Week 1 (Jan 4 - 8)

Monday

Door code is: *8896*

Notable software: VMware, VirtualBox, lldb, dtrace

See git2.soe.ucsc.edu

Wednesday

Get a feeling for estimating numbers. E.g. Time to perform disc operation, # of disc operations per second

Operating System

- Provides useful abstractions
- Standardizes interface to use across different hardware
- Manages resources
  - Each program gets time and space
- Conflicting goals
  - Use hardware efficiently
  - Max performance per user

Hardware Generations

First gen

- One job at a time
  - Enter program (by rewiring)
  - Run it
  - Record result
- Problem: Wasted time
  - Idle during first and last step
  - Very expensive

Second gen - Batch System

- Batch system using cards and tape
- Input card -> input tape -> output tape -> printer
  - Allowed expensive machine to be used more efficiently
  - Inexpensive machines produced tapes and printed
- Later used discs

Third gen - Multiprogramming

- Multiple jobs in memory
  - Processor switched between them when slow IO was required
- Timesharing
  - Allowed multiple jobs to be active at once

Friday

Storage speeds

Storage Type	Time
Register	.4 ns
On-chip cache	4 ns
Cache	10 ns
DRAM	50 ns
Flash	100 micros
Disk	5 ms
Tape	50 s

Disk Drive Structure

- Data stored on surfaces
  - Up to two surfaces per platter
  - One or more platters per disk
- Data in concentric tracks
  - Broken into sectors
    - 256B - 1KB
- Data read by heads moved by actuator

Flash Memory

- Divided into Erase Blocks
  - Erased before written
  - Erase blocks 256KB - 1MB+
- Written in Pages
  - 64 - 256 pages per erase block
- Flash Translation Layer (FTL)
  - Manages device
  - Makes it look like Disk

Memory

- Single base/Limit Pair: Set for each process
- Two base/limit registers: One for program, one for Data