File permissions and ownership in Linux

- UNIX based operating systems have always been multi-user systems, meaning there is more than one user in the system.
- Users in linux have permissions that restrict access to privileges such as read and write to files and directories.
- By default, the user that creates the file or directory naturally becomes the owner of that file.

Listing permissions for files and directories

```Bash
$ ls -l
    -rwx--xr-- abdul_samad 61 Nov  9 12:42:33 hi.txt*
```

the `-l` flag stands for long, listing format

Understanding `-|rwx|rw-|r--`

- The first part, that is `-` OR `d` indicates the content is a file or a directory
- The second part is pemissions for the owner
- The third part is permissions for the group that the owner belongs to.
- The fourth and last part is the permissions of everyone else (public).

Changing ownership of a file (`chown`)

In order to change ownership of a file or a directory, you use a command called `chown` (change ownership).
Changing ownership of a file or a directory automatically gives permissions of read/write but not execute to the user.
Example:

```Bash
$ sudo chown boy hi.txt
```

Change ownership of file `hi.txt` to `boy`.

Setting permissions for groups, and other users using `chmod`.

`chmod` (change mode bits) is a command line utility that lets us set file permissions for different users as well as groups.

If we want to set permission like `rwx-rw-r--` we can do so by two methods:

- ***Absolute method*** (numerical method)
  Each read, write, and execute has a number value
  - `r` -> 4
  - `w` -> 2
  - `x` -> 1
  - no-permission -> 0

  If we want to set permission like `rwx-rw-r--` we can do so like,
  - 1st part -> r+w+x = 4 + 2 + 1 = *7*
  - 2st part -> r+w = 4 + 2 = *6*
  - 3st part -> r = 4 = *4*
    So, the final number becomes, *764*

  We use this number like,

```Bash
$ sudo chmod 764 hi.txt
$ ls -l
    -rwxrw-r-- abdul_samad 61   Nov  9 12:42:33 hi.txt*
```

- ***Symbolic method***

```Bash
$ sudo chmod u=rwx,g=rw,o=r hi.txt
```

This method is much easier to understand and doesn't require mathematical calculations