File permissions in Linux

Project description

I am a security professional working with the research team at a large organization. My role involves ensuring that users have appropriate permissions to maintain system security. I review existing file system permissions, verify if they align with the required authorizations, and adjust them as needed by removing unauthorized access.

Check file and directory details

First step is to enter the : `/home/researcher2/projects/` directory.

```
researcher2@c6baa81bdd93:~$ cd projects/
researcher2@c6baa81bdd93:~/projects$ pwd
/home/researcher2/projects
```

`ls -l`: Displays permissions to files and directories.

```
researcher2@c6baa81bdd93:~/projects$ ls -l
total 20
drwx--x--- 2 researcher2 research_team 4096 Dec  5 21:05 drafts
-rw-rw-rw- 1 researcher2 research_team   46 Dec  5 21:05 project_k.txt
-rw-r----- 1 researcher2 research_team   46 Dec  5 21:05 project_m.txt
-rw-rw-r-- 1 researcher2 research_team   46 Dec  5 21:05 project_r.txt
-rw-rw-r-- 1 researcher2 research_team   46 Dec  5 21:05 project_t.txt
researcher2@c6baa81bdd93:~/projects$
```

`ls -a`: Displays hidden files.

```
researcher2@c6baa81bdd93:~/projects$ ls -a
.   .project_x.txt  project_k.txt  project_r.txt
..  drafts          project_m.txt  project_t.txt
researcher2@c6baa81bdd93:~/projects$
```

`ls -la`: Displays permissions to files and directories, including hidden files.

```
researcher2@c6baa81bdd93:~/projects$ ls -la
total 32
drwxr-xr-x 3 researcher2 research_team 4096 Dec  5 21:05 .
drwxr-xr-x 3 researcher2 research_team 4096 Dec  5 21:39 ..
-rw--w---- 1 researcher2 research_team   46 Dec  5 21:05 .project_x.txt
drwx--x--- 2 researcher2 research_team 4096 Dec  5 21:05 drafts
-rw-rw-rw- 1 researcher2 research_team   46 Dec  5 21:05 project_k.txt
-rw-r----- 1 researcher2 research_team   46 Dec  5 21:05 project_m.txt
-rw-rw-r-- 1 researcher2 research_team   46 Dec  5 21:05 project_r.txt
-rw-rw-r-- 1 researcher2 research_team   46 Dec  5 21:05 project_t.txt
researcher2@c6baa81bdd93:~/projects$
```

Describe the permissions string

In linux, file permissions are represented with a 10 character string
From the previous step :

```
drwx--x--- 2 researcher2 research_team 4096 Dec  5 21:05 drafts
-rw-rw-rw- 1 researcher2 research_team   46 Dec  5 21:05 project_k.txt
-rw-r----- 1 researcher2 research_team   46 Dec  5 21:05 project_m.txt
```

- The first character indicates the file type. As shown on the first line highlighted in yellow, **d** is used to indicate it is a directory. If this character contains a hyphen instead, it would be a regular file.
- The second, third, and fourth characters indicate the permissions for the user. **r** indicates the user has read permissions, **w** indicates the user has write permissions, and **x** indicates the user has execute permissions.
- In the same way, the fifth, sixth, and seventh characters indicate permissions for the next owner type group. Hyphens indicate that permissions haven't been granted. As shown here, the type group only has execute permission.
- Finally, the eighth through tenth characters indicate permissions for the last owner type: other. As it shows here, they have no permission.

Change file permissions

The organization does not allow others to have write access to any files. So the first step is to identify which file needs to have its permissions modified. It is highlighted in green on the next screen. The filename is "**project_k.txt**".

```
researcher2@6f1c57bf982a:~/projects$ ls -la
total 32
drwxr-xr-x 3 researcher2 research_team 4096 Dec  5 21:59 .
drwxr-xr-x 3 researcher2 research_team 4096 Dec  5 22:45 ..
-rw--w---- 1 researcher2 research_team   46 Dec  5 21:59 .project_x.txt
drwx--x--- 2 researcher2 research_team 4096 Dec  5 21:59 drafts
-rw-rw-rw- 1 researcher2 research_team   46 Dec  5 21:59 project_k.txt
-rw-r----- 1 researcher2 research_team   46 Dec  5 21:59 project_m.txt
-rw-rw-r-- 1 researcher2 research_team   46 Dec  5 21:59 project_r.txt
-rw-rw-r-- 1 researcher2 research_team   46 Dec  5 21:59 project_t.txt
researcher2@6f1c57bf982a:~/projects$
```

Using the command "**chmod o-w project_k.txt**"will remove the writing permission from the other as you can see on the next screen.

```
researcher2@6f1c57bf982a:~/projects$ chmod o-w project_k.txt
researcher2@6f1c57bf982a:~/projects$ ls -l
total 20
drwx--x--- 2 researcher2 research_team 4096 Dec  5 21:59 drafts
-rw-rw-r-- 1 researcher2 research_team   46 Dec  5 21:59 project_k.txt
-rw-r----- 1 researcher2 research_team   46 Dec  5 21:59 project_m.txt
-rw-rw-r-- 1 researcher2 research_team   46 Dec  5 21:59 project_r.txt
-rw-rw-r-- 1 researcher2 research_team   46 Dec  5 21:59 project_t.txt
researcher2@6f1c57bf982a:~/projects$
```

Change file permissions on a hidden file

Hidden files, which begin with a period before their name, don't normally appear when you use ls to display file contents. Entering ls -a displays hidden files. Entering ls -la displays permissions to files and directories, including hidden files.

```
researcher2@b10b5e96a218:~/projects$ ls -la
total 32
drwxr-xr-x 3 researcher2 research_team 4096 Dec  7 22:30 .
drwxr-xr-x 3 researcher2 research_team 4096 Dec  7 23:32 ..
-rw--w---- 1 researcher2 research_team   46 Dec  7 22:30 .project_x.txt
drwx--x--- 2 researcher2 research_team 4096 Dec  7 22:30 drafts
-rw-rw-rw- 1 researcher2 research_team   46 Dec  7 22:30 project_k.txt
-rw-r----- 1 researcher2 research_team   46 Dec  7 22:30 project_m.txt
-rw-rw-r-- 1 researcher2 research_team   46 Dec  7 22:30 project_r.txt
-rw-rw-r-- 1 researcher2 research_team   46 Dec  7 22:30 project_t.txt
researcher2@b10b5e96a218:~/projects$
```

The command "**chmod u-w, g-w+r .projects_x.txt**" is used to remove write permission for the user and grant read permission for the group as shown on the next screen.

```
researcher2@b10b5e96a218:~/projects$ chmod u-w,g-w+r .project_x.txt
researcher2@b10b5e96a218:~/projects$ ls -la
total 32
drwxr-xr-x 3 researcher2 research_team 4096 Dec  7 22:30 .
drwxr-xr-x 3 researcher2 research_team 4096 Dec  7 23:32 ..
-r--r----- 1 researcher2 research_team   46 Dec  7 22:30 .project_x.txt
drwx--x--- 2 researcher2 research_team 4096 Dec  7 22:30 drafts
-rw-rw-rw- 1 researcher2 research_team   46 Dec  7 22:30 project_k.txt
-rw-r----- 1 researcher2 research_team   46 Dec  7 22:30 project_m.txt
-rw-rw-r-- 1 researcher2 research_team   46 Dec  7 22:30 project_r.txt
-rw-rw-r-- 1 researcher2 research_team   46 Dec  7 22:30 project_t.txt
researcher2@b10b5e96a218:~/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. Which is not the case as highlighted on the previous screen. The command used to remove the execution permission from the group is "**chmod g-x draft/**".

```
researcher2@b10b5e96a218:~/projects$ chmod g-x drafts/
researcher2@b10b5e96a218:~/projects$ ls -la
total 32
drwxr-xr-x 3 researcher2 research_team 4096 Dec  7 22:30 .
drwxr-xr-x 3 researcher2 research_team 4096 Dec  7 23:32 ..
-r--r----- 1 researcher2 research_team   46 Dec  7 22:30 .project_x.txt
drwx------ 2 researcher2 research_team 4096 Dec  7 22:30 drafts
-rw-rw-rw- 1 researcher2 research_team   46 Dec  7 22:30 project_k.txt
-rw-r----- 1 researcher2 research_team   46 Dec  7 22:30 project_m.txt
-rw-rw-r-- 1 researcher2 research_team   46 Dec  7 22:30 project_r.txt
-rw-rw-r-- 1 researcher2 research_team   46 Dec  7 22:30 project_t.txt
researcher2@b10b5e96a218:~/projects$
```

Summary

I have completed the necessary verifications, and all required adjustments to the file system permissions have been successfully implemented. The system is now aligned with the appropriate authorizations and compliant with the company policy, ensuring security and proper access management.