Question Paper

Exam Date & Time: 26-Jun-2024 (02:30 PM - 05:30 PM)

MANIPAL ACADEMY OF HIGHER EDUCATION

FOURTH SEMESTER B.TECH END SEMESTER MAKE-UP EXAMINATIONS, JUNE 2024

OPERATING SYSTEMS [CSE 2226]

Marks: 50 **Duration: 180 mins.**

Answer all the questions.

Instructions to Candidates: Answer ALL questions Missing data may be suitably assumed

1) With the aid of a neat diagram, explain the layered structure of operating system. Identify any three advantages and disadvantages of the layered structure. (5)

A)

B) Discuss any four states of a process. Point out any two differences between a process and a program. (3)

C) Describe the resources that are used when a thread is created. How do they differ from those used when a process is created. (2)

2) Analyze the major drawback of priority scheduling algorithms. Describe a solution for the same. Assume that the following processes are scheduled using shortest remaining time first scheduling algorithm. Use FIFO to break a tie wherever required. (5)

A)

Process	Arrival Time	Burst Time
P1	0	8
P2	1	4
P3	2	2
P4	3	1
P5	4	3
P6	5	2

(a) Show the scheduling order of the processes using Gantt chart.
(b) Determine the turnaround time and waiting time for each process.

B) There are 5 resources RI with 2 instances, R2 with single instance, R3 with 2 instances, R4 with single instance and R5 with single instance (3)

(a) Process PI holding one instance of RI and an instance ofR2 and requesting one instance of R5

(b) Process P2 holding one instance of RI and an instance of R4.

(c) Process P3 is holding one instance of R3 and requesting one instance of R2.

(d) Process P4 is holding one instance ofR3 and requesting for one instance of R4 and requesting one instance of resource R5

(e) Process P5 is requesting for one instance of R3 and holding one instance of R5.

(f) Process P6 is requesting for one instance of R4.

		Draw the resource allocation graph and identify whether deadlock exists? If yes, how many processes are involved in the deadlock? If No, give reason. Justify your answer depending on Yes/No.	
	C)	Write the structure of a process Pi in Peterson's solution. Justify how mutual exclusion is preserved in Peterson's solution.	(2)
3)		(i) Explain the steps involved in basic page replacement with a diagram. (2Marks)	(5)
	A)	(ii) Consider the following page reference string: 6, 7, 8, 9, 6, 7, 1, 6, 7, 8, 9, 1 How many page faults would occur for the following replacement algorithms, with three page frames? Remember that all frames are initially empty. Show the frame contents in each step. (3Marks) (a) FIFO replacement (b) Optimal algorithm	
	B)	Consider a logical address space of 8 pages; each page is 2048 byte long, mapped onto a physical memory of 64 frames. (i)How many bits are there in the logical address and how many bits are there in the physical address? (ii) A 6284 bytes program is to be loaded in some of the available frames= {10, 8, 40, 25, 3, 15, 56, 18, 12, 35}. Show the contents of the program's page table. (iii)Is there internal fragmentation? If yes what is the size of internal fragmentation?	(3)
	C)	Describe is the cause of thrashing? How can the system prevent thrashing using working-Set model?.	(2)
4)		Paging uses Page table associated with each process. Each entry refers to a page and processes reference pages through the pages' virtual addresses. When there are multiple processes, each Page table consist of millions of entries and consume large amounts of physical memory. (i) Propose a solution to the above problem where a large amounts of physical memory for page tables is required.	(5)
	A)	(ii) With the help of a labelled diagram show how this could be done for a 32-bit logical address space of 4-KB page size and 10 bit page number and explain the same	
	B)	Consider a disk drive which has 200 cylinders, numbered 0 to 199. The drive is currently serving a request at cylinder 60. The queue of pending requests, in order, is: 70, 140, 50, 125, 30, 25, 160. Starting from the current head position, calculate what is the total distance (in cylinders) that the disk arm moves to satisfy all the pending requests for following disk-scheduling algorithm? Depict the sequence in a graph. (a) SCAN (b)C-SCAN	(3)
	C)	How does the principle of least privilege aid in the creation of protection system. Justify	(2)
5)		Explain any four file operations.	(4)
	A)		
	B)	Write a short note on (a) Two level Directory (b) File System Mounting.	(3)
	C)	Explain "Global table" and "Access list" implementation of access matrix.	(3)

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