

Experiment [2]: [Linux file systems permissions and essential commands]

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AIM:

- [To Learn linux file systems permissions and essential commands]

Requirements:

- [Any Linux Distro, any kind of text editor (vs code, vim, notepad, nano, etc,)]

Theory:

- [Basic Linux file systems permissions and essential commands]

Procedure & Observations

TASK 1: [Directory Navigation]

Task Statement:

- [Create a directory called test_project in your home directory, then create subdirectories docs, scripts, and data inside it. Navigate to the scripts directory and display your current path.]

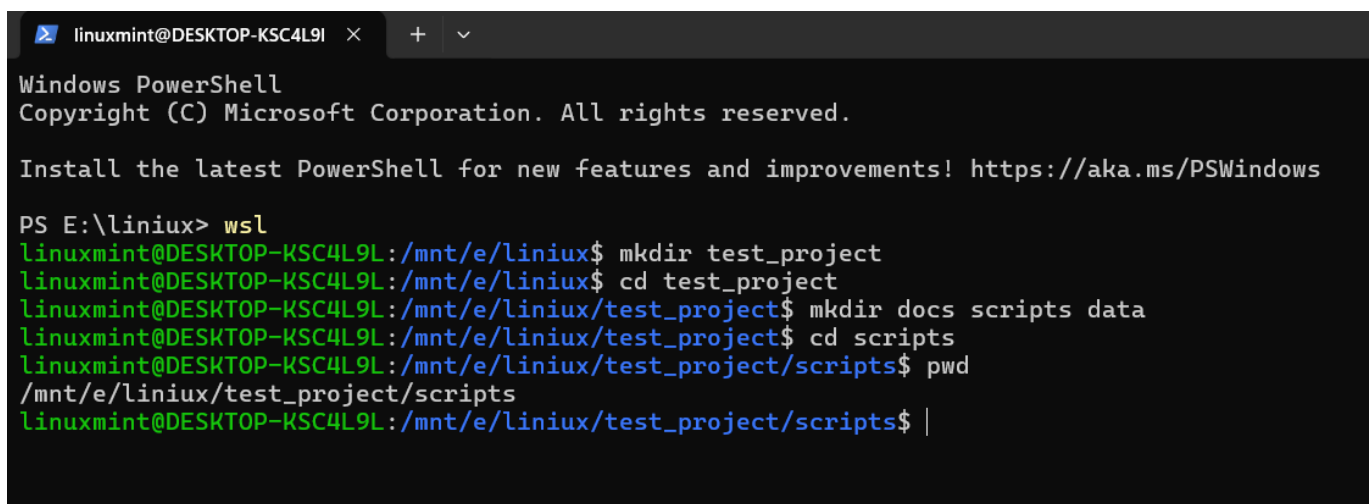
Explanation:

- [Use mkdir to create the wanted directory we can use cd to navigate and use pwd to show current path]

Command(s):

```
"" mkdir test_project cd test_project mkdir docs scripts data cd scripts pwd ""
```

Output:



```
linuxmint@DESKTOP-KSC4L9L  x  +  v
Windows PowerShell
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PS E:\linux> wsl
linuxmint@DESKTOP-KSC4L9L:/mnt/e/linux$ mkdir test_project
linuxmint@DESKTOP-KSC4L9L:/mnt/e/linux$ cd test_project
linuxmint@DESKTOP-KSC4L9L:/mnt/e/linux/test_project$ mkdir docs scripts data
linuxmint@DESKTOP-KSC4L9L:/mnt/e/linux/test_project$ cd scripts
linuxmint@DESKTOP-KSC4L9L:/mnt/e/linux/test_project/scripts$ pwd
/mnt/e/linux/test_project/scripts
linuxmint@DESKTOP-KSC4L9L:/mnt/e/linux/test_project/scripts$ |
```

TASK 2: [File Creation and Content]

Task Statement:

- [Create three files in the docs directory: readme.txt, notes.txt, and todo.txt. Add the text "Project documentation" to readme.txt and "Important notes" to notes.txt. Display the contents of both files.]

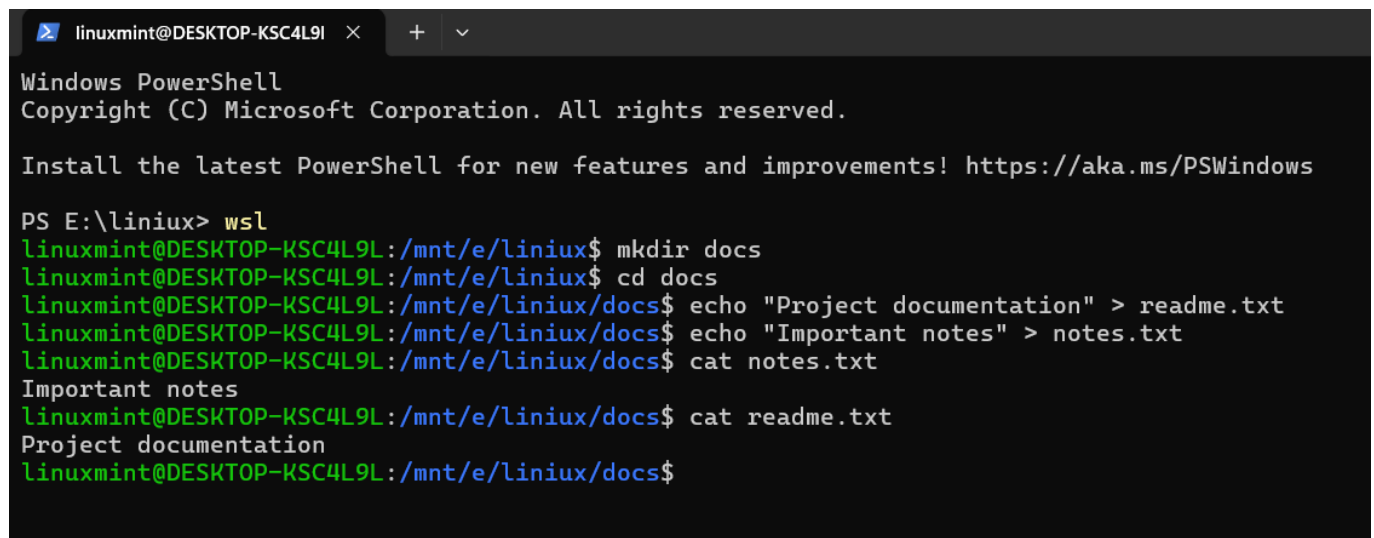
Explanation:

- [We can use touch to create empty files and using echo "text" > file.txt to add content to a file and using cat to display file contents]

Command(s):

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

Output:



```
linuxmint@DESKTOP-KSC4L9L  ×  +  ▾
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PS E:\linux> wsl
linuxmint@DESKTOP-KSC4L9L:/mnt/e/linux$ mkdir docs
linuxmint@DESKTOP-KSC4L9L:/mnt/e/linux$ cd docs
linuxmint@DESKTOP-KSC4L9L:/mnt/e/linux/docs$ echo "Project documentation" > readme.txt
linuxmint@DESKTOP-KSC4L9L:/mnt/e/linux/docs$ echo "Important notes" > notes.txt
linuxmint@DESKTOP-KSC4L9L:/mnt/e/linux/docs$ cat notes.txt
Important notes
linuxmint@DESKTOP-KSC4L9L:/mnt/e/linux/docs$ cat readme.txt
Project documentation
linuxmint@DESKTOP-KSC4L9L:/mnt/e/linux/docs$
```

TASK 3: [File Operations]

Task Statement:

- [Copy readme.txt to the data directory and rename the copy to project_info.txt. Then move todo.txt from docs to scripts directory.]

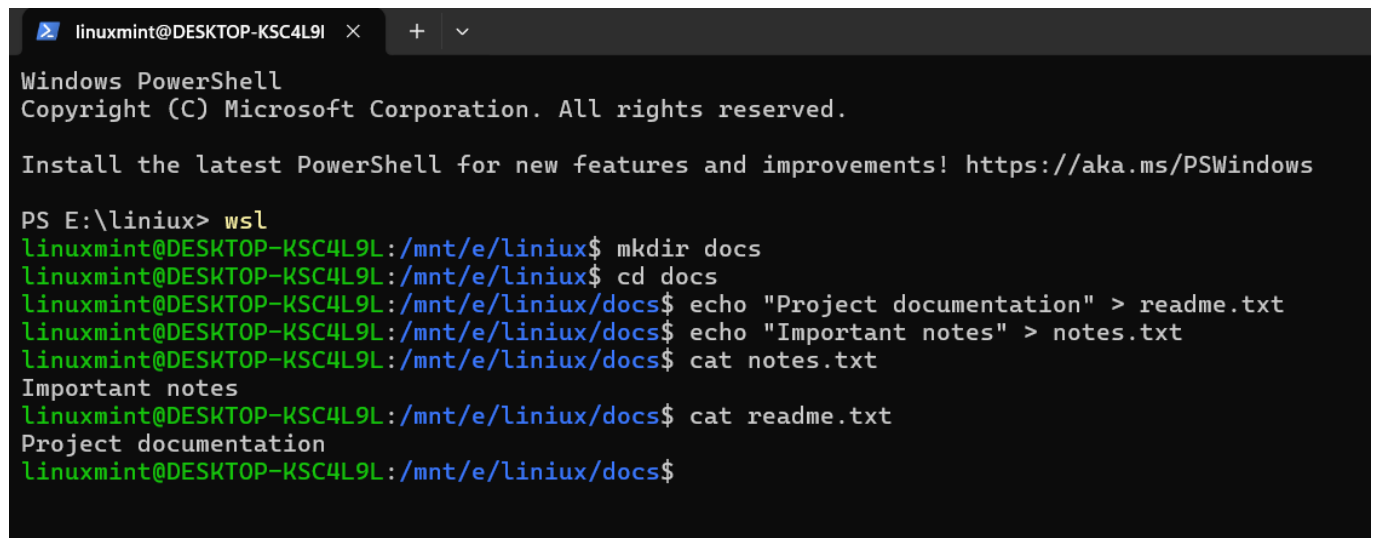
Explanation:

- [- We can use the cp source destination to copy files and using the mv oldname newname to rename files also using the same command mv file directory/ to move files to another directory we can also combine copy and rename: cp file.txt newdir/newname.txt]

Command(s):

```
cp readme.txt data/project_info.txt
```

Output:



```
linuxmint@DESKTOP-KSC4L9L  ×  +  v
Windows PowerShell
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PS E:\linux> wsl
linuxmint@DESKTOP-KSC4L9L:/mnt/e/linux$ mkdir docs
linuxmint@DESKTOP-KSC4L9L:/mnt/e/linux$ cd docs
linuxmint@DESKTOP-KSC4L9L:/mnt/e/linux/docs$ echo "Project documentation" > readme.txt
linuxmint@DESKTOP-KSC4L9L:/mnt/e/linux/docs$ echo "Important notes" > notes.txt
linuxmint@DESKTOP-KSC4L9L:/mnt/e/linux/docs$ cat notes.txt
Important notes
linuxmint@DESKTOP-KSC4L9L:/mnt/e/linux/docs$ cat readme.txt
Project documentation
linuxmint@DESKTOP-KSC4L9L:/mnt/e/linux/docs$
```

TASK 4: [File Permissions]

Task Statement:

- [Create a shell script file called backup.sh in the scripts directory. Add the content `#!/bin/bash` and `echo "Backup complete"` to it. Make the file executable only for the owner.]

Explanation:

- [Using `chmod u+x filename` we can make the file executable for user only using `ls -l` to check for permissions also script files typically need executable permission to run]

Command(s):

```
cd scripts
touch backup.sh > echo "Backup complete"
chmod u+x backup.sh
```

Output:

```
linuxmint@DESKTOP-KSC4L9L: /mnt/e/linux$ mkdir scripts
linuxmint@DESKTOP-KSC4L9L: /mnt/e/linux$ cd scripts
linuxmint@DESKTOP-KSC4L9L: /mnt/e/linux/scripts$ touch backup.sh > echo "Backup complete"
linuxmint@DESKTOP-KSC4L9L: /mnt/e/linux/scripts$ chmod u+x backup.sh
linuxmint@DESKTOP-KSC4L9L: /mnt/e/linux/scripts$ ls -l
total 0
-rwxrwxrwx 1 linuxmint linuxmint 0 Oct 29 12:50 'Backup complete'
-rwxrwxrwx 1 linuxmint linuxmint 0 Oct 29 12:50 backup.sh
-rwxrwxrwx 1 linuxmint linuxmint 0 Oct 29 12:50 echo
linuxmint@DESKTOP-KSC4L9L: /mnt/e/linux/scripts$
```

TASK 5: [File Viewing]

Task Statement:

- [Create a file called numbers.txt with numbers 1 to 20 (each on a new line). Display only the first 5 lines, then only the last 3 lines, then search for lines containing the number "1".]

Explanation:

- [I can quickly generate a list of numbers by running `seq 1 20 > numbers.txt`. To check the first few numbers, I use `head -n 5` to see the first 5 lines, and `tail -n 3` to see the last 3 lines. If I want to find all numbers containing a "1", I can use `grep "1"`. Alternatively, I could create the list manually by using multiple `echo` commands.]

Command(s):

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

Output:

```
linuxmint@DESKTOP-KSC4L9L: /mnt/e/linux/scripts$ seq 1 20 > number1.txt
linuxmint@DESKTOP-KSC4L9L: /mnt/e/linux/scripts$ head -n 5 number1.txt
1
2
3
4
5
linuxmint@DESKTOP-KSC4L9L: /mnt/e/linux/scripts$ head -n 5 number1.txt
1
2
3
4
5
linuxmint@DESKTOP-KSC4L9L: /mnt/e/linux/scripts$ tail -n 5 number1.txt
16
17
18
19
20
linuxmint@DESKTOP-KSC4L9L: /mnt/e/linux/scripts$ grep "1" number.txt
1
10
11
12
13
14
15
16
17
18
19
linuxmint@DESKTOP-KSC4L9L: /mnt/e/linux/scripts$
linuxmint@DESKTOP-KSC4L9L: /mnt/e/linux/scripts$
```

TASK 6: [Text Editing]

Task Statement:

- [Using nano, create a file called config.txt with the following content:

Database=localhost Port=5432 Username=admin

Save the file and then display its contents.]

Explanation:

- [I open a file in Nano using `nano filename.txt` and type my content normally. Once I'm done, I press `Ctrl+O` to save the file and `Ctrl+X` to exit Nano. After that, I use `cat` to check the contents and make sure everything was saved correctly.]

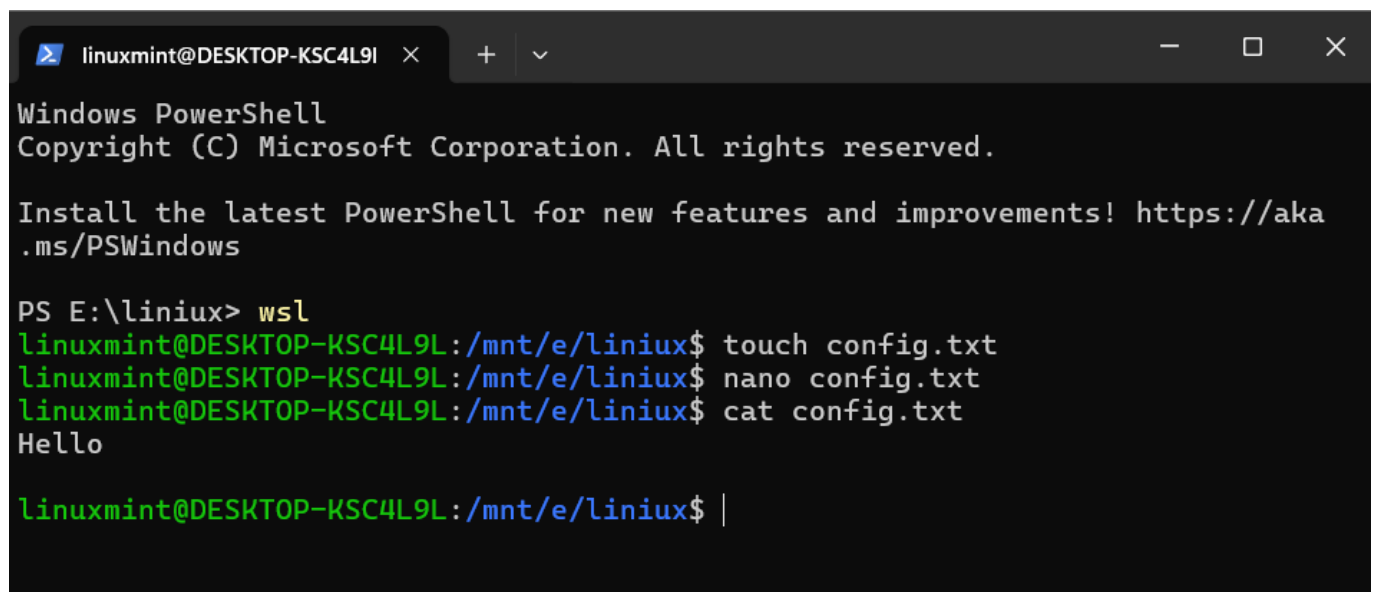
Command(s):

```
vim config.txt
cat config.txt
```

Alternatively

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

Output:



```
linuxmint@DESKTOP-KSC4L9L x + v - □ ×
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PS E:\linux> wsl
linuxmint@DESKTOP-KSC4L9L:/mnt/e/linux$ touch config.txt
linuxmint@DESKTOP-KSC4L9L:/mnt/e/linux$ nano config.txt
linuxmint@DESKTOP-KSC4L9L:/mnt/e/linux$ cat config.txt
Hello

linuxmint@DESKTOP-KSC4L9L:/mnt/e/linux$ |
```

TASK 7: [System Information]

Task Statement:

- [Create a file called `system_info.txt` that contains: your username, current date, your current directory, and disk usage information in human-readable format.]

Explanation:

- [I can use `whoami` to check my username, `date` to see the current date, and `pwd` to know my current directory. To check disk usage, I use `df -h`. I can save the output of any command to a file by using redirection like command `>> filename.txt`. If I want to add labels, I use `echo` like this: `echo "Username:" >> file.txt`.]

Command(s):

```
cd scripts
touch system_info.txt
echo "Username:" >> system_info.txt
whoami >> system_info.txt
echo "Date:" >> system_info.txt
date >> system_info.txt
echo "Current Directory:" >> system_info.txt
pwd >> system_info.txt
echo "Disk Usage:" >> system_info.txt
df -h >> system_info.txt
```

Output:

```
linuxmint@DESKTOP-KSC4L9L: /mnt/e/linux$ mkdir scripts2
linuxmint@DESKTOP-KSC4L9L: /mnt/e/linux$ touch system_info.txt
linuxmint@DESKTOP-KSC4L9L: /mnt/e/linux$ echo

linuxmint@DESKTOP-KSC4L9L: /mnt/e/linux$ echo "Username:" >> system
linuxmint@DESKTOP-KSC4L9L: /mnt/e/linux$ echo "Username:" >> system.txt
linuxmint@DESKTOP-KSC4L9L: /mnt/e/linux$ whoami >> system_info.txt
linuxmint@DESKTOP-KSC4L9L: /mnt/e/linux$ date >> system_info.txt
linuxmint@DESKTOP-KSC4L9L: /mnt/e/linux$ echo "Current Directory:" >> system_info.txt
linuxmint@DESKTOP-KSC4L9L: /mnt/e/linux$ pwd >> system_info.txt
linuxmint@DESKTOP-KSC4L9L: /mnt/e/linux$ echo "Disk usage:" >> system_info.txt
linuxmint@DESKTOP-KSC4L9L: /mnt/e/linux$ df -h >> system_info.txt
linuxmint@DESKTOP-KSC4L9L: /mnt/e/linux$ cat system_info.txt
linuxmint
Wed Oct 29 13:24:14 UTC 2025
Current Directory:
/mnt/e/linux
Disk usage:
Filesystem      Size  Used Avail Use% Mounted on
none            3.9G   0    3.9G   0% /usr/lib/modules/6.6.87.2-microsoft-standard-WSL2
none            3.9G  4.0K   3.9G   1% /mnt/wsl
drivers          317G  150G  168G  48% /usr/lib/wsl/drivers
/dev/sdd        1007G  1.7G  954G   1% /
none            3.9G   80K   3.9G   1% /mnt/wslg
none            3.9G   0    3.9G   0% /usr/lib/wsl/lib
rootfs          3.9G  2.7M   3.9G   1% /init
none            3.9G  504K   3.9G   1% /run
none            3.9G   0    3.9G   0% /run/lock
none            3.9G   0    3.9G   0% /run/shm
none            3.9G   76K   3.9G   1% /mnt/wslg/versions.txt
none            3.9G   76K   3.9G   1% /mnt/wslg/doc
C:\              317G  150G  168G  48% /mnt/c
D:\              318G   34G  285G  11% /mnt/d
E:\              318G  206G  113G  65% /mnt/e
tmpfs            3.9G   16K   3.9G   1% /run/user/1000
linuxmint@DESKTOP-KSC4L9L: /mnt/e/linux$ |
```

TASK 8: [File Organisation]

Task Statement:

- [In your test_project directory, create a backup folder. Copy all .txt files from all subdirectories into this backup folder. Then list all files in the backup folder with detailed information.]

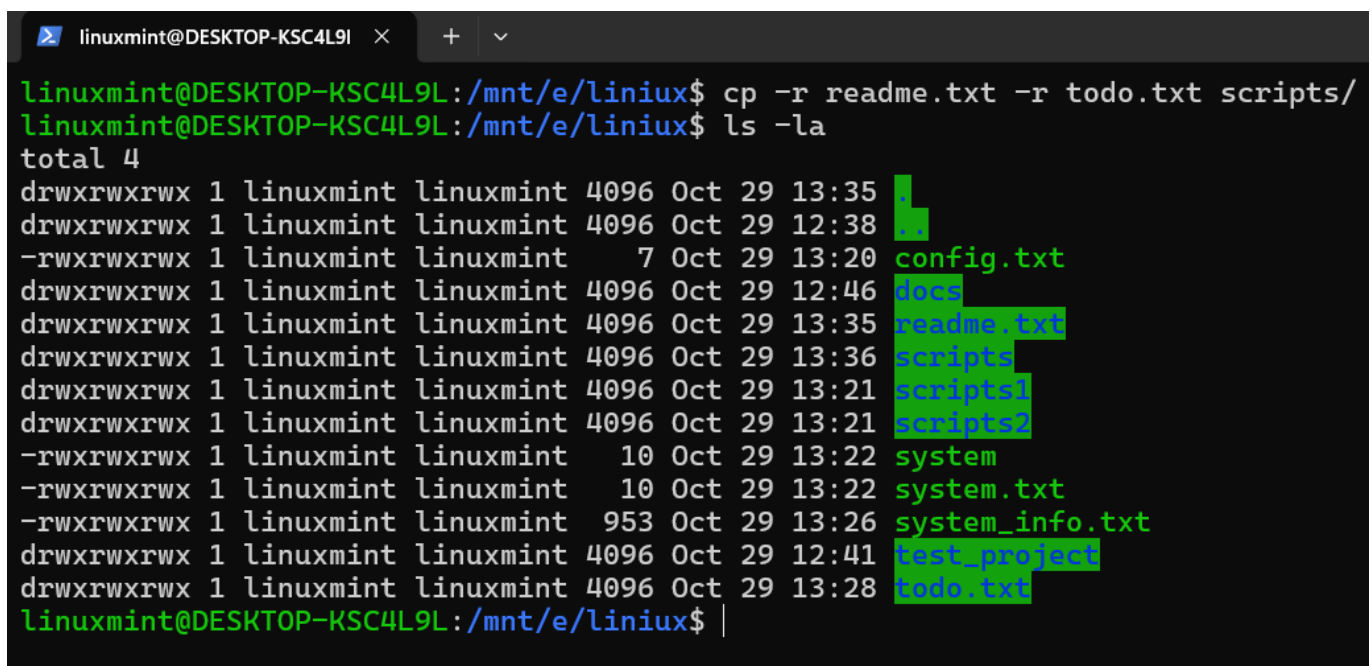
Explanation:

- [I can use `find . -name "*.txt"` to locate all .txt files. Alternatively, I can navigate to each directory and copy files manually. To copy multiple files at once, I use `cp file1.txt file2.txt destination/`. If I want detailed information about the files, I use `ls -la`. The wildcard `*.txt` helps me match all files that end with .txt.]

Command(s):

```
cp test_project/data/project_info.txt    test_project/docs/notes.txt
test_project/docs/readme.txt            test_project/docs/todo.txt
test_project/scripts/config.txt         test_project/scripts/numbers.txt
test_project/scripts/system_info.txt    test_project/scripts/todo.txt    backup/
```

Output:



```
linuxmint@DESKTOP-KSC4L9L: /mnt/e/linux$ cp -r readme.txt -r todo.txt scripts/
linuxmint@DESKTOP-KSC4L9L: /mnt/e/linux$ ls -la
total 4
drwxrwxrwx 1 linuxmint linuxmint 4096 Oct 29 13:35 .
drwxrwxrwx 1 linuxmint linuxmint 4096 Oct 29 12:38 ..
-rwxrwxrwx 1 linuxmint linuxmint    7 Oct 29 13:20 config.txt
drwxrwxrwx 1 linuxmint linuxmint 4096 Oct 29 12:46 docs
drwxrwxrwx 1 linuxmint linuxmint 4096 Oct 29 13:35 readme.txt
drwxrwxrwx 1 linuxmint linuxmint 4096 Oct 29 13:36 scripts
drwxrwxrwx 1 linuxmint linuxmint 4096 Oct 29 13:21 scripts1
drwxrwxrwx 1 linuxmint linuxmint 4096 Oct 29 13:21 scripts2
-rwxrwxrwx 1 linuxmint linuxmint   10 Oct 29 13:22 system
-rwxrwxrwx 1 linuxmint linuxmint   10 Oct 29 13:22 system.txt
-rwxrwxrwx 1 linuxmint linuxmint  953 Oct 29 13:26 system_info.txt
drwxrwxrwx 1 linuxmint linuxmint 4096 Oct 29 12:41 test_project
drwxrwxrwx 1 linuxmint linuxmint 4096 Oct 29 13:28 todo.txt
linuxmint@DESKTOP-KSC4L9L: /mnt/e/linux$
```

TASK 9: [Process and History]

Task Statement:

- [Display your command history and count how many commands you've executed. Then show the top 10 most recent commands.]

Explanation:

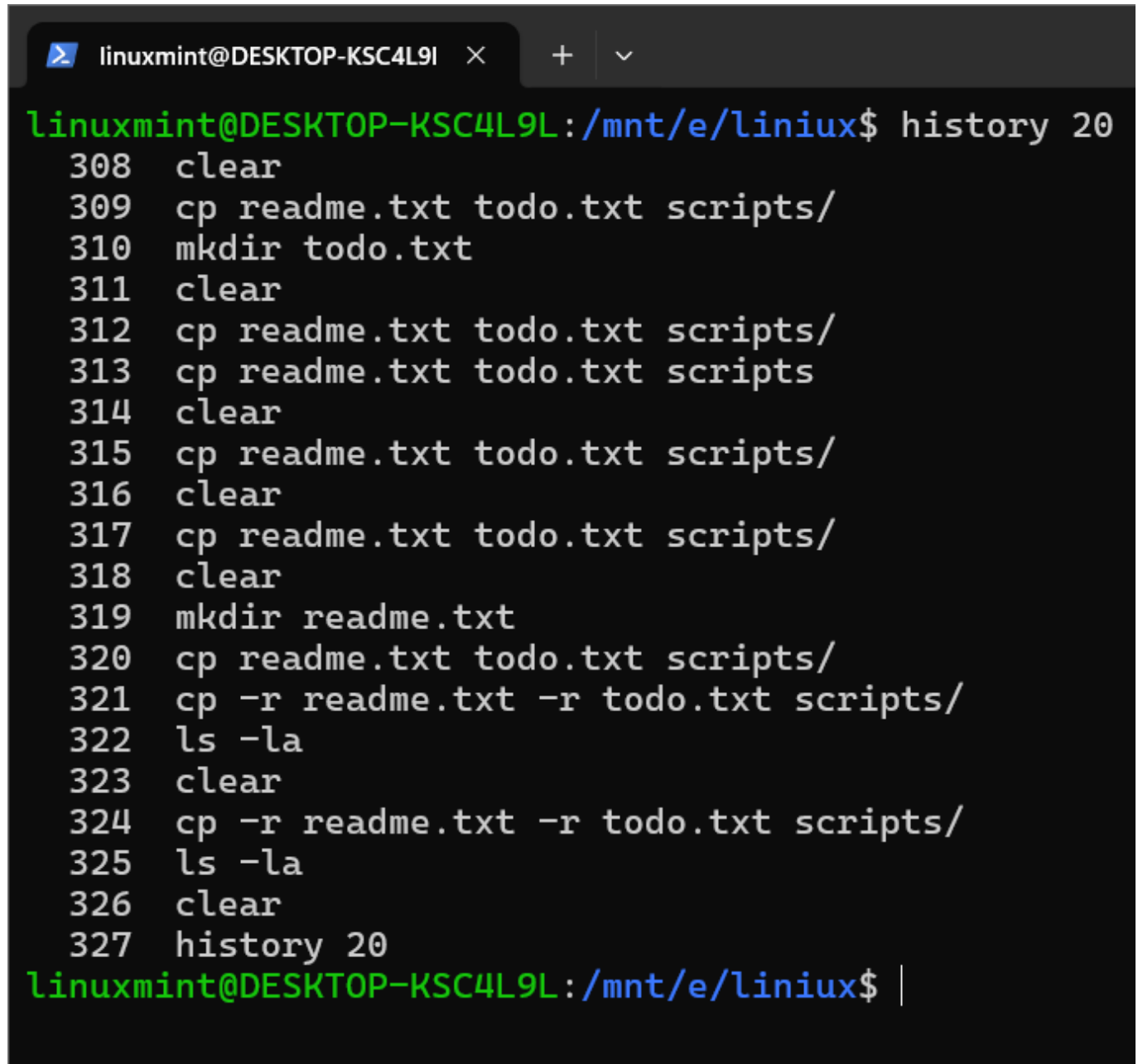
- [I can use `history` to see all the commands I've typed. To count the total number of commands, I use `history | wc -l`. If I want to view just the last 10 commands, I can use `history 10` or `history | tail -10`. The

`wc -l` command simply counts the number of lines in the output.]

Command(s):

```
history 10
```

Output:

A terminal window titled 'linuxmint@DESKTOP-KSC4L9I' with a dark background. The prompt is 'linuxmint@DESKTOP-KSC4L9L:/mnt/e/liniux\$'. The command 'history 20' has been entered, displaying a list of 20 previous commands with their line numbers (308-327). The commands include 'clear', 'cp', 'mkdir', and 'ls'. The terminal ends with the prompt 'linuxmint@DESKTOP-KSC4L9L:/mnt/e/liniux\$ |' and a cursor.

```
linuxmint@DESKTOP-KSC4L9L:/mnt/e/liniux$ history 20
308  clear
309  cp readme.txt todo.txt scripts/
310  mkdir todo.txt
311  clear
312  cp readme.txt todo.txt scripts/
313  cp readme.txt todo.txt scripts
314  clear
315  cp readme.txt todo.txt scripts/
316  clear
317  cp readme.txt todo.txt scripts/
318  clear
319  mkdir readme.txt
320  cp readme.txt todo.txt scripts/
321  cp -r readme.txt -r todo.txt scripts/
322  ls -la
323  clear
324  cp -r readme.txt -r todo.txt scripts/
325  ls -la
326  clear
327  history 20
linuxmint@DESKTOP-KSC4L9L:/mnt/e/liniux$ |
```

TASK 10: [Comprehensive Cleanup]

Task Statement:

- [Set the permissions of your `backup.sh` script to be readable, writable, and executable by owner, readable and executable by group, and readable by others. Then create a summary file that lists the total number of files and directories in your entire `test_project`.]

Explanation:

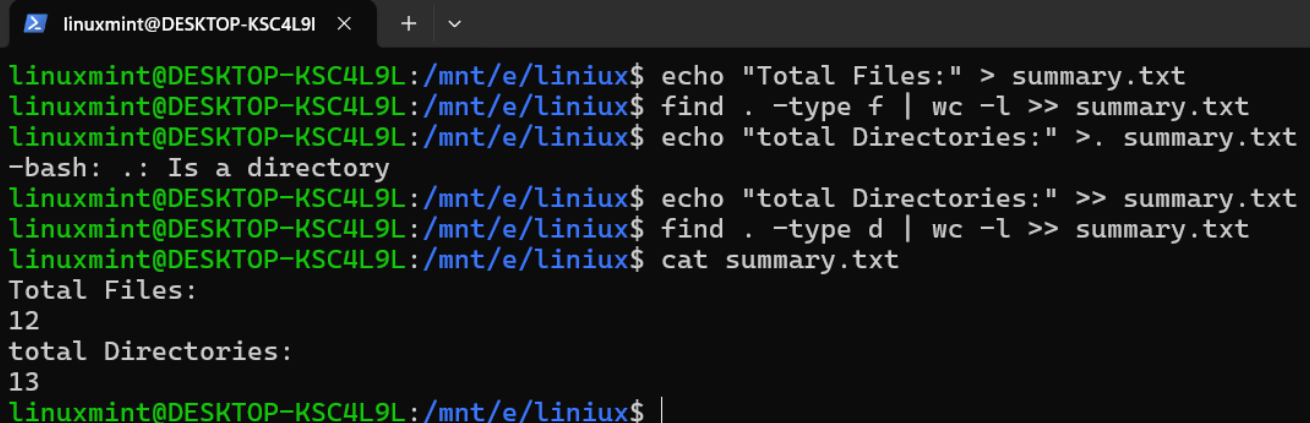
- [I can set permissions for backup.sh using `chmod 754 backup.sh` to give `rwxr-xr--` permissions. Alternatively, I can use `chmod u=rwx,g=rx,o=r backup.sh`. To count all files, I use `find . -type f | wc -l`, and to count directories, I use `find . -type d | wc -l`. If I want to see the full directory structure recursively, I use `ls -R`. I can also combine multiple commands with `&&` or save the outputs to a summary file for later reference.]

Command(s):

```
chmod 754 backup.sh
```

```
echo "Total files:" > summary.txt
find . -type f | wc -l >> summary.txt
echo "Total directories:" >> summary.txt
find . -type d | wc -l >> summary.txt
```

Output:



```
linuxmint@DESKTOP-KSC4L9L: /mnt/e/linux$ echo "Total Files:" > summary.txt
linuxmint@DESKTOP-KSC4L9L: /mnt/e/linux$ find . -type f | wc -l >> summary.txt
linuxmint@DESKTOP-KSC4L9L: /mnt/e/linux$ echo "total Directories:" >. summary.txt
-bash: .: Is a directory
linuxmint@DESKTOP-KSC4L9L: /mnt/e/linux$ echo "total Directories:" >> summary.txt
linuxmint@DESKTOP-KSC4L9L: /mnt/e/linux$ find . -type d | wc -l >> summary.txt
linuxmint@DESKTOP-KSC4L9L: /mnt/e/linux$ cat summary.txt
Total Files:
12
total Directories:
13
linuxmint@DESKTOP-KSC4L9L: /mnt/e/linux$ |
```