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Question Paper Code : 80100

B.E./B.Tech. DEGREE EXAMINATIONS, APRIL/MAY 2019.

Fourth Semester

Computer Science and Engineering

CS 8493 — OPERATING SYSTEMS

(Common to Information Technology)

(Regulation 2017)

Time : Three hours Maximum : 100 marks

Answer ALL questions.

PART A — (10 × 2 = 20 marks)

1. What is dual mode operation and what is the need of it?

2. List out some system calls required to control the communication system.

3. Give the queueing diagram representation of process scheduling.

4. List out the benefits and challenges of thread handling.

5. Consider the following segmentation table.

Segment	Base	Length
0	219	600
1	2300	14
2	90	100
3	1327	580
4	1952	96

What are the physical addresses for the logical addresses 3400 and 0110?

6. What is thrashing? and how to resolve this problem?

7. Write short notes on file system mounting.

8. What is SSD?

9. Write short notes on driver registration in Linux.

10. List out the methods used to recover from the deadlock.

PART B — (5 × 13 = 65 marks)

11. (a) Explain in detail the different architectures of OS starting from simple structure, layered structure, micro kernels, modules and hybrid system with suitable example OS structures, including google's Android. (13)

Or

(b) (i) Discuss the pros and cons of single processor system, multi core system and clustered system. (8)

(ii) Explain the steps involved to transfer the stored historical information in a magnetic tapes to the CPU for further processing through various storage devices. (5)

12. (a) (i) Explain the dining-philosopher critical section problem solution using monitor. (8)

(ii) Write the algorithm using test-and-set( ) instruction that satisfy all the critical section requirements. (5)

Or

(b) Consider the following snapshot of a system.

Processes	Allocation				Max				Available			
	A	B	C	D	A	B	C	D	A	B	C	D
P_0	2	0	0	1	4	2	1	2	3	3	2	1
P_1	3	1	2	1	5	2	5	2				
P_2	2	1	0	3	2	3	1	6				
P_3	1	3	1	2	1	4	2	4				
P_4	1	4	3	2	3	6	6	5				

Answer the following question using Bankers algorithm.

(i) Illustrate that the system is in safe state by demonstrating an order in which the processes may complete?

(ii) If a request from a process P_1 arrives for (1,1,0,0), can the request be granted immediately?

(iii) If the request from P_4 arrives for (0, 0, 2, 0), can the request be granted immediately? (13)

13. (a) (i) Consider a computer system with 16 bit logical address and 4 KB page size. The system supports upto 1 MB of physical memory. Assume that the actual process size is only 33 KB, page table base register contains 1000, and free frame list contains 13, 11, 9, 7, 5, 3, 1, 2, 4, 6, 8.

Construct the physical and logical memory structures, page table of the corresponding process.

Find the physical address of 13,256 and another logical address with page number 2 and offset of 128.

Discuss about the possible valid-invalid bit and possible protection bits in page table. (8)

(ii) Consider a paging system with page table stored in memory.

(1) If a memory reference takes 50 ns, how long does a paged memory reference take?

(2) If we add TLB and 75% of all page table references are found in TLB, what is the effective memory reference time? (Assume that find a page entry in TLB takes 2ns, if entry is present) (5)

Or

(b) (i) Explain the global and local frame allocation algorithms and their pros and cons. (3)

(ii) 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 for the following replacement algorithms, assuming 1 and 3 free frames. Remember that all frames are initially empty so that first unique page request will all cost one fault each. LRU replacement, FIFO, Optimal replacement, LFU and MFU. (10)

14. (a) Suppose that a disk drive has 5000 cylinders, numbered 0 through 4999. The drive is serving a request at cylinder 143. The queue of pending requests, in FIFO order is 86, 1470, 913, 1774, 948, 1509, 1022, 1750, 130 Starting from the 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? FCFS, SSTF, SCAN, LOOK, C-SCAN C-LOOK. Explain the pros and cons of all disks scheduling algorithms. (13)

Or

(b) (i) Explain in detail the various allocation methods with their pros and cons. (8)

(ii) Brief the various procedures need to be followed in disk management. (5)

15. (a) Discuss the process and memory management in Linux. (13)

Or

(b) Explain the architecture of iOS. Discuss the media and service layers clearly. (13)

PART C — (1 × 15 = 15 marks)

16. (a) (i) Consider the following set of processes with the length of CPU-burst time given in milliseconds.

Process	Burst time	Priority	Arrival time
P_1	10	3	0
P_2	1	1	1
P_3	2	3	2
P_4	1	4	1
P_5	5	2	2

Draw the Gantt chart for the execution of these processes using FCFS, SJF, SRTS, pre-emptive and non-pre-emptive priority, round robin with time slice of 2 ms. Find the average waiting and turnaround time using each of the methods. (10)

(ii) Explain – Multi level queue and multi level feedback queue scheduling with suitable example. (5)

Or

(b) (i) Consider two processes, p_1 and p_2, where $p_1 = 50$, $t_1 = 25$, $p_2 = -75$ and $t_2 = 30$. Can these two processes be scheduled using rate-monotonic scheduling and earliest deadline first scheduling. Illustrate your answer using Gantt charts. (10)

(ii) Explain in detail about paging in 32 bit and 64 bit architectures. (5)