CS 300 Data Structures

Introduction

Course Topics

- Data Structures
- Linux
- C Programming
- Software Development Tools
- Software Development Methods

UNIX/Linux/GNU

- UNIX is an Operating System (OS)
  - 1969 at Bell Labs
  - Thompson/Ritchie/Kernighan/McIlroy/Ossanna
- UNIX Operating Systems include:
  - MacOS X
  - Sun Solaris
  - OpenBSD
- GNU/Linux is “Unix-Like”
- We will be using a server called zeus
  - Zeus runs OpenSUSE 13.1 64-bit OS

UNIX OS

- UNIX OS is made up of:
  - The kernel
  - The shell
  - The programs
- Linux
  - is just a kernel
- Linux distributions (suse, ubuntu, red hat, …) include:
  - GUI system
  - GNU utilities (cp, mv, ls, …)
  - GNU c/c++ compilers
  - Applications (OpenOffice, Firefox, …)

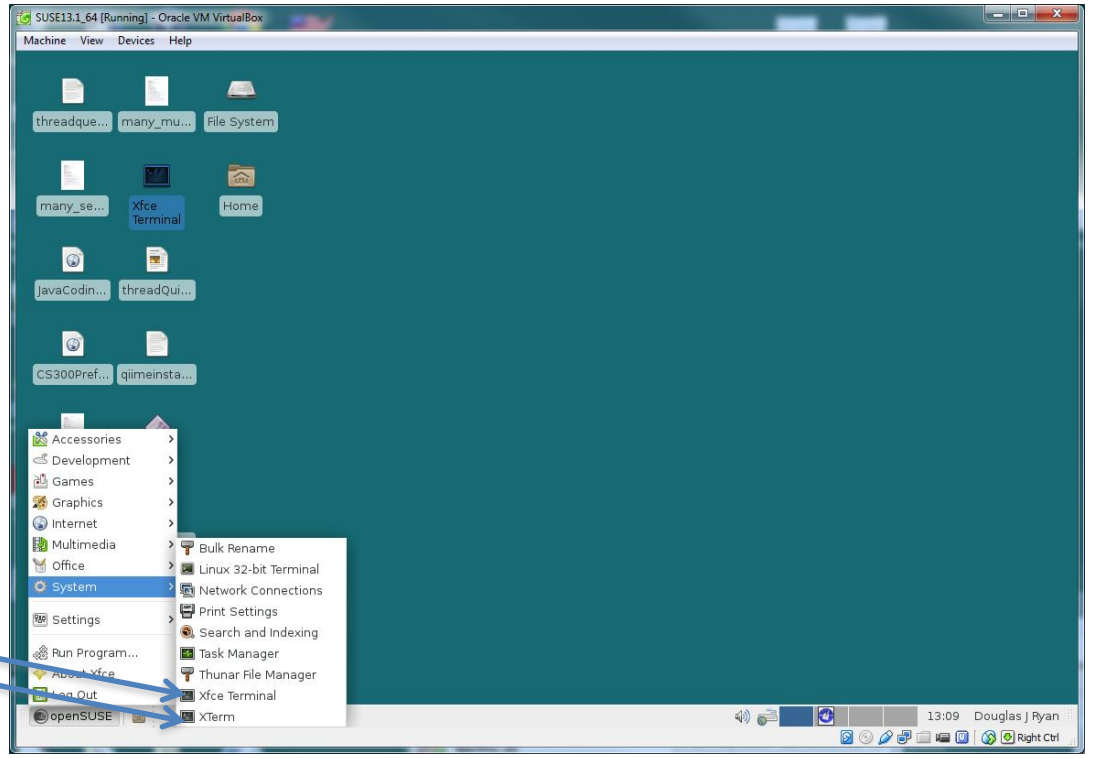
Processes and Files

- Everything in UNIX is a process or file
  - Process is an executing program
  - File is a collection of data
- directory is a hierarchical structure that groups files
  - Windows = folder
  - UNIX = directory

Start VirtualBox In Marsh Lab c:\cs300

1) Login
2) Start a terminal

Select either Xcfe Terminal or XTerm. I will use Xcfe.



24 iMacs in Library

User:
Password:

The kernel

- kernel – code that manages access to shared resources
  - CPU, network, hard drive, RAM
- kernel is responsible for managing system resources through system calls
  - Process management
  - Memory allocation
  - Hardware access

```
ryand@linux:~> uname -a
sysname       Name of the operating system implementation.
nodename      Network name of this machine.
release       Release level of the operating system.
version       Version level of the operating system.
machine       Machine hardware platform.
```

The shell

- Interface between the user and kernel
  - command line interface (CLI)
- The shell interprets commands
- Many different shells exist such as bash, tcsh, ..
  - each has slightly different commands
- My examples use bash
- Your environment is customizable by editing .bashrc .profile

```
ryand@linux:~>alias ls='ls -al'
```

Window Manager

- Xfce
  - default in the lab
- GNOME
- KDE
- Lightweight window manager
  - LXDE

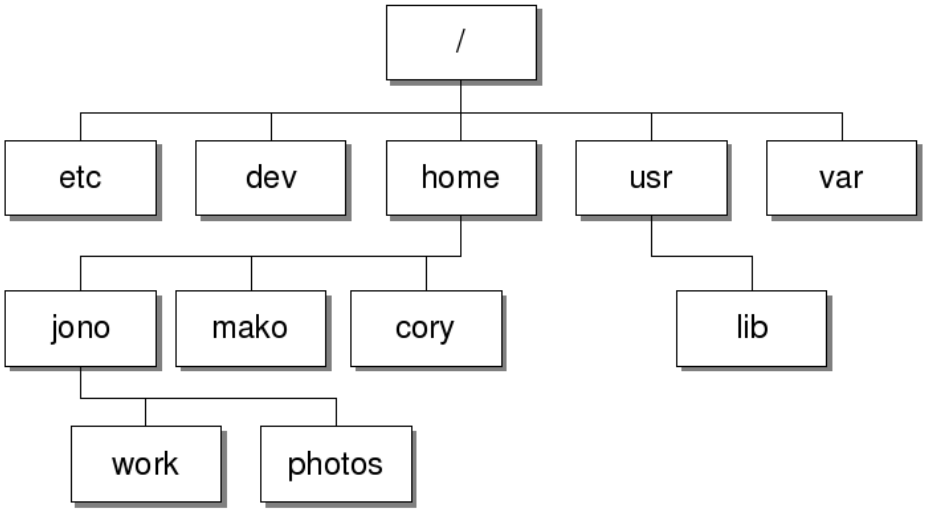
How to add an Icon

- Right Click Desktop widget
- Create new | Link to Application
- Eclipse
- Application
  - Command : /usr/local/share/eclipse/eclipse
- General
  - Wrench | Click icon box on left
  - choose Icon

If the icon does not stick, right click the icon | Properties click the icon on the Left.

File System

- The file system is arranged in a hierarchical structure where the top of the hierarchy is called the root
- The root is signified by / (forward-slash)
- ls /



File and Directory Commands

Command	Type	Meaning
pwd	program	display present working directory
which	program	display which program provides a command
ls	program	list contents of present directory less special files beginning with a .
ls -al	program	show an extended list of all files and directories
cd ..	shell builtin	change to parent directory
cd	shell builtin	change to home directory
cd ~	shell builtin	change to home directory
mkdir backup	program	make a directory called backup
rmdir backup	program	removes an empty directory
passwd	program	change your current password

Specific File Commands

Command	Meaning
cp file1 file2	makes a copy of file1 and names the copied file file2
mv file1 file2	moves (or renames) file1 to file2
rm file1	removes (or deletes) file1 DANGER DANGER DANGER rm -i
rmdir directory	removes (or deletes) an empty directory
clear	clears the display screen
cat file1	displays the contents of a file to the screen
less file1	displays the contents of file1 to the screen one screen at a time spacebar – advances another page q - quits
diff file1 file2	display the differences between file1 and file2

In Class Problems

1. Change your password

2. Using ls, list the contents of your present working directory

3. Create a directory called CS 300 (Linux is case-sensitive)

scp

- Copy a file from ada to zeus assuming you are logged in to ada
  - **`scp message punetid@machinename:destination`**

```
ryand@ada:~/cs300> scp message ryand@zeus:Documents/CS300
```

- **Copy a file from zeus to your present working directory on your local machine**
  - **`scp ryand@zeus.cs.pacificu.edu:/home/CS300Public/2014/message .`**

Problems

- On Zeus, in the directory /home/CS300Public/2016 is a file called “message”.

```
ssh zeus.cs.pacificu.edu
cd /home/CS300Public/2016
```

- Copy the file ‘message’ to the directory CS300 in your home directory on your local machine

```
scp message punetid@machinename:CS300
```

- List the contents of this file
- Make a backup of this file and call the backup message.bk
- Remove message.bk

Problems To Work
See Me With Questions

1. Watch the video Basic Linux Commands at http://zeus.cs.pacificu.edu/PacificCSVideos/linux/basiclinux.html
2. Find a program to take screenshots. What is the name of that program?
3. What does the command **`df`** do? Use **`man df`** and/or the Web.
4. What does the **`-h`** option to **`df`** do?
5. What does the command **`cal`** do?
6. How would you copy the file **`prog.c`** from the present working directory to the parent directory? That is, list the linux command to do so. There is more than one command.
7. Make a folder CS300 in your Documents folder. Copy the file **`Hound.txt`** from **`/home/CS300Public/2016`** on zeus into **`CS300`**.
8. The command **`grep -i hound Hound.txt | wc -l`** outputs the number of lines containing the word hound. Run the command and state the number of lines containing hound.
9. In your own words, describe the difference between **`ssh`** and **`scp`**.