

## Practical - I

### Installation of Linux Software:

In Install your choice of LINUX distribution.

Eg:- (i). Ubuntu, (ii). Fedora,

(iii) Debian,

(iv) Screensavers.

Customize desktop environment by changing effect different default options like unringing, background, themes, screensavers.

To Access App: setting in Ubuntu, lets click user menu at the top right corner, on the top menu bar and select system settings.

A window will pop-up with all setting listed personal: hardware and software options icons. Lets first select the appearance icon.

⇒) Changing Wallpaper theme/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, select Image from there.

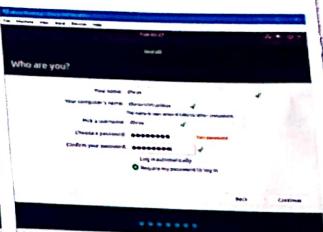
⇒) Changing Ubuntu theme :-

- Ubuntu also has option to change the desktop theme, which is one click will change the entire way your computer looks.
- To do that, click on the drop-down menu. From there choose between Ambiance, Radiance or High contrast.
- Ambiance is a light theme that looks a bit more like Mac, while Radiance looks like a darker brown theme used in Ubuntu in default.

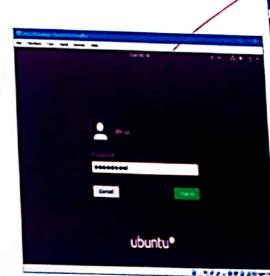
Step5



step6

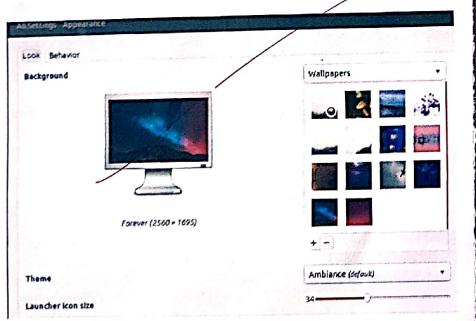


Step7



step8





(4) Screen Resolution *Ascertain the current screen resolution for your desktop.*

- Change the size or rotation of the screen.
- you can change how big (or ~~how~~) things appear on the screen by changing the screen resolution.
  - you can change which way up things appear (for example, if you have a rotating display) 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 ~~from~~ preview area.
  4. Select your desired resolution and rotation.
  5. Click Apply. The new settings will be applied for 30 sec. before reverting back. The way, if you cannot see anything with the new.

(5) Time settings *Change the time zone of your system to (or New York Time).*

- If you are currently in Indian time). Now does the displayed time change.
- After ~~noting~~ noting the time change the time zone back to your local time zone.
- Just ~~click~~ click on the clock on the top bar, and choose Time and Date Settings. Once 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.

## PRACTICAL - 2

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Aim: Installing and removing software.

af. 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'

## Now 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

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.

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That's all for today, see you in the next video!

## PRACTICAL-3

Aim: Utilization of grep, man commands.

Documentation:

- a). 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. Syntax 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) & (back space=down) keys.

Another more summarized form of showing info is the 'man' command.

b]. finding main page from cmd line: Bring up the man page for the 'ls' command. scroll down the 4th example 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!

### a). 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

\* There are certain terms that have different functions in different sections (eg: 'printf' as a command appears in section 1. of a 'stdlib' function appears in section 3), in case 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 use to show every matching page in a row.

a) finding main page by section from the command line  
 bring up the man page for the printf lib function  
 which manual page section and library function  
 not found.

Ans : the human responses to what section of the page is known ; 1 is user command, while 2 is sysadmin stuff. The man page for man itself explain it and list the 6th one.

You can tell what section a command you are with 'man -k' (equivalent to grep approach).

It will do something more so you need to use "num" to limit it.

\*) \$ man 1 printf

\$ man 3 printf

\$ man -k printf

printf

printf

printf

printf

printf (built-in)

printf (built-in)

(1) - format and print data

(2) - write formatted output

(3) - formatted output conversion

(3p) - print formatted output

(1) - bash built-in command embedded

command-line (CL) Help list the  
available options for the mkdir command. How can  
you do this? 50

⇒ ~~\$ mkdir -m a=rwx direction.~~

J.R.  
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## PRACTICAL NO - 4

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Command Line Interface Operations:

Install new package

On your system

sudo apt-get install [package name]

remove the package installed

sudo apt-get remove [package name]

Find the password file in /usr/bin command

# find / -name passwd

\* /usr/share/doc/nss-1.2.5.3/panel/passwd

\* /usr/bin/passwd

\* /etc/pam.d/passwd

\* /etc/passwd

Find the directory passwd file under root and one level down

# find / -maxdepth 2 -name passwd

\* /etc/passwd

Find the passwd file under root and 2 level down.

# find / -maxdepth 3 -name

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~~# m / tñp / example . tñp + 11/10 / g~~

Step - by step solution next  
Delete the file moved to

~~my example~~ #

~~+x4 example~~ ~~turn~~ ~~#~~

Create an empty file example.txt and type the following text in it.

# file1.gff - file2.gff

• dots + soj uj punaf

a symbolic link to  
etc/pam.d/passwd.

passad / 469 / 180 /

good man - so good man - so good man - good #

level 2 ~~for~~ & 4 .

· passed / 2+2 / -

pmmod / p-mod / 2d / -

· pmssod/ u59/ 150 / -

of 15, ps, 9809 Community.

• 51 ~~51~~ ~~whereas~~

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Ques:- file operations.

1. Explore mounted file systems on your computer.  
Ans :- df -k.

Ques:- what are the different ways of exploring mounted file systems on LINUX?

Ans :- mount.

Ques:- Copying test from files.

Ans :- cp command, mv command

```
jeba@jeba-VirtualBox:~$ df -h
Filesystem      1K-blocks   Used   Available  Mounted on
/dev/sda1        404438     8    404430  /dev
tmpfs            3883372   3326824   518 /run
tmpfs            51200       0    51200   /dev/shm
tmpfs            51200       4    51196   /dev/lock
tmpfs            51200       0    51200   /sys/fs/cgroup
tmpfs            51200       0    51200   /run/user/1000
tmpfs            102400      48   102388  /run/lock
```

```
jeba@jeba-VirtualBox:~$ ls -l /sys/fs/cgroup
total 0
drwxr-xr-x 1 root root 0 Jan  8 22:15 cgroup
drwxr-xr-x 1 root root 0 Jan  8 22:15 dev
drwxr-xr-x 1 root root 0 Jan  8 22:15 freezer
drwxr-xr-x 1 root root 0 Jan  8 22:15 kmem
drwxr-xr-x 1 root root 0 Jan  8 22:15 memory
drwxr-xr-x 1 root root 0 Jan  8 22:15 perf_event
drwxr-xr-x 1 root root 0 Jan  8 22:15 pids
drwxr-xr-x 1 root root 0 Jan  8 22:15 cpuset
drwxr-xr-x 1 root root 0 Jan  8 22:15 devices
drwxr-xr-x 1 root root 0 Jan  8 22:15 blkio
drwxr-xr-x 1 root root 0 Jan  8 22:15 hugetlb
drwxr-xr-x 1 root root 0 Jan  8 22:15 net
drwxr-xr-x 1 root root 0 Jan  8 22:15 storage
drwxr-xr-x 1 root root 0 Jan  8 22:15 user_ns
drwxr-xr-x 1 root root 0 Jan  8 22:15 cpuset
drwxr-xr-x 1 root root 0 Jan  8 22:15 freezer
drwxr-xr-x 1 root root 0 Jan  8 22:15 memory
drwxr-xr-x 1 root root 0 Jan  8 22:15 perf_event
drwxr-xr-x 1 root root 0 Jan  8 22:15 pids
drwxr-xr-x 1 root root 0 Jan  8 22:15 devices
drwxr-xr-x 1 root root 0 Jan  8 22:15 blkio
drwxr-xr-x 1 root root 0 Jan  8 22:15 hugetlb
drwxr-xr-x 1 root root 0 Jan  8 22:15 net
drwxr-xr-x 1 root root 0 Jan  8 22:15 storage
drwxr-xr-x 1 root root 0 Jan  8 22:15 user_ns
```

```
jeba@jeba-VirtualBox:~/Desktop$ cat >hi.txt
hi
hi
hi
^C
jeba@jeba-VirtualBox:~/Desktop$ cat >hii.txt
hello
hello
hello
^C
jeba@jeba-VirtualBox:~/Desktop$ diff -u hi.txt hii.txt >sam.patch
jeba@jeba-VirtualBox:~/Desktop$ patch <sam.patch
patching file hii.txt
jeba@jeba-VirtualBox:~/Desktop$ cat sam.patch
--- hi.txt      2028-01-08 22:14:55.163569834 +0530
+++ hii.txt    2028-01-08 22:15:16.259898738 +0530
@@ -1,3 +1,3 @@
-hi
+hi
+hello
+hello
jeba@jeba-VirtualBox:~/Desktop$
```

4. Archiving and backup the work directory using tar, gzip and bzip2 commands.  
Ans:- gzip filename.txt
  5. Use diff command to create diff of two files  
Ans:- diff filename1 filename2
  6. Use patch command to patch a file. And analyze the patch using patch command again.

```
jeba@jeba-VirtualBox:~/jeb$ ls  
dd.txt.gz ss.txt.bz2  
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
```

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```
jeba@jeba-VirtualBox:~$ who
jeba@jeba-VirtualBox:~$ who -r
jeba@jeba-VirtualBox:~$ whoami
jeba@jeba-VirtualBox:~$ who -l
jeba@jeba-VirtualBox:~$ who -u
jeba@jeba-VirtualBox:~$ who -n
jeba@jeba-VirtualBox:~$ who -t
jeba@jeba-VirtualBox:~$ who -d
jeba@jeba-VirtualBox:~$ who -i
jeba@jeba-VirtualBox:~$ who -o
jeba@jeba-VirtualBox:~$ who -s
jeba@jeba-VirtualBox:~$ who -w
```

```
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 tty :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: 0.68, 0.77, 0.37
USER TTY FROM IDLE WHAT
jeba tty :0 4:38 /sbin/upstart --user
jeba@jeba-VirtualBox:~$ w -h
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
```

Ans: alias label="command"

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

### Aims:- USE ENVIRONMENT

which account you are logged in? How do you find out? Who command and whoami.

Ans:

- 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 characters encrypted. A blank entry indicates a password is not required to log in (usually a bad idea).

### ~~THE HISTORY~~

- c) Explore different ways of getting command history to run previously executed command without f

Ans: History.

! line number

- c). Create alias to most commonly used commands.  
 ⇨ Alias command instructs the shell to replace one setting with another setting while executing commands

e.g.: alias label = "command"

```
jeba@jeba-VirtualBox:~$ sudo cat /etc/shadow
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:::
```

```
jeba@jeba-VirtualBox:~$ pwd
/home/jeba
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
LOGIN    tty1          2020-01-15 20:30
jeba@jeba-VirtualBox:~$
```

```
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:4:0: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
```

## PRACTICAL - 7

८

He is a man of great energy and enthusiasm.

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

Q). Creating a file

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

Q). Modifying the file:

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

```
:set hlsearch
```

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

1 Hello

2 This is our Linux example

3 Welcome

4 Welldone

5 This is vi Editor

6 Thank you

Hello This is my Linux example  
Welcome Welldone  
This is Vi Editor  
Thank you

## Word Navigation

### Action

Ctrl + b

key

Moves forward to the beginning of word.

e

Moves forward to the beginning of word.

w

Moves forward to the first character of word.

0 (zero)

Moves to the end of the line.

\$

## Scrolling

### Action

Ctrl + f

key

Scrolls forward

Ctrl + b

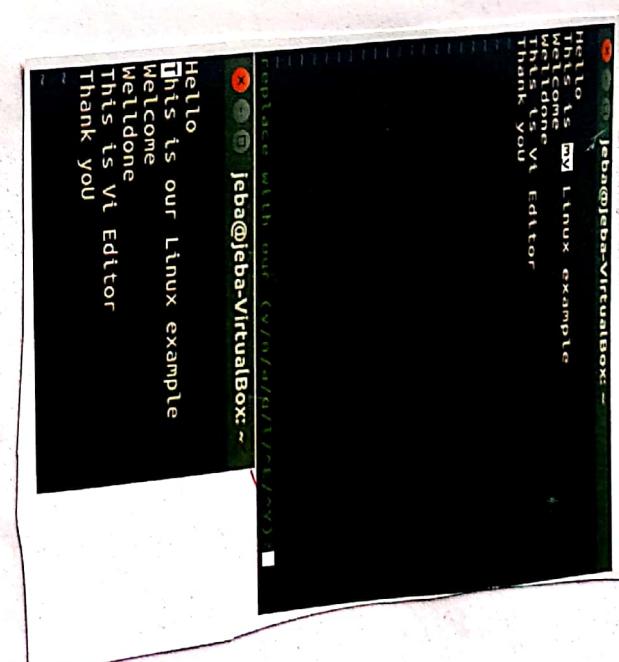
Scrolls backward

Ctrl + d

Scrolls half page down

Ctrl + u

Scrolls half page backward



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## PRACTICAL - 8.

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### LINUX SECURITY

Use of ~~Sudo~~ to change user privileges for root.

Create an user named user1.

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

```
# 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
#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 privilege specification
#
# User ALL=(ALL:ALL) ALL
User1 ALL=(ALL:ALL) ALL
```

b). Identify operations that require sudo privileges

Q. Modify expiration date for new user using password aging

- E : Expiration Date
- m : minimum number of days before password is valid.
- M : Number of days of warning before a password change is required.
- I : Account inactive.
- W : Number of days of warning before password expires.

d). Delete newly added user.

```
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
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 -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
```

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## PRACTICAL - 9

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### Practical - Network Management.

Get IP address of your machine using ifconfig.

QUESTION - 9

```
jessiebox:~$ traceroute www.google.com
jessiebox:~$ traceroute www.google.com (172.21.166.100), 30 hops max, 60 byte packets
traceroute to www.google.com (172.21.166.100):
1  10.0.2.2 (10.0.2.2)  0.190 ms  0.143 ms  0.151 ms
2  ... (10.0.2.2)  69.508 ms  68.486 ms  69.405 ms
3  10.0.2.2 (10.0.2.2)  69.508 ms  68.486 ms  69.405 ms
jessiebox:~$
```

```
jessiebox:~$ route
Kernel IP routing table
Destination     Gateway      Genmask       Flags Metric Ref    Use Iface
          0.0.0.0      0.0.0.0   0.0.0.0      UG        0      0    enp0s3
          255.255.0.0   0.0.0.0   255.255.0.0  U         0      0    enp0s3
          255.255.255.0 0.0.0.0  255.255.255.0 U         0      0    enp0s3
            10.0.2.0   0.0.0.0   255.255.0.0  U        1000   0    enp0s3
              link-local 0.0.0.0  255.255.0.0  U        1000   0    enp0s3
jessiebox:~$
```

PRACTICE - 8 :-

```
jessiebox:~$ sudo chage -E 25/01/2020 -m 10 -n 90 -I 30 -W 30 user1
jessiebox:~$ sudo chage -l user1
Last password change          : Jan 21, 2020
Password expires               : Apr 26, 2020
Password warning               : May 26, 2020
Password inactive              : Jan 01, 2022
Account expires                :
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
jessiebox:~$
```

Get hostname of your machine

c). Use ping to check the network where (VirtualBox) to generate machines

d). Use of dig command

```
jeba@jeba-VirtualBox:~$ ifconfig  
enp0s3 Link encap:Ethernet HWaddr 0B:00:27:00:18:18  
inet addr:10.0.2.15 Bcast:10.0.2.255 Mask:255.255.255.0  
inet6 addr: fe80::cccd:5a0d%enp0s3/64 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:180 (1.1 kB) TX bytes:18518 (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:~  
jeba@jeba-VirtualBox:~$ sudo userdel user1  
[sudo] password for jeba:  
jeba@jeba-VirtualBox:~$ su user1  
No passwd entry for user 'user1'  
jeba@jeba-VirtualBox:~$
```

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

Troubleshooting network using traceroute, route command

a) Use of ARP arp command

b) Use of host command.

```
jeba@jeba-VirtualBox:~$ hostname
jeba@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=
80.8 ms
64 bytes from maa03s28-in-f4.1e100.net (172.217.31.196): icmp_seq=4 ttl=54 time=
87.4 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:~$ host -V
host 9.10.3-P4-Ubuntu
jeba@jeba-VirtualBox:~$ I
```

Government and Nonprofit Committee

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Category	Sub-Category	Parameter	Value	Description
System Configuration	Processor	CPU Type	Intel Core i9-13900K	High-performance 13th Gen Intel Core processor.
		Clock Speed	5.5 GHz	Supports up to 5.5 GHz base clock speed.
		Cache Size	64 MB L3	Large L3 cache for improved performance.
		Hyper-Threading	Enabled	Supports Hyper-Threading technology.
		Virtualization	Enabled	Supports Intel VT-x virtualization technology.
	Memory	RAM Type	DIMM DDR5	Supports DDR5 RAM modules.
		RAM Capacity	64 GB	Total system memory capacity.
		RAM Speed	4800 MHz	RAM clock speed.
		RAM Channel	4x4	Number of RAM channels.
		RAM ECC	Enabled	Supports ECC memory.
Storage	HDD Type	SATA III	Supports SATA III storage drives.	
	HDD Capacity	1 TB	Capacity of the primary storage drive.	
	HDD Speed	7200 RPM	Rotational speed of the hard disk drive.	
	Solid State Drive (SSD)	PCIe NVMe M.2	Supports PCIe NVMe M.2 SSDs.	
	SSD Capacity	1 TB	Capacity of the secondary storage drive.	
Power Supply	Power Supply Type	ATX	Standard ATX power supply.	
	Power Supply Rating	800W	Minimum power supply rating.	
	Power Supply Efficiency	80+	Efficiency rating of the power supply.	
	Power Supply Modularity	Modular	Supports modular power supply design.	
	Power Supply Noise	Low	Low noise output.	
Cooling System	Cooler Type	AIR COOLED	Standard air-cooled cooler.	
	Cooler Rating	120mm	Size of the cooling fan.	
	Cooler Speed	1400 RPM	Fan speed.	
	Cooler Noise	Medium	Fan noise level.	
	Cooler Efficiency	Good	Efficiency of the cooling system.	
Case & Chassis	Case Type	Tower	Standard tower case.	
	Case Material	Aluminum	Case material.	
	Case Dimensions	400 x 200 x 100 mm	Case dimensions.	
	Case Weight	5 kg	Case weight.	
	Case Noise	Low	Case noise level.	
Power Management	Battery Type	None	No battery support.	
	Battery Capacity	N/A	N/A.	
	Battery Life	N/A	N/A.	
	Battery Efficiency	N/A	N/A.	
	Battery Noise	N/A	N/A.	
Network & Connectivity	Network Interface	PCIe WiFi 6E	Supports PCIe WiFi 6E.	
	Network Speed	2.4 GHz / 5 GHz	Wireless network speeds.	
	Network Range	Up to 100m	Wireless range.	
	Network Power	Low	Low power consumption.	
	Network Noise	Medium	Medium noise level.	
Power Management	Power Management	UEFI	UEFI-based power management.	
	Power Consumption	Low	Low power consumption.	
	Power Efficiency	Good	Good efficiency.	
	Power Noise	Medium	Medium noise level.	
	Power Management	UEFI	UEFI-based power management.	
Performance	Processor Performance	Excellent	Excellent performance.	
	Processor Efficiency	Good	Good efficiency.	
	Processor Noise	Medium	Medium noise level.	
	Processor Power	High	High power consumption.	
	Processor Cooling	Good	Good cooling performance.	
Reliability	Processor Reliability	Very Good	Very good reliability.	
	Processor Durability	Good	Good durability.	
	Processor Lifespan	5+ years	Processor lifespan.	
	Processor Cooling	Good	Good cooling performance.	
	Processor Power	High	High power consumption.	
Overall Rating	Overall Rating	Excellent	Overall excellent rating.	
	Overall Durability	Good	Good durability.	
	Overall Lifespan	5+ years	Processor lifespan.	
	Overall Cooling	Good	Good cooling performance.	
	Overall Power	High	High power consumption.	

```
root@vbox-01:~# nmap www.google.com
Starting Nmap 7.01 ( https://nmap.org ) at 2013-01-29 22:53:15
Nmap scan report for www.google.com (178.62.196.68)
Host is up (0.04s latency).
Other addresses for www.google.com (not scanned):
        2404:6800:4007::8000
Nmap scan finished at 2013-01-29 22:53:15 -- 0.00s to complete; 1 IP address (1 host up) scanned in 20.32 seconds
root@vbox-01:~#
```



program to find the sum of variables

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#!/bin/bash

a=100

b=25

sum=\$(( \$a +\$b ))

ECHO "sum is: \$sum".

=) program to find the sum of 2 numbers (values passed during execution),

```
tc@tc-OptiPlex-5070:~
```

```
tc@tc-OptiPlex-5070:~$ cd /home/tc
```

```
tc@tc-OptiPlex-5070:~/home/tc$ ./sum.sh
```

```
tc@tc-OptiPlex-5070:~/home/tc$ sum 15:25
```

```
tc@tc-OptiPlex-5070:~/home/tc$
```

"lin.sh" 3 lines, 46 characters

5) replace a string in a particular line

6) add a line before the inserted string.

To add a new line with some content before every python print, use option [q].

```
tsc@tsc-VirtualBox:~$ sed '1c/a "this is linux" > .in' subjects offered in cs  
subjects offered in cs  
this is linux  
datastructure  
database management  
linux  
python tech  
softskill  
stats  
calculus  
computer basic  
tsc@tsc-VirtualBox:~$  
tsc@tsc-VirtualBox:~$ sed '1c/a "this is linux" > .in' subjects offered in cs  
subjects offered in cs  
this is linux  
datastructure  
database management  
linux  
python tech  
softskill  
stats  
calculus  
computer basic  
tsc@tsc-VirtualBox:~$ |
```

- a) To change a whole line with matched pattern.
- b) To change a whole line to search pattern match, use Option 'C'.

```
tsc@tsc-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
```

### Appending Lines.

- b) To add some content before every line with use \*

*if / \n /*

```
tsc@tsc-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
```