M.C.A. Third Semester (Second Year) (CGS)
15519 : Operating Systems : 3 MCA 1

P. Pages : 2

Time : Three Hours

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AU - 3159

Max. Marks :80

Notes : 1. All question carry equal marks.
2. Due credit will be given to neatness and adequate dimensions.
3. Assume suitable data wherever necessary.
4. Illustrate your answer necessary with the help of neat sketches.

1. a) Describe the five major activities of an operating system with regard to file management. 6
What are the advantages of using the same system call interface for manipulating both files and devices?

b) Describe the differences among short-term, medium-term and long term scheduling. 8
Describe which of the scheduler will be invoked under each of the following conditions.
    i) A process completes its time slice
    ii) A process completes its required I/O
    iii) A process finishes its execution
    iv) A process request for an I/O
    v) A process in newly created
    vi) A suspended process is swapped to disk.

OR

2. a) Consider a system running ten I/O bound tasks issue an I/O operation once for every 8
millisecond of CPU computing and that each I/O operation takes 10 millisecond to
complete. Also assume that the context switching overhead is 0.1 millisecond and that all
processes are long running tasks. What is the CPU utilization for a round-robin scheduler
when –
    i) The time quantum is 1 millisecond
    ii) The time quantum is 10 millisecond

b) Processes, Memory and files are the major objects that and OS manages. Describe the main 6
problems, issue and approaches used in the management of these objects.

3. a) Define the term Deadlock? Explain deadlock detection in brief. 7

b) Explain "Page fault"? Explain the actions taken by OS to handle the page fault? 7

OR

4. a) Differentiate between: 8
    i) Critical Section and Critical regions.
    ii) Semaphore and Monitor.
    iii) Binary and General Semaphore.
    iv) Competing and Cooperating process.

b) Describe Peterson's algorithm for critical section problem between two processes with its 6
merits and demerits.

5. a) Describe the following terms in brief: 8
    i) Dirty Page and Clean Page.   ii) Internal & External Fragmentation.
    iii) Consumables and reusable resource.   iv) Deadlock & Livelock.

b) What is meant by locality of reference? How is this principle used in Virtual Memory? Discuss. 5

OR

6. a) Given memory partitions of 100K, 500K, 200K, 400K, 300K and 600K (in order), how would each of first-fit, best-fit and worst-fit algorithms place processes of 210K, 415K, 105K and 425k (In order)? Which is the most efficient in terms of memory usage and why? 7

b) Consider the following reference string in a virtual memory system.
2, 3, 6, 1, 2, 3, 4, 2, 1, 5, 6, 3, 1, 2, 3, 6, 7, 3, 2, 1
How many page faults would occur for each of the following replacement algorithms if number of frames is 4, initially all the frames are empty:
LRU, FIFO, OPTIMAL 6

7. a) Compare and contrast various disk scheduling algorithms with their merits and demerits. 6

b) What is meant by consistency semantics? Describe consistency semantics employed in modern OS. 7

8. a) Describe briefly the following methods of free space management:
Bit Vector, Linked List, Grouping, Counting. 8

b) Describe following methods of Directory implementation with merits and demerits of each.
Linear List, Hash Tables. 5

9. a) Explain the following terms:
i) Polled I/O. ii) Interrupt I/O.
iii) DMA. 6

b) Explain the working of RAID structure in brief. 7

10. a) Discuss various techniques used in an operating system to improve disk performance. 6

b) Describe the services provided by the kernel I/O subsystem. 7

11. a) Describe Linux virtual file system. 7

b) Describe the virtual memory system under Linux. 6

OR

12. a) Describe the network structure of Linux Briefly. 6

b) Describe interprocess communication mechanism under Linux using signals & semaphores. 7

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