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Get Started
Listing Files

Listing Files

The `ls` command is used to list the contents of a directory. You've already seen it used a few times before in examples, but this page will help ensure you are comfortable with its use.

```
ls [OPTIONS] [FILE]
```

By default, when the `ls` command is used with no options or arguments, it will list the files in the current directory:

```
sysadmin@localhost:~$ ls
Desktop   Documents   Downloads   Music   Pictures   Public   Templates
```

To learn the details about a file, such as the type of file, the permissions, ownerships or the timestamp, perform a long listing using the `-l` option to the `ls` command. Below, a listing of the `/var/log` directory is used as an example, since it provides a variety of output:

```
sysadmin@localhost:~$ ls -l /var/log/
total 844
-rw-r--r-- 1 root   root    18047 Dec 20  2017 alternatives.log
drwxr-x--- 2 root   adm      4096 Dec 20  2017 apache2
drwxr-xr-x 1 root   root     4096 Dec 20  2017 apt
-rw-r----- 1 syslog adm      1346 Oct  2 22:17 auth.log
-rw-r--r-- 1 root   root    47816 Dec  7  2017 bootstrap.log
-rw-rw---- 1 root   utmp        0 Dec  7  2017 btmp
-rw-r----- 1 syslog adm       547 Oct  2 22:17 cron.log
-rw-r----- 1 root   adm     85083 Dec 20  2017 dmesg
-rw-r--r-- 1 root   root   325238 Dec 20  2017 dpkg.log
-rw-r--r-- 1 root   root    32064 Dec 20  2017 faillog
drwxr-xr-x 2 root   root     4096 Dec  7  2017 fsck
-rw-r----- 1 syslog adm       106 Oct  2 19:57 kern.log
-rw-rw-r-- 1 root   utmp   292584 Oct  2 19:57 lastlog
-rw-r----- 1 syslog adm     19573 Oct  2 22:57 syslog
drwxr-xr-x 2 root   root     4096 Apr 11  2014 upstart
-rw-rw-r-- 1 root   utmp      384 Oct  2 19:57 wtmp
```

Each line corresponds to a file contained within the directory. The information can be broken down into fields separated by spaces. The fields are as follows:

File Type

```
- rw-r--r-- 1 root   root   18047 Dec 20  2017 alternatives.log

d rwxr-x--- 2 root   adm     4096 Dec 20  2017 apache2
```

The first field actually contains ten characters, where the first character indicates the type of file and the next nine specify permissions. The file types are:

Symbol	File Type	Description
d	directory	A file used to store other files.
–	regular file	Includes readable files, images files, binary files, and compressed files.
l	symbolic link	Points to another file.
s	socket	Allows for communication between processes.
p	pipe	Allows for communication between processes.
b	block file	Used to communicate with hardware.
c	character file	Used to communicate with hardware.

The first file `alternatives.log` is a regular file `-`, while the second file `apache2` is a directory `d`.

Permissions

```
d rwxr-xr-x  2 root    root    4096 Apr 11  2014 upstart
```

Permissions indicate how certain users can access a file. Keep reading to learn more about permissions.

Hard Link Count

```
-rw-r-----  1 syslog adm     1346 Oct   2 22:17 auth.log
```

This number indicates how many hard links point to this file. Hard links are beyond the scope of this module, but are covered in the NDG Linux Essentials course.

User Owner

```
-rw-r-----  1 syslog  adm      106 Oct   2 19:57 kern.log
```

User `syslog` owns this file. Every time a file is created, the ownership is automatically assigned to the user who created it.

Group Owner

```
-rw-rw-r--  1 root   utmp  292584 Oct   2 19:57 lastlog
```

Indicates which group owns this file

File Size

```
-rw-r-----  1 syslog adm    19573  Oct   2 22:57 syslog
```

> Directories and larger files may be shown in kilobytes since displaying their size in bytes would present a very large number. Therefore, in the case of a directory, it might actually be a multiple of the block size used for the file system. Block size is the size of a series of data stored in the filesystem.

Timestamp

```
drwxr-xr-x 2 root    root    4096 Dec  7  2017  fsck
```

This indicates the time that the file's contents were last modified.

Filename

```
-rw-r--r--  1 root    root   47816 Dec  7   2017  bootstrap.log
```

The final field contains the name of the file or directory.

> **Consider This**
>
> In the case of symbolic links, a file that points to another file, the link name will be displayed along with an arrow and the pathname of the original file.
>
> ```
> lrwxrwxrwx. 1 root root 22 Nov 6 2012 /etc/grub.conf -> ..
> ```
>
> Symbolic links are beyond the scope of this module, but are covered in the NDG Linux Essentials course.

Sorting

By default the output of the `ls` command is sorted alphabetically by filename. It can sort by other methods as well.

> **Follow Along**
>
> The options in examples below will be combined with the `-l` option so the relevant details of the files are displayed. Notice fields corresponding to the search option.

The `-t` option will sort the files by timestamp:

```
sysadmin@localhost:~$ ls -lt /var/log
total 844
-rw-r-----  1 syslog adm    19573 Oct   2 22:57 syslog
-rw-r-----  1 syslog adm     1346 Oct   2 22:17 auth.log
-rw-r-----  1 syslog adm      547 Oct   2 22:17 cron.log
-rw-rw-r--  1 root   utmp  292584 Oct   2 19:57 lastlog
-rw-rw-r--  1 root   utmp     384 Oct   2 19:57 wtmp
-rw-r-----  1 syslog adm      106 Oct   2 19:57 kern.log
-rw-r--r--  1 root   root   18047 Dec 20  2017 alternatives.log
-rw-r--r--  1 root   root   32064 Dec 20  2017 faillog
-rw-r-----  1 root   adm    85083 Dec 20  2017 dmesg
-rw-r--r--  1 root   root  325238 Dec 20  2017 dpkg.log
drwxr-x---  2 root   adm     4096 Dec 20  2017 apache2
drwxr-xr-x  1 root   root    4096 Dec 20  2017 apt
-rw-r--r--  1 root   root   47816 Dec  7  2017 bootstrap.log
drwxr-xr-x  2 root   root    4096 Dec  7  2017 fsck
```

```
-rw-rw---- 1 root    utmp       0 Dec  7  2017 btmp
drwxr-xr-x 2 root    root    4096 Apr 11  2014 upstart
```

The `-s` option will sort the files by file size:

```
sysadmin@localhost:~$ ls -l -S /var/log
total 844
-rw-r--r-- 1 root    root  325238 Dec 20  2017 dpkg.log
-rw-rw-r-- 1 root    utmp  292584 Oct  2 19:57 lastlog
-rw-r----- 1 root    adm    85083 Dec 20  2017 dmesg
-rw-r--r-- 1 root    root   47816 Dec  7  2017 bootstrap.log
-rw-r--r-- 1 root    root   32064 Dec 20  2017 faillog
-rw-r----- 1 syslog adm    19573 Oct  2 22:57 syslog
-rw-r--r-- 1 root    root   18047 Dec 20  2017 alternatives.log
drwxr-x--- 2 root    adm     4096 Dec 20  2017 apache2
drwxr-xr-x 1 root    root    4096 Dec 20  2017 apt
drwxr-xr-x 2 root    root    4096 Dec  7  2017 fsck
drwxr-xr-x 2 root    root    4096 Apr 11  2014 upstart
-rw-r----- 1 syslog adm     1346 Oct  2 22:17 auth.log
-rw-r----- 1 syslog adm      547 Oct  2 22:17 cron.log
-rw-rw-r-- 1 root    utmp     384 Oct  2 19:57 wtmp
-rw-r----- 1 syslog adm      106 Oct  2 19:57 kern.log
-rw-rw---- 1 root    utmp       0 Dec  7  2017 btmp
```

The `-r` option will reverse the order of any type of sort. Notice the difference when it is added to the previous example:

```
sysadmin@localhost:~$ ls -lSr /var/log
total 844
-rw-rw---- 1 root    utmp       0 Dec  7  2017 btmp
-rw-r----- 1 syslog adm      106 Oct  2 19:57 kern.log
-rw-rw-r-- 1 root    utmp     384 Oct  2 19:57 wtmp
-rw-r----- 1 syslog adm      654 Oct  2 23:17 cron.log
-rw-r----- 1 syslog adm     1669 Oct  2 23:17 auth.log
drwxr-xr-x 2 root    root    4096 Apr 11  2014 upstart
drwxr-xr-x 2 root    root    4096 Dec  7  2017 fsck
drwxr-xr-x 1 root    root    4096 Dec 20  2017 apt
drwxr-x--- 2 root    adm     4096 Dec 20  2017 apache2
-rw-r--r-- 1 root    root   18047 Dec 20  2017 alternatives.log
-rw-r----- 1 syslog adm    19680 Oct  2 23:17 syslog
-rw-r--r-- 1 root    root   32064 Dec 20  2017 faillog
-rw-r--r-- 1 root    root   47816 Dec  7  2017 bootstrap.log
-rw-r----- 1 root    adm    85083 Dec 20  2017 dmesg
-rw-rw-r-- 1 root    utmp  292584 Oct  2 19:57 lastlog
-rw-r--r-- 1 root    root  325238 Dec 20  2017 dpkg.log
```

The numbers in file size field switch from descending to ascending.

Used alone the `-r` option with list the files in reverse alphabetical order:

```
sysadmin@localhost:~$ ls -r /var/log
wtmp     lastlog  faillog  cron.log      auth.log  alternatives.
upstart  kern.log dpkg.log btmp          apt
syslog   fsck     dmesg    bootstrap.log apache2
```