

CSE451 Midterm Review

October 25, 2007

“Open Forum” review session at
6:30-7:30pm in EE037

Start off

- HW4s handed back
- Majority of students showed firm grasp of concepts from problem set
- Many interesting “solutions” to the traffic deadlock problem
 - Crane to lift cars out of intersection and throw them away
 - Getting rid of the mutual exclusion condition by allowing cars to occupy the same space at the same time
- Mean = 17/18

Admin for Midterm

- Bring a blue/green exam booklet
- Bring a pen or pencil
- Exams not accepted w/o booklet.
- Declare all assumptions you make in your implementations

Midterm coverage

- Generally, you are responsible for all class material covered so far:
 - All lecture topics
 - All assigned reading
 - All material discussed in homeworks
 - All projects

What have we covered so far?

- Operating Systems Structures
- Process Management
- Threads
- CPU Scheduling
- Process Synchronization:
 - locks, semaphores, monitors
- Deadlocks

Processes

- What is a process?
- What kind of information is in the Process Control Block?
- What occurs when `fork()` is called?
- How does `exec()` differ from `fork()`?

Threads

- Describe the difference btwn
 - kernel threads
 - user threads
- What occurs in a thread context switch?
- How to implement threads (knowledge from project 2)

Context switching

- What occurs during a context switch?

Scheduling

- Preemptive vs non-preemptive scheduling
- Scheduling algorithms:
 - How are they different?
 - How do we quantify algorithm performance?
- FCFS
- SJF
- Priority scheduling
- Round-Robin

Synchronization

- Problem: Two concurrent threads accessing shared data
- Solution: Establishing mutual exclusion
- What methods are there for establishing mutual exclusion?

Locks

- Lock provides two operations
 - acquire()
 - release()
- What underlying implementation occurs here?
- How to implement spinlocks?

Semaphores

- What is a semaphore?
- How do we use semaphores to assert mutual exclusion?
- How to implement a semaphore?

Monitors

- How does a monitor differ from a semaphore?
- What are condition variables?
 - How do we use them to accomplish the function of monitor?
- How to implement a monitor?

Deadlock

- What is deadlock?
- What are the four conditions for deadlock?
- How to determine deadlock using resource graphs?
- Deadlock reduction
 - Prevention
 - Avoidance
 - Detection