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File permissions in Linux

Project description

To ensure security best practices within the organization, the research group conducted a files and directories permissions review, giving and removing permissions according to the requirements. To complete this task, I performed the following tasks:

Check file and directory details

The following screenshots demonstrate how I conducted the research and change permissions using linux commands:

```
researcher2@fef0f7b7aa41:~/projects$ ls -la
total 32
drwxr-xr-x 3 researcher2 research_team 4096 Jun 16 14:35 .
drwxr-xr-x 3 researcher2 research_team 4096 Jun 16 15:05 ..
-rw--w---- 1 researcher2 research_team   46 Jun 16 14:35 .project_x.txt
drwx--x--- 2 researcher2 research_team 4096 Jun 16 14:35 drafts
-rw-rw-rw- 1 researcher2 research_team   46 Jun 16 14:35 project_k.txt
-rw-r----- 1 researcher2 research_team   46 Jun 16 14:35 project_m.txt
-rw-rw-r-- 1 researcher2 research_team   46 Jun 16 14:35 project_r.txt
-rw-rw-r-- 1 researcher2 research_team   46 Jun 16 14:35 project_t.txt
researcher2@fef0f7b7aa41:~/projects$
```

The first line shows the command `ls -ls`, this command is used to show files, folder and hidden files. Using the command under projects directory, brought me the output:

- 4 `.txt` files
- 1 directory named `drafts`
- 1 hidden file named `.project_x.txt`

Describe the permissions string

The permissions string consists of 10 characters, which determine the type of the file, either a file, hidden file or directory, and the respective permissions.

- 1º character

Indicate if it is a file or directory. If it is a file a dash signal "-" is used to represent, and if it is directory the letter "`d`".

The last 9 character are divided in 3 groups to represent permissions as follow:

- `User`: represented by 2, 3 and 4º character
- `Group`: represented by 5, 6 and 7º
- `Others`: represented by 8, 9 and 10º

The permissions are based on:
`r` = read
`w` = write
`x` = executable

Always follow this order `rwe`

When the user doesn't have some permission the signal dash "-" will replace the letter of permission that they don't have.

For better understanding, let's break it down the `project_k.txt`permissions:
- rw- rw- rw-

`-` means the this is a `file` and not a directory
rw- means the `user` has permission to read, write but no execute the file
rw- means the `group` has permission to read, write but no execute the file
rw- means the `others` has permission to read, write but no execute the file

Change file permissions

The organization determined that the `others` should not have permission to `write` the file `project_k.txt`.
To change permissions the command `chmod` is required.
The commands `chmod` is followed by the group that you are changing the permission `(u, g` or `o)`, a math signal (`+` if you are adding permission or - if you are removing permission) and the letter of the permission (`r, w` and `e)` that you are either adding or removing permission, and the last is the name of the file/directory that you are modifying.

```
researcher2@fef0f7b7aa41:~/projects$ chmod o-w project_k.txt
researcher2@fef0f7b7aa41:~/projects$ ls -la
total 32
drwxr-xr-x 3 researcher2 research_team 4096 Jun 16 14:35 .
drwxr-xr-x 3 researcher2 research_team 4096 Jun 16 15:05 ..
-rw--w---- 1 researcher2 research_team   46 Jun 16 14:35 .project_x.txt
drwx--x--- 2 researcher2 research_team 4096 Jun 16 14:35 drafts
-rw-rw-r-- 1 researcher2 research_team   46 Jun 16 14:35 project_k.txt
-rw-r----- 1 researcher2 research_team   46 Jun 16 14:35 project_m.txt
-rw-rw-r-- 1 researcher2 research_team   46 Jun 16 14:35 project_r.txt
-rw-rw-r-- 1 researcher2 research_team   46 Jun 16 14:35 project_t.txt
researcher2@fef0f7b7aa41:~/projects$
```

To remove `write` permission for the `others`, the commands used was:
`chmod o-w project_k.txt`
`o-w` = means that we are removing the write permission of the others.

After this change the files permission will be:
- rw- rw- r--

`-` means the this is a `file` and not a directory
rw- means the `user` has permission to read, write but no execute the file
rw- means the `group` has permission to read, write but no execute the file
r-- means the `others` has only permission to read, but not write or execute the file

Change file permissions on a hidden file

The team required that the hidden file `.project_x.txt` has been archived and should not be written to by anyone, however the `user` and `group` should still be able to `read` this file.). The following code demonstrated how I used linux commands to change the permissions

```
researcher2@fef0f7b7aa41:~/projects$ chmod u-w,g-w,g+r .project_x.txt
researcher2@fef0f7b7aa41:~/projects$ ls -la
total 32
drwxr-xr-x 3 researcher2 research_team 4096 Jun 16 14:35 .
drwxr-xr-x 3 researcher2 research_team 4096 Jun 16 15:05 ..
-r--r----- 1 researcher2 research_team   46 Jun 16 14:35 .project_x.txt
drwx--x--- 2 researcher2 research_team 4096 Jun 16 14:35 drafts
-rw-rw-r-- 1 researcher2 research_team   46 Jun 16 14:35 project_k.txt
-rw------- 1 researcher2 research_team   46 Jun 16 14:35 project_m.txt
-rw-rw-r-- 1 researcher2 research_team   46 Jun 16 14:35 project_r.txt
-rw-rw-r-- 1 researcher2 research_team   46 Jun 16 14:35 project_t.txt
researcher2@fef0f7b7aa41:~/projects$
```

After this change the files permission will be:

`-` `r--` `r--` `---`

`-` means the this is a `file` and not a directory
`r--` means the `user` has only permission to read.
`r--` means the `group` has only permission to read.
`---` means the `others` have no permission.

Change directory permissions

The research team also requested that the user should be allowed to access the `drafts` directory and its contents.

```
researcher2@fef0f7b7aa41:~/projects$ chmod g-x drafts
researcher2@fef0f7b7aa41:~/projects$ ls -la
total 32
drwxr-xr-x 3 researcher2 research_team 4096 Jun 16 14:35 .
drwxr-xr-x 3 researcher2 research_team 4096 Jun 16 15:05 ..
-r--r----- 1 researcher2 research_team   46 Jun 16 14:35 .project_x.txt
drwx------ 2 researcher2 research_team 4096 Jun 16 14:35 drafts
-rw-rw-r-- 1 researcher2 research_team   46 Jun 16 14:35 project_k.txt
-rw------- 1 researcher2 research_team   46 Jun 16 14:35 project_m.txt
-rw-rw-r-- 1 researcher2 research_team   46 Jun 16 14:35 project_r.txt
-rw-rw-r-- 1 researcher2 research_team   46 Jun 16 14:35 project_t.txt
researcher2@fef0f7b7aa41:~/projects$
```

After this change the files permission will be:

`d` `rwx` `r--` `---`

`d` means the this is an `directory`
`rwx` means the `user` has permission to read, write and execute the directory.
`---` means the `group` has no permission.

`---` means the `others` have no permission.

Summary

I changed multiple permissions to match the level of authorization my organization wanted for files and directories in the `projects` directory. The first step in this was using `ls -la` to check the permissions for the directory, then using the `chmod` command multiple times to change the permissions on files and directories.