

File permissions in Linux

Project description

In this scenario, I am a security professional at a large organization and am tasked with ensuring that team members are authorized with the appropriate permissions to keep the system secure. To carry out this task, a command-line interface (CLI) is required, along with knowledge of using the Linux Bash shell.

Check file and directory details

To check for file and directory details, the `ls` command can be used to display available files and directories. To check for all files and directories, including hidden ones, `ls -a` is used. To view all details of files and directories, including their permission information and hidden files, the following command is used: `ls -la`

```
researcher2@62130f50f5ff:~/projects$ ls
drafts project_k.txt project_m.txt project_r.txt project_t.txt
researcher2@62130f50f5ff:~/projects$ ls -a
. .. .project_x.txt drafts project_k.txt project_m.txt project_r.txt project_t.txt
researcher2@62130f50f5ff:~/projects$ ls -la
total 32
drwxr-xr-x 3 researcher2 research_team 4096 Nov 19 16:53 .
drwxr-xr-x 3 researcher2 research_team 4096 Nov 19 17:20 ..
-rw--w---- 1 researcher2 research_team  46 Nov 19 16:53 .project_x.txt
drwxr--r-- 2 researcher2 research_team 4096 Nov 19 16:53 drafts
-rw-rw-rw- 1 researcher2 research_team  46 Nov 19 16:53 project_k.txt
-rw-r----- 1 researcher2 research_team  46 Nov 19 16:53 project_m.txt
-rw-rw-r-- 1 researcher2 research_team  46 Nov 19 16:53 project_r.txt
-rw-rw-r-- 1 researcher2 research_team  46 Nov 19 16:53 project_t.txt
researcher2@62130f50f5ff:~/projects$
```

Describe the permissions string

```
researcher2@c188187142b5:~$ ls
projects
researcher2@c188187142b5:~$ cd projects
researcher2@c188187142b5:~/projects$ ls
drafts project_k.txt project_m.txt project_r.txt project_t.txt
researcher2@c188187142b5:~/projects$ ls -l
total 20
drwx-x--- 2 researcher2 research_team 4096 Nov 19 14:50 drafts
-rw-rw-rw- 1 researcher2 research_team 46 Nov 19 14:50 project_k.txt
-rw-r----- 1 researcher2 research_team 46 Nov 19 14:50 project_m.txt
-rw-rw-r-- 1 researcher2 research_team 46 Nov 19 14:50 project_r.txt
-rw-rw-r-- 1 researcher2 research_team 46 Nov 19 14:50 project_t.txt
researcher2@c188187142b5:~/projects$ ls -la
total 32
drwxr-xr-x 3 researcher2 research_team 4096 Nov 19 14:50 .
drwxr-xr-x 3 researcher2 research_team 4096 Nov 19 15:02 ..
-rw-r----- 1 researcher2 research_team 46 Nov 19 14:50 .project_x.txt
drwx-x--- 2 researcher2 research_team 4096 Nov 19 14:50 drafts
-rw-rw-rw- 1 researcher2 research_team 46 Nov 19 14:50 project_k.txt
-rw-r----- 1 researcher2 research_team 46 Nov 19 14:50 project_m.txt
-rw-rw-r-- 1 researcher2 research_team 46 Nov 19 14:50 project_r.txt
-rw-rw-r-- 1 researcher2 research_team 46 Nov 19 14:50 project_t.txt
researcher2@c188187142b5:~/projects$
```

In Linux, permissions are represented by a 10-character string. These permissions include read (r), write (w), and execute (x), and they are assigned to three types of owners: user, group, and others. For example:

```
-rw--w---- 1 researcher2 research_team 46 Nov 19 16:53 .project_x.txt
```

-rW-w----

- 1st character: indicate whether this is a file or a directory, files start with a hyphen like the one above while directories start with a d.
- 2nd to 4th: 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.

Change file permissions

To change a file's permissions, the **chmod** command is used. As mentioned earlier, there are three types of owners, each with its own set of permissions.

The format for using the command is: **chmod [permissions] [filename]**.

The example below demonstrates how to change a file's permissions for the group and others.

```
researcher2@61e7e6817599:~/projects$ ls
drafts project_k.txt project_m.txt project_r.txt project_t.txt
researcher2@61e7e6817599:~/projects$ ls -la
total 32
drwxr-xr-x 3 researcher2 research_team 4096 Nov 19 15:56 .
drwxr-xr-x 3 researcher2 research_team 4096 Nov 19 16:16 ..
-rw--w---- 1 researcher2 research_team 46 Nov 19 15:56 .project_x.txt
drwx--x--- 2 researcher2 research_team 4096 Nov 19 15:56 drafts
-rw-rw-rw- 1 researcher2 research_team 46 Nov 19 15:56 project_k.txt
-rw-r----- 1 researcher2 research_team 46 Nov 19 15:56 project_m.txt
-rw-rw-r-- 1 researcher2 research_team 46 Nov 19 15:56 project_r.txt
-rw-rw-r-- 1 researcher2 research_team 46 Nov 19 15:56 project_t.txt
researcher2@61e7e6817599:~/projects$ chmod g-w,o-w project_k.txt
researcher2@61e7e6817599:~/projects$ ls -la
total 32
drwxr-xr-x 3 researcher2 research_team 4096 Nov 19 15:56 .
drwxr-xr-x 3 researcher2 research_team 4096 Nov 19 16:16 ..
-rw--w---- 1 researcher2 research_team 46 Nov 19 15:56 .project_x.txt
drwx--x--- 2 researcher2 research_team 4096 Nov 19 15:56 drafts
-rw-r--r-- 1 researcher2 research_team 46 Nov 19 15:56 project_k.txt
-rw-r----- 1 researcher2 research_team 46 Nov 19 15:56 project_m.txt
-rw-rw-r-- 1 researcher2 research_team 46 Nov 19 15:56 project_r.txt
-rw-rw-r-- 1 researcher2 research_team 46 Nov 19 15:56 project_t.txt
researcher2@61e7e6817599:~/projects$
```

Change file permissions on a hidden file

In Linux, hidden files start with a dot. For example, `.project_x.txt` is a hidden file. To change the permissions of this file, I used the following command: `chmod g+r,g-w,o+r .project_x.txt`.

```
researcher2@61e7e6817599:~/projects$ ls -la
total 32
drwxr-xr-x 3 researcher2 research_team 4096 Nov 19 15:56 .
drwxr-xr-x 3 researcher2 research_team 4096 Nov 19 16:16 ..
-rw--w---- 1 researcher2 research_team 46 Nov 19 15:56 .project_x.txt
drwx--x--- 2 researcher2 research_team 4096 Nov 19 15:56 drafts
-rw-r--r-- 1 researcher2 research_team 46 Nov 19 15:56 project_k.txt
-rw-r----- 1 researcher2 research_team 46 Nov 19 15:56 project_m.txt
-rw-rw-r-- 1 researcher2 research_team 46 Nov 19 15:56 project_r.txt
-rw-rw-r-- 1 researcher2 research_team 46 Nov 19 15:56 project_t.txt
researcher2@61e7e6817599:~/projects$ chmod g+r,g-w,o+r .project_x.txt
researcher2@61e7e6817599:~/projects$ ls -la
total 32
drwxr-xr-x 3 researcher2 research_team 4096 Nov 19 15:56 .
drwxr-xr-x 3 researcher2 research_team 4096 Nov 19 16:16 ..
-rw-r--r-- 1 researcher2 research_team 46 Nov 19 15:56 .project_x.txt
drwx--x--- 2 researcher2 research_team 4096 Nov 19 15:56 drafts
-rw-r--r-- 1 researcher2 research_team 46 Nov 19 15:56 project_k.txt
-rw-r----- 1 researcher2 research_team 46 Nov 19 15:56 project_m.txt
-rw-rw-r-- 1 researcher2 research_team 46 Nov 19 15:56 project_r.txt
-rw-rw-r-- 1 researcher2 research_team 46 Nov 19 15:56 project_t.txt
researcher2@61e7e6817599:~/projects$
```

Change directory permissions

To change a directory's permissions, the same format is used as when changing a file's permissions. For example, to change the permissions of the `drafts` directory, I used the command: `chmod g+r,g-x,o+r drafts`

```
researcher2@62130f50f5ff:~$ ls
projects
researcher2@62130f50f5ff:~$ cd projects
researcher2@62130f50f5ff:~/projects$ ls -la
total 32
drwxr-xr-x 3 researcher2 research_team 4096 Nov 19 16:53 .
drwxr-xr-x 3 researcher2 research_team 4096 Nov 19 17:20 ..
-rw--w--- 1 researcher2 research_team  46 Nov 19 16:53 .project_x.txt
drwx--x--- 2 researcher2 research_team 4096 Nov 19 16:53 drafts
-rw-rw-rw- 1 researcher2 research_team  46 Nov 19 16:53 project_k.txt
-rw-r----- 1 researcher2 research_team  46 Nov 19 16:53 project_m.txt
-rw-rw-r-- 1 researcher2 research_team  46 Nov 19 16:53 project_r.txt
-rw-rw-r-- 1 researcher2 research_team  46 Nov 19 16:53 project_t.txt
researcher2@62130f50f5ff:~/projects$ chmod g+r,g-x,o+r drafts
researcher2@62130f50f5ff:~/projects$ ls -la
total 32
drwxr-xr-x 3 researcher2 research_team 4096 Nov 19 16:53 .
drwxr-xr-x 3 researcher2 research_team 4096 Nov 19 17:20 ..
-rw--w--- 1 researcher2 research_team  46 Nov 19 16:53 .project_x.txt
drwxr--r-- 2 researcher2 research_team 4096 Nov 19 16:53 drafts
-rw-rw-rw- 1 researcher2 research_team  46 Nov 19 16:53 project_k.txt
-rw-r----- 1 researcher2 research_team  46 Nov 19 16:53 project_m.txt
-rw-rw-r-- 1 researcher2 research_team  46 Nov 19 16:53 project_r.txt
-rw-rw-r-- 1 researcher2 research_team  46 Nov 19 16:53 project_t.txt
researcher2@62130f50f5ff:~/projects$
```

Summary

In this project, I gained a deeper understanding of managing file and directory permissions in a Linux environment, which is crucial for ensuring system security. By using commands like `ls -la` and `chmod`, I learned how to view and modify access levels for users, groups, and others, ensuring only authorized individuals have the correct access to files and directories.

Additionally, I improved my ability to work with hidden files and directories, a key aspect of Linux systems. This experience enhanced my skills in managing permissions to protect sensitive data, ensuring that I can effectively control access and contribute to a more secure computing environment.