

CSCI-GA.2250-001 - Operating Systems - Practice problems

1. What is the difference and/or relationship of the following terms: multiprogramming, multi-user, multiprocessor, and multithreading?
2. The four conditions (mutual exclusion, hold and wait, no preemption, and circular wait) are necessary for a resource deadlock to occur. Give an example to show that these conditions are not sufficient for a resource deadlock to occur. When are these conditions sufficient for a resource deadlock to occur?
3. Suppose there is a resource deadlock in a system. Give an example to show that the set of processes deadlocked can include processes that are not in the circular chain in the corresponding resource allocation graph.
4. A computer with 32-bit address uses a two-level page table. Virtual addresses are split into a 9-bit top-level page table field, an 11-bit second-level page table field, and an offset. How large are the pages and how many are there in the virtual address space?
5. We have seen many page replacement policies. Many of them use the R bit that indicates a page has been referenced recently. TLBs in Intel processors do not contain an R-bit. What do you think is the reason?
6. Can a page be in two working sets at the same time? Explain.
7. What would happen if the bitmap or free list containing the information about free disk blocks was completely lost due to a crash? Is there a way to recover from this disaster?
8. In which of the four I/O software layers is each of the following done.
 - a) Compute the track, sector, and head for a disk read.
 - b) Writing commands to the device registers
 - c) Checking to see if the user is permitted to use the device.
 - d) Converting binary integers to ASCII for printing.
9. What is the relationship between race condition and critical region?

10. Choose only one answer from the following

1. If you want to write a program to multiply two matrices in a parallel way. Which method will be faster?

a. threads b. processes c. multiprogramming (e.g. pipes) d. just serial program

2. Shortest job first is more suitable for:

a. Real-time system b. Batch system c. Interactive system d. In all of them

3. Which of the following is NOT an advantage of using threads

a. Makes programming model simpler when many things in an application are going on at once.

b. They are easier to create than processes

c. Threads of a program have separate address spaces hence increase protection.