

File permissions in Linux

Project description

As a security professional at a large organization. I mainly work with their research team. Part of my job is to ensure users on this team are authorized with the appropriate permissions. This helps keep the system secure.

My task is to examine existing permissions on the file system. I'll need to determine if the permissions match the authorization that should be given. If they do not match, I'll need to modify the permissions to authorize the appropriate users and remove any unauthorized access.

Command codes

`chmod` - this command requires two arguments. The first argument indicates how to change permissions, and the second argument indicates the file or directory that you want to change permissions for.

`ls -l` - command was used to investigate who has permissions on files and directories. This specific command displays permissions to files and directories. Also displays other additional information, including owner name, group, file size, and the time of last modification.

`ls -la` - command was used to displays permissions to files and directories, including hidden files. This is a combination of `ls -l` and `ls -a`.

Check file and directory details

In the `/home/researcher2/projects` directory, there are five files with the following names and permissions:

```
researcher2@d3125398cd06:~/projects$ ls -la
total 32
drwxr-xr-x 3 researcher2 research_team 4096 Dec 23 04:25 .
drwxr-xr-x 3 researcher2 research_team 4096 Dec 23 05:39 ..
-rw--w---- 1 researcher2 research_team  46 Dec 23 04:25 .project_x.txt
drwx--x--- 2 researcher2 research_team 4096 Dec 23 04:25 drafts
-rw-rw-rw- 1 researcher2 research_team  46 Dec 23 04:25 project_k.txt
-rw-r----- 1 researcher2 research_team  46 Dec 23 04:25 project_m.txt
-rw-rw-r-- 1 researcher2 research_team  46 Dec 23 04:25 project_r.txt
-rw-rw-r-- 1 researcher2 research_team  46 Dec 23 04:25 project_t.txt
researcher2@d3125398cd06:~/projects$
```

Describe the permissions string

The permissions string is a 10 character string that is read the following way:

drwxrwxrwx

d represents the file being a directory file.

rwX - group 1 represents r - read, w - write, and x - execute for the User.

rwX - group 2 represents the same rwX above but for the Group.

rwX - group 3 represents the same rwX above but for Others.

-rwxrwxrwx

The 10 character string above is similar to the **drwxrwxrwx** string above with one difference, the (-) represents a regular file.

As you can see above in the picture the current permissions are set as follows:

- **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

Change file permissions

The organization does not allow the group other to have write access to any files. Based on the permissions established in Step 3, identify which file needs to have its permissions modified. Use a Linux command to modify these permissions.

`chmod o-w project_k.txt` was used to remove the other users ability to write to files. (see below)

```
researcher2@d3125398cd06:~/projects$ ls -la
total 32
drwxr-xr-x 3 researcher2 research_team 4096 Dec 23 04:25 .
drwxr-xr-x 3 researcher2 research_team 4096 Dec 23 05:39 ..
-rw--w---- 1 researcher2 research_team   46 Dec 23 04:25 .project_x.txt
drwx--x--- 2 researcher2 research_team 4096 Dec 23 04:25 drafts
-rw-rw-rw- 1 researcher2 research_team   46 Dec 23 04:25 project_k.txt
-rw-r----- 1 researcher2 research_team   46 Dec 23 04:25 project_m.txt
-rw-rw-r-- 1 researcher2 research_team   46 Dec 23 04:25 project_r.txt
-rw-rw-r-- 1 researcher2 research_team   46 Dec 23 04:25 project_t.txt
researcher2@d3125398cd06:~/projects$ chmod o-w project_k.txt
researcher2@d3125398cd06:~/projects$ ls -la
total 32
drwxr-xr-x 3 researcher2 research_team 4096 Dec 23 04:25 .
drwxr-xr-x 3 researcher2 research_team 4096 Dec 23 05:39 ..
-rw--w---- 1 researcher2 research_team   46 Dec 23 04:25 .project_x.txt
drwx--x--- 2 researcher2 research_team 4096 Dec 23 04:25 drafts
-rw-rw-r-- 1 researcher2 research_team   46 Dec 23 04:25 project_k.txt
-rw-r----- 1 researcher2 research_team   46 Dec 23 04:25 project_m.txt
-rw-rw-r-- 1 researcher2 research_team   46 Dec 23 04:25 project_r.txt
-rw-rw-r-- 1 researcher2 research_team   46 Dec 23 04:25 project_t.txt
researcher2@d3125398cd06:~/projects$
```

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.

`chmod g-r project_m.txt` was used to remove the groups ability to read the restricted `project_m.txt` file. (see below)

```
drwxr-xr-x 3 researcher2 research_team 4096 Dec 23 04:25 .
drwxr-xr-x 3 researcher2 research_team 4096 Dec 23 05:39 ..
-rw--w---- 1 researcher2 research_team  46 Dec 23 04:25 .project_x.txt
drwx--x--- 2 researcher2 research_team 4096 Dec 23 04:25 drafts
-rw-rw-r-- 1 researcher2 research_team  46 Dec 23 04:25 project_k.txt
-rw----- 1 researcher2 research_team  46 Dec 23 04:25 project_m.txt
-rw-rw-r-- 1 researcher2 research_team  46 Dec 23 04:25 project_r.txt
-rw-rw-r-- 1 researcher2 research_team  46 Dec 23 04:25 project_t.txt
```

Change file permissions on a hidden file

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.

```
researcher2@d3125398cd06:~/projects$ ls -la
total 32
drwxr-xr-x 3 researcher2 research_team 4096 Dec 23 04:25 .
drwxr-xr-x 3 researcher2 research_team 4096 Dec 23 05:39 ..
-rw--w---- 1 researcher2 research_team  46 Dec 23 04:25 .project_x.txt
drwx--x--- 2 researcher2 research_team 4096 Dec 23 04:25 drafts
-rw-rw-r-- 1 researcher2 research_team  46 Dec 23 04:25 project_k.txt
-rw----- 1 researcher2 research_team  46 Dec 23 04:25 project_m.txt
-rw-rw-r-- 1 researcher2 research_team  46 Dec 23 04:25 project_r.txt
-rw-rw-r-- 1 researcher2 research_team  46 Dec 23 04:25 project_t.txt
researcher2@d3125398cd06:~/projects$
```

Using `chmod u-w,g-w,g+r .project_x.txt` we updated the `.project_x.txt` file to be only readable by the user and the group.

```
researcher2@d3125398cd06:~/projects$ chmod u-w,g-w,g+r .project_x.txt
researcher2@d3125398cd06:~/projects$ ls -la
total 32
drwxr-xr-x 3 researcher2 research_team 4096 Dec 23 04:25 .
drwxr-xr-x 3 researcher2 research_team 4096 Dec 23 05:39 ..
-r--r----- 1 researcher2 research_team  46 Dec 23 04:25 .project_x.txt
drwx--x--- 2 researcher2 research_team 4096 Dec 23 04:25 drafts
-rw-rw-r-- 1 researcher2 research_team  46 Dec 23 04:25 project_k.txt
-rw----- 1 researcher2 research_team  46 Dec 23 04:25 project_m.txt
-rw-rw-r-- 1 researcher2 research_team  46 Dec 23 04:25 project_r.txt
-rw-rw-r-- 1 researcher2 research_team  46 Dec 23 04:25 project_t.txt
researcher2@d3125398cd06:~/projects$
```

Change directory permissions

Only the `researcher2` user should be allowed to access the `drafts` directory and its contents. (This means that only `researcher2` should have execute privileges.)

```
researcher2@d3125398cd06:~/projects$ chmod u-w,g-w,g+r .project_x.txt
researcher2@d3125398cd06:~/projects$ ls -la
total 32
drwxr-xr-x 3 researcher2 research_team 4096 Dec 23 04:25 .
drwxr-xr-x 3 researcher2 research_team 4096 Dec 23 05:39 ..
-r--r----- 1 researcher2 research_team  46 Dec 23 04:25 .project_x.txt
drwx--x--- 2 researcher2 research_team 4096 Dec 23 04:25 drafts
-rw-rw-r-- 1 researcher2 research_team  46 Dec 23 04:25 project_k.txt
-rw----- 1 researcher2 research_team  46 Dec 23 04:25 project_m.txt
-rw-rw-r-- 1 researcher2 research_team  46 Dec 23 04:25 project_r.txt
-rw-rw-r-- 1 researcher2 research_team  46 Dec 23 04:25 project_t.txt
researcher2@d3125398cd06:~/projects$
```

Using `chmod g-x drafts` we removed the groups permission to access the `drafts` director and its contents.

```
researcher2@d3125398cd06:~/projects$ chmod g-x drafts
researcher2@d3125398cd06:~/projects$ ls -la
total 32
drwxr-xr-x 3 researcher2 research_team 4096 Dec 23 04:25 .
drwxr-xr-x 3 researcher2 research_team 4096 Dec 23 05:39 ..
-r--r----- 1 researcher2 research_team  46 Dec 23 04:25 .project_x.txt
drwx----- 2 researcher2 research_team 4096 Dec 23 04:25 drafts
-rw-rw-r-- 1 researcher2 research_team  46 Dec 23 04:25 project_k.txt
-rw----- 1 researcher2 research_team  46 Dec 23 04:25 project_m.txt
-rw-rw-r-- 1 researcher2 research_team  46 Dec 23 04:25 project_r.txt
-rw-rw-r-- 1 researcher2 research_team  46 Dec 23 04:25 project_t.txt
```

Summary

Using basic Linux Bash shell commands `chmod`, `ls -l`, `ls -la`, and reading permissions of the User, Group, and Other. I was able to update the Read (r), Write (w), and execute (x) permissions by examining the file and directory permissions, change permissions on files, and change permissions on directories to successfully complete the file permissions project to maintain the principle of least privilege in action at the level my organization wanted for their files and directories.

Addendum

Beginning of project

```
researcher2@d3125398cd06:~/projects$ ls -la
total 32
drwxr-xr-x 3 researcher2 research_team 4096 Dec 23 04:25 .
drwxr-xr-x 3 researcher2 research_team 4096 Dec 23 05:39 ..
-rw--w---- 1 researcher2 research_team  46 Dec 23 04:25 .project_x.txt
drwx--x--- 2 researcher2 research_team 4096 Dec 23 04:25 drafts
-rw-rw-rw- 1 researcher2 research_team  46 Dec 23 04:25 project_k.txt
-rw-r----- 1 researcher2 research_team  46 Dec 23 04:25 project_m.txt
-rw-rw-r-- 1 researcher2 research_team  46 Dec 23 04:25 project_r.txt
-rw-rw-r-- 1 researcher2 research_team  46 Dec 23 04:25 project_t.txt
researcher2@d3125398cd06:~/projects$
```

End of project

```
researcher2@d3125398cd06:~/projects$ chmod g-x drafts
researcher2@d3125398cd06:~/projects$ ls -la
total 32
drwxr-xr-x 3 researcher2 research_team 4096 Dec 23 04:25 .
drwxr-xr-x 3 researcher2 research_team 4096 Dec 23 05:39 ..
-r--r----- 1 researcher2 research_team  46 Dec 23 04:25 .project_x.txt
drwx----- 2 researcher2 research_team 4096 Dec 23 04:25 drafts
-rw-rw-r-- 1 researcher2 research_team  46 Dec 23 04:25 project_k.txt
-rw----- 1 researcher2 research_team  46 Dec 23 04:25 project_m.txt
-rw-rw-r-- 1 researcher2 research_team  46 Dec 23 04:25 project_r.txt
-rw-rw-r-- 1 researcher2 research_team  46 Dec 23 04:25 project_t.txt
researcher2@d3125398cd06:~/projects$
```