File Manipulation

Unix File Permissions
Unix is a multi-user system where the same resources can be shared by different users.

All permissions in Unix are based on restricting access to specific files and folders to specific users or user groups.
Access to a file has three levels:

Read permission – If authorized, the user can read the contents of the file.
Write permission – If authorized, the user can modify the file.
Execute permission – If authorized, the user can execute the file as a program.
Each file is associated with a set of identifiers that are used to determine who can access the file:

User ID (UID) – Specifies the user that owns the file. By default, this is the creator of the file.
Group ID (GID) – Specifies the user-group that the file belongs to.
Finally, there are three sets of access permissions associated with each file:

User permission – Specifies the level of access given to the user matching the file's UID.
Group permission – Specifies the level of access given to users in groups matching the file's GID.
Others permission – Specifies the level of access given to users without a matching UID or GID.
Together, this scheme of access controls makes the Unix system extremely secure while simultaneously providing the flexibility required of a multi-user system.

The ls -l command can be used to view the permissions associated with each of the files in the current folder.

Example output of this command is given below.

```
total of 24

drwxr-xr-x 7 user staff 224 Jun 21 15:26 .
drwxrwxrwx 8 user staff 576 Jun 21 15:02.
-rw-r--r-- 1 user staff 6 Jun 21 15:04 .hfile
drwxr-xr-x 3 user staff 96 Jun 21 15:17 dir1
drwxr-xr-x 2 user staff 64 Jun 21 15:04 dir2
-rw-r--r-- 1 user staff 39 Jun 21 15:37 file1
-rw-r--r-- 1 user staff 35 Jun 21 15:32 file2
```

In this output, the 'total 24' indicates the total number of blocks occupied by the listed files.
The remaining columns are:

flags – A collection of flags indicating the file mode and the file permissions.
links – The number of links associated with the file.
owner – The UID that owns the file.
group – The GIDs associated with the file.

size – The size of the file in bytes.
modified-date – The month, date, hour and minute of the last modification to the file.
name – The name of the file or directory.

#1) chmod: Change file access permissions.
Description: This command is used to change the file permissions. These permissions read, write and execute permission for owner, group, and others.
Syntax (symbolic mode): *chmod [ugoa][[+-=][mode]] file*
The first optional parameter indicates who – this can be (u)ser, (g)roup, (o)thers or (a)ll.

The second optional parameter indicates opcode – this can be for adding (+), removing (-) or assigning (=) a permission.

The third optional parameter indicates the mode – this can be (r)ead, (w)rite, or e(x)ecute.

Example: Add write permission for user, group and others for file1.
$ chmod ugo+w file1
Syntax (numeric mode): *chmod [mode] file*
The mode is a combination of three digits – the first digit indicates the permission for the user, the second digit for the group, and the third digit for others.

Each digit is computed by adding the associated permissions. Read permission is '4', write permission is '2' and execute permission is '1'.

Example: Give read/write/execute permission to the user, read/execute permission to the group, and execute permission to others.
$ chmod 751 file1
#2) chown: Change ownership of the file.

- **Description**: Only the owner of the file has the rights to change the file ownership.
- **Syntax**: chown [owner] [file]
- **Example**: Change the owner of file1 to user2 assuming it is currently owned by the current user
  - *$ chown user2 file1*

#3) chgrp: Change the group ownership of the file

- **Description**: Only the owner of the file has the rights to change the file ownership
- **Syntax**: chgrp [group] [file]
- **Example**: Change group of file1 to group2 assuming it is currently owned by the current user
  - *$ chgrp group2 file1*

Q1 – Explain the concept of File Permissions

Q2 – How you can change File Permissions