04 - More Files, Chaining Commands, and your First(?) Git Repository

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

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February 3rd, 2016

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Some Logistics

- Last day to add is today.

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- (Poll) The demo last time.

Recap on Permissions

The Octal Version of **chmod**

Last time I linked you to this[2] website for a good explanation. For the formula hungry, you can represent **r**, **w**, and **x** as binary variables (where 0 is off, and 1 is on). Then the formula for the modes is

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Examples

- `chmod 755`: `rwxr-xr-x`
- `chmod 777`: `rwxrwxrwx`
- `chmod 600`: `rw-------`

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- `chmod 777`: `rwxrwxrwx`
- `chmod 600`: `rw-------`

If that makes less sense to you, feel free to ignore it.

Super Confused...

Superuser Do

`sudo <command>`

- Execute **<command>** as the super user.
- The regular user (e.g. **student**) is executing the **sudo** command, *not* the **root**.
- You enter *your* user password.
- You can only execute **sudo** if you are an "administrator"*.

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*Note that where you look to see who can execute **sudo** varies greatly between distributions.

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- The commands `sudo su root` and `sudo su` are equivalent:
  - Since you typed `sudo` first, that is why you type the user password.

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If you know the `root` password, then you can become `root` using `su` directly.

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- Switches to user `user_name`.
- The password you enter is the password for `user_name`.
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- The commands `sudo su root` and `sudo su` are equivalent:
  - Since you typed `sudo` first, that is why you type the user password.
- If you just execute `su` directly, then you have to type the `root` password.

Default Permissions

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User mask

`umask <mode>`

- Remove `mode` from the file's permissions.
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  - `umask 077`: full access to the user, no access to anybody else.
  - `umask g+w`: enables group write permissions.
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- If this has meaning, it is just a bit mask with `0o777`.

File Compression

Making Archives: Zip

Zip

`zip <name_of_archive> <files_to_include>`

- Note I said *files*.
  - E.g. `zip files.zip a.txt b.txt c.txt`
  - These will extract to `a.txt`, `b.txt`, and `c.txt` in the current directory.
- To do folders, you need recursion.
  - `zip -r folder.zip my_files/`
  - This will extract to a folder named `my_files`, with whatever was inside of it in tact.

Unzip

`unzip <archive_name>`

Note: The original files DO stay in tact.

Making Archives: Gzip

Gzip

```
gzip <files_to_compress>
```

- Less time to compress, larger file: `--fast`
- More time to compress, smaller file: `--best`
- Read the `man` page, lots of options.

Gunzip

```
gunzip <archive_name>
```

Notes:

- By default, *replaces* the original files!
  - You can use `--keep` to bypass this.
- Does not bundle the files.
- Usually has better compression than `zip`.

Making Archives: Tar

Tape Archive

```
tar -cf <tar_archive_name> <files_to_compress>
```

- Create a tar archive.

```
tar -xf <tar_archive_name>
```

- Extract all files from archive.

Notes:

- `tar` is just a bundling suite, creating a single file.
- By default, it does *not* compress.
- Original files DO stay in tact.
- Unlike `zip`, you do not need the `-r` flag for folders :)

Making Archives: Tarballs

Making tarballs

```
tar -c(z/j)f <archive_name> <source_files>
tar -x(z/j)f <archive_name>
```

- `(z/j)` here means *either* `z` *or* `j`, not both.
- The `-z` flag specifies `gzip` as the compression method.
- YOU have to specify the file extension.
  - Extension convention: `.tar.gz`
  - Example: `tar -cjf files.tar.gz files/`
- The `-j` flag specifies `bzip2` as the compression method.
  - Extension convention: `.tar.bz2`
  - Example: `tar -cjf files.tar.bz2 files/`

Note:

- Extraction can *usually* happen automatically:
  - `tar -xf files.tar.gz` will usually work (no `-z`)

Assorted Commands

Before we can Chain...

...we need some more interesting tools to chain together!

Counting

Word Count

`wc [options] <file>`

- `-l`: count the number of lines.
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- showing people how cool you are.

Sorting

Sort

`sort [options] <file>`

- Default: sort by the `ASCII` code (roughly alphabetical) for the whole line.
- Use `-r` to reverse the order.
- Use `-n` to sort by numerical order.
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```
>>> cat peeps.txt
Manson, Charles
Bundy, Ted
Bundy, Jed
Nevs, Sven
Nevs, Sven
```

```
>>> sort -r peeps.txt
Nevs, Sven
Nevs, Sven
Manson, Charles
Bundy, Ted
Bundy, Jed
```

```
>>> sort -ru peeps.txt
Nevs, Sven
Manson, Charles
Bundy, Ted
Bundy, Jed
# only 1 Nevs, Sven
```

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>>> cat numbers.txt
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```

Special Snowflakes

Unique

`uniq [options] <file>`

- No flags: discards all but one of successive identical lines.
- Use `-c` to prints the number of successive identical lines next to each line.

Search and Replace

Translate

`tr [options] <set1> [set2]`

- Translate or delete characters.
- Sets are strings of characters.
- By default, searches for strings matching `set1` and replaces them with `set2`.
- You can use POSIX and custom-defined *sets* (we'll get there soon!).

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- The `tr` command only works with streams.
- Examples to come after we learn about chaining commands in the next section.

Chaining Commands

Your Environment and Variables

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>>> echo $OLDPWD # print previous working directory
>>> printenv     # print all environment variables
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- When you execute commands, they have something called an ”exit code”.
- The exit code of the last command executed is stored in the $? environment variable.

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  - `set`: displays all shell / local variables.
  - `unset <name>`: remove a shell variable.
- We'll cover these a little more when we talk about customizing your terminal shell.

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bash: super_awesome_command: command not found...
>>> echo $?
127
>>> echo "What is the exit code we want?"
>>> echo $?
0
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  - The success code we want is actually `0`. Refer to [3] for some more examples.

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  - The success code we want is actually `0`. Refer to [3] for some more examples.
  - Remember that `cat /dev/urandom` trickery? You will have to `ctrl+c` to kill it, what would the exit code be?

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>>> cmd1 || cmd2 # exec cmd2 only if cmd1 returned NOT 0
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>>> cmd1 && cmd2 # exec cmd2 only if cmd1 returned 0
>>> cmd1 || cmd2 # exec cmd2 only if cmd1 returned NOT 0
```

- Kind of backwards, in terms of what means continue for *and*, but that was likely easier to implement since there is only one `0` and many not `0`'s.

Piping Commands

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Piping

`<command1> | <command2>`

- Passes the output from `command1` to be the input of `command2`.
- Works for *heaps* of programs that take input and provide output to the terminal.

Some Piping Examples

Piping along...

```
>>> ls -al /bin | less
```

- Allows you to scroll through the long list of programs in `/bin`

```
>>> history | tail -20 | head -10
```

- Displays the 10^{th} - 19^{th} previous commands from the previous session.

```
>>> echo * | tr ' ' '\n'
```

- Replaces all spaces characters with new lines.
- Execute just `echo *` to see the difference.

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  - ...or ignoring them (you will often see that sent to `/dev/null`).

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- Piping and Redirection are quite sophisticated, please refer to the Wikipedia page in [4].

More Git: Forking a Repository

In class demo...

https://github.com/cs2043-sp16/lecture-demos/tree/master/lec04

References I

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