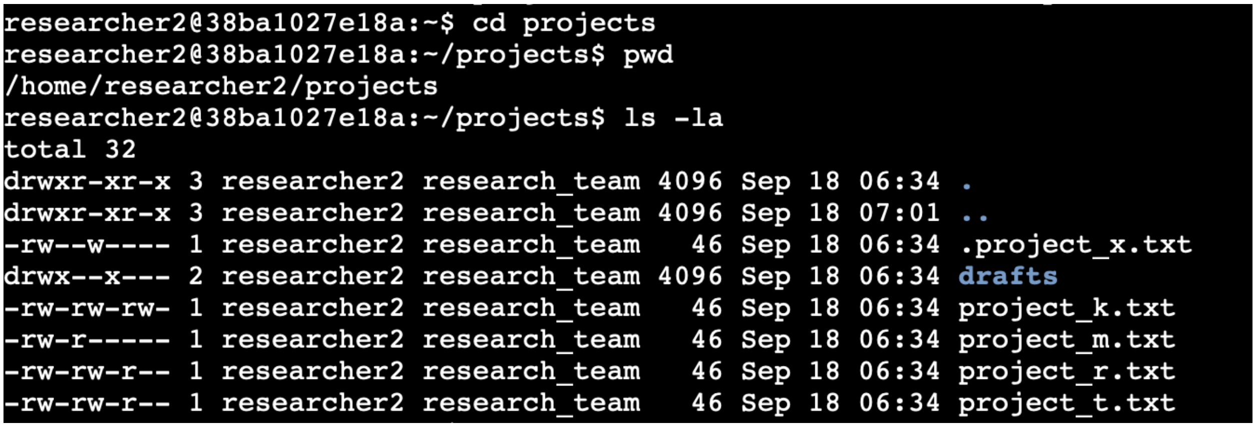
File permissions in Linux

Project description

In this project, I demonstrate my ability to manage file and directory permissions using Linux commands. The goal is to ensure that files and directories in a research team's workspace have the appropriate permissions based on authorization requirements. This includes checking current permissions, interpreting the permission string, and modifying access rights to align with security policies.

Managing file permissions is a critical skill in cybersecurity as it helps protect sensitive information from unauthorized access. Properly configured permissions ensure that only the right individuals or groups have access to files, reducing the risk of data breaches and insider threats. By managing permissions effectively, organizations can enforce least-privilege principles, which is a cornerstone of cybersecurity best practices.

Check file and directory details



```
researcher2@38ba1027e18a:~$ cd projects
researcher2@38ba1027e18a:~/projects$ pwd
/home/researcher2/projects
researcher2@38ba1027e18a:~/projects$ ls -la
total 32
drwxr-xr-x 3 researcher2 research_team 4096 Sep 18 06:34 .
drwxr-xr-x 3 researcher2 research_team 4096 Sep 18 07:01 ..
-rw--w---- 1 researcher2 research_team   46 Sep 18 06:34 .project_x.txt
drwx--x--- 2 researcher2 research_team 4096 Sep 18 06:34 drafts
-rw-rw-rw- 1 researcher2 research_team   46 Sep 18 06:34 project_k.txt
-rw-r----- 1 researcher2 research_team   46 Sep 18 06:34 project_m.txt
-rw-rw-r-- 1 researcher2 research_team   46 Sep 18 06:34 project_r.txt
-rw-rw-r-- 1 researcher2 research_team   46 Sep 18 06:34 project_t.txt
```

To check the permissions of files and subdirectories within the projects directory, we can use the command **ls -la.** This command lists all the files and directories in the specified location, including hidden files (those starting with a dot `.`). It also displays permissions, ownership, and other file attributes.

Describe the permissions string

Each file or directory has a 10-character string representing its permissions:

- The first character indicates the type (`-` for a file, `d` for a directory). (char 1)
- The next nine characters are divided into three sets of permissions:
  - **User (Owner)**: read (`r`), write (`w`), execute (`x`) (char 2-4)
  - **Group**: read (`r`), write (`w`), execute (`x`) (char 5-7)
  - **Other**: read (`r`), write (`w`), execute (`x`) (char 8-10)

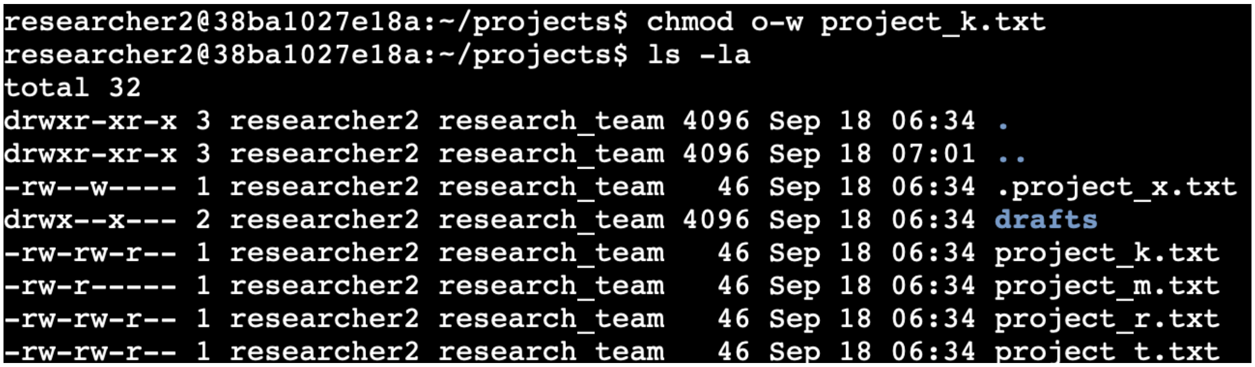
For example, the permission string `-rw-rw-r--` for `project_r.txt` means:

- The first character `-` indicates it is a regular file.
- `rw-` means the user has read and write permissions but not execute permissions.
- `rw-` means the group has read and write permissions but not execute permissions.
- `r--` means others have only read permission and not write or execute permissions.

Change file permissions

The organization does not allow other to have write access to any files. Based on the file permissions, we can see that the project_k.txt file has write permission for other.

To change file permissions, we can use the chmod command - **chmod o-w project_k.txt**:



```
researcher2@38ba1027e18a:~/projects$ chmod o-w project_k.txt
researcher2@38ba1027e18a:~/projects$ ls -la
total 32
drwxr-xr-x 3 researcher2 research_team 4096 Sep 18 06:34 .
drwxr-xr-x 3 researcher2 research_team 4096 Sep 18 07:01 ..
-rw--w---- 1 researcher2 research_team   46 Sep 18 06:34 .project_x.txt
drwx--x--- 2 researcher2 research_team 4096 Sep 18 06:34 drafts
-rw-rw-r-- 1 researcher2 research_team   46 Sep 18 06:34 project_k.txt
-rw-r----- 1 researcher2 research_team   46 Sep 18 06:34 project_m.txt
-rw-rw-r-- 1 researcher2 research_team   46 Sep 18 06:34 project_r.txt
-rw-rw-r-- 1 researcher2 research_team   46 Sep 18 06:34 project_t.txt
```

Command Explanation

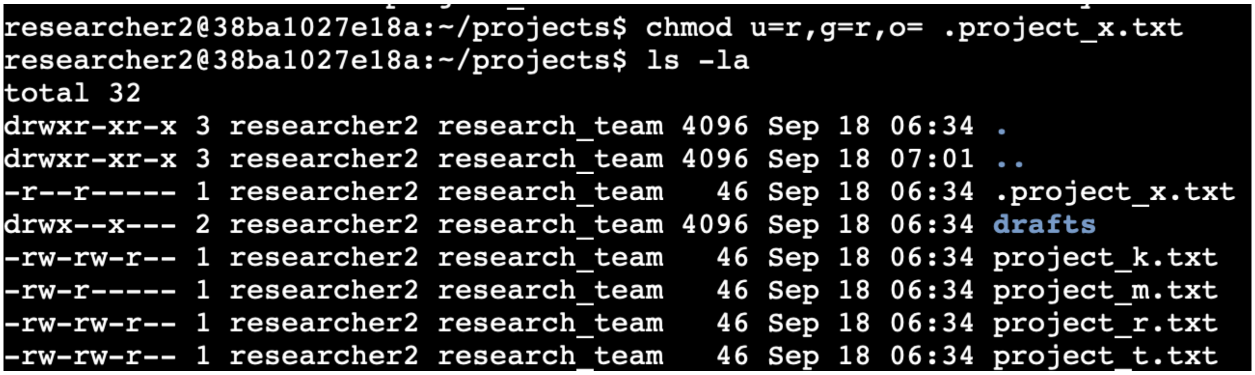
- `chmod`: The command used to change file permissions.
- `o`: Refers to "others."

- `-w`: Removes the write permission.

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.

To change permissions on the hidden file, we can use the ‘=’ sign with chmod as this assigns the permissions exactly as specified and overwrites the current permissions - **chmod u=r,g=r,o= .project_x.txt :**

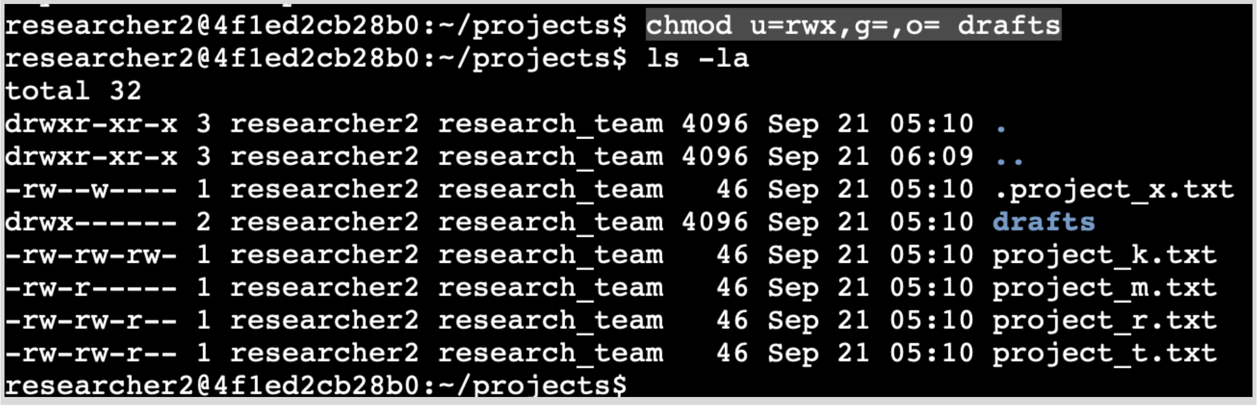


```
researcher2@38ba1027e18a:~/projects$ chmod u=r,g=r,o= .project_x.txt
researcher2@38ba1027e18a:~/projects$ ls -la
total 32
drwxr-xr-x 3 researcher2 research_team 4096 Sep 18 06:34 .
drwxr-xr-x 3 researcher2 research_team 4096 Sep 18 07:01 ..
-r--r----- 1 researcher2 research_team   46 Sep 18 06:34 .project_x.txt
drwx--x--- 2 researcher2 research_team 4096 Sep 18 06:34 drafts
-rw-rw-r-- 1 researcher2 research_team   46 Sep 18 06:34 project_k.txt
-rw-r----- 1 researcher2 research_team   46 Sep 18 06:34 project_m.txt
-rw-rw-r-- 1 researcher2 research_team   46 Sep 18 06:34 project_r.txt
-rw-rw-r-- 1 researcher2 research_team   46 Sep 18 06:34 project_t.txt
```

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.

Therefore, the user should have read, write and execute permissions and all permissions for group and others should be removed - **chmod u=rwx,g=,o= drafts**



```
researcher2@4f1ed2cb28b0:~/projects$ chmod u=rwx,g=,o= drafts
researcher2@4f1ed2cb28b0:~/projects$ ls -la
total 32
drwxr-xr-x 3 researcher2 research_team 4096 Sep 21 05:10 .
drwxr-xr-x 3 researcher2 research_team 4096 Sep 21 06:09 ..
-rw--w---- 1 researcher2 research_team   46 Sep 21 05:10 .project_x.txt
drwx------ 2 researcher2 research_team 4096 Sep 21 05:10 drafts
-rw-rw-rw- 1 researcher2 research_team   46 Sep 21 05:10 project_k.txt
-rw-r----- 1 researcher2 research_team   46 Sep 21 05:10 project_m.txt
-rw-rw-r-- 1 researcher2 research_team   46 Sep 21 05:10 project_r.txt
-rw-rw-r-- 1 researcher2 research_team   46 Sep 21 05:10 project_t.txt
researcher2@4f1ed2cb28b0:~/projects$
```

Summary

In this project, I demonstrated how to check and modify file and directory permissions using Linux commands. This ensures the appropriate authorization for each file and directory, enhancing the overall security of the system. I also showed how to manage permissions on hidden files and directories, which is crucial for maintaining secure work environments in Linux.