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 cards 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 between
  – 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