

# File permissions with Linux

## Project description

The research team at Bubble Inc needs to update the file permissions for certain files and directories within the `projects` directory. The amount and type of permission that should be granted is not yet reflected in the permissions. Their system will remain safe if these permissions are checked and updated. To complete this task, I performed the following tasks:

## Check file and directory details

The following code demonstrates how I used Linux commands to determine the existing permissions set for a specific directory in the file system:

```
researcher2@5d738f0f927b:~/projects$ ls -la
total 32
drwxr-xr-x 3 researcher2 research_team 4096 Dec  2 15:27 .
drwxr-xr-x 3 researcher2 research_team 4096 Dec  2 15:27 ..
-rw--w--- 1 researcher2 research_team  46 Dec  2 15:27 .project_x.txt
drwx--x--- 2 researcher2 research_team 4096 Dec  2 15:27 drafts
-rw-rw-rw- 1 researcher2 research_team  46 Dec  2 15:27 project_k.txt
-rw-r----- 1 researcher2 research_team  46 Dec  2 15:27 project_m.txt
-rw-rw-r-- 1 researcher2 research_team  46 Dec  2 15:27 project_r.txt
-rw-rw-r-- 1 researcher2 research_team  46 Dec  2 15:27 project_t.txt
researcher2@5d738f0f927b:~/projects$
```

The command I executed is shown on the first line of the screenshot, and the output is shown on the following lines. The code contains a list of every item in the `projects` directory. I provided a thorough listing of the file contents that included hidden files using the `ls` tool with the `-la` option. According to the outcomes of my command, there is one directory called `drafts`, one hidden file with the name `.project_x.txt`, and five other project files. The permissions assigned to each file or directory are represented by the 10-character string in the first column.

## Describe the permissions string

The 10-character string can be deconstructed to determine who is authorized to access the file and their specific permissions. The characters and what they represent are as follows:

- **1st character:** This character is either a `d` or hyphen (`-`) and indicates the file type. If it's a `d`, it's a directory. If it's a hyphen (`-`), it's a regular file.
- **2nd-4th characters:** These 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.
- **5th-7th characters:** These 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.
- **8th-10th characters:** These characters indicate the read (`r`), write (`w`), and execute (`x`) permissions for 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.

For example, the file permissions for `project_t.txt` are `-rw-rw-r--`. Since the first character is a hyphen (`-`), this indicates that `project_t.txt` is a file, not a directory. The second, fifth, and eighth characters are all `r`, which indicates that user, group, and other all have read permissions. The third and sixth characters are `w`, which indicates that only the user and group have write permissions. No one has execute permissions for `project_t.txt`.

## Change file permissions

Bubble Inc determined that others shouldn't have write access to any of their files. To comply with this, I referred to the file permissions that I previously returned. I determined `project_k.txt` must have the write access removed for other.

The following code demonstrates how I used Linux commands to do this:

```
researcher2@5d738f0f927b:~/projects$ chmod o-w project_k.txt
researcher2@5d738f0f927b:~/projects$ ls -la
total 32
drwxr-xr-x 3 researcher2 research_team 4096 Dec  2 15:27 .
drwxr-xr-x 3 researcher2 research_team 4096 Dec  2 15:27 ..
-rw--w--- 1 researcher2 research_team  46 Dec  2 15:27 .project_x.txt
drwx--x--- 2 researcher2 research_team 4096 Dec  2 15:27 drafts
-rw-rw-r-- 1 researcher2 research_team  46 Dec  2 15:27 project_k.txt
-rw-r----- 1 researcher2 research_team  46 Dec  2 15:27 project_m.txt
-rw-rw-r-- 1 researcher2 research_team  46 Dec  2 15:27 project_r.txt
-rw-rw-r-- 1 researcher2 research_team  46 Dec  2 15:27 project_t.txt
researcher2@5d738f0f927b:~/projects$
```

The first two lines of the screenshot display the commands I entered, and the other lines display the output of the second command. The `chmod` command changes the permissions on

files and directories. The first argument indicates what permissions should be changed, and the second argument specifies the file or directory. In this example, I removed write permissions from others for the `project_k.txt` file. After this, I used `ls -la` to review the updates I made.

## Change file permissions on a hidden file

The research team at Bubbles Inc recently archived `project_x.txt`. They do not want anyone to have write access to this project, but the user and group should have read access.

The following code demonstrates how I used Linux commands to change the permissions:

```
researcher2@3213bbc1d047:~/projects$ chmod u-w,g-w,g+r .project_x.txt
researcher2@3213bbc1d047:~/projects$ ls -la
total 32
drwxr-xr-x 3 researcher2 research_team 4096 Dec 20 15:36 .
drwxr-xr-x 3 researcher2 research_team 4096 Dec 20 15:36 ..
-r--r----- 1 researcher2 research_team  46 Dec 20 15:36 .project_x.txt
drwx--x--- 2 researcher2 research_team 4096 Dec 20 15:36 drafts
-rw-rw-rw- 1 researcher2 research_team  46 Dec 20 15:36 project_k.txt
-rw-r----- 1 researcher2 research_team  46 Dec 20 15:36 project_m.txt
-rw-rw-r-- 1 researcher2 research_team  46 Dec 20 15:36 project_r.txt
-rw-rw-r-- 1 researcher2 research_team  46 Dec 20 15:36 project_t.txt
researcher2@3213bbc1d047:~/projects$
```

The first two lines of the screenshot display the commands I entered, and the other lines display the output of the second command. I know `.project_x.txt` is a hidden file because it starts with a period (`.`). In this example, I removed write permissions from the user and group, and added read permissions to the group. I removed write permissions from the user with `u-w`. Then, I removed write permissions from the group with `g-w`, and added read permissions to the group with `g+r`.

## Change directory permissions

Bubble Inc only wants the `researcher2` user to have access to the `drafts` directory and its contents. This means that no one other than `researcher2` should have execute permissions.

The following code demonstrates how I used Linux commands to change the permissions:

```
researcher2@5d738f0f927b:~/projects$ chmod g-x drafts
researcher2@5d738f0f927b:~/projects$ ls -la
total 32
drwxr-xr-x 3 researcher2 research_team 4096 Dec  2 15:27 .
drwxr-xr-x 3 researcher2 research_team 4096 Dec  2 15:27 ..
-r--r----- 1 researcher2 research_team  46 Dec  2 15:27 .project_x.txt
drwx----- 2 researcher2 research_team 4096 Dec  2 15:27 drafts
-rw-rw-r-- 1 researcher2 research_team  46 Dec  2 15:27 project_k.txt
-rw-r----- 1 researcher2 research_team  46 Dec  2 15:27 project_m.txt
-rw-rw-r-- 1 researcher2 research_team  46 Dec  2 15:27 project_r.txt
-rw-rw-r-- 1 researcher2 research_team  46 Dec  2 15:27 project_t.txt
researcher2@5d738f0f927b:~/projects$
```

The first two lines of the screenshot display the commands I entered, and the other lines display the output of the second command. I previously determined that the group had execute permissions, so I used the `chmod` command to remove them. The `researcher2` user already had execute permissions, so they did not need to be added.

## Summary

In order to provide files and directories in the `projects` directory to the degree of authorisation that Bubble Inc desired, I altered a number of permissions. Using `ls -la` to examine the directory's permissions was the initial step in this process. My choices in the subsequent phases were influenced by this. Then, I repeatedly used the `chmod` command to alter the permissions of files and directories.