Printed Pages : 5

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NMCA-311

(Following Paper ID and Roll No. to be filled in your Answer Book)

PAPER ID : 214317

Roll No. | | | | | | | | | | |

M.C.A. (Semester-III)

SPL. THEORY EXAMINATION, 2014-15

OPERATING SYSTEMS

Time : 3 Hours] *[Total Marks : 100*

Note : Attempt all questions. All questions carry equal marks.

1. Attempt any two questions: [10x2=20]

   (a) Discuss various operating system services in detail.

   (b) Discuss concept of virtual machines in detail with its implementations and benefits.

   (c) Differentiate between the following :

      (i) Trap and Interrupt

      (ii) Hard real time and soft real time system

2. Attempt any two questions: [10x2=20]

(a) Explain the following terms briefly:

(i) Process Control Block

(ii) Inter-process Communication

(b) Differentiate between the following :

(i) Threads and Processes

(ii) User level threads and Kernel level threads

(c) Consider the following set of processes with the length of the CPU burst time given in milliseconds :

PROCESSES	ARRIVAL TIME (ms)	BURST TIME (ms)
P_1	0	7
P_2	3	2
P_3	4	3
P_4	4	1
P_5	5	3

Draw gantt chart and find out average waiting time and average turnaround time for :

(i) FCFS

(ii) SRTF (Preemptive)

(iii) Round Robin (Time quantum = 2 ms)

3. Attempt any two questions: [10x2=20]

(a) What is busy waiting with respect to process synchronization? Explain how semaphore reduces the severity of this problem. Also define the following with examples:

(i) Strong semaphores

(ii) Weak semaphores

(iii) General semaphores

(iv) Binary semaphores

(b) Consider a system with five processes P_0 through P_4 and three resources A, B and C. Resource type A has 10 instances, B has 5 instances and C has 7 instances. Suppose snapshot of a system at time t_0 is following :

PROCESSES	ALLOCATION			MAX			AVAILABLE		
	A	B	C	A	B	C	A	B	C
P_0	0	1	0	7	5	3	3	3	2
P_1	2	0	2	3	2	2			
P_2	3	0	2	9	0	2			
P_3	2	1	1	2	2	2			
P_4	0	0	2	4	3	3			

(i) Calculate the need matrix.

(ii) Is the system in a safe state? If yes, give the safe sequence.

(iii) If a request from process P1 arrives for (1,0,2) instances can the request be granted immediately?

(c) What is dining philosopher's problem? Write a solution for the problem using monitors.

4. Attempt any two questions: [10x2=20]

(a) (i) Explain principle of locality in brief.

(ii) On a system using demand-paged memory, it takes 120ns to satisfy a memory request if the page is in memory. If the page is not in memory, the request takes (on average) 5 ms. What would the page fault rate need to be to achieve an effective access time of 1 micro-sec.? Assume the system is only running a single process and the CPU is idle during page swaps.

(b) On a disk with 200 cylinders numbered 0 to 199, compute the number of tracks the disk arm must move to satisfy all the requests in the disk queue. Assume the last request serviced was at track 143 and the head is moving toward track 0. The queue in FIFO order contains requests for the following tracks:

86,147,91,177,94,150,102,175,130.

Perform the computation for following scheduling algorithms: FCFS, SSTF, SCAN, C-SCAN, LOOK.

(c) Consider that the pages are referenced in the following sequences :

1,2,3,4,5,6,2,1,5,6,3,2,1,3,7,6,3,2,1,2,3,6

How many page faults would occur for the following replacement algorithms, assuming three frames? Remember all frames are initially empty:

(i) FIFO

(ii) LRU

5. Attempt any two questions. [10x2=20]

(a) Discuss the following terms :

(i) File Control Block

(ii) Encryption

(b) Compare various access matrix schemes of implementation and revocation with respect to each other.

(c) Describe program and system threats in detail.

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