File permissions in Linux

Project description

Tasks:
1. The organization doesn't allow **others** to have write access to any files. We need to remove permission accordingly.
2. The research team wants to **remove** the **groups** read permission for **project_m.txt**
3. 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. Use a Linux command to assign **.project_x.txt** the appropriate authorization.
4. The **drafts** folder must not be accessible to anyone except the user**.**

Check file and directory details

`ls -la` command

`ls -la` is used to list all files and directories in the current directory

Lists all files (including hidden ones) in long format.

`-l`
 Long listing (shows permissions, owner, size, date, etc.)

`-a`
 Shows all files, including hidden files (those starting with .)

```
researcher2@fab1aab63c4a:~/projects$ ls -la
total 32
drwxr-xr-x 3 researcher2 research_team 4096 Jun  7 10:27 .
drwxr-xr-x 3 researcher2 research_team 4096 Jun  7 11:23 ..
-rw--w---- 1 researcher2 research_team   46 Jun  7 10:27 .project_x.txt
drwx--x--- 2 researcher2 research_team 4096 Jun  7 10:27 drafts
-rw-rw-rw- 1 researcher2 research_team   46 Jun  7 10:27 project_k.txt
-rw-r----- 1 researcher2 research_team   46 Jun  7 10:27 project_m.txt
-rw-rw-r-- 1 researcher2 research_team   46 Jun  7 10:27 project_r.txt
-rw-rw-r-- 1 researcher2 research_team   46 Jun  7 10:27 project_t.txt
researcher2@fab1aab63c4a:~/projects$ []
```

As you can see above, -la lists all files along with details like permission, user, group, date, time and name of file in the extreme right.

Current file permissions

This document displays the file structure of the /home/researcher2/projects directory and the permissions of the files and subdirectory it contains.

In the /home/researcher2/projects directory, there are five files with the following names and permissions:
- project_k.txt
    - User = read, write,
    - Group = read, write
    - Other = read, write
- project_m.txt
    - User = read, write
    - Group = read
    - Other = none
- project_r.txt
    - User= read, write
    - Group = read, write
    - Other = read
- project_t.txt
    - User = read, write
    - Group = read, write
    - Other = read
- .project_x.txt
    - User = read, write
    - Group = write
    - Other = none

There is also one subdirectory inside the projects directory named drafts. The permissions on drafts are:
- User = read, write, execute
- Group = execute
- Other = none

Describe the permissions string

A 10-character string begins each entry and indicates how the permissions on the file are set. For instance, a directory with full permissions for all owner types would be **drwxrwxrwx**:

- The 1st character indicates the file type. The d indicates it's a directory. When this character is a hyphen (-), it's a regular file.
- The 2nd-4th characters indicate the read (r), write (w), and execute (x) permissions for the user. When one of these characters is a hyphen (-) instead, it indicates that this permission is not granted to the user.
- The 5th-7th characters indicate the read (r), write (w), and execute (x) permissions for the group. When one of these characters is a hyphen (-) instead, it indicates that this permission is not granted for the group.
- The 8th-10th characters indicate the read (r), write (w), and execute (x) permissions for the owner type of other. This owner type consists of all other users on the system apart from the user and the group. When one of these characters is a hyphen (-) instead, that indicates that this permission is not granted for other.

chmod command

The chmod command is used to **change file or directory permissions** (short for change mode) in Linux.

Syntax:
```
chmod [permissions] [file/directory]
```

Example:
```
chmod u+x,g-x,o=r [file/directory]
```

- u= user

- g= group
- o=others
- Plus (+) sign indicated to add a permission in addition to existing permission
- Minus (-) sign indicates to remove permission from existing permissions
- Equal to (=) indicates that the group will be assigned the new permission replacing the previous permissions

Change file permissions

```
researcher2@fab1aab63c4a:~$ cd projects/
researcher2@fab1aab63c4a:~/projects$ ls
drafts  project_k.txt  project_m.txt  project_r.txt  project_t.txt
researcher2@fab1aab63c4a:~/projects$ ls -l
total 20
drwx--x--- 2 researcher2 research_team 4096 Jun  7 10:27 drafts
-rw-rw-rw- 1 researcher2 research_team   46 Jun  7 10:27 project_k.txt
-rw-r----- 1 researcher2 research_team   46 Jun  7 10:27 project_m.txt
-rw-rw-r-- 1 researcher2 research_team   46 Jun  7 10:27 project_r.txt
-rw-rw-r-- 1 researcher2 research_team   46 Jun  7 10:27 project_t.txt
researcher2@fab1aab63c4a:~/projects$ ls -la
total 32
drwxr-xr-x 3 researcher2 research_team 4096 Jun  7 10:27 .
drwxr-xr-x 3 researcher2 research_team 4096 Jun  7 11:23 ..
-rw--w---- 1 researcher2 research_team   46 Jun  7 10:27 .project_x.txt
drwx--x--- 2 researcher2 research_team 4096 Jun  7 10:27 drafts
-rw-rw-rw- 1 researcher2 research_team   46 Jun  7 10:27 project_k.txt
-rw-r----- 1 researcher2 research_team   46 Jun  7 10:27 project_m.txt
-rw-rw-r-- 1 researcher2 research_team   46 Jun  7 10:27 project_r.txt
-rw-rw-r-- 1 researcher2 research_team   46 Jun  7 10:27 project_t.txt
researcher2@fab1aab63c4a:~/projects$ chmod o-w project_k.txt
researcher2@fab1aab63c4a:~/projects$ ls -la
total 32
drwxr-xr-x 3 researcher2 research_team 4096 Jun  7 10:27 .
drwxr-xr-x 3 researcher2 research_team 4096 Jun  7 11:23 ..
-rw--w---- 1 researcher2 research_team   46 Jun  7 10:27 .project_x.txt
drwx--x--- 2 researcher2 research_team 4096 Jun  7 10:27 drafts
-rw-rw-r-- 1 researcher2 research_team   46 Jun  7 10:27 project_k.txt
-rw-r----- 1 researcher2 research_team   46 Jun  7 10:27 project_m.txt
-rw-rw-r-- 1 researcher2 research_team   46 Jun  7 10:27 project_r.txt
-rw-rw-r-- 1 researcher2 research_team   46 Jun  7 10:27 project_t.txt
researcher2@fab1aab63c4a:~/projects$ chmod g-r projrct_m
chmod: cannot access 'projrct_m': No such file or directory
researcher2@fab1aab63c4a:~/projects$ chmod g-r project_m.txt
researcher2@fab1aab63c4a:~/projects$ ls -la
total 32
drwxr-xr-x 3 researcher2 research_team 4096 Jun  7 10:27 .
drwxr-xr-x 3 researcher2 research_team 4096 Jun  7 11:23 ..
-rw--w---- 1 researcher2 research_team   46 Jun  7 10:27 .project_x.txt
drwx--x--- 2 researcher2 research_team 4096 Jun  7 10:27 drafts
-rw-rw-r-- 1 researcher2 research_team   46 Jun  7 10:27 project_k.txt
-rw------- 1 researcher2 research_team   46 Jun  7 10:27 project_m.txt
-rw-rw-r-- 1 researcher2 research_team   46 Jun  7 10:27 project_r.txt
-rw-rw-r-- 1 researcher2 research_team   46 Jun  7 10:27 project_t.txt
researcher2@fab1aab63c4a:~/projects$ ▯
```

1. Remove the write permission of other.

    chmod o-w project_k.txt

    This removes(- sign) write(w) permission of others(o) for project_k.txt file.

We can observe that after permission is removed, the file permission string on running `ls -la` command are updated to `-rw-rw-r--`

2. Only group must have no read permission for project_m.txt

   `chmod g-r project_m.txt`

   This removes (- sign) the read (r) permission for group (g) for project_m.txt

Change file permissions on a hidden file

```
researcher2@fab1aab63c4a:~/projects$ ls -la
total 32
drwxr-xr-x 3 researcher2 research_team 4096 Jun  7 10:27 .
drwxr-xr-x 3 researcher2 research_team 4096 Jun  7 11:23 ..
-rw--w---- 1 researcher2 research_team   46 Jun  7 10:27 .project_x.txt
drwx--x--- 2 researcher2 research_team 4096 Jun  7 10:27 drafts
-rw-rw-r-- 1 researcher2 research_team   46 Jun  7 10:27 project_k.txt
-rw------- 1 researcher2 research_team   46 Jun  7 10:27 project_m.txt
-rw-rw-r-- 1 researcher2 research_team   46 Jun  7 10:27 project_r.txt
-rw-rw-r-- 1 researcher2 research_team   46 Jun  7 10:27 project_t.txt
researcher2@fab1aab63c4a:~/projects$ chmod u=r,g=r .project_x.txt
researcher2@fab1aab63c4a:~/projects$ ls -la
total 32
drwxr-xr-x 3 researcher2 research_team 4096 Jun  7 10:27 .
drwxr-xr-x 3 researcher2 research_team 4096 Jun  7 11:23 ..
-r--r----- 1 researcher2 research_team   46 Jun  7 10:27 .project_x.txt
drwx--x--- 2 researcher2 research_team 4096 Jun  7 10:27 drafts
-rw-rw-r-- 1 researcher2 research_team   46 Jun  7 10:27 project_k.txt
-rw------- 1 researcher2 research_team   46 Jun  7 10:27 project_m.txt
-rw-rw-r-- 1 researcher2 research_team   46 Jun  7 10:27 project_r.txt
-rw-rw-r-- 1 researcher2 research_team   46 Jun  7 10:27 project_t.txt
researcher2@fab1aab63c4a:~/projects$
```

`chmod u=r,g=r .project_x.txt`

Equal to (= sign) assigns only (= replaces existing permission) read permission to group (g) and user (u) for hidden file (indicated by filename beginning from .) .project_x.txt.

Change directory permissions

```
researcher2@fab1aab63c4a:~/projects$ ls -la
total 32
drwxr-xr-x 3 researcher2 research_team 4096 Jun  7 10:27 .
drwxr-xr-x 3 researcher2 research_team 4096 Jun  7 11:23 ..
-r--r----- 1 researcher2 research_team   46 Jun  7 10:27 .project_x.txt
drwx--x--- 2 researcher2 research_team 4096 Jun  7 10:27 drafts
-rw-rw-r-- 1 researcher2 research_team   46 Jun  7 10:27 project_k.txt
-rw------- 1 researcher2 research_team   46 Jun  7 10:27 project_m.txt
-rw-rw-r-- 1 researcher2 research_team   46 Jun  7 10:27 project_r.txt
-rw-rw-r-- 1 researcher2 research_team   46 Jun  7 10:27 project_t.txt
researcher2@fab1aab63c4a:~/projects$ chmod g-x drafts/
researcher2@fab1aab63c4a:~/projects$ ls -la
total 32
drwxr-xr-x 3 researcher2 research_team 4096 Jun  7 10:27 .
drwxr-xr-x 3 researcher2 research_team 4096 Jun  7 11:23 ..
-r--r----- 1 researcher2 research_team   46 Jun  7 10:27 .project_x.txt
drwx------ 2 researcher2 research_team 4096 Jun  7 10:27 drafts
-rw-rw-r-- 1 researcher2 research_team   46 Jun  7 10:27 project_k.txt
-rw------- 1 researcher2 research_team   46 Jun  7 10:27 project_m.txt
-rw-rw-r-- 1 researcher2 research_team   46 Jun  7 10:27 project_r.txt
-rw-rw-r-- 1 researcher2 research_team   46 Jun  7 10:27 project_t.txt
researcher2@fab1aab63c4a:~/projects$ 
```

```
chmod g-x drafts/
```

This removes(- sign) execute (x) permission for group (g) for draft directory.

Summary

Linux commands help security professionals to manage user permissions which is essential task to control and manage security of system.