05 - More Files, Chaining Commands, Piping and Redirection

CS 2043: Unix Tools and Scripting, Spring 2017 [1]

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Cornell University

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- Assignments and release dates.

Recap on Permissions

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

Super Confused...

- Elevate your workflow:

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- 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.

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- You can only execute `sudo` if you are an "administrator"*.

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- On the course VMs the `student` user originally had the password `student`, so that is what you would type if you were executing `sudo`.

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- 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"*.

- On the course VMs the `student` user originally had the password `student`, so that is what you would type if you were executing `sudo`.
- On your personal Mac (or native Linux install), you would be typing whatever your password is to login to the computer.

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- The commands `sudo su root` and `sudo su` are equivalent:
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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

- When you create files during a particular session, the mode you are running in determines what the permissions will be.

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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>
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Notes:

- By default, *replaces* the original files!

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- Does not bundle the files.

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- By default, *replaces* the original files!
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- Does not bundle the files.
- Usually has better compression than `zip`.

Making Archives: Tar

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- By default, it does *not* compress.
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- Unlike `zip`, you do not need the `-r` flag for folders :)

Making Archives: Tarballs

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  - Example: `tar -cjf files.tar.gz files/`

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  - Extension convention: `.tar.bz2`

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- It's the flag equivalent of the `tab` key.
  - Ok, maybe not...but just remember it!
  - This serves as a not-so-subtle reminder to obsessively hit your `tab` key ;)

Assorted Commands

Before we can Chain...

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

Counting

- Ever wanted to show off how cool you are?

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Word Count

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wc [options] <file>
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  - Showing people how cool you are.
  - Completing homework assignments?

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- Use `-r` to reverse the order.

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- Use `-n` to sort by numerical order.

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```
$ cat peeps.txt
Manson, Charles
Bundy, Ted
Bundy, Jed
Nevs, Sven
Nevs, Sven
```

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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
```

Sorting

- You don't even need to use your brain to sort things anymore!

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.
- Use `-u` to remove duplicates.

```
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Bundy, Ted
Bundy, Jed
Nevs, Sven
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```

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

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

Advanced Sorting

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$ cat numbers.txt
02,there
04,how
01,hi
06,you
03,bob
05,are
```

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```

```
$ sort -n -k 2 -t "," numbers.txt
01,hi
02,there
03,bob
04,how
05,are
06,you
```

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.

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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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$ echo $OLDPWD # print previous working directory
$ printenv     # print all environment variables
```

- 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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- 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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bash: super_awesome_command: command not found...
$ echo $?
127
$ echo "What is the exit code we want?"
$ echo $?
0
```

  - 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.

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Piping

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<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].

References I

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