2005 Operating System Final (CLD)

1. (10%) What are the differences between the following pairs?

a. Paging, Segmentation.

b. Deadlock, Starvation.

1. (5%) What is Belady's Anomaly.
2. (10%) Describe the scheme of inverted page table for address translation.
3. (10%) What is a race condition? Give an example of a race condition. Use either the semaphore or the monitor and explain how it can be used to prevent race conditions.
4. (10%) Consider a paging system with page table stored in memory, where a memory reference takes 100 nanoseconds. If wer add associative registers, and 80 percent of all page-table references are found in the associative registers, what is the effective memory reference time? (Assume that finding a page-table entry in the associative registers takes zero time, if the entry is there.)
5. (20%) Consider the following set of processes, with the length of CPU burst time and arrival time given in milliseconds:

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Process Arrival time Burst time

\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

P1 0 8

P2 1 4

P3 2 9

P4 3 5

\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

a. Draw a Gantt chart and determine the average waiting time for FCFS

(First Come First Served) scheduling algorithm.

b. Draw a Gantt chart and determine the average waiting time for RR

(Round-Robin) scheduling algorithm with a quantum time of 4 unit.

c. Draw a Gantt chart and determine the average waiting time for preemptive

Shortest-Job-First (i.e.,Shortest Remaining Time First) scheduling

algorithm.

d. What is the average turnaround time for the RR scheduling algorithm in

part(b)?

1. (15%) Consider the following page reference string : 7,0,1,2,0,3,0,4,2,3,0,3,2,1. How many page faults would occur on the following page replacement algorithms? Assume that there are three frames in the memory.

a. The LRU algorithm.

b. The FIFO algorithm.

c. The Optimal Replacement algorithm.

1. (20%) Suppose that a disk drive has 200 cylinders, numbered 0 to 199. The drive is currently serving a request at cylinder 143, and the previous request was at cylinder 125. The queue of pending requests, in FIFO order, is 86,147,91,177,94,150,102,175,130 Starting from the current head position. What are the head movement sequences and the total distance (in cylinders) that the disk arm moves to satisfy all the pending requests, for each of the following disk scheduling algorithms?

a. SSTF (shortest-seek-time-first)

b. SCAN

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# Answers