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10CS53

Fifth Semester B.E. Degree Examination, Aug./Sept.2020
Operating Systems

Time: 3 hrs. Max. Marks:100

Note: ***Answer FIVE full questions, selecting atleast TWO questions from each part.***

PART – A

1 a. Define an operating system. List the operating systems responsibilities in connection with process management and memory management. **(06 Marks)**

b. Explain the services provided by an operating system that are designed to make using computer systems more convenient for users. **(06 Marks)**

c. With a neat diagram of VMware architecture, explain the concept of virtual machine and benefits of using virtual machine concept. **(08 Marks)**

2 a. Describe the function of various schedulers with a block diagram. **(06 Marks)**

b. Explain the three multithreading models. **(06 Marks)**

c. Consider the following set of process with a length of the CPU Burst time given in milliseconds.

Process	Arrival time	Burst time	Priority
P_1	0	7	3
P_2	3	2	2
P_3	4	3	1
P_4	4	1	1
P_5	5	3	3

i) Draw Gantt charts illustrating the execution of these processes using Shortest Remaining Time First (SRTF), preemptive priority and round robin scheduling (time slice = 1ms)(a smaller priority number implies higher priority)

ii) Calculate average waiting time and average turn around time for each of the scheduling algorithm in part(i). **(08 Marks)**

3 a. Explain critical section problem. Along with an appropriate "C" struct explain the implementation of wait( ) and signal( ) semaphore operations. **(10 Marks)**

b. Explain the solution to classical dining philosopher's problem using monitor. **(10 Marks)**

4 a. What is deadlock? Describe the necessary conditions for a deadlock situation to arise in a system. **(05 Marks)**

b. Explain deadlock detection mechanism for the system with single instance of each resource type. **(05 Marks)**

c. Consider the following snapshot of a system :

Process	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	0	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			

Answer the following questions using Banker's algorithm.

i) What is the content of matrix NEED?

ii) Is the system in "Safe State"?

iii) If the process P_1 requests for one additional instance of resource type A and two instances of resource type C, can the request be granted immediately? **(10 Marks)**

Important Note : 1. On completing your answers, compulsorily draw diagonal cross lines on the remaining blank pages.
2. Any revealing of identification, appeal to evaluator and /or equations written eg, 42+8 = 50, will be treated as malpractice.

PART – B

5 a. Consider the following page reference string :
7 0 1 2 0 3 0 4 2 3 0 3 2 1 2 0 1 7 0 1
for a memory with three frames. How many page faults would occur for LRU, FIFO and OPTIMAL replacement algorithm? **(09 Marks)**
b. With a neat diagram explain paging with Translation Look aside Buffer (TLB). **(06 Marks)**
c. Explain commonly used strategies for dynamic storage allocation. **(05 Marks)**

6 a. List any four common file types along with their extensions and functions. **(04 Marks)**
b. Explain linked file allocation method, with advantages and disadvantages. **(08 Marks)**
c. Describe the methods used for implementing directories. **(08 Marks)**

7 a. Suppose that a disk has 200 cylinders numbered from 0 to 99 and the drive is currently serving a request at cylinder 53. The previous request was at cylinder 70, (i.e, the disk arm is moving towards cylinder 0). The queue of pending requests is 98, 183, 37, 122, 14, 124, 65, 67. Illustrate the disk movement using FCFS, SSTF and SCAN disk scheduling algorithm. Also give the total head movement in each case. **(09 Marks)**
b. Explain sector slipping with an example. **(04 Marks)**
c. What is access matrix? Explain the implementation of access matrix using access lists for objects. **(07 Marks)**

8 a. Explain clone( ) system case in Linux. **(05 Marks)**
b. Explain the components of kernel module support under Linux. **(08 Marks)**
c. Explain process scheduling in Linux. **(07 Marks)**

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