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Aim:- Installs your choice of Linux distribution on Ubuntu, Fedora, Debian,

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 box 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 file or a physical drive to start Ubuntu in your virtual machine. Space given to it is 1.86 GB.

Step 2: Select the language of your choice and click on 'Install Ubuntu'. You can also try Ubuntu for free on computer device from this (e).

Step 3: In updates and add software click on the normal installation.

Step 4: While configuring installation type we need to click 'Erase disk and install Ubuntu'. This step would delete all types of documents, photos, etc in all operating system.

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Step 5:- While configuring installation type we need to click. In this you only need to choose the location for the click 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.

Step 8:- Type name of virtual disk and command size to be given is 2048 MB or 2 GB.

Therefore now the virtual box is ready to use.

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

Accessing Appearance Settings:

To access Appearance settings in Ubuntu, lets 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, lets 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 of Ubuntu wallpapers clicking on any thumbnails wallpaper will be unchanged right away, with a fading effect.

If you want to select web wallpaper from your folder click the drop-down menu above thumbnail and select the pictures for 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 pictures inside of it.

changing Ubuntu Theme.

- ① Ubuntu also has an option to change the desktop theme, which in one click will change the entire way your computer looks.
- ② To do that click on the drop-down menu below the wallpaper. thumbnails and choose between Ambiance, Radiance, or High Contrast.
- ③ Ambiance is a light theme that looks a bit more mac-like, while Radiance is the darker theme used in Ubuntu by default.

↳ Screen Resolution- Assertion the current screen resolution for your desktop.

Changes the size or rotation of the screen:

- ④ You can changes how big (or how deleted things appear) on the screen by changing the screen resolution.
- ⑤ You can change how big which way up things appear for example if you have a rotating display by changing the rotation.
- ⑥ Click the icon on the very right of the menu bar and select system settings.
- ⑦ Open Screen display.
- ⑧ If you have multi multiple display and they are not mirrored you can have different settings on each display - Select a display in the previous card.
- ⑨ Select your desired resolution and rotation.
- ⑩ Click apply. The new settings will be applied for 30 seconds before reverting back. That ways if you cannot see anything will the need.

Name _____ Installing and removing software.

4) Install gcc package, easily the verify that it runs and then remove it

Step 4: First type 'gcc' - will know if you have already installed gcc compiler
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.

Ans

How to uninstall gcc compiler.

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

Type: `ld build gcc --prefix=/usr/local`
Sudo make uninstall.

This does not remove everything that way installed, but it removes may or executable like `gcc`, `g++`, `cpp` — contained in that directory.

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Nim: Utilization of grep, man commands. Documentation.

ii) 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 on to your screen.

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

More more summarized from of showing info
is the man command. The command is
same as info but required data.

b.) finding man pages from the exact cmd line, bring up the man page for the 'ls' command scroll down to the examples section.

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

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

simply type 'man ls'

) finding man pages by topic : What man pages are already available that document file compression.

Ans: 'tar' 'zip' are some man pages which are available for document file compression type : man zip, man tar.

command line operation

a) Install new package on your system
 Psudo APT get install package name.

b) Remove the package installed.
 Psudo apt. get remove (package name)

c) Find the psudo file in | using find command.

✓ # Find | - name password
 . | usr | show | loc | nss - | clap - 283 | pam - id |
 password
 . | usr | bin | password
 . | etc | pamd | password
 . | etc | password | password

Find the directory password file under and one
 level down
 ✓ # find / - maxdepth 3 - name password
 . | usr | bin | password
 . | etc | bin | password
 . | etc | password

Find the password file under root and 2 level
 down
 ✓ # find / - maxdepth 3 - name password
 . | usr | bin | password
 . | etc | bin | password
 . | etc | password

- Find the `password` file below sub-directories
level 2 + 4
- ↳ #! find - maxdepth 3 - maxdepth \$name
 - pass
 - ↳_usr /bin /password
 - etc /pwd /password
- d) create a symbolic link to the file you found
in last step.
- ```
ln -s file file2
```
- e) create an empty file example `txt` move it  
to `/tmp` directory using relations pathname:
- ```
# touch example -txd.
```
- ```
mv example -txt /tmp
```
- delete the file moved to `/tmp` in  
previous step by absolute method.
- ```
# rm /tmp /example -txt.
```

q) Find the location of ls, ps, bash commands
whereis ls

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

whereis ps

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

whereis bash.

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

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File Operations

1. Explore mounted file systems on your computer

Ans: 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	51116	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?

Ans: mount

```

j3bbjeba-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=123309,mode=755)
devpts on /dev/pts type devpts (rw,nosuid ,nodev,relatime,gid=5 mode=620,ptmxmode=760)
tmpfs on /run type tmpfs (rw,nosuid ,nodev,relatime, size=162416k,mode=755)
/dev/sda1 on / type ext4 (rw,nosuid ,nodev,noexec,relatime,errors=remount,rw,data=ordered)
securityfs on /sys/kernel/security type securityfs (rw,nosuid,nodev,noexec,relatime, size=5120k)
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 (rw,nosuid ,nodev,noexec,relatime, size=5120k)
cgroup on /sys/fs/cgroup/systemd type cgroup (rw,nosuid ,nodev,noexec,relatime,xattr,runtime,
agents=11th/systemd/systemd-cgroups-agent, name=systemd,nsroot=/)
cgroup on /sys/fs/btrfs type btrfs (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/cpuset/prio type cgroup (rw,nosuid ,nodev,noexec,relatime,cpu,prio
=/)
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,nsro
ot=/)
cgroup on /sys/fs/cgroup/cpuid type cgroup (rw,nosuid ,nodev,noexec,relatime,cpu,cpua
nd,nsroot=/)
cgroup on /sys/fs/cgroup/devices type cgroup (rw,nosuid ,nodev,noexec,relatime,devices,nsro
ot=/)
cgroup on /sys/fs/cgroup/memory type cgroup (rw,nosuid ,nodev,npexec,relatime,mem,nsroot
=/)
cgroup on /sys/fs/cgroup/bikio type cgroup (rw,nosuid ,nodev,noexec,relatime,bikio,nsroot=/,
cgroup on /sys/fs/cgroup/perf_event type cgroup (rw,nosuid ,nodev,noexec,relatime,perf even
t,nsroot=/)
cgroup on /sys/fs/cgroup/hugegetib type cgroup (rw,nosuid ,nodev,noexec,relatime,hugegetib,nsro
ot=/)
Systemd-1 on /proc/sys/fs/bliblnt_msc type autofs.(rw,relatime,fd=32,pgrp=1,timeout=0,minp
er=1,suexec=1)
hugegetib on /dev/hugepages type hugegetibfs (rw,relatime)

```

3)

Copying text from files using command

An cp command in command

```
jeba@jeba-VirtualBox:~$ ls
documents examples desktop jj pictures templates
jeba@jeba-VirtualBox:~/debs$ 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
Linux
jeba@jeba-VirtualBox:~/jeb$ touch dd.txt
dd>dd.txt
jeba@jeba-VirtualBox:~/jeb$ cp gg.txt dd.txt
jeba@jeba-VirtualBox:~/jeb$ cat 99.txt
cat: 99.txt: No such file or directory
jeba@jeba-VirtualBox:~/jeb$ cat dd.txt
Linux
jeba@jeba-VirtualBox:~/jeb$
```

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

An gzip plename.txt
or bunzip2 txt

```
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
Linux
jeba@jeba-VirtualBox:~/jeb$
```

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

Ans: gzip filename.txt

Bzip2 filename.txt

Ans: diff filename1 filename2

```
jeba@jeba-VirtualBox:~/jeba$ bzip2 ss.txt
jeba@jeba-VirtualBox:~/jeba$ ls
dd.txt ss.txt bz2
jeba@jeba-VirtualBox:~/jeba$ cat ss.txt.bz2
'Zbzg91AySY.♦[■■■■■]♦[■■■■■]'[■■■■■]
jeba@jeba-VirtualBox:~/jeba$ gzip dd.txt
jeba@jeba-VirtualBox:~/jeba$ ls
dd.txt.gz ss.txt.bz2
jeba@jeba-VirtualBox:~/jeba$ cat dd.txt.gz
jeba@jeba-VirtualBox:~/jeba$ xz -M00000000 dd.txt.gz
```

5. Use diff command to create diff of two files
Ans: **diff filename1 filename2**

b) Use `putch` command to patch a file. And analyze the patch using `patch` command again.

Use patch command to patch a file. And analyze the patch using patch command again.

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

```
jeba@jeba-VirtualBox:~/jeb$ ls
aa.txt bb.txt
jeba@jeba-VirtualBox:~/jeb$ cat >aa.txt
Hello World
^C
jeba@jeba-VirtualBox:~/jeb$ cat >bb.txt
this is Linux
jeba@jeba-VirtualBox:~/jeb$ diff aa.txt bb.txt
aa.txt: hello world
bb.txt: this is Linux
^C
jeba@jeba-VirtualBox:~/jeb$ cat >bb.txt
bb.txt
^C
jeba@jeba-VirtualBox:~/jeb$ diff aa.txt bb.txt
aa.txt: Hello World
bb.txt: this is Linux
^C
jeba@jeba-VirtualBox:~/jeb$ gzip aa.txt
jeba@jeba-VirtualBox:~/jeb$ gzip bb.txt
jeba@jeba-VirtualBox:~/jeb$ diff aa.txt.gz bb.txt.gz
Binary files aa.txt and bb.txt differ
```

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

Ans: who command & whoami

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

```
jeba@jeba-VirtualBox:~$ who
jeba@jeba-tty7          2628-01-15 20:32 (:0)
jeba@jeba-VirtualBox:~$ whoami
jeba
jeba@jeba-VirtualBox:~$ who -L
2628-01-15 20:30    786 1d=tty1
jeba@jeba-VirtualBox:~$
```



```
jeba@jeba-VirtualBox:~$ w
20:35:04 up 4 min, 1 user, load average: 0.79, 0.79, 0.38
USER      TTY      FROM      LOGIN@     IDLE      PCPU WHAT
jeba      :0       ttv7      26:32     4:28     0.39s /sbin/upstart -
jeba@jeba-VirtualBox:~$ w -s
20:35:14 up 4 min, 1 user, load average: 0.69, 0.77, 0.37
USER      TTY      FROM      LOGIN@     IDLE      PCPU WHAT
jeba      :0       ttv7      4:38     /sbin/upstart --user
jeba@jeba-VirtualBox:~$ w -h
jeba      :0       ttv7      26:32     4:44     0.67s /sbin/upstart -
jeba@jeba-VirtualBox:~$ w -f
20:36:12 up 5 min, 1 user, load average: 0.41, 0.69, 0.37
USER      TTY      FROM      LOGIN@     IDLE      PCPU WHAT
jeba      :0       ttv7      5:36     9:06s 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 /etc/passwd file.

Any cat /etc/shadow

As with the passwd file, each field in the shadow file is also separated with colon characters, and are as follow.

Username, up to \$ character. case - sensitive, uppercase in the /etc/passwd file

- password character encrypted. A blank entry (e.g.) indicates a password is not required to login (usually a bad idea), and a "star" entry (e.g.:*) indicates the account may been disabled.
- ⇒ The number of days (since January 1, 1970) since the password was last changed.
- ⇒ The number of days before password must 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 forever, many years.)
- ⇒ The number of days to warn user of an expiring password (0 for a full warning)
- ⇒ The number of days after password expires that account is disabled.
- ⇒ The number of days since January 1, 1970 that an account may been disabled.
- ⇒ A reserved field for possible use

A colon (:) field for possible home use.

```
jebaj@jeba-virtualbox:~$ sudo cat /etc/shadow
root:$1$824b$passw0rd_for_jeba:
root:!:1824b: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:::
```

Each field in a password entry is separated with a colon character and are as follow.

- Username, up to 8 character - case sensitive , usually all lowercase
- Numeric An "x" in the password field . Passwords are stored in the "/etc/shadow" file.
- Numeric for 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 ids in a pairing unique manner for enhanced file security. usually the group id will match the user id.
- Full name of user tho I'm not sure what the maximum length for this field is but try to keep it reasonable (under 32 characters)
- User's home directory . Usually /home/username (e.g. /home/jimmy). All users personal files are forwarded etc, will be stored here,

e)

```
jeba@jeba-VirtualBox:~$ sudo cat /etc/passwd
root:x:0:0::root:/bin/bash
daemon:x:1:1::daemon:/usr/sbin/nologin
bin:x:2:2::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: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::Mail Manager:/var/list:/usr/sbin/nologin
```

c) Get your current working directory

Ans: pwd

d) Explore different ways of getting command history.
How to run previously executed command without
typing it +
Any history.

i) Create alias to most commonly used commands.
alias command instructs the shell to replace one string
within another string while executing the command.

Ex: alias label = "command"

No.

principle 2

Create, modify, search and navigate a file in editor by creating a file.

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

(ii) To modify a file, on the vi editor, type -

(iii) Search in a file:

To find a word (Forward search) press J followed by the word to search.

(iv) Navigator:

From Movement in your direction.

Key Action.

K moves cursor up
J moves cursor down
L moves cursor left
H moves cursor right

Word Navigation

<u>Key</u>	<u>Action</u>
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
o(zero)	moves to first character of a line
f	moves to the end of line.

Scrolling

<u>Key</u>	<u>Action</u>
ctrl + f	scrolls forward
ctrl + b	scrolls backward
ctrl + p	scrolls half page
ctrl + t	scrolls half page backward

- b) learn all essential commands like scroll replace, highlight, show line numbers.

Regular expression

Syntax: `pattern to be replaced` `with what ever`

`! $ || r`

```
git clone https://github.com/jeba/our-project.git
cd our-project
cat file1.txt
```

Hello
This is my Linux example
Welcome
Welldone
This is Vi Editor
Thank you

```
:g/my/s//our/gc
```

```
git clone https://github.com/jeba/our-project.git
cd our-project
cat file1.txt
```

Hello
This is ~~my~~ Linux example
Welcome
Welldone
This is Vi Editor
Thank you

```
replace with your command <your command>
```

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

Hello
This is our Linux example
Welcome
Welldone
This is Vi Editor
Thank you

ii) 
Highlight

Use setlsearch

```
root@jeba:~# cat file1  
Hello  
This is our Linux example  
Welcome  
Welldone  
This is vi Editor  
Thank you  
  
root@jeba:~# :set hlsearch
```

iii) Show the line number

Use set nu

```
root@jeba:~# :set nu  
root@jeba:~# cat file1  
1 Hello  
2 This is our Linux example  
3 Welcome  
4 Welldone  
5 This is vi Editor  
6 Thank you  
7  
root@jeba:~# :set nu
```

Practical : 8

Linux Security

a) Use of sudo to change user privileges to root.

- a) Create an user named user1

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

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

```
# Please consider adding local content to /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 mail_badpass
#Defaults secure_path="/usr/local/sbin:/usr/local/bin:/usr/sbin:/usr/bin:/sbin:/bin"
#
# Host alias specification
#
# User alias specification
#
# Cmnd alias specification
#
# User privilege specification
root    ALL=(ALL:ALL) ALL
user1   ALL=(ALL:ALL) ALL
```

b) Identify operations that require sudo privileges

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

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

```
jeba@jeba-VirtualBox:~$ sudo chage -I user1
Last password change : Jan 20, 2020
Password expires      : 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 [6]: 100
Maximum Password Age [99999]: 286
Last Password Change (YYYY-MM-DD) [2020-01-26]: 2020-01-21
Password Expiration Warning [7]: 5

Password Inactive [-1]: 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, 2026
Account inactive : never
Minimum number of days between password change : 100
Maximum number of days between password change : 286
Number of days of warning before password expires : 5
jeba@jeba-VirtualBox:~$
```

```
jeba@jeba-VirtualBox:~$ sudo chage -E 25/01/2020 -m 10 -N 90 -I 30 -W 30 user1
jeba@jeba-VirtualBox:~$ sudo chage -l user1
Last password change : Jan 21, 2020
Password expires : Apr. 26, 2026
Account inactive : May 26, 2026
Minimum number of days between password change : Jan 01, 2022
Maximum number of days between password change : 10
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

```
jeba@jeba-VirtualBox:~$ sudo userdel user1
[sudo] password for jeba:
jeba@jeba-VirtualBox:~$ su user1
No passwd entry for user 'user1'
jeba@jeba-VirtualBox:~$
```

PRACTICAL - 9

Network Management

Practical: 9

a) Get IP address of your machine using ifconfig

```
jeba@jeba-VirtualBox:~$ ifconfig
eth0      Link encap:Ethernet HWaddr 08:00:27:0e:6b:69
          BROADCAST MTU:1500 Metric:1
          RX packets:53246 errors:0 dropped:0 overruns:0 carrier:0
          TX packets:53246 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
                  UP LOOPBACK RUNNING MTU:65536 Metric:1
                  RX packets:53246 errors:0 dropped:0 overruns:0 carrier:0
                  TX packets:53246 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:~$ hostnames
jeba@jeba-VirtualBox
jeba@jeba-VirtualBox:~$
```

c) 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-tn-f4.1e100.net (172.217.31.196): icmp_seq=1 ttl=54 time=97.8 ms
64 bytes from maa03s28-tn-f4.1e100.net (172.217.31.196): icmp_seq=2 ttl=54 time=82.0 ms
64 bytes from maa03s28-tn-f4.1e100.net (172.217.31.196): icmp_seq=3 ttl=54 time=84.8 ms
64 bytes from maa03s28-tn-f4.1e100.net (172.217.31.196): icmp_seq=4 ttl=54 time=87.1 ms
64 bytes from maa03s28-tn-f4.1e100.net (172.217.31.196): icmp_seq=5 ttl=54 time=93.5 ms
64 bytes from maa03s28-tn-f4.1e100.net (172.217.31.196): icmp_seq=6 ttl=54 time=86.9 ms
64 bytes from maa03s28-tn-f4.1e100.net (172.217.31.196): icmp_seq=7 ttl=54 time=98.0 ms
64 bytes from maa03s28-tn-f4.1e100.net (172.217.31.196): icmp_seq=8 ttl=54 time=90.9 ms
[1]+  Stopped                  ping www.google.com
```

d) Use of dig command

```
S ② Jeba@jeba-VirtualBox:~$ dig www.google.com
;; Global options: +cmd
;; Got answer:
;; ->>> QUERY: www.google.com, ANSWER: 1, AUTHORITY: 0, ADDITIONAL: 1
;
;; OPT PSEUDOSECTION:
;; EDNS: version: 0, flags: udp: 4096
;
;; QUESTION SECTION:
;www.google.com. IN A
;
;; ANSWER SECTION:
www.google.com. 91 IN A 172.217.166.100
;
;; Query time: 152 msec
;; SERVER: 127.0.1.1#53(127.0.1.1)
;; WHEN: Mon Jan 28 22:48:06 IST 2026
;; MSG SIZE rcvd: 59
jeba@jeba-VirtualBox:~$
```

e) Troubleshooting network using traceroute, route command

```
S ② 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)  6.190 ms  6.143 ms  6.151 ms
 2  * * *
 3  10.0.2.2 (10.0.2.2)  68.568 ms  68.486 ms  68.485 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 0 0 0 enp0s3
10.0.2.0 * 255.255.255.0 U 0 0 0 enp0s3
link-local * 0.0.0.0 U 1000 0 0 enp0s3

f) Use of arp command

```
S ② Jeba@jeba-VirtualBox:~$ arp
Address      Hwtype   Hwaddress          Flags Mask          Iface
10.0.2.2      ether    .52:54:00:12:35:02  C          enp0s3
```

g) Use of host command

```
S ② Jeba@jeba-VirtualBox:~$ host -V
host: 9.10.3: P4-Ubuntu
jeba@jeba-VirtualBox:~$
```

h) Use of netstat command and Nmap command

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jebajebavirtualbox:~\$ netstat -an		Active UNIX domain sockets (w/o servers)		Foreign Address	State	
Proto	Recv-Q	Send-Q	Local Address	Type	I-Node	Path
unix	2	0	[::]:42149	DGRAM	42149	/run/user/1000/system
d/notty	1	0	[::]:9094	DGRAM	9094	/run/systemd/Journal/
unix	2	0	[::]:9095	DGRAM	9095	/run/systemd/Journal/
sylog	1	0	[::]:9784	DGRAM	9784	/run/systemd/Journal/
unix	16	0	[::]:9884	DGRAM	9884	/run/systemd/Journal/
dev/log	0	0	[::]:9892	DGRAM	9892	/run/systemd/notify
socket	0	0	[::]:42988	STREAM	42988	@/tmp/abuse.Cymrel7ZAGC
unix	3	0	[::]:43042	STREAM	43042	@/tmp/abuse.CHGGeCc7P5
unix	3	0	[::]:43331	STREAM	43331	/run/systemd/Journal/
unix	3	0	[::]:43522	STREAM	43522	/run/systemd/Journal/
unix	3	0	[::]:43613	STREAM	43613	/run/systemd/Journal/
socket	0	0	[::]:43613	STREAM	43613	/run/systemd/Journal/
unix	3	0	[::]:42935	STREAM	42935	/run/systemd/Journal/

```
jebajebavirtualbox:~$ nmap www.google.com
Starting Nmap 7.01 ( https://nmap.org ) at 2020-01-20 22:51 IST
Nmap scan report for www.google.com (216.58.196.68)
Host is up (0.044s latency).
Other addresses for www.google.com (not scanned): 2404:6800:4007:811::2004
DNS record for 216.58.196.68: b0m05s11-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
```

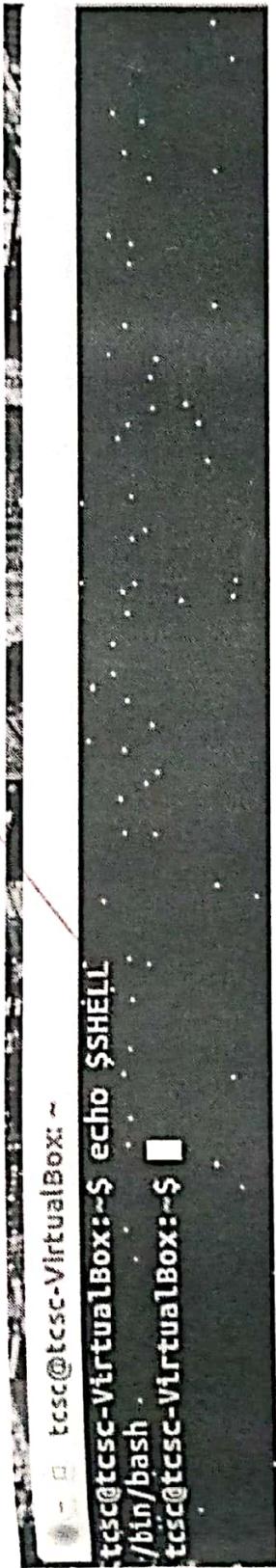
PRACTICAL 10

AIM: 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

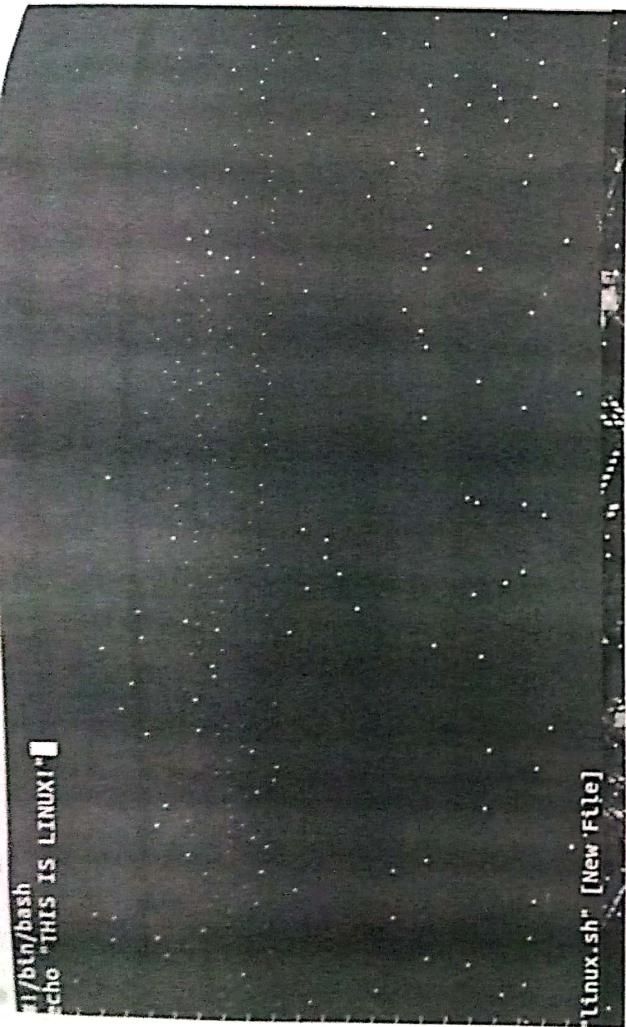
Echo \$SHELL



```
tesc@tcsct-VirtualBox:~$ echo $SHELL
/bin/bash
tesc@tcsct-VirtualBox:~$ █
```

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

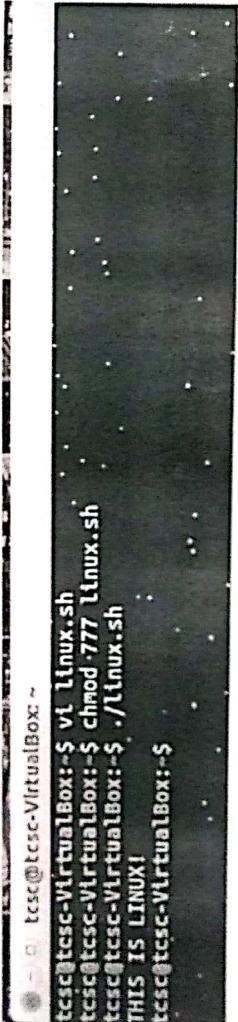
```
1/bin/bash  
echo "THIS IS LINUX!"
```



a)

b)

- Chmod 777 filename.sh
./filename.sh



tsc@tesc-VirtualBox:~\$ vi llinux.sh
tsc@tesc-VirtualBox:~\$ chmod 777 llinux.sh
tsc@tesc-VirtualBox:~\$./llinux.sh
THIS IS LINUX!
tsc@tesc-VirtualBox:~\$ ls

Step to write and 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
- Vi filename.sh [You can use your favorite editor, to edit the script]
- Chmod 777 filename.sh (for making the script executable)
or filename.sh or ./filename.sh (for running the script)

Program to display your name

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

A screenshot of a terminal window titled 'tcsc@tcsc-VirtualBox: ~'. The window contains the following text:
#!/bin/bash
echo "Enter your name:"
read name
echo "My name is:\$name"
The text is displayed in white on a dark background.

A screenshot of a terminal window titled 'tcsc@tcsc-VirtualBox: ~'. The window contains the following text:
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:~\$ █
The text is displayed in white on a dark background.

Program to find the sum of two variables

```
vi filename.sh  
#!/bin/bash  
a=100  
b=25  
Sum=$((a+b))  
Echo "sum is :$sum"
```

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

```
test@tesc:~/VirtualBox~  
17$ vi llinx1.sh  
sum=$(( $1+$2 ))  
echo "sum $1:$sum"  
.  
.
```

llinx1.sh - 3 lines, 46 characters

```
test@tesc:~/VirtualBox~  
41 /bin/bash  
a=100  
b=25  
sum=$(( $a+$b ))  
echo "Sum $1:$sum"  
.
```

```
test@tesc:~/VirtualBox~  
res@res-OptiPlex-5090:~$ vi llinx2.sh  
res@res-OptiPlex-5090:~$ chmod 777 llinx2.sh  
res@res-OptiPlex-5090:~$ ./llinx2.sh  
Sum 15:125  
res@res-OptiPlex-5090:~$
```

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Sed

Sed command or Stream Editor is very powerful utility offered by Linux. Sed command 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,



```
teric@teric-VirtualBox:~$ cat subjects-offered-in-exam.txt
subjects offered in exam
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 seeing whole file.

```
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:~$ 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  
calculus  
computer basic
```

5) Replace a string on a particular line

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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 management  
Linux  
python  
green tech  
softskill  
stats  
calculus  
computer basic
```

6) 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 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 management  
Linux  
python  
green tech  
softskill  
stats  
calculus  
computer basic  
tcsc@tcsc-VirtualBox:~$
```

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

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
```

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
```