File permissions in Linux

Project description

The `projects` directory, maintained by the research team in my organization, required updates to file and directory permissions to reflect the appropriate level of authorization. The current permissions did not align with the security and access requirements. Updating these permissions ensures that the files and systems remain secure.

To accomplish this, I performed the following tasks:

Check file and directory details

I used the command `ls -la` to determine the current permissions set for the files and directories within `projects` directory.

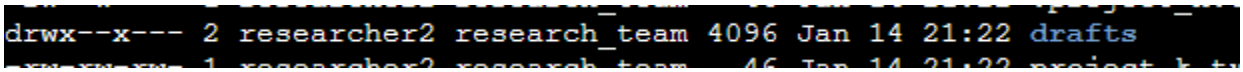
```
researcher2@fd12d1ad8c85:~/projects$ ls -la
total 32
drwxr-xr-x 3 researcher2 research_team 4096 Jan 14 21:22 .
drwxr-xr-x 3 researcher2 research_team 4096 Jan 14 22:20 ..
-rw--w---- 1 researcher2 research_team   46 Jan 14 21:22 .project_x.txt
drwx--x--- 2 researcher2 research_team 4096 Jan 14 21:22 drafts
-rw-rw-rw- 1 researcher2 research_team   46 Jan 14 21:22 project_k.txt
-rw-r----- 1 researcher2 research_team   46 Jan 14 21:22 project_m.txt
-rw-rw-r-- 1 researcher2 research_team   46 Jan 14 21:22 project_r.txt
-rw-rw-r-- 1 researcher2 research_team   46 Jan 14 21:22 project_t.txt
researcher2@fd12d1ad8c85:~/projects$
```

The first line of the result is the command I entered and the other lines display the result output. `ls` is used to display all the files and directories within a directory. Excluding hidden files and directories. By combining `-la` I was able to view the hidden files and directories as well as show the specific permission sets which are represented in the first column in the result with a 10-character string.

Describe the permissions string

The 10-character string can be deconstructed into 4 parts to determine who is authorized to access the file and their specific permissions.
1st character: This character is either a `d` or a hyphen (`-`) and indicates the file type. Directory as `d` and file as a hyphen(`-`).

2nd to 4th character: These specify the User's permissions. There are 4 different types of permissions `r` for Read, `w` for Write, `x` for Execute and `-` for permission not granted.
5th to 7th character: These specify the Group's permissions. There are 4 different types of permissions `r` for Read, `w` for Write, `x` for Execute and `-` for permission not granted.
8th to 10th character: These specify every other user's permissions. There are 4 different types of permissions `r` for Read, `w` for Write, `x` for Execute and `-` for permission not granted.



In the above image, the `drafts` directory's 10-character permission is `drwx--x---`. This can be interpreted as follows:
`d`: Indicated that `drafts` is a directory.
`rwx`: The **user**(owner) has **read(r), write(w) and execute(x)** permissions.
`--x`: The **group** has only the **execute(x)** permission.
`---`: **Other users** (everyone else) have no permissions.

In summary, the `drafts` directory is a folder where the user(owner) can fully access and modify its content. The group members can access it. While any other user cannot interact with it at all.

Change file permissions

The research team determined that others should not have write access to any of their files. After reviewing the file permissions, I found that `project_k.txt` had write access enabled for others, so I decided to remove it.

The following code snipped demonstrates how I used the `chmod` command to change permission on `project_k.txt`. Afterward, I used the `ls -la` command to verify the changes.

```
researcher2@fd12d1ad8c85:~/projects$ chmod o-w project_k.txt
researcher2@fd12d1ad8c85:~/projects$ ls -la
total 32
drwxr-xr-x 3 researcher2 research_team 4096 Jan 14 21:22 .
drwxr-xr-x 3 researcher2 research_team 4096 Jan 14 22:20 ..
-rw--w---- 1 researcher2 research_team   46 Jan 14 21:22 .project_x.txt
drwx--x--- 2 researcher2 research_team 4096 Jan 14 21:22 drafts
-rw-rw-r-- 1 researcher2 research_team   46 Jan 14 21:22 project_k.txt
-rw-r----- 1 researcher2 research_team   46 Jan 14 21:22 project_m.txt
-rw-rw-r-- 1 researcher2 research_team   46 Jan 14 21:22 project_r.txt
-rw-rw-r-- 1 researcher2 research_team   46 Jan 14 21:22 project_t.txt
researcher2@fd12d1ad8c85:~/projects$
```

Change file permissions on a hidden file

The research team archived `project_x.txt` and decided that no one should have access to it except **read-only** permissions for the user(owner) and the group. To achieve this I used the `chmod` command with the `u=r, g=r` options to override current permissions and set read-only access for the user and group.
Then I used the `ls -la` command to verify the changes and ensure that only the specified read permissions were applied.

```
researcher2@fd12d1ad8c85:~/projects$ chmod u=r,g=r .project_x.txt
researcher2@fd12d1ad8c85:~/projects$ ls -la
total 32
drwxr-xr-x 3 researcher2 research_team 4096 Jan 14 21:22 .
drwxr-xr-x 3 researcher2 research_team 4096 Jan 14 22:20 ..
-r--r----- 1 researcher2 research_team   46 Jan 14 21:22 .project_x.txt
drwx--x--- 2 researcher2 research_team 4096 Jan 14 21:22 drafts
-rw-rw-r-- 1 researcher2 research_team   46 Jan 14 21:22 project_k.txt
-rw------- 1 researcher2 research_team   46 Jan 14 21:22 project_m.txt
-rw-rw-r-- 1 researcher2 research_team   46 Jan 14 21:22 project_r.txt
-rw-rw-r-- 1 researcher2 research_team   46 Jan 14 21:22 project_t.txt
researcher2@fd12d1ad8c85:~/projects$
```

Change directory permissions

The research team decided that only `researcher2` users should have access to the drafts directory and its content. This means no one else should have to execute permission for the directory.
To achieve this I used the `chmod` command with `g-x` option to remove the execute permission from the group, ensuring that only `researcher2` has full access to the directory.

After making this change I used the `ls -la` command to verify that only `researcher2` users retain full access to the `drafts` directory.

```
researcher2@fd12d1ad8c85:~/projects$ chmod g-x drafts
researcher2@fd12d1ad8c85:~/projects$ ls -la
total 32
drwxr-xr-x 3 researcher2 research_team 4096 Jan 14 21:22 .
drwxr-xr-x 3 researcher2 research_team 4096 Jan 14 22:20 ..
-r--r----- 1 researcher2 research_team   46 Jan 14 21:22 .project_x.txt
drwx------ 2 researcher2 research_team 4096 Jan 14 21:22 drafts
-rw-rw-r-- 1 researcher2 research_team   46 Jan 14 21:22 project_k.txt
-rw------- 1 researcher2 research_team   46 Jan 14 21:22 project_m.txt
-rw-rw-r-- 1 researcher2 research_team   46 Jan 14 21:22 project_r.txt
-rw-rw-r-- 1 researcher2 research_team   46 Jan 14 21:22 project_t.txt
```

Summary

I modified multiple file and directory permissions in the `projects` directory to align with the research team's required level of authorization. The process began by using the `ls -la` command to inspect the current permissions, which informed my decisions in the subsequent steps. Based on these findings, I utilized the `chmod` command with various options to adjust the permissions and meet the research team's requirements.