File permissions in Linux

Project description

I work on a research team that needs to update file permissions with the correct level of authorization to help keep the system secure. To achieve this, i performed the following tasks:

Check file and directory details

We will check that using the `ls -la` command, to list all files and directories present in the current directory. We also add `-la` to list hidden files.

```
researcher2@427d10666056:~/projects$ ls -la
total 32
drwxr-xr-x 3 researcher2 research_team 4096 Sep 15 01:39 .
drwxr-xr-x 3 researcher2 research_team 4096 Sep 15 02:04 ..
-rw--w---- 1 researcher2 research_team   46 Sep 15 01:39 .project_x.txt
drwx--x--- 2 researcher2 research_team 4096 Sep 15 01:39 drafts
-rw-rw-rw- 1 researcher2 research_team   46 Sep 15 01:39 project_k.txt
-rw-r----- 1 researcher2 research_team   46 Sep 15 01:39 project_m.txt
-rw-rw-r-- 1 researcher2 research_team   46 Sep 15 01:39 project_r.txt
-rw-rw-r-- 1 researcher2 research_team   46 Sep 15 01:39 project_t.txt
```

The first column is the permissions string, which is the important thing i have to change to keep the systems secure.

Describe the permissions string

A permission string shows the different kinds of permissions each possible user has in a specific file or directory.

The first character in a permission string represents whether it's a file (-) or a directory (d), and because there's a hyphen we know it's a file. We also have 3 kinds of possible owners: User, Group and Other:

- User permissions are represented by the 2nd, 3rd and 4th characters.
- Group permissions are represented by the 5th, 6th and 7th characters.
- Other's permissions are represented by the 8th, 9th and 10th characters.

The first character on each of these represents whether the owner has read (r) access or not(-).
The second character represents whether the respective owner has write (w) access or not(-).
The third character represents whether the respective owner has executed (x) access or not(-).

As an example, the file `project_k.txt` has the permission string of: `-rw-rw-rw-`. Based on the previous explanation, it's a file with the following permissions:

- User: Read and write.

- Group: Read and write
- Other: Read and write

Change file permissions

In this example, the organization does not allow others to have write access to any files. As we have seen previously, other does have write permissions, as such we will proceeded to change those permissions by using the following command `chmod o-w project_k.txt`

```
researcher2@427d10666056:~/projects$ chmod o-w project_k.txt
researcher2@427d10666056:~/projects$ ls -la
total 32
drwxr-xr-x 3 researcher2 research_team 4096 Sep 15 01:39 .
drwxr-xr-x 3 researcher2 research_team 4096 Sep 15 02:04 ..
-rw--w---- 1 researcher2 research_team   46 Sep 15 01:39 .project_x.txt
drwx--x--- 2 researcher2 research_team 4096 Sep 15 01:39 drafts
-rw-rw-r-- 1 researcher2 research_team   46 Sep 15 01:39 project_k.txt
-rw-r----- 1 researcher2 research_team   46 Sep 15 01:39 project_m.txt
-rw-rw-r-- 1 researcher2 research_team   46 Sep 15 01:39 project_r.txt
-rw-rw-r-- 1 researcher2 research_team   46 Sep 15 01:39 project_t.txt
```

The command `chmod` changes permissions for a certain file or directory, in this case `project_k.txt`. The first argument is used to select which permission we will change, in this case (`o-w`) we will remove (-) the write (w) permission to the owner "other"(o). The second argument represents in which file or directory this change will take place (`project_k.txt`). Now we can see that after using the command `ls -la`, no file in the directory has write access for the owners that are classified as others.

Change file permissions on a hidden file

The research team has archived `.project_x.txt`, which is why it's a hidden file. This file should not have write permissions for anyone, but the user and group should be able to read the file.
To achieve this goal, we will use the command `chmod u-w,g-w,g+r .project_x.txt`

```
researcher2@427d10666056:~/projects$ chmod u-w,g-w,g+r .project_x.txt
researcher2@427d10666056:~/projects$ ls -la
total 32
drwxr-xr-x 3 researcher2 research_team 4096 Sep 15 01:39 .
drwxr-xr-x 3 researcher2 research_team 4096 Sep 15 02:04 ..
-r--r----- 1 researcher2 research_team   46 Sep 15 01:39 .project_x.txt
drwx--x--- 2 researcher2 research_team 4096 Sep 15 01:39 drafts
-rw-rw-r-- 1 researcher2 research_team   46 Sep 15 01:39 project_k.txt
-rw-r----- 1 researcher2 research_team   46 Sep 15 01:39 project_m.txt
-rw-rw-r-- 1 researcher2 research_team   46 Sep 15 01:39 project_r.txt
-rw-rw-r-- 1 researcher2 research_team   46 Sep 15 01:39 project_t.txt
researcher2@427d10666056:~/projects$
```

The `chmod` command has the ability to change multiple permissions at once by separating them with commas. The argument `u-w,g-w,g+r` does the following changes:

- Removes writes permissions for User and Group. (`u-w,g-w`)
- Adds read permissions for Group. (`g+r`)

Change directory permissions

The files and directories in the projects directory belong to the `researcher2` user. Only `researcher2` should be allowed to access the drafts directory and its contents.
For this change, we will use the command `chmod g-x drafts`

```
researcher2@427d10666056:~/projects$ chmod g-x drafts
researcher2@427d10666056:~/projects$ ls -la
total 32
drwxr-xr-x 3 researcher2 research_team 4096 Sep 15 01:39 .
drwxr-xr-x 3 researcher2 research_team 4096 Sep 15 02:04 ..
-r--r----- 1 researcher2 research_team   46 Sep 15 01:39 .project_x.txt
drwx------ 2 researcher2 research_team 4096 Sep 15 01:39 drafts
-rw-rw-r-- 1 researcher2 research_team   46 Sep 15 01:39 project_k.txt
-rw-r----- 1 researcher2 research_team   46 Sep 15 01:39 project_m.txt
-rw-rw-r-- 1 researcher2 research_team   46 Sep 15 01:39 project_r.txt
-rw-rw-r-- 1 researcher2 research_team   46 Sep 15 01:39 project_t.txt
```

With the `g-x` argument we are removing execute access to the owner “Group”, and as such when we check the output of the `ls -la` command we can clearly see that only the User (`researcher2`) has execute access to the `drafts` directory.

Summary

I did many permissions changes to fulfill the level of system security the research team wanted for the files and directories in the present directory.