8.10.3 The umask Command Facts

This lesson covers the following topics:

- About umask
- Calculating umask
- umask commands

About umask

Each file on your system has a set of permissions associated with it which are used to protect files. For example, file permissions determine which users may access that file, and what type of access they have to the file, such as being able to read, write, and execute the file.

When a user creates a file or directory, it's created with a default set of permissions. In some cases the system defaults may be open or relaxed for the purpose in which the file or directory was created. For example, if a file has been given the default permissions of 666, then read/write permissions (rw-rw-rw-) have been granted to everyone. Similarly, a directory with the default permissions of 777 is granted the read/write/execute permissions (rwxrwxrwx) to everyone.

A new file's permissions may be restricted by applying a permissions "mask" called the umask.

Calculating umask

By default, files receive rw-rw-rw- (666) permissions and directories receive rwxrwxrwx (777) permissions when they are created. In most cases, the default assignment gives excess permissions to files and directories.

The umask value identifies which permissions are *removed* from the default permissions when files and directories are created. The following table shows what happens when the mask is set to a value of 022.

Umask Calculation	For Files (binary)	For Directories (binary)	For Files (letter abbreviation)	For Directories (letter abbreviation)
Default Permission	666	777	rw-rw-rw-	rwxrwxrwx
Umask (minus)	022	022	----w--w-	----w--w-
Result (equals)	644	755	rw-r--r--	rwxr-xr-x

Additional umask example calculations are described below:

- A umask of **066** results in file permissions of **rw-------- (600)** and directory permissions of **rwx--x--x (711)**.
- A umask of **033** results in file permissions of **rw-r--r-- (644)** and directory permissions of **rwxr--r-- (744)**.
- A umask of **011** results in no changes to file permissions (the **x** permission is already removed by default) and directory permissions of **rwxrw-rw- (766)**.

The umask can also be represented and changed using a symbolic (letter) representations of the mask.

Symbol	Definition
u	User (the owner of the file)
g	Group (any member of the file's defined group)
o	Other (anyone else)
a	All (equivalent to all of the above - u, g, and o)

The syntax for using symbolic representation is: **umask *symbolic_letter*[+ or -]*permission***. Example: **umask g-w** or **umask g+w**

Umask Calculation	Binary	Letters	Example
Default Permission	666	rw-rw-rw-	
Default umask	022	u=rwx,g=rx,o=rx	
Command: **umask g-w**	222	u=rx,g=rx,o=rx	

Result (equals)	644	r--r--r--

```
[admin@Centos mydir]$ umask
0022
[admin@Centos mydir]$ ls -l file1
-rw-r--r--. 1 admin anadmin 0 Mar 14 14:08 file1
[admin@Centos mydir]$ umask u-w
[admin@Centos mydir]$ touch file2
[admin@Centos mydir]$ umask
0222
[admin@Centos mydir]$ ls -l file2
-r--r--r--. 1 admin anadmin 0 Mar 14 14:09 file2
[admin@Centos mydir]$ umask -S
u=rx,g=rx,o=rx
[admin@Centos mydir]$
```

umask Commands

The table below lists the commands for managing umask:

Command	Description	Example
umask or **umask -S**	Displays the current umask setting. The **-S** switch indicates that a symbolic representation of a mask will be used.	**umask** The result would be something like: **022** or **0022** This is the typical default umask setting. **umask -S** The result would be something like: **u=rwx,g=rx,o=rx** This is the equivalent of 022.
umask *number*	Changes the default umask a number between 000 and 777.	Typing **umask 007** sets the umask to remove nothing from the user or group, but removes all permissions from other.
umask *symbol*	Changes the default umask a symbolic representation of a mask.	**umask g+w** Add the write permission to the group.

Be aware of the following:

- The default umask value may vary depending on the Linux distribution (022 or 0022 is the most common default).
- Setting the umask with the **umask** command is only persistent for the shell session.
- To make the umask persistent through shell sessions and reboots, add the **umask** command to the shell configuration file (depending on the distribution).