File permissions in Linux

Project description

In this project I navigated through Linux directories and folders changing the permissions of the public files, a secret file, and a directory using the command line interface (CLI). In this scenario the research team of an organization needed me to edit these permissions to ensure security and the best practice of least privilege. All of these actions can be seen in the included screenshots. A brief explanation of some of the actions will be included beneath.

Check file and directory details

I first navigated to the projects directory us [cd projects]. Then I listed the contents of the folder using [ls -l]. I then checked again to see any hidden files using [ls -la]. Any file with a period "." in front of it indicates the file is hidden. I was now able to see all the file permissions, ownership, and metadata.

```
researcher2@e85eb5d2ea0f:~$ pwd
/home/researcher2
researcher2@e85eb5d2ea0f:~$ ls
projects
researcher2@e85eb5d2ea0f:~$ cd projects
researcher2@e85eb5d2ea0f:~/projects$ ls -l
total 20
drwx--x--- 2 researcher2 research_team 4096 Mar 22 16:34 drafts
-rw-rw-rw- 1 researcher2 research_team   46 Mar 22 16:34 project_k.txt
-rw-r----- 1 researcher2 research_team   46 Mar 22 16:34 project_m.txt
-rw-rw-r-- 1 researcher2 research_team   46 Mar 22 16:34 project_r.txt
-rw-rw-r-- 1 researcher2 research_team   46 Mar 22 16:34 project_t.txt
researcher2@e85eb5d2ea0f:~/projects$ ls -la
total 32
drwxr-xr-x 3 researcher2 research_team 4096 Mar 22 16:34 .
drwxr-xr-x 3 researcher2 research_team 4096 Mar 22 17:06 ..
-rw--w---- 1 researcher2 research_team   46 Mar 22 16:34 .project_x.txt
drwx--x--- 2 researcher2 research_team 4096 Mar 22 16:34 drafts
-rw-rw-rw- 1 researcher2 research_team   46 Mar 22 16:34 project_k.txt
-rw-r----- 1 researcher2 research_team   46 Mar 22 16:34 project_m.txt
-rw-rw-r-- 1 researcher2 research_team   46 Mar 22 16:34 project_r.txt
-rw-rw-r-- 1 researcher2 research_team   46 Mar 22 16:34 project_t.txt
```

Describe the permissions string

The string of letters that can be seen on the far left side of the screen is used to show a wealth of information.

```
drwxr-xr-x
drwxr-xr-x
-rw--w----
drwx--x---
-rw-rw-rw-
```

Moving from left to right:

1. The first column is to indicate if these permissions are about a directory “d” or a file “-”
2. The following characters are segmented into groups of three
    a. The first 3 is for users
    b. The second for groups
    c. The third for others
3. In each trio you can see a “r”, “w”, “x”, or “-”. The r indicates read permissions, the w indicates write, the x indicates execute. If the column has a - (dash) it indicates that trio does not have those permissions.

Using this logic you can see that the first row is a directory that gives users read, write, and execute permissions. The same row gives the group read permissions, not write, but does give execute permissions. These same permissions are replicated for the last group, other.

Change file permissions

The organization wanted a few changes made to the files in the projects directory.

```
researcher2@e85eb5d2ea0f:~/projects$ chmod o-w project_k.txt
researcher2@e85eb5d2ea0f:~/projects$ chmod g-r project_m.txt
researcher2@e85eb5d2ea0f:~/projects$ chmod u-w,g-w .project_x.txt
researcher2@e85eb5d2ea0f:~/projects$ ls -la
total 32
drwxr-xr-x 3 researcher2 research_team 4096 Mar 22 16:34 .
drwxr-xr-x 3 researcher2 research_team 4096 Mar 22 17:06 ..
-r-------- 1 researcher2 research_team   46 Mar 22 16:34 .project_x.txt
drwx--x--- 2 researcher2 research_team 4096 Mar 22 16:34 drafts
-rw-rw-r-- 1 researcher2 research_team   46 Mar 22 16:34 project_k.txt
-rw------- 1 researcher2 research_team   46 Mar 22 16:34 project_m.txt
-rw-rw-r-- 1 researcher2 research_team   46 Mar 22 16:34 project_r.txt
-rw-rw-r-- 1 researcher2 research_team   46 Mar 22 16:34 project_t.txt
```

You can see that the organization requested write be removed from others and read be removed from groups. This can be seen in the first two lines with the “chmod o-w project_k.txt” and “chmod g-r project_m.txt”.

Change file permissions on a hidden file

The organization wanted the w or write permission removed from the user and group. You can see that I did this using the “chmod u-w,g-w .project_x.txt” command seen in the screenshot.

```
researcher2@e85eb5d2ea0f:~/projects$ chmod u-w,g-w .project_x.txt
researcher2@e85eb5d2ea0f:~/projects$ ls -la
total 32
drwxr-xr-x 3 researcher2 research_team 4096 Mar 22 16:34 .
drwxr-xr-x 3 researcher2 research_team 4096 Mar 22 17:06 ..
-r-------- 1 researcher2 research_team   46 Mar 22 16:34 .project_x.txt
drwx--x--- 2 researcher2 research_team 4096 Mar 22 16:34 drafts
-rw-rw-r-- 1 researcher2 research_team   46 Mar 22 16:34 project_k.txt
-rw------- 1 researcher2 research_team   46 Mar 22 16:34 project_m.txt
-rw-rw-r-- 1 researcher2 research_team   46 Mar 22 16:34 project_r.txt
-rw-rw-r-- 1 researcher2 research_team   46 Mar 22 16:34 project_t.txt
```

After executing the command I ran the ls -la command to check my work.

Change directory permissions

It was decided by the organization that the drafts directory shouldn’t be executable by the entire group.

```
researcher2@e85eb5d2ea0f:~/projects$ chmod g-x /home/researcher2/projects/drafts
researcher2@e85eb5d2ea0f:~/projects$ ls -la
total 32
drwxr-xr-x 3 researcher2 research_team 4096 Mar 22 16:34 .
drwxr-xr-x 3 researcher2 research_team 4096 Mar 22 17:06 ..
-r--r----- 1 researcher2 research_team   46 Mar 22 16:34 .project_x.txt
drwx------ 2 researcher2 research_team 4096 Mar 22 16:34 drafts
-rw-rw-r-- 1 researcher2 research_team   46 Mar 22 16:34 project_k.txt
-rw------- 1 researcher2 research_team   46 Mar 22 16:34 project_m.txt
-rw-rw-r-- 1 researcher2 research_team   46 Mar 22 16:34 project_r.txt
-rw-rw-r-- 1 researcher2 research_team   46 Mar 22 16:34 project_t.txt
researcher2@e85eb5d2ea0f:~/projects$
```

This was accomplished by using the command on the top line:
chmod g-x /home/researcher2/projects/drafts

I then checked it had been taken with the ls -la command.

Summary

I have made sure to match the privileges with the organization's preferences. I demonstrated I have done this with files, a hidden file, and a directory. This will help the organization meet its security goals.

← Activity: Manage authorization

```
researcher2@e85eb5d2ea0f:~$ pwd
/home/researcher2
researcher2@e85eb5d2ea0f:~$ ls
projects
researcher2@e85eb5d2ea0f:~$ cd projects
researcher2@e85eb5d2ea0f:~/projects$ ls -l
total 20
drwx--x--- 2 researcher2 research_team 4096 Mar 22 16:34 drafts
-rw-rw-rw- 1 researcher2 research_team   46 Mar 22 16:34 project_k.txt
-rw-r----- 1 researcher2 research_team   46 Mar 22 16:34 project_m.txt
-rw-rw-r-- 1 researcher2 research_team   46 Mar 22 16:34 project_r.txt
-rw-rw-r-- 1 researcher2 research_team   46 Mar 22 16:34 project_t.txt
researcher2@e85eb5d2ea0f:~/projects$ ls -la
total 32
drwxr-xr-x 3 researcher2 research_team 4096 Mar 22 16:34 .
drwxr-xr-x 3 researcher2 research_team 4096 Mar 22 17:06 ..
-rw--w---- 1 researcher2 research_team   46 Mar 22 16:34 .project_x.txt
drwx--x--- 2 researcher2 research_team 4096 Mar 22 16:34 drafts
-rw-rw-rw- 1 researcher2 research_team   46 Mar 22 16:34 project_k.txt
-rw-r----- 1 researcher2 research_team   46 Mar 22 16:34 project_m.txt
-rw-rw-r-- 1 researcher2 research_team   46 Mar 22 16:34 project_r.txt
-rw-rw-r-- 1 researcher2 research_team   46 Mar 22 16:34 project_t.txt
researcher2@e85eb5d2ea0f:~/projects$ chmod o-w project_k.txt
researcher2@e85eb5d2ea0f:~/projects$ chmod g-r project_m.txt
researcher2@e85eb5d2ea0f:~/projects$ chmod u-w,g-w .project_x.txt
researcher2@e85eb5d2ea0f:~/projects$ ls -la
total 32
drwxr-xr-x 3 researcher2 research_team 4096 Mar 22 16:34 .
drwxr-xr-x 3 researcher2 research_team 4096 Mar 22 17:06 ..
-r-------- 1 researcher2 research_team   46 Mar 22 16:34 .project_x.txt
drwx--x--- 2 researcher2 research_team 4096 Mar 22 16:34 drafts
-rw-rw-r-- 1 researcher2 research_team   46 Mar 22 16:34 project_k.txt
-rw------- 1 researcher2 research_team   46 Mar 22 16:34 project_m.txt
-rw-rw-r-- 1 researcher2 research_team   46 Mar 22 16:34 project_r.txt
-rw-rw-r-- 1 researcher2 research_team   46 Mar 22 16:34 project_t.txt
researcher2@e85eb5d2ea0f:~/projects$ chmod g+r .project_x.txt
researcher2@e85eb5d2ea0f:~/projects$ ls -la
total 32
drwxr-xr-x 3 researcher2 research_team 4096 Mar 22 16:34 .
drwxr-xr-x 3 researcher2 research_team 4096 Mar 22 17:06 ..
-r--r----- 1 researcher2 research_team   46 Mar 22 16:34 .project_x.txt
drwx--x--- 2 researcher2 research_team 4096 Mar 22 16:34 drafts
-rw-rw-r-- 1 researcher2 research_team   46 Mar 22 16:34 project_k.txt
-rw------- 1 researcher2 research_team   46 Mar 22 16:34 project_m.txt
-rw-rw-r-- 1 researcher2 research_team   46 Mar 22 16:34 project_r.txt
-rw-rw-r-- 1 researcher2 research_team   46 Mar 22 16:34 project_t.txt
researcher2@e85eb5d2ea0f:~/projects$ chmod g-x /drafts
chmod: cannot access '/drafts': No such file or directory
researcher2@e85eb5d2ea0f:~/projects$ chmod g-x /home/researcher2/projects/drafts
researcher2@e85eb5d2ea0f:~/projects$ ls -la
total 32
drwxr-xr-x 3 researcher2 research_team 4096 Mar 22 16:34 .
drwxr-xr-x 3 researcher2 research_team 4096 Mar 22 17:06 ..
-r--r----- 1 researcher2 research_team   46 Mar 22 16:34 .project_x.txt
drwx------ 2 researcher2 research_team 4096 Mar 22 16:34 drafts
-rw-rw-r-- 1 researcher2 research_team   46 Mar 22 16:34 project_k.txt
-rw------- 1 researcher2 research_team   46 Mar 22 16:34 project_m.txt
-rw-rw-r-- 1 researcher2 research_team   46 Mar 22 16:34 project_r.txt
-rw-rw-r-- 1 researcher2 research_team   46 Mar 22 16:34 project_t.txt
researcher2@e85eb5d2ea0f:~/projects$
```