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I confirm that I understand my coursework needs to be submitted online via Google Classroom under the relevant module page before the deadline in order for my assignment to be accepted and marked. I am fully aware that late submissions will be treated as non-submission and a mark of zero will be awarded.

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1 Introduction

1.1 Ubuntu Linux:

Ubuntu is a free, open-source operating system OS based on Debian Linux (Sheldon, 2023). It was first released in 2004 when Mark Shuttleworth and a small team of Debian developers founded Canonical and then launched the Ubuntu project (Sheldon, 2023). Canonical released its first official version of the OS Ubuntu 4.10 in October 2004 (Sheldon, 2023). The word ubuntu comes from the southern African Nguni languages and translates as humanity to others (Sheldon, 2023). Canonical set out to build a desktop OS that was easier to use than Debian or other Linux Distributions (Sheldon, 2023). Its effort has proven to be successful, and Ubuntu is still considered a good distribution for beginners (Sheldon, 2023).

1.2 Workshop Task:

In this workshop, we focus on practicing fundamental UNIX/Linux commands for directory management, file operations, text output, directory listing, and file and directory permissions. Creating a directory structure, using relative paths to navigate, creating, copying, moving, and deleting files, printing text using shell commands, utilizing various ls options, and comprehending how file and directory permissions impact access and operations are all part of the task.

1.3 Aim and Objective:

The aim of this workshop is to develop practical skills in using UNIX utilities to manage files and directories, navigate the file system efficiently using relative paths, and understand the role of permissions in securing files and directories.

The main Objective of this workshop class are:

To create and manage directory structures using mkdir.

- To navigate between directories using relative pathnames.
- To create, copy, move, and remove files using standard UNIX commands.
- To display directory contents using various ls options.
- To print text output using echo and printf.
- To understand and modify file and directory access permissions.

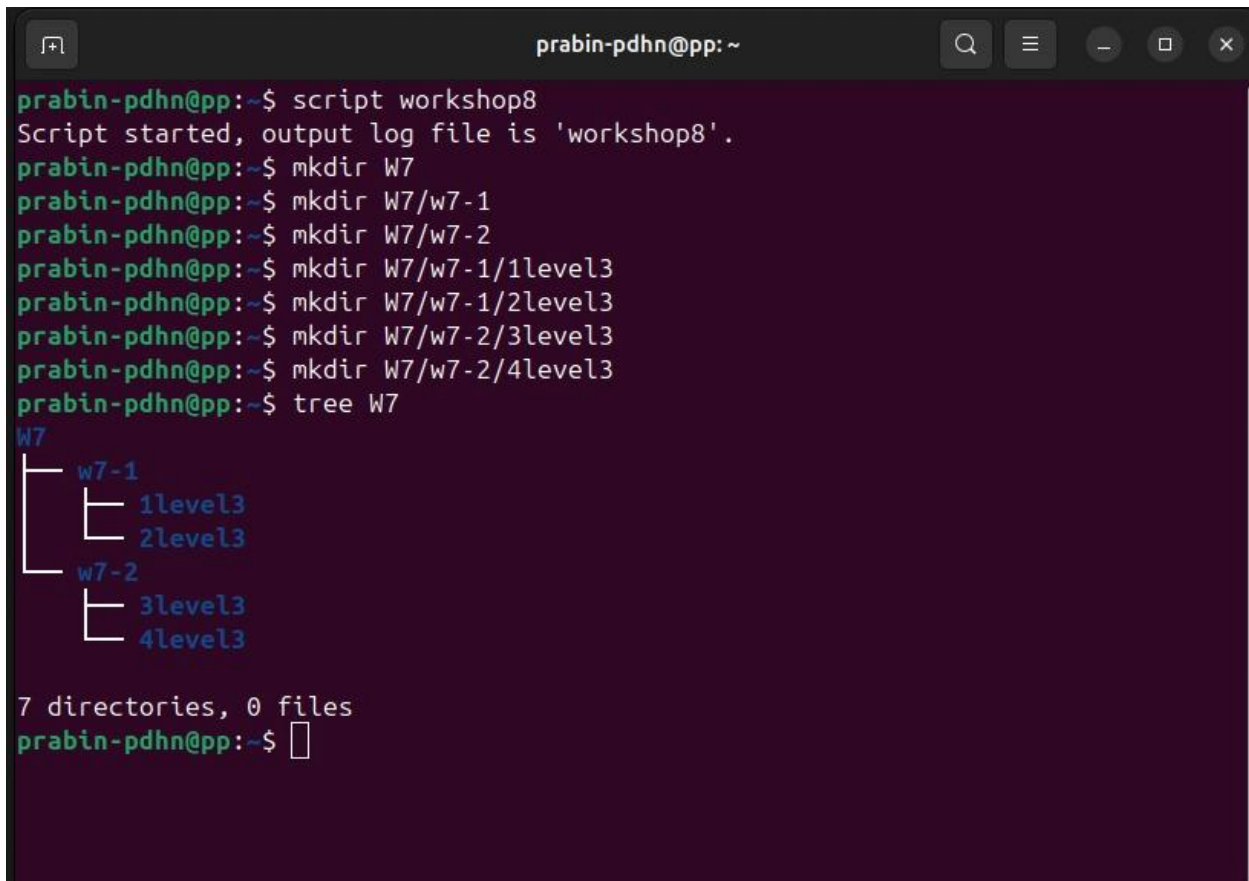
2 Commands with Explanation:

1 Create the directory structure presented in the figure below. Use **mkdir** command and relative pathnames from your home directory. Try both: no option and **-p** option, for the command.

Used to create directories.

Without options: creates one directory at a time.

With **-p**: creates parent and child directories in one command if they do not exist.



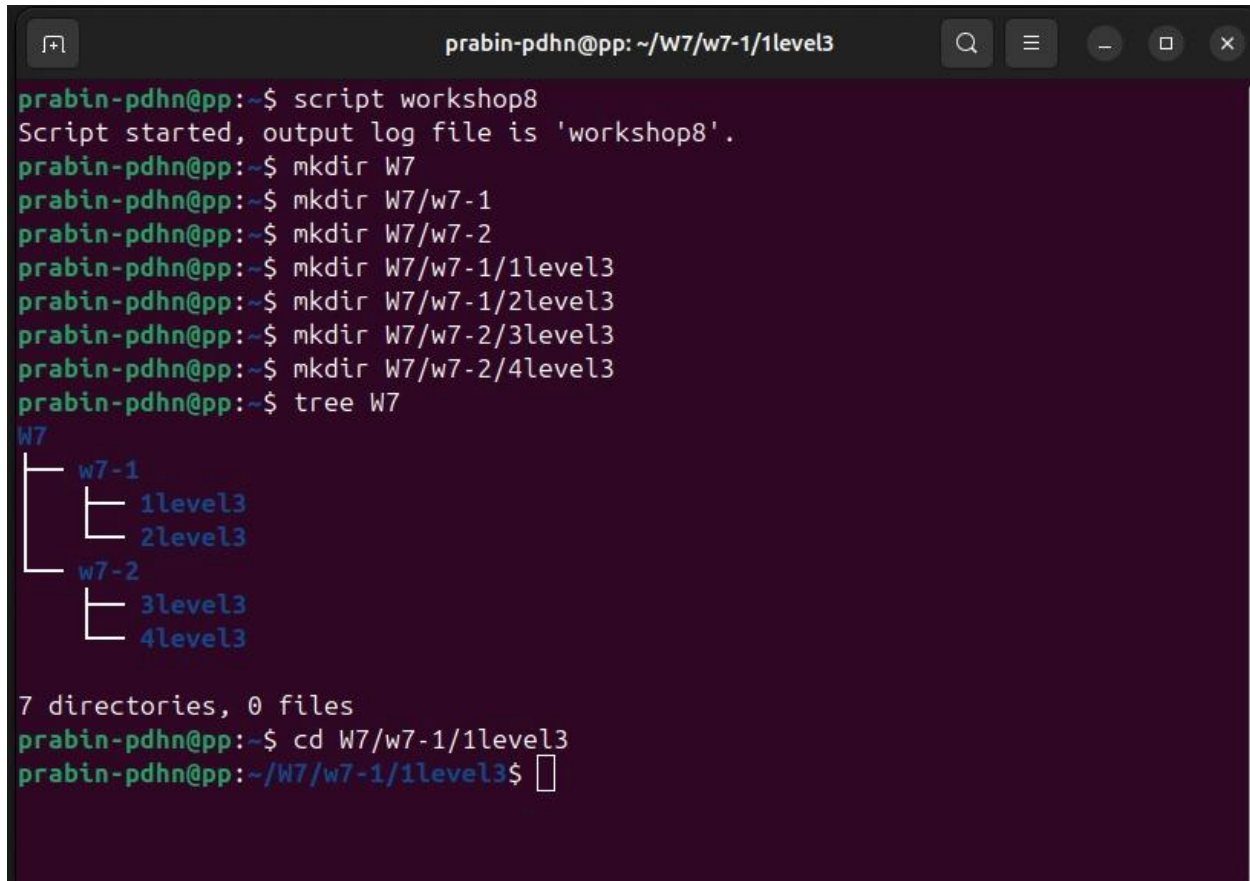
```
prabin-pdhn@pp: ~  
prabin-pdhn@pp:~$ script workshop8  
Script started, output log file is 'workshop8'.  
prabin-pdhn@pp:~$ mkdir W7  
prabin-pdhn@pp:~$ mkdir W7/w7-1  
prabin-pdhn@pp:~$ mkdir W7/w7-2  
prabin-pdhn@pp:~$ mkdir W7/w7-1/1level3  
prabin-pdhn@pp:~$ mkdir W7/w7-1/2level3  
prabin-pdhn@pp:~$ mkdir W7/w7-2/3level3  
prabin-pdhn@pp:~$ mkdir W7/w7-2/4level3  
prabin-pdhn@pp:~$ tree W7  
W7  
├── w7-1  
│   ├── 1level3  
│   └── 2level3  
└── w7-2  
    ├── 3level3  
    └── 4level3  
  
7 directories, 0 files  
prabin-pdhn@pp:~$
```

Figure 1: Parent and Child directories

2 Change to the 1level3 directory by one step using a relative pathname.

Used to change the current working directory.

Relative paths allow moving step by step or directly between directories.

A terminal window titled 'prabin-pdhn@pp: ~/W7/w7-1/1level3' with standard window controls. The terminal shows a script named 'workshop8' being executed. The script starts by creating a directory 'W7', then 'W7/w7-1', and 'W7/w7-2'. It then creates four subdirectories: 'W7/w7-1/1level3', 'W7/w7-1/2level3', 'W7/w7-2/3level3', and 'W7/w7-2/4level3'. A 'tree W7' command is run, showing the directory structure. The output indicates 7 directories and 0 files. Finally, the user navigates to 'W7/w7-1/1level3' using 'cd' and then to the relative path '~/W7/w7-1/1level3' using 'cd' again.

```
prabin-pdhn@pp:~$ script workshop8
Script started, output log file is 'workshop8'.
prabin-pdhn@pp:~$ mkdir W7
prabin-pdhn@pp:~$ mkdir W7/w7-1
prabin-pdhn@pp:~$ mkdir W7/w7-2
prabin-pdhn@pp:~$ mkdir W7/w7-1/1level3
prabin-pdhn@pp:~$ mkdir W7/w7-1/2level3
prabin-pdhn@pp:~$ mkdir W7/w7-2/3level3
prabin-pdhn@pp:~$ mkdir W7/w7-2/4level3
prabin-pdhn@pp:~$ tree W7
W7
├── w7-1
│   ├── 1level3
│   └── 2level3
└── w7-2
    ├── 3level3
    └── 4level3

7 directories, 0 files
prabin-pdhn@pp:~$ cd W7/w7-1/1level3
prabin-pdhn@pp:~/W7/w7-1/1level3$
```

Figure 2: Changed Directory using relative pathname

3 Practice in changing directories in your directory structure by one command using relative pathnames, e.g., from **1level3** to **2level3**, from **2level3** to **4level3**, from **4level3** to **W7**, etc. Use names of parent and child directories ('.' and '..') as well.

refers to the current directory.

.. refers to the parent directory.

```
prabin-pdhn@pp:~/W7/w7-1/1level3$ cd ../2level3
prabin-pdhn@pp:~/W7/w7-1/2level3$ cd ../../w7-2/4level3
prabin-pdhn@pp:~/W7/w7-2/4level3$ cd ../../
prabin-pdhn@pp:~/W7$
```

Figure 3: Change Current Directory

4 Change to **1level3** and create a text file by any tool (e.g., by **cat** or **touch** like last tutorial).

touch creates an empty file.

cat can create a file and add content to it.

```
^C
prabin-pdhn@pp:~/W7/w7-1/1level3$ cat > prabin.txt
Hi, i am doing workshop8
^C
prabin-pdhn@pp:~/W7/w7-1/1level3$
```

Figure 4: Create file using cat

5 Copy this text file from **1level3** to **1level3** (with the name **file1**), **2level3**, and to **3level3** changing its name. Show that there are these files in corresponding directories.

Allows copying the same file to multiple directories.

File names can be changed during copying

```
prabin-pdhn@pp:~$ ls ~/W7/w7-1/2level3/
prabin.txt
prabin-pdhn@pp:~$ ls ~/W7/w7-1/1level3/
file1 prabin prabin.txt
prabin-pdhn@pp:~$ ls ~/W7/w7-1/2level3/
prabin.txt
prabin-pdhn@pp:~$
```

Figure 5: Copy txt file

6 Move this file to **4level3**. Show that there is this file in **4level3** and there is not in **1level3**.

Used to move or rename files.

When a file is moved, it no longer exists in the original location.

```
prabin-pdhn@pp:~/W7/w7-1/1level3$ mv prabin.txt ~/W7/w7-2/4level3/
prabin-pdhn@pp:~/W7/w7-1/1level3$ ls ~/W7/w7-2/4level3
prabin.txt
prabin-pdhn@pp:~/W7/w7-1/1level3$
```

Figure 6: Moving file

7 Print the following texts each in one **echo** or **printf** command:

Hello! I can do it

5 > (20: 8) < (30 * 2)

Line 1 Line 2

a-b, A-B, -, +, <, >, #, \$, %, &.

```
prabin-pdhn@pp:~/W7/w7-1/1level3$ echo "Hello! I can do it"
Hello! I can do it
prabin-pdhn@pp:~/W7/w7-1/1level3$ echo '5 > (20: 8) < (30 * 2)'
5 > (20: 8) < (30 * 2)
prabin-pdhn@pp:~/W7/w7-1/1level3$ printf "Line 1\nLine 2\na-b, A-B, -, +, <, >,
#, $, %, &.\n"
Line 1
Line 2
a-b, A-B, -, +, <, >, #, $, %, &.
prabin-pdhn@pp:~/W7/w7-1/1level3$
```

Figure 7: Printing Text using echo

8 Give the **ls** command (without options and with **a**, **d**, **g**, **l**, **R** options) in home directory, **w7**, **w7-1**, and **1level3** directories. Explain for yourself the results received.

Used to list directory contents.

-ls command

```
prabin-pdhn@pp:~$ ls
7          Downloads  Os          prabin1    Python     Videos    workshop8
Desktop    Laptop            Pictures    pt         snap       W7
Documents  Music            prabin     Public     Templates  week
```



```
prabin-pdhn@pp:~/W7/w7-1$ ls
1level3 2level3
prabin-pdhn@pp:~/W7/w7-1$
```

```
drwxrwxr-x 2 prabin-pdhn prabin-pdhn 4096 Dec 15 09:55 2level3
prabin-pdhn@pp:~/W7/w7-1$ cd 1level3
prabin-pdhn@pp:~/W7/w7-1/1level3$ ls
file1 prabin
prabin-pdhn@pp:~/W7/w7-1/1level3$
```

Figure 8: ls

-a: shows hidden files.

```
prabin-pdhn@pp:~$ ls -a
.      Documents  .nv      Public    Videos
..     .dotnet      0s       Python    .vscode
7      Downloads  .packettracer snap       W7
.bash_history .gnome      Pictures  .ssh       week
.bash_logout .gnupg      .pki      .steam     workshop8
.bashrc      Laptop      prabin    .steampath
.cache       .lessht     prabin1   .steampid
.config      .local      .profile  .sudo_as_admin_successful
Desktop     Music       pt        Templates
```

```
prabin-pdhn@pp:~/W7$ ls -a
.  ..  w7-1  w7-2
prabin-pdhn@pp:~/W7$
```

```
prabin-pdhn@pp:~/W7/w7-1/1level3$ ls
file1 prabin
prabin-pdhn@pp:~/W7/w7-1/1level3$ ls -a
.  ..  file1 prabin
prabin-pdhn@pp:~/W7/w7-1/1level3$
```

Figure 9: Shows hidden files

-l: shows detailed information.

```
prabin-pdhn@pp:~$ ls -l
total 104
drwxrwxr-x 2 prabin-pdhn prabin-pdhn 4096 Dec  4 21:34 7
drwxr-xr-x 2 prabin-pdhn prabin-pdhn 4096 Dec  4 23:42 Desktop
drwxr-xr-x 3 prabin-pdhn prabin-pdhn 4096 Dec  4 21:41 Documents
drwxr-xr-x 2 prabin-pdhn prabin-pdhn 4096 Dec 15 09:19 Downloads
drwxrwxr-x 4 prabin-pdhn prabin-pdhn 4096 Dec 12 10:32 Laptop
drwxr-xr-x 2 prabin-pdhn prabin-pdhn 4096 Dec  5 01:41 Music
drwxrwxr-x 2 prabin-pdhn prabin-pdhn 4096 Dec  5 10:20 Os
drwxr-xr-x 3 prabin-pdhn prabin-pdhn 4096 Dec  6 22:56 Pictures
-rw-rw-r-- 1 prabin-pdhn prabin-pdhn 9617 Dec  8 09:58 prabin
-rw-rw-r-- 1 prabin-pdhn prabin-pdhn 14105 Dec 12 10:47 prabin1
drwxrwxr-x 6 prabin-pdhn prabin-pdhn 4096 Dec  6 23:15 pt
drwxr-xr-x 2 prabin-pdhn prabin-pdhn 4096 Dec  5 01:41 Public
drwxrwxr-x 2 prabin-pdhn prabin-pdhn 4096 Dec 14 10:48 Python
drwx----- 7 prabin-pdhn prabin-pdhn 4096 Dec  4 21:00 snap
drwxr-xr-x 2 prabin-pdhn prabin-pdhn 4096 Dec  5 01:41 Templates
drwxr-xr-x 2 prabin-pdhn prabin-pdhn 4096 Dec  5 01:41 Videos
drwxrwxr-x 4 prabin-pdhn prabin-pdhn 4096 Dec 15 09:35 W7
drwxrwxr-x 2 prabin-pdhn prabin-pdhn 4096 Dec  4 21:34 week
-rw-rw-r-- 1 prabin-pdhn prabin-pdhn 12288 Dec 15 10:07 workshop8
prabin-pdhn@pp:~$
```

```
prabin-pdhn@pp:~/W7$ ls -l
total 8
drwxrwxr-x 4 prabin-pdhn prabin-pdhn 4096 Dec 15 09:35 w7-1
drwxrwxr-x 4 prabin-pdhn prabin-pdhn 4096 Dec 15 09:36 w7-2
prabin-pdhn@pp:~/W7$
```

```
prabin-pdhn@pp:~/W7/w7-1$ ls -l
total 8
drwxrwxr-x 2 prabin-pdhn prabin-pdhn 4096 Dec 15 10:06 1level3
drwxrwxr-x 2 prabin-pdhn prabin-pdhn 4096 Dec 15 09:55 2level3
prabin-pdhn@pp:~/W7/w7-1$
```

```
prabin-pdhn@pp:~/W7/w7-1/1level3$ ls -l
total 8
-rw-rw-r-- 1 prabin-pdhn prabin-pdhn 25 Dec 15 09:54 file1
-rw-rw-r-- 1 prabin-pdhn prabin-pdhn 26 Dec 15 09:49 prabin
prabin-pdhn@pp:~/W7/w7-1/1level3$
```

Figure 10: Shows details information

-d: lists directory itself, not its contents.

```
prabin-pdhn@pp:~$ ls -d
```

Figure 11: Shows contents

-R: lists contents recursively.

```
prabin-pdhn@pp:~$ ls -R
.:
7      Downloads 0s      prabin1 Python  Videos  workshop8
Desktop Laptop  Pictures pt      snap    W7
Documents Music  prabin  Public  Templates week

./7:

./Desktop:

./Documents:
0s

./Documents/0s:

./Downloads:
CiscoPacketTracer_900_Ubuntu_64bit.deb
code_1.106.3-1764110892_amd64.deb
LibreOffice_25.8.3_Linux_x86-64_deb.tar.gz
steam_latest.deb
Tutorial8_f90da30d_59eb_4f51_9a1c_b61bf4cf5459_212996_docx
```

```
drwxrwxr-x 4 prabin-pdhn prabin-pdhn 4096 Dec 15 09:36 w7-2
prabin-pdhn@pp:~/w7$ ls -R
.:
w7-1 w7-2

./w7-1:
1level3 2level3

./w7-1/1level3:
file1 prabin

./w7-1/2level3:
prabin.txt

./w7-2:
3level3 4level3

./w7-2/3level3:

./w7-2/4level3:
prabin.txt
prabin-pdhn@pp:~/w7$
```

Figure 12: Shows list contents recursively

10 Change to **w7-1**.

Display access permissions for the file **file1** in **1level3**.

```
prabtn-pdhn@pp:~/W7$ cd ~/W7/W7-1
prabin-pdhn@pp:~/W7/w7-1$ ls -l 1level3/file1
-rw-rw-r-- 1 prabin-pdhn prabin-pdhn 25 Dec 15 09:54 1level3/file1
prabin-pdhn@pp:~/W7/w7-1$
```

Figure 13: Access Permission

Remove all access permissions for this file.

```
prabtn-pdhn@pp:~/W7/w7-1$ ls -l 1level3/file1
-rw-rw-r-- 1 prabin-pdhn prabin-pdhn 25 Dec 15 09:54 1level3/file1
prabin-pdhn@pp:~/W7/w7-1$ chmod 000 1level3/file1
prabin-pdhn@pp:~/W7/w7-1$
```

Figure 14: Permission Remove

Display access permissions for this file.

```
prabtn-pdhn@pp:~/W7/w7-1$ chmod 000 1level3/file1
prabin-pdhn@pp:~/W7/w7-1$ ls -l 1level3/file1
----- 1 prabin-pdhn prabin-pdhn 25 Dec 15 09:54 1level3/file1
prabin-pdhn@pp:~/W7/w7-1$
```

Figure 15: Displayed Permission

Try to read this file using any utility (**cat**).

```
----- 1 prabtn-pdhn prabtn-pdhn 25 Dec 15 09:54 1level3/file1
prabin-pdhn@pp:~/W7/w7-1$ cat 1level3/file1
cat: 1level3/file1: Permission denied
prabin-pdhn@pp:~/W7/w7-1$
```

Figure 16: Trying to read file using cat

Try to write into this file using any utility (e.g., **cat** with the sign **>>** – *append*).

```
cat: 1level3/file1: Permission denied
prabin-pdhn@pp:~/W7/w7-1$ echo "test" >> 1level3/file1
bash: 1level3/file1: Permission denied
prabin-pdhn@pp:~/W7/w7-1$
```

Figure 17: Trying to write using cat

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

```
prabtn-pdhn@pp:~/W7/w7-1$ echo "test" >> 1level3/file1
bash: 1level3/file1: Permission denied
prabin-pdhn@pp:~/W7/w7-1$ chmod 600 1level3/file1
prabin-pdhn@pp:~/W7/w7-1$
```

Figure 18: Read and Write Access

Display access permissions for this file.

```
prabn-pdhn@pp:~/W7/W7-1$ chmod 600 1level3/file1
prabin-pdhn@pp:~/W7/W7-1$ ls -l 1level3/file1
-rw----- 1 prabin-pdhn prabin-pdhn 25 Dec 15 09:54 1level3/file1
prabin-pdhn@pp:~/W7/W7-1$
```

Figure 19: Displayed Access file

Try to read this file using any utility.

```
-rw----- 1 prabn-pdhn prabin-pdhn 25 Dec 15 09:54 1level3/file1
prabin-pdhn@pp:~/W7/W7-1$ cat 1level3/file1
Hi, i am doing workshop8
prabin-pdhn@pp:~/W7/W7-1$
```

Figure 20: Read File Access

Try to write into this file using any utility.

```
prabn-pdhn@pp:~/W7/W7-1$ cat 1level3/file1
Hi, i am doing workshop8
prabin-pdhn@pp:~/W7/W7-1$ echo "new line" >> 1level3/file1
prabin-pdhn@pp:~/W7/W7-1$
```

Figure 21: Write file Access

11 (Now),

Display access permissions for **1level3**.

```
prabtn-pdhn@pp:~/W7/W7-1$ echo new file >> 1level3/file1
prabin-pdhn@pp:~/W7/W7-1$ ls -ld 1level3
drwxrwxr-x 2 prabin-pdhn prabin-pdhn 4096 Dec 15 10:06 1level3
prabin-pdhn@pp:~/W7/W7-1$
```

Figure 22: Displayed Access Permissions

Remove all access permissions for the **1level3** directory.

```
prabtn-pdhn@pp:~/W7/W7-1$ ls -ld 1level3
drwxrwxr-x 2 prabin-pdhn prabin-pdhn 4096 Dec 15 10:06 1level3
prabin-pdhn@pp:~/W7/W7-1$ chmod 000 1level3
prabin-pdhn@pp:~/W7/W7-1$
```

Figure 23: Remove all Permission

Display access permissions for **1level3**.

```
prabtn-pdhn@pp:~/W7/W7-1$ chmod 000 1level3
prabin-pdhn@pp:~/W7/W7-1$ ls -ld 1level3
d----- 2 prabin-pdhn prabin-pdhn 4096 Dec 15 10:06 1level3
prabin-pdhn@pp:~/W7/W7-1$
```

Figure 24: Access Permission of 1level3

Try to read a file from **1level3** using any utility.

```
ls: cannot open directory '1level3': Permission denied
prabin-pdhn@pp:~/W7/W7-1$ cat 1level3/file1
cat: 1level3/file1: Permission denied
prabin-pdhn@pp:~/W7/W7-1$
```

Figure 25: Trying to read file

Try to put a file into **1level3** using any utility.

```
prabtn-pdhn@pp:~/W7/W7-1$ touch new.txt
prabin-pdhn@pp:~/W7/W7-1$ cp new.txt 1level3/
cp: cannot stat '1level3/new.txt': Permission denied
prabin-pdhn@pp:~/W7/W7-1$
```

Figure 26: Trying to put file into another folder

Try to search in **1level3** using any command (e.g., the **ls** command).

```
d----- 2 prabtn-pdhn prabtn-pdhn 4096 Dec 15 10:06 1level3
prabin-pdhn@pp:~/W7/W7-1$ ls 1level3
ls: cannot open directory '1level3': Permission denied
prabin-pdhn@pp:~/W7/W7-1$
```

Figure 27: Access Denied

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

```
prabtn-pdhn@pp:~/W7/W7-1$ cp new.txt 1level3/  
cp: cannot stat '1level3/new.txt': Permission denied  
prabin-pdhn@pp:~/W7/W7-1$ chmod 700 1level3  
prabin-pdhn@pp:~/W7/W7-1$
```

Figure 28: Full Access to 1level3

Display access permissions for **1level3**.

```
prabtn-pdhn@pp:~/W7/W7-1$ chmod 700 1level3  
prabin-pdhn@pp:~/W7/W7-1$ ls -ld 1level3  
drwx----- 2 prabin-pdhn prabin-pdhn 4096 Dec 15 10:06 1level3  
prabin-pdhn@pp:~/W7/W7-1$
```

Figure 29: Access for read, write, and execute

Try to read a file from **1level3** using any utility.

```
prabtn-pdhn@pp:~/W7/W7-1$ cat 1level3/file1  
Hi, i am doing workshop8  
new line  
prabin-pdhn@pp:~/W7/W7-1$
```

Figure 30: Access to read file

Try to put a file into **1level3** using any utility.

```
Hi, i am doing workshop8  
new line  
prabin-pdhn@pp:~/W7/W7-1$ cp new.txt 1level3/  
prabin-pdhn@pp:~/W7/W7-1$
```

Figure 31: Copying to 1level3

Try to search in **1level3** using any command (e.g., the **ls** command).

```
drwx----- 2 prabtn-pdhn prabtn-pdhn 4096 Dec 15 10:06 1level3  
prabin-pdhn@pp:~/W7/W7-1$ ls 1level3  
file1 prabin  
prabin-pdhn@pp:~/W7/W7-1$
```

Figure 32: Try to search file using ls command

3 Conclusion:

This workshop enhanced familiarity with UNIX/Linux operating system fundamentals by using commands in a given directory and file structure. The project activity allowed better understanding of directory, file, and relative path relationships, which in turn increased familiarity with UNIX/Linux operating system fundamentals.

Handling file creation, copying, moving, and deletion provided an insight into managing data on a command line interface level. Handling commands such as copy, move, and remove demonstrated the importance of using these commands with caution to prevent loss of data, especially when handling more than one directory.

Most importantly, the permission-related tasks have given us a better understanding of file and directory permissions. Deleting and reinstating read, write, and execute permissions have shown how UNIX preserves access to system resources. In sum, this workshop has improved our command-line manipulation capabilities and will provide a solid groundwork for more complex UNIX and network operations.

References:

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<https://www.techtarget.com/searchdatacenter/definition/Ubuntu> (Accessed: 15
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