DEPARTMENT OF COMPUTER SCIENCE & ENGINEERING

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Subject: Operating Systems   **Assignment- 3**   **Subject Code:** CS 1403

MEMORY MANAGEMENT & VIRTUAL MEMORY

1. What are the memory management requirements?

2. Explain the Memory Hierarchy of Operating System.

3. What are Various Memory Allocation Schemes?

4. Differentiate between Internal and External Fragmentation.

5. Explain the Structure of Page Table entry. If a machine has 48 bit Virtual Addresses and 32 bit physical addresses and pages are of 8 KB. How many entries are needed for the page table?

6. How is Segmentation different from Paging?

7. Consider a Main memory with the capacity of 4 page frames. Assume that the pages of a process are referenced in the order given below:

   1, 3, 4, 4, 3, 2, 1, 7, 5, 6, 4, 2, 1, 2

   Which of FIFO or LRU would be better in the case as page replacement policy and why?

8. Consider the following page referenced in the order given below:
   1, 2, 3, 4, 2, 1, 5, 6, 2, 1, 2, 3, 7, 6, 3, 2, 1, 2, 3, 6
   How many page faults will occur from the following page replacement Algorithm assuming 5 frames?
   a. LRU
   b. FIFO
   c. Optimal

9. Explain multiprogramming with fixed partition.

10. Explain multiprogramming with dynamic partition.

11. Explain static partitioned allocation with partition sizes 300,150, 100, 200, and 20. Assuming first fit method indicate the memory status after memory request for sizes 80, 180, 280, 380, 30.

12. Discuss in details memory management with buddy system.

13. A 1MB block of memory is allocated using the buddy system.

    i. Show the results of the following sequence in a figure: Request 70; Request 35; Request 80; Return A; Request 60; Return B; Return D; Return C.

    j. ii. Show the binary tree representation following Return B.

14. Explain memory management with bit maps in detail.

15. Explain memory management with linked list in details.

16. What are the differences of internal and external memory Fragmentation?

17. Explain following allocation algorithm.

   a. First fit   b. Best fit   c. Worst fit   d. Next fit

18. Explain the difference between logical and physical addresses?

19. What is paging? Discuss basic paging technique in details.

20. Explain hierarchical page table and inverted page table.

21. What is segmentation? Explain the basic segmentation method.

22. What is demand paging? Explain it with address translation mechanism used. What are its specific advantages? How a page table is implemented?

23. What is virtual memory? How it is implemented.

24. Explain following page replacement algorithm in detail. i. LRU ii. FIFO

25. Explain the following page replacement algorithm. a) Optimal page replacement b) Least recently used page replacement.

26. Explain difference between internal external fragmentations in detail.

27. Consider the following page reference string. 1,2,3,4,5,3,4,1,6,7,8,7,8,9,7,8,9,5,4,5,4,2How many page faults would occur for the following replacement algorithm, assuming four and six frames respectively?

   a. LRU page replacement.

   b. FIFO page replacement.

28. Describe the term page fault frequency. What is thrashing? How is it controlled by OS?

29. Free memory holes of sizes 15K, 10K, 5K, 25K, 30K, 40K are available. The processes of size 12K, 2K, 25K, 20K is to be allocated. How processes are placed in first fit, best fit, worst fit. Calculate internal as well as external fragmentation.

30. On a simple paging system with 2^{24} bytes of physical memory, 256 pages of logical address Space, and a, page size of 2^{10} bytes, how many bits are in logical address?

31. Calculate page faults for (LRU, FIFO, OPT) for following sequences where page frame is three. 0,1,2,1,4,2,3,7,2,1,3,5,1,2,5. Write the steps of Bankers Algorithm and Bankers Safety Algorithm with Examples.

32. Define and explain the Following terms:

   a. Paging
   b. Segmentation
   c. Page Fault
   d. Fragmentation
   e. Compaction
   f. Working set model
   g. Page table