



# Section 2

# Intro to UNIX

CS 107A, Autumn 2021  
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Don't forget to start recording



# Announcements

- Any new students?
- CS 107A
  - Reminder about how permission codes work
  - I'll add any new students to Slack soon
- CS 107
  - Lab Preferences
  - Lecture Quiz due at 1pm tomorrow!



# Bird's Eye View

Day	Week 1 Wednesday	Thursday	Friday	Week 2 Monday	Tuesday	Wednesday	Thursday	Friday
CS 107A		Section: Intro to UNIX			Section: Integers		Section: Bitwise Operations	
CS 107	No Lab		Lecture: Integers	Lecture: Bitwise Operations		Lab: Integers / Bits		Lecture: Chars and C Strings
CS 107 assignments				assign0 due, assign1 released				



# Agenda

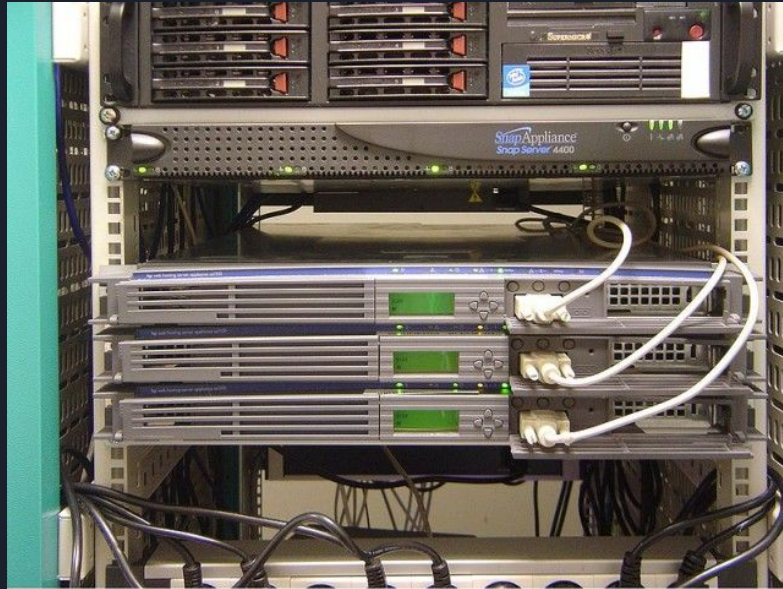
- Myth Machines
- UNIX
- UNIX Commands
- UNIX Practice



# Myth Machines

# Servers

- Some computers are designed to be used remotely. They might not even have a screen!



<https://arstechnica.com/information-technology/2013/04/intel-wants-to-kill-the-traditional-server-rack-with-100gbps-links/>



<http://www.mindscopetech.com/desktopserver>

# A Google datacenter with lots of servers



[https://storage.googleapis.com/gweb-uniblog-publish-prod/images/unnamed\\_RTmGiMI.max-1000x1000.png](https://storage.googleapis.com/gweb-uniblog-publish-prod/images/unnamed_RTmGiMI.max-1000x1000.png)



# The Stanford Myth Machines (half of them)



Courtesy of Lisa Yan



# Myth Machines

- myth51 - myth66
- Or “Myth clusters”
- Servers in the basement of Gates (room B08).
- They run a UNIX-like operating system called Linux
- No matter “which” Myth machine you use, you’ll see the same files
- All your CS 107 computing will be done here! Nice and consistent.

# Remotely Connecting to Myth



adbenson's  
computer/terminal(s)

ssh to server: adbenson typed 'a'

ssh to terminal: adbenson typed 'a'



ssh to server: <no input>



troccoli's computer/terminal

ssh to terminal: troccoli's command finished, here's the output



# Remotely Connecting to Myth

- <https://web.stanford.edu/class/cs107/getting-started.html>
- We use the “Secure Shell” (ssh) program to remotely connect
- The ssh program runs within a terminal program on your computer
- `ssh <SUNET>@myth.stanford.edu`
- Tip: You can open multiple terminal windows, and use ssh within each of them! Try doing assignments with two ssh sessions side-by-side.
- Tip (?): Make your friends think you’re an elite hacker by writing all your essays in emacs in a terminal instead of Microsoft Word



UNIX



# What's the big deal about UNIX?

- UNIX: an operating system (OS) from the 70s made by the people who made C. Pretty much no one uses it now, just its successors.
- UNIX-like OS: an OS that shares similarities with UNIX, perhaps in design or how programs for it are made or the commonly bundled programs it has
- Linux: a UNIX-like OS created by a Finnish guy that got really popular. Used in most servers, Android smartphones, lots of other stuff.
- macOS: a UNIX-like OS created by Apple for laptops/desktops.
- Windows: a NOT UNIX-like OS created by Microsoft that is extremely different from these other OSes in many internal ways

# What's the big deal about UNIX?

- Back then, everyone used the command line. It's simpler to create programs for which is why we're teaching you it.



Also, it's more efficient to use with practice, and it's still relevant today for certain types of work.

# Myth Filesystem

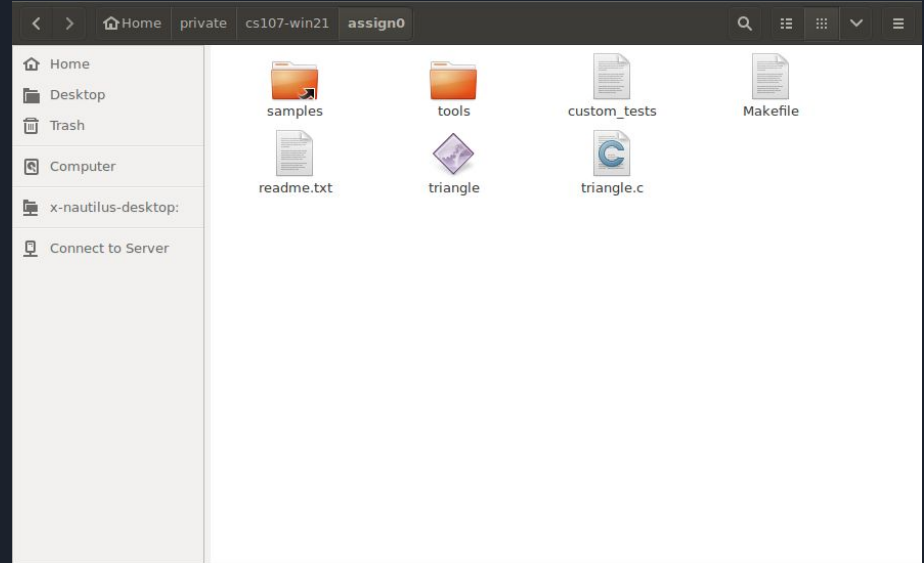
- Just like your computer, the Myth machines have a filesystem

```
adbenson@myth61 ~/private/cs107-win21/assign0
02:42 AM (master) $ ls -a
.  .git  tools  .gitignore  readme.txt  triangle
.. .metadata  custom_tests  Makefile  samples  triangle.c

adbenson@myth61 ~/private/cs107-win21/assign0
02:42 AM (master) $ cd .

adbenson@myth61 ~/private/cs107-win21/assign0
02:42 AM (master) $ cd ..

adbenson@myth61 ~/private/cs107-win21
02:42 AM $ _
```







# UNIX Commands



# Please follow along

- If you haven't already, open a terminal or two, `ssh` into the Myth machines, and try out these commands alongside me



# UNIX Commands for Directories

- `pwd`: print out the “Current Working Directory”
- `ls`: list the contents of the CWD
- `ls -l`: list the contents of the CWD, but show extra information
- `ls -a`: list the contents of the CWD, but also list the hidden files (preceded by a dot)
- `ls -la`: list the contents of the CWD, but do both `-l` and `-a`
- `ls assign0`: list the contents of `assign0`, regardless of the CWD



# UNIX Commands for Directories

- `cd <newpath>` : change the CWD to `<newpath>`
- `cd cs107`
- `cd cs107/assign0`
- `cd ..`
- `cd ../..`
- `cd ~`



# UNIX Commands for Files

- `touch <filename>` : create an empty file
  - `touch file1.txt`
- `mkdir <filename>` : create a empty directory
  - `mkdir folder1`



# UNIX Commands for Files

- `mv <currentpath> <newpath>` : move or rename a file or directory
  - `mv file1.txt file2.txt`
  - `mv assign0/triangle.c assign0/triangle_old.c`
  - `mv file1.txt assign0/file1.txt`
  - `mv file1.txt assign0/`
  - `mv ../file1.txt assign0/file2.txt`
  - `mv assign0/ cs107_assign0/`



# UNIX Commands for Files

- `cp <currentpath> <dupedpath>` : copy a file or directory
  - `cp file1.txt file2.txt`
  - `cp assign0/triangle.c assign0/triangle_old.c`
  - `cp file1.txt assign0/file1.txt`
  - `cp file1.txt assign0/`
  - `cp ../file1.txt assign0/file2.txt`
  - `cp -r assign0 assign0_backup_that_sorta_worked`



# UNIX Commands for Files

- `rm <filename>` : remove a file or directory
  - By remove, we mean a PERMANENT deletion!
  - `rm file1.txt`
  - `rm file2.txt file3.txt`
  - `rm -r assign0_backup_that_i_no_longer_need`





# UNIX Commands for Files

- `cat <file>` : output file contents (“conCATenate”)
  - `cat readme.txt`
  - `cat Makefile`
- `grep <keyword> <file>` : search a file for lines containing a word (Globally search for a Regular Expression and Print matching lines)
  - `grep andrew list_of_names.txt`
  - `grep -r resposne`  
`my_gigantic_directory_of_files_that_might_have_t`  
`ypos`



# UNIX Tips


- Command line pros are lazy and type as little as possible
  - Cycle through previous commands with UP and DOWN (or CTRL+P and CTRL+N)
  - Tab-complete everything! This works for a lot of things (just try it) but most notably filenames and program names
- Use multiple terminals – try using one for `emacs` and one to make and run your program
- Clear your terminal with CTRL+L (you can still scroll up to see it)
- On your laptop, make a file called `config` inside `~/ .ssh` and put this in it:

```
Host myth
```

```
Hostname myth.stanford.edu
```

```
User adbenson
```

- Then you can do `ssh myth` instead of `ssh adbenson@myth.stanford.edu`!  
Saves typing in the long run.



UNIX Practice (on  
the course website)