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:

Check file and directory details

In order to check the original permissions of the "projects" directory including hidden files I used the ls -la command to display all of the directories/file names and their permissions. This will show me the user, group and other permissions in that order. Here is the input and output that I used to check the directory details.

```
researcher2@d349710b31a3:~/projects$ ls -la
total 32
drwxr-xr-x 3 researcher2 research_team 4096 Sep 10 13:13 .
drwxr-xr-x 3 researcher2 research_team 4096 Sep 10 13:41 ..
-r--r----- 1 researcher2 research_team   46 Sep 10 13:13 .project_x.txt
drwx------ 2 researcher2 research_team 4096 Sep 10 13:13 drafts
-rw-rw-r-- 1 researcher2 research_team   46 Sep 10 13:13 project_k.txt
-rw------- 1 researcher2 research_team   46 Sep 10 13:13 project_m.txt
-rw-rw-r-- 1 researcher2 research_team   46 Sep 10 13:13 project_r.txt
-rw-rw-r-- 1 researcher2 research_team   46 Sep 10 13:13 project_t.txt
researcher2@d349710b31a3:~/projects$
```

Describe the permissions string

The permissions string is a 10-character string that show whether directory/file is a directory or a file, and then the user, group and other permissions in that order. The 1st character tells the me if it is a directory and if so then the string will start with a "d" and if not there will be a "-". For the user, group and other permissions there are read, write and execute permissions for each of them that describe what they are allowed to do with the file/directory. In order of appearance r=read, w=write and x=execute with a "-" in any spot where that permission is not granted. There are 3 options for each category with no spaces or dashes between them, including the directory/file categorization that makes 10 characters. Characters 2-4 are for the user, 5-7 are for the group and 8-10 are for all other users. Seen below is the permissions string for the project_k.txt file.

```
-rw-rw-r-- 1 researcher2 research_team   46 Sep 10 13:13 project_k.txt
```

Change file permissions

In order to change file permissions, I used the "chmod" command. Others should not have any write permissions for any of the projects in this directory, so I had to change the permissions for "project_k.txt" as it had write permissions for others. I used the "chmod" command with the argument "o-w" which means I am removing the write command from the other category and the second argument "project_k.txt" which is the file being changed

```
researcher2@bae8263344f2:~/projects$ ls -la
total 32
drwxr-xr-x 3 researcher2 research_team 4096 Sep 10 13:48 .
drwxr-xr-x 3 researcher2 research_team 4096 Sep 10 14:48 ..
-rw--w---- 1 researcher2 research_team   46 Sep 10 13:48 .project_x.txt
drwx--x--- 2 researcher2 research_team 4096 Sep 10 13:48 drafts
-rw-rw-rw- 1 researcher2 research_team   46 Sep 10 13:48 project_k.txt
-rw-r----- 1 researcher2 research_team   46 Sep 10 13:48 project_m.txt
-rw-rw-r-- 1 researcher2 research_team   46 Sep 10 13:48 project_r.txt
-rw-rw-r-- 1 researcher2 research_team   46 Sep 10 13:48 project_t.txt
researcher2@bae8263344f2:~/projects$ chmod o-w project_k.txt
researcher2@bae8263344f2:~/projects$ ls -la
total 32
drwxr-xr-x 3 researcher2 research_team 4096 Sep 10 13:48 .
drwxr-xr-x 3 researcher2 research_team 4096 Sep 10 14:48 ..
-rw--w---- 1 researcher2 research_team   46 Sep 10 13:48 .project_x.txt
drwx--x--- 2 researcher2 research_team 4096 Sep 10 13:48 drafts
-rw-rw-r-- 1 researcher2 research_team   46 Sep 10 13:48 project_k.txt
-rw-r----- 1 researcher2 research_team   46 Sep 10 13:48 project_m.txt
-rw-rw-r-- 1 researcher2 research_team   46 Sep 10 13:48 project_r.txt
-rw-rw-r-- 1 researcher2 research_team   46 Sep 10 13:48 project_t.txt
researcher2@bae8263344f2:~/projects$
```

Next, I had to change the file permissions on "project_m.txt" as it is a restricted file and only I, the user should have permissions to that file. The file had group read permissions that needed to be removed so I had to use the "chmod" command with the "g-r" argument in order to remove those permissions.

```
researcher2@bae8263344f2:~/projects$ chmod g-r project_m.txt
researcher2@bae8263344f2:~/projects$ ls -la
total 32
drwxr-xr-x 3 researcher2 research_team 4096 Sep 10 13:48 .
drwxr-xr-x 3 researcher2 research_team 4096 Sep 10 14:48 ..
-rw--w---- 1 researcher2 research_team   46 Sep 10 13:48 .project_x.txt
drwx--x--- 2 researcher2 research_team 4096 Sep 10 13:48 drafts
-rw-rw-r-- 1 researcher2 research_team   46 Sep 10 13:48 project_k.txt
-rw------- 1 researcher2 research_team   46 Sep 10 13:48 project_m.txt
-rw-rw-r-- 1 researcher2 research_team   46 Sep 10 13:48 project_r.txt
-rw-rw-r-- 1 researcher2 research_team   46 Sep 10 13:48 project_t.txt
researcher2@bae8263344f2:~/projects$
```

Change file permissions on a hidden file

The hidden file ".project_x.txt" is a file that should not be able to be written by anyone but should be able to be read by groups and the user. In the above screenshot it can be seen that the permissions were originally read and write for the user and write for the group. In order to rectify this, I again used the "chmod" command with the argument "g+r,g-w,u-w" to add group read permissions and remove group and user write permissions and the second argument ".project_x.txt". I then used "ls -la" to display the hidden file and its permissions to ensure it was properly changed.

```
researcher2@bae8263344f2:~/projects$ chmod g+r,g-w,u-w .project_x.txt
researcher2@bae8263344f2:~/projects$ ls -la        total 32
drwxr-xr-x 3 researcher2 research_team 4096 Sep 10 13:48 .
drwxr-xr-x 3 researcher2 research_team 4096 Sep 10 14:48 ..
-r--r----- 1 researcher2 research_team   46 Sep 10 13:48 .project_x.txt
drwx--x--- 2 researcher2 research_team 4096 Sep 10 13:48 drafts
-rw-rw-r-- 1 researcher2 research_team   46 Sep 10 13:48 project_k.txt
-rw------- 1 researcher2 research_team   46 Sep 10 13:48 project_m.txt
-rw-rw-r-- 1 researcher2 research_team   46 Sep 10 13:48 project_r.txt
-rw-rw-r-- 1 researcher2 research_team   46 Sep 10 13:48 project_t.txt
researcher2@bae8263344f2:~/projects$
```

Change directory permissions

The drafts directory is supposed to be a directory that only the user has access to and as you can see in the screenshot above it originally had the group execute permission. In order to rectify this and remove the group execute permissions I used the "chmod" command with the "g-x" command using the second argument to specify the drafts directory. Then I used "ls -la" to ensure that the proper changes have been made.

```
researcher2@bae8263344f2:~/projects$ chmod g-x drafts
researcher2@bae8263344f2:~/projects$ ls -la
total 32
drwxr-xr-x 3 researcher2 research_team 4096 Sep 10 13:48 .
drwxr-xr-x 3 researcher2 research_team 4096 Sep 10 14:48 ..
-r--r----- 1 researcher2 research_team   46 Sep 10 13:48 .project_x.txt
drwx------ 2 researcher2 research_team 4096 Sep 10 13:48 drafts
-rw-rw-r-- 1 researcher2 research_team   46 Sep 10 13:48 project_k.txt
-rw------- 1 researcher2 research_team   46 Sep 10 13:48 project_m.txt
-rw-rw-r-- 1 researcher2 research_team   46 Sep 10 13:48 project_r.txt
-rw-rw-r-- 1 researcher2 research_team   46 Sep 10 13:48 project_t.txt
researcher2@bae8263344f2:~/projects$
```

Summary

In summary I needed to change multiple permissions to match the level of authorization my organization wanted for files and directories in the "projects" directory. In order to do this, I first used ls -la to check the permissions for the directory. This information showed me

exactly what I needed to change. With this knowledge I used the chmod command multiple times to change the permissions on files and directories.

```
researcher2@d349710b31a3:~$ pwd
/home/researcher2
researcher2@d349710b31a3:~$ ls
projects
researcher2@d349710b31a3:~$ cd projects
researcher2@d349710b31a3:~/projects$ ls -la
total 32
drwxr-xr-x 3 researcher2 research_team 4096 Sep 10 13:13 .
drwxr-xr-x 3 researcher2 research_team 4096 Sep 10 13:41 ..
-rw--w---- 1 researcher2 research_team   46 Sep 10 13:13 .project_x.txt
drwx--x--- 2 researcher2 research_team 4096 Sep 10 13:13 drafts
-rw-rw-rw- 1 researcher2 research_team   46 Sep 10 13:13 project_k.txt
-rw-r----- 1 researcher2 research_team   46 Sep 10 13:13 project_m.txt
-rw-rw-r-- 1 researcher2 research_team   46 Sep 10 13:13 project_r.txt
-rw-rw-r-- 1 researcher2 research_team   46 Sep 10 13:13 project_t.txt
researcher2@d349710b31a3:~/projects$ chmod o-w project_k.txt
researcher2@d349710b31a3:~/projects$ ls -l        total 20
drwx--x--- 2 researcher2 research_team 4096 Sep 10 13:13 drafts
-rw-rw-r-- 1 researcher2 research_team   46 Sep 10 13:13 project_k.txt
-rw-r----- 1 researcher2 research_team   46 Sep 10 13:13 project_m.txt
-rw-rw-r-- 1 researcher2 research_team   46 Sep 10 13:13 project_r.txt
-rw-rw-r-- 1 researcher2 research_team   46 Sep 10 13:13 project_t.txt
researcher2@d349710b31a3:~/projects$ chmod g-r project_m.txt
researcher2@d349710b31a3:~/projects$ ls -l        total 20
drwx--x--- 2 researcher2 research_team 4096 Sep 10 13:13 drafts
-rw-rw-r-- 1 researcher2 research_team   46 Sep 10 13:13 project_k.txt
-rw------- 1 researcher2 research_team   46 Sep 10 13:13 project_m.txt
-rw-rw-r-- 1 researcher2 research_team   46 Sep 10 13:13 project_r.txt
-rw-rw-r-- 1 researcher2 research_team   46 Sep 10 13:13 project_t.txt
researcher2@d349710b31a3:~/projects$ chmod g+r,g-w,u-w .project_x.txt
researcher2@d349710b31a3:~/projects$ ls -la        total 32
drwxr-xr-x 3 researcher2 research_team 4096 Sep 10 13:13 .
drwxr-xr-x 3 researcher2 research_team 4096 Sep 10 13:41 ..
-r--r----- 1 researcher2 research_team   46 Sep 10 13:13 .project_x.txt
drwx--x--- 2 researcher2 research_team 4096 Sep 10 13:13 drafts
-rw-rw-r-- 1 researcher2 research_team   46 Sep 10 13:13 project_k.txt
-rw------- 1 researcher2 research_team   46 Sep 10 13:13 project_m.txt
-rw-rw-r-- 1 researcher2 research_team   46 Sep 10 13:13 project_r.txt
-rw-rw-r-- 1 researcher2 research_team   46 Sep 10 13:13 project_t.txt
researcher2@d349710b31a3:~/projects$ chmod g-x drafts
researcher2@d349710b31a3:~/projects$ ls -la        total 32
drwxr-xr-x 3 researcher2 research_team 4096 Sep 10 13:13 .
drwxr-xr-x 3 researcher2 research_team 4096 Sep 10 13:41 ..
-r--r----- 1 researcher2 research_team   46 Sep 10 13:13 .project_x.txt
drwx------ 2 researcher2 research_team 4096 Sep 10 13:13 drafts
-rw-rw-r-- 1 researcher2 research_team   46 Sep 10 13:13 project_k.txt
-rw------- 1 researcher2 research_team   46 Sep 10 13:13 project_m.txt
-rw-rw-r-- 1 researcher2 research_team   46 Sep 10 13:13 project_r.txt
-rw-rw-r-- 1 researcher2 research_team   46 Sep 10 13:13 project_t.txt
researcher2@d349710b31a3:~/projects$
```