

Assignment-1 Questions:

(Note: All answers should include an attached screenshot as proof of execution)

1. What does CLI stand for, and how does it differ from GUI?

Ans. CLI stands for “[Command line interface](#)”.

Command line interface and graphical user interface are 2 ways to interact with

Computer and software applications. Here are different points:

1. CLI use type command in terminals whereas GUI use visual elements buttons, icons, etc;
2. CLI need knowledge to run commands and is steep learning curve where as GUI is very user friendly and intuitive.
3. CLI is faster for experienced user and GUI is slower because of graphical elements.

2. Open a terminal and execute a simple command such as echo "Hello". Can you perform a similar action in a GUI? What are the advantages of using CLI compared to a GUI?

Ans.

```
[root@localhost ~]# echo "hello"
hello
[root@localhost ~]#
```

- In GUI you could do in this way:
 1. Open text editor.
 2. Type “hello” in the editor
 3. Save the file or simply view the text on the screen.
- Advantage of using CLI compared to GUI:
 1. CLI allows exact control over task with detailed options and parameters.
 2. It allows automation through scripts which GUI cannot
 3. It is lightweight and consume low-power

3. To convert a minimal CLI-based Linux interface into a GUI-based one, which packages are typically required? Find them

Ans. To convert a minimal CLI-based Linux interface into a GUI-based one we need typically following packages:

1. X window system: For this we use “XORG”, it is foundation layer and provide basic framework for GUI environment.

2. Desktop Environment: Popular choice like “GNOME”, “KDE Plasma”, “XFCE” and “LXDE”.

3. Display Manager: “GDM”, “LightDM”, and “SDDM”.

4. What are terminals in Linux? How many virtual terminals are available on your system, and which key combination is used to access them?

Ans. 1. In linux, terminals are referred as an interface that allows to interact with the system by inputting and executing text-based commands, this interaction is facilitated by the help of a command line interface, enabling tasks like file manipulation, system administration, program execution etc.

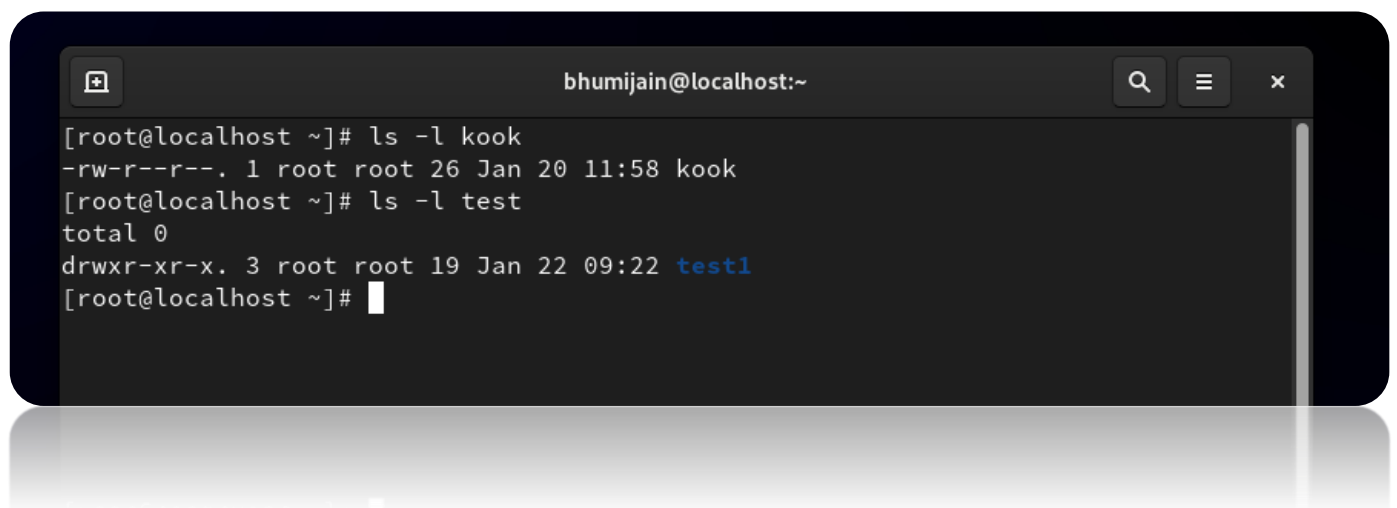
2. Virtual terminals are also known as a virtual console. The no. of virtual terminals can vary on linux based on distribution and configuration. For eg. Many provide six Terminals by default, accessible using specific key combination.

3. The key combination used to access them are:

- Ctr+alt+F1 through Ctr+alt+F6 : Switch to virtual terminal 1 to virtual terminal 6.
- Ctr+alt+F7: Typically switches back to GUI session.

5. Write the commands to check a file and a directory in a long listing format. How can you determine whether it is a file or a directory?

Ans.

A terminal window with a dark background and light text. The window title is 'bhumijain@localhost:~'. It shows two 'ls -l' commands. The first command 'ls -l kook' shows a file 'kook' with permissions '-rw-r--r--'. The second command 'ls -l test' shows a directory 'test1' with permissions 'drwxr-xr-x'.

```
[root@localhost ~]# ls -l kook
-rw-r--r--. 1 root root 26 Jan 20 11:58 kook
[root@localhost ~]# ls -l test
total 0
drwxr-xr-x. 3 root root 19 Jan 22 09:22 test1
[root@localhost ~]#
```

- drwxr-xr-x indicates a directory.
- -rw-r--r-- indicates file.

6. Which Linux commands are used to view the content of files and directories? Write the commands.

Ans. For Directory:

```
bhumijain@localhost:~  
[root@localhost ~]# ls  
anaconda-ks.cfg kook link softlink test test.txt  
[root@localhost ~]# ls -l  
total 12  
-rw-----. 1 root root 860 Jan 19 22:09 anaconda-ks.cfg  
-rw-r--r--. 1 root root 26 Jan 20 11:58 kook  
-rw-r--r--. 1 root root 7 Jan 20 11:56 link  
drwxr-xr-x. 2 root root 44 Jan 20 13:51 softlink  
drwxr-xr-x. 3 root root 19 Jan 22 09:22 test  
-rw-r--r--. 1 root root 0 Jan 20 10:26 test.txt  
[root@localhost ~]# ls -a  
.  
..  
anaconda-ks.cfg .bash_logout .config .local test .xauthaY3bgV  
                  .bash_profile .cshrc softlink test.txt .xauthU3eKqF  
                  .bashrc kook .ssh .viminfo  
.bash_history .cache link .tcshrc .xauth2NCrXJ  
[root@localhost ~]# ls -R  
.:  
anaconda-ks.cfg kook link softlink test test.txt  
  
./softlink:  
file2 file3 kook  
  
./test:  
test1  
  
./test/test1:  
test2  
  
./test/test1/test2:  
test3  
  
./test/test1/test2/test3:  
[root@localhost ~]#
```

For File:

```
[root@localhost ~]# cat kook  
hello this is bhumi jain  
[root@localhost ~]# less kook  
[root@localhost ~]# more kook  
hello this is bhumi jain  
[root@localhost ~]# head kook  
hello this is bhumi jain  
[root@localhost ~]# tail kook  
hello this is bhumi jain  
[root@localhost ~]#
```

7. Change your current location to the /etc/yum.repos.d directory.

Ans. A. Create xyz.repo in /etc/yum.repos.d/ using a relative path:

```
[root@localhost ~]# cd test
[root@localhost test]# touch xyz.repo
[root@localhost test]#
```

B. Create xyz.conf in /etc/rsyslog.d/ using an absolute path:

```
[root@localhost ~]# mkdir /etc/rsyslog.d/
mkdir: cannot create directory '/etc/rsyslog.d/': File exists
[root@localhost ~]# touch /etc/rsyslog.d/xyz.conf
[root@localhost ~]# ls -l
```

C. What differences did you observe between using a relative path and an absolute path

Absolute Path: Starts from the root directory (/), e.g., /home/user/file.txt. **Absolute Path:** Always points to the same location, regardless of the current directory.

Relative Path: Starts from the current working directory, e.g., docs/file.txt. **Relative Path:** Depends on the current working directory and may break if the directory Changes.

8. List all files, including hidden ones, in the /usr/bin/ directory with details like file permissions. Save the

output to a file named output.txt in the /mnt directory.
Write the command.

Ans.

```
[root@localhost ~]# ls -la /usr/bin/ >/mnt/output.txt
[root@localhost ~]# cat /mnt/output.txt
total 214920
dr-xr-xr-x.  2 root root      45056 Jan 19 21:59 .
drwxr-xr-x. 12 root root       144 Jan 19 21:53 ..
-rwxr-xr-x.  1 root root    53032 Aug 16 19:07 [
-rwxr-xr-x.  1 root root    33416 Nov  1 2021 ac
-rwxr-xr-x.  1 root root    24000 Jul  4 2024 aconnect
-rwxr-xr-x.  1 root root    28584 Aug 15 14:04 addr2line
-rwxr-xr-x.  1 root root   293272 Jan  2 2024 adwaita-1-demo
-rwxr-xr-x.  1 root root   154416 Aug 11 2021 aircan-discover
-rwxr-xr-x.  1 root root      33 Feb 15 2024 alias
-rwxr-xr-x.  1 root root    86912 Jul  4 2024 alsaloop
-rwxr-xr-x.  1 root root    84104 Jul  4 2024 alsamixer
-rwxr-xr-x.  1 root root     127 Jul  4 2024 alsaunmute
-rwxr-xr-x.  1 root root    32152 Jul  4 2024 amidi
```

1 ls-la:

- -l: Lists detailed information such as permissions, owner, size, and modification date.
- -a: Includes hidden files (files starting with a .).

2 /usr/bin/: The directory to list.

3 >: Redirects the output of the command to a file.

4 /mnt/output.txt: Specifies the file where the output will be saved

9. Create the parent directories

/Techno/Udaipur/Rajasthan/India/Asia/Earth/Solar
using one command.

Then, check the full structure with details in a long
listing format. Write the commands.

Ans.

```
[root@localhost ~]# mkdir -p /Techno/udaipur/rajasthan/earth/solar/

[root@localhost ~]# ls -lR /Techno
/Techno:
total 0
drwxr-xr-x. 3 root root 23 Jan 22 18:06 udaipur

/Techno/udaipur:
total 0
drwxr-xr-x. 3 root root 19 Jan 22 18:06 rajasthan

/Techno/udaipur/rajasthan:
total 0
drwxr-xr-x. 3 root root 19 Jan 22 18:06 earth

/Techno/udaipur/rajasthan/earth:
total 0
drwxr-xr-x. 2 root root 6 Jan 22 18:06 solar

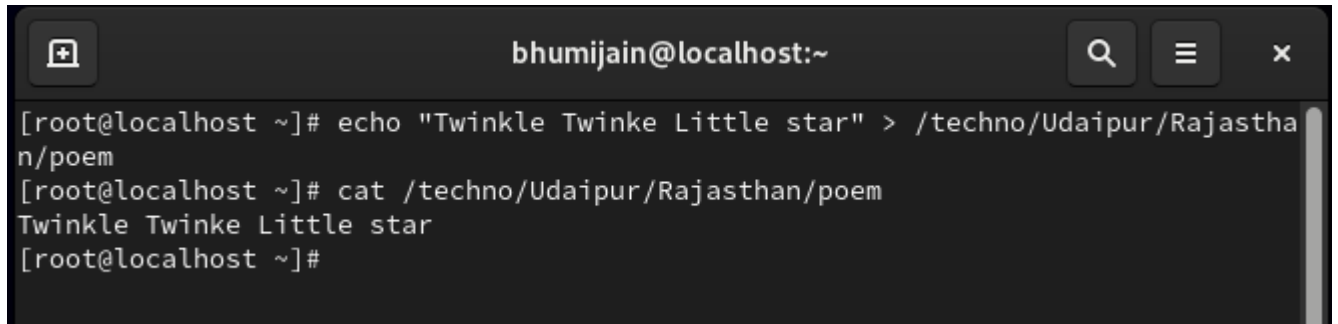
/Techno/udaipur/rajasthan/earth/solar:
total 0
[root@localhost ~]#
```

10. Create a file named "Poem" under the

/Techno/Udaipur/Rajasthan/ directory. Write the text
"Twinkle

Twinkle Little Star" into the file and save it. Perform all actions using the absolute path method.

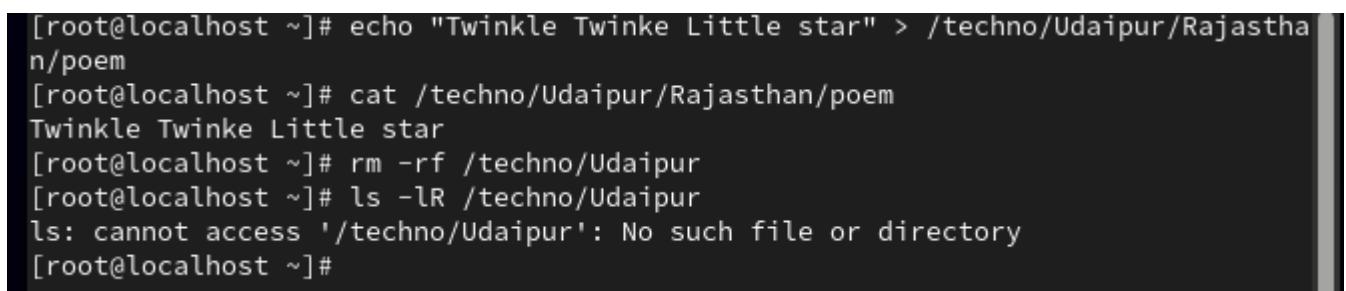
Ans.

A terminal window titled 'bhumijain@localhost:~' with search, menu, and close buttons. It shows the execution of two commands: 'echo "Twinkle Twinke Little star" > /techno/Udaipur/Rajasthan/poem' and 'cat /techno/Udaipur/Rajasthan/poem', with the output 'Twinkle Twinke Little star' displayed.

```
[root@localhost ~]# echo "Twinkle Twinke Little star" > /techno/Udaipur/Rajasthan/poem
[root@localhost ~]# cat /techno/Udaipur/Rajasthan/poem
Twinkle Twinke Little star
[root@localhost ~]#
```

11. Delete the /Techno/Udaipur directory, including its contents, using a single Linux command. Write the command.

Ans.

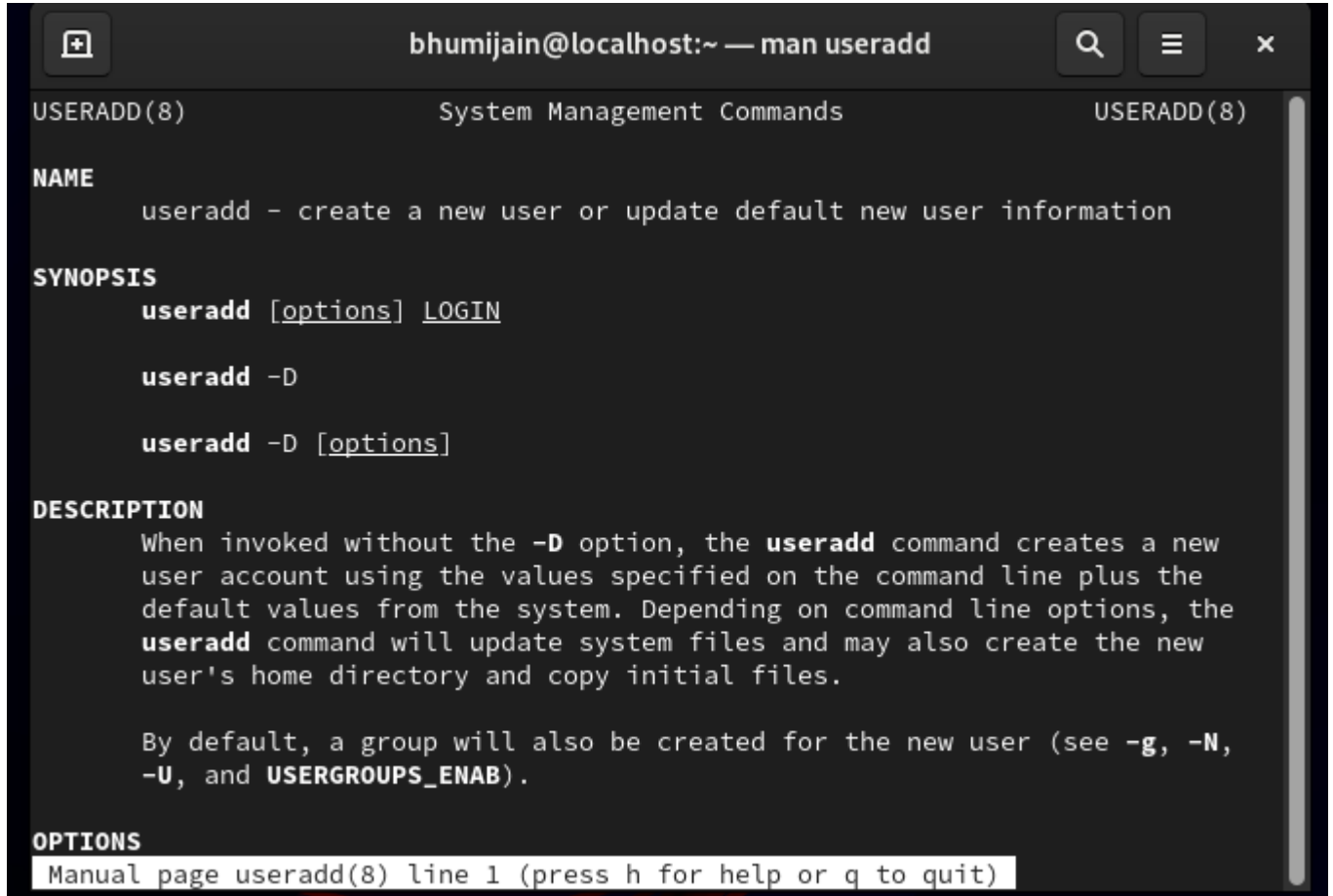
A terminal window showing the deletion of the directory '/techno/Udaipur' using the command 'rm -rf /techno/Udaipur'. It also shows the command 'ls -lR /techno/Udaipur' which results in an error message: 'ls: cannot access '/techno/Udaipur': No such file or directory'.

```
[root@localhost ~]# echo "Twinkle Twinke Little star" > /techno/Udaipur/Rajasthan/poem
[root@localhost ~]# cat /techno/Udaipur/Rajasthan/poem
Twinkle Twinke Little star
[root@localhost ~]# rm -rf /techno/Udaipur
[root@localhost ~]# ls -lR /techno/Udaipur
ls: cannot access '/techno/Udaipur': No such file or directory
[root@localhost ~]#
```

12. How can you view the manual page for the useradd command? From the manual page, identify which files

are important for user administration.(Hint: Check the 'Files' Section)

Ans. man useradd



```
USERADD(8)                                System Management Commands                                USERADD(8)

NAME
    useradd - create a new user or update default new user information

SYNOPSIS
    useradd [options] LOGIN

    useradd -D

    useradd -D [options]

DESCRIPTION
    When invoked without the -D option, the useradd command creates a new
    user account using the values specified on the command line plus the
    default values from the system. Depending on command line options, the
    useradd command will update system files and may also create the new
    user's home directory and copy initial files.

    By default, a group will also be created for the new user (see -g, -N,
    -U, and USERGROUPS_ENAB).

OPTIONS
    Manual page useradd(8) line 1 (press h for help or q to quit)
```

```
/etc/passwd
    User account information.

/etc/shadow
    Secure user account information.

/etc/group
    Group account information.

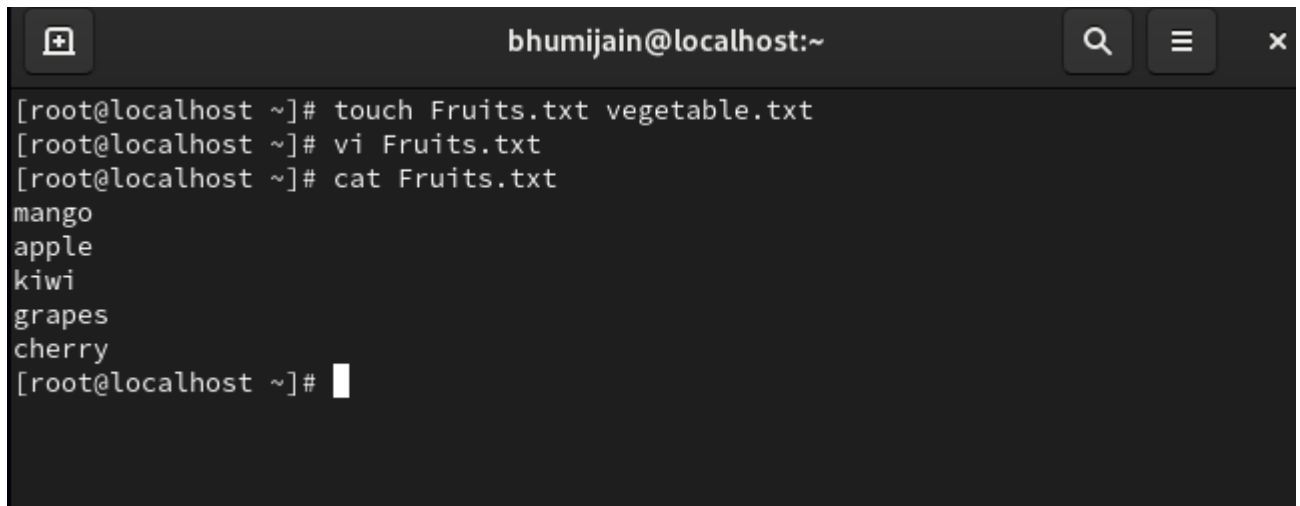
/etc/gshadow
    Secure group account information.

/etc/default/useradd
    Default values for account creation.

/etc/shadow-maint/useradd-pre.d/*, /etc/shadow-maint/useradd-post.d/*
    Run-part files to execute during user addition. The environment
    variable ACTION will be populated with useradd and SUBJECT with the
    username. useradd-pre.d will be executed prior to any user
    addition. useradd-post.d will execute after user addition. If a
    script exits non-zero then execution will terminate.
```

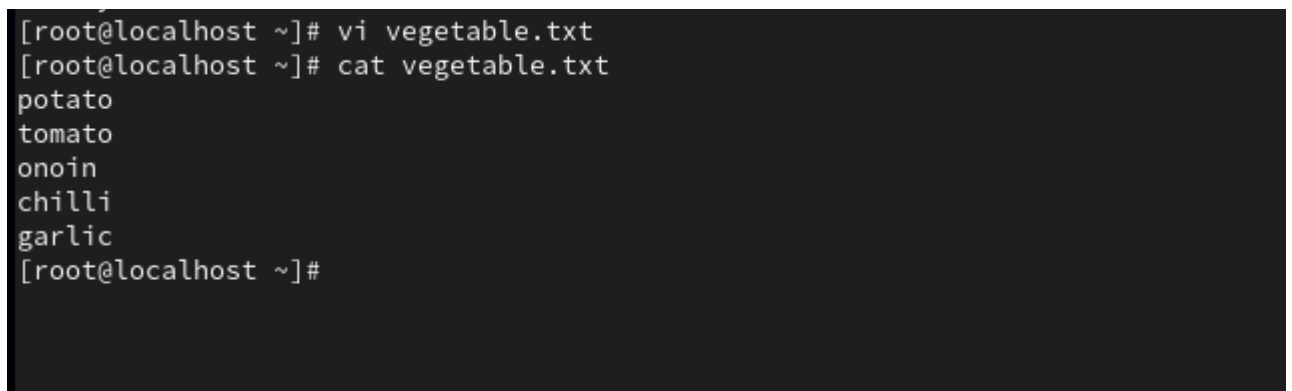
13. You have two files: Fruits.txt and Vegetables.txt, each containing related content.

a. Write content in fruits.txt using vi. (EX: mango, apple, kiwi, grapes, cherry).

A terminal window titled 'bhumijain@localhost:~' with search, menu, and close buttons. It shows the execution of 'touch Fruits.txt vegetable.txt', opening 'Fruits.txt' with 'vi', and displaying its contents with 'cat'. The contents are: mango, apple, kiwi, grapes, and cherry.

```
[root@localhost ~]# touch Fruits.txt vegetable.txt
[root@localhost ~]# vi Fruits.txt
[root@localhost ~]# cat Fruits.txt
mango
apple
kiwi
grapes
cherry
[root@localhost ~]#
```

b. Write content in vegetables.txt using nano. (Ex: potato, tomato, onion, chilli, garlic).

A terminal window showing the execution of 'vi vegetable.txt', opening it with 'cat', and displaying its contents. The contents are: potato, tomato, onion, chilli, and garlic.

```
[root@localhost ~]# vi vegetable.txt
[root@localhost ~]# cat vegetable.txt
potato
tomato
onoin
chilli
garlic
[root@localhost ~]#
```

c. Write the single command to Combine the contents of both files into a single file named vegetarian and display its content.

```
[root@localhost ~]# nano vegetable.txt
[root@localhost ~]# cat Fruits.txt vegetable.txt > vegetarian
[root@localhost ~]# cat Fruits.txt vegetable.txt > vegetarian && cat vegetarian
mango
apple
kiwi
grapes
cherry
potato
tomato
onion
chilli
garlic
[root@localhost ~]#
```

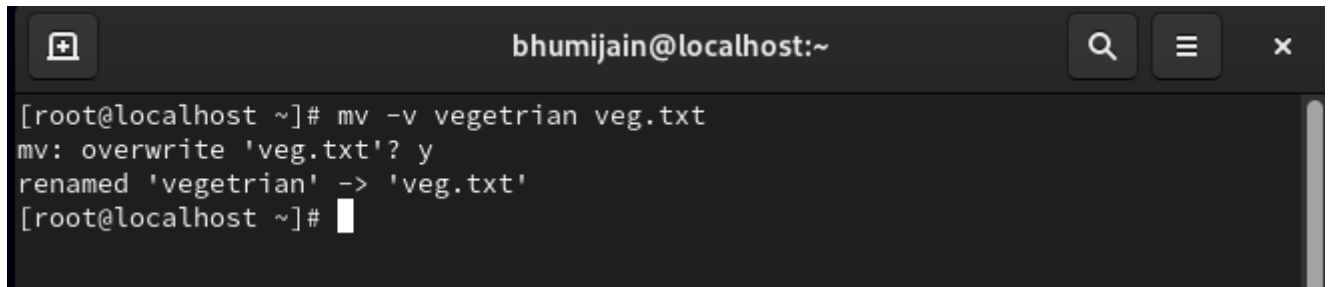
14. Write the command to copy all files, including related sub-files, from /var to a new location /tmp/data/. The output should be displayed during the copying process.

Ans.

```
[root@localhost ~]# mkdir -p /tmp/data
[root@localhost ~]# cp -rv /var/* /tmp/data
'/var/account' -> '/tmp/data/account'
'/var/account/pacct' -> '/tmp/data/account/pacct'
'/var/adm' -> '/tmp/data/adm'
'/var/cache' -> '/tmp/data/cache'
```

15. Rename the file “Vegetarian.txt” to “Veg.txt”. Write the command.

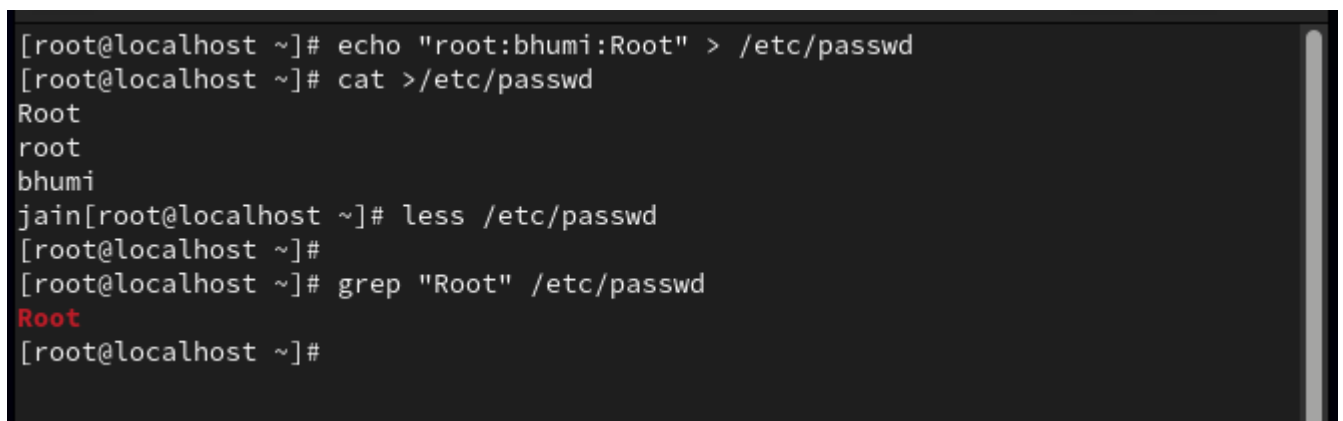
Ans.



```
bhumijain@localhost:~  
[root@localhost ~]# mv -v vegetarian veg.txt  
mv: overwrite 'veg.txt'? y  
renamed 'vegetarian' -> 'veg.txt'  
[root@localhost ~]#
```

16. Open the file “/etc/passwd and locate the following lines using less and more:

- a. Search for the text "Root" using the less command.
- b. Search for the word "root" using the grep command.



```
[root@localhost ~]# echo "root:bhumi:Root" > /etc/passwd  
[root@localhost ~]# cat >/etc/passwd  
Root  
root  
bhumi  
jain[root@localhost ~]# less /etc/passwd  
[root@localhost ~]#  
[root@localhost ~]# grep "Root" /etc/passwd  
Root  
[root@localhost ~]#
```

c. What is the use difference between more and less commands?

1 more:

- more is a basic pager program that allows you to view the content of a file one page at a time.
- You can move forward through the file by pressing the spacebar, but it doesn't allow you to move backward (unless using specific options).

2 less:

- less is an advanced pager that allows both forward and backward navigation within a file.
- You can use the arrow keys to scroll up and down, search for text with /, and more.
- Generally, less is considered more versatile and user-friendly than more.

17. Perform the following tasks and write the commands to achieve them:

a. Display the top 7th line of the /etc/passwd file.

Ans.

```
bhumijain@localhost:~  
[root@localhost bhumijain]# cd  
[root@localhost ~]# sed -n '7p' /etc/passwd  
sed: -e expression #1, char 3: extra characters after command  
[root@localhost ~]# sed -n '7p' /etc/passwd  
shutdown:x:6:0:shutdown:/sbin:/sbin/shutdown  
[root@localhost ~]#
```

b. Display the last 3 lines of the /etc/group file.

Ans.

```
[root@localhost ~]# sed -n '7p' /etc/passwd  
shutdown:x:6:0:shutdown:/sbin:/sbin/shutdown  
[root@localhost ~]# tail -n 3 /etc/group  
dnsmasq:x:978:  
tcpdump:x:72:  
bhumijain:x:1000:  
[root@localhost ~]#
```

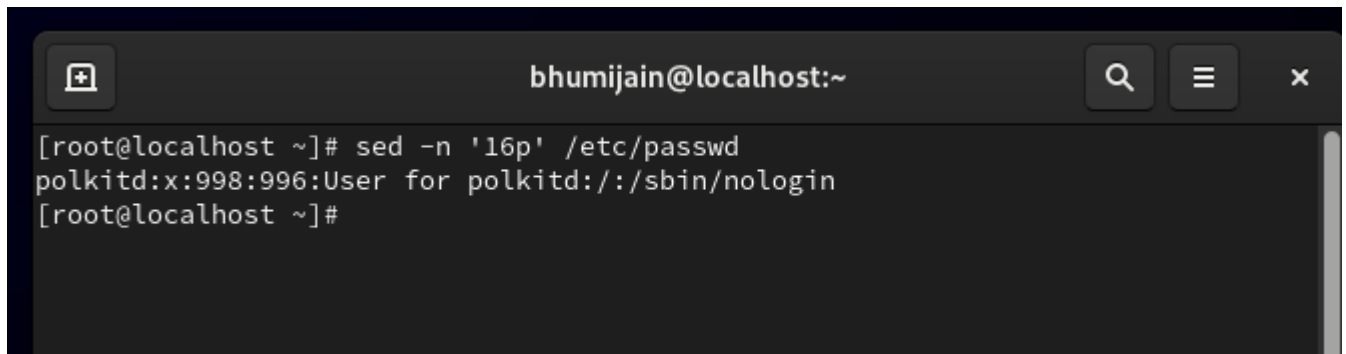
c. Display the lines 11th to 15th from the /etc/shadow file using a pipeline.

Ans.

```
bhumijain@localhost:~  
[root@localhost ~]# cat /etc/passwd | sed -n '11,15p'  
games:x:12:100:games:/usr/games:/sbin/nologin  
ftp:x:14:50:FTP User:/var/ftp:/sbin/nologin  
nobody:x:65534:65534:Kernel Overflow User:/:/sbin/nologin  
systemd-coredump:x:999:997:systemd Core Dumper:/:/sbin/nologin  
dbus:x:81:81:System message bus:/:/sbin/nologin  
[root@localhost ~]#
```

d. Display only the 16th line of the /etc/passwd file.

Ans.

A terminal window with a dark background. The title bar shows 'bhumijain@localhost:~'. The terminal content shows a root user at localhost using the 'sed' command to edit the '/etc/passwd' file. The command is 'sed -n '16p' /etc/passwd'. The output shows the 16th line of the file: 'polkitd:x:998:996:User for polkitd:/:/sbin/nologin'. The prompt returns to the root user at localhost.

```
[root@localhost ~]# sed -n '16p' /etc/passwd
polkitd:x:998:996:User for polkitd:/:/sbin/nologin
[root@localhost ~]#
```

18. Perform the following tasks using the grep command on the /etc/passwd file:

a. Write a command to match and display lines containing the word /sbin/nologin.

Ans.

```
bhumijain@localhost:~  
[root@localhost ~]# grep '/sbin/nologin' /etc/passwd  
bin:x:1:1:bin:/bin:/sbin/nologin  
daemon:x:2:2:daemon:/sbin:/sbin/nologin  
adm:x:3:4:adm:/var/adm:/sbin/nologin  
lp:x:4:7:lp:/var/spool/lpd:/sbin/nologin  
mail:x:8:12:mail:/var/spool/mail:/sbin/nologin  
operator:x:11:0:operator:/root:/sbin/nologin  
games:x:12:100:games:/usr/games:/sbin/nologin  
ftp:x:14:50:FTP User:/var/ftp:/sbin/nologin  
nobody:x:65534:65534:Kernel Overflow User:/:/sbin/nologin  
systemd-coredump:x:999:997:systemd Core Dumper:/:/sbin/nologin  
dbus:x:81:81:System message bus:/:/sbin/nologin  
polkitd:x:998:996:User for polkitd:/:/sbin/nologin  
avahi:x:70:70:Avahi mDNS/DNS-SD Stack:/var/run/avahi-daemon:/sbin/nologin  
rtkit:x:172:172:RealtimeKit:/proc:/sbin/nologin  
pipewire:x:997:993:PipeWire System Daemon:/var/run/pipewire:/sbin/nologin  
sssd:x:996:992:User for sssd:/:/sbin/nologin  
libstoragemgmt:x:990:990:daemon account for libstoragemgmt:/:usr/sbin/nologin  
systemd-oom:x:989:989:systemd Userspace OOM Killer:/:usr/sbin/nologin  
tss:x:59:59:Account used for TPM access:/:/sbin/nologin  
geoclue:x:988:987:User for geoclue:/var/lib/geoclue:/sbin/nologin  
cockpit-ws:x:987:986:User for cockpit web service:/nonexisting:/sbin/nologin  
cockpit-wsinstance:x:986:985:User for cockpit-ws instances:/nonexisting:/sbin/nologin
```

b. Write a command to match and display lines containing the multiple words (root, sbin, and /home) simultaneously, ignoring typographical case errors. Save the output for all three matches into the file /root/test. Without losing data.

Ans.

```
bhumijain@localhost:~  
[root@localhost ~]# grep -Ei "root|sbin|/home" /etc/passwd >> /root/test  
[root@localhost ~]# cat /root/test  
/etc/passwd:bhumijain:x:1000:1000:Bhumi Jain:/home/bhumijain:/bin/bash  
root:x:0:0:root:/root:/bin/bash  
bin:x:1:1:bin:/bin:/sbin/nologin  
daemon:x:2:2:daemon:/sbin:/sbin/nologin  
adm:x:3:4:adm:/var/adm:/sbin/nologin  
lp:x:4:7:lp:/var/spool/lpd:/sbin/nologin  
sync:x:5:0:sync:/sbin:/bin/sync  
shutdown:x:6:0:shutdown:/sbin:/sbin/shutdown  
halt:x:7:0:halt:/sbin:/sbin/halt  
mail:x:8:12:mail:/var/spool/mail:/sbin/nologin  
operator:x:11:0:operator:/root:/sbin/nologin  
games:x:12:100:games:/usr/games:/sbin/nologin  
ftp:x:14:50:FTP User:/var/ftp:/sbin/nologin  
nobody:x:65534:65534:Kernel Overflow User:/:/sbin/nologin  
systemd-coredump:x:999:997:systemd Core Dumper:/:/sbin/nologin  
dbus:x:81:81:System message bus:/:/sbin/nologin  
polkitd:x:998:996:User for polkitd:/:/sbin/nologin  
avahi:x:70:70:Avahi mDNS/DNS-SD Stack:/var/run/avahi-daemon:/sbin/nologin  
rtkit:x:172:172:RealtimeKit:/proc:/sbin/nologin  
pipewire:x:997:993:PipeWire System Daemon:/var/run/pipewire:/sbin/nologin  
sssd:x:996:992:User for sssd:/:/sbin/nologin  
libstoragemgmt:x:990:990:daemon account for libstoragemgmt:/:/usr/sbin/nologin
```

19. Replace Text Using sed Linux Commands

a. Write the command to replace the word localhost with localhost.localhost in the file

/etc/hosts without opening the file in an editor.

```
oot@localhost ~]# sed -i 's/localhost/localhost.localhost/g' /etc/hosts
oot@localhost ~]# cat /etc/hosts
7.0.0.1    localhost.localhost.localhost.localhost.localhost.localhost.localhost
localhost localhost.localhost.localhost.localhost.localhost.localhost.localhost
localhost.localhost localhost.localhost.localhost.localhost.localhost.localhost
t.localhost.localhost4 localhost.localhost.localhost.localhost.localhost.localhost
st.localhost.localhost4.localdomain4
1          localhost.localhost.localhost.localhost.localhost.localhost.localhost
localhost localhost.localhost.localhost.localhost.localhost.localhost.localhost
localhost.localhost localhost.localhost.localhost.localhost.localhost.localhost
t.localhost.localhost6 localhost.localhost.localhost.localhost.localhost.localhost
st.localhost.localhost6.localdomain6
oot@localhost ~]#
```

b. The `/var/log/audit/audit.log` file contains audit log messages, some of which include the word “success.” Write the command to count how many lines contain the word success.

```
bhumijain@localhost:~  
[root@localhost ~]# grep -c 'success' /var/log/audit/audit.log  
158  
[root@localhost ~]#
```

20. Create a directory named “demo” on “/root”.

a. Create a file “RedHat” under the “demo” directory.

```
[root@localhost ~]# ls
anaconda-ks.cfg  demo  test
[root@localhost ~]# ls demo
Redhat
[root@localhost ~]#
```

b. Run the command “vimtutor” and save the output to the “RedHat” file.

```
bhumijain@localhost:~
[root@localhost ~]# ls
anaconda-ks.cfg  demo  test
[root@localhost ~]# ls demo
Redhat
[root@localhost ~]# vimtutor > /root/demo/Redhat
```

c. Now create a soft link of “RedHat” to “/etc/” location.

```
[root@localhost ~]# ln -s /root/demo/Redhat /etc/Redhat
[root@localhost ~]# ls -l /etc/Redhat
lrwxrwxrwx. 1 root root 17 Jan 23 15:19 /etc/Redhat -> /root/demo/Redhat
[root@localhost ~]#
```

d. Create a hard link of /var/log/messages to /etc/log.

```
[root@localhost ~]# ln /var/log/messages /etc/log
[root@localhost ~]# ls -l /etc/log
-rw-----. 2 root root 1064522 Jan 23 15:19 /etc/log
[root@localhost ~]#
```