COMP 2718: The File System: Part 2

By: Dr. Andrew Vardy

Adapted from the notes of Dr. Rod Byrne

Outline

- File System Navigation — Chapter 3 of TLCL
- Options and Arguments
- Long format: `ls -l`
- Determine a file's type with `file`
- Viewing File Contents with `less`

File System Navigation — Chapter 3 of TLCL

We'll now cover material from chapter 3 of the textbook. The following commands will be introduced:

- `file`: Determine file type
- `less`: View file contents

We will also discuss options and commands in general and spend more time with `ls`.

Options and Arguments

Most commands accept **options** (usually preceded by a '-') and **arguments**:

```
command -options arguments
```

The ls command lists information on all files or directories listed as arguments:

```
$ ls ~/work/config/ /usr/share/doc/bash/

/Users/av/work/config/:
arbot              dual_boot_mac_ubuntu

/usr/share/doc/bash/:
article.pdf bash.pdf    bashref.html    builtins.pdf
bash.html   bashbug.pdf bashref.pdf     rbash.pdf
```

Options are usually specified by a character preceded by a dash. Many commands also support **long options** which consist of a word preceded by two dashes.

`ls` accepts many options, the following are particularly useful:

Option	Long Option	Description
-a,	–all	all including hidden files (starting with .)
-d,	–directory	only name directories
-F		label directories with /
-h		used with -l to display human readable size
-l		long display
-S		sort by file size
-t		sort by time

Options can be combined. For example, to list all hidden files and sort by size you would use `ls -a -S`. Short options can be listed together—so the previous command can be abbreviated as `ls -aS`.

Long format: `ls -l`

When you want detailed information on a file's permissions, owner, time of modification, or similar then you should use `ls -l`.
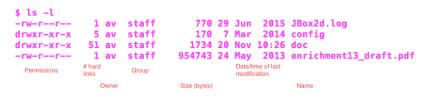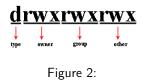
```
$ ls -l
-rw-r--r--    1 av   staff        770 29 Jun  2015 JBox2d.log
drwxr-xr-x    5 av   staff        170  7 Mar  2014 config
drwxr-xr-x   51 av   staff       1734 20 Nov 10:26 doc
-rw-r--r--    1 av   staff     954743 24 May  2013 enrichment13_draft.pdf
```

Permissions   # hard links   Group   Date/time of last modification

Owner   Size (bytes)   Name

Figure 1:

This is know as **long format**.

```
-rw-r--r-- 1  av   staff    770 29  Jun 2015  JBox2d.log
```

Consider the permission string `-rw-r--r--`:

- ► `r` means read permission
- ► `w` means write permission
- ► `x` means execute permission (or change directory permission)
- ► `-` means not allowed, except for the first char where it means that it is a file instead of a directory (`d` for directory)

The permission string is broken into sections:

Figure 2:

So `-rw-r--r--` means the user can read/write, while the group and others can only read.

Determine a file's type with `file`

An OS "sees" data files as a sequence of bytes. Users "see" files using programs that access the bytes and transform the bytes into pictures/sounds. Since the information encoded is very diverse, different programs are required to view different files types.

Sometimes the name of the file ends with a '.' and an extension which indicates the file type. For example `picture.jpg`. In the Unix world, this is not required—although it is still often helpful. To determine a file's type, run the following:

```
file FILENAME
```

where FILENAME is replaced by the file's name or pathname. The two main types of files are:

- ▶ text: sequence of characters from a character set
- ▶ binary: everything else

The `file` command normally uses well-known start sequences to identify the type.

Viewing File Contents with `less`

`less` is a viewer for text files. It is known in the Unix world as a **pager** which allows the viewing of long text documents page-by-page.

`less` accepts the following keyboard input:

Command	Action
Page Up or b	Scroll back one page
Page Down or space	Scroll forward one page
Up Arrow	Scroll up one line
Down Arrow	Scroll down one line
G	Move to the end of the text file
1G or g	Move to the beginning of the text file
/characters	Search forward to the next occurrence of characters
n	Search for the next occurrence of the previous search
h	Display help screen
q	Quit `less`

Figure 3: