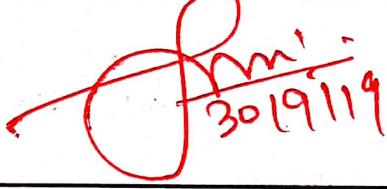
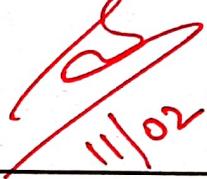


PERFORMANCE

Term	Remarks	Staff Member's Signature
I	<u>Completed</u> <u>Credit</u>	 30/9/119
II	Completed	 11/02

★ ★ INDEX ★ ★

No.	Title	Page No.	Date	Staff Member's Signature
1)	a) Install your choice of Linux Distribution e.g. Ubuntu, Fedora, Debian	33	5/12/19	
	b) customize desktop environment by changing default options like changing default background, themes, screensavers.			
2)	Installing and removing software	39	12/12/19	
3)	Utilization of grep, man commands	41	19/12/19	BP/03
4)	Command Line operations	44	19/12/19	BP/03
5)	File operations	47	2/01/20	
6)	User Environment	49	9/1/20	
7)	Linux Editors : Vi	52	9/1/20	
8)	Linux Security	54	16/1/20	BP/03
9)	Network Management	55	23/1/20	BP/03
10)	SHELL SCRIPTING	57	6/2/20	BP/02

Aim: Install your choice of Linux Distribution
e.g. Ubuntu, Fedora, Debian.

Ubuntu: Ubuntu is a free and open source software based on debian. Ubuntu is officially released under 3 editions: Desktop, server, union.

All the editions can be runned on the computer alone or a virtual box machine.

It is a popular open source software for cloud computing with support of openstack.

Steps for installing ubuntu in a virtual machine:

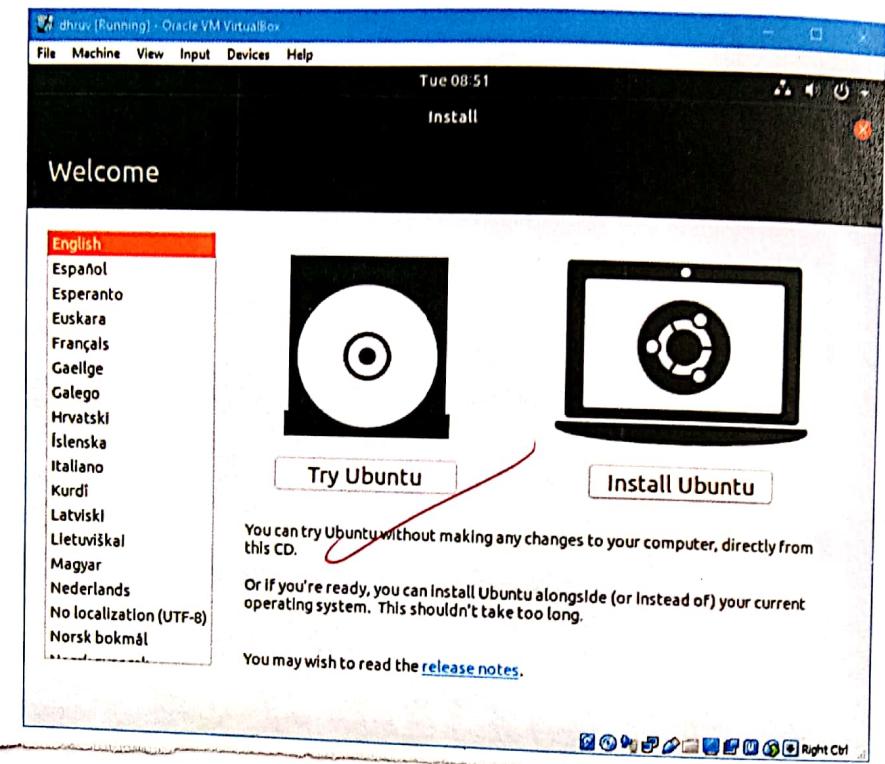
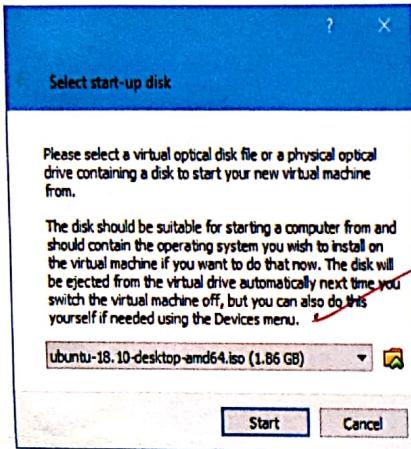
Step 1: Select a virtual optical file on a physical drive to start ubuntu in your virtual machine. Space given to it is 1.86 GB.

Step 2: Select the language of your choice and click on 'Install Ubuntu'. You can also 'try ubuntu' for free on computer device from this CD.

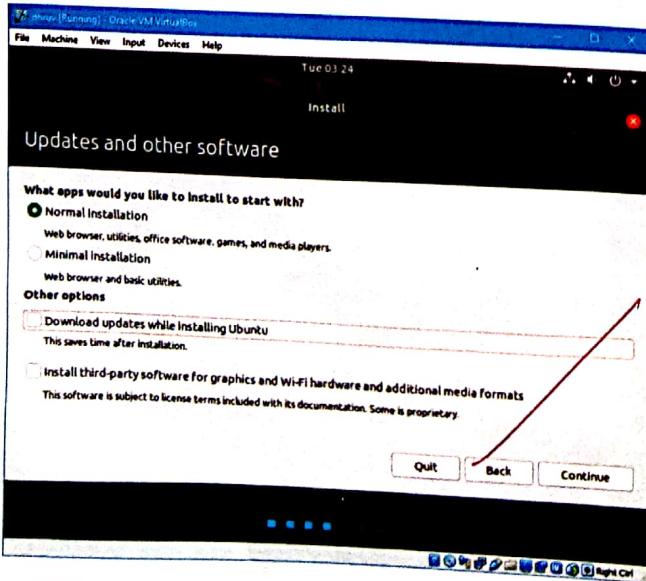
Step 3: In 'updates and add software' click on the normal installation.

Step 2

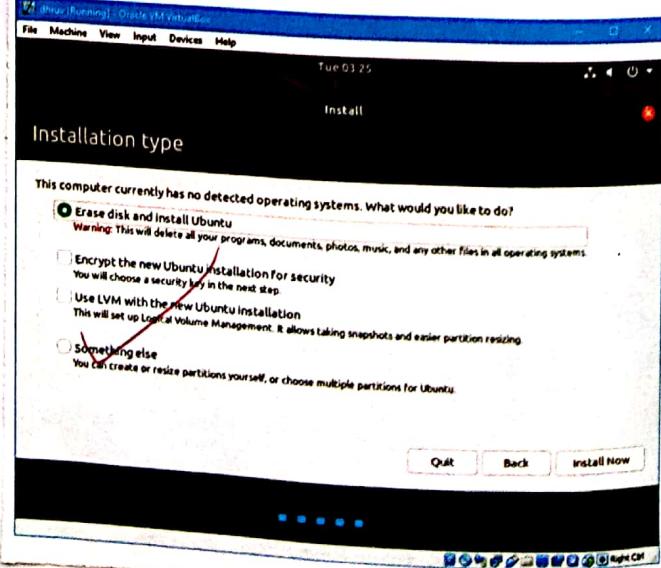
Step 1



Step3



step 4



68

Step 4: While configuring installation type we need to click 'Erase disk and install ubuntu'. This step would delete all types of documents, photos, etc in all operating systems.

Step 5: In this you only need to choose the location for the clock to work on ubuntu.

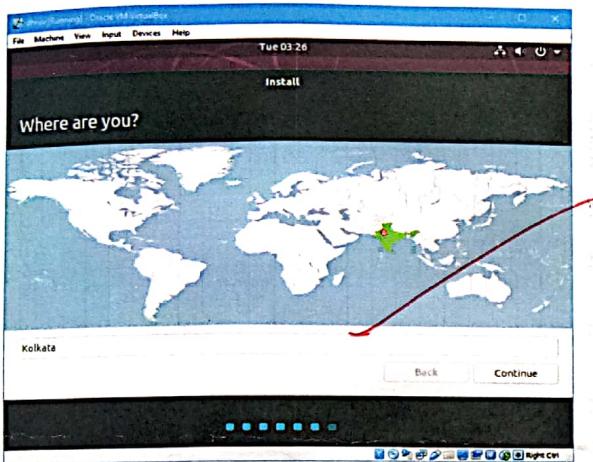
Step 6: In this type you need to choose username and password for the login in ubuntu and then click on continue.

Step 7: Here you simply need to type password again and it is done.

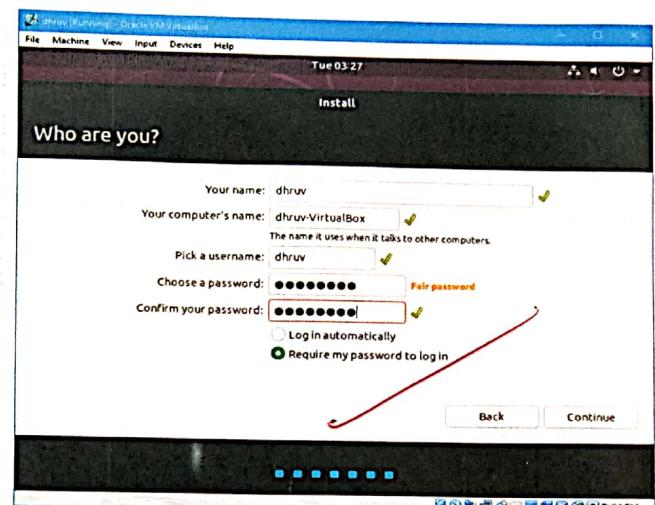
Step 8: Type name of virtual disk and recommend size to be given is 2048 GB or 2TB.

Therefore, now the virtualbox is ready to use

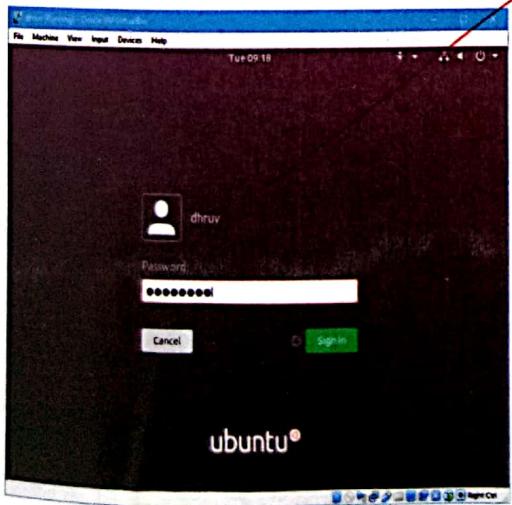
Step5



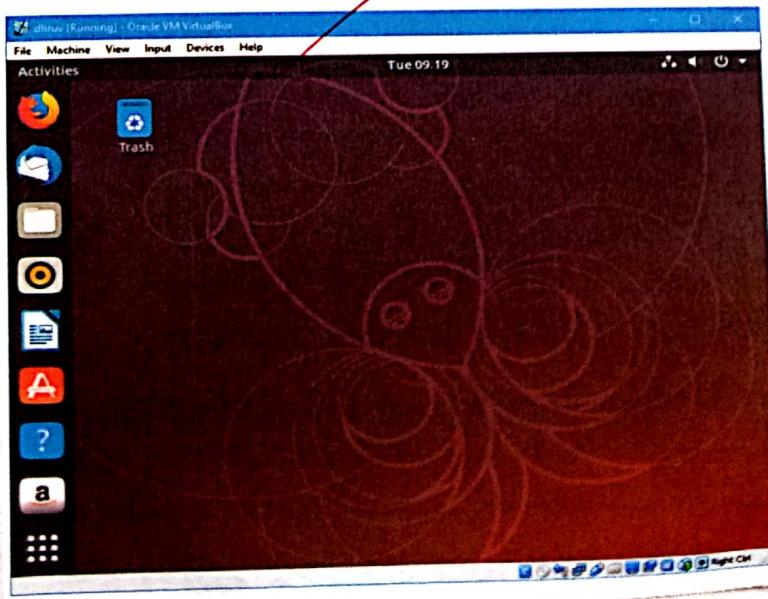
step6



Step7



step 8



- b) Customize desktop environment by changing different default options like changing default background, themes, screensavers.

Accessing Appearance Settings:

- 1) To access Appearance settings in Ubuntu, let's click on User menu at the top right corner, on the top menu bar and select system settings.
- 2) A window will pop-up with All settings divided into Personal, Hardware and System options icons. Let's first select the appearance icon.

Changing Wallpaper picture:

- 1) On the left side of Background part, you can see your current wallpaper.
- 2) On the right side is part where we can select one of Ubuntu wallpapers. Clicking on any thumbnail our wallpaper will be changed right away, with a fading effect.
- 3) If you want to select wallpaper from your Picture folder, click the drop-down menu above thumbnails and select the Pictures Folder.

Install

Welcome to Ubuntu 14.04

Fast and full of new features, the latest version of Ubuntu makes computing easier than ever. Here are just a few cool new things to look out for...



Next >

▶ Installing system

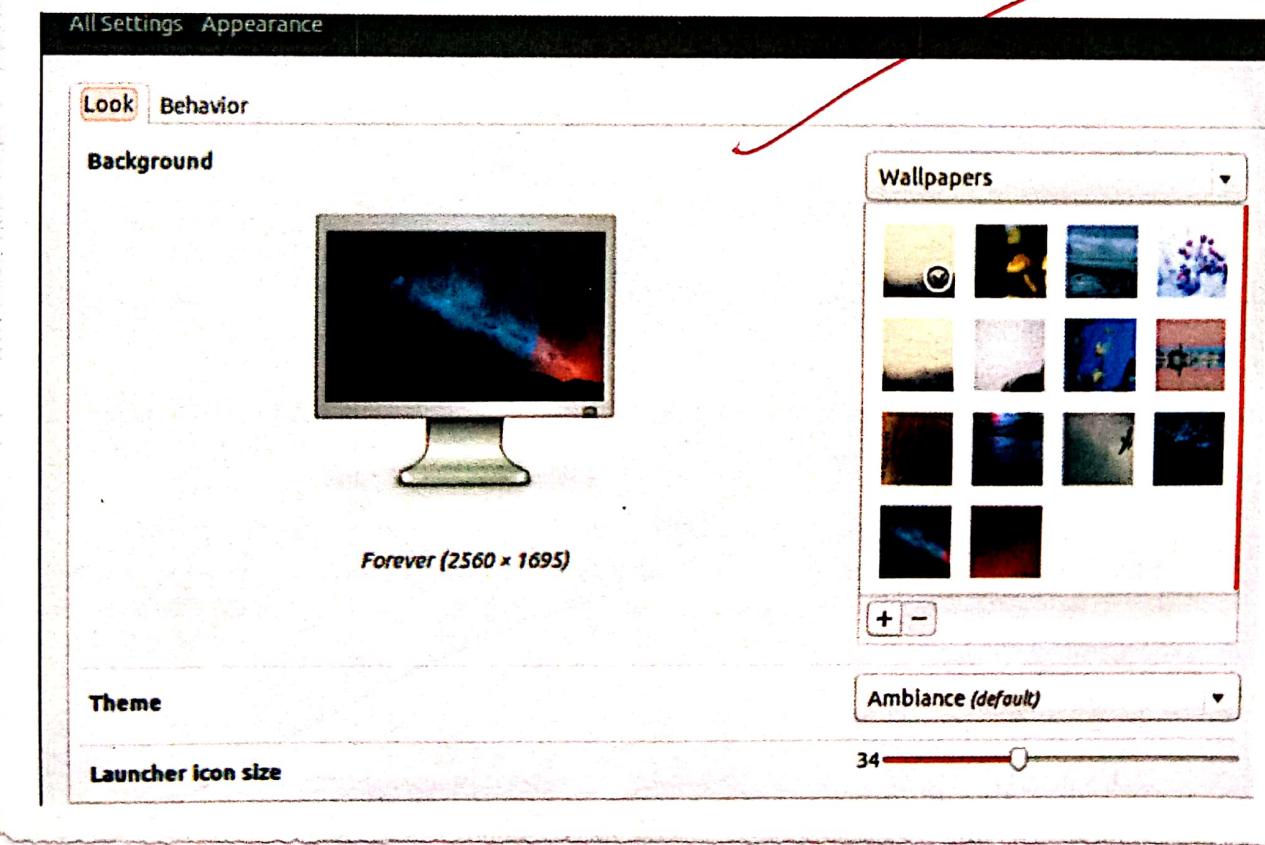
Skip

- w) You will see all the pictures in your Pictures folder as thumbnails, where you can select them as your wallpaper.

To add wallpaper that is in another folder, just click the plus icon ~~be~~ below the thumbnails and then in pop-up window, select the path to our custom folder and choose the picture inside of it.

• Changing Ubuntu Theme:

- i) Ubuntu also has an option to change the Desktop theme, which in one click will change the entire way your computer looks.
- 2) To do that, click on the drop-down menu below the wallpaper thumbnails, and choose between Ambiance, Radiance or High contrast.
- 3) Ambiance is a light theme that looks a bit more Mac-like, while Radiance is the darker brown theme used in Ubuntu by default.



c) Screen Resolution : Ascertain the current screen resolution for your desktop.

Changes the size or rotation of the screen:

- 1) You can change how big (or how detailed) things appear on the screen by changing the screen resolution.
- 2) You can change which way up things appear (for example, if you have a rotating display) by changing the rotation.
- 3) Click the icon on the very right of the menu bar and select system settings.
- 4) Open screen display.
- 5) If you have multiple displays and they are not mirrored, you can have different settings on each display. Select a display in the preview area.
- 6) Select your desired resolution and rotation.
- 7) Click Apply. The new settings will be applied for 30 seconds before reverting back. That way, if you cannot see anything with the new...

Q8.

- d) Time settings change the time zone ~~to~~ of your system to (or New York Time)
- 1) If ~~you~~ you are currently in Indian Time. How does the displayed time change?
- 2) After noting the time change, change the time zone back to your local time zone.
- 3) Just click on the clock on the top bar, and choose time and Date Settings, once the Time and Date window opens, choose Manually, so you can change the time and date manually; otherwise choose your time zone from the map, and choose Automatic.

✓
Q8

Aim: Installing and removing software.

- a) Install gcc package, verify that it runs and then remove it.

Step 1: First type 'gcc-v' to know if you have already installed gcc compiler or not. If the output is blank then it means that you don't have gcc installed.

Step 2: Type 'sudo apt-get install gcc'. After typing the following command installation will take place.

Step 3: Type 'sudo apt-get install build-essential'. This will install all the libraries required for C and C++ programming language.

88.

How to Uninstall GCC compiler?

In GCC 5.1.0, although there is no top level uninstall target, some directories do have it, in particular gcc, so you can do:

Type: cd build/gcc

sudo make uninstall

This does not remove everything that was installed, but it removes major executables like gcc, g++, cpp... contained in that directory.

88
030

Aim: Utilization of grep , man commands

Documentation :

- a) Find info documentation from the command line : bring up the info page for the grep command . Bring up the usage section.

Ans: To find ^{info} about any command 'info' command is used. The syntax of info command is "info (command name)".

we are going to find the info about the 'grep' command :

open the terminal (ctrl + Alt + T) and type : info grep;

After typing this command following output will be displayed onto your screen:

You can also scroll through pages using (space=up) & (backspace = down) keys.

Another more summarized form of showing info is the 'man' command . The command is same as 'info' , but required data.

TAR(1)

NAME

tar - an archiving utility

SYNOPSIS

Traditional usage

tar { A | C | d | r | t | u | x } [GNUWUWOPSMBio]

UNIX-style usage

tar -A[OPTIONS] ARCHIVE ARCHIVE

tar -c [-f ARCHIVE] [OPTIONS] [FILE...]

tar -d [-f ARCHIVE] [OPTIONS] [FILE...]

tar -f [-f ARCHIVE] [OPTIONS] [FILE...]

tar -r [-f ARCHIVE] [OPTIONS] [FILE...]

tar -u [-f ARCHIVE] [OPTIONS] [FILE...]

tar -x [-f ARCHIVE] [OPTIONS] [FILE...]

GNU-style usage:

tar { --catenate | ... [concatenate] } [OPTIONS] ARCHIVE ARCHIVE

tar --create [-f ARCHIVE] [OPTIONS] [FILE...]

tar { --diff | ... [compare] } [-f ARCHIVE] [OPTIONS] [FILE...]

tar --delete [-f ARCHIVE] [OPTIONS] [MEMBER...]

b) Finding man pages from the cmd line.
Bring up the man page for the 'ls' command. scroll down to the examples section.

Ans) To use the 'man' command simply type 'man (command name)'.
Now we are going to find all the manual for 'ls' command.
simply type : 'man ls'

c) Finding man pages by topic. what man pages are available that document file compression.

Ans) 'tar', 'zip' are some man pages which are available for document file compression. simply type : man zip.

d) Find man pages by section from the cmd line bring up the man page for the printf lib. function. which manual pages section are library function found.

Ans) The number corresponds to what section of the manual page is from; 1 is user command, while 8 is sysadmin stuff.
The man page for man itself explain it and list the std one.

ZIP(1)**NAME****zip** - package and compress (archive) files**SYNOPSIS****zip [-aABcdDeEf.FghjklLmqrRSTUvVwxyz1@\\$]****zipcloak** (see separate man page)**zipnote** (see separate man page)**zipsplit** (see separate man page)

Note! Command line processing in zip has been changed to support long options and handle all options and arguments more consistently. Some old command lines that depend on command line inconsistencies may no longer work.

*** MANUAL SECTIONS**

The standard sections of the manual include:

- 1 User Commands
- 2 System Calls
- 3 C Library Functions
- 4 Devices and Special Files
- 5 File Formats and Conventions
- 6 Games et. al.
- 7 Miscellanea
- 8 System Administration Tools and Daemons

Distributions customize the manual section to their specifics, which often include additional sections.

\$

man printf

\$ man 1 printf

\$ man 3 printf

\$ man -a printf

\$ man -k 'printf'

printf (1) - format and print data

printf (1p) - write formatted output

printf (3) - formatted output conversion

printf (3p) - print formatted output

printf [builtins] (1) - bash built-in commands, see bash

There are certain terms that have different pages in different sections (e.g. "printf" as a command appears in section 3); in cases like that you can pass the section no. to the man before the page name to choose which one you want or use man -a to show every matching page in a row.

You can tell what section a term falls in with "man-k" (equivalent to apropos command). It will do substring matches too, so you need to use "term" to limit it.

- e) command-line Help: List the available options for the mkdir command. How can you do this?

~~\$ mkdir -m a=rwx directoryname~~

~~03/01~~

command line operations

a) Install new package on your system.

`sudo apt-get install (package name)`

b) Remove the package installed.

`sudo apt-get remove (package name)`

c) Find the `passwd` file in / using `find` command.

✓ # `find -name passwd`

- `/usr/share/doc/nss-ldap-2.8.1/pam.d/passwd`

- `/usr/bin/passwd`

- `/etc/pam.d/passwd`

- `/etc/passwd`

i) find the ~~directory~~ `passwd` file under root and one level down.

`find -maxdepth 2 -name passwd`

- `/etc/passwd`

ii) find the password file under root and 2 level down.

```
# find / -maxdepth 3 -name password
```

- /usr/bin/password
- /etc/pam.d/password
- /etc/password

iii) find the password file b/w ~~each~~ sub-directories level 2 & 4.

```
# find -maxdepth 3 -maxdepth 5 -name password
```

- /usr/bin/password
- /etc/pam.d/password

d) Create a symbolic link to the file you found in last step.

```
# ln -s file1 file2
```

e) Create an empty file example.txt & move it to /tmp directory using relative path name.

```
# touch example.txt
```

```
# mv example.txt /tmp
```

f) delete the file moved to /tmp in previous step by absolute method.

```
# rm /tmp/example.txt
```

g) find the location of ls, ps, bash commands.

```
# whereis ls
```

```
ls: /bin/ls/usr/share/man/man1/ls.1.gz
```

```
# whereis ps
```

```
ps: /bin/ps/usr/share/maps,/bin/ps/usr/share/  
man/man1/ps.1.gz
```

```
# whereis bash
```

```
bash: /bin/bash/etc/bashrc/usr/share/  
man/man1/bash.1.gz
```

87
88
89

File Operations :

- 1) Explore mounted file systems on your computer.

Ans: `df -h`

```
jeba@jeba-VirtualBox:~$ df -h
Filesystem      1K-blocks   Used Available Use% Mounted on
udev                  494436      0    494436   0% /dev
tmpfs                 102416   3676     98740   4% /run
/dev/sda1             7092728 3383372   3326024  51% /
tmpfs                 512076    216    511860   1% /dev/shm
tmpfs                  5120       4      5116   1% /run/lock
tmpfs                 512076      0    512076   0% /sys/fs/cgroup
tmpfs                 102416     48    102368   1% /run/user/1000
jeba@jeba-VirtualBox:~$
```

- 2) What are the different ways of exploring mounted file systems on Linux?

Ans) `mount`

```
jeba@jeba-VirtualBox:~$ mount
sysfs on /sys type sysfs (rw,nosuid,nodev,noexec,relatime)
proc on /proc type proc (rw,nosuid,nodev,noexec,relatime)
udev on /dev type devtmpfs (rw,nosuid,relatime,size=494436k,nr_inodes=123609,mode=755)
devpts on /dev/pts type devpts (rw,nosuid,noexec,relatime,gid=5,mode=620,ptmxmode=000)
tmpfs on /run type tmpfs (rw,nosuid,noexec,relatime,size=102416k,mode=755)
/dev/sda1 on / type ext4 (rw,relatime,errors=remount-ro,data=ordered)
securityfs on /sys/kernel/security type securityfs (rw,nosuid,nodev,noexec,relatime)
tmpfs on /dev/shm type tmpfs (rw,nosuid,nodev)
tmpfs on /run/lock type tmpfs (rw,nosuid,nodev,noexec,relatime,size=5120k)
cgroup on /sys/fs/cgroup type tmpfs (ro,nosuid,nodev,noexec,mode=755)
cgroup on /sys/fs/cgroup/systemd type cgroup (rw,nosuid,nodev,noexec,relatime,xattr,release_agent=/lib/systemd/systemd-cgroups-agent,name=systemd,nsroot=/)
pstore on /sys/fs/pstore type pstore (rw,nosuid,nodev,noexec,relatime)
cgroup on /sys/fs/cgroup/cpuset type cgroup (rw,nosuid,nodev,noexec,relatime,cpuset,nsroot=/)
cgroup on /sys/fs/cgroup/net_cls,net_prio type cgroup (rw,nosuid,nodev,noexec,relatime,net_cls,net_prio,nsroot=/)
cgroup on /sys/fs/cgroup/pids type cgroup (rw,nosuid,nodev,noexec,relatime,pids,nsroot=/)
cgroup on /sys/fs/cgroup/freezer type cgroup (rw,nosuid,nodev,noexec,relatime,freezer,nsroot=/)
cgroup on /sys/fs/cgroup/cpu,cpuacct type cgroup (rw,nosuid,nodev,noexec,relatime,cpu,cpuacct,nsroot=/)
cgroup on /sys/fs/cgroup/devices type cgroup (rw,nosuid,nodev,noexec,relatime,devices,nsroot=/)
cgroup on /sys/fs/cgroup/memory type cgroup (rw,nosuid,nodev,noexec,relatime,memory,nsroot=/)
cgroup on /sys/fs/cgroup/blkio type cgroup (rw,nosuid,nodev,noexec,relatime,blkio,nsroot=/)
cgroup on /sys/fs/cgroup/perf_event type cgroup (rw,nosuid,nodev,noexec,relatime,perf_event,nsroot=/)
cgroup on /sys/fs/cgroup/hugetlb type cgroup (rw,nosuid,nodev,noexec,relatime,hugetlb,nsroot=/)
systemd-1 on /proc/sys/fs/binfmt_misc type autofs (rw,relatime,fd=32,pgrp=1,timeout=0,minproto=3,maxproto=5,direct)
hugetlbfs on /dev/hugepages type hugetlbf (rw,relatime)
```

3) Copying text from files.

Ans: cp command , mv command

```
jeba@jeba-VirtualBox:~$ ls
Desktop    Downloads    [jeb]  Music    Public    Templates    Videos
Documents  examples.desktop  jj  Pictures
jeba@jeba-VirtualBox:~$ cd jeb
jeba@jeba-VirtualBox:~/jeb$ cat .gg.txt
cat: .gg.txt: No such file or directory
jeba@jeba-VirtualBox:~/jeb$ cat gg.txt
cat: gg.txt: No such file or directory
jeba@jeba-VirtualBox:~/jeb$ cat >gg.txt
welcome
Linux
^C
jeba@jeba-VirtualBox:~/jeb$ touch dd.txt
jeba@jeba-VirtualBox:~/jeb$ ls
dd.txt  gg.txt
jeba@jeba-VirtualBox:~/jeb$ cp gg.txt dd.txt
jeba@jeba-VirtualBox:~/jeb$ cat gg.txt
welcome
Linux
jeba@jeba-VirtualBox:~/jeb$ cat dd.txt
welcome
Linux
jeba@jeba-VirtualBox:~/jeb$ █
```

```
jeba@jeba-VirtualBox:~/jeb$ touch ss.txt
jeba@jeba-VirtualBox:~/jeb$ mv gg.txt ss.txt
jeba@jeba-VirtualBox:~/jeb$ cat gg.txt
cat: gg.txt: No such file or directory
jeba@jeba-VirtualBox:~/jeb$ cat ss.txt
welcome
Linux
jeba@jeba-VirtualBox:~/jeb$ █
```

ii) Achieving and backup the work directory using tar, gzip and bzip2 commands.

Ans: gzip filename.txt

Bzip2 filename.txt

```
jeba@jeba-VirtualBox:~/jeb$ bzip2 ss.txt
jeba@jeba-VirtualBox:~/jeb$ ls
dd.txt ss.txt.bz2
jeba@jeba-VirtualBox:~/jeb$ cat ss.txt.bz2
BZh91AY&SY`+-----+
'JowS**#1 jeba@jeba-VirtualBox:~/jeb$ gzip dd.txt
jeba@jeba-VirtualBox:~/jeb$ ls
dd.txt.gz ss.txt.bz2
jeba@jeba-VirtualBox:~/jeb$ cat dd.txt.gz
*-----d.txt+0*I**M*****+**Xzjeba@jeba-VirtualBox:-
```

5) Use diff command to create diff of two files.

Ans: cliff filename1 filename2

```
jeba@jeba-VirtualBox:~/jeb$ ls
dd.txt.gz  ss.txt.bzz
jeba@jeba-VirtualBox:~/jeb$ cat >aa.txt
hello world
^C
jeba@jeba-VirtualBox:~/jeb$ cat >bb.txt
this is linux^C
jeba@jeba-VirtualBox:~/jeb$ diff aa.txt bb.txt
1d0
< hello world
jeba@jeba-VirtualBox:~/jeb$ cat >bb.txt
this is Linux
^C
jeba@jeba-VirtualBox:~/jeb$ diff aa.txt bb.txt
1c1
< hello world
---
> this is Linux
jeba@jeba-VirtualBox:~/jeb$ gzip aa.txt
jeba@jeba-VirtualBox:~/jeb$ gzip bb.txt
jeba@jeba-VirtualBox:~/jeb$ diff aa.txt.gz bb.txt.gz
Binary files aa.txt.gz and bb.txt.gz differ
```

6) Use patch command to patch a file. And analyze the patch using patch command again.

```
jeba@jeba-VirtualBox:~/jeb$ cat >hi.txt
hi
hi
hi
^C
jeba@jeba-VirtualBox:~/jeb$ cat >hii.txt
hello
hello
hello
^C
jeba@jeba-VirtualBox:~/jeb$ diff -u hi.txt hii.txt >sam.patch
jeba@jeba-VirtualBox:~/jeb$ patch ,sam.patch
^C
jeba@jeba-VirtualBox:~/jeb$ patch <sam.patch
patching file hi.txt
jeba@jeba-VirtualBox:~/jeb$ cat sam.patch
--- hi.txt      2020-01-08 22:14:55.463569834 +0530
+++ hii.txt     2020-01-08 22:15:16.259898738 +0530
@@ -1,3 +1,3 @@
-hi
-hi
-hi
+hello
+hello
+hello
```

Use Environment :

- a) which account you are logged in? How do you find out?

Ans: who command & ~~whoami~~

```
jeba@jeba-VirtualBox:~$ who
jeba    tty7          2020-01-15 20:32 (:0)
jeba@jeba-VirtualBox:~$ whoami
jeba
jeba@jeba-VirtualBox:~$ who -l
LOGIN   tty1          2020-01-15 20:30          780 id=tty1
```

```
jeba@jeba-VirtualBox:~$ w
20:35:04 up 4 min, 1 user, load average: 0.70, 0.79, 0.38
USER      TTY      FROM          LOGIN@     IDLE     JCPU      PCPU WHAT
jeba      tty7      :0          20:32      4:28    8.19s  0.33s /sbin/upstart -
jeba@jeba-VirtualBox:~$ w -s
20:35:14 up 4 min, 1 user, load average: 0.60, 0.77, 0.37
USER      TTY      FROM          IDLE WHAT
jeba      tty7      :0          4:38   /sbin/upstart --user
jeba@jeba-VirtualBox:~$ w -h
jeba      tty7      :0          20:32      4:44    8.67s  0.33s /sbin/upstart -
jeba@jeba-VirtualBox:~$ w -f
20:36:12 up 5 min, 1 user, load average: 0.41, 0.69, 0.37
USER      TTY      LOGIN@     IDLE     JCPU      PCPU WHAT
jeba      tty7      20:32      5:36    9.00s  0.33s /sbin/upstart --user
```

- b) Display /etc/shadow file using cat command and understand the importance of shadow file. How it's different than passwd file.

Ans: cat /etc/shadow

As with the passwd file ; each field in the shadow file is also separated with ":" colon characters, and are as follows:-

- Username , up to 8 characters , case-sensitive , usually , all lowercase . A direct match to the username in the /etc/passwd file.
- Password , 13 character encrypted . A blank entry (e.g. ::) indicates a password is not required to log in (usually a bad idea) , and a "*" entry (e.g. *:) indicates the account has been disabled .
- The number of days (since January 1, 1970) since the password was last changed.
- The number of before password may be changed (0 indicates it may be changed at any time) .
- The number of days after which password must be changed (99999 indicates user can keep his or her password unchanged for many, many years)
- The number of days to warn user of an expiring password (7 for a full week)
- The number of days after password expires that account is disabled .
- The number of days January 1, 1970 that an account has been disabled.

- A reserve field for possible future use

```
jeba@jeba-VirtualBox:~$ sudo cat /etc/shadow
[sudo] password for jeba:
root:!$18240!0:99999:7:::
daemon!*:16911!0:99999:7:::
bin!*:16911!0:99999:7:::
sys!*:16911!0:99999:7:::
sync!*:16911!0:99999:7:::
games!*:16911!0:99999:7:::
man!*:16911!0:99999:7:::
lp!*:16911!0:99999:7:::
mail!*:16911!0:99999:7:::
news!*:16911!0:99999:7:::
```

Each field in a password entry is separated with ":", colon characters, and are as follows:

- username, up to 8 characters. Case-sensitive, usually all lowercase.
- An "x" in the password field. Passwords are stored in the "etc/shadow" file.
- Numeric user id. This is assigned by "adduser" script. Unix uses this field, plus the following group field, to identify which files belong to the user.
- Numeric group id. Red Hat uses group id's in a fairly unique manner for enhanced file security. Usually the group id will match the user id.
- full name of user. I'm not sure what the maximum length for this field is, but try to keep it reasonable (under 30 characters).
- User's home directory. Usually /home/username (e.g. /home/smithj). All user's personal files, web pages, mail forwarding, etc. will be stored here.

Q

- User's "shell account". Often set to " /bin/bash" to provide access to the bash shell (my personal favourite shell).

```
jeba@jeba-VirtualBox:~$ sudo cat /etc/passwd
root:x:0:0:root:/root:/bin/bash
daemon:x:1:1:daemon:/usr/sbin:/usr/sbin/nologin
bin:x:2:2:bin:/bin:/usr/sbin/nologin
sys:x:3:3:sys:/dev:/usr/sbin/nologin
sync:x:4:65534:sync:/bin:/sync
games:x:5:60:games:/usr/games:/usr/sbin/nologin
man:x:6:12:man:/var/cache/man:/usr/sbin/nologin
lp:x:7:7:lp:/var/spool/lpd:/usr/sbin/nologin
mail:x:8:8:mail:/var/mail:/usr/sbin/nologin
news:x:9:9:news:/var/spool/news:/usr/sbin/nologin
uucp:x:10:10:uucp:/var/spool/uucp:/usr/sbin/nologin
proxy:x:13:13:proxy:/bin:/usr/sbin/nologin
www-data:x:33:33:www-data:/var/www:/usr/sbin/nologin
backup:x:34:34:backup:/var/backups:/usr/sbin/nologin
list:x:38:38:Mailing List Manager:/var/list:/usr/sbin/nologin
```

C) Get your current working directory.

Ans: pwd

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

d) Explore different ways of getting command history, how to run previously executed command without typing it.

Ans: history

line number

```
jeba@jeba-VirtualBox:~$ history
1 who
2 whoami
3 who -l
4 clear
5 w
6 w -s
7 w -h
8 w -f
9 clear
10 cat /etc/shadow
11 sudo cat /etc/shadow
12 clear
13 sudo cat /etc/passwd
14 pwd
15 clear
16 history
jeba@jeba-VirtualBox:~$ !3
who -l
LOGIN    tty1      2020-01-15 20:30
jeba@jeba-VirtualBox:~$
```

780 id=tty1

e) Create alias to most commonly used commands.

Alias command instructs the shell to replace one string with another string while executing the commands.

Ans: alias label = "command"

```
jeba@jeba-VirtualBox:~$ alias m="mkdir new"
jeba@jeba-VirtualBox:~$ m
jeba@jeba-VirtualBox:~$ ls
Desktop  Downloads  jeb  Music  Pictures  Templates
Documents examples.desktop  jj  new  Public  Videos
jeba@jeba-VirtualBox:~$
```

Linux Editors : Vi

a) Create, modify, search and navigate a file in editor.

i) creating a file

To create a file, on the terminal type vi followed by filename.

ii) Modifying the file:

To modify a file, on the vi editor, type 'o'.

iii) Search in a file:

To find a word (forward search) press / followed by the word to search.

iv) Navigate:

Movement in four directions.

Key	Action
k	Moves cursor up
j	Moves cursor down
h	Moves cursor left
l	Moves cursor right

word Navigation ;

52

Key	Action
b	moves back to the beginning of the word
e	moves forward to the end of the word
w	moves forward to the beginning of the word
0(zero)	move to first character of a line
\$	move to the end of line

scrolling :

Key	Action
ctrl + f	scrolls forward
ctrl + b	scrolls backward
ctrl + d	scrolls half page
ctrl + u	scrolls half page backward

b) Learn all essential commands like search / replace, highlight, show line numbers.

i) Replace

Syntax: /g | word to be replaced /s | new word /g

```
jeba@jeba-VirtualBox: ~
Hello
This is my Linux example
Welcome
Welldone
This is Vi Editor
Thank you

I

:g/mv/s//our/gc

jeba@jeba-VirtualBox: ~
Hello
This is mv Linux example
Welcome
Welldone
This is Vi Editor
Thank you

jeba@jeba-VirtualBox: ~
Hello
This is our Linux example
Welcome
Welldone
This is Vi Editor
Thank you
```

ii) Highlight

use set hlssearch

```
jeba@jeba-VirtualBox: ~
Hello
This is our Linux example
Welcome
Welldone
This is Vi Editor
Thank you

:set hlsearch
```

Show line number

Use set nu

```
jeba@jeba-VirtualBox: ~
1 Hello
2 This is our Linux example
3 Welcome
4 Welldone
5 This is Vi Editor
6 Thank you

:set nu
```

100% ✓

Linux Security

a) Use of sudo to change user privileges to root.

Create an user named user1

```
jeba@jeba-VirtualBox: ~
jeba@jeba-VirtualBox:~$ sudo useradd user1
[sudo] password for jeba:
jeba@jeba-VirtualBox:~$ sudo passwd user1
Enter new UNIX password:
Retype new UNIX password:
passwd: password updated successfully
jeba@jeba-VirtualBox:~$
```

To give some user root privileges ~~edit /etc/sudoers~~
 edit /etc/sudoers using visudo. Enter new
 line as highlighted below.

```
# Please consider adding local content in /etc/sudoers.d/ instead of
# directly modifying this file.
#
# See the man page for details on how to write a sudoers file.
#
Defaults      env_reset
Defaults      mail_badpass
Defaults      secure_path="/usr/local/sbin:/usr/local/bin:/usr/sbin:/usr/bin:/
sbin:/bin"
#
# Host alias specification
#
# User alias specification
#
# Cmnd alias specification
#
# User privilege specification
root    ALL=(ALL:ALL) ALL
user1  ALL=(ALL:ALL) ALL
```

b) Identify operations that require sudo privileges.

```
jeba@jeba-VirtualBox:~$ su user1
Password:
user1@jeba-VirtualBox:/home/jeba$ mkdir folder1
mkdir: cannot create directory 'folder1': Permission denied
user1@jeba-VirtualBox:/home/jeba$ sudo mkdir folder1
[sudo] password for user1:
user1 is not in the sudoers file. This incident will be reported.
```

c) modify expiration date for new user using password ageing.

```
jeba@jeba-VirtualBox:~$ sudo chage -l user1
Last password change : Jan 20, 2020
Password expires      : never
Password inactive     : never
Account expires        : never
Minimum number of days between password change : 0
Maximum number of days between password change : 99999
Number of days of warning before password expires : 7
```

```
jeba@jeba-VirtualBox:~$ sudo chage user1
Changing the aging information for user1
Enter the new value, or press ENTER for the default

    Minimum Password Age [0]: 100
    Maximum Password Age [99999]: 200
    Last Password Change (YYYY-MM-DD) [2020-01-20]: 2020-01-21
    Password Expiration Warning [7]: 5
    Password Inactive [-1]:
    Account Expiration Date (YYYY-MM-DD) [-1]: 2020-01-31
jeba@jeba-VirtualBox:~$ sudo chage -l user1
Last password change : Jan 21, 2020
Password expires      : Aug 08, 2020
Password inactive     : never
Account expires        : Jan 31, 2020
Minimum number of days between password change : 100
Maximum number of days between password change : 200
Number of days of warning before password expires : 5
```

```
jeba@jeba-VirtualBox:~$ sudo chage -E 25/01/2020 -m 10 -M 90 -I 30 -W 30 user1
jeba@jeba-VirtualBox:~$ sudo chage -l user1
Last password change : Jan 21, 2020
Password expires      : Apr 20, 2020
Password inactive     : May 20, 2020
Account expires        : Jan 01, 2022
Minimum number of days between password change : 10
Maximum number of days between password change : 90
Number of days of warning before password expires : 30
jeba@jeba-VirtualBox:~$
```

- E : Expiration Date

- m : Minimum number of days before password change

- M : Number of days password is valid.

- I : Account inactive

- W : Number of days of warning before a password is change is required.

c) Delete newly added user

```
jeba@jeba-VirtualBox:~$ sudo userdel user1
[sudo] password for jeba:
jeba@jeba-VirtualBox:~$ su user1
No passwd entry for user 'user1'
jeba@jeba-VirtualBox:~$
```

Network Management

- a) Get IP address of your machine using ifconfig.

```
jeba@jeba-VirtualBox:~$ ifconfig
enp0s3      Link encap:Ethernet HWaddr 08:00:27:0e:6b:69
             inet addr:10.0.2.15 Bcast:10.0.2.255 Mask:255.255.255.0
               inet6 addr: fe80::c0cd:53a0:d5a3:848e/64 Scope:Link
                     UP BROADCAST RUNNING MULTICAST MTU:1500 Metric:1
                     RX packets:2 errors:0 dropped:0 overruns:0 frame:0
                     TX packets:73 errors:0 dropped:0 overruns:0 carrier:0
                     collisions:0 txqueuelen:1000
                     RX bytes:1180 (1.1 KB) TX bytes:8518 (8.5 KB)

lo          Link encap:Local Loopback
             inet addr:127.0.0.1 Mask:255.0.0.0
               inet6 addr: ::1/128 Scope:Host
                     UP LOOPBACK RUNNING MTU:65536 Metric:1
                     RX packets:53240 errors:0 dropped:0 overruns:0 frame:0
                     TX packets:53240 errors:0 dropped:0 overruns:0 carrier:0
                     collisions:0 txqueuelen:1
                     RX bytes:4225072 (4.2 MB) TX bytes:4225072 (4.2 MB)
```

- b) Get hostname of your machine.

```
jeba@jeba-VirtualBox:~$ hostname
jeba-VirtualBox
jeba@jeba-VirtualBox:~$
```

c) Use ping to check the network connectivity to remote machines.

c) Use ping to check the network connectivity to remote machines

```
jeba@jeba-VirtualBox:~$ ping www.google.com
PING www.google.com (172.217.31.196) 56(84) bytes of data.
64 bytes from maa03s28-in-f4.1e100.net (172.217.31.196): icmp_seq=1 ttl=54 time=97.8 ms
64 bytes from maa03s28-in-f4.1e100.net (172.217.31.196): icmp_seq=2 ttl=54 time=82.0 ms
64 bytes from maa03s28-in-f4.1e100.net (172.217.31.196): icmp_seq=3 ttl=54 time=84.8 ms
64 bytes from maa03s28-in-f4.1e100.net (172.217.31.196): icmp_seq=4 ttl=54 time=87.1 ms
64 bytes from maa03s28-in-f4.1e100.net (172.217.31.196): icmp_seq=5 ttl=54 time=93.5 ms
64 bytes from maa03s28-in-f4.1e100.net (172.217.31.196): icmp_seq=6 ttl=54 time=86.9 ms
64 bytes from maa03s28-in-f4.1e100.net (172.217.31.196): icmp_seq=7 ttl=54 time=98.0 ms
64 bytes from maa03s28-in-f4.1e100.net (172.217.31.196): icmp_seq=8 ttl=54 time=90.9 ms
^Z
[1]+ Stopped                  ping www.google.com
jeba@jeba-VirtualBox:~$
```

d) Use of dig command

```
jeba@jeba-VirtualBox:~$
jeba@jeba-VirtualBox:~$ dig www.google.com
; <>> DiG 9.10.3-P4-Ubuntu <>> www.google.com
;; global options: +cmd
;; Got answer:
;; ->>HEADER<- opcode: QUERY, status: NOERROR, id: 52068
;; flags: qr rd ra; QUERY: 1, ANSWER: 1, AUTHORITY: 0, ADDITIONAL: 1
;; OPT PSEUDOSECTION:
;; EDNS: version: 0, flags:; udp: 4096
;; QUESTION SECTION:
:www.google.com.           IN      A
;; ANSWER SECTION:
www.google.com.          91      IN      A      172.217.166.100
;; Query time: 152 msec
;; SERVER: 127.0.1.1#53(127.0.1.1)
;; WHEN: Mon Jan 20 22:40:06 IST 2020
;; MSG SIZE  rcvd: 59
jeba@jeba-VirtualBox:~$
```

e) Troubleshooting network using traceroute, route command

e) Troubleshooting network using traceroute, route command

```
jeba@jeba-VirtualBox:~$ traceroute www.google.com
traceroute to www.google.com (172.217.166.100), 30 hops max, 60 byte packets
 1  10.0.2.2 (10.0.2.2)  0.190 ms  0.143 ms  0.151 ms
 2 * * *
 3  10.0.2.2 (10.0.2.2)  68.568 ms  68.486 ms  68.405 ms
jeba@jeba-VirtualBox:~$
```

```
jeba@jeba-VirtualBox:~$ 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        *              255.255.255.0 U     100    0        0 enp0s3
link-local      *              255.255.0.0   U     1000   0        0 enp0s3
jeba@jeba-VirtualBox:~$
```

f) Use of arp command

```
jeba@jeba-VirtualBox:~$ arp
Address          HWtype  HWaddress           Flags Mask          Iface
10.0.2.2          ether   52:54:00:12:35:02  C             enp0s
```

g) Use of host command

```
jeba@jeba-VirtualBox:~$ host -V
host 9.10.3-P4-Ubuntu
jeba@jeba-VirtualBox:~$
```

h) Use of netstat command and Nmap command.

```
jeba@jeba-VirtualBox:~$ netstat
Active Internet connections (w/o servers)
Proto Recv-Q Send-Q Local Address           Foreign Address         State
Active UNIX domain sockets (w/o servers)
Proto RefCnt Flags       Type            State         I-Node Path
unix  2      [ ]        DGRAM           42149  /run/user/1000/system
d/notify
unix  2      [ ]        DGRAM           9694   /run/systemd/journal/
syslog
unix  16     [ ]        DGRAM           9695   /run/systemd/journal/
dev-log
unix  7      [ ]        DGRAM           9704   /run/systemd/journal/
socket
unix  3      [ ]        DGRAM           9684   /run/systemd/notify
unix  3      [ ]        STREAM           CONNECTED  44042  @/tmp/dbus-CymTeI7AQG
unix  3      [ ]        STREAM           CONNECTED  43331
unix  3      [ ]        STREAM           CONNECTED  42988  @/tmp/dbus-CymTeI7AQG
unix  3      [ ]        STREAM           CONNECTED  42690  @/tmp/dbus-CMGGc6G7P5
stdout
unix  3      [ ]        STREAM           CONNECTED  13242  /run/systemd/journal/
stdout
unix  3      [ ]        STREAM           CONNECTED  43113  /run/systemd/journal/
unix  3      [ ]        STREAM           CONNECTED  43013
unix  3      [ ]        STREAM           CONNECTED  42935
```

```
jeba@jeba-VirtualBox:~$ nmap www.google.com
Starting Nmap 7.01 ( https://nmap.org ) at 2020-01-20 22:51 IST
Nmap scan report for www.google.com (216.58.196.68)
Host is up (0.044s latency).
Other addresses for www.google.com (not scanned): 2404:6800:4007:811::2004
rDNS record for 216.58.196.68: bom05s11-in-f4.1e100.net
Not shown: 998 filtered ports
PORT      STATE SERVICE
80/tcp    open  http
443/tcp   open  https

Nmap done: 1 IP address (1 host up) scanned in 20.32 seconds
```

23/01

AIM: SHELL SCRIPTING

Basics of shell scripting.

- a) To get a shell, you need to start a terminal.
- b) To see what shell you have, run: echo \$SHELL
- c) In linux, the dollar sign (\$) stands for shell variable.
- d) The echo command just returns whatever you type in.
- e) #!/bin/bash - It is called shebang. It is written at the top of a shell script and it passes the instruction to the program /bin/bash.

Echo \$SHELL



A screenshot of a terminal window titled "tcsc@tcsc-VirtualBox: ~". The window shows the command "echo \$SHELL" being typed and its output "/bin/bash". The terminal has a black background with white text. A red arrow points from the handwritten text "Echo \$SHELL" above to the terminal window.

```
tcsc@tcsc-VirtualBox: ~
tcsc@tcsc-VirtualBox: ~$ echo $SHELL
/bin/bash
tcsc@tcsc-VirtualBox: ~$
```

- Vi filename.sh

```
#!/bin/bash
echo "THIS IS Linux!"
```

A screenshot of a terminal window titled 'tcsc@tcsc-VirtualBox: ~'. The window shows the command 'vi linux.sh' being run, followed by the content of the file: '#!/bin/bash' and 'echo "THIS IS LINUX!"'. The file is saved with the message '2)'.

- Chmod 777 filename.sh

- ./filename.sh

A screenshot of a terminal window titled 'tcsc@tcsc-VirtualBox: ~'. The window shows the commands 'vi linux.sh', 'chmod 777 linux.sh', and './linux.sh' being run. The output of the script, 'THIS IS LINUX!', is displayed. The file is saved with the message '3)'.

⇒ Step to write and a shell script .

Shell script is just a simple text file with .sh extension , having executable permission .

- a) Open terminal.
- b) Navigate to the place where you want to create script using cd command.
- c) Touch filename.sh
- d) vi filename.sh [You can use your favourite editor, to edit the script]
- e) chmod 777 filename.sh (for making the script executable)
- f) sh filename.sh or ./filename.sh (for running the script)

⇒ Program to display your name

```
#!/bin/bash
echo "Enter your name"
read name
echo "My name is: $name"
```

4) :wq

A screenshot of a terminal window titled 'tcsc@tcsc-VirtualBox ~'. The window contains the following text:

```
#!/bin/bash
echo "Enter your name"
read name
echo "My name is: $name"
```

The cursor is at the end of the command line, indicated by a small red arrow pointing towards it.

5)

A screenshot of a terminal window titled 'tcsc@tcsc-VirtualBox ~'. The window shows the following sequence of commands and their output:

```
tcsc@tcsc-VirtualBox:~$ vi ubuntu.sh
tcsc@tcsc-VirtualBox:~$ chmod 777 ubuntu.sh
tcsc@tcsc-VirtualBox:~$ ./ubuntu.sh
'Enter your name:
TANVI
My name is: TANVI
tcsc@tcsc-VirtualBox:~$
```

The cursor is at the end of the command line, indicated by a small red arrow pointing towards it.

8)

Program to find the sum of two variables

vi filename.sh

#!/bin/bash

a=100

b=25

sum=\$((a+b))

echo "sum is : \$sum"

tcsc@tcsc-VirtualBox: ~

#!/bin/bash

a=100

b=25

sum=\$((a+b))

echo "Sum is:\$sum"

6) :wq

tcsc@tcsc-VirtualBox: ~

tcsc@tcsc-VirtualBox: ~\$ vi linux2.sh

tcsc@tcsc-VirtualBox: ~\$ chmod 777 linux2.sh

tcsc@tcsc-VirtualBox: ~\$./linux2.sh

Sum is:125

7)

Program to find sum of two numbers (values passed during execution)

tcsc@tcsc-VirtualBox: ~

#!/bin/bash

sum=\$((S1+S2))

echo "sum is:\$sum"

8)

"lin.sh" 3 lines, 46 characters

```
tcsc@tcsc-VirtualBox:~$ vi lin.sh
tcsc@tcsc-VirtualBox:~$ chmod 777 lin.sh
tcsc@tcsc-VirtualBox:~$ ./lin.sh 50 70
sum is:120
9) tcsc@tcsc-VirtualBox:~$
```

Sed : Sed command on Stream Edition is very powerful utility offered by Linux systems. It is mainly used for text substitution, find & replace but it can perform other text manipulations like insertion, deletion, search, etc. with sed, we can edit complete files without actually having to open it.

Consider the following text file.

```
tcsc@tcsc-VirtualBox:~$ cat subjects.txt
subjects offered in cs
datastructure
database management
linux
python
green tech
softskill
stats
calculus
computer basic
```

10)

88

1) Displaying partial text of a file.

With Sed, we can view only part of a file rather than seeing whole file.

```
tcsc@tcsc-VirtualBox:~$ vi cs.txt
tcsc@tcsc-VirtualBox:~$ sed -n 3,5p cs.txt
database management
linux
python
11) tcsc@tcsc-VirtualBox:~$
```

2) Display all except some lines.

To display all content of a file except for some portion, use option 'd'.

```
tcsc@tcsc-VirtualBox:~$ sed 3,5d cs.txt
subjects offered in cs
datastructure
green tech
softskill
stats
calclus
computer basic
12) tcsc@tcsc-VirtualBox:~$
```

3) Deleting a line.

To delete a line, use line number followed by 'd'.

```
tcsc@tcsc-VirtualBox:~$ vi linux.sh
tcsc@tcsc-VirtualBox:~$ chmod 777 linux.sh
tcsc@tcsc-VirtualBox:~$ ./linux.sh
THIS IS LINUX!
13) tcsc@tcsc-VirtualBox:~$
```

60

- 4) search and Replace a string.
's' option is for searching a word

tcsc@tcsc-VirtualBox:~\$ sed 's/cs/computer/' cs.txt
subjects offered in computer
datastructure
database management
linux
python
green tech
softskill
stats
calculus
14)computer basic

- 5) Replace a string on a particular line.

To replace a string on a particular line, use line number with 's' option.

tcsc@tcsc-VirtualBox:~\$ sed '6 s/cs/computer system /' cs.txt
subjects offered in cs
datastructure
database management
linux
python
green tech
softskill
stats
calculus
15)computer basic

- 6) Add a line after/before the matched string.

To add a new line with some content after every pattern match, use option 'a'.

tcsc@tcsc-VirtualBox:~\$ sed '/cs/a "this is linux"' cs.txt
subjects offered in cs
"this is linux"
datastructure
database management
linux
python
green tech
softskill
stats
calculus
computer basic
16) tcsc@tcsc-VirtualBox:~\$

08

To add a new line with some content before every pattern match.
use option 'i'.

```
tcsc@tcsc-VirtualBox:~$ sed '/cs/i "this is linux"' cs.txt
>this is linux"
subjects offered in cs
datastructure
database management
linux
python
green tech
softskill
stats
calculus
computer basic
17) tcsc@tcsc-VirtualBox:~$
```

7) To change a whole line with matched pattern.

To change a whole line to a new line when a search pattern matches , use option 'c'.

```
tcsc@tcsc-VirtualBox:~$ sed '/linux/c "this is linux"' cs.txt
subjects offered in cs
datastructure
database management
>this is linux"
python
green tech
softskill
stats
calculus
computer basic
18) tcsc@tcsc-VirtualBox:~$
```

3) Appending lines

To add some content before every line with sed, use * and & as follows.

```
tcsc@tcsc-VirtualBox:~$ sed -e 's/.*/Thanks &/' cs.txt
Thanks subjects offered in cs
Thanks datastructure
Thanks database management
Thanks linux
Thanks python
Thanks green tech
Thanks softskill
Thanks stats
Thanks calculus
19) Thanks computer basic
```

11/02