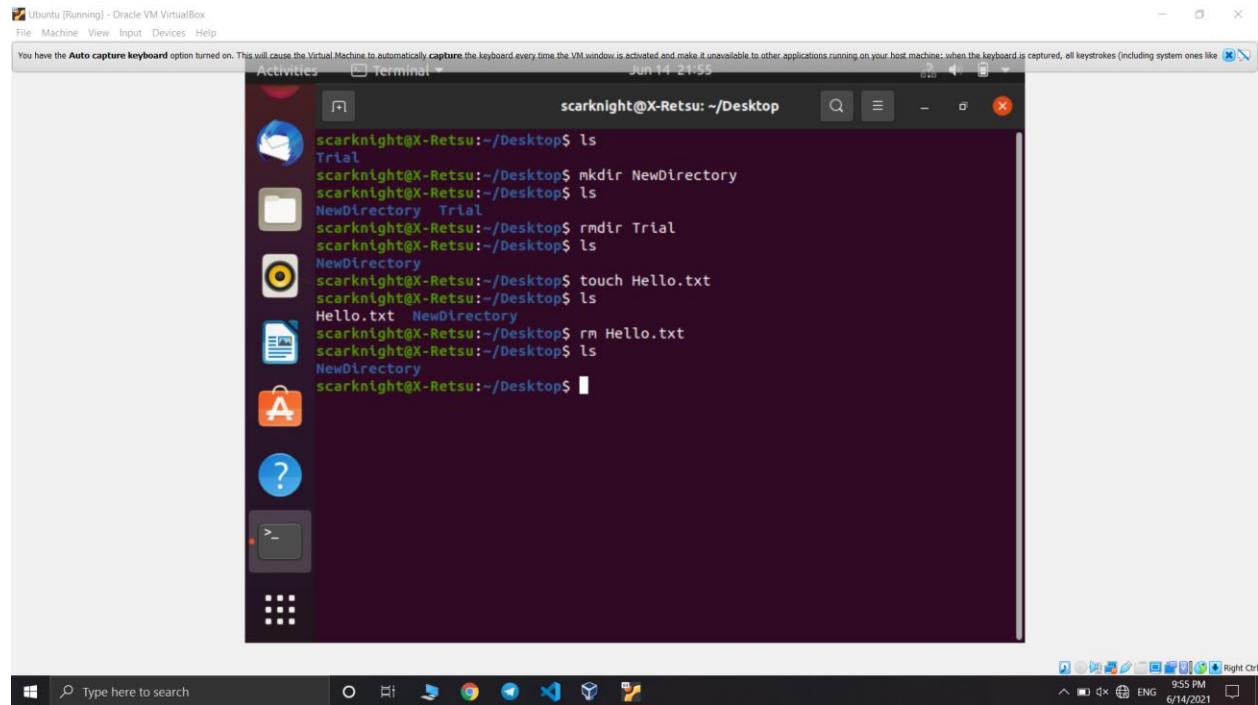
8. touch



```
scarknight@X-Retsu:~/Desktop$ ls
Trial
scarknight@X-Retsu:~/Desktop$ mkdir NewDirectory
scarknight@X-Retsu:~/Desktop$ ls
NewDirectory
scarknight@X-Retsu:~/Desktop$ rmdir Trial
scarknight@X-Retsu:~/Desktop$ ls
NewDirectory
scarknight@X-Retsu:~/Desktop$ touch Hello.txt
scarknight@X-Retsu:~/Desktop$ ls
Hello.txt NewDirectory
scarknight@X-Retsu:~/Desktop$
```

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

9. rm



A screenshot of a Linux desktop environment, specifically Ubuntu, running in a virtual machine. The desktop has a dark theme. In the center, there's a terminal window titled 'Terminal' with the command-line interface (CLI) visible. The CLI shows the user creating a directory ('mkdir NewDirectory'), creating a file ('touch Hello.txt'), and then deleting the file ('rm Hello.txt'). To the left of the terminal is a file manager window showing the 'Desktop' folder containing files named 'Trial', 'NewDirectory', and 'Hello.txt'. The desktop bar at the bottom includes icons for various applications like a browser, file explorer, and terminal, along with system status indicators like battery level and network connection.

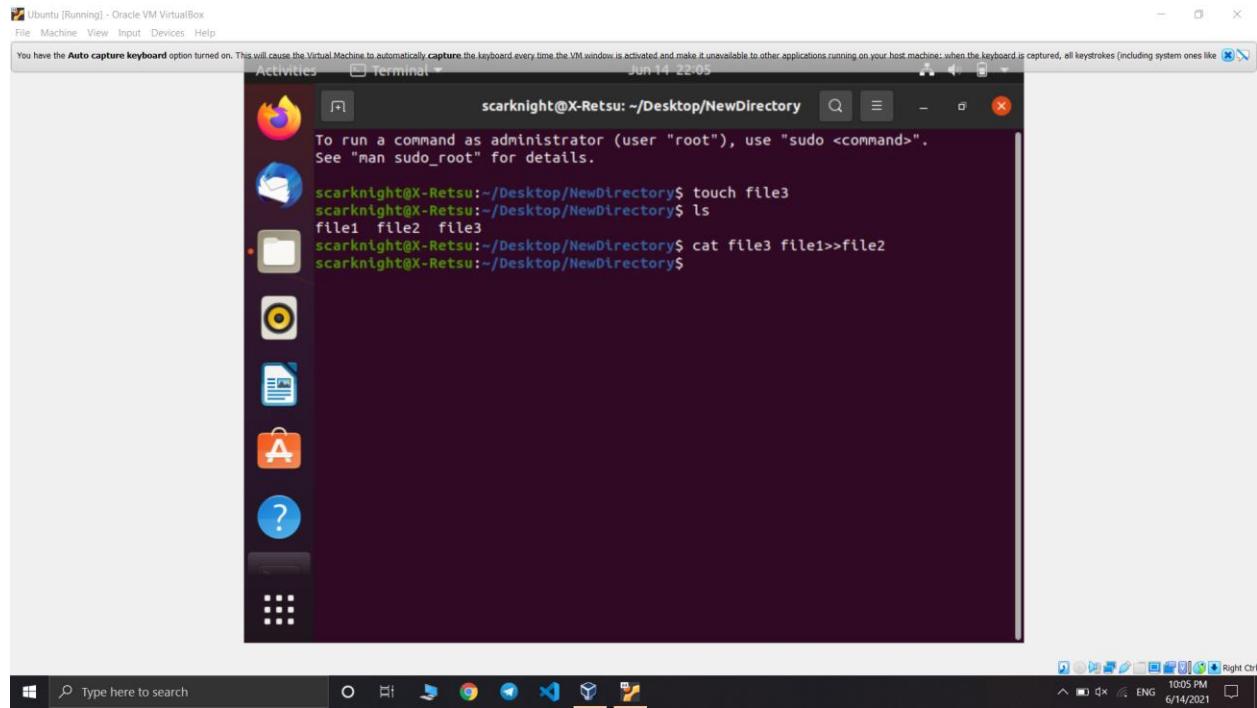
```
scarknight@X-Retsu:~/Desktop$ ls
Trial
scarknight@X-Retsu:~/Desktop$ mkdir NewDirectory
scarknight@X-Retsu:~/Desktop$ ls
NewDirectory Trial
scarknight@X-Retsu:~/Desktop$ rmdir Trial
scarknight@X-Retsu:~/Desktop$ ls
NewDirectory
scarknight@X-Retsu:~/Desktop$ touch Hello.txt
scarknight@X-Retsu:~/Desktop$ ls
Hello.txt NewDirectory
scarknight@X-Retsu:~/Desktop$ rm Hello.txt
scarknight@X-Retsu:~/Desktop$ ls
NewDirectory
scarknight@X-Retsu:~/Desktop$
```

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.

To remove a file use **rm filename**

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 .

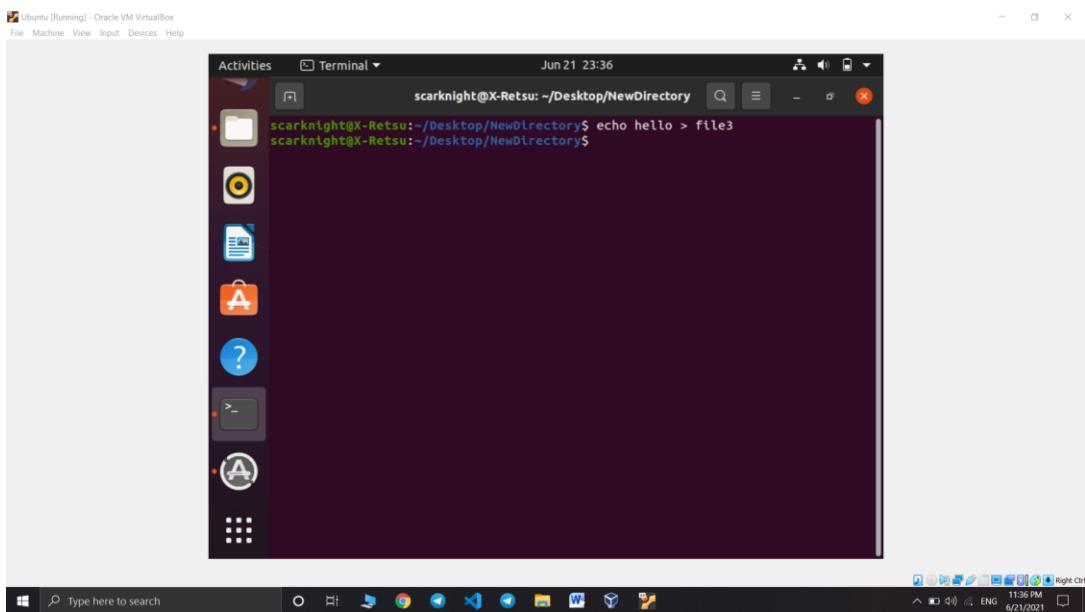
To run this command, type cat followed by the file's name and its extension. For instance: cat file.txt.

Here are other ways to use the cat command:

- **cat > filename** creates a new file
- **cat filename1 filename2>filename3** joins two files (1)and (2) and stores the output of them in a new file (3)
- **cat filename | tr a-z A-Z >output.txt** to convert a file to upper or lower case use
- **cat >>myfile** insert data to a file

Basic Linux Commands

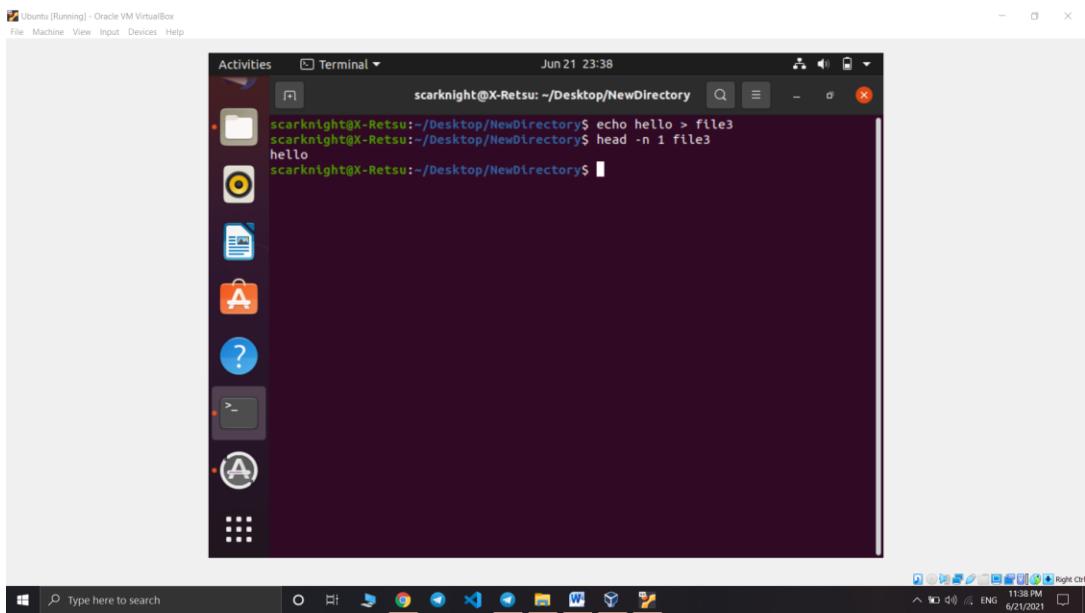
1. echo



A screenshot of a Linux desktop environment, likely Ubuntu, running in a VirtualBox VM. The desktop has a dark theme with a dock at the bottom containing icons for various applications like File Explorer, Photos, and a web browser. A terminal window is open in the center, showing the command line interface. The terminal window title is "Activities Terminal" and the status bar shows the date and time as "Jun 21 23:36". The command entered in the terminal is "scarknight@X-Retsu: ~/Desktop/NewDirectory\$ echo hello > file3". The output of the command is "hello", which is displayed in green text in the terminal window.

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

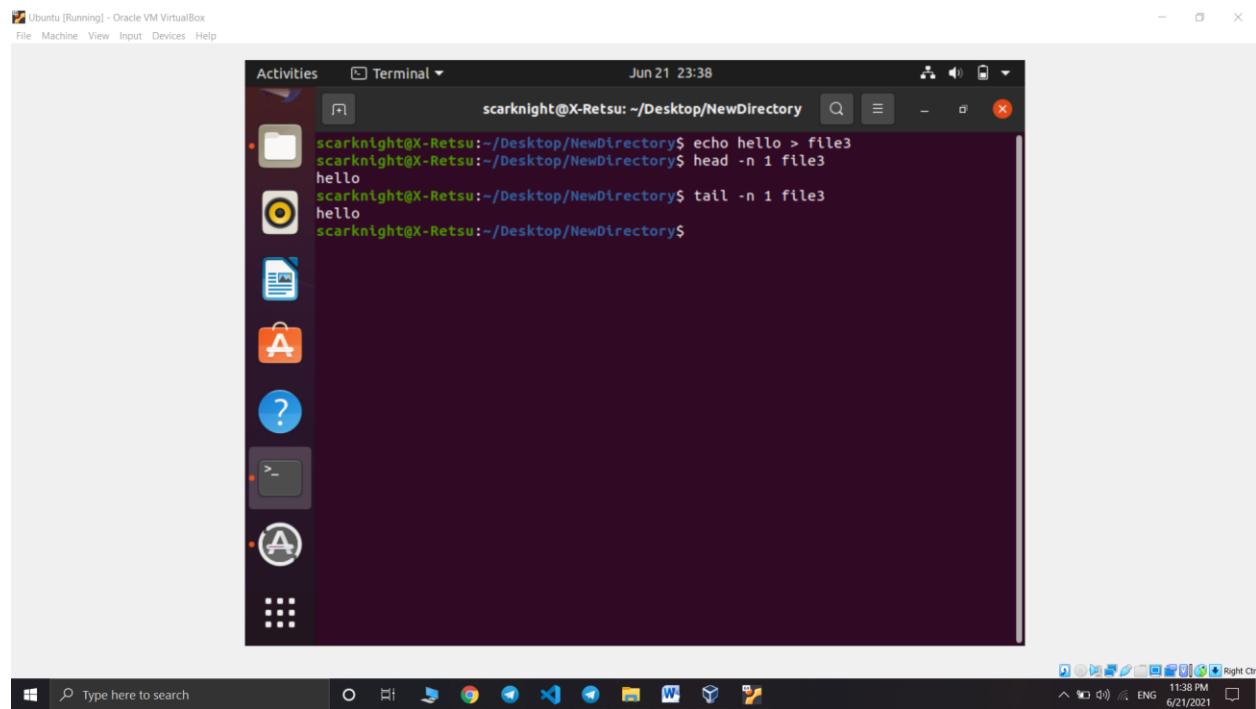
2. head



A screenshot of a Linux desktop environment, likely Ubuntu, running in a VirtualBox VM. The desktop has a dark theme with a dock at the bottom containing icons for various applications like File Explorer, Photos, and a web browser. A terminal window is open in the center, showing the command line interface. The terminal window title is "Activities Terminal" and the status bar shows the date and time as "Jun 21 23:38". The commands entered in the terminal are "scarknight@X-Retsu: ~/Desktop/NewDirectory\$ echo hello > file3" followed by "scarknight@X-Retsu: ~/Desktop/NewDirectory\$ head -n 1 file3". The output of the head command is "hello", which is displayed in green text in the terminal window.

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.

3. tail



```
Ubuntu [Running] - Oracle VM VirtualBox
File Machine View Input Devices Help
Activities Terminal Jun 21 23:38
scarknight@X-Retsu: ~/Desktop/NewDirectory$ echo hello > file3
scarknight@X-Retsu: ~/Desktop/NewDirectory$ head -n 1 file3
hello
scarknight@X-Retsu: ~/Desktop/NewDirectory$ tail -n 1 file3
hello
scarknight@X-Retsu: ~/Desktop/NewDirectory$
```

The screenshot shows a Linux desktop environment with a terminal window open. The terminal window title is "Terminal" and the date and time are "Jun 21 23:38". The terminal content shows the user running the "head" and "tail" commands on a file named "file3". The "head" command outputs the first line ("hello") and the "tail" command outputs the last line ("hello"). The desktop interface includes a dock with various icons and a system tray at the bottom.

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

4. read

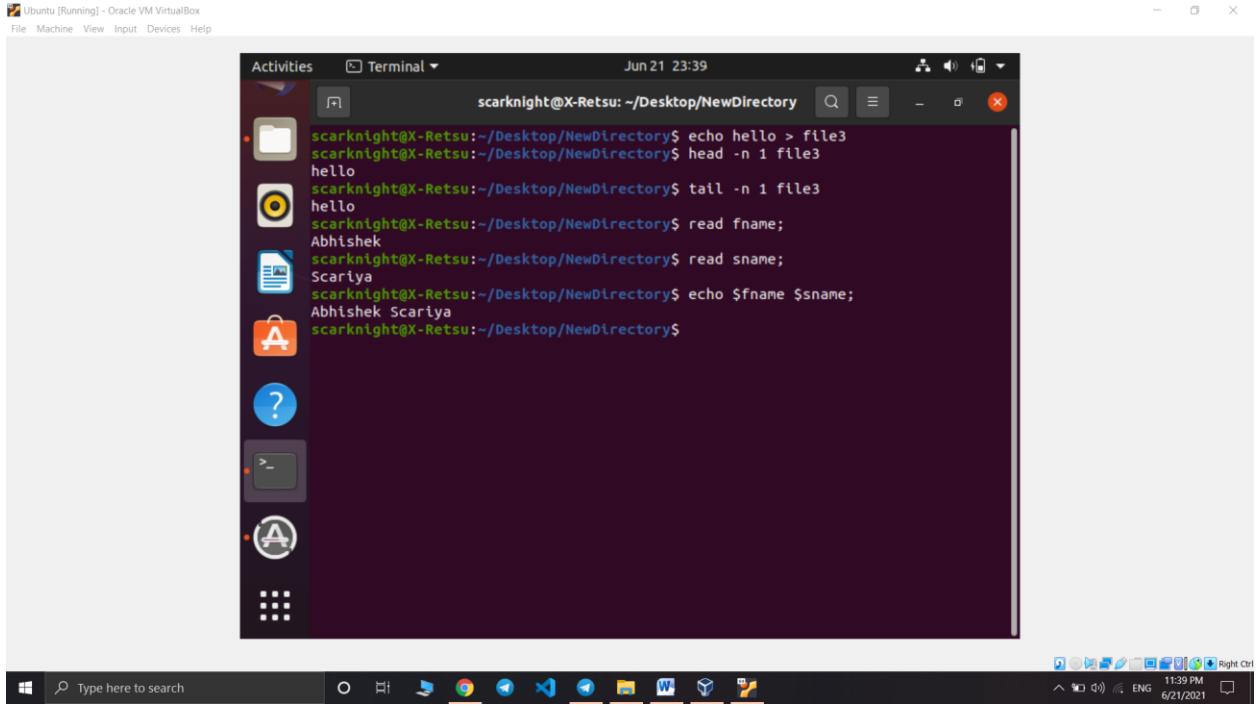
To read the contents of a line into a variable. The read command can be used with and without arguments

Ubuntu [Running] - Oracle VM VirtualBox

File Machine View Input Devices Help

Activities Terminal Jun 21 23:39

```
scarknight@X-Retsu:~/Desktop/NewDirectory$ echo hello > file3
scarknight@X-Retsu:~/Desktop/NewDirectory$ head -n 1 file3
hello
scarknight@X-Retsu:~/Desktop/NewDirectory$ tail -n 1 file3
hello
scarknight@X-Retsu:~/Desktop/NewDirectory$ read fname;
Abhishek
scarknight@X-Retsu:~/Desktop/NewDirectory$ read sname;
Scaryya
scarknight@X-Retsu:~/Desktop/NewDirectory$ echo $fname $sname;
Abhishek Scaryya
scarknight@X-Retsu:~/Desktop/NewDirectory$
```



Type here to search

11:39 PM ENG 6/21/2021 Right Ctrl

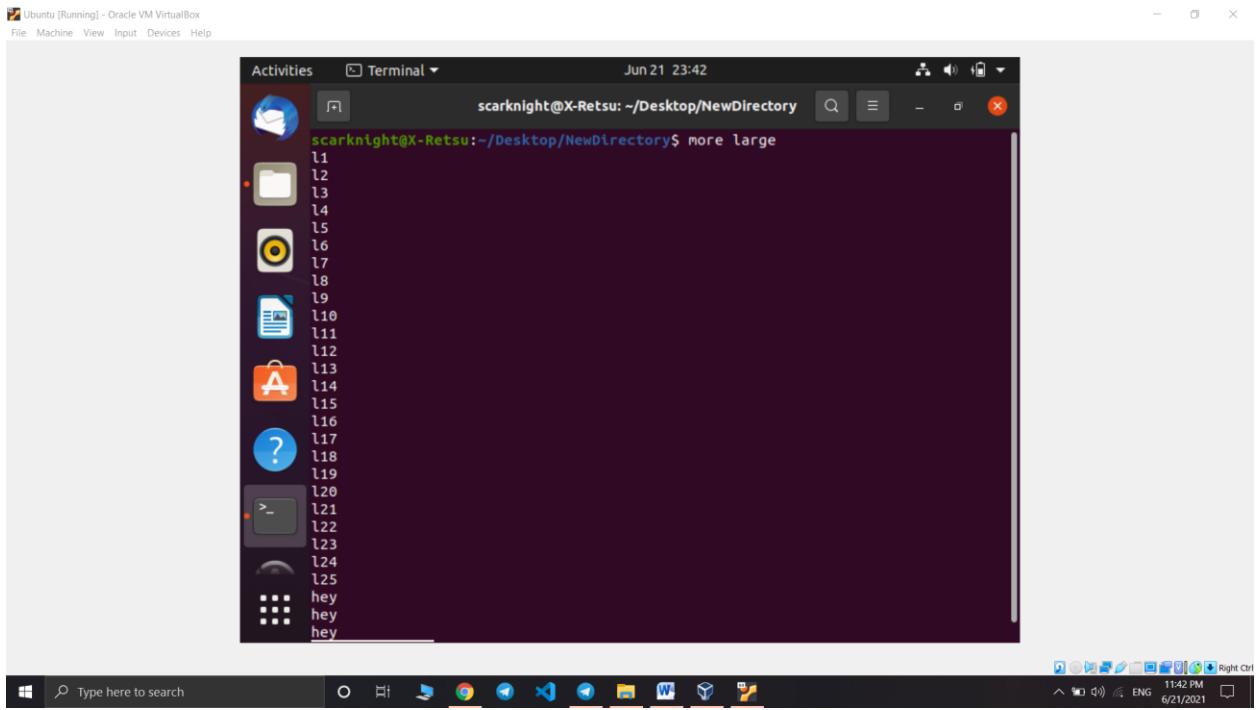
5. more

Ubuntu [Running] - Oracle VM VirtualBox

File Machine View Input Devices Help

Activities Terminal Jun 21 23:42

```
scarknight@X-Retsu:~/Desktop/NewDirectory$ more large
l1
l2
l3
l4
l5
l6
l7
l8
l9
l10
l11
l12
l13
l14
l15
l16
l17
l18
l19
l20
l21
l22
l23
l24
l25
hey
hey
hey
```

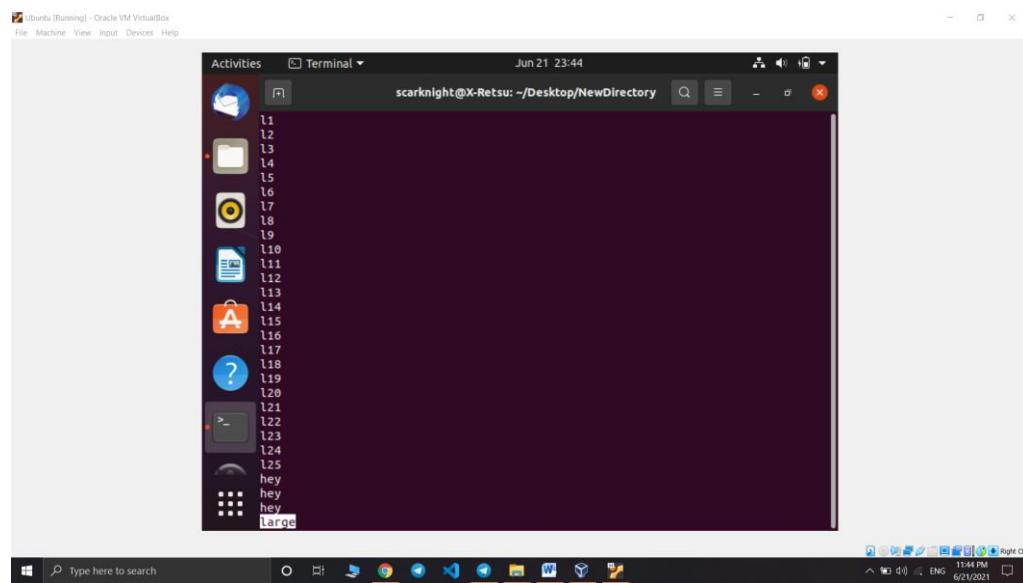
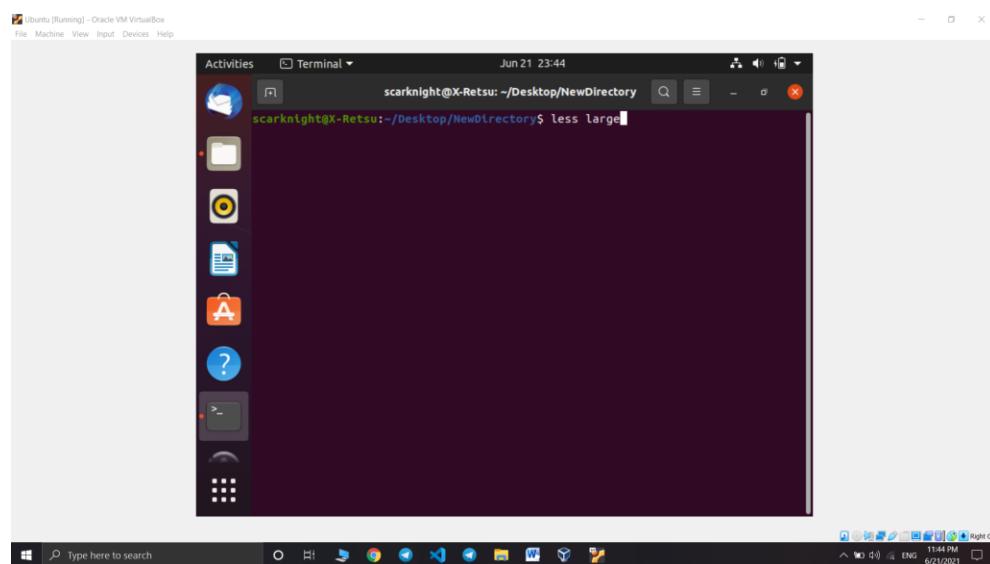


Type here to search

11:42 PM ENG 6/21/2021 Right Ctrl

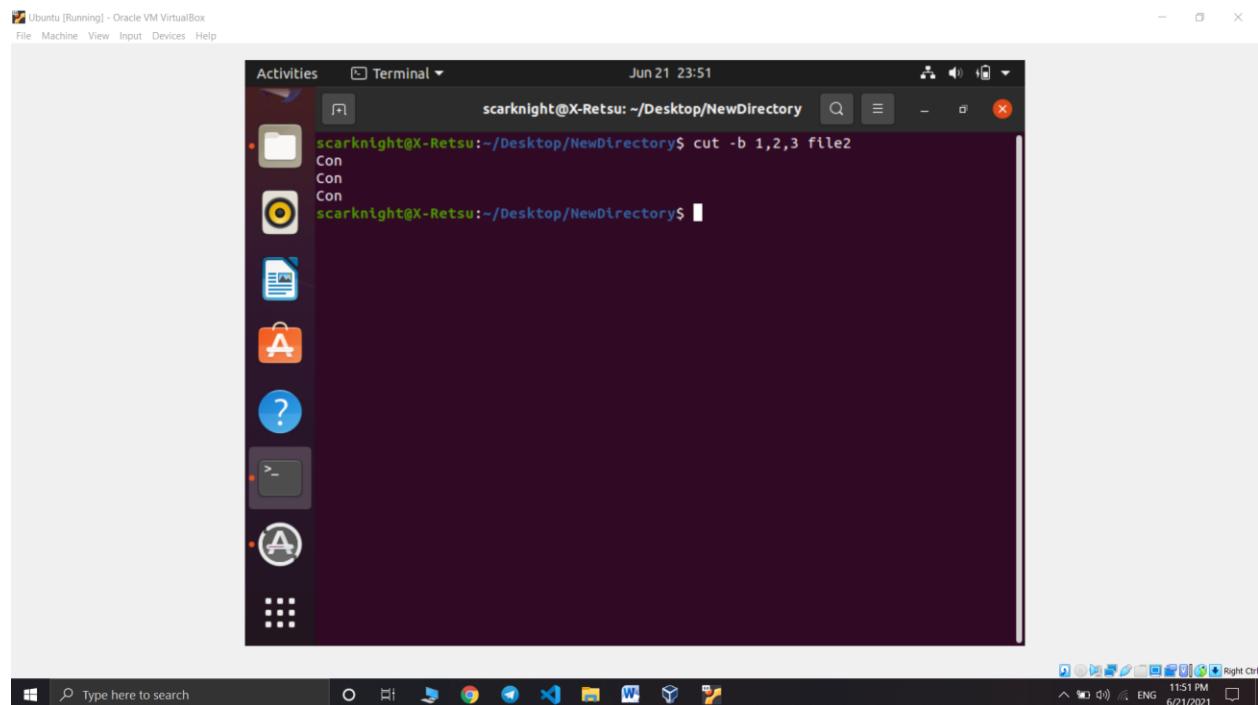
The more command is used to view the text files in the command prompt, displaying one screen at a time in case the file is large. The more command also allows the user do scroll up and down through the page.

6. less



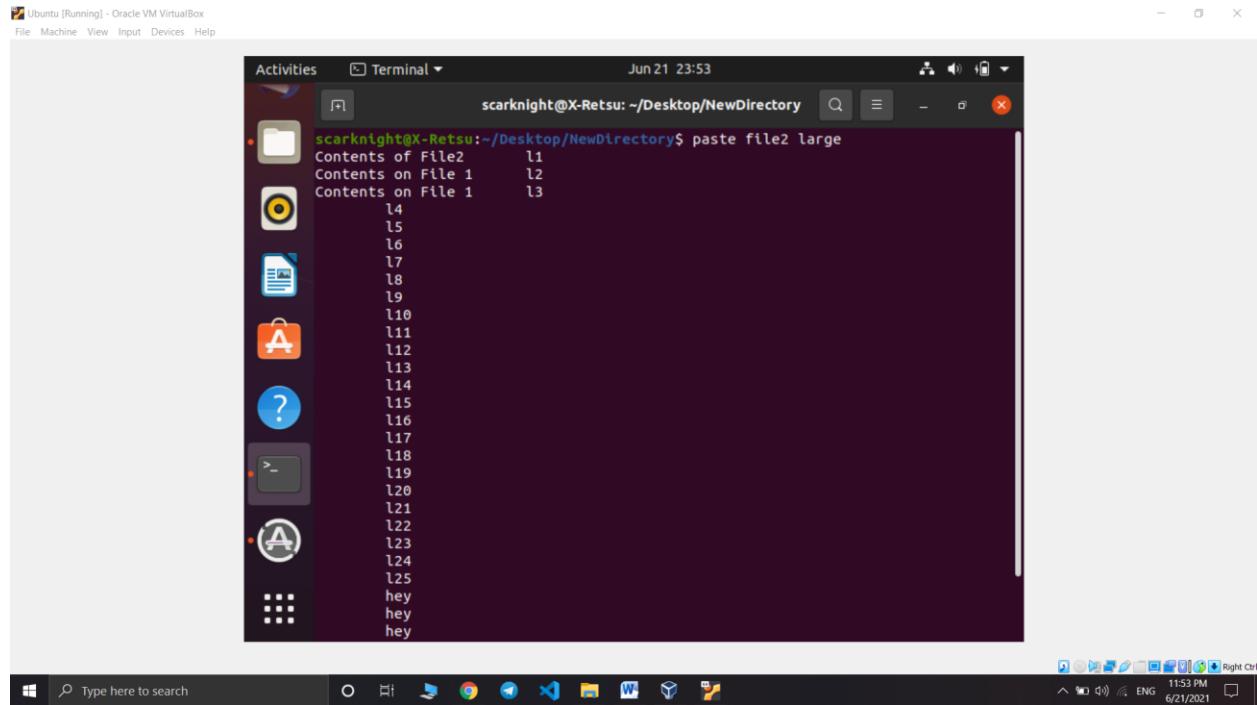
Less command is a Linux utility which can be used to read contents of text file one page(one screen) per time.

7. cut



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

8. paste



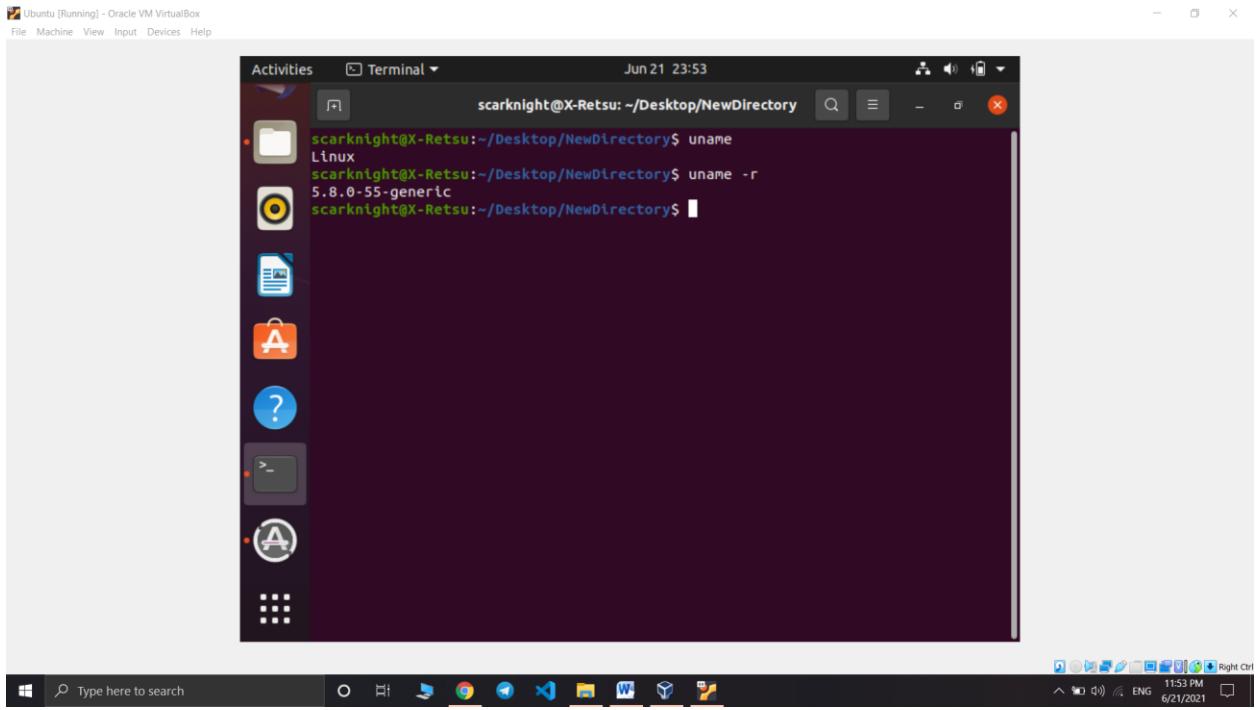
A screenshot of a Linux desktop environment showing a terminal window. The terminal window title is "Activities Terminal" and the date and time are "Jun 21 23:53". The command entered is "scarknight@X-Retsu:~/Desktop/NewDirectory\$ paste file2 large". The output shows the contents of "file2" followed by the contents of "large" separated by tabs. The "large" file contains many lines labeled l1 through l25, and three lines labeled "hey". The desktop interface includes a dock with various icons at the bottom.

```
scarknight@X-Retsu:~/Desktop/NewDirectory$ paste file2 large
Contents of File2      l1
Contents on File 1     l2
Contents on File 1     l3
l4
l5
l6
l7
l8
l9
l10
l11
l12
l13
l14
l15
l16
l17
l18
l19
l20
l21
l22
l23
l24
l25
hey
hey
hey
```

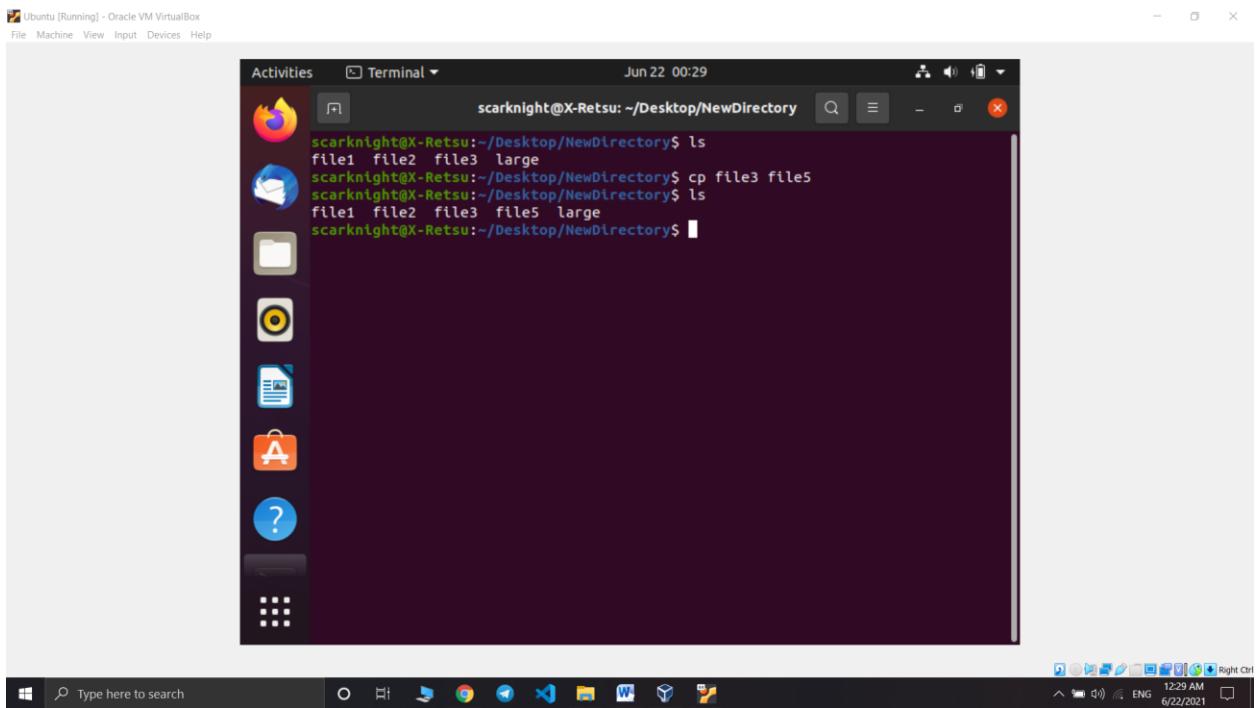
It is used to join files horizontally (parallel merging) by outputting lines consisting of lines from each file specified, separated by tab as delimiter, to the standard output.

9. uname

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



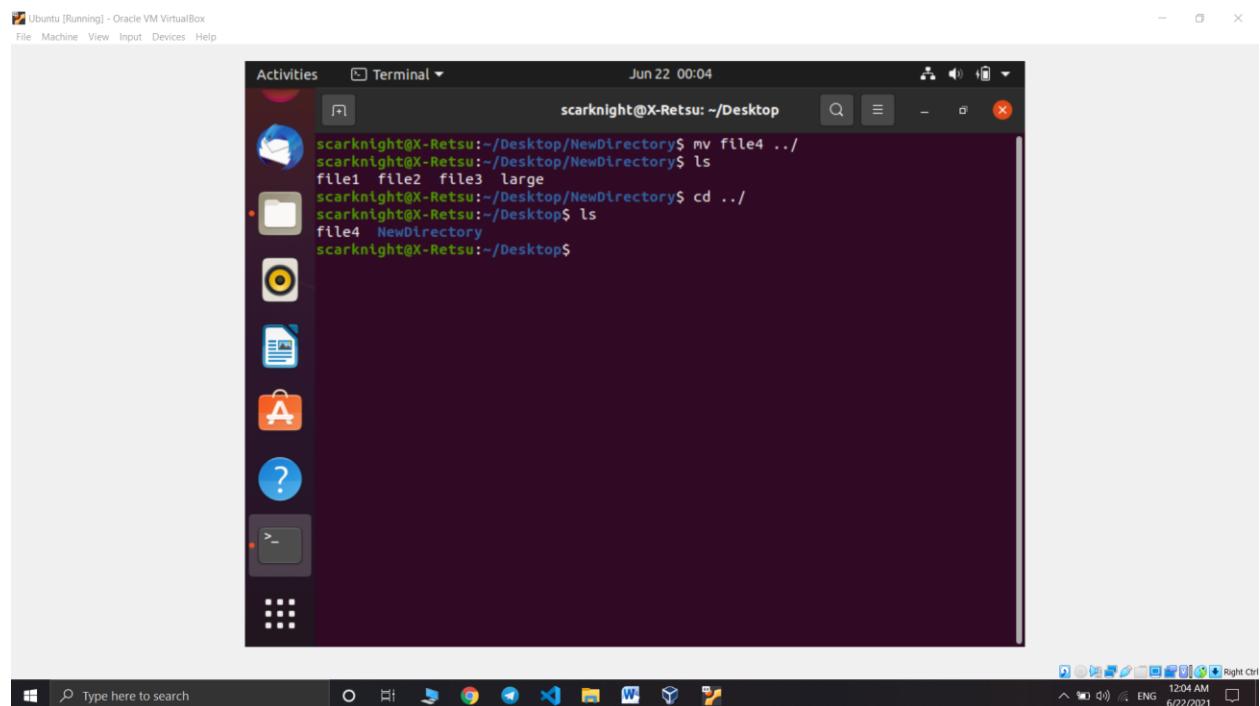
10. cp



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

11. mv

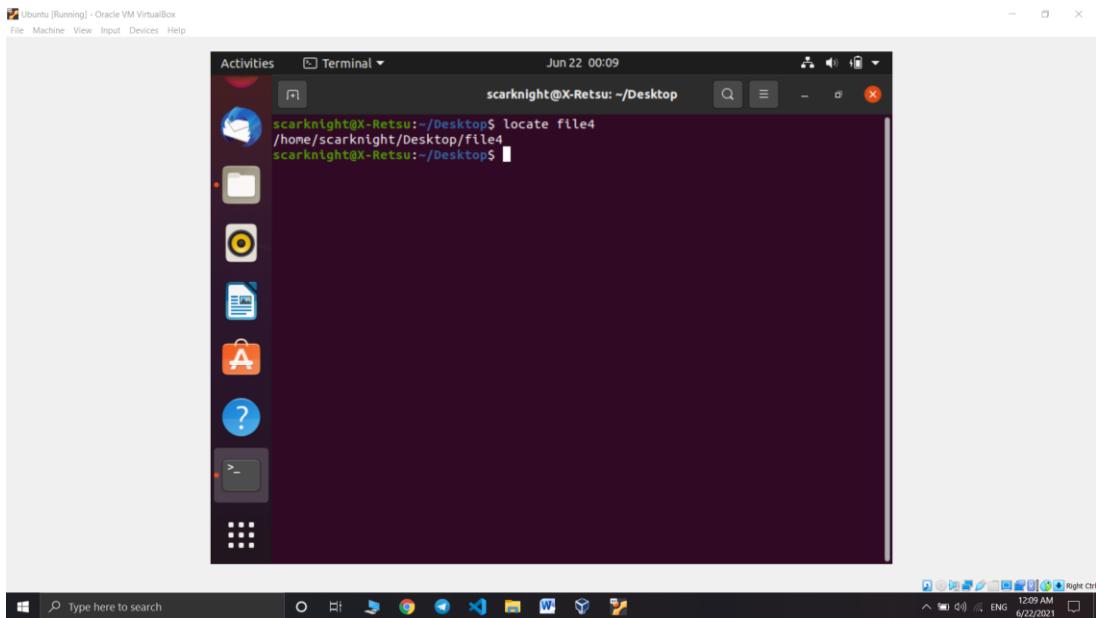
The primary use of the mv command is to move files, it can also be used to rename files. The arguments in mv are similar to the cp command. You need to type mv, the file's name, and the destination's directory.



A screenshot of a Linux desktop environment, likely Ubuntu, running in a virtual machine. The desktop has a dark theme with a dock at the bottom containing icons for various applications like a browser, file manager, and system tools. On the left, there's a vertical dock with icons for a terminal, file manager, and other utilities. A central terminal window titled 'Terminal' shows the following command-line session:

```
scarknight@X-Retsu:~/Desktop$ mv file4 ../
scarknight@X-Retsu:~/Desktop/NewDirectory$ ls
file1 file2 file3 large
scarknight@X-Retsu:~/Desktop/NewDirectory$ cd ../
scarknight@X-Retsu:~/Desktop$ ls
file4 NewDirectory
scarknight@X-Retsu:~/Desktop$
```

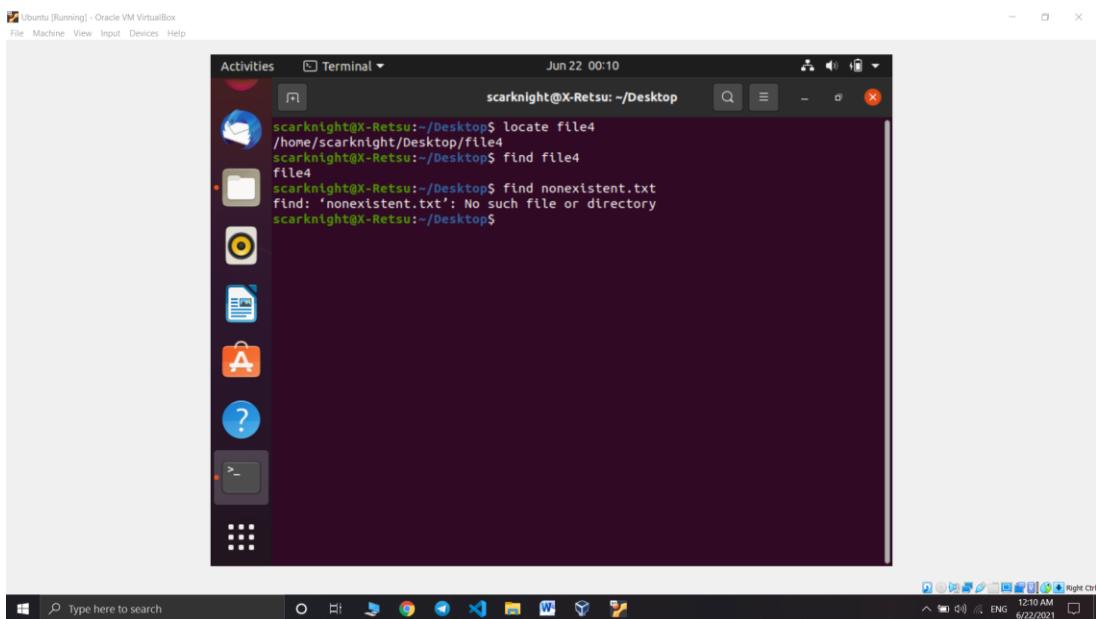
12. locate



A screenshot of an Ubuntu desktop environment. A terminal window titled "Terminal" is open, showing the command "locate file4" and its output: "/home/scarknight/Desktop/file4". The terminal window is part of the Unity interface, which includes a dock at the bottom with various application icons.

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

13. find

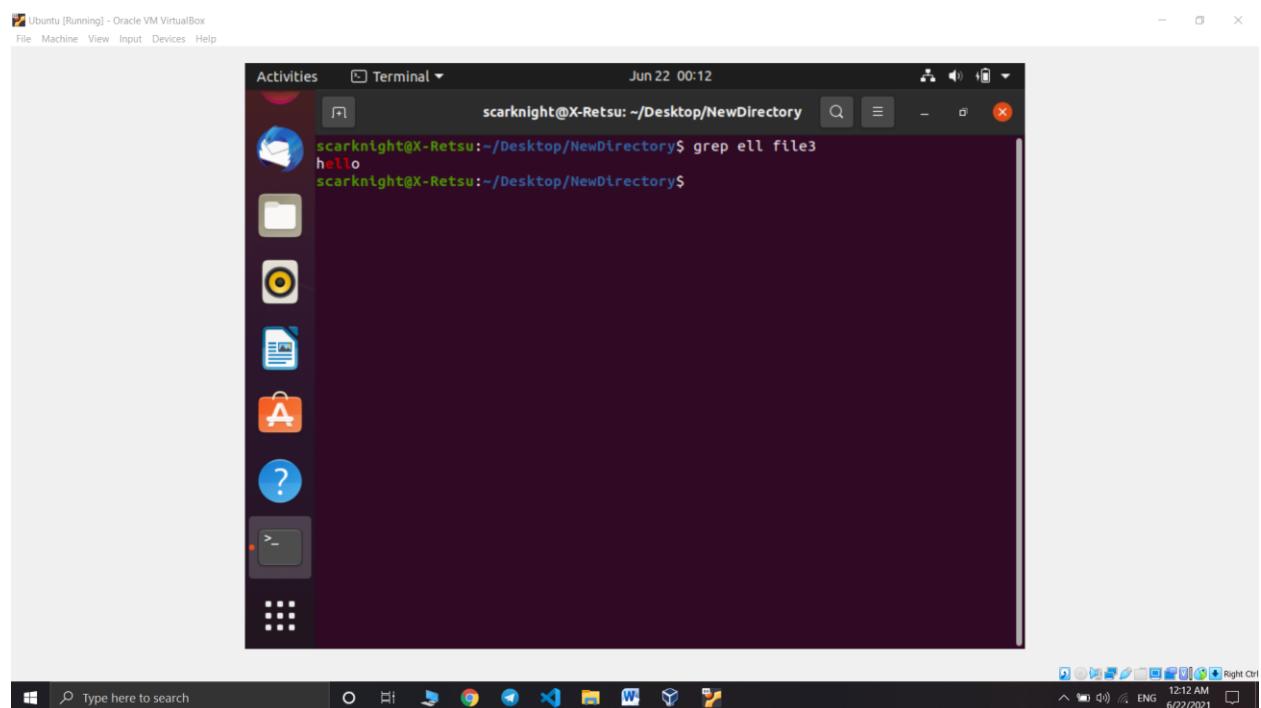


A screenshot of an Ubuntu desktop environment. A terminal window titled "Terminal" is open, showing the command "find file4" and its output: "/home/scarknight/Desktop/file4". It also shows the command "find nonexistent.txt" and its output: "find: 'nonexistent.txt': No such file or directory". The terminal window is part of the Unity interface, which includes a dock at the bottom with various application icons.

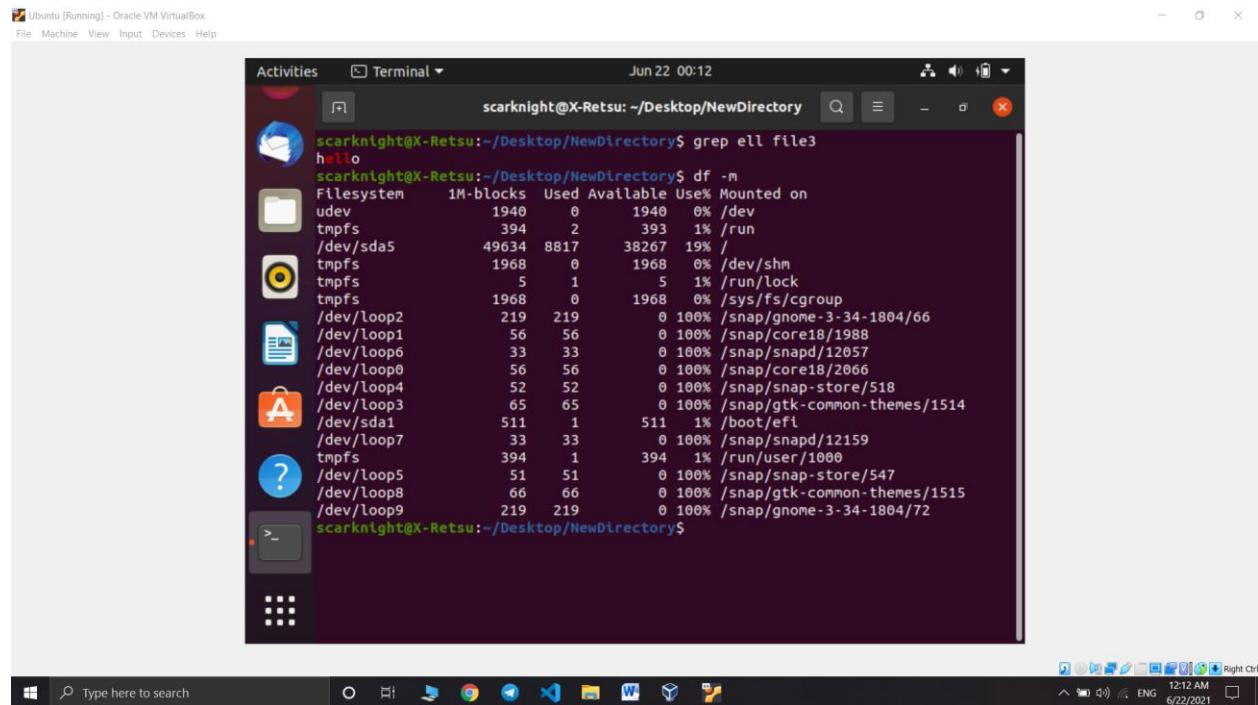
Similar to the locate command, using find also searches for files and directories. The difference is, you use the find command to locate files within a given directory.

14. grep

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



15. df



A screenshot of a Linux desktop environment showing a terminal window. The terminal window title is "Terminal" and the command entered is "df -m". The output shows disk usage in megabytes for various filesystems, including /dev/sda5, tmpfs, /dev/loop0, /dev/loop1, /dev/loop2, /dev/loop3, /dev/loop4, /dev/loop5, /dev/loop6, /dev/loop7, /dev/loop8, and /dev/loop9. The output includes columns for Filesystem, 1M-blocks, Used, Available, Use%, and Mounted on.

Filesystem	1M-blocks	Used	Available	Use%	Mounted on
udev	1940	0	1940	0%	/dev
tmpfs	394	2	393	1%	/run
/dev/sda5	49634	8817	38267	19%	/
tmpfs	1968	0	1968	0%	/dev/shm
tmpfs	5	1	5	1%	/run/lock
tmpfs	1968	0	1968	0%	/sys/fs/cgroup
/dev/loop2	219	219	0	100%	/snap/gnome-3-34-1804/66
/dev/loop1	56	56	0	100%	/snap/core18/1988
/dev/loop6	33	33	0	100%	/snap/snapd/12057
/dev/loop0	56	56	0	100%	/snap/core18/2066
/dev/loop4	52	52	0	100%	/snap/snap-store/518
/dev/loop3	65	65	0	100%	/snap/gtk-common-themes/1514
/dev/sda1	511	1	511	1%	/boot/efi
/dev/loop7	33	33	0	100%	/snap/snapd/12159
tmpfs	394	1	394	1%	/run/user/1000
/dev/loop5	51	51	0	100%	/snap/snap-store/547
/dev/loop8	66	66	0	100%	/snap/gtk-common-themes/1515
/dev/loop9	219	219	0	100%	/snap/gnome-3-34-1804/72

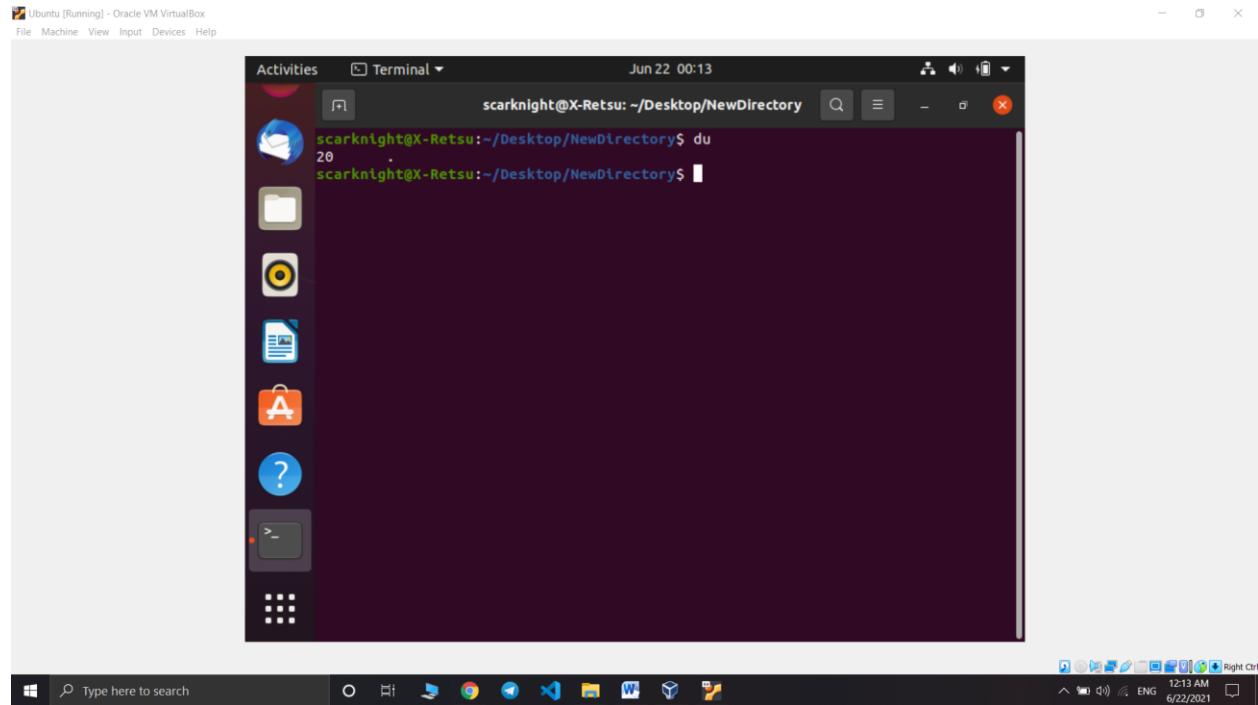
Use df command to get a report on the system's disk space usage, shown in

percentage and KBs. If you want to see the report in megabytes, type df -m.

16. du

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

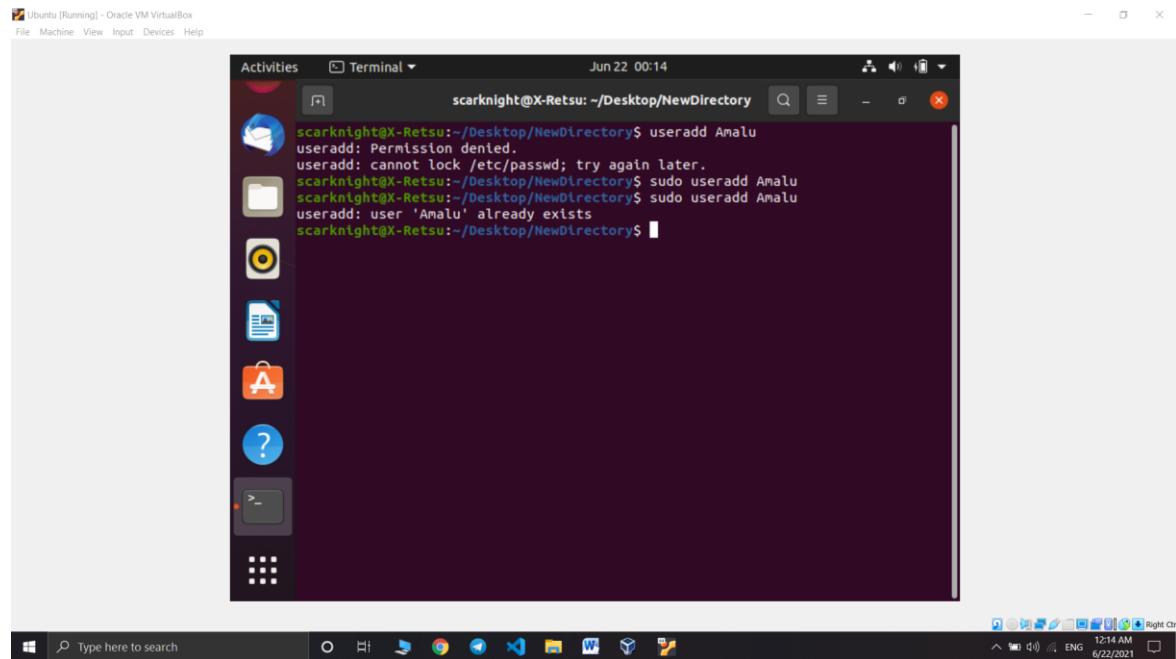
- \$du -h



A screenshot of a Linux desktop environment, likely Ubuntu, running in a virtual machine. The desktop has a dark theme with a dock at the bottom containing icons for various applications like File Explorer, Edge, and FileZilla. A terminal window titled 'Terminal' is open, showing the command 'du -h' being run in the directory '/Desktop/NewDirectory'. The output shows a single file named '20' with a size of 20 bytes.

```
scarknight@X-Retsu:~/Desktop/NewDirectory$ du
20 .
scarknight@X-Retsu:~/Desktop/NewDirectory$
```

17. useradd



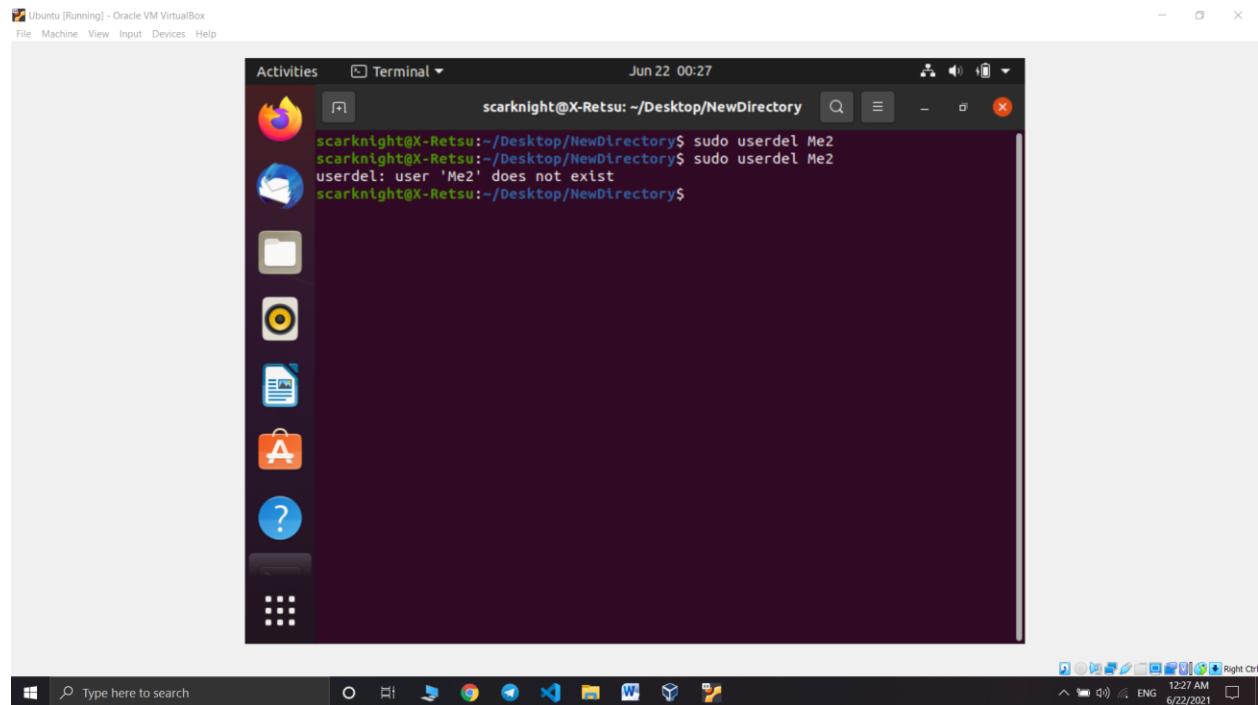
A screenshot of a Windows desktop environment. The taskbar at the bottom includes icons for File Explorer, Edge, and FileZilla. A terminal window titled 'Terminal' is open, showing the command 'useradd Amalu' being run. The output indicates permission denial and then shows that the user 'Amalu' already exists.

```
scarknight@X-Retsu:~/Desktop/NewDirectory$ useradd Amalu
useradd: Permission denied.
useradd: cannot lock /etc/passwd; try again later.
scarknight@X-Retsu:~/Desktop/NewDirectory$ sudo useradd Amalu
scarknight@X-Retsu:~/Desktop/NewDirectory$ sudo useradd Amalu
useradd: user 'Amalu' already exists
scarknight@X-Retsu:~/Desktop/NewDirectory$
```

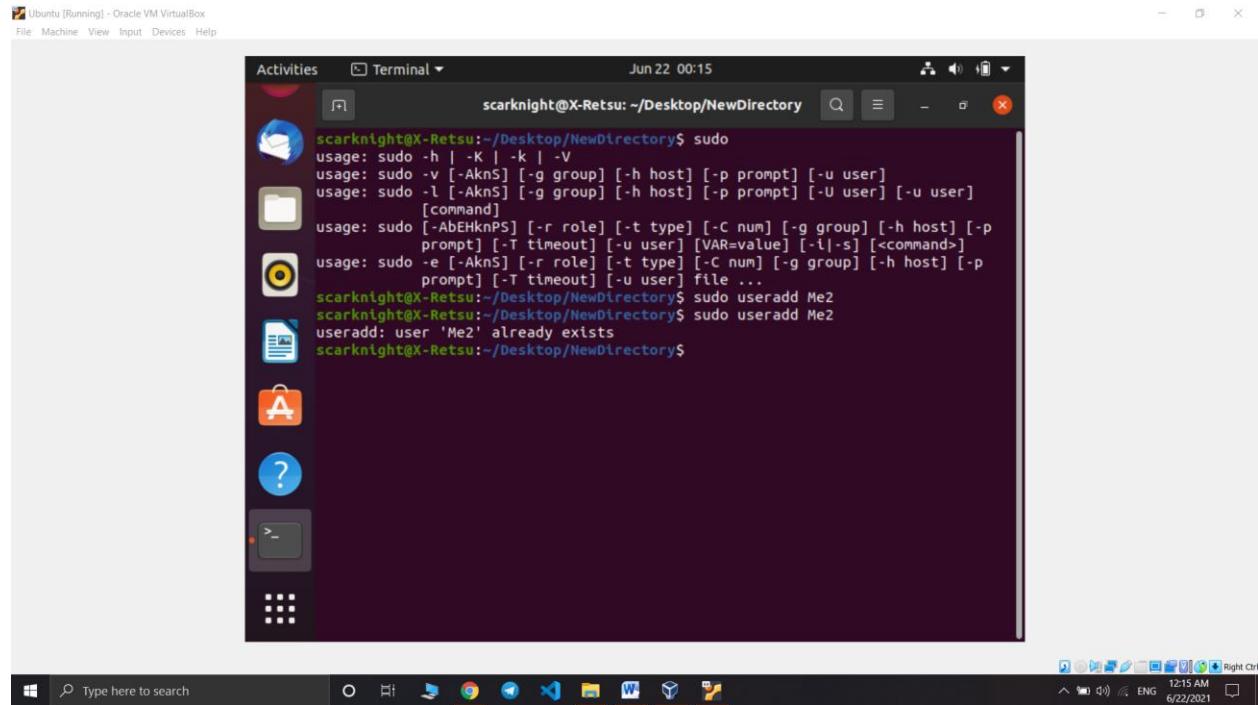
The useradd is used to create a new user, while passwd is adding a password to that user's account. To add a new person named John type, useradd John and then to add his password type, passwd 123456789

18. userdel

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



19. sudo



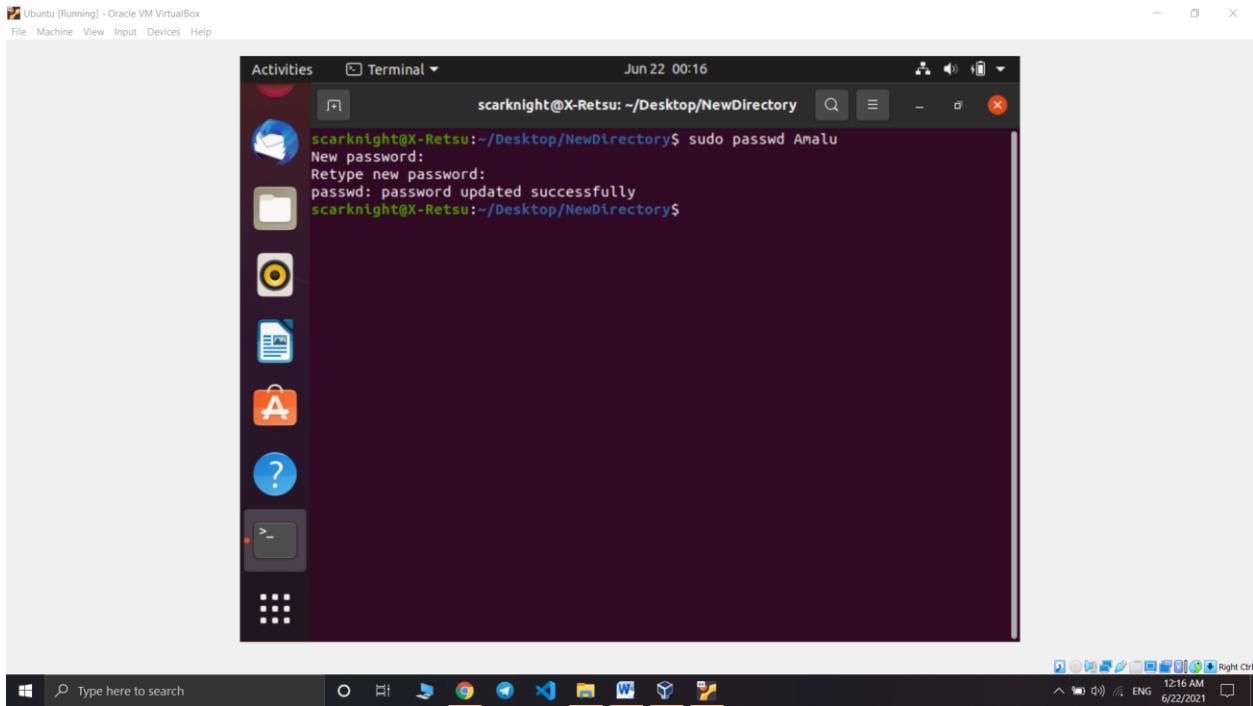
A screenshot of a Linux desktop environment, specifically Ubuntu, running in Oracle VM VirtualBox. The desktop has a dark theme. In the center is a terminal window titled "Terminal" with the command "scarknight@X-Retsu: ~/Desktop/NewDirectory\$". The terminal shows the usage of the sudo command and attempts to add a user named "Me2" twice, resulting in an error message: "useradd: user 'Me2' already exists". The desktop background is a light blue gradient, and there's a dock at the bottom with icons for various applications like a file manager, browser, and terminal.

```
scarknight@X-Retsu:~/Desktop/NewDirectory$ sudo
usage: sudo -h | -K | -k | -V
usage: sudo -v [-AknS] [-g group] [-h host] [-p prompt] [-u user]
usage: sudo -l [-AknS] [-g group] [-h host] [-p prompt] [-U user] [-u user]
           [command]
usage: sudo [-ABEHknPS] [-r role] [-t type] [-C num] [-g group] [-h host] [-p
           prompt] [-T timeout] [-u user] [VAR=value] [-i|-s] [<command>]
usage: sudo -e [-AknS] [-r role] [-t type] [-C num] [-g group] [-h host] [-p
           prompt] [-T timeout] [-u user] file ...
scarknight@X-Retsu:~/Desktop/NewDirectory$ sudo useradd Me2
scarknight@X-Retsu:~/Desktop/NewDirectory$ sudo useradd Me2
useradd: user 'Me2' already exists
scarknight@X-Retsu:~/Desktop/NewDirectory$
```

SuperUser Do(sudo) command enables you to perform tasks that require administrative or root permissions.

20. passwd

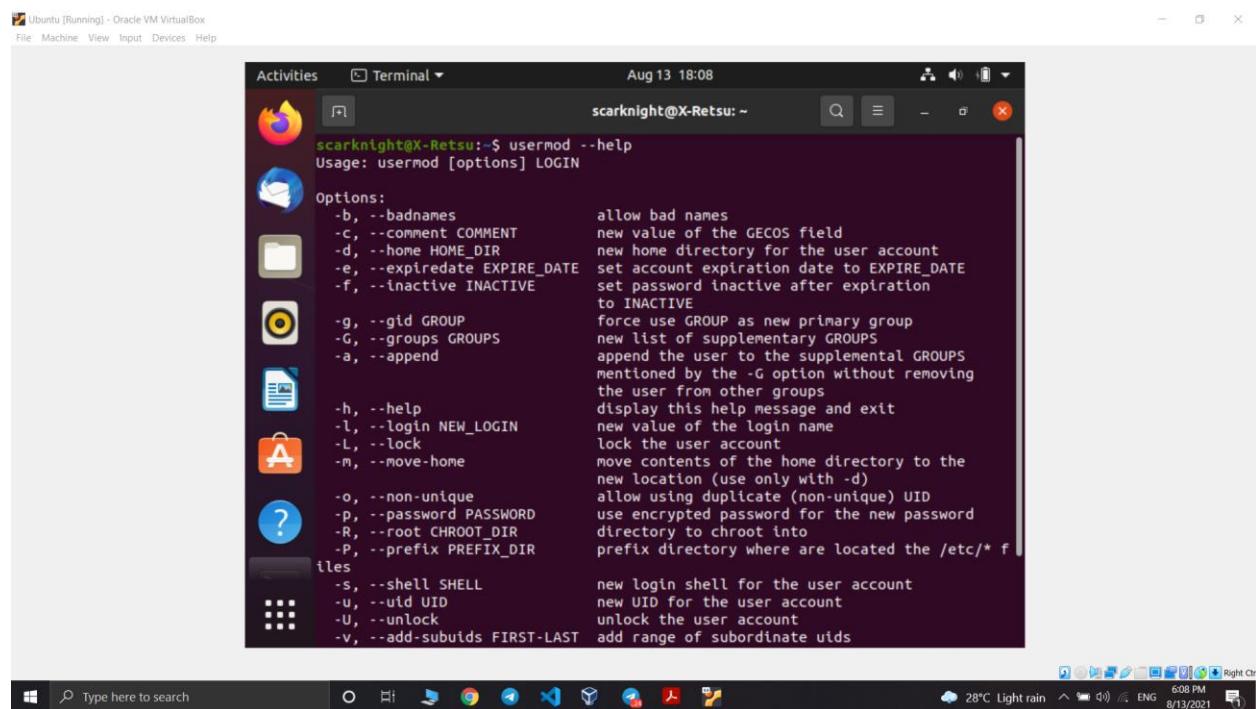
Changes passwords for user accounts. A normal user may only change the password for their own account, while the superuser may change the password for any account.



Basic Linux Commands

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 Linux desktop environment with a terminal window open. The terminal title is "Activities Terminal" and the date and time are "Aug 13 18:08". The user is at the prompt "scarknight@X-Retsu:~\$". The command entered is "usermod --help". The output displays the usage of the usermod command and a detailed list of options and their descriptions. The terminal window has a dark background with light-colored text. The desktop interface includes a dock with various icons and a system tray at the bottom.

```
scarknight@X-Retsu:~$ 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
  -R, --root CHROOT_DIR     directory to chroot into
  -P, --prefix PREFIX_DIR   prefix directory where are located the /etc/* files
  -s, --shell SHELL          new login shell for the user account
  -u, --uid UID              new UID for the user account
  -U, --unlock               unlock the user account
  -v, --add-subuids FIRST-LAST add range of subordinate uids
```

```
Ubuntu [Running] - Oracle VM VirtualBox
File Machine View Input Devices Help
Activities Terminal Aug 13 18:13
scarknight@X-Retsu: ~
-f, --inactive INACTIVE set password inactive after expiration
-g, --gid GROUP to INACTIVE
-G, --groups GROUPS force use GROUP as new primary group
-a, --append new list of supplementary GROUPS
append the user to the supplemental GROUPS
mentioned by the -G option without removing
the user from other groups
-h, --help display this help message and exit
-l, --login NEW_LOGIN new value of the login name
-L, --lock lock the user account
-m, --move-home move contents of the home directory to the
new location (use only with -d)
-o, --non-unique allow using duplicate (non-unique) UID
-p, --password PASSWORD use encrypted password for the new password
-R, --root CHROOT_DIR directory to chroot into
-P, --prefix PREFIX_DIR prefix directory where are located the /etc/* f
iles
-s, --shell SHELL new login shell for the user account
-u, --uid UID new UID for the user account
-U, --unlock unlock the user account
-v, --add-subuids FIRST-LAST add range of subordinate uids
-V, --del-subuids FIRST-LAST remove range of subordinate uids
-w, --add-subgids FIRST-LAST add range of subordinate gids
-W, --del-subgids FIRST-LAST remove range of subordinate gids
-Z, --selinux-user SEUSER new SELinux user mapping for the user account
scarknight@X-Retsu:~$ usermod -u 2000 scarknight
usermod: user scarknight is currently used by process 1858
scarknight@X-Retsu:~$
```

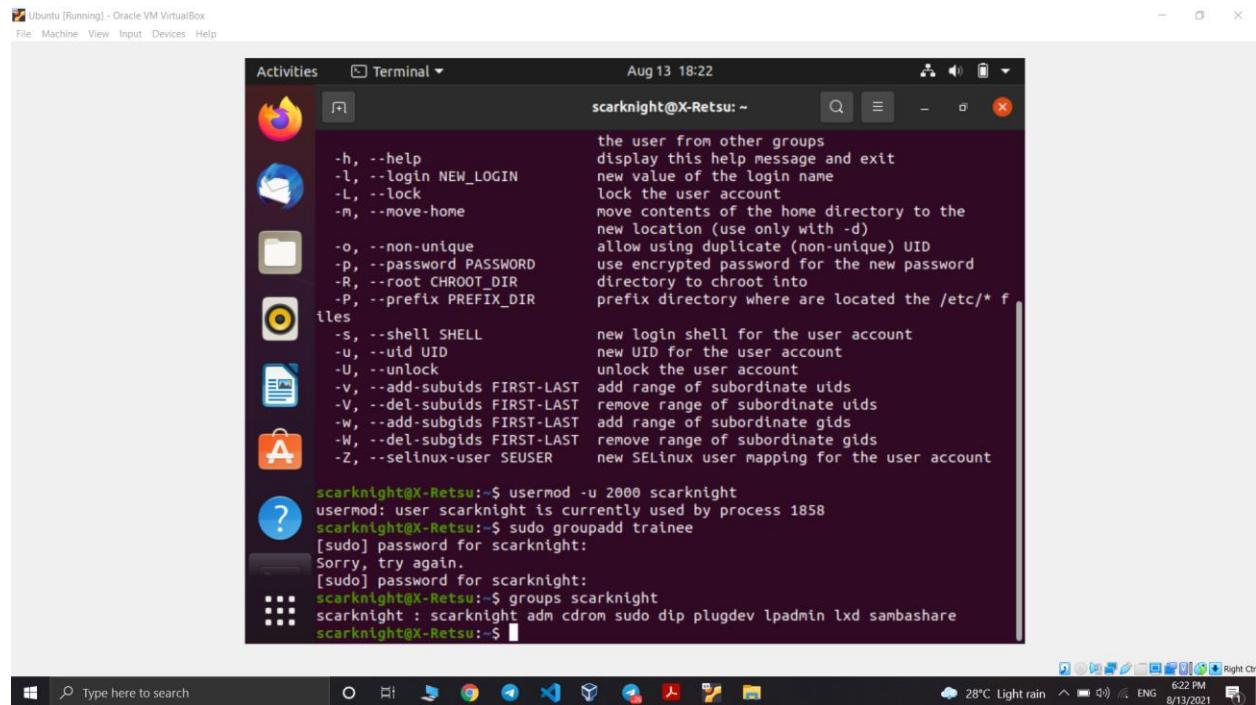
2. **groupadd** - **groupadd** command creates a new group account using the values specified on the command line and the default values from the system.

- #groupadd trainee

```
Ubuntu [Running] - Oracle VM VirtualBox
File Machine View Input Devices Help
Activities Terminal Aug 13 18:17
scarknight@X-Retsu: ~
-f, --inactive INACTIVE
-g, --gid GROUP
-G, --groups GROUPS
-a, --append
-h, --help
-l, --login NEW_LOGIN
-L, --lock
-m, --move-home
-o, --non-unique
-p, --password PASSWORD
-R, --root CHROOT_DIR
-P, --prefix PREFIX_DIR
files
-s, --shell SHELL
-u, --uid UID
-U, --unlock
-v, --add-subuids FIRST-LAST
-V, --del-subuids FIRST-LAST
-w, --add-subgids FIRST-LAST
-W, --del-subgids FIRST-LAST
-Z, --selinux-user SEUSER
to INACTIVE
force use GROUP as new primary group
new list of supplementary GROUPS
append the user to the supplemental GROUPS
mentioned by the -G option without removing
the user from other groups
display this help message and exit
new value of the login name
lock the user account
move contents of the home directory to the
new location (use only with -d)
allow using duplicate (non-unique) UID
use encrypted password for the new password
directory to chroot into
prefix directory where are located the /etc/* f
new login shell for the user account
new UID for the user account
unlock the user account
add range of subordinate uids
remove range of subordinate uids
add range of subordinate gids
remove range of subordinate gids
new SELinux user mapping for the user account
scarknight@X-Retsu:~$ usermod -u 2000 scarknight
usermod: user scarknight is currently used by process 1858
scarknight@X-Retsu:~$ sudo groupadd trainee
[sudo] password for scarknight:
```

3. groups - print the groups a user is in

- `#groups alice`



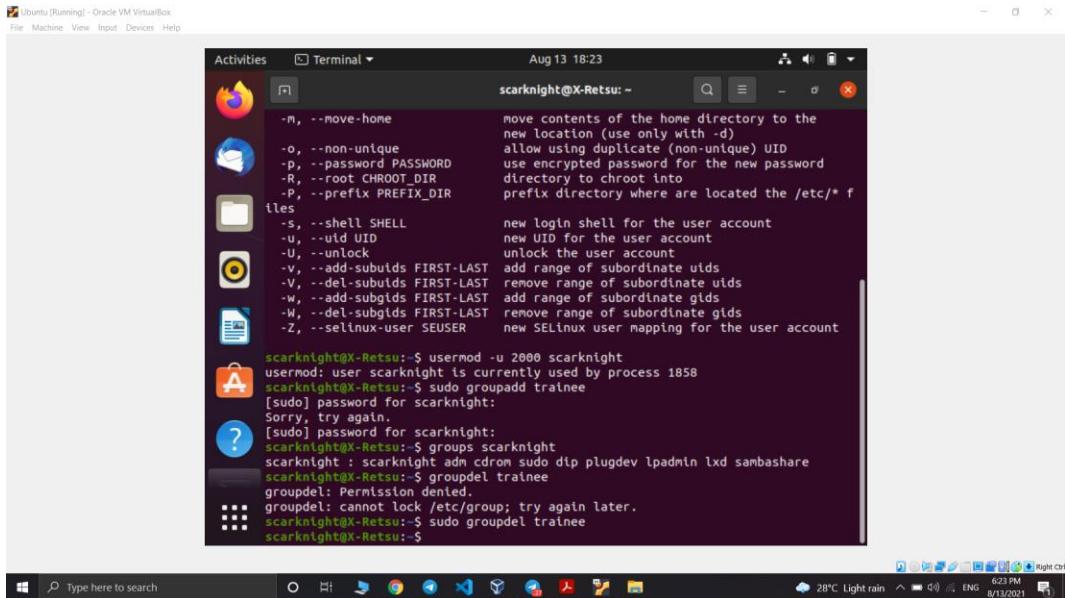
The screenshot shows a Linux desktop environment with a terminal window open. The terminal window title is "Terminal" and the date and time are "Aug 13 18:22". The user is "scarknight@X-Retsu: ~". The terminal displays the following command and its output:

```
usermod -u 2000 scarknight
sudo groupadd trainee
[sudo] password for scarknight:
Sorry, try again.
[sudo] password for scarknight:
groups scarknight
scarknight : scarknight adm cdrom sudo dip plugdev lpadmin lxd sambashare
```

The desktop interface includes a dock with various icons like a browser, file manager, terminal, and system tray icons showing weather (28°C Light rain), battery level, and network status.

4. groupdel

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



A screenshot of a Linux desktop environment showing a terminal window. The terminal window title is "Activities Terminal" and the date and time are "Aug 13 18:23". The user is "scarknight@X-Retsu:~". The terminal shows the following commands and their outputs:

```
-m, --move-home      move contents of the home directory to the new location (use only with -d)
-o, --non-unique     allow using duplicate (non-unique) UID
-p, --password PASSWORD use encrypted password for the new password
-R, --root CHROOT_DIR
-P, --prefix PREFIX_DIR
files               prefix directory where are located the /etc/* files
-s, --shell SHELL    new login shell for the user account
-u, --uid UID        new UID for the user account
-U, --unlock         unlock the user account
-v, --add-subuids FIRST-LAST
-V, --del-subuids FIRST-LAST
-w, --add-subgids FIRST-LAST
-W, --del-subgids FIRST-LAST
-Z, --selinux-user SEUSER  new SELinux user mapping for the user account

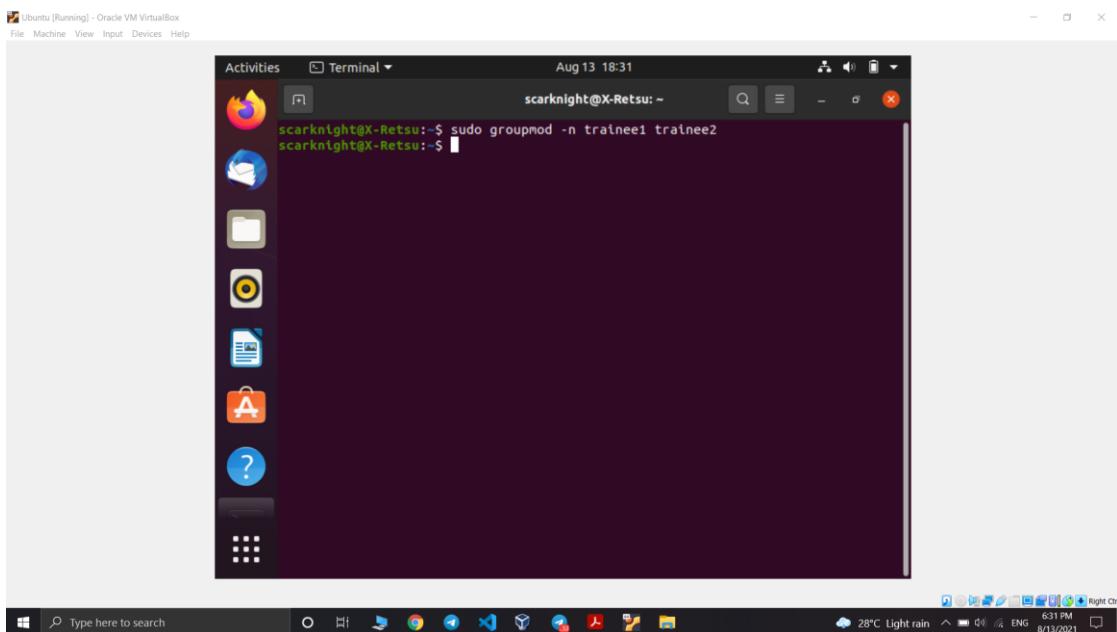
scarknight@X-Retsu:~$ usermod -u 2000 scarknight
usermod: user scarknight is currently used by process 1858
[sudo] password for scarknight:
Sorry, try again.
[sudo] password for scarknight:
scarknight@X-Retsu:~$ groups scarknight
scarknight : scarknight adm cdrom sudo dip plugdev lpadmin lxd sambashare
scarknight@X-Retsu:~$ groupdel trainee
groupdel: Permission denied.
groupdel: cannot lock /etc/group; try again later.
scarknight@X-Retsu:~$ sudo groupdel trainee
scarknight@X-Retsu:~$
```

The desktop interface includes a dock with icons for various applications like a browser, file manager, and terminal, and a system tray at the bottom.

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



A screenshot of a Linux desktop environment showing a terminal window. The terminal window title is "Activities Terminal" and the date and time are "Aug 13 18:31". The user is "scarknight@X-Retsu:~". The terminal shows the following command and its output:

```
scarknight@X-Retsu:~$ sudo groupmod -n trainee1 trainee2
scarknight@X-Retsu:~$
```

The desktop interface includes a dock with icons for various applications like a browser, file manager, and terminal, and a system tray at the bottom.

6. chmod

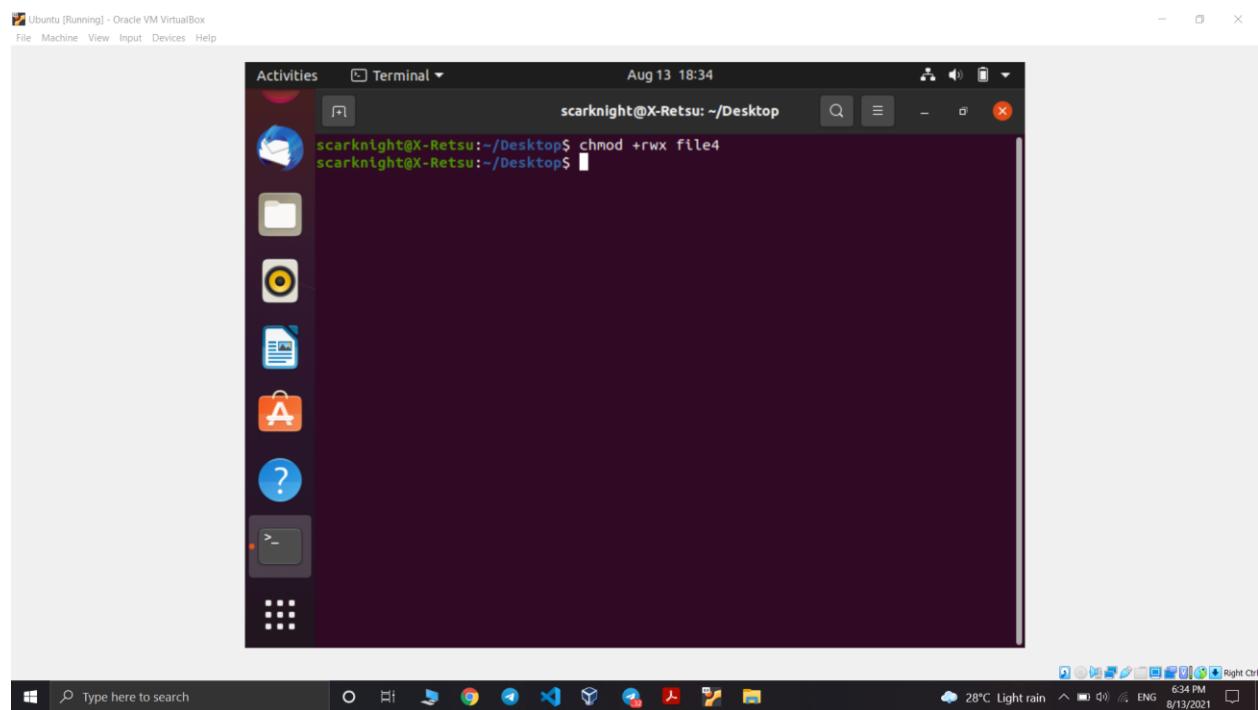
- To change directory permissions of file/ Directory in Linux.

#chmod whowhatwhich file/directory

- chmod +rwx filename to add permissions.
- chmod -rwx directoryname to remove permissions.
- chmod +x filename to allow executable permissions.
- chmod -wx filename to take out write and executable permissions.

#chmod u+x test

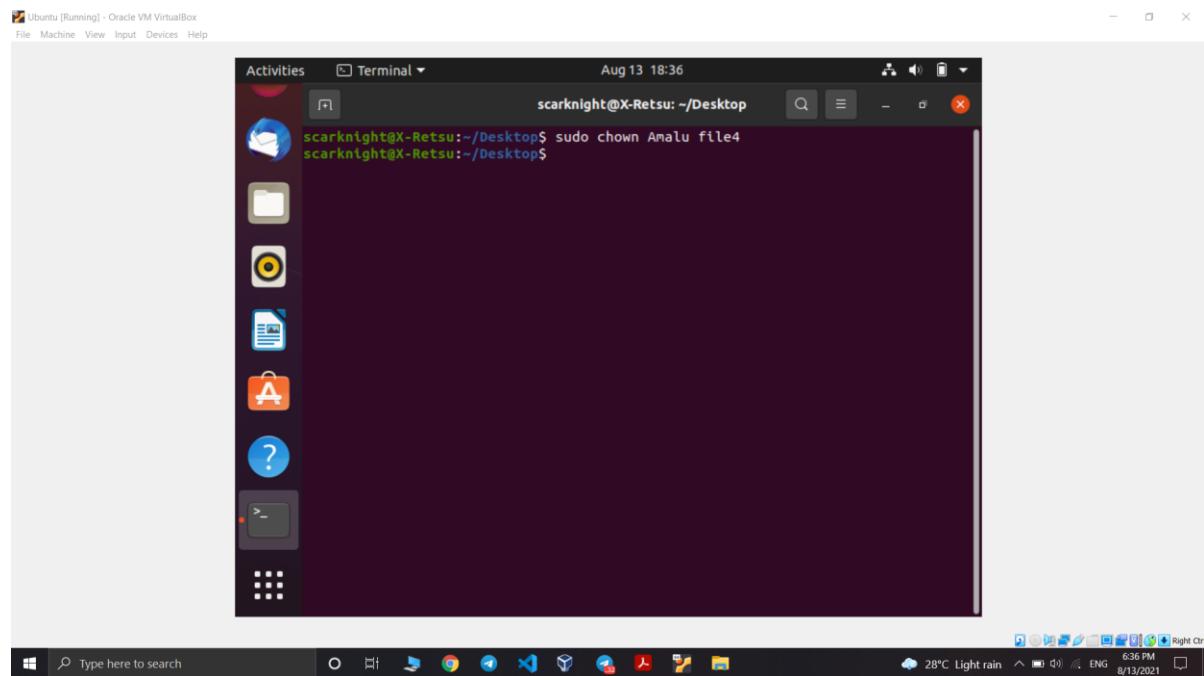
#chmod g-rwx test #chmod o-r test 4



7. chown

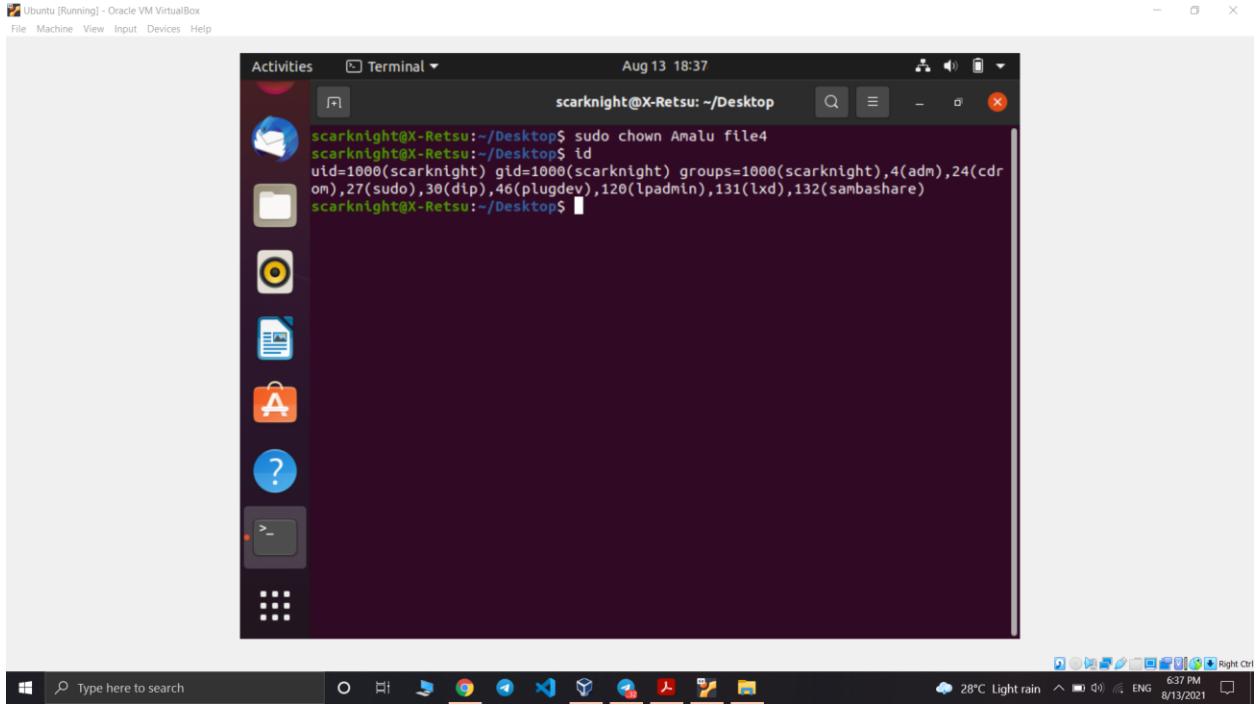
- The chown command allows you to change the user and/or group ownership of a given file, directory.

#chown Tom Test



8. id

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



9. ps

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

#ps -a

```

Ubuntu (Running) - Oracle VM VirtualBox
File Machine View Input Devices Help
Activities Terminal Aug 13 18:37
scarknight@X-Retsu: ~/Desktop
scarknight@X-Retsu: ~$ sudo chown Amalu file4
scarknight@X-Retsu: ~$ id
uid=1000(scarknight) gid=1000(scarknight) groups=1000(scarknight),4(adm),24(cdrom),27(sudo),30(dip),46(plugdev),120(lpadmin),131(lxd),132(sambashare)
scarknight@X-Retsu: ~/Desktop$ ps -a
  PID TTY      TIME CMD
 1917 tty2    00:00:15 Xorg
 1964 tty2    00:00:00 gnome-session-b
 3115 pts/0    00:00:00 ps
scarknight@X-Retsu: ~/Desktop$ 

```

The screenshot shows a Linux desktop environment with a terminal window open. The terminal window title is "Terminal" and the date and time are "Aug 13 18:37". The user is "scarknight" and the host is "X-Retsu". The user runs the command "sudo chown Amalu file4", then checks their user ID with "id", which shows they are in the adm group. They then run "ps -a" to list all processes. The desktop environment includes a dock with various icons like Home, File Manager, and Applications.

10. top

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

#top -u Amalu

```

Ubuntu (Running) - Oracle VM VirtualBox
File Machine View Input Devices Help
Activities Terminal Aug 13 18:38
scarknight@X-Retsu: ~/Desktop
scarknight@X-Retsu: ~$ top -u Amalu
top - 18:38:36 up 1:16, 1 user, load average: 0.10, 0.16, 0.08
Tasks: 167 total, 1 running, 166 sleeping, 0 stopped, 0 zombie
CPU(s): 6.0 us, 2.5 sy, 0.0 ni, 91.6 id, 0.0 wa, 0.0 hi, 0.0 si, 0.0 st
Mem: 3935.9 total, 2113.4 free, 685.5 used, 1137.0 buff/cache
Swap: 2048.0 total, 0.0 used, 2995.0 avail Mem

PID USER PR NI VIRT RES SHR S %CPU %MEM TIME+ COMMAND
1917 scarkni+ 20 0 527549 57668 39388 S 3.0 1.4 0:16.35 Xorg
2094 scarkni+ 20 0 3713104 346088 120068 S 2.3 9.6 1:03.59 gnome+-+
2670 scarkni+ 20 0 823264 51304 38748 S 2.0 1.2 0:09.79 gnome+-+
3120 scarkni+ 20 0 20488 3748 3240 R 1.3 0.1 0:00.06 top
2413 scarkni+ 20 0 472824 43352 32784 S 0.3 1.1 0:00.79 update+-+
1858 scarkni+ 20 0 19388 16512 8116 S 0.0 0.3 0:00.79 systemd
1860 scarkni+ 20 0 104772 4788 4 S 0.0 0.1 0:00.00 (sd-pa+)
1865 scarkni+ 9 -11 1679356 19432 15228 S 0.0 0.5 0:02.27 pulseaudio
1867 scarkni+ 39 19 593736 24584 16128 S 0.0 0.6 0:00.30 tracke+-
1870 scarkni+ 20 0 10208 7360 3988 S 0.0 0.2 0:00.82 dbus-d+-
1874 scarkni+ 20 0 248120 7640 6684 S 0.0 0.2 0:00.06 gvfsd
1876 scarkni+ 20 0 248812 7352 6304 S 0.0 0.2 0:00.13 gnome+-+
1883 scarkni+ 20 0 382060 8276 7412 S 0.0 0.2 0:00.01 gvfsd+-+
1894 scarkni+ 20 0 326968 11148 9588 S 0.0 0.3 0:00.06 gvfs-u+-
1908 scarkni+ 20 0 172652 6452 5808 S 0.0 0.2 0:00.01 gvfs-x+-
1911 scarkni+ 20 0 246606 6856 6168 S 0.0 0.2 0:00.02 gvfs-g+-
1918 scarkni+ 20 0 325368 8872 7852 S 0.0 0.2 0:00.56 gvfs-a+-
1923 scarkni+ 20 0 244588 5072 5536 S 0.0 0.2 0:00.02 gvfs-o+-
1927 scarkni+ 20 0 554888 36416 30416 S 0.0 0.9 0:00.00 goa-da+
1934 scarkni+ 20 0 327300 11304 9976 S 0.0 0.3 0:00.02 goa-ld+
1939 scarkni+ 20 0 244332 6260 5680 S 0.0 0.2 0:00.03 gvfs-m+
1964 scarkni+ 20 0 199016 15556 13748 S 0.0 0.4 0:00.06 gnome+-+

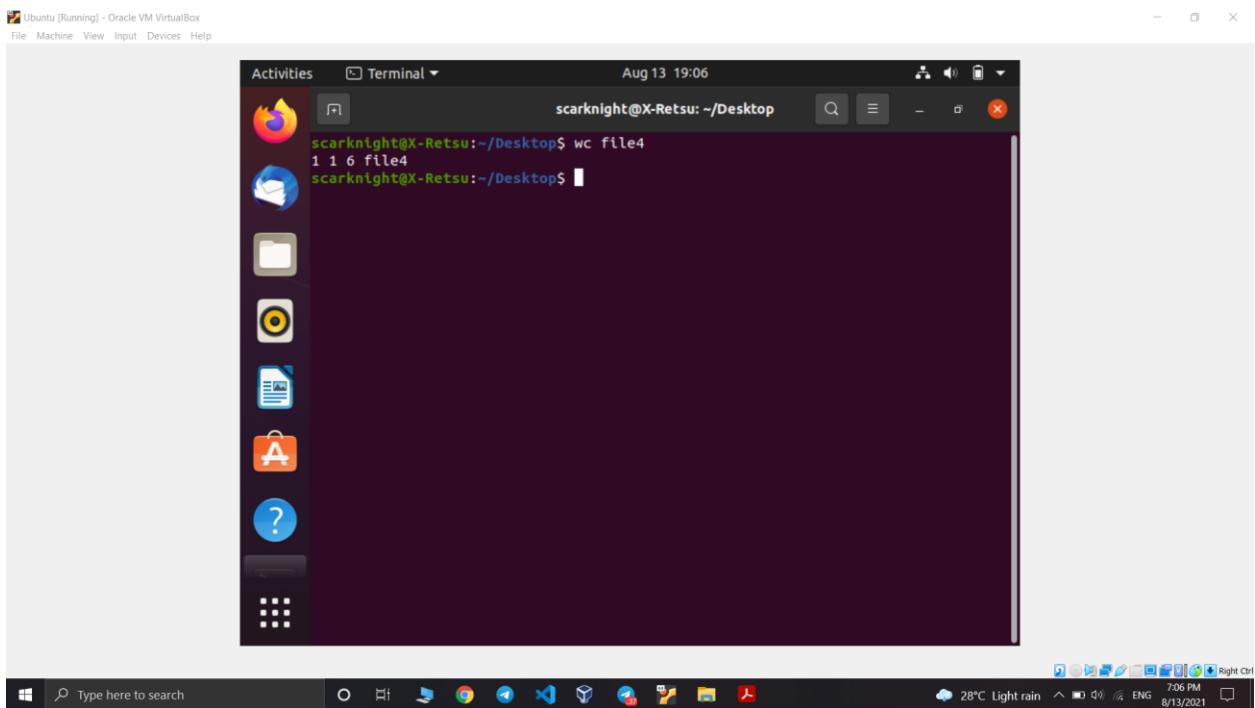
```

The screenshot shows a Linux desktop environment with a terminal window running the "top -u Amalu" command. The terminal window title is "Terminal" and the date and time are "Aug 13 18:38". The user is "scarknight" and the host is "X-Retsu". The output of the "top" command shows a list of processes, including Xorg, gnome-session, and various system daemons. The desktop environment includes a dock with various icons like Home, File Manager, and Applications.

Basic Linux Commands

1. wc

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



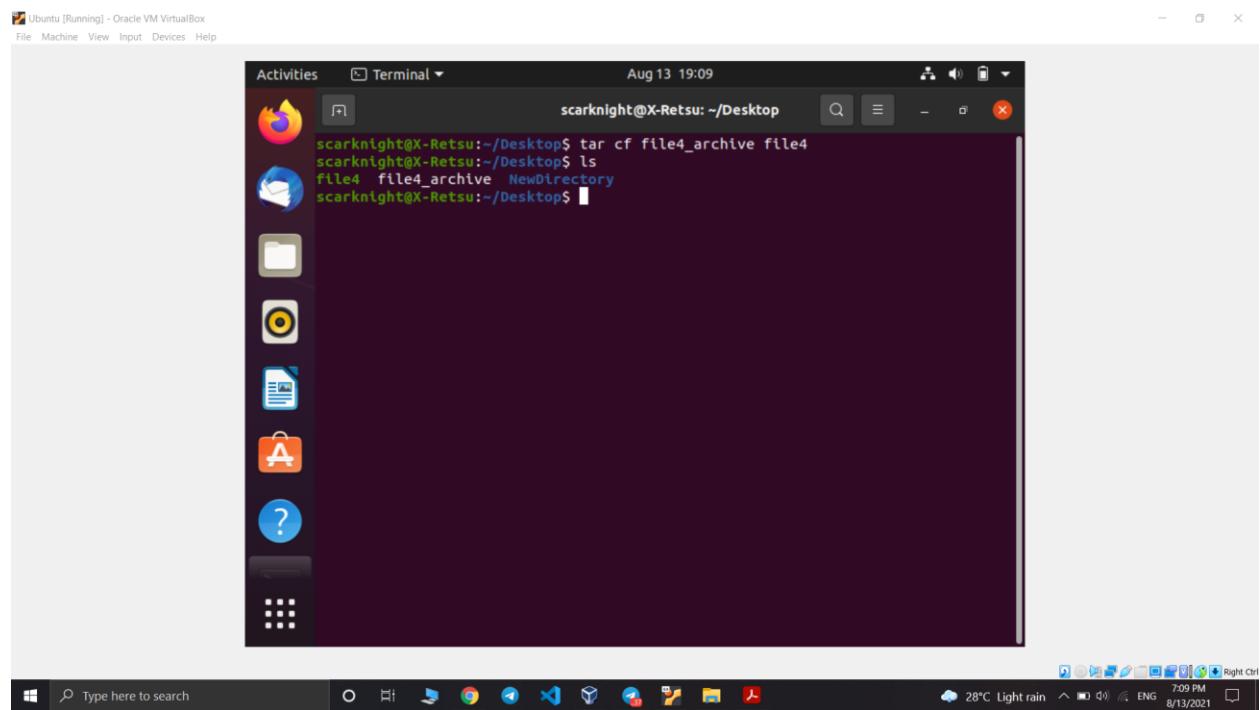
2. tar

- 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

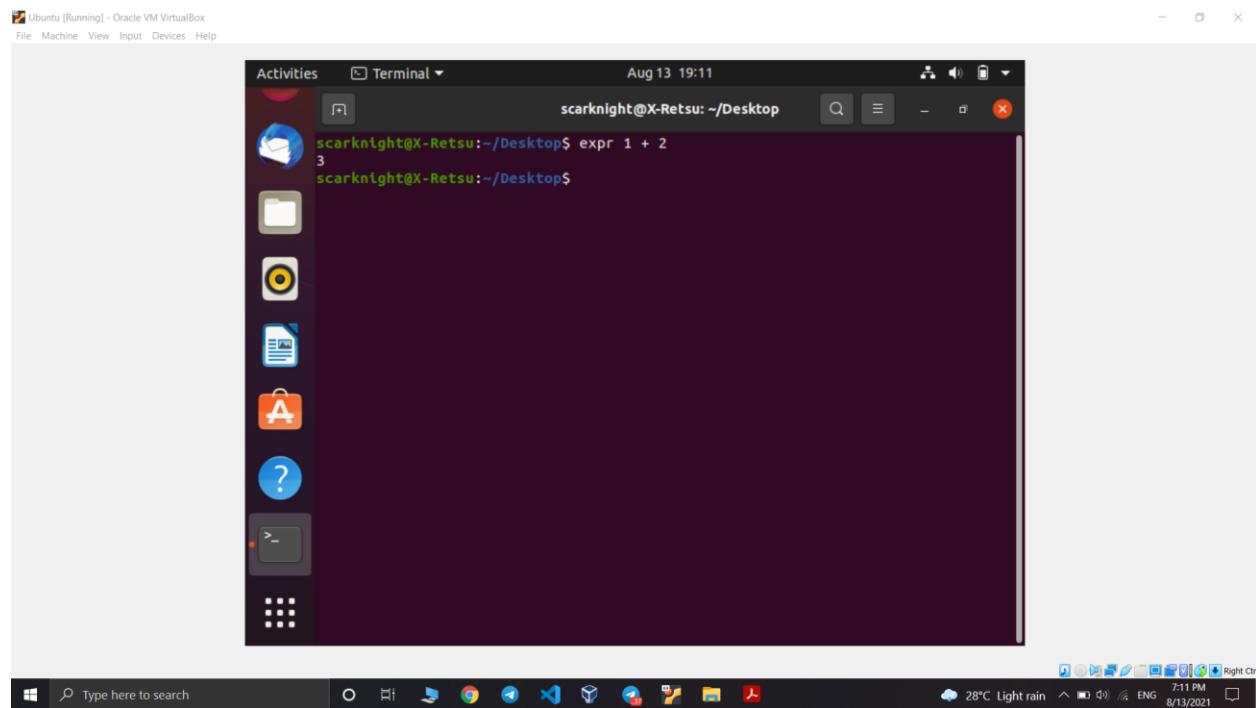
```
#tar xf /home/meera/Documents/Meera_Linux/archive.tar
```



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

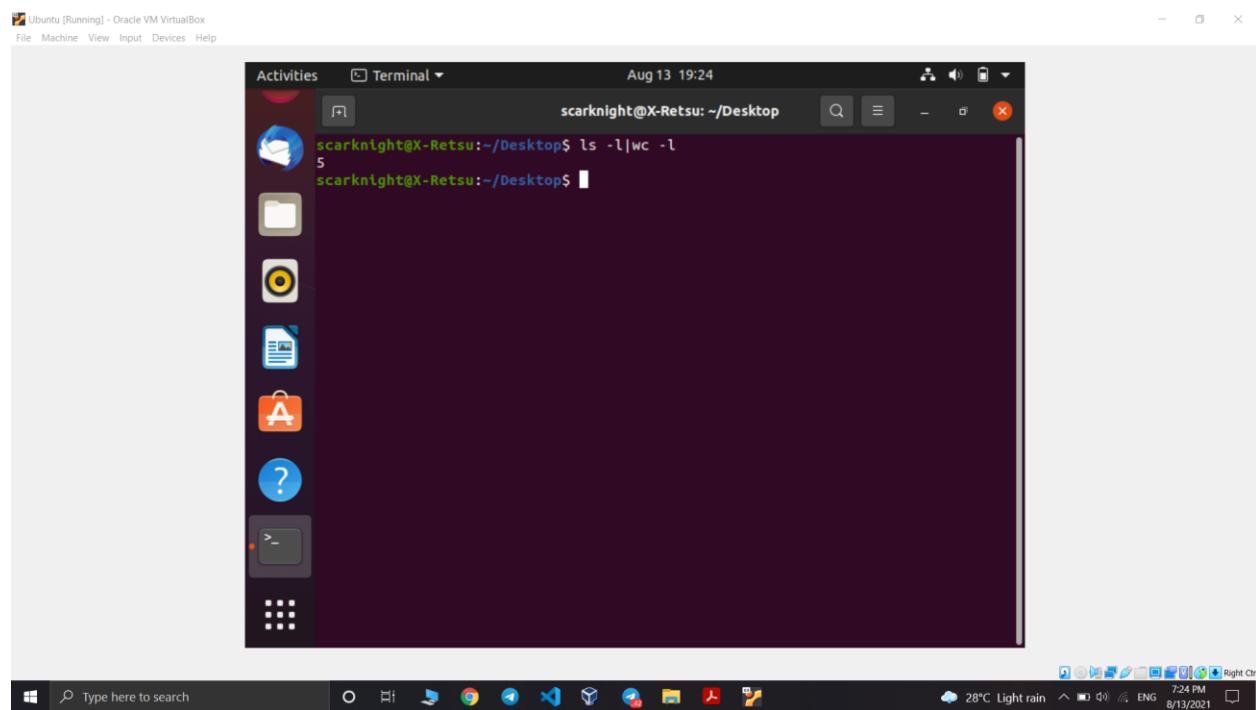
#expr 10 + 2



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
```

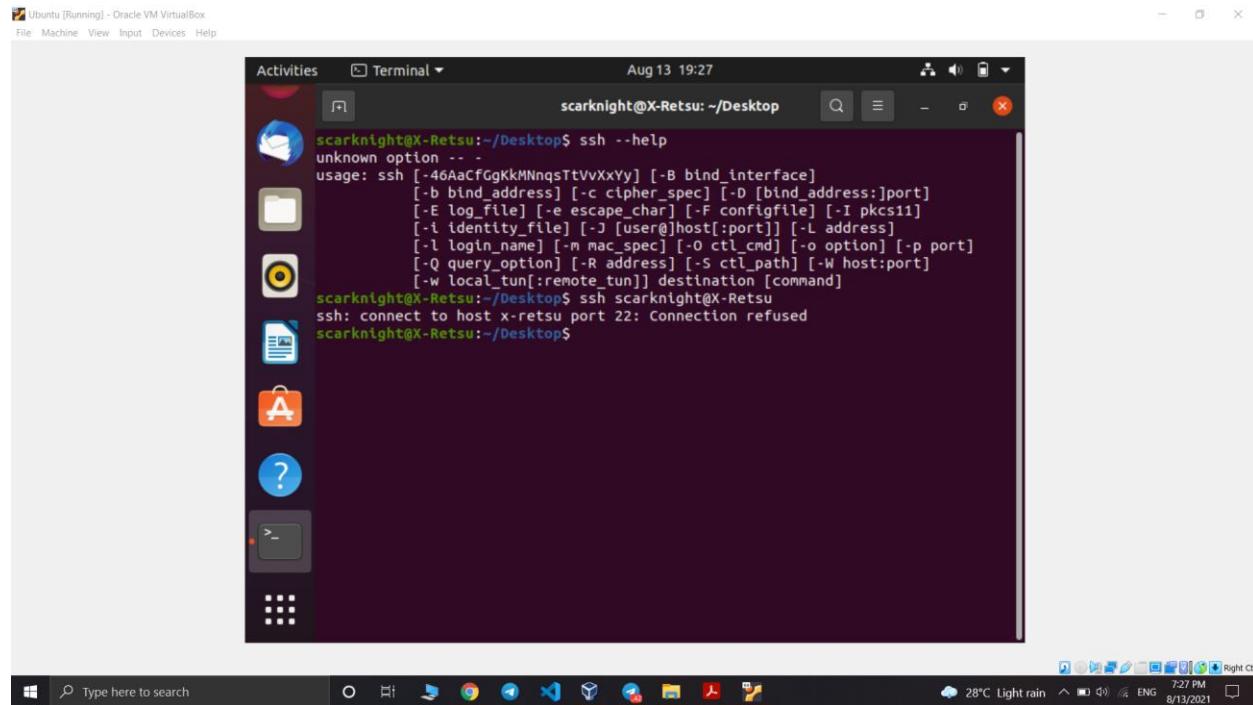


5. ssh

- 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](#)



The screenshot shows a terminal window titled "Terminal" running on an Ubuntu desktop environment. The terminal window has a dark background and displays the following text:

```
scarknight@X-Retsu:~/Desktop$ 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]
scarknight@X-Retsu:~/Desktop$ ssh scarknight@X-Retsu
ssh: connect to host x-retsu port 22: Connection refused
scarknight@X-Retsu:~/Desktop$
```

The terminal window is part of a desktop interface with a dock at the bottom containing icons for various applications like a file manager, browser, and terminal. The desktop environment is Oracle VM VirtualBox.

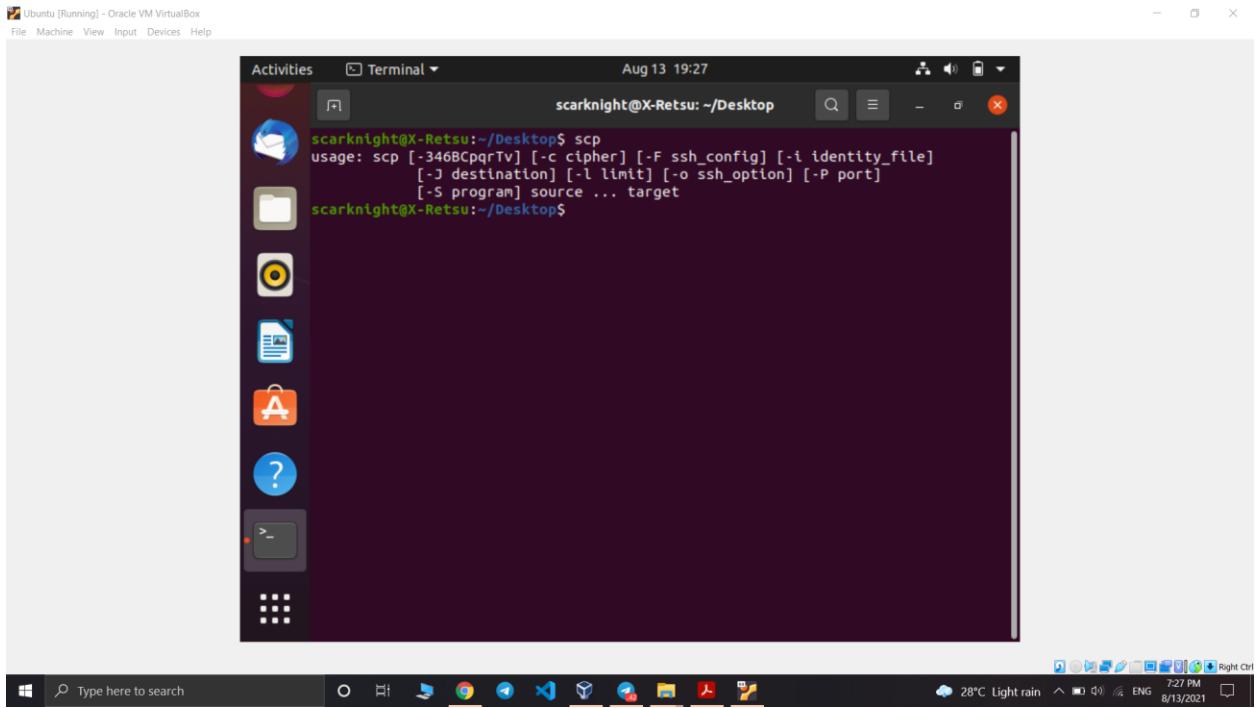
6. scp

- 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:

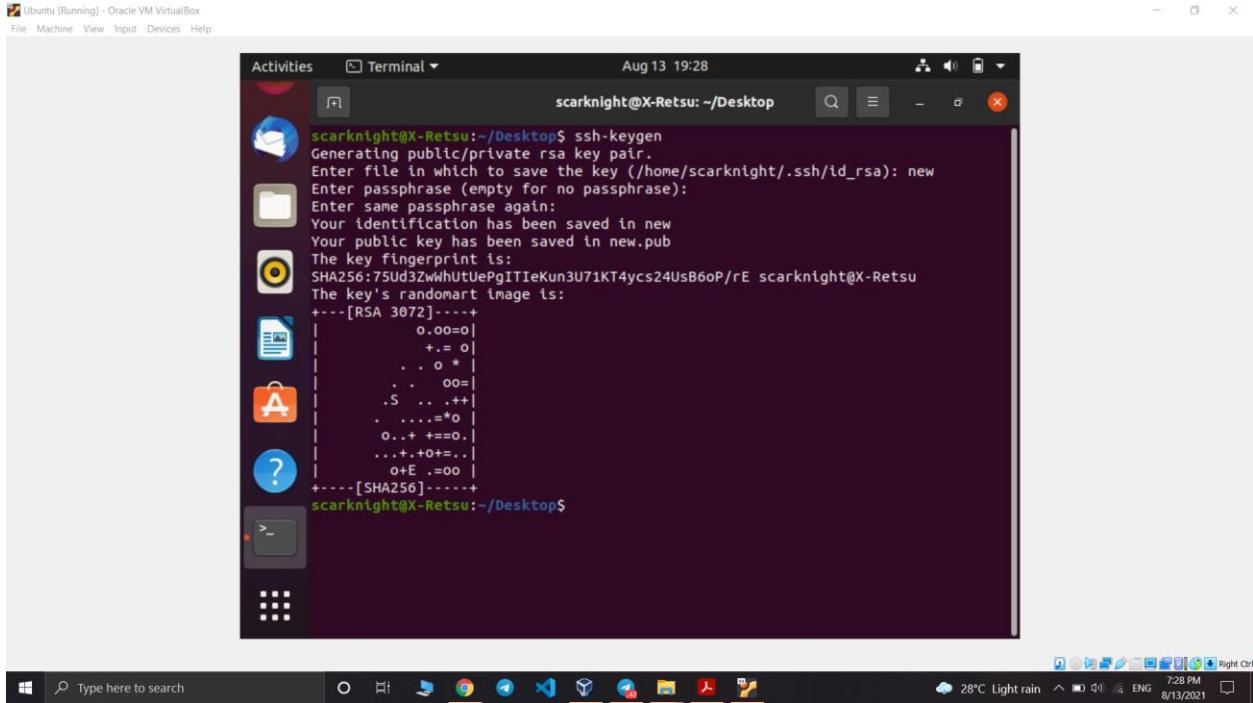
```
scp [OPTION] [user@]SRC_HOST:]file1  
[user@]DEST_HOST:]file2
```

```
$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.



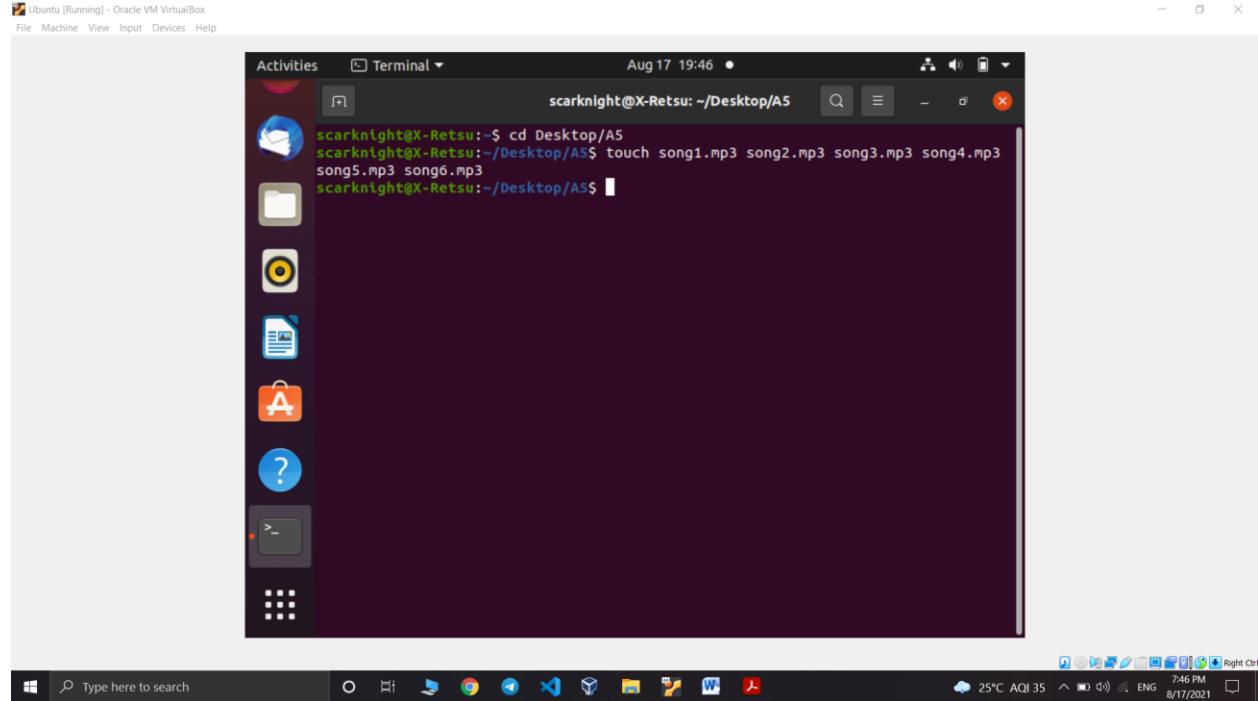
```
scarknight@X-Retsu:~/Desktop$ ssh-keygen
Generating public/private rsa key pair.
Enter file in which to save the key (/home/scarknight/.ssh/id_rsa): new
Enter passphrase (empty for no passphrase):
Enter same passphrase again:
Your identification has been saved in new
Your public key has been saved in new.pub
The key fingerprint is:
SHA256:75Ud3ZwhUtUePgITIeKun3U71KT4ycs24UsB6oP/rE scarknight@X-Retsu
The key's randomart image is:
+---[RSA 3072]----+
|          o.o=o|
|         += o|
|        . . o * |
|       . . oo=|
|      .S ... .++|
|     . . . .*=o |
|    o...+ +==o.|
|   ...+.o+=.=..|
|  o+E ..oo=|
+---[SHA256]----+
scarknight@X-Retsu:~/Desktop$
```

8. ssh-copy-id

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

\$ssh-copy-id username@remote_host

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

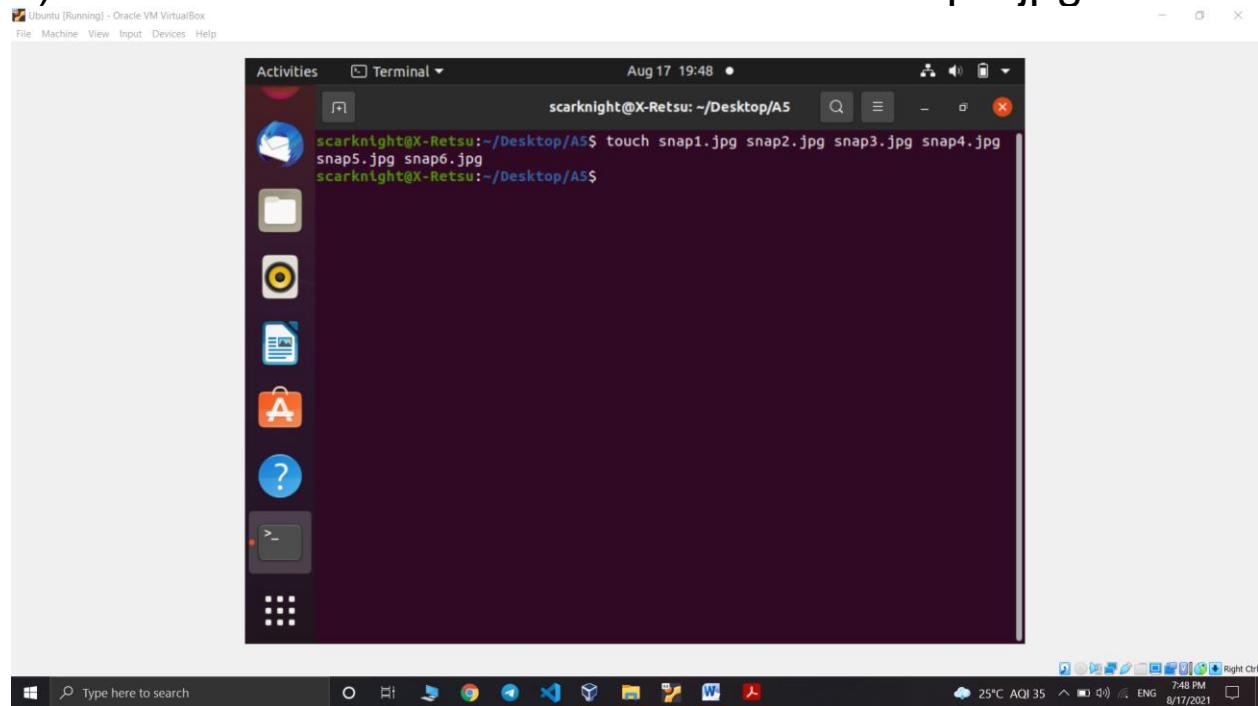


A screenshot of a Linux desktop environment, specifically Ubuntu, running in Oracle VM VirtualBox. The desktop has a dark purple theme. In the center is a terminal window titled "Terminal". The terminal shows the command:

```
scarknight@X-Retsu:~/Desktop/A5$ cd Desktop/A5
scarknight@X-Retsu:~/Desktop/A5$ touch song1.mp3 song2.mp3 song3.mp3 song4.mp3
song5.mp3 song6.mp3
scarknight@X-Retsu:~/Desktop/A5$
```

The terminal window has a dark background with light-colored text. The desktop icons on the left include Home, Applications, Dash, Help, and a terminal icon. The taskbar at the bottom shows various application icons and system status.

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

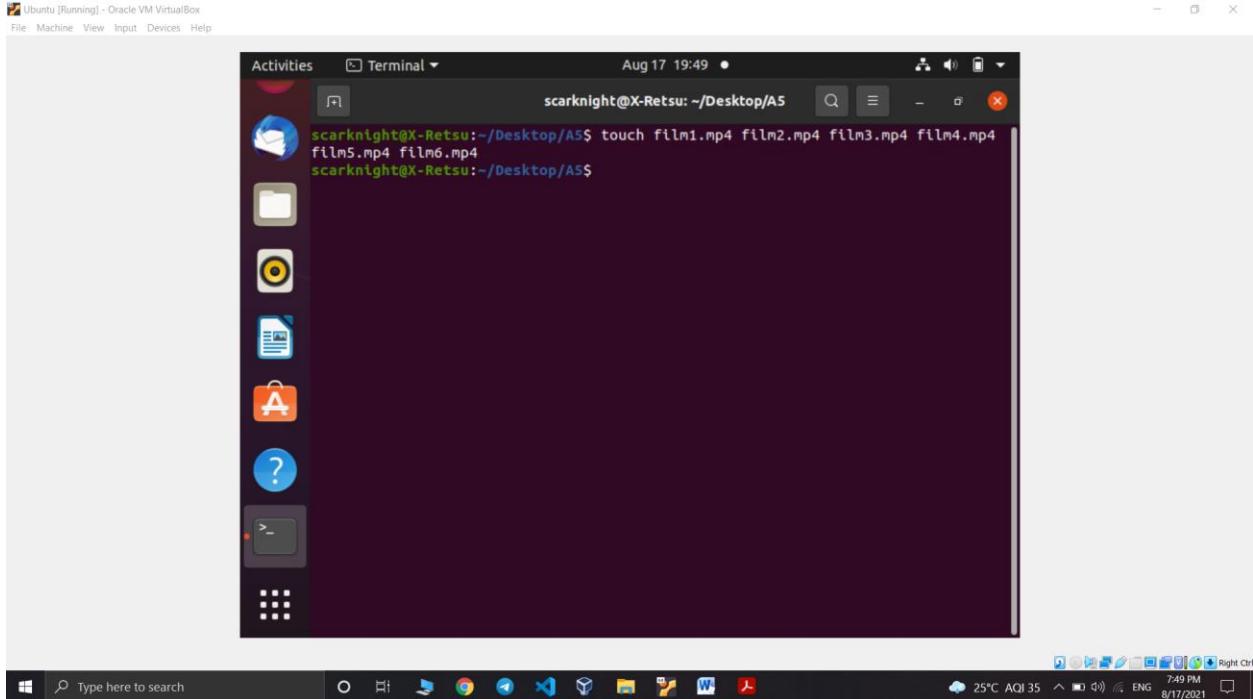


A screenshot of a Linux desktop environment, specifically Ubuntu, running in Oracle VM VirtualBox. The desktop has a light gray theme. In the center is a terminal window titled "Terminal". The terminal shows the command:

```
scarknight@X-Retsu:~/Desktop/A5$ touch snap1.jpg snap2.jpg snap3.jpg snap4.jpg
snap5.jpg snap6.jpg
scarknight@X-Retsu:~/Desktop/A5$
```

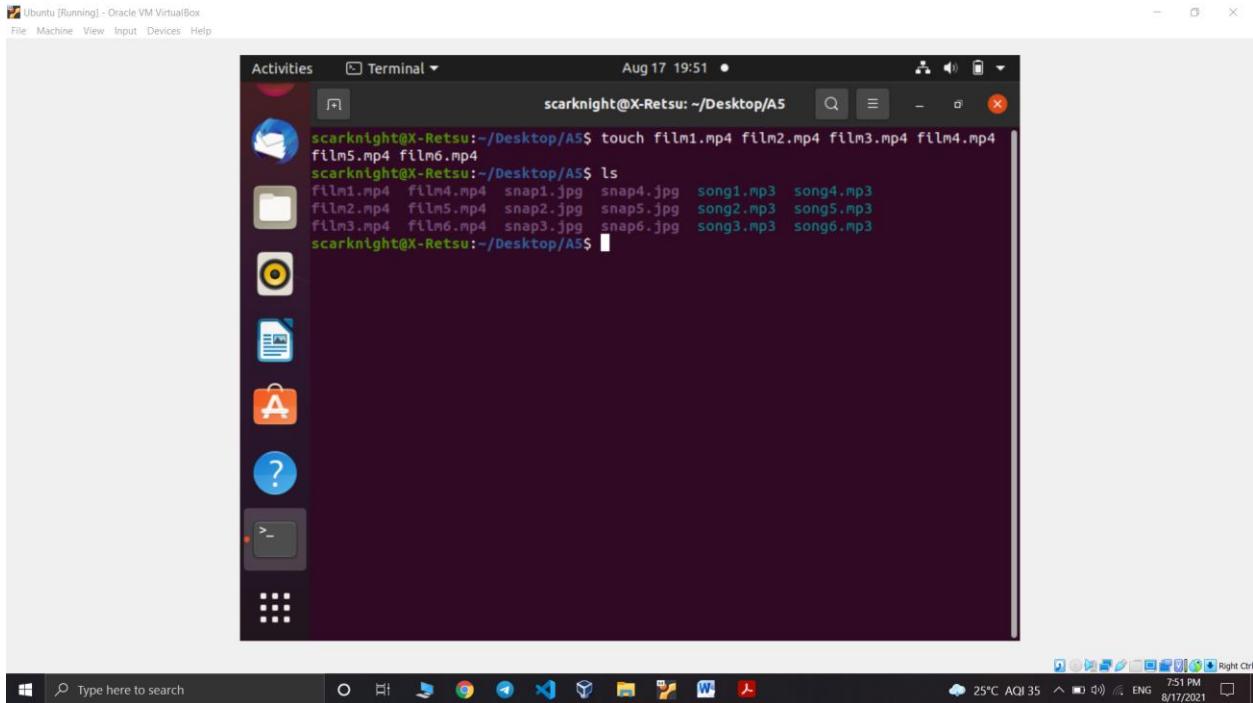
The terminal window has a light gray background with dark text. The desktop icons on the left include Home, Applications, Dash, Help, and a terminal icon. The taskbar at the bottom shows various application icons and system status.

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



A screenshot of an Ubuntu desktop environment running in Oracle VM VirtualBox. The terminal window shows the command `touch film1.mp4 film2.mp4 film3.mp4 film4.mp4 film5.mp4 film6.mp4` being run by the user 'scarknight' at 19:49 on August 17. The terminal window has a dark background and is part of the Unity interface. The desktop bar at the bottom shows various application icons and system status.

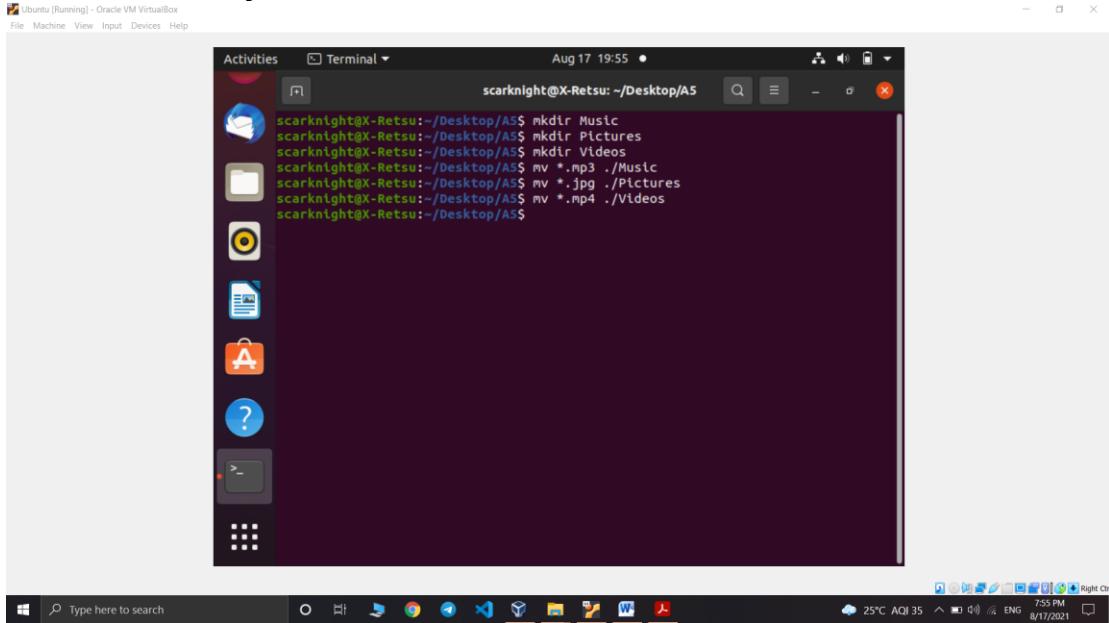
```
scarknight@X-Retsu:~/Desktop/A5$ touch film1.mp4 film2.mp4 film3.mp4 film4.mp4  
film5.mp4 film6.mp4  
scarknight@X-Retsu:~/Desktop/A5$
```



A screenshot of an Ubuntu desktop environment running in Oracle VM VirtualBox. The terminal window shows the command `touch film1.mp4 film2.mp4 film3.mp4 film4.mp4 film5.mp4 film6.mp4` followed by the command `ls` being run by the user 'scarknight' at 19:51 on August 17. The terminal window has a dark background and is part of the Unity interface. The desktop bar at the bottom shows various application icons and system status.

```
scarknight@X-Retsu:~/Desktop/A5$ touch film1.mp4 film2.mp4 film3.mp4 film4.mp4  
film5.mp4 film6.mp4  
scarknight@X-Retsu:~/Desktop/A5$ ls  
film1.mp4  film4.mp4  snap1.jpg  snap4.jpg  song1.mp3  song4.mp3  
film2.mp4  film5.mp4  snap2.jpg  snap5.jpg  song2.mp3  song5.mp3  
film3.mp4  film6.mp4  snap3.jpg  snap6.jpg  song3.mp3  song6.mp3  
scarknight@X-Retsu:~/Desktop/A5$
```

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.

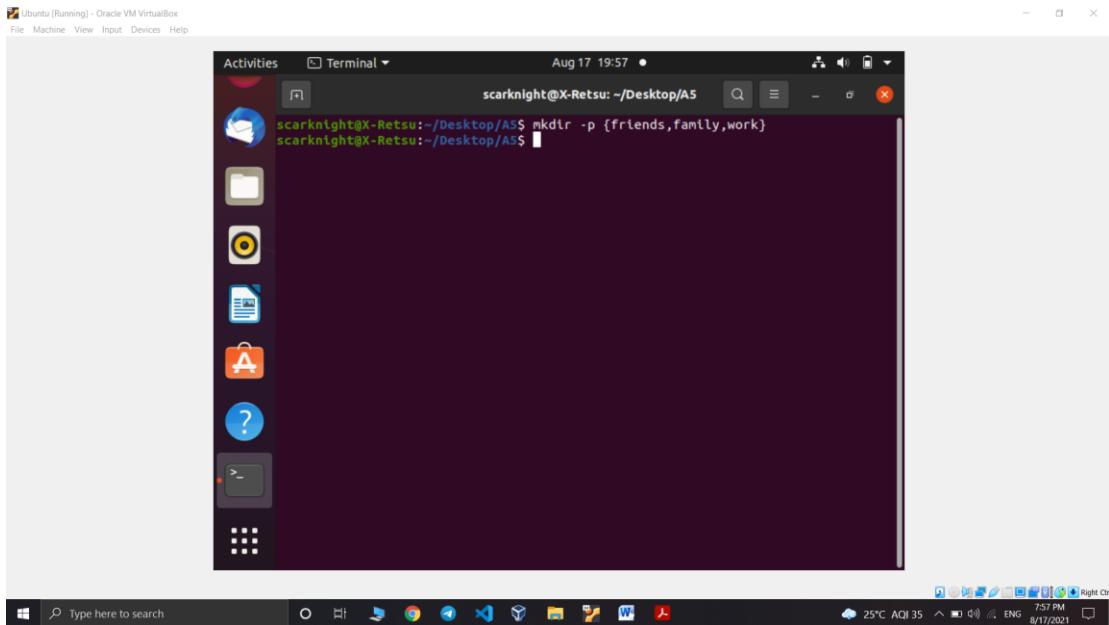


A screenshot of a Linux desktop environment, specifically Ubuntu, running in Oracle VM VirtualBox. The desktop has a dark purple background. On the left is a vertical dock with icons for Dash, Activities, Terminal, Home, Applications, and Help. A terminal window titled 'Terminal' is open, showing the following command-line session:

```
scarknight@X-Retsu:~/Desktop/A$ mkdir Music  
scarknight@X-Retsu:~/Desktop/A$ mkdir Pictures  
scarknight@X-Retsu:~/Desktop/A$ mkdir Videos  
scarknight@X-Retsu:~/Desktop/A$ mv *.mp3 ./Music  
scarknight@X-Retsu:~/Desktop/A$ mv *.jpg ./Pictures  
scarknight@X-Retsu:~/Desktop/A$ mv *.mp4 ./Videos  
scarknight@X-Retsu:~/Desktop/A$
```

The desktop bar at the bottom shows various application icons and system status indicators like weather and battery level. The taskbar below the desktop shows the Unity interface with its characteristic grid icon.

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

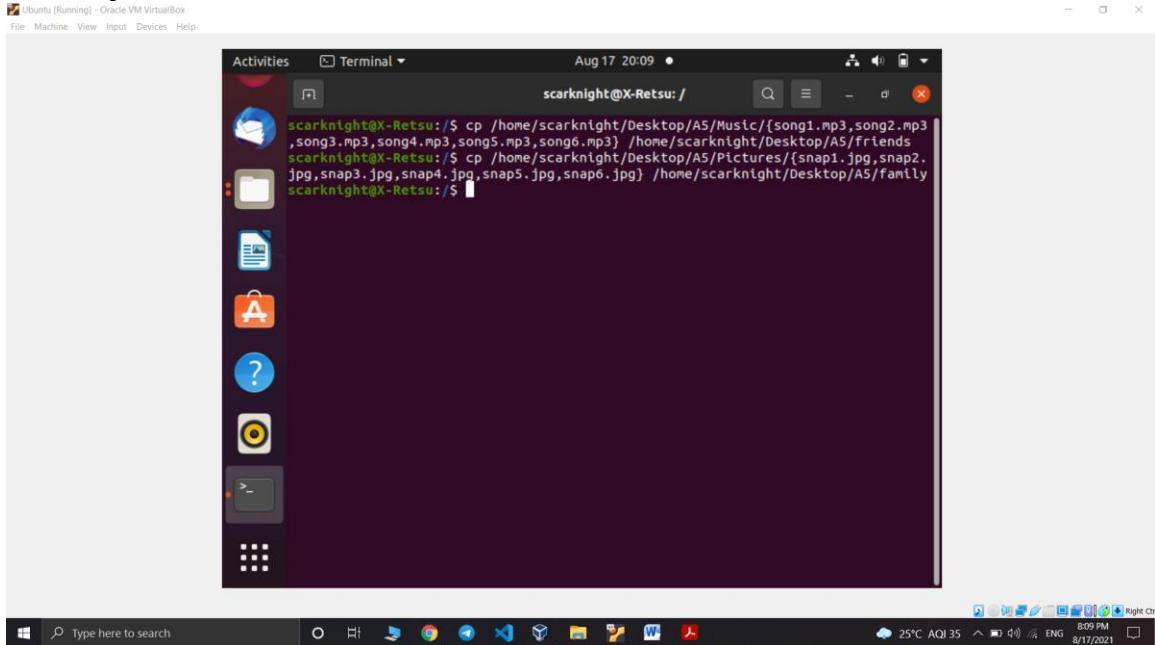


A screenshot of a Linux desktop environment, specifically Ubuntu, running in Oracle VM VirtualBox. The desktop has a dark purple background. On the left is a vertical dock with icons for Dash, Activities, Terminal, Home, Applications, and Help. A terminal window titled 'Terminal' is open, showing the following command-line session:

```
scarknight@X-Retsu:~/Desktop/A$ mkdir -p {friends,family,work}
```

The desktop bar at the bottom shows various application icons and system status indicators like weather and battery level. The taskbar below the desktop shows the Unity interface with its characteristic grid icon.

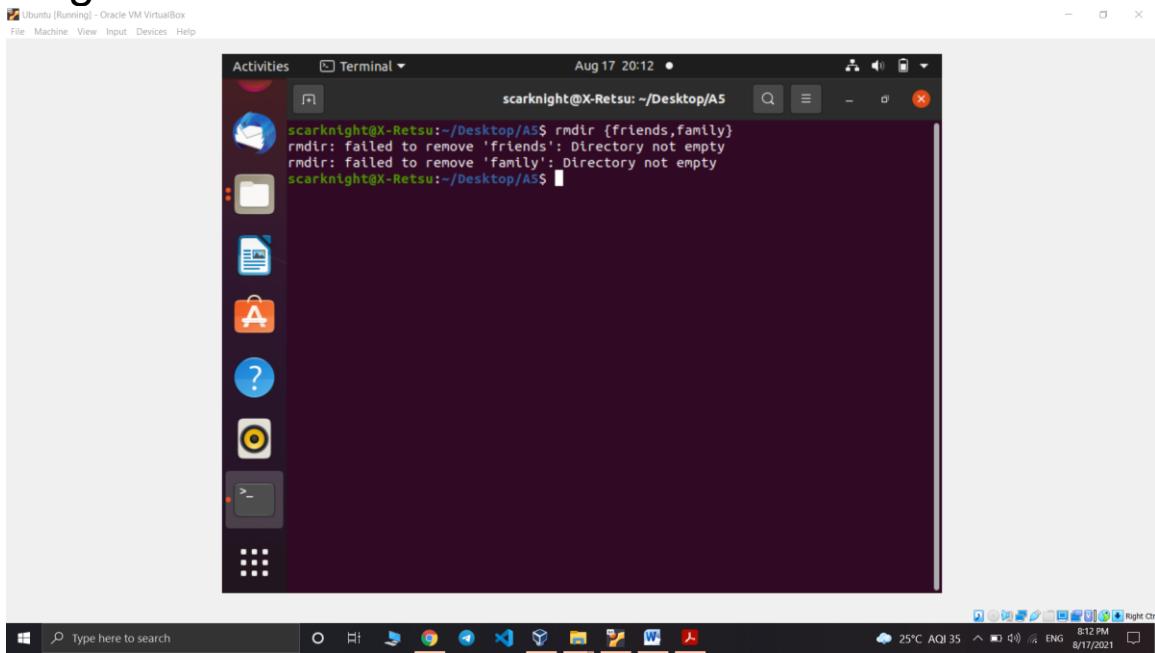
4. Copy song files to the friends folder and snap files to family folder.



The screenshot shows a Ubuntu desktop environment with a terminal window open. The terminal window title is "Activities Terminal" and the date and time are "Aug 17 20:09". The terminal content shows the user executing two "cp" commands to move files from the "/home/scarknight/Desktop/A5/Music" directory to the "/home/scarknight/Desktop/A5/friends" and "/home/scarknight/Desktop/A5/family" directories respectively. The desktop interface includes a dock with various application icons and a system tray at the bottom.

```
scarknight@X-Retsu:~$ cp /home/scarknight/Desktop/A5/Music/{song1.mp3,song2.mp3,song3.mp3,song4.mp3,song5.mp3,song6.mp3} /home/scarknight/Desktop/A5/friends  
scarknight@X-Retsu:~$ cp /home/scarknight/Desktop/A5/Pictures/{snap1.jpg,snap2.jpg,snap3.jpg,snap4.jpg,snap5.jpg,snap6.jpg} /home/scarknight/Desktop/A5/family  
scarknight@X-Retsu:~$
```

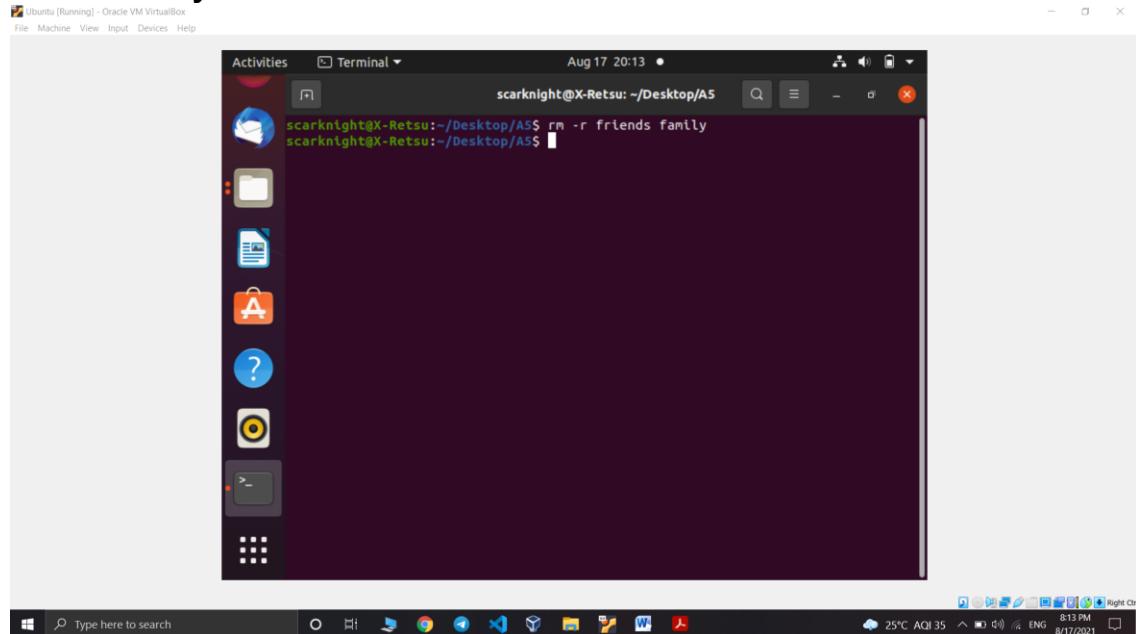
5. Attempt to delete both family and friends projects with a single rmdir command.



The screenshot shows a Ubuntu desktop environment with a terminal window open. The terminal window title is "Activities Terminal" and the date and time are "Aug 17 20:12". The terminal content shows the user attempting to delete the "friends" and "family" directories with a single "rmdir" command. The command fails because both directories are not empty. The desktop interface includes a dock with various application icons and a system tray at the bottom.

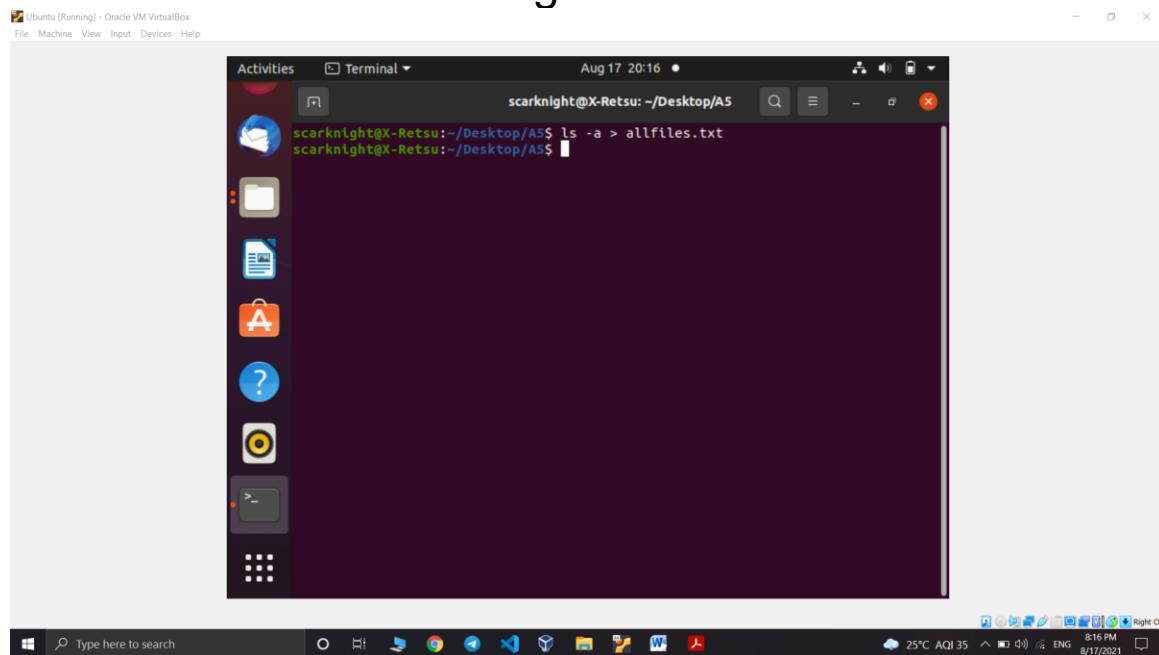
```
scarknight@X-Retsu:~/Desktop/A5$ rmdir {friends,family}  
rmdir: failed to remove 'friends': Directory not empty  
rmdir: failed to remove 'family': Directory not empty  
scarknight@X-Retsu:~/Desktop/A5$
```

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



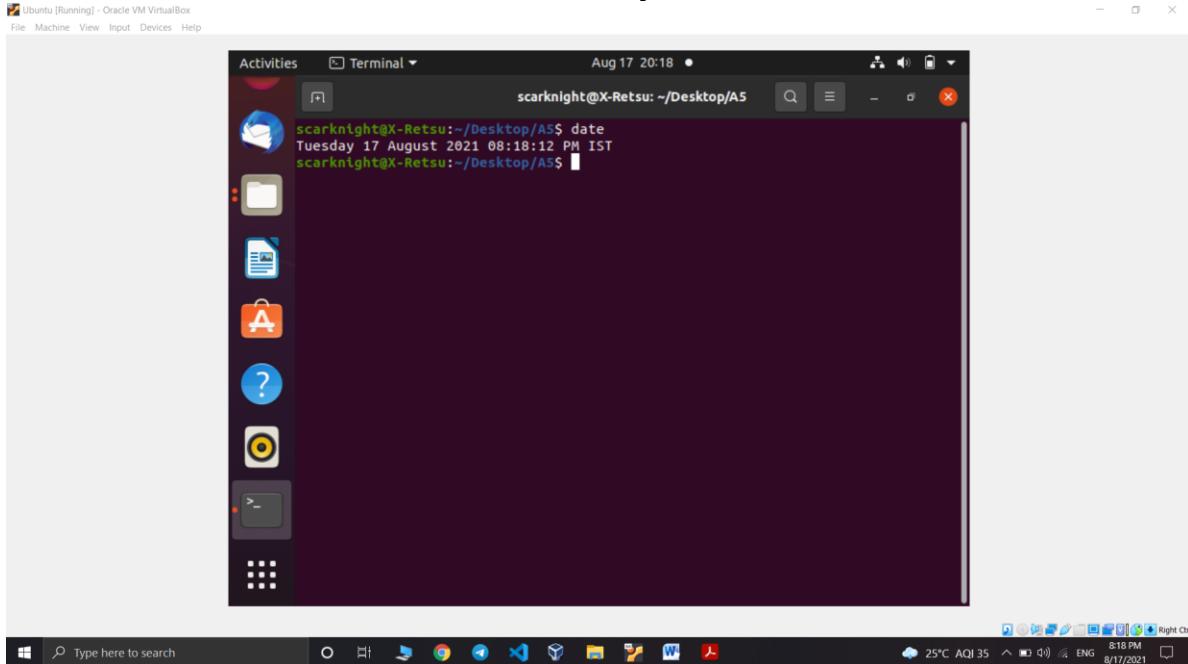
A screenshot of a Linux desktop environment showing a terminal window. The terminal window title is "Activities Terminal" and the status bar shows the date and time as "Aug 17 20:13". The terminal window contains the following command and its output:
scarknight@X-Retsu:~/Desktop/A5\$ rm -r friends family
scarknight@X-Retsu:~/Desktop/A5\$

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



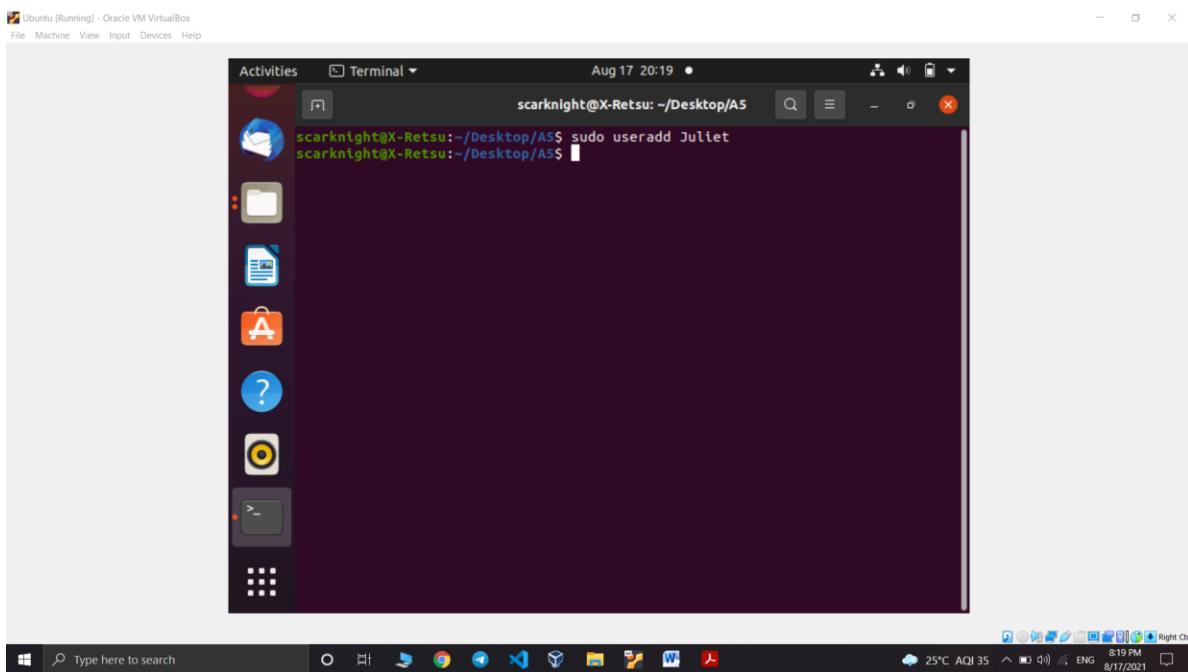
A screenshot of a Linux desktop environment showing a terminal window. The terminal window title is "Activities Terminal" and the status bar shows the date and time as "Aug 17 20:16". The terminal window contains the following command and its output:
scarknight@X-Retsu:~/Desktop/A5\$ ls -a > allfiles.txt
scarknight@X-Retsu:~/Desktop/A5\$

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



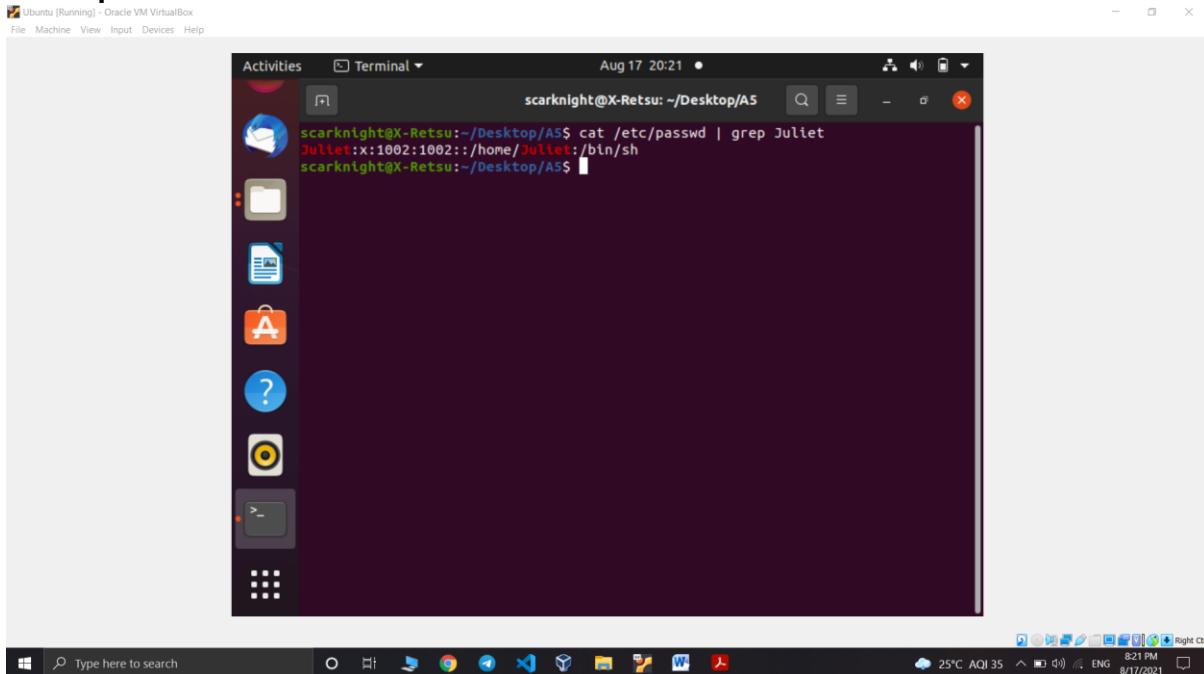
A screenshot of a Linux desktop environment, specifically Ubuntu, running in Oracle VM VirtualBox. The desktop has a dark theme. A terminal window titled 'Terminal' is open, showing the command 'date' being run and its output: 'Tuesday 17 August 2021 08:18:12 PM IST'. The terminal window is part of the Unity interface, which includes a dock at the bottom with various application icons like File Explorer, Mail, and Browser. The system tray shows the date as 'Aug 17 20:18', temperature as '25°C', and battery level as 'AQL 35%'. The title bar of the terminal window also shows the date and time.

9. Add the user Juliet



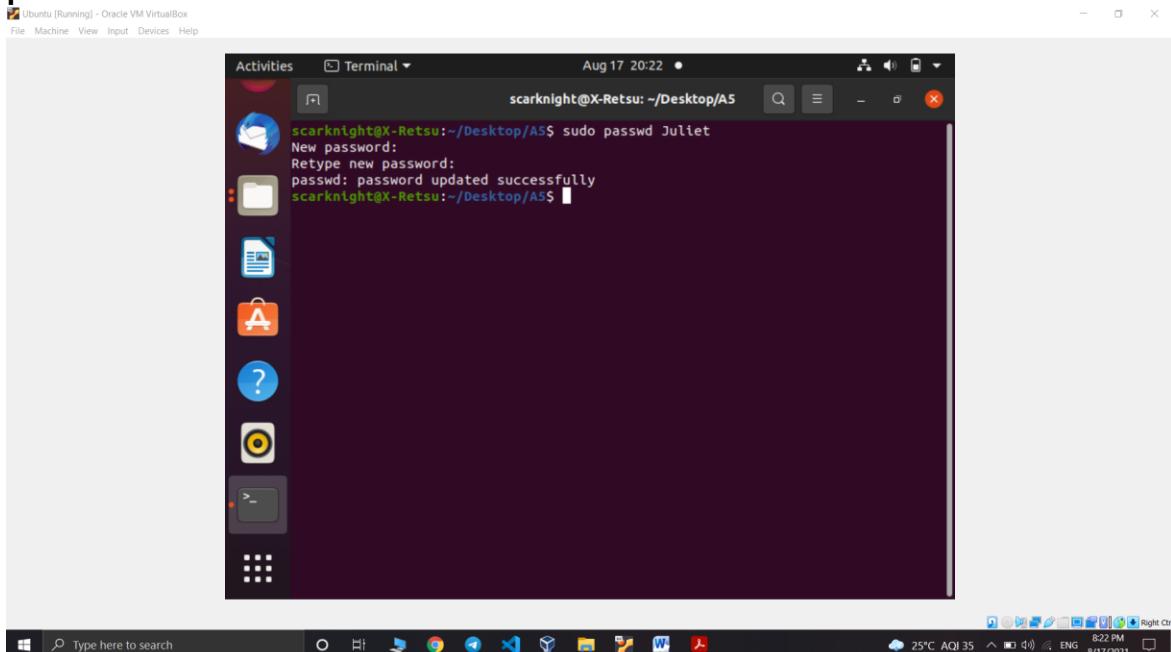
A screenshot of a Linux desktop environment, specifically Ubuntu, running in Oracle VM VirtualBox. The desktop has a dark theme. A terminal window titled 'Terminal' is open, showing the command 'sudo useradd Juliet' being run and its output: 'scarknight@X-Retsu:~/Desktop/A5\$'. The terminal window is part of the Unity interface, which includes a dock at the bottom with various application icons like File Explorer, Mail, and Browser. The system tray shows the date as 'Aug 17 20:19', temperature as '25°C', and battery level as 'AQL 35%'. The title bar of the terminal window also shows the date and time.

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



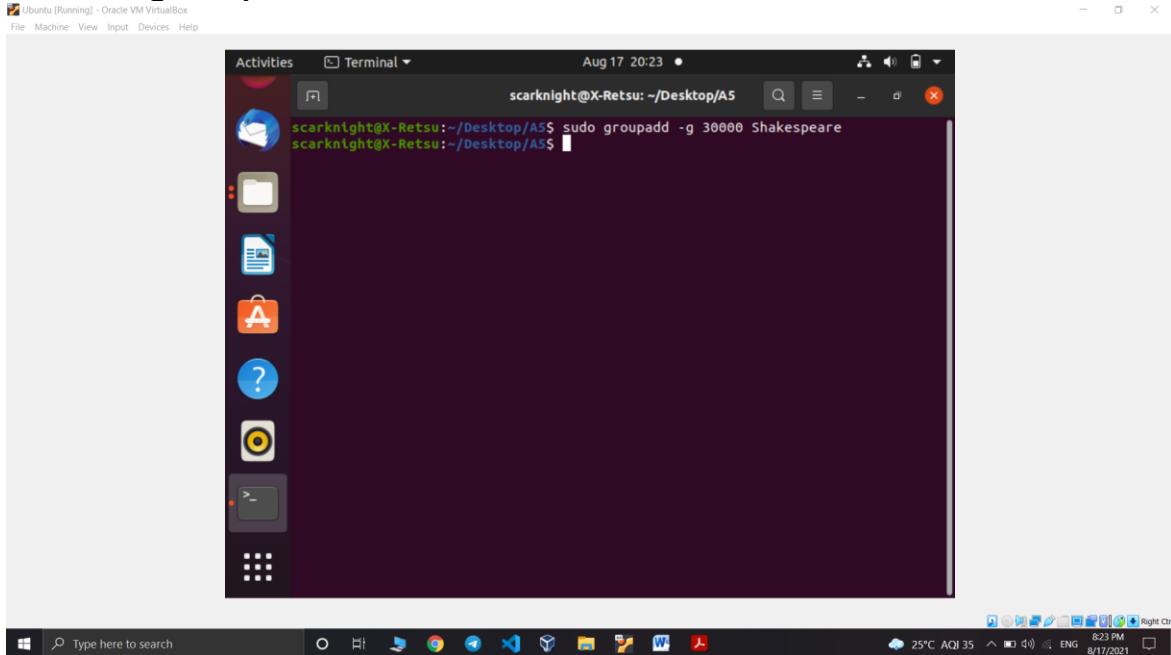
A screenshot of a Linux desktop environment, specifically Ubuntu, running in a VirtualBox VM. The desktop has a dark theme with a dock at the bottom containing icons for various applications like File Explorer, Microsoft Word, and Microsoft Excel. A terminal window is open in the center, showing the command 'cat /etc/passwd | grep Juliet' being run. The output shows a user entry for 'Juliet': 'Juliet:x:1002:1002::/home/Juliet:/bin/sh'. The terminal window title bar says 'scarknight@X-Retsu: ~/Desktop/A5\$'.

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



A screenshot of a Linux desktop environment, specifically Ubuntu, running in a VirtualBox VM. The desktop has a dark theme with a dock at the bottom containing icons for various applications like File Explorer, Microsoft Word, and Microsoft Excel. A terminal window is open in the center, showing the command 'sudo passwd Juliet' being run. The user is prompted to enter a new password and retype it. The message 'passwd: password updated successfully' is displayed. The terminal window title bar says 'scarknight@X-Retsu: ~/Desktop/A5\$'.

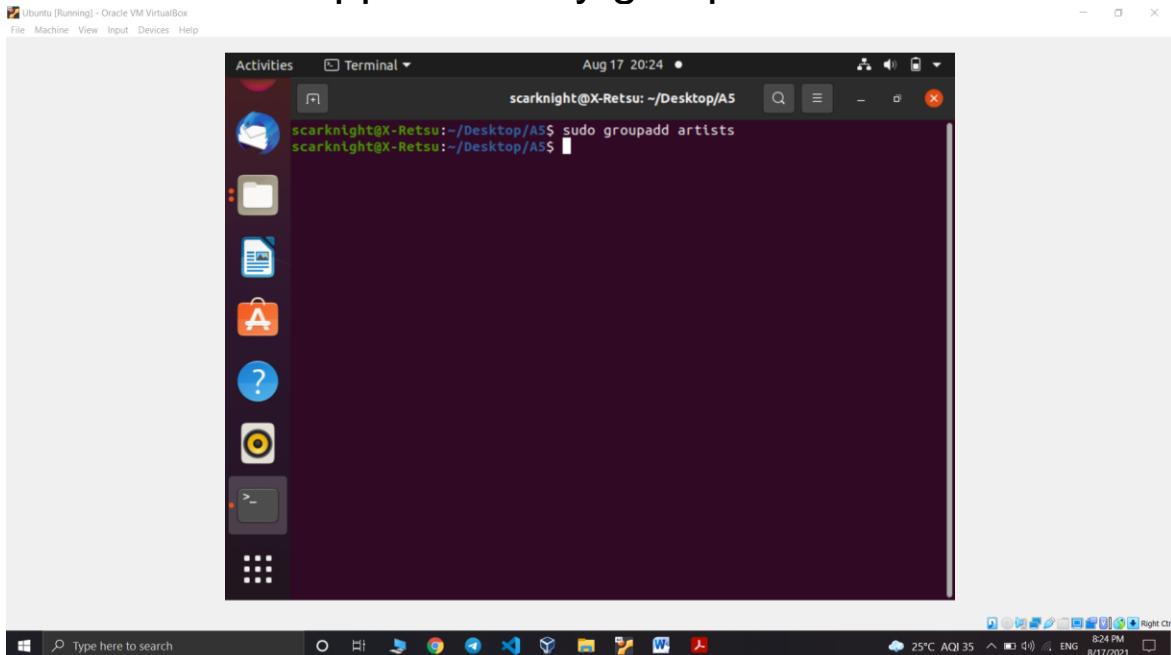
12. Create a supplementary group called Shakespeare with a group id of 30000



```
Ubuntu [Running] - Oracle VM VirtualBox
File Machine View Input Devices Help
Activities Terminal Aug 17 20:23 •
scarknight@X-Retsu:~/Desktop/A5$ sudo groupadd -g 30000 Shakespeare
scarknight@X-Retsu:~/Desktop/A5$
```

The screenshot shows a terminal window on an Ubuntu desktop. The terminal title is "Terminal". The date and time are "Aug 17 20:23". The user is "scarknight" on the host "X-Retsu". The command entered is "sudo groupadd -g 30000 Shakespeare". The terminal window has a dark background with light-colored text. The desktop environment includes a dock with various icons and a system tray at the bottom.

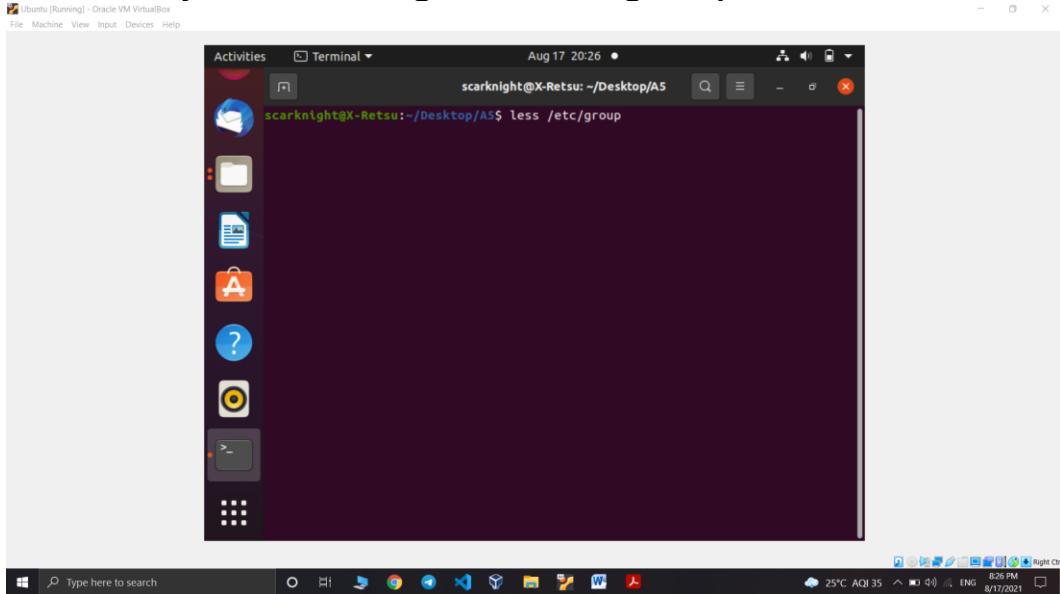
13. Create a supplementary group called artists



```
Ubuntu [Running] - Oracle VM VirtualBox
File Machine View Input Devices Help
Activities Terminal Aug 17 20:24 •
scarknight@X-Retsu:~/Desktop/A5$ sudo groupadd artists
scarknight@X-Retsu:~/Desktop/A5$
```

The screenshot shows a terminal window on an Ubuntu desktop. The terminal title is "Terminal". The date and time are "Aug 17 20:24". The user is "scarknight" on the host "X-Retsu". The command entered is "sudo groupadd artists". The terminal window has a dark background with light-colored text. The desktop environment includes a dock with various icons and a system tray at the bottom.

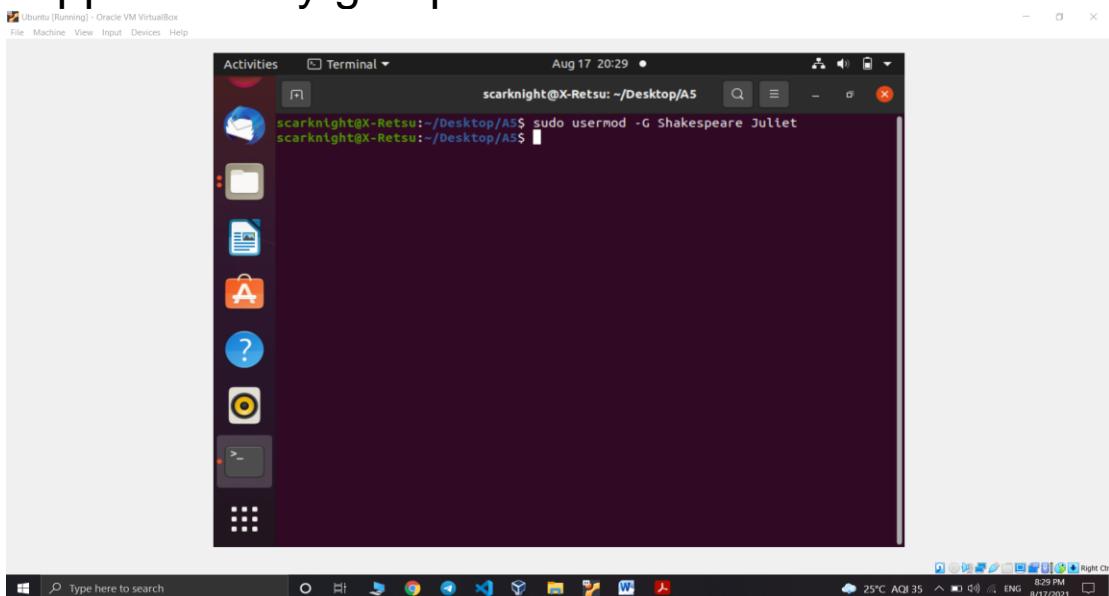
14. Confirm that Shakespeare and artists have been added by examining the /etc/group file.



A screenshot of an Ubuntu desktop environment. A terminal window titled "Terminal" is open, showing the command "less /etc/group". The output in the terminal shows two entries: "Shakespeare:x:30000:" and "artists:x:30001:". The desktop interface includes a dock with various icons and a system tray at the bottom.

```
Ubuntu [Running] - Oracle VM VirtualBox
File Machine View Input Devices Help
Activities Terminal Aug 17 20:26 •
scarknight@X-Retsu:~/Desktop/A$ less /etc/group
Shakespeare:x:30000:
artists:x:30001:
(END)
```

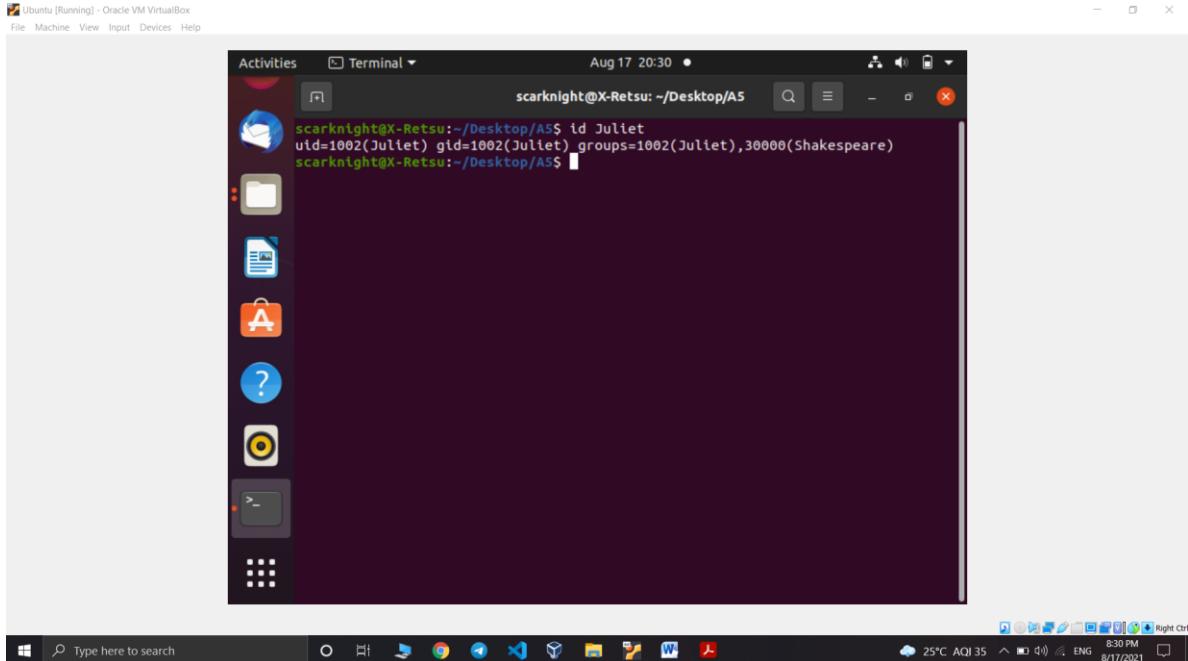
15. Add the Juliet user to the Shakespeare group as a supplementary group.



A screenshot of an Ubuntu desktop environment. A terminal window titled "Terminal" is open, showing the command "sudo usermod -G Shakespeare Juliet". The output in the terminal shows the command was run successfully. The desktop interface includes a dock with various icons and a system tray at the bottom.

```
Ubuntu [Running] - Oracle VM VirtualBox
File Machine View Input Devices Help
Activities Terminal Aug 17 20:29 •
scarknight@X-Retsu:~/Desktop/A$ sudo usermod -G Shakespeare Juliet
scarknight@X-Retsu:~/Desktop/A$
```

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



Ubuntu [Running] - Oracle VM VirtualBox

File Machine View Input Devices Help

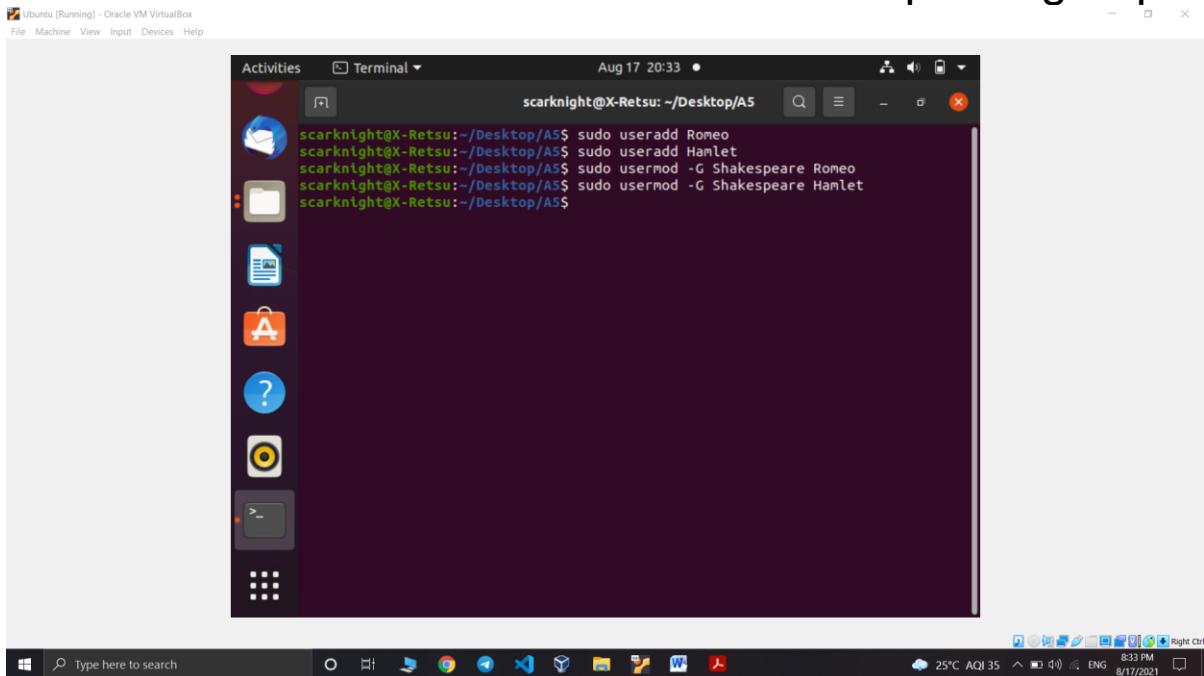
Activities Terminal Aug 17 20:30 scarknight@X-Retsu: ~/Desktop/A5

```
scarknight@X-Retsu:~/Desktop/A5$ id Juliet
uid=1002(Juliet) gid=1002(Juliet) groups=1002(Juliet),30000(Shakespeare)
scarknight@X-Retsu:~/Desktop/A5$
```

Type here to search

Windows Start button, Taskbar icons (File Explorer, Edge, Google Chrome, File Manager, etc.), System tray showing 25°C, AQI 35, 8:30 PM, 8/17/2021.

17. Add Romeo and Hamlet to the Shakespeare group.



Ubuntu [Running] - Oracle VM VirtualBox

File Machine View Input Devices Help

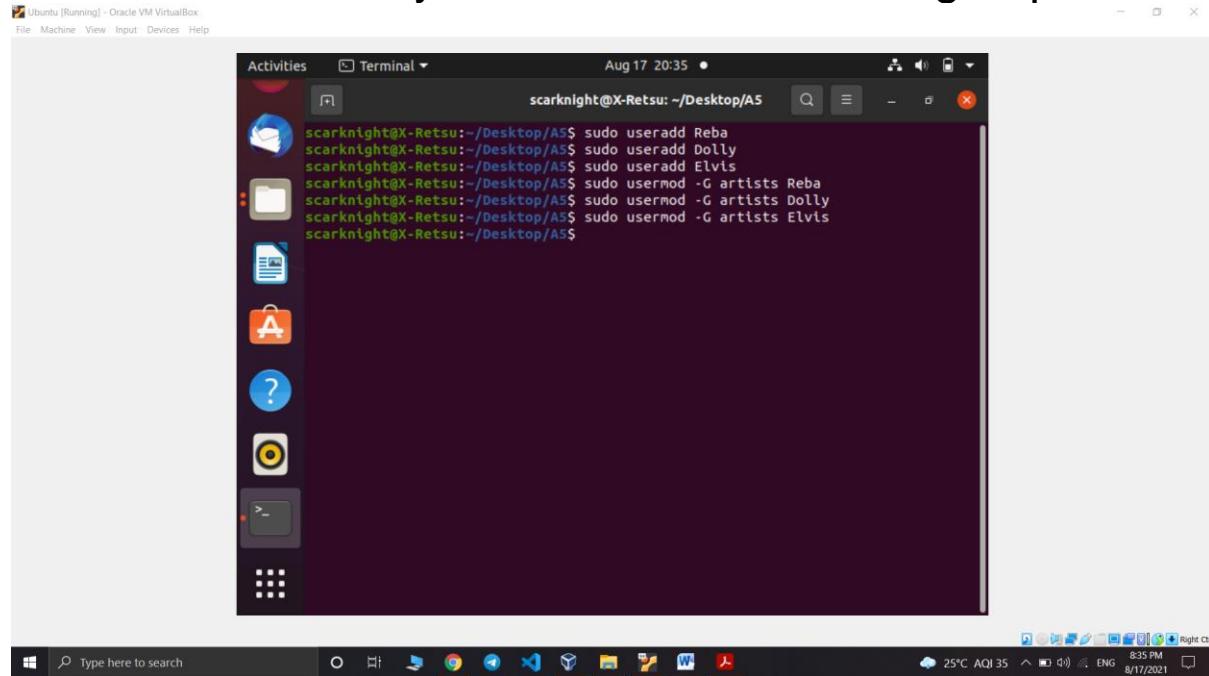
Activities Terminal Aug 17 20:33 scarknight@X-Retsu: ~/Desktop/A5

```
scarknight@X-Retsu:~/Desktop/A5$ sudo useradd Romeo
scarknight@X-Retsu:~/Desktop/A5$ sudo useradd Hamlet
scarknight@X-Retsu:~/Desktop/A5$ sudo usermod -G Shakespeare Romeo
scarknight@X-Retsu:~/Desktop/A5$ sudo usermod -G Shakespeare Hamlet
scarknight@X-Retsu:~/Desktop/A5$
```

Type here to search

Windows Start button, Taskbar icons (File Explorer, Edge, Google Chrome, File Manager, etc.), System tray showing 25°C, AQI 35, 8:33 PM, 8/17/2021.

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

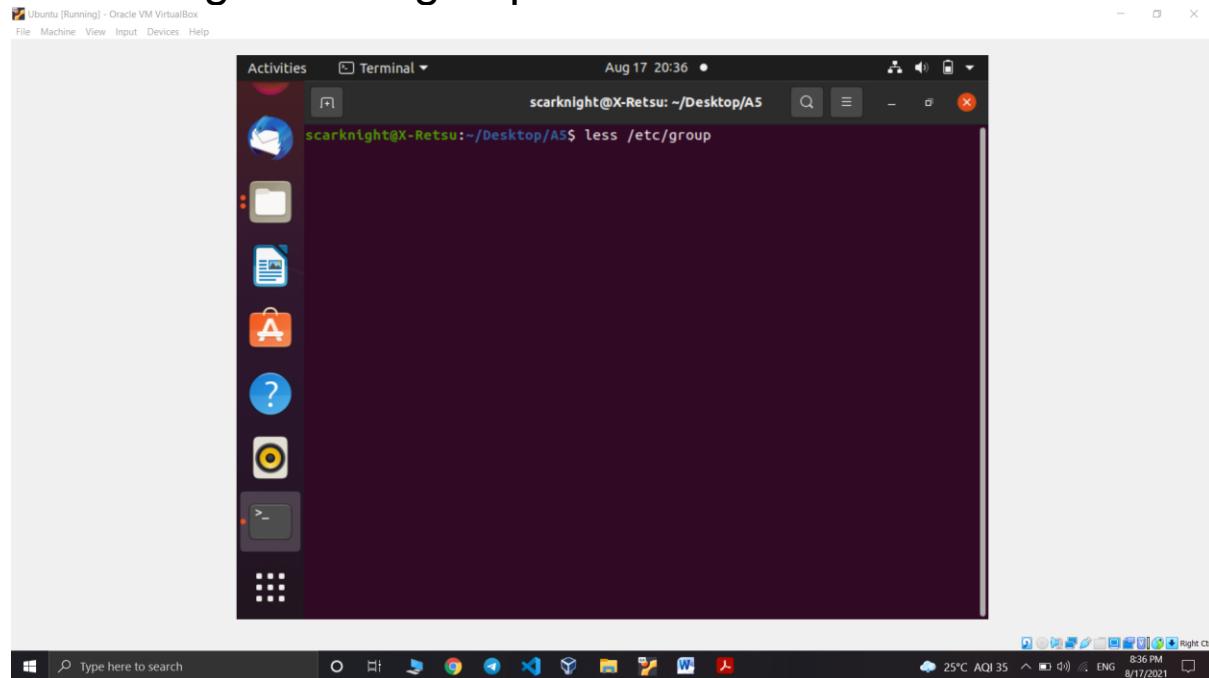


A screenshot of a Ubuntu desktop environment running in Oracle VM VirtualBox. The terminal window shows the following commands being run:

```
scarknight@X-Retsu:~/Desktop/AS$ sudo useradd Reba
scarknight@X-Retsu:~/Desktop/AS$ sudo useradd Dolly
scarknight@X-Retsu:~/Desktop/AS$ sudo useradd Elvis
scarknight@X-Retsu:~/Desktop/AS$ sudo usermod -G artists Reba
scarknight@X-Retsu:~/Desktop/AS$ sudo usermod -G artists Dolly
scarknight@X-Retsu:~/Desktop/AS$ sudo usermod -G artists Elvis
```

The desktop interface includes a dock with various application icons and a system tray at the bottom.

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



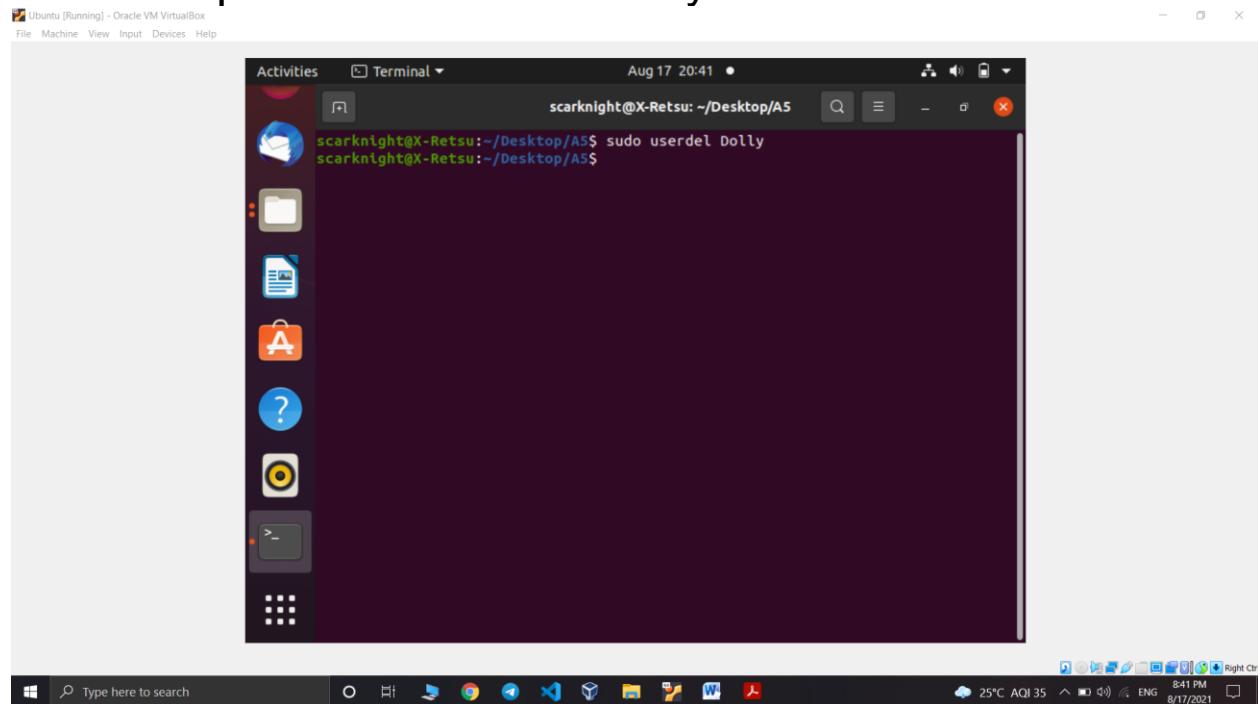
A screenshot of a Ubuntu desktop environment running in Oracle VM VirtualBox. The terminal window shows the command:

```
scarknight@X-Retsu:~/Desktop/AS$ less /etc/group
```

The desktop interface includes a dock with various application icons and a system tray at the bottom.

```
Juliet:x:1002:  
Shakespeare:x:30000:Juliet,Romeo,Hamlet  
artists:x:30001:Reba,Dolly,Elvis  
Romeo:x:30002:  
Hamlet:x:1004:  
Reba:x:1005:  
Dolly:x:1006:  
Elvis:x:1007:  
(END)
```

20. Attempt to remove user Dolly.

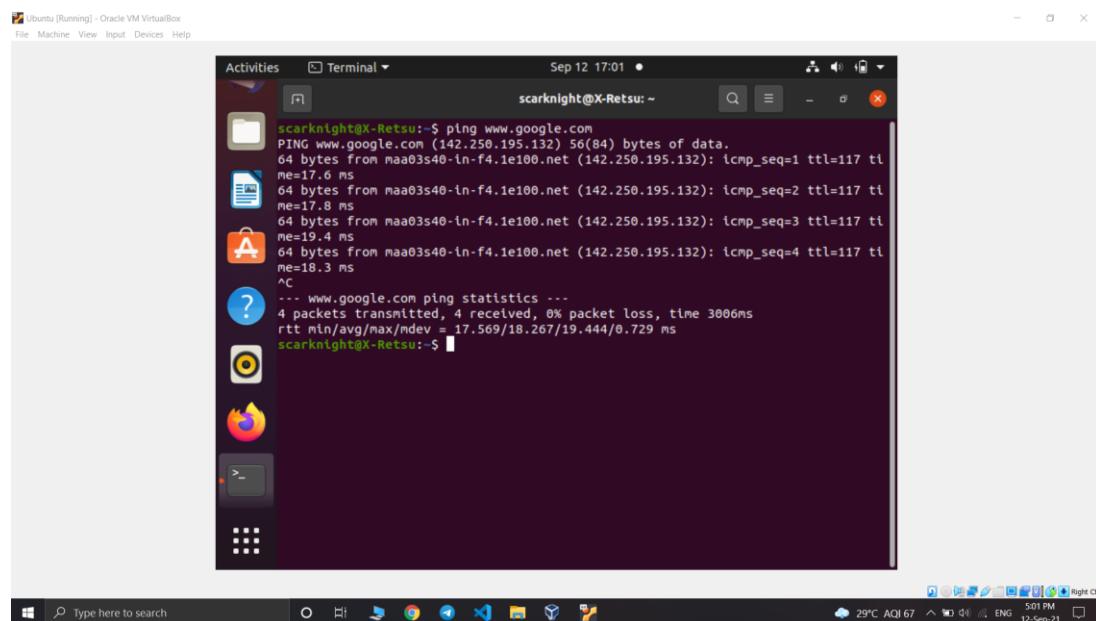


(1.) Try out these network commands in Window as well as in Linux and perform at least 4 options with each command:

ping route traceroute, nslookup, Ip Config, NetStat

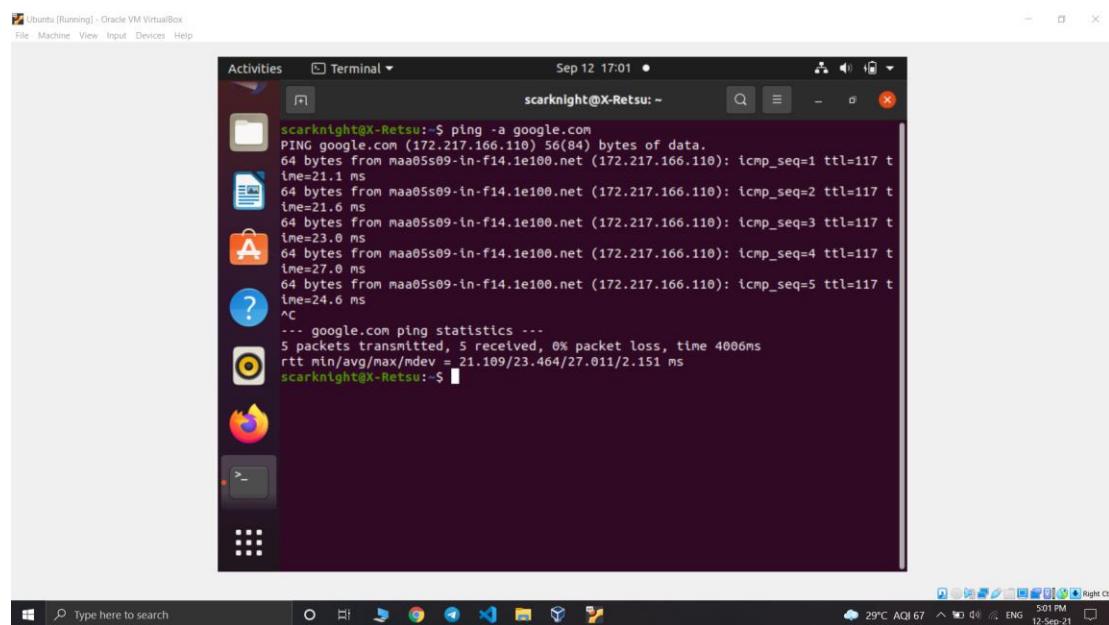
UBUNTU

Ping



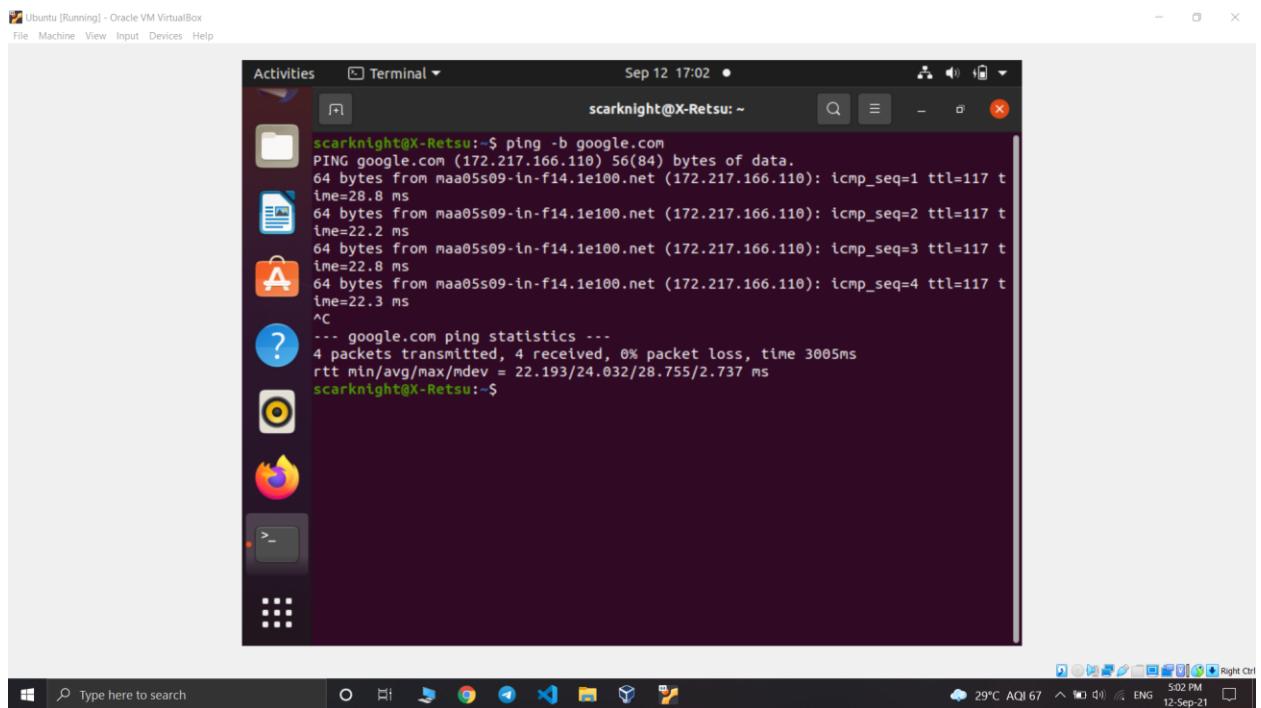
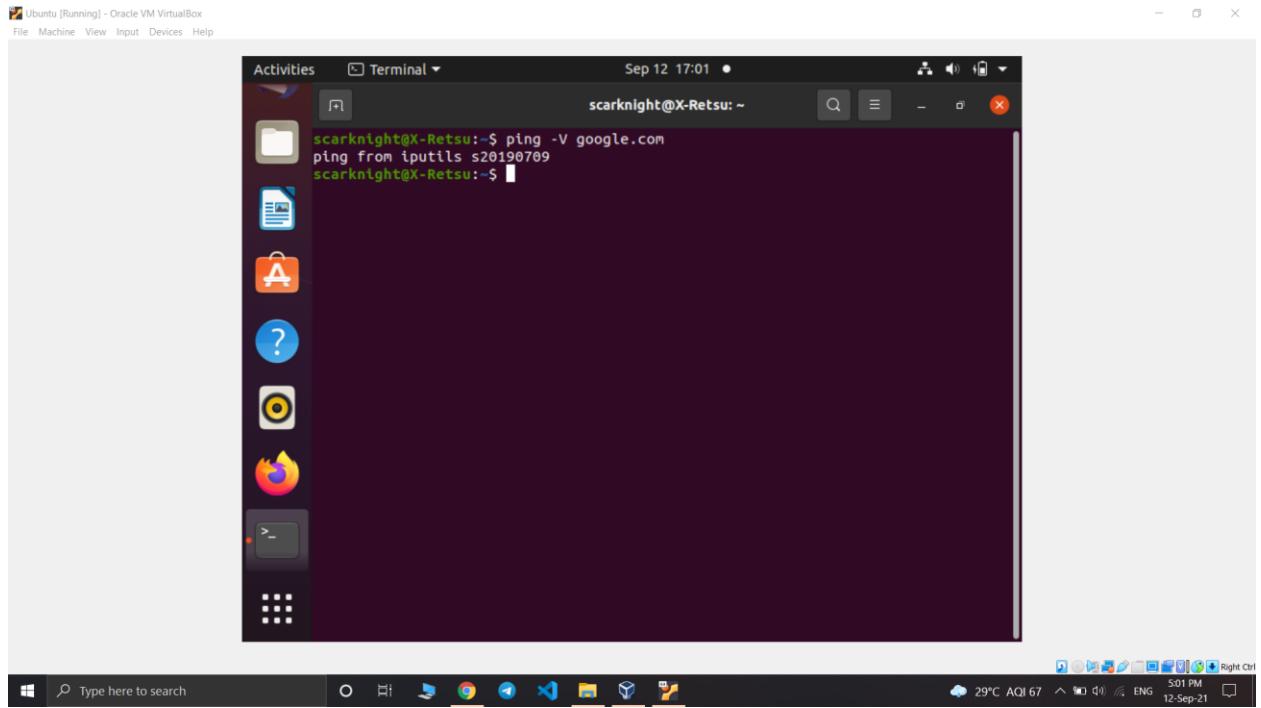
A screenshot of an Ubuntu desktop environment. In the center is a terminal window titled "Activities Terminal" with the command "scarknight@X-Retsu: ~". The terminal displays the output of the "ping www.google.com" command, showing five packets being sent to 142.250.195.132 with varying round-trip times (rtt) and sequence numbers (icmp_seq). Below the terminal is a dock with icons for various applications like Dash, Home, Dash to Dock, and the Dash menu. At the bottom is a system tray showing the date (Sep 12 17:01), time (5:01 PM), and system status (29°C, AQI 67, ENG, 12-Sep-21).

```
scarknight@X-Retsu:~$ ping www.google.com
PING www.google.com (142.250.195.132) 56(84) bytes of data.
64 bytes from maa03s40-in-f4.1e100.net (142.250.195.132): icmp_seq=1 ttl=117 time=17.6 ms
64 bytes from maa03s40-in-f4.1e100.net (142.250.195.132): icmp_seq=2 ttl=117 time=17.8 ms
64 bytes from maa03s40-in-f4.1e100.net (142.250.195.132): icmp_seq=3 ttl=117 time=19.4 ms
64 bytes from maa03s40-in-f4.1e100.net (142.250.195.132): icmp_seq=4 ttl=117 time=18.3 ms
^C
--- www.google.com ping statistics ---
4 packets transmitted, 4 received, 0% packet loss, time 3006ms
rtt min/avg/max/mdev = 17.569/18.267/19.444/0.729 ms
scarknight@X-Retsu:~$
```

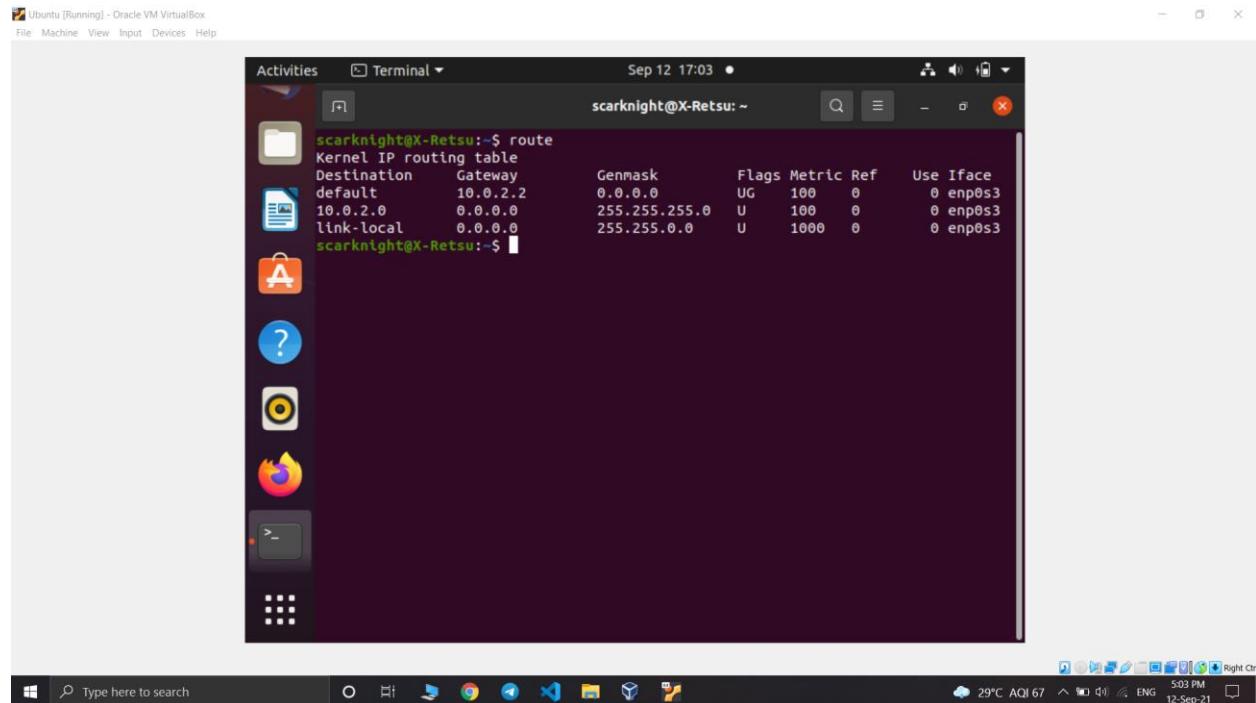


A second screenshot of the same Ubuntu desktop environment. This time, the terminal window shows the output of the "ping -a google.com" command. It displays five packets being sent to 172.217.166.110 with sequence numbers 1 through 5 and their respective round-trip times (rtt). The interface and system status at the bottom remain the same.

```
scarknight@X-Retsu:~$ ping -a google.com
PING google.com (172.217.166.110) 56(84) bytes of data.
64 bytes from maa05s09-in-f14.1e100.net (172.217.166.110): icmp_seq=1 ttl=117 time=21.1 ms
64 bytes from maa05s09-in-f14.1e100.net (172.217.166.110): icmp_seq=2 ttl=117 time=21.6 ms
64 bytes from maa05s09-in-f14.1e100.net (172.217.166.110): icmp_seq=3 ttl=117 time=23.0 ms
64 bytes from maa05s09-in-f14.1e100.net (172.217.166.110): icmp_seq=4 ttl=117 time=27.0 ms
64 bytes from maa05s09-in-f14.1e100.net (172.217.166.110): icmp_seq=5 ttl=117 time=24.6 ms
^C
--- google.com ping statistics ---
5 packets transmitted, 5 received, 0% packet loss, time 4006ms
rtt min/avg/max/mdev = 21.109/23.464/27.011/2.151 ms
scarknight@X-Retsu:~$
```



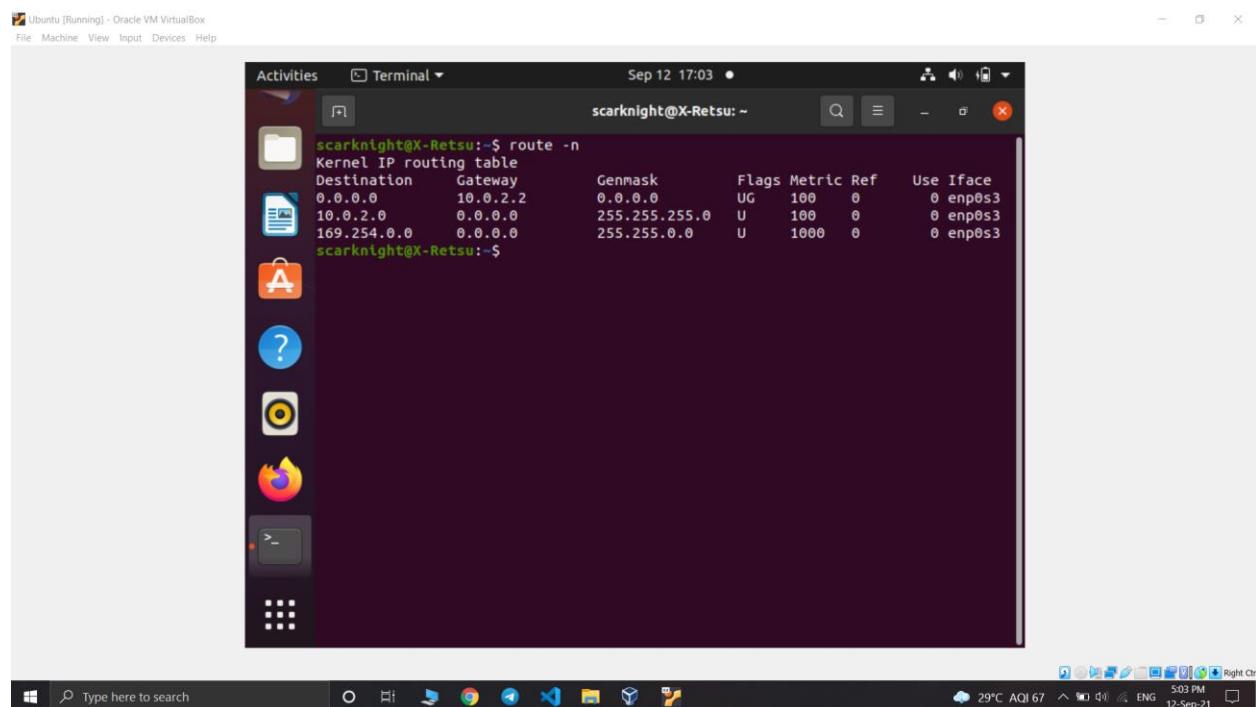
Route



Ubuntu [Running] - Oracle VM VirtualBox
File Machine View Input Devices Help

Activities Terminal Sep 12 17:03 scarknight@X-Retsu: ~

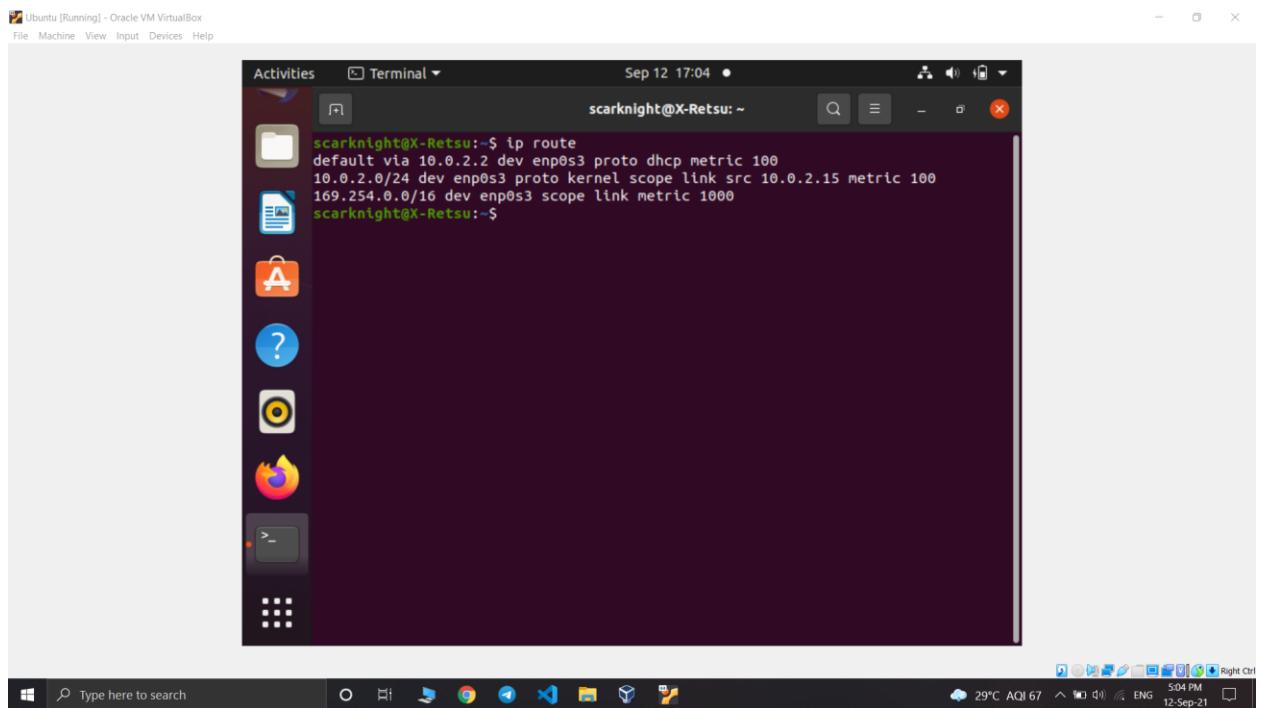
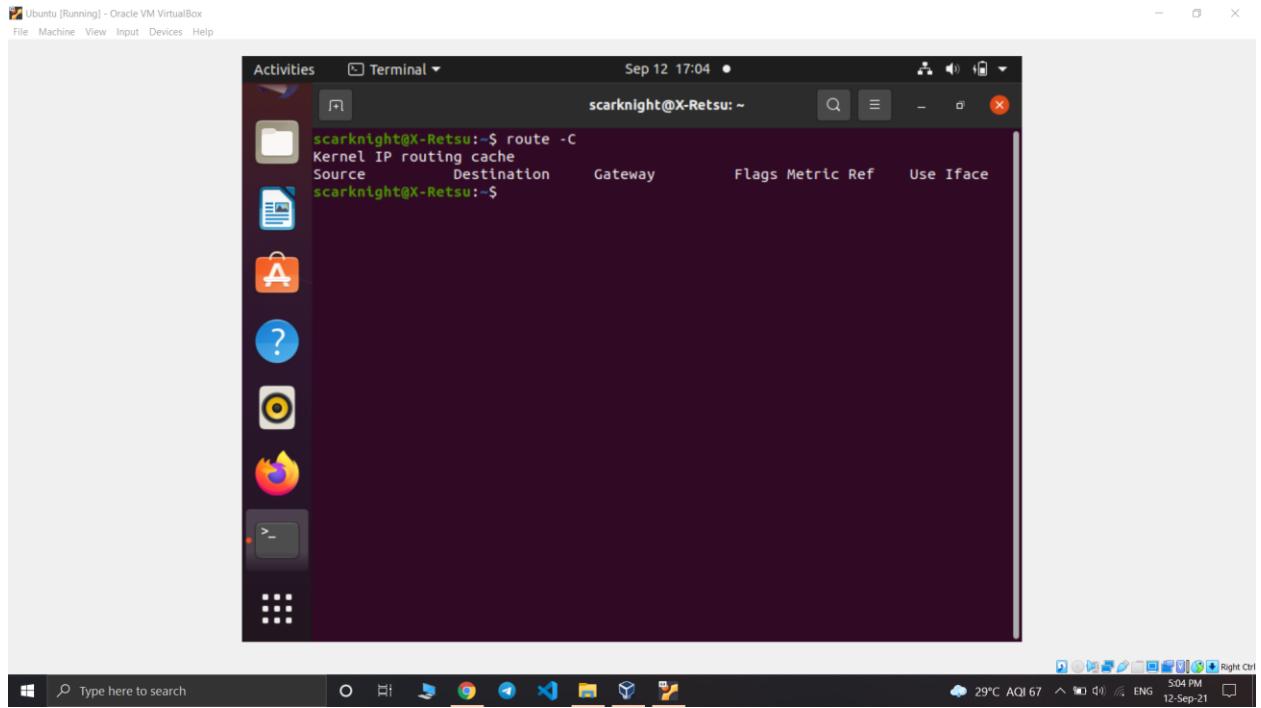
```
scarknight@X-Retsu:~$ route
Kernel IP routing table
Destination     Gateway         Genmask         Flags Metric Ref    Use Iface
default         10.0.2.2        0.0.0.0         UG    100    0        0 enp0s3
10.0.2.0        0.0.0.0         255.255.255.0 U     100    0        0 enp0s3
link-local      0.0.0.0         255.255.0.0   U     1000   0        0 enp0s3
scarknight@X-Retsu:~$
```



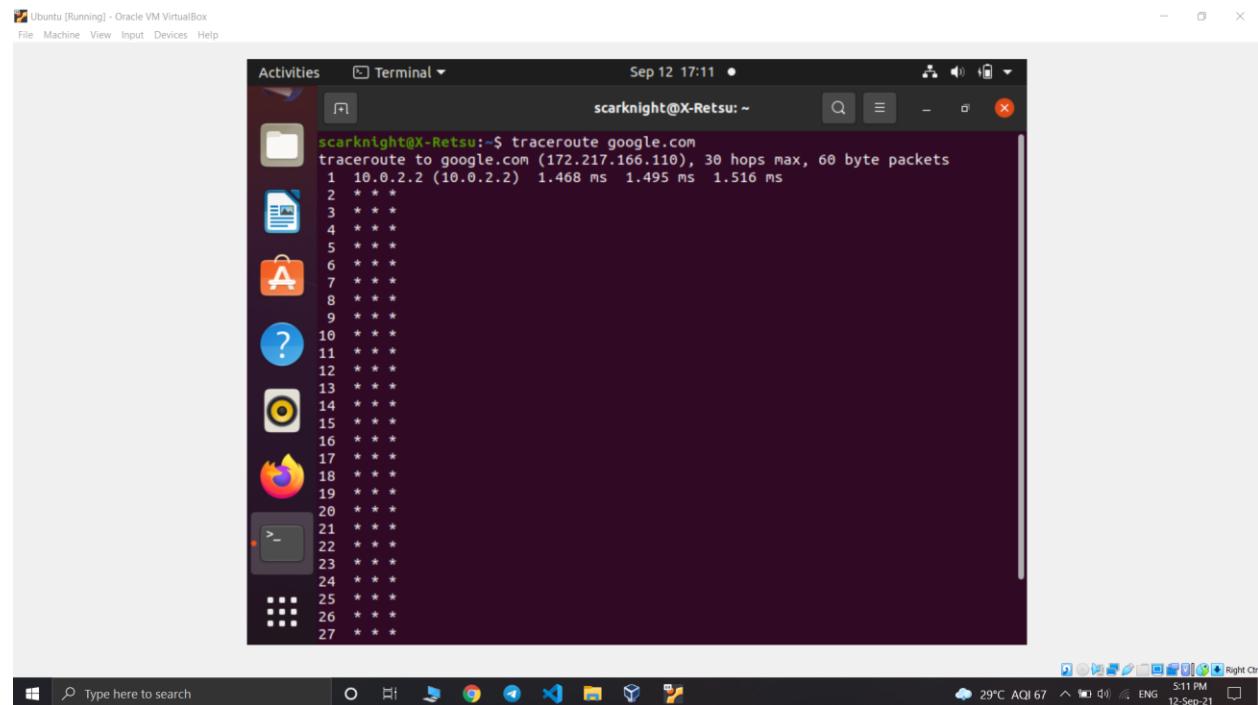
Ubuntu [Running] - Oracle VM VirtualBox
File Machine View Input Devices Help

Activities Terminal Sep 12 17:03 scarknight@X-Retsu: ~

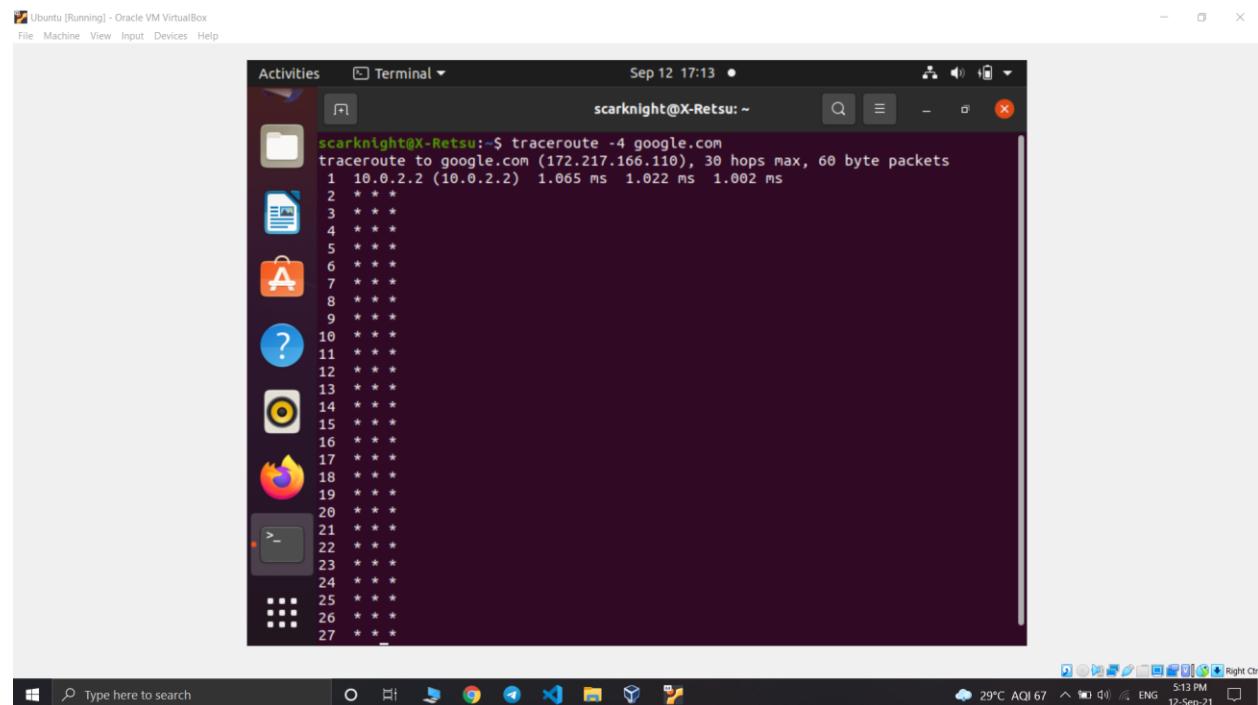
```
scarknight@X-Retsu:~$ route -n
Kernel IP routing table
Destination     Gateway         Genmask         Flags Metric Ref    Use Iface
0.0.0.0         10.0.2.2        0.0.0.0         UG    100    0        0 enp0s3
10.0.2.0        0.0.0.0         255.255.255.0 U     100    0        0 enp0s3
169.254.0.0     0.0.0.0         255.255.0.0   U     1000   0        0 enp0s3
scarknight@X-Retsu:~$
```



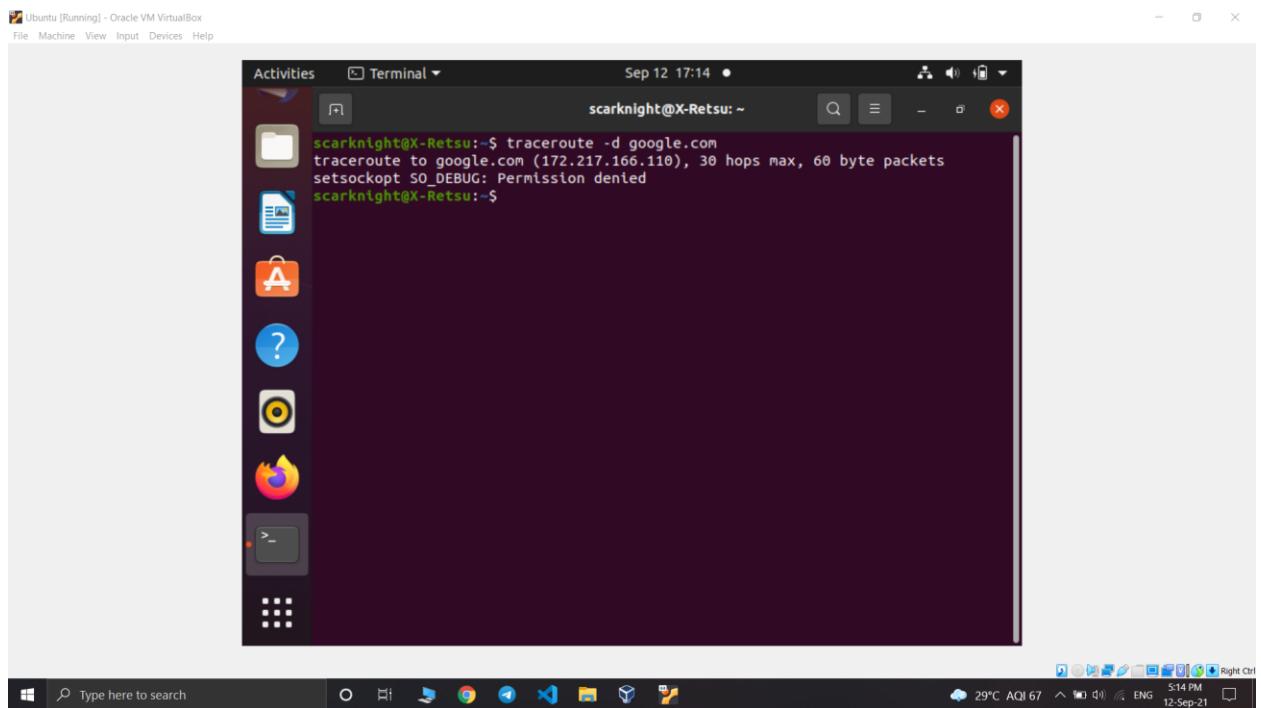
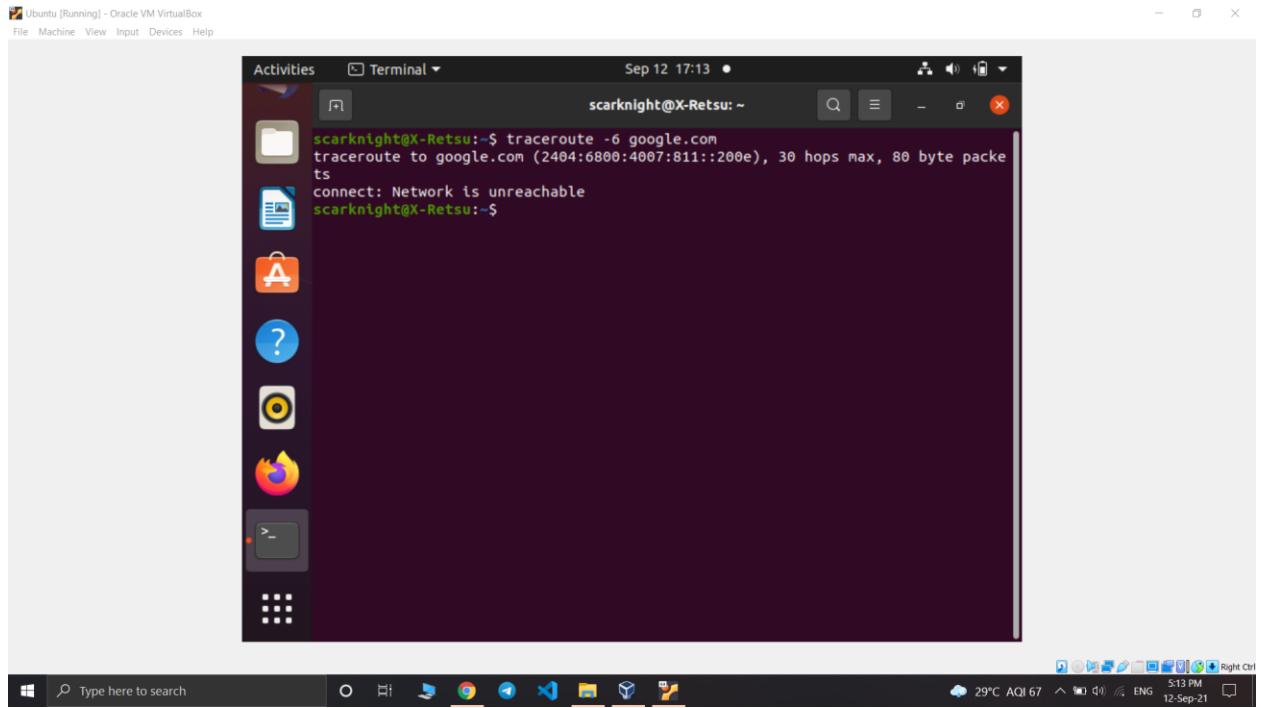
Traceroute



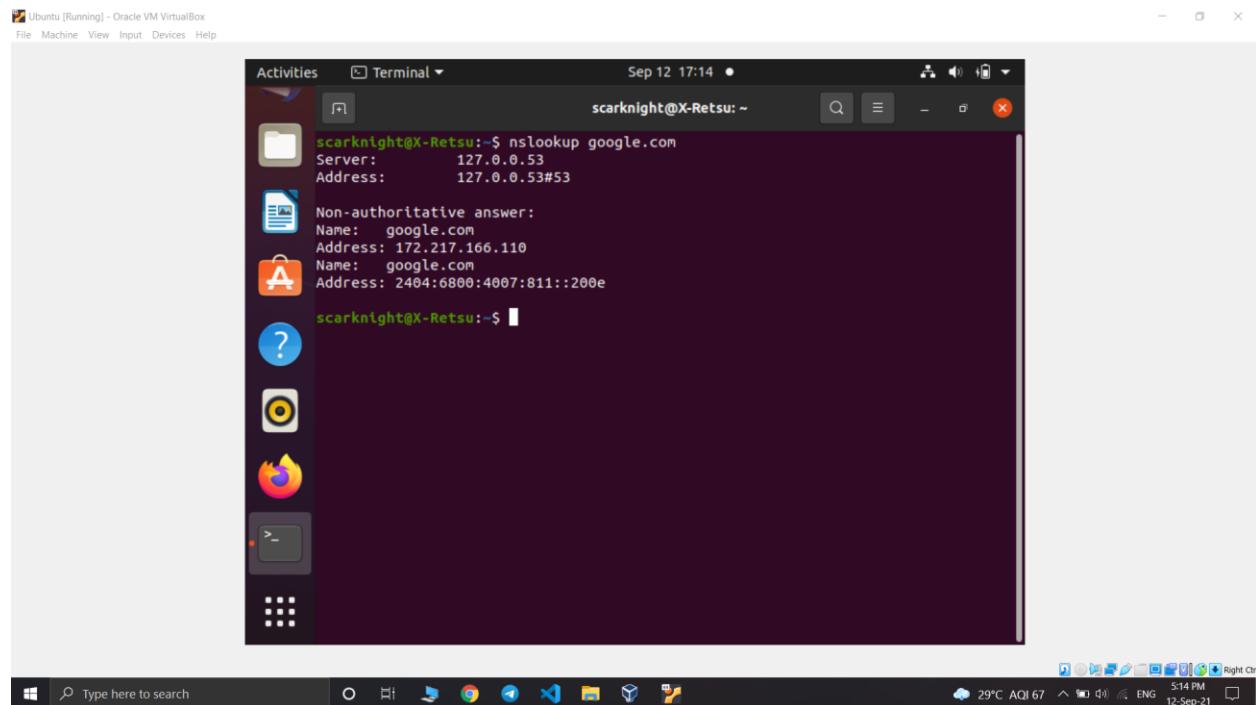
```
scarknight@X-Retsu:~$ traceroute google.com
traceroute to google.com (172.217.166.110), 30 hops max, 60 byte packets
1 10.0.2.2 (10.0.2.2) 1.468 ms 1.495 ms 1.516 ms
2 * * *
3 * * *
4 * * *
5 * * *
6 * * *
7 * * *
8 * * *
9 * * *
10 * * *
11 * * *
12 * * *
13 * * *
14 * * *
15 * * *
16 * * *
17 * * *
18 * * *
19 * * *
20 * * *
21 * * *
22 * * *
23 * * *
24 * * *
25 * * *
26 * * *
27 * * *
```



```
scarknight@X-Retsu:~$ traceroute -4 google.com
traceroute to google.com (172.217.166.110), 30 hops max, 60 byte packets
1 10.0.2.2 (10.0.2.2) 1.065 ms 1.022 ms 1.002 ms
2 * * *
3 * * *
4 * * *
5 * * *
6 * * *
7 * * *
8 * * *
9 * * *
10 * * *
11 * * *
12 * * *
13 * * *
14 * * *
15 * * *
16 * * *
17 * * *
18 * * *
19 * * *
20 * * *
21 * * *
22 * * *
23 * * *
24 * * *
25 * * *
26 * * *
27 * * *
```

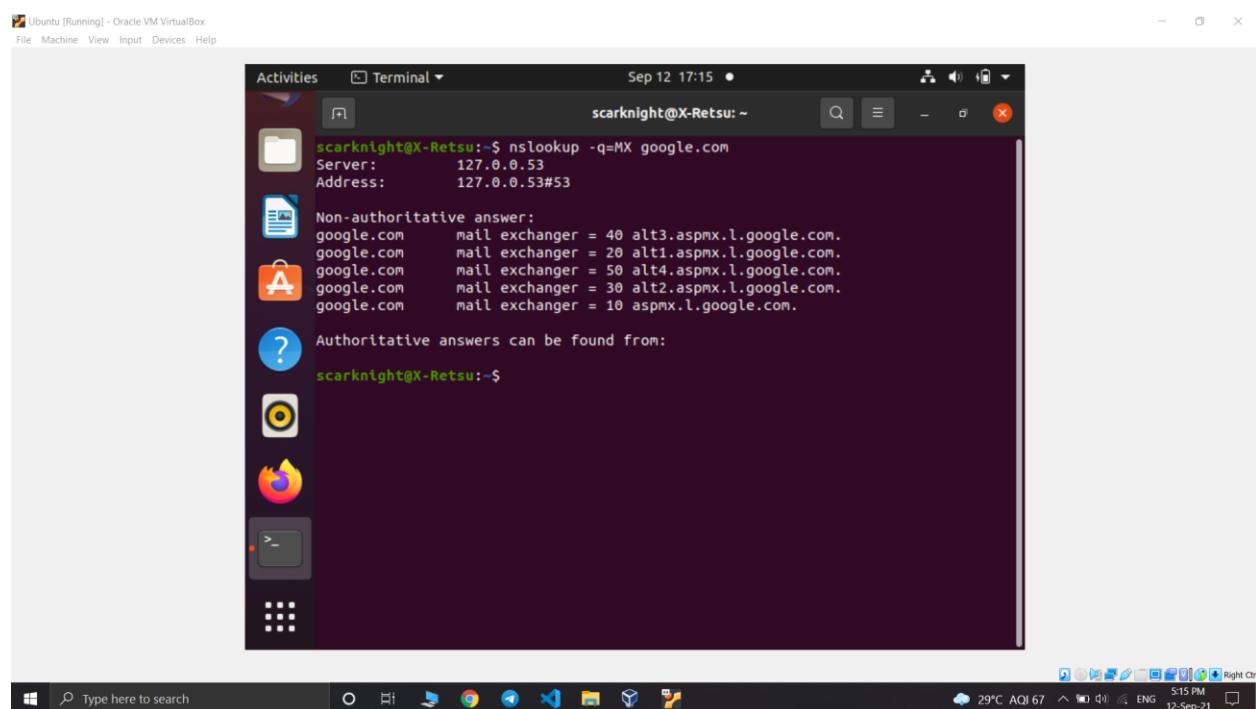


Nslookup



```
Ubuntu [Running] - Oracle VM VirtualBox
File Machine View Input Devices Help
Activities Terminal Sep 12 17:14 • scarknight@X-Retsu: ~
scarknight@X-Retsu:~$ nslookup google.com
Server: 127.0.0.53
Address: 127.0.0.53#53

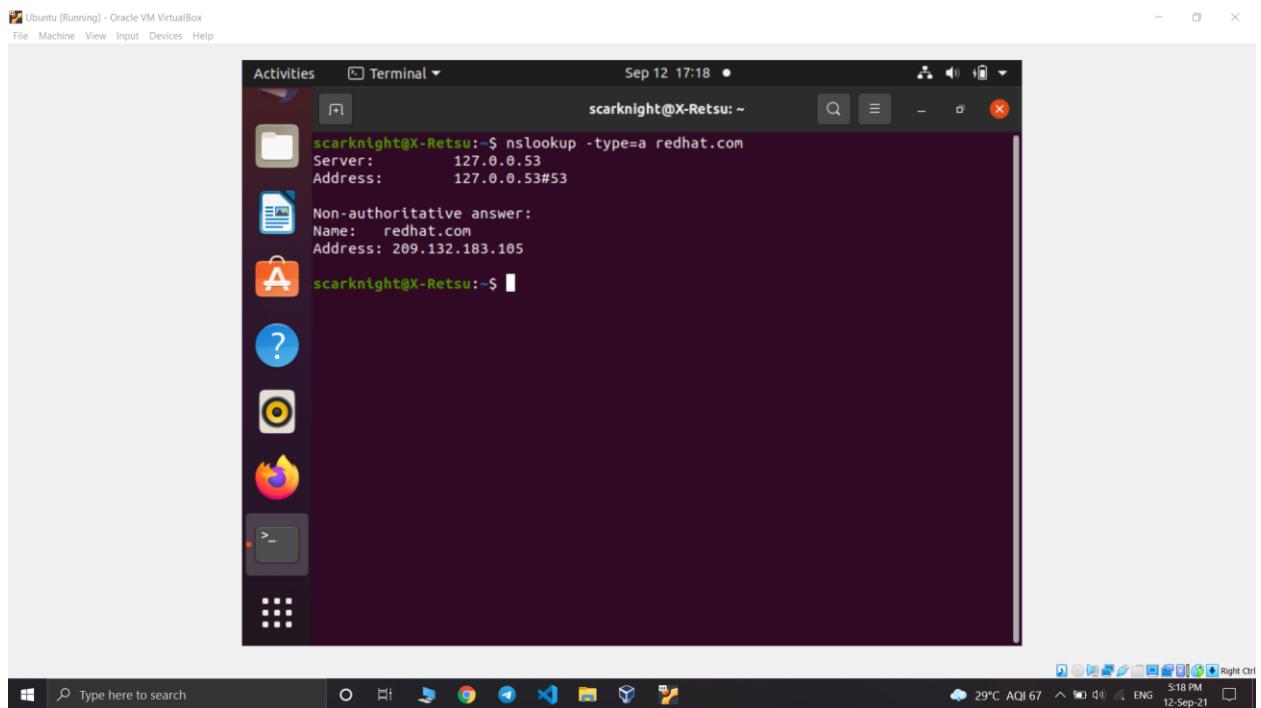
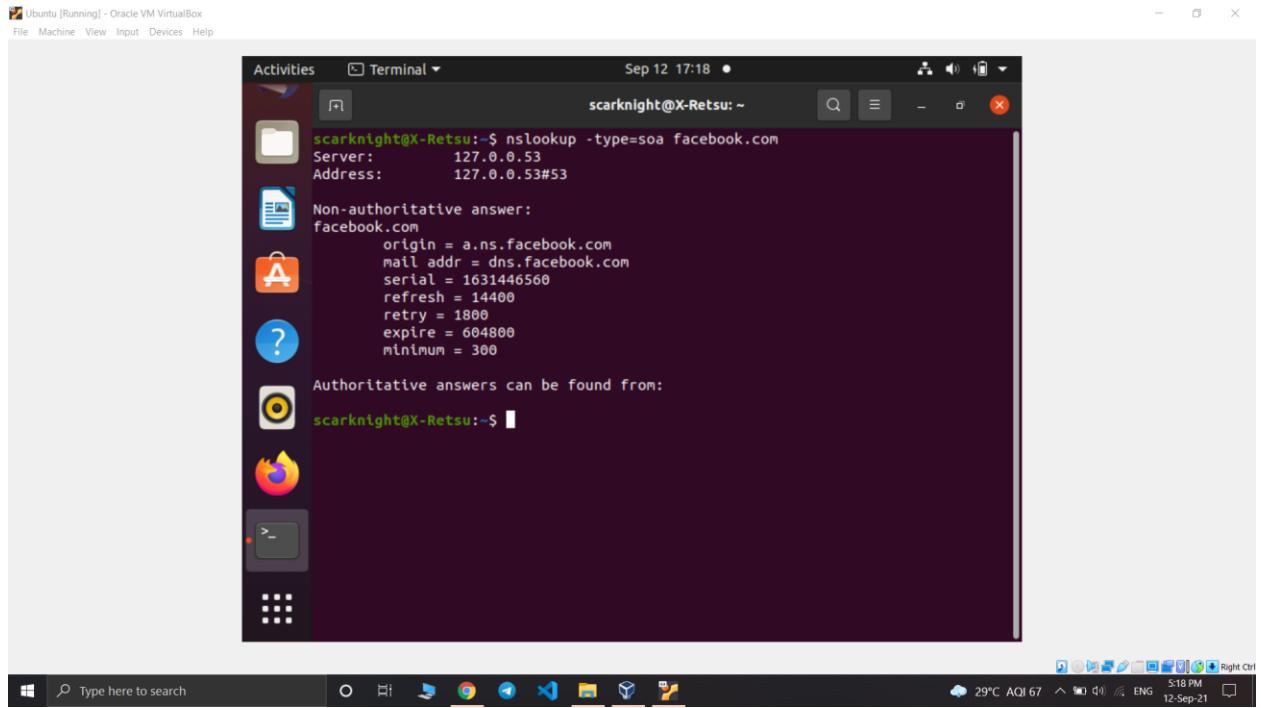
Non-authoritative answer:
Name: google.com
Address: 172.217.166.110
Name: google.com
Address: 2404:6800:4007:811::200e
scarknight@X-Retsu:~$
```



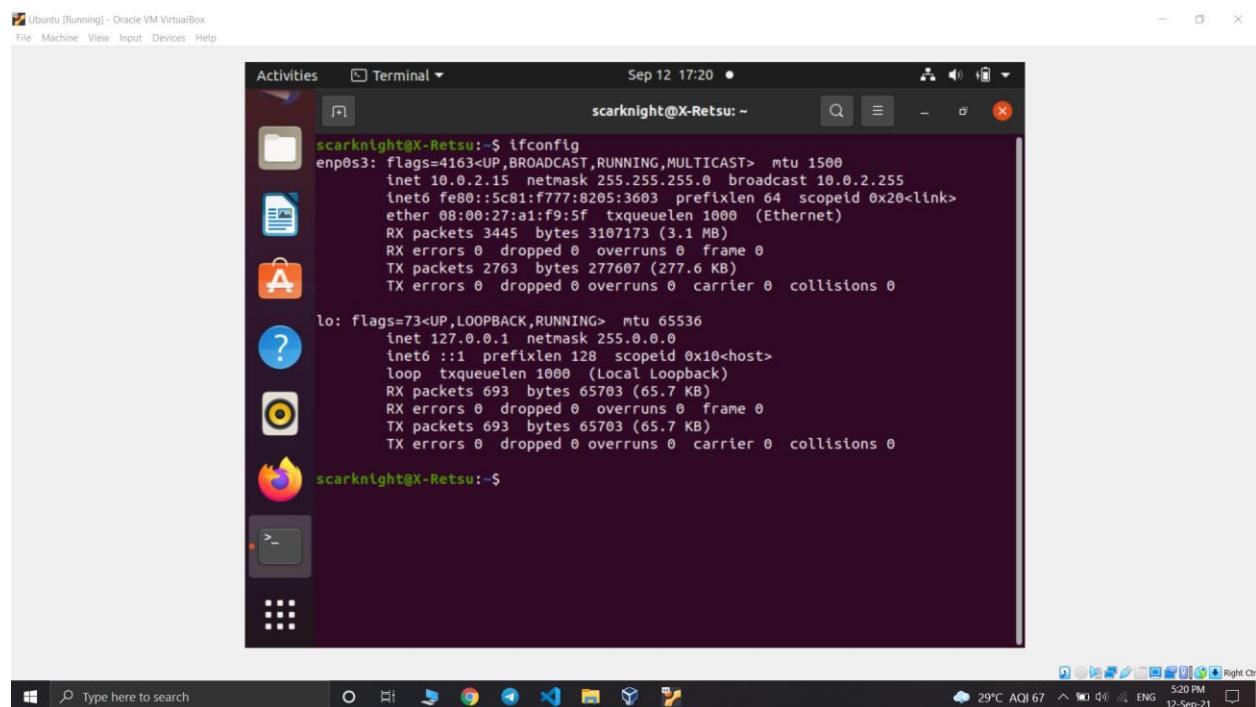
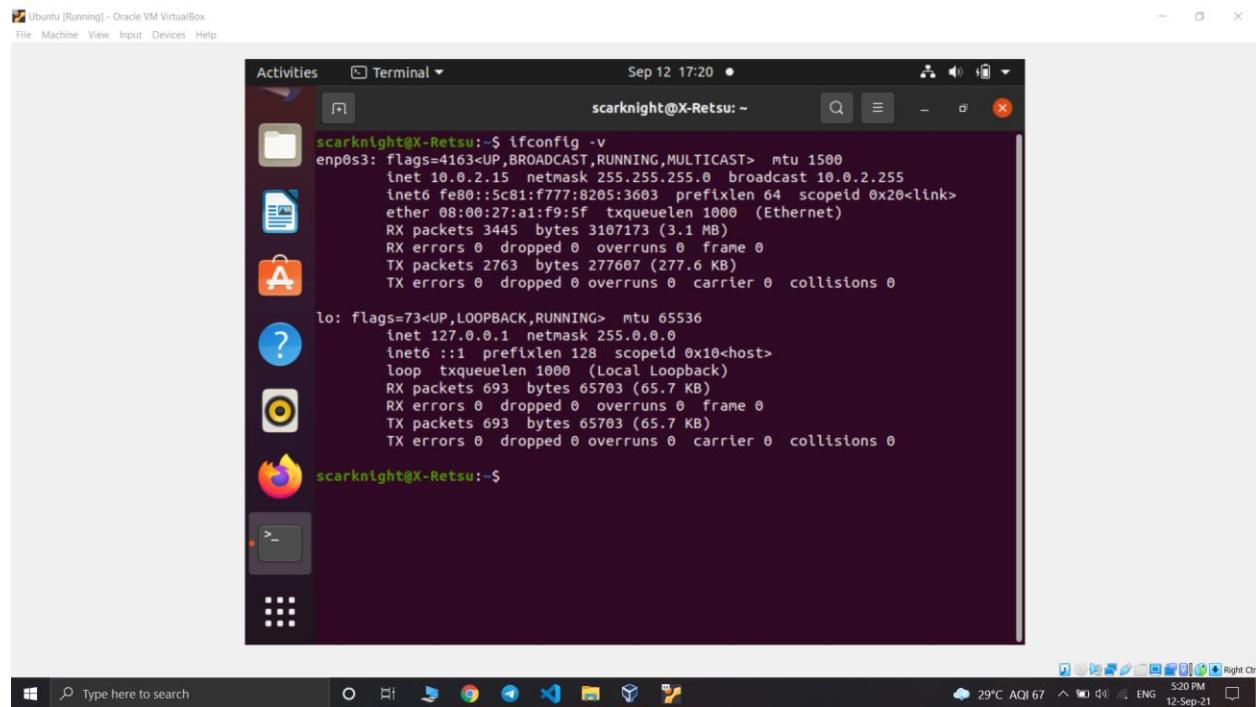
```
Ubuntu [Running] - Oracle VM VirtualBox
File Machine View Input Devices Help
Activities Terminal Sep 12 17:15 • scarknight@X-Retsu: ~
scarknight@X-Retsu:~$ nslookup -q=MX google.com
Server: 127.0.0.53
Address: 127.0.0.53#53

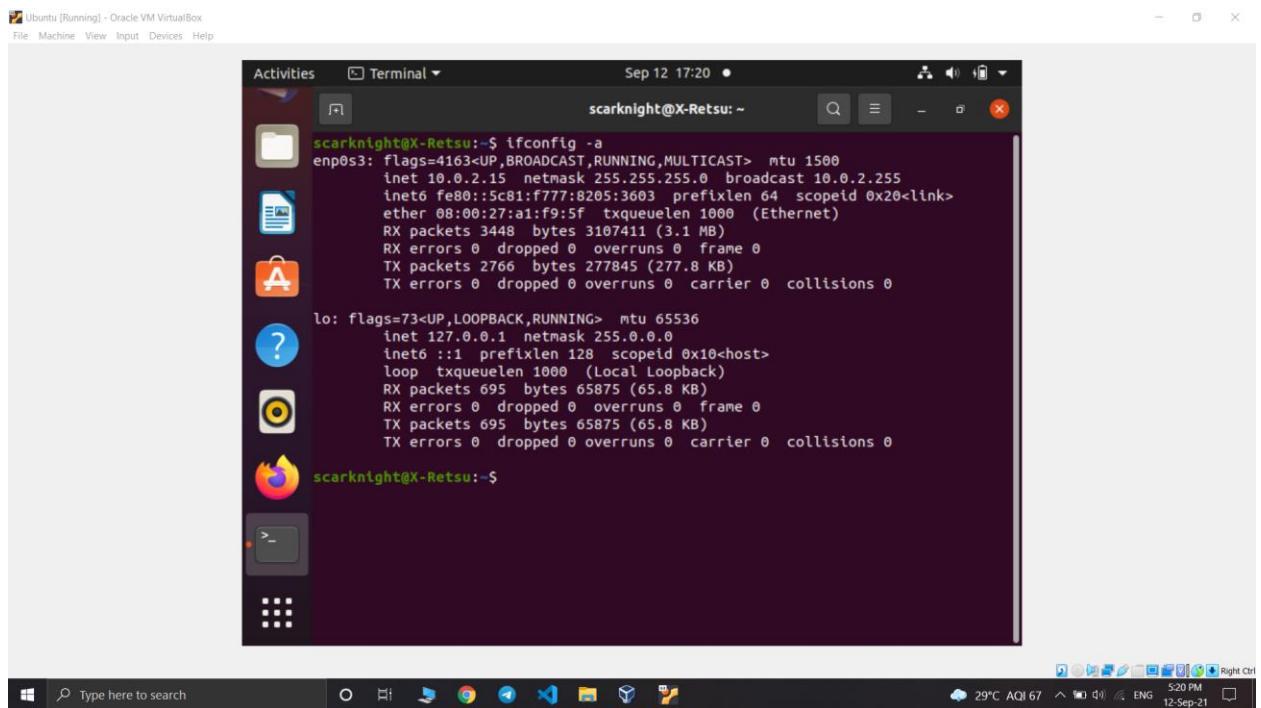
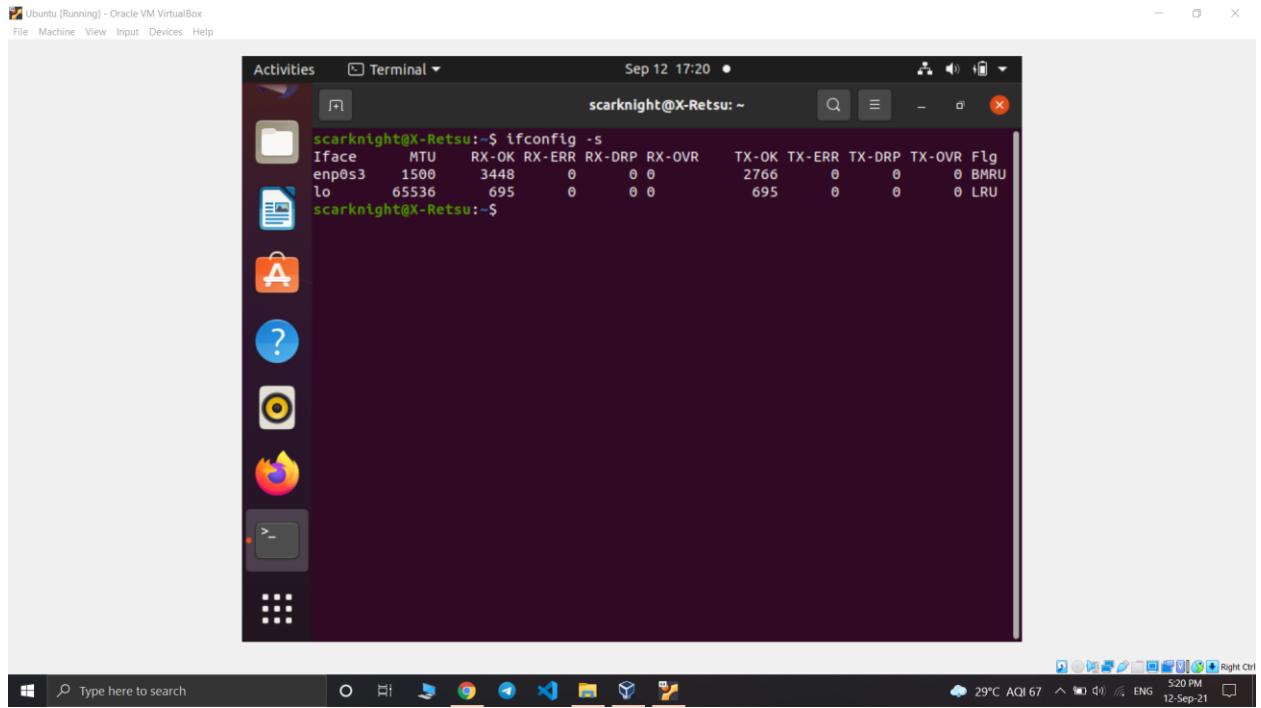
Non-authoritative answer:
google.com mail exchanger = 40 alt3.aspmx.l.google.com.
google.com mail exchanger = 20 alt1.aspmx.l.google.com.
google.com mail exchanger = 50 alt4.aspmx.l.google.com.
google.com mail exchanger = 30 alt2.aspmx.l.google.com.
google.com mail exchanger = 10 aspmx.l.google.com.

Authoritative answers can be found from:
scarknight@X-Retsu:~$
```



ifconfig





Netstat

Ubuntu [Running] - Oracle VM VirtualBox
File Machine View Input Devices Help

Activities Terminal Sep 12 17:21 scarknight@X-Retsu: ~

```
scarknight@X-Retsu:~$ netstat
Active Internet connections (w/o servers)
Proto Recv-Q Send-Q Local Address           Foreign Address         State
udp        0      0 10.0.2.15:bootpc        10.0.2.2:bootps       ESTABLISHED
Active UNIX domain sockets (w/o servers)
Proto RefCnt Flags     Type      State          I-Node Path
unix  2          [ ]    DGRAM    ESTABLISHED   32467  /run/user/1000/systemd
md/notify      [ ]    DGRAM
unix  2          [ ]    DGRAM
/syslog        [ ]    DGRAM
unix  15         [ ]    DGRAM
/dev-log        [ ]    DGRAM
unix  8          [ ]    DGRAM
/socket        [ ]    DGRAM
unix  3          [ ]    DGRAM
unix  3          [ ]    STREAM   CONNECTED    15170  /run/systemd/notify
unix  3          [ ]    STREAM   CONNECTED    36976  /run/dbus/system_bus_socket
unix  3          [ ]    STREAM   CONNECTED    31808  /run/systemd/journal
unix  3          [ ]    STREAM   CONNECTED    37387
unix  3          [ ]    STREAM   CONNECTED    32724
unix  3          [ ]    STREAM   CONNECTED    36972
unix  3          [ ]    STREAM   CONNECTED    31805  /run/systemd/journal
/stdout        [ ]    STREAM   CONNECTED    23645  /run/systemd/journal
unix  3          [ ]    STREAM   CONNECTED    36352  /run/systemd/journal
/stdout        [ ]    STREAM   CONNECTED    32727
unix  3          [ ]    STREAM   CONNECTED    36974
unix  3          [ ]    STREAM   CONNECTED    31804
```

29°C AQI 67 521 PM ENG 12-Sep-21 Right Ctrl

Ubuntu [Running] - Oracle VM VirtualBox
File Machine View Input Devices Help

Activities Terminal Sep 12 17:22 scarknight@X-Retsu: ~

```
scarknight@X-Retsu:~$ netstat -n
Active Internet connections (w/o servers)
Proto Recv-Q Send-Q Local Address           Foreign Address         State
udp        0      0 10.0.2.15:68        10.0.2.2:67       ESTABLISHED
Active UNIX domain sockets (w/o servers)
Proto RefCnt Flags     Type      State          I-Node Path
unix  2          [ ]    DGRAM    ESTABLISHED   32467  /run/user/1000/systemd
md/notify      [ ]    DGRAM
unix  2          [ ]    DGRAM
/syslog        [ ]    DGRAM
unix  15         [ ]    DGRAM
/dev-log        [ ]    DGRAM
unix  8          [ ]    DGRAM
/socket        [ ]    DGRAM
unix  3          [ ]    DGRAM
unix  3          [ ]    STREAM   CONNECTED    15170  /run/systemd/notify
unix  3          [ ]    STREAM   CONNECTED    36976  /run/dbus/system_bus_socket
unix  3          [ ]    STREAM   CONNECTED    31808  /run/systemd/journal
unix  3          [ ]    STREAM   CONNECTED    37387
unix  3          [ ]    STREAM   CONNECTED    32724
unix  3          [ ]    STREAM   CONNECTED    36972
unix  3          [ ]    STREAM   CONNECTED    31805  /run/systemd/journal
/stdout        [ ]    STREAM   CONNECTED    23645  /run/systemd/journal
unix  3          [ ]    STREAM   CONNECTED    36352  /run/systemd/journal
/stdout        [ ]    STREAM   CONNECTED    32727
unix  3          [ ]    STREAM   CONNECTED    36974
unix  3          [ ]    STREAM   CONNECTED    31804
```

29°C AQI 67 522 PM ENG 12-Sep-21 Right Ctrl

Ubuntu [Running] - Oracle VM VirtualBox

File Machine View Input Devices Help

Activities Terminal Sep 12 17:22 scarknight@X-Retsu: ~

```
scarknight@X-Retsu:~$ netstat -a
Active Internet connections (servers and established)
Proto Recv-Q Send-Q Local Address           Foreign Address         State
tcp     0      0 localhost:domain          0.0.0.0:*
tcp     0      0 localhost:ipp             0.0.0.0:*
tcp     0      0 localhost:mysql           0.0.0.0:*
tcp6    0      0 ip6-localhost:ipp        [:]:*
udp     0      0 0.0.0.0:mdns            0.0.0.0:*
udp     0      0 localhost:domain          0.0.0.0:*
udp     0      0 10.0.2.15:bootpc        10.0.2.2:bootps      ESTABLISHED
udp     0      0 0.0.0.0:35046           0.0.0.0:*
udp     0      0 0.0.0.0:631             0.0.0.0:*
udp6    0      0 [:]:mdns              [:]:*
udp6    0      0 [:]:34152             [:]:*
raw6   0      0 [:]:ipv6-icmp          [:]:*                7
Active UNIX domain sockets (servers and established)
Proto RefCnt Flags       Type      State      I-Node  Path
unix  2      [ ACC ]     STREAM    LISTENING  34722  @/tmp/.ICE-unix/1610
unix  2      [ ACC ]     SEQPACKET  LISTENING  15200  /run/udev/control
unix  2      [ ACC ]     STREAM    LISTENING  15173  /run/systemd/private
unix  2      [ ]          DGRAM     LISTENING  32467  /run/user/1000/systemd
md/notify
unix  2      [ ACC ]     STREAM    LISTENING  15175  /run/systemd/userdb/
io.systemd.DynamicUser
unix  2      [ ACC ]     STREAM    LISTENING  32470  /run/user/1000/systemd
md/private
unix  2      [ ACC ]     STREAM    LISTENING  32504  /run/user/1000/bus
unix  2      [ ]          DGRAM     LISTENING  15184  /run/systemd/journal
/syslog
```

Type here to search

29°C AQI 67 5:22 PM ENG 12-Sep-21 Right Ctrl

Ubuntu [Running] - Oracle VM VirtualBox

File Machine View Input Devices Help

Activities Terminal Sep 12 17:22 scarknight@X-Retsu: ~

```
scarknight@X-Retsu:~$ netstat -nS
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     LISTENING  32467  /run/user/1000/systemd
md/notify
unix  2      [ ]          DGRAM     LISTENING  15184  /run/systemd/journal
/syslog
unix 15     [ ]          DGRAM     LISTENING  15194  /run/systemd/journal
/dev-log
unix  8      [ ]          DGRAM     LISTENING  15198  /run/systemd/journal
/socket
unix  3      [ ]          DGRAM     CONNECTED  15170  /run/systemd/notify
unix  3      [ ]          STREAM    CONNECTED  36976  /
unix  3      [ ]          STREAM    CONNECTED  31808  /run/dbus/system_bus_socket
unix  3      [ ]          STREAM    CONNECTED  37387  /
unix  3      [ ]          STREAM    CONNECTED  32724  /
unix  3      [ ]          STREAM    CONNECTED  36972  /
unix  3      [ ]          STREAM    CONNECTED  31805  /run/systemd/journal
/stdout
unix  3      [ ]          STREAM    CONNECTED  23645  /
unix  3      [ ]          STREAM    CONNECTED  36352  /run/systemd/journal
/stdout
unix  3      [ ]          STREAM    CONNECTED  32727  /
unix  3      [ ]          STREAM    CONNECTED  36974  /
unix  3      [ ]          STREAM    CONNECTED  31804  /
```

Type here to search

29°C AQI 67 5:22 PM ENG 12-Sep-21 Right Ctrl

WINDOWS

Ping

```
Command Prompt
C:\Users\HP>ping google.com

Pinging google.com [172.217.166.118] with 32 bytes of data:
Reply from 172.217.166.118: bytes=32 time=20ms TTL=118
Reply from 172.217.166.118: bytes=32 time=20ms TTL=118
Reply from 172.217.166.118: bytes=32 time=21ms TTL=118
Reply from 172.217.166.118: bytes=32 time=551ms TTL=118

Ping statistics for 172.217.166.118:
    Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
Approximate round trip times in milli-seconds:
    Minimum = 20ms, Maximum = 551ms, Average = 153ms

C:\Users\HP>
```

```
Command Prompt
C:\Users\HP>ping -a google.com

Pinging google.com [172.217.166.118] with 32 bytes of data:
Reply from 172.217.166.118: bytes=32 time=21ms TTL=118
Reply from 172.217.166.118: bytes=32 time=20ms TTL=118
Reply from 172.217.166.118: bytes=32 time=20ms TTL=118
Reply from 172.217.166.118: bytes=32 time=20ms TTL=118

Ping statistics for 172.217.166.118:
    Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
Approximate round trip times in milli-seconds:
    Minimum = 20ms, Maximum = 21ms, Average = 20ms

C:\Users\HP>
```

```
C:\ Command Prompt
C:\Users\HP>ping -j google.com

Pinging google.com [172.217.166.110] with 32 bytes of data:
General failure.
General failure.
General failure.
General failure.

Ping statistics for 172.217.166.110:
  Packets: Sent = 4, Received = 0, Lost = 4 (100% loss),
C:\Users\HP>
```

Route

```
Microsoft Windows [Version 10.0.19043.1110]
(c) Microsoft Corporation. All rights reserved.

C:\Users\HP>route print
=====
Interface List
17...48 ba 4e ab cf d8 ....Realtek PCIe GBE Family Controller
18...0a 00 27 00 00 12 ....VirtualBox Host-Only Ethernet Adapter
15...00 ff 6c 30 b9 7e ....TAP-Windows Adapter V9
12...d6 6a 6a 1f 66 93 ....Microsoft Wi-Fi Direct Virtual Adapter #2
5...04 6a 6a 1f 66 93 ....Microsoft Wi-Fi Direct Virtual Adapter #3
4...04 6a 6a 1f 66 93 ....Realtek RTL8723DE 802.11b/g/n PCIe Adapter
1.....Software Loopback Interface 1
=====

IPv4 Route Table
=====
Active Routes:
Network Destination      Netmask        Gateway       Interface Metric
          0.0.0.0          0.0.0.0   192.168.1.1    192.168.1.2      55
        127.0.0.0          255.0.0.0   On-link        127.0.0.1      331
       127.0.0.1          255.255.255   On-link        127.0.0.1      331
  127.255.255.255          255.255.255   On-link        127.0.0.1      331
 192.168.1.0          255.255.255.0   On-link      192.168.1.2      311
 192.168.1.2          255.255.255.255  On-link      192.168.1.2      311
 192.168.1.255         255.255.255.255  On-link      192.168.1.2      311
 192.168.56.0          255.255.255.0   On-link      192.168.56.1      281
 192.168.56.1          255.255.255.255  On-link      192.168.56.1      281
 192.168.56.255         255.255.255.255  On-link      192.168.56.1      281
 224.0.0.0            240.0.0.0        On-link        127.0.0.1      331
 224.0.0.0            240.0.0.0        On-link      192.168.56.1      281
 224.0.0.0            240.0.0.0        On-link      192.168.1.2      311
 255.255.255.255         255.255.255.255  On-link        127.0.0.1      331
 255.255.255.255         255.255.255.255  On-link      192.168.56.1      281
 255.255.255.255         255.255.255.255  On-link      192.168.1.2      311
=====
Persistent Routes:
  None

IPv6 Route Table
=====
```

```
Microsoft Windows [Version 10.0.19043.1110]
(c) Microsoft Corporation. All rights reserved.

C:\Users\HP>route print
=====
Interface List
127.0.0.0          255.0.0.0   On-link        127.0.0.1      331
 127.0.0.1          255.255.255.255  On-link        127.0.0.1      331
 127.255.255.255         255.255.255.255  On-link        127.0.0.1      331
 192.168.1.0          255.255.255.0   On-link      192.168.1.2      311
 192.168.1.2          255.255.255.255  On-link      192.168.1.2      311
 192.168.1.255         255.255.255.255  On-link      192.168.1.2      311
 192.168.56.0          255.255.255.0   On-link      192.168.56.1      281
 192.168.56.1          255.255.255.255  On-link      192.168.56.1      281
 192.168.56.255         255.255.255.255  On-link      192.168.56.1      281
 224.0.0.0            240.0.0.0        On-link        127.0.0.1      331
 224.0.0.0            240.0.0.0        On-link      192.168.56.1      281
 224.0.0.0            240.0.0.0        On-link      192.168.1.2      311
 255.255.255.255         255.255.255.255  On-link        127.0.0.1      331
 255.255.255.255         255.255.255.255  On-link      192.168.56.1      281
 255.255.255.255         255.255.255.255  On-link      192.168.1.2      311
=====
Persistent Routes:
  None

IPv6 Route Table
=====
Active Routes:
  If Metric Network Destination      Gateway
  4    311 ::/0                  fe80::1
  1    331 ::1/128              On-link
 18    281 fe80::/64             On-link
  4    311 fe80::/64             On-link
  4    311 fe80::5f9:db9f:6f92:c940/128
                                On-link
 18    281 fe80::a857:abdb:11db:cb9/128
                                On-link
  1    331 ff00::/8              On-link
 18    281 ff00::/8              On-link
  4    311 ff00::/8              On-link
=====
Persistent Routes:
  None

C:\Users\HP>
```

```
Command Prompt
C:\Users\HP>route print -4
=====
Interface List
17...48 ba 4e ab cf d8 ....Realtek PCIe GBE Family Controller
18...0a 00 27 00 00 12 ....VirtualBox Host-Only Ethernet Adapter
15...00 ff 6c 30 b9 7e ....TAP-Windows Adapter V9
12...06 6a 6a 1f 66 93 ....Microsoft Wi-Fi Direct Virtual Adapter #2
5...04 6a 6a 1f 66 93 ....Microsoft Wi-Fi Direct Virtual Adapter #3
4...d4 6a 6a 1f 66 93 ....Realtek RTL8723DE 802.11b/g/n PCIe Adapter
1....Software Loopback Interface 1
=====

IPv4 Route Table
=====
Active Routes:
Network Destination      Netmask          Gateway        Interface Metric
          0.0.0.0          0.0.0.0    192.168.1.1   192.168.1.2       60
         127.0.0.0        255.0.0.0        On-link        127.0.0.1       331
         127.0.0.1        255.255.255.255  On-link        127.0.0.1       331
 127.255.255.255 255.255.255.255  On-link        127.0.0.1       331
 192.168.1.0        255.255.255.255  On-link        192.168.1.2       316
 192.168.1.2        255.255.255.255  On-link        192.168.1.2       316
 192.168.1.255     255.255.255.255  On-link        192.168.1.2       316
 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          248.0.0.0        On-link        127.0.0.1       331
 224.0.0.0          248.0.0.0        On-link        192.168.56.1       281
 224.0.0.0          248.0.0.0        On-link        192.168.1.2       316
 255.255.255.255   255.255.255.255  On-link        127.0.0.1       331
 255.255.255.255   255.255.255.255  On-link        192.168.56.1       281
 255.255.255.255   255.255.255.255  On-link        192.168.1.2       316
=====
Persistent Routes:
  None
C:\Users\HP>
```

```
Command Prompt
C:\Users\HP>route print -6
=====
Interface List
17...48 ba 4e ab cf d8 ....Realtek PCIe GBE Family Controller
18...0a 00 27 00 00 12 ....VirtualBox Host-Only Ethernet Adapter
15...00 ff 6c 30 b9 7e ....TAP-Windows Adapter V9
12...06 6a 6a 1f 66 93 ....Microsoft Wi-Fi Direct Virtual Adapter #2
5...04 6a 6a 1f 66 93 ....Microsoft Wi-Fi Direct Virtual Adapter #3
4...d4 6a 6a 1f 66 93 ....Realtek RTL8723DE 802.11b/g/n PCIe Adapter
1....Software Loopback Interface 1
=====

IPv6 Route Table
=====
Active Routes:
  If Metric Network Destination      Gateway
  4    316 ::/0           fe80::1
  1    331 ::1/128        On-link
 18    281 fe80::/64       On-link
  4    316 fe80::/64       On-link
  4    316 fe80::5f9:db9f:6f92:c940/128
                                On-link
 18    281 fe80::a857:abdb:11db:cbb9/128
                                On-link
  1    331 ff00::/8        On-link
 18    281 ff00::/8        On-link
  4    316 ff00::/8        On-link
=====
Persistent Routes:
  None
C:\Users\HP>
```

```
Command Prompt
C:\Users\HP>route print *157
=====
Interface List
17...48 ba 4e ab cf d8 ....Realtek PCIe GBE Family Controller
18...0a 00 27 00 00 12 ....VirtualBox Host-Only Ethernet Adapter
15...00 ff 6c 30 b9 7e ....TAP-Windows Adapter V9
12...d6 6a 6a 1f 66 93 ....Microsoft Wi-Fi Direct Virtual Adapter #2
5...d4 6a 6a 1f 66 93 ....Microsoft Wi-Fi Direct Virtual Adapter #3
4...d4 6a 6a 1f 66 93 ....Realtek RTL8723DE 802.11b/g/n PCIe Adapter
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\HP>
```

Traceroute

```
Command Prompt
C:\Users\HP>tracert 192.168.1.1
Tracing route to csp1.zte.com.cn [192.168.1.1]
over a maximum of 30 hops:
  1     2 ms     2 ms     2 ms  csp3.zte.com.cn [192.168.1.1]
Trace complete.

C:\Users\HP>
```

```
Command Prompt
C:\Users\HP>tracert www.google.com
Tracing route to www.google.com [142.250.195.100]
over a maximum of 30 hops:
 1  *          *          *      Request timed out.
 2  6 ms       7 ms       5 ms  1.105.92.111.asianet.co.in [111.92.105.1]
 3  *          *          *      Request timed out.
 4  19 ms      19 ms      19 ms  130.230.88.202.asianet.co.in [202.88.230.130]
 5  17 ms      18 ms      18 ms  77.252.88.202.asianet.co.in [202.88.252.77]
 6  18 ms      19 ms      18 ms  216.239.47.9
 7  20 ms      18 ms      18 ms  142.251.55.71
 8  25 ms      17 ms      16 ms  maa03s39-in-f4.1e100.net [142.250.195.100]

Trace complete.

C:\Users\HP>
```

```
Command Prompt
C:\Users\HP>tracert -d www.yahoo.com
Tracing route to new-fp-shed.wg1.b.yahoo.com [202.165.107.50]
over a maximum of 30 hops:
 1  *          *          *      Request timed out.
 2  6 ms       6 ms       6 ms  111.92.105.1
 3  *          *          *      Request timed out.
 4  11 ms      7 ms       7 ms  14.142.20.225
 5  23 ms      22 ms      24 ms  172.19.249.170
 6  25 ms      27 ms      24 ms  180.87.36.9
 7  58 ms      64 ms      57 ms  180.87.36.13
 8  56 ms      56 ms      56 ms  180.87.96.21
 9  58 ms      57 ms      58 ms  180.87.96.130
10  724 ms     58 ms      58 ms  202.126.129.125
11  59 ms      62 ms      58 ms  203.84.289.87
12  57 ms      57 ms      57 ms  106.10.128.3
13  56 ms      57 ms      56 ms  106.10.131.215
14  57 ms      59 ms      57 ms  106.10.128.247
15  56 ms      55 ms      56 ms  202.165.107.50

Trace complete.

C:\Users\HP>
```

```
Command Prompt
C:\Users\HP>tracert 22.110.0.1
Tracing route to 22.110.0.1 over a maximum of 30 hops
 1  *          *          *      Request timed out.
 2  57 ms   198 ms   6 ms  1.105.92.111.asianet.co.in [111.92.105.1]
 3  *          *          *      Request timed out.
 4  6 ms    8 ms    7 ms  14.142.20.213.static-ernakulam.tcl.net.in [14.142.20.213]
 5  131 ms   33 ms   32 ms  172.28.176.254 [172.28.176.254]
 6  32 ms   32 ms   35 ms  ix-ae-1-100.tcore2.mlv-mumbai.as6453.net [180.87.39.25]
 7  133 ms   138 ms   134 ms  if-ae-2-2.tcore1.mlv-mumbai.as6453.net [180.87.38.1]
 8  169 ms   148 ms   137 ms  if-ae-5-2.tcore1.wyn-marseille.as6453.net [80.231.217.29]
 9  146 ms   199 ms   198 ms  if-ae-8-1600.tcore1.pye-paris.as6453.net [80.231.217.6]
10  183 ms   302 ms   302 ms  80.231.154.29
11  350 ms   302 ms   484 ms  prs-bb1-link.ip.twelve99.net [62.115.125.170]
12  275 ms   301 ms   301 ms  ash-bb2-link.ip.twelve99.net [62.115.112.242]
13  238 ms   238 ms   231 ms  ash-b1-link.ip.twelve99.net [62.115.143.121]
14  228 ms   227 ms   227 ms  hurricane-ic124167-ash-bb1.ip.twelve99-cust.net [213.248.98.94]
15  229 ms   229 ms   229 ms  100ge5-1.core2.ash1.he.net [72.52.92.226]
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\HP>
```

Nslookup

```
Command Prompt - nslookup
C:\Users\HP>nslookup
Default Server: cspl.zte.com.cn
Address: fe80::1

>
```

```
Command Prompt
C:\Users\HP>nslookup google.com
Server:  csp3.zte.com.cn
Address:  fe80::1

Non-authoritative answer:
Name:    google.com
Addresses:  2404:6800:4007:811::200e
          172.217.166.110

C:\Users\HP>
```

```
Command Prompt
C:\Users\HP>nslookup -q=MX google.com
Server:  csp1.zte.com.cn
Address:  fe80::1

Non-authoritative answer:
google.com      MX preference = 20, mail exchanger = alt1.aspmx.l.google.com
google.com      MX preference = 48, mail exchanger = alt3.aspmx.l.google.com
google.com      MX preference = 50, mail exchanger = alt4.aspmx.l.google.com
google.com      MX preference = 10, mail exchanger = aspmx.l.google.com
google.com      MX preference = 30, mail exchanger = alt2.aspmx.l.google.com

C:\Users\HP>
```

```
Command Prompt
C:\Users\HP>nslookup -type=ns google.com
Server: csp3.zte.com.cn
Address: fe80::1

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

C:\Users\HP>
```

Ipconfig

```
Command Prompt
C:\Users\HP>ipconfig

Windows IP Configuration

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

Ethernet adapter Ethernet 4:
  Connection-specific DNS Suffix . :
  Link-local IPv6 Address . . . . . : fe80::a857:abdb:11db:cbb9%18
  IPv4 Address . . . . . : 192.168.56.1
  Subnet Mask . . . . . : 255.255.255.0
  Default Gateway . . . . . :

Unknown adapter Local Area Connection:
  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 Local Area Connection* 4:
  Media State . . . . . : Media disconnected
  Connection-specific DNS Suffix . :

Wireless LAN adapter Wi-Fi:
  Connection-specific DNS Suffix . :
  Link-local IPv6 Address . . . . . : fe80::5f9:db9f:6f92:c940%4
  IPv4 Address . . . . . : 192.168.1.2
  Subnet Mask . . . . . : 255.255.255.0
  Default Gateway . . . . . : fe80::1%4
                                192.168.1.1
```

```
C:\ Command Prompt  
C:\Users\HP>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 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 Local Area Connection* 4 while it has its media disconnected.  
  
Ethernet adapter Ethernet:  
  
    Media State . . . . . : Media disconnected  
    Connection-specific DNS Suffix . .  
  
Ethernet adapter Ethernet 4:  
  
    Connection-specific DNS Suffix . .  
    Link-local IPv6 Address . . . . . : fe80::a857:abdb:11db:cbb9%18  
    IPv4 Address . . . . . : 192.168.56.1  
    Subnet Mask . . . . . : 255.255.255.0  
    Default Gateway . . . . . :  
  
Unknown adapter Local Area Connection:  
  
    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 Local Area Connection* 4:  
  
    Media State . . . . . : Media disconnected  
    Connection-specific DNS Suffix . .  
  
Wireless LAN adapter Wi-Fi:  
  
    Connection-specific DNS Suffix . .  
    Link-local IPv6 Address . . . . . : fe80::5f9:db9f:6f92:c940%4  
    Default Gateway . . . . . : fe80::1%4
```

```
Command Prompt

C:\Users\HP>ipconfig /displaydns

Windows IP Configuration

scinstallcheck.mcafee.com
-----
No records of type AAAA

scinstallcheck.mcafee.com
-----
Record Name . . . . . : scinstallcheck.mcafee.com
Record Type . . . . . : 1
Time To Live . . . . . : 0
Data Length . . . . . : 4
Section . . . . . : Answer
A (Host) Record . . . . . : 0.0.0.1

1.173.168.192.in-addr.arpa
-----
Record Name . . . . . : 1.173.168.192.in-addr.arpa.
Record Type . . . . . : 12
Time To Live . . . . . : 0
Data Length . . . . . : 8
Section . . . . . : Answer
PTR Record . . . . . : X-Retsu.mshome.net

1.0.0.127.in-addr.arpa
-----
Record Name . . . . . : 1.0.0.127.in-addr.arpa.
Record Type . . . . . : 12
Time To Live . . . . . : 0
Data Length . . . . . : 8
Section . . . . . : Answer
PTR Record . . . . . : localhost

chat-pa.clients6.google.com
-----
Record Name . . . . . : chat-pa.clients6.google.com
```

```
Command Prompt  
C:\Users\HP>ipconfig /renew  
  
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 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 Local Area Connection* 4 while it has its media disconnected.  
  
Ethernet adapter Ethernet:  
  
    Media State . . . . . : Media disconnected  
    Connection-specific DNS Suffix . .  
  
Ethernet adapter Ethernet 4:  
  
    Connection-specific DNS Suffix . .  
    Link-local IPv6 Address . . . . . : fe80::a857:abdb:11db:cbb9%18  
    IPv4 Address . . . . . : 192.168.56.1  
    Subnet Mask . . . . . : 255.255.255.0  
    Default Gateway . . . . . :  
  
Unknown adapter Local Area Connection:  
  
    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 Local Area Connection* 4:  
  
    Media State . . . . . : Media disconnected  
    Connection-specific DNS Suffix . .  
  
Wireless LAN adapter Wi-Fi:  
  
    Connection-specific DNS Suffix . .  
    Link-local IPv6 Address . . . . . : fe80::5f9:db9f:6f92:c940%4  
    IPv4 Address . . . . . : 192.168.1.2
```

Netstat

```
Command Prompt
C:\Users\HP>netstat
Active Connections

 Proto Local Address          Foreign Address      State
 TCP   192.168.1.2:51291       sa-in-f188:5228    ESTABLISHED
 TCP   192.168.1.2:51751       maa03s45-in-f10:https TIME_WAIT
 TCP   192.168.1.2:51753       91.108.56.174:https ESTABLISHED
 TCP   192.168.1.2:57912       11:http             TIME_WAIT
 TCP   192.168.1.2:57915       11:http             TIME_WAIT
 TCP   192.168.1.2:58358       maa03s43-in-f3:https ESTABLISHED
 TCP   192.168.1.2:60000       20.197.71.89:https ESTABLISHED
 TCP   192.168.1.2:61625       maa03s45-in-f10:https ESTABLISHED
 TCP   192.168.1.2:61822       maa03s43-in-f3:https ESTABLISHED
 TCP   192.168.56.1:1521       192.63020          ESTABLISHED
 TCP   192.168.56.1:63020      192:1521           ESTABLISHED

C:\Users\HP>
```

```
Command Prompt
C:\Users\HP>netstat -n
Active Connections

 Proto Local Address          Foreign Address        State
 TCP   192.168.1.2:51291      74.125.200.188:5228 ESTABLISHED
 TCP   192.168.1.2:51753      91.108.56.174:443  ESTABLISHED
 TCP   192.168.1.2:58358      142.250.195.227:443 ESTABLISHED
 TCP   192.168.1.2:60000      20.197.71.89:443  ESTABLISHED
 TCP   192.168.1.2:61625      142.250.196.42:443 ESTABLISHED
 TCP   192.168.1.2:61822      142.250.195.227:443 ESTABLISHED
 TCP   192.168.56.1:1521      192.168.56.1:63020 ESTABLISHED
 TCP   192.168.56.1:63020     192.168.56.1:1521 ESTABLISHED

C:\Users\HP>
```

```
Command Prompt - netstat -n 5
C:\Users\HP>netstat -n 5
Active Connections

 Proto Local Address          Foreign Address        State
 TCP   192.168.1.2:51291      74.125.200.188:5228 ESTABLISHED
 TCP   192.168.1.2:51753      91.108.56.174:443  ESTABLISHED
 TCP   192.168.1.2:58358      142.250.195.227:443 ESTABLISHED
 TCP   192.168.1.2:60000      20.197.71.89:443  ESTABLISHED
 TCP   192.168.1.2:61625      142.250.196.42:443 ESTABLISHED
 TCP   192.168.1.2:61822      142.250.195.227:443 ESTABLISHED
 TCP   192.168.56.1:1521      192.168.56.1:63020 ESTABLISHED
 TCP   192.168.56.1:63020     192.168.56.1:1521 ESTABLISHED

Active Connections

 Proto Local Address          Foreign Address        State
 TCP   192.168.1.2:51291      74.125.200.188:5228 ESTABLISHED
 TCP   192.168.1.2:51753      91.108.56.174:443  ESTABLISHED
 TCP   192.168.1.2:58358      142.250.195.227:443 ESTABLISHED
 TCP   192.168.1.2:60000      20.197.71.89:443  ESTABLISHED
 TCP   192.168.1.2:61625      142.250.196.42:443 ESTABLISHED
 TCP   192.168.1.2:61822      142.250.195.227:443 ESTABLISHED
 TCP   192.168.56.1:1521      192.168.56.1:63020 ESTABLISHED
 TCP   192.168.56.1:63020     192.168.56.1:1521 ESTABLISHED

Active Connections

 Proto Local Address          Foreign Address        State
 TCP   192.168.1.2:51291      74.125.200.188:5228 ESTABLISHED
 TCP   192.168.1.2:51753      91.108.56.174:443  ESTABLISHED
 TCP   192.168.1.2:58358      142.250.195.227:443 ESTABLISHED
 TCP   192.168.1.2:60000      20.197.71.89:443  ESTABLISHED
 TCP   192.168.1.2:61625      142.250.196.42:443 ESTABLISHED
 TCP   192.168.1.2:61822      142.250.195.227:443 ESTABLISHED
 TCP   192.168.56.1:1521      192.168.56.1:63020 ESTABLISHED
 TCP   192.168.56.1:63020     192.168.56.1:1521 ESTABLISHED

Active Connections

 Proto Local Address          Foreign Address        State
 TCP   192.168.1.2:51291      74.125.200.188:5228 ESTABLISHED
```

```
Command Prompt
C:\Users\HP>netstat -a
Active Connections

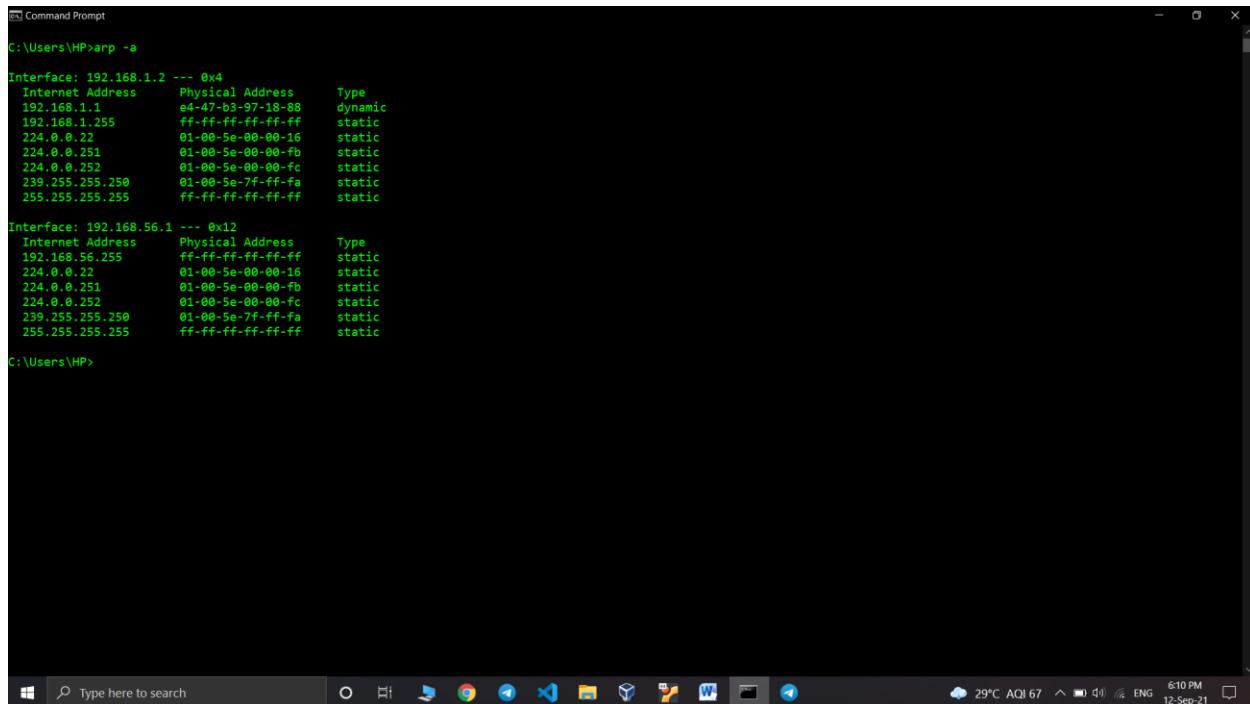
  Proto  Local Address        Foreign Address      State
  TCP    0.0.0.0:135          X-Retsu:0           LISTENING
  TCP    0.0.0.0:445          X-Retsu:0           LISTENING
  TCP    0.0.0.0:1521         X-Retsu:0           LISTENING
  TCP    0.0.0.0:5840         X-Retsu:0           LISTENING
  TCP    0.0.0.0:49664         X-Retsu:0           LISTENING
  TCP    0.0.0.0:49665         X-Retsu:0           LISTENING
  TCP    0.0.0.0:49666         X-Retsu:0           LISTENING
  TCP    0.0.0.0:49667         X-Retsu:0           LISTENING
  TCP    0.0.0.0:49668         X-Retsu:0           LISTENING
  TCP    0.0.0.0:49672         X-Retsu:0           LISTENING
  TCP    0.0.0.0:49677         X-Retsu:0           LISTENING
  TCP    127.0.0.1:8080        X-Retsu:0           LISTENING
  TCP    127.0.0.1:49670        X-Retsu:0           LISTENING
  TCP    192.168.1.2:139        X-Retsu:0           LISTENING
  TCP    192.168.1.2:51291       sa-in-f188:5228   ESTABLISHED
  TCP    192.168.1.2:51753       91.108.56.174:https  ESTABLISHED
  TCP    192.168.1.2:58358       maa03s43-in-f3:https CLOSE_WAIT
  TCP    192.168.1.2:58000       20.197.71.89:https  ESTABLISHED
  TCP    192.168.1.2:61625       maa03s45-in-f10:https TIME_WAIT
  TCP    192.168.1.2:61822       maa03s43-in-f3:https CLOSE_WAIT
  TCP    192.168.56.1:139        X-Retsu:0           LISTENING
  TCP    192.168.56.1:1521       192.168.2.20:53820  ESTABLISHED
  TCP    192.168.56.1:63020       192.1521          ESTABLISHED
  TCP    [::]:135              X-Retsu:0           LISTENING
  TCP    [::]:445              X-Retsu:0           LISTENING
  TCP    [::]:49664             X-Retsu:0           LISTENING
  TCP    [::]:49665             X-Retsu:0           LISTENING
  TCP    [::]:49666             X-Retsu:0           LISTENING
  TCP    [::]:49667             X-Retsu:0           LISTENING
  TCP    [::]:49668             X-Retsu:0           LISTENING
  TCP    [::]:49677             X-Retsu:0           LISTENING
  TCP    [::]:49669             X-Retsu:0           LISTENING
  UDP    0.0.0.0:5850            *:*                *
  UDP    0.0.0.0:5353            *:*                *
  UDP    0.0.0.0:5353            *:*                *
  UDP    0.0.0.0:5353            *:*                *
  UDP    0.0.0.0:5353            *:*                *
```

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

i. 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.



```
Command Prompt
C:\Users\HP>arp -a

Interface: 192.168.1.2 --- 0x4
Internet Address      Physical Address      Type
192.168.1.1            e4-47-b3-97-18-88    dynamic
192.168.1.255          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

Interface: 192.168.56.1 --- 0x12
Internet Address      Physical Address      Type
192.168.56.255         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\HP>
```

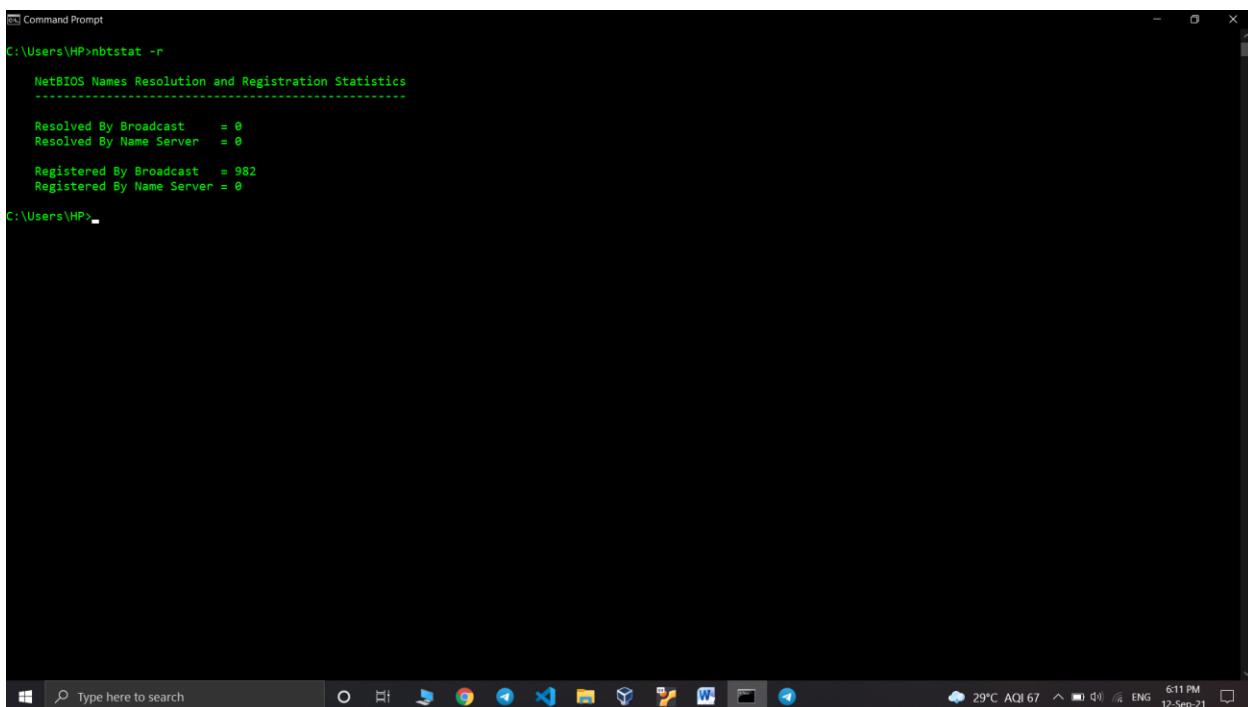
ii. NbtStat

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.



```
Command Prompt
C:\Users\HP>nbtstat -r
NetBIOS Names Resolution and Registration Statistics
-----
Resolved By Broadcast      = 0
Resolved By Name Server   = 0
Registered By Broadcast   = 982
Registered By Name Server = 0
C:\Users\HP>
```

The screenshot shows a Windows Command Prompt window titled "Command Prompt". The command "nbtstat -r" is entered at the prompt. The output displays NetBIOS Names Resolution and Registration Statistics. It shows that there have been 982 registrations by broadcast and 0 registrations by name server. There have been 0 resolutions by broadcast and 0 resolutions by name server. The taskbar at the bottom of the screen shows various pinned icons and the system tray with the date and time (12-Sep-21) and battery status.

iii. 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.

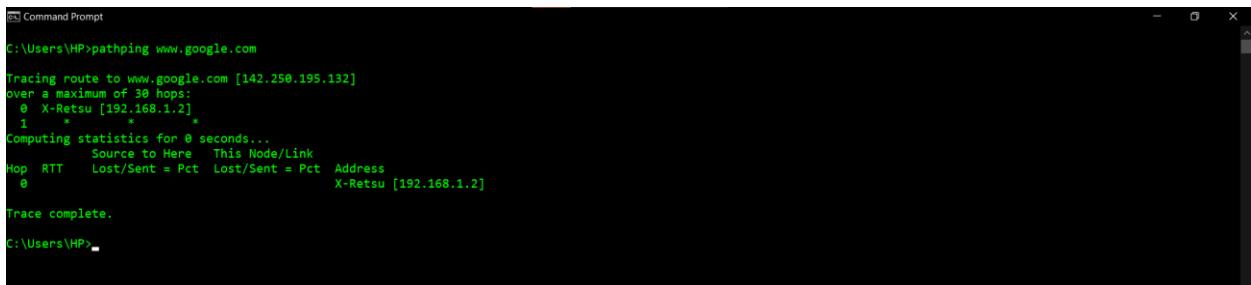


```
Command Prompt
C:\Users\HP>hostname
X-Retsu
C:\Users\HP>
```

iv. 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.

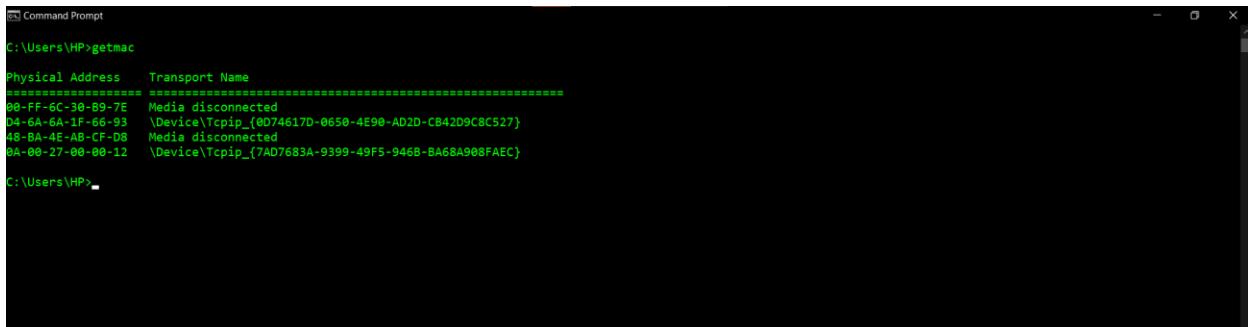


```
Command Prompt
C:\Users\HP>pathping www.google.com
Tracing route to www.google.com [142.250.195.132]
over a maximum of 38 hops:
  0  X-Retsu [192.168.1.2]
  1  *          *
Computing statistics for 8 seconds...
      Source to Here  This Node/Link
Hop  RTT    Lost/Sent = Pct  Lost/Sent = Pct  Address
  0          X-Retsu [192.168.1.2]

Trace complete.
C:\Users\HP>
```

v. getmac

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



The screenshot shows a Windows Command Prompt window titled "Command Prompt". The command "getmac" is entered at the prompt. The output displays the physical MAC addresses and their corresponding transport names for three network interfaces. The first interface has a disconnected status and is associated with a specific GUID. The second interface is also disconnected and has a different GUID. The third interface is connected and has a standard MAC address.

```
C:\Users\HP>getmac
Physical Address      Transport Name
-----
00-FF-6C-3B-89-7E    Media disconnected
04-6A-6A-1F-66-93    \Device\Tcpip_{0D746170-0650-4E90-AD2D-CB42D9C8C527}
48-BA-4E-AB-CF-D8    Media disconnected
0A-00-27-00-00-12    \Device\Tcpip_{7AD7683A-9399-49F5-946B-BA68A908FAEC}

C:\Users\HP>
```

LAMP stands for:

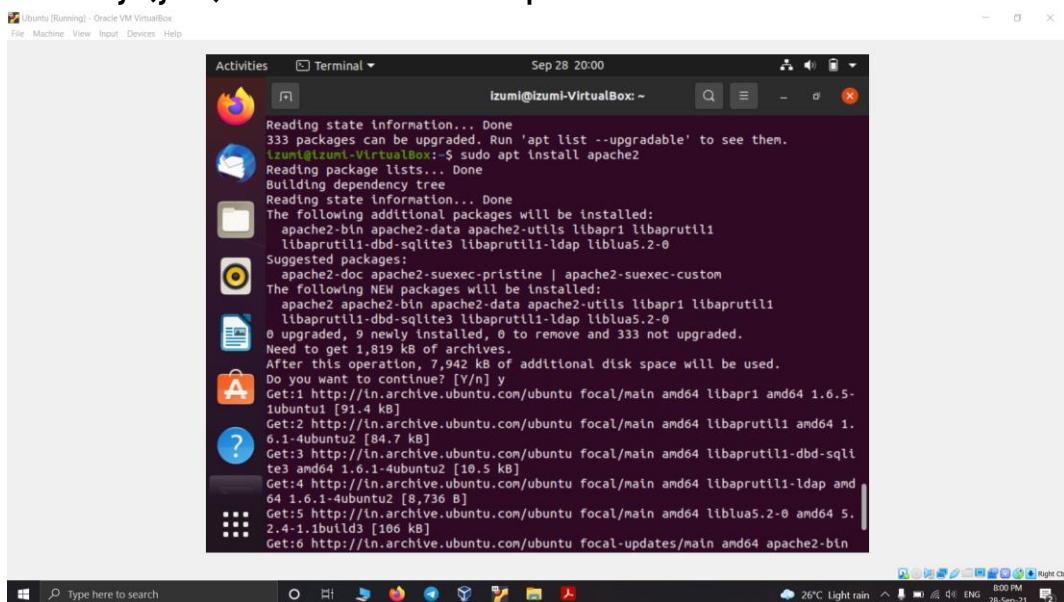
- Linux OS
- Apache HTTP Server
- MySQL database management system
- PHP programming language

1. Installation of Apache Server.

Command:

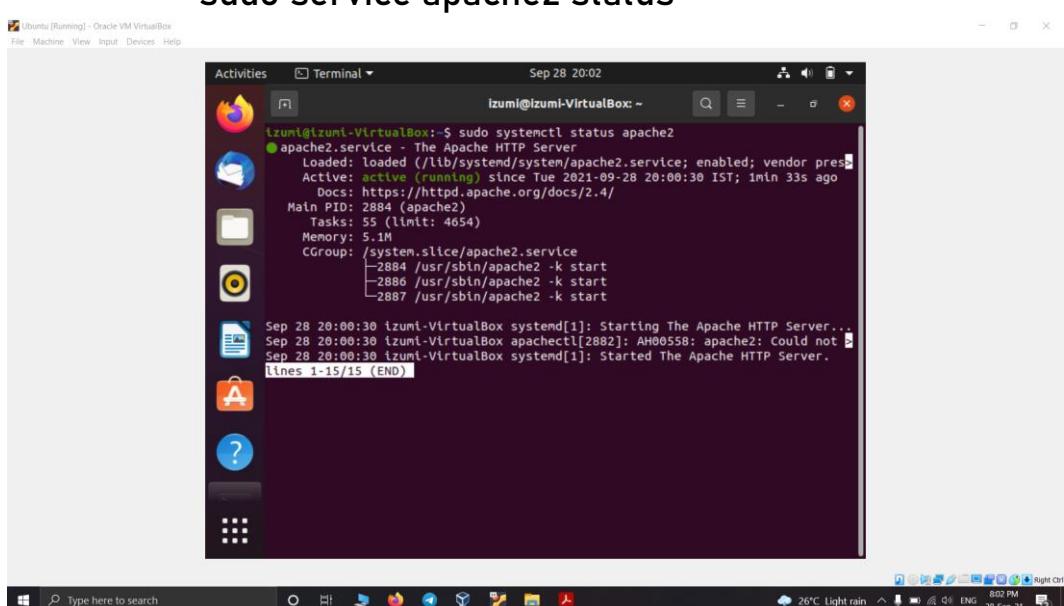
```
sudo apt-get install apache2
```

Press y (yes) and hit ENTER to permit the installation



Check if Apache is installed correctly by running the Apache service status. Use the following the command:

sudo service apache2 status

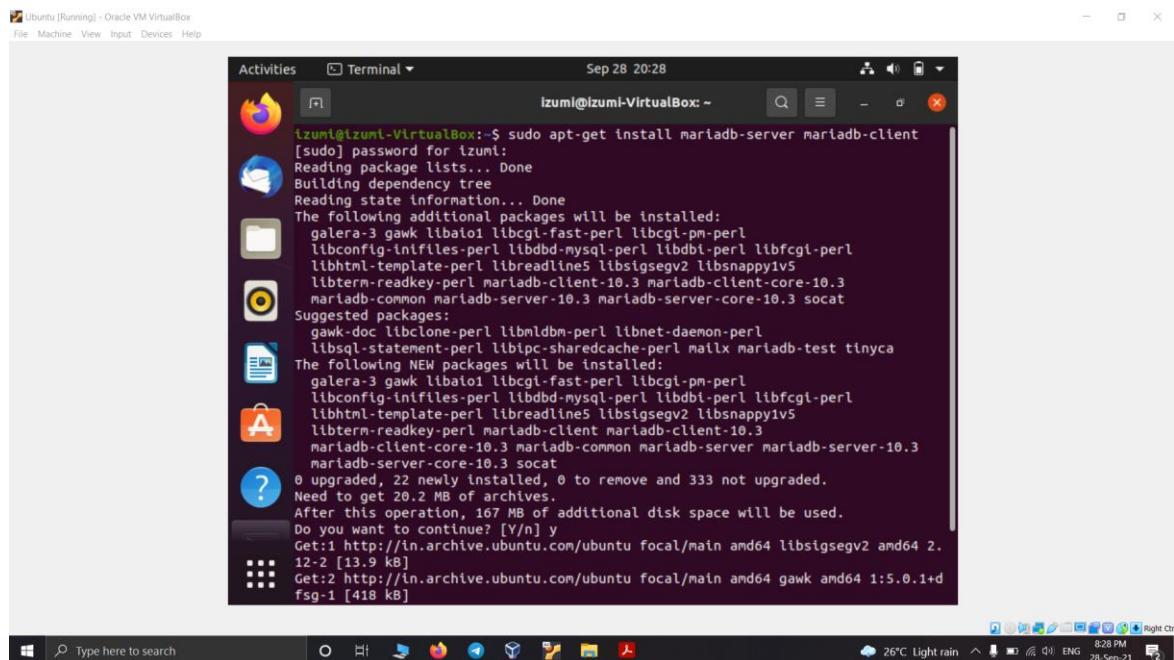


2. Installation of MariaDB

MariaDB is an open source relational database management system (RDBMS)

Command:

`sudo apt install mariadb-server mariadb-client`

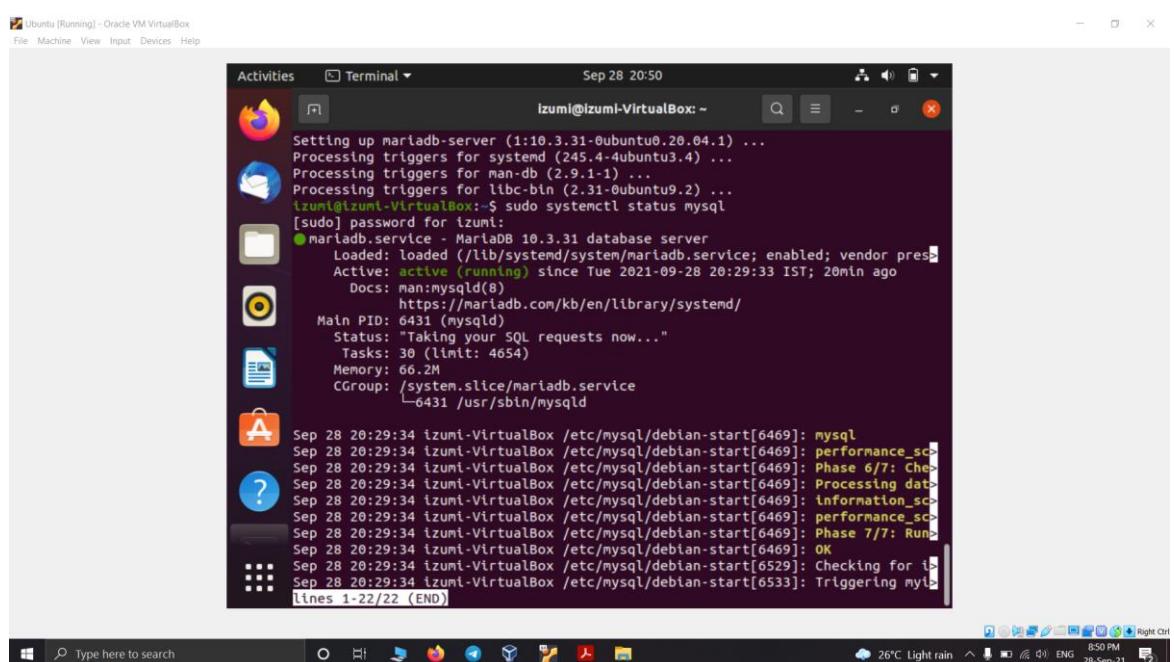


```
Ubuntu [Running] - Oracle VM VirtualBox
File Machine View Input Devices Help
Activities Terminal Sep 28 20:28
izumi@izumi-VirtualBox:~$ sudo apt-get install mariadb-server mariadb-client
[sudo] password for izumi:
Reading package lists... Done
Building dependency tree
Reading state information... Done
The following additional packages will be installed:
galera-3 gawk libaio1 libcgi-fast-perl libcgl-pm-perl
libconfig-inifiles-perl libdbd-mysql-perl libdbi-perl libfcgi-perl
libhtml-template-perl libreadline5 libsigsegv2 libsnappyv5
libterm-readkey-perl mariadb-client-10.3 mariadb-client-core-10.3
mariadb-common mariadb-server-10.3 mariadb-server-core-10.3 socat
Suggested packages:
gawk-doc libclowne-perl libmldb-perl libnet-daemon-perl
libsql-statement-perl libipc-sharedcache-perl mailx mariadb-test tinyca
The following NEW packages will be installed:
galera-3 gawk libaio1 libcgi-fast-perl libcgl-pm-perl
libconfig-inifiles-perl libdbd-mysql-perl libdbi-perl libfcgi-perl
libhtml-template-perl libreadline5 libsigsegv2 libsnappyv5
libterm-readkey-perl mariadb-client mariadb-client-10.3
mariadb-client-core-10.3 mariadb-common mariadb-server mariadb-server-10.3
mariadb-server-core-10.3 socat
0 upgraded, 22 newly installed, 0 to remove and 333 not upgraded.
Need to get 20.2 MB of archives.
After this operation, 167 MB of additional disk space will be used.
Do you want to continue? [Y/n]
Get:1 http://in.archive.ubuntu.com/ubuntu focal/main amd64 gawk amd64 1:5.0.1+dfsg-2 [13.9 kB]
Get:2 http://in.archive.ubuntu.com/ubuntu focal/main amd64 libsigsegv2 amd64 2.12-2 [418 kB]
```

Check MariaDB Installation:-

`sudo systemctl status mysql`

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



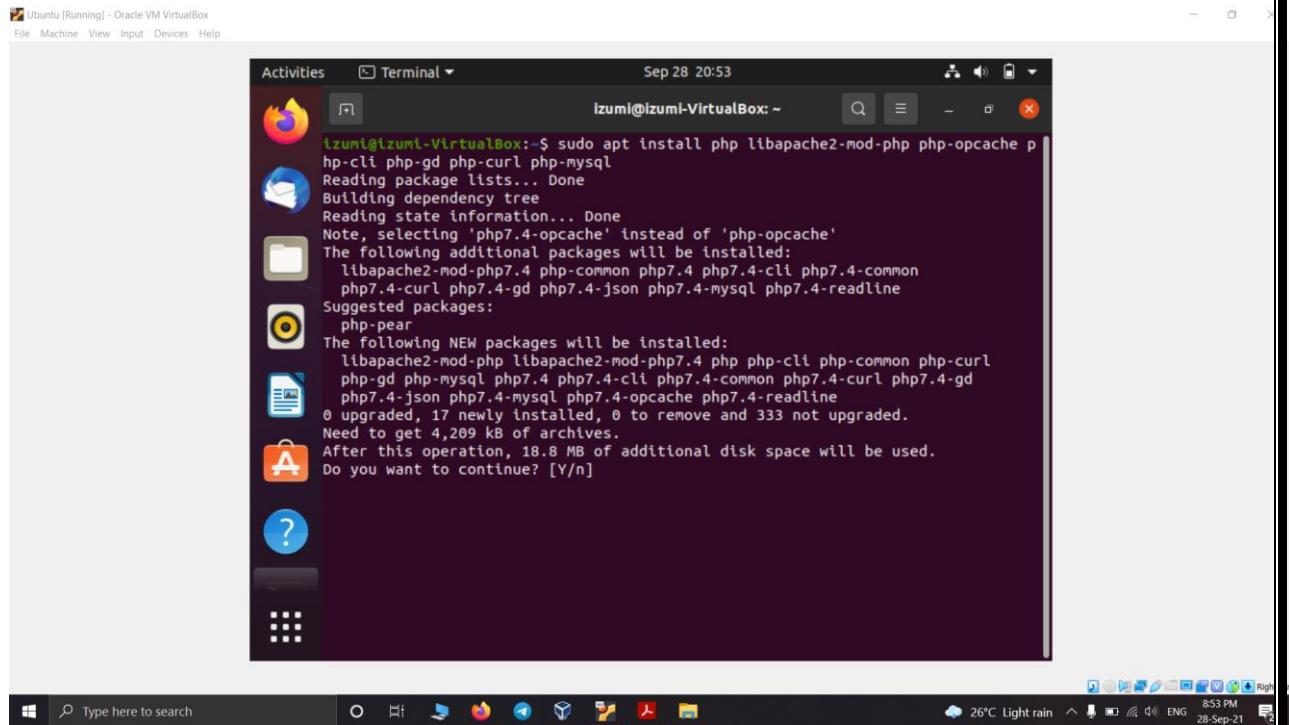
```
Ubuntu [Running] - Oracle VM VirtualBox
File Machine View Input Devices Help
Activities Terminal Sep 28 20:50
izumi@izumi-VirtualBox:~$ sudo systemctl status mysql
[sudo] password for izumi:
● mariadb.service - MySQL Community Server
   Loaded: loaded (/lib/systemd/system/mariadb.service; enabled; vendor pres
   Active: active (running) since Tue 2021-09-28 20:29:33 IST; 20min ago
     Docs: man:mysqld(8)
           https://mariadb.com/kb/en/library/systemd/
   Main PID: 6431 (mysqld)
      Status: "Taking your SQL requests now..."
      Tasks: 30 (limit: 4654)
     Memory: 66.2M
        CGroup: /system.slice/mariadb.service
                  └─ 6431 /usr/sbin/mysqld

Sep 28 20:29:34 izumi-VirtualBox /etc/mysql/debian-start[6469]: mysql
Sep 28 20:29:34 izumi-VirtualBox /etc/mysql/debian-start[6469]: performance_sc>
Sep 28 20:29:34 izumi-VirtualBox /etc/mysql/debian-start[6469]: Phase 6/7: Che>
Sep 28 20:29:34 izumi-VirtualBox /etc/mysql/debian-start[6469]: Processing dat>
Sep 28 20:29:34 izumi-VirtualBox /etc/mysql/debian-start[6469]: Information_sc>
Sep 28 20:29:34 izumi-VirtualBox /etc/mysql/debian-start[6469]: performance_sc>
Sep 28 20:29:34 izumi-VirtualBox /etc/mysql/debian-start[6469]: Phase 7/7: Run>
Sep 28 20:29:34 izumi-VirtualBox /etc/mysql/debian-start[6469]: OK
Sep 28 20:29:34 izumi-VirtualBox /etc/mysql/debian-start[6529]: Checking for i>
Sep 28 20:29:34 izumi-VirtualBox /etc/mysql/debian-start[6533]: Triggering myb[>
lines 1-22/22 (END)
```

3. Install PHP

Command:

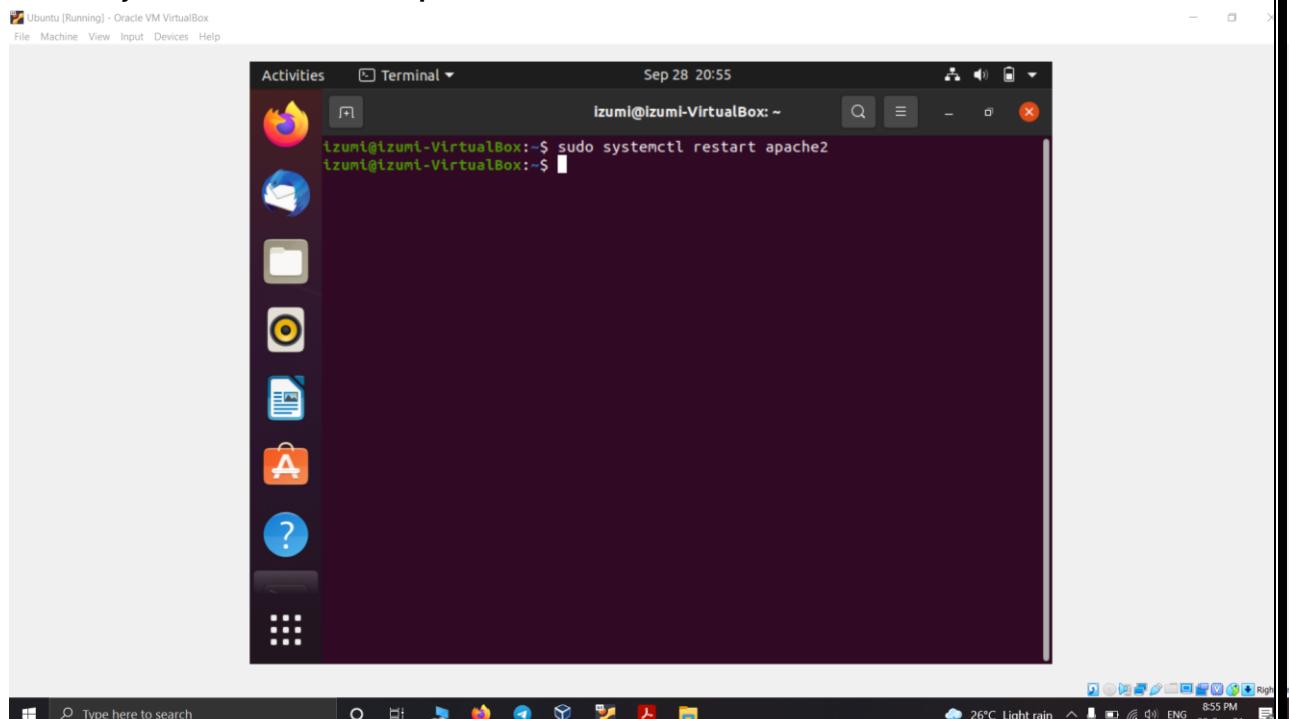
```
sudo apt install php libapache2-mod-php php-ocpache php-cli php-gd  
php-curl php-mysql
```



```
izumi@izumi-VirtualBox:~$ sudo apt install php libapache2-mod-php php-ocpache p  
hp-cli php-gd php-curl php-mysql  
Reading package lists... Done  
Building dependency tree  
Reading state information... Done  
Note, selecting 'php7.4-ocpache' instead of 'php-ocpache'  
The following additional packages will be installed:  
  libapache2-mod-php7.4 php-common php7.4 php7.4-cgi php7.4-common  
  php7.4-curl php7.4-gd php7.4-json php7.4-mysql php7.4-readline  
Suggested packages:  
  php-pear  
The following NEW packages will be installed:  
  libapache2-mod-php libapache2-mod-php7.4 php php-common php-curl  
  php-gd php-mysql php7.4 php7.4-cgi php7.4-common php7.4-curl php7.4-gd  
  php7.4-json php7.4-mysql php7.4-ocpache php7.4-readline  
0 upgraded, 17 newly installed, 0 to remove and 333 not upgraded.  
Need to get 4,209 kB of archives.  
After this operation, 18.8 MB of additional disk space will be used.  
Do you want to continue? [Y/n]
```

Restart apache2

```
sudo systemctl restart apache2
```



```
izumi@izumi-VirtualBox:~$ sudo systemctl restart apache2  
izumi@izumi-VirtualBox:~$
```

check installation

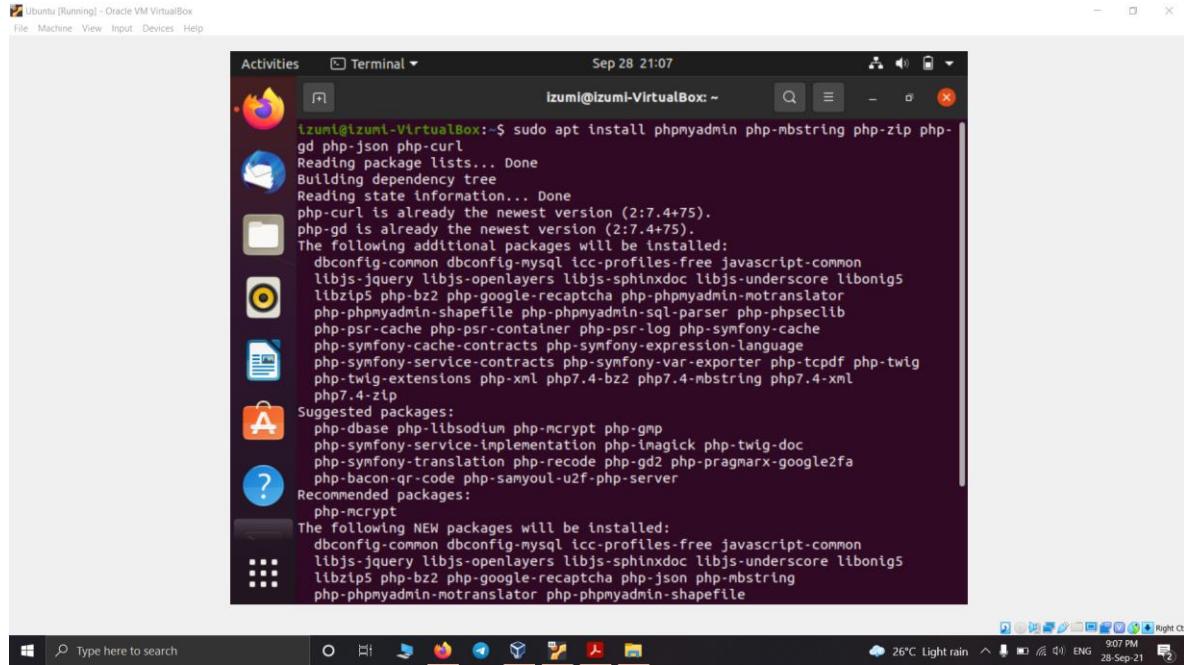
open <http://127.0.0.1/phpinfo.php> in any browser

4. Install phpmyadmin

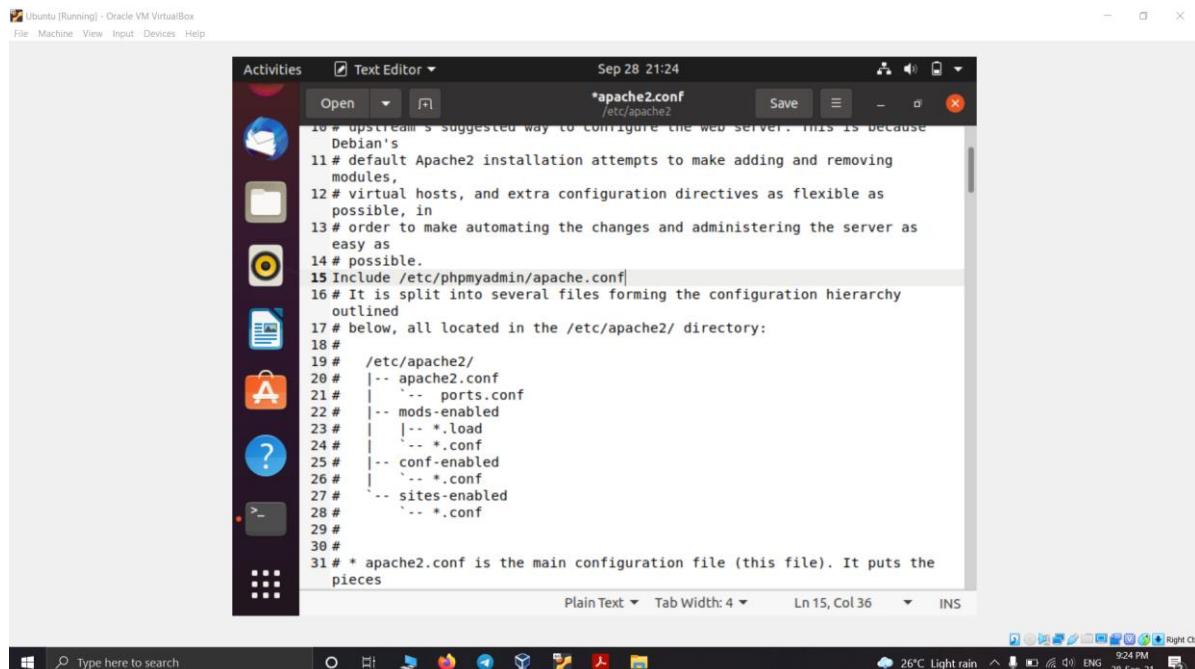
Command:

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

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



```
Ubuntu [Running] - Oracle VM VirtualBox
File Machine View Input Devices Help
Activities Terminal Sep 28 21:07
izumi@izumi-VirtualBox:~$ sudo apt install phpmyadmin php-mbstring php-zip php-
gd php-json php-curl
Reading package lists... Done
Building dependency tree
Reading state information... Done
php-curl is already the newest version (2:7.4+75).
php-gd is already the newest version (2:7.4+75).
The following additional packages will be installed:
dbconfig-common dbconfig-mysql tcc-profiles-free javascript-common
libjs-jquery libjs-openlayers libjs-sphinxdoc libjs-underscore libonig5
libzip5 php-bz2 php-google-recaptcha php-phpmyadmin-motranslator
php-phpmyadmin-shapefile php-phpmyadmin-sql-parser php-phseclib
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-twigs
php-twigs-extensions php-xml php7.4-bz2 php7.4-mbstring php7.4-xml
php7.4-zip
Suggested packages:
php-dbase php-libodium php-mcrypt php-gmp
php-symfony-implementation php-imagick php-twigs-doc
php-symfony-translation php-recode php-gd2 php-pragmarx-google2fa
php-bacon-qr-code php-samyoul-u2f-php-server
Recommended packages:
php-mcrypt
The following NEW packages will be installed:
dbconfig-common dbconfig-mysql tcc-profiles-free javascript-common
libjs-jquery libjs-openlayers libjs-sphinxdoc libjs-underscore libonig5
libzip5 php-bz2 php-google-recaptcha php-json php-mbstring
php-phpmyadmin-motranslator php-phpmyadmin-shapefile
izumi@izumi-VirtualBox:~$
```



```
Ubuntu [Running] - Oracle VM VirtualBox
File Machine View Input Devices Help
Activities Text Editor Sep 28 21:24
*apache2.conf /etc/apache2
10 # upstream's suggested way to configure the web server. This is because
Debian's
11 # default Apache2 installation attempts to make adding and removing
modules,
12 # virtual hosts, and extra configuration directives as flexible as
possible, in
13 # order to make automating the changes and administering the server as
easy as
14 # possible.
15 Include /etc/phpmyadmin/apache.conf
16 # It is split into several files forming the configuration hierarchy
outlined
17 # below, all located in the /etc/apache2/ directory:
18 #
19 #   /etc/apache2/
20 #     |-- apache2.conf
21 #       '-- ports.conf
22 #         '-- mods-enabled
23 #           |-- *.load
24 #           '-- *.conf
25 #         '-- conf-enabled
26 #           '-- *.conf
27 #             '-- sites-enabled
28 #               '-- *.conf
29 #
30 #
31 # * apache2.conf is the main configuration file (this file). It puts the
pieces
Plain Text Tab Width: 4 Ln 15, Col 36 INS
izumi@izumi-VirtualBox:~$
```

Restart apache2

```
sudo systemctl restart apache2
```

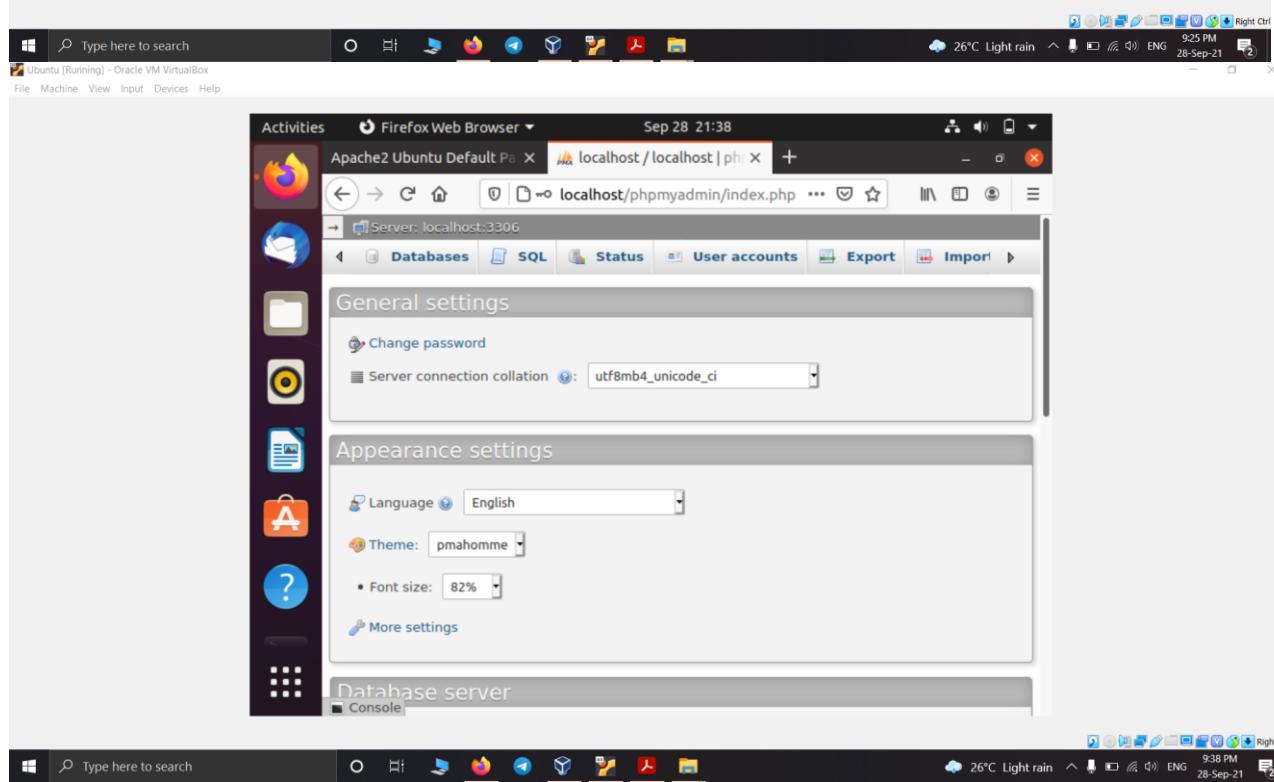
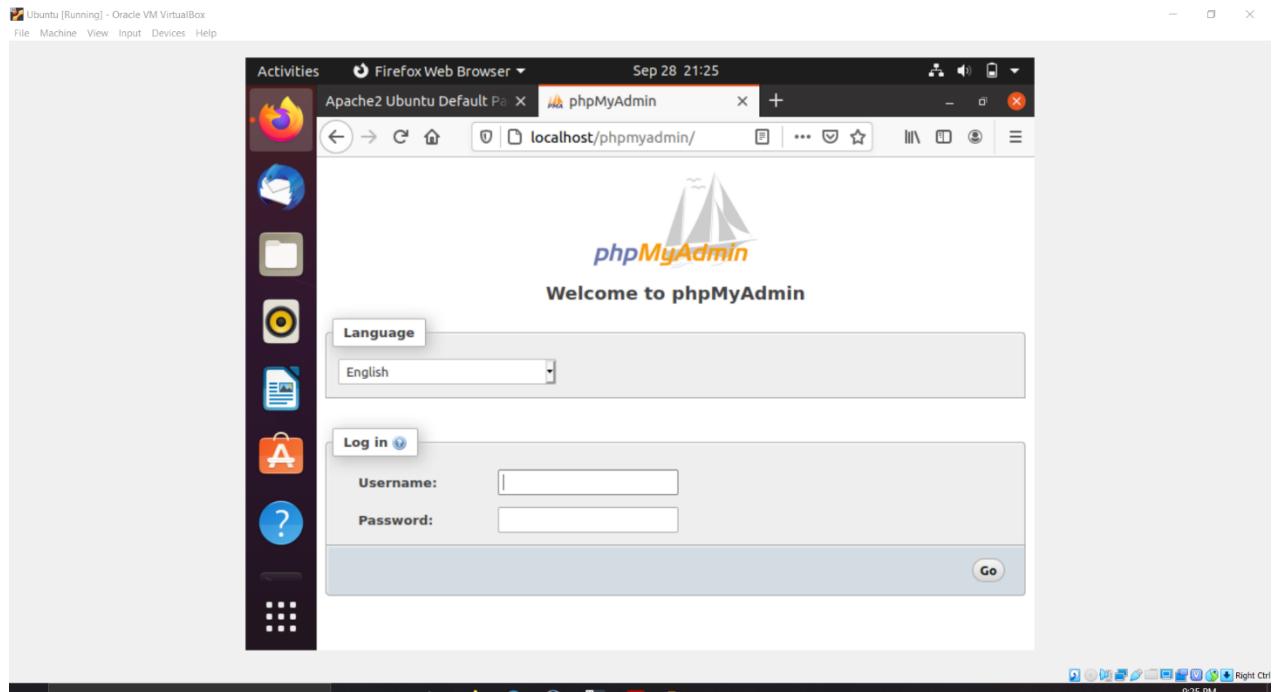
Check phpmyadmin

Open a browser

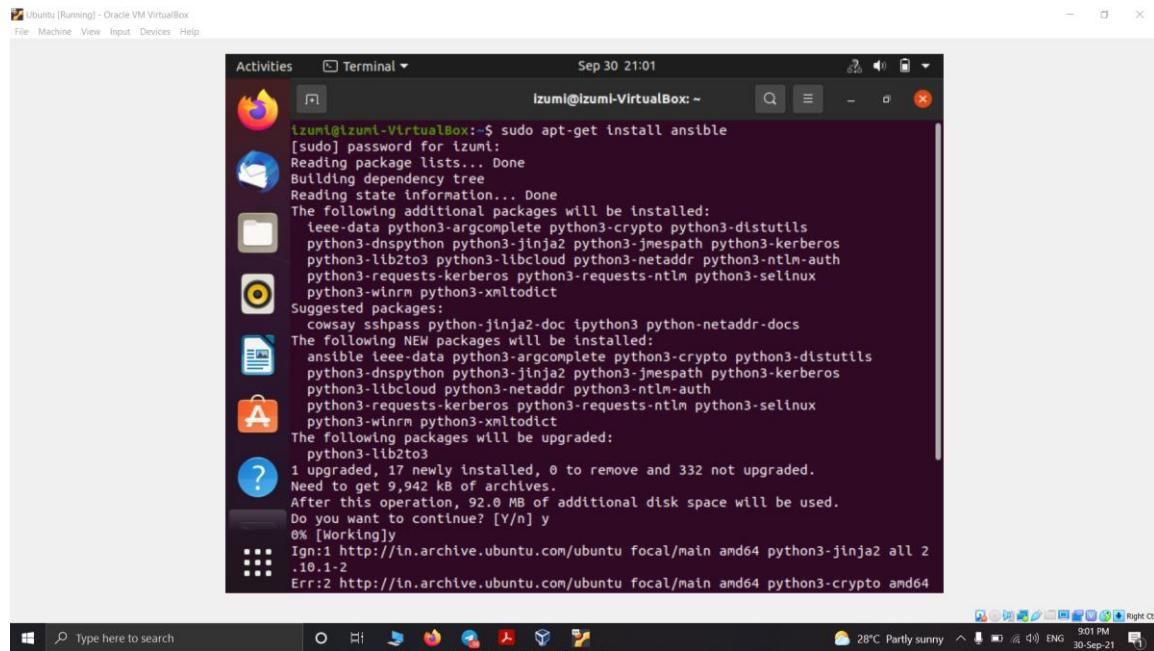
http://localhost/phpmyadmin

username : root

password : yourpassword

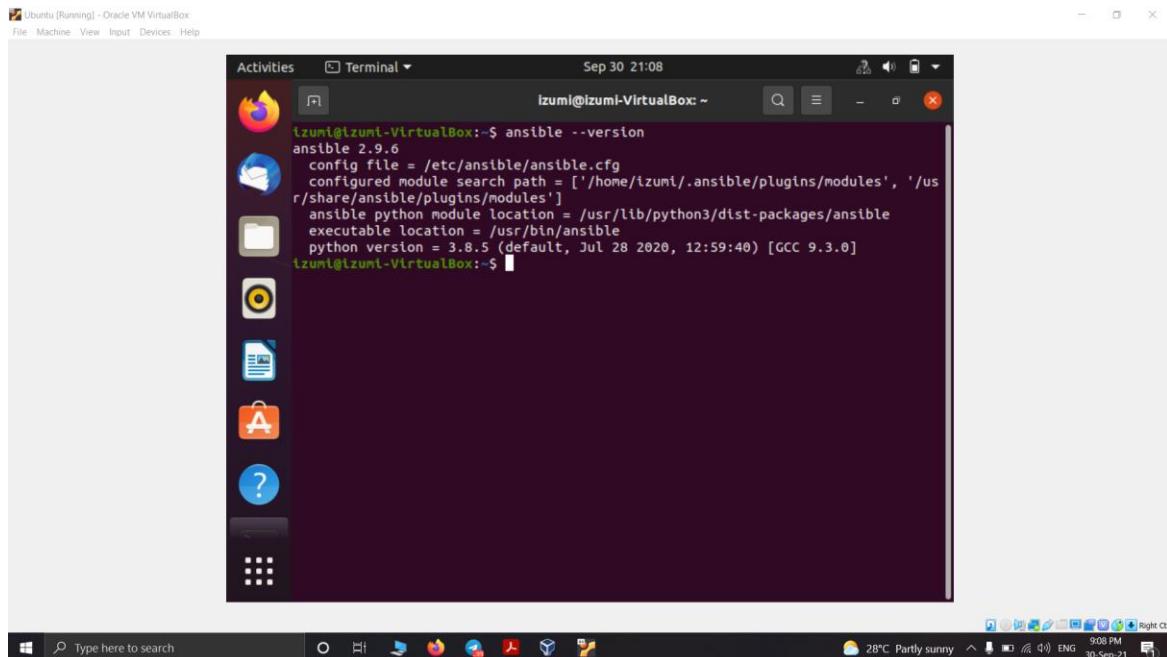


1.) sudo apt-get install ansible



```
Ubuntu [Running] - Oracle VM VirtualBox
File Machine View Input Devices Help
Activities Terminal Sep 30 21:01
izumi@izumi-VirtualBox:~$ sudo apt-get install ansible
[sudo] password for izumi:
Reading package lists... Done
Building dependency tree
Reading state information... Done
The following additional packages will be installed:
  ieee-data python3-argcomplete python3-crypto python3-distutils
  python3-dnspython python3-jinja2 python3-jmespath python3-kerberos
  python3-lib2to3 python3-libcloud python3-netaddr python3-ntlm-auth
  python3-requests-kerberos python3-requests-ntlm python3-selinux
  python3-winrm python3-xmldict
Suggested packages:
  coway sshpass python-jinja2-doc ipython3 python-netaddr-docs
The following NEW packages will be installed:
  ansible ieee-data python3-argcomplete python3-crypto python3-distutils
  python3-dnspython python3-jinja2 python3-jmespath python3-kerberos
  python3-libcloud python3-netaddr python3-ntlm-auth
  python3-requests-kerberos python3-requests-ntlm python3-selinux
  python3-winrm python3-xmldict
The following packages will be upgraded:
  python3-lib2to3
  1 upgraded, 17 newly installed, 0 to remove and 332 not upgraded.
  Need to get 9,942 kB of archives.
  After this operation, 92.0 MB of additional disk space will be used.
  Do you want to continue? [Y/n] y
  0% [Working]
  Ign:1 http://in.archive.ubuntu.com/ubuntu focal/main amd64 python3-jinja2 all 2
  .10.1-2
  Err:2 http://in.archive.ubuntu.com/ubuntu focal/main amd64 python3-crypto amd64
  
```

2.) ansible --version



```
Ubuntu [Running] - Oracle VM VirtualBox
File Machine View Input Devices Help
Activities Terminal Sep 30 21:08
izumi@izumi-VirtualBox:~$ ansible --version
ansible 2.9.6
  config file = /etc/ansible/ansible.cfg
  configured module search path = ['~/home/izumi/.ansible/plugins/modules', '/usr/share/ansible/plugins/modules']
  ansible python module location = /usr/lib/python3/dist-packages/ansible
  executable location = /usr/bin/ansible
  python version = 3.8.5 (default, Jul 28 2020, 12:59:40) [GCC 9.3.0]
izumi@izumi-VirtualBox:~$ 
```

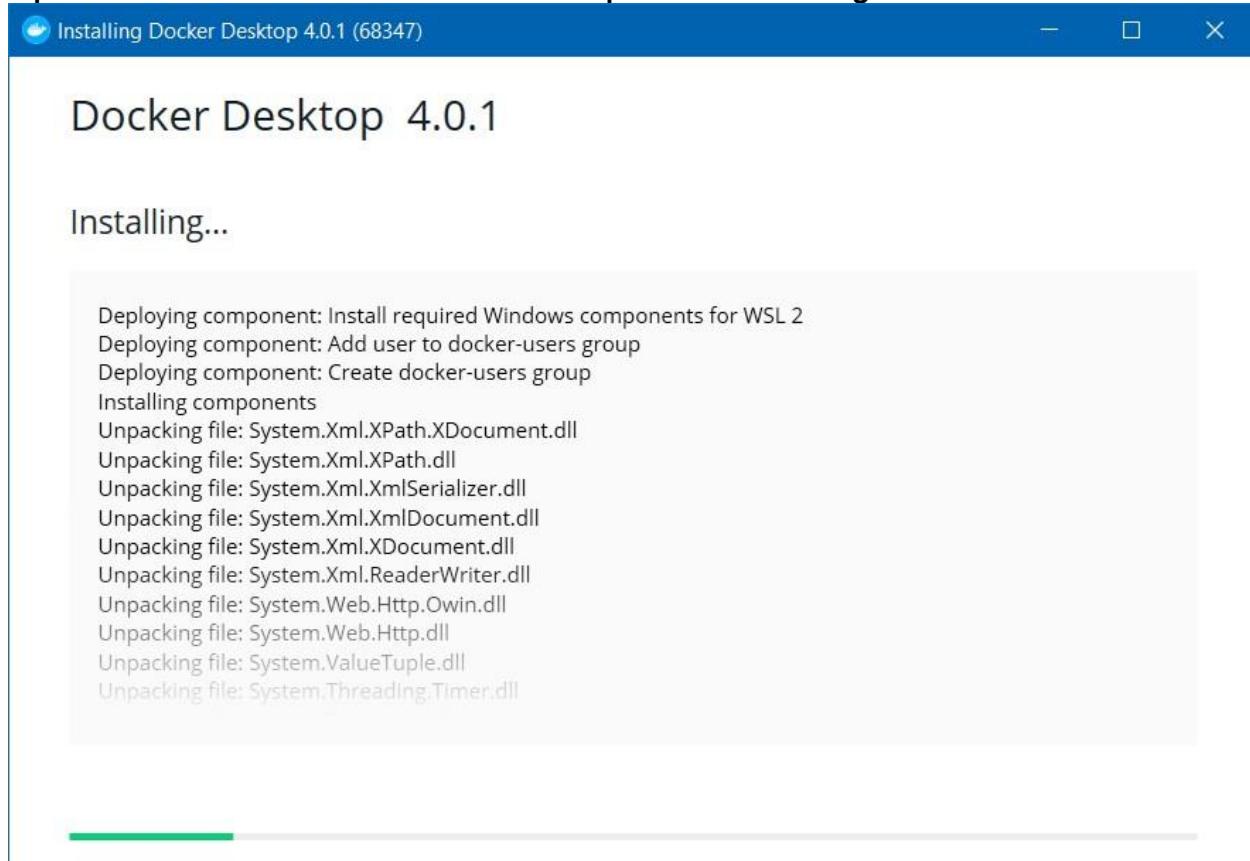
Step-I

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



Step-II

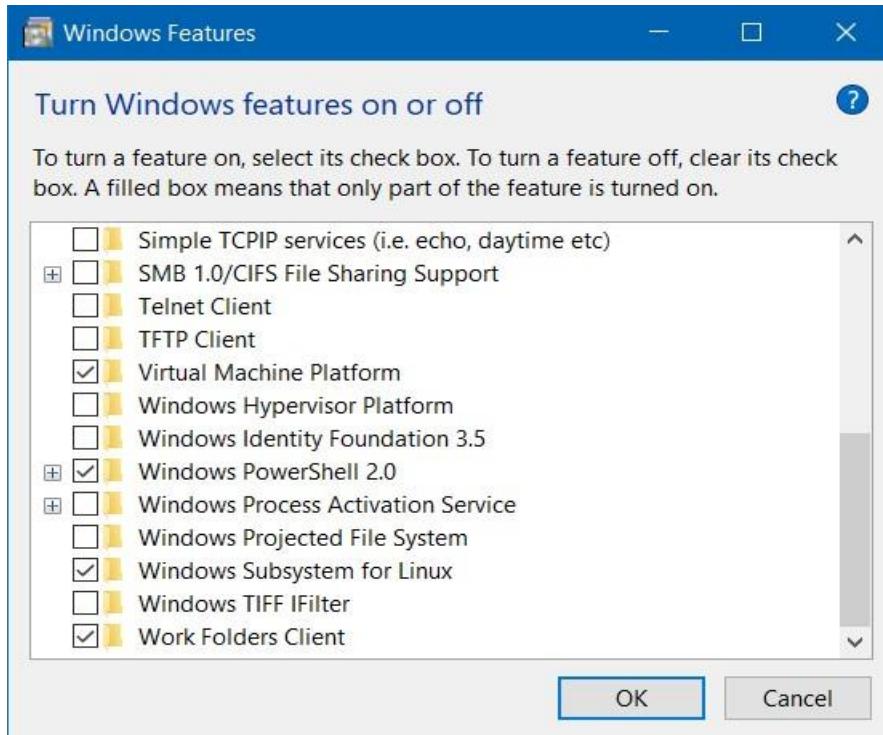
Open the .exe file and follow the steps after clicking install button.



Step-III

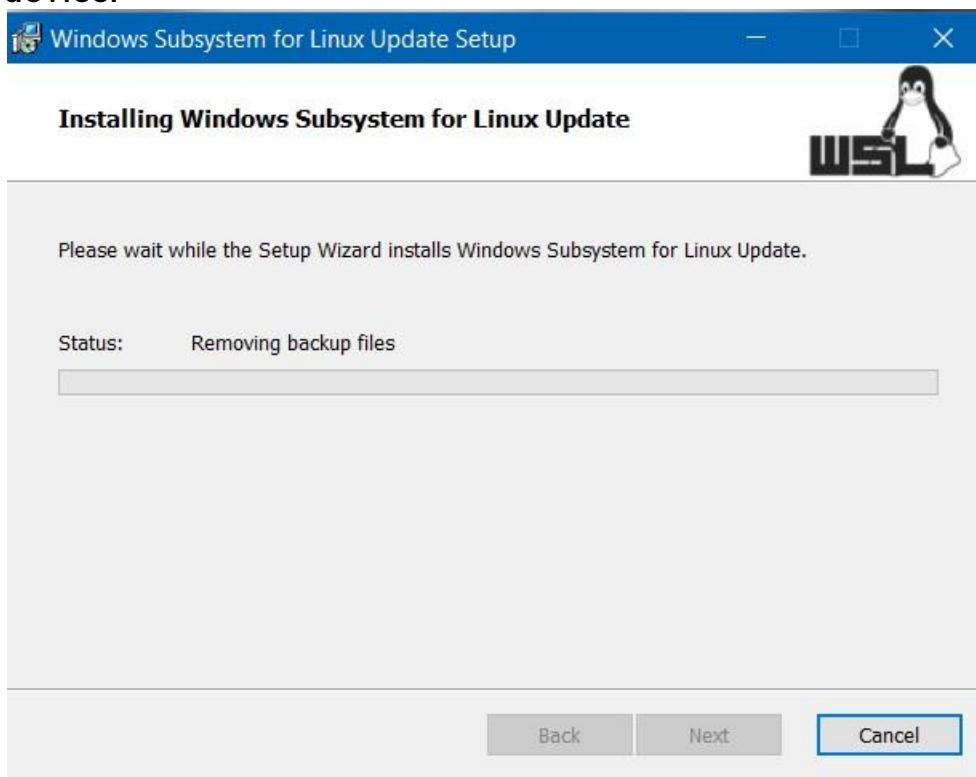
Once installed go to programs and features and click turn on windows features on or off

Scroll to the bottom and select windows subsystem for Linux



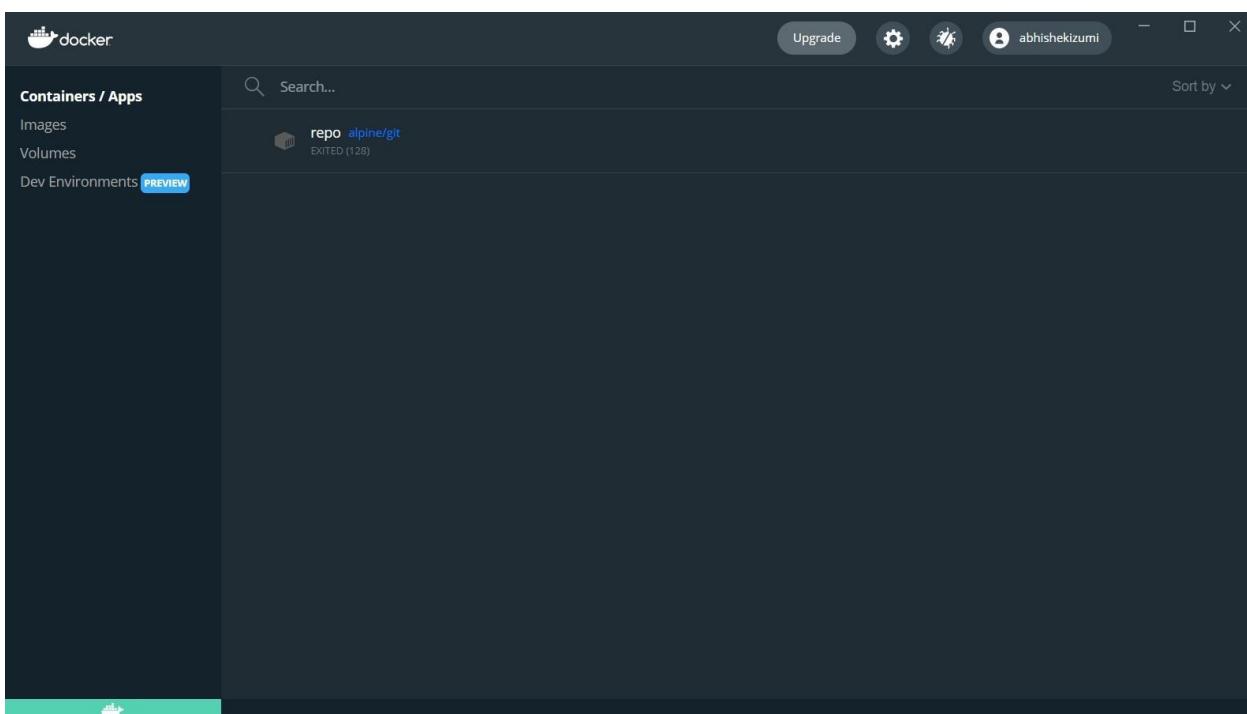
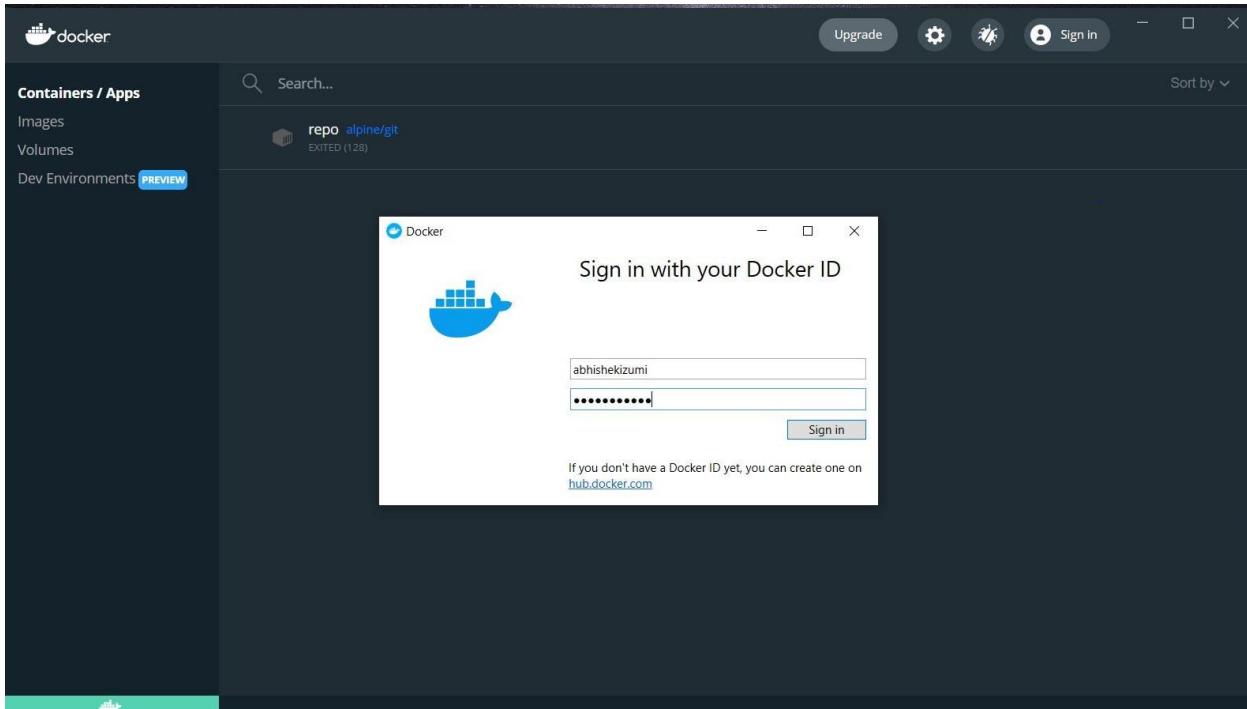
Step-IV

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



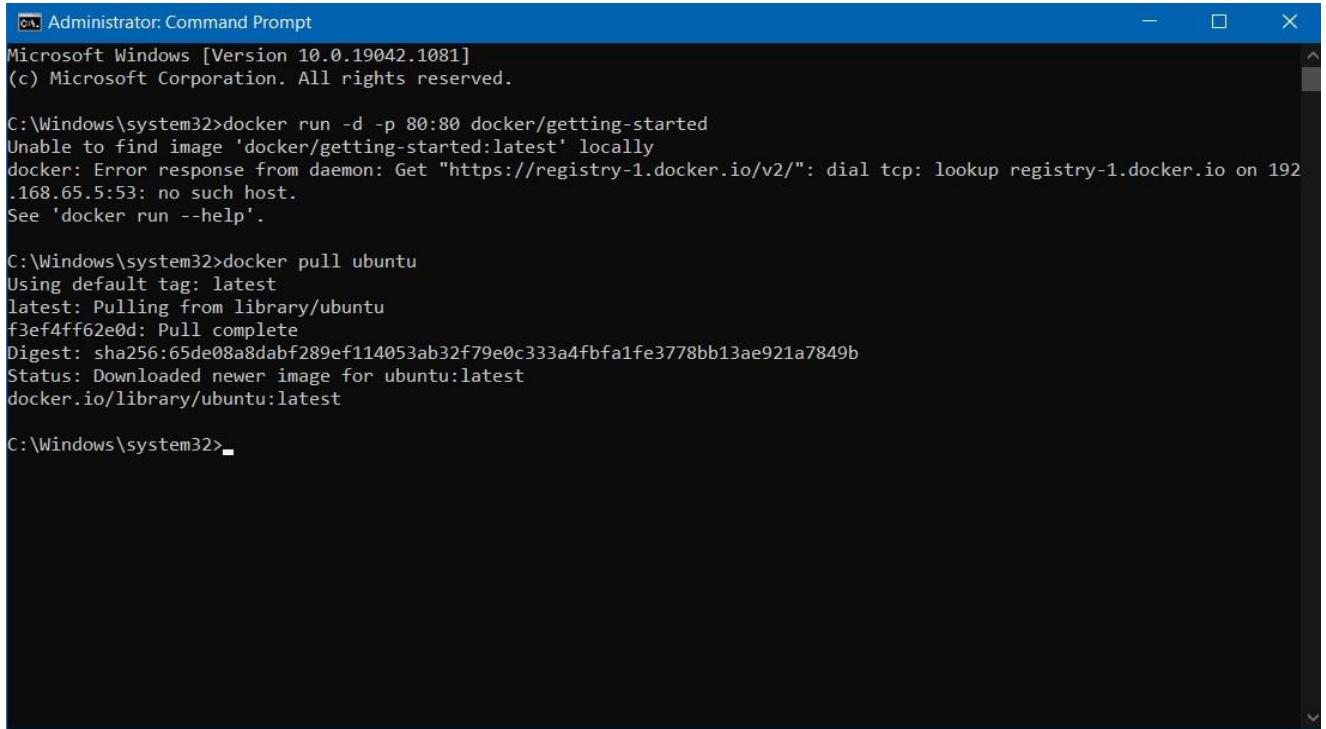
Step-V

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



Step-VI

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

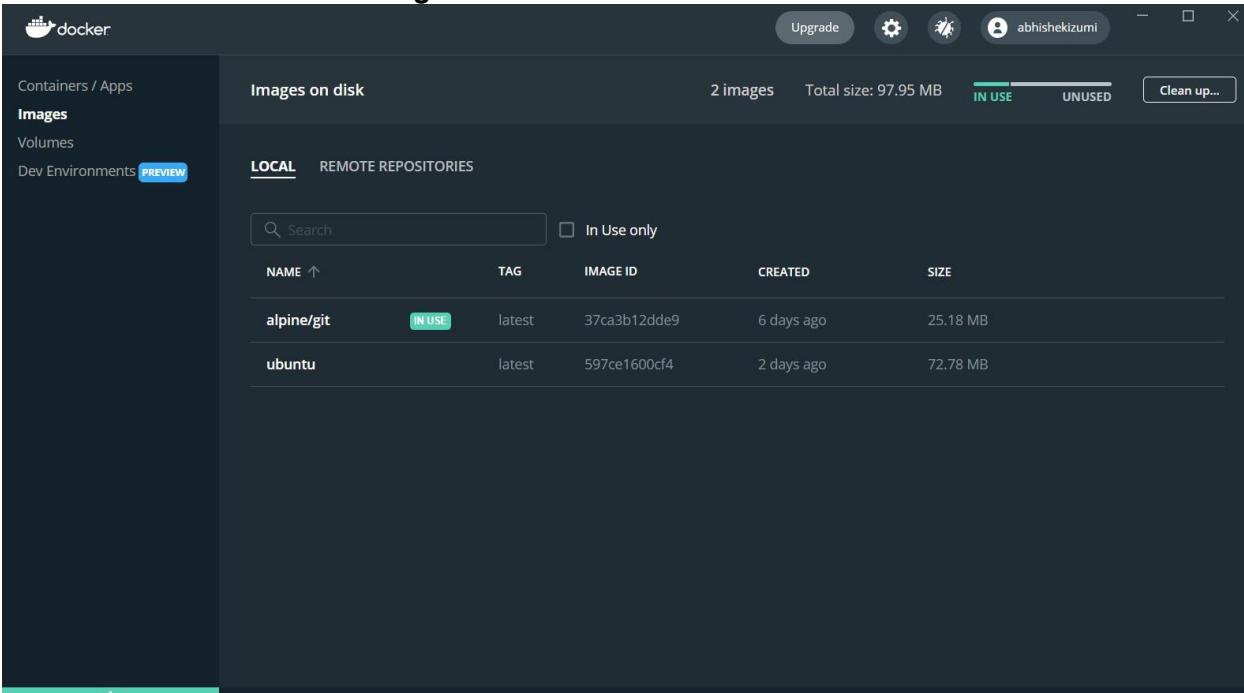


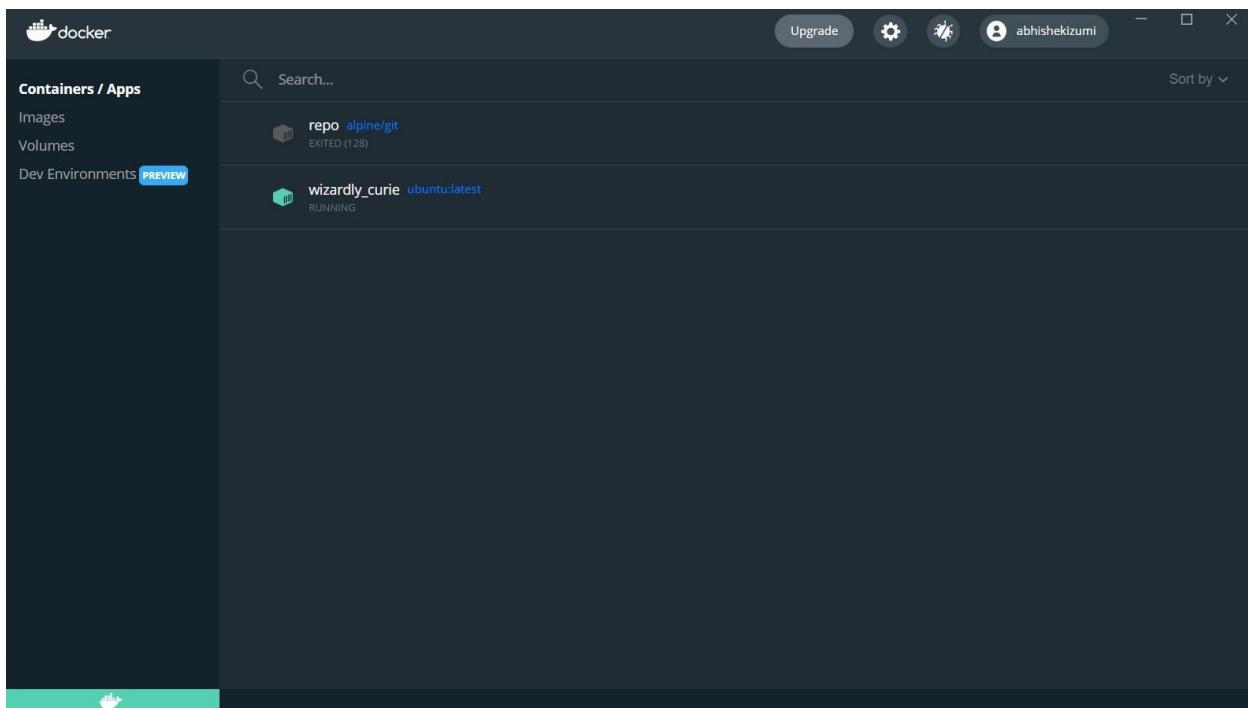
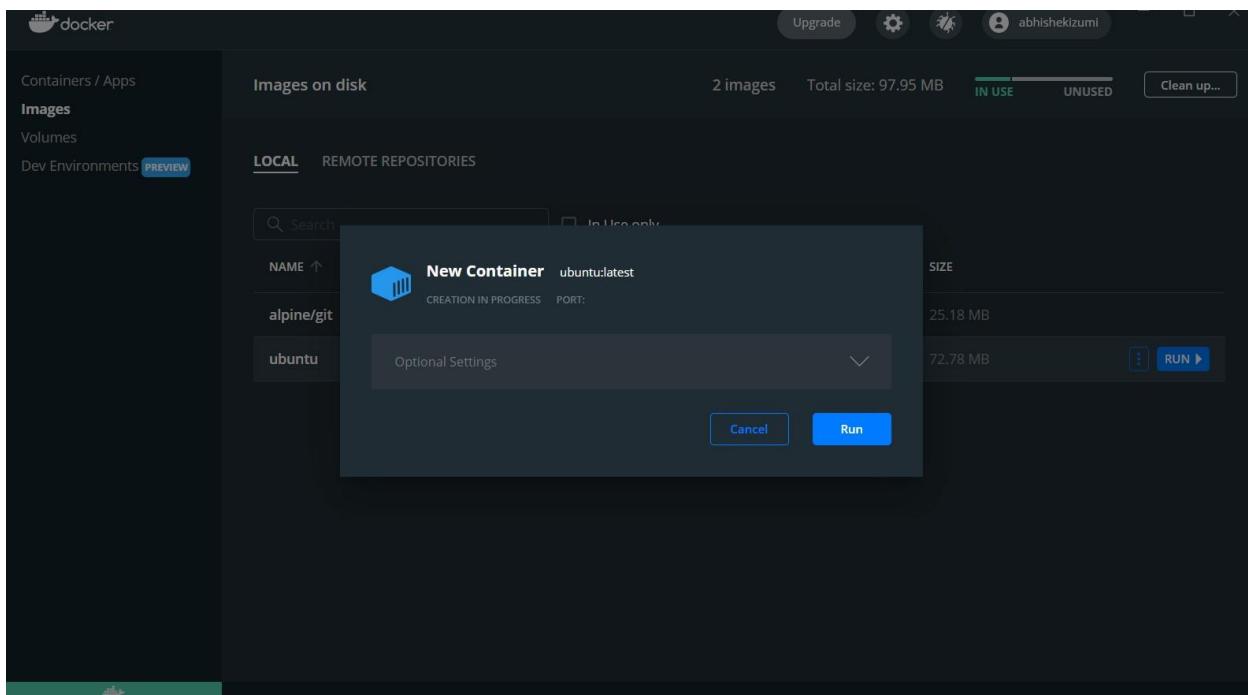
```
C:\Windows\system32>docker run -d -p 80:80 docker/getting-started
Unable to find image 'docker/getting-started:latest' locally
docker: Error response from daemon: Get "https://registry-1.docker.io/v2/": dial tcp: lookup registry-1.docker.io on 192.168.65.53: no such host.
See 'docker run --help'.

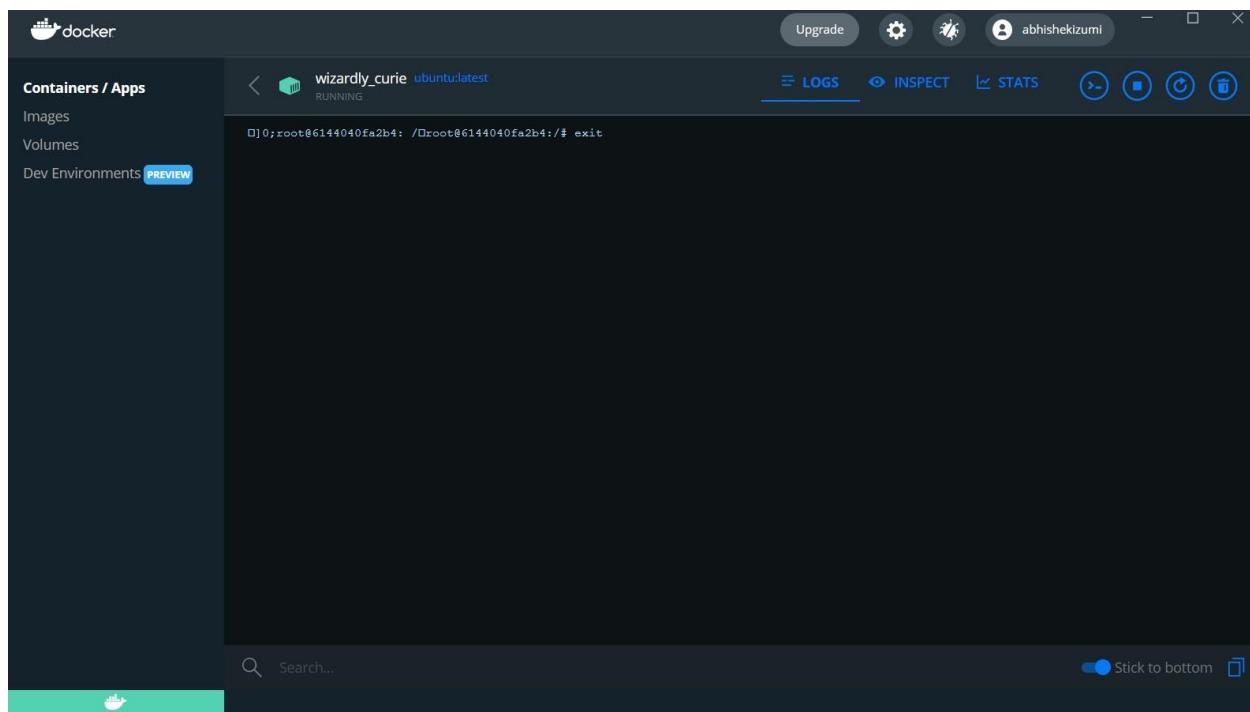
C:\Windows\system32>docker pull ubuntu
Using default tag: latest
latest: Pulling from library/ubuntu
f3ef4ff62e0d: Pull complete
Digest: sha256:65de08a8dabf289ef114053ab32f79e0c333a4fbfa1fe3778bb13ae921a7849b
Status: Downloaded newer image for ubuntu:latest
docker.io/library/ubuntu:latest

C:\Windows\system32>
```

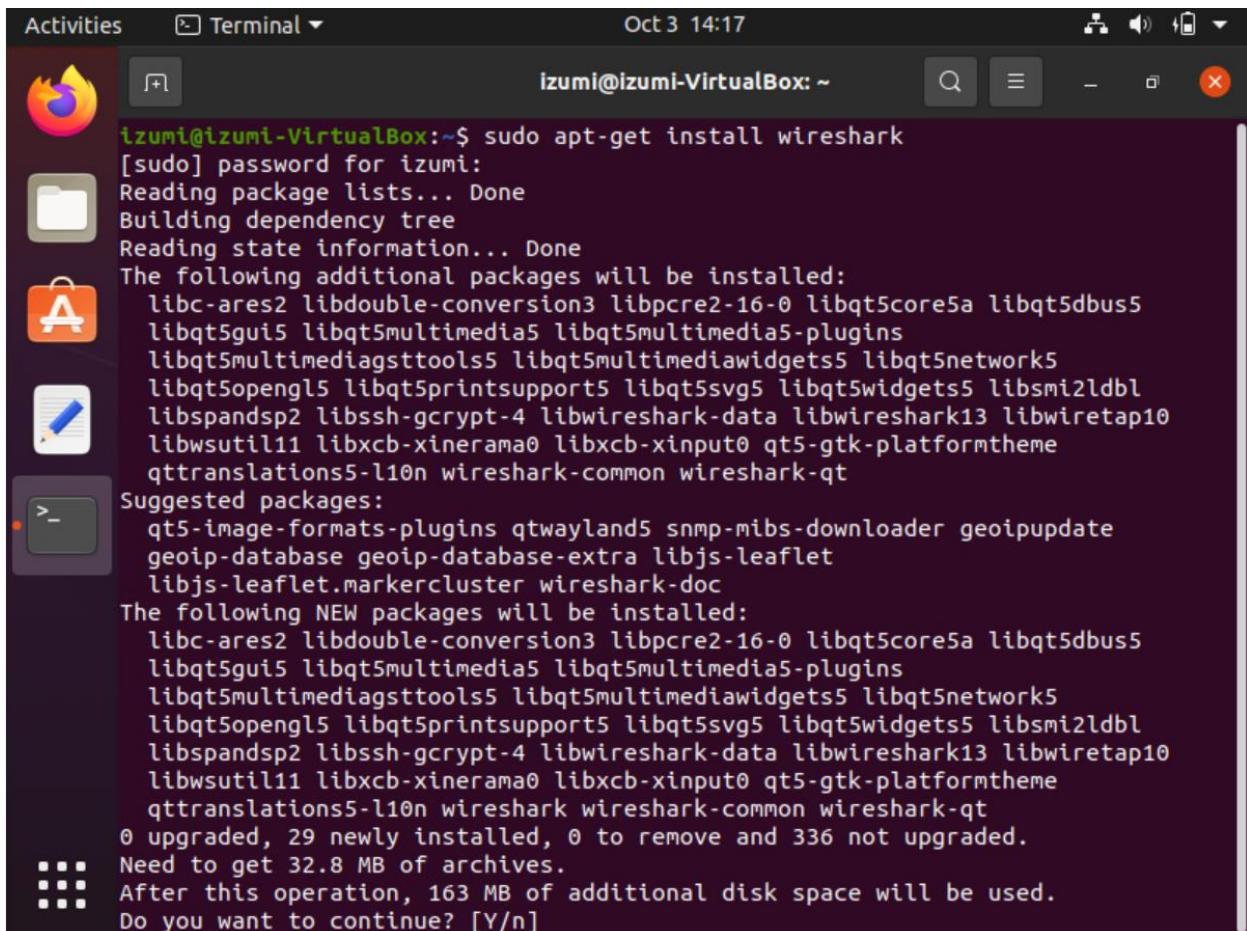
Now in the images tab an image of ubuntu will be displayed, we can run the ubuntu instance using the cli.







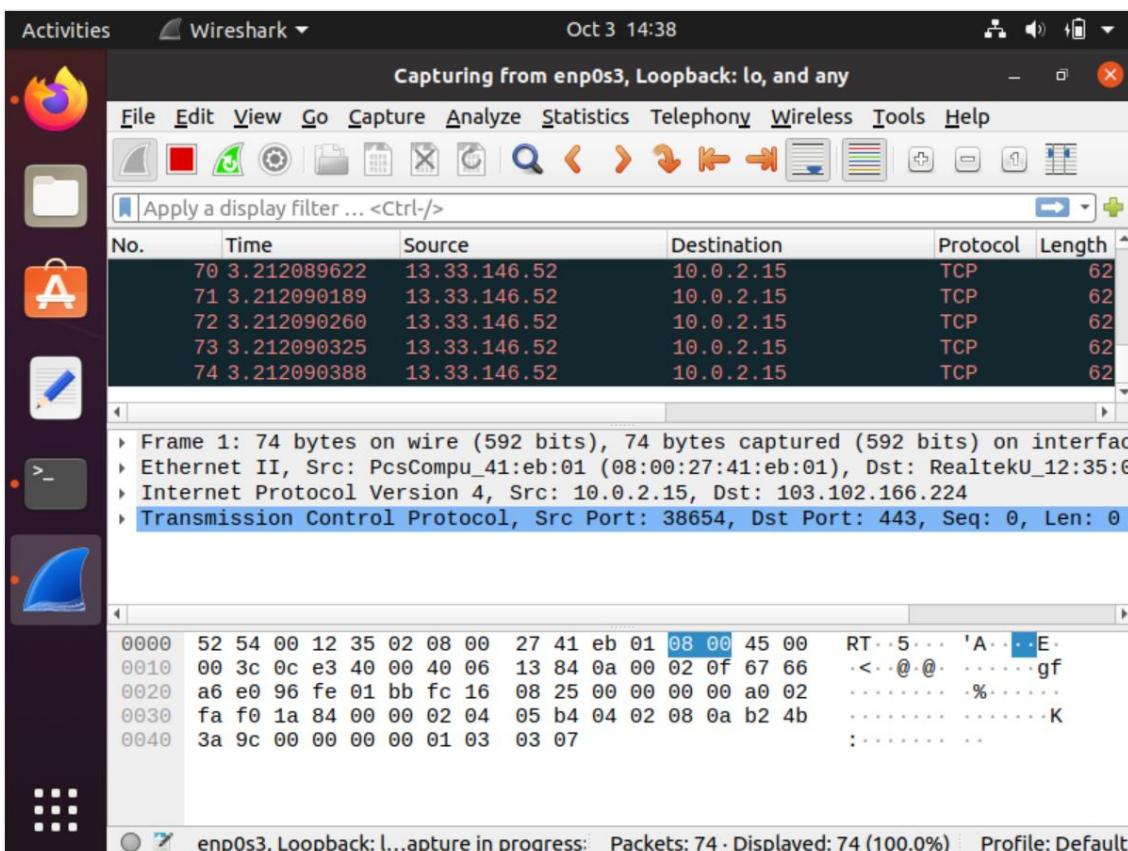
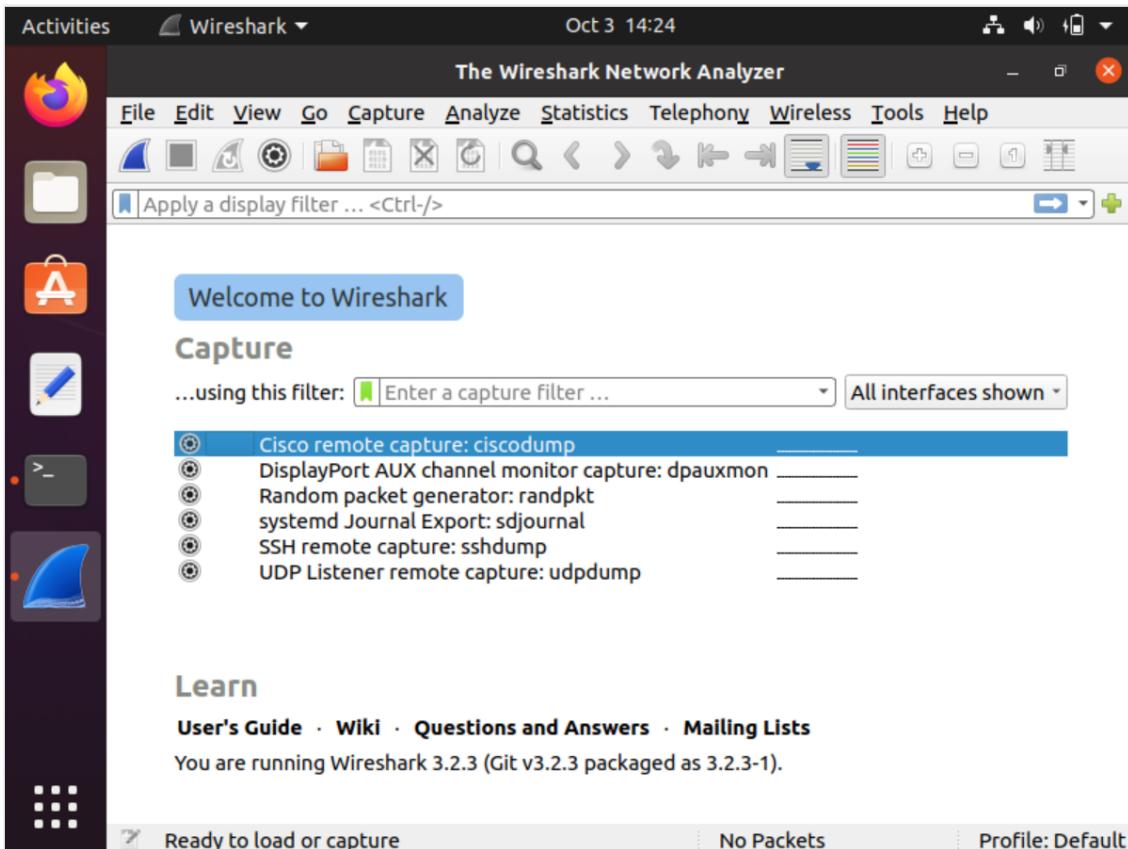
sudo apt-get install wireshark



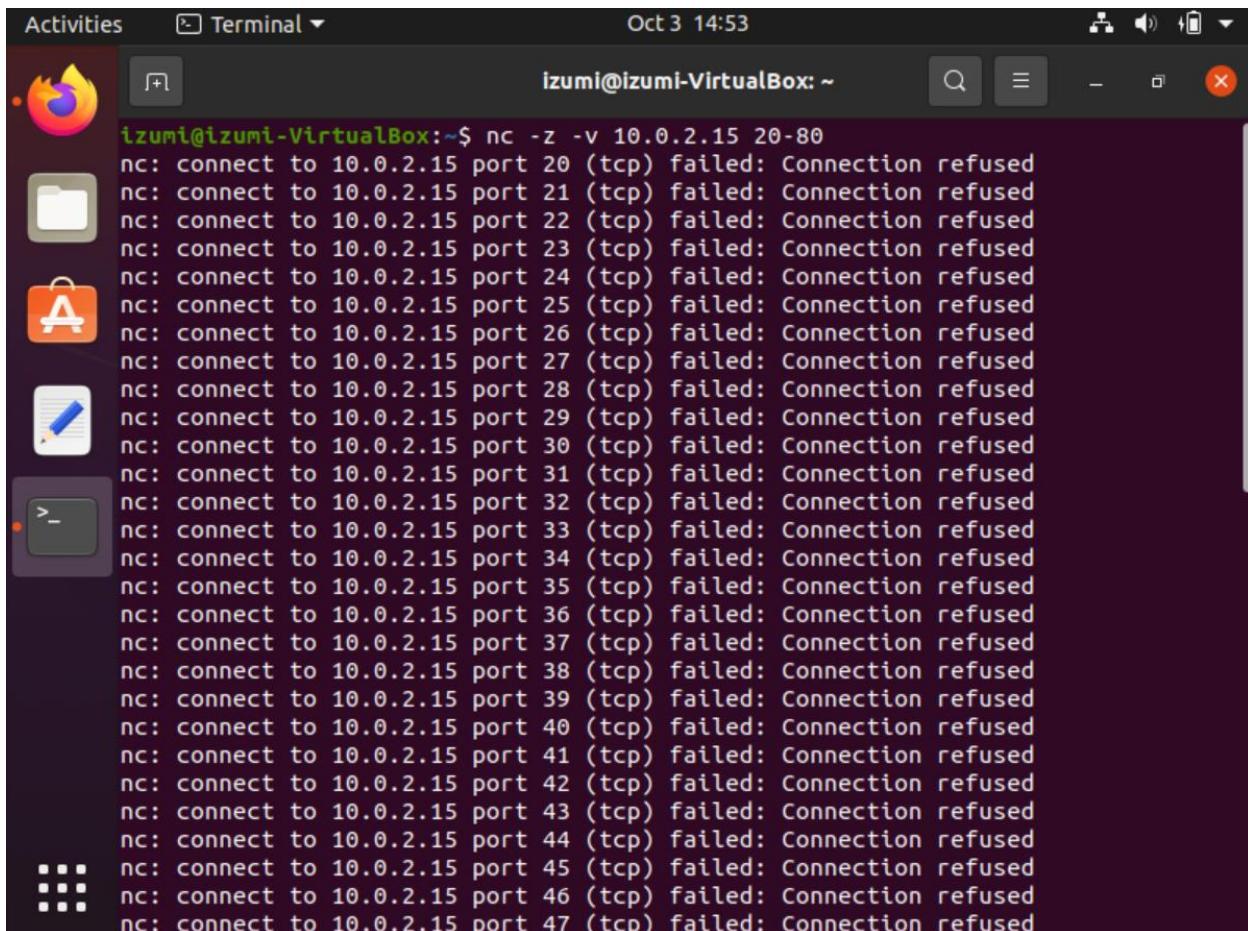
```
izumi@izumi-VirtualBox:~$ sudo apt-get install wireshark
[sudo] password for izumi:
Reading package lists... Done
Building dependency tree
Reading state information... Done
The following additional packages will be installed:
libc-ares2 libdouble-conversion3 libpcre2-16-0 libqt5core5a libqt5dbus5
libqt5gui5 libqt5multimedia5 libqt5multimedia5-plugins
libqt5multimeddiagsttools5 libqt5multimedawidgets5 libqt5network5
libqt5opengl5 libqt5printsupports5 libqt5svg5 libqt5widgets5 libsmi2ldbl
libspandsp2 libssh-gcrypt-4 libwireshark-data libwireshark13 libwiretap10
libwsutil11 libxcb-xinerama0 libxcb-xinput0 qt5-gtk-platformtheme
qttranslations5-l10n wireshark-common wireshark-qt
Suggested packages:
qt5-image-formats-plugins qtwayland5 snmp-mibs-downloader geoipupdate
geoip-database geoip-database-extra libjs-leaflet
libjs-leaflet.markercluster wireshark-doc
The following NEW packages will be installed:
libc-ares2 libdouble-conversion3 libpcre2-16-0 libqt5core5a libqt5dbus5
libqt5gui5 libqt5multimedia5 libqt5multimedia5-plugins
libqt5multimeddiagsttools5 libqt5multimedawidgets5 libqt5network5
libqt5opengl5 libqt5printsupports5 libqt5svg5 libqt5widgets5 libsmi2ldbl
libspandsp2 libssh-gcrypt-4 libwireshark-data libwireshark13 libwiretap10
libwsutil11 libxcb-xinerama0 libxcb-xinput0 qt5-gtk-platformtheme
qttranslations5-l10n wireshark wireshark-common wireshark-qt
0 upgraded, 29 newly installed, 0 to remove and 336 not upgraded.
Need to get 32.8 MB of archives.
After this operation, 163 MB of additional disk space will be used.
Do you want to continue? [Y/n]
```

Sudo dpkg-reconfigure wireshark-common

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



Netcat



A screenshot of an Ubuntu desktop environment. On the left is a dock with icons for the Dash, Home, Activities, Terminal, and several application windows. The terminal window is open and shows the command:

```
izumi@izumi-VirtualBox:~$ nc -z -v 10.0.2.15 20-80
```

The output of the command is a series of failed connection attempts to ports 20 through 47 on the host 10.0.2.15, all resulting in "Connection refused".

```
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
nc: connect to 10.0.2.15 port 46 (tcp) failed: Connection refused
nc: connect to 10.0.2.15 port 47 (tcp) failed: Connection refused
```

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

Code:

```
#!/bin/bash
echo Enter Details
echo -++++-+-
echo Enter name:
read name
echo Enter college name:
read college
clear
echo Details
echo -++-+-
echo Name: $name
echo College: $college
```

Output:

```
izumi@izumi-VirtualBox:~/Desktop/shell$ bash 1.sh
Enter Details
-++++-+-
Enter name:
Abhishek Scariya M B
Enter college name:
Amal Jyothi College of Engineering
```

```
Details
-++-+-
Name: Abhishek Scariya M B
College: Amal Jyothi College of Engineering
izumi@izumi-VirtualBox:~/Desktop/shell$
```

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

Code:

```
#!/bin/bash
echo Display the value of a variable
echo ++++++-----+
a=11
echo $a
```

Output:

```
izumi@izumi-VirtualBox:~/Desktop/shell$ bash 2.sh
Display the value of a variable
+++++-----+
11
```

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

Code:

```
#!/bin/bash
echo Arithmetic Operations
echo ++++++-----+
opr=0
echo Read a number:
read a
echo Read another number:
read b
while [ $opr -ne 5 ]
do
echo Choose an operation:
printf "\n1.Addition\n2.Subtraction\n3.Multiplication\n4.Division\n5.Exit\nChoice :"
read opr
case $opr 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));;  
5)break  
esac  
done
```

Output:

```
izumi@izumi-VirtualBox:~/Desktop/shell$ bash 3.sh  
Arithmetic Operations  
+++++-----  
Read a number:  
12  
Read another number:  
11  
Choose an operation:  
  
1.Addition  
2.Subtraction  
3.Multiplication  
4.Division  
5.Exit  
Choice:3  
a*b=132  
Choose an operation:  
  
1.Addition  
2.Subtraction  
3.Multiplication  
4.Division  
5.Exit  
Choice:5  
izumi@izumi-VirtualBox:~/Desktop/shell$ █
```

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

Code:

```
echo "Finding a number"  
echo +--+---+---+  
echo Enter a number:
```

```
read a
if [ $a == 10 ];then
echo "Number found!"
else
echo "Number not found!"
fi
```

Output:

```
izumi@izumi-VirtualBox:~/Desktop/shell$ bash 4.sh
Finding a number
+++++-
Enter a number:
10
Number found!
izumi@izumi-VirtualBox:~/Desktop/shell$ bash 4.sh
Finding a number
+++++-
Enter a number:
12
Number not found!
izumi@izumi-VirtualBox:~/Desktop/shell$
```

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

Code:

```
echo "Time and calendar"
echo +---+---+---+---+
echo "Today is $(date)"
echo "Calendar:-"
cal
```

Output:

```
izumi@izumi-VirtualBox:~/Desktop/shell$ bash 5.sh
Time and calendar
+---+---+---+---+---+
Today is Saturday 02 October 2021 05:31:50 PM IST
Calendar:-
    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.

Code:

```
echo Odd or Even?
echo Enter number
read a
if [ $(($a%2)) -eq 0 ];then
echo It is even!
else
echo It is odd!
fi
```

Output:

```
izumi@izumi-VirtualBox:~/Desktop/shell$ bash 6.sh
Odd or Even?
Enter number
12
It is even!
izumi@izumi-VirtualBox:~/Desktop/shell$ bash 6.sh
Odd or Even?
Enter number
13
It is odd!
izumi@izumi-VirtualBox:~/Desktop/shell$
```

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

Code:

```
echo Enter a number
read a
echo Enter another number
read b
if [ $a -lt $b ];then
echo $a is lesser than $b
elif [ $a -gt $b ];then
echo $a is greater than $b
else
echo They are equal
fi
```

Output:

```
izumi@izumi-VirtualBox:~/Desktop/shell$ bash 7.sh
Enter a number
12
Enter another number
13
12 is lesser than 13
izumi@izumi-VirtualBox:~/Desktop/shell$ bash 7.sh
Enter a number
13
Enter another number
12
13 is greater than 12
izumi@izumi-VirtualBox:~/Desktop/shell$ bash 7.sh
Enter a number
12
Enter another number
12
They are equal
```

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

Code:

```
s=0
for (( i=1;i<=10;i++ ))
do
s=`expr $s + $i`
done
echo Sum of first 10 numbers is $s
```

Output:

```
izumi@izumi-VirtualBox:~/Desktop/shell$ bash 8.sh
Sum of first 10 numbers is 55
```

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

Code:

```
echo Enter 4 numbers
read a
read b
read c
read d
s=$((a+b+c+d))
prod=$((a * b * c * d))
avg=$(echo $s/4 | bc -l)
echo Sum is $s
echo Product is $prod
echo Average is $avg
```

Output:

```
izumi@izumi-VirtualBox:~/Desktop/shell$ bash 9.sh
Enter 4 numbers
1
2
3
4
Sum is 10
Product is 24
Average is 2.50000000000000000000000000000000
izumi@izumi-VirtualBox:~/Desktop/shell$
```

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

Code:

```
echo Enter 3 numbers:
read a
read b
read c
if [ $a -lt $b ];then
if [ $a -lt $c ];then
echo $a is the smallest
else
echo $c is the smallest
fi
elif [ $b -lt $c ];then
echo $b is the smallest
else
echo $c is the smallest
fi
```

Output:

```
izumi@izumi-VirtualBox:~/Desktop/shell$ bash 10.sh
Enter 3 numbers:
1
2
34
1 is the smallest
```

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

Code:

```
echo Enter a number
read a
f=1
while((a>0))
do
f=$((a*f))
a=$((a-1))
done
echo Factorial is $f
```

Output:

```
izumi@izumi-VirtualBox:~/Desktop/shell$ bash 11.sh
Enter a number
6
Factorial is 720
izumi@izumi-VirtualBox:~/Desktop/shell$ █
```

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

Code:

```
echo Enter a number:
read a
rev=$(echo $a| rev)
if [ $a -eq $rev ];then
echo It is palindrome!
else
echo "It isn't Palindrome!"
fi
```

Output:

```
izumi@izumi-VirtualBox:~/Desktop/shell$ bash 12.sh
Enter a number:
12321
It is palindrome!
izumi@izumi-VirtualBox:~/Desktop/shell$ bash 12.sh
Enter a number:
123
It isn't Palindrome!
izumi@izumi-VirtualBox:~/Desktop/shell$
```

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

Code:

```
echo Enter size:
read n
echo Enter $n numbers:
s=0
for((i=0;i<n;i++))
{
    read a
    s=$((s+$a))
}
avg=$(echo $s/$n |bc -l)
echo Average is $avg
```

Output:

```
izumi@izumi-VirtualBox:~/Desktop/shell$ bash 13.sh
Enter size:
4
Enter 4 numbers:
2
7
4
6
Average is 4.750000000000000
izumi@izumi-VirtualBox:~/Desktop/shell$ █
```

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

Code:

```
echo Enter a number:  
read n  
r=0  
s=0  
while((n>0))  
do  
r=$((n%10))  
n=$((n/10))  
s=$((s+r))  
done  
echo Sum of digits is $s
```

Output:

```
izumi@izumi-VirtualBox:~/Desktop/shell$ bash 14.sh  
Enter a number:  
12345  
Sum of digits is 15  
izumi@izumi-VirtualBox:~/Desktop/shell$ █
```

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

Code:

```
echo Enter a year:  
read y  
a=$((y%400))  
if [ $a -eq 0 ];then  
echo It is a leap year  
exit  
fi  
a=$((y%100))
```

```
b=$((y%4))
if [ $a -ne 0 ] && [ $b -eq 0 ];then
echo It is a leap year
else
echo It is not a leap year
fi
```

Output:

```
izumi@izumi-VirtualBox:~/Desktop/shell$ bash 15.sh
Enter a year:
2020
It is a leap year
izumi@izumi-VirtualBox:~/Desktop/shell$ bash 15.sh
Enter a year:
2000
It is a leap year
izumi@izumi-VirtualBox:~/Desktop/shell$ bash 15.sh
Enter a year:
1996
It is a leap year
izumi@izumi-VirtualBox:~/Desktop/shell$ bash 15.sh
Enter a year:
1997
It is not a leap year
izumi@izumi-VirtualBox:~/Desktop/shell$ █
```