File permissions in Linux

Project description

Part of my job in the organization is to ensure users on the research team are authorized with the appropriate permissions in order to keep the system secure. My task is to examine existing permissions on the file system, determine if the permissions match the authorization that should be given, modify the permissions to correct users if they do not match, and remove unauthorized access.

Check file and directory details

```
researcher2@e8a06ac3e2be:~/projects$ ls -la
total 32
drwxr-xr-x 3 researcher2 research_team 4096 May 18 00:05 .
drwxr-xr-x 3 researcher2 research_team 4096 May 18 00:30 ..
-rw--w---- 1 researcher2 research_team   46 May 18 00:05 .project_x.txt
drwx--x--- 2 researcher2 research_team 4096 May 18 00:05 drafts
-rw-rw-rw- 1 researcher2 research_team   46 May 18 00:05 project_k.txt
-rw-r----- 1 researcher2 research_team   46 May 18 00:05 project_m.txt
-rw-rw-r-- 1 researcher2 research_team   46 May 18 00:05 project_r.txt
-rw-rw-r-- 1 researcher2 research_team   46 May 18 00:05 project_t.txt
```

To check permissions of the file system, I used the command `ls` with `-la` options to display a detailed listing of the contents as well as the hidden files. The output includes a directory named `drafts`, a hidden file named `.project_x.txt`, and 4 others project files. The first 10-character string in the 1st column represents the permissions of a file or directory. 2nd column represent the username of the user, in this case is `researcher2`

Describe the permissions string

1st character: describe file type, either `hyphen ( - )` or `d` to represent a file or directory respectively

2nd - 4th character: describe permission for the user which stands for `read ( r )`, `write ( w )`, and `execute ( x )`. If any of them are `hyphen ( - )` then said permission is not set/turned on for the user.

5th - 7th character: describe permission for the group the user belongs to, a group can have multiple users

8th - 10th character: describe permission for others, meaning not the user nor the group.

Change file permissions

```
researcher2@e8a06ac3e2be:~/projects$ ls -la
total 32
drwxr-xr-x 3 researcher2 research_team 4096 May 18 00:05 .
drwxr-xr-x 3 researcher2 research_team 4096 May 18 00:30 ..
-rw--w---- 1 researcher2 research_team   46 May 18 00:05 .project_x.txt
drwx--x--- 2 researcher2 research_team 4096 May 18 00:05 drafts
-rw-rw-rw- 1 researcher2 research_team   46 May 18 00:05 project_k.txt
-rw-r----- 1 researcher2 research_team   46 May 18 00:05 project_m.txt
-rw-rw-r-- 1 researcher2 research_team   46 May 18 00:05 project_r.txt
-rw-rw-r-- 1 researcher2 research_team   46 May 18 00:05 project_t.txt
```

The organization does not allow others to have write access to any files, however as seen above `project_k.txt` still has write access for others. I will be changing so the permission to write for others is removed.

```
researcher2@e8a06ac3e2be:~/projects$ chmod o-w project_k.txt
researcher2@e8a06ac3e2be:~/projects$ ls -la
total 32
drwxr-xr-x 3 researcher2 research_team 4096 May 18 00:05 .
drwxr-xr-x 3 researcher2 research_team 4096 May 18 00:30 ..
-rw--w---- 1 researcher2 research_team   46 May 18 00:05 .project_x.txt
drwx--x--- 2 researcher2 research_team 4096 May 18 00:05 drafts
-rw-rw-r-- 1 researcher2 research_team   46 May 18 00:05 project_k.txt
-rw-r----- 1 researcher2 research_team   46 May 18 00:05 project_m.txt
-rw-rw-r-- 1 researcher2 research_team   46 May 18 00:05 project_r.txt
-rw-rw-r-- 1 researcher2 research_team   46 May 18 00:05 project_t.txt
```

To change file permission, I used the `chmod` command. First argument `o-w` specify that I am removing write permission from others. The `hyphen ( - )` can be replaced with plus `sign ( + )` to add permission.
Second argument specifies the file name.

Change file permissions on a hidden file

```
researcher2@e8a06ac3e2be:~/projects$ chmod o-w project_k.txt
researcher2@e8a06ac3e2be:~/projects$ ls -la
total 32
drwxr-xr-x 3 researcher2 research_team 4096 May 18 00:05 .
drwxr-xr-x 3 researcher2 research_team 4096 May 18 00:30 ..
-rw--w---- 1 researcher2 research_team   46 May 18 00:05 .project_x.txt
drwx--x--- 2 researcher2 research_team 4096 May 18 00:05 drafts
-rw-rw-r-- 1 researcher2 research_team   46 May 18 00:05 project_k.txt
-rw-r----- 1 researcher2 research_team   46 May 18 00:05 project_m.txt
-rw-rw-r-- 1 researcher2 research_team   46 May 18 00:05 project_r.txt
-rw-rw-r-- 1 researcher2 research_team   46 May 18 00:05 project_t.txt
```

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. As seen above, `.project_x.txt` currently has write permission for user and group while group does not have read permission.

```
researcher2@e8a06ac3e2be:~/projects$ chmod u-w,g-w,g+r .project_x.txt
researcher2@e8a06ac3e2be:~/projects$ ls -la
total 32
drwxr-xr-x 3 researcher2 research_team 4096 May 18 00:05 .
drwxr-xr-x 3 researcher2 research_team 4096 May 18 00:30 ..
-r--r----- 1 researcher2 research_team   46 May 18 00:05 .project_x.txt
drwx--x--- 2 researcher2 research_team 4096 May 18 00:05 drafts
-rw-rw-r-- 1 researcher2 research_team   46 May 18 00:05 project_k.txt
-rw-r----- 1 researcher2 research_team   46 May 18 00:05 project_m.txt
-rw-rw-r-- 1 researcher2 research_team   46 May 18 00:05 project_r.txt
-rw-rw-r-- 1 researcher2 research_team   46 May 18 00:05 project_t.txt
```

Like earlier, I used the `chmod` command. This time with 1st argument being `u-w,g-w,g+r` to specify that I'm removing write permission for user and group along with adding read permission to group.
Second argument specifies the file name. However since `project_x.txt` is a hidden file, the name start with a `period ( . )`

Change directory permissions

```
researcher2@e8a06ac3e2be:~/projects$ chmod u-w,g-w,g+r .project_x.txt
researcher2@e8a06ac3e2be:~/projects$ ls -la
total 32
drwxr-xr-x 3 researcher2 research_team 4096 May 18 00:05 .
drwxr-xr-x 3 researcher2 research_team 4096 May 18 00:30 ..
-r--r----- 1 researcher2 research_team   46 May 18 00:05 .project_x.txt
drwx--x--- 2 researcher2 research_team 4096 May 18 00:05 drafts
-rw-rw-r-- 1 researcher2 research_team   46 May 18 00:05 project_k.txt
-rw-r----- 1 researcher2 research_team   46 May 18 00:05 project_m.txt
-rw-rw-r-- 1 researcher2 research_team   46 May 18 00:05 project_r.txt
-rw-rw-r-- 1 researcher2 research_team   46 May 18 00:05 project_t.txt
```

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. As seen above, group have execute permission that needed to be removed.

```
researcher2@e8a06ac3e2be:~/projects$ chmod g-x drafts/
researcher2@e8a06ac3e2be:~/projects$ ls -la
total 32
drwxr-xr-x 3 researcher2 research_team 4096 May 18 00:05 .
drwxr-xr-x 3 researcher2 research_team 4096 May 18 00:30 ..
-r--r----- 1 researcher2 research_team   46 May 18 00:05 .project_x.txt
drwx------ 2 researcher2 research_team 4096 May 18 00:05 drafts
-rw-rw-r-- 1 researcher2 research_team   46 May 18 00:05 project_k.txt
-rw-r----- 1 researcher2 research_team   46 May 18 00:05 project_m.txt
-rw-rw-r-- 1 researcher2 research_team   46 May 18 00:05 project_r.txt
-rw-rw-r-- 1 researcher2 research_team   46 May 18 00:05 project_t.txt
```

I used the `chmod` command with `g-x` argument to remove execute permission from group

Summary

I changed multiple permissions to match the authorization that the organization wanted. 1st step is to use `ls -la` to check permission in order to let me know the next step. After that I used the `chmod` command to change the permissions.