File permissions in Linux

Project description

The research team at the organization I work at needs to revise the file permissions for specific files and directories within the projects directory, as the current settings don't align with the required authorization levels. Updating these permissions is essential for maintaining system security. To address this, I used the following Linux bash commands:

Check file and directory details

To check the current permissions I used the **ls -la** command, which lists all files including any hidden files and what their current permissions are.

```
researcher2@06a2ac74400a:~/projects$ ls -la
total 32
drwxr-xr-x 3 researcher2 research_team 4096 Jan 13 13:21 .
drwxr-xr-x 3 researcher2 research_team 4096 Jan 13 14:15 ..
-rw--w---- 1 researcher2 research_team   46 Jan 13 13:21 .project_x.txt
drwx--x--- 2 researcher2 research_team 4096 Jan 13 13:21 drafts
-rw-rw-rw- 1 researcher2 research_team   46 Jan 13 13:21 project_k.txt
-rw-r----- 1 researcher2 research_team   46 Jan 13 13:21 project_m.txt
-rw-rw-r-- 1 researcher2 research_team   46 Jan 13 13:21 project_r.txt
-rw-rw-r-- 1 researcher2 research_team   46 Jan 13 13:21 project_t.txt
```

The output returned indicates that there is a directory called drafts inside the projects directory. There is also a hidden file in the directory indicated by the **(.)** before the file name, which is ".project_x.txt".

Describe the permissions string

The 10-character string can be broken down to identify who is authorized to access the file and the specific permissions granted to them. I will break down the first row from the picture above which is drwxr-xr-x:

- **1st character:** This is either a "d" or a hyphen "-" and it indicates what the file type is. A "d" shows that the file is a directory, whilst a hyphen "-" shows that it is a regular file. In this example the permission string tells us this is a directory.

- **2nd-4th characters:** These characters indicate the read “r”, write “w” and execute “e” permissions for the user. It can also be a hyphen “-” which indicates that there are no permissions granted for this user.
- **5th-7th characters:** These characters indicate the read “r”, write “w” and execute “e” permissions for the group. It can also be a hyphen “-” which indicates that there are no permissions granted for the group.
- **8th-10th characters:** These characters indicate the read “r”, write “w” and execute “e” permissions for others. This is all other users apart from the owner user and group. It can also be a hyphen “-” which indicates that there are no permissions granted for others.
- We can see from this that user, group and other have read permissions, user and group have write permissions, but none of them have execute permissions.

Change file permissions

The organization does not want other to have write permissions for any of the files. The file permissions I previously returned show that other has write access for “project_k.txt”. This needs to be removed.

To do this I used the **chmod** command, which allows me to change permissions for files and directories. I then used two arguments to specify what needed changing **o-w.** The “o” being for others and the “w” being for write. I then specified the file “project_k.txt”

```
researcher2@116dfa027a96:~/projects$ chmod o-w project_k.txt
researcher2@116dfa027a96:~/projects$ ls -la
total 32
drwxr-xr-x 3 researcher2 research_team 4096 Jan 13 16:08 .
drwxr-xr-x 3 researcher2 research_team 4096 Jan 13 16:27 ..
-rw--w---- 1 researcher2 research_team   46 Jan 13 16:08 .project_x.txt
drwx--x--- 2 researcher2 research_team 4096 Jan 13 16:08 drafts
-rw-rw-r-- 1 researcher2 research_team   46 Jan 13 16:08 project_k.txt
-rw-r----- 1 researcher2 research_team   46 Jan 13 16:08 project_m.txt
-rw-rw-r-- 1 researcher2 research_team   46 Jan 13 16:08 project_r.txt
-rw-rw-r-- 1 researcher2 research_team   46 Jan 13 16:08 project_t.txt
```

I then used ls-la to list the updated permissions so I could verify these changes had been made, which they have as there is now a hyphen “-” in the other section for “project_k.txt” instead of “w”.

Change file permissions on a hidden file

As mentioned further up “project_x.txt” is a hidden file. The research team at my organization do not want anyone to have write access to this file as it is now archived, but the user and group should have read access.

To complete this I executed the **chmod** command again along with **ls-la** to confirm these changes have been made.

I used u-w to remove write permissions from user. Then I used g-w to remove write permissions from the group. I then added read permissions to the group using g+r.

```
researcher2@116dfa027a96:~/projects$ chmod u-w,g-w,g+r .project_x.txt
researcher2@116dfa027a96:~/projects$ ls -la
total 32
drwxr-xr-x 3 researcher2 research_team 4096 Jan 13 16:08 .
drwxr-xr-x 3 researcher2 research_team 4096 Jan 13 16:27 ..
-r--r----- 1 researcher2 research_team   46 Jan 13 16:08 .project_x.txt
drwx--x--- 2 researcher2 research_team 4096 Jan 13 16:08 drafts
-rw-rw-r-- 1 researcher2 research_team   46 Jan 13 16:08 project_k.txt
-rw-r----- 1 researcher2 research_team   46 Jan 13 16:08 project_m.txt
-rw-rw-r-- 1 researcher2 research_team   46 Jan 13 16:08 project_r.txt
-rw-rw-r-- 1 researcher2 research_team   46 Jan 13 16:08 project_t.txt
```

Change directory permissions

The organization only wants the reseacher2 user to have access to the drafts directory and it’s contents.

I used the **chmod** command again to change these permissions as there was an execute permission in place for group. I used g-x to remove this.

```
researcher2@116dfa027a96:~/projects$ chmod g-x drafts
researcher2@116dfa027a96:~/projects$ ls -la
total 32
drwxr-xr-x 3 researcher2 research_team 4096 Jan 13 16:08 .
drwxr-xr-x 3 researcher2 research_team 4096 Jan 13 16:27 ..
-r--r----- 1 researcher2 research_team   46 Jan 13 16:08 .project_x.txt
drwx------ 2 researcher2 research_team 4096 Jan 13 16:08 drafts
-rw-rw-r-- 1 researcher2 research_team   46 Jan 13 16:08 project_k.txt
-rw-r----- 1 researcher2 research_team   46 Jan 13 16:08 project_m.txt
-rw-rw-r-- 1 researcher2 research_team   46 Jan 13 16:08 project_r.txt
-rw-rw-r-- 1 researcher2 research_team   46 Jan 13 16:08 project_t.txt
```

I then used the **ls-la** command to verify these changes had been made.

Summary

Managing file and directory permissions is crucial for a cybersecurity analyst. In this project, I utilized bash commands to ensure that the organization's filesystem had the appropriate access permissions. Adhering to the principle of least privilege is essential for maintaining strong security practices. By using commands like **chmod** and **ls**, I was able to view and adjust the access permissions as required by the organization.