



- Aim:
1. Install your choice of Linux distribution.
  2. Customize desktop environment by changing different default options like changing default background, themes, screensaver.
  3. Changing screen resolution.
  4. Changing time settings.

1. Step 1: Create a virtual machine. Go into settings → storage and add the virtual optical drive. Click on ok.

Step 2: Now click on start. A new window will open.

Step 3: Choose 'install ubuntu' option.

Step 4: Choose the appropriate language for the keyboard layout. Click on continue.

Step 5: Choose between normal & minimal installation. Click next.

Step 6: Click on 'install now' option.

Step 7: Enter superuser's credentials and click continue.

Step 8: The installation will complete and you will be prompted to restart your computer.

Step 9: Restart your computer. Enter the password. You've successfully installed and logged into your system.

Q. Accessing Appearance Settings.: To access Appearance Settings in Ubuntu, click on User menu at the top right corner, on the top Menu bar & select system settings.

A window will pop up with all settings divided into Personal, Hardware & system options icon. Let's select the Appearance icon.

### → Changing wallpaper picture.

- i) On the left side of Background part, you can see your current wallpaper.
- ii) On the right side is part where we can select one of Ubuntu wallpapers. Clicking on any thumbnail will change our wallpaper.
- iii) If you want to select wallpaper from your pictures folder, click the drop-down menu above thumbnails and select the Pictures Folder.
- iv) You will see all the pictures in your pictures folder as thumbnails where you can select them as your wallpaper.
- v) 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 custom folder & choose the picture inside it.

## → changing Ubuntu theme :

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

## 3. Screen Resolution : Ascertain the current screen resolution for your desktop.

- You can change how big (or how detailed) things appear on the screen by changing the screen resolution.
- You can change which way up things appear (for eg, if you have a rotating display) by changing the rotation.
  - i) Click the icon on the very right of the menu bar & select system settings.
  - ii) Open screen display.
  - iii) If you have multiple displays & they're not mirrored, you can have different settings on each display. Select a display in the preview area.
  - iv) Select your desired resolution & rotation.

v) click apply. The new settings will be applied for 30 seconds before reverting back. That way, if you cannot see anything with new settings, it will go back to the working conditions.

#### 4. Time settings change the time zone of your system.

- i) If you are currently in Indian time, how does the displayed time change?
- ii) After noting the time, change the time zone back to your local time zone.
- iii) Just click on the clock on the top bar, and choose 'time and date' settings. Once the time and date window opens, choose 'Manually' so you can change the time & date manually; otherwise choose your time zone from the map, and choose Automatic.

87  
06/01/2020

fahd@fahd-VirtualBox:~  
To run a command as administrator (user "root"), use "sudo <command>".  
See "man sudo\_root" for details.

```
fahd@fahd-VirtualBox:~$ sudo apt-get install gcc  
[sudo] password for fahd:  
Reading package lists... Done  
Building dependency tree  
Reading state information... Done  
gcc is already the newest version (4:5.3.1-1ubuntu1).  
0 upgraded, 0 newly installed, 0 to remove and 304 not upgraded.  
fahd@fahd-VirtualBox:~$
```

Aim: Installing and removing software.

1. Install gcc package, verify that it runs & then remove it.

Step 1: 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 & executing the command, installation will take place.

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

To Uninstall GCC compiler:

In gcc 5.1.0, although there is top level uninstall target, some directories do have it, in particular gcc, so you can do:

Type: ~~cd build/gcc~~  
~~sudo make uninstall.~~

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

## ES Practical Number. 3

Aim : Utilization of grep, man commands.

Documentation :

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

Ans : To find info about any command, 'info' command is used. The syntax of 'info' command is 'info command-name'. We are going to find the info about the 'grep' command:  
Open the terminal (ctrl + alt + t) and type:  
`info grep.`

After typing the command, following output will be displayed onto your screen.

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

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

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

Ans. To use the 'man' command simply type  
man (command\_name)

Now we are going to find the manual for 'ls' command.  
man ls.

```

LS(1)                               User Commands                               LS(1)
NAME
    ls - list directory contents

SYNOPSIS
    ls [OPTION]... [FILE]...

DESCRIPTION
    List information about the FILEs (the current directory by default).
    Sort entries alphabetically if none of -cftuvSUX nor --sort is specified.

    Mandatory arguments to long options are mandatory for short options too.

    -a, --all
        do not ignore entries starting with .

    -A, --almost-all
        do not list implied . and ..

    --author
    ...
Manual page ls(1) line 1 (press h for help or q to quit)

```

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

Ans. "Tar" & "zip" are some man pages which are available that document file compression. Simply type

man zip

man tar.

(1P(3)) General Commands Manual ZIP(1)

**NAME**

zip - package and compress (archive) files

**SYNOPSIS**

```
zip [-aBcdDeFFghijklmopqrStUvwxyz] [--longoption ...] [-b path]
[-h suffixes] [-t date] [-T date] [zippedfile [file ...]] [-xI [list]]
```

zipcloak (see separate man page)

zipnote (see separate man page)

zipsplit (see separate man page)

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

**DESCRIPTION**

zip is a compression and file packaging utility for Unix, VMS, MSDOS, OS/2, Windows 9x/NT/XP, Minix, Atari, Macintosh, Amiga, and Acorn RISC Manual page zip(1) line 1 (press h for help or q to quit)

(1A(1)) BSD General Commands Manual TAR(1)

**NAME**

tar - The CIX version of the tar archiving utility

**SYNOPSIS**

```
tar [-c] A --catenate ..concatenate | c --create | d --diff --compare |
--delete | r --append | t --list | --test-label | u --update | x
--extract --get [options] [pathname ...]
```

**DESCRIPTION**

Tar stores and extracts files from a tape or disk archive.

The first argument to tar should be a function; either one of the letters A, d, or r, or one of the long function names. A function letter need not be prefixed with '--', and may be combined with other single-letter options. A long function name must be prefixed with '--'. Some options take a parameter; with the single-letter form these must be given as separate arguments. With the long form, they may be given by appending \*value to the option.

**FUNCTION LETTERS**

Main operation mode:

- \*A, --catenate, --concatenate
- append tar files to an archive
- c, --create
- create a new archive
- d, --diff, --compare

Manual page tar(1) line 1 (press h for help or q to quit)

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

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

## MANUAL SECTIONS

The standard sections of the manual include:

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

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

There are certain terms that have different pages in different sections (eg: 'printf' as a command appears in section 1 as a 'stdlib' function appears in section 3.) In cases like that, you can pass the section no. to the man before the page name to choose which one you want or use man -a to show every matching page in a row.

```
$ man 1 printf
$ man 3 printf
$ man -a printf
$ man -k "printf"
printf
printf
printf
printf
printf [builtins]
```

- |      |   |                                     |
|------|---|-------------------------------------|
| (1)  | - | format and print data               |
| (1p) | - | write formatted output              |
| (3)  | - | formatted output conversion         |
| (3p) | - | print formatted output              |
| (1)  | - | bash built-in commands, see bash(1) |

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

- c) Command-Line; help list the available options for the mkdir command. How can you do this?

Ans. \$mkdir -m a=rwx directoryname.

~~8/0  
0/0~~

## Practical No: 4

Aim: Command line operations.

a) Install new package on your system.

→ sudo apt-get install [package name]

b) Remove the package installed

→ sudo apt-get remove [package name]

c) Find the password file in / using find command.

→ # find / -name passwd.

• /usr/share/doc/nss-1dap-253/pam.d/passwd.

• /usr/bin/passwd.

• /etc/pam.d/passwd

• /etc/passwd

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

→ # find / -max\_depth 2 -name passwd.

• /etc/passwd

e) find the passwd file under root of two level down.

→ # find / -max\_depth 3 -name passwd.

• /usr/bin/passwd

• /etc/pam.d/passwd

• /etc/passwd.

f) Find the password file b/w sub-directories level 2 & 4.

→ # find -maxdepth 3 -maxdepth 5 -name password.

• /usr/bin/password

• /etc/pam.d/password

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

→ # ln -s file1 file2.

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

→ # touch example.txt

# mv example.txt /tmp.

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

→ # rm /tmp/example.txt.

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

→ # whereis ls

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

# whereis ps.

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

# whereis bash

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

1) 

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

2) 

```
jeba@jeba-VirtualBox:~$ mount
sysfs on /sys type sysfs (rw,nosuid,nodev,noexec,relatime)
proc on /proc type proc (rw,nosuid,nodev,noexec,relatime)
udev on /dev type devtmpfs (rw,nosuid,relatime,size=494436k,nr_inbdes=123609,mode=755)
devpts on /dev/pts type devpts (rw,nosuid,noexec,relatime,gid=5,mode=620,ptmxmode=000)
tmpfs on /run type tmpfs (rw,nosuid,noexec,relatime,size=102416k,mode=755)
/dev/sda1 on / type ext4 (rw,relatime,errors=remount-ro,data=ordered)
securityfs on /sys/kernel/security type securityfs (rw,nosuid,nodev,noexec,relatime)
tmpfs on /dev/shm type tmpfs (rw,nosuid,nodev)
tmpfs on /run/lock type tmpfs (rw,nosuid,nodev,noexec,relatime,size=5120k)
tmpfs on /sys/fs/cgroup type tmpfs (ro,nosuid,nodev,noexec,mode=755)
cgroup on /sys/fs/cgroup/systemd type cgroup (rw,nosuid,nodev,noexec,relatime,xattr,release_agent=/lib/systemd/systemd-cgrouper-agent,name=systemd,nsroot=/)
pstore on /sys/fs/pstore type pstore (rw,nosuid,nodev,noexec,relatime)
cgroup on /sys/fs/cgroup/cpuset type cgroup (rw,nosuid,nodev,noexec,relatime,cpuset,nsroot=/)
cgroup on /sys/fs/cgroup/net_cls,net_prio type cgroup (rw,nosuid,nodev,noexec,relatime,net_cls,net_prio,nsroot=/)
cgroup on /sys/fs/cgroup/pids type cgroup (rw,nosuid,nodev,noexec,relatime,pids,nsroot=/)
cgroup on /sys/fs/cgroup/freezer type cgroup (rw,nosuid,nodev,noexec,relatime,freezer,nsroot=/)
cgroup on /sys/fs/cgroup/cpu,cpuacct type cgroup (rw,nosuid,nodev,noexec,relatime,cpu,cpuacct,nsroot=/)
cgroup on /sys/fs/cgroup/devices type cgroup (rw,nosuid,nodev,noexec,relatime,devices,nsroot=/)
cgroup on /sys/fs/cgroup/memory type cgroup (rw,nosuid,nodev,noexec,relatime,memory,nsroot=/)
cgroup on /sys/fs/cgroup/blkio type cgroup (rw,nosuid,nodev,noexec,relatime,blkio,nsroot=/)
cgroup on /sys/fs/cgroup/perf_event type cgroup (rw,nosuid,nodev,noexec,relatime,perf_event,nsroot=/)
cgroup on /sys/fs/cgroup/hugetlb type cgroup (rw,nosuid,nodev,noexec,relatime,hugetlb,nsroot=/)
systemd-1 on /proc/sys/fs/binfmt_misc type autofs (rw,relatime,fd=32,pgrp=1,timeout=0,minproto=5,maxproto=5,direct)
rotor5,maxproto=5,direct)
hugetlbfss on /dev/hugepages type hugetlbfss (rw,relatime)
```

3) 

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



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

Aim: Operations.

1) Explore mounted file systems on your computer.

→ `df -h`

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

→ `mount`.

3) Copying text from files.

→ `cp` command

→ `mv` command.

4) Archiving & backup the work directory using `tar`, `gzip`, and `bzip2` commands.

→ `gzip filename.txt`

→ `bzip2 filename.txt`

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

→ ~~`diff filename1 filename2`~~

Q8.

- Q) Use patch command to patch a file. and analyze the patch using patch command again.

4)

```
jeba@jeba-VirtualBox:~$ tar -cvf data.tar /mn
tar: data.tar: Cannot open: Permission denied
tar: Error is not recoverable: exiting now
jeba@jeba-VirtualBox:~$ sudo tar -cvf data.tar /mn
tar: Removing leading '/' from member names
/mn/
/mn/hd/
jeba@jeba-VirtualBox:~$ ls
bin  data.tar  etc      lib      mn  opt   run   sry  usr
boot dd   home  lost+found  mnt  proc  sbin  sys  var
cdrom dev  initrd.img  media  mnt  root  snap  vmlinuz
jeba@jeba-VirtualBox:~$ cat data.tar
mn/0000755000000000000000000000000013605376557010365 Sustar  rootrootmn/hd/0000755000000000000000000000000013605376557010760 Sustar  rootrootjeba@VirtualBox:~$
```

```
jeba@jeba-VirtualBox:~/jeb$ bzip2 ss.txt
jeba@jeba-VirtualBox:~/jeb$ ls
dd.txt  ss.txt.bz2
jeba@jeba-VirtualBox:~/jeb$ cat ss.txt.bz2
BZh91AY&SY: <><><>
'Jew$++@jeba@jeba-VirtualBox:~/jeb$ gzip dd.txt
jeba@jeba-VirtualBox:~/jeb$ ls
dd.txt.gz  ss.txt.bz2
jeba@jeba-VirtualBox:~/jeb$ cat dd.txt.gz
<><>d.txt+OeIeeMeeee+<><>Xzjeba@jeba-VirtualBox:~/jeb$
```

5)

```
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.
```

6)

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

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

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

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

8A  
✓  
✓X

Aim: Use Environment.

- a) Which account you are logged in? How do you find out?  
→ Using commands: who, whoami.
- b) Display /etc/shadow file using cat command and understand the importance of shadow file. How it's different than passwd file.  
→ cat/etc/shadow.  
As with the passwd file, each field in the shadow file is also separated with ":" colon characters, and are as follows:
- i) Username, upto 8 characters. Case-sensitive, usually all lowercase. It direct match to the username in the /etc/passwd file.
  - ii) Password, 13 character encrypted. A blank entry (eg. ::) indicates a password is not required to log in (usually a bad idea), and a "\*" entry (eg.: \*:) indicates the account has been disabled.
  - iii) The number of days (since January 1, 1970) since the password was last changed.
  - iv) The number of days before password may be changed (0 indicates it may be changed at any time)
  - v) The number of days after which password must be changed (99999 indicates user can keep his or her password unchanged for many, many years)

- vi) The number of days to warn user of an expiring password (+ for a full week)
- vii) The number of days after password expires that account is disabled.
- viii) The number of days since January 1, 1970 that an account has been disabled.
- ix) A reserved field for possible future use.

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

- i) Username, up to 8 characters. Case-sensitive, usually all lowercase.
- ii) An "x" in the password field. Passwords are stored in the "/etc/shadow" file.
- iii) 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.
- iv) 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.
- v) Full name of user. It should be between 1 and 32 characters in length.
- vi) User's home directory. Usually /home/username (eg. /home/fahd). All user's personal files, web pages, mail forwarding, etc.. will be stored here.

vii) User's "shell account". Often set to "/bin/bash" to provide access to the bash shell

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

c) Get your current working directory

→ pwd.

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

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

→ history

! line number.

(d)

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

(e)

```
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:~$ █
```

c) Create alias to most commonly used commands.

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

alias label = " command "

DR. 2  
2X

## Practical 7

### Topic : Linux Editors : Vi

- a) Create, modify, search & navigate a file in editor  
i) Creating a file.

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

- ii) Modifying the file.

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

- iii) Search in a file.

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

- iv) Navigate :

Movement in four directions.

key	Action
k	Moves cursor up
j	Moves cursor down
h	Moves cursor left
l	Moves cursor right.

### Word Navigation

key	Action
b	Moves back to the beginning of the word
e	Moves forward to the end of the word.
w	Moves forward to the beginning of the word.
D(zero)	Move to first character of line
\$	Move to the end of line.

## scrolling

key	Action
ctrl + f	Scrolls forward
ctrl + b	Scrolls backward
ctrl + d	Scrolls half page
ctrl + u	Scrolls half page backward

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

## i) Replace

Syntax : !g/word\_to\_be\_replaced!s//new\_word/gc.

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

```
jeba@jeba-VirtualBox: ~
Hello
This is my Linux example
Welcome
Welldone
This is Vi Editor
Thank you
replaced with our [cyan]a/g/g/m/v
```

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

ii) highlight.

Use set hlsearch

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

iii) Show the line number.

Use set nu.

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

## Topic : Linux Security

- a) Use of sudo to change user privileges to root.  
Create an user named 'user1'.

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

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

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

b) Identify operations that require sudo privileges.

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

c) Modify expiration date for new user using password aging

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

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

-E : Expiration Date.

-M : Minimum number of days before password change.

-M : Number of days password is valid.

-I : Account inactive.

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

d) 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:~$
```

*SB  
24/02*

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

a)

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

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

b)

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

c)

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

## Practical 9.

## Topic : Network Management.

- Get IP address of your machine using ifconfig.
- Get hostname of your machine.
- Use ping to check the network connectivity to remote machines.
- Use of dig command.



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

- Troubleshooting network using traceroute, route command



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

```
jeba@jeba-VirtualBox:~$ route
Kernel IP routing table
destination     gateway      genmask      flags metric ref use iface
default        10.0.2.2    0.0.0.0      UG     100      0      0 enp0s3
10.0.2.0       *           255.255.255.0 U       100      0      0 enp0s3
link-local     *           255.255.0.0   U       1000     0      0 enp0s3
jeba@jeba-VirtualBox:~$
```

f) Use of arp command

```
jeba@jeba-VirtualBox:~$ arp
Address: 10.0.2.2 HWtype ether Flags Mask Iface
          ether 52:54:00:12:35:02 C enp0s5
```

g) Use of host command

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

h) Use of netstat command and Nmap command

```
jeba@jeba-VirtualBox:~$ netstat
Active Internet connections (w/o servers)
Proto Recv-Q Send-Q Local Address           Foreign Address         State
Active UNIX domain sockets (w/o servers)
Proto RefCnt Flags       Type      State          I-Node Path
unix 2      [ ]          DGRAM
unix 2      [ ]          DGRAM
syslog
unix 16     [ ]          DGRAM
/dev/log
unix 7      [ ]          DGRAM
socket
unix 3      [ ]          DGRAM
unix 3      [ ]          STREAM   CONNECTED  44042  @/tmp/dbus-CymTeI7AQG
unix 3      [ ]          STREAM   CONNECTED  43331  @/tmp/dbus-CymTeI7AQG
unix 3      [ ]          STREAM   CONNECTED  42988  @/tmp/dbus-CMGc6G7PS
unix 3      [ ]          STREAM   CONNECTED  42696  @/tmp/dbus-CMGc6G7PS
unix 3      [ ]          STREAM   CONNECTED  13242  /run/systemd/journal/
stdout
unix 3      [ ]          STREAM   CONNECTED  43113  /run/systemd/journal/
stderr
unix 3      [ ]          STREAM   CONNECTED  43013  /run/systemd/journal/
unix 3      [ ]          STREAM   CONNECTED  42935
```

46

```
jeba@jeba-VirtualBox:~$ nmap www.google.com

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

Nmap done: 1 IP address (1 host up) scanned in 20.32 seconds
jeba@jeba-VirtualBox:~$
```

S  
24/02

```
tcsc@tcsc-VirtualBox ~
$ /bin/bash
$ echo "THIS IS LINUX"
$
```

linux.sh [New File]

# Practical 10

Topic : First Shell Scripting.

## Basics of shell scripting

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

### Echo \$SHELL

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

### vi filename.sh

```
#!/bin/bash
echo "This is Linux"
```

- chmod 777 filename.sh.

./filename.sh

A screenshot of a terminal window titled "tcsc@tcsc-VirtualBox: ~". The window contains the following text:  
tcsc@tcsc-VirtualBox:~\$ vi linux.sh  
tcsc@tcsc-VirtualBox:~\$ chmod 777 linux.sh  
tcsc@tcsc-VirtualBox:~\$ ./linux.sh  
THIS IS LINUX!  
tcsc@tcsc-VirtualBox:~\$

Steps to write & 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 the script]
- e) chmod 777 filename.sh (for making the script executable)
- f) sh filename.sh or ./filename.sh (for running the script)

program to display your name.

`#!/bin/bash`

`Echo "Enter your name:"`

`Read name`

`Echo "My name is: $name"`

```
tcsc@tcsc-VirtualBox: ~
#!/bin/bash
'echo "Enter your name:"
read name
"echo "My name is: $name"
'WM:
```

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

88

Program to find the sum of two variables.

vi filename.sh

#!/bin/bash

a=100

b=25

Sum=\$((a+b))

Echo "sum is :\$sum"

```
tcsc@tcsc-VirtualBox: ~
#!/bin/bash
a=100
b=25
sum=$((a+b))
echo "Sum is:$sum"

:~
```

```
tcsc@tcsc-VirtualBox: ~
tcsc@tcsc-VirtualBox: $ vi linux2.sh
tcsc@tcsc-VirtualBox: $ chmod 777 linux2.sh
tcsc@tcsc-VirtualBox: $ ./linux2.sh
Sum is:125
tcsc@tcsc-VirtualBox: $
```

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

```
tcsc@tcsc-VirtualBox:~$ /bin/bash
sum=$(( $1+$2 ))
echo "sum is:$sum"

"lin.sh" 3 lines, 46 characters
```

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

#### \* sed.

~~sed command or Stream editor is very powerful utility offered by Linux systems. It is mainly used for text substitution, find and replace but it can perform other text manipulation like insertion, deletion, search, etc. with sed, we can edit complete files without actually having to open it.~~

Q.8

Consider the following test file.

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

1) Displaying partial text of a file.

With sed, we can view part of a file rather than the whole file.

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

2) Display all except some lines.

To display all content except 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 replace a string

's' option is for searching a word.

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

5) Replace a string on a particular line.

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

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

6) Add a new line after/before the matched string

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

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

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

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

⇒ To change a whole line with matched pattern

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

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

### 8) Appending Lines.

To add some contents before every line with sed, we '\*' and '+' as follows.

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

GP  
24/02