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10MCA35

Third Semester MCA Degree Examination, June/July 2014
Operating System

Time: 3 hrs. Max. Marks:100

Note: ***Answer any FIVE full questions.***

1 a. Explain the following:
   i) Multiprocessor systems.
   ii) Distributed systems.
   iii) Handheld systems.
   iv) Clustered systems. **(10 Marks)**

   b. What is an operating system? Explain various services provided by an operating systems. **(10 Marks)**

2 a. What are system calls? Briefly explain different categories of these. **(07 Marks)**

   b. What is a scheduler? Explain various types of schedulers briefly. **(08 Marks)**

   c. What is a thread? Briefly mention various types of threads. **(05 Marks)**

3 a. With the help of a state transition diagram, explain various states of a process. **(06 Marks)**

   b. Explain process control block. **(04 Marks)**

   c. Consider the following set of processes, with the length of the CPU-burst time given in milliseconds:

Process	Burst time	Priority	Arrival time
P_1	8	3	0
P_2	1	1	1
P_3	2	3	2
P_4	1	4	3
P_5	4	2	4

   The processes are assumed to have arrived in the order P_1, P_2, P_3, P_4, P_5 all at time 0.
   i) Draw four Gantt charts illustrating the execution of these processes using FCFS, SJF (preemptive), priority (preemptive) and Round Robin (time quantum = 2) scheduling.
   ii) What is the waiting time of each process for each of the scheduling algorithm in part (i)? **(10 Marks)**

4 a. What is a deadlock? List the four necessary conditions for a deadlock to occur. **(06 Marks)**

   b. Bring out the difference between deadlock avoidance and deadlock prevention scheme. **(02 Marks)**

   c. Consider the snapshot of a system:

Process	Allocation	Max	Available
	ABCD	ABCD	ABCD
P_0	0012	0012	1520
P_1	1000	1750	
P_2	1354	2356	
P_3	0632	0652	
P_4	0014	0656	

Answer the following questions using the Banker's algorithm:

i) Is the system in a safe state?

ii) If a request from process P_1 arrives for (0, 4, 2, 0), can the request be granted immediately?

iii) If a request from process P_4 arrives for (0, 2, 2, 0), can the request be granted immediately? **(12 Marks)**

5 a. Define critical section problem and explain the necessary characteristics of a correct solution. **(06 Marks)**

b. Explain readers-writers problem and discuss the solution using semaphores. **(08 Marks)**

c. Explain the n-processes hardware solution for the critical section problem. **(06 Marks)**

6 a. What is fragmentation? Explain their types with examples. **(06 Marks)**

b. What is a page fault? What actions does operating system take when a page fault occurs? **(08 Marks)**

c. What are the cause of thrashing? **(03 Marks)**

d. What do you mean by segmentation? **(03 Marks)**

7 a. Explain the file allocation methods with their merits and demerits. **(10 Marks)**

b. What is access matrix? Discuss the implementation of access matrix. **(10 Marks)**

8 a. Consider the following page reference string:
1, 2, 3, 4, 2, 1, 5, 6, 2, 1, 2, 3, 7, 6, 3, 2, 1, 2, 3, 6.
How many page faults would occur in the case: i) LRU; ii) FIFO; iii) Optimal algorithms assuming three frames. Note that initially all frames are empty. **(10 Marks)**

b. Suppose that a disk drive has 5000 cylinders, numbered 0 to 4999. 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, 1470, 913, 1774, 948, 1509, 1022, 1750, 130.
Starting from the current head position, what is the total distance (in cylinders) that the disk arm moves to satisfy all the pending requests for each of the following disk-scheduling algorithms?
i) FCFS; ii) SSTF; iii) SCAN; iv) LOOK. **(10 Marks)**

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