AMITY UNIVERSITY UTTAR PRADESH NOIDA

AMITY SCHOOL OF ENGINEERING AND TECHNOLOGY

DEPARTMENT OF COMPUTER SCIENCE AND ENGINEERING

LINUX FOR DEVICES

[CSE 438] PRACTICAL FILE

Submitted By:
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B. TECH(CSE)
BATCH 2021-2025
7CSE-6X

Submitted to:
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INDEX-

S No.	Name of Program	Date of Conduct	Maximum Marks	Marks Obtained	Signature of faculty
1.	Installation of Linux Operating System.				
2.	Study of Unix/Linux general purpose utility command list obtained from (man, cat, cd, cp, ps, ls, mv, rm, mkdir, rmdir, date, time, chmod, pwd, cal) commands.				
3.	Study of vi editor, Study of bash shell,bourne shell and C shell in Unix/Linux operating system.				
4.	Write a shell script program to display “HELLO WORLD”,				
5.	Write a shell script program to develop a scientific calculator.				
6.	Install Docker and run: Start, stop, push, pull, log, docker ps, docker ps –a,create account, docker compose, docker build, docker run				
7.	Write a shell script program to illustrate the implementation of the following: a) Integer Comparison b) String comparison c) Logical operators d) File tests e) Conditional control structure f) Loop control structures				

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8.	Write a shell script to a) print a number in reverse order. b) to reverse the string and reverse each string further in the list c) find the sum of all numbers in a file in Linux d) validate password strength. Here are a few assumptions for the password string. Length – minimum of 8 characters, Contain both alphabet and number, Include both the small and capital case letters.				
9.	Design and develop a “Birthday Reminder” that can automatically send birthday wishes with a personalized message via email.				
10.	Check whether the strings in csv are palindrome.				
11.	Implement NIC Bonding and Teaming in Linux				

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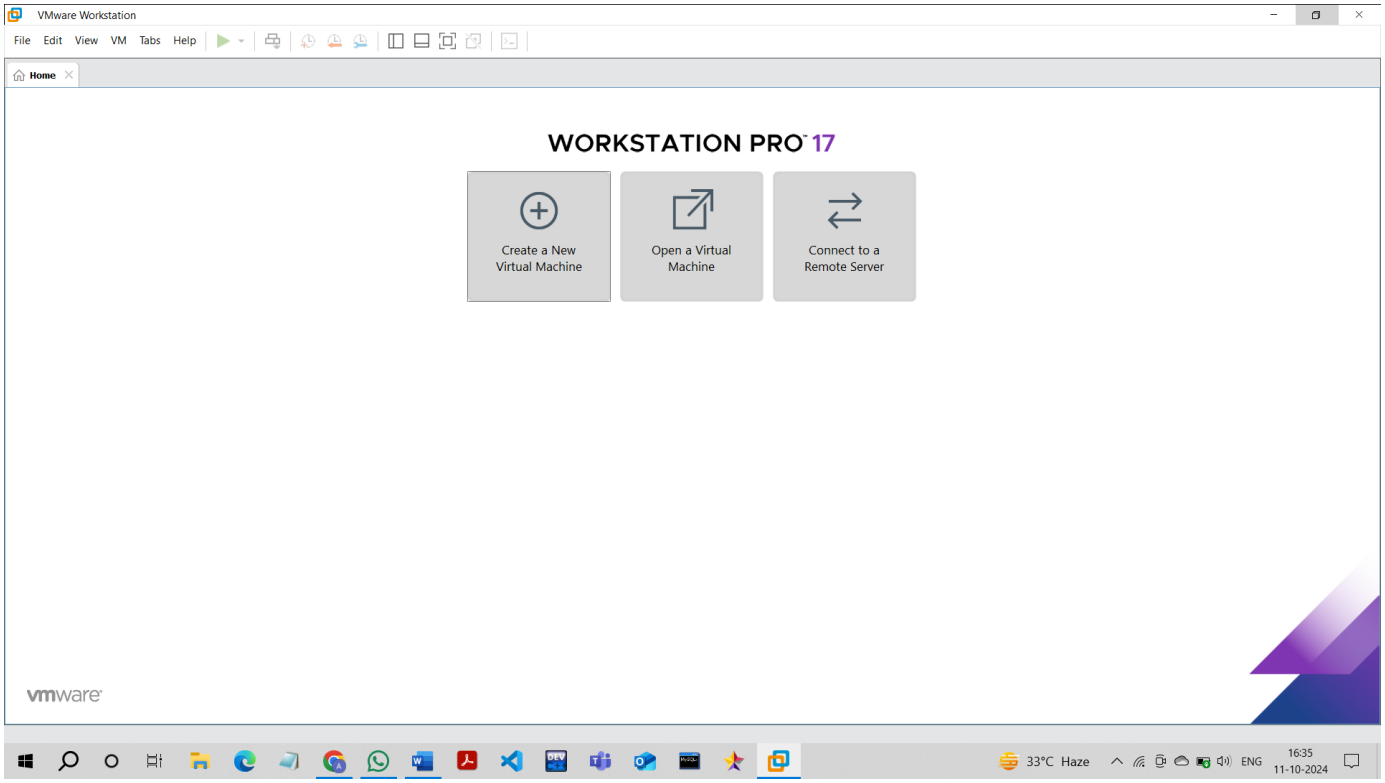
Practical-1

AIM- Installation of Linux Operating System.

THEORY-

- Linux is an open-source operating system (OS). Linux was designed to be like UNIX, but has evolved to run on a wide variety of hardware from phones to supercomputers.
- Every Linux-based OS involves the Linux kernel—which manages hardware resources—and a set of software packages that make up the rest of the operating system. Linux makes very efficient **use** of the system's resources.
- Linux runs on a range of hardware, right from supercomputers to watches. You can give new life to your old and slow Windows system by installing a lightweight Linux system, or even run a NAS or media streamer using a particular distribution of Linux**.**
- Linux is perfect for everyday tasks like browsing, emailing, photo management, financial management, and much more.

PROCEDURE-



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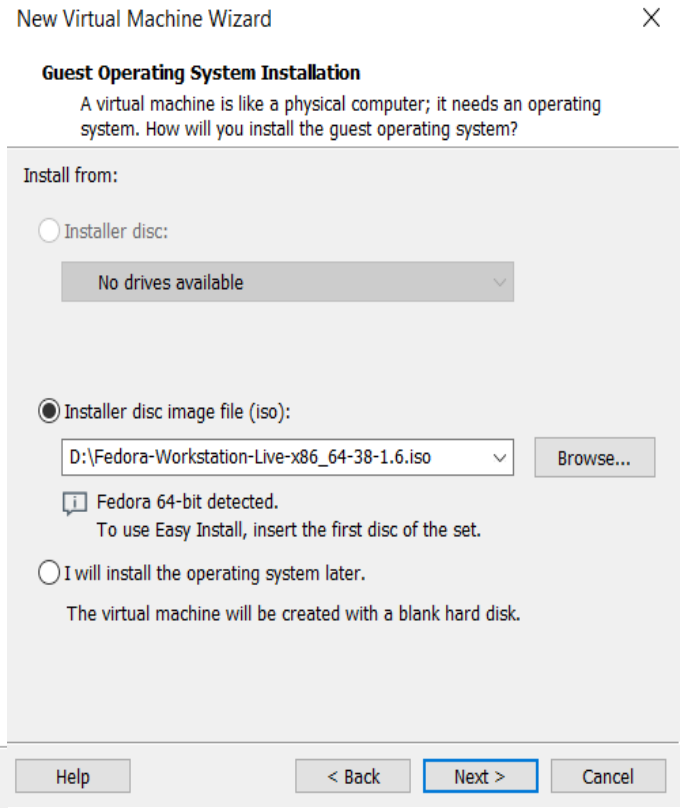

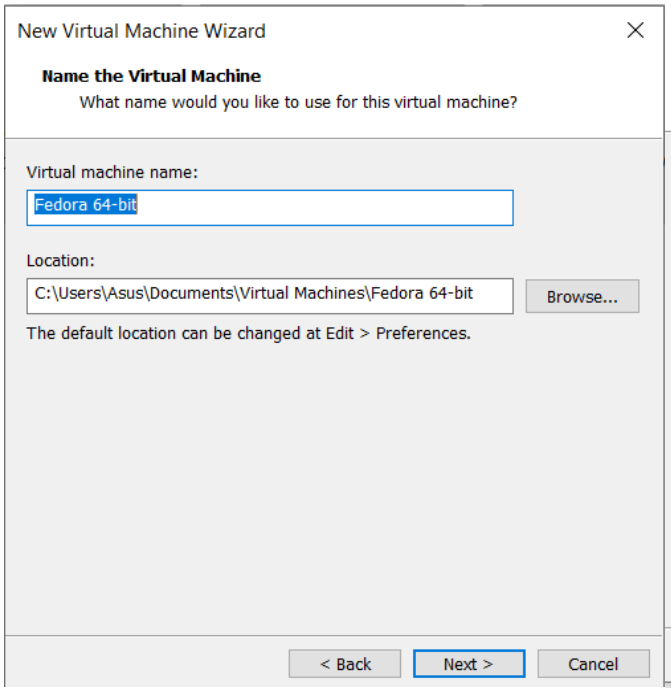

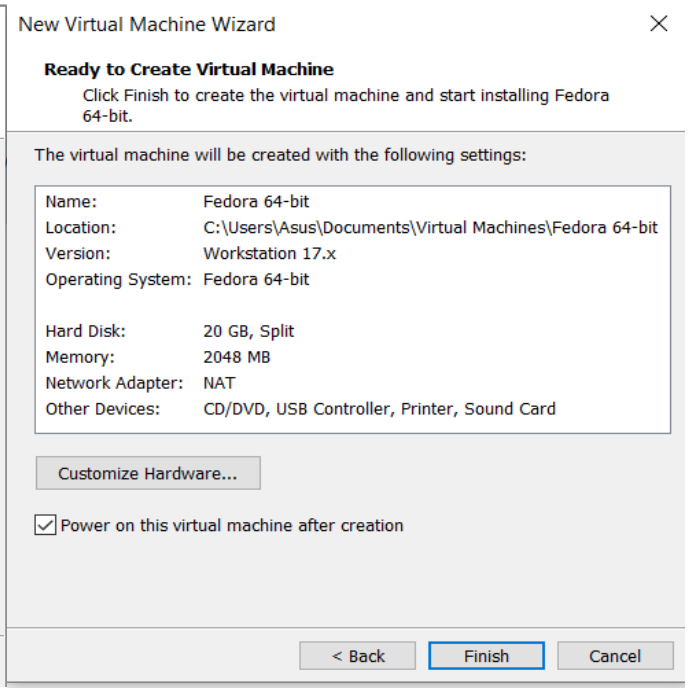

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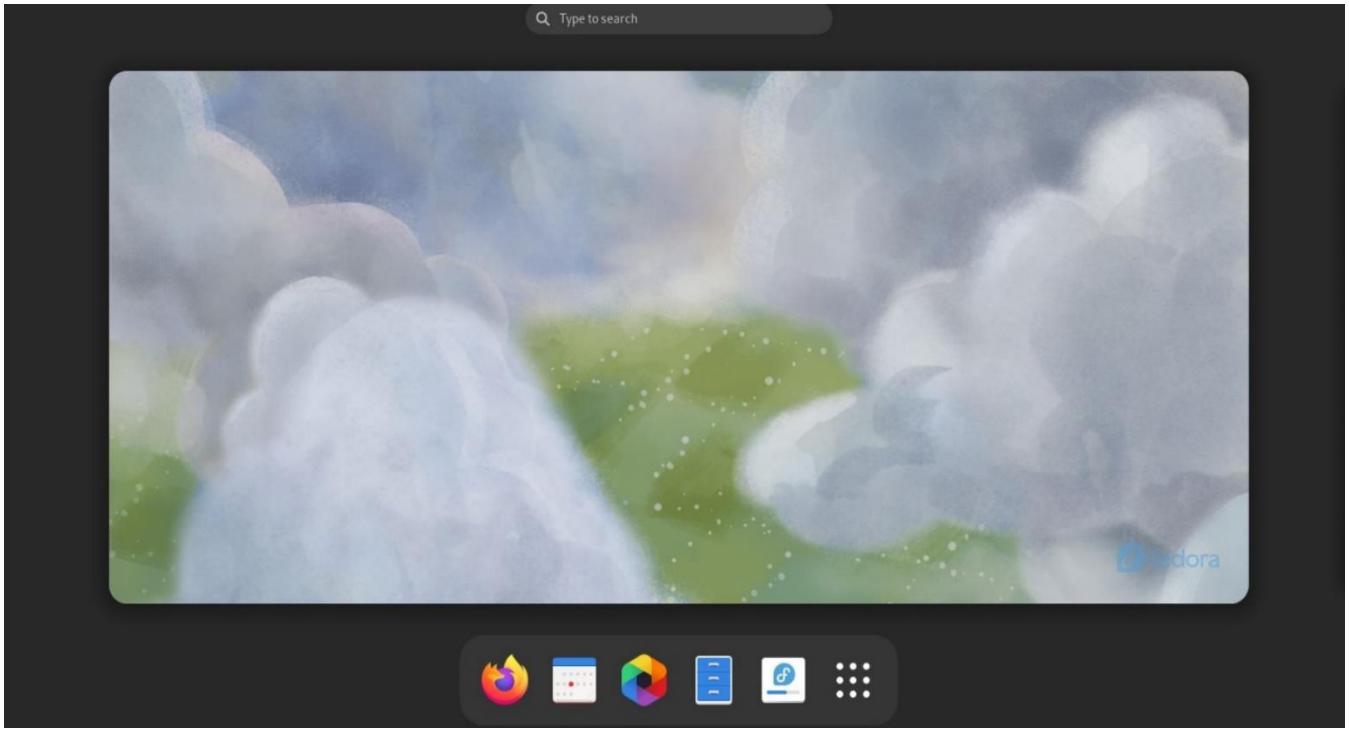

<u>CONCLUSION-</u> Ubuntu has been successfully installed on my device.

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Practical-2

AIM: Study of Unix/Linux general purpose utility command list obtained from (man, who, cat, cd, cp, ps, ls, mv, rm, mkdir, rmdir, echo, more, date, time, kill, history, chmod, chown, finger, pwd, cal, logout, shutdown) commands.

PROCEDURE-

1. man command

Used to display the user manual of any command that we can run on the terminal.

```
linuxlab@linuxlab-VirtualBox:~/Desktop$ man
What manual page do you want?
For example, try 'man man'.
linuxlab@linuxlab-VirtualBox:~/Desktop$ man echo
linuxlab@linuxlab-VirtualBox:~/Desktop$ echo hello
hello
linuxlab@linuxlab-VirtualBox:~/Desktop$
```

2. pwd command

Used to find current path

```
linuxlab@linuxlab-VirtualBox:~/Desktop$ pwd
/home/linuxlab/Desktop
linuxlab@linuxlab-VirtualBox:~/Desktop$
```

3. ls command

It is used to list files in current directory.

```
linuxlab@linuxlab-VirtualBox:~$ ls
dead.letter  Documents  Music     Public        Templates  VIfile.txt
Desktop      Downloads  Pictures  shellfile.sh  Videos
linuxlab@linuxlab-VirtualBox:~$
```

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4. ls -ltr command

It is used to list files by time in reverse order with long listing.

```
linuxlab@linuxlab-VirtualBox:~$ ls -ltr
total 44
drwxr-xr-x 2 linuxlab linuxlab 4096 Nov  9 17:39 Templates
drwxr-xr-x 2 linuxlab linuxlab 4096 Nov  9 17:39 Public
drwxr-xr-x 2 linuxlab linuxlab 4096 Nov 10 11:24 Documents
drwxr-xr-x 2 linuxlab linuxlab 4096 Nov 10 11:25 Downloads
drwxr-xr-x 2 linuxlab linuxlab 4096 Nov 10 11:25 Music
drwxr-xr-x 2 linuxlab linuxlab 4096 Nov 10 11:25 Pictures
drwxr-xr-x 2 linuxlab linuxlab 4096 Nov 10 11:25 Videos
-rw-rw-r-- 1 linuxlab linuxlab   21 Nov 10 11:40 VIfile.txt
-rw-rw-r-- 1 linuxlab linuxlab   18 Nov 10 11:46 shellfile.sh
-rw-rw-r-- 1 linuxlab mail      372 Nov 10 13:07 dead.letter
drwxr-xr-x 2 linuxlab linuxlab 4096 Nov 10 17:47 Desktop
linuxlab@linuxlab-VirtualBox:~$
```

5. history command

This command displays all the commands that were previously being executed by the user.

```
linuxlab@linuxlab-VirtualBox:~$ history
    1  docker
    2  sudo apt install docker.io
    3  docker --version
    4  sudo systemctl status docker
    5  sudo apt-get update
    6  sudo docker run hello-world
    7  docker images
    8  sudo docker images
    9  docker ps
   10  sudo docker ps
   11  sudo docker ps -a
   12  sudo chmod compare.sh
   13  cat > compare.sh
   14  bash compare.sh
   15  cat > string.sh
   16  bash string.shj
   17  bash string.sh
   18  cat >logical.sh
```

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6. ping command

The ping command (packet internet groper) checks connectivity status between host to server.Ping uses ICMP(Internet Control Message protocol) and sends an ICMP echo to the server.It takes an input of an IP address or URL.

```
linuxlab@linuxlab-VirtualBox:~$ ping google.com
PING google.com (142.250.192.110) 56(84) bytes of data.
64 bytes from bom12s17-in-f14.1e100.net (142.250.192.110): icmp_seq=1 ttl=58 ti
me=26.4 ms
64 bytes from bom12s17-in-f14.1e100.net (142.250.192.110): icmp_seq=2 ttl=58 ti
me=28.2 ms
64 bytes from bom12s17-in-f14.1e100.net (142.250.192.110): icmp_seq=3 ttl=58 ti
me=26.6 ms
64 bytes from bom12s17-in-f14.1e100.net (142.250.192.110): icmp_seq=4 ttl=58 ti
me=27.5 ms
64 bytes from bom12s17-in-f14.1e100.net (142.250.192.110): icmp_seq=5 ttl=58 ti
me=27.4 ms
64 bytes from bom12s17-in-f14.1e100.net (142.250.192.110): icmp_seq=6 ttl=58 ti
me=27.4 ms
64 bytes from bom12s17-in-f14.1e100.net (142.250.192.110): icmp_seq=7 ttl=58 ti
me=27.6 ms
64 bytes from bom12s17-in-f14.1e100.net (142.250.192.110): icmp_seq=8 ttl=58 ti
me=27.0 ms
64 bytes from bom12s17-in-f14.1e100.net (142.250.192.110): icmp_seq=9 ttl=58 ti
me=27.9 ms
64 bytes from bom12s17-in-f14.1e100.net (142.250.192.110): icmp_seq=10 ttl=58 t
```

7. **df command-**The df command is used to display the disk space used in the file system. It displays the output as in the number of used blocks, available blocks, and the mounted directory.

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```
linuxlab@linuxlab-VirtualBox:~$ df
Filesystem     1K-blocks    Used Available Use% Mounted on
udev              723808       0    723808   0% /dev
tmpfs             151200    1352    149848   1% /run
/dev/sda5        9736500 8242036    980160  90% /
tmpfs             755984       0    755984   0% /dev/shm
tmpfs               5120       4      5116   1% /run/lock
tmpfs             755984       0    755984   0% /sys/fs/cgroup
/dev/loop5           128     128         0 100% /snap/bare/5
/dev/loop0        224256  224256         0 100% /snap/gnome-3-34-1804/66
/dev/loop1         66432   66432         0 100% /snap/gtk-common-themes/1514
/dev/loop3         31872   31872         0 100% /snap/snapd/11036
/dev/loop4         52352   52352         0 100% /snap/snap-store/518
/dev/loop7        224256  224256         0 100% /snap/gnome-3-34-1804/72
/dev/loop6         66816   66816         0 100% /snap/gtk-common-themes/1519
/dev/loop2         56832   56832         0 100% /snap/core18/1988
/dev/loop8         52224   52224         0 100% /snap/snap-store/547
/dev/loop10        43264   43264         0 100% /snap/snapd/13831
/dev/loop9         56832   56832         0 100% /snap/core18/2246
/dev/sda1         523248       4    523244   1% /boot/efi
tmpfs             151196      20    151176   1% /run/user/1000
linuxlab@linuxlab-VirtualBox:~$
```

8. cd command

The “cd” command is used to change the current directory.

```
linuxlab@linuxlab-VirtualBox:~$ cd Desktop
linuxlab@linuxlab-VirtualBox:~/Desktop$
```

9. cat command

The “cat” command is a multi-purpose utility in the Linux system. It can be used to create a file, display content of the file, copy the content of one file to another file, and more.

```
linuxlab@linuxlab-VirtualBox:~/Desktop$ cat > sample.txt
abc
def
aa
ads
^C
linuxlab@linuxlab-VirtualBox:~/Desktop$
```

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10 .ps command

To view the processes that you're running, use ps command.

```
linuxlab@linuxlab-VirtualBox:~/Desktop$ ps
    PID TTY          TIME CMD
   2160 pts/0    00:00:00 bash
   2318 pts/0    00:00:00 ps
linuxlab@linuxlab-VirtualBox:~/Desktop$
```

11. top command

Command used to view all the processes that are running.

```
linuxlab@linuxlab-VirtualBox:~/Desktop$ top

top - 18:15:12 up 21 min,  1 user,  load average: 0.01, 0.07, 0.09
Tasks: 181 total,   1 running, 180 sleeping,   0 stopped,   0 zombie
%Cpu(s):  9.9 us,  1.4 sy,  0.0 ni, 88.4 id,  0.0 wa,  0.0 hi,  0.3 si,  0.0 st
MiB Mem :   1476.5 total,     86.9 free,    723.3 used,    666.4 buff/cache
MiB Swap:    448.5 total,    447.5 free,      1.0 used.    613.6 avail Mem

    PID USER      PR  NI    VIRT    RES    SHR S  %CPU  %MEM     TIME+ COMMAND
   1290 linuxlab  20   0 3439632 326104 118224 S   6.0  21.6   0:33.75 gnome-+
    732 linuxlab  20   0  529888  58988  38268 S   3.0   3.9   0:07.77 Xorg
   2152 linuxlab  20   0  823280  50748  38280 S   2.0   3.4   0:02.33 gnome-+
     12 root      20   0       0      0      0 S   0.3   0.0   0:00.17 ksofti+
   1621 linuxlab  20   0  912320  32408  21688 S   0.3   2.1   0:00.38 gsd-me+
   2321 linuxlab  20   0   20488   3688   3176 R   0.3   0.2   0:00.03 top
      1 root      20   0  167776  11584   8436 S   0.0   0.8   0:02.17 systemd
      2 root      20   0       0      0      0 S   0.0   0.0   0:00.00 kthrea+
      3 root       0 -20       0      0      0 I   0.0   0.0   0:00.00 rcu_gp
      4 root       0 -20       0      0      0 I   0.0   0.0   0:00.00 rcu_pa+
      6 root       0 -20       0      0      0 I   0.0   0.0   0:00.00 kworke+
      9 root       0 -20       0      0      0 I   0.0   0.0   0:00.00 mm_per+
     10 root      20   0       0      0      0 S   0.0   0.0   0:00.00 rcu_ta+
     11 root      20   0       0      0      0 S   0.0   0.0   0:00.00 rcu_ta+
     13 root      20   0       0      0      0 I   0.0   0.0   0:00.85 rcu_sc+
     14 root      rt   0       0      0      0 S   0.0   0.0   0:00.02 migrat+
     15 root     -51   0       0      0      0 S   0.0   0.0   0:00.00 idle_i+
     16 root      20   0       0      0      0 S   0.0   0.0   0:00.00 cpuhp/0
     17 root      20   0       0      0      0 S   0.0   0.0   0:00.00 kdevtm+
```

12. mkdir command

To create a new directory, use "mkdir".

13. rmdir command

```
linuxlab@linuxlab-VirtualBox:~/Desktop$ mkdir linux
linuxlab@linuxlab-VirtualBox:~/Desktop$ ls
linux  sample.txt
linuxlab@linuxlab-VirtualBox:~/Desktop$
```

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14. head command

"head" command displays the top part of a file. It displays the first 10 lines in a file.

```
linuxlab@linuxlab-VirtualBox:~/Desktop$ head sample.txt
abc
def
aa
ads
linuxlab@linuxlab-VirtualBox:~/Desktop$
```

15. head command for n lines

Command used to display the n number of lines in a file.

```
linuxlab@linuxlab-VirtualBox:~/Desktop$ head -n 2 sample.txt
abc
def
linuxlab@linuxlab-VirtualBox:~/Desktop$
```

16. tail command

"tail" command displays the last part of a file. It displays the last 10 lines in a file.

```
linuxlab@linuxlab-VirtualBox:~/Desktop$ tail sample.txt
abc
def
aa
ads
linuxlab@linuxlab-VirtualBox:~/Desktop$
```

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17. tail command for n lines

Command used to display the n number of lines in a file.

```
linuxlab@linuxlab-VirtualBox:~/Desktop$ tail -n 2 sample.txt
aa
ads
linuxlab@linuxlab-VirtualBox:~/Desktop$
```

18. cp command

The “cp” command is used to copy a file or directory.

```
linuxlab@linuxlab-VirtualBox:~/Desktop$ cat abcd.txt
abc
def
aa
ads
linuxlab@linuxlab-VirtualBox:~/Desktop$
```

19.id command

The “id” command is used to display the user ID (UID) and group ID (GID).

```
linuxlab@linuxlab-VirtualBox:~/Desktop$ id
uid=1000(linuxlab) gid=1000(linuxlab) groups=1000(linuxlab),4(adm),24(cdrom),27
(sudo),30(dip),46(plugdev),120(lpadmin),131(lxd),132(sambashare)
linuxlab@linuxlab-VirtualBox:~/Desktop$
```

20. wc command

The “wc” command is used to count the lines, words, and characters in a file.

```
linuxlab@linuxlab-VirtualBox:~/Desktop$ wc sample.txt
 4  4 15 sample.txt
linuxlab@linuxlab-VirtualBox:~/Desktop$
```

21. host command

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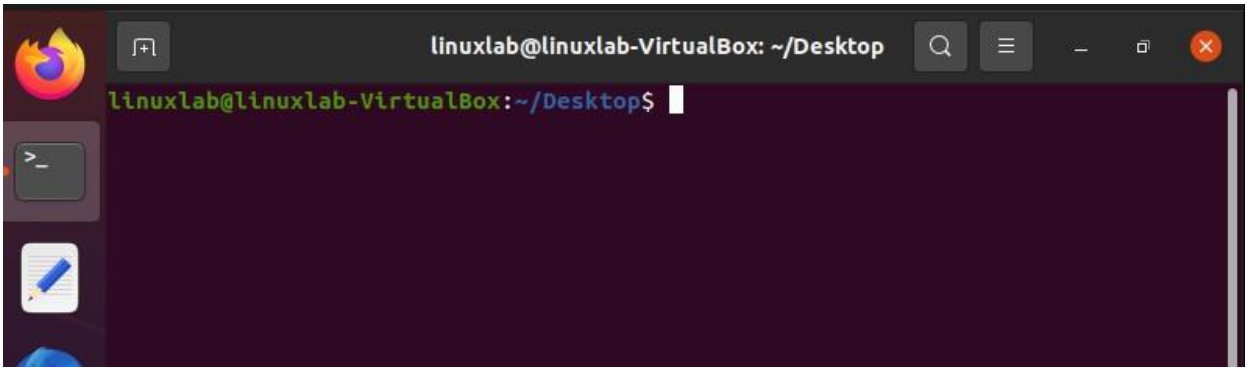
The “host” command is used to display the IP address for a given domain name and vice versa. It performs the DNS lookups for the DNS Query.

```
linuxlab@linuxlab-VirtualBox:~/Desktop$ host google.com
google.com has address 142.250.192.142
google.com has IPv6 address 2404:6800:4009:825::200e
google.com mail is handled by 10 aspmx.l.google.com.
google.com mail is handled by 30 alt2.aspmx.l.google.com.
google.com mail is handled by 50 alt4.aspmx.l.google.com.
google.com mail is handled by 40 alt3.aspmx.l.google.com.
google.com mail is handled by 20 alt1.aspmx.l.google.com.
linuxlab@linuxlab-VirtualBox:~/Desktop$
```

21.clear command

Linux **clear** command is used to clear the terminal screen.



22. less command

“less” displays a file, allowing forward/backward movement within it.

```
abc
def
aa
ads
sample.txt (END)
```

23. ls -l command

Command used to display the files in long list format.

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```
linuxlab@linuxlab-VirtualBox:~/Desktop$ ls -l
total 8
-rw-rw-r-- 1 linuxlab linuxlab 15 Nov 10 18:19 abcd.txt
-rw-rw-r-- 1 linuxlab linuxlab 15 Nov 10 18:13 sample.txt
linuxlab@linuxlab-VirtualBox:~/Desktop$
```

24. ls -t command

Command used to display the files in sorting format of time modification.

```
linuxlab@linuxlab-VirtualBox:~/Desktop$ ls -t
abcd.txt  sample.txt
linuxlab@linuxlab-VirtualBox:~/Desktop$
```

25. ls -h command

Command used to display the file sizes in human readable format.

```
linuxlab@linuxlab-VirtualBox:~/Desktop$ ls -h
abcd.txt  sample.txt
linuxlab@linuxlab-VirtualBox:~/Desktop$
```

26. ls -r command

Command used to display the files in reverse order format.

```
linuxlab@linuxlab-VirtualBox:~/Desktop$ ls -r
sample.txt  abcd.txt
linuxlab@linuxlab-VirtualBox:~/Desktop$
```

27. ip command-

: Linux “ip” command is an updated version of the ipconfig command. It is used to assign an IP address, initialize an interface, disable an interface.

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```
linuxlab@linuxlab-VirtualBox:~/Desktop$ ip
Usage: ip [ OPTIONS ] OBJECT { COMMAND | help }
       ip [ -force ] -batch filename
where  OBJECT := { link | address | addrlabel | route | rule | neigh | ntable |
                   tunnel | tuntap | maddress | mroute | mrule | monitor | xfrm
 |
                   netns | l2tp | fou | macsec | tcp_metrics | token | netconf
| ila |
                   vrf | sr | nexthop }
       OPTIONS := { -V[ersion] | -s[tatistics] | -d[etails] | -r[esolve] |
                    -h[uman-readable] | -iec | -j[son] | -p[retty] |
                    -f[amily] { inet | inet6 | mpls | bridge | link } |
                    -4 | -6 | -I | -D | -M | -B | -0 |
                    -l[oops] { maximum-addr-flush-attempts } | -br[ief] |
                    -o[neline] | -t[imestamp] | -ts[hort] | -b[atch] [filename]
 |
                    -rc[vbuf] [size] | -n[etns] name | -N[umeric] | -a[ll] |
                    -c[olor]}
linuxlab@linuxlab-VirtualBox:~/Desktop$
```

28. exit command

Linux **exit** command is used to exit from the current shell.

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PRACTICAL-3

AIM- Study of Vi Editor, Study of Bash shell, Bourne shell and C shell in Unix/Linux operating system.

THEORY-

vi Editor is used to edit files in Unix. It is done using the screen-oriented text editor, vi is one of the best ways. This editor enables you to edit lines in context with other lines in the file.
An improved version of the vi editor which is called the VIM has also been made available now. Here, VIM stands for vi improved.

- vi is generally considered the de facto standard in Unix editors because −
- It's usually available on all the flavors of Unix system.
- Its implementations are very similar across the board.
- It requires very few resources.
- It is more user-friendly than other editors such as the ed or the ex.

You can use the vi editor to edit an existing file or to create a new file from scratch. You can also use this editor to just read a text file.

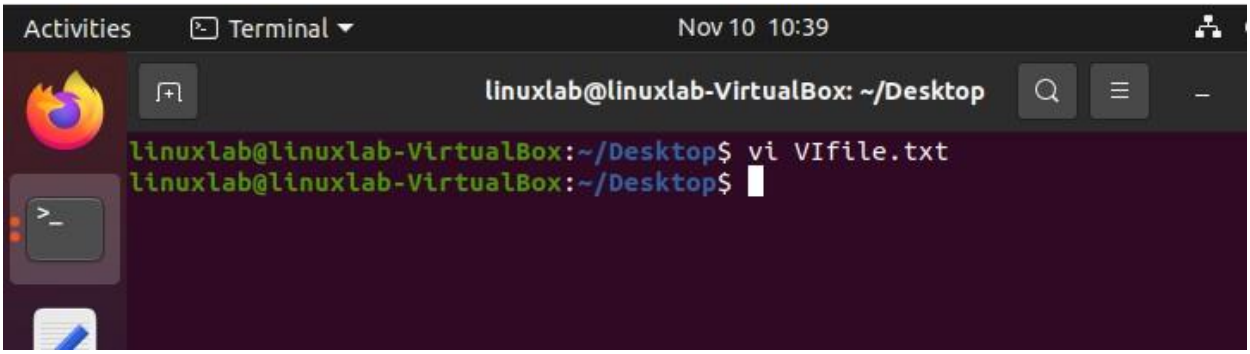
In Unix, there are two major types of shells −

1. **Bourne shell** − If you are using a Bourne-type shell, the **$** character is the default prompt.
2. **C shell** − If you are using a C-type shell, the % character is the default prompt.

The Bourne Shell has the following subcategories: Bourne shell (sh), Korn shell (ksh), Bourne Again shell (bash), POSIX shell (sh).
The different C-type shells follow: C shell (csh), TENEX/TOPS C shell (tcsh).
The original Unix shell was written in the mid-1970s by Stephen R. Bourne while he was at the AT&T Bell Labs in New Jersey.
Bourne shell was the first shell to appear on Unix systems, thus it is referred to as "the shell".
Bourne shell is usually installed as **/bin/sh** on most versions of Unix. For this reason, it is the shell of choice for writing scripts that can be used on different versions of Unix.

PROCEDURE:

1. **vi filename command:** Creates a new file if it already does not exist, otherwise opens an existing file.



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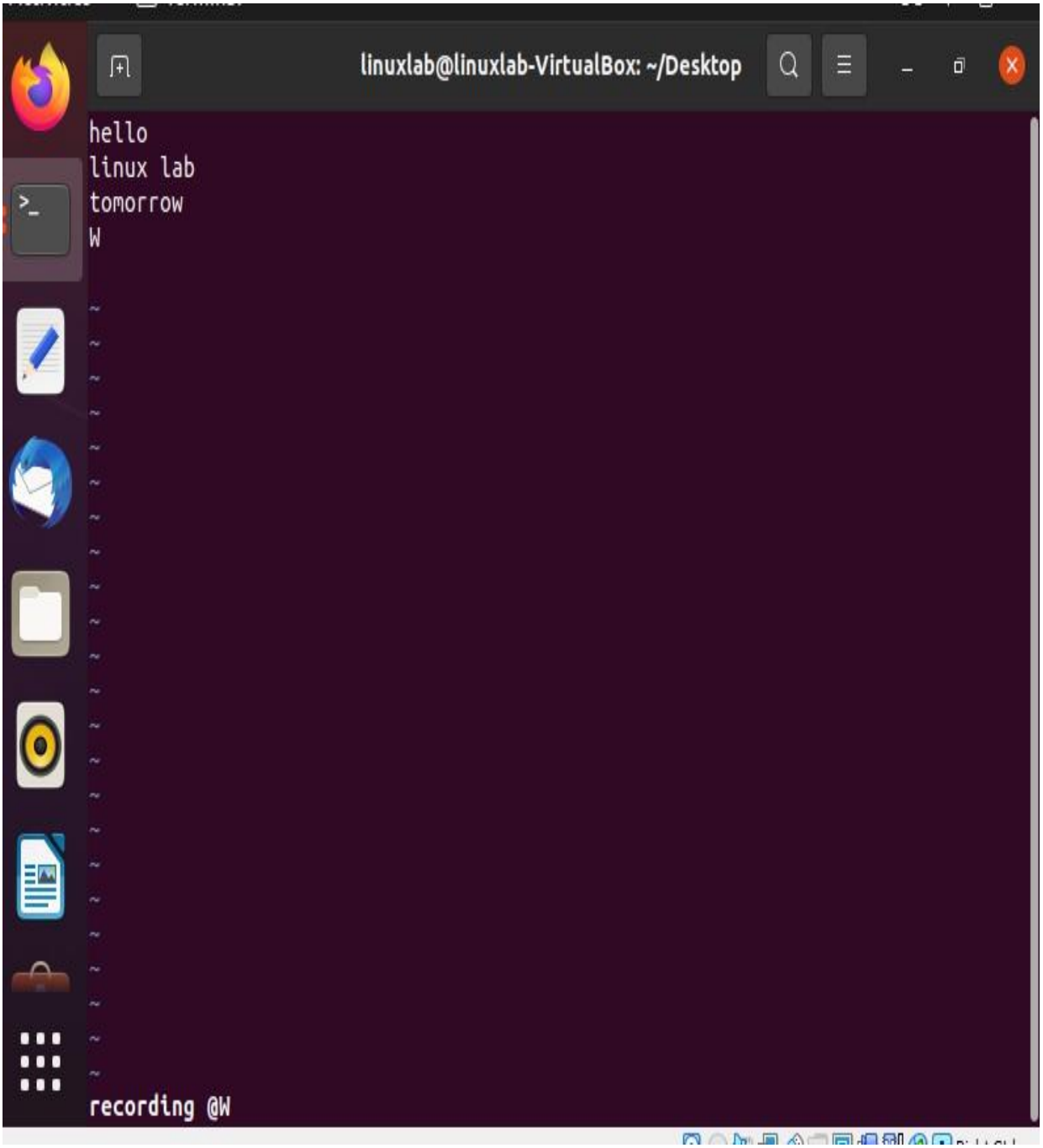
2. **Inserting in vi:** use ‘I’ to enter insertion mode.



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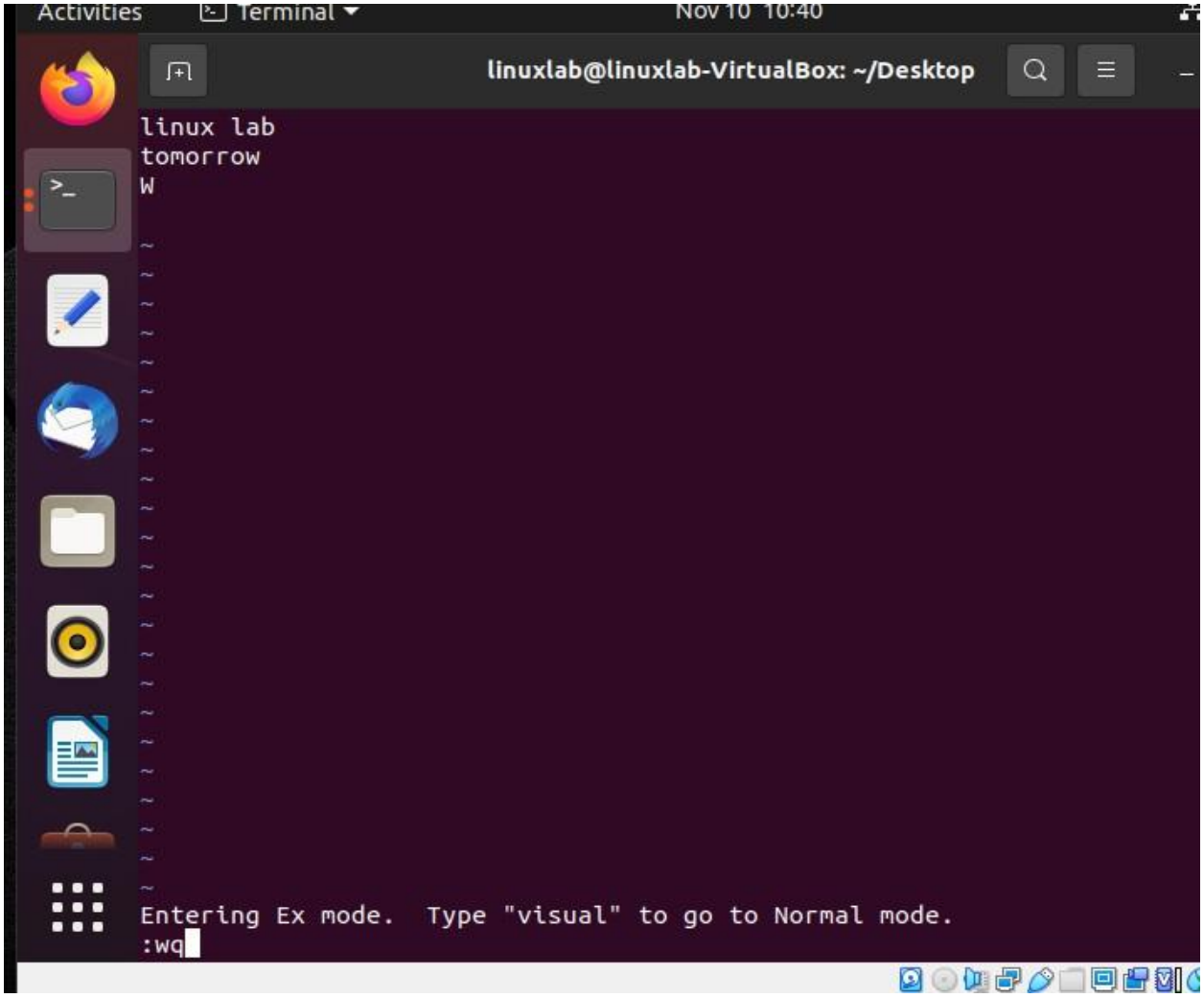
3. **wq-** To exit vi editor.



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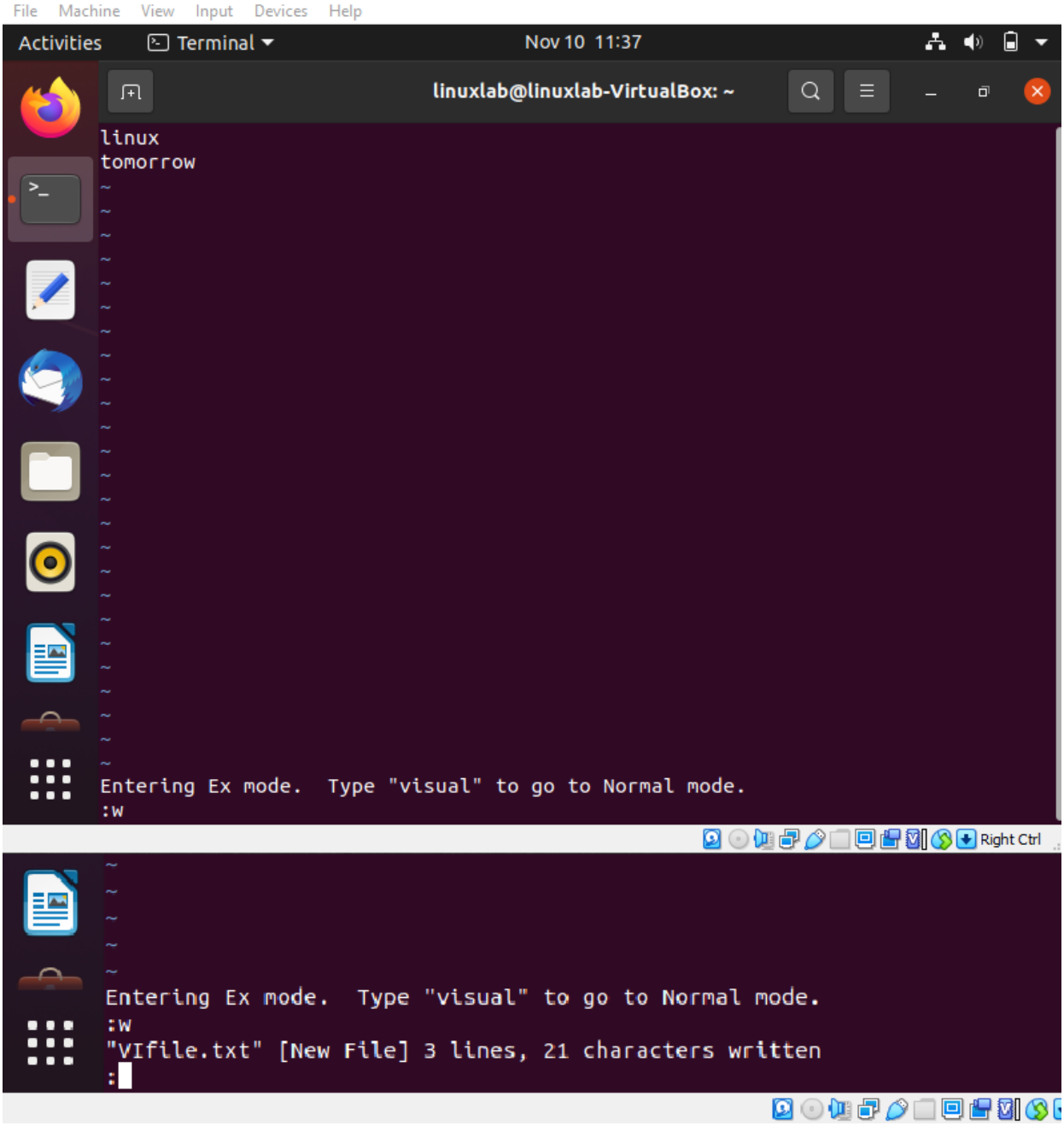
4: w- To save edited content in vi editor



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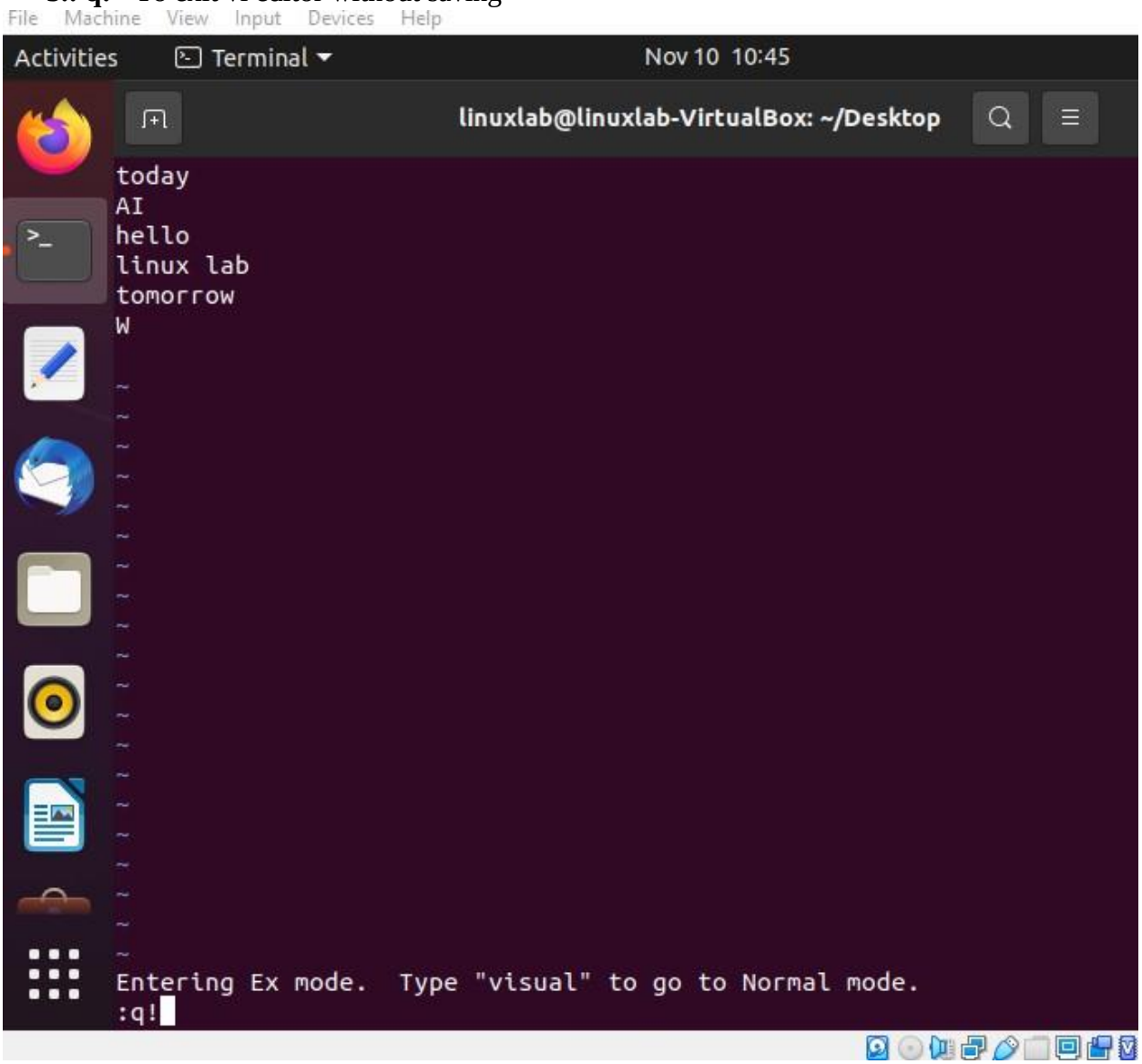
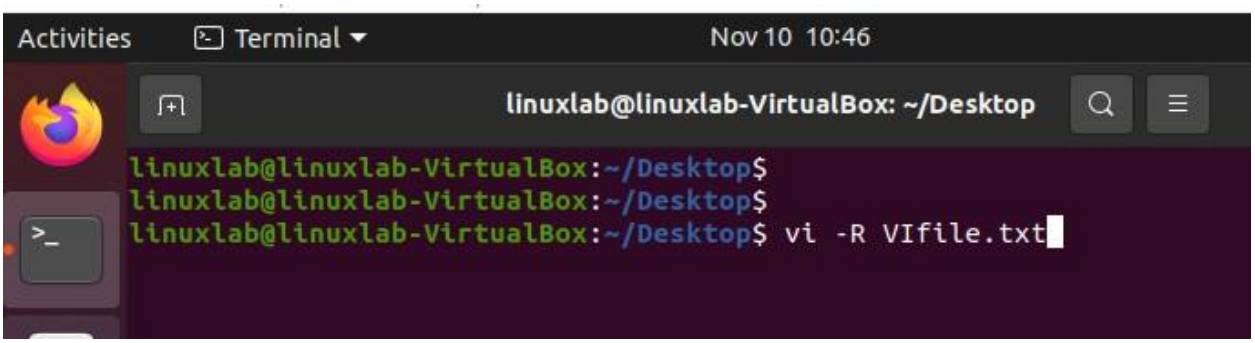
5.: q! - To exit vi editor without saving



6. **vi –R filename:** Opens an existing file in the read-only mode.



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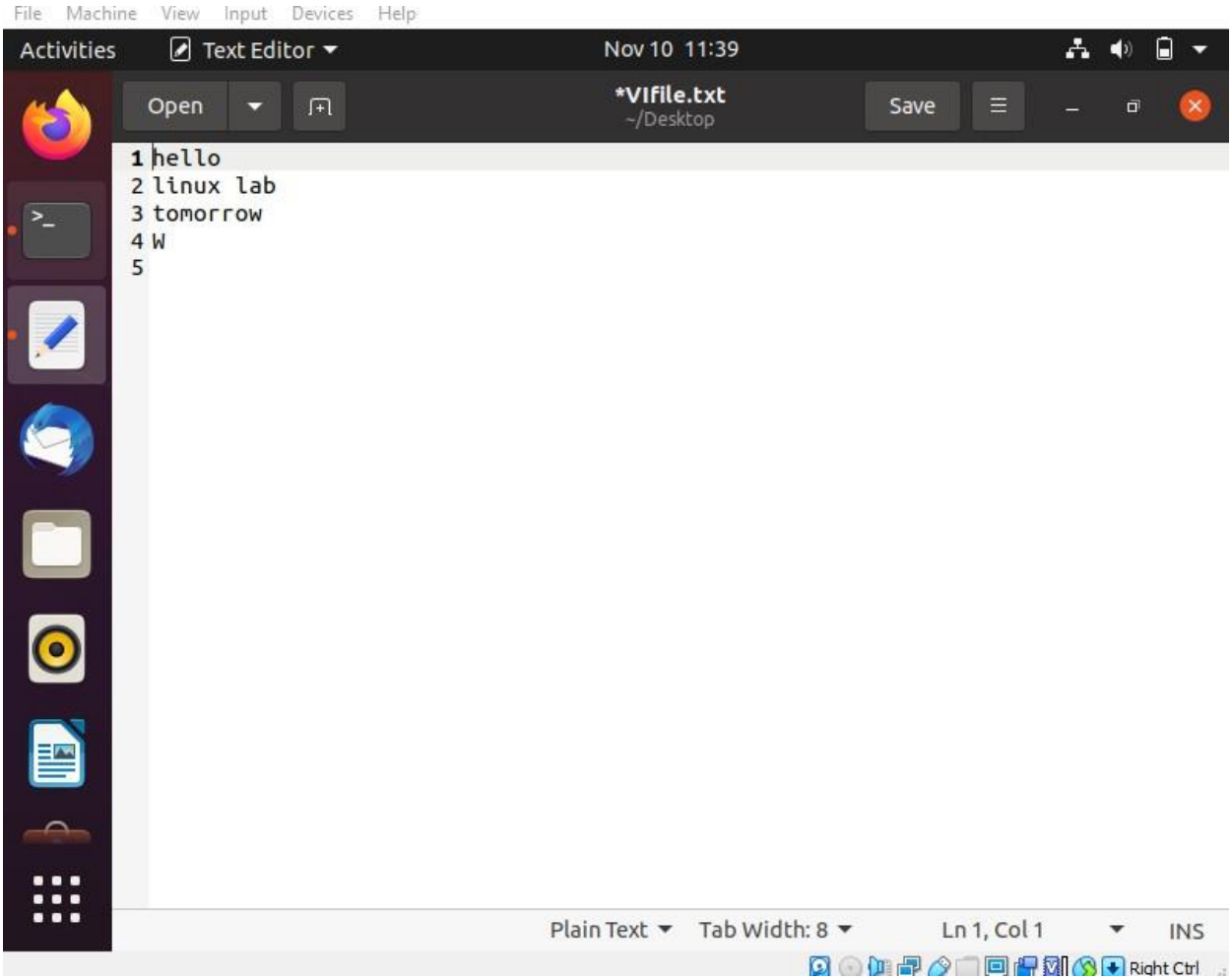

Conclusion: Study of Bash shell, Bourne shell and C shell in Unix/Linux operating system.

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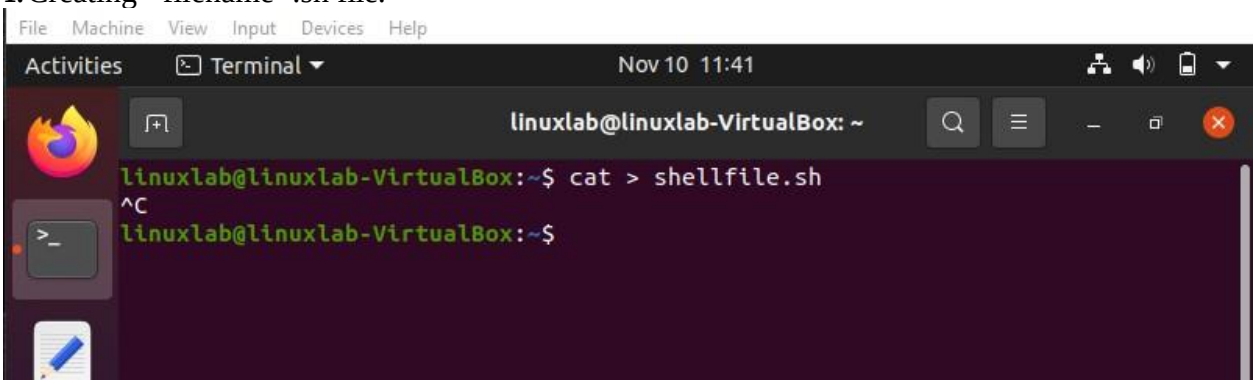
PROCEDURE:

1. Creating <filename>.sh file:



2. Inserting linux command in .sh file:

3. Saving and exciting .sh file:

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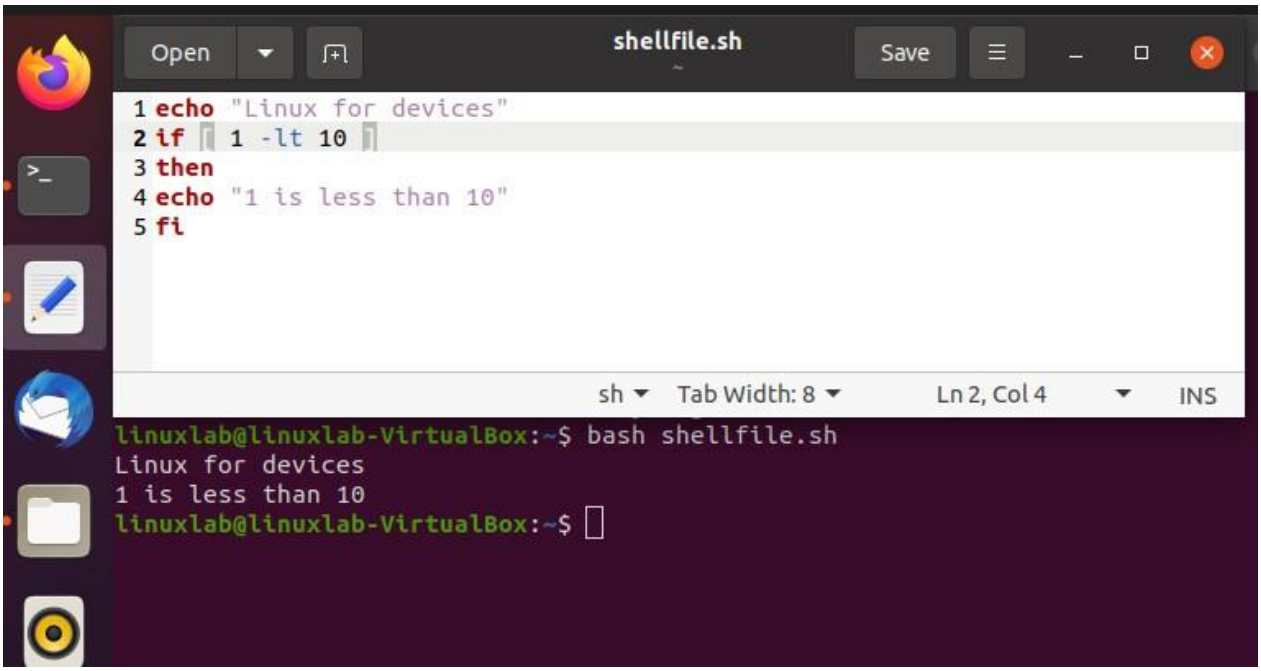
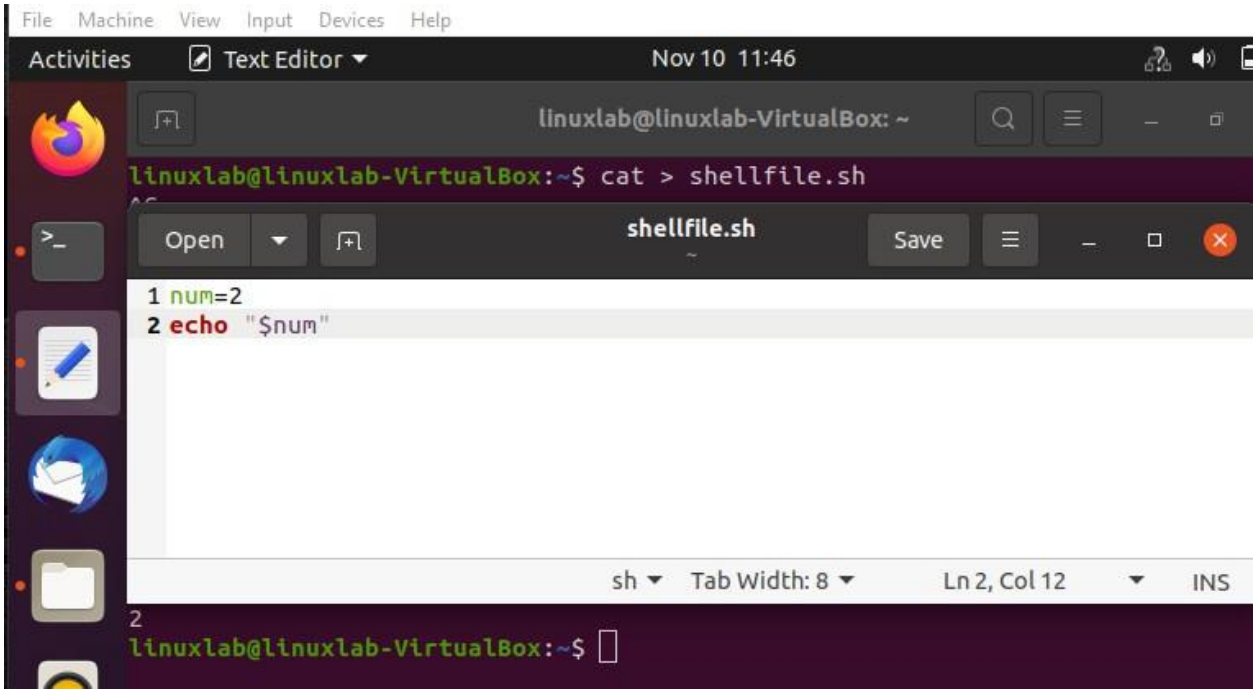
4.running the .sh file:



5.Creating Variable in .sh file and executing it:



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PRACTICAL 4 & 5

AIM- Write a shell script program to display “HELLO WORLD”. write a shell script program to develop a scientific calculator.

THEORY-

Bash is a command language interpreter. It is widely available on various operating systems and is a default command interpreter on most GNU/Linux systems. The name is an acronym for the ‘**B**ourne-**A**gain **S**hell’. Bash is a shell program. Bash is a command processor that typically runs in a text window where the user types of commands that cause actions. Bash can also read and execute commands from a file, called a shell script. A shell program is typically an executable binary that takes commands that you type and (once you hit return), translates those commands into (ultimately) system calls to the Operating System API. Bash is not the only kind of shell. Other shells include:
Sh, ash, dash, ksh, tcsh, zsh, tclsh.

Shell

Shell is a macro processor which allows for interactive or non-interactive command execution.

Scripting
Scripting allows for an automatic commands execution that would otherwise be executed interactively one-by-one.

all our scripts will include shell interpreter definition #!/bin/bash.

Script

In Computer programming, a script is a set of commands for an appropriate run time environment which is used to automate the execution of tasks.

Bash Script:

A Bash Shell Script is a plain text file containing a set of various commands that we usually type in the command line. It is used to automate repetitive tasks on Linux filesystem. It might include a set of commands, or a single command, or it might contain the hallmarks of imperative programming like loops, functions, conditional constructs, etc. Effectively, a Bash script is a computer program written in the Bash programming language.

How to create and run a Bash Script?

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- To create an empty bash script, first, change the directory in which you want to save your script using cd command. Try to use text editor like gedit in which you want to type the shell commands.
- Use touch command to create the zero bytes sized script.

1. touch file_name

- To open the script in the text editor (eg., gedit), type

1. gedit file_name.sh

Here, .sh is suffixed as an extension that you have to provide for execution.

- Type the shell commands for your bash script in the newly opened text window or the text editor. Before typing bash shell commands, first, look at the base of any bash script.

Each Bash based Linux script starts by the line-

1. #! /bin/bash

Where #! is referred to as the shebang and rest of the line is the path to the interpreter specifying the location of bash shell in our operating system.

Bash use # to comment any line.

Bash use echo command to print the output.

At the end, execute the bash script prefixing with ./.

Have a look at the basic terms of a Bash Script, i.e., SheBang and echo command.

SheBang (#!)

The She Bang (#!) is a character sequence consisting of the characters number sign (#) and exclamation mark (!) at the beginning of a script.

Under the Unix-like operating systems, when a script with a shebang runs as a program, the program loader parses the rest of the lines with the first line as an interpreter directive. So, SheBang denotes an interpreter to execute the script lines, and it is known as the path directive for the execution of different kinds of Scripts like Bash, Python, etc.

Here is the correct SheBang format for the discussed Bash Script.

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1. #!/bin/bash

The formatting for shebang is most important. Its incorrect format can cause improper working of commands. So, always remember these two points of SheBang formatting while creating a Script as follows:

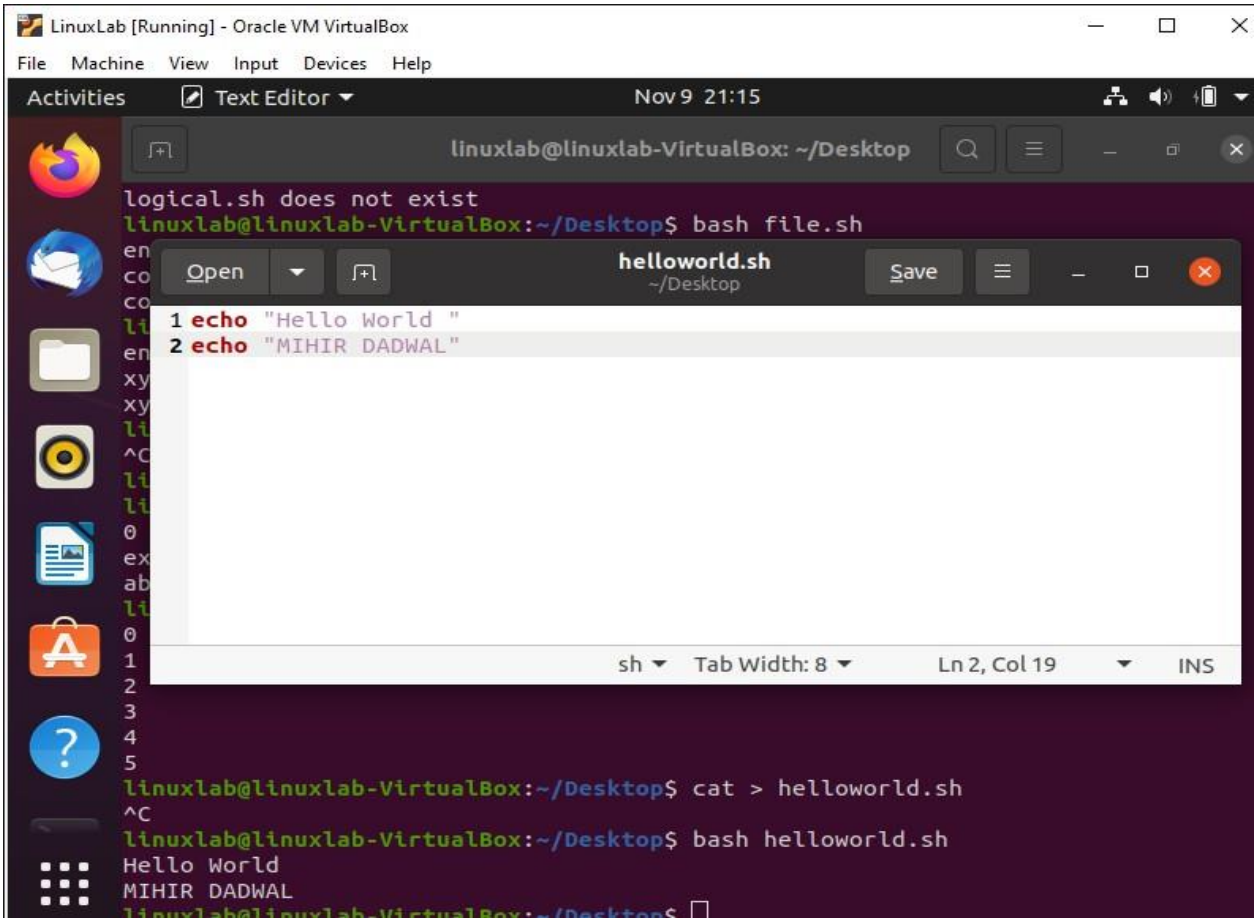
1. It should always be on the very first line of the Script.
2. There should not be any space before the hash (#), between the hash exclamation marks (#!), and the path to the interpreter.

echo

echo is a built-in command in Bash, which is used to display the standard output by passing the arguments. It is the most widely used command for printing the lines of text/String to the screen. Its performance is the same on both the platforms: Bash Shell and Command Line Terminal.

OUTPUT:

HELLO WORLD:



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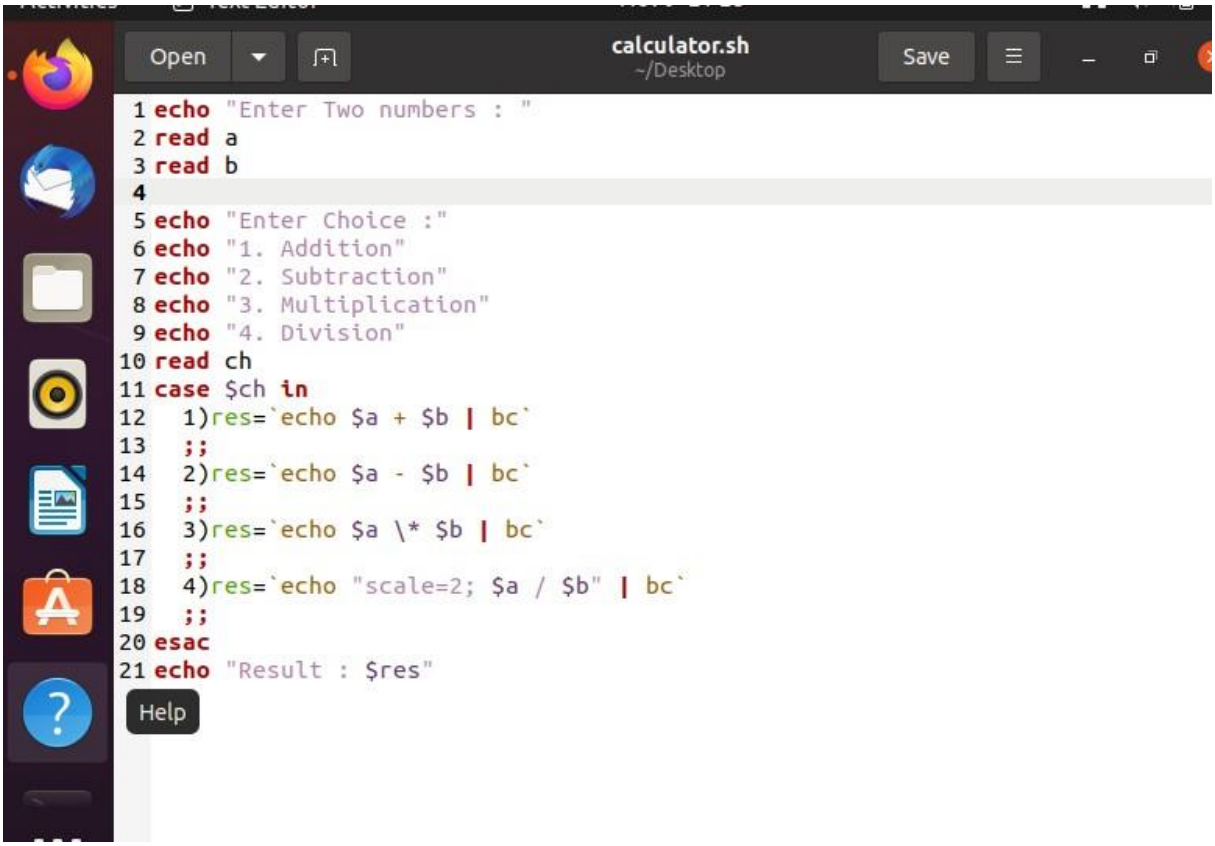
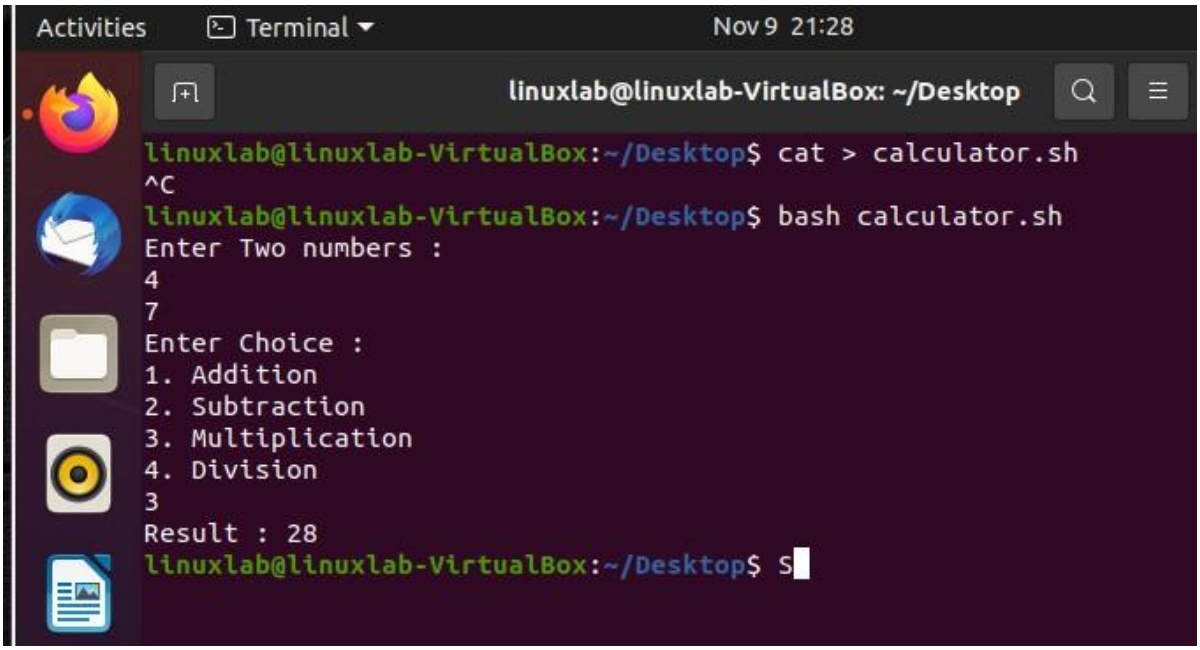
Calculator:





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PRACTICAL 6

AIM- Install Docker and run: Start, stop, push, pull, log, docker ps, docker ps –a,create account, docker compose, docker build, docker run

THEORY-

- Docker is an open source containerization platform. It enables developers to package applications into containers—standardized executable components combining application source code with the operating system (OS) libraries and dependencies required to run that code in any environment. Containers simplify delivery of distributed applications, and have become increasingly popular as organizations shift to cloud-native development and
  hybrid multicloud environments.

- Developers can create containers without Docker, but the platform makes it easier, simpler, and safer to build, deploy and manage containers. Docker is essentially a toolkit that enables developers to build, deploy, run, update, and stop containers using simple commands and work- saving automation through a single API.

- Docker is so popular today that “Docker” and “containers” are used interchangeably. But the first container-related technologies were available for years — even decades (link resides outside IBM) — before Docker was released to the public in 2013.

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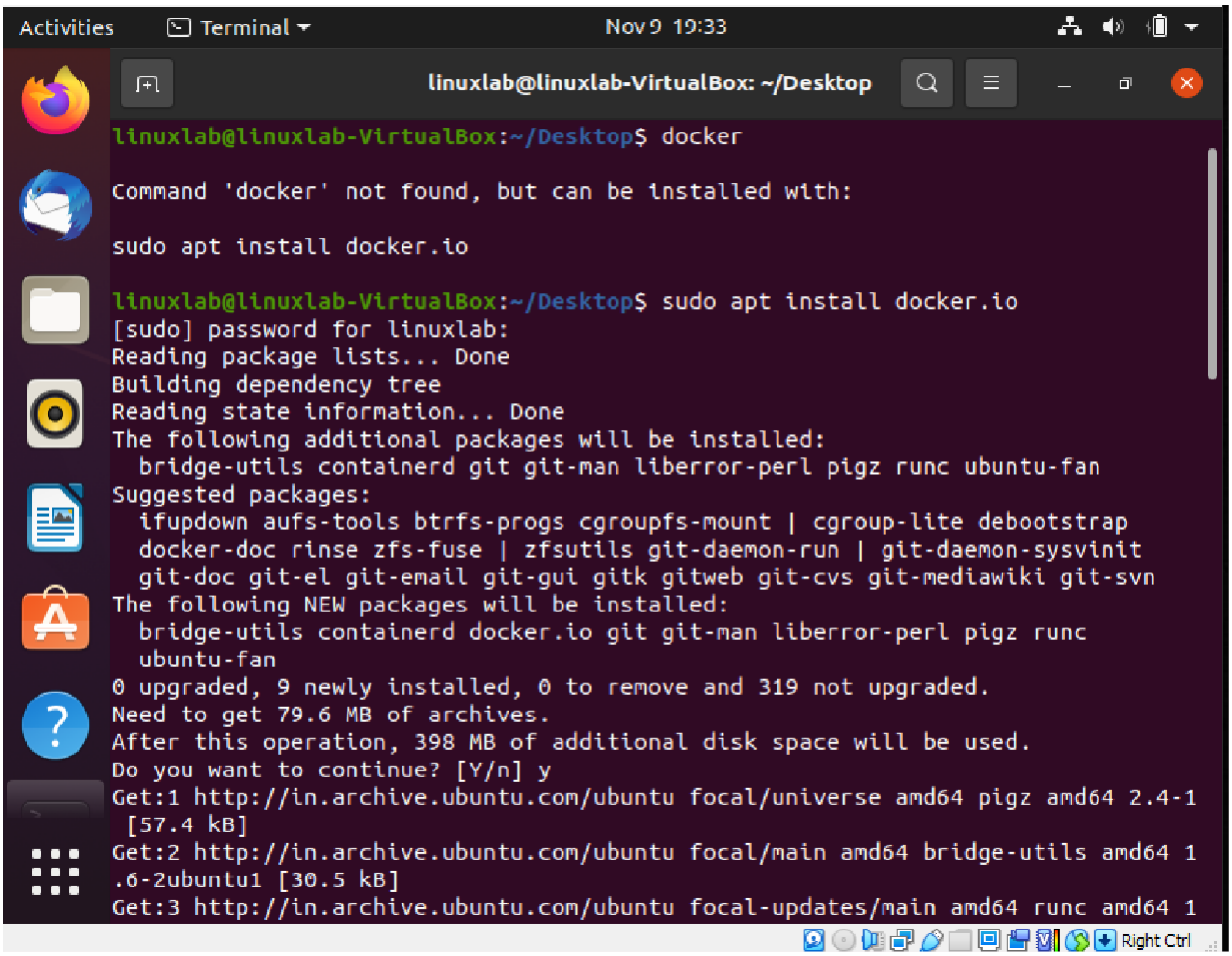
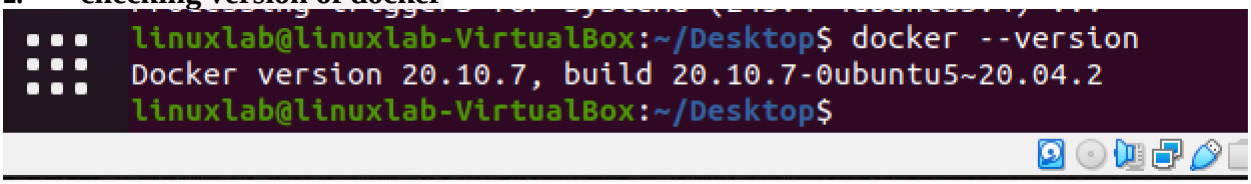
PROCEDURE-

1. installing docker



2. checking version of docker



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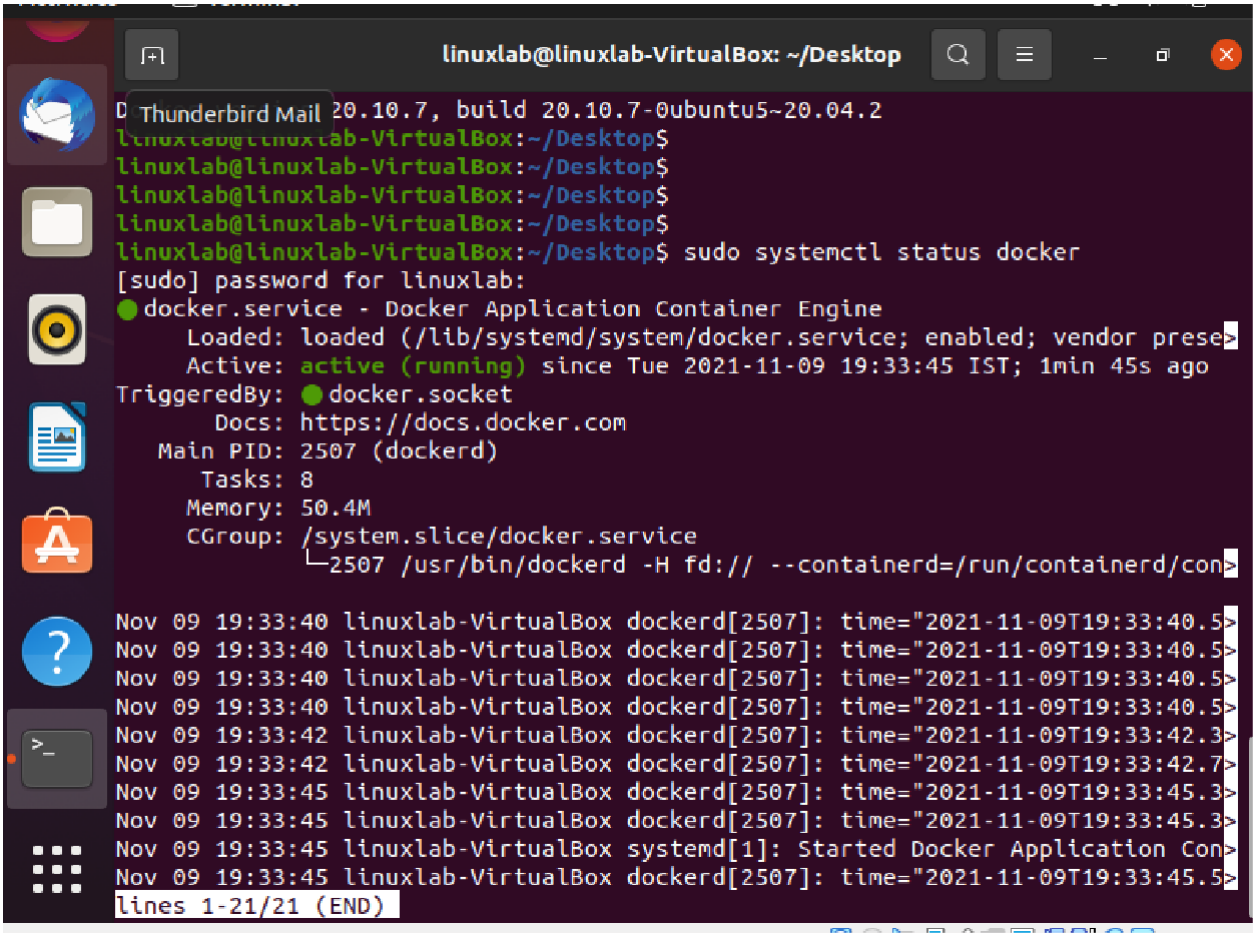
3.Checking enables status of docker(active/inactive)



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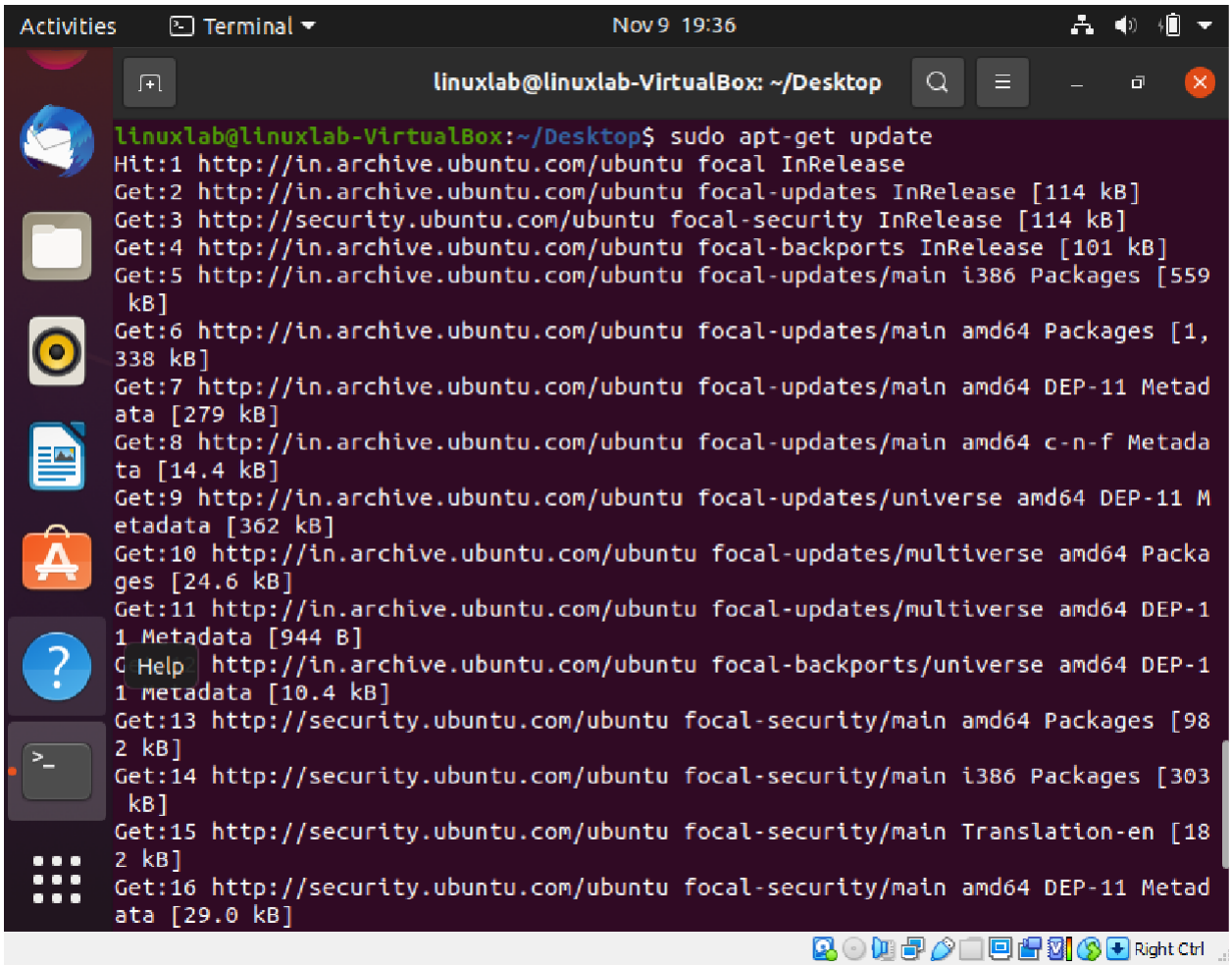

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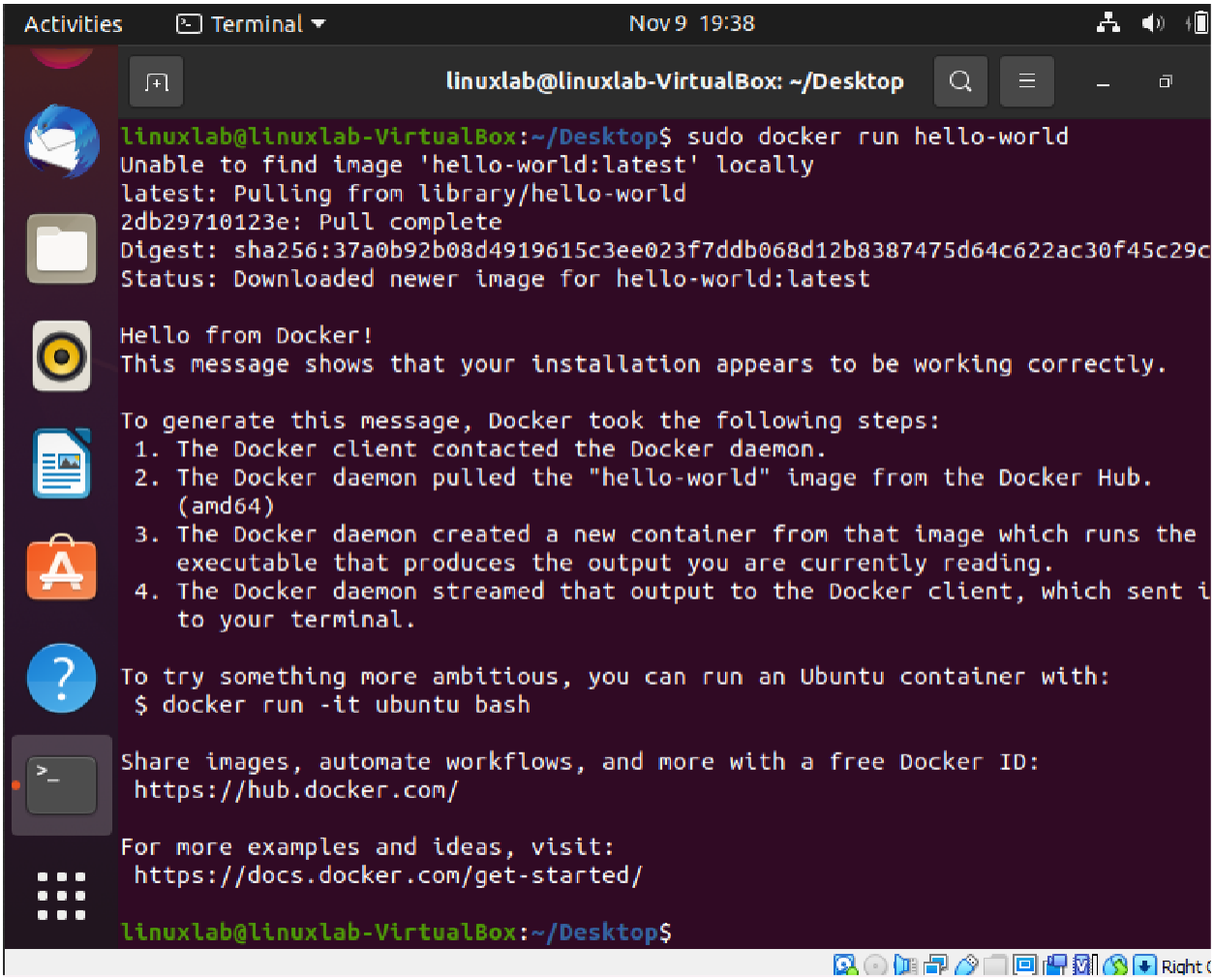
4. Run hello world



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5. Run image pulled from repository

```
linuxlab@linuxlab-VirtualBox:~/Desktop$ docker images
Got permission denied while trying to connect to the Docker daemon socket at
ix:///var/run/docker.sock: Get http://%2Fvar%2Frun%2Fdocker.sock/v1.24/images
son: dial unix /var/run/docker.sock: connect: permission denied
linuxlab@linuxlab-VirtualBox:~/Desktop$ sudo docker images
REPOSITORY    TAG       IMAGE ID       CREATED       SIZE
hello-world   latest    feb5d9fea6a5   6 weeks ago   13.3kB
linuxlab@linuxlab-VirtualBox:~/Desktop$
```

6. **Checking if containers are still running in machine**

docker ps: Checks if container is running

```
linuxlab@linuxlab-VirtualBox:~/Desktop$ docker ps
Got permission denied while trying to connect to the Docker daemon socket at un
ix:///var/run/docker.sock: Get http://%2Fvar%2Frun%2Fdocker.sock/v1.24/containe
rs/json: dial unix /var/run/docker.sock: connect: permission denied
linuxlab@linuxlab-VirtualBox:~/Desktop$ sudo docker ps
CONTAINER ID   IMAGE     COMMAND   CREATED   STATUS    PORTS     NAMES
linuxlab@linuxlab-VirtualBox:~/Desktop$ sudo docker ps -a
CONTAINER ID   IMAGE         COMMAND    CREATED              STATUS
              PORTS     NAMES
4fc3eb5d21b3   hello-world   "/hello"   About a minute ago   Exited (0) About a
 minute ago             clever_galois
linuxlab@linuxlab-VirtualBox:~/Desktop$
```

No container is running.

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PRACTICAL 7

AIM Write a shell script program to illustrate the implementation of the following:

a) Integer Comparison

b) String comparison

c) Logical operators

d) File tests

e) Conditional control structure

f) Loop control structures

THEORY-

Bash is a command language interpreter. It is widely available on various operating systems and is a default command interpreter on most GNU/Linux systems. The name is an acronym for the '**B**ourne-**A**gain **S**hell'. Bash is a shell program. Bash is a command processor that typically runs in a text window where the user types of commands that cause actions. Bash can also read and execute commands from a file, called a shell script. A shell program is typically an executable binary that takes commands that you type and (once you hit return), translates those commands into (ultimately) system calls to the Operating System API. Bash is not the only kind of shell.

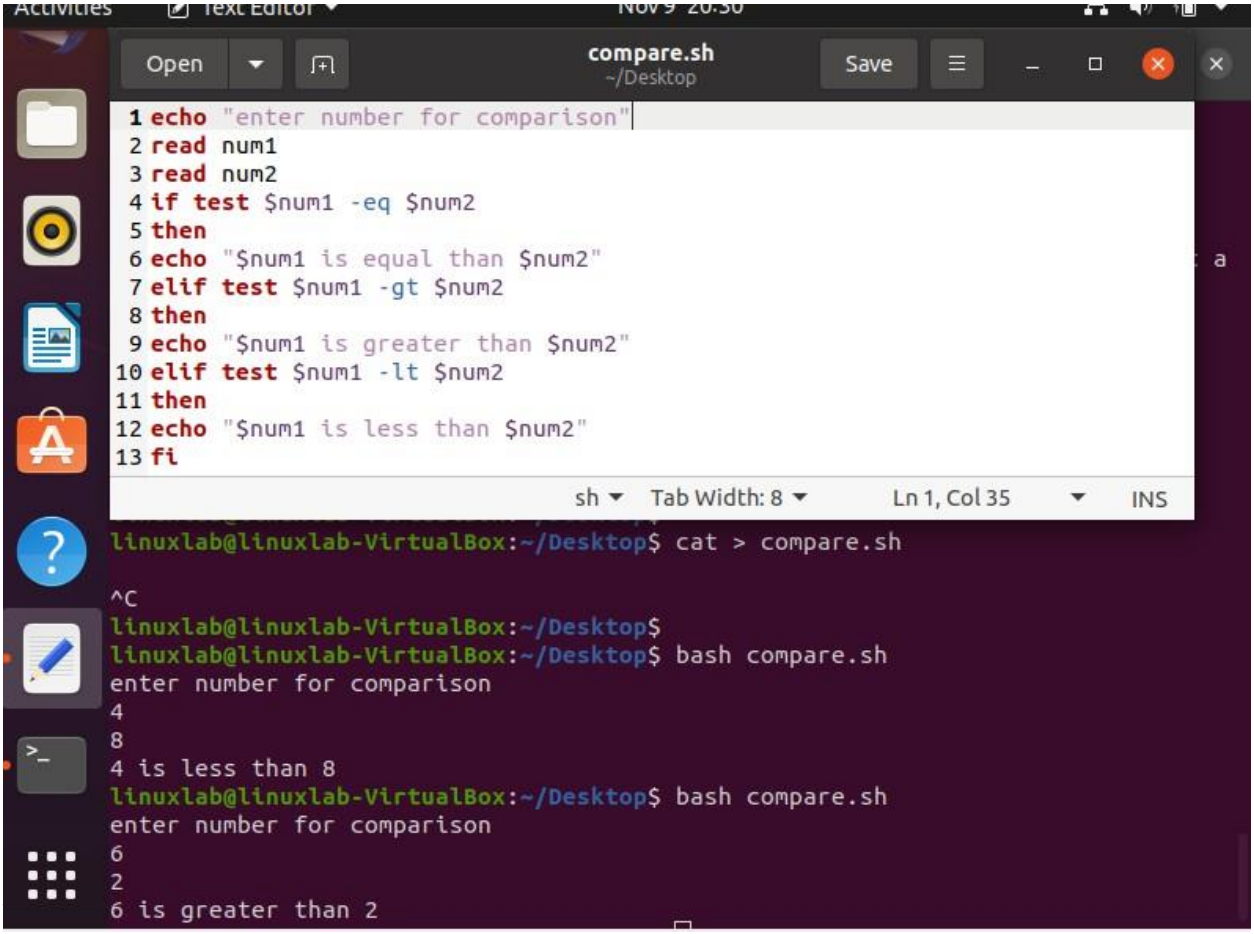
PROCEDURE:

1. Integer comparison

Different kinds of integer operator in bash are-
The general form of integer comparisons is int1 -operator int2.

Operator	Purpose
-eq	Integer equality
-ne	Integer inequality
-lt	Integer less than

-le	Integer less than or equal to
-gt	Integer greater than
-ge	Integer greater than or equal to



String Comparison Operators

Comparison operators are operators that compare values and return true or false. When comparing strings in Bash you can use the following operators:

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string1 = string2 and string1 == string2 - The equality operator returns true if the operands are equal.

- *Use the = operator with the test [command.*
- *Use the == operator with the [[command for pattern matching.*

string1 != string2 - The inequality operator returns true if the operands are not equal.

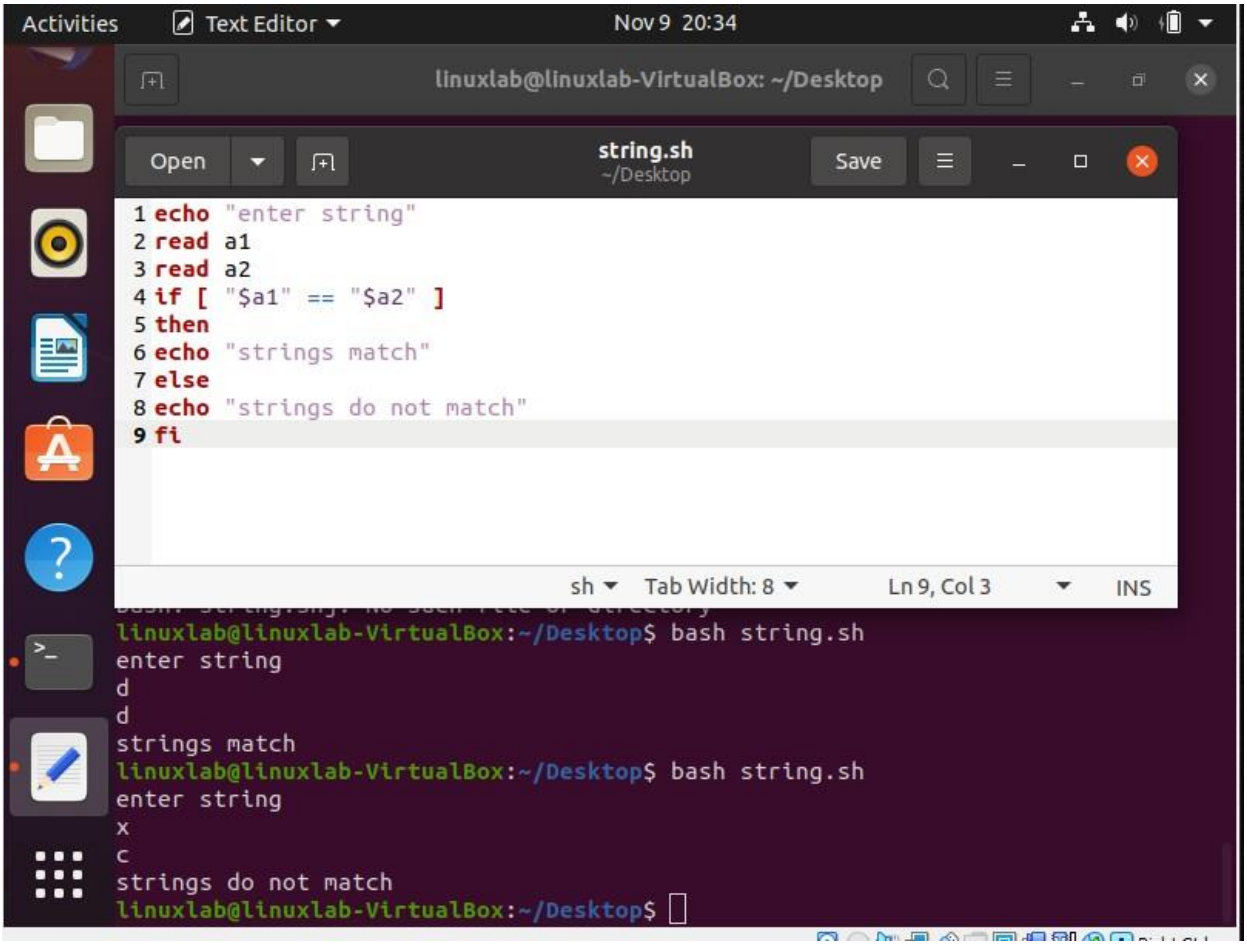
string1 =~ regex- The regex operator returns true if the left operand matches the extended regular expression on the right.

string1 > string2 - The greater than operator returns true if the left operand is greater than the right sorted by lexicographical (alphabetical) order.

string1 < string2 - The less than operator returns true if the right operand is greater than the right sorted by lexicographical (alphabetical) order.

-z string - True if the string length is zero.

-n string - True if the string length is non-zero.



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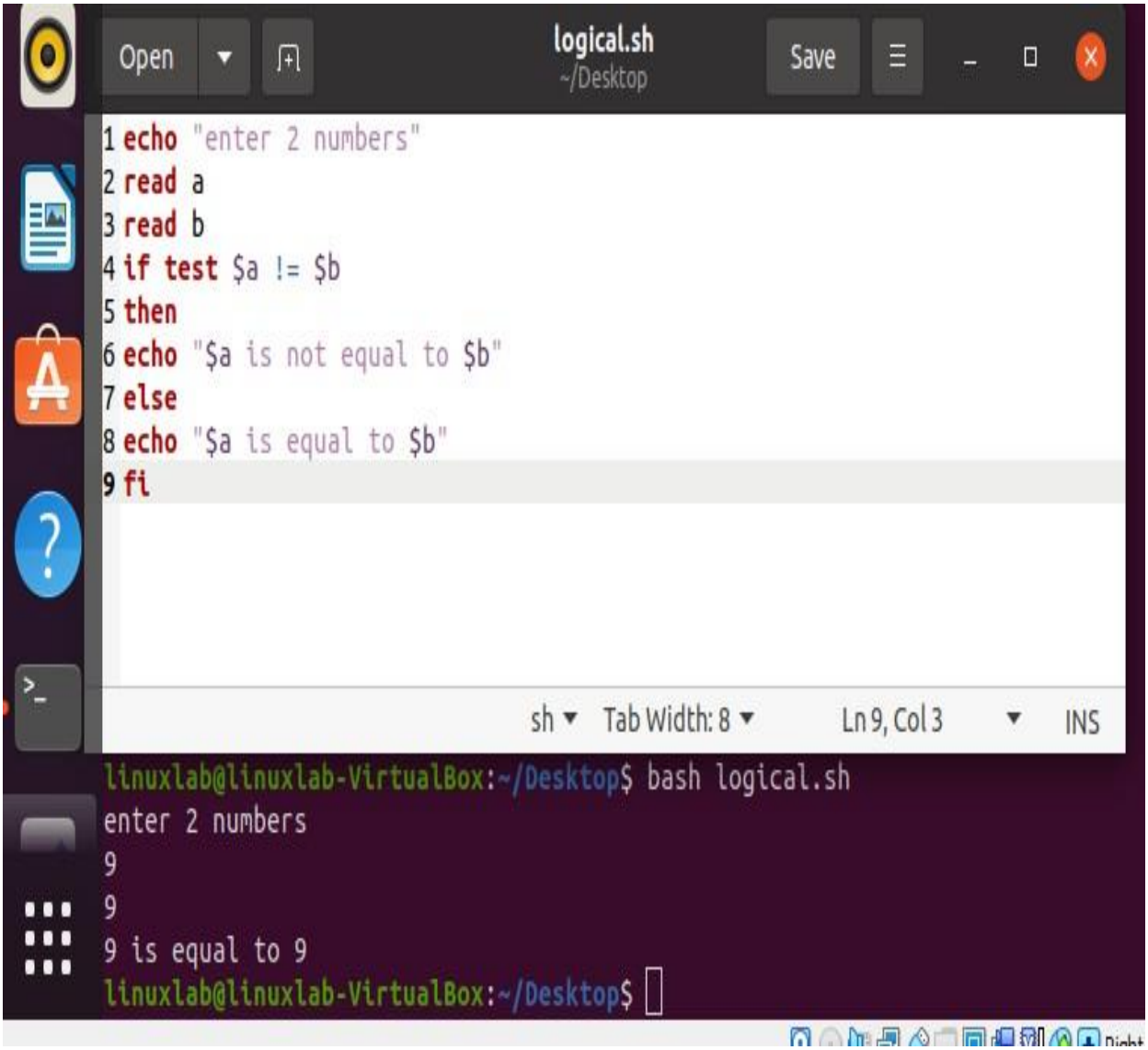
3.Logical operators

Different Logical Operator in Linux are:
!: This is logical negation. This inverts a true condition into false and vice versa.
-o: This is logical OR. If one of the operands is true, then the condition becomes true.
-a: This is logical AND. If both the operands are true, then the condition becomes true otherwise fals



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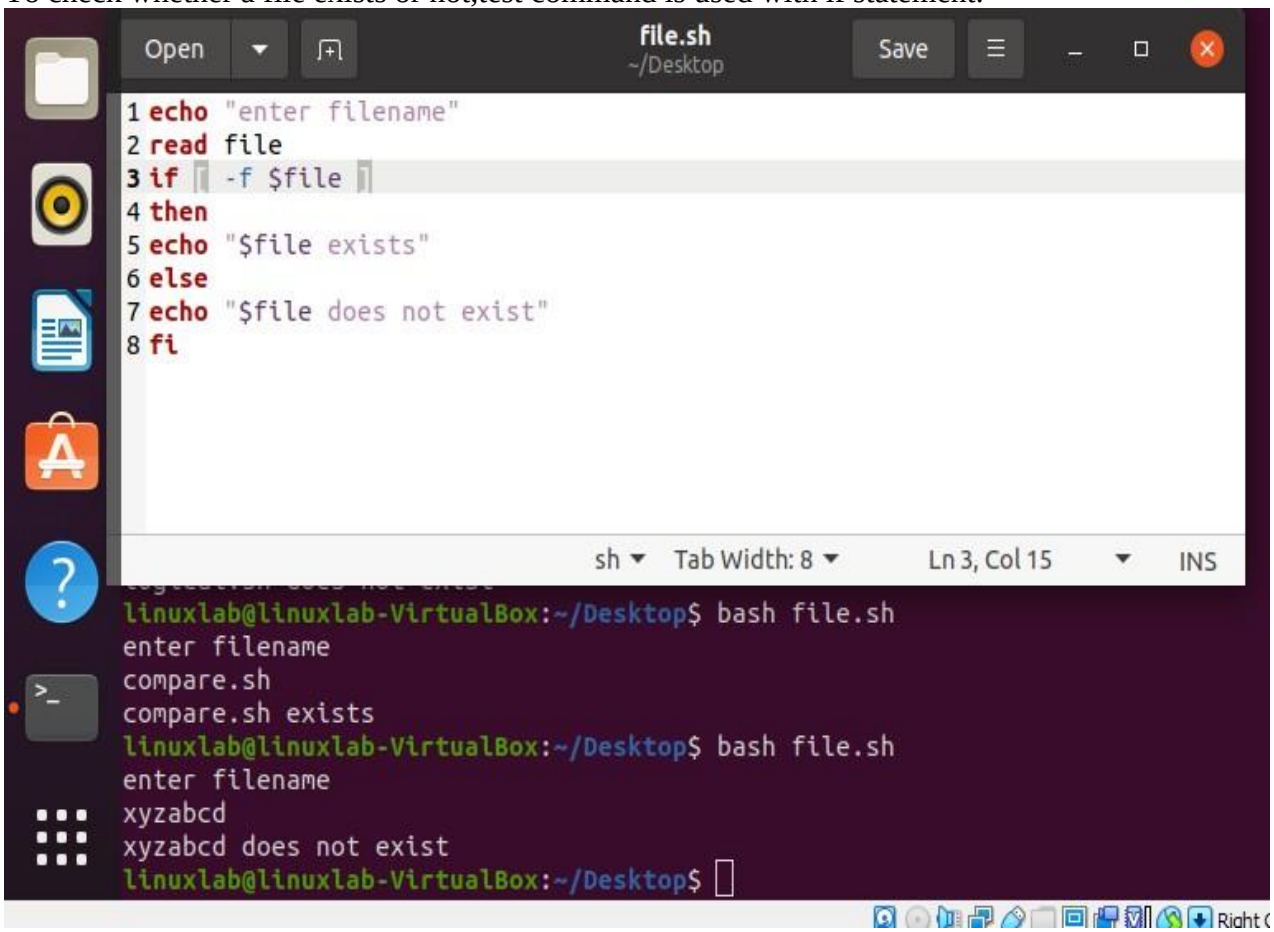
4. File tests

To check whether a file exists,most commonly used file operators are -e and -f.
-e checks whether a file exists regardless of its type,
-f return true only if file is a regular file,not a directory or device.

To check whether a file exists or not,test command is used with if statement.



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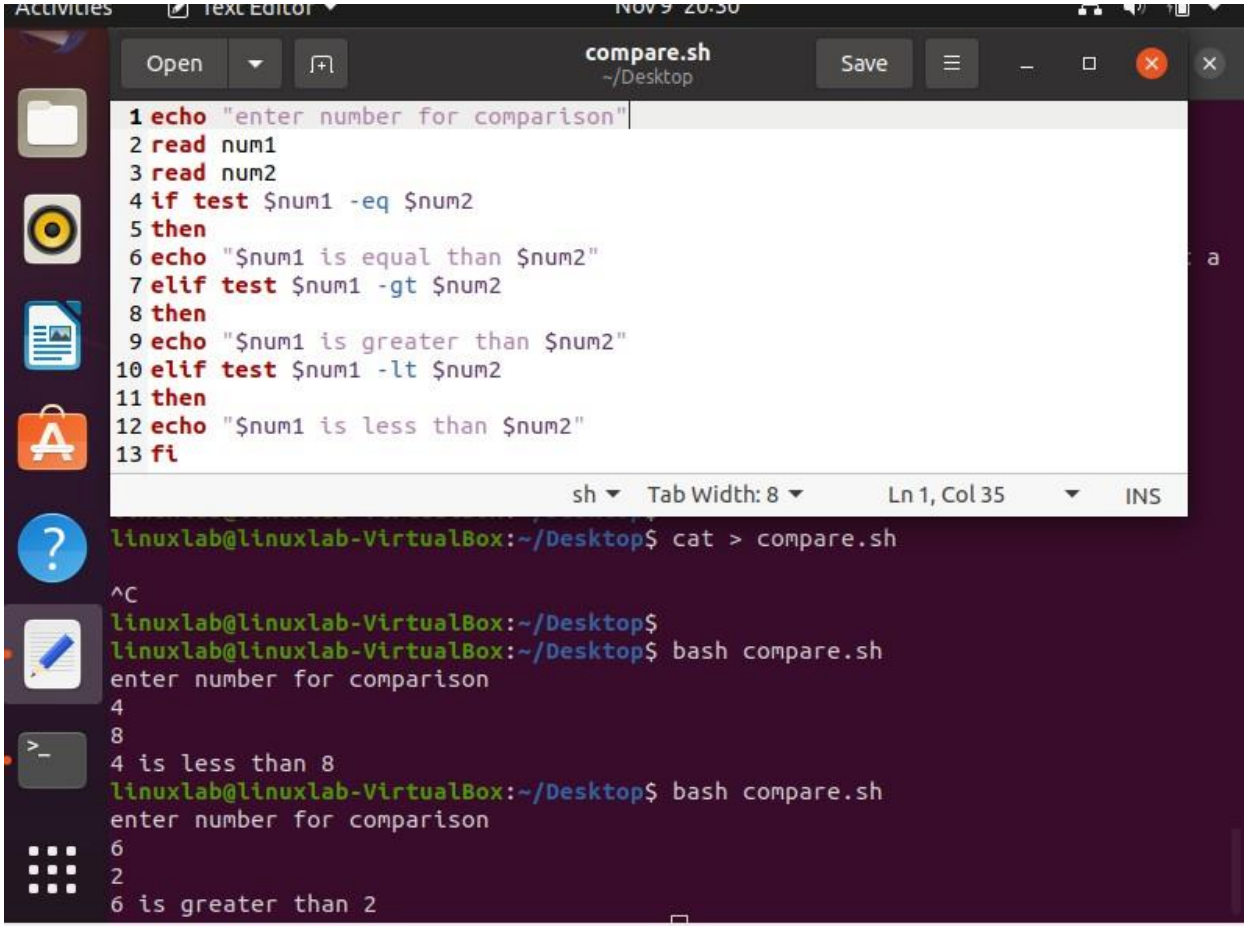
5. Conditional control structure

Conditional Statements: There are a total of five conditional statements which can be used in bash programming.

1. if statement
2. if-else statement
3. if..elif..else..fi statement (Else If ladder)
4. if..then..else..if..then..fi..fi..(Nested if)
5. switch statement

simple program for integer comparison using if statement



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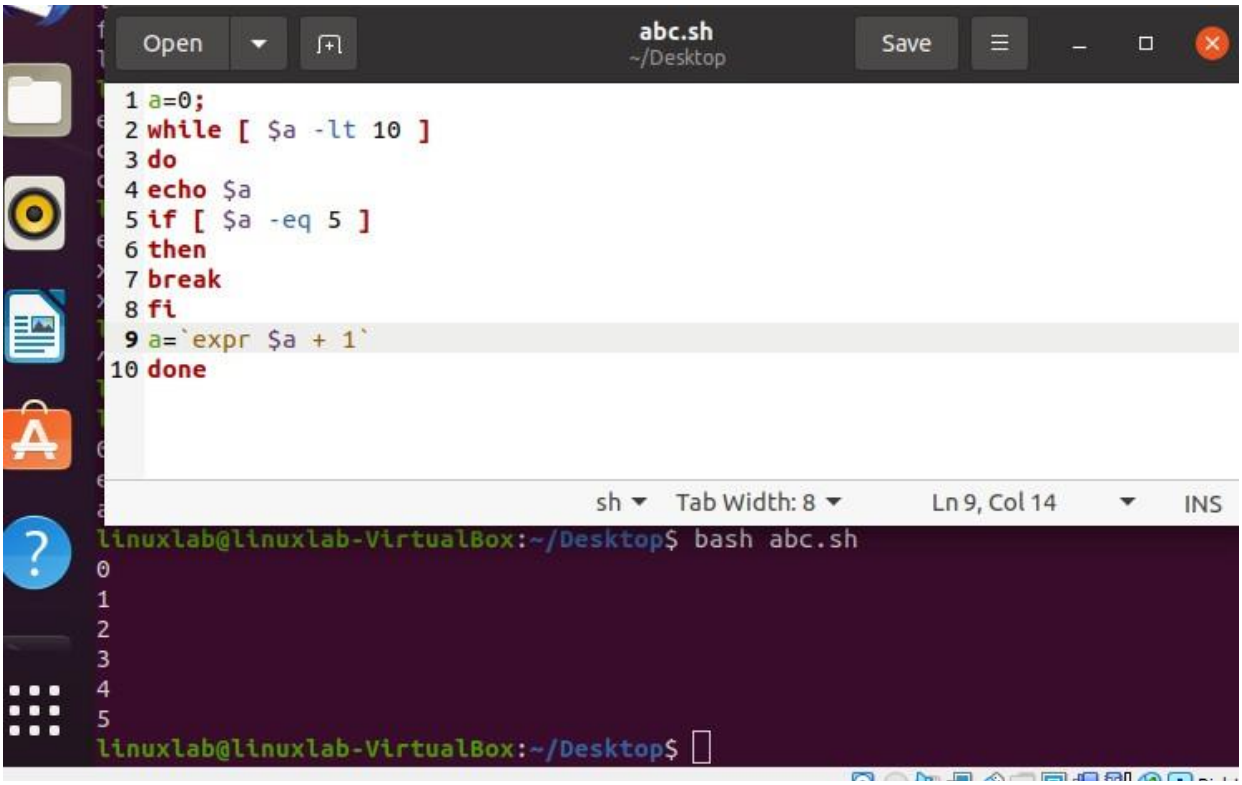
6. Loop control structures

This bash shows that the loop terminates as soon as **a** becomes 5 −



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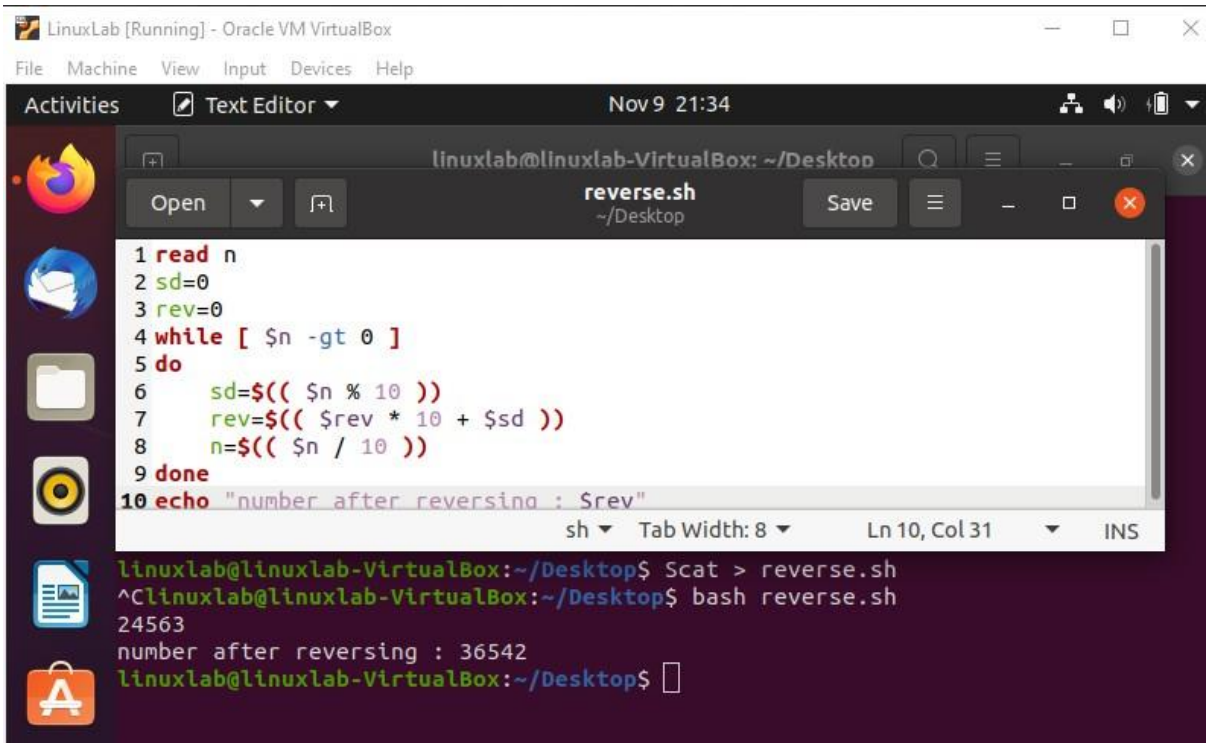
PRACTICAL 8

AIM-

Write a shell script to
a) print a number in reverse order.
b) to reverse the string and reverse each string further in the list
c) find the sum of all numbers in a file in Linux
d) validate password strength. Here are a few assumptions for the password string. Length – minimum of 8 characters, Contain both alphabet and number, Include both the small and capital case letters.

PROCEDURE-

1. Reverse a number



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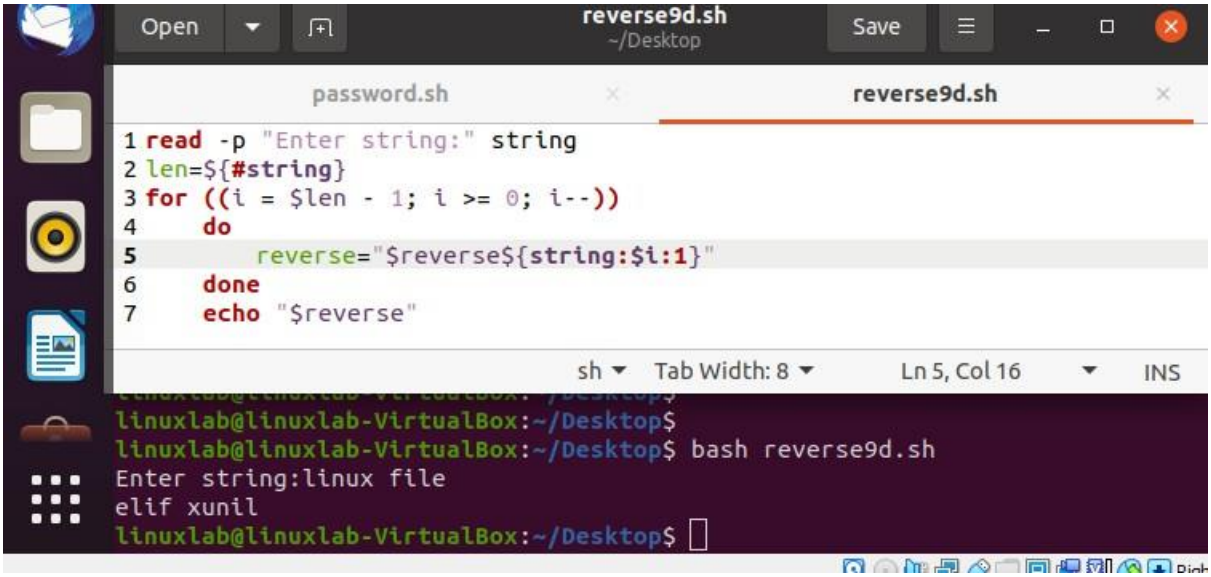
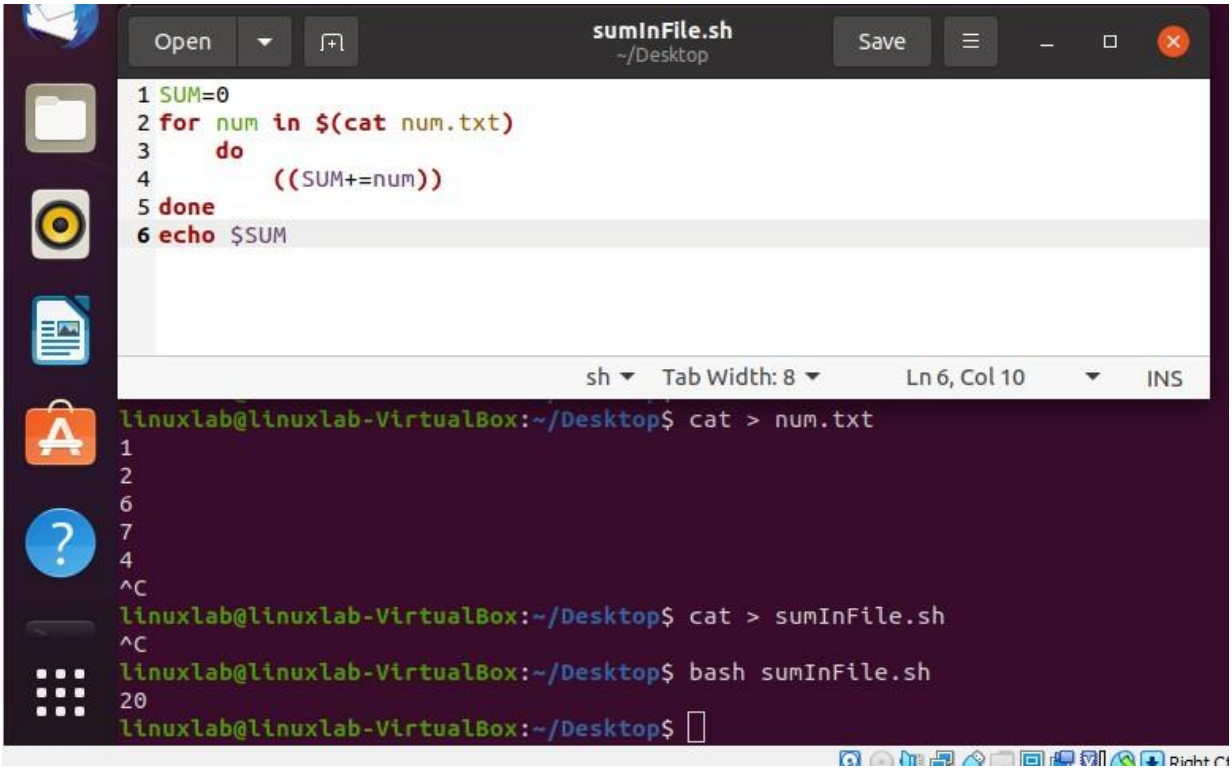
2.reverse a string and reverse each string further in the list



3.Print the sum of all numbers in file



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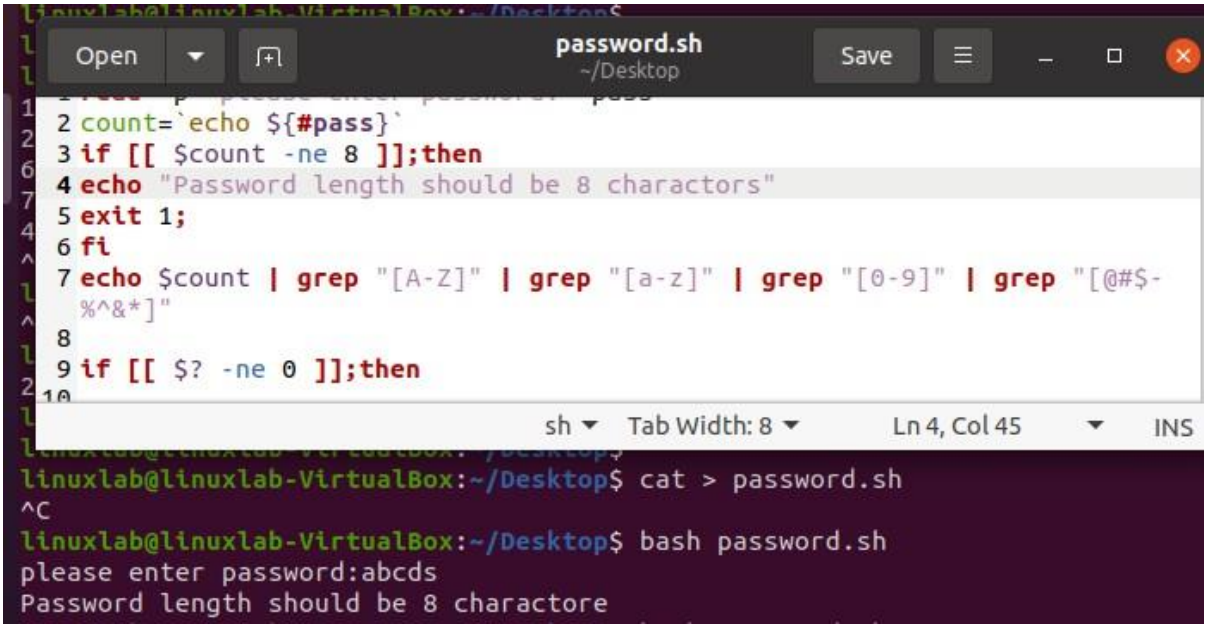
4.validate password strength. Here are a few assumptions for the password string. Length – minimum of 8 characters, Contain both alphabet and number, Include both the small and capital case letters.



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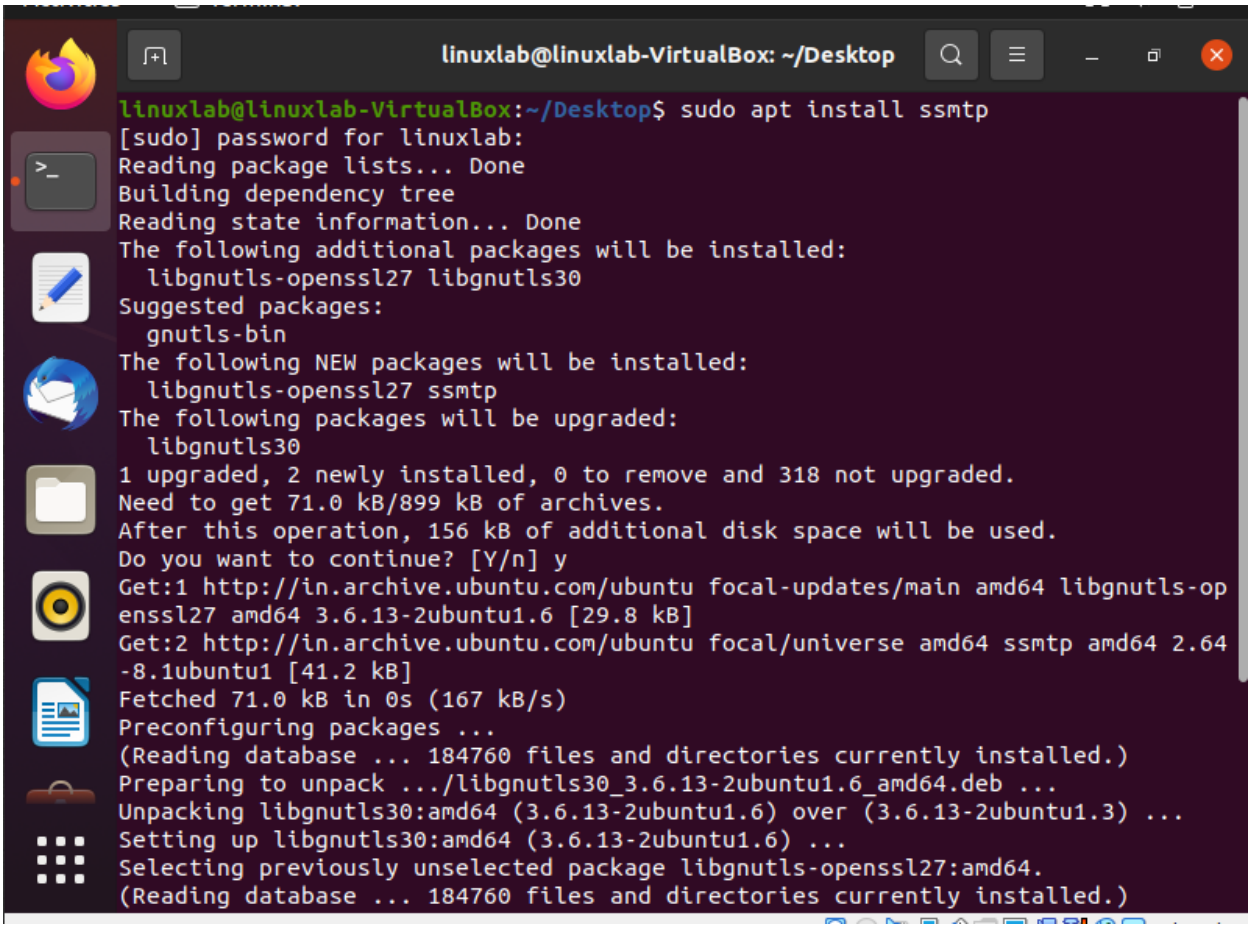
PRACTICAL 9

AIM: Design and develop a “Birthday Reminder” that can automatically send birthday wishes with a personalized message via email.

PROCEDURE-



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```
data_file="./bday.txt"     # Path to the birthday data file
email_file="./email.txt" # Path to the email template

today_month=$(date +%m)
today_day=$(date +%d)
today_date="$today_month-$today_day"

before_15_days=$(date --date="15 days ago" +%m-%d)

all_friends=$(grep -v '^#' $data_file | grep $today_date)

for friend in $all_friends
do
    email_addr=$(echo $friend | cut -d ',' -f 4)

    if [ -z "$email_addr" ]; then
        continue
    fi

    first_name=$(echo $friend | cut -d ',' -f 1)
    last_name=$(echo $friend | cut -d ',' -f 2)
    full_name="$first_name $last_name"

    echo "Sending birthday wish to $full_name ($email_addr)"

    sed "s/_name_/$full_name/g" $email_file | mailx -s "Happy Birthday: $full_name" $email_addr
done
```

```
[liveuser@localhost-live ~]$ ./abc.sh
Sending email to Ashish Gupta (guptaashish15a@gmail.com)...
Resolving host smtp.gmail.com . . . done.
Connecting to 142.251.175.109:587 . . . connected.
220 smtp.gmail.com ESMTP d2e1a72fcca58-71e2aa93dd2sm3466396b3a.119 - gsmtp
>>> EHLO localhost-live
250-smtp.gmail.com at your service, [49.47.69.98]
250-SIZE 35882577
250-8BITMIME
250-STARTTLS
250-ENHANCEDSTATUSCODES
250-PIPELINING
250-CHUNKING
250 SMTPUTF8
>>> STARTTLS
220 2.0.0 Ready to start TLS
>>> EHLO localhost-live
250-smtp.gmail.com at your service, [49.47.69.98]
250-SIZE 35882577
250-8BITMIME
250-AUTH LOGIN PLAIN XOAUTH2 PLAIN-CLIENTTOKEN OAUTHBEARER XOAUTH
250-ENHANCEDSTATUSCODES
250-PIPELINING
250-CHUNKING
250 SMTPUTF8
>>> AUTH LOGIN
334 VXNlcm5hbWU6
>>> Z3VwdGFhc2hpc2gxNWFAZ21haWwuY29t
334 UGFzc3dvcmQ6
>>> YnRiciB4amxxIG5nYWQgdmRzcQ==
235 2.7.0 Accepted
>>> MAIL FROM:<guptaashish15a@gmail.com>
250 2.1.0 OK d2e1a72fcca58-71e2aa93dd2sm3466396b3a.119 - gsmtp
>>> RCPT TO:<guptaashish15a@gmail.com>
250 2.1.5 OK d2e1a72fcca58-71e2aa93dd2sm3466396b3a.119 - gsmtp
>>> DATA
354 Go ahead d2e1a72fcca58-71e2aa93dd2sm3466396b3a.119 - gsmtp
>>> .
250 2.0.0 OK  1728707940 d2e1a72fcca58-71e2aa93dd2sm3466396b3a.119 - gsmtp
>>> QUIT
221 2.0.0 closing connection d2e1a72fcca58-71e2aa93dd2sm3466396b3a.119 - gsmtp
Email sent!
[liveuser@localhost-live ~]$
```

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Output:
Birthday wish sent successfully.

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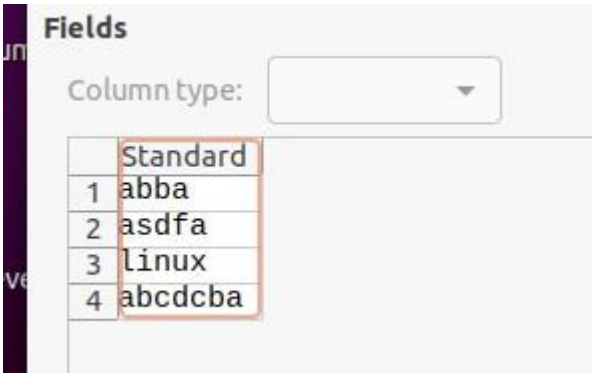
PRACTICAL 10

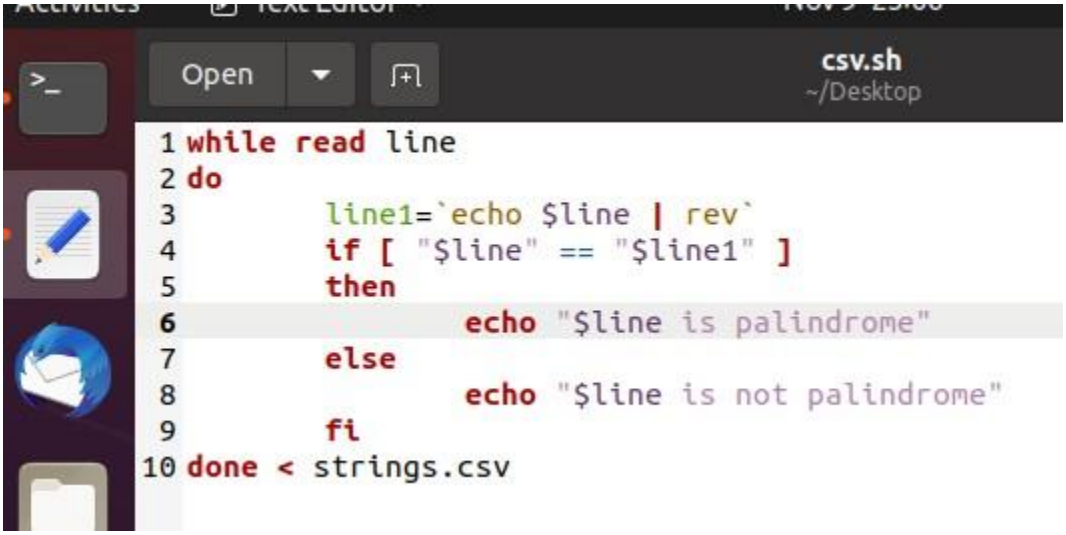
AIM: Check whether strings in csv files are palindrome or not.

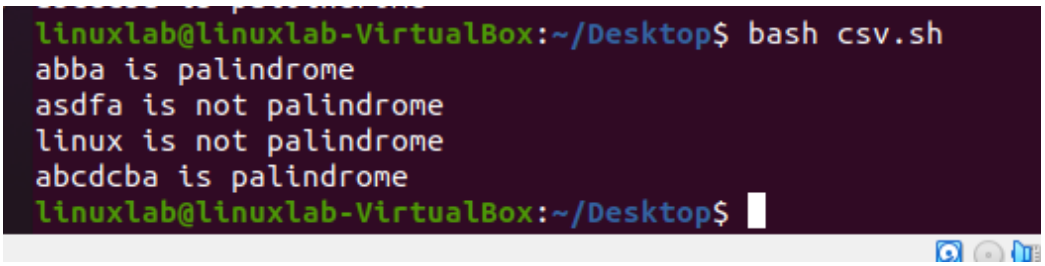
Procedure:

Strings present in the csv file:



.sh file:





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PRACTICAL 11

AIM: Implement NIC Bonding and Teaming.

THEORY:

Network Interface Bonding is a mechanism used in Linux servers which consists of binding more physical network interfaces in order to provide more bandwidth than a single interface can provide or provide link redundancy in case of a cable failure. This type of link redundancy has multiple names in Linux, such as **Bonding**, **Teaming** or **Link Aggregation Groups** (**LAG**).

Bonding is nothing but Linux kernel feature that allows to aggregate multiple link interfaces (such as eth0, eth1) into a single virtual link such as bond0. The idea is pretty simple to get higher data rates and as well as link failover. Linux allows administrators to bind multiple network interfaces together into a single channel using the bonding kernel module and a special network interface called a channel bonding interface. Channel bonding enables two or more network interfaces to act as one, simultaneously increasing the bandwidth and providing redundancy.

```
linuxlab@linuxlab-VirtualBox:~$ ethtool docker0
Settings for docker0:
        Supported ports: [ ]
        Supported link modes:   Not reported
        Supported pause frame use: No
        Supports auto-negotiation: No
        Supported FEC modes: Not reported
        Advertised link modes:  Not reported
        Advertised pause frame use: No
        Advertised auto-negotiation: No
        Advertised FEC modes: Not reported
        Speed: Unknown!
        Duplex: Unknown! (255)
        Port: Other
        PHYAD: 0
        Transceiver: internal
        Auto-negotiation: off
Cannot get wake-on-lan settings: Operation not permitted
        Link detected: no
linuxlab@linuxlab-VirtualBox:~$
```

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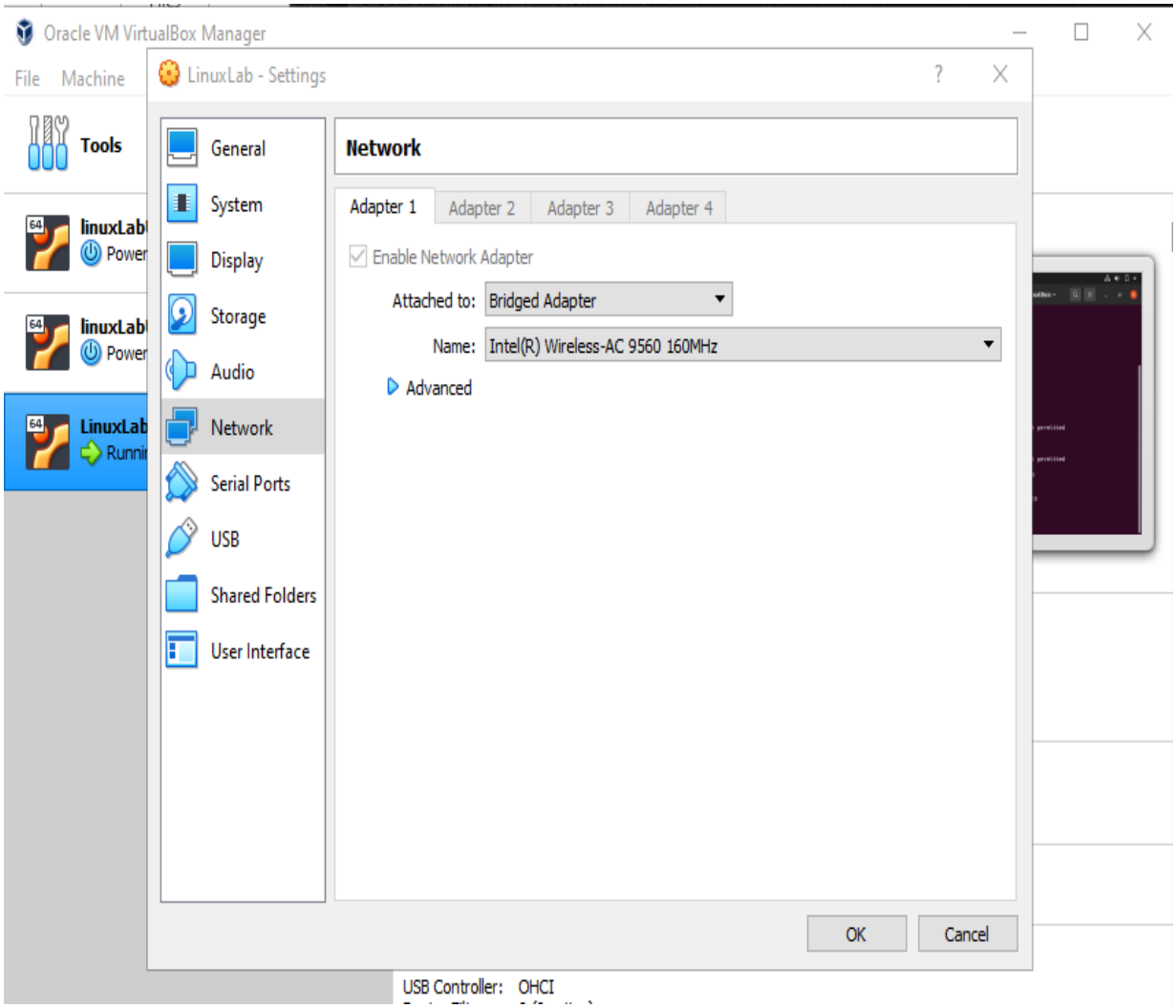
```
linuxlab@linuxlab-VirtualBox:~$ ethtool lo
Settings for lo:
Cannot get wake-on-lan settings: Operation not permitted
        Link detected: yes
linuxlab@linuxlab-VirtualBox:~$ ethtool enpis0
Settings for enpis0:
Cannot get device settings: No such device
Cannot get wake-on-lan settings: No such device
Cannot get message level: No such device
Cannot get link status: No such device
No data available
linuxlab@linuxlab-VirtualBox:~$
```



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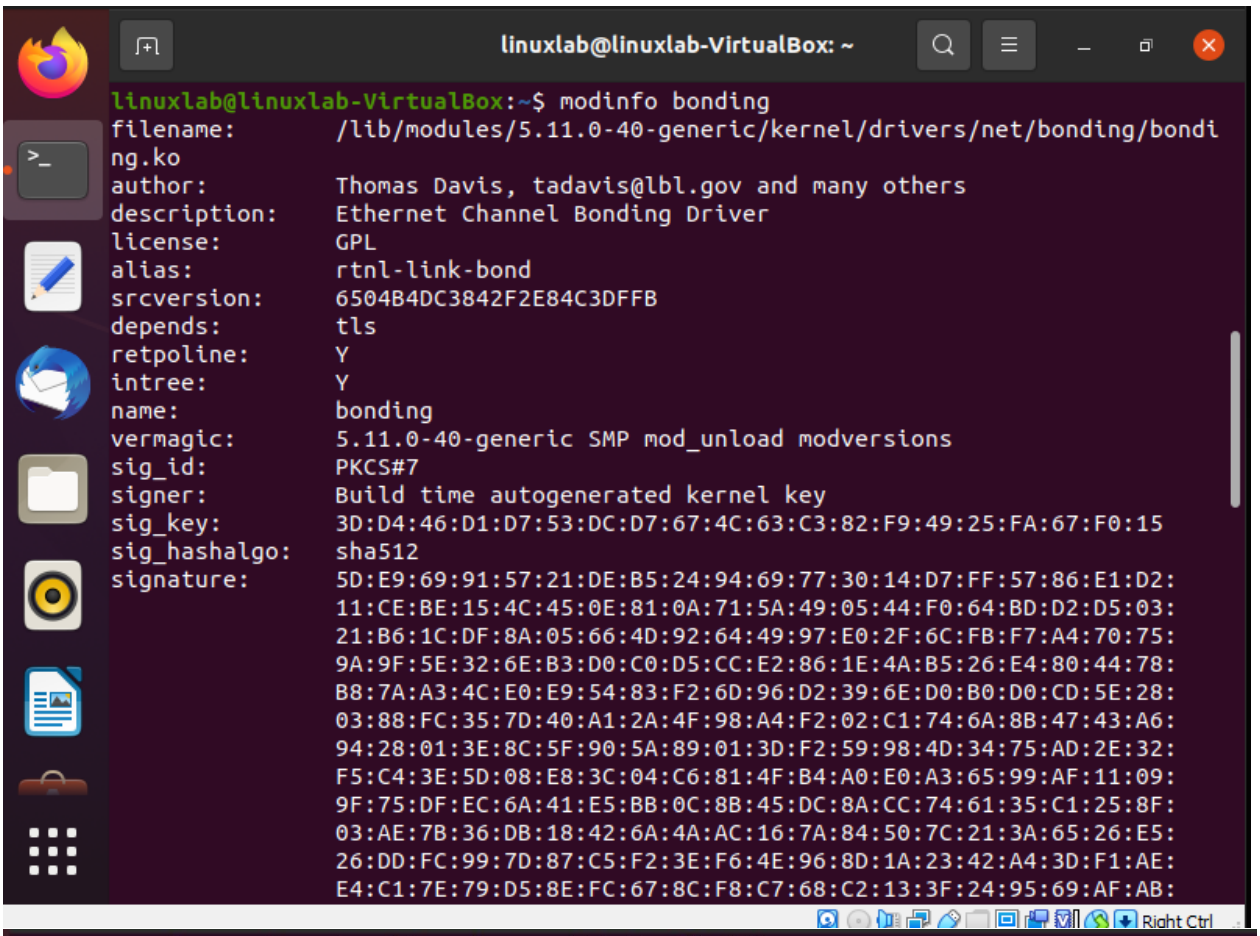

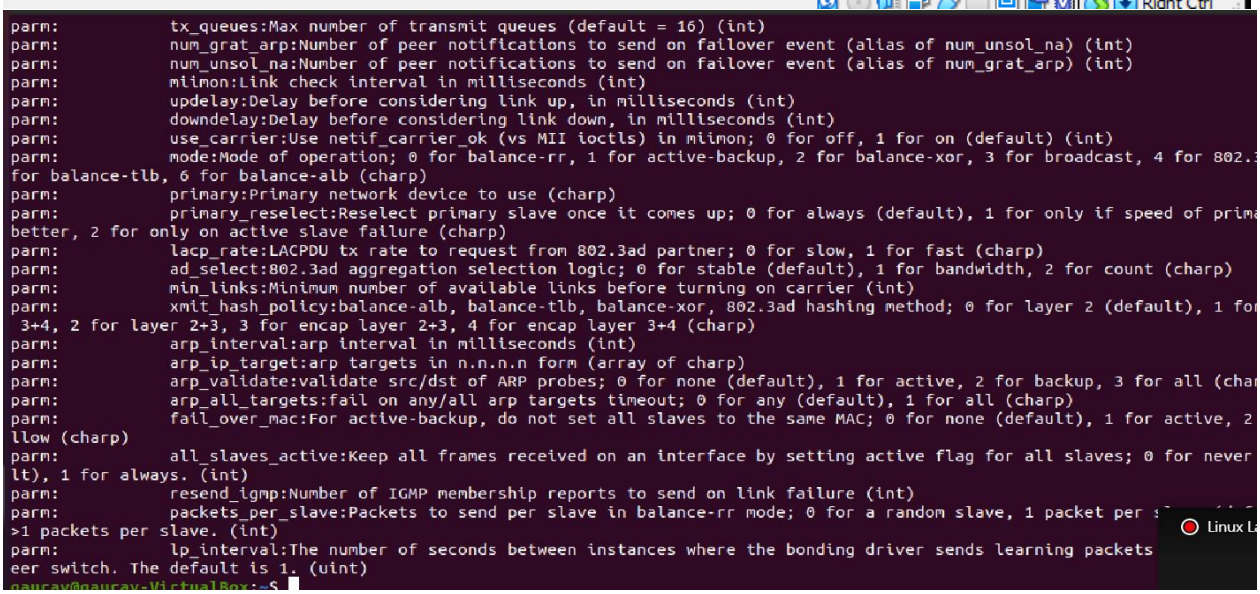

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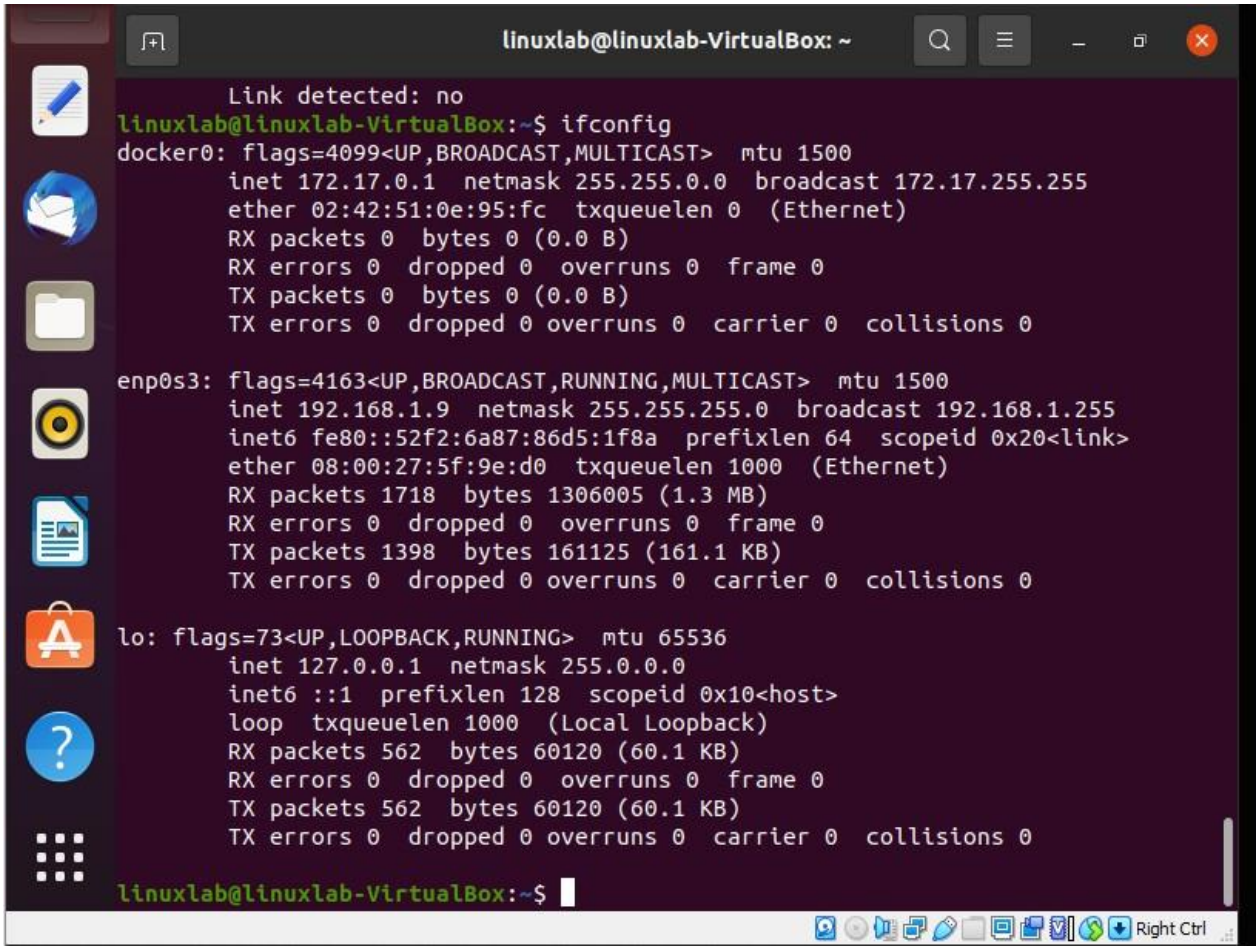

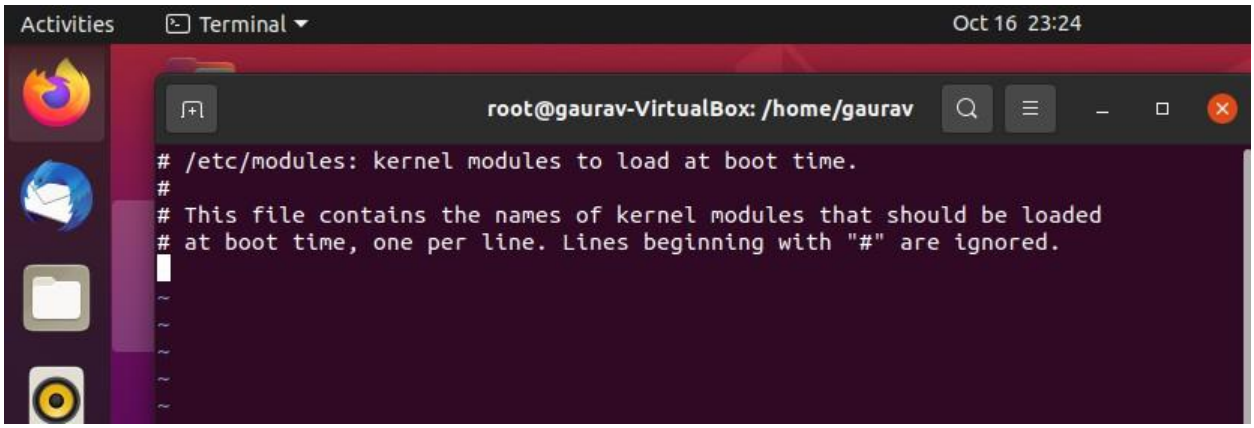

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```
root@linuxlab-VirtualBox: /home/linuxlab

linuxlab@linuxlab-VirtualBox:~$ sudo -s
root@linuxlab-VirtualBox:/home/linuxlab# vi /etc/module
root@linuxlab-VirtualBox:/home/linuxlab# vi /etc/modules
root@linuxlab-VirtualBox:/home/linuxlab# vi /etc/modules
root@linuxlab-VirtualBox:/home/linuxlab# vi /etc/network/interfaces
root@linuxlab-VirtualBox:/home/linuxlab# apt-get install ifenslave-2.6
Reading package lists... Done
Building dependency tree
Reading state information... Done
The following package was automatically installed and is no longer required:
  vim-runtime
Use 'apt autoremove' to remove it.
The following additional packages will be installed:
  ifenslave ifupdown
Suggested packages:
  rdnssd
The following NEW packages will be installed:
  ifenslave ifenslave-2.6 ifupdown
0 upgraded, 3 newly installed, 0 to remove and 316 not upgraded.
Need to get 75.5 kB of archives.
After this operation, 297 kB of additional disk space will be used.
Do you want to continue? [Y/n] y
Get:1 http://in.archive.ubuntu.com/ubuntu focal/universe amd64 ifupdown amd64 0
.8.35ubuntu1 [60.5 kB]
Get:2 http://in.archive.ubuntu.com/ubuntu focal/universe amd64 ifenslave all 2.
9ubuntu1 [13.3 kB]
Get:3 http://in.archive.ubuntu.com/ubuntu focal/universe amd64 ifenslave-2.6 al
l 2.9ubuntu1 [1,740 B]
```

```
# interfaces(5) file used by ifup(8) and ifdown(8)
auto lo
iface lo inet loopback

#enp0s3 configuration
auto enp0s3
iface enp0s3 inet manual
bond-master bond0
bond-primary enp0s3

#enp0s8  configuration
auto enp0s8
iface enp0s8  inet manual
bond-master bond0

# Bonding enp0s3 & enp0s8  create bond0 NIC
auto bond0
iface bond0 inet static
address 192.168.100.200
gateway 192.168.100.255
netmask 255.255.255.0
bond-mode active-backup
bond-miimon 100
bond-slaves none
Show Applications
-- INSERT --
```

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```
Bonding Mode: fault-tolerance (active-backup)
Primary Slave: enp0s3 (primary_reselect always)
Currently Active Slave: enp0s3
MII Status: up
MII Polling Interval (ms): 100
Up Delay (ms): 0
Down Delay (ms): 0
Peer Notification Delay (ms): 0

Slave Interface: enp0s3
MII Status: up
Speed: 1000 Mbps
Duplex: full
Link Failure Count: 0
Permanent HW addr: 08:00:27:15:8b:df
Slave queue ID: 0

Slave Interface: enp0s8
MII Status: up
Speed: 1000 Mbps
Duplex: full
Link Failure Count: 0
Permanent HW addr: 08:00:27:e2:f6:1f
Slave queue ID: 0
```

```
root@gaurav-VirtualBox:/home/gaurav# ifconfig
bond0: flags=5187<UP,BROADCAST,RUNNING,MASTER,MULTICAST>  mtu 1500
        inet 192.168.100.200  netmask 255.255.255.0  broadcast 192.168.100.255
        inet6 fe80::a00:27ff:fe15:8bdf  prefixlen 64  scopeid 0x20<link>
        ether 08:00:27:15:8b:df  txqueuelen 1000  (Ethernet)
        RX packets 68  bytes 9431 (9.4 KB)
        RX errors 0  dropped 0  overruns 0  frame 0
        TX packets 55  bytes 7729 (7.7 KB)
        TX errors 0  dropped 0 overruns 0  carrier 0  collisions 0

docker0: flags=4099<UP,BROADCAST,MULTICAST>  mtu 1500
        inet 172.17.0.1  netmask 255.255.0.0  broadcast 172.17.255.255
        ether 02:42:04:4d:0f:ac  txqueuelen 0  (Ethernet)
        RX packets 0  bytes 0 (0.0 B)
        RX errors 0  dropped 0  overruns 0  frame 0
        TX packets 0  bytes 0 (0.0 B)
        TX errors 0  dropped 0 overruns 0  carrier 0  collisions 0

enp0s3: flags=6211<UP,BROADCAST,RUNNING,SLAVE,MULTICAST>  mtu 1500
        inet 192.168.100.3  netmask 255.255.255.0  broadcast 192.168.100.255
        inet6 fe80::de61:8b4d:29ce:5bf6  prefixlen 64  scopeid 0x20<link>
        ether 08:00:27:15:8b:df  txqueuelen 1000  (Ethernet)
        RX packets 461  bytes 129174 (129.1 KB)
        RX errors 0  dropped 0  overruns 0  frame 0
        TX packets 227  bytes 30431 (30.4 KB)
```

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