File permissions in Linux

Project description

In the scenarios imaged below, I use Linux commands including ls -la and chmod to examine and modify existing permissions to authorize the appropriate users and remove any unauthorized access. Confirming that user permissions are in accordance with the principle of least privilege strengthens the security of the system by ensuring that each user has only the minimal access required to complete their job functions.

Check file and directory details

I used the command ls -la to show permissions for all files and subdirectories in the projects directory, including the permissions for hidden files. Combining the commands ls -l and ls -a will ensure that permissions for all files and subdirectories, including permissions for hidden files, are displayed. Hidden files are titled with a period preceding their name and will not display if only the ls -l command is used.

```
researcher2@169e5d3e890c:~/projects$ ls -la
```

```
researcher2@169e5d3e890c:~/projects$ ls -la
total 32
drwxr-xr-x 3 researcher2 research_team 4096 Nov 13 22:44 .
drwxr-xr-x 3 researcher2 research_team 4096 Nov 13 23:30 ..
-rw--w---- 1 researcher2 research_team   46 Nov 13 22:44 .project_x.txt
drwx--x--- 2 researcher2 research_team 4096 Nov 13 22:44 drafts
-rw-rw-rw- 1 researcher2 research_team   46 Nov 13 22:44 project_k.txt
-rw-r----- 1 researcher2 research_team   46 Nov 13 22:44 project_m.txt
-rw-rw-r-- 1 researcher2 research_team   46 Nov 13 22:44 project_r.txt
-rw-rw-r-- 1 researcher2 research_team   46 Nov 13 22:44 project_t.txt
```

Describe the permissions string

```
-rw--w---- 1 researcher2 research_team   46 Nov 13 22:44 .project_x.txt
```

The 10-character string pictured above indicates the permissions for the hidden file titled .project_x.txt. The first character is a hyphen, which indicates this string describes permissions for a file rather than a directory. The second character indicates that the user has read permissions. The third character indicates that the user has write permissions. The hyphen as the fourth character indicates that the user does not have execute permissions. Each grouping of three characters after the first character in the string indicates the permissions for the three owner types: user, group, and other. The first character in each group of three characters

corresponds to read permissions, the second character in each group of three corresponds to the write permissions, and the third character in each group of three corresponds to the execute permissions. So the fifth through seventh characters indicate that the group has only write permissions, and the eighth through tenth characters indicate that other has no permissions because all three characters are hyphens.

Change file permissions

Because the organization does not allow other to have write permissions to any files, the permissions for project_k.txt need to be modified to remove the write permissions using the command chmod o-w project_k.txt. The chmod command modifies permissions using two arguments. The first argument indicates how to update the permissions, and the second argument indicates the file or directory that the permissions will be updated for. The letters u, g, and o are used in the first argument to indicate which owner type is having its permissions updated. The + and - are used to add and remove permissions, respectively. The = sets the permissions for an owner type and will overwrite any existing permissions. Using the command ls -la after modifying the permissions with the command chmod o-w project_k.txt reveals that the permissions were updated correctly. The command ls -la can be used after any modification to verify accuracy.

```
researcher2@169e5d3e890c:~/projects$ chmod o-w project_k.txt
researcher2@169e5d3e890c:~/projects$ chmod o-w project_k.txt
researcher2@169e5d3e890c:~/projects$ ls -la
total 32
drwxr-xr-x 3 researcher2 research_team 4096 Nov 13 22:44 .
drwxr-xr-x 3 researcher2 research_team 4096 Nov 13 23:30 ..
-rw--w---- 1 researcher2 research_team   46 Nov 13 22:44 .project_x.txt
drwx--x--- 2 researcher2 research_team 4096 Nov 13 22:44 drafts
-rw-rw-r-- 1 researcher2 research_team   46 Nov 13 22:44 project_k.txt
-rw-r----- 1 researcher2 research_team   46 Nov 13 22:44 project_m.txt
-rw-rw-r-- 1 researcher2 research_team   46 Nov 13 22:44 project_r.txt
-rw-rw-r-- 1 researcher2 research_team   46 Nov 13 22:44 project_t.txt
researcher2@169e5d3e890c:~/projects$
```

Change file permissions on a hidden file

I used the command chmod u=r,g=r .project_x.txt to assign read only permissions to the user and the group. Using the = overwrites existing permissions, so it removed the write permissions

from the user and group and added the read permissions to the group in one step.

```
researcher2@169e5d3e890c:~/projects$ chmod u=r,g=r .project_x.txt
researcher2@169e5d3e890c:~/projects$ ls -la
total 32
drwxr-xr-x 3 researcher2 research_team 4096 Nov 13 22:44 .
drwxr-xr-x 3 researcher2 research_team 4096 Nov 13 23:30 ..
-r--r----- 1 researcher2 research_team   46 Nov 13 22:44 .project_x.txt
drwx--x--- 2 researcher2 research_team 4096 Nov 13 22:44 drafts
-rw-rw-r-- 1 researcher2 research_team   46 Nov 13 22:44 project_k.txt
-rw-r----- 1 researcher2 research_team   46 Nov 13 22:44 project_m.txt
-rw-rw-r-- 1 researcher2 research_team   46 Nov 13 22:44 project_r.txt
-rw-rw-r-- 1 researcher2 research_team   46 Nov 13 22:44 project_t.txt
researcher2@169e5d3e890c:~/projects$
```

Change directory permissions

I used the command chmod g-x drafts to remove the execute permissions from the group so that only the user can enter the drafts directory and access its files.

```
researcher2@169e5d3e890c:~/projects$ chmod g-x drafts
researcher2@169e5d3e890c:~/projects$ ls -la
total 32
drwxr-xr-x 3 researcher2 research_team 4096 Nov 13 22:44 .
drwxr-xr-x 3 researcher2 research_team 4096 Nov 13 23:30 ..
-r--r----- 1 researcher2 research_team   46 Nov 13 22:44 .project_x.txt
drwx------ 2 researcher2 research_team 4096 Nov 13 22:44 drafts
-rw-rw-r-- 1 researcher2 research_team   46 Nov 13 22:44 project_k.txt
-rw-r----- 1 researcher2 research_team   46 Nov 13 22:44 project_m.txt
-rw-rw-r-- 1 researcher2 research_team   46 Nov 13 22:44 project_r.txt
-rw-rw-r-- 1 researcher2 research_team   46 Nov 13 22:44 project_t.txt
researcher2@169e5d3e890c:~/projects$
```

Summary

I used the command ls -la to display the permissions for all files and subdirectories within the project directory, including hidden files. I compared the output of this command against the appropriate authorizations designated by my organization for each user type. I employed the chmod command to modify permissions for files and the drafts subdirectory to bring those permissions in line with the organizations' intended authorizations. I used the command ls -la to confirm that the permissions were updated successfully and correctly after each modification command.