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:

```
PS C:\Users\drago\OneDrive\Desktop> wsl
tanishq@Tanishq:/mnt/c/Users/drago/OneDrive/Desktop$ mkdir test_project
tanishq@Tanishq:/mnt/c/Users/drago/OneDrive/Desktop$ cd test_project
tanishq@Tanishq:/mnt/c/Users/drago/OneDrive/Desktop/test_project$ mkdir docs scripts data
tanishq@Tanishq:/mnt/c/Users/drago/OneDrive/Desktop/test_project$ cd scripts
tanishq@Tanishq:/mnt/c/Users/drago/OneDrive/Desktop/test_project/scripts$ pwd
/mnt/c/Users/drago/OneDrive/Desktop/test_project/scripts
tanishq@Tanishq:/mnt/c/Users/drago/OneDrive/Desktop/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:

```
PS C:\Users\drago\OneDrive\Desktop> wsl
tanishq@Tanishq:/mnt/c/Users/drago/OneDrive/Desktop$ mkdir test_project
tanishq@Tanishq:/mnt/c/Users/drago/OneDrive/Desktop$ cd test_project
tanishq@Tanishq:/mnt/c/Users/drago/OneDrive/Desktop/test_project$ mkdir docs scripts data
tanishq@Tanishq:/mnt/c/Users/drago/OneDrive/Desktop/test_project$ cd scripts
tanishq@Tanishq:/mnt/c/Users/drago/OneDrive/Desktop/test_project/scripts$ pwd
/mnt/c/Users/drago/OneDrive/Desktop/test_project/scripts
tanishq@Tanishq:/mnt/c/Users/drago/OneDrive/Desktop/test_project/scripts$
```

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:

```
PS C:\Users\drago\OneDrive\Desktop> wsl
tanishq@Tanishq:/mnt/c/Users/drago/OneDrive/Desktop$ mkdir test_project
tanishq@Tanishq:/mnt/c/Users/drago/OneDrive/Desktop$ cd test_project
tanishq@Tanishq:/mnt/c/Users/drago/OneDrive/Desktop/test_project$ mkdir docs scripts data
tanishq@Tanishq:/mnt/c/Users/drago/OneDrive/Desktop/test_project$ cd scripts
tanishq@Tanishq:/mnt/c/Users/drago/OneDrive/Desktop/test_project/scripts$ pwd
/mnt/c/Users/drago/OneDrive/Desktop/test_project/scripts
tanishq@Tanishq:/mnt/c/Users/drago/OneDrive/Desktop/test_project/scripts$
```

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:

```
friday@friday-VirtualBox:~/Desktop/Om$ cd scripts
friday@friday-VirtualBox:~/Desktop/Om/scripts$ touch backup.sh > echo "Backup Complete"
friday@friday-VirtualBox:~/Desktop/Om/scripts$ chmod u+x backup.sh
friday@friday-VirtualBox:~/Desktop/Om/scripts$ ls -l
total 0
-rw-rw-r-- 1 friday friday 0 Sep 26 12:13 'Backup Complete'
-rwxrw-r-- 1 friday friday 0 Sep 26 12:13  backup.sh
-rw-rw-r-- 1 friday friday 0 Sep 26 12:13  echo
friday@friday-VirtualBox:~/Desktop/Om/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:

```
tanishq@Tanishq:/mnt/c/Users/drago/OneDrive/Desktop/test_project/scripts/docs$ seq 1 20 > numbers.txt
tanishq@Tanishq:/mnt/c/Users/drago/OneDrive/Desktop/test_project/scripts/docs$ head -n 5 numbers.txt
1
2
3
4
5
tanishq@Tanishq:/mnt/c/Users/drago/OneDrive/Desktop/test_project/scripts/docs$ tail -n 3 numbers.txt
18
19
20
tanishq@Tanishq:/mnt/c/Users/drago/OneDrive/Desktop/test_project/scripts/docs$ grep "1" numbers.txt
1
10
11
12
13
14
15
16
17
18
19
tanishq@Tanishq:/mnt/c/Users/drago/OneDrive/Desktop/test_project/scripts/docs$
```

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.]

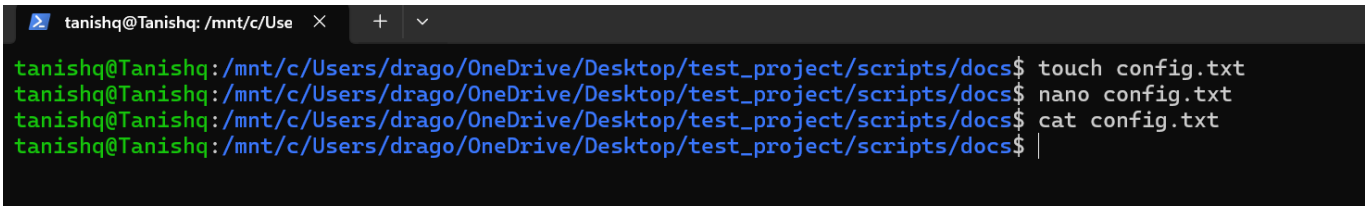
Command(s):

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

Alternatively

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

Output:



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:

```
PS C:\Users\drago\OneDrive\Desktop> wsl
tanishq@Tanishq:/mnt/c/Users/drago/OneDrive/Desktop$ mkdir scripts
tanishq@Tanishq:/mnt/c/Users/drago/OneDrive/Desktop$ touch system_info.txt
tanishq@Tanishq:/mnt/c/Users/drago/OneDrive/Desktop$ echo "Username" >> system
tanishq@Tanishq:/mnt/c/Users/drago/OneDrive/Desktop$ echo "Username" >> system_info.txt
tanishq@Tanishq:/mnt/c/Users/drago/OneDrive/Desktop$ date >> system_info.txt
tanishq@Tanishq:/mnt/c/Users/drago/OneDrive/Desktop$ pwd >> system_info.txt
tanishq@Tanishq:/mnt/c/Users/drago/OneDrive/Desktop$ echo "Disk usage" >> system_info.txt
tanishq@Tanishq:/mnt/c/Users/drago/OneDrive/Desktop$ df .h >> system_info.txt
df: .h: No such file or directory
tanishq@Tanishq:/mnt/c/Users/drago/OneDrive/Desktop$ cat system_info.txt
Username
Wed Oct 29 11:02:44 UTC 2025
/mnt/c/Users/drago/OneDrive/Desktop
Disk usage
tanishq@Tanishq:/mnt/c/Users/drago/OneDrive/Desktop$
```

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:

```
friday@friday-VirtualBox: ~/Desktop/Om
friday@friday-VirtualBox:~/Desktop/Om$ cp readme.txt todo.txt scripts/
friday@friday-VirtualBox:~/Desktop/Om$ ls -la
total 24
drwxrwxr-x 3 friday friday 4096 Sep 26 12:37 .
drwxr-xr-x 9 friday friday 4096 Sep 26 12:04 ..
-rw-rw-r-- 1 friday friday    7 Sep 26 12:26 config.txt
-rw-rw-r-- 1 friday friday    0 Sep 26 12:37 readme.txt
drwxrwxr-x 2 friday friday 4096 Sep 26 12:37 scripts
-rw-rw-r-- 1 friday friday   10 Sep 26 12:30 system
-rw-rw-r-- 1 friday friday  441 Sep 26 12:34 system_info.txt
-rw-rw-r-- 1 friday friday    0 Sep 26 12:37 todo.txt
friday@friday-VirtualBox:~/Desktop/Om$
```

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.]

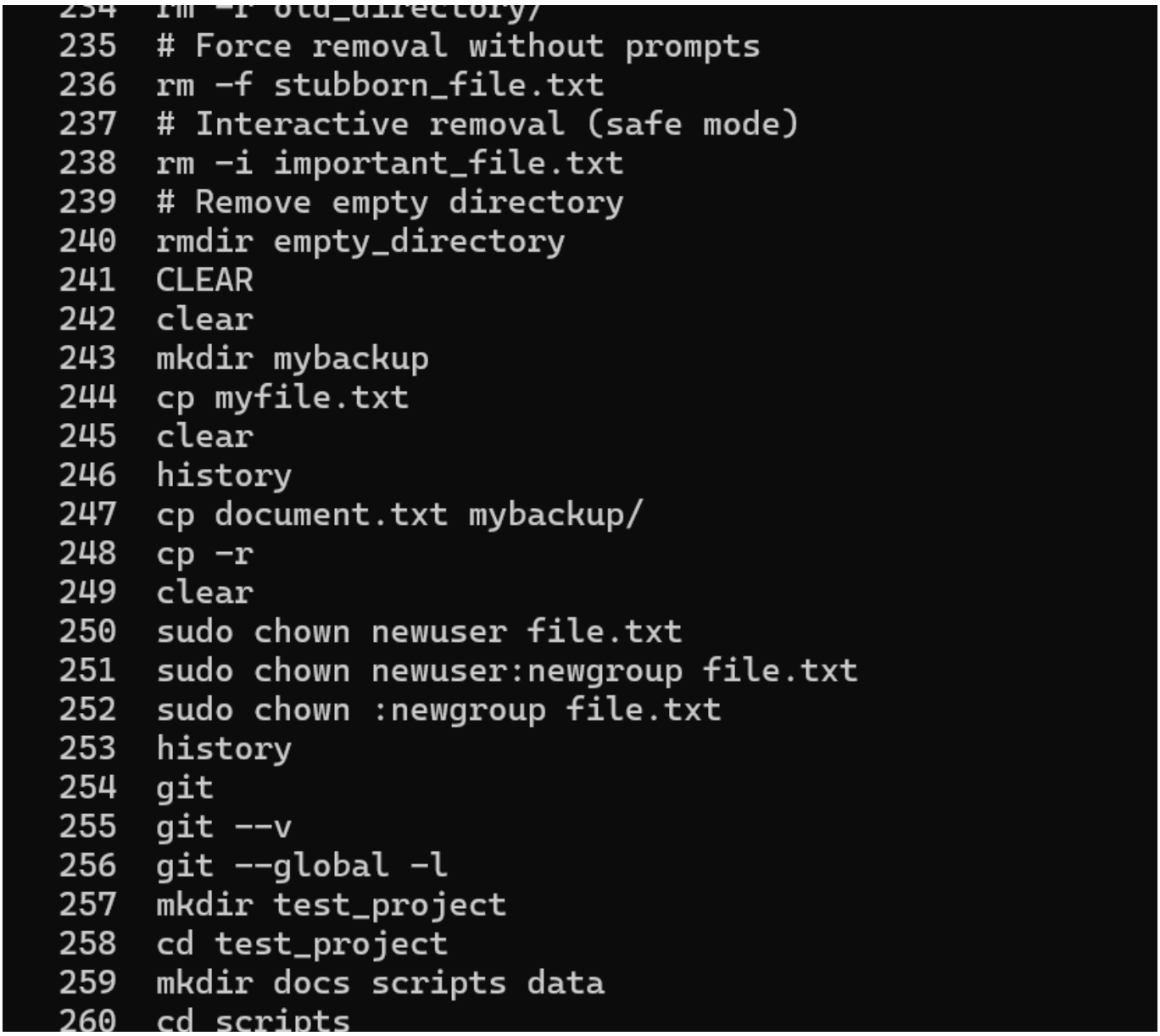
Explanation:

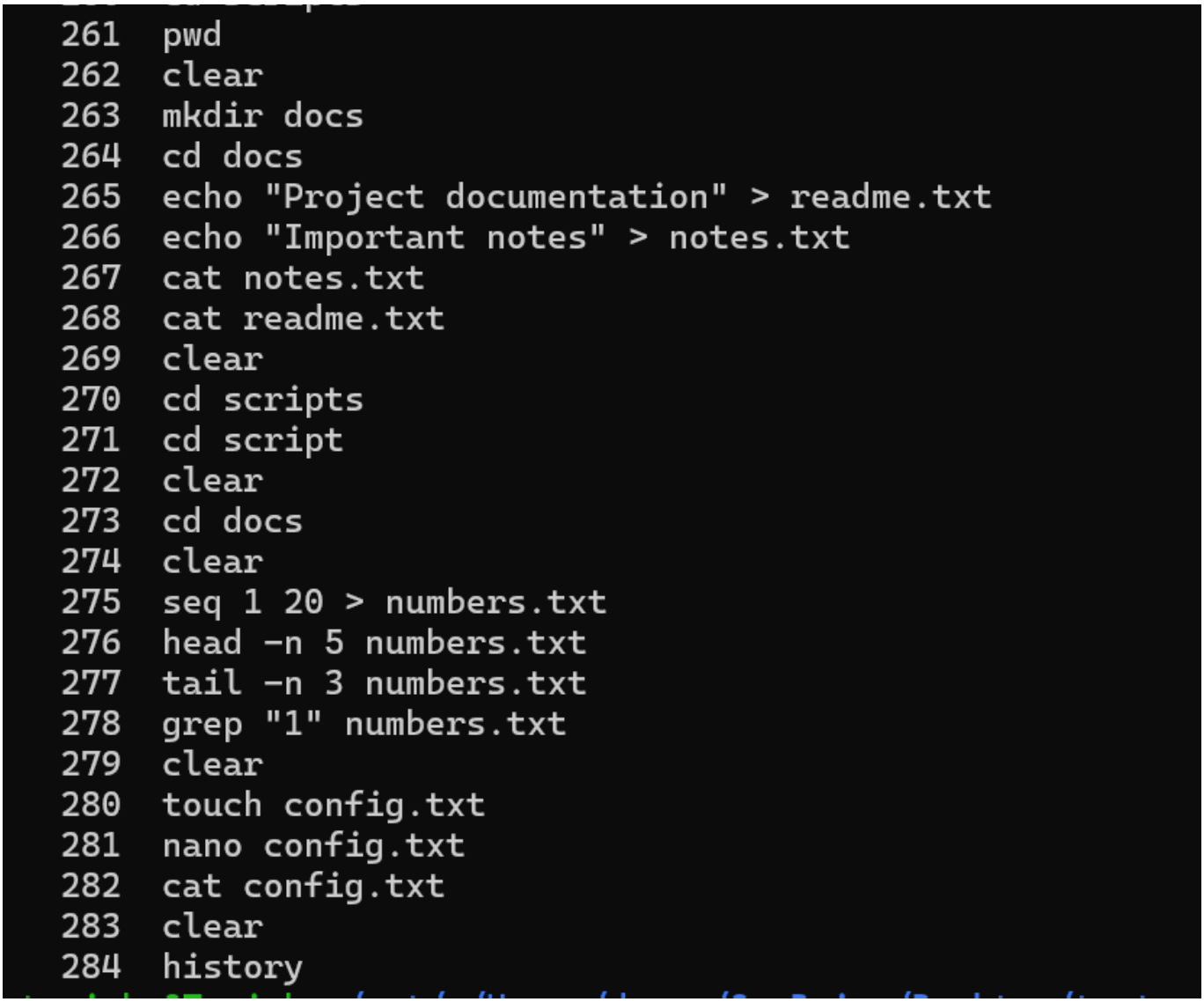
- [I can use history to see all the commands I've typed. To count the total number of commands, I use history | wc -l. If I want to view just the last 10 commands, I can use history 10 or history | tail -10. The wc -l command simply counts the number of lines in the output.]

Command(s):

```
history 10
```

Output:





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: