File permissions in Linux

Project description

The research team at my organization identified that several files and folders within the **projects** directory have incorrect permission settings. These permissions do not align with the intended access levels for authorized users. To enhance system security, it was necessary to review and adjust these settings. I carried out the following actions to address the issue:

Check file and directory details

The code below shows how I use linux command to determine the existing permissions for a specific directory in the file system.

```
researcher2@38af567e8907:~$ ls
projects
researcher2@38af567e8907:~$ cd projects
researcher2@38af567e8907:~/projects$ ls -la
total 32
drwxr-xr-x 3 researcher2 research_team 4096 Aug 10 15:26 .
drwxr-xr-x 3 researcher2 research_team 4096 Aug 10 16:52 ..
-rw--w---- 1 researcher2 research_team   46 Aug 10 15:26 .project_x.txt
drwx--x--- 2 researcher2 research_team 4096 Aug 10 15:26 drafts
-rw-rw-rw- 1 researcher2 research_team   46 Aug 10 15:26 project_k.txt
-rw-r----- 1 researcher2 research_team   46 Aug 10 15:26 project_m.txt
-rw-rw-r-- 1 researcher2 research_team   46 Aug 10 15:26 project_r.txt
-rw-rw-r-- 1 researcher2 research_team   46 Aug 10 15:26 project_t.txt
researcher2@38af567e8907:~/projects$
```

The first line of the screenshot displays a command I used to check the list of directories in the current directory. And then I used the “cd” command to change the directory to the projects directory. I used the “ls -la” command to display a detailed listing of all the files and directories in the project directory, with the permissions, user and group, including hidden files. The projects directory contains one hidden file named “.project_x.txt”, one directory named drafts and five project files. The 10 characters at the beginning of each file and directory is the permission for the file and directory respectively

Describe the permissions string

The 10 character string is a string used to determine who is authorized to access a file and other permissions. The description of the characters are as follows.

- First character : This character is either a d which stands for directory or a - which means it is a file.
- Second - Fourth character: The second to fourth character represents the permission for the user where; r stands for read permission, w stands for write permission, x stands for execute permission and when one of the characters is a hyphen (-) it means that the permission is not granted for the user.
- Fifth - Seventh character: This represents permissions for a group of users where;r stands for read permission, w stands for write permission, x stands for execute permission and when one of the characters is a hyphen (-) it means that the permission is not granted for the group.
- Eight to Tenth character: This represents permissions for others where; r stands for read permission, w stands for write permission, x stands for execute permission and when one of the characters is a hyphen (-) it means that the permission is not granted for others.

For example the permissions for the file project_r.txt are "-rw-rw-r–". The first hyphen (-) means it's a regular file. The 2nd to 4th characters (rw-) means the user has read and write permission but no permission is granted to execute the file. The 5th - 7th (rw-) characters means the group has read and write permission but no permission is granted to execute the file. And the 8th - 10th characters (r–) means others have permission to read but not to write and execute.

Change file permissions

The organization specified that none of the files should allow the other users permissions to write to it. To comply with this I determined "project_k.txt" should have its write access to other removed.

To achieve this i used the linux command below

```
researcher2@264f81fe4de2:~/projects$ chmod o-w project_k.txt
researcher2@264f81fe4de2:~/projects$ ls -l
total 20
drwx--x--- 2 researcher2 research_team 4096 Aug 10 14:26 drafts
-rw-rw-r-- 1 researcher2 research_team   46 Aug 10 14:26 project_k.txt
-rw-r----- 1 researcher2 research_team   46 Aug 10 14:26 project_m.txt
-rw-rw-r-- 1 researcher2 research_team   46 Aug 10 14:26 project_r.txt
-rw-rw-r-- 1 researcher2 research_team   46 Aug 10 14:26 project_t.txt
researcher2@264f81fe4de2:~/projects$
```

I used the chmod (change mode) command for this, specifying the arguments o-w (meaning remove write access for other) and the project name. Where, o stands for other, - means remove and w means write access/permission.
After that I used the ls -l command to list out the files and verify that all the files no longer have write access to other.

Change file permissions on a hidden file

The organization also determined that the hidden file ".project_x.txt" has been archived and should not be written to by anyone (but the user and group should still be able to read the file). To achieve this i used the below commands:

```
researcher2@264f81fe4de2:~/projects$ ls -la
total 32
drwxr-xr-x 3 researcher2 research_team 4096 Aug 10 14:26 .
drwxr-xr-x 3 researcher2 research_team 4096 Aug 10 15:41 ..
-rw--w---- 1 researcher2 research_team   46 Aug 10 14:26 .project_x.txt
drwx--x--- 2 researcher2 research_team 4096 Aug 10 14:26 drafts
-rw-rw-r-- 1 researcher2 research_team   46 Aug 10 14:26 project_k.txt
-rw------- 1 researcher2 research_team   46 Aug 10 14:26 project_m.txt
-rw-rw-r-- 1 researcher2 research_team   46 Aug 10 14:26 project_r.txt
-rw-rw-r-- 1 researcher2 research_team   46 Aug 10 14:26 project_t.txt
researcher2@264f81fe4de2:~/projects$ chmod u-w,g-w,g+r .project_x.txt
researcher2@264f81fe4de2:~/projects$ ls -la
total 32
drwxr-xr-x 3 researcher2 research_team 4096 Aug 10 14:26 .
drwxr-xr-x 3 researcher2 research_team 4096 Aug 10 15:41 ..
-r--r----- 1 researcher2 research_team   46 Aug 10 14:26 .project_x.txt
drwx--x--- 2 researcher2 research_team 4096 Aug 10 14:26 drafts
-rw-rw-r-- 1 researcher2 research_team   46 Aug 10 14:26 project_k.txt
-rw------- 1 researcher2 research_team   46 Aug 10 14:26 project_m.txt
-rw-rw-r-- 1 researcher2 research_team   46 Aug 10 14:26 project_r.txt
-rw-rw-r-- 1 researcher2 research_team   46 Aug 10 14:26 project_t.txt
researcher2@264f81fe4de2:~/projects$
```

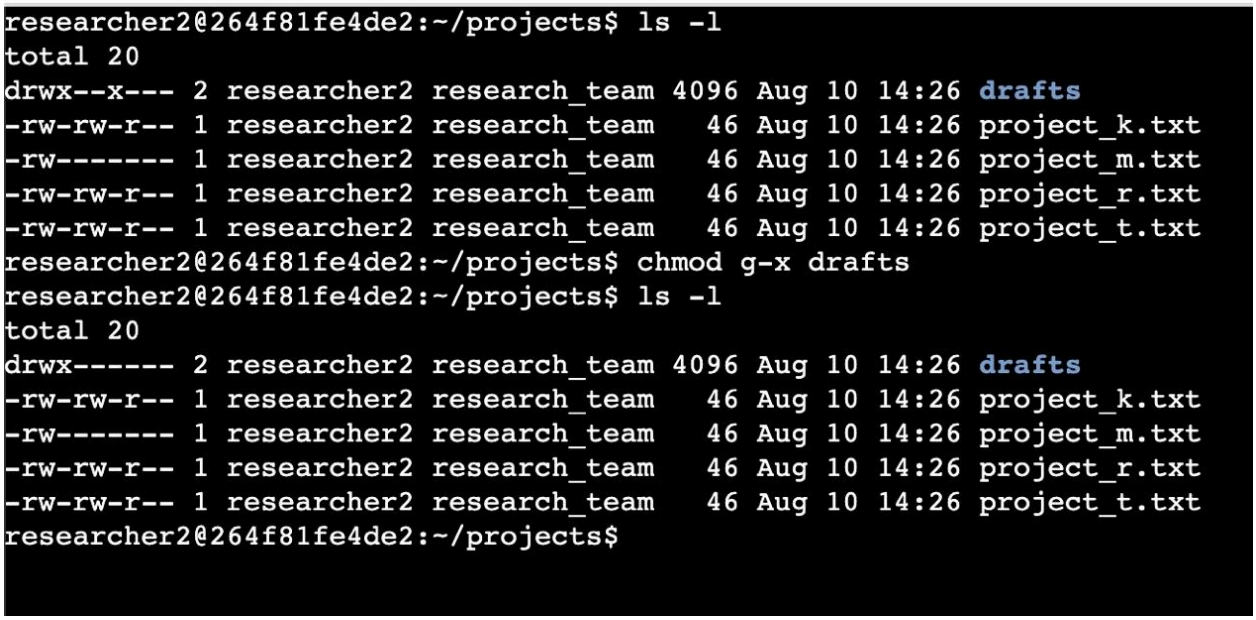
In the first line I listed all the files and directories (including those hidden) with the ls -la command.
And then using the chmod command specifying the right arguments and the name of the project i made the specified change as follows;

- chmod; change mode
- u-w; remove write permission for user
- g-w; remove write permission for group
- g+r; add read permission for group

Lastly I used the ls -la command to list all files and review the changes.

Change directory permissions

The organization determined that Only the researcher2 user should be allowed to access the drafts directory and its contents. (This means that only researcher2 should have execute privileges.)
To achieve this i used the linux command on the screenshot below



First i list all the files and directories that are not hidden in the current working directory using ls -l
Then I used the chmod g-x command to remove execute access to the group since that is the only change to be made as stated by the organization's directives.
Lastly i listed the files and directories again using the ls -l command for review

Summary

I reviewed and adjusted the file and directory permissions in the projects folder to align with the organization's required access levels. I began by running the ls-l and `ls -la` command to view the current permission settings. Based on this output, I determined which changes were needed and applied them using the `chmod` command several times to update the permissions accordingly.