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Question Paper Code : 20417

B.E./B.Tech. DEGREE EXAMINATIONS, APRIL/MAY 2022.

Fourth/Fifth Semester

Computer Science and Engineering

CS 8493 – OPERATING SYSTEMS

(Common to : Electronics and Communication Engineering/Computer Science and Business Systems/Information Technology)

(Regulations 2017)

Time : Three hours | Maximum : 100 marks

Answer ALL questions.

PART A — (10 × 2 = 20 marks)

1. What are the steps in Instruction Execution?
2. Define System Boot.
3. What are Kernel Threads?
4. Describe Context Switch.
5. What is External Fragmentation?
6. Describe Demand Paging System.
7. List out major attributes of a file.
8. What is Mount point'?
9. Define Kernel in Linux Operating System.
10. What is the purpose of fork() and exec() system calls?

PART B — (5 × 13 = 65 marks)

11. (a) (i) Illustrate the flow of control with and without Interrupts. (7)
    (ii) List and explain five types of System Calls. (6)

Or

(b) (i) Explain the basic structure and operations of operating system. (7)
    (ii) Brief about the various types of memories in memory hierarchy. (6)

12. (a) (i) With suitable example, explain about various types of process scheduling algorithms. (7)

(ii) Discuss about the various methods for handling deadlock. (6)

Or

(b) (i) Describe Critical Section Problem with a suitable example. (7)

(ii) Explain with a neat diagram about various multi threading models. (6)

13. (a) Explain briefly about the hardware implementation of Page Table.

Or

(b) Consider the page reference string 7, 0, 1, 2, 0, 3, 0, 4, 2, 3, 0, 3, 2, 1, 2, 0, 1, 7, 0, 1. Calculate the number of page faults could occur for Optimal Page replacement algorithm and LRU page replacement algorithm.

14. (a) Describe about the Sequential and Direct Access methods of information from a file.

Or

(b) How disc space is allocated in Contagious Allocation method? What is the drawback of this method?

15. (a) Illustrate the various components that make up a Full Linux System with a neat diagram.

Or

(b) Explain in detail about the Android Architecture and its components.

PART C — (1 × 15 = 15 marks)

16. (a) Consider the following status of the system.

	Allocation				Max				Available			
	A	B	C	D	A	B	C	D	A	B	C	D
P0	0	0	1	2	0	0	1	2	1	5	2	0
P1	1	0	0	0	1	7	5	0				
P2	1	3	5	4	2	3	5	6				
P3	0	6	3	2	0	6	5	2				
P4	0	0	1	4	0	6	5	6				

Answer the following questions using the banker's algorithm:

(i) What is the content of the matrix *Need*?

(ii) Is the system in a safe state?

(iii) If a request from process P1 arrives for (0,4,2,0), can the request be granted immediately?

Or

(b) It is sometimes said that tape is a sequential-access medium, whereas a magnetic disk is a random-access medium. In fact, the suitability of a storage device for random access depends on the transfer size. The term streaming transfer rate denotes the rate for a data transfer that is underway, excluding the effect of access latency. By contrast, the effective transfer rate is the ratio of total bytes per total seconds, including overhead time such as access latency.

Suppose that, in a computer, the level-2 cache has an access latency of 8 nanoseconds and a streaming transfer rate of 800 megabytes per second, the main memory has an access latency of 60 nanoseconds and a streaming transfer rate of 80 megabytes per second, the magnetic disk has an access latency of 15 milliseconds and a streaming transfer rate of 5 megabytes per second, and a tape drive has an access latency of 60 seconds and a streaming transfer rate of 2 megabytes per seconds.

(i) Random access causes the effective transfer rate of a device to decrease, because no data are transferred during the access time. For the disk described, what is the effective transfer rate if an average access is followed by a streaming transfer of (1) 512 bytes, (2) 8 kilobytes, (3) 1 megabyte, and (4) 16 megabytes?

(ii) The utilization of a device is the ratio of effective transfer rate to streaming transfer rate. Calculate the utilization of the disk drive for each of the four transfer sizes given in part (i).

(iii) Suppose that a utilization of 25 percent (or higher) is considered acceptable. Using the performance figures given, compute the smallest transfer size for disk that gives acceptable utilization.
