

1. Show how to implement the bounded buffer problem using semaphores. Show the sender, receiver, and all global variables with initializations.
2. Explain the difference between (1) Deadlock prevention, (2) Deadlock avoidance, and (3) Deadlock detection and recovery.

3. Translate the following real addresses into virtual addresses using the following *segment* table. Addresses are specified in decimal, with four digits per address. The first two digits of the virtual address are the segment number. If an address can't be translated, write "Seg. Fault" in the real address box.

Segment Table.

0012
1000
0300
2222
0370
1213
4422
0000
7777

Virtual	Real
0012	
0433	
0621	
0914	
0211	
0300	
0727	
0502	
0823	
0115	

4. Given the following five processes and associated burst times, give the GANTT chart for the scheduling algorithms First Come First Served (FCFS), Shortest Job First (SJF), and Round Robin with a quantum of 3. Give the average wait time for each algorithm

Process Number	Burst Time
0	2
1	9
2	3
3	1
4	4

5. Assume that a process is assigned four page frames and that demand paging is being used. Given the following reference string, how many page faults will occur with the LRU algorithm, the FCFS algorithm and the OPT algorithm? Show your work for each algorithm

1,2,3,4,5,1,3,2,1,3,4,5,1,5,4,2,3,1

6. Suppose you have a file that occupies sectors 100,101,102, 300, 21, 22, 23, 24, 7, 400, and 401. (in that order.) The file is named "tolam.txt". Show a typical directory entry for the three types of file organization, multiple-contiguous-blocks, linked-list, and indexed. Assume that all file information is stored in the directory entry.

7. Give three properties of the NTFS that distinguish it from the indexed, linked-list, and multiple-contiguous-blocks file organizations. (There are several correct answers to this question.)
8. What is middleware? Give an example of middleware.

9. What is a driver, and why is it needed?

10. What four things would you expect to find on any hard disk, regardless of the file organization?