# 05 - More Files, Chaining Commands, Piping and Redirection

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

Stephen McDowell February 3rd, 2017

Cornell University

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- Assignments and release dates.

# Recap on Permissions

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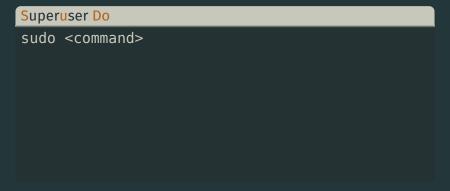
chmod 777: rwxrwxrwx

chmod 600: rw-----

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

Elevate your workflow

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#### Superuser Do

#### sudo <command>

Execute <command> as the super user

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- Execute **<command>** as the super user.
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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.

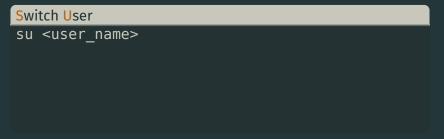
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#### Superuser Do

- Execute **<command>** as the super user.
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- 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 b
   typing whatever your password is to login to the computer.

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

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# Switch User su <user\_name>

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- Switches to user user\_name.
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 If you know the root password, then you can become root using su directly.

#### Switch User

- Switches to user **user\_name**.
- The password you enter is the password for **user\_name**.
- If no username is specified, **root** is implied.
- The commands **sudo su root** and **sudo su** are equivalent:
  - Since you typed sudo first, that is why you type the user password.

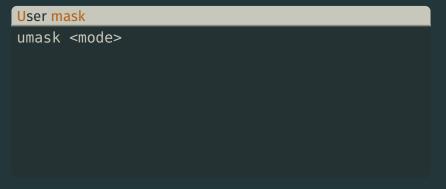
 If you know the root password, then you can become root using su directly.

#### Switch User

- Switches to user user\_name.
- The password you enter is the password for user\_name.
- If no username is specified, **root** is implied.
- 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.

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- umask -S: display the current mask.
- Changing the **umask** only applies for the remainder of the session (e.g. until you close the terminal window you were writing this in).
- If this has meaning, it is just a bit mask with 0o777.

File Compression

### 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.

### 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!

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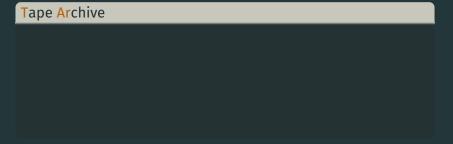
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#### Notes:

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

Bundling files together to compress is easy!

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## **Tape Archive**

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tar -cf <tar_archive_name> <files_to_compress>
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### **Tape Archive**

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- Create a tar archive.

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tar -xf <tar_archive_name>
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- Extract all files from archive.

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- Original files DO stay in tact.
- Unlike zip, you do not need the -r flag for folders:)

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```
tar -c(z/j)f <archive_name> <source_files>
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### Making tarballs

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tar -c(z/j)f <archive_name> <source_files>
tar -x(z/j)f <archive_name>
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- (z/j) here means either z or j, not both.

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tar -c(z/j)f <archive_name> <source_files>
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- (z/j) here means either z or j, not both.
- The -z flag specifies gzip as the compression method.

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- YOU have to specify the file extension.
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  - Extension convention: .tar.bz2

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# Pro Tip: Minimize your Keystrokes

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  - tar -xf files.tar.gz will usually work (no -z)
- 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!

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# Word Count wc [options] <file>

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#### **Word Count**

wc [options] <file>

-1: count the number of lines.

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#### **Word Count**

- -l: count the number of lines.
- -w: count the number of words.

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- -m: count the number of characters.

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#### **Word Count**

- -l: count the number of lines.
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  - Reveling in the number of lines you have programmed.

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  - Showing people how cool you are.

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  - Showing people how cool you are.
  - Completing homework assignments?

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

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```
sort
sort [options] <file>
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#### Sort

### sort [options] <file>

- Default: sort by the **ASCII** code (roughly alphabetical) for the whole line.

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- Use r to reverse the order.
- Use **-n** to sort by numerical order.

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- Use -u to remove duplicates.

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

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

```
$ sort -n -k 2 -t "," <filename>
```

• The **sort** command is quite powerful, for example you can do:

```
$ sort -n -k 2 -t "," <filename>
```

 Sorts the file numerically by using the second column, separating by a comma as the delimiter instead of a space.

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

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```
$ cat numbers.txt $ sort -n -k 2 -t "," numbers.txt 02, there 01, hi 04, how 02, there 01, hi 03, bob 06, you 04, how 03, bob 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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# Translate tr [options] <set1> [set2]

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#### **Translate**

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

- Translate or delete characters.

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

- Translate or delete characters.
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#### **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.

# Search and Replace

 Translate characters and sets (but not regular expressions) easily!

#### **Translate**

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

- Translate or delete characters.
- Sets are strings of characters.
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## Search and Replace

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- Examples to come after we learn about chaining commands in the next section.

Chaining Commands

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$ echo $OLDPWD # print previous working directory
$ printenv  # print all environment variables
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- 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 $?
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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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• Execute conditioned upon exit code:

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$ cmd1 && cmd2 # exec cmd2 only if cmd1 returned 0
$ cmd1 || cmd2 # exec cmd2 only if cmd1 returned NOT 0
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 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

### <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<sup>th</sup> 19<sup>th</sup> 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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    - Useful for debugging / catching error messages...
    - ...or ignoring them (you will often see that sent to /dev/null).

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tr -cd '0-9' < test1.txt > test2.txt
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- Deletes everything but the numbers from test1.txt, then store them in test2.txt.
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  - Example: tr -cd '0-9' < original.txt > original.txt
  - You will lose all your data, you cannot read and write this way.
- Piping and Redirection are quite sophisticated, please refer to the Wikipedia page in [4].

#### References I

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