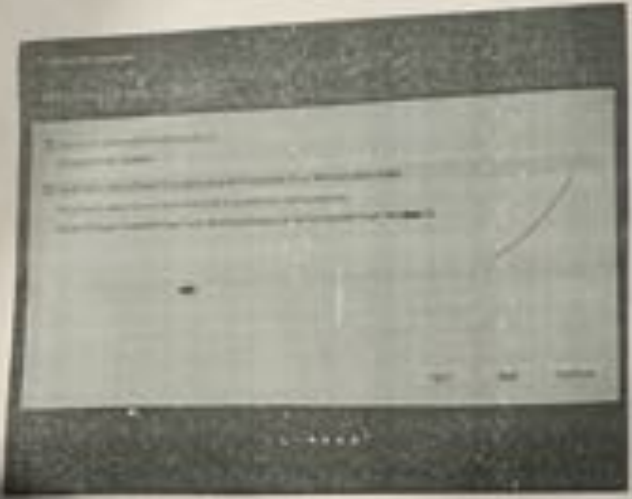


Practical-1:

Aim: Installation of Ubuntu and background changing

Steps to install Ubuntu:

- Using a USB drive:

Most newer computers can boot from USB you should see a welcome screen prompting you to choose your language and giving you the option to install Ubuntu or try it from the USB

- If your computer doesn't automatically do so, you might need to press the F12 key to bring up the boot menu, but be careful not to hold it down that can cause an error message

- Prepare to install Ubuntu:

- We recommend you plug your computer into a power source
- You should also make sure you have enough space on your computer to install Ubuntu
- We advise you to select Download updates while installing & install this third-party software now

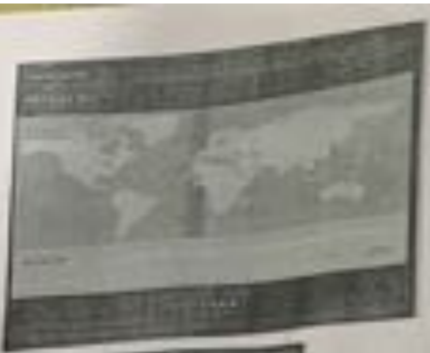
- You should also stay connected to the Internet so you can get the latest updates while you install ubuntu.
- If you are not connected to the internet, you will be asked to select a wireless network, if available. We advise you to connect during the installation so we can ensure your machine is up to date.

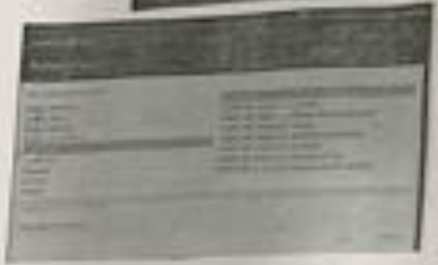
- Allocate drive space:

- Use the checkboxes to choose whether you had like to install ubuntu alongside another operating system, delete your existing operating system and replace it with ubuntu or if you are an advanced user choose the 'something else' option.

- Begin the installation:

- Depending on your previous selections you can now verify that you have chosen the way in which you would like to install ubuntu.
- The installation process will begin when you click the install Now button.





- Ubuntu needs about 4.5 GB to install, so add a few extra GB to allow for your files.

- Select your location:

If you are connected to the internet, this should be done automatically. Check your location is correct & click 'Forward' to proceed. If you are unsure of your time zone, type the name of the town you are in or click on the map and we will help you find it.

- Select your preferred keyboard layout:

Click on the language option you need. If you're not sure, click the 'detect keyboard layout' button for help.

- Enter your login & password details.
- Learn more about Ubuntu while the system installs
-
- That's it
  All that's left is to restart your computer and start enjoying Ubuntu.

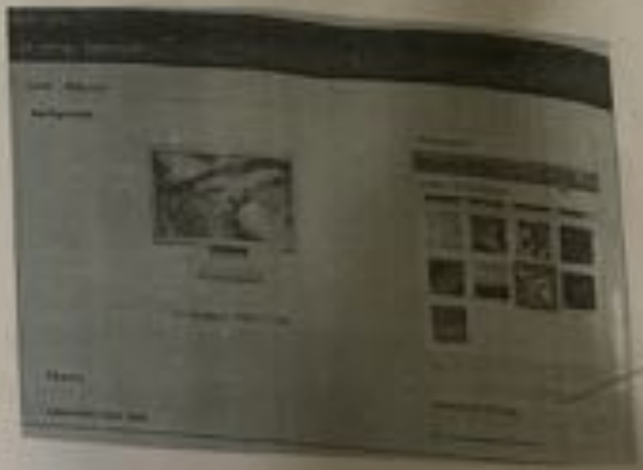
- Steps to change background settings of ubuntu:

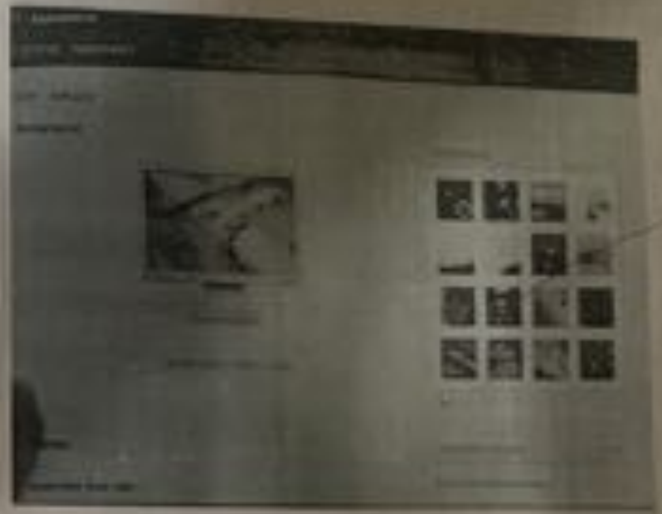
- Accessing Appearance settings:

- 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 settings 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 menu above thumbnails and select the Picture folder





- 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 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:**

- 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 dropdown 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 brown theme used in Ubuntu by default.

- **Change the size or rotation of screen:**

- You can change how big things appear on the screen by changing the screen resolution.
- You can change which way up things appear by changing the rotation.

[1] Click the icon on the very right of the menu bar and select System settings.

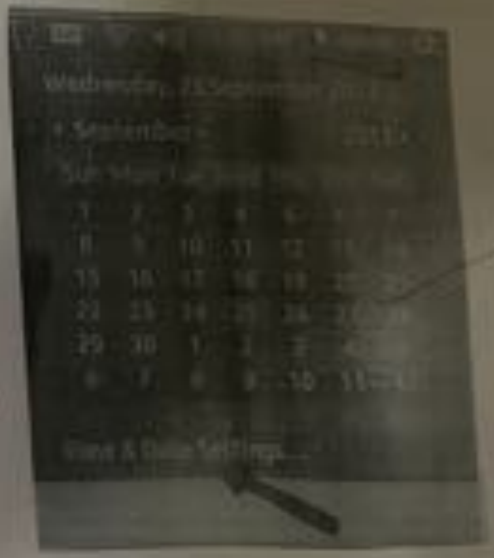
[2] Open Screen Display

[3] 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.

[4] Select your desired resolution and rotation

[5] Click apply. The new settings will be applied for 30 seconds before revert back. That way, if you cannot see anything with the new

- Time settings change time zone of your system:
- If you are currently in Indian time. Note the time change, change the time zone back to your local time zone.
- Just click on the clock on the top of bar, choose Time & Date settings & choose from map, & choose automat



| Sun | Mon | Tue | Wed | Thu | Fri | Sat |
|---|---|---|---|---|---|---|
| 1 | 2 | 3 | 4 | [illegible] | [illegible] | [illegible] |
| 8 | 9 | 10 | 11 | 12 | [illegible] | [illegible] |
| 15 | 16 | 17 | 18 | 19 | [illegible] | [illegible] |
| 22 | 23 | 24 | 25 | 26 | [illegible] | [illegible] |
| 29 | 30 | 1 | 2 | 3 | 4 | [illegible] |
| 6 | 7 | 8 | 9 | 10 | 11 | [illegible] |

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Practical 2

Aim: Installing and removing software

1] Install gcc package, verify that it runs and then remove it:

Step1: 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

Step2: Type 'sudo apt-get install gcc'. After typing the following command and installation will take place

Step3: Type 'sudo apt-get install build-essential' This will install all the libraries required for C & C++ programming language

## b] Now To uninstall gcc compiler:

In GCC 5.1.0, although there is no top-level uninstall target, some dictionaries 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 remove major executable like gcc, g++, cpp ... contained in that directory.

20/12

```
• :~$ info
OUTPUT: This is the info main menu
        (aka directory node):
        A few useful info commands:
        'q' quits;
        '?' lists all info commands;
        'h' starts the info tutorial;
        'mTexinfo RET' visits the
         Texinfo manual, etc;
```

Practical 9:

Aim: Utilization of grep, main commands :

i) Documentation:

• Finding info documentation from the command line: bring up the info page for the grep command. Bring up the usage section

Solution: 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 and type

```
:~$ info grep
```

After typing the command following output will be displayed onto your screen. Another more summarized form of showing info is the 'man' command. The command is same as 'info' but summarized data.

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

- Finding man pages from the command line: Bring up the man page for the 'ls' command. Scroll down to the examples section.

Answer: 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'

- Finding man pages by topic. What man pages are available that document file compression

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

- Finding man pages by section: from the command like bring up the man page for the printf file function. Which manual page section are library function found.

```
• :~$ man ls •
OUTPUT: NAME:
          ls - list directory contents
        SYNOPSIS:
          ls [OPTIONS]... [FILE]...
        DISCRIPTION:
          list information about the FILES
          sort entries alphabetically if
          none of -cftuvSUX nor --sort is
          specified
          -a, --all
                do not ignore entries
                        starting with
          -A, --almost-all
                do not list implied . and ..
          --author
                with -l, print the author
                     of each file
          -b, --escape
                print C-style escapes for
                   nongraphic characters
          -c
             list entries by columns
• :~$ man tar
OUTPUT: NAME: The GNU version of the tar
           archiving utility
        SYNOPSIS:
           tar [-] A --concatenate | c -- create
1 d --diff -- compare | -- delete | r -- append |
```

t, --list --test-label | u --update | x ..
extract --get [option] [pathname ...]
description:
tar stores and extracts files from a tape or disk archive
function letters
-A, --catenate, --concatenate
append tar files to an archive
-c, --create
create a new archive
-d, --diff, --compare
find differences between archive and file system
--delete
delete from the archive
-r, --append
append files to the end of an archive

:~$ man 3 printf:
NAME: printf, fprintf, sprintf, dprintf, snprint
f, vprintf, vfprintf, vsnprintf formatted
output conversion
ISCRIPTION:
The functions in the printf() family produ
output according to a format as
scribed below

Answer: The number corresponds to what section of the manual page is from: 1 is user command, while 8 is system admin stuff. The man page for man itself explain it and list the std ones. There are certain items that have different page in different sections. In case there 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 which section a term falls in with 'man -k'. It will do substring matches too so you need to use "^term$" to limit it.

Simply type : man 3 printf

. Command line help list the available options for the mkdir command.

Answer : :~$ mkdir -m a=rwx
files3

:~$ ls

10/01

Practical 4

Aim: command line operator

a] Install new package on your system

```
:$~ sudo apt-get install [package
     name]
```

b] Remove package installed

```
:$~ sudo apt-get remove [package
                     name]
```

c] Find passwd file in / using find command

```
:$~ find / -name passwd
o/p: ./usr/share/doc/nss_/dap
       -253/pam.d/passwd
     ./usr/bin/passwd
     ./etc/perm.d/passwd
     ./etc/passwd
```

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

```
:$~ find / -maxdepth 2 -name passwd
o/p:  /etc/passwd
```

e] find the passwd file under root are 2 level down

```
:$~ find / -maxdepth 3 -name passwd
o/p:    /usr/bin/passwd
        /etc/pam.d/passwd
        /etc/passwd
```

f] find the passwd file between sub directories level 2 to 4

```
:$~ find -maxdepth 3 -maxdepth 5 -name
                        passwd
o/p: /usr/bin/passwd
     /etc/pam.d/passwd
```

g] create a symbolic link to the file you found in step

```
:$~ ln -s file1 file2
```

h] create an empty file example.txt & move it to /temp directory using relative pathname

```
:$~ touch example.txt
:$~ mv example.txt /temp
```

i] delete the file moved to /temp in previous step by absolute method

```
:$~ rm /temp/example.txt
```

3] find the location of ls, ps, bash commands

```
:$~ whereis ls
o/p: ls : /bin/ls/ usr/ share/man/ man1/ls
/gz

:$~ whereis ps
o/p: /bin/ps/ usr/ share/ mepi:/bin/ ps/ usr/
share/ man/ man1/ ps/ .gz

:$~ whereis bash
o/p: /bin/bash/ etc/ bash.bashrc/ usr/ share
/man/ man1/ bash.1.gz
```

10/01

Practical 5

Title: File operations

Q1] Explore mounted file systems on your computer

Answer: df -h

Q2] what are the different ways of exploring mounted file systems on unix?

Solution: mount

Q3] Copying text from files

Answer: cp command, mv command

Q.4] Archiving and backup the work directory using tar, gzip and bzip2 commands

Answer: gzip filename.txt, bzip2 filename.txt

Q.5] Use diff command to create diff of two files

Answer: diff filename1 filename2

Q.6] Use patch command to patch a file and analyse the patch using patch command again.

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Practical 6

Title: User Environment

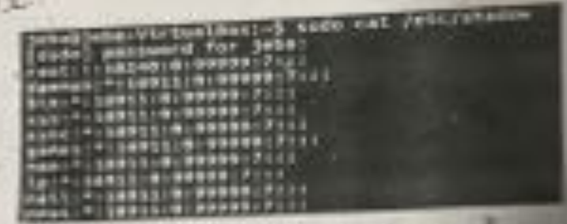
Q.1] Which account you are logged in? How do you find out?

Answer: who command & whoami

Q.2] Display /etc/shadow file using cat command and understand the importance of shadow file. How its different than passwd file.

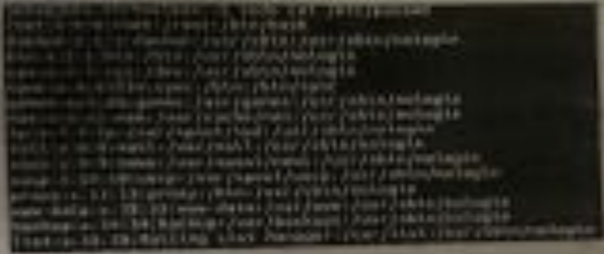
Answer: cat /etc/shadow
As with the passwd file, each field in the shadow file is also separated with ":" colons characters and are as follows:
- username, up to 8 characters. case-sensitive, usually all lowercase. A direct match to the username in the /etc/passwd file.

- Password; 13 character encrypted. A blank entry (eg ::) indicates a password is not required to log in and a "*" entry (eg :*:) indicates the account has been disabled.
- The number of days since the password was last changed.
- The number of days before password may be changed.
- The number of days which password must be changed.
- The number of days to warn user of an expiring password.
- The number of days after password expires that account is disabled.
- The number of days since January 1970 that an account 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, 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 the "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 am not sure what the maximum length for this field is, but try to keep it reasonable.
- User's home directory. Usually /home/username. All user's personal files, web pages, mail forwarding etc will be stored here.
- User's "shell account". Often set to "/bin/bash" to provide access to the bash shell.

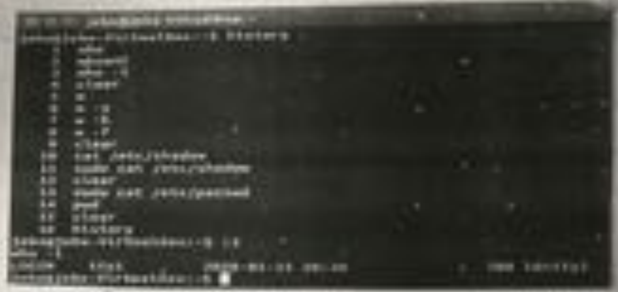


Q.3] List your current working directory

Answer: pwd

Q.4] Explore different ways of getting command history, How to run previously executed command without typing it.

Answer: history
! the line number



Q.5] Create alias to most common used commands.

Answer: alias label = "command"

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---

Practical 7

Title: Linux Editors: vi

Q.1] Create, modify, search and navigate a file in editor

a] Creating a file

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

b] Modifying a file

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

c] Search in a file

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

d] 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:

| Key | Action |
|---|---|
| b | moves back to beginning of the word |
| e | moves forward to the end of the word |
| w | moves forward to the beginning of the word |
| 0 (zero) | moves to 1st character of a line |
| $ | moves to the end of line |

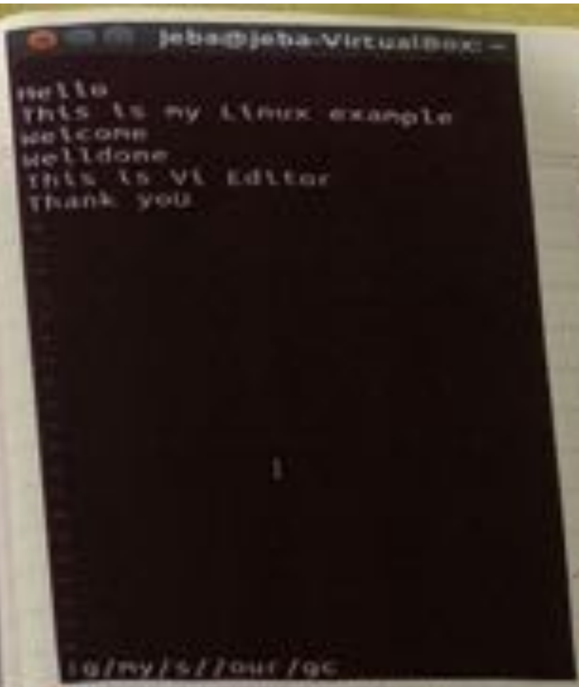
Scrolling:

| Key | Action |
|---|---|
| ctrl + f | scrolls forward |
| ctrl + b | scrolls backwards |
| ctrl + d | scrolls half page |
| ctrl + u | scroll half page backward |

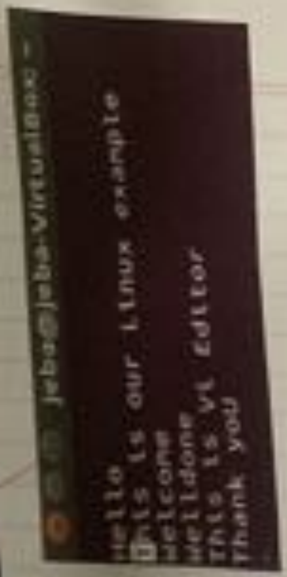
Q.2] Learn all essential commands like search / replace, highlight, show line numbers

I] Replace

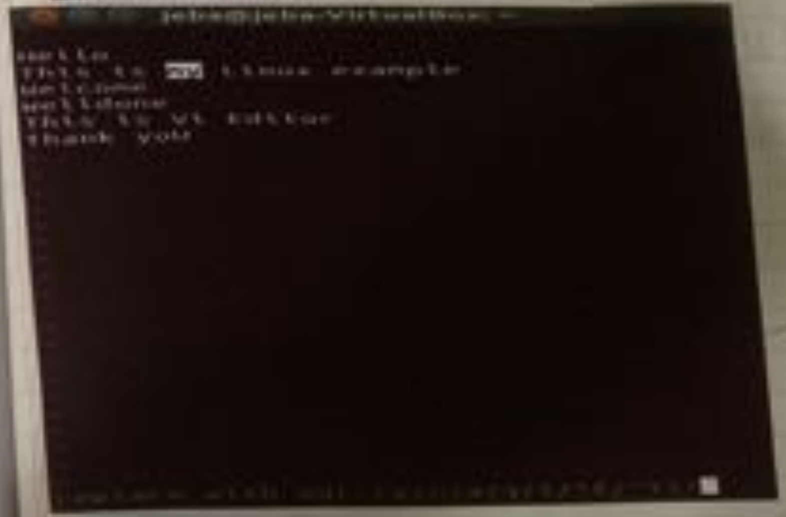
Syntax: /g/ word to be replaced /s/ newword /gc



```
hello
This is my Linux example
Welcome
Welldone
This is vi Editor
Thank you

:g/my/s//our/gc
```



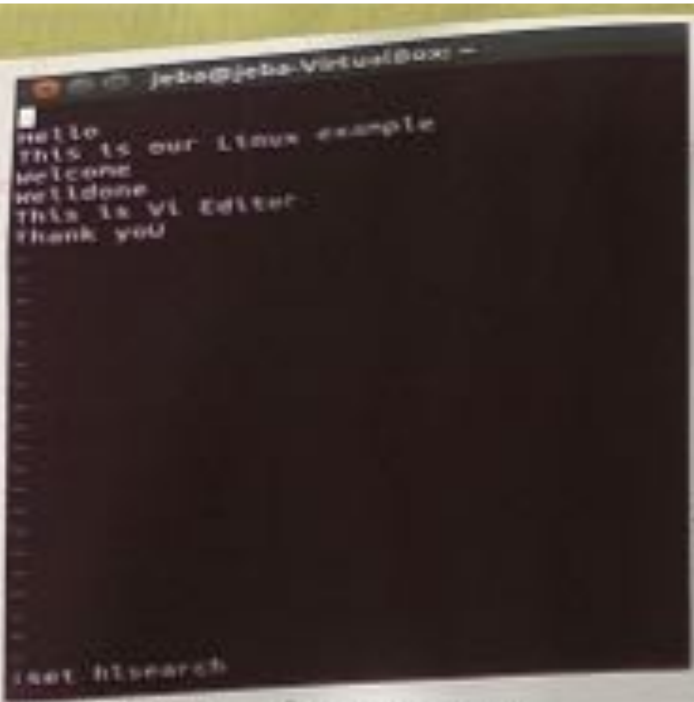
```
hello
This is our Linux example
Welcome
Welldone
This is vi Editor
Thank you
```



```
hello
This is my Linux example
Welcome
Welldone
This is vi Editor
Thank you
```

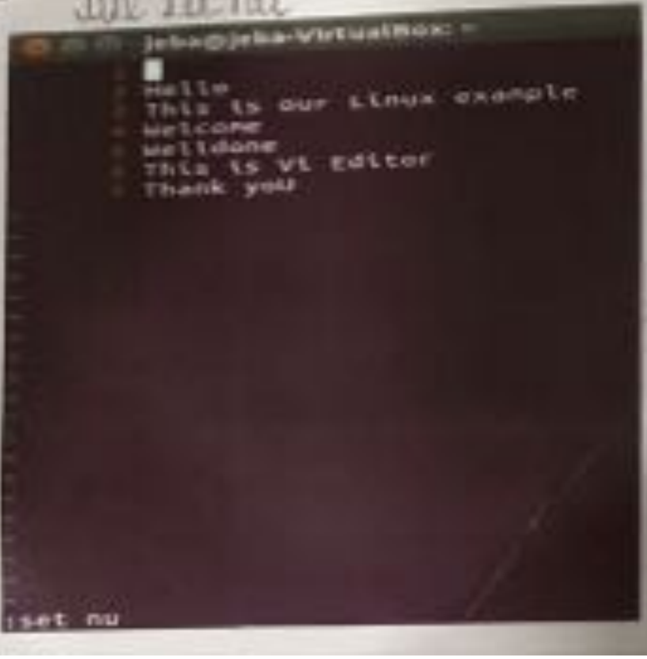
2] Highlight

Use set hlsearch



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

:set hlsearch
```

5] show the line number
use :set nu



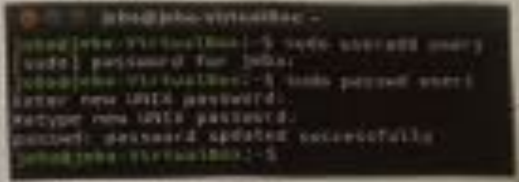
```
jeba@jeba-VirtualBox: ~
      1 
      2 Hello
      3 This is our Linux example
      4 Welcome
      5 Welldone
      6 This is Vi Editor
      7 Thank you

:set nu
```

Practical 8

Title : Linux security

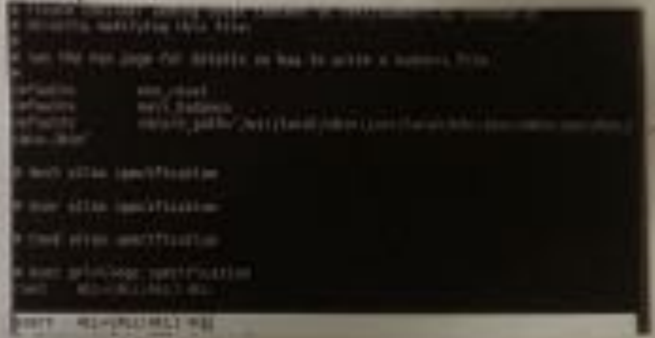
Q1] Use of sudo to change user privileges to root.

Create an user named user1

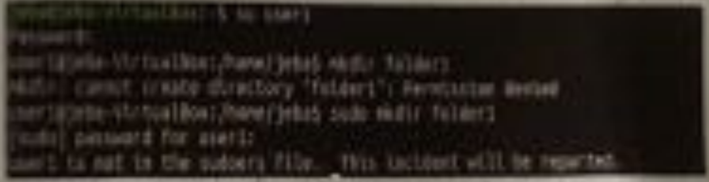


```
jeba@jeba-VirtualBox: ~
jeba@jeba-VirtualBox:~$ sudo useradd user1
[sudo] password for jeba:
jeba@jeba-VirtualBox:~$ sudo passwd user1
Enter new UNIX password:
Retype new UNIX password:
passwd: password updated successfully
jeba@jeba-VirtualBox:~$
```

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

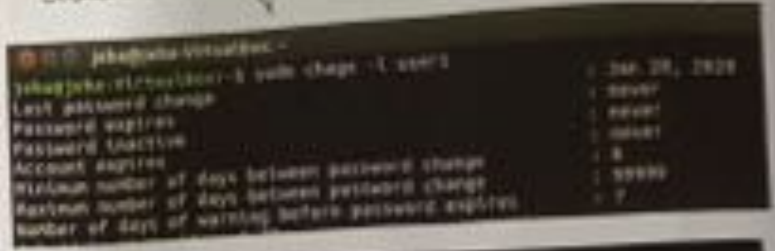


Q2] Identify operations that require sudo privileges

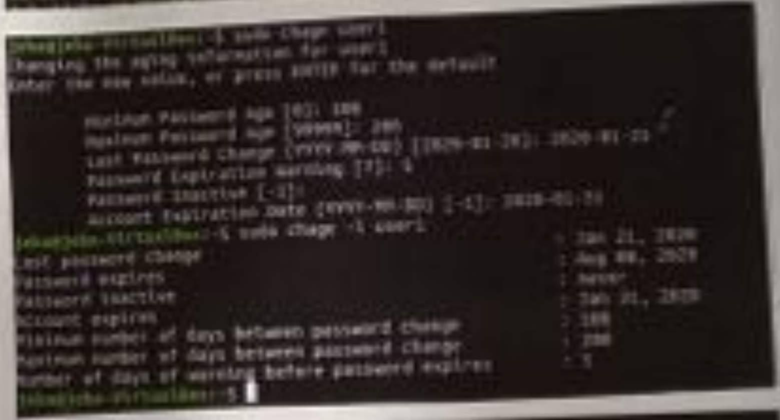


```
jeba@jeba-VirtualBox:~$ su user1
Password:
user1@jeba-VirtualBox:/home/jeba$ mkdir folder1
mkdir: cannot create directory 'folder1': Permission denied
user1@jeba-VirtualBox:/home/jeba$ sudo mkdir folder1
[sudo] password for user1:
user1 is not in the sudoers file.  This incident will be reported.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

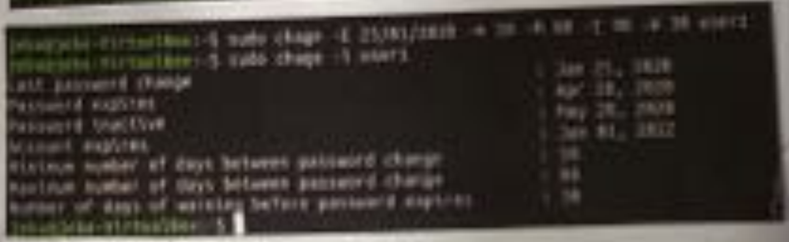
3] Modify expiration data from new user using password ageing



```
jeba@jeba-VirtualBox:~$ sudo chage -l user1
Last password change                                    : Jan 28, 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
```



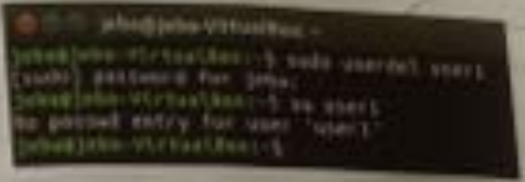
```
jeba@jeba-VirtualBox:~$ sudo chage user1
Changing the aging information for user1
Enter the new value, or press ENTER for the default

        Minimum Password Age [0]: 100
        Maximum Password Age [99999]: 200
        Last Password Change (YYYY-MM-DD) [2020-01-28]: 2020-01-21
        Password Expiration Warning [7]: 5
        Password Inactive [-1]:
        Account Expiration Date (YYYY-MM-DD) [-1]: 2020-01-21
jeba@jeba-VirtualBox:~$ sudo chage -l user1
Last password change                                    : Jan 21, 2020
Password expires                                        : Aug 08, 2020
Password inactive                                       : never
Account expires                                         : Jan 21, 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 30 -M 60 -I 90 -W 30 user1
jeba@jeba-VirtualBox:~$ sudo chage -l user1
Last password change                                    : Jan 21, 2020
Password expires                                        : Apr 18, 2020
Password inactive                                       : May 28, 2020
Account expires                                         : Jan 01, 2022
Minimum number of days between password change          : 30
Maximum number of days between password change          : 60
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: No. of days of warning before password change is required

4] Delete newly added user



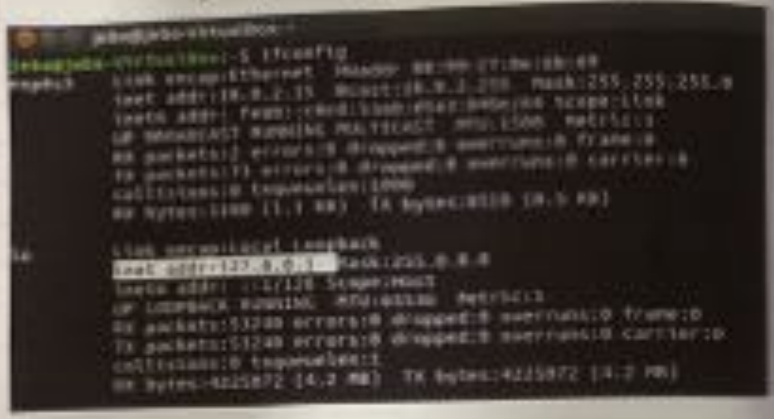
```
jeba@jeba-VirtualBox:~$ sudo userdel user1
[sudo] password for jeba:
jeba@jeba-VirtualBox:~$ su user1
No passwd entry for user 'user1'
jeba@jeba-VirtualBox:~$
```

07/02

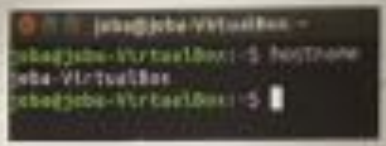
Practical No 9

Title : Network Management

Q.1] Get IP address of your machine using ifconfig

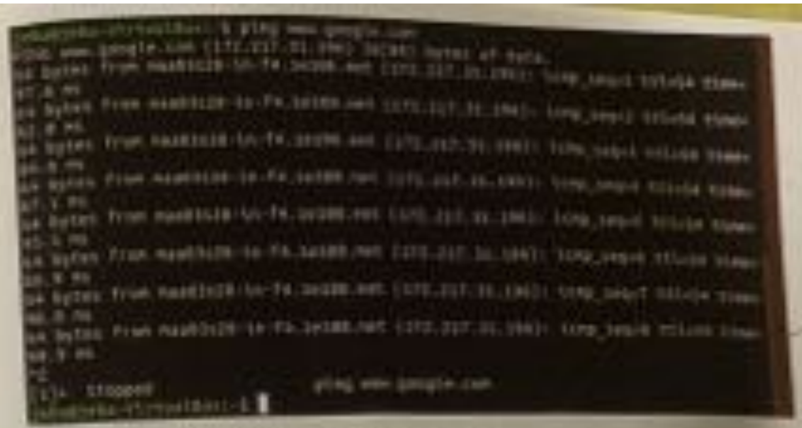


Q.2] Get hostname of your machine

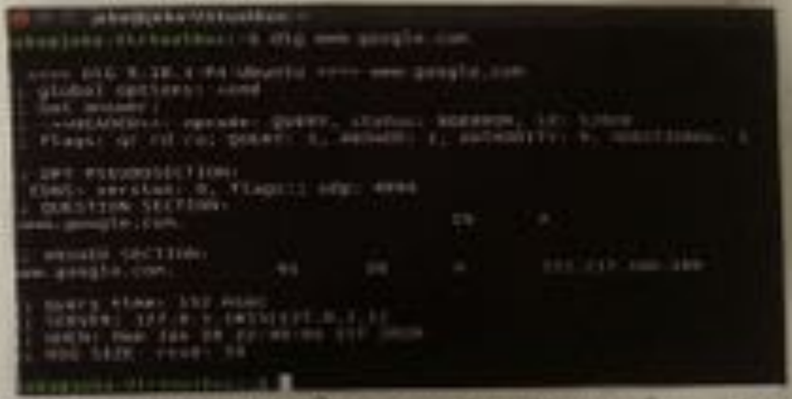


```
jeba@jeba-VirtualBox:~$ hostname
jeba-VirtualBox
jeba@jeba-VirtualBox:~$
```

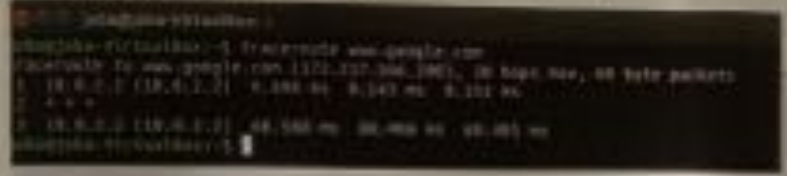
Q.3] Using ping to check the network connectivity to remote machine.

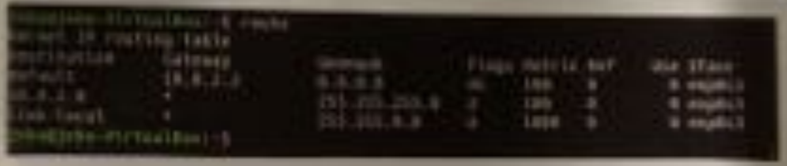


Q.4] Use of dig command

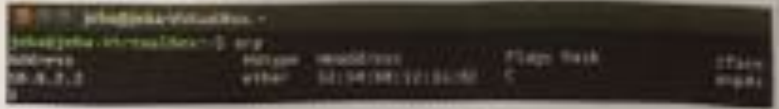


Q.5] Troubleshooting network using trace-route, route command

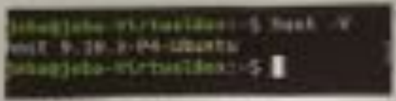




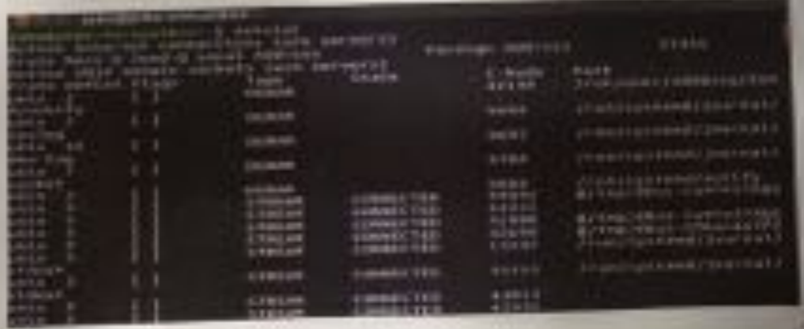
f] use of arp command

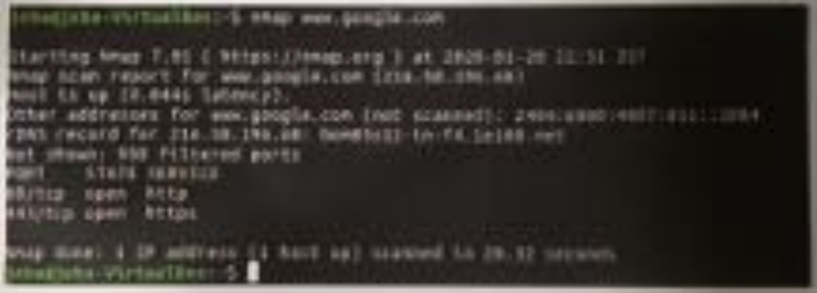


g] use of host command



h] use of netstat command & Nmap command





Practical 10:
Title: Shell Scripting

Basics of shell scripting

a] To get a shell, you need to start a terminal

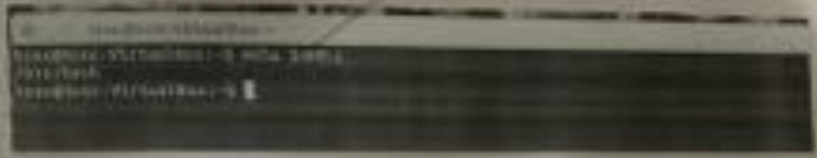
b] To see what shell you have, run: echo $SHELL

c] In Linux, the dollar sign ($) stands for shell variable.

d] The echo command just returns what 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 program /bin/bash.

- echo $SHELL



- vi filename.sh

```
#!/bin/bash
echo "This linux"!
```

- chmod 777 filename.sh
  ./filename.sh

- Step to write and execute 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 script]

e] chmod 777 filename.sh (for making the script executable)

f] sh filename.sh or ./filename.sh (for running the script)

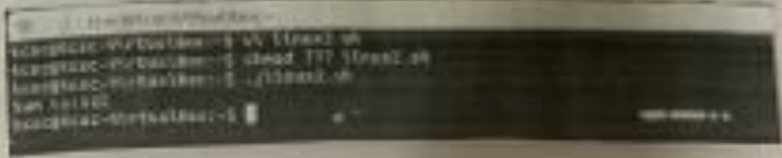
3

- Program to display your name:

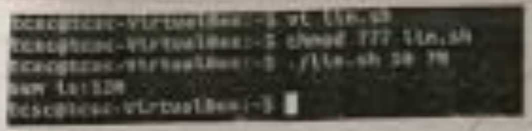
```
#!/bin/bash
Echo "Enter your name:"
Read name
Echo " My name is $ name".
```

- Program to find the sum of two variables

```
vi filename.sh
#!/bin/bash
a=100
b=25
sum=$(($a+$b))
echo "sum is $sum"
```



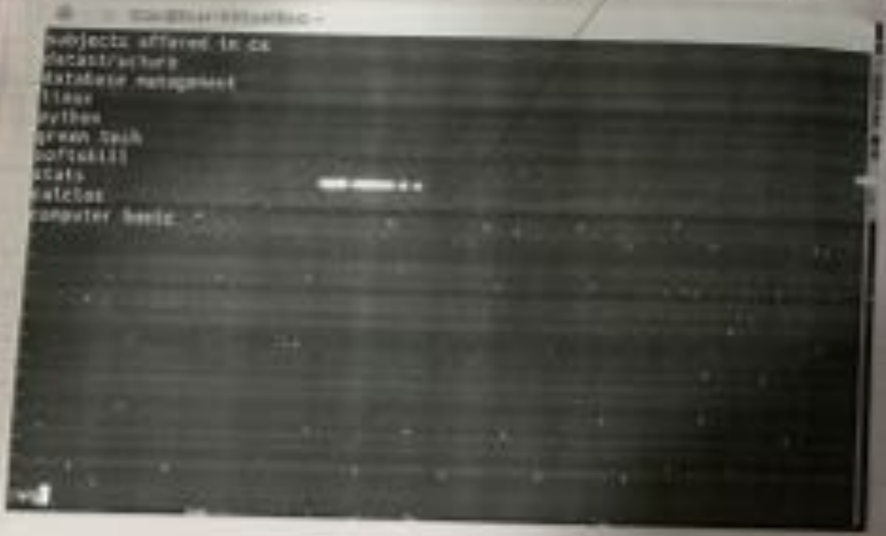
- Program to find sum of two numbers (values passed during execution)



```
tcsc@tcsc-VirtualBox:~$ vi lin.sh
tcsc@tcsc-VirtualBox:~$ chmod 777 lin.sh
tcsc@tcsc-VirtualBox:~$ ./lin.sh 30 90
sum is:120
tcsc@tcsc-VirtualBox:~$ 
```

- SED:

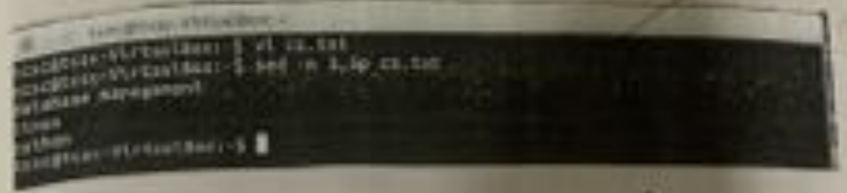
sed command or stream editor is very powerful utility offered by linux systems. It is mainly used for text substitution, find & replace but it can perform other text manipulations like insertion, deletion, search etc. with sed we can edit complete files without actually have to open it.



```
subjects offered in cs
datastructure
database management
linux
python
green tech
softskill
stats
calclus
computer basic
```

1] displaying partial text of a file

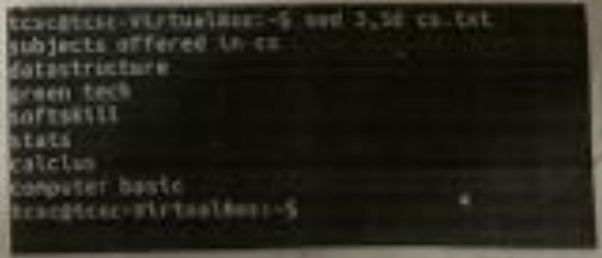
with sed, we can view only part of a file rather than viewing whole file



```
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

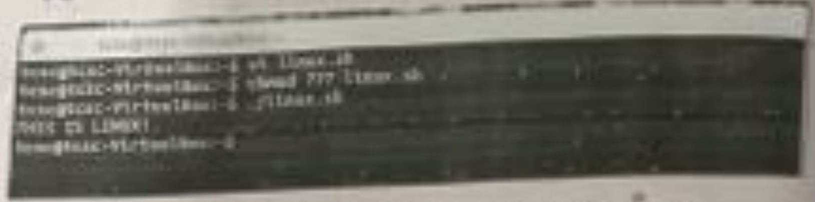
To display all content of a file except for some portion, use option 'd'



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

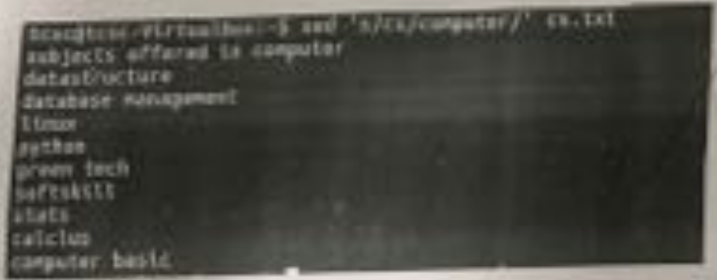
3] deleting a line

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

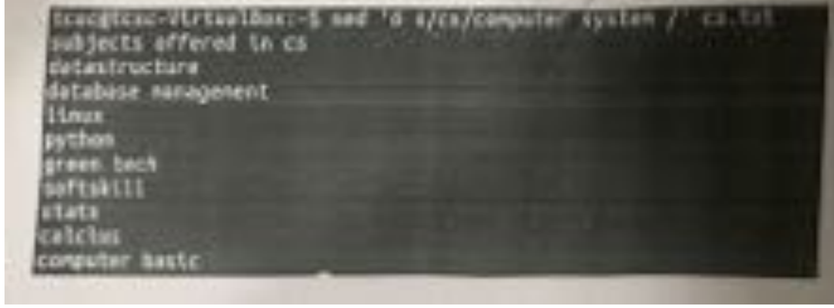
4] search and replacing a string
'<sub></sub>s' option is you searching a word



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

5] Replacing a string on a particular line

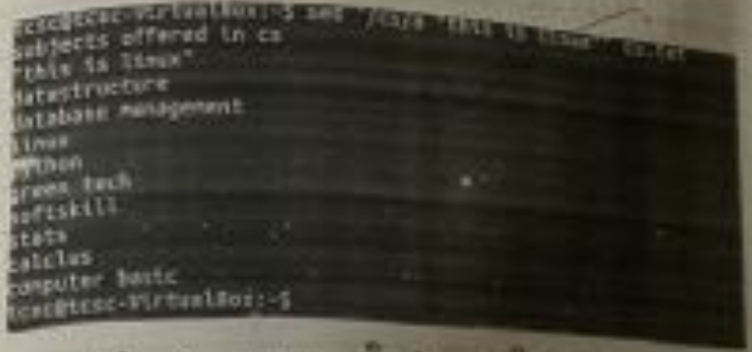
To replace a string on a particular line, use line number with 's' option



```
tcsc@tcsc-VirtualBox:~$ sed '8 s/cs/computer system /' cs.txt
subjects offered in cs
datastructure
database management
linux
python
green tech
softskill
stats
calclus
computer basic
```

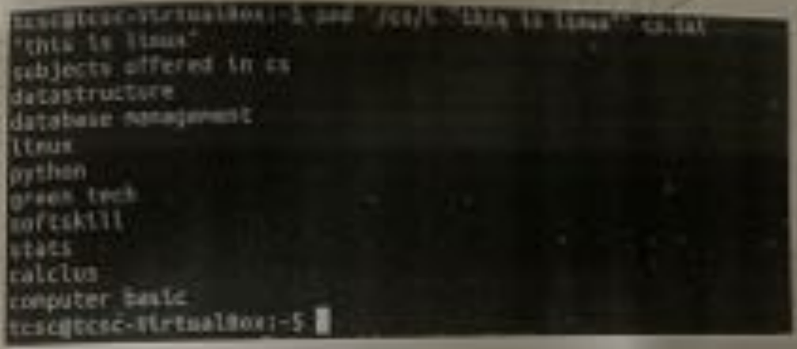
6] Add a line after / before the matched string

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
calclus
computer basic
tcsc@tcsc-VirtualBox:~$
```

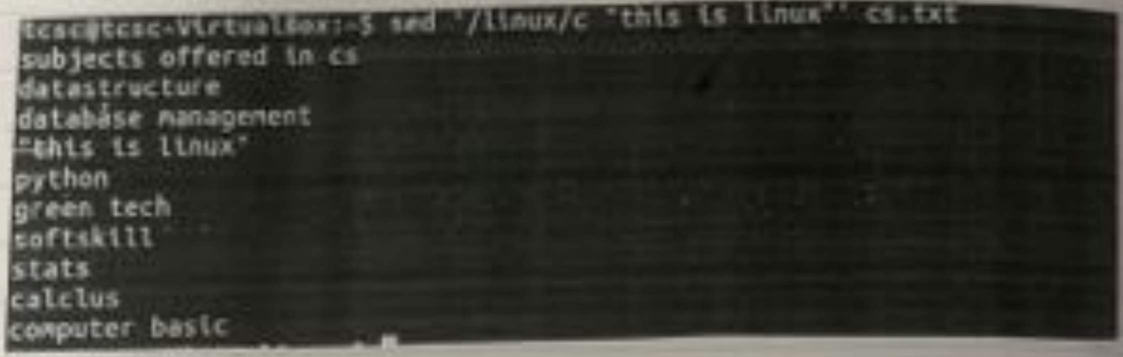
To add a new line with some content before every pattern match, use option 'i'



```
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
calclus
computer basic
tcsc@tcsc-VirtualBox:~$
```

7] To change a whole line with matched pattern

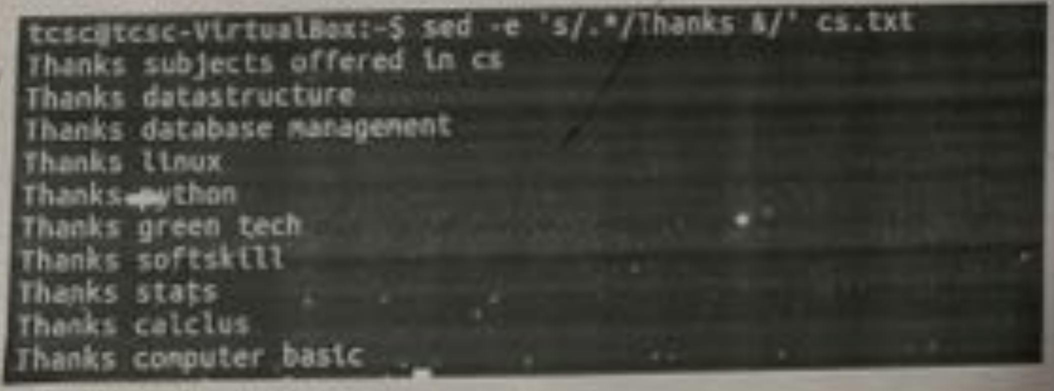
To change a whole line to a new line, when a search pattern matche option 'c'.



```
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
calclus
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 calclus
Thanks computer basic
```