

Experiment 2: Linux File Systems, Permissions, and Essential Commands

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Aim:

- To understand the structure of Linux file systems.
- To learn and practice essential navigation and file management commands.
- To explore file permissions and ownership, and manage them using Linux commands.
- To use user management, system information commands, and editing tools.
- To solve practical exercises and tasks for mastering Linux basics.

Requirements

- A Linux machine (Ubuntu/Debian/Linux Mint or similar).
 - User privileges to create, modify, and delete files.
 - Access to terminal and text editors like **nano** or **vim**.
-

Theory

Linux uses a hierarchical file system starting from the root /. Essential directories include **/home**, **/etc**, **/usr**, **/var**, **/bin**, and **/tmp**. File permissions are divided among **owner**, **group**, and **others**, with actions **r** (read), **w** (write), and **x** (execute). Navigation commands like **ls**, **pwd**, **cd**, and file operations (**cp**, **mv**, **rm**) form the basis of Linux usage. Editors (**nano**, **vim**) and commands for system info (**uname**, **df**, **top**, **history**) provide insights and control. Practice tasks build practical confidence.

Procedure & Observations

Section 1: File Systems and Permissions

We learned how Linux organizes directories, how to view and change file permissions using **chmod**, **chown**, and **chgrp**.

Section 2: Navigation and File Operations

Commands like **ls**, **pwd**, **cd**, **mkdir**, **rmdir**, **touch**, **cp**, **mv**, **rm** were practiced to manage files and directories.

Section 3: File Viewing and Editing

We used **cat**, **less**, **head**, **tail** to view file contents, and practiced editing with **nano** and **vim**.

Section 4: User Management

Commands `whoami`, `who`, `passwd`, `sudo` were practiced to understand users and privileges.

Section 5: System Information

Commands like `uname`, `df`, `top`, `htop`, `history` were used to gather system and process information.

Section 6: Practice Exercises

Hands-on practice included navigation, file operations, text editing, system exploration, and cleanup.

Practice Exercises

Exercise 1: File System Navigation

```
cd
pwd
mkdir -p projects/linux_practice/{scripts,documents,backup}
cd projects/linux_practice/scripts
touch setup.sh cleanup.sh readme.txt
ls -la
cd ..
ls -la
```

Output:

Exercise 2: File Operations and Permissions

```
cd ~/projects/linux_practice/documents
echo "This is a practice document" > practice.txt
ls -l practice.txt
chmod 644 practice.txt
cp practice.txt ../backup/
cp practice.txt ../backup/practice_backup_$(date +%Y%m%d).txt
ls -la ../backup/
```

Output:

```
sartaj@sartajpc: ~/projects/lu x + v - □ x
sartaj@sartajpc:~$ cd
sartaj@sartajpc:~$ pwd
/home/sartaj
sartaj@sartajpc:~$ mkdir -p projects/linux_practice/{scripts,documents,backup}
sartaj@sartajpc:~$ cd projects/linux_practice/scripts
sartaj@sartajpc:~/projects/linux_practice/scripts$ touch setup.sh cleanup.sh readme.txt
sartaj@sartajpc:~/projects/linux_practice/scripts$ ls -la
total 8
drwxr-xr-x 2 sartaj sartaj 4096 Nov  3 16:11 .
drwxr-xr-x 5 sartaj sartaj 4096 Nov  3 16:11 ..
-rw-r--r-- 1 sartaj sartaj  0 Nov  3 16:11 cleanup.sh
-rw-r--r-- 1 sartaj sartaj  0 Nov  3 16:11 readme.txt
-rw-r--r-- 1 sartaj sartaj  0 Nov  3 16:11 setup.sh
sartaj@sartajpc:~/projects/linux_practice/scripts$ cd ..
sartaj@sartajpc:~/projects/linux_practice$ ls -la
total 20
drwxr-xr-x 5 sartaj sartaj 4096 Nov  3 16:11 .
drwxr-xr-x 3 sartaj sartaj 4096 Nov  3 16:11 ..
drwxr-xr-x 2 sartaj sartaj 4096 Nov  3 16:11 backup
drwxr-xr-x 2 sartaj sartaj 4096 Nov  3 16:11 documents
drwxr-xr-x 2 sartaj sartaj 4096 Nov  3 16:11 scripts
sartaj@sartajpc:~/projects/linux_practice$
```

Figure 1: exp2_ex1

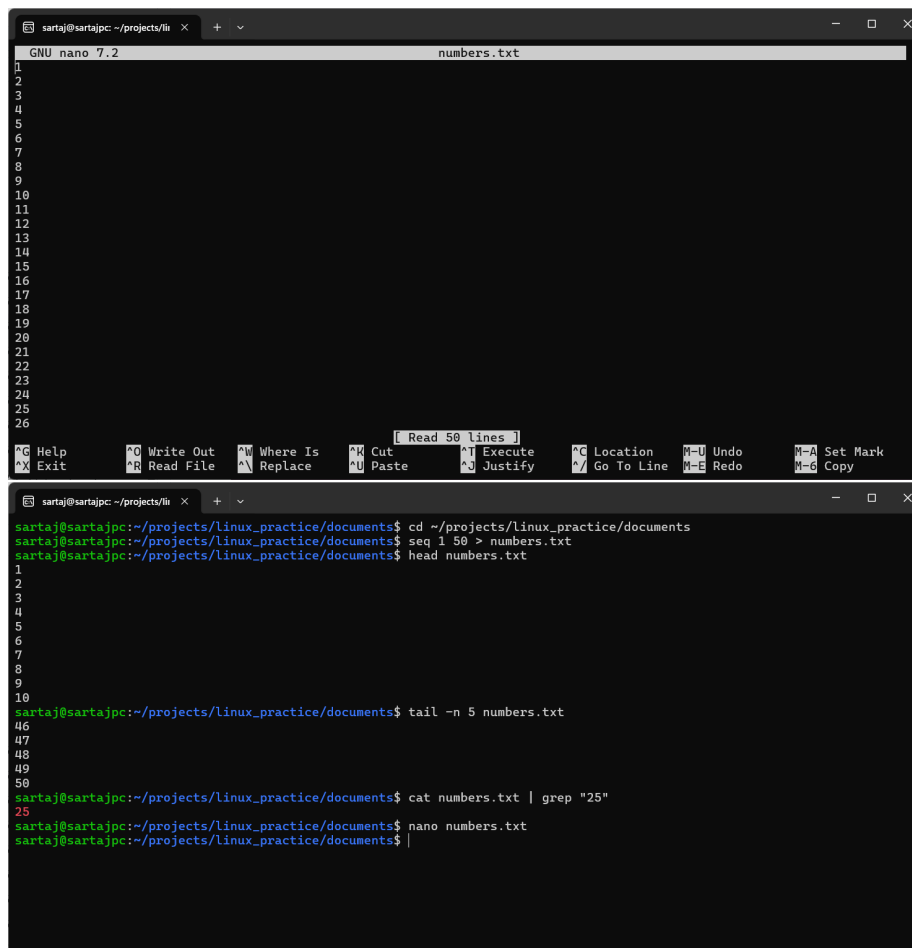
```
sartaj@sartajpc: ~/projects/lu x + v - □ x
sartaj@sartajpc:~$ cd ~/projects/linux_practice/documents
sartaj@sartajpc:~/projects/linux_practice/documents$ echo "This is a practice document" > practice.txt
sartaj@sartajpc:~/projects/linux_practice/documents$ ls -l practice.txt
-rw-r--r-- 1 sartaj sartaj 28 Nov  3 16:29 practice.txt
sartaj@sartajpc:~/projects/linux_practice/documents$ chmod 644 practice.txt
sartaj@sartajpc:~/projects/linux_practice/documents$ cp practice.txt ../backup/
sartaj@sartajpc:~/projects/linux_practice/documents$ cp practice.txt ../backup/practice_backup_$(date +%Y%m%d).txt
sartaj@sartajpc:~/projects/linux_practice/documents$ ls -la ../backup/
total 16
drwxr-xr-x 2 sartaj sartaj 4096 Nov  3 16:30 .
drwxr-xr-x 5 sartaj sartaj 4096 Nov  3 16:11 ..
-rw-r--r-- 1 sartaj sartaj 28 Nov  3 16:30 practice.txt
-rw-r--r-- 1 sartaj sartaj 28 Nov  3 16:30 practice_backup_20251103.txt
sartaj@sartajpc:~/projects/linux_practice/documents$ |
```

Figure 2: exp2_ex2

Exercise 3: Text Editing and Viewing

```
cd ~/projects/linux_practice/documents
seq 1 50 > numbers.txt
head numbers.txt
tail -n 5 numbers.txt
cat numbers.txt | grep "25"
nano numbers.txt
cat numbers.txt
```

Output:



```
sartaj@sartajpc: ~/projects/linux_practice/documents
GNU nano 7.2 numbers.txt
1
2
3
4
5
6
7
8
9
10
11
12
13
14
15
16
17
18
19
20
21
22
23
24
25
26
[ Read 50 lines ]
Help Write Out Where Is Cut Execute Location Undo Set Mark
Exit Read File Replace Paste Justify Go To Line Redo Copy

sartaj@sartajpc:~/projects/linux_practice/documents$ cd ~/projects/linux_practice/documents
sartaj@sartajpc:~/projects/linux_practice/documents$ seq 1 50 > numbers.txt
sartaj@sartajpc:~/projects/linux_practice/documents$ head numbers.txt
1
2
3
4
5
6
7
8
9
10
sartaj@sartajpc:~/projects/linux_practice/documents$ tail -n 5 numbers.txt
46
47
48
49
50
sartaj@sartajpc:~/projects/linux_practice/documents$ cat numbers.txt | grep "25"
25
sartaj@sartajpc:~/projects/linux_practice/documents$ nano numbers.txt
sartaj@sartajpc:~/projects/linux_practice/documents$ cat numbers.txt
```

```
sartaj@sartajpc: ~/projects/fin
25 sartaj@sartajpc:~/projects/linux_practice/documents$ nano numbers.txt
sartaj@sartajpc:~/projects/linux_practice/documents$ cat numbers.txt
1
2
3
4
5
6
7
8
9
10
11
12
13
14
15
16
17
18
19
20
21
22
23
24
25
26
27

sartaj@sartajpc: ~
sartaj@sartajpc:~$ uname -a
Linux sartajpc 6.6.87.2-microsoft-standard-WSL2 #1 SMP PREEMPT_DYNAMIC Thu Jun  5 18:30:46 UTC 2025 x86_64 x86_64 x86_64
GNU/Linux
sartaj@sartajpc:~$ df -h
Filesystem      Size  Used Avail Use% Mounted on
none            1.9G   0 1.9G   0% /usr/lib/modules/6.6.87.2-microsoft-standard-WSL2
none            1.9G 4.0K 1.9G   1% /mnt/wsl
drivers          427G 285G 143G  67% /usr/lib/wsl/drivers
/dev/sdd        1007G  1.7G 954G   1% /
none            1.9G  84K 1.9G   1% /mnt/wslg
none            1.9G   0 1.9G   0% /usr/lib/wsl/lib
rootfs          1.9G 2.7M 1.9G   1% /init
none            1.9G 548K 1.9G   1% /run
none            1.9G   0 1.9G   0% /run/lock
none            1.9G   0 1.9G   0% /run/shm
none            1.9G 76K 1.9G   1% /mnt/wslg/versions.txt
none            1.9G 76K 1.9G   1% /mnt/wslg/doc
C:\             427G 285G 143G  67% /mnt/c
D:\             49G  21G  29G  42% /mnt/d
tmpfs           1.9G 16K 1.9G   1% /run/user/1000
sartaj@sartajpc:~$ history 10
80 tail -n 5 numbers.txt
81 cat numbers.txt | grep "25"
82 nano numbers.txt
83 cat numbers.txt
84 clear
85 cd
86 clear
87 uname -a
88 df -h
```

Exercise 4: System Exploration

```
uname -a
df -h
history 10
who
whoami
top
```

Output:

```
sartaj@sartajpc: ~
top - 16:33:48 up 25 min, 1 user, load average: 0.03, 0.03, 0.00
Tasks: 23 total, 1 running, 22 sleeping, 0 stopped, 0 zombie
%Cpu(s): 0.0 us, 1.8 sy, 0.0 ni, 98.2 id, 0.0 wa, 0.0 hi, 0.0 si, 0.0 st
MiB Mem : 3748.2 total, 3254.5 free, 436.7 used, 132.1 buff/cache
MiB Swap: 1824.0 total, 1824.0 free, 0.0 used, 3311.5 avail Mem

  PID USER      PR  NI    VIRT    RES    SHR S  %CPU  %MEM    TIME+  COMMAND
  1 root        20   0   21568   12080   9136 S   0.0   0.3   0:01.09 systemd
  2 root        20   0    3060    1664    1664 S   0.0   0.0   0:00.01 init-systemd(Ub
  7 root        20   0    3076    1792    1792 S   0.0   0.0   0:00.00 init
 53 root        19  -1   66812   18748   17852 S   0.0   0.5   0:00.67 systemd-journal
101 root        20   0   25268    6400    4864 S   0.0   0.2   0:00.74 systemd-udev
117 systemd+    20   0   21452   12672   10496 S   0.0   0.3   0:00.17 systemd-resolve
121 systemd+    20   0   91020    7680    6784 S   0.0   0.2   0:00.18 systemd-timesyn
166 root        20   0    4236    2432    2304 S   0.0   0.1   0:00.04 cron
167 message+    20   0    9632    4736    4352 S   0.0   0.1   0:00.14 dbus-daemon
180 root        20   0   17964    8448    7552 S   0.0   0.2   0:00.13 systemd-logind
182 root        20   0   1756096   12032   10112 S   0.0   0.3   0:00.43 wsl-pro-service
202 syslog      20   0   222508    5504    4352 S   0.0   0.1   0:00.14 rsyslogd
204 root        20   0    3160    1920    1792 S   0.0   0.1   0:00.01agetty
207 root        20   0    3116    1792    1664 S   0.0   0.0   0:00.01agetty
214 root        20   0   107024   22400   13056 S   0.0   0.6   0:00.13 unattended-upgr
318 root        20   0    3064     896     896 S   0.0   0.0   0:00.00 SessionLeader
319 root        20   0    3080    1024    1024 S   0.0   0.0   0:00.11 Relay(320)
320 sartaj      20   0    6072    5120    3456 S   0.0   0.1   0:00.29 bash
321 root        20   0    6696    4352    3712 S   0.0   0.1   0:00.01 login
412 sartaj      20   0   20296   11392    9244 S   0.0   0.3   0:00.17 systemd
413 sartaj      20   0   21148    3520    1792 S   0.0   0.1   0:00.00 (sd-pam)
426 sartaj      20   0    6056    5248    3584 S   0.0   0.1   0:00.01 bash
718 sartaj      20   0    9272    5120   3072 R   0.0   0.1   0:00.05 top

  none      1.9G   0 1.9G   0% /run/shm
  none      1.9G 76K 1.9G   1% /mnt/wslg/versions.txt
  none      1.9G 76K 1.9G   1% /mnt/wslg/doc
  C:\       427G 285G 143G 67% /mnt/c
  D:\       49G 21G 29G 42% /mnt/d
  tmpfs     1.9G 16K 1.9G   1% /run/user/1000

sartaj@sartajpc:~$ history 10
80 tail -n 5 numbers.txt
81 cat numbers.txt | grep "25"
82 nano numbers.txt
83 cat numbers.txt
84 clear
85 cd
86 clear
87 uname -a
88 df -h
89 history 10

sartaj@sartajpc:~$ who
sartaj pts/1 2025-11-03 16:09
sartaj@sartajpc:~$ whoami
sartaj
sartaj@sartajpc:~$ top
top - 16:33:52 up 25 min, 1 user, load average: 0.03, 0.03, 0.00
Tasks: 23 total, 1 running, 22 sleeping, 0 stopped, 0 zombie
%Cpu(s): 0.0 us, 0.0 sy, 0.0 ni,100.0 id, 0.0 wa, 0.0 hi, 0.0 si, 0.0 st
MiB Mem : 3748.2 total, 3254.0 free, 437.0 used, 132.3 buff/cache
MiB Swap: 1824.0 total, 1824.0 free, 0.0 used, 3311.2 avail Mem

  PID USER      PR  NI    VIRT    RES    SHR S  %CPU  %MEM    TIME+  COMMAND
  1 root        20   0   21568   12080   9136 S   0.0   0.3   0:01.09 systemd
```

Exercise 5: Cleanup

```
cd ~/projects/linux_practice
rm -i documents/numbers.txt
rmdir backup
rm -r backup
ls -la
history | tail -20
```

Output:

```
sartaj@sartajpc: ~/projects/lin
sartaj@sartajpc:~$ cd ~/projects/linux_practice
sartaj@sartajpc:~/projects/linux_practice$ rm -i documents/numbers.txt
rm: remove regular file 'documents/numbers.txt'? y
sartaj@sartajpc:~/projects/linux_practice$ rmdir backup
rmdir: failed to remove 'backup': Directory not empty
sartaj@sartajpc:~/projects/linux_practice$ rm -r backup
sartaj@sartajpc:~/projects/linux_practice$ ls -la
total 16
drwxr-xr-x 4 sartaj sartaj 4096 Nov  3 16:35 .
drwxr-xr-x 3 sartaj sartaj 4096 Nov  3 16:11 ..
drwxr-xr-x 2 sartaj sartaj 4096 Nov  3 16:35 documents
drwxr-xr-x 2 sartaj sartaj 4096 Nov  3 16:11 scripts
sartaj@sartajpc:~/projects/linux_practice$ history | tail -20
80  tail -n 5 numbers.txt
81  cat numbers.txt | grep "25"
82  nano numbers.txt
83  cat numbers.txt
84  clear
85  cd
86  clear
87  uname -a
88  df -h
89  history 10
90  who
91  whoami
92  top
93  clear
94  cd ~/projects/linux_practice
95  rm -i documents/numbers.txt
96  rmdir backup
```

Figure 3: ex2_ex5

Question Bank / Lab Exam Tasks

Task 1: Directory Navigation

```
mkdir -p ~/test_project/{docs,scripts,data}
cd ~/test_project/scripts
pwd
```

Output:

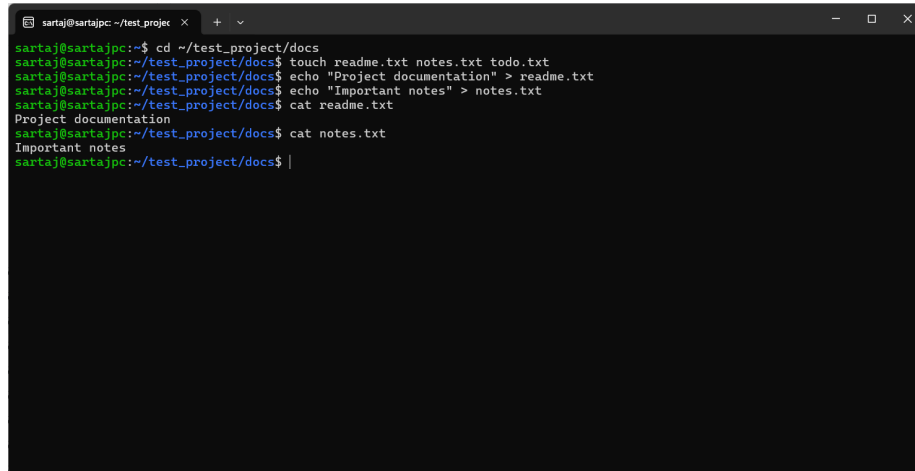
```
sartaj@sartajpc: ~/test_projec
sartaj@sartajpc:~$ mkdir -p ~/test_project/{docs,scripts,data}
sartaj@sartajpc:~$ cd ~/test_project/scripts
sartaj@sartajpc:~/test_project/scripts$ pwd
/home/sartaj/test_project/scripts
sartaj@sartajpc:~/test_project/scripts$ |
```

Figure 4: exp2_t1

Task 2: File Creation and Content

```
cd ~/test_project/docs
touch readme.txt notes.txt todo.txt
echo "Project documentation" > readme.txt
echo "Important notes" > notes.txt
cat readme.txt
cat notes.txt
```

Output:

A terminal window titled 'sartaj@sartajpc: ~/test_project' with a dark background and light green text. The terminal shows the following commands and their outputs:

```
sartaj@sartajpc:~$ cd ~/test_project/docs
sartaj@sartajpc:~/test_project/docs$ touch readme.txt notes.txt todo.txt
sartaj@sartajpc:~/test_project/docs$ echo "Project documentation" > readme.txt
sartaj@sartajpc:~/test_project/docs$ echo "Important notes" > notes.txt
sartaj@sartajpc:~/test_project/docs$ cat readme.txt
Project documentation
sartaj@sartajpc:~/test_project/docs$ cat notes.txt
Important notes
sartaj@sartajpc:~/test_project/docs$ |
```

Figure 5: exp2_t2

Task 3: File Operations

```
cp readme.txt ../data/project_info.txt
mv todo.txt ../scripts/
```

Output:

Task 4: File Permissions

```
cd ~/test_project/scripts
echo "#!/bin/bash" > backup.sh
echo "echo Backup complete" >> backup.sh
```



```
sartaj@sartajpc: ~/test_projex
sartaj@sartajpc:~$ cp readme.txt ../data/project_info.txt
cp: cannot stat 'readme.txt': No such file or directory
sartaj@sartajpc:~$ cd ~/test_project/docs
sartaj@sartajpc:~/test_project/docs$ cp readme.txt ../data/project_info.txt
sartaj@sartajpc:~/test_project/docs$ mv todo.txt ../scripts/
sartaj@sartajpc:~/test_project/docs$
```

Figure 6: exp2_t3

```
chmod u+x backup.sh
ls -l backup.sh
```

Output:

```
sartaj@sartajpc: ~/test_projex
sartaj@sartajpc:~/test_project/docs$ cd ~/test_project/scripts
sartaj@sartajpc:~/test_project/scripts$ echo "#!/bin/bash" > backup.sh
sartaj@sartajpc:~/test_project/scripts$ echo "echo Backup complete" >> backup.sh
sartaj@sartajpc:~/test_project/scripts$ chmod u+x backup.sh
sartaj@sartajpc:~/test_project/scripts$ ls -l backup.sh
-rwxr--r-- 1 sartaj sartaj 34 Nov  3 16:38 backup.sh
sartaj@sartajpc:~/test_project/scripts$
```

Figure 7: exp2_t4

Task 5: File Viewing

```
seq 1 20 > numbers.txt
head -n 5 numbers.txt
tail -n 3 numbers.txt
grep "1" numbers.txt
```

Output:

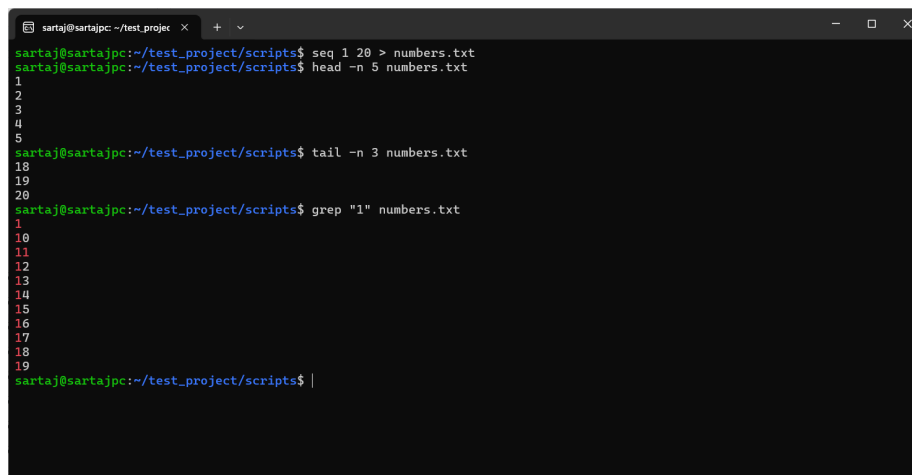
A terminal window with a dark background and light green text. The window title is 'sartaj@sartajpc: ~/test_projec'. The commands and their outputs are as follows:
1. Command: `seq 1 20 > numbers.txt`
2. Command: `head -n 5 numbers.txt`
 Output: `1`
 `2`
 `3`
 `4`
 `5`
3. Command: `tail -n 3 numbers.txt`
 Output: `18`
 `19`
 `20`
4. Command: `grep "1" numbers.txt`
 Output: `1`
 `10`
 `11`
 `12`
 `13`
 `14`
 `15`
 `16`
 `17`
 `18`
 `19`
The prompt `sartaj@sartajpc:~/test_project/scripts$` is visible at the end of the output.

Figure 8: exp2_t5

Task 6: Text Editing

```
nano config.txt
cat config.txt
```

Output:

Task 7: System Information

```
echo "Username: $(whoami)" > system_info.txt
echo "Date: $(date)" >> system_info.txt
echo "Directory: $(pwd)" >> system_info.txt
df -h >> system_info.txt
cat system_info.txt
```

```
sartaj@sartajpc: ~/test_project
sartaj@sartajpc:~/test_project/scripts$ nano config.txt
sartaj@sartajpc:~/test_project/scripts$ cat config.txt
sartaj@sartajpc:~/test_project/scripts$ |
```

Figure 9: exp2_t6

```
sartaj@sartajpc: ~/test_project
sartaj@sartajpc:~/test_project/scripts$ echo "Username: $(whoami)" > system_info.txt
sartaj@sartajpc:~/test_project/scripts$ echo "Date: $(date)" >> system_info.txt
sartaj@sartajpc:~/test_project/scripts$ echo "Directory: $(pwd)" >> system_info.txt
sartaj@sartajpc:~/test_project/scripts$ df -h >> system_info.txt
sartaj@sartajpc:~/test_project/scripts$ cat system_info.txt
Username: sartaj
Date: Mon Nov  3 16:39:44 UTC 2025
Directory: /home/sartaj/test_project/scripts
Filesystem      Size  Used Avail Use% Mounted on
none            1.9G   0 1.9G   0% /usr/lib/modules/6.6.87.2-microsoft-standard-WSL2
none            1.9G 4.0K 1.9G   1% /mnt/wsl
drivers          427G 282G 145G  67% /usr/lib/wsl/drivers
/dev/sdd        1007G  1.7G  954G   1% /
none            1.9G  92K 1.9G   1% /mnt/wslg
none            1.9G   0 1.9G   0% /usr/lib/wsl/lib
rootfs          1.9G 2.7M 1.9G   1% /init
none            1.9G 548K 1.9G   1% /run
none            1.9G   0 1.9G   0% /run/lock
none            1.9G   0 1.9G   0% /run/shm
none            1.9G  76K 1.9G   1% /mnt/wslg/versions.txt
none            1.9G  76K 1.9G   1% /mnt/wslg/doc
C:\              427G 282G 145G  67% /mnt/c
D:\              49G  21G  29G  42% /mnt/d
tmpfs            1.9G  16K 1.9G   1% /run/user/1000
sartaj@sartajpc:~/test_project/scripts$ |
```

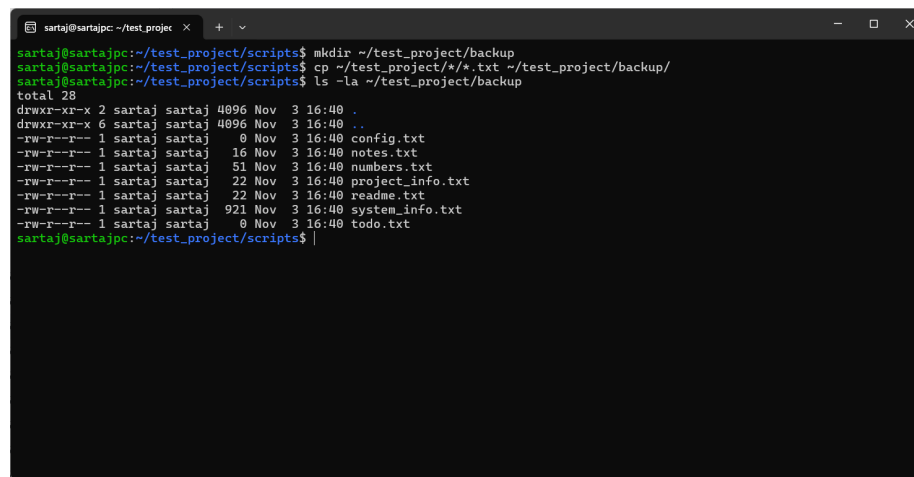
Figure 10: exp2_t7

Output:

Task 8: File Organization

```
mkdir ~/test_project/backup
cp ~/test_project/*/*.txt ~/test_project/backup/
ls -la ~/test_project/backup
```

Output:



```
sartaj@sartajpc: ~/test_project
sartaj@sartajpc:~/test_project/scripts$ mkdir ~/test_project/backup
sartaj@sartajpc:~/test_project/scripts$ cp ~/test_project/*/*.txt ~/test_project/backup/
sartaj@sartajpc:~/test_project/scripts$ ls -la ~/test_project/backup
total 28
drwxr-xr-x 2 sartaj sartaj 4096 Nov  3 16:40 .
drwxr-xr-x 6 sartaj sartaj 4096 Nov  3 16:40 ..
-rw-r--r-- 1 sartaj sartaj   0 Nov  3 16:40 config.txt
-rw-r--r-- 1 sartaj sartaj  16 Nov  3 16:40 notes.txt
-rw-r--r-- 1 sartaj sartaj  51 Nov  3 16:40 numbers.txt
-rw-r--r-- 1 sartaj sartaj  22 Nov  3 16:40 project_info.txt
-rw-r--r-- 1 sartaj sartaj  22 Nov  3 16:40 readme.txt
-rw-r--r-- 1 sartaj sartaj 921 Nov  3 16:40 system_info.txt
-rw-r--r-- 1 sartaj sartaj   0 Nov  3 16:40 todo.txt
sartaj@sartajpc:~/test_project/scripts$
```

Figure 11: exp2_t8

Task 9: Process and History

```
history | wc -l
history 10
```

Output:

Task 10: Comprehensive Cleanup

```
chmod 754 backup.sh
find ~/test_project -type f | wc -l > summary.txt
find ~/test_project -type d | wc -l >> summary.txt
cat summary.txt
```

```
sartaj@sartajpc: ~/test_projec
sartaj@sartajpc:~/test_project/scripts$ mkdir ~/test_project/backup
sartaj@sartajpc:~/test_project/scripts$ cp ~/test_project/*.txt ~/test_project/backup/
sartaj@sartajpc:~/test_project/scripts$ ls -la ~/test_project/backup
total 28
drwxr-xr-x 2 sartaj sartaj 4096 Nov  3 16:40 .
drwxr-xr-x 6 sartaj sartaj 4096 Nov  3 16:40 ..
-rw-r--r-- 1 sartaj sartaj   0 Nov  3 16:40 config.txt
-rw-r--r-- 1 sartaj sartaj  16 Nov  3 16:40 notes.txt
-rw-r--r-- 1 sartaj sartaj  51 Nov  3 16:40 numbers.txt
-rw-r--r-- 1 sartaj sartaj  22 Nov  3 16:40 project_info.txt
-rw-r--r-- 1 sartaj sartaj  22 Nov  3 16:40 readme.txt
-rw-r--r-- 1 sartaj sartaj 921 Nov  3 16:40 system_info.txt
-rw-r--r-- 1 sartaj sartaj   0 Nov  3 16:40 todo.txt
sartaj@sartajpc:~/test_project/scripts$ history | wc -l
149
sartaj@sartajpc:~/test_project/scripts$ history 10
141  echo "Date: $(date)" >> system_info.txt
142  echo "Directory: $(pwd)" >> system_info.txt
143  df -h >> system_info.txt
144  cat system_info.txt
145  clear
146  mkdir ~/test_project/backup
147  cp ~/test_project/*.txt ~/test_project/backup/
148  ls -la ~/test_project/backup
149  history | wc -l
150  history 10
sartaj@sartajpc:~/test_project/scripts$ |
```

Figure 12: exp2_t9

Output:

```
sartaj@sartajpc: ~/test_projec
sartaj@sartajpc:~/test_project/scripts$ chmod 754 backup.sh
sartaj@sartajpc:~/test_project/scripts$ find ~/test_project -type f | wc -l > summary.txt
sartaj@sartajpc:~/test_project/scripts$ find ~/test_project -type d | wc -l >> summary.txt
sartaj@sartajpc:~/test_project/scripts$ cat summary.txt
16
5
sartaj@sartajpc:~/test_project/scripts$ |
```

Figure 13: exp2_t10

Result

- Explored Linux file system structure.
- Practiced file operations, editing, and permissions.
- Learned user and system management commands.
- Completed practical exercises and lab exam-style tasks.

Challenges Faced & Learning Outcomes

- Challenge 1: Managing complex directory structures.
- Challenge 2: Remembering symbolic vs numeric permissions.
- Challenge 3: Using **find**, **grep**, and redirection effectively.

Learning:

- Mastered Linux navigation, file handling, and permissions.
- Gained practical knowledge of user/system management.
- Practiced exam-style tasks to solidify learning.

Conclusion

This experiment comprehensively covered **Linux file systems, permissions, commands, editing, user management, and system info**. The tasks ensured thorough practice, making it a complete foundation for Linux proficiency.