

# File permissions in Linux

## Project description

Authorization is the concept of granting access to specific resources in a system. It's important because without authorization any user could access and modify all files belonging to other users or system files. This would certainly be a security risk.

In Linux, file and directory permissions are used to specify who has access to specific files and directories. As a security analyst, setting appropriate access permissions is critical to protecting sensitive information and maintaining the overall security of a system.

## Check file and directory details

ls -l : Checks permissions to both files and directories

ls -la : Checks permissions to files and directories and hidden files.

```
researcher2@304ca6801161:~$ cd /home/researcher2/projects
researcher2@304ca6801161:~/projects$ ls -l
total 20
drwx--x--- 2 researcher2 research_team 4096 Apr 26 12:08 drafts
-rw-rw-rw- 1 researcher2 research_team  46 Apr 26 12:08 project_k.txt
-rw-r----- 1 researcher2 research_team  46 Apr 26 12:08 project_m.txt
-rw-rw-r--  1 researcher2 research_team  46 Apr 26 12:08 project_r.txt
-rw-rw-r--  1 researcher2 research_team  46 Apr 26 12:08 project_t.txt
researcher2@304ca6801161:~/projects$ ls -la
total 32
drwxr-xr-x 3 researcher2 research_team 4096 Apr 26 12:08 .
drwxr-xr-x 3 researcher2 research_team 4096 Apr 26 12:40 ..
-rw--w---- 1 researcher2 research_team  46 Apr 26 12:08 .project_x.txt
drwx--x--- 2 researcher2 research_team 4096 Apr 26 12:08 drafts
-rw-rw-rw- 1 researcher2 research_team  46 Apr 26 12:08 project_k.txt
-rw-r----- 1 researcher2 research_team  46 Apr 26 12:08 project_m.txt
-rw-rw-r--  1 researcher2 research_team  46 Apr 26 12:08 project_r.txt
-rw-rw-r--  1 researcher2 research_team  46 Apr 26 12:08 project_t.txt
researcher2@304ca6801161:~/projects$
```

## Describe the permissions string

The permissions string is a 10-character string that begins each entry and indicates how the permissions on the file are set. For instance, a directory with full permissions for all owner types would be drwxrwxrwx:

- The 1st character indicates the file type. The d indicates it's a directory. When this character is a hyphen (-), it's a regular file.
- The 2nd-4th 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.
- The 5th-7th 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.
- The 8th-10th characters indicate the read (r), write (w), and execute (x) permissions for the owner type of 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.

## Change file permissions

In this scenario, none of the files should give permission to “other” users to write to files. You can change this permission with: **chmod o-w project\_k.txt**

The file `project_m.txt` is a restricted file and should not be readable or writable by the group or other; only the user should have these permissions on this file. You can change this permission with: **chmod g-r project\_m.txt**

```

researcher2@304ca6801161:~/projects$ ls -la
total 32
drwxr-xr-x 3 researcher2 research_team 4096 Apr 26 12:08 .
drwxr-xr-x 3 researcher2 research_team 4096 Apr 26 12:40 ..
-rw--w---- 1 researcher2 research_team  46 Apr 26 12:08 .project_x.txt
drwx--x--- 2 researcher2 research_team 4096 Apr 26 12:08 drafts
-rw-rw-rw- 1 researcher2 research_team  46 Apr 26 12:08 project_k.txt
-rw-r----- 1 researcher2 research_team  46 Apr 26 12:08 project_m.txt
-rw-rw-r-- 1 researcher2 research_team  46 Apr 26 12:08 project_r.txt
-rw-rw-r-- 1 researcher2 research_team  46 Apr 26 12:08 project_t.txt
researcher2@304ca6801161:~/projects$ chmod o-w project_k.txt
researcher2@304ca6801161:~/projects$ ls -la
total 32
drwxr-xr-x 3 researcher2 research_team 4096 Apr 26 12:08 .
drwxr-xr-x 3 researcher2 research_team 4096 Apr 26 12:40 ..
-rw--w---- 1 researcher2 research_team  46 Apr 26 12:08 .project_x.txt
drwx--x--- 2 researcher2 research_team 4096 Apr 26 12:08 drafts
-rw-rw-r-- 1 researcher2 research_team  46 Apr 26 12:08 project_k.txt
-rw-r----- 1 researcher2 research_team  46 Apr 26 12:08 project_m.txt
-rw-rw-r-- 1 researcher2 research_team  46 Apr 26 12:08 project_r.txt
-rw-rw-r-- 1 researcher2 research_team  46 Apr 26 12:08 project_t.txt
researcher2@304ca6801161:~/projects$ chmod g-r project_m.txt
researcher2@304ca6801161:~/projects$ ls -la
total 32
drwxr-xr-x 3 researcher2 research_team 4096 Apr 26 12:08 .
drwxr-xr-x 3 researcher2 research_team 4096 Apr 26 12:40 ..
-rw--w---- 1 researcher2 research_team  46 Apr 26 12:08 .project_x.txt
drwx--x--- 2 researcher2 research_team 4096 Apr 26 12:08 drafts
-rw-rw-r-- 1 researcher2 research_team  46 Apr 26 12:08 project_k.txt
-rw----- 1 researcher2 research_team  46 Apr 26 12:08 project_m.txt
-rw-rw-r-- 1 researcher2 research_team  46 Apr 26 12:08 project_r.txt
-rw-rw-r-- 1 researcher2 research_team  46 Apr 26 12:08 project_t.txt
researcher2@304ca6801161:~/projects$ █

```

## Change file permissions on a hidden file

The file `.project_x.txt` is a hidden file that has been archived and should not be written to by anyone. (The user and group should still be able to read this file.)

```

researcher2@304ca6801161:~/projects$ chmod g-r project_m.txt
researcher2@304ca6801161:~/projects$ ls -la
total 32
drwxr-xr-x 3 researcher2 research_team 4096 Apr 26 12:08 .
drwxr-xr-x 3 researcher2 research_team 4096 Apr 26 12:40 ..
-rw--w---- 1 researcher2 research_team  46 Apr 26 12:08 .project_x.txt
drwx--x--- 2 researcher2 research_team 4096 Apr 26 12:08 drafts
-rw-rw-r-- 1 researcher2 research_team  46 Apr 26 12:08 project_k.txt
-rw----- 1 researcher2 research_team  46 Apr 26 12:08 project_m.txt
-rw-rw-r-- 1 researcher2 research_team  46 Apr 26 12:08 project_r.txt
-rw-rw-r-- 1 researcher2 research_team  46 Apr 26 12:08 project_t.txt
researcher2@304ca6801161:~/projects$ chmod u=r,g=r .project_x.txt
researcher2@304ca6801161:~/projects$ ls -la
total 32
drwxr-xr-x 3 researcher2 research_team 4096 Apr 26 12:08 .
drwxr-xr-x 3 researcher2 research_team 4096 Apr 26 12:40 ..
-r--r----- 1 researcher2 research_team  46 Apr 26 12:08 .project_x.txt
drwx--x--- 2 researcher2 research_team 4096 Apr 26 12:08 drafts
-rw-rw-r-- 1 researcher2 research_team  46 Apr 26 12:08 project_k.txt
-rw----- 1 researcher2 research_team  46 Apr 26 12:08 project_m.txt
-rw-rw-r-- 1 researcher2 research_team  46 Apr 26 12:08 project_r.txt
-rw-rw-r-- 1 researcher2 research_team  46 Apr 26 12:08 project_t.txt
researcher2@304ca6801161:~/projects$ █

```

## Change directory permissions

Only the researcher2 user should be allowed to access the drafts directory and its contents. (This means that only researcher2 should have execute privileges.)

```

researcher2@304ca6801161:~/projects$ ls -la
total 32
drwxr-xr-x 3 researcher2 research_team 4096 Apr 26 12:08 .
drwxr-xr-x 3 researcher2 research_team 4096 Apr 26 12:40 ..
-r--r----- 1 researcher2 research_team  46 Apr 26 12:08 .project_x.txt
drwx--x--- 2 researcher2 research_team 4096 Apr 26 12:08 drafts
-rw-rw-r-- 1 researcher2 research_team  46 Apr 26 12:08 project_k.txt
-rw----- 1 researcher2 research_team  46 Apr 26 12:08 project_m.txt
-rw-rw-r-- 1 researcher2 research_team  46 Apr 26 12:08 project_r.txt
-rw-rw-r-- 1 researcher2 research_team  46 Apr 26 12:08 project_t.txt
researcher2@304ca6801161:~/projects$ chmod g-x drafts
researcher2@304ca6801161:~/projects$ ls -la
total 32
drwxr-xr-x 3 researcher2 research_team 4096 Apr 26 12:08 .
drwxr-xr-x 3 researcher2 research_team 4096 Apr 26 12:40 ..
-r--r----- 1 researcher2 research_team  46 Apr 26 12:08 .project_x.txt
drwx----- 2 researcher2 research_team 4096 Apr 26 12:08 drafts
-rw-rw-r-- 1 researcher2 research_team  46 Apr 26 12:08 project_k.txt
-rw----- 1 researcher2 research_team  46 Apr 26 12:08 project_m.txt
-rw-rw-r-- 1 researcher2 research_team  46 Apr 26 12:08 project_r.txt
-rw-rw-r-- 1 researcher2 research_team  46 Apr 26 12:08 project_t.txt
researcher2@304ca6801161:~/projects$ █

```

## Summary

This gave me practical experience in using basic Linux Bash shell commands to

- examine file and directory permissions,
- change permissions on files, and
- change permissions on directories.