CS 300 Data Structures

Introduction

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 12.1 64-bit OS

UNIX OS

- UNIX OS is made up of:
  - The kernel
  - The shell
  - The programs
- GNU/Linux
  - Linux Kernel
  - GNU Tools (ls, bash, gcc)
  - Programs (Firefox, Chrome, Eclipse, KDE)

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
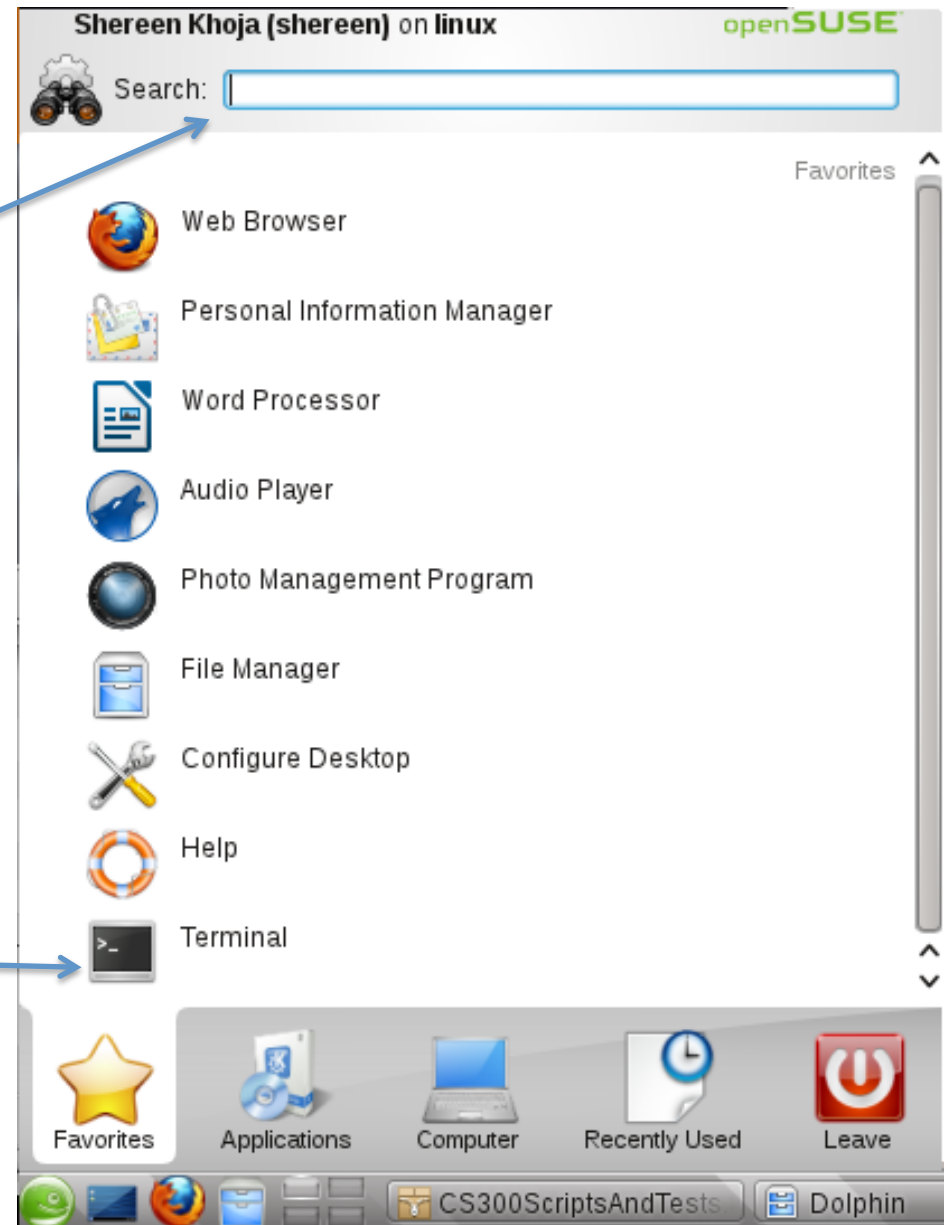 - Windows = folder
  - UNIX = directory

Login!

Start a terminal

Type terminal here

OR

Scroll down in your favorites

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

```
shereen@linux:~> uname -a
```

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 .bash   .profile

```
shereen@linux:~>alias ls='ls —al'
```

Window Manager

- KDE
  - default in the lab
- GNOME
  - main competitor to KDE
- Lightweight window managers
  - LXDE
  - XFCE

Let's add an Icon

- Right Click Desktop widget
- Create new | Link to Application
- Geany
- Application
  – Command : /usr/bin/geany
- 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

Problems

1. Change your password
2. Create a directory called CS 300 (Linux is case-sensitive)
3. Other than your directory, name two other directories at the same level as yours
4. What do you think is the meaning of ls ~/..

Write your answer down before testing

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

Problems

On Zeus, in the directory /home/CS300Public/2012 is a file called "message".

- ssh zeus.cs.pacificu.edu
  cd /home/CS300Public/2012

- 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

scp

- Copy a file from zeus to your local machine

  1. `scp message punetid@machinename:CS300`
     - `shereen@zeus:/home/CS300Public/2012> ls`
     - `message`
     - `shereen@zeus:/home/CS300Public/2012> scp message shereen@ralph:CS300`
  2. `scp shereen@zeus.cs.pacificu.edu:/home/CS300Public/2012/message .`

More Linux Commands

- /home/CS300/Hound.txt contains the text of THE HOUND OF THE BASKERVILLES By A. Conan Doyle

- from Project Gutenberg

- How many lines in the book contain the word "hound"?

- grep -i hound Hound.txt | wc -l

Homework

1. Using the Lizard menu, find a program to take screenshots. What is the name of that program?
2. What does `man man` do in a linux terminal?
3. What does the `-h` option to `ls` do?
4. How can you count the number of characters in the text file "message"?
5. How can you count the number of lines in the file "message"?
6. What does the command `cal` do?
7. In your own words, describe the difference between `ssh` and `scp`.

*   Turn in your answers to the above questions on Wednesday by 9:15am.