Lecture 2: Meet the Linux Shell

CSE 374: Intermediate Programming Concepts and Tools
Administrivia

- Exercise 0 will release today
- Class webpage now live
- Class discussion board available
- Linux accounts will be available later this afternoon
  - Username = uwnetid
  - Password = tempPassword
- Linux account issues? Fill out form: https://forms.gle/SDNkjSfmB7GLsFrT6
- Fill out student survey: https://forms.gle/2nqB8HnAHhXeLWCD7
Meet the Linux Shell

- Text based interface for Linux operating system
- We will be using the “Bash” shell
  - There are different versions, but for this course we will only be using bash
- Use echo $SHELL to check which shell you are using
- Bash in a unix shell and command language that is the default login shell for most Linux and MacOS
- Interpreted, not compiled
  - You’re on your own when things go wrong

Local MacOS terminal connecting to remote Linux machine
The shell is a text-based interface that takes commands instead of clicks.

Commands are pre-existing programs:
- `<command name> <options> <input || output>`

To learn about an individual command use “man”:
- `<command name> man`
- Short for “manual page”
- Can also use the --help option
Shell Interaction Basics

1. Open the terminal application on your local computer
2. Connect to Klaatu Linux server with
3. `ssh <username>@klaatu.cs.washington.edu`
4. Enter in your password, you will not see characters as you type

Basic Interactions:

- You can use copy and paste with with your usual short cuts
- You can navigate through your executed commands by using the up and down arrows
  - Convenient way to rerun commands or to fix small errors in previous command
- The history command will print the commands you’ve used this session to the terminal
Linux Demo

Recorded Demo from 374 Sp 20 Instructor Megan Hazen
Running Programs

▪ You can run a program by typing its path into the terminal

▪ Some folders are globally visible, so you only need the program’s name
  - /bin/ is globally visible because it is in the PATH shell variable

▪ To run a program in the current directory you need to give the path
  - ./local_program
  - Running local_program by itself will not work because it’s not globally visible

▪ All commands are bash files that are executed when you hit “enter” on a terminal line
  - You can write and execute your own! More on that later
Files

- A collection of data used for long term storage
  - Stored on a hard drive
  - Hard drive is the physical portion of a computer that stores large amounts of data sits outside the CPU

- Files have...
  - Name
    - Unique string within the folder
  - Type
    - Indicated by the extension at the end of the name
  - Content
    - Data contained within the file
  - Location
    - Folder trail from drive to name
    - “breadcrumb”

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Finder GUI view of folder

```
[ Lecture Slides]$ ls -l
total 33128
-rw-r--r--@ 1 Kasey staff 4893375 Oct 7 07:57 Lecture1-Intro.pptx
-rw-r--r--@ 1 Kasey staff 1488041 Oct 13 23:49 Lecture2-Shell.pptx
-rw-r--r--@ 1 Kasey staff 2425734 Oct 7 07:57 Lecture3-Shell2.pptx
-rw-r--r--@ 1 Kasey staff 988501 Oct 7 10:45 Lecture4-grep.pptx
-rw-r--r--@ 1 Kasey staff 958522 Oct 12 08:57 Lecture5-Scripting.pptx
-rw-r--r--@ 1 Kasey staff 954220 Oct 12 09:28 Lecture6-Regex.pptx
-rw-r--r--@ 1 Kasey staff 1869399 Oct 13 23:13 Lecture7-IntroToC.pptx
-rw-r--r--@ 1 Kasey staff 2498379 Oct 13 23:15 Lecture8-Cpointers.pptx
-rw-r--r--@ 1 Kasey staff 857760 Oct 13 23:17 Lecture9-malloc.pptx
-rw-r--r--@ 1 Kasey staff 165 Oct 13 23:21 ~$Lecture2-Shell.pptx
-rw-r--r--@ 1 Kasey staff 165 Oct 13 21:15 ~$Lecture7-IntroToC.pptx
```

ls –l view of folder
File System

▪ Files contain other files, branching out from the root “/” forming a tree-like hierarchy

▪ Files are located with a path of folders separated by “/” this is called the “file path”

▪ Paths starting with “/” are called absolute paths
  - Start searching from the root of the file system
  - EX: /usr/documents/myFiles/myFile.txt

▪ Paths that do NOT start with “/” are called relative paths
  - Starts searching from current directory
  - EX: myFiles/myFile.txt

▪ pwd command will print the current directory

https://homepages.uc.edu/~thomam/Intro_Unix_Text/File_System.html
Navigating the File System

- cd – change directory
  - cd <file path>

- Terminal commands for paths
  - ~ your home directory
    - EX: cd - #change location to home directory
  - . current directory
  - .. parent directory
    - EX: ls .. #print contents of parent directory

Beef up:
- Change this slide to be about navigating the file system with bash
- Recursive traversal vs non
# Useful Commands

<table>
<thead>
<tr>
<th>Command</th>
<th>Operation</th>
<th>Example</th>
</tr>
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<tbody>
<tr>
<td><code>ls</code></td>
<td>See folder contents</td>
<td><code>ls -l</code></td>
</tr>
<tr>
<td><code>cd &lt;folderName&gt;</code></td>
<td>Move into given folder</td>
<td><code>cs Downloads</code></td>
</tr>
<tr>
<td><code>cp &lt;source&gt; &lt;destination&gt;</code></td>
<td>Make a copy of given file in given destination</td>
<td><code>cp file.txt myDir/</code></td>
</tr>
<tr>
<td><code>mv &lt;oldName&gt; &lt;newname&gt;</code></td>
<td>Rename or move given existing file to given name/destination</td>
<td><code>mv fil.txt file.txt</code></td>
</tr>
<tr>
<td><code>cat &lt;fileName&gt;</code></td>
<td>Print file contents to terminal window</td>
<td><code>cat file.txt</code></td>
</tr>
<tr>
<td><code>touch &lt;filename&gt;</code></td>
<td>Create empty file with given name</td>
<td><code>touch file.txt</code></td>
</tr>
<tr>
<td><code>echo &lt;string&gt;</code></td>
<td>Print given string to terminal window</td>
<td><code>echo “hello world”</code></td>
</tr>
<tr>
<td><code>pwd</code></td>
<td>Print working directory</td>
<td><code>pwd</code></td>
</tr>
<tr>
<td><code>mkdir &lt;directoryName&gt;</code></td>
<td>Create an empty directory at location specified</td>
<td><code>mkdir ~/newDir</code></td>
</tr>
<tr>
<td><code>exit</code></td>
<td>Exit the shell</td>
<td><code>exit</code></td>
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## Other Useful Commands

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<th>Operation</th>
<th>Example</th>
</tr>
</thead>
<tbody>
<tr>
<td><code>pico &lt;fileName&gt;</code></td>
<td>Create or edit file</td>
<td><code>pico filename</code></td>
</tr>
<tr>
<td><code>echo &lt;text&gt;</code></td>
<td>Print text</td>
<td><code>echo hello world</code></td>
</tr>
<tr>
<td><code>pwd</code></td>
<td>Print working directory's absolute path</td>
<td><code>pwd</code></td>
</tr>
<tr>
<td><code>touch &lt;filename&gt;</code></td>
<td>Create empty file</td>
<td><code>touch filename</code></td>
</tr>
<tr>
<td><code>mkdir</code></td>
<td>Create empty directory</td>
<td><code>mkdir</code></td>
</tr>
<tr>
<td><code>find -name &lt;filename&gt;</code></td>
<td>Search for file</td>
<td><code>find -name &lt;filename&gt;</code></td>
</tr>
<tr>
<td><code>exit</code></td>
<td>Exit the shell</td>
<td><code>exit</code></td>
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### Moving files between machines
- **Tar**
- **Wget**
- **Scp**
- **Filezilla**
Demo: File Manipulation
Questions?

Lecture Participation Poll #2

Log onto pollev.com/cse374
Or
Text CSE374 to 22333