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CS 4/53201

Final Exam

Operating Systems

Tuesday 10 December 2002

1. To protect against damaging actions by users, certain CPU instructions are considered to be privileged instructions, meaning they only run when the CPU is set to kernel / monitor mode. How does the CPU get set to kernel mode? Be specific. (10 points)
2. Consider a time-sharing OS with a round-robin CPU scheduler.
 - a. Briefly summarize this scheduling algorithm. (10 points)
 - b. What is the effect if the time slice is chosen to be too short or too long? (5 points)

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3. When a thread performs a semaphore Wait operation, it may have to block. How does being blocked on a semaphore Wait compare to being blocked waiting on an I/O operation to complete? (5 points)

4. Deadlock can be eliminated if the “mutual exclusion” criterion can be avoided. Explain how printer spooling can avoid mutual exclusion and thus prevent deadlock from occurring. (10 points)

5. Consider the memory management technique of paging and the technique of allocating disk space in fixed-size blocks.

a. In what ways are these two techniques similar? (10 points)

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b. In what ways are these two techniques different? (10 points)

6. In demand paging, the ideal page replacement algorithm is the Optimal algorithm, where the page evicted is the page that will be referenced the farthest in the future. Since this algorithm is impossible to implement, the Least-Recently-Used (LRU) algorithm is considered instead.

Explain why the LRU algorithm should approximate the Optimal algorithm. (10 points)

7. There are many techniques for organizing the disk blocks that comprise a file.

a. What advantages does continuous allocation have over indexed allocation? (10 points)

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9. Explain the concept of mounting a remote file system. Draw a picture if you think that might aid in your explanation. (15 points)

10. Linux is distributed under the GNU General Public License (GPL). What does this mean? (10 points)

11. When a new version of Windows comes out, why is it likely to run programs compiled under earlier versions of Windows (even old DOS program), yet it may require a new device driver for a printer that you bought only last year? (10 points)