Outline

- Class organization
- Introduction to Unix
- Creating a Computer Science account

- To be done by the next class
  - Have an account on Computer Science Servers
  - Read “man ls” and “man chmod”
Announcements

- Textbook and class materials
  - The textbook for this class is “Learning the UNIX Operating System” 5th Edition (by Jerry Peek et al., O’Reilly, 2002)
    - I will follow the textbook only loosely though
  - “UNIX Power Tools” 3rd Edition (by Shelley Powers et al., O’Reilly, 2002) is NOT required
    - But it provides a lot of expert tips on how to do certain jobs effectively
  - I will also include papers from the literature to cover shell programming and some other topics
Announcements – cont.

- About this class
  - Attendance is required
  - This class will be more interesting if you participate in-class activities by answering questions and sharing your thinking and ideas
    - It will also prepare you better for other computer science courses (such as computer organization and operating systems)
    - I will also know you a lot better if you participate often.
Announcements – cont.

- The homework assignments (tentative)
  - Homework #1: UNIX commands for files and directories
  - Homework #2: File editing using vi and emacs
  - Homework #3: Input/output redirection
  - Homework #4: Basic shell programming
  - Homework #5: Shell programming II
  - Homework #6: Makefile and make utilities
Expectations

- You are expected to do all the assignments on your own
  - Note that consequences of violating the honor code can be very serious
- By the end of this course, you are expected to be able to become an expert of using a UNIX system
- You are expected to know how to read and understand UNIX online manuals
Frequently Asked Questions

- Is this an easy course?
  - Relatively speaking, this course is an easy one as it does NOT require heavy programming and anyone who is willing can complete all the assignments.

- Will everyone get a good grade in this class?
  - Not necessarily so. If you do not do the work, you can actually fail this class (which happened in the past). Note that there will be NO curving in this class and so you will be evaluated based on what you have learned.
I know how to do a lot of fancy things on the web using existing tools already and what we are going to cover in this class seem very primitive. Why is this course important?

This course provides first steps for you to understand how computers work (not just how to select menus and click buttons) and to do certain tasks more effectively. Ultimately, the goal is to let YOU become a computer science expert for creating next generation algorithms, tools and utilities that many others will use (you can also make a good living and even a fortune (if you are lucky enough))
“A trade like programming needs a craft background. Also, because computers have become ubiquitous, some programming should be taught in primary and secondary school alongside woodwork, cooking, and the like. This would be helped if the popular operating systems replaced their menu and click facilities with a scripting and command-line facility. The menu/click style of use drives the user along paths chosen by the application or operating system developer. A scripting and command-line facility would let the learner compose and develop ways to control the computer and could lead naturally into coding programs.” (p. 87)

Frequently Asked Questions – cont.

- But I have been using Linux on my own for years and use UNIX commands routinely. What can this class offer me?
  - Well, in this case, you need to talk to me and I will work with you to design assignments suitable for you. However, you still need to take the midterm and final exams.
Opening the Box
A Motherboard
They are connected together using buses (i.e., wires)
Displaying a File on Screen

- Suppose that we are hardware experts (i.e., we know everything about the hardware) and need to develop a program to read from a file and display the content on the screen, what should we do?
  - Essentially what “more” or “less” UNIX command does
Hierarchical Abstraction

A fundamental principle in computer science is hierarchical abstraction
Basic Components of a Computer System

- CPU (Central Processing Unit, "Processor")
  - Brain of a computer system

- Main memory
  - Random access memory (RAM)
  - Stores running programs

- Input/output/storage devices
  - Keyboard, mouse, scanner (input devices)
  - Monitor, printer (output devices)
  - Mass storage (hard drives (fixed and removable), CD-ROM)

- Operating system
  - Oversees interaction of hardware components
  - Provides interface between software and hardware
  - Provides interface to user to run programs and manage "files"
Brief History of UNIX

- Dennis Ritchie and Ken Thompson of Bell Laboratories developed the Unix operating system in the early 1970’s
  - As a multi-user, multitasking operating system for scientific and professional users
  - There were two main versions of UNIX for a long time: UNIX releases from AT&T and from the University of California at Berkeley (BSD)
  - Recent versions include Linux (and its variations) and MAC OS
- See http://www.unix.org/what_is_unix/history_timeline.html (not required for exams)
Major Components of the Unix OS

- **Kernel**
  - The master control program to control both hardware and software
  - Schedules tasks and provides multitasking and multi-user operations
  - Manages resources

- **Shell**
  - Interprets user commands
  - Passes user commands to the kernel for execution (executes programs)

- **File System**
  - Information organized as files and directories (special files)

- **Utilities**
  - Software tools provided as part of the OS
Logging in to a CS Machine

- Machines available to you at the Computer Science Department
  - Shell (“shell.cs.fsu.edu”) - Use this one generally (Linux OS)
  - Linprog (“linprog.cs.fsu.edu”) - Use for programming (actually a stack of “linprog1” – “linprog4”, Linux OS)
  - Prog (“program.cs.fsu.edu”) – Also for programming (“program1” – “program4”, Solaris OS)

- SSH (Secure Shell)
  - Use an SSH client program to connect to CS machines
  - SSH software can be obtained from http://www.help.fsu.edu/Network-Help/SSH for home use

- New Account Application
  - http://system.cs.fsu.edu/newusers/newaccount.php
  - Use SSH Client to connect to "shell.cs.fsu.edu"
  - username: newacct
  - password: newacct
  - Carefully follow rules for creating your password.
  - Remember to record / remember your username and remember your password
Variety of Shells

- Some aspects
  - Prompt ($, %, >, machine you are on, etc)
  - History mechanism (arrow keys), string completion (tab)
  - Command line editing

- Different shells
  - sh: Bourne shell, (S.R. Bourne, good scripting capabilities)
  - csh: C shell, (UC Berkeley, closer to C syntax)
  - ksh: Korn shell, (David Korn, better interactivity)
  - bash: Bourne-again shell (built on sh with more features)
  - tcsh: T shell: (Tenex shell) similar to C shell, default on Linux /Intel installations, default on CS accounts
Syntax of UNIX Command Lines

- A UNIX command may have arguments, which can be an option or a filename.
- The general format for UNIX command lines is
  - `command option(s) filename(s)`
    - A command is typically in lowercase
    - Options modify the way in which a command works
      - Options are often single letters prefixed with a dash
      - Some of options can be made from complete words
    - There are also special characters (such ‘>’, ‘<‘, ‘&’, ‘|’, ‘;’, ‘(‘, ‘)’)

Online Manual Pages of UNIX Commands

- UNIX systems come with manual pages and you can access them by typing “man UNIX-command”
  - For example, “man man”
- If you are not sure of the complete spelling of a UNIX command, you can see the available matching UNIX commands using the TAB key
  - If the match is unique, the shell will complete the rest
  - If the match is not unique, you can use CTRL-D to see all the matches
Finding UNIX Commands

- You can use “apropos” to search for UNIX commands whose description contains any of the given words
  - `apropos pico`
- You can also obtain a short description of a UNIX command using “whatis”
  - `whatis pico`
  - `whatis chmod`
Next Time

- Common UNIX commands for files

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