File permissions in Linux

Project description

The research team of an organization needed to update permissions of certain files and directories within the project directory. The permissions did not follow the Principle of least privilege. Checking the file and directory permission will prevent data leaks and secure their system. I was appointed to complete the authorization task

Check file and directory details

Below are the files and directories i edited permissions of

```
researcher2@ff9f871e295e:~$ cd projects
researcher2@ff9f871e295e:~/projects$ ls -la
total 32
drwxr-xr-x 3 researcher2 research_team 4096 Jun 20 14:15 .
drwxr-xr-x 3 researcher2 research_team 4096 Jun 20 14:43 ..
-rw--w---- 1 researcher2 research_team   46 Jun 20 14:15 .project_x.txt
drwx--x--- 2 researcher2 research_team 4096 Jun 20 14:15 drafts
-rw-rw-rw- 1 researcher2 research_team   46 Jun 20 14:15 project_k.txt
-rw-r----- 1 researcher2 research_team   46 Jun 20 14:15 project_m.txt
-rw-rw-r-- 1 researcher2 research_team   46 Jun 20 14:15 project_r.txt
-rw-rw-r-- 1 researcher2 research_team   46 Jun 20 14:15 project_t.txt
researcher2@ff9f871e295e:~/projects$
```

The first line is the command i used to navigate to **projects** directory and then following it is the command used to view all the contents (including hidden) and their permissions in the directory. According to the input command there is one directory named **drafts** and one hidden file named **.project_x.txt**

Describe the permissions string

The 10-character string can be deconstructed to determine who is authorized to access the file and their specific permissions. The characters and what they represent are as follows:

- **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.

For example, the file permissions for `project_t.txt` are `-rw-rw-r--`. Since the first character is a hyphen (`-`), this indicates that `project_t.txt` is a file, not a directory. The second, fifth, and eighth characters are all `r`, which indicates that user, group, and other all have read permissions. The third and sixth characters are `w`, which indicates that only the user and group have write permissions. No one has execute permissions for `project_t.txt`.

Change file permissions

The organization determined that other users shouldn't have write access to any of their files. To comply with this, I referred to the file permissions that I previously returned. I determined `project_k.txt` must have the write access removed for other users.

The following code demonstrates how I used Linux commands to do this:

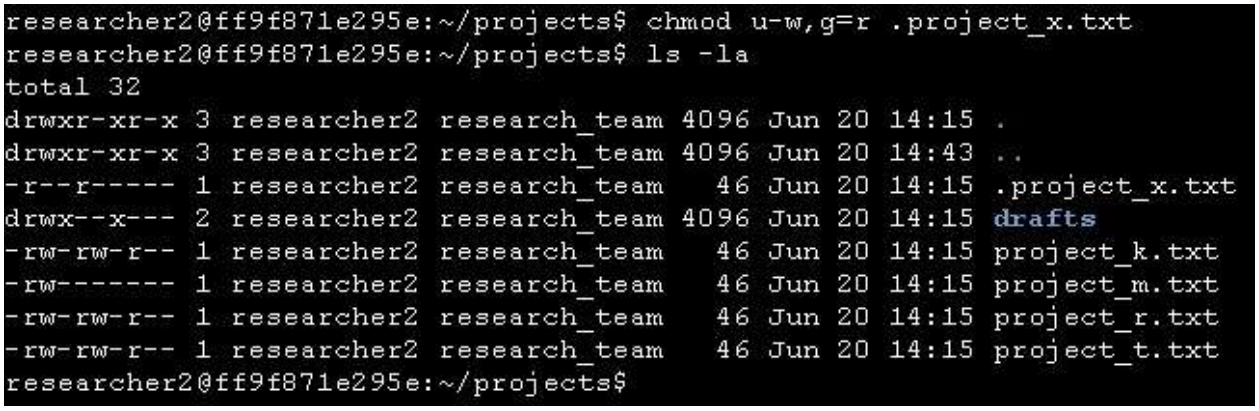
```
researcher2@ff9f871e295e:~/projects$ chmod o-w project_k.txt
researcher2@ff9f871e295e:~/projects$ ls -la
total 32
drwxr-xr-x 3 researcher2 research_team 4096 Jun 20 14:15 .
drwxr-xr-x 3 researcher2 research_team 4096 Jun 20 14:43 ..
-rw--w---- 1 researcher2 research_team   46 Jun 20 14:15 .project_x.txt
drwx--x--- 2 researcher2 research_team 4096 Jun 20 14:15 drafts
-rw-rw-r-- 1 researcher2 research_team   46 Jun 20 14:15 project_k.txt
-rw-r----- 1 researcher2 research_team   46 Jun 20 14:15 project_m.txt
-rw-rw-r-- 1 researcher2 research_team   46 Jun 20 14:15 project_r.txt
-rw-rw-r-- 1 researcher2 research_team   46 Jun 20 14:15 project_t.txt
researcher2@ff9f871e295e:~/projects$
```

The first two lines of the screenshot display the commands I entered, and the other lines display the output of the second command. The `chmod` command changes the permissions on files and directories. The first argument indicates what permissions should be changed, and the second argument specifies the file or directory.

Change file permissions on a hidden file

The research team at my organization recently archived `project_x.txt`. They do not want anyone to have write access to this project, but the user and group should have read access.

The following code demonstrates how I used Linux commands to change the permissions:



The first two lines of the screenshot display the commands I entered, and the other lines display the output of the second command. I know `.project_x.txt` is a hidden file because it starts with a period (`.`). In this example, I removed write permissions from the user and group, and added read permissions to the group. I removed write permissions from the user with `u-w`. Then i changed the permission for group to only read with the command `g=r`

Change directory permissions

My organization only wants the `researcher2` user to have access to the `drafts` directory and its contents. This means that no one other than `researcher2` should have execute permissions.

The following code demonstrates how I used Linux commands to change the permissions:

```
researcher2@ff9f871e295e:~/projects$ chmod g-x drafts
researcher2@ff9f871e295e:~/projects$ ls -la
total 32
drwxr-xr-x 3 researcher2 research_team 4096 Jun 20 14:15 .
drwxr-xr-x 3 researcher2 research_team 4096 Jun 20 14:43 ..
-r--r----- 1 researcher2 research_team   46 Jun 20 14:15 .project_x.txt
drwx------ 2 researcher2 research_team 4096 Jun 20 14:15 drafts
-rw-rw-r-- 1 researcher2 research_team   46 Jun 20 14:15 project_k.txt
-rw------- 1 researcher2 research_team   46 Jun 20 14:15 project_m.txt
-rw-rw-r-- 1 researcher2 research_team   46 Jun 20 14:15 project_r.txt
-rw-rw-r-- 1 researcher2 research_team   46 Jun 20 14:15 project_t.txt
researcher2@ff9f871e295e:~/projects$
```

The output here displays the permission listing for several files and directories. Line 1 indicates the current directory (projects), and line 2 indicates the parent directory (home). Line 3 indicates a regular file titled `.project_x.txt`. Line 4 is the directory (drafts) with restricted permissions. Here you can see that only researcher2 has execute permissions. It was previously determined that the group had execute permissions, so I used the `chmod` command to remove them. The `researcher2` user already had execute permissions, so they did not need to be added.

Summary

I changed multiple permissions to match the level of authorization my organization wanted for files and directories in the `projects` directory. The first step in this was using `ls -la` to check the permissions for the directory. This informed my decisions in the following steps. I then used the `chmod` command multiple times to change the permissions on files and directories.