File permissions in Linux

Project description

A researcher team in my organization came to me with a concern about some file permissions within their `projects` directory and I performed the following tasks to ensure everyone has the correct permissions.

Check file and directory details

```
researcher2@748b50924c13:~$ cd projects/
researcher2@748b50924c13:~/projects$ ls -l
total 20
drwx--x--- 2 researcher2 research_team 4096 May 20 02:27 drafts
-rw-rw-rw- 1 researcher2 research_team   46 May 20 02:27 project_k.txt
-rw-r----- 1 researcher2 research_team   46 May 20 02:27 project_m.txt
-rw-rw-r-- 1 researcher2 research_team   46 May 20 02:27 project_r.txt
-rw-rw-r-- 1 researcher2 research_team   46 May 20 02:27 project_t.txt
```

I started by checking permissions of the visible files. On the first line, I navigated to the `projects` directory and on the second line, I checked the permissions of the visible files within the directory. The 10 character string on the output of each line shows the permissions for the user, the group and others respectfully.

Describe the permissions string

The 10 character string describes:

- 1st character: This determines whether the thing we're checking for the permission is a directory or a file. "d" stands for directory and "-" stands for file.
- 2-4th character: These characters determine the permissions for the user.
- 5-7th character: These characters determine the permissions for the group.
- 8-10th character: These characters determine the permissions for others.

To determine the respective entity's permissions, "r" stands for reading, "w" stands for writing, and "x" stands for executing. The order of these characters will be "rwx" and if one or more of these characters are replaced with "-" instead, this means that the respective entity is not given the respective permissions. For example, if we read the permissions for a directory called `drafts`, "`drwx--x---`" is given. "d" tells us that `drafts` is a directory, 2-4th character "rwx" tells that user has all three permissions, 5-7th character "--x" tells that the group has only executing permission and the last three characters "---" tells that others have no permissions.

Change file permissions

```
researcher2@748b50924c13:~/projects$ chmod o-w project_k.txt
researcher2@748b50924c13:~/projects$ ls -l
total 20
drwx--x--- 2 researcher2 research_team 4096 May 20 02:27 drafts
-rw-rw-r-- 1 researcher2 research_team   46 May 20 02:27 project_k.txt
-rw-r----- 1 researcher2 research_team   46 May 20 02:27 project_m.txt
-rw-rw-r-- 1 researcher2 research_team   46 May 20 02:27 project_r.txt
-rw-rw-r-- 1 researcher2 research_team   46 May 20 02:27 project_t.txt
researcher2@748b50924c13:~/projects$ chmod g-r project_m.txt
researcher2@748b50924c13:~/projects$ ls -l
total 20
drwx--x--- 2 researcher2 research_team 4096 May 20 02:27 drafts
-rw-rw-r-- 1 researcher2 research_team   46 May 20 02:27 project_k.txt
-rw------- 1 researcher2 research_team   46 May 20 02:27 project_m.txt
-rw-rw-r-- 1 researcher2 research_team   46 May 20 02:27 project_r.txt
-rw-rw-r-- 1 researcher2 research_team   46 May 20 02:27 project_t.txt
```

Some files needed permissions changed since others outside of the organization can write `project_k.txt` and `project_m.txt` can be read by the group. I used `chmod o-w project_k.txt` to remove the permissions for others to write the project and checked afterwards if the permission has been removed. `project_m.txt` is a private project for only one user so I used `chmod g-r project_m.txt` to remove the permission for the group to read and checked afterwards if the permission has been removed.

Change file permissions on a hidden file

```
researcher2@748b50924c13:~/projects$ ls -la
total 32
drwxr-xr-x 3 researcher2 research_team 4096 May 20 02:27 .
drwxr-xr-x 3 researcher2 research_team 4096 May 20 03:00 ..
-rw--w---- 1 researcher2 research_team   46 May 20 02:27 .project_x.txt
drwx--x--- 2 researcher2 research_team 4096 May 20 02:27 drafts
-rw-rw-r-- 1 researcher2 research_team   46 May 20 02:27 project_k.txt
-rw------- 1 researcher2 research_team   46 May 20 02:27 project_m.txt
-rw-rw-r-- 1 researcher2 research_team   46 May 20 02:27 project_r.txt
-rw-rw-r-- 1 researcher2 research_team   46 May 20 02:27 project_t.txt
researcher2@748b50924c13:~/projects$ chmod u-w,g-w,g+r .project_x.txt
researcher2@748b50924c13:~/projects$ ls -la
total 32
drwxr-xr-x 3 researcher2 research_team 4096 May 20 02:27 .
drwxr-xr-x 3 researcher2 research_team 4096 May 20 03:00 ..
-r--r----- 1 researcher2 research_team   46 May 20 02:27 .project_x.txt
drwx--x--- 2 researcher2 research_team 4096 May 20 02:27 drafts
-rw-rw-r-- 1 researcher2 research_team   46 May 20 02:27 project_k.txt
-rw------- 1 researcher2 research_team   46 May 20 02:27 project_m.txt
-rw-rw-r-- 1 researcher2 research_team   46 May 20 02:27 project_r.txt
-rw-rw-r-- 1 researcher2 research_team   46 May 20 02:27 project_t.txt
```

I checked for hidden files and permissions using `ls -la` and the hidden project is `.project_x.txt` which can only be read by both user and the group but no one can write and execute. I used `chmod u-w,g-w,g+r .project_x.txt` to give the correct permissions for the user and the group and checked if the correct permissions are given afterwards using `ls -la`.

Change directory permissions

```
researcher2@748b50924c13:~/projects$ chmod g-x drafts/
researcher2@748b50924c13:~/projects$ ls -la
total 32
drwxr-xr-x 3 researcher2 research_team 4096 May 20 02:27 .
drwxr-xr-x 3 researcher2 research_team 4096 May 20 03:00 ..
-r--r----- 1 researcher2 research_team   46 May 20 02:27 .project_x.txt
drwx------ 2 researcher2 research_team 4096 May 20 02:27 drafts
-rw-rw-r-- 1 researcher2 research_team   46 May 20 02:27 project_k.txt
-rw------- 1 researcher2 research_team   46 May 20 02:27 project_m.txt
-rw-rw-r-- 1 researcher2 research_team   46 May 20 02:27 project_r.txt
-rw-rw-r-- 1 researcher2 research_team   46 May 20 02:27 project_t.txt
```

The only directory is `drafts` which I can tell by looking at the 10 string characters at the beginning of `drafts`. Only the user can have all three permissions for the `drafts` directory

so I removed the permission for the group to execute using `chmod g-x drafts/` and checked afterwards if the permission has been removed.

Summary

I changed the permissions for all the files and directories inside `projects` directory to ensure confidentiality. I used the `chmod` command and used `ls -la` to check for permissions.