03 - Manipulating Files and Using Git

CS 2043: Unix Tools and Scripting, Spring 2016 [1]

Stephen McDowell

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Cornell University

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- A note about HW1…

Working with Files

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- Access to files depends on the users' account
- All accounts are presided over by the Superuser, or `root` account
- Each user has absolute control over any files they own, which can only be superseded by `root`
- Files can also be owned by a `group`, allowing more users to have access

You can discern who owns a file many ways, the most immediate being `ls -l`

Permissions with `ls`

```
> ls -l Makefile
-rw-rw-r--. 1 sven users 4.9K Jan 31 04:42 Makefile
            sven       # the user
                  users # the group
```

The third column is the *user*, and the fourth column is the *group*.

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Directory permissions begin with a d instead of a -.

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- Group members are allowed to read the file, but cannot write to or execute
- Other cannot do *anything* with it

Change Mode

```
chmod <mode> <file>
```

- Changes file / directory permissions to `<mode>`
- The format of `<mode>` is a combination of three fields:
    - Who is affected - a combination of `u`, `g`, `o`, or `a` (all)
    - Whether adding or removing permissions; add with `+`, remove with `-`
    - Which permissions are being modified - any combination of `r`, `w`, `x`
- Or you can specify mode in octal: user, then group, then other
    - e.g. `777` means user=7, group=7, other=7

The octal version can be confusing, but will save you time.
Excellent resource in [2].

Changing Ownership

Changing the group

Change Group

```
chgrp group <file>
```
- Changes the group ownership of `<file>`

As the super user, you can change who owns a file

Change Ownership

```
chown user:group <file>
```
- Changes the ownership of `<file>`
- `group` is optional
- the `-R` flag is useful for recursively modifying everything in a directory

If you are like me, you often forget which column is which in `ls -l`…

Status of a file or filesystem

`stat [opts] <filename>`

- Gives you a wealth of information, generally more than you will need
- `Uid` is the user, `Gid` is the group
- Can be useful if you want to mimic file permissions you don't know
    - `--format=%A`: human readable, e.g. `-rw-rw-r--`
    - `--format=%a`: octal (great for `chmod`), e.g. `664`

Convenience flag for chmod and chmod on non-BSD Unix

```
> chmod --reference=<src> <dest>
```

It will set the permissions of dest to the permissions of src!
Mac users: sorry :/

The stat on BSD: the --format does not exist, it is just -f.
The options seem to be the same, but read the man page.

The `stat` command performs a little differently on OSX by default. For example, on the `Makefile` it produces this giant wall (on one line, continued for presentation purposes):

```
> stat Makefile
> 16777218 6517959 -rw-r--r-- 1 sven staff 0 4945
    "Feb  1 11:48:14 2016" "Jan 31 07:02:42 2016"
    "Jan 31 08:28:22 2016" "Jan 31 07:02:42 2016"
    4096 16 0 Makefile
```

To get more useful output for the intended purpose of `stat` in how I am presenting it, you need to do `stat -x Makefile`. This will print out the `Uid` and `Gid` for you.

Types of Files and Usages

Plain text files are human-readable, and are usually used for things like

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- Documentation
- Application settings
- Source code
- Logs
- Anything you may want to read via the terminal (e.g. README.txt)

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- Executables
- Libraries
- Media files
- Archives (.zip, etc)

Print a file to the screen

`cat <filename>`

- Prints the contents of the file to the terminal window

`cat <file1> <file2>`

- Prints `file1` first, then `file2`.

more

`more <filename>`

- Scroll through one page at a time

less

`less <filename>`

- Scroll by pages or lines (mouse wheel, space bar, and arrows)

Long files can be a pain with the previous tools.

Head and Tail

```
head -[numlines] <filename>
tail -[numlines] <filename>
```

- Prints the first / last numlines of the file
- Default is 10 lines

You can talk to yourself in the terminal too!

Echo

```
echo <text>
```

- Prints the input string to the standard output (the terminal)
- We will soon learn how to use `echo` to put things into files, append to files, etc

Let's Git Started

Another Brief Git Demo

If you are not at lecture, don't worry about this slide not making any sense.

```
> git clone <url>
> git status
> git add <file(s)>
> git commit
> git push
```

Demo Time!

Instructions are here:

https://github.com/cs2043-sp16/lecture-demos/tree/master/lec03

[1] B. Abrahao, H. Abu-Libdeh, N. Savva, D. Slater, and others over the years.
Previous cornell cs 2043 course slides.

[2] C. Hope.
Linux and unix chmod command help and examples.
http://www.computerhope.com/unix/uchmod.htm,
2016.