



Files and Links

Linux Essentials



TRAINING
CENTER



File types in Linux

Type	Prefix	Description
Ordinary files	-	Regular file, such as an ASCII text file, binary, image files
Directories	d	Files that store both ordinary and other special files and they are organized on the Linux file system in a hierarchy starting from the root (/) directory
Block files	b	Device files that provide a method of communication with system hardware components through the filesystem
Character special files	c	
Symbolic link files	l	A symbolic link files are files that point to other files, and they can either be directories or regular files.
Socket files	s	Files that provide a means of inter-process communication, but they can transfer data and information between process running on different environments.
Pipes	p	Files that allow inter-process communication by connecting the output of one process to the input of another.

File types in Linux

Ordinary file

Symbolic link

Directory

Block files

Character files

Socket files

```
[root@centos7 ~]# ls -l
total 40
-rw-r--r--  1 root root    0 Jul 30 10:35 best_file.txt
lrwxrwxrwx.  1 root root    7 Apr 13  2019 bin -> usr/bin
dr-xr-xr-x.  5 root root 4096 Jul 29 02:51 boot
drwxr-xr-x  20 root root 3240 Jul 29 02:50 dev
drwxr-xr-x. 157 root root 12288 Jul 30 06:26 etc
```

```
[root@centos7 ~]#
[root@centos7 ~]# ls -l /dev/sda1 | grep "^b"
brw-rw----  1 root disk 8, 1 Jul 29 02:50 /dev/sda1
[root@centos7 ~]#
```

```
[root@centos7 ~]#
[root@centos7 ~]# ls -l /dev/ | grep "^c"
crw-----  1 root  root   10, 235 Jul 29 02:50 autofs
crw-----  1 root  root   10, 234 Jul 29 02:50 btrfs-control
```

```
[root@centos7 ~]# ls -l /dev/ | grep "^s"
srw-rw-rw-  1 root  root      0 Jul 29 02:50 log
```

File extension

- A file extension is a suffix that is added to the end of the base name of a file after period.
- OS like Windows require the use of extensions in order to identify what apps are associated with file type
- Unlike Windows, **Linux** doesn't rely on file extension. Instead it determines the type of a file via a code in the file header.
- Linux has a useful utility called **file** is used to identify file type

```
[root@centos7 andrii_zinchenko]# file test.txt
test.txt: ASCII text
[root@centos7 andrii_zinchenko]# mv test.txt test.sh
[root@centos7 andrii_zinchenko]# file test.sh
test.sh: ASCII text
[root@centos7 andrii_zinchenko]# mv root.pem root
[root@centos7 andrii_zinchenko]# file root
root: PEM certificate
[root@centos7 andrii_zinchenko]#
```

Commands with files

- **ls** – list information about the files (the current directory by default)

Key	Description
-a	List of all files including hidden
-d	Display data about directory, but not its content
-h	Using with <code>-l</code> displays files size not in bytes
-l	Output in long format
-r	Displays result of listing in reverse order
-t	Sort results of listing by changed time

```
[root@centos7 opt]# ls
containerd  rh  v10.txt  VBoxGuestAdditions-6.0.10
[root@centos7 opt]#
```

```
[root@centos7 opt]# ls -lh
total 8.0K
drwx--x--x. 4 root root  28 Jun  4 2019 containerd
drwxr-xr-x. 2 root root   6 Oct 30 2018 rh
-rwxrwxrwx. 1 root root 4.8K Jul 24 2019 v10.txt
drwxr-xr-x. 9 root root 147 Jul 22 2019 VBoxGuestAdditions-6.0.10
```

```
[root@centos7 etc]# ls -ltr | tail -n 10
-rw-r--r-- 1 root root 1182 Jun 22 05:53 group
----- 1 root root 964 Jun 22 05:53 gshadow
-rw-r--r-- 1 root root 2644 Jun 22 05:53 passwd
----- 1 root root 1517 Jun 22 05:53 shadow
drwxr-xr-x 4 root root 37 Jun 22 08:29 nginx
drwxr-xr-x. 2 root root 257 Jun 22 08:29 logrotate.d
drwxr-xr-x. 2 root root 4096 Jul 22 02:45 bash_completion.d
-rw-r--r-- 1 root root 158 Jul 27 11:37 hosts
-rw-r--r-- 1 root root 99 Jul 30 06:26 resolv.conf
drwxr-xr-x. 5 root lp 4096 Jul 30 10:41 cups
[root@centos7 etc]#
```

Commands with files

- **cp** – copy files and directories

Command	Result
cp file1 file2	Copy existing file1 to a new file2
cp file1 /demo	Copy file1 to directory /demo , located in root directory
cp -R dir1 dir2	Copy directory dir1 to dir2 recursively.

```
[root@centos7 temp]# cp file1 file2
[root@centos7 temp]# ls -l
total 8
-rw-r--r-- 1 root root 1835 Jul 31 04:38 file1
-rw-r--r-- 1 root root 1835 Jul 31 04:38 file2
[root@centos7 temp]#
```

```
[root@centos7 temp]# cp file1 /demo
[root@centos7 temp]# ls -l /demo/
total 4
-rw-r--r-- 1 root root 1835 Jul 31 04:45 file1
[root@centos7 temp]#
```

```
[root@centos7 temp]# cp -R dir1 dir2
[root@centos7 temp]# ls -l dir2/
total 8
-rw-r--r-- 1 root root 20 Jul 31 04:49 myfile1.txt
-rw-r--r-- 1 root root 50 Jul 31 04:49 myfile2.txt
[root@centos7 temp]#
```

Commands with files

- **mv** – move and rename files

Command	Result
mv file1 file2	Rename file1 to a file2
mv /dir1 /dir2	Rename directory dir1 to dir2 . If directory dir2 exists and not empty, error message arise.
mv file1 /dir1	Move file1 to directory dir1 located in root directory

```
[root@centos7 demo]# ls -l
total 4
-rw-r--r-- 1 root root 1835 Jul 31 04:45 file1
[root@centos7 demo]# mv file1 file2
[root@centos7 demo]# ls -l
total 4
-rw-r--r-- 1 root root 1835 Jul 31 04:45 file2
[root@centos7 demo]#
```

```
[root@centos7 temp]# ls -l
total 8
drwxr-xr-x 2 root root  6 Jul 31 04:39 demo
drwxr-xr-x 2 root root 44 Jul 31 04:49 dir1
-rw-r--r-- 1 root root 1835 Jul 31 04:38 file1
-rw-r--r-- 1 root root 1835 Jul 31 04:38 file2
[root@centos7 temp]#
[root@centos7 temp]# mv dir1 dir2
[root@centos7 temp]# ls -l
total 8
drwxr-xr-x 2 root root  6 Jul 31 04:39 demo
drwxr-xr-x 2 root root 44 Jul 31 04:49 dir2
-rw-r--r-- 1 root root 1835 Jul 31 04:38 file1
-rw-r--r-- 1 root root 1835 Jul 31 04:38 file2
[root@centos7 temp]#
```

Commands with files

- **rm** – delete files and directories
- **rmdir** – delete empty directory

Command	Result
rm -f file1	Delete file1 , -f option doesn't ask about confirmation
rm -R dir1	Delete dir1 and its content.
rmdir dir1	Delete empty directory dir1

- **mkdir** – create directory

Command	Result
mkdir dir1	Create directory dir1

```
[root@centos7 temp]# ls -l
total 8
drwxr-xr-x 2 root root  6 Jul 31 04:39 demo
drwxr-xr-x 2 root root 44 Jul 31 04:49 dir2
-rw-r--r-- 1 root root 1835 Jul 31 04:38 file1
-rw-r--r-- 1 root root 1835 Jul 31 04:38 file2
[root@centos7 temp]# rm -f file1
[root@centos7 temp]# ls -l
total 4
drwxr-xr-x 2 root root  6 Jul 31 04:39 demo
drwxr-xr-x 2 root root 44 Jul 31 04:49 dir2
-rw-r--r-- 1 root root 1835 Jul 31 04:38 file2
[root@centos7 temp]#
```

```
[root@centos7 temp]# ls -l
total 4
drwxr-xr-x 2 root root  6 Jul 31 04:39 demo
drwxr-xr-x 2 root root  6 Jul 31 07:17 dir2
-rw-r--r-- 1 root root 1835 Jul 31 04:38 file2
[root@centos7 temp]# rmdir dir2
[root@centos7 temp]# ls -l
total 4
drwxr-xr-x 2 root root  6 Jul 31 04:39 demo
-rw-r--r-- 1 root root 1835 Jul 31 04:38 file2
[root@centos7 temp]#
```

```
[root@centos7 temp]# mkdir dir1
[root@centos7 temp]# ls -l
total 4
drwxr-xr-x 2 root root  6 Jul 31 04:39 demo
drwxr-xr-x 2 root root  6 Jul 31 07:20 dir1
-rw-r--r-- 1 root root 1835 Jul 31 04:38 file2
[root@centos7 temp]#
```


Commands with files

- **cat** – display content of file
- **touch** – create an ordinary file
- **less** – displays the contents of a file or a command output, one page at a time
- **tail** – print last 10 lines of a file.
- **head** – print first 10 lines of a file.

```
[root@centos7 temp]# head file2
This is a test file
Quince
Raspberries
Strawberries
Tangerine
Ugni
Voavanga
Watermelon
Xigua
Yangmei
[root@centos7 temp]#
```

```
[root@centos7 temp]# tail file2
Quince
Raspberries
Strawberries
Tangerine
Ugni
Voavanga
Watermelon
Xigua
Yangmei
Zuchinni
[root@centos7 temp]#
```

```
[root@centos7 temp]# cat file2
This is a test file
[root@centos7 temp]#
```

```
[root@centos7 dir1]# touch myfile.txt
[root@centos7 dir1]# ls -l
total 0
-rw-r--r-- 1 root root 0 Jul 31 07:25 myfile.txt
[root@centos7 dir1]#
```

Link types in Linux

Type	Command	Description
Hard Link	<code>ln SOURCE LINK</code>	Hard link is a file that points to the same underlying inode, as another file. With a hard links you can link only to files (and not directories); you cannot reference a file on a different disk or volume, and they reference the same inode as the original source. A hard link will continue to remain usable, even if the original file is removed
Soft Link	<code>ln -s SOURCE LINK</code>	Symbolic links can link to directories, reference a file/folder on a different disk or volume, will exist as a broken (unusable) link if the original location is deleted, reference abstract filenames and directories (as opposed to physical locations), and are given their own, unique inode.

Hard & Soft Links

```
[root@centos7 temp]# ln file2 f2
[root@centos7 temp]# ls -l
total 8
drwxr-xr-x 2 root root  6 Jul 31 04:39 demo
drwxr-xr-x 2 root root 24 Jul 31 07:25 dir1
-rw-r--r-- 2 root root 110 Jul 31 07:35 f2
-rw-r--r-- 2 root root 110 Jul 31 07:35 file2
[root@centos7 temp]#
```

Hard link – a new file
pointed to original

Original file
“file2”

```
[root@centos7 temp]# ln -s dir1/myfile.txt file
[root@centos7 temp]# ls -l
total 4
drwxr-xr-x 2 root root  6 Jul 31 04:39 demo
drwxr-xr-x 2 root root 24 Jul 31 07:25 dir1
lrwxrwxrwx 1 root root 15 Jul 31 09:13 file -> dir1/myfile.txt
-rw-r--r-- 1 root root 110 Jul 31 07:35 file2
[root@centos7 temp]#
```

Symbolic link –
reference to another
file

```
[root@centos7 temp]# cat file
Example of symbolic link
[root@centos7 temp]# cat dir1/myfile.txt
Example of symbolic link
[root@centos7 temp]#
```