CSE 390a
Lecture 3

bash shell continued:
processes; multi-user systems; remote login; editors

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Lecture summary

- A bit more on combining commands
- Processes and basic process management
- Connecting to remote servers (`attu`)
  - multi-user environments
- Text editors

Review: Redirection and Pipes

- ***command*** **>** ***filename***
  - Write the output of ***command*** to ***filename*** (>> to append instead)
- ***command*** **<** ***filename***
  - Use ***filename*** as the input stream to ***command***
- ***command1*** **|** ***command2***
  - Use the console output of ***command1*** as the input to ***command2***
- ***command1*** **;** ***command2***
  - Run ***command1*** and then run ***command2***
- ***command1*** **&&** ***command2***
  - Run ***command1***, if completed without errors then run ***command2***

Tricky Examples

- The wc command can take multiple files: wc names.txt student.txt
  - So, can we use the following to wc on every txt file in the directory:
    - `ls *.txt | wc`

- Amongst the sorted, unique Josh's in Student Names.txt, display the third to last person.

- Find the disk space usage of the man program
  - Hints: even with `which` and du...
  - Does `which man | du` work?

The back-tick

command1 `command2`

- run ***command2*** and pass its console output to ***command1*** as a parameter; ` is a back-tick, on the ~ key; not an apostrophe
- best used when ***command2***'s output is short (one line)

- Finish the example!
  - `du `which man``

xargs

command	description
xargs	runs each line of its input as a command

- xargs allows you to repeatedly run a command over a set of lines
  - often used in conjunction with find to process each of a set of files

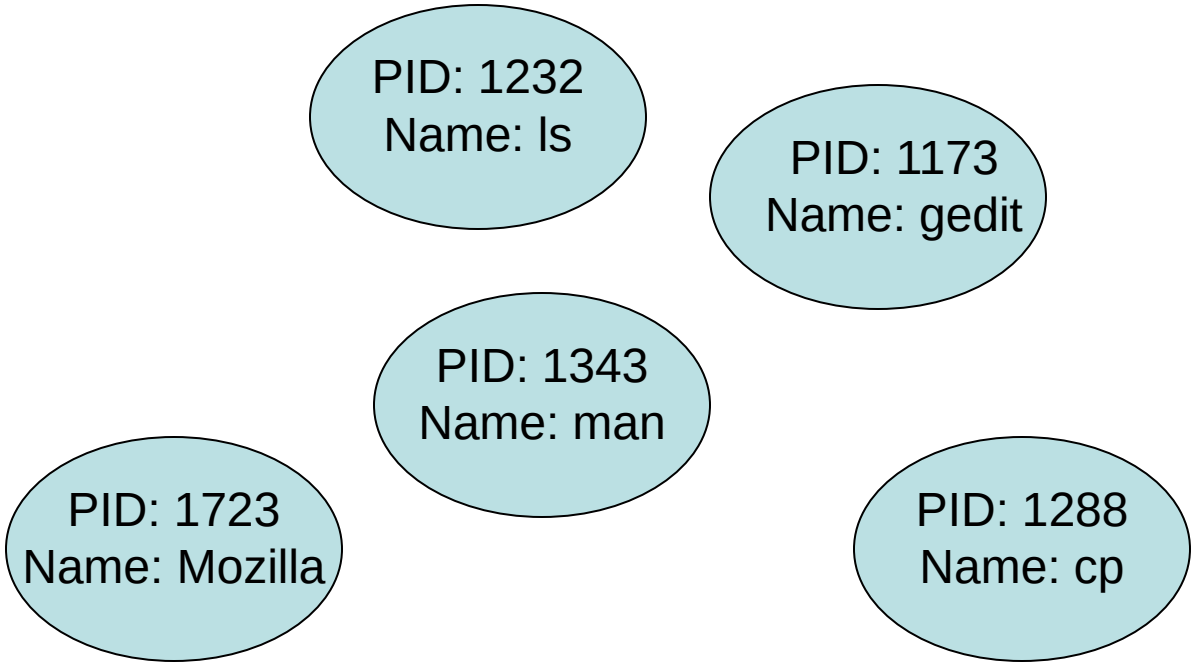
- Example: Remove all evidence of my BitTorrent transfers.

```
find ~ -name "*.torrent" | xargs rm
```

- Find the disk usage of man using xargs
  - `which man | xargs du`

Processes

- **process**: a program that is running (essentially)
  - when you run commands in a shell, it launches processes for each
  - Process management is one of the major purposes of an OS



Process commands

command	description
`ps or jobs`	list processes being run by a user; each process has a unique integer id (PID)
`top`	show which processes are using CPU/memory; also shows stats about the computer
`kill`	terminate a process by PID
`killall`	terminate several processes by name

- use `kill` or `killall` to stop a runaway process (infinite loop)
  - similar to ^C hotkey, but doesn't require keyboard intervention

Background processes

command	description
`&`	(special character) when placed at the end of a command, runs that command in the background
`^Z`	(hotkey) suspends the currently running process
`fg , bg`	resumes the currently suspended process in either the foreground or background

- If you run a graphical program like `gedit` from the shell, the shell will lock up waiting for the graphical program to finish
  - instead, run the program in the background, so the shell won't wait:

    ```
    $ gedit resume.txt &
    ```

  - if you forget to use `&` , suspend `gedit` with `^Z` , then run `bg`
  - lets play around with an infinite process…

Connecting with ssh

command	description
ssh	open a shell on a remote server

- Linux/Unix are built to be used in multi-user environments where several users are logged in to the same machine at the same time
  - users can be logged in either locally or via the network
- You can connect to other Linux/Unix servers with ssh
  - once connected, you can run commands on the remote server
  - other users might also be connected; you can interact with them
  - can connect even from other operating systems

The attu server

- attu : The UW CSE department's shared Linux server

- connect to attu by typing:

```
ssh attu.cs.washington.edu
```

(or `ssh username@attu.cs.washington.edu` if your Linux system's user name is different than your CSE user name)

- Note: There are several computers that respond as attu (to spread load), so if you want to be on the same machine as your friend, you may need to connect to attu2, attu3, etc.

Multi-user environments

command	description
`whoami`	outputs your username
`passwd`	changes your password
`hostname`	outputs this computer's name/address
`w` or `finger`	see info about people logged in to this server
`write`	send a message to another logged in user

- *Exercise* : Connect to `attu`, and send somebody else a message.
  - fun hint: try out the banner program at ~stepp/banner

Network commands

command	description
`links or lynx`	text-only web browsers (really!)
`ssh`	connect to a remote server
`sftp or scp`	transfer files to/from a remote server (after starting sftp, use get and put commands)
`wget`	download from a URL to a file
`curl`	download from a URL and output to console
`pine, mail`	text-only email programs

Text editors

command	description
`pico or nano`	simple but crappy text editors (recommended)
`emacs`	complicated text editor
`vi or vim`	complicated text editor

- you cannot run graphical programs when connected to `attu` (yet)
  - so if you want to edit documents, you need to use a text-only editor
- most advanced Unix/Linux users learn `emacs` or `vi`
  - these editors are powerful but complicated and hard to learn
  - we recommend the simpler `nano` (hotkeys are shown on screen)

Aliases

command	description
`alias`	assigns a pseudonym to a command

`alias` ***name=command***

- must wrap the command in quotes if it contains spaces

- Example: When I type `q` , I want it to log me out of my shell.
- Example: When I type `ll` , I want it to list all files in long format.

```
alias q=exit
alias ll="ls -la"
```

- *Exercise* : Make it so that typing `q` quits out of a shell.
- *Exercise* : Make it so that typing `woman` runs `man`.
- *Exercise* : Make it so that typing `attu` connects me to `attu`.
- *Exercise* : Make it so that typing `banner` on `attu` runs banner.