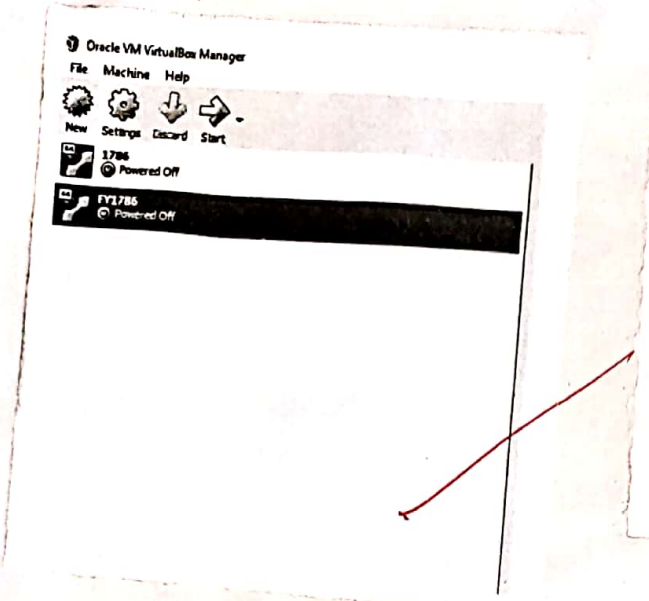

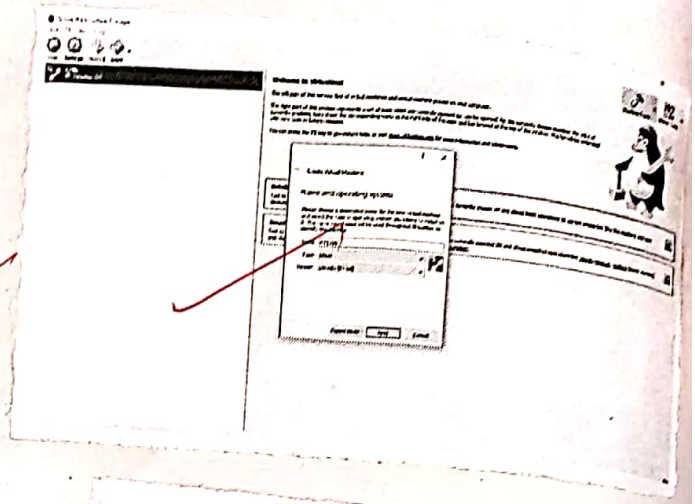

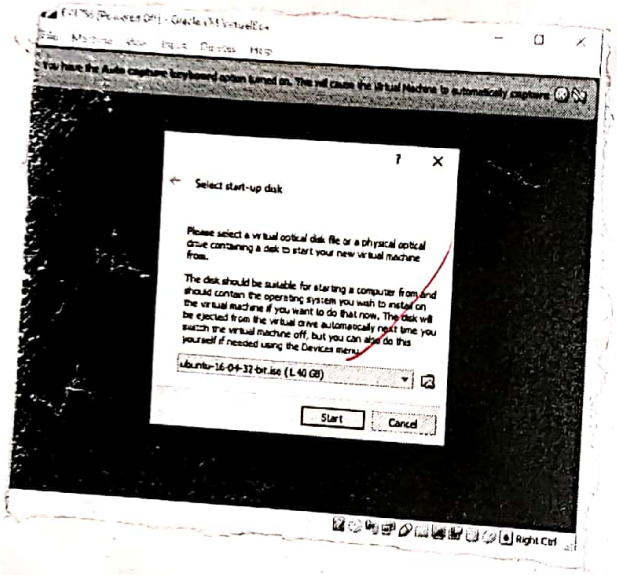

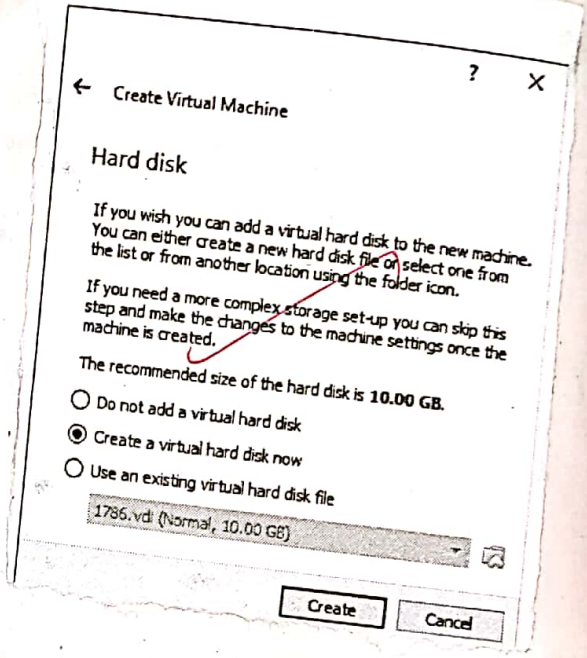

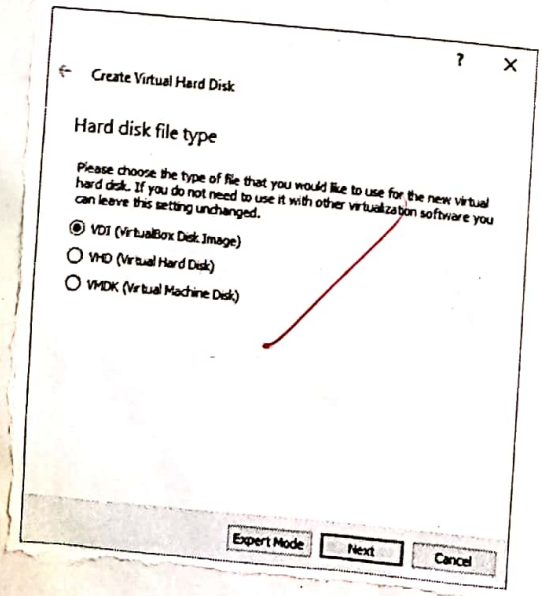

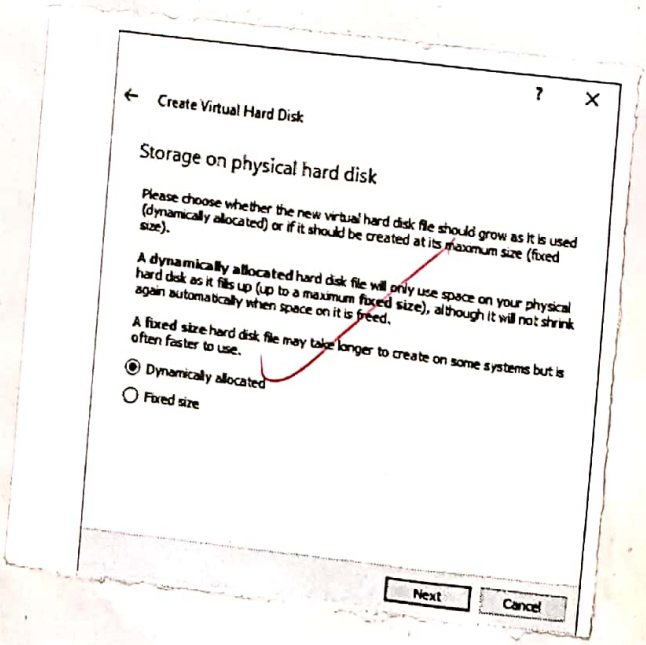

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Practical No :- 1

Aim :-

i) Install your choice of Linux distribution eg :- Ubuntu, Fedora.

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

iii) Screen Resolution

iv) Time Settings.

Linux Installation :-

Install your choice of Linux distribution eg. Ubuntu, Fedora, Debian, Using a USB device.

a) Most newer computer ~~doesn't automatically~~ can boot from USB. You should see a welcome screen prompting you to choose your language & giving you the option to install Ubuntu or try it from the USB.

b) 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.

1.] Prepare to install Ubuntu :-

* We recommend you plug your computer into a power source.
* You should also make sure you have enough space on your computer to install Ubuntu.
* We advise you to select Download updates while installing and install this first party software now.

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* You should also stay connected to the internet so you can get the latest updates while you install Ubuntu.

* If you are connected to the internet so you can get the latest updates while ~~you~~ wireless network if available. We advise you to connect during the installation so we can ensure your machine is up to date.

2.] Allocate device space :-

* Use the checkboxes to choose whether you had like to install Ubuntu alongside another operating system, delete you existing operating system & replace it with Ubuntu, or if you are an advanced user choose the 'Something else' option

3) Begin the installation

* Depending 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.

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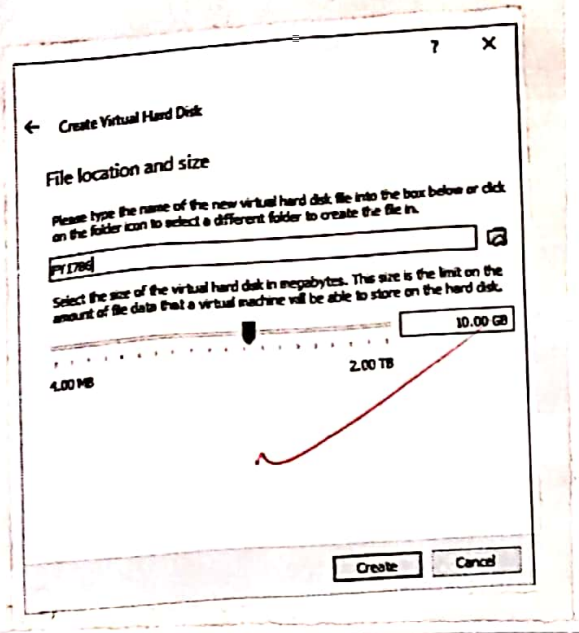

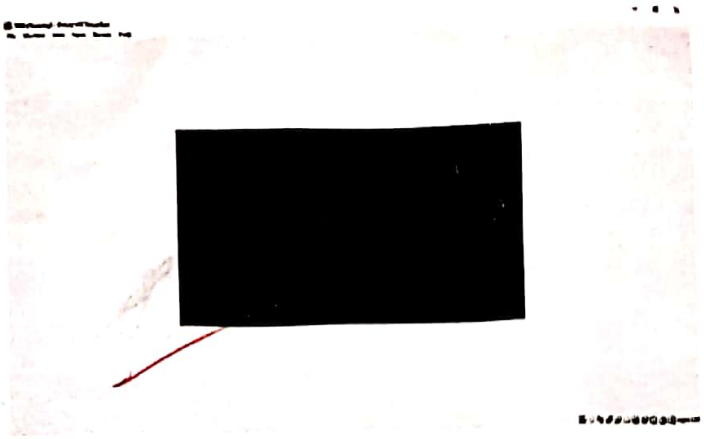

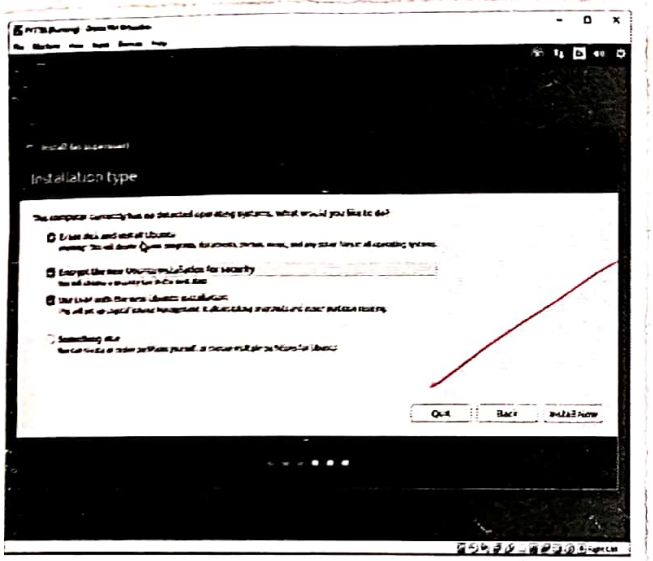

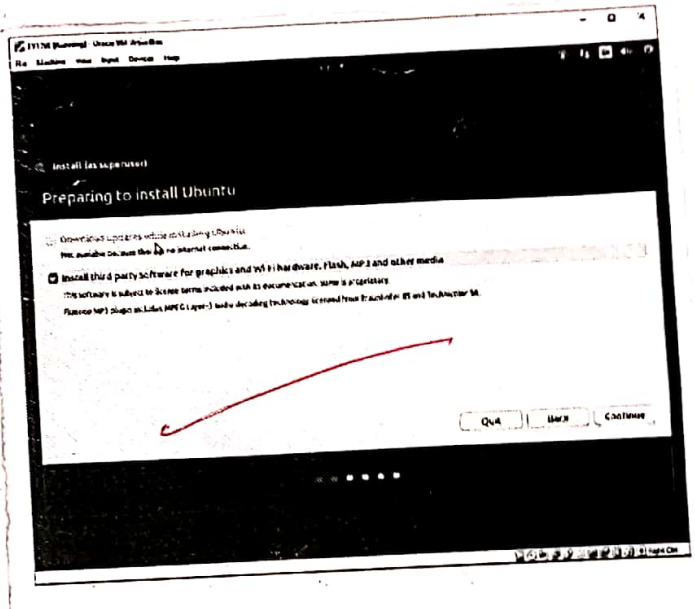

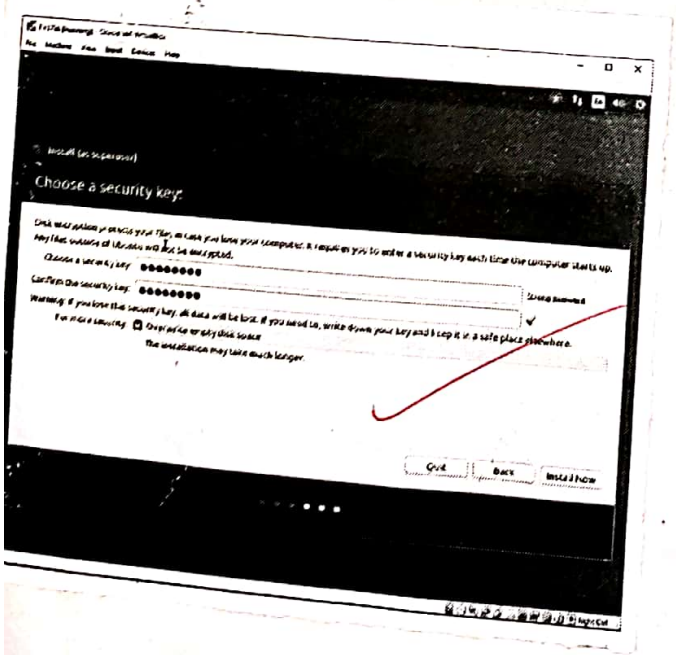

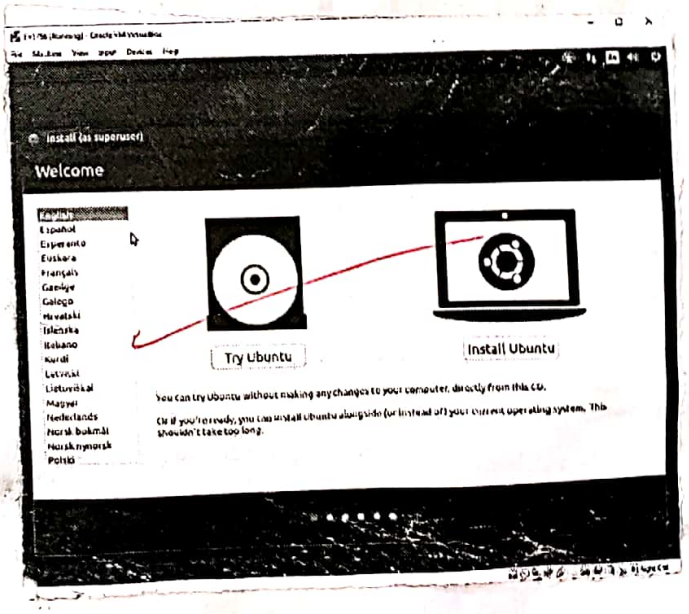

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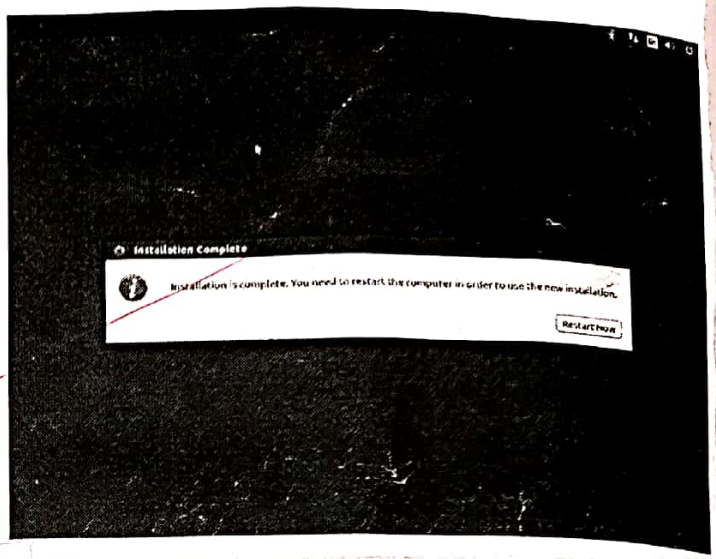

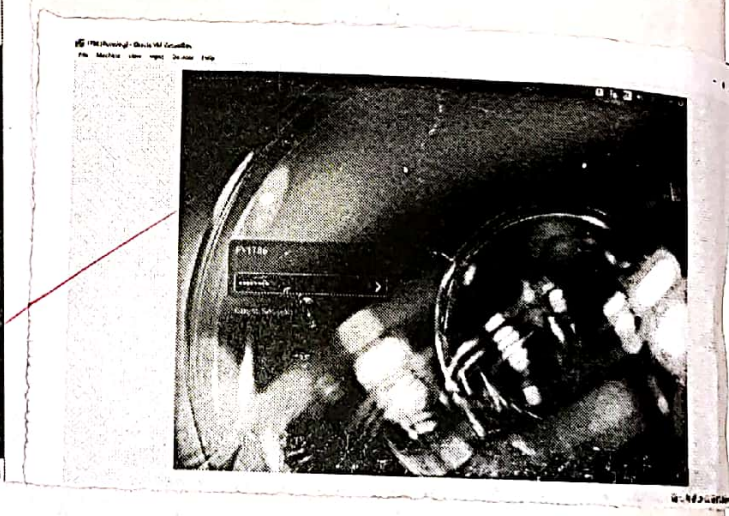

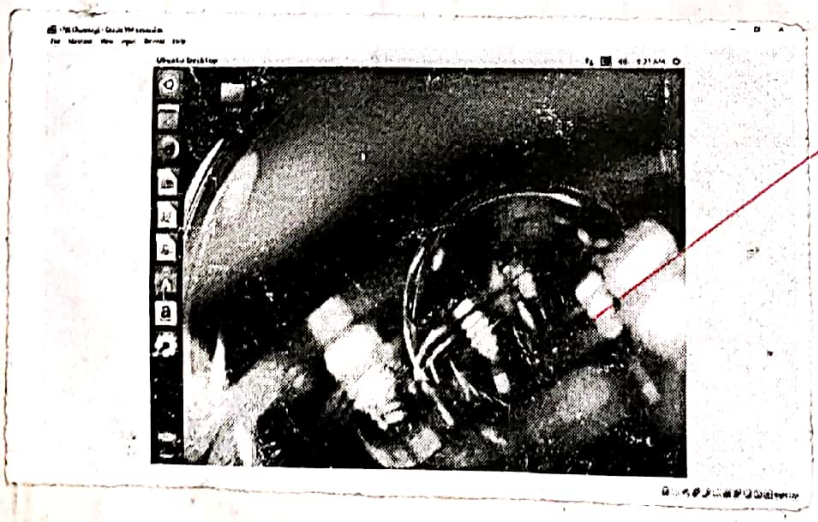

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4] Select your location :-

* 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 your time zone, type the name of the town you are in or click on the map, we will help you find it.

* TIP :- If you are having problems connecting to the Internet, use the menu in the top-right hand corner to select a network.

5] 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.

6] Enter your login & password details.

7] Learn more about Ubuntu while the system installs.

8] That's it :- All that's left is to restart your computer in order to use ~~the~~ Ubuntu!

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PRACTICAL NO 1-2

Aim :- Installing & 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 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 & C++ programming language.

b) **NOW TO UNINSTALL GCC COMPILER :-**

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

Type :- cd build/gcc
sudo make uninstall

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

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PRACTICAL NO 1-3

Aim :- Utilization of grep ; man commands :-

Documentation :-

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

Ans :- To find info about any command 'info' command is used 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 this command following output will be displayed onto your screen.
You can also scroll through pages using (space = up) & (backspace = down) keys.
Anothermore 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 ~~from~~ 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.

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Output :- ~$ info

This is the info main menu (aka directory) 32 node):
A few useful info commands:
'q' quit's;
'?' list all info commands;
'h' starts the info tutorial;
'M Texinfo RET visits the Texinfo manual, etc;

:~$ man ls

Output : Name :
ls - list directory contents
Synopsis :
ls [options] ---- [File] ----
Description :
List information about the files sort entries alphabetically if none of -cftuvSUX nor --sort is specified.

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

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

--author
with -L print the author of each file.

-b , --escape
print C-style escapes for nongraphic characters.

-C list entries by columns.

:~$ man tar

Output : Name : The GNU version of the tar archiving utility

Synopsis :-
tar [-] A -- concatenate | C -- create | d -- diff

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-- compare | -- delete | r - append |
t -- list | SEO test - label / u -- update | x -- extract -- get [option
[pathname ...]

Description:

Tap stores and extracts file from a tap or disk to archive.

Function letters:

- A -- catenate, -- concatenate append tar files to an archive
- C, -- create
  create a new archive.
- d, -- diff, -- compare
  find differences between archive and file system.
- delete
  delete from the archive.
- r, -- append
  append files to the end of an archive.

~ $ man 3 printf:

Name:- printf, sprintf, fprintf, dprintf, snprintf, vprintf, vfprintf, vsnprintf, formatted output conversion.

Description:-

The functions in the printf() family produce output according to a format as described below.

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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 for the cmd lines being 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 sysadmin stuff. The man page for man itself. Explain it & list the std there are certain terms that have different pages in a 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. 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.

e] Command-line Help List the available options for the mkdir command. How can you do this?
$ mkdir -m a=rwx directoryname.

EEO PRACTICAL NO 1-4

* 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_ldap-253/pam.d/passwd
- /usr/bin/passwd
- /etc/pam.d/passwd
- /etc/passwd.

d) find the directory passwd file under root & one level down.

find / -maxdepth 2 -name passwd
- /etc/passwd

e) find the passwd file under the root & 2 level down
find / -maxdepth 3 -name passwd.

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

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f) find the passwd file b/w sub-directories level 2 & 4
find -mindepth 3 -maxdepth -05 -name passwd
- /usr/bin/passwd.
- /etc/pam.d/passwd

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

ln -s file1 file2

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

touch example.txt
mv example.txt /temp

f) delete the file moved to /tmp in previous step by

rm /tmp/example.txt

g) find the location of ls, ps, bash commands
where is ls

ls: /bin/ls /usr/share/man/man1/ls.1.gz
where is ps

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

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where is bash

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

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Practical No :- 5

* File Operations :-

1] Explore mounted file systems on your computer

→ $df -k

```
ubu@ubu-VirtualBox: ~
ubu@ubu-VirtualBox:~$ df -k
Filesystem     1K-blocks    Used Available Use% Mounted on
udev              494436       0    494436   0% /dev
tmpfs             102416    3672     98744   4% /run
/dev/sda1        9156984 3496692   5172100  41% /
tmpfs             512076     228    511848   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
```

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

→ mount

```
ubu@ubu-VirtualBox: ~
ubu@ubu-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,mod
e=755)
devpts on /dev/pts type devpts (rw,nosuid,noexec,relatime,gid=5,mode=620,ptmxmod
e=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,relat
ime)
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,xa
ttr,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/devices type cgroup (rw,nosuid,nodev,noexec,relatime,de
vices,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,hu
getlb,nsroot=/)
cgroup on /sys/fs/cgroup/net_cls,net_prio type cgroup (rw,nosuid,nodev,noexec,re
```

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3] Copying text from files.

→ cp command, mv command

```
ubu@ubu-VirtualBox: ~
mqueue on /dev/mqueue type mqueue (rw,relatime)
debugfs on /sys/kernel/debug type debugfs (rw,relatime)
hugetlbfs on /dev/hugepages type hugetlbfs (rw,relatime)
fusectl on /sys/fs/fuse/connections type fusectl (rw,relatime)
tmpfs on /run/user/1000 type tmpfs (rw,nosuid,nodev,relatime,size=102416k,mode=7
00,uid=1000,gid=1000)
gvfsd-fuse on /run/user/1000/gvfs type fuse.gvfsd-fuse (rw,nosuid,nodev,relatime
,user_id=1000,group_id=1000)
ubu@ubu-VirtualBox:~$ ls
Desktop    Downloads         file2.txt  Pictures  sample.txt  Videos
Documents  examples.desktop  Music      Public    Templates
ubu@ubu-VirtualBox:~$ cat >sample.txt
hello world
^C
ubu@ubu-VirtualBox:~$ cat sample.txt
hello world
ubu@ubu-VirtualBox:~$ touch shubh.txt
ubu@ubu-VirtualBox:~$ mv sample.txt shubh.txt
ubu@ubu-VirtualBox:~$ cat shubh.txt
hello world
ubu@ubu-VirtualBox:~$ ls
Desktop    Downloads         file2.txt  Pictures  shubh.txt  Videos
Documents  examples.desktop  Music      Public    Templates
ubu@ubu-VirtualBox:~$
```

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

Ans:- gzip filename.txt

bzip2 filename.txt

```
ubu@ubu-VirtualBox: ~
ubu@ubu-VirtualBox:~$ cat samtext.txt.gz
samtext.txtbu@ubu-VirtualBox:~$ ls
data.tar   Downloads         Music      samtext.txt.gz  Videos
Desktop    examples.desktop  Pictures   shubh.txt.bz2
Documents  file2.txt         Public     Templates
ubu@ubu-VirtualBox:~$ cat >aa.txt
hey fellass^C
ubu@ubu-VirtualBox:~$ cat >bb.txt
wassup?^C
ubu@ubu-VirtualBox:~$ ls
aa.txt     Desktop    examples.desktop  Pictures        shubh.txt.bz2
bb.txt     Documents  file2.txt         Public          Templates
data.tar   Downloads  Music             samtext.txt.gz  Videos
ubu@ubu-VirtualBox:~$ diff aa.txt bb.txt
ubu@ubu-VirtualBox:~$ bzip2 bb.txt
ubu@ubu-VirtualBox:~$ gzip aa.txt
ubu@ubu-VirtualBox:~$ ls
aa.txt.gz  Desktop    examples.desktop  Pictures        shubh.txt.bz2
bb.txt.bz2 Documents  file2.txt         Public          Templates
data.tar   Downloads  Music             samtext.txt.gz  Videos
ubu@ubu-VirtualBox:~$ diff aa.txt.bz2 bb.txt.gz
diff: aa.txt.bz2: No such file or directory
diff: bb.txt.gz: No such file or directory
ubu@ubu-VirtualBox:~$ diff aa.txt.gz bb.txt.bz2
```

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```
ubu@ubu-VirtualBox: ~
tar: Exiting with failure status due to previous errors
ubu@ubu-VirtualBox:~$ ls
data.tar  Documents  examples.desktop  Music     Public     Templates
Desktop   Downloads  file2.txt         Pictures  shubh.txt  Videos
ubu@ubu-VirtualBox:~$ cat data.tar
ubu@ubu-VirtualBox:~$ bzip2 shubh.txt
ubu@ubu-VirtualBox:~$ ls
data.tar  Documents  examples.desktop  Music     Public     Templates
Desktop   Downloads  file2.txt         Pictures  shubh.txt.bz2  Videos
ubu@ubu-VirtualBox:~$ cat shubh.txt.bz2
BZh91AY&SYN◆◆6◆◆◆◆◆ 1◆◆A◆◆◆◆◆1◆◆◆)
                                        ◆wgA◆ubu@ubu-VirtualBox:~$ touch samtext
.txt
ubu@ubu-VirtualBox:~$ ls
data.tar   Downloads         Music     samtext.txt    Videos
Desktop    examples.desktop  Pictures  shubh.txt.bz2
Documents  file2.txt         Public    Templates
ubu@ubu-VirtualBox:~$ gzip samtext.txt
ubu@ubu-VirtualBox:~$ ls
data.tar   Downloads         Music     samtext.txt.gz  Videos
Desktop    examples.desktop  Pictures  shubh.txt.bz2
Documents  file2.txt         Public    Templates
ubu@ubu-VirtualBox:~$ cat samtext.txt.gz
◆◆◆◆samtext.txt◆◆bu@ubu-VirtualBox:~$
```

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

→ diff filename1 filename2

```
ubu@ubu-VirtualBox: ~
data.tar  Downloads  Music                samtext.txt.gz  Videos
ubu@ubu-VirtualBox:~$ diff aa.txt bb.txt
ubu@ubu-VirtualBox:~$ bzip2 bb.txt
ubu@ubu-VirtualBox:~$ gzip aa.txt
ubu@ubu-VirtualBox:~$ ls
aa.txt.gz   Desktop    examples.desktop  Pictures        shubh.txt.bz2
bb.txt.bz2  Documents  file2.txt         Public          Templates
data.tar    Downloads  Music             samtext.txt.gz  Videos
ubu@ubu-VirtualBox:~$ diff aa.txt.bz2 bb.txt.gz
diff: aa.txt.bz2: No such file or directory
diff: bb.txt.gz: No such file or directory
ubu@ubu-VirtualBox:~$ diff aa.txt.gz bb.txt.bz2
Binary files aa.txt.gz and bb.txt.bz2 differ
ubu@ubu-VirtualBox:~$ cat >cc.txt
hiiiiiii^C
ubu@ubu-VirtualBox:~$ cat >dd.txt
hellloooooo^C
ubu@ubu-VirtualBox:~$ diff -u cc.txt dd.txt >sam.patch
ubu@ubu-VirtualBox:~$ patch <sam.patch
ubu@ubu-VirtualBox:~$ patch ,sam.patch
^C
ubu@ubu-VirtualBox:~$ patch <sam.patch
ubu@ubu-VirtualBox:~$ cat sam.patch
ubu@ubu-VirtualBox:~$
```

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

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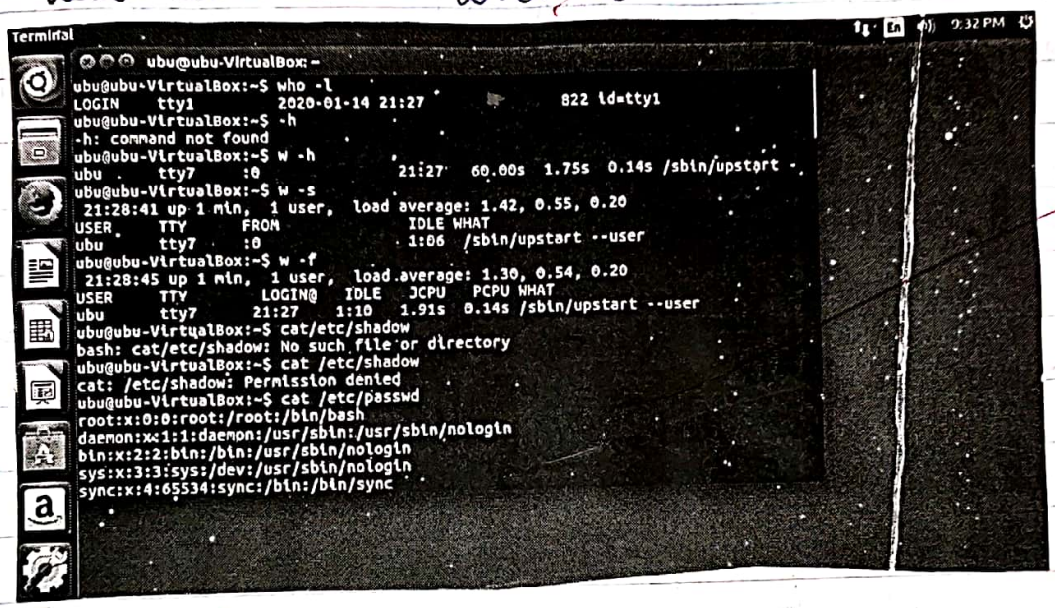
Practical No :- 6

037

* User Environment :-

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

Ans :- who command & whoami



b] Display /etc/shadow file using cat command & understand the importance of shadow file. How it's different then passwd file.

Ans :- cat/etc/shadow

As with the passwd file, each field in the shadow file is also seperated with ":" colons characters, and are as follows :-

- Username, upto 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 (eg. ::) indicates a password is not required to log in (usually a bad idea), and a "*" entry (eg :*:) indicates the account has been disabled.
- The number of days (since January 1, 1970) since the passwd was

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last changed.

- The number of days before password maybe change (0 indicates it maybe changed at any time)
- The numbers of days after which password must be chang (99999 indicates user can keep his or her password unchanged for many, many years)
- The number of days to warn user of an expiring passw (7 for a full week).
- The number of days after password expires that account is disabled.
- The number of days since January 1, 1970 that an acc unt has been disabled.
- A reserved field ~~for~~ possible future use.

```
ubu@ubu-VirtualBox:~$ sudo cat /etc/shadow
[sudo] password for ubu:
root:!:18267:0:99999:7:::
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:::
uucp:*:16911:0:99999:7:::
proxy:*:16911:0:99999:7:::
www-data:*:16911:0:99999:7:::
backup:*:16911:0:99999:7:::
list:*:16911:0:99999:7:::
irc:*:16911:0:99999:7:::
gnats:*:16911:0:99999:7:::
nobody:*:16911:0:99999:7:::
systemd-timesync:*:16911:0:99999:7:::
systemd-network:*:16911:0:99999:7:::
systemd-resolve:*:16911:0:99999:7:::
systemd-bus-proxy:*:16911:0:99999:7:::
syslog:*:16911:0:99999:7:::
_apt:*:16911:0:99999:7:::
messagebus:*:16911:0:99999:7:::
uuidd:*:16911:0:99999:7:::
lightdm:*:16911:0:99999:7:::
whoopsie:*:16911:0:99999:7:::
avahi-autoipd:*:16911:0:99999:7:::
avahi:*:16911:0:99999:7:::
dnsmasq:*:16911:0:99999:7:::
colord:*:16911:0:99999:7:::
speech-dispatcher:!:16911:0:99999:7:::
hplip:*:16911:0:99999:7:::
kernoops:*:16911:0:99999:7:::
pulse:*:16911:0:99999:7:::
rtkit:*:16911:0:99999:7:::
saned:*:16911:0:99999:7:::
usbmux:*:16911:0:99999:7:::
ubu:$6$K5OFgGDnSbEySCF0Q1ZL972Ep00IFkdTtlTxjYn2cSehtk96B2JDD/okAweAPVhDsb3LuCuM3H5HO6zPBTYGXWZRaQlQhR1:18267:0:99999:7:::
vboxadd:!:18281:::::
```

Each field ~~fr~~ in a password entry is seperated with ":" colon characters, and as follows:

- Username, upto 8 characters. Case-sensitive, usually all

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lowercase.

- An "x" in the password field. 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.

- 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.

- 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).

- User's home directory. Usually /home/username (eg. home/smithj). All user's personal files, web pages, mail forwarding etc. will be stored here.

- User's "shell account". Often set to "/bin/bash" to provide access to the bash shell (my personal favourite shell).

```
ubu@ubu-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:/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
irc:x:39:39:ircd:/var/run/ircd:/usr/sbin/nologin
gnats:x:41:41:Gnats Bug-Reporting System (admin):/var/lib/gnats:/usr/sbin/nologin
nobody:x:65534:65534:nobody:/nonexistent:/usr/sbin/nologin
systemd-timesync:x:100:102:systemd Time Synchronization,,,:/run/systemd:/bin/false
systemd-network:x:101:103:systemd Network Management,,,:/run/systemd/netif:/bin/false
systemd-resolve:x:102:104:systemd Resolver,,,:/run/systemd/resolve:/bin/false
systemd-bus-proxy:x:103:105:systemd Bus Proxy,,,:/run/systemd:/bin/false
syslog:x:104:108::/home/syslog:/bin/false
_apt:x:105:65534::/nonexistent:/bin/false
messagebus:x:106:110::/var/run/dbus:/bin/false
uuidd:x:107:111::/run/uuidd:/bin/false
lightdm:x:108:114:Light Display Manager:/var/lib/lightdm:/bin/false
whoopsie:x:109:116::/nonexistent:/bin/false
avahi-autoipd:x:110:119:Avahi autoip daemon,,,:/var/lib/avahi-autoipd:/bin/false
avahi:x:111:120:Avahi mDNS daemon,,,:/var/run/avahi-daemon:/bin/false
dnsmasq:x:112:65534:dnsmasq,,,:/var/lib/misc:/bin/false
colord:x:113:123:colord colour management daemon,,,:/var/lib/colord:/bin/false
speech-dispatcher:x:114:29:Speech Dispatcher,,,:/var/run/speech-dispatcher:/bin/false
hplip:x:115:7:HPLIP system user,,,:/var/run/hplip:/bin/false
kernoops:x:116:65534:Kernel Oops Tracking Daemon,,,:/:/bin/false
pulse:x:117:124:PulseAudio daemon,,,:/var/run/pulse:/bin/false
rtkit:x:118:126:RealtimeKit,,,:/proc:/bin/false
saned:x:119:127::/var/lib/saned:/bin/false
usbmux:x:120:46:usbmux daemon,,,:/var/lib/usbmux:/bin/false
ubu:x:1000:1000:ubu,,,:/home/ubu:/bin/bash
vboxadd:x:999:1::/var/run/vboxadd:/bin/false
```

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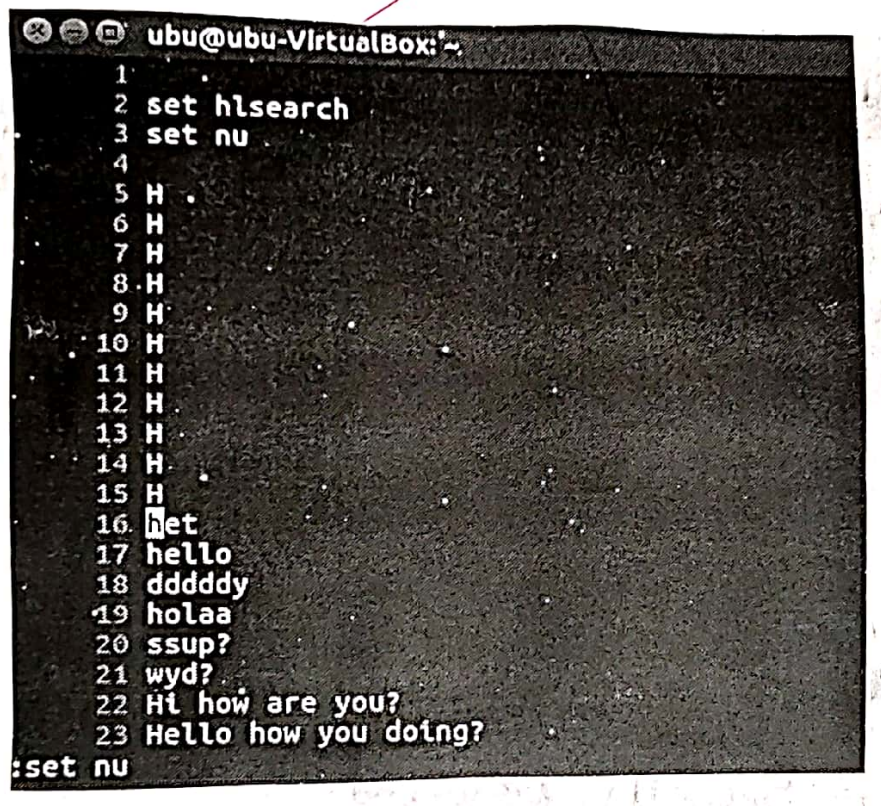
ii) Show the line number.
Use set nu.



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Practical No 1-8

041

* Linux Security :-

a) Use of sudo to change user privileges to root. Create an user named user 1

```
ubu@ubu-VirtualBox:~$ sudo useradd 1786
[sudo] password for ubu:
ubu@ubu-VirtualBox:~$ sudo passwd 1786
Enter new UNIX password:
Retype new UNIX password:
passwd: password updated successfully
ubu@ubu-VirtualBox:~$ su 1786
Password:
1786@ubu-VirtualBox:/home/ubu$ touch shubh.txt
touch: cannot touch 'shubh.txt': Permission denied
1786@ubu-VirtualBox:/home/ubu$
```

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

b) Identify operations that require sudo privileges.

```
1786@ubu-VirtualBox:/home/ubu$ su ubu
Password:
ubu@ubu-VirtualBox:~$ sudo change -l 1786
[sudo] password for ubu:
sudo: change: command not found
ubu@ubu-VirtualBox:~$ sudo chage -l 1786
Last password change                                    : Jan 22, 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
ubu@ubu-VirtualBox:~$
```

c) Modify expiration date for new user using password ageing.

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```
ubu@ubu-VirtualBox:~$ sudo chage 1786
Changing the aging information for 1786
Enter the new value, or press ENTER for the default

        Minimum Password Age [0]: 898989
        Maximum Password Age [99999]: 10000000
        Last Password Change (YYYY-MM-DD) [2020-01-22]: 2020-10-21
        Password Expiration Warning [7]: 10
        Password Inactive [-1]: 55555
        Account Expiration Date (YYYY-MM-DD) [-1]: 2029-10-21
ubu@ubu-VirtualBox:~$ sudo chage -l 1786
Last password change                                    : Oct 21, 2020
Password expires                                        : never
Password inactive                                       : never
Account expires                                         : Oct 21, 2029
Minimum number of days between password change          : 898989
Maximum number of days between password change          : 10000000
Number of days of warning before password expires       : 10
ubu@ubu-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.

```
ubu@ubu-VirtualBox:~$ sudo userdel 1786
[sudo] password for ubu:
ubu@ubu-VirtualBox:~$
```

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Practical No :- 9

* Network Management

a) Get IP address of your machine using ifconfig.

```
ubu@ubu-VirtualBox: ~
ubu@ubu-VirtualBox:~$ ifconfig
enp0s3    Link encap:Ethernet  HWaddr 08:00:27:0f:5c:aa
          inet addr:10.0.2.15  Bcast:10.0.2.255  Mask:255.255.255.0
          inet6 addr: fe80::1f7a:9df6:a957:f109/64 Scope:Link
          UP BROADCAST RUNNING MULTICAST  MTU:1500  Metric:1
          RX packets:478753 errors:0 dropped:0 overruns:0 frame:0
          TX packets:161665 errors:0 dropped:0 overruns:0 carrier:0
          collisions:0 txqueuelen:1000
          RX bytes:489398886 (489.3 MB)  TX bytes:9789227 (9.7 MB)

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:241 errors:0 dropped:0 overruns:0 frame:0
          TX packets:241 errors:0 dropped:0 overruns:0 carrier:0
          collisions:0 txqueuelen:1
          RX bytes:18266 (18.2 KB)  TX bytes:18266 (18.2 KB)
```

b) Get hostname of your machine.

```
ubu@ubu-VirtualBox:~$ hostname
ubu-VirtualBox
ubu@ubu-VirtualBox:~$ arp
Address                  HWtype  HWaddress           Flags Mask            Iface
10.0.2.2                 ether   52:54:00:12:35:02   C                     enp0s3
ubu@ubu-VirtualBox:~$ host -V
host 9.10.3-P4-Ubuntu
ubu@ubu-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
```

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

```
ubu@ubu-VirtualBox:~$ ping 127.0.0.123
PING 127.0.0.123 (127.0.0.123) 56(84) bytes of data.
64 bytes from 127.0.0.123: icmp_seq=1 ttl=64 time=0.011 ms
64 bytes from 127.0.0.123: icmp_seq=2 ttl=64 time=0.042 ms
64 bytes from 127.0.0.123: icmp_seq=3 ttl=64 time=0.042 ms
64 bytes from 127.0.0.123: icmp_seq=4 ttl=64 time=0.042 ms
64 bytes from 127.0.0.123: icmp_seq=5 ttl=64 time=0.045 ms
64 bytes from 127.0.0.123: icmp_seq=6 ttl=64 time=0.045 ms
64 bytes from 127.0.0.123: icmp_seq=7 ttl=64 time=0.044 ms
64 bytes from 127.0.0.123: icmp_seq=8 ttl=64 time=0.029 ms
64 bytes from 127.0.0.123: icmp_seq=9 ttl=64 time=0.019 ms
64 bytes from 127.0.0.123: icmp_seq=10 ttl=64 time=0.044 ms
64 bytes from 127.0.0.123: icmp_seq=11 ttl=64 time=0.046 ms
64 bytes from 127.0.0.123: icmp_seq=12 ttl=64 time=0.043 ms
64 bytes from 127.0.0.123: icmp_seq=13 ttl=64 time=0.022 ms
64 bytes from 127.0.0.123: icmp_seq=14 ttl=64 time=0.033 ms
^C
--- 127.0.0.123 ping statistics ---
14 packets transmitted, 14 received, 0% packet loss, time 13010ms
rtt min/avg/max/mdev = 0.011/0.036/0.046/0.011 ms
```

d) Use of dig command.

```
ubu@ubu-VirtualBox:~$ dig 127.0.0.1

; <<>> DiG 9.10.3-P4-Ubuntu <<>> 127.0.0.1
;; global options: +cmd
;; Got answer:
;; ->>HEADER<<- opcode: QUERY, status: NOERROR, id: 17727
;; flags: qr aa rd ra ad; QUERY: 1, ANSWER: 1, AUTHORITY: 0, ADDITIONAL: 1

;; OPT PSEUDOSECTION:
; EDNS: version: 0, flags:; udp: 1280
;; QUESTION SECTION:
;127.0.0.1.                     IN      A

;; ANSWER SECTION:
127.0.0.1.              0       IN      A       127.0.0.1

;; Query time: 0 msec
;; SERVER: 127.0.1.1#53(127.0.1.1)
;; WHEN: Tue Jan 21 22:14:04 EST 2020
;; MSG SIZE  rcvd: 54
```

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e) Troubleshooting network using traceroute, route command.

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```
ubu@ubu-VirtualBox:~$ traceroute 127.0.0.1
traceroute to 127.0.0.1 (127.0.0.1), 30 hops max, 60 byte packets
 1  localhost (127.0.0.1)  0.013 ms  0.003 ms  0.003 ms
```

f) Use of arp command.

g) Use of hoest command.

h) Use of net-stat & nmap command.

```
ubu@ubu-VirtualBox:~$ nmap 127.0.0.1

Starting Nmap 7.01 ( https://nmap.org ) at 2020-01-21 22:22 EST
Nmap scan report for localhost (127.0.0.1)
Host is up (0.000046s latency).
All 1000 scanned ports on localhost (127.0.0.1) are closed

Nmap done: 1 IP address (1 host up) scanned in 0.08 seconds
```

```
ubu@ubu-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                    16187    /run/user/1000/systemd/notify
unix  2      [ ]         DGRAM                    9745     /run/systemd/journal/syslog
unix  6      [ ]         DGRAM                    9747     /run/systemd/journal/socket
unix  16     [ ]         DGRAM                    9913     /run/systemd/journal/dev-log
unix  3      [ ]         DGRAM                    9736     /run/systemd/notify
unix  3      [ ]         STREAM     CONNECTED     17093
unix  3      [ ]         STREAM     CONNECTED     21628    @/tmp/dbus-J8qzL61BEY
unix  3      [ ]         STREAM     CONNECTED     18643    /run/systemd/journal/stdout
unix  3      [ ]         STREAM     CONNECTED     18677    /run/systemd/journal/stdout
unix  3      [ ]         STREAM     CONNECTED     18446    /var/run/dbus/system_bus_socket
unix  3      [ ]         STREAM     CONNECTED     18411
unix  3      [ ]         STREAM     CONNECTED     18372    @/tmp/.X11-unix/X0
unix  3      [ ]         STREAM     CONNECTED     16878
unix  3      [ ]         STREAM     CONNECTED     14322
unix  3      [ ]         STREAM     CONNECTED     15122
unix  3      [ ]         STREAM     CONNECTED     18830    @/dbus-vfs-daemon/socket-xJshvaSz
unix  3      [ ]         STREAM     CONNECTED     18604
unix  3      [ ]         STREAM     CONNECTED     19623    @/tmp/dbus-J8qzL61BEY
unix  3      [ ]         STREAM     CONNECTED     16902
unix  3      [ ]         STREAM     CONNECTED     18877
unix  3      [ ]         STREAM     CONNECTED     18416
unix  3      [ ]         STREAM     CONNECTED     16985
unix  3      [ ]         STREAM     CONNECTED     19627    @/tmp/dbus-9rMKN0fDbR
unix  3      [ ]         STREAM     CONNECTED     12214    /run/systemd/journal/stdout
unix  3      [ ]         STREAM     CONNECTED     16856    @/tmp/.X11-unix/X0
unix  3      [ ]         STREAM     CONNECTED     16236
unix  3      [ ]         STREAM     CONNECTED     18839    @/dbus-vfs-daemon/socket-2Pe8DUjs
unix  3      [ ]         STREAM     CONNECTED     18670    /var/run/dbus/system_bus_socket
unix  3      [ ]         STREAM     CONNECTED     19450
unix  3      [ ]         STREAM     CONNECTED     19079    /run/systemd/journal/stdout
unix  3      [ ]         STREAM     CONNECTED     16764    @/tmp/dbus-J8qzL61BEY
unix  3      [ ]         STREAM     CONNECTED     16942
unix  3      [ ]         STREAM     CONNECTED     16364    @/com/ubuntu/upstart-session/1000/1093
unix  3      [ ]         STREAM     CONNECTED     14304
unix  3      [ ]         STREAM     CONNECTED     19080
unix  3      [ ]         STREAM     CONNECTED     15146
unix  2      [ ]         DGRAM                    12835
unix  3      [ ]         STREAM     CONNECTED     18744    @/tmp/dbus-J8qzL61BEY
```

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Practical No :- 10

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

vi filename.sh

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

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

"linux.sh" [New File]
```

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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.

a) Open terminal
b) Navigate to the place where you want to create a 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 / ~~for~~ filename.sh (for running the script)

Program to display your name

```
#!/bin/bash
Echo "Enter your name"
Read name
Echo "My name is: $name"
```

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

```
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:~$
```

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"
:wq
```

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```
tcsc@tcsc-VirtualBox: ~
tcsc@tcsc-VirtualBox: $ vi linux2.sh
tcsc@tcsc-VirtualBox: $ chmod 777 linux2.sh
tcsc@tcsc-VirtualBox: $ ./linux2.sh
sum is:175
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 & 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.

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

1] Displaying partial text of a file.
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:~$
```

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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:~$
```

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
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
calclus
computer basic
```

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6] Add a line after/before the matched string.

To add a new line with same content after 048 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 same 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 whole line with pattern matched.

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 calclus
Thanks computer basic
```

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