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CS 4/53201 **Exam #2** **Operating Systems**

Wednesday 6 November 2002

1. Define the network term "connection-oriented communication". (10 points)

2. Shortest-Job-First (SJF) and Shortest-Remaining-Time (SRT) are two related CPU scheduling algorithms.

   a. How do these two algorithms differ with respect to picking the next process to run on the CPU? (8 points)

   b. How do these two algorithms differ with respect to their treatment of processes with a long CPU burst? (8 points)

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3. It is theoretically possible to prevent deadlock by forcing a process to request all resources at the beginning of its execution and release them at the end of its execution.

   a. Why would this prevent deadlock? (6 points)

   b. Why is this solution impractical? (6 points)

4. Coffman's algorithm for deadlock detection can be summarized as:
   Every process is initially unmarked.
   1. Look for an unmarked process Pi for which the i-th row of the Request matrix is less than or equal to the Available vector
   2. If such a process is found, add the i-th row of the Current matrix to the Available vector, mark the process, and go back to step 1
   3. If no such process exists, the algorithm terminates

   When the algorithm terminates, any unmarked processes are deadlocked.

   What does it mean to mark a process? Why is there no deadlock in the system if the algorithm results in every process being marked? Be explicit in your answer. (10 points)

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5. When a process is loaded into memory, it has four major components. List those four components and briefly describe what each is used for. (20 points)

6. There are many techniques for allocating memory and providing transparency and safety / protection.

   a. What advantages does segmentation provide over dynamic relocation? (10 points)

b. What disadvantages of dynamic relocation are retained by segmentation (i.e., what disadvantages do the two techniques share)? (10 points)

7. In paging, what is the function of the page table? (12 points)