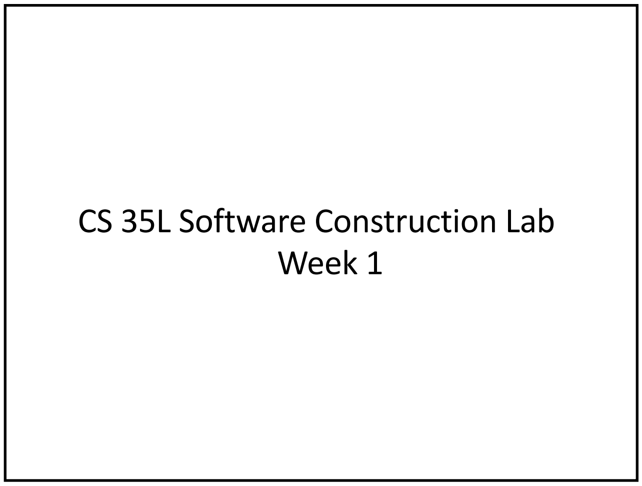
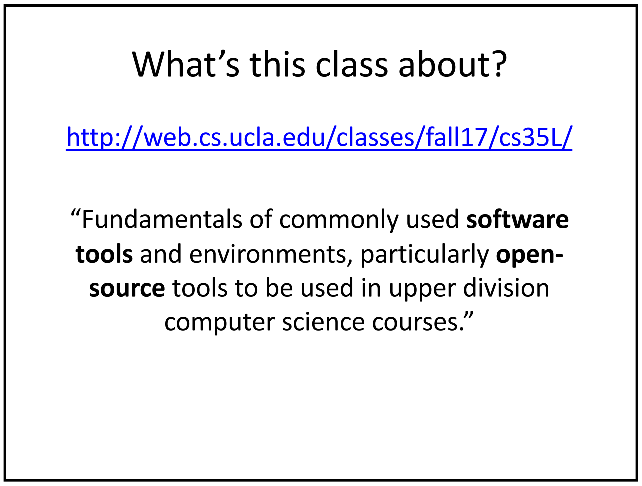


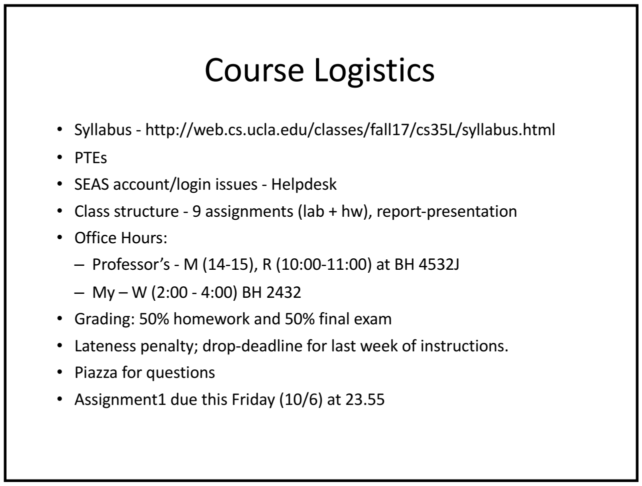
CS 35L Software Construction Lab
Week 1



What's this class about?

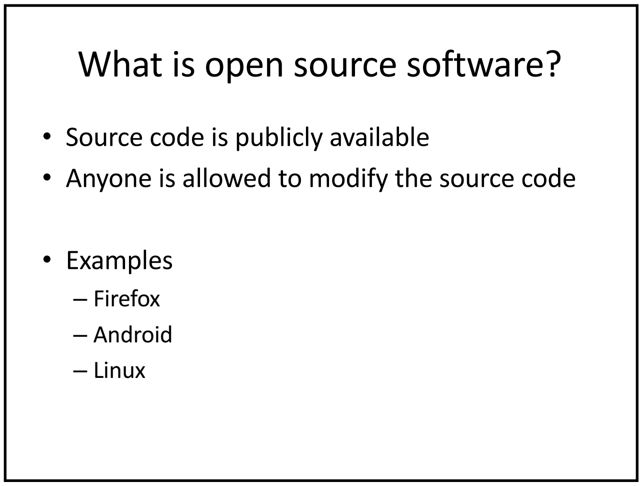
http://web.cs.ucla.edu/classes/fall17/cs35L/

"Fundamentals of commonly used **software tools** and environments, particularly **open-source** tools to be used in upper division computer science courses."



Course Logistics

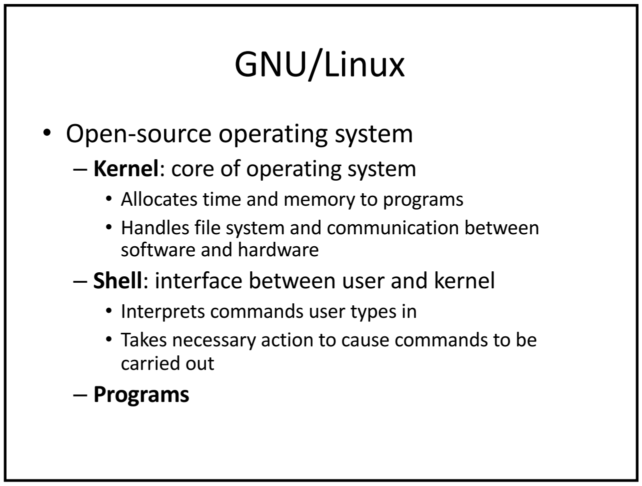
- Syllabus - http://web.cs.ucla.edu/classes/fall17/cs35L/syllabus.html
- PTEs
- SEAS account/login issues - Helpdesk
- Class structure - 9 assignments (lab + hw), report-presentation
- Office Hours:
  - Professor's - M (14-15), R (10:00-11:00) at BH 4532J
  - My – W (2:00 - 4:00) BH 2432
- Grading: 50% homework and 50% final exam
- Lateness penalty; drop-deadline for last week of instructions.
- Piazza for questions
- Assignment1 due this Friday (10/6) at 23.55



What is open source software?

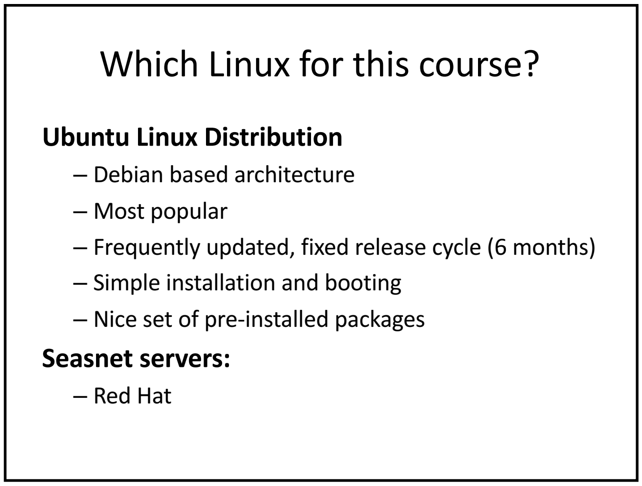
- Source code is publicly available
- Anyone is allowed to modify the source code

- Examples
  - Firefox
  - Android
  - Linux



GNU/Linux

- Open-source operating system
  - **Kernel**: core of operating system
    - Allocates time and memory to programs
    - Handles file system and communication between software and hardware
  - **Shell**: interface between user and kernel
    - Interprets commands user types in
    - Takes necessary action to cause commands to be carried out
  - **Programs**



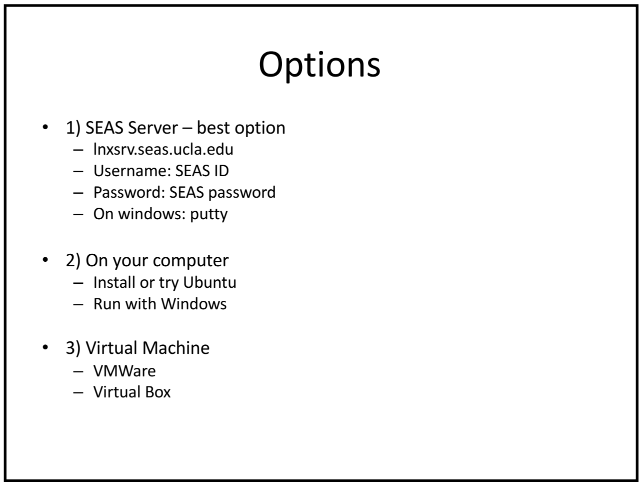
Which Linux for this course?

Ubuntu Linux Distribution

- Debian based architecture
- Most popular
- Frequently updated, fixed release cycle (6 months)
- Simple installation and booting
- Nice set of pre-installed packages

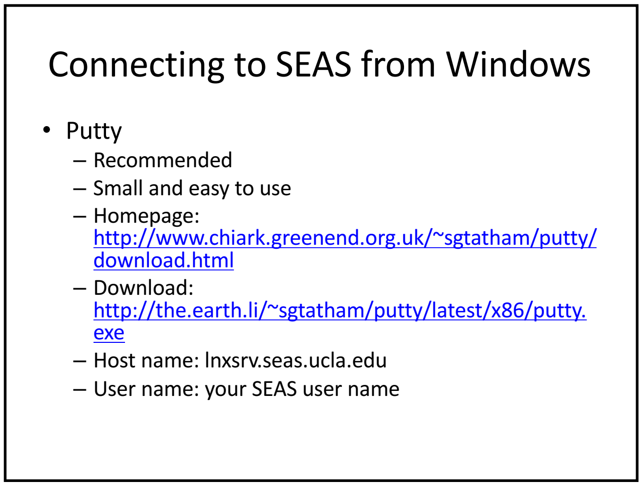
Seasnet servers:

- Red Hat



Options

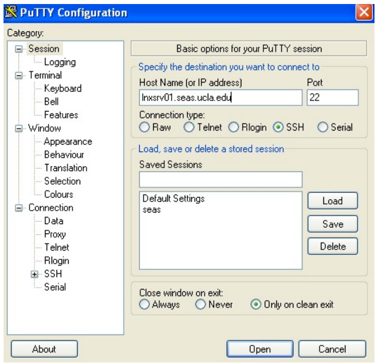
- 1) SEAS Server – best option
  - lnxsrv.seas.ucla.edu
  - Username: SEAS ID
  - Password: SEAS password
  - On windows: putty
- 2) On your computer
  - Install or try Ubuntu
  - Run with Windows
- 3) Virtual Machine
  - VMWare
  - Virtual Box



Connecting to SEAS from Windows

- Putty
  - Recommended
  - Small and easy to use
  - Homepage: http://www.chiark.greenend.org.uk/~sgtatham/putty/download.html
  - Download: http://the.earth.li/~sgtatham/putty/latest/x86/putty.exe
  - Host name: lnxsrv.seas.ucla.edu
  - User name: your SEAS user name

Putty



Host Name (or IP address): lnxsrv01.seas.ucla.edu

Port: 22

Connection type: ○ Raw ○ Telnet ○ Rlogin ● SSH ○ Serial

Saved Sessions:

Default Settings
seas

Close window on exit: ○ Always ○ Never ● Only on clean exit

Connecting to SEAS from OS X or Linux

- Terminal
  - $ ssh username@lnxsrv.seas.ucla.edu
  - Username = your SEAS user name

The Basics: Shell

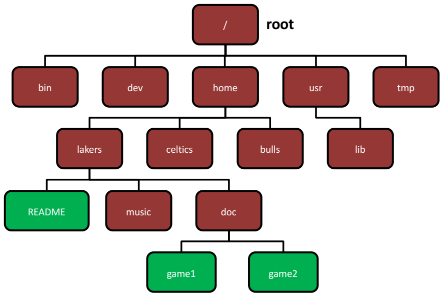
- **<up arrow>**: previous command
- **<tab>**: auto-complete
- **!!**: replace with previous command
- **![*str*]**: refer to previous command with str
- **^[*str*]**: replace with command referred to as str

Files and Processes

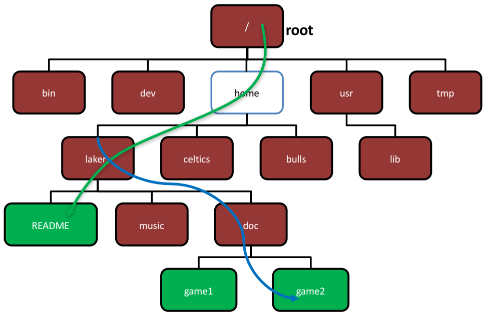
- Everything is either a **process** or a **file**:
  - **Process**: an executing program identified by PID
  - **File**: collection of data
    - A document
    - Text of program written in high-level language
    - Executable
    - Directory
    - Devices

Linux File System Layout

- Tree structured hierarchy



Absolute Path vs. Relative Path



Current directory: home

The Basics: Moving Around

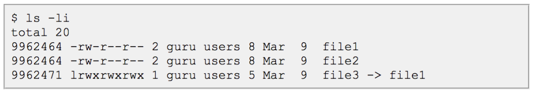
- **pwd**: print working directory
- **cd**: change directory
  - **~** home directory
  - **.** current directory
  - **/** root directory, or directory separator
  - **..** parent directory

The Basics: Dealing with Files

- **mv**: move/rename a file
- **cp**: copy a file
- **rm**: remove a file
  - r: remove directories and their contents recursively
- **mkdir**: make a directory
- **rmdir**: remove an empty directory
- **ls**: list contents of a directory
  - d: list only directories
  - a: list all files including hidden ones
  - l: show long listing including permission info
  - s: show size of each file, in blocks

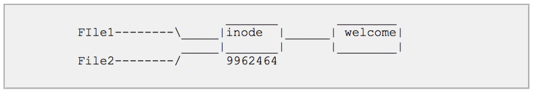
The Basics: Changing File Attributes

- **ln**: create a link
  - Hard links: point to physical data
  - Soft links aka symbolic links (-s): point to a file
- **touch**: update access & modification time to current time
  - touch *filename*
  - touch -t 201101311759.30 *filename*
    - Change filename’s access & modification time to (year 2011 January day 31 time 17:59:30)



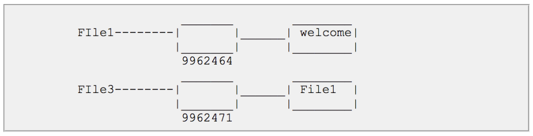
```
$ ls -li
total 20
9962464 -rw-r--r-- 2 guru users 8 Mar  9  file1
9962464 -rw-r--r-- 2 guru users 8 Mar  9  file2
9962471 lrwxrwxrwx 1 guru users 5 Mar  9  file3 -> file1
```

Hard link:



```
                        _______         _________
   FIle1--------\_____|inode  |______| welcome|
                 _____|_______|      |________|
   File2--------/      9962464
```

Soft link:



```
                    _______         _________
   FIle1--------|       |______| welcome|
                |_______|      |________|
                 9962464
                  _______         _________
   FIle3--------|       |______| File1   |
                |_______|      |________|
                 9962471
```

- Create two files

  $ touch blah1 $ touch blah2
- Fill contents into the files and print them

  $ echo "Cat" > blah1 $ echo "Dog" > blah2

  $cat blah1; cat blah2

  Cat

  Dog
- Create links

  $ ln blah1 blah1-hard $ ln -s blah2 blah2-soft $ ls –l

  blah1 blah1-hard blah2 blah2-soft -> blah2
- Change the original file

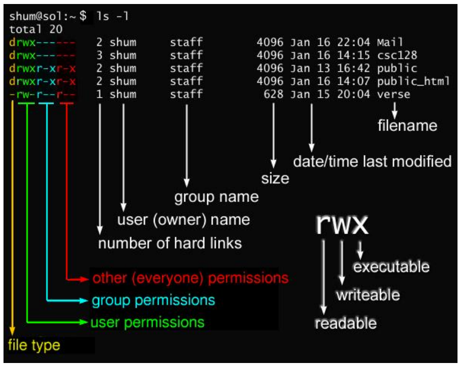
  $ mv blah1 blah1-new $ cat blah1-hard

  Cat

  $ mv blah2 blah2-new $ cat blah2-soft

  cat: blah2-soft: No such file or directory

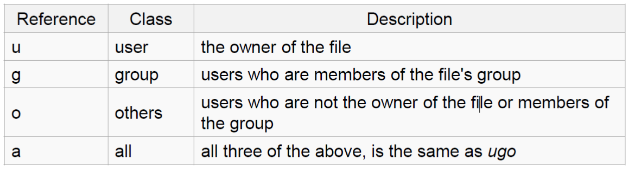
Linux File Permissions



```
shum@sol:~$  ls -l
total 20
drwx------   2 shum     staff        4096 Jan 16 22:04 Mail
drwx------   3 shum     staff        4096 Jan 16 14:15 csc128
drwxr-xr-x   2 shum     staff        4096 Jan 13 16:42 public
drwxr-xr-x   2 shum     staff        4096 Jan 16 14:07 public_html
-rw-r--r--   1 shum     staff         628 Jan 15 20:04 verse
```

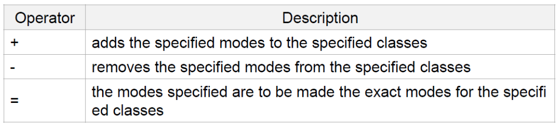
Linux File Permissions

- chmod
  - read (r), write (w), executable (x)
  - User, group, others

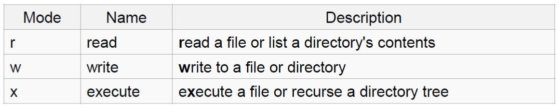


Reference	Class	Description
u	user	the owner of the file
g	group	users who are members of the file's group
o	others	users who are not the owner of the file or members of the group
a	all	all three of the above, is the same as *ugo*

The Basics: chmod (symbolic)

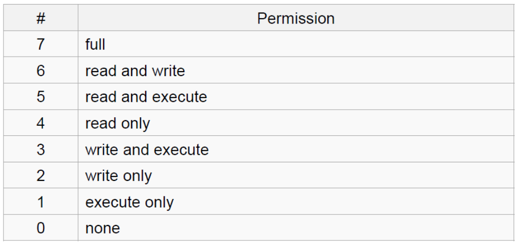


Operator	Description
+	adds the specified modes to the specified classes
-	removes the specified modes from the specified classes
=	the modes specified are to be made the exact modes for the specifi ed classes



Mode	Name	Description
r	read	**r**ead a file or list a directory's contents
w	write	**w**rite to a file or directory
x	execute	e**x**ecute a file or recurse a directory tree

The Basics: chmod (numeric)



#	Permission
7	full
6	read and write
5	read and execute
4	read only
3	write and execute
2	write only
1	execute only
0	none

- Usage

– chmod [''references''][''operator''][''modes''] ''file1'' ...
Example: **chmod** ug+rw mydir, **chmod** a-w myfile,
Example: **chmod** ug=rx mydir, **chmod** 664 myfile

The Basics: find

- -type: type of a file (e.g: directory, symbolic link)
- -perm: permission of a file
- -name: name of a file
- -user: owner of a file
- -maxdepth: how many levels to search

File Name Matching

- ?: matches any single character in a filename
- *: matches one or more characters in a filename
- []*:* matches any one of the characters between the brackets. Use '-' to separate a range of consecutive characters.

`find` Examples

- Examples
  - find . -name my*
  - find . -name my* -type f
  - find / -type f -name myfile

man

- Extensive documentation that comes preinstalled with almost all substantial Unix and Unix-like operating systems
- Usage
  - read a manual page for a Linux command
    - **man <**command_name**>**
    - **man** section command_name
    - 1 User Commands 2 System Calls 3 C Library Functions 4 Devices and Special Files 5 File Formats and Conventions 6 Games et. al. 7 Miscellanea 8 System Administration tools and Daemons
    - Hit "q" to get out of man page

`wh`… Commands

- `whatis` <command>: returns Name section of man page
- `whereis` <command>: locates the binary, source, and manual page files for a command

Assignment 1

- Hints for first 10 questions:
  1. man man
  2. which
  3. find
  4. readlink
  5. man chmod
  6. man find
  7. find
  8. whereis, man find
  9. find, sort
  10. localedef

Assignment 1 – Example ans1.txt

ans1.txt is specifically for LABORATORY section

- 1. Here is the answer to question 1
- 2. Here is the answer to question 2
- 3. Here is the answer to question 3
- …..

Assignment 1 – Example key1.txt

key1.txt is specifically for HOMEWORK section

1. C-s H E L L O W O R L D
2. C-s H T M L
3. C-d
4. C-n
5. M-x goto-line Enter 1 2 3 Enter