Lecture 1

45 minutes on Th 1/28/16

(due to delayed opening)

Operating Systems

- Review Syllabus
  - read the warning about the size of the project
  - make sure you get the 6th edition (or later) of the book
- Class Grades Server
  - Grades.cs.umd.edu
- Program #0 Handout
  - its due in just under one week
  - purpose is to get familiar with the simulator
- Discussion Sections
  - will focus on the project and meet only once a week (W)
- Reading
  - Chapter 1
  - Chapter 2 (for Tuesday)

What is an Operating System?

- Resource Manager
  - Resources include: CPU, memory, disk, network
  - OS allocates and de-allocates these resources
- Virtualizer
  - provides an abstraction of a larger (or just different machine)
  - Examples:
    - Virtual memory - looks like more memory
    - Java - pseudo machine that looks like a stack machine
    - VM - a complete virtual machine (can boot multiple copies of an OS on it)
- Multiplexor
  - allows sharing of resources and protection
  - motivation is cost: consider a $40M supercomputer

What is an OS (cont)?

- Provider of Services
  - includes most of the things in the above definition
  - provide “common” subroutines for the programmer
    - windowing systems
    - memory management
- The software that is always loaded/running
  - generally refers to the Os *kernel.*
    - small protected piece of software
- All of these definitions are correct
  - **but** not all operating have all of these features

Closely Related to an Operating System

- Hardware
  - OS is managing hardware resources so needs to know about the ugly details of the hardware
    - interrupt vectors
    - page tables
    - I/O registers
  - some features can be implemented either in hardware or the OS
    - Example: page tables on MIPS
- Languages
  - can you write an OS in any language?
    - No: need to be able to explicitly layout data structures to match hardware

OS Related Topics (cont)

- Language Runtime systems
  - memory management requirements
    - explicit heap management
    - garbage collection
    - stack layout
  - concurrency and synchronization
  - calling convention (how are parameters passed)
- Data Structure and Algorithms
  - efficient access to information in an OS
    - for most things need linear time and space
    - for many things want log or constant time