File permissions in Linux

Project description

The research team at my organisation needs some changes in the permissions of the files and subdirectories inside the projects directory; the current level of access does not match the required permissions needed for them to complete a new project. Checking the permissions will make sure that the sensitive data is secure. Here are the tasks i did to complete the task.

Check file and directory details

First I used the ls command along with the -la options to list all the files in the directory (including the hidden ones by option l) along with the current permissions.
This was the output :

```
researcher2@5d738f0f927b:~/projects$ ls -la
total 32
drwxr-xr-x 3 researcher2 research_team 4096 Dec  2 15:27 .
drwxr-xr-x 3 researcher2 research_team 4096 Dec  2 15:27 ..
-rw--w---- 1 researcher2 research_team   46 Dec  2 15:27 .project_x.txt
drwx--x--- 2 researcher2 research_team 4096 Dec  2 15:27 drafts
-rw-rw-rw- 1 researcher2 research_team   46 Dec  2 15:27 project_k.txt
-rw-r----- 1 researcher2 research_team   46 Dec  2 15:27 project_m.txt
-rw-rw-r-- 1 researcher2 research_team   46 Dec  2 15:27 project_r.txt
-rw-rw-r-- 1 researcher2 research_team   46 Dec  2 15:27 project_t.txt
researcher2@5d738f0f927b:~/projects$
```

Describe the permissions string

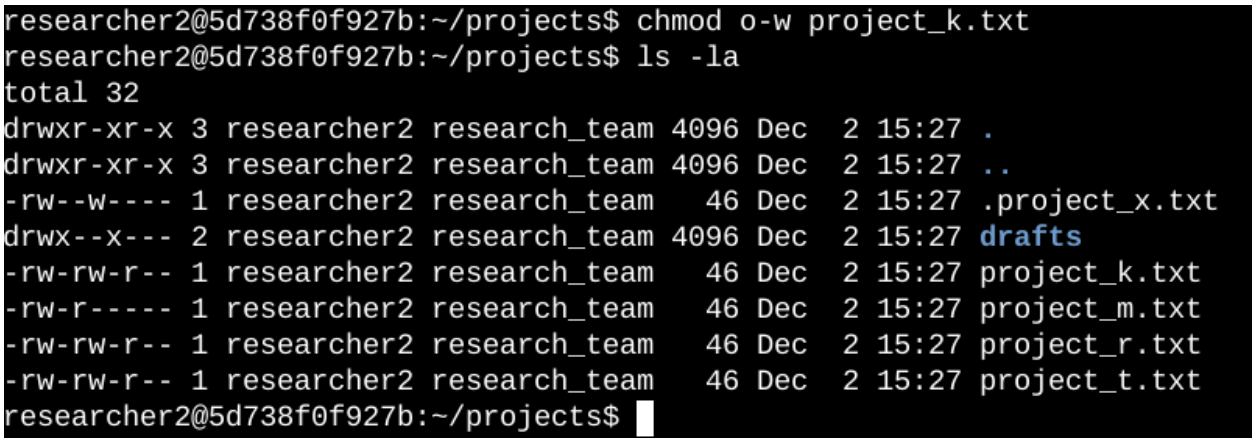
In the first line of the screenshot we can see the command `ls -la`.
What the first 10 digits in the output describe are the permissions for each of the files and subdirectories inside the projects directory.

- **1st character :** Is either `d` or a hyphen `-` . Here the d indicates that it is directory and the hyphen - describes that it is a file.
- **2nd-4th characters :** These characters describe the permissions for the user the `r` (read) , `w` (write) , `x` (execute) . If any of these is replaced with a hyphen (`-`) this means the user does not have that permission.
- **5th-7th characters :** These characters describe the permissions for the group the `r` (read) , `w` (write) , `x` (execute) . If any of these is replaced with a hyphen (`-`) this means the user does not have that permission.

- **8th-10th characters :** These characters describe the permissions for the user the r (read) , w (write) , x (execute) . If any of these is replaced with a hyphen (-) this means the user does not have that permission. Other are the users that have access to the system but are not part of user or group.

Change file permissions

According to the organization users in other should not have write (w) permissions for any file in the projects directory, currently other have write permission for project_k.txt file so i need to revoke those permissions for the other users.
Following images shows the command i used to revoke the write permission for other users:



The first line shows the command I used to remove the write permissions from other users. The second part shows the output after changing the permissions for the file. The chmod command changes permissions for files and directory. The first argument o represents the other users and the second argument - describes that we want to remove (minus) the third argument w (write) permission from other users for the project_k.txt file.

Change file permissions on a hidden file

The research team at my organization recently archived the .project_x.txt file and they want to make sure that no one can write to that file but the user and group can read it.
Following image shows the command i used to change the permissions:

```
researcher2@3213bbc1d047:~/projects$ chmod u-w,g-w,g+r .project_x.txt
researcher2@3213bbc1d047:~/projects$ ls -la
total 32
drwxr-xr-x 3 researcher2 research_team 4096 Dec 20 15:36 .
drwxr-xr-x 3 researcher2 research_team 4096 Dec 20 15:36 ..
-r--r----- 1 researcher2 research_team   46 Dec 20 15:36 .project_x.txt
drwx--x--- 2 researcher2 research_team 4096 Dec 20 15:36 drafts
-rw-rw-rw- 1 researcher2 research_team   46 Dec 20 15:36 project_k.txt
-rw-r----- 1 researcher2 research_team   46 Dec 20 15:36 project_m.txt
-rw-rw-r-- 1 researcher2 research_team   46 Dec 20 15:36 project_r.txt
-rw-rw-r-- 1 researcher2 research_team   46 Dec 20 15:36 project_t.txt
researcher2@3213bbc1d047:~/projects$
```

`.project_x.txt` is a hidden file so it starts with a `(.)` , here the chmod command was used with `u-w` meaning remove write permission for `.project_x.txt` same with `g-w` to remove write permission for group. The third option `g+r` adds read permission for the group as required by the research team.

Change directory permissions

My organization only wants researcher2 to have access to the draft directory, currently group has execute (x) permission which we need to revoke to make sure only researcher2 can access the directory.
Following is the command i used to make the necessary permission changes:

```
researcher2@5d738f0f927b:~/projects$ chmod g-x drafts
researcher2@5d738f0f927b:~/projects$ ls -la
total 32
drwxr-xr-x 3 researcher2 research_team 4096 Dec  2 15:27 .
drwxr-xr-x 3 researcher2 research_team 4096 Dec  2 15:27 ..
-r--r----- 1 researcher2 research_team   46 Dec  2 15:27 .project_x.txt
drwx------ 2 researcher2 research_team 4096 Dec  2 15:27 drafts
-rw-rw-r-- 1 researcher2 research_team   46 Dec  2 15:27 project_k.txt
-rw-r----- 1 researcher2 research_team   46 Dec  2 15:27 project_m.txt
-rw-rw-r-- 1 researcher2 research_team   46 Dec  2 15:27 project_r.txt
-rw-rw-r-- 1 researcher2 research_team   46 Dec  2 15:27 project_t.txt
researcher2@5d738f0f927b:~/projects$
```

The first line shows the chmod that i used to remove the execute permissions from the group and the user researcher2 already had all the required permissions so that did not need any changes. I also used `ls` with `-la` to make sure that all the permissions are according to the requirements .

Summary

I changed multiple permissions to make sure that the level of permissions match the level of authorization my organisation wants in the `projects` directory.
The first step was to check the current state of the permissions with the `ls -la` command which informed my decision in the following steps. I used the `chmod` command multiple times to change the permissions for files and directories.