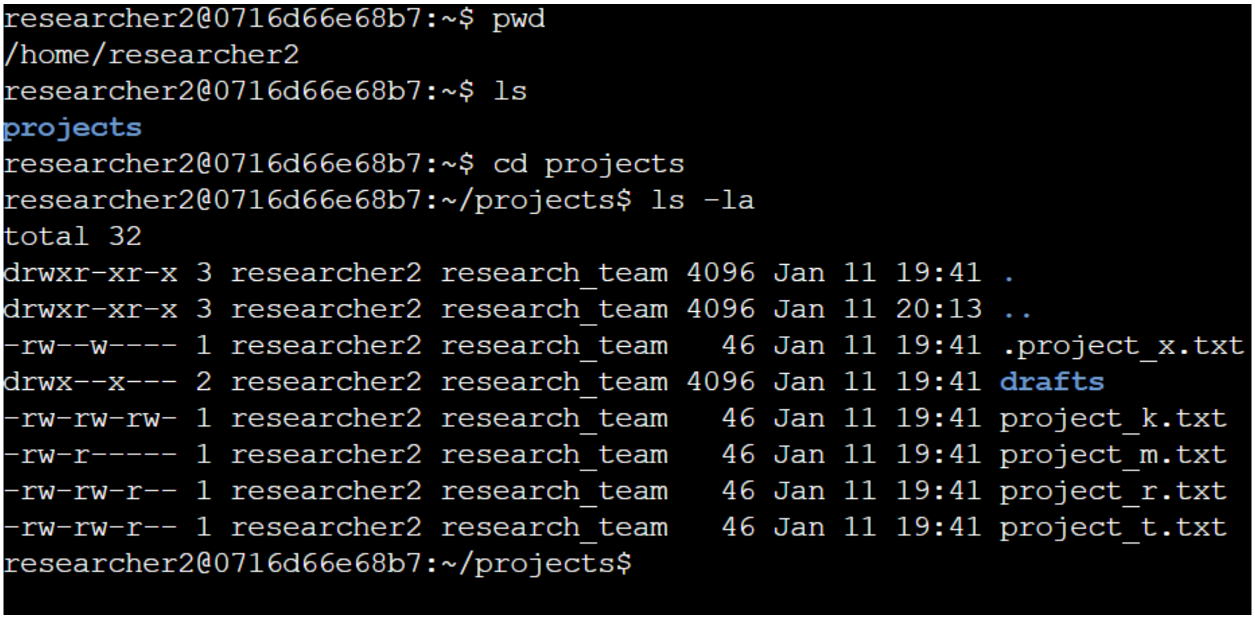
File permissions in Linux

Project description

At my organization, the research team must update specific files and directory permissions in the `projects` directory. Updating the permissions will ensure the system's security and provide the level of authorization that each personnel needs. This was how I completed the task;

Check file and directory details

Using the Linux commands, I determined what permissions had already been assigned to the directory in the file.



```
researcher2@0716d66e68b7:~$ pwd
/home/researcher2
researcher2@0716d66e68b7:~$ ls
projects
researcher2@0716d66e68b7:~$ cd projects
researcher2@0716d66e68b7:~/projects$ ls -la
total 32
drwxr-xr-x 3 researcher2 research_team 4096 Jan 11 19:41 .
drwxr-xr-x 3 researcher2 research_team 4096 Jan 11 20:13 ..
-rw--w---- 1 researcher2 research_team   46 Jan 11 19:41 .project_x.txt
drwx--x--- 2 researcher2 research_team 4096 Jan 11 19:41 drafts
-rw-rw-rw- 1 researcher2 research_team   46 Jan 11 19:41 project_k.txt
-rw-r----- 1 researcher2 research_team   46 Jan 11 19:41 project_m.txt
-rw-rw-r-- 1 researcher2 research_team   46 Jan 11 19:41 project_r.txt
-rw-rw-r-- 1 researcher2 research_team   46 Jan 11 19:41 project_t.txt
researcher2@0716d66e68b7:~/projects$
```

The code lists all contents of the `projects` directory. I proceeded to use the `ls` `-la` command to show a detailed list of file contents as well as its hidden files. The output of my command displays the only directory called `drafts`, a hidden file named `.project_x.txt`, and five project files. The 10-character string in the first column(on the left-hand side) displays each permissions set for each file or directory (user, group, and other users).

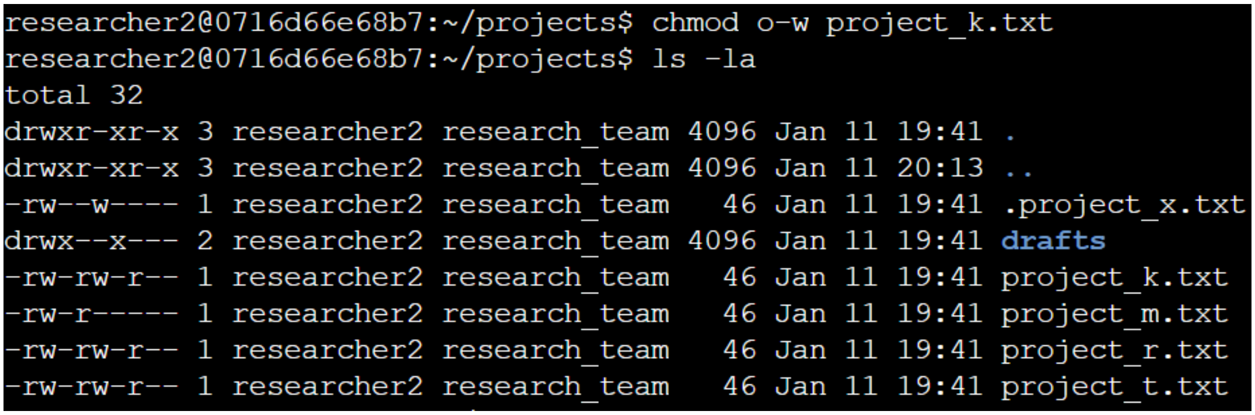
Describe the permissions string

The 10-character permissions string is sectioned into different parts and helps me determine who is authorized to access the file with their different permissions.

- **1st character**: This character can either be the character `d` or the hyphen (`-`) which is used to indicate the file type. The character `d` means the file is a directory and the symbol hyphen (`-`) means it's a regular file.
- **2nd-4th characters**: Characters in positions 2 through 4 show the user's permissions for reading (`r`), writing (`w`), and executing (`x`). If a hyphen (`-`) appears, it means that specific permission is not granted to the user.
- **5th-7th characters:** Characters in positions 5 through 7 represent the group's permissions for read (`r`), write (`w`), and execute (`x`). A hyphen (`-`) in any of these positions indicates that the group lacks that particular permission.
- **8th-10th characters:** Characters in positions 8 through 10 display the permissions for others, which include all users except the user and the group. These permissions cover read (`r`), write (`w`), and execute (`x`). A hyphen (`-`) in these positions signifies that permission is not granted to others.

Change file permissions

The organization requested that "other" should not have access to any of their files. To do this, I checked through the file permissions and determined that `project_k.txt` needs the write access taken away from "other" users. The code below shows what the file permissions look like after taking the write access from others in `project_k.txt`.

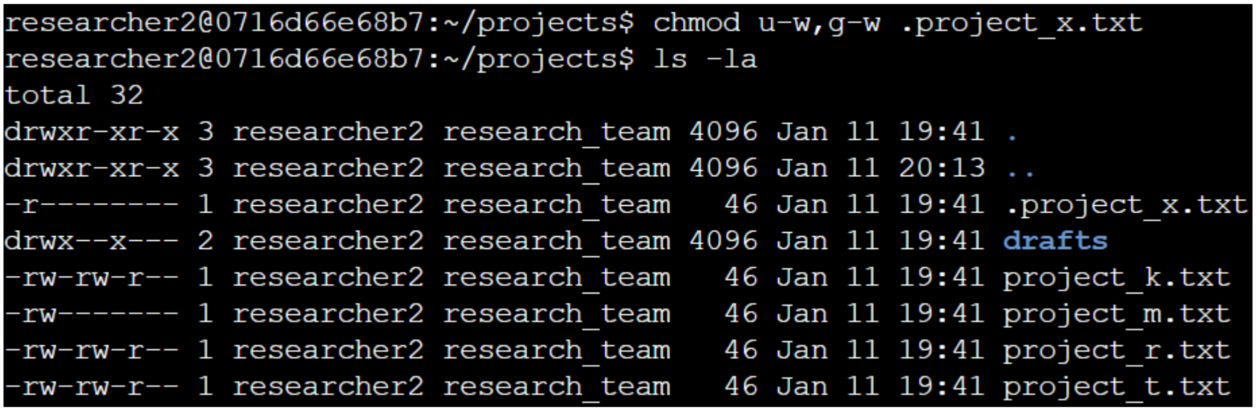


```
researcher2@0716d66e68b7:~/projects$ chmod o-w project_k.txt
researcher2@0716d66e68b7:~/projects$ ls -la
total 32
drwxr-xr-x 3 researcher2 research_team 4096 Jan 11 19:41 .
drwxr-xr-x 3 researcher2 research_team 4096 Jan 11 20:13 ..
-rw--w---- 1 researcher2 research_team   46 Jan 11 19:41 .project_x.txt
drwx--x--- 2 researcher2 research_team 4096 Jan 11 19:41 drafts
-rw-rw-r-- 1 researcher2 research_team   46 Jan 11 19:41 project_k.txt
-rw-r----- 1 researcher2 research_team   46 Jan 11 19:41 project_m.txt
-rw-rw-r-- 1 researcher2 research_team   46 Jan 11 19:41 project_r.txt
-rw-rw-r-- 1 researcher2 research_team   46 Jan 11 19:41 project_t.txt
```

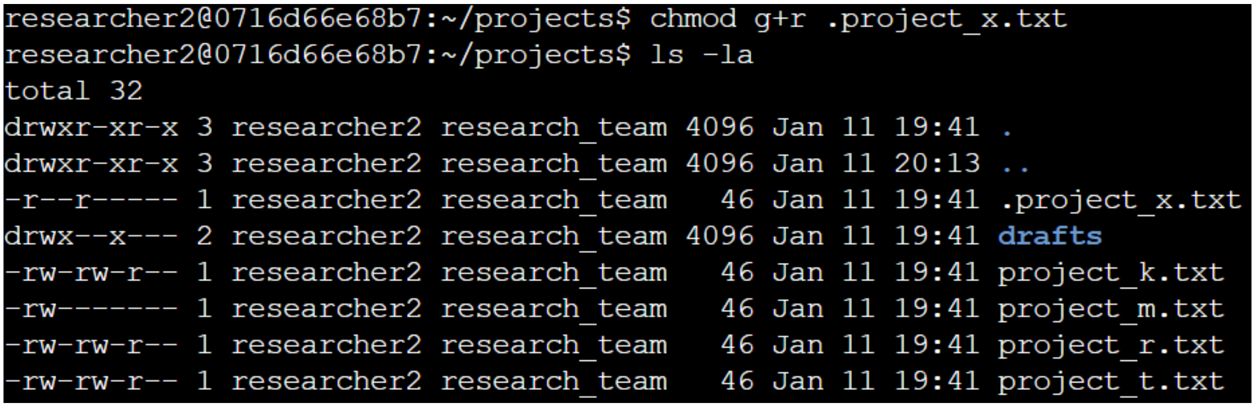
The `chmod` command is used to modify permissions for files and directories. The first parameter specifies the permissions to change, and the second parameter indicates the file or directory. In this case, I removed write permissions for others from the project_k.txt file (o-`w)`.

Change file permissions on a hidden file

The research team hid (archived) `project_x.txt` and now they want me to remove all write access to users, groups, and others. However, they want both the users and groups to still have read access.



```
researcher2@0716d66e68b7:~/projects$ chmod u-w,g-w .project_x.txt
researcher2@0716d66e68b7:~/projects$ ls -la
total 32
drwxr-xr-x 3 researcher2 research_team 4096 Jan 11 19:41 .
drwxr-xr-x 3 researcher2 research_team 4096 Jan 11 20:13 ..
-r-------- 1 researcher2 research_team   46 Jan 11 19:41 .project_x.txt
drwx--x--- 2 researcher2 research_team 4096 Jan 11 19:41 drafts
-rw-rw-r-- 1 researcher2 research_team   46 Jan 11 19:41 project_k.txt
-rw------- 1 researcher2 research_team   46 Jan 11 19:41 project_m.txt
-rw-rw-r-- 1 researcher2 research_team   46 Jan 11 19:41 project_r.txt
-rw-rw-r-- 1 researcher2 research_team   46 Jan 11 19:41 project_t.txt
```

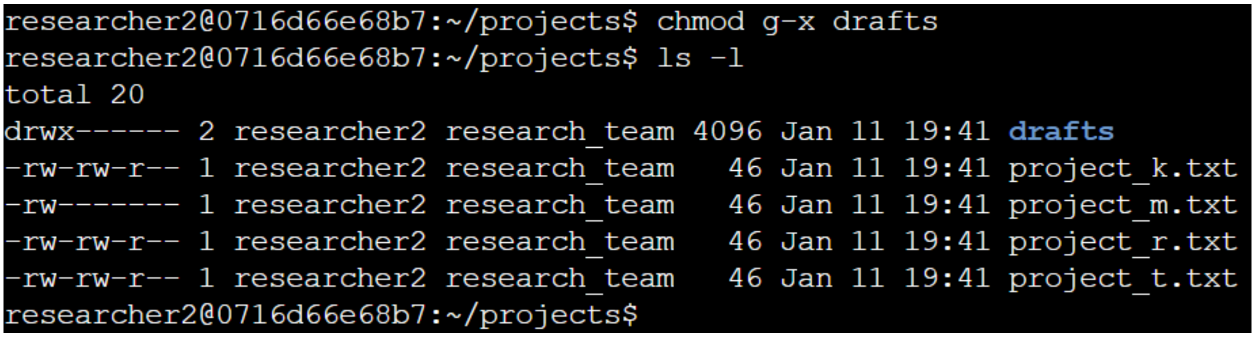


```
researcher2@0716d66e68b7:~/projects$ chmod g+r .project_x.txt
researcher2@0716d66e68b7:~/projects$ ls -la
total 32
drwxr-xr-x 3 researcher2 research_team 4096 Jan 11 19:41 .
drwxr-xr-x 3 researcher2 research_team 4096 Jan 11 20:13 ..
-r--r----- 1 researcher2 research_team   46 Jan 11 19:41 .project_x.txt
drwx--x--- 2 researcher2 research_team 4096 Jan 11 19:41 drafts
-rw-rw-r-- 1 researcher2 research_team   46 Jan 11 19:41 project_k.txt
-rw------- 1 researcher2 research_team   46 Jan 11 19:41 project_m.txt
-rw-rw-r-- 1 researcher2 research_team   46 Jan 11 19:41 project_r.txt
-rw-rw-r-- 1 researcher2 research_team   46 Jan 11 19:41 project_t.txt
```

We can see that `.project_x.txt` is a hidden file because it starts with a period (`.`). I removed write permissions from the user and group in the first screenshot, then I added read permissions to the group in the second screenshot.

Change directory permissions

The organization only wants the `researcher2` user to have access to the `drafts` directory and its contents. To do this, I have to use Linux commands to change the permissions.



```
researcher2@0716d66e68b7:~/projects$ chmod g-x drafts
researcher2@0716d66e68b7:~/projects$ ls -l
total 20
drwx------ 2 researcher2 research_team 4096 Jan 11 19:41 drafts
-rw-rw-r-- 1 researcher2 research_team   46 Jan 11 19:41 project_k.txt
-rw------- 1 researcher2 research_team   46 Jan 11 19:41 project_m.txt
-rw-rw-r-- 1 researcher2 research_team   46 Jan 11 19:41 project_r.txt
-rw-rw-r-- 1 researcher2 research_team   46 Jan 11 19:41 project_t.txt
researcher2@0716d66e68b7:~/projects$
```

I realized that the groups in drafts still had permission to execute so I removed that permission and now we can see that `researcher2` is the only one that has execute permissions.

Summary

I adjusted several permissions to align with the authorization levels my organization required for files and directories within the `projects` directory. First, I used `ls -la` to inspect the current permissions for the directory. This helped guide my subsequent actions. Then, I repeatedly used the `chmod` command to modify the permissions on the necessary files and directories.