

Practical - 1

Aim : Install your choice of Linux distribution
eg . Ubuntu ,

Ubuntu

Ubuntu is a free and open source software based on Debian. Ubuntu is officially released under 3 editions Desktop, Server, Union.

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

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

Steps for installing Ubuntu in a virtual machine :

Step 1 :

Select a virtual optical disk file or a physical drive to store Ubuntu in your virtual machine.

Step 2 :

Select the language of your choice and click on install Ubuntu.

You can also try Ubuntu for free on computer directly from this CD.

Step 3:

In updaters and add software
on the normal installation.

Step 4:

While configuring installation type
need to click Erase disk and install
This step would delete all types of down-
photos etc in all operating systems.

Step 5:

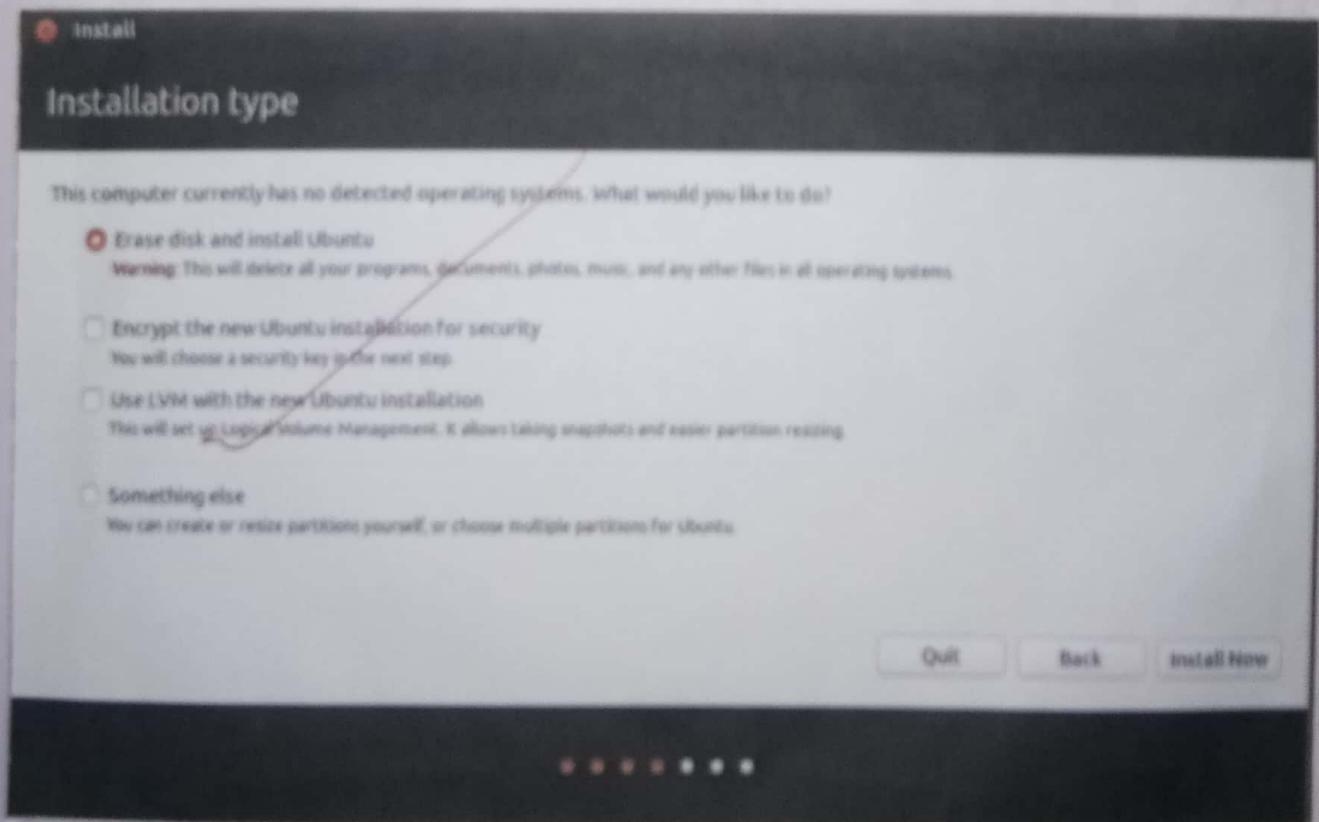
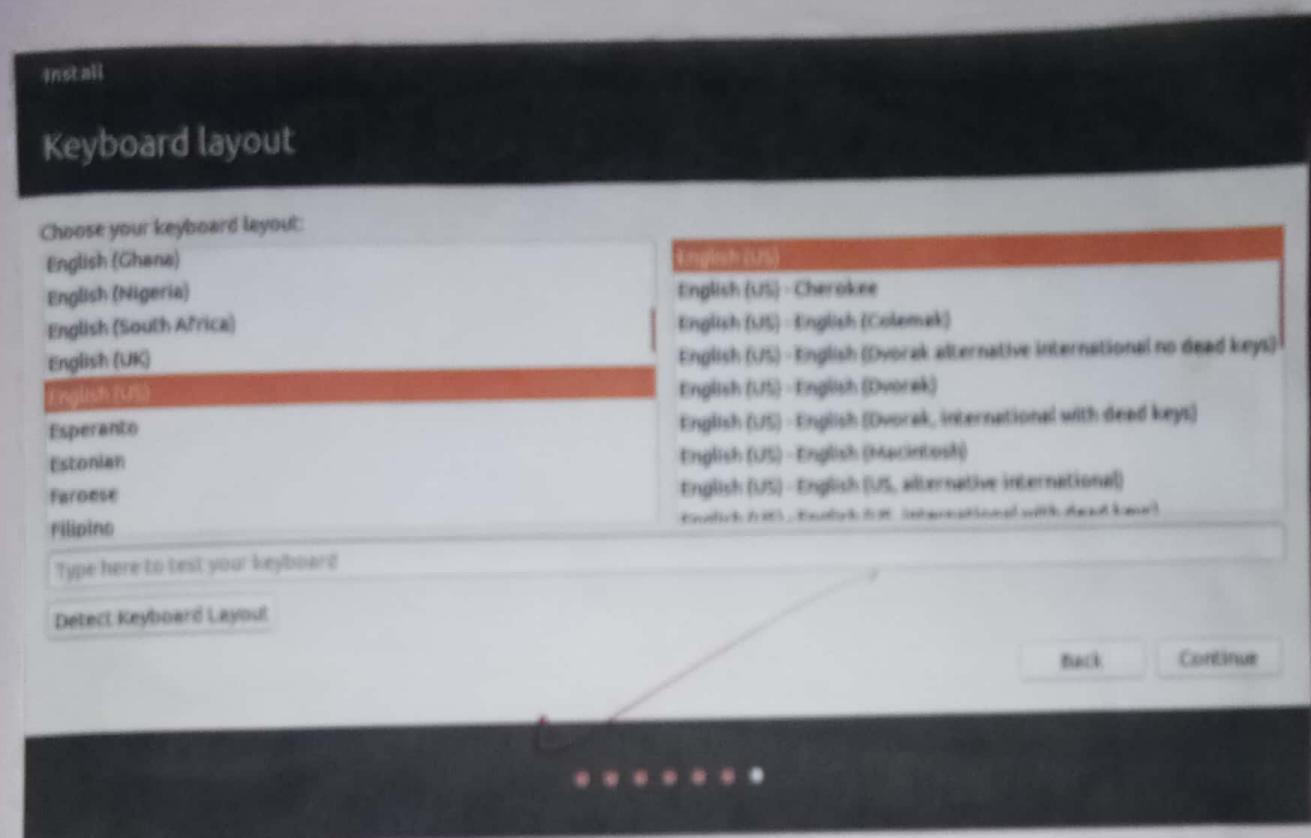
In this you only need to choose
the location for the doc to work on ubuntu

Step 6:

In this type you need to choose
username and password for the login
in ubuntu and then click on continue

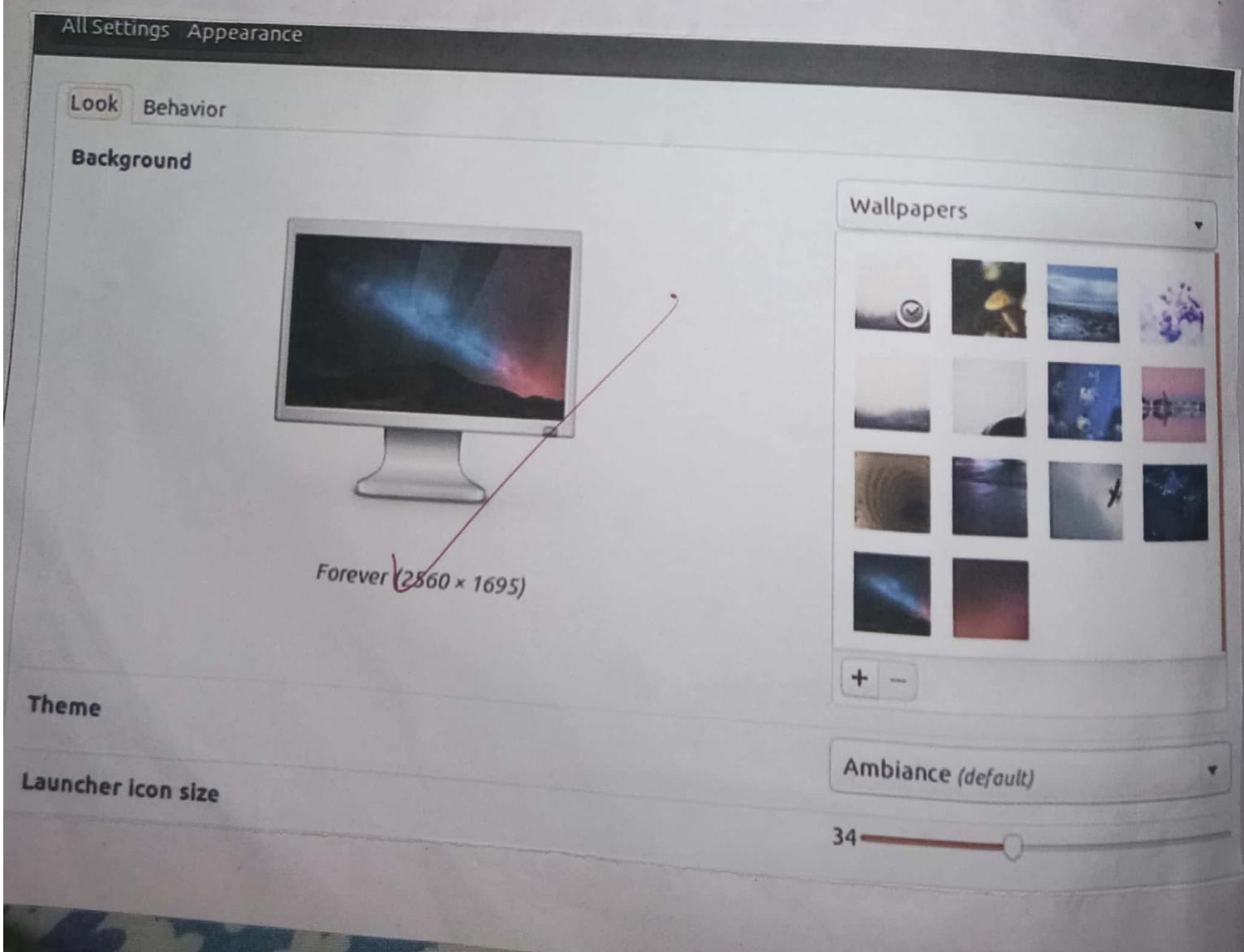
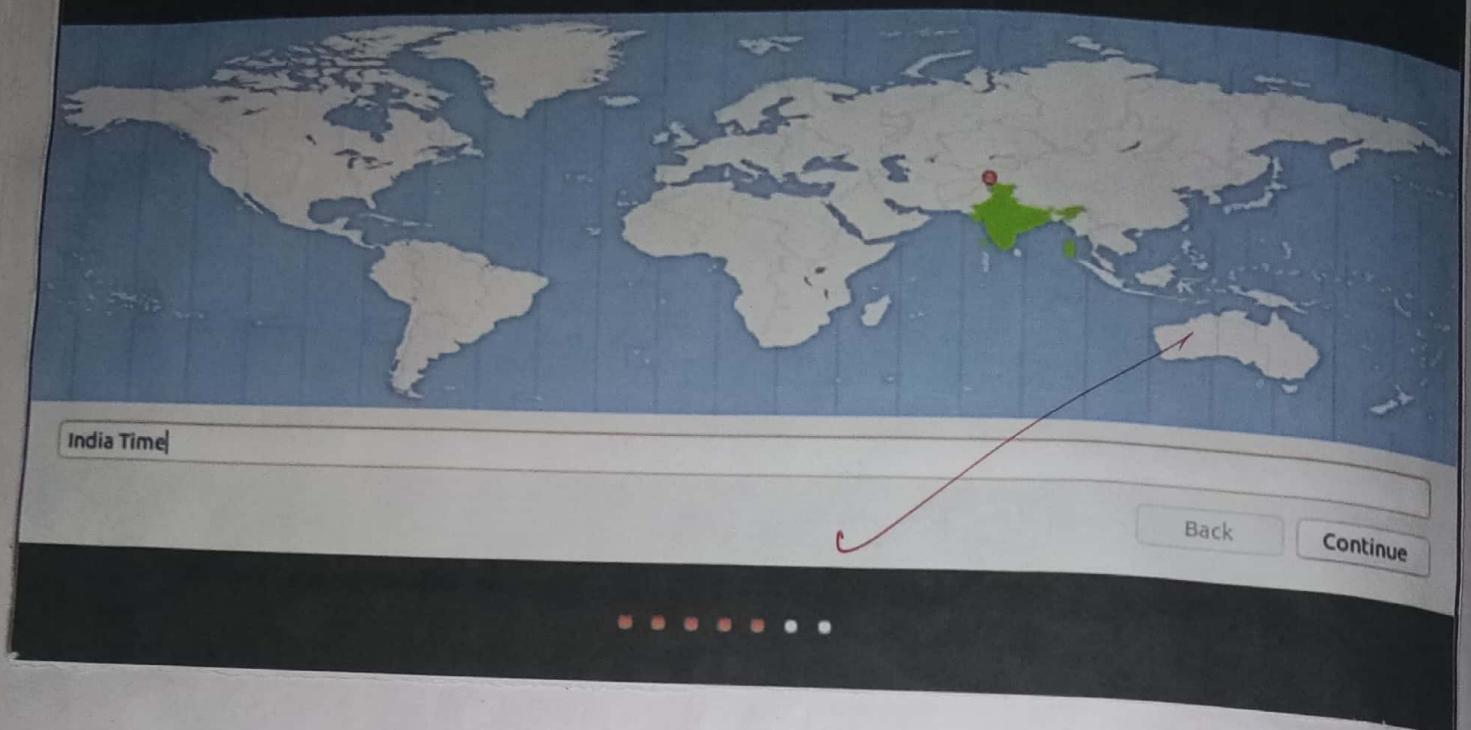
Step 7:

Here you simply need to type password
again and it is done.



Install

Where are you?



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

Accessing Appearance Settings

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

* Changing wallpaper picture

- On the left side of Background part, you can see your current wallpaper.
- On the right side is part where we can select one of Ubuntu wallpapers. Clicking any thumbnail our wallpaper will be changed right away, with a fading effect.
- If you want to select wallpaper from your picture folder, click the drop-down menu above the thumbnails and select the Pictures folder.
- You will see all the pictures in your pictures folder as thumbnails, where you can select them as your wallpaper.
- To add wallpaper that is in the another folder, just click the plus icon below the thumbnails and

Time & Date

All Settings Time & Date

Time & Date Clock



Location: Mumbai

Set the time: Manually Automatically from the Internet.

Time: 08:21:15 AM - Date: 2019-12-05 - +

Install (as superuser)

Who are you?

Your name: chandresh ✓
Your computer's name: chandresh-VirtualBox ✓
The name I use when I talk to other computers.
Pick a username: chandresh ✓
Choose a password:
Confirm your password: ✓
Log in automatically
 Require my password to log in
 Encrypt my home folder

Back Continue

Install

Welcome to Ubuntu 14.04

Fast and full of new features, the latest version of Ubuntu makes computing easier than ever. Here are just a few cool new things to look out for...



▶ Installing system

Skip

② Open Screen Display

③ If you have multiple displays and they are not mirrored, you can have different settings on each display. Select a display in the preview area.

④ Select your desired resolution and rotation.

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

* Time Settings Change the time zone of your system to (or New York time)

① If you are currently in Indian time). How does the displayed time change?

② After noting the time change, change the time zone back to your local time zone.

③ Just click on the clock on the top bar, and choose Time and Date Settings, once the Time and Date window opens, choose Manually, so you can change the time and date manually. Otherwise choose your time zone from the map, and choose Automatic.

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Practical - 2

Aim :- Installing and removing software

Install gcc package, verify that it runs
remove it.

Step 1 :

First type 'gcc -v' to know if you have already installed gcc compiler or not. If the output is blank then it means that you don't have gcc installed.

Step 2 :

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

Step 3 :

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

How to uninstall GCC compiler.

In GCC 5.1.0, although there is no top-level uninstall target, some directories do have it, in particular gcc, so you can do -

Type : cd build/gcc
sudo make uninstall

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

DS
02/01

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 Examples section.

Ans: To use the 'man' command simply type 'man (command name)'.

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

Simply type: 'man ls'.

(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 for document file compression.

Simply type: man zip
man tar.

(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 command, while 8 is sysadmin stuff. man page for man itself explain it and list the std out.

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

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

① Command-Line Help list the available options for the 'mkdir' command. How can you do this?

\$ mkdir -m a=777x directory name

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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 password

• /usr/share/doc/nss-ldap-2.53/password

• /usr/bin/password

• /etc/passwd

• /etc/password

Find the directory password file under root one level down.

find / -maxdepth 2 -name password

• /etc/password

Find the password file under root and 2 level

find / -maxdepth 3 -name password

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

Find the password file b/w sub-directories level 2 and 4.

```
# Find - maxdepth 3 - maxdepth
• /usr/bin/passwd
• /etc/pam.d/passwd
```

④ Create a symbolic link to the file you found in 3rd step.

```
# ln -s file1 file2
```

⑤ Create an empty file example.txt and move it to /tmp directory using selective path name

```
# touch example.txt
# mv example.txt /tmp
```

⑥ Delete the file moved to /tmp in previous step by absolute method

```
# rm /tmp/example.txt
```

g) Find the location of ls, ps, bash commands.

whereis ls

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

whereis ps

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

share/man/man1/ps.1.gz.

whereis id bash

bash : /bin/bash /etc/bash.bashrc/etc

share/man/man1/bash.1.gz

Bash
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File Operation

1. Explore mounted file systems on your computer

Ans: df -k

```
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. What are the different ways of exploring mounted file systems on Linux?

Ans: mount

```
jeba@jeba-VirtualBox:~$ mount
sysfs on /sys type sysfs (rw,nosuid,nodev,noexec,relatime)
proc on /proc type proc (rw,nosuid,nodev,noexec,relatime)
udev on /dev type devtmpfs (rw,nosuid,relatime,size=494436k,nr_inodes=123609,mode=755)
devpts on /dev/pts type devpts (rw,nosuid,noexec,relatime,gid=5,mode=620,ptmxmode=000)
tmpfs on /run type tmpfs (rw,nosuid,noexec,relatime,errors=remount-ro,data=ordered)
/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,noexec,relatime)
tmpfs on /run/lock type tmpfs (rw,nosuid,nodev)
tmpfs on /sys/fs/cgroup type tmpfs (ro,nosuid,nodev,noexec,mode=755)
cgroup on /sys/fs/cgroup/systemd type cgroup (rw,nosuid,nodev,noexec,relatime,xattr,release_agent=/lib/systemd/systemd-cgroups-agent,name=systemd,nsroot=/)
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)
hugetlbfss on /dev/hugepages type hugetlbfss (rw,relatime)
```

3. Copying text from files

Ans : cp command, mv command

```
jeba@jeba-VirtualBox:~$ ls
Desktop      Downloads      .deb      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$ ■
```

V

```
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$ ■
```

✓

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

Ans : gzip filename.txt

Bzip2 filename.txt

```
jeba@jeba-VirtualBox:~/Jobs$ bzip2 ss.txt
jeba@jeba-VirtualBox:~/Jobs$ ls
dd.txt ss.txt.bz2
jeba@jeba-VirtualBox:~/Jobs$ cat ss.txt.bz2
BZh91AY&SY-+[[[el
jeba@jeba-VirtualBox:~/Jobs$ gzip dd.txt
jeba@jeba-VirtualBox:~/Jobs$ ls
dd.txt.gz ss.txt.bz2
jeba@jeba-VirtualBox:~/Jobs$ cat dd.txt.gz
[[[[el+DeleMeese+ee]]]@jeba@jeba-VirtualBox:~/Jobs$
```

5. Use `diff` command to create diff of two files
- Ans) `diff filename1 filename2`

```
jeba@jeba-VirtualBox:~/Jobs$ ls
dd.txt.gz ss.txt.bz2
jeba@jeba-VirtualBox:~/Jobs$ cat ss.txt
hello world
^C
jeba@jeba-VirtualBox:~/Jobs$ cat >bb.txt
this is Linux^C
jeba@jeba-VirtualBox:~/Jobs$ dtff aa.txt bb.txt
1do
< hello world
jeba@jeba-VirtualBox:~/Jobs$ cat >bb.txt
this is Linux
^C
jeba@jeba-VirtualBox:~/Jobs$ dtff aa.txt bb.txt
1c1
< hello world
^C
> this is Linux
jeba@jeba-VirtualBox:~/Jobs$ gzip aa.txt
jeba@jeba-VirtualBox:~/Jobs$ gzip bb.txt
jeba@jeba-VirtualBox:~/Jobs$ dtff aa.txt.gz bb.txt.gz
Binary files aa.txt.gz and bb.txt.gz differ
```

- Use patch command to patch a file.
Analyze the patch using patch comm again.

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

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Practical - 6

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User Environment

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

Ans: who command & whoami

```
jeba@jeba-VirtualBox:~$ who
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          IDLE WHAT
jeba      tty7      :0          4:38   /sbin/upstart --user
jeba@jeba-VirtualBox:~$ w -h
jeba      tty7      :0          20:32      4:44    8.67s  0.33s /sbin/upstart -
jeba@jeba-VirtualBox:~$ w -f
20:36:12 up 5 min, 1 user, load average: 0.41, 0.69, 0.37
USER      TTY      LOGIN@     IDLE     JCPU    PCPU WHAT
jeba      tty7      20:32      5:36    9.00s  0.33s /sbin/upstart --user
```

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:

- ① Username, up to 8 characters - case-sensitive, usually all lowercase. A direct match to the username in the /etc/passwd file.

- ② Password, 13 character encrypted. A blank (eg. ::) indicates a password is not required to log in (usually a bad idea), and a "*" (eg. :*:) indicates the account has been disabled.
- ③ The number of days (since January 1, 1970) since the password was last changed.
- ④ The number of days before password may be changed (0 indicates it may be changed at any time).
- ⑤ The number of days after which password may be changed (99999 indicates user can keep his or her password unchanged for many years).
- ⑥ The number of days to warn user of an expiring password (7 for a full week).
- ⑦ The number of days after password expires that account is disabled.
- ⑧ The number of days since January 1, 1970 that an account has been disabled.
- ⑨ A reserved field for possible future use.

```
jeba@jeba-VirtualBox:~$ sudo cat /etc/shadow
[sudo] password for jeba:
root:!$1$18240$0:99999:7:::
daemon:*$1$16911$0:99999:7:::
bin:*$1$16911$0:99999:7:::
sys:*$1$16911$0:99999:7:::
sync:*$1$16911$0:99999:7:::
games:*$1$16911$0:99999:7:::
man:*$1$16911$0:99999:7:::
lp:*$1$16911$0:99999:7:::
mail:*$1$16911$0:99999:7:::
news:*$1$16911$0:99999:7:::
```

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

- ① Username, up to 8 characters. Case-sensitive, usually all lowercase.
- ② An "x" in the password field. Passwords are stored in the "/etc/shadow" file.
- ③ 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.
- ④ 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.
- ⑤ Full name of user. I'm not sure what the maximum length for this field is, but try to keep it reasonable (under 30 characters).
- ⑥ User's home directory. Usually /home/username (eg. /home smith). All user's personal files, web pages, mail forwarding, etc. will be stored here.

⑦ User's "shell account". Often set to "/bin/bash" to provide access to the ^{best} shell (my personal favorite 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
```

⑧ Get your current working directory
Ans: pwd

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

⑨ Explore different ways of getting command history, how to run previously executed command without typing it.

Ans: history
! line number

```
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:~$
```

⑥ Create alias to most commonly used commands.
Alias command instructs the shell to replace ⁵² one string with another string while executing the commands.

Ans: alias label="Command"

```
johngjoh@virtualbox:~$ alias n='ls -lR' new  
johngjoh@virtualbox:~$ n  
johngjoh@virtualbox:~$ ls  
Desktop Downloads Music Pictures Templates  
Documents examples.desktop 33 new Public Videos  
johngjoh@virtualbox:~$
```

Practical - 7

Linux Editors: Vi

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

i) Creating a file:

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

ii) Modifying the file:

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

iii) Search in a file:

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

iv) Navigate:

Movement in four directions.

Key	Action
K	Moves cursor up
j	Moves cursor down
h	Moves cursor left
l	Moves cursor right

Practical - 7

Linux Editors : Vi

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

i) Creating a file :

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

ii) Modifying the file :

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

iii) Search in a file :

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

iv) Navigate :

Movement in four directions.

Key	Action
k	Moves cursor up
j	Moves cursor down
h	Moves cursor left
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 -
0 (zero)	Move to first character of a 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 .

- ⑥ Learn all essential commands like search/replace, highlight, show line numbers.

① Replace

Syntax :

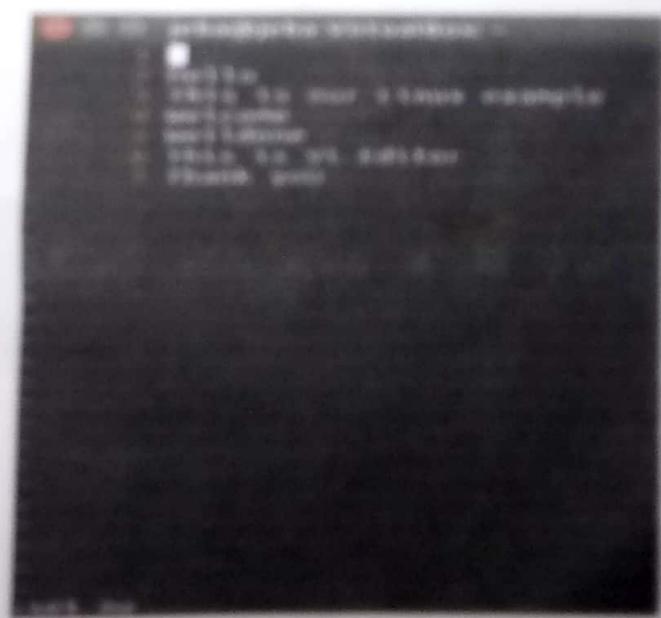
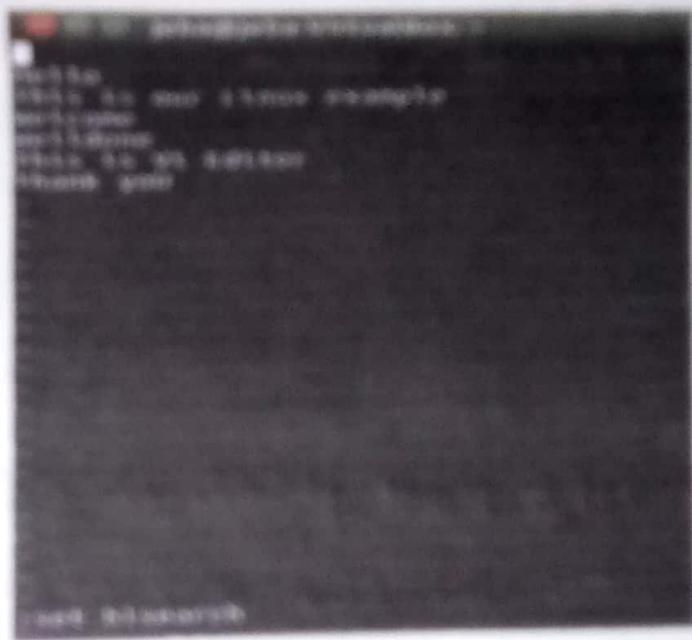
/g/word to be replaced /s // new word/g

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

```
jeba@jeba-VirtualBox: ~  
Hello  
This is my Linux example  
Welcome  
Welldone  
This is VI Editor  
Thank you  
  
replace with our :g/n/a/gf/l/^E/j/vn  
jeba@jeba-VirtualBox: ~  
Hello  
This is our Linux example  
Welcome  
Welldone  
This is VI Editor  
Thank you
```

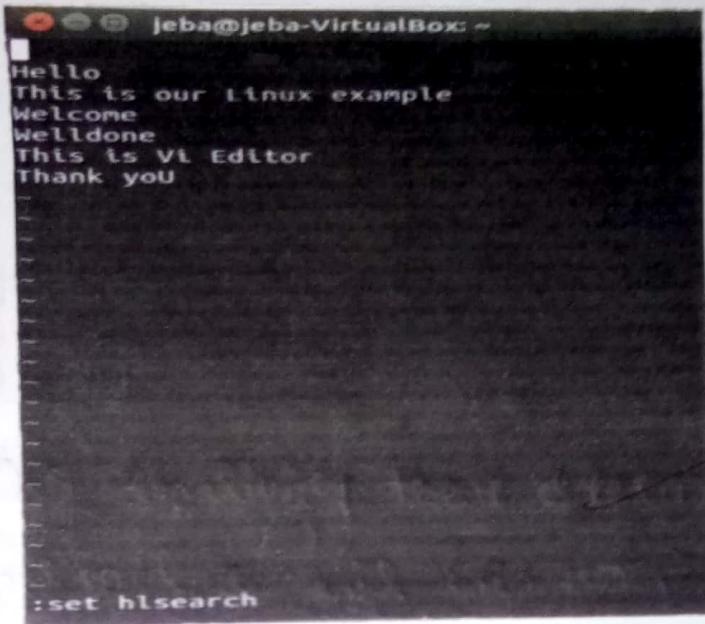
3

③ Highlight
use ~~not~~ brush



① Highlight

use set hlsearch

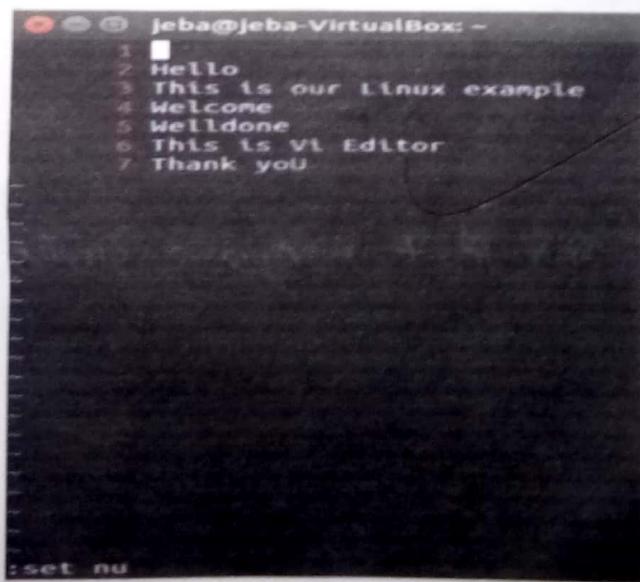


```
jeba@jeba-VirtualBox: ~
Hello
This is our Linux example
Welcome
Welldone
This is VI Editor
Thank you

:set hlsearch
```

② 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
```

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Linux Security

@ Use of sudo to change user privileges to root

Create an user named user 1

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

To give some users root privileges edit /etc/sudo
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.
```

modify expiration date for new user using password ageing-

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

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

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

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

- 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

② Delete newly added user.

```
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:~$
```

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Network Management

5B

- ① Get IP address of your machine using `ifconfig`.

```
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)
```

- ② Get hostname of your machine

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

- ③ Use ping to check the network connectivity to remote machines.

```
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=82.8 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:~$
```

② Use of dig command

```
jeba@jeba-VirtualBox:~  
jeba@jeba-VirtualBox:~$ dig www.google.com  
;; options: +auth +dnssec nocomm www.google.com  
;; global options: +cmd  
;; No answer:  
;;=SHEADER=; opcode: QUERY, status: NOERROR, id: 5008  
;; flags: qr rd ra; QUERY: 1, ANSWER: 1, AUTHORITY: 0, ADDITIONAL: 0  
  
;; OPT PSEUDOSECTION:  
; EDNS: version: 0, flags: udpt 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:~$
```

③ Troubleshooting Network using Traceroute, route Command

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

④ Use of arp command

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

③ Use of host command

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

④ Use of netstat command and Nmap command

```
jeba@jeba-VirtualBox:~$ netstat -an  
Active Internet connections (w/o servers)  
Proto Recv-Q Send-Q Local Address           Foreign Address         State  
Proto RefCnt Flags       Type      State          I-Node      Path  
unix  2      [ ]        DGRAM                    42149      /run/user/1000/system  
d/notify  
unix  2      [ ]        DGRAM                    9694       /run/systemd/journal/  
syslog  
unix  16     [ ]        DGRAM  
dev-log  
unix  7      [ ]        DGRAM                    9704       /run/systemd/journal/  
socket  
unix  3      [ ]        DGRAM  
unix  3      [ ]        STREAM     CONNECTED    9684       /run/systemd/notify  
unix  3      [ ]        STREAM     CONNECTED    44042      @/tmp/dbus-CymTeI7AQG  
unix  3      [ ]        STREAM     CONNECTED    43331      @/tmp/dbus-CymTeI7AQG  
unix  3      [ ]        STREAM     CONNECTED    42988      @/tmp/dbus-CMGGc6G7PS  
unix  3      [ ]        STREAM     CONNECTED    42690      /run/systemd/journal/  
unix  3      [ ]        STREAM     CONNECTED    13242      /run/systemd/journal/  
stdout  
unix  3      [ ]        STREAM     CONNECTED    43113      /run/systemd/journal/  
stdout  
unix  3      [ ]        STREAM     CONNECTED    43013      /run/systemd/journal/  
unix  3      [ ]        STREAM     CONNECTED    42935      /run/systemd/journal/
```

```
jeba@jeba-VirtualBox:~$ nmap www.google.com  
Starting Nmap 7.01 ( https://nmap.org ) at 2020-01-20 22:51 IST  
Nmap scan report for www.google.com (216.58.196.68)  
Host is up (0.044s latency).  
Other addresses for www.google.com (not scanned): 2404:6800:4007:811::2004  
rDNS record for 216.58.196.68: bom05s11-in-f4.1e100.net  
Not shown: 998 filtered ports  
PORT      STATE SERVICE  
80/tcp    open  http  
443/tcp   open  https  
Nmap done: 1 IP address (1 host up) scanned in 20.32 seconds.  
jeba@jeba-VirtualBox:~$
```

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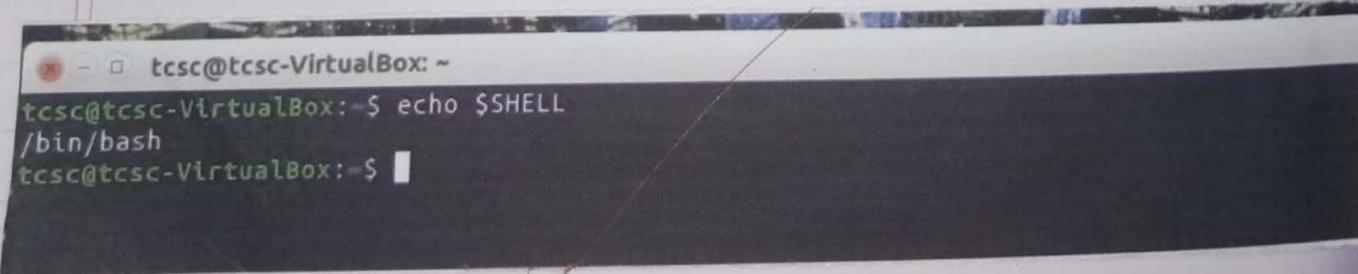
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Shell Scripting

Basics of shell scripting

- ① To get a shell, you need to start a terminal.
- ② To see what shell you have, run: echo \$SHELL
- ③ In linux, the dollar sign (\$) stands for shell variable.
- ④ The echo command just returns whatever you type in.
- ⑤ #!/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: ~
tcsc@tcsc-VirtualBox: ~$ echo $SHELL
/bin/bash
tcsc@tcsc-VirtualBox: ~
```

- vi filename.sh
- #!/bin/bash
- echo "THIS IS LINUX!"

```
#!/bin/bash  
echo "THIS IS LINUX!"
```

linux.sh" [New File]

- chmod 777 filename.sh
- ./filename.sh

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

Step to write and execute a shell script

Shell script is just a simple text file with .sh extension, having executable permission.

- ① Open terminal
- ② Navigate to the place where you want to create script using cd command.
- ③ Touch filename.sh

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- ① `vi filename.sh` [You can use your favourite editor to edit the script].
 - ② `chmod 777 filename.sh` (for making the script executable).
 - ③ `sh filename.sh` or `./filename.sh` (for running the script).

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

```
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
(values 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 manipulations like insertion, deletion, search, etc. With Sed, we can edit complete files without actually having to open it.

Consider the following text file

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

① Displaying partial text of a file

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

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

② Display all Except some lines

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

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

③ Deleting a line

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

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

① Search and Replacing a string
‘s’ option is for searching a word

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

② Replace a string on a particular line

To replace a string on a particular line, we
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
calclus
computer basic
```

Add a line after / before the matched string

To add a new line with some content after
every pattern match, use option ‘a’

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

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

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

⑦ To change a whole line with matched pattern

To change a whole line to a new line when a search pattern 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
```

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⑧ Appending lines

To add some content before every line with sed, use * and & as follows

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

PJ
11/02