File permissions in Linux

Project description

Using Linux commands in the Bash shell, I learned how to check for permissions for a file in a directory, check for incorrect file permissions, change permissions as needed, and remove unauthorized access to a directory.

Check file and directory details

This document displays the file structure of the `/home/researcher2/projects` directory and the permissions of the files and subdirectory it contains.

In the `/home/researcher2/projects` directory, there are five files with the following names and permissions:

- `project_k.txt`
  - User = read, write,
  - Group = read, write
  - Other = read, write
- `project_m.txt`
  - User = read, write
  - Group = read
  - Other = none
- `project_r.txt`
  - User= read, write
  - Group = read, write
  - Other = read
- `project_t.txt`
  - User = read, write
  - Group = read, write
  - Other = read
- `.project_x.txt`
  - User = read, write
  - Group = write
  - Other = none

There is also one subdirectory inside the `projects` directory named `drafts`. The permissions on `drafts` are:

- User = read, write, execute
- Group = execute
- Other = none

```
researcher2@dd6cbe638c97:~$ cd projects
researcher2@dd6cbe638c97:~/projects$ ls -la
total 32
drwxr-xr-x 3 researcher2 research_team 4096 Dec  4 06:01 .
drwxr-xr-x 3 researcher2 research_team 4096 Dec  4 07:47 ..
-rw--w---- 1 researcher2 research_team   46 Dec  4 06:01 .project_x.txt
drwx--x--- 2 researcher2 research_team 4096 Dec  4 06:01 drafts
-rw-rw-rw- 1 researcher2 research_team   46 Dec  4 06:01 project_k.txt
-rw-r----- 1 researcher2 research_team   46 Dec  4 06:01 project_m.txt
-rw-rw-r-- 1 researcher2 research_team   46 Dec  4 06:01 project_r.txt
-rw-rw-r-- 1 researcher2 research_team   46 Dec  4 06:01 project_t.txt
researcher2@dd6cbe638c97:~/projects$ ls -lad
drwxr-xr-x 3 researcher2 research_team 4096 Dec  4 06:01 .
researcher2@dd6cbe638c97:~/projects$
```

The command “ls -la” displayed the permissions for all the files, including the hidden files. The command “ls-lad” was used to display the permissions for the directories and the hidden directories in the current directory.

Describe the permissions string

In the above screenshot let’s take the first example, “drwxr-xr-x”. The first character specifies whether it’s a directory (d) or a file (-). The next three characters are for user, the next three for group and the last three are for others. “r” represents the read permission, “w” represents the write permission while “x” represents the execute permission.

Change file permissions

The files in this structure should not give permission to others to write. We use “chmod o-w project_k.txt” to remove the permission.

```
researcher2@dd6cbe638c97:~/projects$ chmod o-w project_k.txt
researcher2@dd6cbe638c97:~/projects$ ls -la
total 32
drwxr-xr-x 3 researcher2 research_team 4096 Dec  4 06:01 .
drwxr-xr-x 3 researcher2 research_team 4096 Dec  4 07:47 ..
-rw--w---- 1 researcher2 research_team   46 Dec  4 06:01 .project_x.txt
drwx--x--- 2 researcher2 research_team 4096 Dec  4 06:01 drafts
-rw-rw-r-- 1 researcher2 research_team   46 Dec  4 06:01 project_k.txt
-rw-r----- 1 researcher2 research_team   46 Dec  4 06:01 project_m.txt
-rw-rw-r-- 1 researcher2 research_team   46 Dec  4 06:01 project_r.txt
-rw-rw-r-- 1 researcher2 research_team   46 Dec  4 06:01 project_t.txt
researcher2@dd6cbe638c97:~/projects$
```

Change file permissions on a hidden file

The same command is used “chmod” but we change “o” to “g” to change permissions for “group” instead of “others” and when you specify the text file name, you have to include “.” before it to specify that it is a hidden file.

```
researcher2@dd6cbe638c97:~/projects$ chmod g-r,g-w .project_x.txt
researcher2@dd6cbe638c97:~/projects$ ls -la
total 32
drwxr-xr-x 3 researcher2 research_team 4096 Dec  4 06:01 .
drwxr-xr-x 3 researcher2 research_team 4096 Dec  4 07:47 ..
-rw------- 1 researcher2 research_team   46 Dec  4 06:01 .project_x.txt
drwx--x--- 2 researcher2 research_team 4096 Dec  4 06:01 drafts
-rw-rw-r-- 1 researcher2 research_team   46 Dec  4 06:01 project_k.txt
-rw-r----- 1 researcher2 research_team   46 Dec  4 06:01 project_m.txt
-rw-rw-r-- 1 researcher2 research_team   46 Dec  4 06:01 project_r.txt
-rw-rw-r-- 1 researcher2 research_team   46 Dec  4 06:01 project_t.txt
researcher2@dd6cbe638c97:~/projects$
```

Change directory permissions

```
researcher2@dd6cbe638c97:~/projects$ chmod g-x drafts
researcher2@dd6cbe638c97:~/projects$ ls -la
total 32
drwxr-xr-x 3 researcher2 research_team 4096 Dec  4 06:01 .
drwxr-xr-x 3 researcher2 research_team 4096 Dec  4 07:47 ..
-rw------- 1 researcher2 research_team   46 Dec  4 06:01 .project_x.txt
drwx------ 2 researcher2 research_team 4096 Dec  4 06:01 drafts
-rw-rw-r-- 1 researcher2 research_team   46 Dec  4 06:01 project_k.txt
-rw-r----- 1 researcher2 research_team   46 Dec  4 06:01 project_m.txt
-rw-rw-r-- 1 researcher2 research_team   46 Dec  4 06:01 project_r.txt
-rw-rw-r-- 1 researcher2 research_team   46 Dec  4 06:01 project_t.txt
```

Summary

In this activity, we explored essential Linux commands and concepts related to file and directory permissions. We used “ls -la” to view permissions, including those of hidden files and directories, and learned to interpret the 10-character string representing permission levels. The “chmod” command was used to modify permissions effectively. This activity highlights the importance of managing permissions to ensure security and proper access control for files and directories in a Linux environment.