CSE 390a Lecture 3

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

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http://www.cs.washington.edu/390a/

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
  - Can we use the following to wc on every txt file in the directory?
    - `ls *.txt | wc`

- Amongst the top 250 movies in movies.txt, display the third to last movie that contains "The" in the title when movies titles are sorted.

- Find the disk space usage of the man program
  - Hints: use `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`	run each line of input as an argument to a specified 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

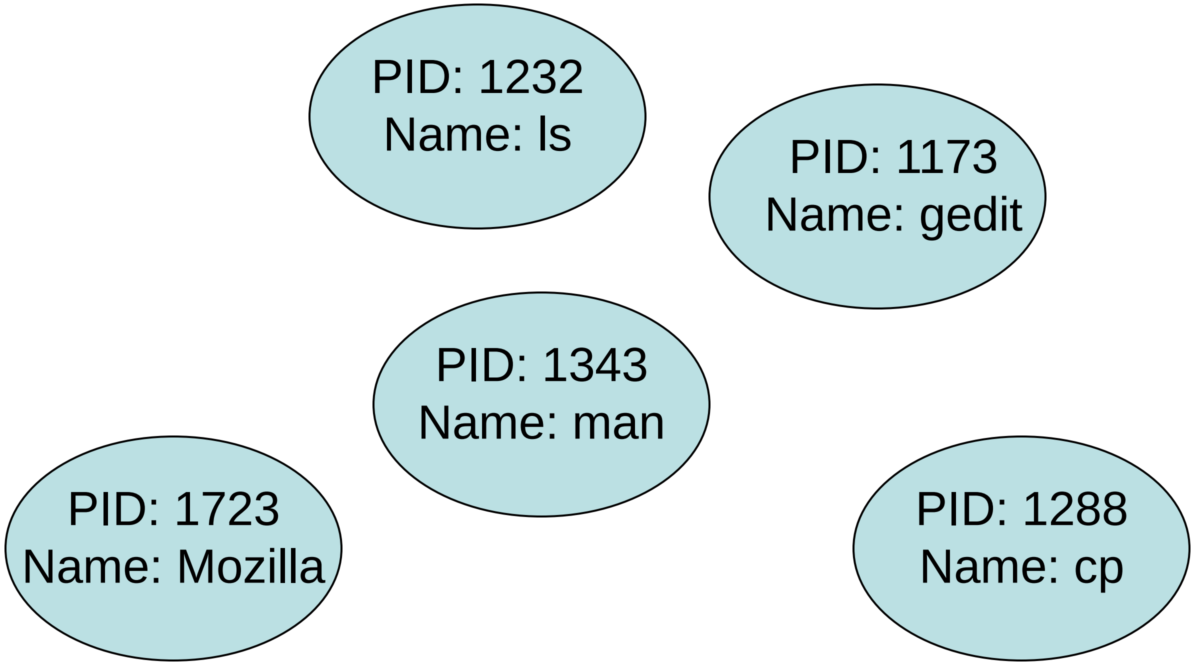
- Example: Remove all my .class files.

```
find ~ -name “*.class” | 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 a process for each command
  - 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 homework1.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.

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
`alpine, mail`	text-only email programs

Text editors

command	description
`pico` or `nano`	simple but crappy text editors
`emacs`	More advanced text editor
`vi` or `vim`	More advanced 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
- **Do not put spaces on either side of the =**

- 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`.

Mounting remote files

command	description
`sshfs`	mount and interact with remote directories and files

- An alternate usage model to remotely connecting to servers is mounting remote directories and files and work on them locally
  - once mounted, use remote directories and files as if they were local

- To mount a remote directory
  - create a local directory to mount to

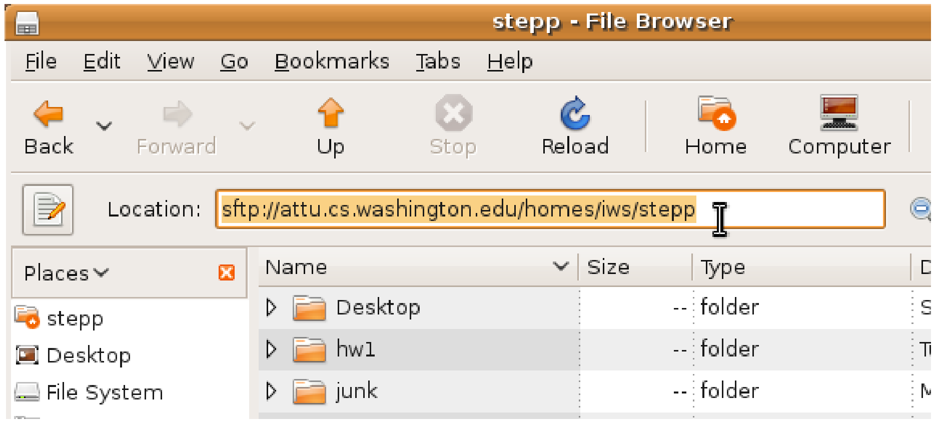
    ```
    mkdir csehomedir
    ```

  - mount your remote files on your local system

    ```
    sshfs username@attu.cs.washington.edu:/homes/iws/username csehomedir/
    ```

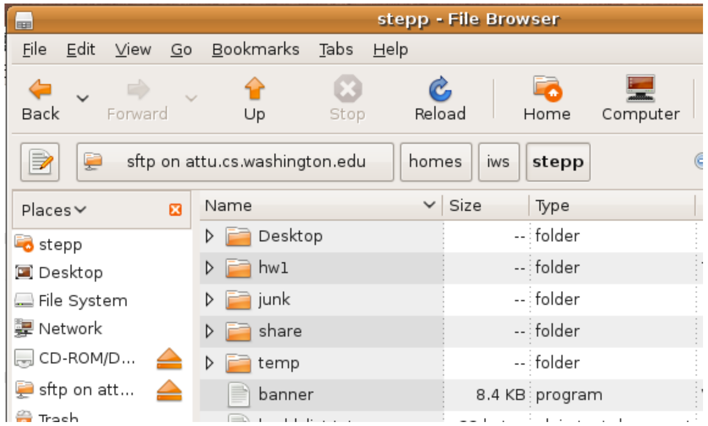
Remote editing

- Gnome's file browser and `gedit` text editor are capable of opening files on a remote server and editing them from your computer
  - press Ctrl-L to type in a network location to open

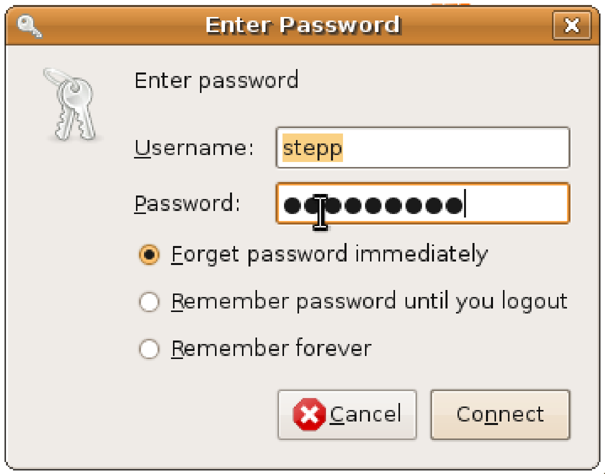

stepp - File Browser
File Edit View Go Bookmarks Tabs Help
Back Forward Up Stop Reload Home Computer
Places
stepp
Desktop
File System

Location: sftp://attu.cs.washington.edu/homes/iws/stepp

Name	Size	Type
Desktop	--	folder
hw1	--	folder
junk	--	folder


stepp - File Browser
File Edit View Go Bookmarks Tabs Help
Back Forward Up Stop Reload Home Computer
sftp on attu.cs.washington.edu
homes
iws
stepp
Places
stepp
Desktop
File System
Network
CD-ROM/D...
sftp on att...
Trash

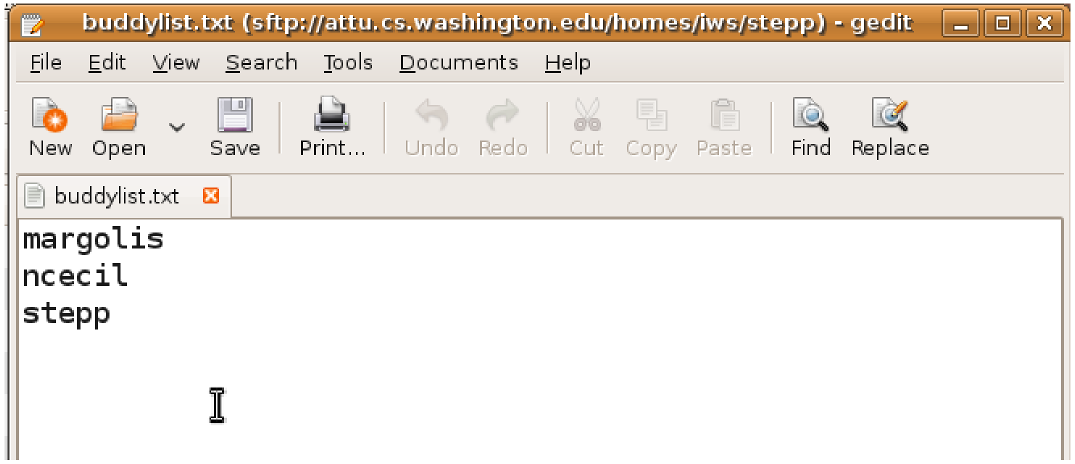
Name	Size	Type
Desktop	--	folder
hw1	--	folder
junk	--	folder
share	--	folder
temp	--	folder
banner	8.4 KB	program



Username: stepp

Password: ●●●●●●●●●●

[✓ Forget password immediately] Remember password until you logout Remember forever


buddylist.txt (sftp://attu.cs.washington.edu/homes/iws/stepp) - gedit
File Edit View Search Tools Documents Help
New Open Save Print... Undo Redo Cut Copy Paste Find Replace
buddylist.txt

```
margolis
ncecil
stepp
```