File permissions in Linux

Project description

The research team at my organization needs to update the file permissions for certain files and directories within the `projects` directory. The permissions do not currently reflect the level of authorization that should be given. Checking and updating these permissions will help keep their system secure. To complete this task, I performed the following tasks:

A permission list has been provided to adjust User, Group and Other permissions to be checked and changed. The permissions are for .txt files, subdirectory folder `draft` which also contain User, Group and Other.

Check file and directory details

With the command `ls -la` Displays permissions to files and directories, including hidden files and directories. This is a combination of the other two options.

After examining the permission rights it is confirmed that the all permissions are set to the permissions structure provided.

```
researcher2@c8b17d70803f:~$ cd projects
researcher2@c8b17d70803f:~/projects$ ls -ls
total 20
4 drwx--x--- 2 researcher2 research_team 4096 Sep 15 11:58 drafts
4 -rw-rw-rw- 1 researcher2 research_team   46 Sep 15 11:58 project_k.txt
4 -rw-r----- 1 researcher2 research_team   46 Sep 15 11:58 project_m.txt
4 -rw-rw-r-- 1 researcher2 research_team   46 Sep 15 11:58 project_r.txt
4 -rw-rw-r-- 1 researcher2 research_team   46 Sep 15 11:58 project_t.txt
researcher2@c8b17d70803f:~/projects$ ls -la
total 32
drwxr-xr-x 3 researcher2 research_team 4096 Sep 15 11:58 .
drwxr-xr-x 3 researcher2 research_team 4096 Sep 15 12:32 ..
-rw--w---- 1 researcher2 research_team   46 Sep 15 11:58 .project_x.txt
drwx--x--- 2 researcher2 research_team 4096 Sep 15 11:58 drafts
-rw-rw-rw- 1 researcher2 research_team   46 Sep 15 11:58 project_k.txt
-rw-r----- 1 researcher2 research_team   46 Sep 15 11:58 project_m.txt
-rw-rw-r-- 1 researcher2 research_team   46 Sep 15 11:58 project_r.txt
-rw-rw-r-- 1 researcher2 research_team   46 Sep 15 11:58 project_t.txt
researcher2@c8b17d70803f:~/projects$ cd drafts
researcher2@c8b17d70803f:~/projects/drafts$ ls -la
total 8
drwx--x--- 2 researcher2 research_team 4096 Sep 15 11:58 .
drwxr-xr-x 3 researcher2 research_team 4096 Sep 15 11:58 ..
researcher2@c8b17d70803f:~/projects/drafts$
```

We can see the hidden file `.project_x.txt` out-put shows the following access once we input the following command: `ls -la`
user: read and execute
Group: write
Other: none
`-rw--w---- 1 researcher2 research_team 46 Sep 15 11:58 .project_x.txt`

Describe the permissions string

The permission string explains what permissions have been given to the 3 types of access to each category of users.
We have the User, Group and Other. Each have three level of permission such as:
r: stands for read
w: stands for write
x: stands for execute

- **1st character**: This character is either a `d` or hyphen (`-`) and indicates the file type. If it's a `d`, it's a directory. If it's a hyphen (`-`), it's a regular file.
- **2nd-4th characters**: These 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.
- **5th-7th characters:** These 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.
- **8th-10th characters:** These characters indicate the read (`r`), write (`w`), and execute (`x`) permissions for 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.

On the hidden file `.project_x.txt` we know it is hidden due to the dot (.) at the beginning of the file name showing.

Change file permissions

The organization does not want the the category Other to have write permission on any files. What I will do is use the `chmod` command and add a second and third part to our command. as visible in the demonstration above we can see that prior to the change `rw-` and we changed it to `r - -` which translates to read only, no write or execution is granted for the group other.

```
researcher2@c8b17d70803f:~/projects$ ls -ls
total 20
4 drwx--x--- 2 researcher2 research_team 4096 Sep 15 11:58 drafts
4 -rw-rw-rw- 1 researcher2 research_team   46 Sep 15 11:58 project_k.txt
4 -rw-r----- 1 researcher2 research_team   46 Sep 15 11:58 project_m.txt
4 -rw-rw-r-- 1 researcher2 research_team   46 Sep 15 11:58 project_r.txt
4 -rw-rw-r-- 1 researcher2 research_team   46 Sep 15 11:58 project_t.txt
researcher2@c8b17d70803f:~/projects$ chmod o=r project_k.txt
researcher2@c8b17d70803f:~/projects$ ls -la project_k.txt
-rw-rw-r-- 1 researcher2 research_team 46 Sep 15 11:58 project_k.txt
researcher2@c8b17d70803f:~/projects$
```

The command used here is: `chmod o=r project_k.txt`

Change file permissions on a hidden file

First we check what the structure looks like current compared to the fact that group should only have read ability on the hidden file .project_x.txt since this was recently added by the research team. They do not want anyone to have write access to this project, but the user and group should have read access.

```
researcher2@c8b17d70803f:~/projects$ ls -la
total 32
drwxr-xr-x 3 researcher2 research_team 4096 Sep 15 11:58 .
drwxr-xr-x 3 researcher2 research_team 4096 Sep 15 12:32 ..
-rw--w---- 1 researcher2 research_team   46 Sep 15 11:58 .project_x.txt
drwx--x--- 2 researcher2 research_team 4096 Sep 15 11:58 drafts
-rw-rw-r-- 1 researcher2 research_team   46 Sep 15 11:58 project_k.txt
-rw-r----- 1 researcher2 research_team   46 Sep 15 11:58 project_m.txt
-rw-rw-r-- 1 researcher2 research_team   46 Sep 15 11:58 project_r.txt
-rw-rw-r-- 1 researcher2 research_team   46 Sep 15 11:58 project_t.txt
researcher2@c8b17d70803f:~/projects$ ls -la .project_x.txt
-rw--w---- 1 researcher2 research_team 46 Sep 15 11:58 .project_x.txt
researcher2@c8b17d70803f:~/projects$ chmod g=r .project_x.txt
researcher2@c8b17d70803f:~/projects$ ls -la .project_x.txt
-rw-r----- 1 researcher2 research_team 46 Sep 15 11:58 .project_x.txt
researcher2@c8b17d70803f:~/projects$
```

researcher2@c8b17d70803f:~/projects$ **`ls -la .project_x.txt`**
-rw--w---- 1 researcher2 research_team 46 Sep 15 11:58 .project_x.txt
researcher2@c8b17d70803f:~/projects$ **`chmod g=r .project_x.txt`**

researcher2@c8b17d70803f:~/projects$ **`ls -la .project_x.txt`**
-rw-r----- 1 researcher2 research_team 46 Sep 15 11:58 .project_x.txt

The highlighted parts show the step by step input and output we achieved with the command `ls -la` and adding .project_x.txt shows us what is in the hidden file in regards to permissions. Now that this is completed we used the `chmod` command to remove write permission and replace it with read only permission. Once this step is completed we double check for the requested change by using the first command ls -la and filename to determine that the requested change took place.

Change directory permissions

Per request from the Organization the drafts folder should only be accessed by `researcher2` We can see the following permission I given and the change that took place below.

```
researcher2@1150ede68fef:~$ cd projects
researcher2@1150ede68fef:~/projects$ ls -la
total 32
drwxr-xr-x 3 researcher2 research_team 4096 Sep 15 12:40 .
drwxr-xr-x 3 researcher2 research_team 4096 Sep 15 13:44 ..
-rw--w---- 1 researcher2 research_team   46 Sep 15 12:40 .project_x.txt
drwx--x--- 2 researcher2 research_team 4096 Sep 15 12:40 drafts
-rw-rw-rw- 1 researcher2 research_team   46 Sep 15 12:40 project_k.txt
-rw-r----- 1 researcher2 research_team   46 Sep 15 12:40 project_m.txt
-rw-rw-r-- 1 researcher2 research_team   46 Sep 15 12:40 project_r.txt
-rw-rw-r-- 1 researcher2 research_team   46 Sep 15 12:40 project_t.txt
researcher2@1150ede68fef:~/projects$ chmod u+rwx,g-rwx,o-rwx /home/researcher2/projects/drafts
researcher2@1150ede68fef:~/projects$ ls -la drafts
total 8
drwx------ 2 researcher2 research_team 4096 Sep 15 12:40 .
drwxr-xr-x 3 researcher2 research_team 4096 Sep 15 12:40 ..
researcher2@1150ede68fef:~/projects$
```

The following command **`chmod u+rwx,g-rwx,o-rwx /home/researcher2/projects/drafts`** tells the system to give user **`u+rwx`** all required access and the following tells the system to remove access from group and other **`g-rwx,o-rwx`** . Once that is completed we double check the changes and make sure that they took effect.

Summary

We started with checking and cross referencing the provided permission list with what is shown on Linux. Once that had been completed and confirmed I started with the permission string and what it entails in regards to the 10 characters displayed when called upon. The identification of each letter was explained and demonstrated in the next step.

Here I changed permission of the permission strings of Other to read. After conducting the change request, I double checked the changes to make sure they took affect.

A change in permission on the hidden file was requested which was completed for have the Group permissions to be changed to read.
As per protocol the data was verified again to make sure the changes where completed.

A change to directory also took place where access to the drafts directory was removed from Group and Other.