

# CS 460

## Operating Systems

TTH 9:40-10:55am

Chadd Williams

Office Hours

M	2:00-3:30
Tues	11-noon
Wed	2:00-3:30

# Overview

- Practical introduction to Operating Systems
- Topics
  - Purpose
  - History
  - Design Issues/Structure
  - Devices
  - System (Kernel) vs User mode
  - Concurrency/Deadlock
  - Processes/Threads
  - Multi-Core CPUs
  - Memory Management
  - Security

# Syllabus

- *Operating System Concepts* (7<sup>th</sup>), Silberschatz, et al.

- Grades:

Midterm 1	15%	March 11
Midterm 2	15%	April 20
Final	25%	May 14
Homework/Quizzes	5%	
Programming Projects	40%	

- **Quizzes:** frequent, unannounced, open-note quizzes will be given
- **Late Policy:** No late assignments accepted
- **Grade Complaints:** one paragraph summary of why the grade is wrong, **within one week of receiving the graded material**
- All projects are *individual* projects
- <http://zeus.cs.pacificu.edu/chadd/cs460s10>
- Don't forget about the CS Message boards

# Introduction to Operating Systems

- Read Chapter 1!
  - Definition of an Operating System:
  - Kernel:
  - What is not part of the OS?
  - Linux vs GNU/Linux?
- Computers that need an OS:
  - How are their needs different?

# Goals of the OS

- Perspectives:
  - User View:
    - Who is the user?
  
  - System View:
    - Who is the system?

# The Computer

- What does a computer really look like?

- Startup Sequence

# We booted!

- Now what?
- Interrupts:
  - Characteristics:
  - Hardware:
  - Software:
    - Trap
  - Interrupt vector:

# Memory System

- Random Access Memory
- Registers
  - Instruction register
  - data registers
  - load
  - store
- Caches



# Disk Storage

- Magnetic Tape
- Magnetic Disks
  - RAM spills over to disk
  - Virtual memory
- USB drives
  - Flash memory

# Devices

- Device controller
  - specialized chip
  - buffer
  
- Device driver

# System Architecture

- Single Processor System
- Multiprocessor System
  - Increased throughput
    - Speed up approaches  $N$  for  $N$  processors (Ahmdal's Law)
  - Economy of scale
  - Increased reliability
  - Asymmetric MP
  - SMP
- Multi core System
  - dual-core
  - quad-core

# System Architecture, cont.

- Blades
- Clusters
  - One OS many computers
  - Beowulf cluster – <http://www.beowulf.org/>

# OS Pieces

- Multiprogramming
  - Job
  - Switching
- Time sharing/multitasking
  - Response time
  - Pre-emptive MT
- Process
- Scheduling
  - Job
  - CPU

# OS Pieces, cont.

- Virtual Memory
- Physical Memory
- Security

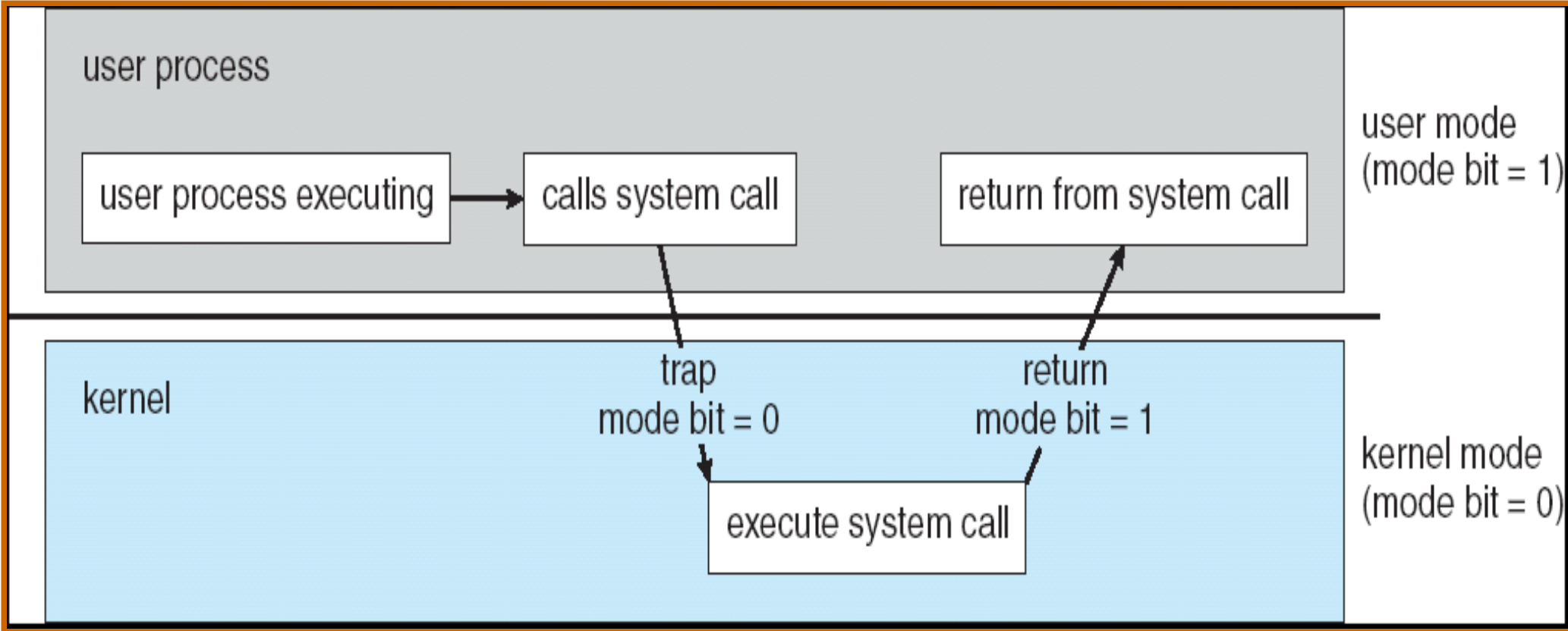
# Operation

- Dual Mode
  - Kernel mode
    - { Supervisor | System | Privileged } mode
    - Hardware bit
    - Privileged instructions
      - Based on CPU type
      - I/O control
      - Interrupt management
      - Stop/Halt
      - Memory management
  - User mode
    - **System calls**

No mode bit on the original Intel 8088 chip

Hence, MS-DOS originally not dual mode!

# Dual-Mode, in action





# Process Management

- Process
  - Active program
  - Resources

# Memory Management

# Read Chapter 2