

PRACTICAL 01:

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Aim: Installation of Ubuntu and background changing.

Steps to install Ubuntu:

- Using a USB drive:
- Most newer computers can boot from USB, you should see a welcome screen prompting you to choose your language and giving you the option to install Ubuntu or try it from the USB.
- If your computer doesn't automatically do so, you might need to press the F12 key to bring up the boot menu, but be careful not to hold it down that can cause an error message.

• Prepare to install Ubuntu:

- We recommend you plug your computer into a power source.
- You should also make sure you have enough space in your computer to install Ubuntu.
- We advise you to select, download update while installing & install this third-party software now.
- You should also stay connected to the internet so you can get the latest updates while you install Ubuntu.
- If you are not connected to the internet, you will be asked to select a wireless network, if available.

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- Allocate drive space:

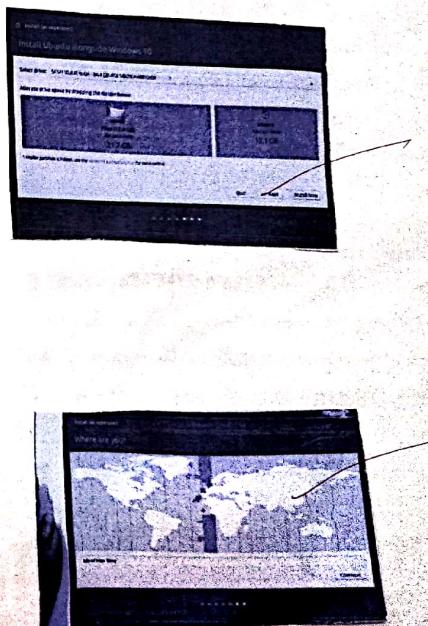
Use the checkboxes to choose whether you had like to install Ubuntu alongside another operating system delete your existing operating system and replace it with Ubuntu or if you are an advanced user choose the 'something else' option.

- Begin the installation:

- Depend on your previous selections you can now verify that you have chosen the way in which you would like to install Ubuntu.
- The installation process will begin when you click the 'Install Now' button.
- Ubuntu needs about 4.5 GB to install, so add a few extra GB to allow for your files.

- Select your location:

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



Select your preferred keyboard layout:

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

Enter your login & password details.

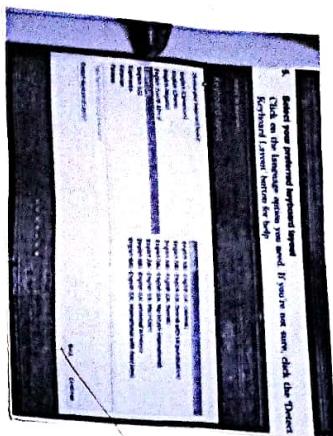
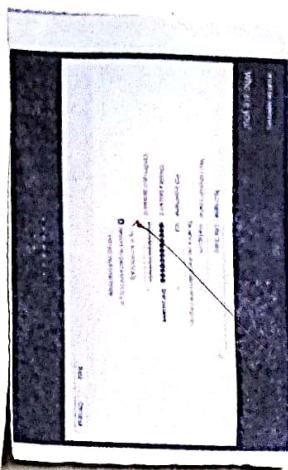
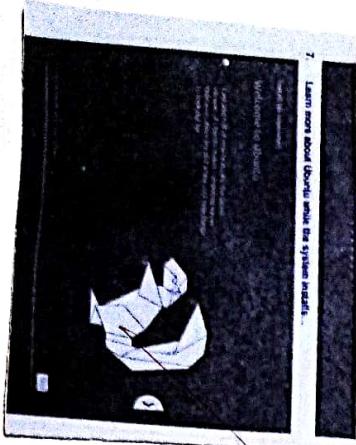
Learn more about Ubuntu's whole the system installs...

That's it:
All that's left is to restart your computer and start enjoying Ubuntu.

• Steps to change background settings of Ubuntu:

Accessing Appearance settings:

- To access appearance settings in Ubuntu let's click on user menu at the top right corner, top menu bar and select system settings...
- A window will pop up with all settings divided into personal hardware and system option icons. Let's first select the appearance icon.



• Changing wallpaper picture :

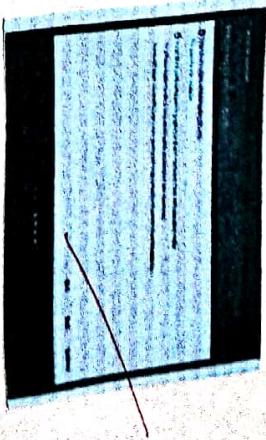
- On the left side of Background part, you can see your current wallpaper. On the right side is part where we can select one of ubuntu wall papers. Clicking on any thumbnail over wallpaper will be changed right away with a fading effect.

- If you want to select wallpaper from your picture folder, click the drop down menu above thumbnails and select the picture folder. You will see all the pictures in your pictures folder as thumbnails, where you can select them as your wallpaper.

- To add wallpaper that is in another folder, just click the plus icon below the thumbnails and then in pop-up window, select the path to our custom folder and choose the picture inside of it.

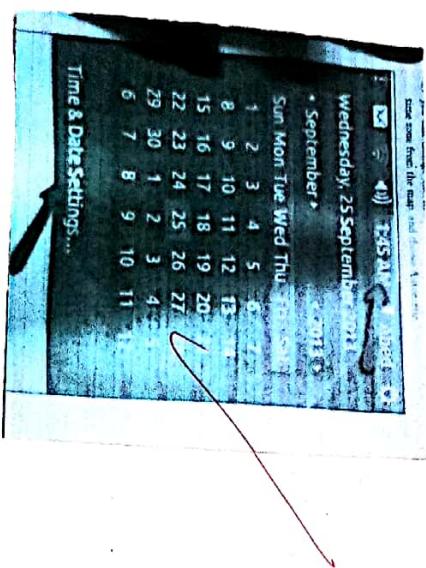
• Changing ubuntu theme :

- Ubuntu also has an option to change the Desktop theme, which in one click will change the entire way your computer looks.
- To do that, click on the drop down menu below the wallpaper thumbnails and choose between Ambiance; Radiance or High contrast.



Ambiance is a light theme that looks a bit more like Radiance in the darker brown theme used in Ubuntu by default.

Change the size or rotation of screen:



- 1] You can change how big things appear on the screen by changing the screen resolution.
- 2] You can change which way up things appear by changing the rotation.
- 3] Click the icon on the very right of the menu bar and select system settings.
- 4] Open screen Display.
- 5] 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.
- 6] Select your desired resolution and rotation.
- 7] Click apply. The new setting will be applied for 30 seconds before reverting back. That way, if you cannot see anything with the new.

- Time settings change time zone of your system:
- 1] If you are currently in Indian time. Note the time changes, change the time zone back to your local time zone.
 - 2] Just click on the clock on the top of bar, choose Time settings & choose from map, & choose automatic.
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Aim : Installing and removing software.

a) Install gcc package ; verify that it runs and then remove it :

Step 1 : First type 'gcc -v' to know if you have already installed gcc compiler or not. If the output is blank then it means that you don't have gcc installed.

Step 2 : Type 'sudo apt-get install gcc'. After trying 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 & C++ programming language.

b] Now To uninstall gcc compiler.

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

Type : cd build/gcc
sudo make uninstall

This does not remove everything that was installed , built
remove major executable like gcc , g++ , eff ...
contained in that directory .

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* Aim: Utilization of grep, man commands

- (a) finding info documentation from the command line for the grep command: bring up the info page for the usage section. Bring up the usage section. To find info about any command, 'info' command is used. The syntax of info command used is info (command name). We are going to find the info about the name.

grep command:

Open the terminal ($Ctrl + Alt + T$) and type info grep. After typing this command, following info will be displayed, on to your screen.

You can also scroll through your pages using

(space = up) A (backspace = down / keys). More summarized form of showing info in the man command. The command is same as 'info', but required data.

Output : - This is the info menu. A few useful info commands

'q': quit

'l': lists all the info commands.

'h': Starts the info tutorial

'm': Text info RET visits the first info manual, etc.

b) Finding man page from the command line: Bring up the man page for the 'ls' command and scroll down to the eg :- 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. 'tar', 'zip', are some man pages which are available for document file compression.

Simple type : man zip

name → zip - package and compress (archive) files
Synopsis → zip [options] (see separate man page).

to note (" " " " "

zipsplit (" " " " ")

Use → ① add → update existing entries and add new files
② update () → update existing entries, if newer on the file system and add new files. If the archive does not exist, more writing than create a new archive.

③ freshen (f) → update existing entries of an archive if newer in the file system. Does not add

② **man**

Output: Name + ls - 1st directory under it
Synopsis → ls [OPTION]... [FILE]...

Synopsis → ls [OPTION]

Description :

-a, -- all

do not ignore entries starting with .

-A, -- almost-all

do not list implied, and -.

-b, -- escape

Print C-style escape for nongraphic

characters.

-c \$IFS + entries by columns.

-d, -- directory

list directories themselves, not their contexts.

③ System administration tool.
Distribution customize the manual section to their which often include additional sections.
There are certain terms that have different page in different sections (e.g.: 'print f') as a command appears in section 1 as 'std::f' function appears in section 5). In user like a standard function appears in section 5) in user like that you can pass the section no.

```
$ man 1 print f  
$ man 3 print f
```

\$ man -1 print f

- ④ finding man pages by section from the and line, bring up the man page for the print f disk fund, which manual page section and library function found.
- Ans . The number correspond to what section of the manual page is given : 1 is user command while 3 is some stuff. The man page for man itself explains it and looks the 5th output

print f (1) - format and print date
print f (3p) - print formatted output.

- ⑤ copy (-u) → Select entries in an existing archive and copy them to a new archive.
- ⑥ finding man pages by section from the and line, bring up the man page for the print f disk fund, which manual page section and library function found.
- Ans . The number correspond to what section of the manual page is given : 1 is user command while 3 is some stuff. The man page for man itself explains it and looks the 5th output

command too! So you need to use 'tar' to 'limit'.
Command -lne help list the available options for the tar command. How can you do this, \$ findiv -m a > random file.

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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 passwd 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
```

- find the directory passwd file under root and one level down.

```
# find / -max_depth 2 -name passwd
./etc/passwd
```

- find the passwd file under root and 2 level down.

```
# find / -max_depth 3 -name passwd
```

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

```
# find -max_depth 3 -max_depth -name passwd
./usr/bin/passwd
./etc/pam.d/passwd
```

- d) Create a symbolic link to the file you found in step.

```
# ln -sfile1 file2
```

- e) Create an empty file example.txt of move it to /tmp directory using relative pathname.

```
# touch example.txt
```

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

- f) 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
```

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

18 ls : /bin/ls/usr/share/man/man1/ls.1g²

where is ps

ps : /bin/ps/usr/share/meps:/bin/ps/usr/share/man/man1/ps.1.g2

where is bash

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

File Operations

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File Operations

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           3876        68740    378740  18%   /run
/dev/sda1       709125 33833572 33160144 51%   /
tmpfs           51100        216    51078  0%   /dev/shm
tmpfs           51100        1     51099  0%   /run/lock
tmpfs           51100        0     51200  0%   /sys/fs/cgroup
tmpfs           102416        48    102368  1%   /run/user/1000
```

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

Ans. Mount.

```
jeba@jeba-VirtualBox:~$ mount
/sys on /sys type sysfs (rw,nosuid,nodev,noexec,relatime)
/proc on /proc type proc (rw,nosuid,nodev,noexec,relatime)
/dev on /dev type devpts (rw,nosuid,noexec,relatime,size=494436k,nr_inodes=123009,mode=755)
/dev/pts on /dev/pts type devpts (rw,nosuid,noexec,relatime,ptmxmode=000)
/tmp on /tmp type tmpfs (rw,nosuid,noexec,relatime,mode=1777,uid=0,gid=0,inode64k,mode=755)
/dev/shm on /dev/shm type tmpfs (rw,nosuid,noexec,relatime,errors=remount-ro,data=ordered)
/dev/zero 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,noexec,relatime,size=5120k)
tmpfs on /run/pmem type tmpfs (ro,nosuid,nodev,noexec,relatime,size=755)
tmpfs on /sys/fs/cgroup type cgroup (rw,nosuid,nodev,noexec,relatime,xattr,release_agent=/lib/systemd/system-cgroups-agent,nsdelegate=/etc/cgconfig.conf,nsroot=/)
pstore on /sys/fs/pstore type pstore (rw,nosuid,nodev,noexec,relatime,cpuset,nsroot)
cgroup on /sys/fs/cgroup/cpuset type cgroup (rw,nosuid,nodev,noexec,relatime,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/bids 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/latency_tier type cgroup (rw,nosuid,nodev,noexec,relatime,latency_tier,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/bikto type cgroup (rw,nosuid,nodev,noexec,relatime,bikto,nsroot=/)
cgroup on /sys/fs/cgroup/perf_event type cgroup (rw,nosuid,nodev,noexec,relatime,perf_event,nsroot=/)
cgroup on /sys/fs/cgroup/group/bugtib type cgroup (rw,nosuid,nodev,noexec,relatime,bugtib,nsroot=/)
bugtib on /proc/sys/fs/blinfmt_msc type autofs (rw,relatime,fd=32,prgrp=1,timeout=0,minp=1,maxp=1,rot=5,maxproto=5,direct)
bugtibfs on /dev/hugepages type hugetlbfs (rw,relatime)
```


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⑥ Use patch command to patch a file. And analyse the patch using patch command again.

```
jeba@jeba-VirtualBox:~/jeb$ cat >ht.txt
ht
ht
^C
jeba@jeba-VirtualBox:~/jeb$ cat >htt.txt
ht
ht
hello
hello
^C
jeba@jeba-VirtualBox:~/jeb$ diff -u ht.txt htt.txt >sam.patch
jeba@jeba-VirtualBox:~/jeb$ patch < sam.patch
jeba@jeba-VirtualBox:~/jeb$ patch -N
patching file ht.txt
patching file htt.txt
jeba@jeba-VirtualBox:~/jeb$ cat sam.patch
--- ht.txt      2020-01-08 22:14:55 +0530
+++ htt.txt    2020-01-08 22:15:16 +0530
@@ -1,3 +1,3 @@
-ht
-ht
+hello
+hello
jeba@jeba-VirtualBox:~/jeb$
```

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- ① Which account you are logged in? How do you find out?

Ans. who command & whoami command

(UEFI) If you are using grub boot, then

if you are booting from browser then

it is depends on your browser

if you are booting from browser then

it is depends on your browser

if you are booting from browser then

it is depends on your browser



- ② 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 character, and are as follows:

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

- Password, 13 character encrypted. A blank entry (e.g.) indicates a password is not required to log in (usually a bad idea), and a "*" entry (e.g.:*) indicates the account has been disabled.
- The number of days (since January 1, 1970) since the password was last changed.
- The number of days before password may be changed (0 indicates it may be changed at any time).
- The number of days after which password must be changed (99999 indicates user can keep his or her password unchanged for many, many years).
- The number of days since January 1, 1970 that an account has been disabled.
- A reserved field for possible future use.

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

- Username, up to 8 characters. Case-sensitive, usually all lowercase.
- An "x" in the password file. Passwords are stored in the "/etc/shadow" file.

Numeric user id. This is assigned by the "adduser" script. Unix uses this field plus the following group field, to identify which files belong to the user.
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 Full name of user. I'm not sure what the maximum length for this field is, but try to keep it reasonable.
 User's shell account, often set to "/bin/bash" to provide access to the bash shell.

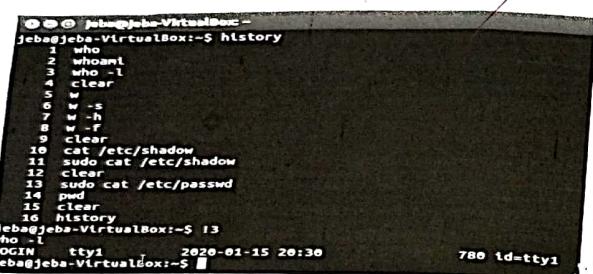
c) Get your current working directory
Ans. Pwd

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

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

Ans. history

! line number

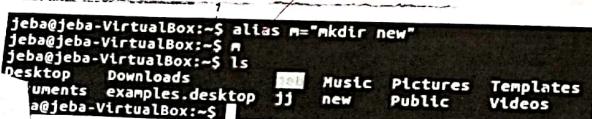


```
jebajeba@jeba-VirtualBox:~$ history
1 who
2 whoami
3 who -l
4 clear
5 w
6 w -s
7 w -h
8 w -r
9 wclear
10 cat /etc/shadow
11 sudo cat /etc/shadow
12 clear
13 sudo cat /etc/passwd
14 clear
15 clear
16 history
jebajeba@jeba-VirtualBox:~$ 13
who -l
LOGGED IN: jebajeba 2020-01-15 20:36
jebajeba@jeba-VirtualBox:~$
```

e) Create alias to most commonly used commands.

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

Ans. alias label = "command".



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

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- i) 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 i.
 - (iii) Search a file:
To find a word (forward search) press / followed by word to search.

(iv) Navigate:

Movement in four directions.

key	Action
k	Moves cursor up
j	Moves cursor down
h	Moves cursor left
I	Moves cursor right

Word navigation

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

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- b) Learn all essential commands like search / replace, highlight, show line numbers.
- i) Replace
Syntax: :g/g/word to be replaced/f/ new word/g

```
Hello
1 Hello
2 This is our Linux example
3 Welcome
4 Wellcome
5 Welldone
6 This is VI Editor
7 Thank you
:
replace with our (y/n/a/g/l/^E/^Y): g
:g/Hello/our/gc
Hello
1 Hello
2 This is our Linux example
3 Welcome
4 Wellcome
5 Welldone
6 This is VI Editor
7 Thank you
```

- ii) Highlight
Use set hlsearch

```
Hello
1 Hello
2 This is our Linux example
3 Welcome
4 Wellcome
5 Welldone
6 This is VI Editor
7 Thank you
:
:set hlsearch
```

iii) Show the line numbers
Use set nu

```
1 Hello
2 This is our Linux example
3 Welcome
4 Wellcome
5 Welldone
6 This is VI Editor
7 Thank you
:
:set nu
```

Practical 8 Linux Security
a) Use of sudo to change user privileges to root.
Create a 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
```

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
```

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```
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
Password Expiration Warning [-1]: 2020-01-21
Password Inactive [-1]:
Account Expiration Date (YYYY-MM-DD) [-1]: 2020-01-31
Last password change : Jan 21, 2020
Password expires     : Aug 09, 2020
Password inactive   : never
Account expires       : Jan 31, 2025
Minimum number of days between password change : 100
Maximum number of days between password change : 200
Number of days of warning before password expires : 5
jeba@jeba-VirtualBox:~$
```

```
jeba@jeba-VirtualBox:~$ sudo chage -E 25/01/2020 -m 10 -M 90 -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 31, 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:~$
```

- 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.

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```
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

a) Get IP address of your machine using ifconfig.

```
jeba@jeba-VirtualBox:~$ ifconfig
enp0s3  Link encap:Ethernet HWaddr 08:0e:6b:69
        inet addr:10.0.2.15 Bcast:10.0.2.255 Mask:255.255.255.0
          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
        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) Get hostname of your machine.

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

c) Use ping to check the network connectivity to remote machine.

```
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
```

d) Use of dig command

```
jeba@jeba-VirtualBox:~$ dig www.google.com
;; <>> DLG 9.10.3-P4-Ubuntu <>> www.google.com
;; options: +cmd
;; Got answer:
;; ->>HEADER<<- opcode: QUERY, status: NOERROR, id: 52666
;; 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:
;; SERVER: 127.0.0.53(127.0.1.1)
;; WHEN: Mon Jan 28 20:46:06 IST 2024
;; MSG SIZE rcvd: 59
jeba@jeba-VirtualBox:~$
```

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e) Troubleshooting network using traceroute, route command

```
jeba@jeba-VirtualBox:~$ traceroute www.google.com
traceroute to www.google.com (172.217.106.100), 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  68.495 ms
jeba@jeba-VirtualBox:~$
```

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

f) Use of arp command

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

g) Use of host command

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

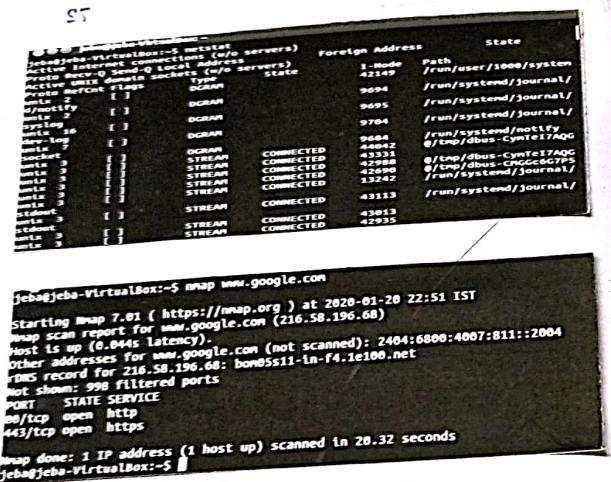
h) Use of netstat command and Nmap command

PRACTICAL : 10Aim : SHELL SCRIPTING
Basics of shell scripting.

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

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

. vi filename.sh
 #!/bin/bash
 echo "This is Linux!"



```
jebajeba@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): 2484:6800:4007:811::2064
rDNS record for 216.58.196.68: bon05s11-in-f4.1e100.net
Not shown: 999 filtered ports
PORT      STATE SERVICE
80/tcp    open  http
443/tcp   open  https
nmap done: 3 IP address (1 host up) scanned in 20.32 seconds
jebajeba@VirtualBox:~$
```

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```
tcsc@tcsc-VirtualBox:~  
#!/bin/bash  
echo "THIS IS LINUX!"
```

"linux.sh" [New File]

- Ch mod 777 filename.sh
- ./filename.sh

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

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

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d) Vi filename.sh (for making the script executable).
e) Ch mod 777 filename.sh (for making it script).
f) Sh filename.sh or ./filename.sh (for running 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"
```

```
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:~$
```

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Program to find the sum of two variables

```
#!/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:~
```

```
wq
```

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

```
! tcsc@tcsc-VirtualBox:~$ vi linux2.sh
```

```
! tcsc@tcsc-VirtualBox:~$ chmod 777 linux2.sh
```

```
! tcsc@tcsc-VirtualBox:~$ ./linux2.sh
```

```
! Sun is:125
```

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

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

```
tcsc@tcsc-VirtualBox:~
```

```
! /bin/bash
```

```
! lln.sh
```

```
! sum=$((a+b))
```

```
! echo "sum is : $sum"
```

```
! lln.sh" 3 lines, 46 characters
```

```
tcsc@tcsc-VirtualBox:~$ vi lln.sh
```

```
tcsc@tcsc-VirtualBox:~$ chmod 777 lln.sh
```

```
tcsc@tcsc-VirtualBox:~$ ./lln.sh 50 70
```

```
! sun is:120
```

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

Sed

Sed command or Stream Editor is very powerful utility offered by Linux systems. It is mainly used for text substitution, find & replace but it can perform other text manipulations like insertion, deletion, search, etc. With sed, we can edit complete files without actually 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.

With sed, we can view only part of a file rather than setting 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  
calculus  
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:~$
```

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4) 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  
calculus  
computer basic
```

5) Replace a string on a particular line

To replace a string on a particular line, use 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
```

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- ⑥ Add a line after/before the matched string.
To add a new line with some content after 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
calculus
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
calculus
computer basic
tcsc@tcsc-VirtualBox:~$
```

- ⑧ Appending line

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

```
tcsc@tcsc-VirtualBox:~$ sed -e 's/.*/Thanks &/i' 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
tcsc@tcsc-VirtualBox:~$
```

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