

UNIT IV - MEMORY MANAGEMENT

Memory management strategies: Background, Swapping, Contiguous Memory Allocation, Segmentation, Paging, Structure of Page Table

Virtual Memory Management: Background, Demand paging, Copy on write, Page replacement algorithms, Allocation of frames, Thrashing.

PART - A

Q.No	Questions	BT Level	Competence																		
1.	Name any two differences between logical and physical addresses.	BTL-2	Understanding																		
2.	Differentiate paging and segmentation.	BTL-2	Understanding																		
3.	What is the purpose of paging the page tables?	BTL-4	Analyzing																		
4.	What is a working set model?	BTL-1	Remembering																		
5.	In memory management consider the program named as Stack1 which size is 100 KB. This program is loaded in the main memory from 2100 to 2200KB. Show the contents of the page map table for the given scenario.	BTL-6	Creating																		
6.	When is page replacement algorithm needed?	BTL-1	Remembering																		
7.	Will optimal page replacement algorithm suffer from Belady's anomaly? Justify your answer.	BTL-5	Evaluating																		
8.	State the effect of Thrashing in an operating system.	BTL-2	Understanding																		
9.	What is thrashing? and how to resolve this problem?	BTL-1	Remembering																		
10.	What is meant by address binding? Mention the different types.	BTL-1	Remembering																		
11.	Write about swapping. Let us assume the user process is of size 1MB and the backing store is a standard hard disk with a transfer rate of 5 MBPS. Calculate the transfer rate.	BTL-5	Evaluating																		
12.	How does the swapping process occur?	BTL-4	Analyzing																		
13.	Consider the following Segmentation table. <table style="margin-left: 20px; border-collapse: collapse;"> <tr> <td style="padding-right: 20px;">Segment</td> <td style="padding-right: 20px;">Base</td> <td>Length</td> </tr> <tr> <td>0</td> <td>219</td> <td>600</td> </tr> <tr> <td>1</td> <td>2300</td> <td>14</td> </tr> <tr> <td>2</td> <td>90</td> <td>100</td> </tr> <tr> <td>3</td> <td>1327</td> <td>580</td> </tr> <tr> <td>4</td> <td>1952</td> <td>96</td> </tr> </table> What are -the physical addresses for the logical addresses 3400 and 0110?	Segment	Base	Length	0	219	600	1	2300	14	2	90	100	3	1327	580	4	1952	96	BTL-5	Evaluating
Segment	Base	Length																			
0	219	600																			
1	2300	14																			
2	90	100																			
3	1327	580																			
4	1952	96																			
14.	What do you mean by compaction? In which situation is it applied?	BTL-3	Applying																		
15.	Consider the following page-reference string: 1,2,3,4,5,6,7,8,9,10,11,12. How many page faults and page fault ratio would occur for the FIFO page replacement algorithm? Assuming there is four frames.	BTL-1	Remembering																		
16.	What is meant by pre-paging? Is it better than demand paging?	BTL-6	Creating																		
17.	Define external fragmentation.	BTL-1	Remembering																		
18.	Define demand paging in memory management.	BTL-4	Analyzing																		

19.	Mention the significance of LDT and GDT in segmentation.	BTL-3	Applying
20.	Why are page sizes always powers of 2?	BTL-3	Applying
21.	Give the steps required to handle a page fault in demand paging.	BTL-2	Understanding
22.	Show what do you meant by hit and miss in paging.	BTL-3	Applying
23.	Analyse the common strategies to select a free hole from a set of available holes?	BTL-4	Analyzing
24.	How the problem of internal fragmentation can be solved?	BTL-2	Understanding
PART - B			
1.	(i) What is demand paging? (3) (ii) Describe the process of demand paging in OS. (10)	BTL-2	Understanding
2.	With a neat sketch, explain how logical address is translated into physical address using Paging mechanism. (13)	BTL-1	Remembering
3.	Explain main memory management in detail with necessary diagram. (13)	BTL-3	Applying
4.	Discuss about contiguous memory allocation with a neat diagram. (13)	BTL-5	Evaluating
5.	Discuss situation under which the FIFO page replacement algorithm generates fewer page faults than the LRU page replacement algorithm..(13)	BTL-2	Understanding
6.	(i) When do page faults occur? (3) (ii) Consider the reference string: 1,2,3,4,1,5,6,2,1,2,3,7,6,3,2,1,2,3,6. How many page faults and page fault rate occur for the FIFO, LRU and optimal replacement algorithms, assuming three and four page frames? (10)	BTL-6	Creating
7.	Given memory partitions of 500 KB, 100 KB, 300 KB, 200 KB and 600 KB in order, how would each of the first-fit, best-fit, and worst-fit algorithms place processes of size 418 KB, 202 KB, 506 KB, 112 KB, and 95 KB (in order)? Which the algorithms make the most efficient use of memory? (13)	BTL-4	Analyzing
8.	Compare paging with segmentation in terms of the amount of memory required by the address translation structures in order to convert virtual addresses to physical addresses. (13)	BTL-1	Remembering
9.	(i) What is the cause of Thrashing? (3) (ii) How does the system detect thrashing? Once it detects thrashing, what can the system do to eliminate this problem? (10)	BTL-1	Remembering
10.	Draw the diagram of segmentation memory management scheme and explain its principle. (13)	BTL-3	Applying
11.	(i) Analyse how paging supports virtual memory. (4) (ii) With neat diagram explain how logical memory addresses are translated into physical memory address. (9)	BTL-4	Analyzing

12.	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 the frames are initially empty so that first unique page request will all cost one fault each.LRU replacement, FIFO, Optimal replacement. (13)	BTL-4	Analyzing
13.	Discuss the given memory management techniques with diagrams. (i)Paging and (7) (ii) Translation Look-aside Buffer.(6)	BTL-2	Understanding
14.	(i) Consider a computer system with 16 bit logical address and 4KB page size. The system support up to 1 MB of physical memory. Assume that the actual address size is only 33KB,Page table base register contains 1000.and free frame list contains 13,11,9,7,5,3,1,2,4,6,8. Construct 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 50ns how long does a paged memory referenced take? (2) If we add TLB and 75% of all page table reference 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)	BTL-1	Remembering
15.	Discuss the steps needed to handle page fault with neat illustration.(13)	BTL-2	Understanding
16.	Illustrate what are the various Page Replacement Algorithms used in memory management. (13)	BTL-3	Applying
17.	Evaluate when page faults will occur? Describe the actions taken by operating system during page fault. (13)	BTL-5	Evaluating
PART - C			
1.	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, 4, 5, 3 How many page faults would occur for the following replacement algorithms, assuming four frames? Remembering all frames are initially empty. (15) i) LRU replacement ii) FIFO replacement iii) Optimal replacement.	BTL-5	Evaluating

2.	(i) Explain in detail about paging in 32-bit and 64-bit architectures (5) (ii) Consider a system that allocated pages of different sizes to its processes. What are the advantages of such a paging scheme? What are modifications to the virtual memory system provide this functionality? (10)	BTL-6	Creating
3.	(i) Consider the following page reference string: 1,2, 3, 2, 5, 6, 3, 4, 6, 3, 7, 3, 1, 5, 3, 6, 3, 4, 2, 4, 3, 4, 5, 1 Indicate page faults and calculate total number of page faults and successful ratio for FIFO, optimal and LRU algorithms. Assume there are four frames and initially all the frames are empty. (12) (ii) Explain the effect of thrashing. (3)	BTL-5	Evaluating
4.	Differentiate between internal and external fragmentation? Suppose that we have memory of 1000 KB with partitions of size 150 KB , 200 KB, 250 KB, 100 KB AND 300 KB. Where the processes A and B of size 175 KB and 125 KB will be loaded, if we used Best fit and Worst fit? (15)	BTL-6	Creating
5.	Most systems allow programs to allocate more memory to its address space during execution. Data allocated in the heap segments of programs is an example of such allocated memory. What is required to support dynamic memory allocation in the following schemes? (15)	BTL-5	Evaluating

UNIT V - FILE SYSTEMS

Implementing File-system: File-System Structure, File-System Implementation, Directory Implementation, Allocation methods, Free-space management.

Case Study- Real Time operating system and Mobile operating system.

PART - A

Q.No	Questions	BT Level	Competence
1.	Compare the various file access methods.	BTL-5	Evaluating
2.	What is rotational latency?	BTL-4	Analyzing
3.	Enlist different types of directory structure.	BTL-3	Applying
4.	Mention the common file types	BTL-4	Analyzing
5.	List out the major attributes and operations of a file system.	BTL-1	Remembering
6.	What is relative block number?	BTL-3	Applying
7.	Do FAT file system advantageous? Justify your answer?	BTL-4	Analyzing
8.	How the information in the file can be accessed?	BTL-3	Applying
9.	List out the drawbacks in indexed allocation	BTL-1	Remembering

10.	Define UFD and MFD.	BTL-1	Remembering
11.	Give the disadvantages of Contiguous allocation.	BTL-2	Understanding
12.	Analyze the advantages of bit vector free space management	BTL-6	Creating
13.	Differentiate between file and directory.	BTL-1	Remembering
14.	What is consistency checking?	BTL-2	Understanding
15.	Write Short notes on file system mounting.	BTL-2	Understanding
16.	What is the advantage of bit vector approach in free space management?	BTL-1	Remembering
17.	What is boot control block?	BTL-1	Remembering
18.	Analyze the backup and restore of a file system.	BTL-5	Evaluating
19.	Identify the two important function of virtual File System (VFS) layer in the concept of file system implementation.	BTL-6	Creating
20.	Compare contiguous allocation with linked allocation method.	BTL-2	Understanding
21.	Analyse the various file accessing methods.	BTL-2	Understanding
22.	Show what are the allocation methods of a disk space.	BTL-3	Applying
23.	Examine how an index file is used to speed up the access in direct-access files.	BTL-4	Analyzing
24.	Determine the most common schemes for defining the logical structure of a directory.	BTL-5	Evaluating
PART – B			
1.	Describe in detail about file sharing and protection.(13)	BTL-1	Remembering
2.	Analyze the various file system mounting methods in detail. (13)	BTL-6	Creating
3.	Explain in detail about tree structured and acyclic graph directories. (13)	BTL-5	Evaluating
4.	(i)Describe with a neat sketch about the various directory structure. (7) (ii)Describe in detail about free space management with neat examples.(6)	BTL-1	Remembering
5.	Discuss about the various file access methods. (13)	BTL-2	Understanding
6.	Explain in detail about file attributes and file operation. (13)	BTL-2	Understanding
7.	Illustrate an application that could benefit from operating system support for random access to indexed files. (13)	BTL-3	Applying
8.	Consider a file system where a file can be deleted and its disk space Reclaimed while links to that file still exist. What problems may occur if a new file is created in the same storage area or with the same absolute path name? How can these problems be avoided? (13)	BTL-3	Applying
9.	Analyze the File system implementation. (13)	BTL-4	Analyzing
10.	(i) Why is it important to balance file system I/O among the disks and controllers on a system in a multitasking environment? (6) (ii) Discuss the advantages and disadvantages of supporting links to files that cross mount points. (7)	BTL-2	Understanding

11.	(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)	BTL-1	Remembering
12.	Explain how to recover in a file system. (13)	BTL-4	Analyzing
13.	Examine in detail about Directory and disk structure. (13)	BTL-4	Analyzing
14.	(i) In a variable partition scheme, the operating system has to keep track of allocated and free space. Suggest a means of achieving this. Describe the effects of new allocations and process terminations in your suggested scheme. (5) (ii) Explain in brief about different allocation methods with neat sketch. (8)	BTL-1	Remembering
15.	(i) Explain how free-space is managed using bit vector implementation. (10) (ii) List its advantages. (3)	BTL-2	Understanding
16.	Consider a file system where a file can be deleted and the disk space reclaimed while the links to that file still exist. What problems may occur if a new file is created in the same storage area or with the same absolute path name? How these problem be avoided? (13)	BTL-3	Applying
17.	Evaluate Linked Allocation method. (5) What are the advantages and disadvantages of Linked Allocation? (8)	BTL-5	Evaluating
PART – C			
1.	Give an example of an application in which data in a file should be accessed in the following order (i) Sequential (8) (ii) Random (7)	BTL-6	Creating
2.	Discuss how performance optimizations for file systems might result in difficulties in maintaining the consistency of the systems in the event of computer crashes. (15)	BTL-5	Evaluating
3.	(i) Discuss the functions of files and file implementation. (8) (ii) Explain free space management with neat example. (7)	BTL-6	Creating
4.	Consider a system that supports 5000 users. Suppose that you want to allow 4990 of these users to be able to access one file a) How would you specify this protection scheme in file system (7) b) Could you suggest another protection scheme that can be used more effectively for this purpose than the scheme provided by the file system? (8)	BTL-5	Evaluating
5.	Determine the most common schemes for defining the logical structure of a directory? (15)	BTL-5	Evaluating

