

Linux File Permissions

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1. Introduction

Every file or directory within Linux has a set of permissions that control who may read, write and execute the contents. Each of these permissions is represented by an abbreviation (r, w or x) and has an octal value (see table 1 below).

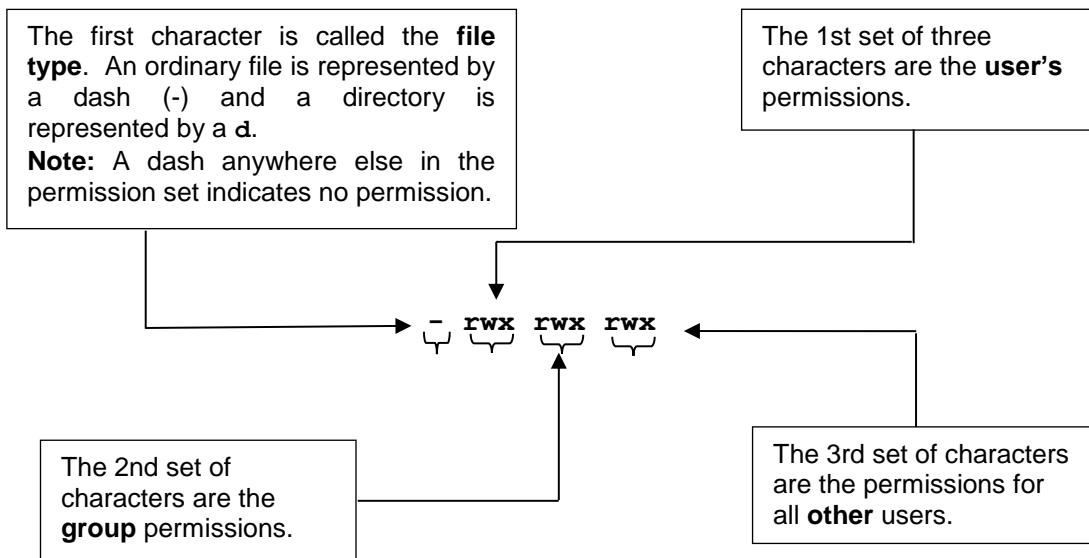
	Abbreviation	File	Directory	Octal Value
Read	r	The file can be viewed or copied.	The contents of the directory can be listed using the <code>ls</code> command.	4
Write	w	Allows the content of the file to be modified.	Files can be created or deleted within the directory.	2
Execute	x	The file can be executed (shell scripts or executables only).	Access to the directory is controlled.	1

Table 1

There are a set of read, write, and execute permissions for the user who owns the file, for everybody in the group he/she belongs to and for all other users.

Category	u (user)			g (group)			o (other)		
Permission	r	w	x	r	w	x	r	w	x
Value	4	2	1	4	2	1	4	2	1

These three categories and their permissions are displayed in Linux, as below:



The File permissions that are set depend on the type of file e.g. a text file has different permissions to a shell script because a text file doesn't need the executable permission but a shell script does.

Examples of different types of permissions on files and directories:

- `-rwx-----` This file is read/write/execute for the owner only.
- `dr-xr-x---` This directory is read/execute for the owner and the group.
- `-rwxr-xr-x` This file is read/write/execute for the owner, and read/execute for the group and others.

2. Deciding On Appropriate Permissions

You change file permissions by using the `chmod` command followed by the octal values that reflect the permissions you want to set. To decide on the permissions:

1. Work out what you want each category of user to be able to do and the appropriate octal value for this (see table 1).
2. Take these 3 octal values and put them together to form a set which will be the permissions for that file.

The example below shows that if we want a **user** to be able to read and write to a file but the **group** and **other** to only be able to read that file then the permissions for this file would need to be set to 644 (see table 2).

Category	u		g		o	
Permission	r	w	r		r	
Value	4	+ 2	4		4	
Total	6		4		4	

Table 2

3. Changing Permissions

1. Decide on the file or directory that you wish to change the permissions for.
2. Change into the directory where the file or directory is located.

```
e-gowing@milly [26] cd public_html
```

3. Set the permissions of that file/directory e.g:

```
e-gowing@milly [28] chmod 711 file1.sh
```

4. To check that the permissions have been set, list the files within the directory.

```
e-gowing@milly [29] ls -l
-rw-r--r-- 1 e-gowing cots 3167 Apr 16 12:09 index.html
-rw-r--r-- 1 e-gowing cots 0 May 1 10:19 file2.txt
-rw-r--r-- 1 e-gowing cots 4911 Apr 15 11:56 page.html
-rw-r--r-- 1 e-gowing cots 2906 Apr 16 15:14 work.html
-rwx--x--x 1 e-gowing cots 48 Apr 30 12:16 file1.sh
-rw-r--r-- 1 e-gowing cots 1264 Apr 17 15:54 hobs.html
```

Your file/directory permissions should now be changed.

4. Typical File Permissions

Octal Value	Permissions
644	rW-r--r--
711	rWX--X--X
754	rWXR-Xr--
755	rWXR-Xr-X

A shell script

A shell script or any other file that needs to be executable (e.g. a cgi file) should have a permission of 711.

```
e-gowing@milly [55] chmod 711 file1.sh
e-gowing@milly [56] ls -l
-rwx-x--x 1 e-gowing cots 178 Apr 24 11:03 file1.sh
```

Owner - read, write and execute.

Group - execute.

Other - execute.

A text file

A text file does not need to be executable; it therefore only needs 644 permissions. This allows you to edit and read the file but only allows others to read the file.

```
e-gowing@milly [57] chmod 644 file2.txt
```

```
e-gowing@milly [58] ls -l
```

```
-rw-r--r--  1 e-gowing  cots  178 Apr 24 11:03 file2.txt
```

Owner – read and write

Group – read

Other – read