CS 1550: Introduction

Jonathan Misurda
jmisurda@cs.pitt.edu
http://www.cs.pitt.edu/~jmisurda/

Operating Systems

- Manage Resources
- Abstract Details

Manage Resources

- CPU Time
- Memory
- I/O Devices
  - Disks/Filesystems
- Security

Abstract Details

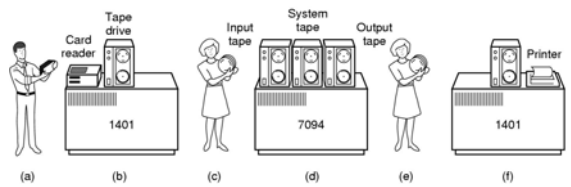
- Exclusive access to the CPU(s)
- Huge amounts of dedicated RAM
- Exclusive access to I/O devices
- Transparent security

In short, **SHARING**

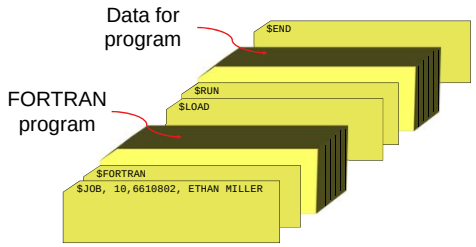
Varieties of OS

- Mainframe OS
- Server OS
- Parallel Computer OS
- Personal Computer OS
- Real-Time OS
  - Hard real-time
  - Soft real-time
- Embedded OS
- Smart Card OS

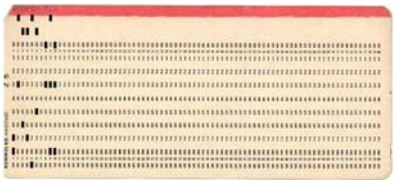
Ye Olde Computer



Ye Olde Program



Punchcard



Why Study History?

Ontogeny Recapitulates Phylogeny

Development of the species is mimicked by the gestation of an individual

Or:

What's old will be new again

Multiprogramming

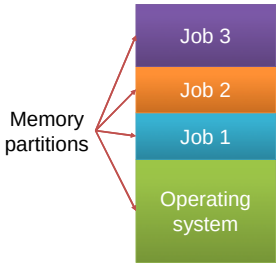
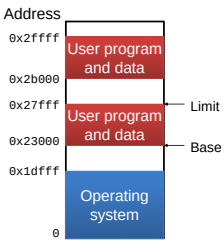
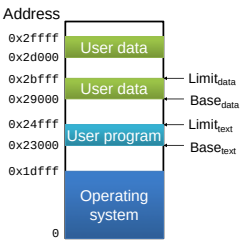
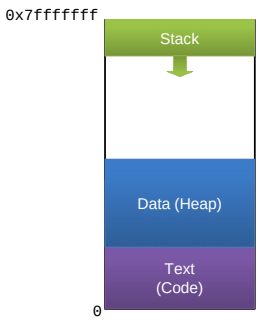


Image Protection

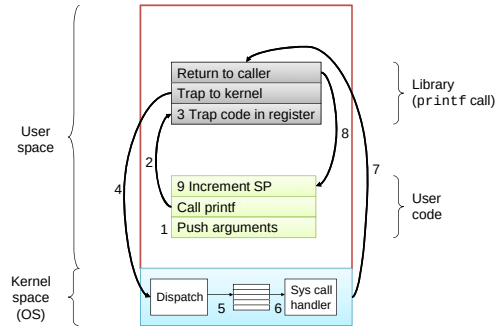




Process's Address Space



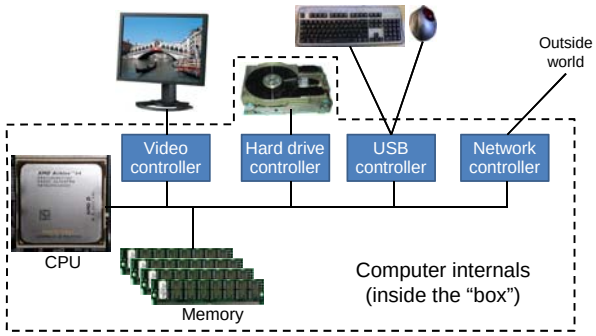
System Call



Context Switch

Switching from one running process to another

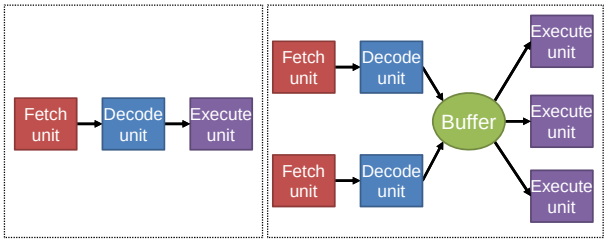
A Simple Computer System



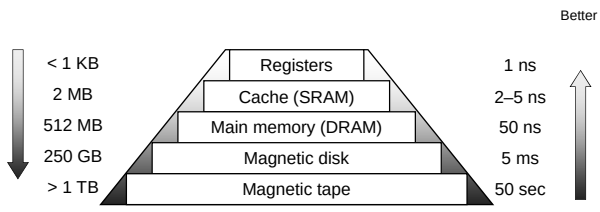
Protect and Share

- CPU time
  - Preemption
- Memory
  - Address Spaces/Virtual Memory
- I/O
  - Spool
    - Simultaneous Peripheral Operation On Line
- Security

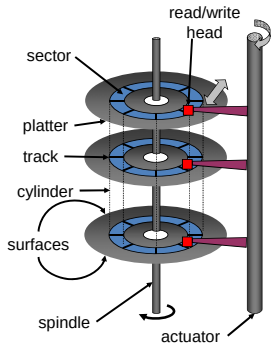
CPU Architecture



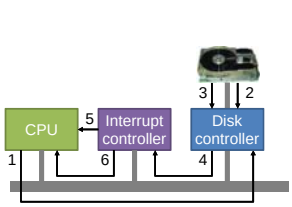
The Memory Hierarchy



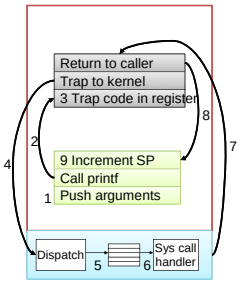
Hard Drive Internals



I/O Via Interrupts

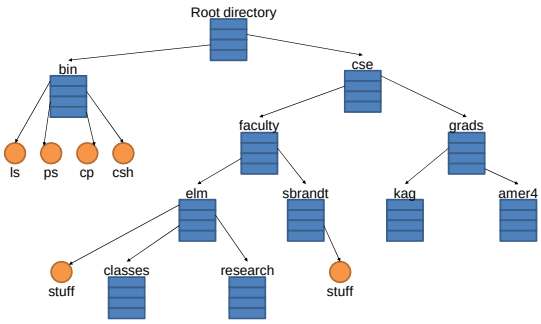


Hardware View

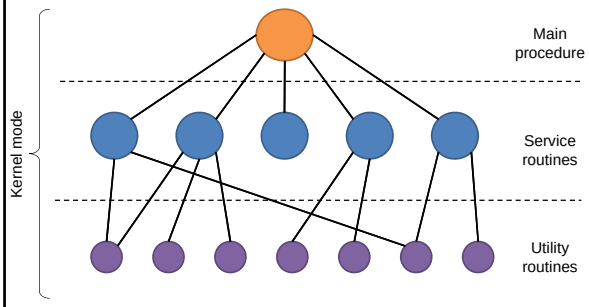


Software View

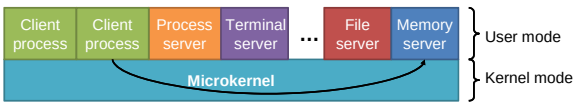
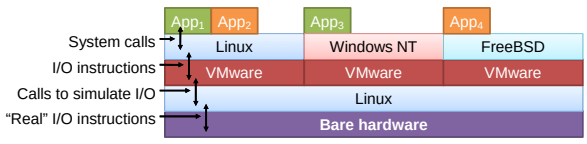
Hierarchical File System



Monolithic OS



Microkernel



Virtual Machines