CS35L – Fall 2018

Slide set:	1.1
Slide topics:	Linux basics
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What’s this class about?

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

What is open source software?

Source code is publicly available

Anyone is allowed to modify the source code

Examples

- Firefox
- Android
- Apache

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

- Most popular
- Frequently updated, fixed release cycle (6 months)

Seasnet servers(recommended):

- lnxsrv.seas.ucla.edu (*lnxsrv06, lnxsrv07, or lnxsrv09*)
- Username: SEAS ID
- Password: SEAS password
- On Windows: putty
- On Mac: terminal

Command Line Interface vs. Graphical User Interface

CLI	GUI
Steep learning curve	Intuitive
Pure control (e.g., scripting)	Limited control
Cumbersome multitasking	Easy multitasking
Convenient remote access	Bulky remote access

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: Shell

<up arrow>: previous command

<tab>: auto-complete

!!: replace with previous command

![*str*]: refer to previous command with str

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

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)

Linux File Permissions

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 –print

wh… Commands

`whatis` <command>: returns Name section of man page

`whereis` <command>: locates the binary, source, and manual page files for a command

More Basics: Look these up

cat

head

tail

du

ps

kill

diff

cmp

wc

sort

Connecting to SEAS from OS X or Linux

Terminal

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

Connecting to SEAS from Windows

Putty

- Recommended
- Small and easy to use

- Host name: lnxsrv.seas.ucla.edu
- User name: your SEAS user name

Putty

PuTTY Configuration
Category:
Session
Logging
Terminal
Keyboard
Bell
Features
Window
Appearance
Behaviour
Translation
Selection
Colours
Connection
Data
Proxy
Telnet
Rlogin
SSH
Serial
Basic options for your PuTTY session
Specify the destination you want to connect to
Host Name (or IP address)
Port
lnxsrv01.seas.ucla.edu
22
Connection type:
Raw
Telnet
Rlogin
SSH
Serial
Load, save or delete a stored session
Saved Sessions
Default Settings
seas
Load
Save
Delete
Close window on exit:
Always
Never
Only on clean exit
About
Open
Cancel

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