File permissions in Linux

Project description

This project focuses on maintaining a robust security posture by validating and modifying permissions, thereby preventing unauthorized access and potential security breaches.
As a dedicated security professional at a prominent organization, my role primarily revolves around safeguarding the integrity of sensitive data within the research team.

Check file and directory details

1. `pwd` command shows the current directory

Output

```
researcher2@0c7b0cbb42f3:~/projects$ pwd
/home/researcher2/projects
researcher2@0c7b0cbb42f3:~/projects$
```

2. `cd` Navigate to the `projects` directory.

```
researcher2@0c7b0cbb42f3:~$ pwd
/home/researcher2
researcher2@0c7b0cbb42f3:~$ cd projects
```

3. Now we use `ls -la` List the contents and permissions of the `projects` directory including hidden files

```
researcher2@0c7b0cbb42f3:~$ pwd
/home/researcher2
researcher2@0c7b0cbb42f3:~$ cd projects
researcher2@0c7b0cbb42f3:~/projects$ ls -la
```

Output

```
researcher2@0c7b0cbb42f3:~$ pwd
/home/researcher2
researcher2@0c7b0cbb42f3:~$ cd projects
researcher2@0c7b0cbb42f3:~/projects$ ls -la
total 32
drwxr-xr-x 3 researcher2 research_team 4096 Jan 17 08:59 .
drwxr-xr-x 3 researcher2 research_team 4096 Jan 17 09:59 ..
-rw--w---- 1 researcher2 research_team   46 Jan 17 08:59 .project_x.txt
drwx--x--- 2 researcher2 research_team 4096 Jan 17 08:59 drafts
-rw-rw-rw- 1 researcher2 research_team   46 Jan 17 08:59 project_k.txt
-rw-r----- 1 researcher2 research_team   46 Jan 17 08:59 project_m.txt
-rw-rw-r-- 1 researcher2 research_team   46 Jan 17 08:59 project_r.txt
-rw-rw-r-- 1 researcher2 research_team   46 Jan 17 08:59 project_t.txt
researcher2@0c7b0cbb42f3:~/projects$
```

Describe the permissions string

From previous output we know that :

In Linux, permissions are represented with a 10-character string. Permissions include:

- **read**: for files, this is the ability to read the file contents; for directories, this is the ability to read all contents in the directory including both files and subdirectories
- **write**: for files, this is the ability to make modifications on the file contents; for directories, this is the ability to create new files in the directory
- **execute**: for files, this is the ability to execute the file if it's a program; for directories, this is the ability to enter the directory and access its files

These permissions are given to these types of owners:

- **user**: the owner of the file
- **group**: a larger group that the owner is a part of
- **other**: all other users on the system

Each character in the 10-character string conveys different information about these permissions.

Character	**Example**	**Meaning**
1st	**d**rwxrwxrwx	file type ● `d` for directory ● – for a regular file (-rwxrwxrwx)
2nd	d**r**wxrwxrwx	read permissions for the user ● `r` if the user has read permissions ● – if the user lacks read permissions (d**-**wxrwxrwx)
3rd	dr**w**xrwxrwx	write permissions for the user ● `w` if the user has write permissions ● – if the user lacks write permissions (dr**-**xrwxrwx)
4th	drw**x**rwxrwx	execute permissions for the user ● `x` if the user has execute permissions ● – if the user lacks execute permissions (drw**-**rwxrwx)

5th	drwx**r**wxrwx	read permissions for the group ● **`r`** if the group has read permissions ● **-** if the group lacks read permissions (drwx**-**wxrwx)
6th	drwxr**w**xrwx	write permissions for the group ● **`w`** if the group has write permissions ● **-** if the group lacks write permissions (drwxr-xrwx)
7th	drwxrw**x**rwx	execute permissions for the group ● **`x`** if the group has execute permissions ● **-** if the group lacks execute permissions (drwxrw**-**rwx)
8th	drwxrwx**r**wx	read permissions for other ● **`r`** if the other owner type has read permissions ● **-** if the other owner type lacks read permissions (drwxrwx**-**wx)
9th	drwxrwxr**w**x	write permissions for other ● **`w`** if the other owner type has write permissions ● **-** if the other owner type lacks write permissions (drwxrwxr**-**x)
10th	drwxrwxrw**x**	execute permissions for other ● **`x`** if the other owner type has execute permissions ● **-** if the other owner type lacks execute permissions (drwxrwxrw**-)**

Change file permissions

As the organization does not allow other to have write access to any files.we have to change the permission of project_k.txt file so, for that we use chmod command

```
researcher2@b6321f017f1d:~$ cd projects
researcher2@b6321f017f1d:~/projects$ chmod o-w project_k.txt
researcher2@b6321f017f1d:~/projects$ ls -la
total 32
drwxr-xr-x 3 researcher2 research_team 4096 Jan 18 11:40 .
drwxr-xr-x 3 researcher2 research_team 4096 Jan 18 12:29 ..
-rw--w---- 1 researcher2 research_team   46 Jan 18 11:40 .project_x.txt
drwx--x--- 2 researcher2 research_team 4096 Jan 18 11:40 drafts
-rw-rw-r-- 1 researcher2 research_team   46 Jan 18 11:40 project_k.txt
-rw-r----- 1 researcher2 research_team   46 Jan 18 11:40 project_m.txt
-rw-rw-r-- 1 researcher2 research_team   46 Jan 18 11:40 project_r.txt
-rw-rw-r-- 1 researcher2 research_team   46 Jan 18 11:40 project_t.txt
researcher2@b6321f017f1d:~/projects$
```

Change file permissions on a hidden file

The research team has archived **.project_x.txt**, which is why it's a hidden file. This file should not have write permissions for anyone, but the user and group should be able to read the fileSo to change the permissions of hidden files we use period in front of filename with chmod command

```
researcher2@b6321f017f1d:~/projects$ chmod u-w, g-w, g+r .project_x.txt
chmod: invalid mode: 'u-w,'
Try 'chmod --help' for more information.
researcher2@b6321f017f1d:~/projects$ chmod u-w,g-w,g+r .project_x.txt
researcher2@b6321f017f1d:~/projects$ ls -la
total 32
drwxr-xr-x 3 researcher2 research_team 4096 Jan 18 11:40 .
drwxr-xr-x 3 researcher2 research_team 4096 Jan 18 12:29 ..
-r--r----- 1 researcher2 research_team   46 Jan 18 11:40 .project_x.txt
drwx--x--- 2 researcher2 research_team 4096 Jan 18 11:40 drafts
-rw-rw-r-- 1 researcher2 research_team   46 Jan 18 11:40 project_k.txt
-rw-r----- 1 researcher2 research_team   46 Jan 18 11:40 project_m.txt
-rw-rw-r-- 1 researcher2 research_team   46 Jan 18 11:40 project_r.txt
-rw-rw-r-- 1 researcher2 research_team   46 Jan 18 11:40 project_t.txt
researcher2@b6321f017f1d:~/projects$
```

Change directory permissions

The files and directories in the projects directory belong to the **researcher2** user. Only **researcher2** should be allowed to access the **drafts** directory and its contents.

First we have to check the permissions of the drafts directory using `ls -l` command

And then as per instructions we have to change execute permission from group

```
researcher2@b6321f017f1d:~/projects$ ls -l
total 20
drwx--x--- 2 researcher2 research_team 4096 Jan 18 11:40 drafts
-rw-rw-r-- 1 researcher2 research_team   46 Jan 18 11:40 project_k.txt
-rw-r----- 1 researcher2 research_team   46 Jan 18 11:40 project_m.txt
-rw-rw-r-- 1 researcher2 research_team   46 Jan 18 11:40 project_r.txt
-rw-rw-r-- 1 researcher2 research_team   46 Jan 18 11:40 project_t.txt
researcher2@b6321f017f1d:~/projects$ chmod g-x drafts
researcher2@b6321f017f1d:~/projects$ ls -l
total 20
drwx------ 2 researcher2 research_team 4096 Jan 18 11:40 drafts
-rw-rw-r-- 1 researcher2 research_team   46 Jan 18 11:40 project_k.txt
-rw-r----- 1 researcher2 research_team   46 Jan 18 11:40 project_m.txt
-rw-rw-r-- 1 researcher2 research_team   46 Jan 18 11:40 project_r.txt
-rw-rw-r-- 1 researcher2 research_team   46 Jan 18 11:40 project_t.txt
researcher2@b6321f017f1d:~/projects$
```

Summary

Throughout the project, we systematically inspected file and directory details using commands like `ls -la` and `pwd`. By deciphering the 10-character string, we comprehended the nuanced permissions granted to users, groups, and others. A key task involved altering permissions on both regular and hidden files using the `chmod` command, adhering to the organization's mandate of limiting write access. The importance of precise permission management was underscored when adjusting directory permissions within the projects directory, specifically granting exclusive execute permission to the designated user, researcher2, for the drafts directory and its contents.