File and Directory Permissions Explained

File and Directory Permissions Explained

Part II

This Lesson Continues in Part Two

What You Will Learn

- Symbolic permissions
- Numeric / octal permissions
- File versus directory permissions
- Changing permissions
- Working with groups
- File creation mask

Permissions

```
$ ls -l
-rw-rw-r-- 1 jason users 10400 Sep 27 08:52 sales.data
```

Symbol	Type
-	Regular file
d	Directory
l	Symbolic link

Permissions

```
$ ls -l
-rw-rw-r-- 1 jason users 10400 Sep 27 08:52 sales.data
```

Symbol	Permission
r	Read
w	Write
x	Execute

Permissions - Files vs Directories

Permission	File	Directory
Read (r)	Allows a file to be read.	Allows file names in the directory to be read.
Write (w)	Allows a file to modified.	Allows entries to be modified within the directory.
Execute (x)	Allows the execution of a file.	Allows access to contents and metadata for entries.

Permission Categories

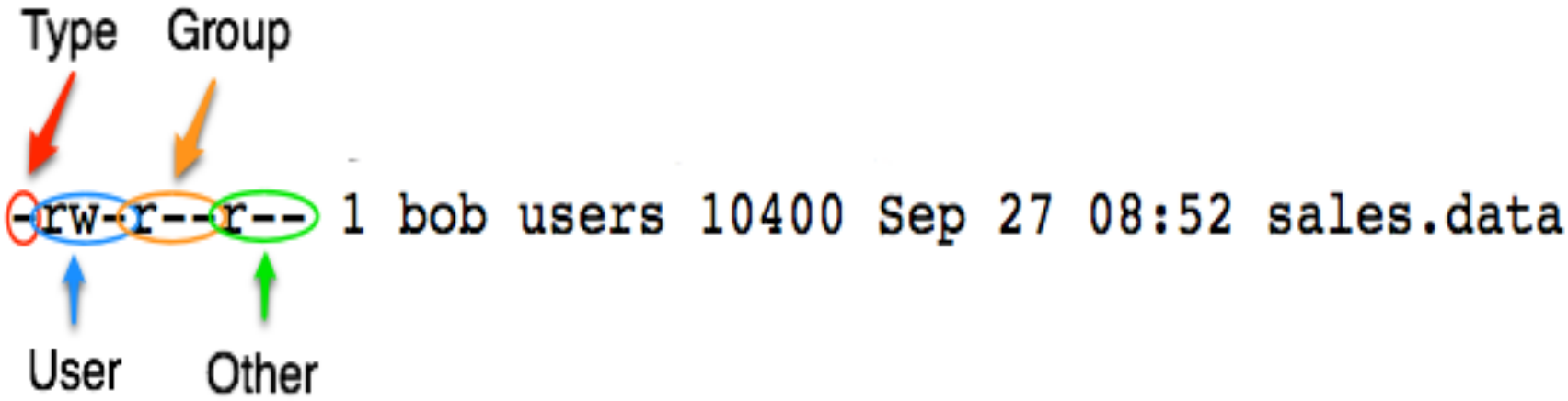
Symbol	Category
u	User
g	Group
o	Other
a	All

Groups

- Every user is in at least one group.
- Users can belong to many groups.
- Groups are used to organize users.
- The `groups` command displays a user's groups.
- You can also use `id -Gn`.

```
[jason@linuxsvr ~]$ groups
jason sales
[jason@linuxsvr ~]$ id -Gn
jason sales
[jason@linuxsvr ~]$ groups pat
pat : finance newyork
[jason@linuxsvr ~]$ groups adminuser
adminuser : adminuser
[jason@linuxsvr ~]$
```

Secret Decoder Ring



Changing Permissions

Item	Meaning
chmod	Change mode command
ugoa	User category user, group, other, all
+-=	Add, subtract, or set permissions
rwx	Read, Write, Execute

Demo - chmod

Numeric Based Permissions

r	w	x	
0	0	0	Value for off
1	1	1	Binary value for on
4	2	1	Base 10 value for on

Octal	Binary	String	Description
0	0	---	No permissions
1	1	--x	Execute only
2	10	-w-	Write only
3	11	-wx	Write and execute (2+1)
4	100	r--	Read only
5	101	r-x	Read and execute (4+1)
6	110	rw-	Read and write (4+2)
7	111	rwx	Read, write, and execute (4+2+1)

Order Has Meaning

	U	G	O
Symbolic	rwx	r-x	r--
Binary	111	101	100
Decimal	7	5	4

Commonly Used Permissions

Symbolic	Octal
`-rwx------`	700
`-rwxr-xr-x`	755
`-rw-rw-r--`	664
`-rw-rw----`	660
`-rw-r--r--`	644

Working with Groups

- New files belong to your primary group.
- The `chgrp` command changes the group.

Demo - chgrp

Directory Permissions Revisited

- Permissions on a directory can effect the files in the directory.
- If the file permissions look correct, start checking directory permissions.
- Work your way up to the root.

demo - dir perms.

File Creation Mask

- File creation mask determines default permissions.
- If no mask were used permissions would be:
  - 777 for directories
  - 666 for files

The `umask` Command

```
umask [-S] [mode]
```

- Sets the file creation mask to mode, if given.
- Use -S to for symbolic notation.

	Directory	File
Base Permission	777	666
Subtract Umask	-022	-022
Creations Permission	755	644

	Directory	File
Base Permission	777	666
Subtract Umask	-002	-002
Creations Permission	775	664

Octal Subtraction Is an Estimation

	Directory	File
Base Permission	777	666
Subtract Umask	-007	-007
Creations Permission	770	660 *

Common umask modes

- 022
- 002
- 077
- 007

Octal	Binary	Dir Perms	File Perms
0	0	rwx	rw-
1	1	rw-	rw-
2	10	r-x	r--
3	11	r--	r--
4	100	-wx	-w-
5	101	-w-	-w-
6	110	--x	---
7	111	---	---

Special Modes

- umask 0022 is the same as umask 022
- chmod 0644 is the same as chmod 644
- The special modes are:
  - setuid
  - setgid
  - sticky

demo - umask Examples

Summary

- Symbolic permissions
- Numeric / octal permissions
- File versus directory permissions
- Changing permissions
- Working with groups
- File creation mask