

## Sem - II

### Practical : 1

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Aim: Install your choice of Linux Distribution  
eg: Ubuntu, Fedora.

→ Ubuntu is a free and open Software based on Debian. Ubuntu is officially released under 3 editions.

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

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

Steps for installing ubuntu in a virtual machine:

Step . 1:

→ Select a virtual optical data ISO file or a physical drive to start ubuntu in your virtual machine. Space given to it is 1.86 GB.

Step . 2:

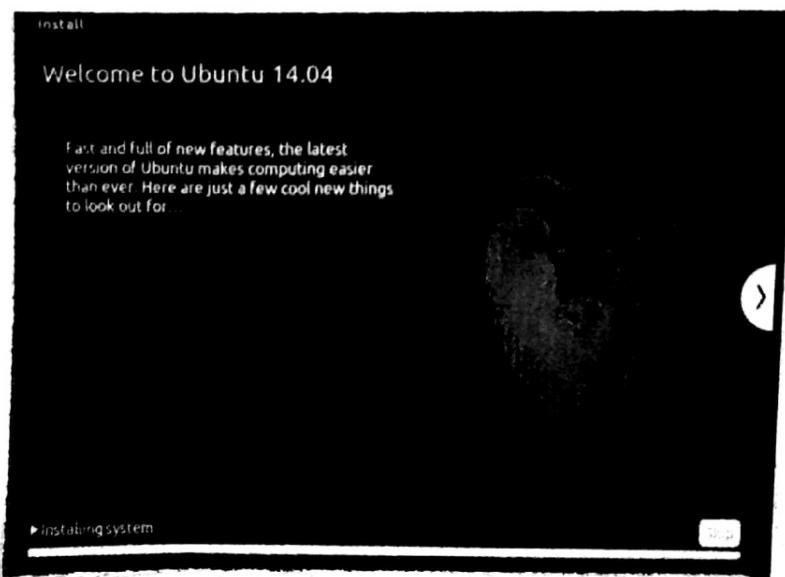
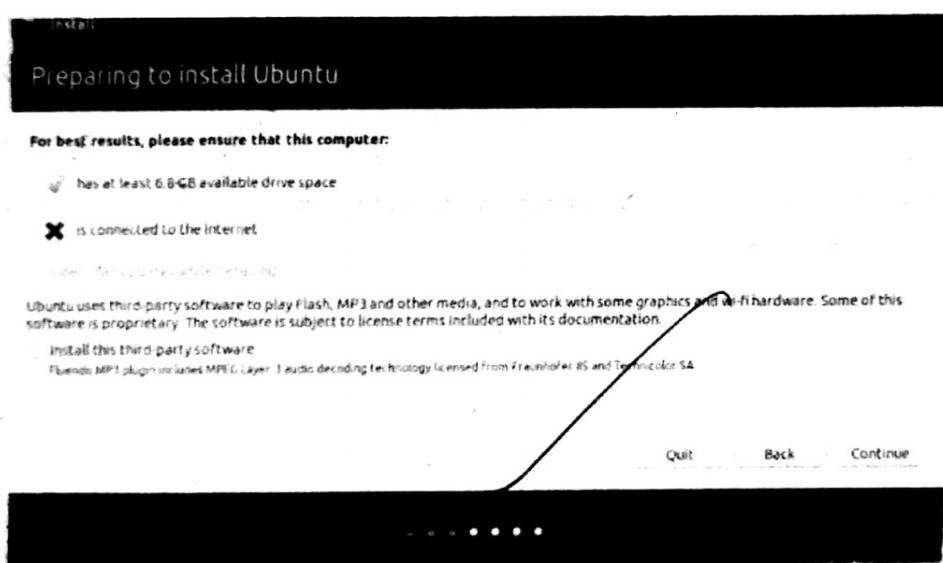
Select the language of your choice and click on 'Install Ubuntu'.

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.

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#### Step-4:

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

#### 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.

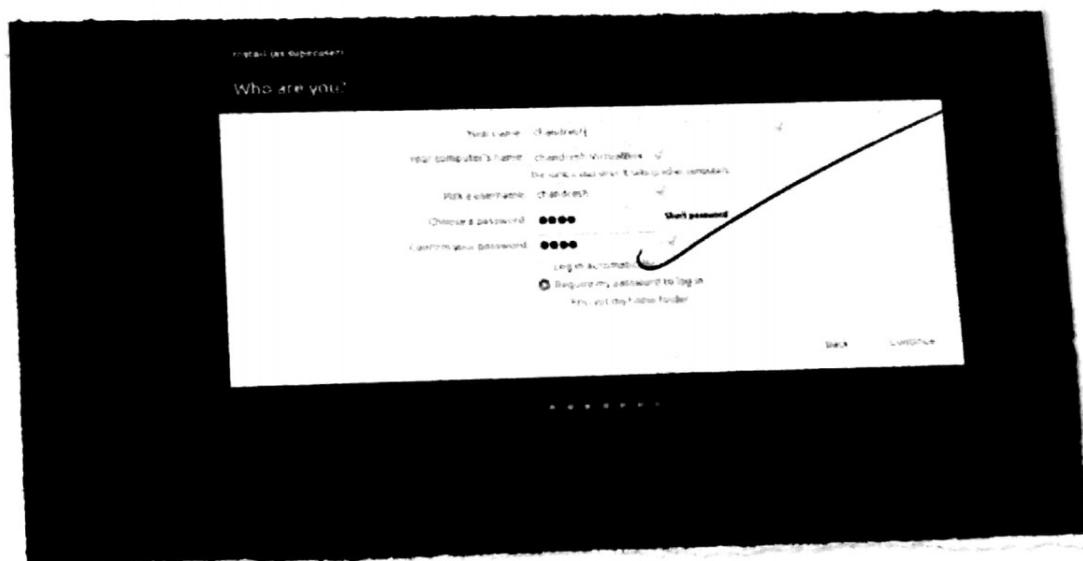
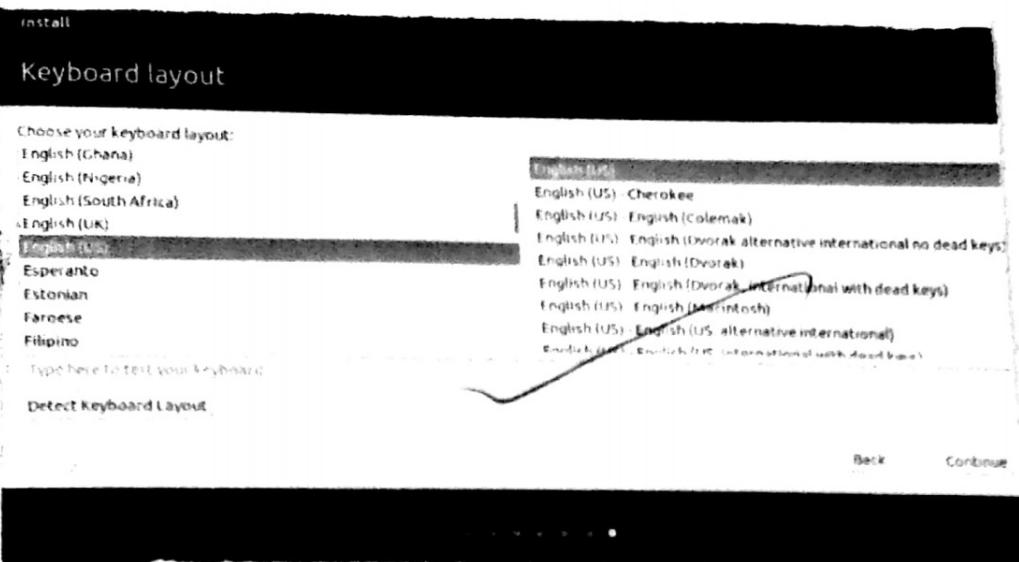
#### Step-7:

- 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 in 2048 MB or 2 TB.

Therefore, now the virtual box is ready to use.



- \* Customize desktop environment by changing different default options like changing default background themes, screen savers.

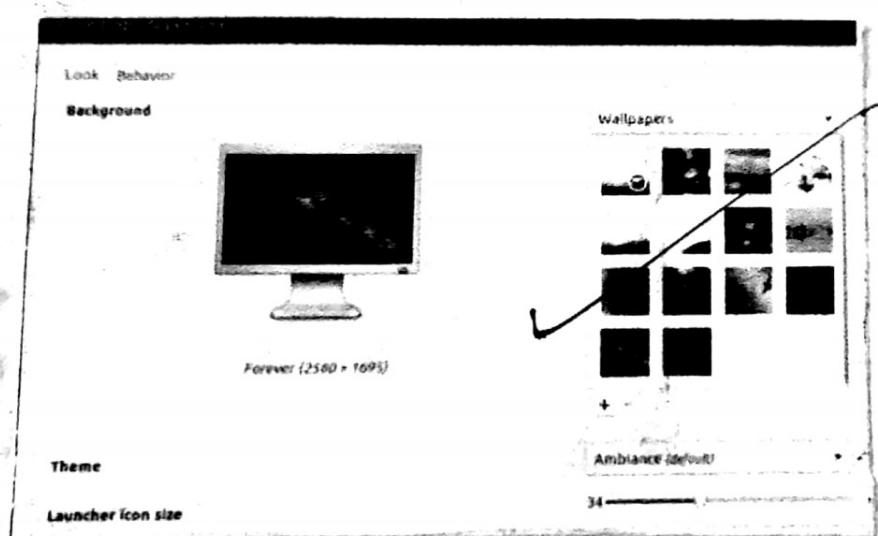
### Accessing Appearance Settings:

- To access Appearance Settings in Ubuntu, let's click on User menu at the top right corner on top Menu bar and select System Settings
- A window will pop-up with All Setting divided into Personal, Hardware and System option icons. Let's first select the Appearance icon.

### Changing Wallpaper picture:

- On the left side of Background part, you can see your current wallpaper.
- 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.
- If you want to select wallpaper from your Picture folder, click the drop-down above thumbnails and select the Picture folder.

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- You will see all the pictures in your Picture Folder as thumbnails, where you can select them as your wallpaper.

\* Changing Ubuntu theme:

- Ubuntu also has an option to change the Desktop theme, which in one click will change the entire way your computer looks
  - To do that, click on the drop-down menu below the Wallpaper thumbnails and choose between Ambiance, Radiance or High Contrast.
  - Ambiance is a light theme that looks a bit more Mac-like, while Radiance is the darker theme used in Ubuntu by default.
- \* Screen Resolution: Aswain / The current screen resolution for your Desktop.

Change the size or rotation of the screen.

- You can change how big things appear on the screen by changing the screen resolution.

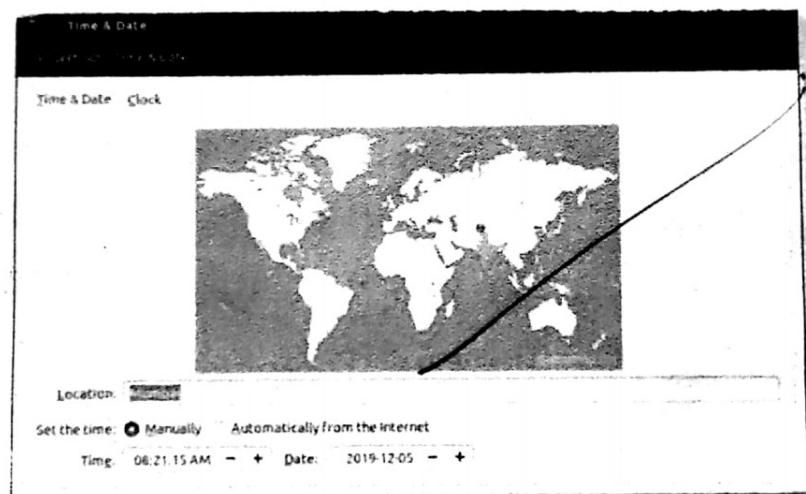
- (i) Click the icon on the very right of the menu bar and select System Settings.
- (ii) Open Screen Display.
- (iii) If you have multiple displays and they are not mirrored, you can have different settings on each display. Select a display in the preview area.
- (iv) Select your desired resolution and rotation.
- (v) Click Apply. The new settings will be applied for 30 seconds before reverting back. That way if you ~~cannot see anything with the new~~.

#### \* Time Settings:

- (i) After noting the time change, change the time zone back to your local time zone.
- (ii) 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.

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## Practical:2

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.

## \* How to uninstall GCC compiler?

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→ 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 executable like gcc, g++, cpp contained in that directory.

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Practical: 3

Aim: Utilization of grep, man commands.

Documentation:

- Finding 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) and (backspace = down) keys.

Another more summarized form of showing info is the man command. The command is same as info but requires less data.

b.] Finding man pages from the cmd line:  
Bring up the 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 the manual for 'ls' command.

Simply type: 'man ls'.

O/P

c.] Finding man pages by topic:

Ans: 'Tar', 'Zip' are some pages which are available for document file compression.

Simply type: man zip

man tar.

O/P

d.] Finding man pages by section from the cmd line  
~~'What man pages are available that document file compression? Bring up the man page for the printflib function. Which manual page section are library function found?~~

→ The number corresponds to what section of the manual page is from; 1 is user command while The man page format itself explains it and list the std commands.

There are certain terms that have different types of pages in different sections (eg: 'print f' 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 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 ~~something~~ substring matches too. So you need to use "term" to limit it.

d) Finding man pages by section from the cmd line  
bring up the

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

\$ mkdir -ma=rwx directoryname.

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## Practical: 4.

### 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 password file in / using find command.

# find / -name passwd

- /usr/share/doc/nss\_ldap-2.53/pam.d/passwd
- /usr/bin/passwd
- /etc/pam.d/passwd
- /etc/passwd

d) find the directory passwd file under root and one level down

# find / -maxdepth 2 -name passwd

- /etc/passwd

e) find the passwd file under root

# find / -maxdepth 3 -name passwd

- /user/bin/passwd
- /etc/pam.d/passwd
- /etc/passwd

find the password file b/w sub-directories  
level 2 to 4.

# find -maxdepth 3 -maxdepth 5 -name passwd.

- /user/bin/passwd
- /etc/pam.d/passwd

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

# ln -s file1 file2.

e) Create an empty file example.txt and move it  
to /tmp directory using relative pathname.

# 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 ls, ps, bash commands.

# where is ls

ls: /bin/ls/usr/share/man/man/ls.1S.

# where is ps

ps: /bin/ps/usr/share/man/ps:/bin/ps/usr/share/man/  
/man1/ps.1.gz.

# where is bash

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

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## Practical-5

Aim: file Operations.

(Q1) Explore mounted file systems on your computer

→ df -K.

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```
jeba@jeba-VirtualBox:~$ df -k
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:~$
```

Q.2) what are the different ways of exploring mounted file systems on linux?

→ 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)
tmpfs 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=/)
e_agent=/lib/systemd/systemd-cgroups-agent
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/bintfmt_misc type autofs (rw,relatime,fd=32,pgroup=1,timeout=0,minproto=5,maxproto=5,direct)
hugetlbfs on /dev/hugepages type hugetlbfs (rw,relatime)
```

Q:3) Copying text from files

→ cp.command , mv.command.

```
jeba@jeba-VirtualBox: ~ ls
Desktop Downloads Music Pictures public_templates
Documents examples.desktop 3D Pictures Templates
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$ ■
```

Q.4) Archiving and Backup the work directory using tar, gzip and bzip2 commands.

→ 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`♦■■■■■♦■■■
'JewSS♦■■■1 jeba@jeba-VirtualBox:~/jeb$ gzip dd.txt
jeba@jeba-VirtualBox:~/jeb$ ls
dd.txt dd.txt.gz
jeba@jeba-VirtualBox:~/jeb$ cat dd.txt.gz
♦■■■dd.txt+O♦I♦M♦e♦e♦+♦■■■♦Xzjeba@jeba-VirtualBox:~/jeb$ █
```

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

→ ~~diff filename1 filename2~~

```
jeba@jeba-VirtualBox:~/jeb$ ls
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
```

Q.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
^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
jeba@jeba-VirtualBox:~/jeb$ █
```

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## Practical: 6 (Use Environment)

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

Ans: who command and whoami  
 ←

b) Display /etc/shadow file using cat command and understand the importance of shadow file. How its 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 (eg. ::) indicates a password is not required to login (usually a bad idea) and "\*" entry (eg.: \*:) indicates the account has been disabled.
- The numbers of days (since January 1, 1970) since the password was last changed.

jeba@jeba-VirtualBox: ~

```
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
jeba@jeba-VirtualBox: ~ $ █
```

780 1d=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
```

- The numbers of days before password may be changed (0 indicates it may be changed at any time).
  - The numbers of days 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 for an expiring password (+ for a full week.)
  - The number of days since January 1, 1970 that an account has been disabled.
  - A reserved field for possible future use.
- Each field in a passwd entry is separated with ":" colon characters, and are as follows:
- Username upto 8 characters. Case-sensitive, usually all lowercase
  - An "X" in the password field. Passwords are stored in "/etc/shadow" file.
  - Numeric user id. This is assigned by the "adduser" script. Unix uses this field, plus the following group field to identify which files belong to the user.
  - User's shell account. Often set to "/bin/bash" to provide access to the bash shell.

```
jeba@jeba-VirtualBox: ~ $ sudo cat /etc/shadow
[judo] password for jeba:
root:$1$8246$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:::
```

```
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:MailList List Manager:/var/ttst:/usr/sbin/nologin
```

c) Get your current working directory.  
Ans: pwd.



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

Ans: history

! line number.



e) Create alias to most commonly used command

Ans: alias label = "command".



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

```
jeba@jeba-VirtualBox: ~  
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  
jeba IN ttys1 2020-01-15 20:38  
jeba@jeba-VirtualBox: $
```

**Ans: alias label="command"**

```
jeba@jeba-VirtualBox: $ alias m="mkdtr new  
jeba@jeba-VirtualBox: $ m  
jeba@jeba-VirtualBox: $ ls  
Desktop examples desktop
```

## Practical-4 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) Searching a file:  
→ To search (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

## Practical: + 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
:	Moves cursor right

## Word Navigation:

Key	Action
b	Moves back to the beginning of the word
c	Moves forward to the end of the word
w	Moves forward to the beginning of the word
o(zero)	Moves to first character of a line
5	Moves to the end of line.

## Scrolling:

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

### (i) Replace:

Syntax: /g/word to be replaced/s//new word/gc.



### (ii) Highlight:

Use set hlsearch:



```
jeba@jeba-VirtualBox ~  
Hello  
This is my Linux example  
Welcome  
Welldone  
This is vi Editor  
Thank you  
  
replace with our (y/n/a/s/z/f/e/r/v)?  
jeba@jeba-VirtualBox ~  
  
Hello  
This is our Linux example  
Welcome  
Welldone  
This is Vi Editor  
Thank you
```

```
jeba@jeba-VirtualBox ~  
Hello  
This is my Linux example  
Welcome  
Welldone  
This is Vi Editor  
Thank you  
  
I  
  
:g/my/s//our/gc
```

(iii) Show the line number.

use set nru  
→

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

cat > test.nu
```

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

rset hisearch
```

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## Practical: 8. Linux Security

- a) Use of sudo to change user privileges to root.  
→ Create a user named user.
- ←
- To give some users root privileges edit /etc/sudoers using visudo. Enter new line as highlighted below
- ← ✓
- b) Identify operation that requires sudo privileges.
- ←

```
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: ~$
```

a)

```
# 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)

```
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

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 change is required.

```
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:~$
```

```
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:~$
```

15  
Practical: a Network Management

- a) Get IP address of your machine using  
if config.  
→
- b) Get host name of your machine.  
→

```
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:1160 (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)
```

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

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:~\$

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 26 22:40:06 IST 2020  
: MSG SIZE rcvd: 59  
jeba@jeba-VirtualBox:~\$

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



d) Use of dig command.



e) Troubleshooting command using tracert.



f.) Use of arp command



g.) Use of host command



```
jeba@jeba-VirtualBox:~  
jeba@jeba-VirtualBox:~$ traceroute www.google.com  
traceroute to www.google.com (172.217.166.100), 30 hops max, 64 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:~$
```

```
jeba@jeba-VirtualBox:~  
jeba@jeba-VirtualBox:~$ arp  
Address          HWtype  HWaddress           Flags Mask          Iface  
10.0.2.2          ether   52:54:00:12:35:02  C               enp0s3  
3
```

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

```
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 Recv-Q Flags  Type      State       PID/Program name
unix  2      [ ]        DGRAM
dnotify  unix  2      [ ]        DGRAM
syslog  unix  10     [ ]        DGRAM
dev log  unix  7      [ ]        DGRAM
socket  unix  3      [ ]        DGRAM
unix  3      [ ]        STREAM   CONNECTED  44042 @/tmp/dbus-CymTeI7AOG
unix  3      [ ]        STREAM   CONNECTED  43331 @/tmp/dbus-CymTeI7AOG
unix  3      [ ]        STREAM   CONNECTED  42988 @/tmp/dbus-CMGGc6G7P5
unix  3      [ ]        STREAM   CONNECTED  42690 /run/systemd/journal/
unix  3      [ ]        STREAM   CONNECTED  13242 /run/systemd/journal/
stdout  unix  3      [ ]        STREAM   CONNECTED  43113 /run/systemd/journal/
stderr  unix  3      [ ]        STREAM   CONNECTED  43013

```

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

ii) Use of netstat command and Nmap command.

prerequisite: nmap

$\leftarrow$

prerequisite: nmap  
nmap -sT -p 1-1000 192.168.1.100  
nmap -sS -p 1-1000 192.168.1.100  
nmap -sU -p 1-1000 192.168.1.100  
nmap -sM -p 1-1000 192.168.1.100  
nmap -sA -p 1-1000 192.168.1.100  
nmap -sO -p 1-1000 192.168.1.100

nmap -sT -p 1-1000 192.168.1.100  
nmap -sS -p 1-1000 192.168.1.100  
nmap -sU -p 1-1000 192.168.1.100  
nmap -sM -p 1-1000 192.168.1.100  
nmap -sA -p 1-1000 192.168.1.100  
nmap -sO -p 1-1000 192.168.1.100

Output of nmap -sT -p 1-1000 192.168.1.100

Starting nmap 7.6.1 ( http://nmap.org ) at 2023-07-10 11:45 +0530  
Nmap scan report for 192.168.1.100

Host is up (0.000000s latency).  
Nmap scan report for 192.168.1.100

Scanning 1 port over 1000 seconds (0.000000s latency).

Completed: 0/1000 ports scanned in 00:00:00 (0.00% done)

Scanning 1 port over 1000 seconds (0.000000s latency).

Completed: 0/1000 ports scanned in 00:00:00 (0.00% done)

Scanning 1 port over 1000 seconds (0.000000s latency).

Completed: 0/1000 ports scanned in 00:00:00 (0.00% done)

Scanning 1 port over 1000 seconds (0.000000s latency).

Completed: 0/1000 ports scanned in 00:00:00 (0.00% done)

# Practical: 10

## 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 \$SH~~EL~~EL
- (c) In Linux, the dollar signs (\$) 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.

- Step to write and execute a shell script.

→ Shell Script is just a simple text file .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.
- (e) chmod 777 filename.sh.
- (f) sh filename.sh or ./filename.sh

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

```
tcsc@tcsc-VirtualBox:~  
#!/bin/bash  
echo "THIS IS LINUX!"
```

"linux.sh" [New File]

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

Programs to display your name:

```
#!/bin/bash
echo "Enter your name:"
Read name
Echo "My name: $name"
```

Program to find sum of two variables:

vi filename.sh

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

a=100

b=25

Sum=\$((a+b))

echo "sum is: \$sum"

26

```
tsc@tsc-VirtualBox: ~  
#!/bin/bash  
echo "Enter your name."  
read name  
echo "My name is: $name"  
  
:wg  
tsc@tsc-VirtualBox: ~  
tsc@tsc-VirtualBox: ~$ vi ubuntu.sh  
tsc@tsc-VirtualBox: ~$ chmod 777 ubuntu.sh  
tsc@tsc-VirtualBox: ~$ ./ubuntu.sh  
Enter your name:  
TANVI  
My name is: TANVI  
tsc@tsc-VirtualBox: ~
```

```
tsc@tsc-VirtualBox: ~  
#!/bin/bash  
a=100  
b=25  
sum=$((a+b))  
echo "Sum is:$sum"  
  
:wg  
tsc@tsc-VirtualBox: ~  
tsc@tsc-VirtualBox: ~$ vi linux2.sh  
tsc@tsc-VirtualBox: ~$ chmod 777 linux2.sh  
tsc@tsc-VirtualBox: ~$ ./linux2.sh  
Sum is125  
tsc@tsc-VirtualBox: ~
```

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

Sed:

→ Sed:  
Sed command or Stream Editor is very powerful utility offered by Linux systems. It is mainly used for text substitution, find and 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:~  
1/btn/bash  
sum=$((51+52))  
echo $sum $(sum)  
  
"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  
tcsc@tcsc-VirtualBox:~$
```

```
tcsc@tcsc-VirtualBox:~  
subjects offered in cs  
datastructure  
database management  
linux  
python  
green tech  
softskill  
stats  
calclus  
computer basic  
  
zwo
```

### 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:~  
tcsc@tcsc-VirtualBox:~$ vi cs.txt  
tcsc@tcsc-VirtualBox:~$ sed -n 3,5p cs.txt  
database management  
linux  
python  
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  
calculus  
computer basic  
tcsc@tcsc-VirtualBox:~$
```

### 3) Deleting a line

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

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

### 4) Search and Replacing 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  
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  
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'

calculus  
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
tcsc@tcsc-VirtualBox:~$
```

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
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
```

### 8) 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
Thanks computer basic
```

*S*  
10/02