File permissions in Linux

Project description

My organization's research team realized that the permissions on their files in the `projects` directory had incorrect authorizations. It is a serious security risk and must be updated to the correct permissions. I did the tasks listed below to secure the research team's files.

Check file and directory details

After changing into the `projects` directory I used the `ls` command with the `-la` option to check the permissions of all files, including the hidden one. The command's output listed 4 project files, a hidden one called `.project_x.txt`, and a directory called `drafts`.

```
researcher2@f2ae532f118d:~$ pwd
/home/researcher2
researcher2@f2ae532f118d:~$ cd projects
researcher2@f2ae532f118d:~/projects$ ls -la
total 32
drwxr-xr-x 3 researcher2 research_team 4096 Nov  4 01:42 .
drwxr-xr-x 3 researcher2 research_team 4096 Nov  4 02:32 ..
-rw--w---- 1 researcher2 research_team   46 Nov  4 01:42 .project_x.txt
drwx--x--- 2 researcher2 research_team 4096 Nov  4 01:42 drafts
-rw-rw-rw- 1 researcher2 research_team   46 Nov  4 01:42 project_k.txt
-rw-r----- 1 researcher2 research_team   46 Nov  4 01:42 project_m.txt
-rw-rw-r-- 1 researcher2 research_team   46 Nov  4 01:42 project_r.txt
-rw-rw-r-- 1 researcher2 research_team   46 Nov  4 01:42 project_t.txt
researcher2@f2ae532f118d:~/projects$
```

Describe the permissions string

The 10-character string in the first column represents permissions for user, group, and other owner types. File permissions include read (`r`), write (`w`), and execute (`x`) in that order and are represented as follows:

- 1st character: If it is a `d` character, it is a directory, while a `-` (hyphen) indicates a file.
- 2nd - 4th characters: Represent the file permissions of the user owner type. If there is a `-` (hyphen) instead of the other characters the permission wasn't granted to the user.
- 5th-7th characters: Represent the file permissions of the group owner type. If there is a `-` (hyphen) instead of the other characters the permission wasn't granted to the group.

- 8th -10th characters: Represent the file permissions of the other owner type. If there is a `-` (hyphen) instead of the other characters the permission wasn't granted to others.

Change file permissions

The organization's security policies didn't allow the other owner type to have written permission to files in the project directory. But the `project_k.txt` file allowed write permission, so I removed it. I used the `chmond` command because it changes the permissions on files and directories. The Linux command `chmod o-w project_k.txt` removed the write permission because the first argument indicates to remove other write permission and the second argument states which file or directory.

```
researcher2@f2ae532f118d:~/projects$ ls -l
total 20
drwx--x--- 2 researcher2 research_team 4096 Nov  4 01:42 drafts
-rw-rw-rw- 1 researcher2 research_team   46 Nov  4 01:42 project_k.txt
-rw-r----- 1 researcher2 research_team   46 Nov  4 01:42 project_m.txt
-rw-rw-r-- 1 researcher2 research_team   46 Nov  4 01:42 project_r.txt
-rw-rw-r-- 1 researcher2 research_team   46 Nov  4 01:42 project_t.txt
researcher2@f2ae532f118d:~/projects$ chmod o-w project_k.txt
researcher2@f2ae532f118d:~/projects$ ls -l
total 20
drwx--x--- 2 researcher2 research_team 4096 Nov  4 01:42 drafts
-rw-rw-r-- 1 researcher2 research_team   46 Nov  4 01:42 project_k.txt
-rw-r----- 1 researcher2 research_team   46 Nov  4 01:42 project_m.txt
-rw-rw-r-- 1 researcher2 research_team   46 Nov  4 01:42 project_r.txt
-rw-rw-r-- 1 researcher2 research_team   46 Nov  4 01:42 project_t.txt
researcher2@f2ae532f118d:~/projects$
```

The `project_m.txt` file should have only been accessible to researcher2 (user) but research_team (group) had read permission. I used the Linux command `chmod g-r project_m.txt` to remove research_team's read permission. Then I used the `ls -l`

command to confirm the permission change.

```
researcher2@f2ae532f118d:~/projects$ ls -l
total 20
drwx--x--- 2 researcher2 research_team 4096 Nov  4 01:42 drafts
-rw-rw-r-- 1 researcher2 research_team   46 Nov  4 01:42 project_k.txt
-rw-r----- 1 researcher2 research_team   46 Nov  4 01:42 project_m.txt
-rw-rw-r-- 1 researcher2 research_team   46 Nov  4 01:42 project_r.txt
-rw-rw-r-- 1 researcher2 research_team   46 Nov  4 01:42 project_t.txt
researcher2@f2ae532f118d:~/projects$ chmod g-r project_m.txt
researcher2@f2ae532f118d:~/projects$ ls -l
total 20
drwx--x--- 2 researcher2 research_team 4096 Nov  4 01:42 drafts
-rw-rw-r-- 1 researcher2 research_team   46 Nov  4 01:42 project_k.txt
-rw------- 1 researcher2 research_team   46 Nov  4 01:42 project_m.txt
-rw-rw-r-- 1 researcher2 research_team   46 Nov  4 01:42 project_r.txt
-rw-rw-r-- 1 researcher2 research_team   46 Nov  4 01:42 project_t.txt
researcher2@f2ae532f118d:~/projects$
```

Change file permissions on a hidden file

The hidden file `.project_x.txt` shouldn't have allowed any write permissions to reseacer2 (user) and research_team (group), only read permission. But both researcher2 and research_team had write permission to the file. I used the command `chmod u-w, g-w, g+r .project_x.txt` to remove the write permission and give both owner types read permission.

Then I used the `ls -la` command to confirm the permission changes.

```
researcher2@bce53f207a9c:~/projects$ ls -la
total 32
drwxr-xr-x 3 researcher2 research_team 4096 Nov  4 02:29 .
drwxr-xr-x 3 researcher2 research_team 4096 Nov  4 03:46 ..
-rw--w---- 1 researcher2 research_team   46 Nov  4 02:29 .project_x.txt
drwx--x--- 2 researcher2 research_team 4096 Nov  4 02:29 drafts
-rw-rw-r-- 1 researcher2 research_team   46 Nov  4 02:29 project_k.txt
-rw------- 1 researcher2 research_team   46 Nov  4 02:29 project_m.txt
-rw-rw-r-- 1 researcher2 research_team   46 Nov  4 02:29 project_r.txt
-rw-rw-r-- 1 researcher2 research_team   46 Nov  4 02:29 project_t.txt
researcher2@bce53f207a9c:~/projects$ chmod u-w,g-w,g+r .project_x.txt
researcher2@bce53f207a9c:~/projects$ ls -la
total 32
drwxr-xr-x 3 researcher2 research_team 4096 Nov  4 02:29 .
drwxr-xr-x 3 researcher2 research_team 4096 Nov  4 03:46 ..
-r--r----- 1 researcher2 research_team   46 Nov  4 02:29 .project_x.txt
drwx--x--- 2 researcher2 research_team 4096 Nov  4 02:29 drafts
-rw-rw-r-- 1 researcher2 research_team   46 Nov  4 02:29 project_k.txt
-rw------- 1 researcher2 research_team   46 Nov  4 02:29 project_m.txt
-rw-rw-r-- 1 researcher2 research_team   46 Nov  4 02:29 project_r.txt
-rw-rw-r-- 1 researcher2 research_team   46 Nov  4 02:29 project_t.txt
researcher2@bce53f207a9c:~/projects$
```

Change directory permissions

The organization's security policies also dictate that the `drafts` directory should have only been accessible to researcher2. But research_team was allowed access to the directory and even execute permission. I used the Linux command `chmod g-x drafts` to remove the research_team's execute permission. Then I used the `ls -l` command to confirm the final

change to the files and directories in the `project` directory.

```
researcher2@bce53f207a9c:~/projects$ ls -l
total 20
drwx--x--- 2 researcher2 research_team 4096 Nov  4 02:29 drafts
-rw-rw-r-- 1 researcher2 research_team   46 Nov  4 02:29 project_k.txt
-rw------- 1 researcher2 research_team   46 Nov  4 02:29 project_m.txt
-rw-rw-r-- 1 researcher2 research_team   46 Nov  4 02:29 project_r.txt
-rw-rw-r-- 1 researcher2 research_team   46 Nov  4 02:29 project_t.txt
researcher2@bce53f207a9c:~/projects$ chmod g-x drafts
researcher2@bce53f207a9c:~/projects$ ls -l
total 20
drwx------ 2 researcher2 research_team 4096 Nov  4 02:29 drafts
-rw-rw-r-- 1 researcher2 research_team   46 Nov  4 02:29 project_k.txt
-rw------- 1 researcher2 research_team   46 Nov  4 02:29 project_m.txt
-rw-rw-r-- 1 researcher2 research_team   46 Nov  4 02:29 project_r.txt
-rw-rw-r-- 1 researcher2 research_team   46 Nov  4 02:29 project_t.txt
researcher2@bce53f207a9c:~/projects$
```

Summary

To summarize my tasks, I first identified the three user types. Examined and described all the file and directory permissions of all three user types. Found the prohibited permissions in the project_k, project_m, and hidden project_x files and corrected their permission strings. Found the prohibited permission in the draft directory permission string and corrected it. It helped me review Linux commands to manage file and directory permissions.