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1. Introduction

Unix is a powerful, multiuser, multitasking operating system initially developed in the 1960s by Ken Thompson, Dennis Ritchie. Unix is known for its simplicity, portability and robust security features. Later on Unix become the foundation for popular OS like linux and macOS.

The concepts of hierarchical file systems, process management and inter process communication was introduced by Unix. Unix empowers users to perform complex operations by combining commands and its legacy is still continues to influence operating systems globally. (Abraham Silberschatz, 2021)

2. Objectives

The aim of this report is to check some basic and essential Linux commands that will assist in interacting with the system, detecting the user, and file management. In this practical exercise, you will try to master the basic of such operations in linux as creating or editing files, concatenating multiple files, fetching information about the system and utilizing logging utilities like the script command efficiently. The steps documented in the report will also aid in understanding and replicating these tasks in similar environments.

To use ls, ls -a and ls -al command to understand the file listing including hidden files and detailed information about files.

To check for the file existences and contents.

To learn to merge multiple files into one.

To use the date command to display the current date and time.

To understand how to finish and save the session using the script command.

3. Required tools and software's

3.1 kali Linux

kali Linux is a Debian-based GNU/Linux distribution to be used for penetration testing, digital forensics and ethical hacking. Originally created by offensive security and released in 2013 as the replacement for BackTrack, Kali Linux provides an extensive collection for tools used for penetration testing, security auditing, and more all of which come pre-installed. Because of its missing lettuce, extensive compatibility and support for a broad variety of hardware platforms Kali has been one of the go to platforms for security test research for both academic and profession world. (Wills, 2020)

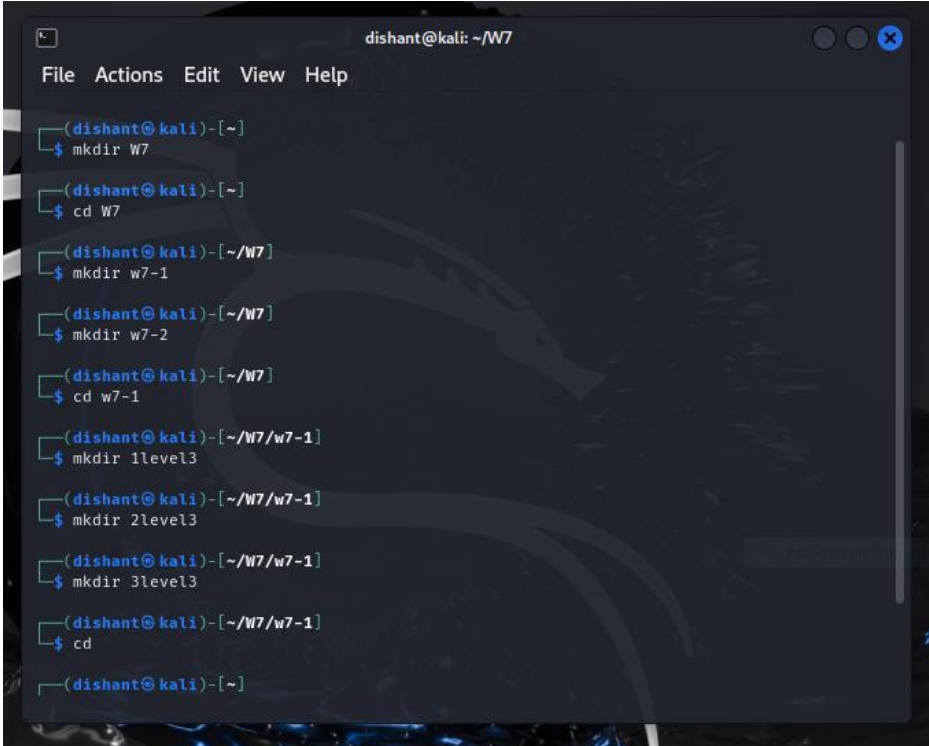
3.2 Oracle VirtualBox

Oracle VirtualBox is a powerful open source virtualization program that allows to run multiple operating systems at the same time on one piece of hardware. It's versatile for testing, development and deployment, supporting multiple host and guest Operating Systems and is developed and supported by Oracle Corporation. (VirtualBox, n.d.)

4. Task in detail:

Here, we will do the task in prompt given by our tutor.

4.1 Creating directory using mkdir

A screenshot of a terminal window titled "dishant@kali: ~/W7". The terminal shows a series of commands and their outputs. The commands are: `mkdir W7`, `cd W7`, `mkdir w7-1`, `mkdir w7-2`, `cd w7-1`, `mkdir 1level3`, `mkdir 2level3`, `mkdir 3level3`, and `cd`. The prompt changes from `(dishant@kali)-[~]` to `(dishant@kali)-[~/W7]` and then to `(dishant@kali)-[~/W7/w7-1]` as the user navigates through the directory structure.

```
dishant@kali: ~/W7
File Actions Edit View Help

(dishant@kali)-[~]
$ mkdir W7

(dishant@kali)-[~]
$ cd W7

(dishant@kali)-[~/W7]
$ mkdir w7-1

(dishant@kali)-[~/W7]
$ mkdir w7-2

(dishant@kali)-[~/W7]
$ cd w7-1

(dishant@kali)-[~/W7/w7-1]
$ mkdir 1level3

(dishant@kali)-[~/W7/w7-1]
$ mkdir 2level3

(dishant@kali)-[~/W7/w7-1]
$ mkdir 3level3

(dishant@kali)-[~/W7/w7-1]
$ cd

(dishant@kali)-[~]
```

Figure 1: creating directory using mkdir

4.2 Changing directory by one step

```
(dishant@kali)~[/W7]
$ cd w7-1

(dishant@kali)~[/W7/w7-1]
$ ls
1level3 2level3 3level3

(dishant@kali)~[/W7/w7-1]
$ cd ..
cd..: command not found

(dishant@kali)~[/W7/w7-1]
$ cd ..
```

Figure 2: changing directory by one step

4.3 Changing directory using relative path

```
dishant@kali: ~/W7/w7-2/4level3
File Actions Edit View Help
$ mkdir -p w7-2/4level3

(dishant@kali)~[/W7]
$ ls
w7-1 w7-2

(dishant@kali)~[/W7]
$ cd w7/w7-1
-bash: cd: w7/w7-1: No such file or directory

(dishant@kali)~[/W7]
$ cd w7-1/1level3

(dishant@kali)~[/W7/w7-1/1level3]
$ ../2level3
-bash: ../2level3: Is a directory

(dishant@kali)~[/W7/w7-1/1level3]
$ ../2level3
-bash: ../2level3: Is a directory

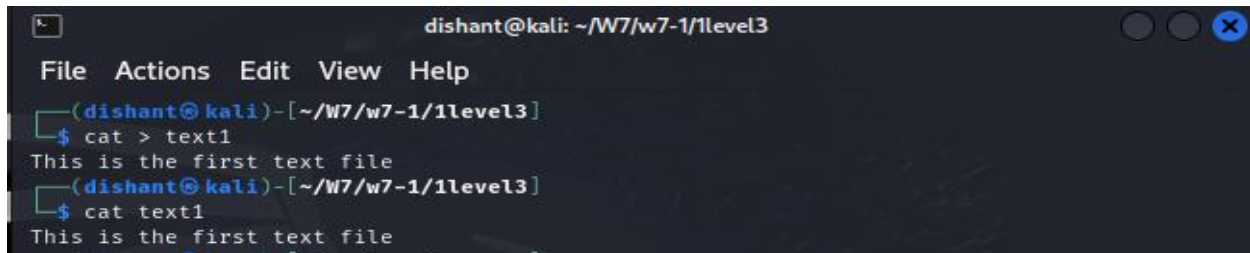
(dishant@kali)~[/W7/w7-1/1level3]
$ cd ../2level3

(dishant@kali)~[/W7/w7-1/2level3]
$ cd ../ ../w7-2/4level3

(dishant@kali)~[/W7/w7-2/4level3]
$
```

Figure 3: changing directory using relative path

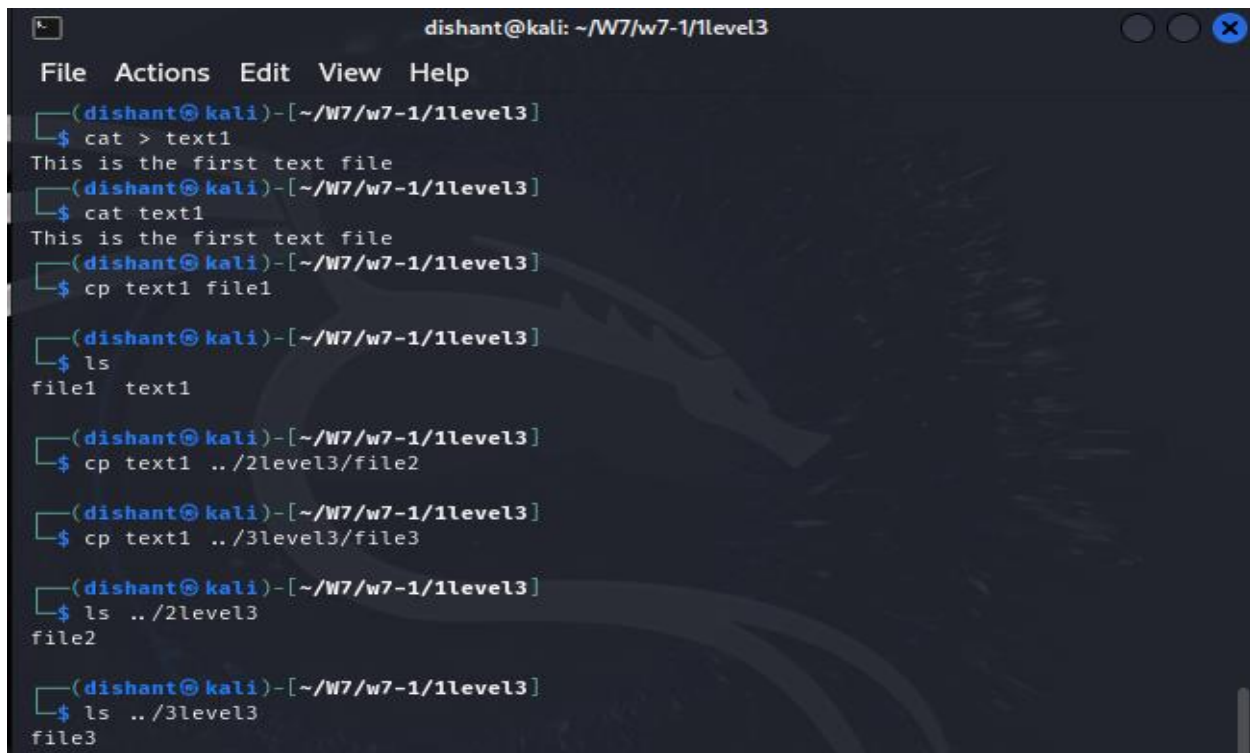
4.4 Creating a text file in 1level3



```
dishant@kali: ~/W7/w7-1/1level3
File Actions Edit View Help
(dishant@kali)-[~/W7/w7-1/1level3]
$ cat > text1
This is the first text file
(dishant@kali)-[~/W7/w7-1/1level3]
$ cat text1
This is the first text file
```

Figure 4: creating a text file in 1level3

4.5 Coping text file from 1level3 to other directory



```
dishant@kali: ~/W7/w7-1/1level3
File Actions Edit View Help
(dishant@kali)-[~/W7/w7-1/1level3]
$ cat > text1
This is the first text file
(dishant@kali)-[~/W7/w7-1/1level3]
$ cat text1
This is the first text file
(dishant@kali)-[~/W7/w7-1/1level3]
$ cp text1 file1

(dishant@kali)-[~/W7/w7-1/1level3]
$ ls
file1 text1

(dishant@kali)-[~/W7/w7-1/1level3]
$ cp text1 ../2level3/file2

(dishant@kali)-[~/W7/w7-1/1level3]
$ cp text1 ../3level3/file3

(dishant@kali)-[~/W7/w7-1/1level3]
$ ls ../2level3
file2

(dishant@kali)-[~/W7/w7-1/1level3]
$ ls ../3level3
file3
```

Figure 5: coping text file from 1level3 to other directory

4.6 Moving file from 1level3 to 4level3

```
(dishant@kali)-[~/W7/w7-1]
$ mv file1 ../w7-2/4level3

(dishant@kali)-[~/W7/w7-1]
$
```

Figure 6: moving file1 to 4level3

4.7 Printing text using echo

```
(dishant@kali)-[~/W7/w7-1/1level3]
$ echo Hello! I can do it
Hello! I can do it

(dishant@kali)-[~/W7/w7-1/1level3]
$ echo "5>(20:8)<(30*2)"
5>(20:8)<(30*2)

(dishant@kali)-[~/W7/w7-1/1level3]
$ echo -e "line1 \n line2 \n na-b, A-B, -, +, <, >, #, $, %, &."
line1
line2
na-b, A-B, -, +, <, >, #, $, %, &.
```

Figure 7: printing text using echo

4.8 Using ls command without option and with a,d,g,i,R


```

dishant@kali: ~/W7/w7-1/level3
File Actions Edit View Help
(dishant@kali)-[~]
$ ls
alscript    combinedTest  Documents  file1  Music  Public  Test  test2  W7
combinedFiles Desktop      Downloads  file2  Pictures Templates test1  Videos

(dishant@kali)-[~]
$ ls -a
.          .face          test2
..         .face.icon     .vboxclient-clipboard-tty8-control.pid
alscript   file1          .vboxclient-clipboard-tty8-service.pid
.bash_history file2         .vboxclient-display-svga-x11-tty8-control.pid
.bash_logout .gnupg        .vboxclient-draganddrop-tty8-control.pid
.bashrc     .ICEauthority .vboxclient-draganddrop-tty8-service.pid
.bashrc.original .java        .vboxclient-hostversion-tty8-control.pid
.cache      .local        .vboxclient-seamless-tty8-control.pid
combinedFiles Music         .vboxclient-seamless-tty8-service.pid
combinedTest Pictures      .vboxclient-vmvga-session-tty8-control.pid
.config     .profile     Videos
Desktop     Public       W7
.dmrc       Templates
Documents   Test
Downloads   test1
            .Xauthority
            .xsession-errors
            .zshrc

(dishant@kali)-[~]
$ ls -d
.

(dishant@kali)-[~]
$ ls -g

```

Figure 8: using ls command in home directory

```

(dishant@kali)-[~]
$ ls -d
.

(dishant@kali)-[~]
$ ls -g
total 72
-rw-rw-r-- 1 dishant 7977 Dec 13 22:42 alscript
-rw-rw-r-- 1 dishant  83 Dec 13 22:39 combinedFiles
-rw-rw-r-- 1 dishant  72 Dec 12 01:11 combinedTest
drwxr-xr-x 2 dishant 4096 Dec 20 20:57 Desktop
drwxr-xr-x 2 dishant 4096 Dec 20 20:57 Documents
drwxr-xr-x 2 dishant 4096 Dec 20 20:57 Downloads
-rw-rw-r-- 1 dishant  24 Dec 13 22:37 file1
-rw-rw-r-- 1 dishant  59 Dec 13 22:38 file2
drwxr-xr-x 2 dishant 4096 Dec 20 20:57 Music
drwxr-xr-x 2 dishant 4096 Dec 20 21:12 Pictures
drwxr-xr-x 2 dishant 4096 Dec 20 20:57 Public
drwxr-xr-x 2 dishant 4096 Dec 20 20:57 Templates
-rw-rw-r-- 1 dishant  75 Dec 15 00:41 Test
-rw-rw-r-- 1 dishant  19 Dec 12 01:08 test1
-rw-rw-r-- 1 dishant  53 Dec 12 01:11 test2
drwxr-xr-x 2 dishant 4096 Dec 20 20:57 Videos
drwxrwxr-x 4 dishant 4096 Dec 20 21:07 W7

```

Figure 9: using ls with options in home directory

```

dishant@kali: ~/W7/w7-1/level3
File Actions Edit View Help
(dishant@kali)-[~]
$ ls -l
total 72
-rw-rw-r-- 1 dishant dishant 7977 Dec 13 22:42 alscript
-rw-rw-r-- 1 dishant dishant 83 Dec 13 22:39 combinedFiles
-rw-rw-r-- 1 dishant dishant 72 Dec 12 01:11 combinedTest
drwxr-xr-x 2 dishant dishant 4096 Dec 20 20:57 Desktop
drwxr-xr-x 2 dishant dishant 4096 Dec 20 20:57 Documents
drwxr-xr-x 2 dishant dishant 4096 Dec 20 20:57 Downloads
-rw-rw-r-- 1 dishant dishant 24 Dec 13 22:37 file1
-rw-rw-r-- 1 dishant dishant 59 Dec 13 22:38 file2
drwxr-xr-x 2 dishant dishant 4096 Dec 20 20:57 Music
drwxr-xr-x 2 dishant dishant 4096 Dec 20 21:12 Pictures
drwxr-xr-x 2 dishant dishant 4096 Dec 20 20:57 Public
drwxr-xr-x 2 dishant dishant 4096 Dec 20 20:57 Templates
-rw-rw-r-- 1 dishant dishant 75 Dec 15 00:41 Test
-rw-rw-r-- 1 dishant dishant 19 Dec 12 01:08 test1
-rw-rw-r-- 1 dishant dishant 53 Dec 12 01:11 test2
drwxr-xr-x 2 dishant dishant 4096 Dec 20 20:57 Videos
drwxrwxr-x 4 dishant dishant 4096 Dec 20 21:07 W7

(dishant@kali)-[~]
$ ls -r
W7      test1      Public    file2      Documents  combinedFiles
Videos  Test       Pictures  file1      Desktop    alscript
test2   Templates Music     Downloads combinedTest

(dishant@kali)-[~]
$ pwd

```

Figure 10: using ls with options in home directory

```

(dishant@kali)-[~/W7]
$ ls
w7-1  w7-2

(dishant@kali)-[~/W7]
$ ls -a
.  ..  w7-1  w7-2

(dishant@kali)-[~/W7]
$ ls -d
.

(dishant@kali)-[~/W7]
$ ls -g
total 8
drwxrwxr-x 5 dishant 4096 Dec 20 21:08 w7-1
drwxrwxr-x 4 dishant 4096 Dec 20 21:35 w7-2

(dishant@kali)-[~/W7]
$ ls -l
total 8
drwxrwxr-x 5 dishant dishant 4096 Dec 20 21:08 w7-1
drwxrwxr-x 4 dishant dishant 4096 Dec 20 21:35 w7-2

(dishant@kali)-[~/W7]
$ ls -R
.:
w7-1  w7-2

```

Figure 11: using ls options in W7 directory

```

(dishant@kali)-[~/W7]
$ ls -R
.:
w7-1  w7-2

./w7-1:
1level3  2level3  3level3

./w7-1/1level3:
text1

./w7-1/2level3:
file2

./w7-1/3level3:
file3

./w7-2:
4level3  file4  W7

./w7-2/4level3:

./w7-2/W7:
w7-11level3  w7-12level3  w7-13level3

./w7-2/W7/w7-11level3:

./w7-2/W7/w7-12level3:

./w7-2/W7/w7-13level3:

(dishant@kali)-[~/W7]
$ cd w7-1

(dishant@kali)-[~/W7/w7-1]
$ ls

```

Figure 12: using ls with options in W7 directory

```

(dishant@kali)-[~/W7/w7-1]
$ ls
1level3  2level3  3level3

(dishant@kali)-[~/W7/w7-1]
$ ls -a
.  ..  1level3  2level3  3level3

(dishant@kali)-[~/W7/w7-1]
$ ls -d
.

(dishant@kali)-[~/W7/w7-1]
$ ls -g
total 12
drwxrwxr-x 2 dishant 4096 Dec 20 21:35 1level3
drwxrwxr-x 2 dishant 4096 Dec 20 21:30 2level3
drwxrwxr-x 2 dishant 4096 Dec 20 21:30 3level3

(dishant@kali)-[~/W7/w7-1]
$ ls -l
total 12
drwxrwxr-x 2 dishant dishant 4096 Dec 20 21:35 1level3
drwxrwxr-x 2 dishant dishant 4096 Dec 20 21:30 2level3
drwxrwxr-x 2 dishant dishant 4096 Dec 20 21:30 3level3

```

Figure 13: using ls options in w7-1 directory

Without options (ls): lists files like myfile.txt, file1 or whatever file exist in 1level3

With -a (ls -a): shows hidden files

With -d (ls -d): lists only the directory itself, not its contents.

With -g (ls -g): omits the owner column in the detailed listing.

With -l (ls -l): provides detailed information, such as file permissions, size and timestamps.

With -R (ls -R): lists the contents of the directory recursively, including all subdirectories and their contents.

4.9 Removin directory files w7-2, 3level3, 4level4 and all other ordinary files.

```
$ rm -i 4level3/*
rm: cannot remove '4level3/*': No such file or directory

(dishant@kali)-[~/W7/w7-2]
$ rmdir 4level3

(dishant@kali)-[~/W7/w7-2]
$ cd ../

(dishant@kali)-[~/W7]
$ rmdir w7-2

(dishant@kali)-[~/W7]
$ cd w7-1

(dishant@kali)-[~/W7/w7-1]
$ cd 3level3

(dishant@kali)-[~/W7/w7-1/3level3]
$ rm -i *
rm: remove regular file 'file3'? y

(dishant@kali)-[~/W7/w7-1/3level3]
$ cd ..

(dishant@kali)-[~/W7/w7-1]
$ rmdir 3level3

(dishant@kali)-[~/W7/w7-1]
```

Figure 14: removing ordinary files and directories

```
(dishant@kali)-[~/W7]
$ ls -R
.:
w7-1

./w7-1:
1level3  2level3

./w7-1/1level3:
file1

./w7-1/2level3:
file2
```

Figure 15: ordinary files and specific directory removed

4.10 Manipulating access permissions

- Display access permissions for the file1 in 1level3.

```
(dishant@kali)-[~/W7/w7-1]
$ ls -l 1level3/*
-rw-rw-r-- 1 dishant dishant 19 Dec 20 22:08 1level3/file1
```

Figure 16: access permissions of file 1

- Remove all access permissions for this file.
- Display access permissions for this file

```
(dishant@kali)-[~/W7/w7-1]
$ chmod 000 1level3/file1

(dishant@kali)-[~/W7/w7-1]
$ ls -l 1level3/*
----- 1 dishant dishant 19 Dec 20 22:08 1level3/file1
```

Figure 17: Removing all access permission and displaying it

- Try to read this file using any utility
- Try to write into this file using any utility

```
(dishant@kali)-[~/W7/w7-1]
$ cat 1level3/file1
cat: 1level3/file1: Permission denied
```

Figure 18: trying to read file1

```
(dishant@kali)-[~/W7/w7-1/1level3]
$ cat >> file1
bash: file1: Permission denied
```

Figure 19: trying to write into file1

- Add read and write access permissions for yourself for this file.
- Display access permissions for this file.

```
(dishant@kali)-[~/W7/w7-1/1level3]
$ chmod 600 file1

(dishant@kali)-[~/W7/w7-1/1level3]
$ ls -l
total 4
-rw----- 1 dishant dishant 27 Dec 20 22:37 file1
```

Figure 20: adding read and write access and displaying it

- Try to read this file using any utility.
- Try to write into this file using any utility

```
(dishant@kali)-[~/W7/w7-1/1level3]
$ cat file1
tired to doing logs

(dishant@kali)-[~/W7/w7-1/1level3]
$ cat >> file1
finally about to finish
```

Figure 21: reading and appending text in file1

- Display access permissions of 1level3

```
(dishant@kali)-[~/W7/w7-1]
$ ls -l
total 8
drwxrwxrwx 2 dishant dishant 4096 Dec 20 22:07 1level3
drwxrwxr-x 2 dishant dishant 4096 Dec 20 21:30 2level3
```

Figure 22: access permission of 1level3

- Remove all access permissions for the 1level3 directory.
- Display access permissions for 1level3.

```
(dishant@kali)-[~/W7/w7-1]
$ ls -l
total 8
d----- 2 dishant dishant 4096 Dec 20 22:07 1level3
drwxrwxr-x 2 dishant dishant 4096 Dec 20 21:30 2level3
```

Figure 23: removing all access permissions for 1level3 directing and displaying

- Try to read a file form 1level3 using any utility.
- Try to put a file into 1level3 using any utility
- Try to search in 1level3 using any command.

```
(dishant@kali)-[~/W7/w7-1]
$ cat 1level3/file1
cat: 1level3/file1: Permission denied

(dishant@kali)-[~/W7/w7-1]
$ cat > 1level3/file2
bash: 1level3/file2: Permission denied
```

Figure 24: trying to read and add file in 1level3 directory

```
(dishant@kali)-[~/W7/w7-1]
$ ls 1level3
ls: cannot open directory '1level3': Permission denied
```

Figure 25: trying to search in 1level3 directory

- Add read, write and execute access permissions for yourself for the 1level3 directory.
- Display access permissions for 1level3 directory.


```
(dishant@kali)-[~/W7/w7-1]
$ chmod 700 1level3

(dishant@kali)-[~/W7/w7-1]
$ ls -l
total 12
drwx----- 2 dishant dishant 4096 Dec 20 22:07 1level3
drwxrwxr-x 2 dishant dishant 4096 Dec 20 21:30 2level3
-rw-rw-r-- 1 dishant dishant 1 Dec 21 10:47 file2
```

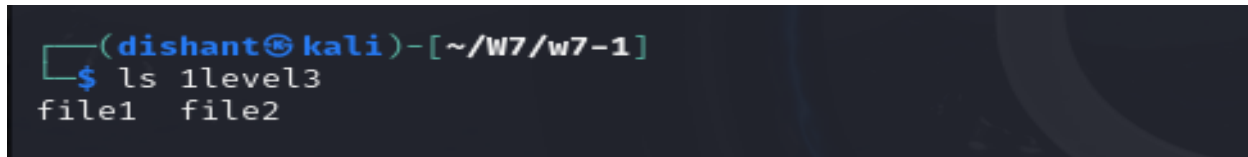
Figure 26: adding read, write and execute permission to user and displaying it

- Try to read a file from 1level3 using any utility.
- Try to put a file into 1level3 using any utility.
- Try to search in 1level3 using any command.

```
(dishant@kali)-[~/W7/w7-1]
$ cat 1level3/file1
tired to doing logs
finally about to finish

(dishant@kali)-[~/W7/w7-1]
$ echo "i'm spiderman" > 1level3/file2
```

Figure 27: reading file1 and adding file2 in 1level3



```
(dishant@kali) - [~/W7/w7-1]  
$ ls 1level3  
file1 file2
```

Figure 28: searching in 1level3 directory

5. Conclusion

In this lab, we learned more about working with files and directories in Linux, including understanding how to read and write directory files. Key skills gained include creating, modifying, and deleting files/directories, managing file accessibility, and restricting access to enhance security and efficiency in system administration

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