File permissions in Linux

Project description

This project demonstrates my competence in managing file and directory permissions on Linux using the bash interface. The research team at my organization needs to update the file permissions for certain files and directories within the projects directory. The permissions do not currently reflect the level of authorization that should be given. Checking and updating these permissions will help keep their system secure. To complete this task, I performed the following tasks:

Check file and directory details

For this, the `ls -la` command is used to list all files and directory permissions including hidden files

```
researcher2@aacc62efbf69:~$ cd projects
researcher2@aacc62efbf69:~/projects$ ls -la
total 32
drwxr-xr-x 3 researcher2 research_team 4096 Jul  2 00:13 .
drwxr-xr-x 3 researcher2 research_team 4096 Jul  2 00:54 ..
-rw--w---- 1 researcher2 research_team   46 Jul  2 00:13 .project_x.txt
drwx--x--- 2 researcher2 research_team 4096 Jul  2 00:13 drafts
-rw-rw-rw- 1 researcher2 research_team   46 Jul  2 00:13 project_k.txt
-rw-r----- 1 researcher2 research_team   46 Jul  2 00:13 project_m.txt
-rw-rw-r-- 1 researcher2 research_team   46 Jul  2 00:13 project_r.txt
-rw-rw-r-- 1 researcher2 research_team   46 Jul  2 00:13 project_t.txt
researcher2@aacc62efbf69:~/projects$
```

Describe the permissions string

Conventionally, there are 10 characters that describe the permissions for a file or directory in the bash shell when you run the `ls -la` command. For files, the first character is a hyphen while for folders, it is a d. Following that, the next three characters indicate the Read, Write, or Execute permissions (in that order) for the User. Followed by the three permissions for Group and lastly, the remaining three characters indicate the permissions for Other. A hyphen in any of the positions indicate that the permission is missing

```
researcher2@aacc62efbf69:~$ cd projects
researcher2@aacc62efbf69:~/projects$ ls -la
total 32
drwxr-xr-x 3 researcher2 research_team 4096 Jul  2 00:13 .
drwxr-xr-x 3 researcher2 research_team 4096 Jul  2 00:54 ..
-rw--w---- 1 researcher2 research_team   46 Jul  2 00:13 .project_x.txt
drwx--x--- 2 researcher2 research_team 4096 Jul  2 00:13 drafts
-rw-rw-rw- 1 researcher2 research_team   46 Jul  2 00:13 project_k.txt
-rw-r----- 1 researcher2 research_team   46 Jul  2 00:13 project_m.txt
-rw-rw-r-- 1 researcher2 research_team   46 Jul  2 00:13 project_r.txt
-rw-rw-r-- 1 researcher2 research_team   46 Jul  2 00:13 project_t.txt
```

The 10-character string can be deconstructed to determine who is authorized to access the file and their specific permissions. The characters and what they represent are as follows:

- **1st character**: This character is either a d or hyphen (-) and indicates the file type. If it's a d, it's a directory. If it's a hyphen (-), it's a regular file.
- **2nd-4th characters**: These characters indicate the read (r), write (w), and execute (x) permissions for the user. When one of these characters is a hyphen (-) instead, it indicates that this permission is not granted to the user.
- **5th-7th characters:** These characters indicate the read (r), write (w), and execute (x) permissions for the group. When one of these characters is a hyphen (-) instead, it indicates that this permission is not granted for the group.
- **8th-10th characters:** These characters indicate the read (r), write (w), and execute (x) permissions for other. This owner type consists of all other users on the system apart from the user and the group. When one of these characters is a hyphen (-) instead, that indicates that this permission is not granted for other.

In the Projects directory shown above, there are four files, one hidden file, and a folder. The folder permissions for the file project_k.txt (-rw-rw-rw-) are explained below:

- User = Read, Write
- Group = Read, Write
- Other = Read, Write

However, for the hidden file, .project_x.txt (-rw—w----), the permissions are as follows:

- User = Read, Write
- Group = Write
- Other = none

Change file permissions

Using the chmod command `chmod g-w,o-w project_k.txt`, I modified the file permissions for the project_k.txt file such that only the User retains RW properties, while the Other and Group permission levels have Read permissions only.

```
researcher2@aacc62efbf69:~/projects$ chmod g-w,o-w project_k.txt
researcher2@aacc62efbf69:~/projects$ ls -la
total 32
drwxr-xr-x 3 researcher2 research_team 4096 Jul  2 00:13 .
drwxr-xr-x 3 researcher2 research_team 4096 Jul  2 00:54 ..
-rw--w---- 1 researcher2 research_team   46 Jul  2 00:13 .project_x.txt
drwx--x--- 2 researcher2 research_team 4096 Jul  2 00:13 drafts
-rw-r--r-- 1 researcher2 research_team   46 Jul  2 00:13 project_k.txt
-rw-r----- 1 researcher2 research_team   46 Jul  2 00:13 project_m.txt
-rw-rw-r-- 1 researcher2 research_team   46 Jul  2 00:13 project_r.txt
-rw-rw-r-- 1 researcher2 research_team   46 Jul  2 00:13 project_t.txt
researcher2@aacc62efbf69:~/projects$ 
```

Change file permissions on a hidden file

To change the file permissions on the hidden file .project_x.txt, I use the command `chmod g-w,g+r,o+r .project_x.txt` to remove Write permissions for the Group and add Read permissions for Group and Other.

```
researcher2@aacc62efbf69:~/projects$ chmod g-w,g+r,o+r .project_x.txt
researcher2@aacc62efbf69:~/projects$ ls -la
total 32
drwxr-xr-x 3 researcher2 research_team 4096 Jul  2 00:13 .
drwxr-xr-x 3 researcher2 research_team 4096 Jul  2 00:54 ..
-rw-r--r-- 1 researcher2 research_team   46 Jul  2 00:13 .project_x.txt
drwx--x--- 2 researcher2 research_team 4096 Jul  2 00:13 drafts
-rw-r--r-- 1 researcher2 research_team   46 Jul  2 00:13 project_k.txt
-rw-r----- 1 researcher2 research_team   46 Jul  2 00:13 project_m.txt
-rw-rw-r-- 1 researcher2 research_team   46 Jul  2 00:13 project_r.txt
-rw-rw-r-- 1 researcher2 research_team   46 Jul  2 00:13 project_t.txt
researcher2@aacc62efbf69:~/projects$ 
```

Change directory permissions

To change the directory permissions for the drafts folder, I run the command `chmod g+r,g-x,o+r drafts` to add Read permissions for both Group and Others and to remove Execute permission for Group.

```
researcher2@aacc62efbf69:~/projects$ chmod g+r,g-x,o+r drafts
researcher2@aacc62efbf69:~/projects$ ls -la
total 32
drwxr-xr-x 3 researcher2 research_team 4096 Jul  2 00:13 .
drwxr-xr-x 3 researcher2 research_team 4096 Jul  2 00:54 ..
-rw-r--r-- 1 researcher2 research_team   46 Jul  2 00:13 .project_x.txt
drwxr--r-- 2 researcher2 research_team 4096 Jul  2 00:13 drafts
-rw-r--r-- 1 researcher2 research_team   46 Jul  2 00:13 project_k.txt
-rw-r----- 1 researcher2 research_team   46 Jul  2 00:13 project_m.txt
-rw-rw-r-- 1 researcher2 research_team   46 Jul  2 00:13 project_r.txt
-rw-rw-r-- 1 researcher2 research_team   46 Jul  2 00:13 project_t.txt
researcher2@aacc62efbf69:~/projects$ 
```

Summary

In this project, I demonstrated my ability to add, remove, and modify Read, Write, and Execute permissions for User, Group, and Other permission levels. I changed multiple permissions to match the level of authorization my organization wanted for files and directories in the `projects` directory. The first step in this was using `ls -la` to check the permissions for the directory. This informed my decisions in the following steps. I then used the `chmod` command multiple times to change the permissions on files and directories.
This skill is crucial in managing access to files and directories to ensure confidentiality and integrity according to the principle of least access.