**The ls –l command and Permissions in Linux**

When the ls –l command is entered, a long listing (-l) of the directory is listed.

The output contains the following information:

* Type of file (This is the first character and specifies if the file is a directory, file, character device, or block device)
* Permissions (The next 9 characters in three groups of three. Discussed below)
* Links column – the number of links or shortcuts to the file
* Owner column – the ID of the person who owns the file.
* Group column – the name of the group
* Size in bytes
* Date and time the file was created or last edited
* Linux filename – can be a maximum of 256 characters long.

An example of the output is below:

uoas050@linux01:~> ls -l

total 12

drwxr-xr-x 2 uoas050 users 48 2008-10-20 11:30 bin

drwx------ 2 uoas050 users 80 2008-10-20 11:30 Documents

drwxr-xr-x 2 uoas050 users 48 2008-10-22 10:39 india

drwxr-xr-x 2 uoas050 users 96 2008-10-22 10:21 junkfiles

drwxr-xr-x 2 uoas050 users 80 2008-10-20 11:30 public\_html

-rwxr-x--- 1 uoas050 users 290 2008-10-22 20:09 test

-rwx------ 1 uoas050 users 95 2008-10-22 20:11 testfile

-rw-r--r-- 1 uoas050 users 158 2008-10-22 09:58 y

The first character is the type field. Possible values include:

d – file is a directory

- – file is a file

c – file is a character device

b – file is a block device.

**Permissions:**

After the first character for the type field, the next nine characters represent the permissions for the file. They are grouped into three groups of three:

1. The first three represent the owner’s permissions
2. The second set of three represent the permissions for the group, and
3. The last three represent the permissions for other users.

The characters used in defining permissions and what they mean are:

r – file can be read

w – file can be written to

x – file can be executed if a file. If a directory, x means that the ls command can be performed to see its contents.

- - permission is not granted.

Example:

-rwxr-x--- 1 uoas050 users 290 2008-10-22 20:09 test

-rwx------ 1 uoas050 users 95 2008-10-22 20:11 testfile

Notice the two file listed above.

The first character of “-“ indicates that they are both files.

The next three characters (rwx) represent the permissions for the owner. In both cases, the owner can read both files, write to the files, and execute the files.

The next three characters represent the permissions for the group. Examine the file named test. The characters are r-x indicating that members of the group named users can read and execute the file named test, but cannot write to the file named test. With --- as the characters on the file named test2, the members cannot read, write to, or execute the file named test2. The last three characters (---) indicate that the outside world cannot read, write to, or execute either of the files.

Changing Permissions:

The chmod command is used to change permissions of a file. Its format is:

chmod nnn filename

where each n represents a number from 0 to 7. The first n is the permission number for the owner, the second n is the permission number for the group, and the third n is the permission number for other users. The table below shows the permissions (read, write, and/or execute) and numbers to which they refer:

|  |  |
| --- | --- |
| **Permissions** | **Number** |
| --- (no permissions) | 0 |
| --x (execute only) | 1 |
| -w- (write only) | 2 |
| -wx | 3 |
| r-- | 4 |
| r-x | 5 |
| rw- | 6 |
| rwx | 7 |

If a file named program1 needed to have read, write and execute for the user owner, read and execute permissions for the group, and no permissions for all others, you would type:

chmod 750 program1