File permissions in Linux

Project description

Our task in this mini project is to examine existing permissions on the file system. We need to determine if the permissions match the authorization that should be given. If they do not match, we modify the permissions to authorize the appropriate users and remove any unauthorized access.

Through Linux commands we try to analyze file and directory permissions, verify the permissions configured match our requirements, and then alter file, hidden files and directory permissions if necessary. So, let's dive in!

Check file and directory details

To check the contents from the current directory, we can use the `ls` command. This command basically outputs all directories and files within the current directory

The `ls -l` command displays the permissions different types of users have on the file and subdirectories. The `ls -la` command includes the hidden files and directories as well.

Here, in this task, we are interested in finding the permissions of files and directories within the `projects` directory. The below screenshot shows this command

```
researcher2@77ed7e2c0946:~$ ls
projects
researcher2@77ed7e2c0946:~$ ls -la projects
```

The output of this command shows the following results. Alternatively, we can change into projects directory and type in `ls -la` to view the same results.

```
researcher2@77ed7e2c0946:~$ ls
projects
researcher2@77ed7e2c0946:~$ ls -la projects
total 32
drwxr-xr-x 3 researcher2 research_team 4096 Jun 30 14:19 .
drwxr-xr-x 3 researcher2 research_team 4096 Jun 30 15:05 ..
-rw--w---- 1 researcher2 research_team   46 Jun 30 14:19 .project_x.txt
drwx--x--- 2 researcher2 research_team 4096 Jun 30 14:19 drafts
-rw-rw-rw- 1 researcher2 research_team   46 Jun 30 14:19 project_k.txt
-rw-r----- 1 researcher2 research_team   46 Jun 30 14:19 project_m.txt
-rw-rw-r-- 1 researcher2 research_team   46 Jun 30 14:19 project_r.txt
-rw-rw-r-- 1 researcher2 research_team   46 Jun 30 14:19 project_t.txt
```

Describe the permissions string

Analyzing the output, we find that there are 8 hidden and visible files and subdirectories in the `projects` directory. The number 32 indicates the total number of bytes all the entries in the `projects` directory currently consume. Let us examine the permissions on the `project_k.txt` file.

```
-rw-rw-rw- 1 researcher2 research_team   46 Jun 30 14:19 project_k.txt
```

The first character of `-rw-rw-rw-` indicates if the entity is a directory or a file. If it was a directory, the letter 'd' would be mentioned. The next 3 characters represent the permissions of the user, where 'r' stands for read, 'w' stands for write. If the user had permission to execute this file, there would be an 'x' instead of '-'. The next three characters indicate permissions of the group and the last three characters indicate permissions for others. In this particular output, the user has read and write permissions on the file, read and write permissions for the group which the user belongs to and read and write permissions for others. None has permission to execute the file.

Change file permissions

The organization does not want any other user to have write permissions on any files. Analyzing current permissions from the previous section, we can see that the `project_k.txt` file is configured otherwise. Let us change the permissions for this file using the `chmod` command.

The command allows us to change permissions. To grant read, write and execute rights for a user, we can add `chmod u+rwx <filename>`, 'u' stands for user. To change permissions for `group` user types and `other`, 'g' and 'o' can be used respectively. To change multiple user types permissions, we can do so by adding commas such as `chmod u+rw,g-w,o-x <filename>`,giving read and write permissions to the user, removing write permissions for the group and removing execute permissions from others.

According to organizational policies, we need to remove write permissions to 'others' for the file `project_k.txt`. The following screenshot shows this.

```
researcher2@08830840bdcf:~/projects$ ls -l
total 20
drwx------ 2 researcher2 research_team 4096 Jul  1 16:58 drafts
-rw-rw-rw- 1 researcher2 research_team   46 Jul  1 16:58 project_k.txt
-rw-r----- 1 researcher2 research_team   46 Jul  1 16:58 project_m.txt
-rw-rw-r-- 1 researcher2 research_team   46 Jul  1 16:58 project_r.txt
-rw-rw-r-- 1 researcher2 research_team   46 Jul  1 16:58 project_t.txt
researcher2@08830840bdcf:~/projects$ chmod o-w project_k.txt
researcher2@08830840bdcf:~/projects$ ls -l
total 20
drwx------ 2 researcher2 research_team 4096 Jul  1 16:58 drafts
-rw-rw-r-- 1 researcher2 research_team   46 Jul  1 16:58 project_k.txt
-rw-r----- 1 researcher2 research_team   46 Jul  1 16:58 project_m.txt
-rw-rw-r-- 1 researcher2 research_team   46 Jul  1 16:58 project_r.txt
-rw-rw-r-- 1 researcher2 research_team   46 Jul  1 16:58 project_t.txt
```

Change file permissions on a hidden file

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. Let us use a Linux command to assign `.project_x.txt` the appropriate authorization.

Current file permissions of .project_x.txt is :

```
-rw--w---- 1 researcher2 research_team   46 Jul  1 10:44 .project_x.txt
```

We need to remove write access from user and group categories and grant read access to group types. Following screenshot demonstrates this.

```
researcher2@9cbff36895e1:~/projects$ ls -la
total 32
drwxr-xr-x 3 researcher2 research_team 4096 Jul  1 10:44 .
drwxr-xr-x 3 researcher2 research_team 4096 Jul  1 11:14 ..
-rw--w---- 1 researcher2 research_team   46 Jul  1 10:44 .project_x.txt
drwx--x--- 2 researcher2 research_team 4096 Jul  1 10:44 drafts
-rw-rw-r-- 1 researcher2 research_team   46 Jul  1 10:44 project_k.txt
-rw-r----- 1 researcher2 research_team   46 Jul  1 10:44 project_m.txt
-rw-rw-r-- 1 researcher2 research_team   46 Jul  1 10:44 project_r.txt
-rw-rw-r-- 1 researcher2 research_team   46 Jul  1 10:44 project_t.txt
researcher2@9cbff36895e1:~/projects$ chmod u-w,g-w+r .project_x.txt
researcher2@9cbff36895e1:~/projects$ ls -la
total 32
drwxr-xr-x 3 researcher2 research_team 4096 Jul  1 10:44 .
drwxr-xr-x 3 researcher2 research_team 4096 Jul  1 11:14 ..
-r--r----- 1 researcher2 research_team   46 Jul  1 10:44 .project_x.txt
drwx--x--- 2 researcher2 research_team 4096 Jul  1 10:44 drafts
-rw-rw-r-- 1 researcher2 research_team   46 Jul  1 10:44 project_k.txt
-rw-r----- 1 researcher2 research_team   46 Jul  1 10:44 project_m.txt
-rw-rw-r-- 1 researcher2 research_team   46 Jul  1 10:44 project_r.txt
-rw-rw-r-- 1 researcher2 research_team   46 Jul  1 10:44 project_t.txt
researcher2@9cbff36895e1:~/projects$
```

Change directory permissions

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. We can use a Linux command to modify the permissions accordingly.

Current permission on the drafts directory is:

```
drwx--x--- 2 researcher2 research_team 4096 Jul  1 16:58 drafts
```

Using the `chmod` command, we can remove execute permissions to group type user by the following command:

```
researcher2@08830840bdcf:~/projects$ ls -la
total 32
drwxr-xr-x 3 researcher2 research_team 4096 Jul  1 16:58 .
drwxr-xr-x 3 researcher2 research_team 4096 Jul  1 17:33 ..
-rw--w---- 1 researcher2 research_team   46 Jul  1 16:58 .project_x.txt
drwx--x--- 2 researcher2 research_team 4096 Jul  1 16:58 drafts
-rw-rw-rw- 1 researcher2 research_team   46 Jul  1 16:58 project_k.txt
-rw-r----- 1 researcher2 research_team   46 Jul  1 16:58 project_m.txt
-rw-rw-r-- 1 researcher2 research_team   46 Jul  1 16:58 project_r.txt
-rw-rw-r-- 1 researcher2 research_team   46 Jul  1 16:58 project_t.txt
researcher2@08830840bdcf:~/projects$ chmod g-x drafts
researcher2@08830840bdcf:~/projects$ ls -la
total 32
drwxr-xr-x 3 researcher2 research_team 4096 Jul  1 16:58 .
drwxr-xr-x 3 researcher2 research_team 4096 Jul  1 17:33 ..
-rw--w---- 1 researcher2 research_team   46 Jul  1 16:58 .project_x.txt
drwx------ 2 researcher2 research_team 4096 Jul  1 16:58 drafts
-rw-rw-rw- 1 researcher2 research_team   46 Jul  1 16:58 project_k.txt
-rw-r----- 1 researcher2 research_team   46 Jul  1 16:58 project_m.txt
-rw-rw-r-- 1 researcher2 research_team   46 Jul  1 16:58 project_r.txt
-rw-rw-r-- 1 researcher2 research_team   46 Jul  1 16:58 project_t.txt
researcher2@08830840bdcf:~/projects$
```

Summary

In this mini project on changing file permissions in Linux, we successfully identified misconfigured file permissions based on organizational needs, altered file permissions accordingly and learned several important Linux commands.

Our tasks included checking file permissions, describe permission string, change file permissions, change hidden file permissions and change directory permissions.

Through this fun activity, I was able to implement authorizing Linux file permissions correctly.