Points to be Covered in Linux Assignment-1

- Explain CLI & GUI
- Login Terminals
- Explain Files & Directory
- Basic Commands
  - ls, cd, mkdir, rm, man, touch, cp, mv, less, more, head, tail, grep with options.
- File Editors
  - vi, vim, nano, gedit.
- Links
  - Softlink & Hardlink.
- Paths
  - Absolute Path & Relative Path.
- Redirections
  - I/O Redirection Operators.(>, >>, &> , &>>)

Assignment-1 Questions:

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

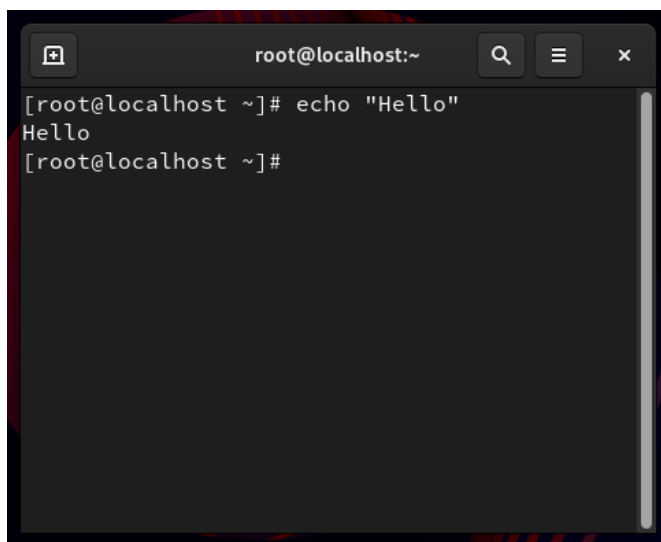1. What does CLI stand for, and how does it differ from GUI?

Ans. CLI (Command-Line Interface):- A text-based interface where users interact with the computer by typing commands into a console or terminal. Ex:- Command Prompt (Windows), Terminal (Linux/macOS).
     GUI (Graphical User Interface):- A visual interface where users interact with the system using graphical elements like buttons, icons, and menus. Ex:- Windows OS, macOS, Android, iOS.

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 a CLI compared to a GUI?

Ans. Using a text editor we can perform similar action in GUI and the advantages of using a CLI compared to a GUI are: 1. Speed and efficiency

2. Scripting and Automation

3. Greater Control

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

Ans. 1. X Window System (Display Server): This foundational layer manages graphical display output and input devices.

2. Display Manager: This handles user logins and starts the graphical session. Lightweight options include LightDM and SLiM.

3. Desktop Environment: This provides the graphical interface elements like windows, panels, and system menus.

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. Terminals are user interfaces that allow interaction with the Linux operating system by entering commands.

Most Linux distributions, including RHEL, support 6 virtual text-based terminals (TTYs) by default.
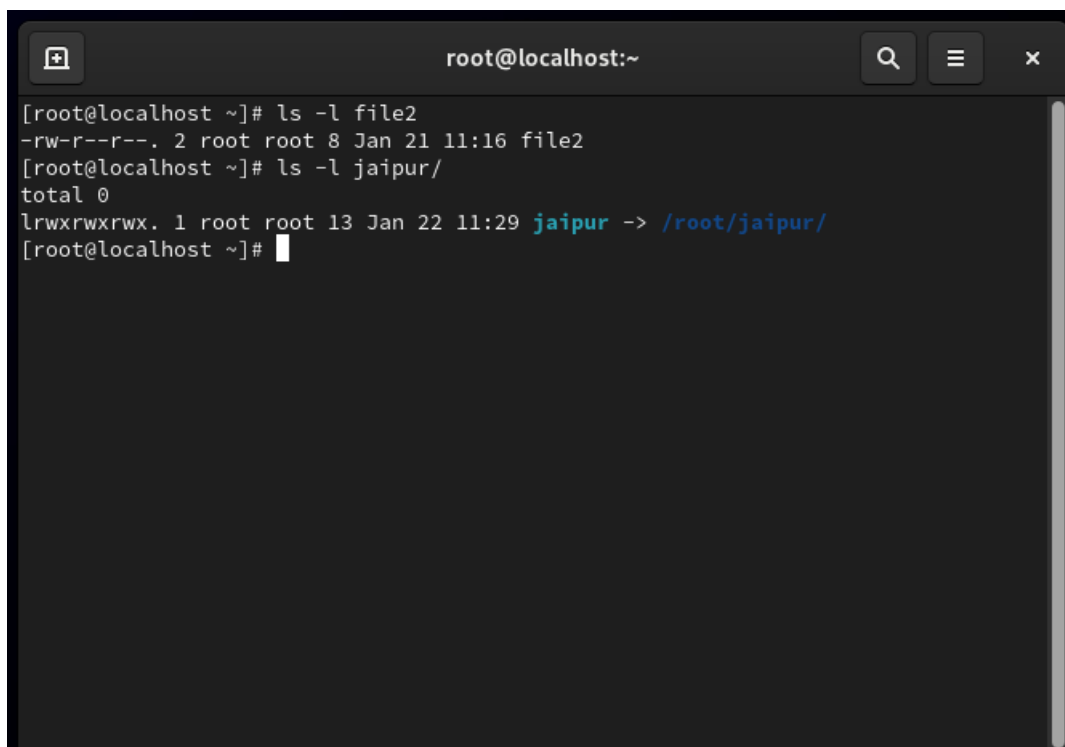
5. Write the commands to check a file and a directory in a long listing format. How can you determine whether it is a file or a directory?

Ans. Ex:- ls -l myfile.txt

-rw-r--r-- 1 user group 1024 Jan 22 14:30 myfile.txt

ls -l mydirectory/

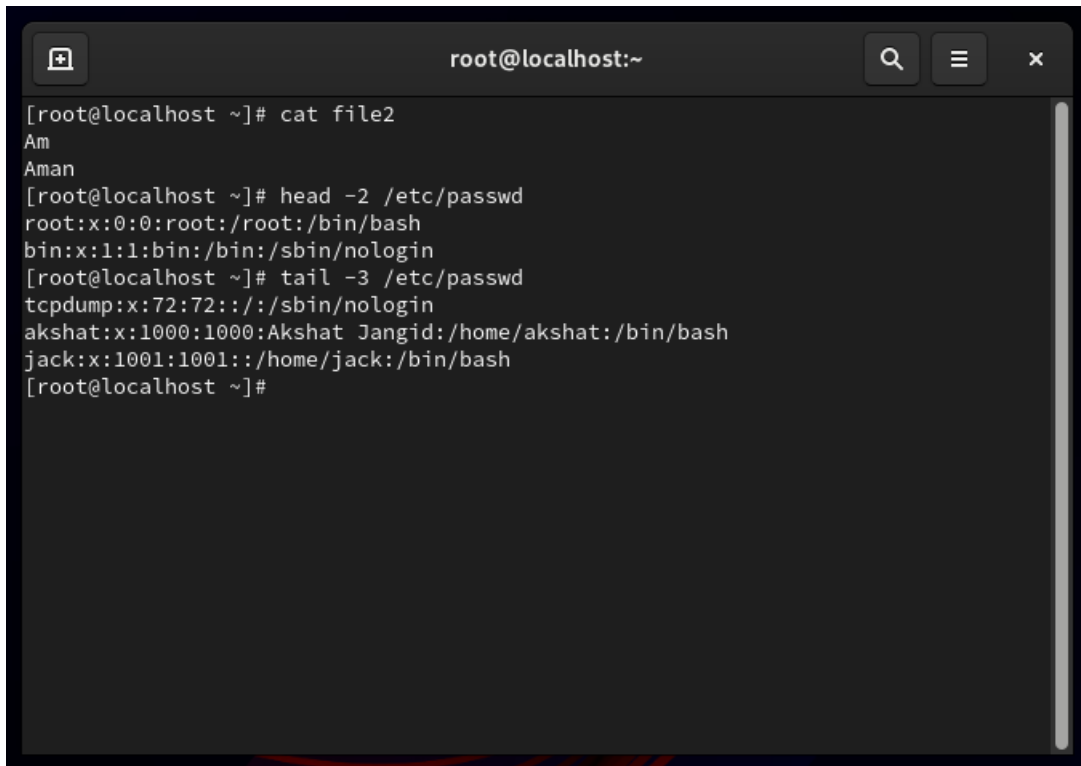drwxr-xr-x 2 user group 4096 Jan 22 14:30 mydirectory

```
root@localhost:~

[root@localhost ~]# ls -l file2
-rw-r--r--. 2 root root 8 Jan 21 11:16 file2
[root@localhost ~]# ls -l jaipur/
total 0
lrwxrwxrwx. 1 root root 13 Jan 22 11:29 jaipur -> /root/jaipur/
[root@localhost ~]#
```

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

Ans. cat (Concatenate): Displays the entire content of a file.

head: Displays the first few lines (default is 10) of a file.

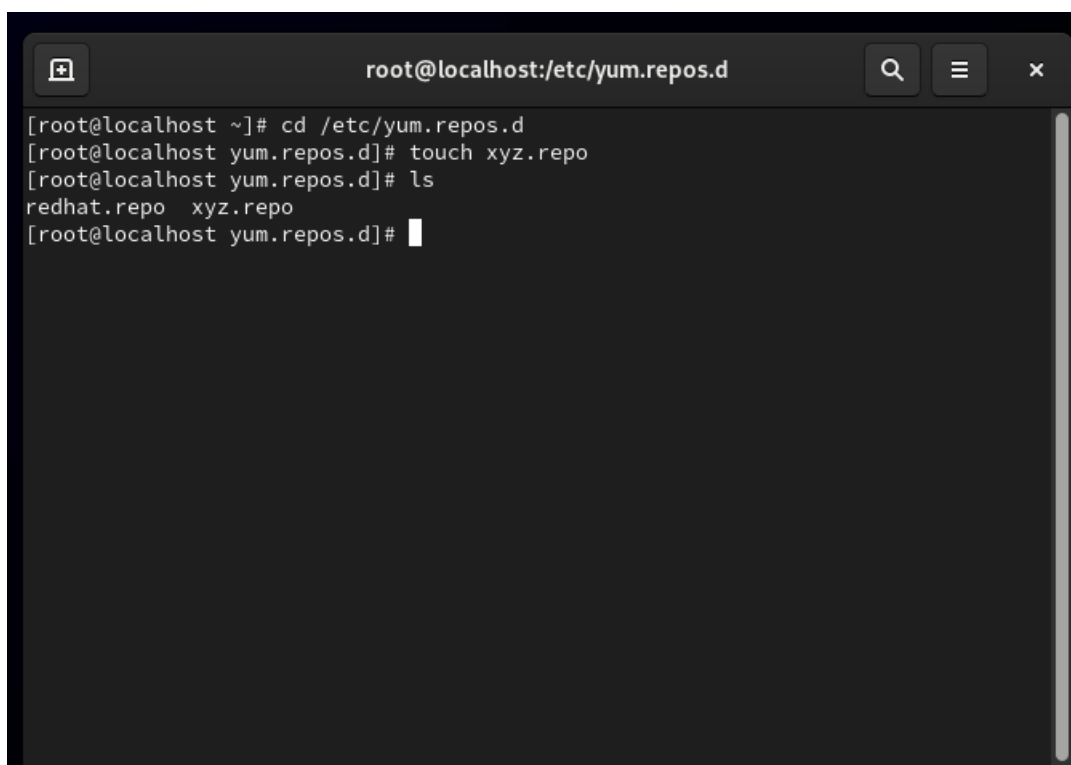Tail: Displays the last few lines (default is 10) of a file.

```
[root@localhost ~]# cat file2
Am
Aman
[root@localhost ~]# head -2 /etc/passwd
root:x:0:0:root:/root:/bin/bash
bin:x:1:1:bin:/bin:/sbin/nologin
[root@localhost ~]# tail -3 /etc/passwd
tcpdump:x:72:72::/:/sbin/nologin
akshat:x:1000:1000:Akshat Jangid:/home/akshat:/bin/bash
jack:x:1001:1001::/home/jack:/bin/bash
[root@localhost ~]#
```

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

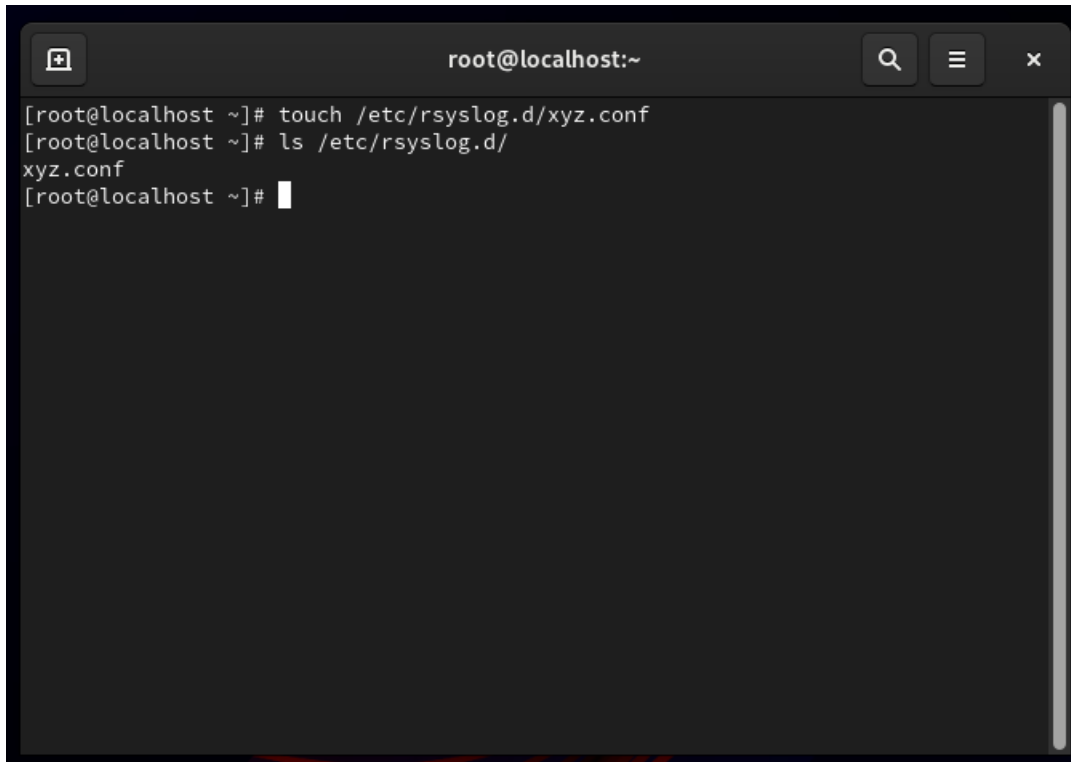   a. Using the relative path method, create a file named **xyz.repo** under **the /etc/yum.repos.d/** directory.

   Sol.

```
[root@localhost ~]# cd /etc/yum.repos.d
[root@localhost yum.repos.d]# touch xyz.repo
[root@localhost yum.repos.d]# ls
redhat.repo  xyz.repo
[root@localhost yum.repos.d]#
```

b. Using the absolute path method, create a file named **xyz.conf** under the **/etc/rsyslog.d/** directory.

Sol.

```
root@localhost:~
[root@localhost ~]# touch /etc/rsyslog.d/xyz.conf
[root@localhost ~]# ls /etc/rsyslog.d/
xyz.conf
[root@localhost ~]#
```

c. What differences did you observe between using a relative path and an absolute path?
Ans.

Aspect	Relative Path	Absolute Path
Definition	Specifies the path relative to the current working directory.	Specifies the full path from the root (/) directory.
Usage	Depends on your current working directory (pwd).	Independent of the current working directory.
Flexibility	Convenient for operations within a specific directory.	Suitable for global operations and scripts.
Examples	touch xyz.repo when in /etc/yum.repos.d.	touch /etc/rsyslog.d/xyz.conf from any location.

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:~

[root@localhost ~]# ls -la /usr/bin/ > /mnt/output.txt
[root@localhost ~]# ls -l /mnt/output.txt
-rw-r--r--. 1 root root 94262 Jan 23 23:03 /mnt/output.txt
[root@localhost ~]# cat /mnt/output.txt
total 200632
dr-xr-xr-x.  2 root root     49152 Jan 20 12:12 .
drwxr-xr-x. 12 root root       144 Jan 20 12:09 ..
-rwxr-xr-x.  1 root root     52856 Jan  6  2023 [
-rwxr-xr-x.  1 root root     33416 Nov  1  2021 ac
-rwxr-xr-x.  1 root root     23808 May 17  2023 aconnect
-rwxr-xr-x.  1 root root     28408 Apr 26  2023 addr2line
-rwxr-xr-x.  1 root root    154416 Aug 11  2021 airscan-discover
-rwxr-xr-x.  1 root root        33 Nov 24  2022 alias
-rwxr-xr-x.  1 root root     86728 May 17  2023 alsaloop
-rwxr-xr-x.  1 root root     83920 May 17  2023 alsamixer
-rwxr-xr-x.  1 root root       127 May 17  2023 alsaunmute
-rwxr-xr-x.  1 root root     31968 May 17  2023 amidi
-rwxr-xr-x.  1 root root     61064 May 17  2023 amixer
-rwxr-xr-x.  1 root root     85640 May 17  2023 aplay
-rwxr-xr-x.  1 root root     27904 May 17  2023 aplaymidi
-rwxr-xr-x.  1 root root    155880 Apr 25  2023 appstreamcli
-rwxr-xr-x.  1 root root     32616 Aug 10  2021 appstream-compose
-rwxr-xr-x.  1 root root    119848 Aug 10  2021 appstream-util
lrwxrwxrwx.  1 root root        25 Jan 20 12:12 apropos -> /etc/alternatives/apropo
s
lrwxrwxrwx.  1 root root         6 Sep 20  2022 apropos.man-db -> whatis
-rwxr-xr-x.  1 root root     57328 Apr 26  2023 ar
-rwxr-xr-x.  1 root root     32224 Jan  6  2023 arch
lrwxrwxrwx.  1 root root         5 May 17  2023 arecord -> aplay
-rwxr-xr-x.  1 root root     32056 May 17  2023 arecordmidi
-rwxr-xr-x.  1 root root     15464 Sep 20  2023 arpaname
-rwxr-xr-x.  1 root root     27896 Jun  8  2023 arping
-rwxr-xr-x.  1 root root    727376 Apr 26  2023 as
```

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.
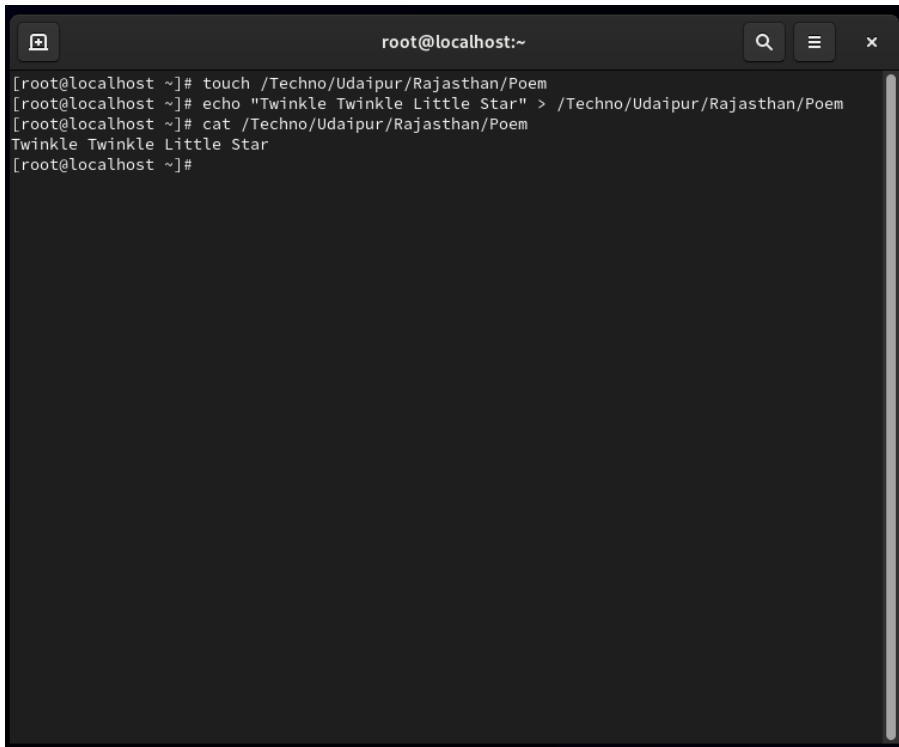
Ans.

```
root@localhost:~

[root@localhost ~]# mkdir -p /Techno/Udaipur/Rajasthan/India/Asia/Earth/Solar
[root@localhost ~]# ls -lr /Techno
total 0
drwxr-xr-x. 3 root root 23 Jan 23 23:08 Udaipur
[root@localhost ~]# tree /Techno
/Techno
└── Udaipur
    └── Rajasthan
        └── India
            └── Asia
                └── Earth
                    └── Solar

6 directories, 0 files
[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.
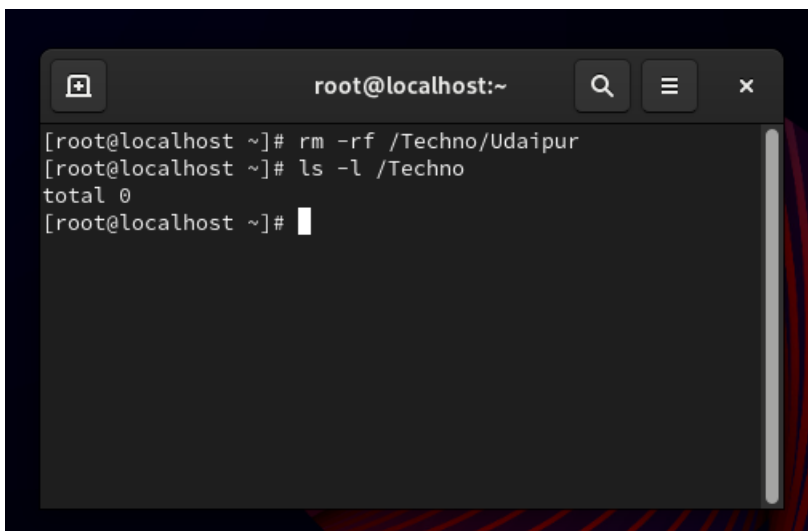
Ans.

```
[root@localhost ~]# touch /Techno/Udaipur/Rajasthan/Poem
[root@localhost ~]# echo "Twinkle Twinkle Little Star" > /Techno/Udaipur/Rajasthan/Poem
[root@localhost ~]# cat /Techno/Udaipur/Rajasthan/Poem
Twinkle Twinkle Little Star
[root@localhost ~]#
```

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

Ans.

```
[root@localhost ~]# rm -rf /Techno/Udaipur
[root@localhost ~]# ls -l /Techno
total 0
[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

Important Files for User Administration (from the Manual):

The exact files may vary depending on your system, but typically include:

1. /etc/passwd:

Contains user account information such as username, UID, GID, and home directory.

2. /etc/shadow:

   Stores encrypted user passwords and additional password-related information, such as expiration dates.

3. /etc/group:

   Contains group account information, including group names, GIDs, and member users.

4. /etc/default/useradd:

   Specifies the default configuration settings for new users, such as default shell and home directory base.
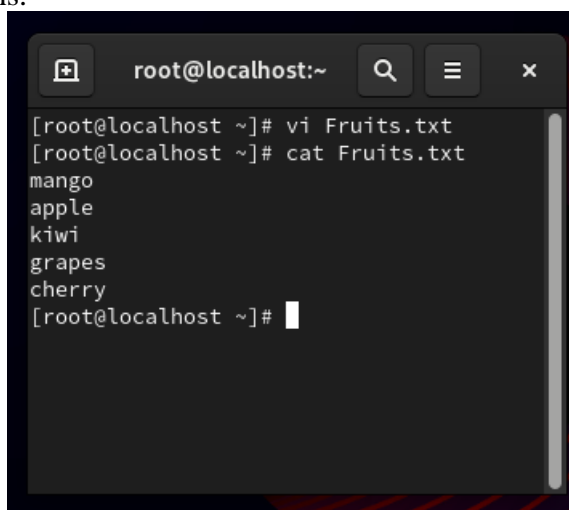
5. /etc/skel/:

   A directory containing default files (e.g., .bashrc, .profile) that are copied to the home directory of new users.

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**).

   Ans.

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

   Ans.

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

   Ans.

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.

15. Rename the **file "Vegetrian.txt"** to **"Veg.txt".** Write the command.
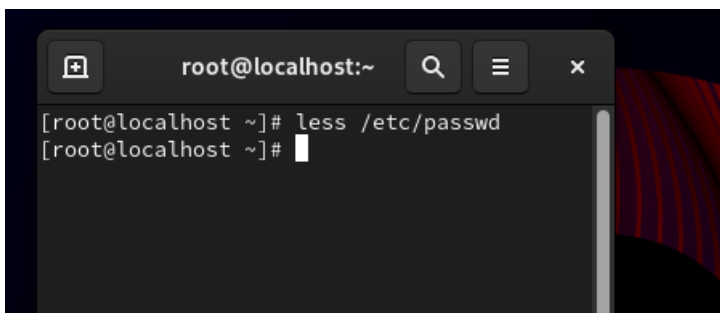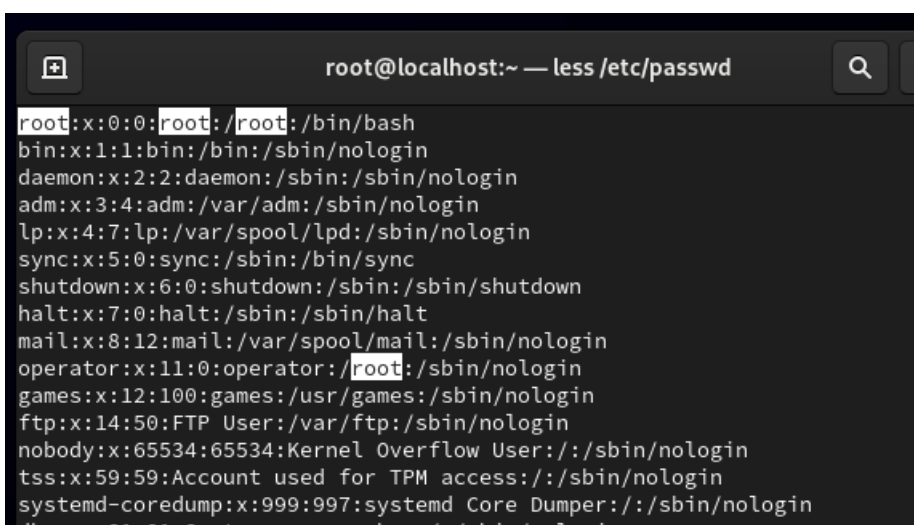
Ans.

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

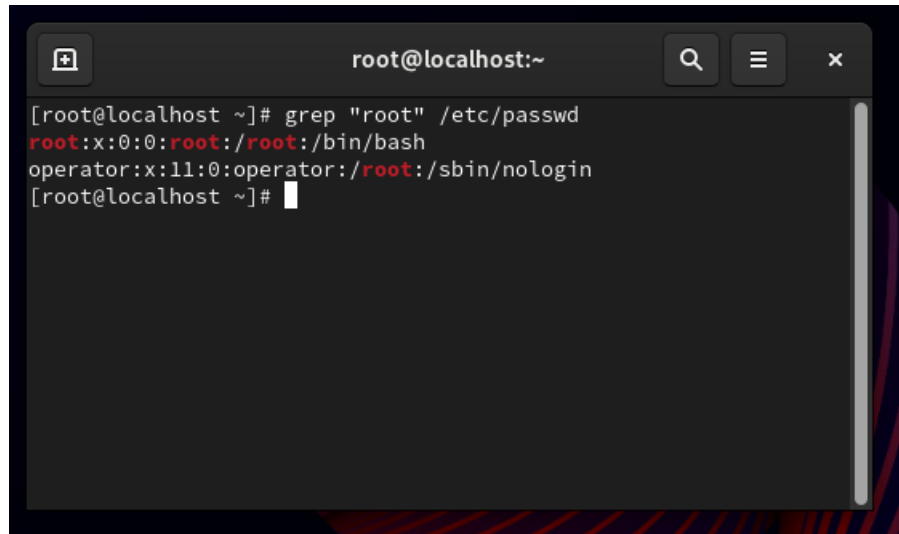   a.   Search for the text "**Root**" using the less command.

    Ans.

    b.   Search for the word "**root**" using the grep command.

    Ans.

```
[root@localhost ~]# grep "root" /etc/passwd
root:x:0:0:root:/root:/bin/bash
operator:x:11:0:operator:/root:/sbin/nologin
[root@localhost ~]#
```

c. What is the use difference between more and less commands?
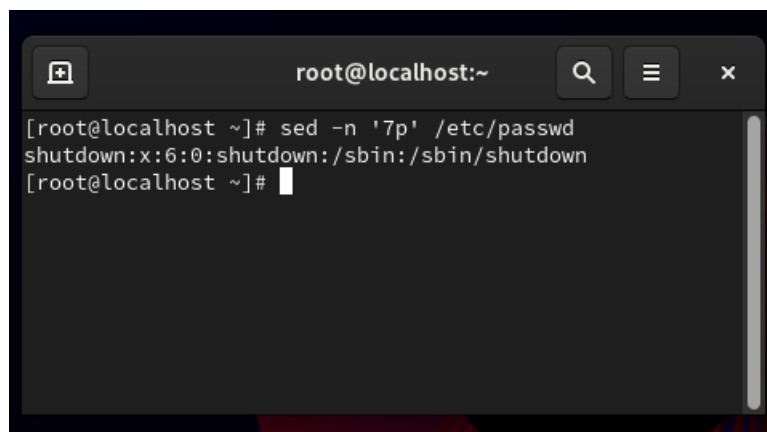
Ans. less: We can scroll both up and down, search for patterns, and navigate freely.

more: Primarily for scrolling down through files, with limited navigation features.

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

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

Ans.


```
[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 ~]# tail -n 3 /etc/group
tcpdump:x:72:
akshat:x:1000:
jack:x:1001:
[root@localhost ~]#
```

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

Ans.

```
root@localhost:~                    Q  ≡  ×

[root@localhost ~]# sed -n '11,15p' /etc/shadow
games:*:19347:0:99999:7:::
ftp:*:19347:0:99999:7:::
nobody:*:19347:0:99999:7:::
tss:!!:20108::::::
systemd-coredump:!!:20108::::::
[root@localhost ~]#
```

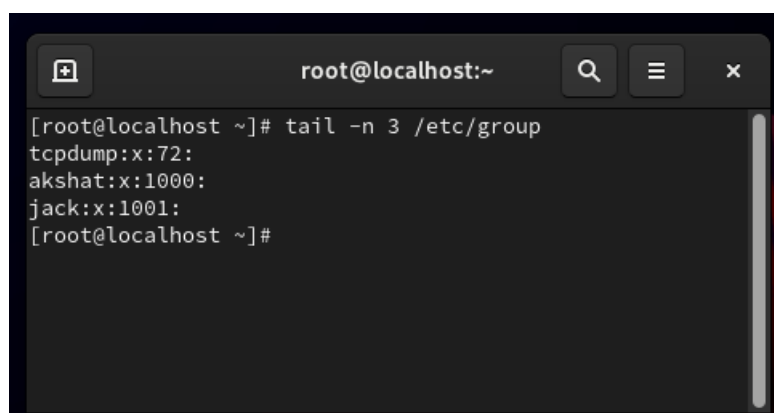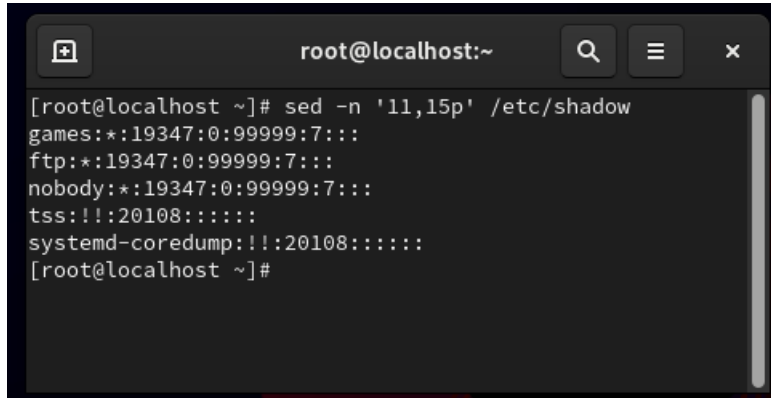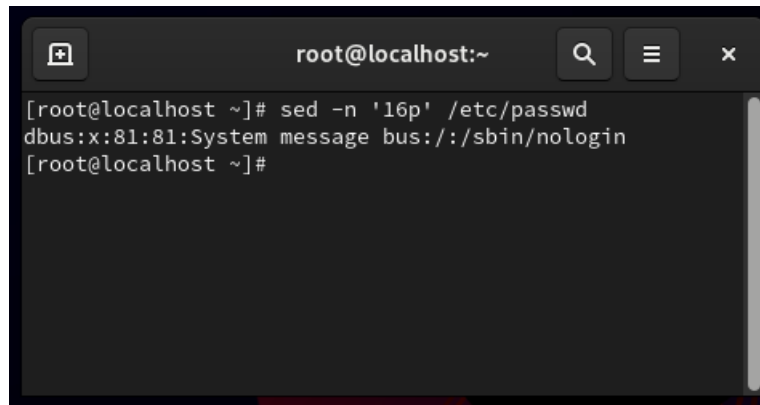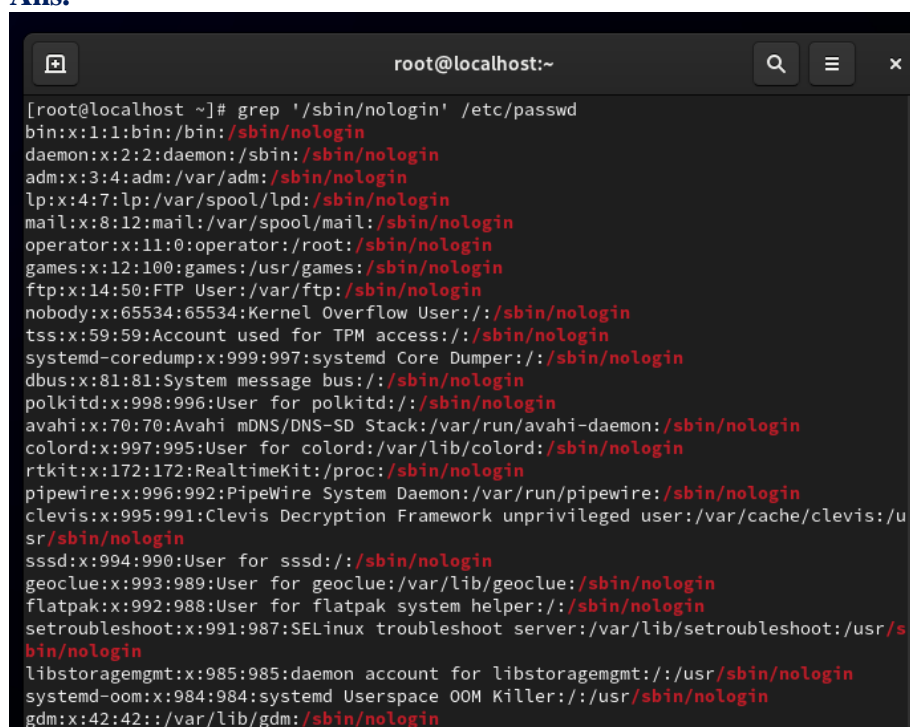d. Display **only the 16th** line of the /etc/passwd file.

Ans.

```
root@localhost:~                    Q  ≡  ×

[root@localhost ~]# sed -n '16p' /etc/passwd
dbus:x:81:81:System message bus:/:/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.

```
root@localhost:~                                              Q  ≡  ×

[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
tss:x:59:59:Account used for TPM access:/:/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
colord:x:997:995:User for colord:/var/lib/colord:/sbin/nologin
rtkit:x:172:172:RealtimeKit:/proc:/sbin/nologin
pipewire:x:996:992:PipeWire System Daemon:/var/run/pipewire:/sbin/nologin
clevis:x:995:991:Clevis Decryption Framework unprivileged user:/var/cache/clevis:/u
sr/sbin/nologin
sssd:x:994:990:User for sssd:/:/sbin/nologin
geoclue:x:993:989:User for geoclue:/var/lib/geoclue:/sbin/nologin
flatpak:x:992:988:User for flatpak system helper:/:/sbin/nologin
setroubleshoot:x:991:987:SELinux troubleshoot server:/var/lib/setroubleshoot:/usr/s
bin/nologin
libstoragemgmt:x:985:985:daemon account for libstoragemgmt:/:/usr/sbin/nologin
systemd-oom:x:984:984:systemd Userspace OOM Killer:/:/usr/sbin/nologin
gdm:x:42:42::/var/lib/gdm:/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 loosing data.

Ans.

```
[root@localhost ~]# grep -i -e 'root' -e 'sbin' -e '/home' /etc/passwd >> /root/test
[root@localhost ~]# cat /root/test
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
tss:x:59:59:Account used for TPM access:/:/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
colord:x:997:995:User for colord:/var/lib/colord:/sbin/nologin
rtkit:x:172:172:RealtimeKit:/proc:/sbin/nologin
pipewire:x:996:992:PipeWire System Daemon:/var/run/pipewire:/sbin/nologin
clevis:x:995:991:Clevis Decryption Framework unprivileged user:/var/cache/clevis:/usr/sbin/nologi
sssd:x:994:990:User for sssd:/:/sbin/nologin
geoclue:x:993:989:User for geoclue:/var/lib/geoclue:/sbin/nologin
flatpak:x:992:988:User for flatpak system helper:/:/sbin/nologin
setroubleshoot:x:991:987:SELinux troubleshoot server:/var/lib/setroubleshoot:/usr/sbin/nologin
libstoragemgmt:x:985:985:daemon account for libstoragemgmt:/:/usr/sbin/nologin
```
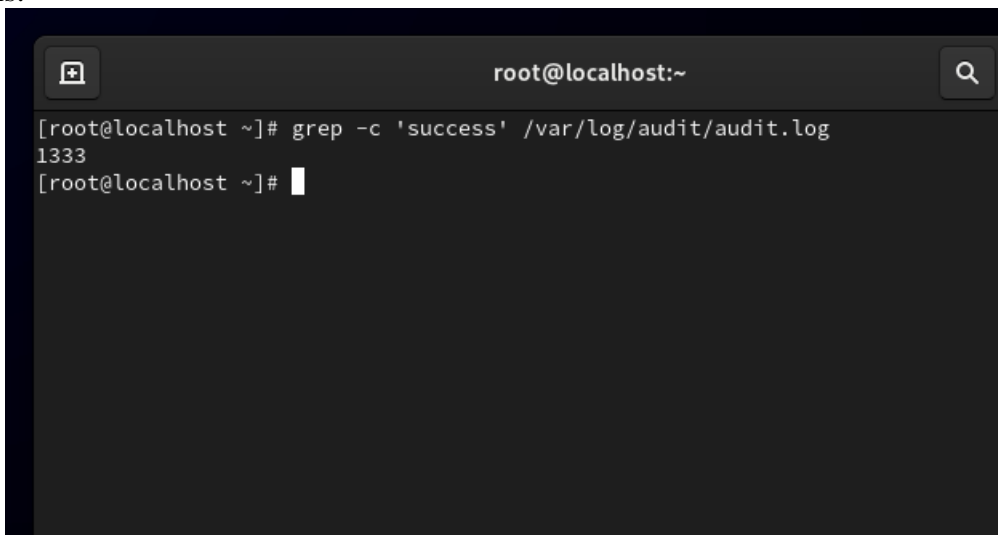
19. Replace Text Using **sed** Linux Commands
    a. Write the command to replace the word **localhost** with **localhost.localhost** in the file **/etc/hosts** without opening the file in an editor.

    Ans.

```
[root@localhost ~]# sed -i 's/localhost/localhost.localhost/g' /etc/hosts
[root@localhost ~]# cat /etc/hosts
127.0.0.1   localhost.localhost.localhost.localhost localhost.localhost.localhost.loc
alhost.localdomain localhost.localhost.localhost.localhost4 localhost.localhost.local
host.localhost4.localdomain4
::1         localhost.localhost.localhost.localhost localhost.localhost.localhost.loc
alhost.localdomain localhost.localhost.localhost.localhost6 localhost.localhost.local
host.localhost6.localdomain6
[root@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.
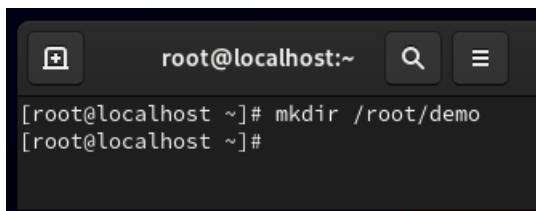
Ans.

```
[root@localhost ~]# grep -c 'success' /var/log/audit/audit.log
1333
[root@localhost ~]# ▮
```
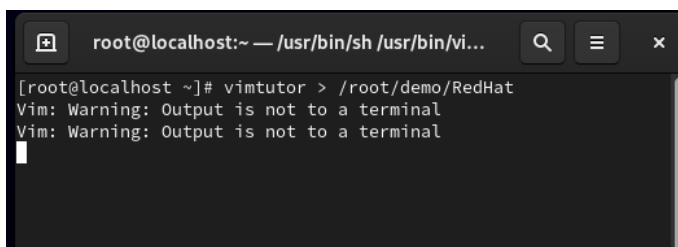
20. Create a directory named "**demo**" on "**/root**".

    a. Create a file "**RedHat**" under the "demo" directory.
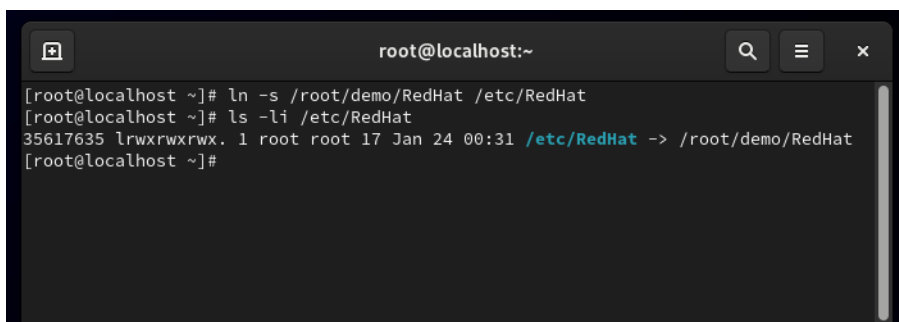
```
[root@localhost ~]# mkdir /root/demo
[root@localhost ~]#
```

    b. Run the command "**vimtutor**" and save the output to the "RedHat" file.

```
[root@localhost ~]# vimtutor > /root/demo/RedHat
Vim: Warning: Output is not to a terminal
Vim: Warning: Output is not to a terminal
▮
```
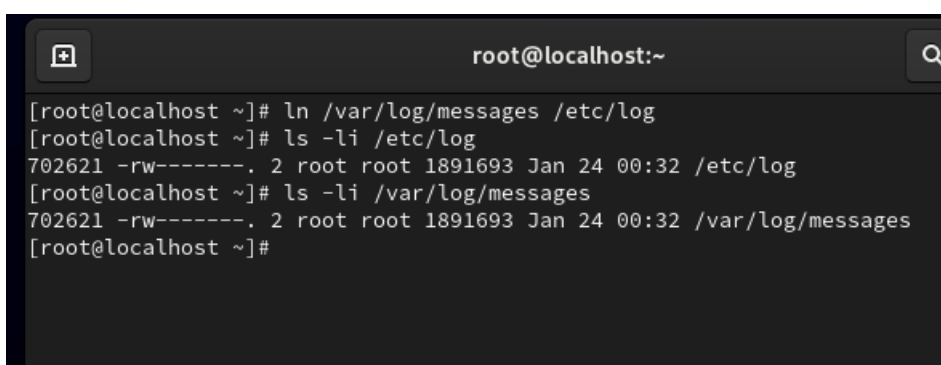
    c. Now create a soft link of "RedHat" to "/etc/" location.

```
[root@localhost ~]# ln -s /root/demo/RedHat /etc/RedHat
[root@localhost ~]# ls -li /etc/RedHat
35617635 lrwxrwxrwx. 1 root root 17 Jan 24 00:31 /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 -li /etc/log
702621 -rw-------. 2 root root 1891693 Jan 24 00:32 /etc/log
[root@localhost ~]# ls -li /var/log/messages
702621 -rw-------. 2 root root 1891693 Jan 24 00:32 /var/log/messages
[root@localhost ~]#
```