OS - Assignment - 03

18CS43

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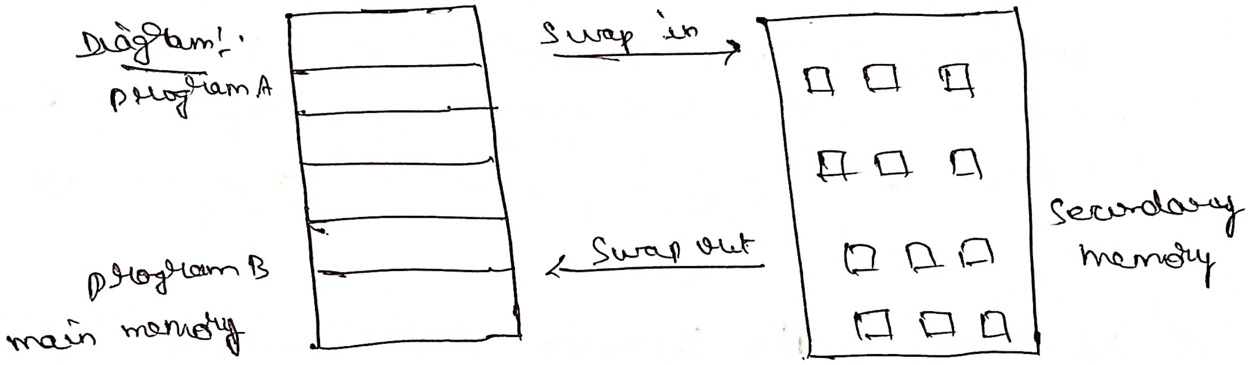
Q) Explain demand paging in detail.

> Demand paging is a process of swapping in the virtual memory system. In this process, all data is not moved from hard drive to main memory because while using the demand paging when some programs are getting demand then data will be transferred but, if required data is already existed into memory then no need to copy of data.

Diagram:



Some page replacement Algorithms are used in the demand paging concept to replace different pages, such as FIFO, LIFO, optimal Algorithm, LRU page, and Random Replacement. Page replacement algorithm,

Eg:- Memory access Time = 200 ns

Avg. page fault service time = 8ms.

$$EAT = (1-P) * 200 + p(8ms)$$

$$= (1-P) * 200 + P * 8000000$$

$$= 200 + P * 7999800$$

→ Advantages:-

- No need of compaction
- Easy to share all pages
- Easy to swap all pages.

Disadvantages:-

- Its memory access time is longer.
- page Table length Register (PTLR) has limit for virtual memory.

(2) what do you mean by free space list? with suitable example, Explain any 3 methods of free space list implementation.

A file system is responsible to allocate the free blocks to the file therefore it has to keep track of all the free blocks present in the disk.

3 methods of free space list implementation

(a) Linked list:- In this approach, the free disk blocks are linked together i.e a free block contains a pointer to the next free block. The block number of the very first disk block is stored at a separate location on disk and its also cached in memory.

(b) Grouping:- This approach stores the address of the free blocks in the 1st free block. The first free block stores the address of some, say n free blocks. out of these n blocks the 1st n-1 blocks are actually free and the last block contains the address of next free n blocks.

(c) Counting:- This approach stores the address of the 1st free disk block and a number n of free contiguous disk blocks that follow the first block.

Every entry in the list would contain.

1. Address of 1st free disk block.

2. A number n,

③ Describe various file allocation methods.

7 ⓐ Contiguous allocation :- Each file occupies a contiguous set of blocks on the disk. This means that given the starting block address. and the length of the file, ~~we and~~ we can determine the blocks occupied by the file. The direct -ory entry for a file with contiguous allocation contains

* Address of starting block.
* length of the allocation position.

ⓑ Linked list Allocation :- In this, Each file is a linked list of disk blocks which need not be contiguous. The disk blocks can be scattered anywhere on the disk. The directory entry contains a pointer to the starting and the ending file block.

ⓒ Indexed Allocation :- Here, A block known as the Indexed block contains the pointers to all the blocks occupied by a file. Each file has it's own index block. The i th entry in the index block contains the disk address of the ith file block.

④ Explain the various types of directory structure.

7 ⓐ. Single level directory :- The single level directory is the simplest directory structure. In it, all files are contained in the same directory which makes it easy to support and understand.

ⓑ 2-level directory :- In the 2-level directory structure, Each ~~user of the~~ user has their own UFD. The UFD's have similar structure, but each lists only the files of single user. The MFD searches whenever a new user id logged in. The MFD is indexed by username or a/c no. And Each ~~entry~~ Entry points to the UFD for that user.

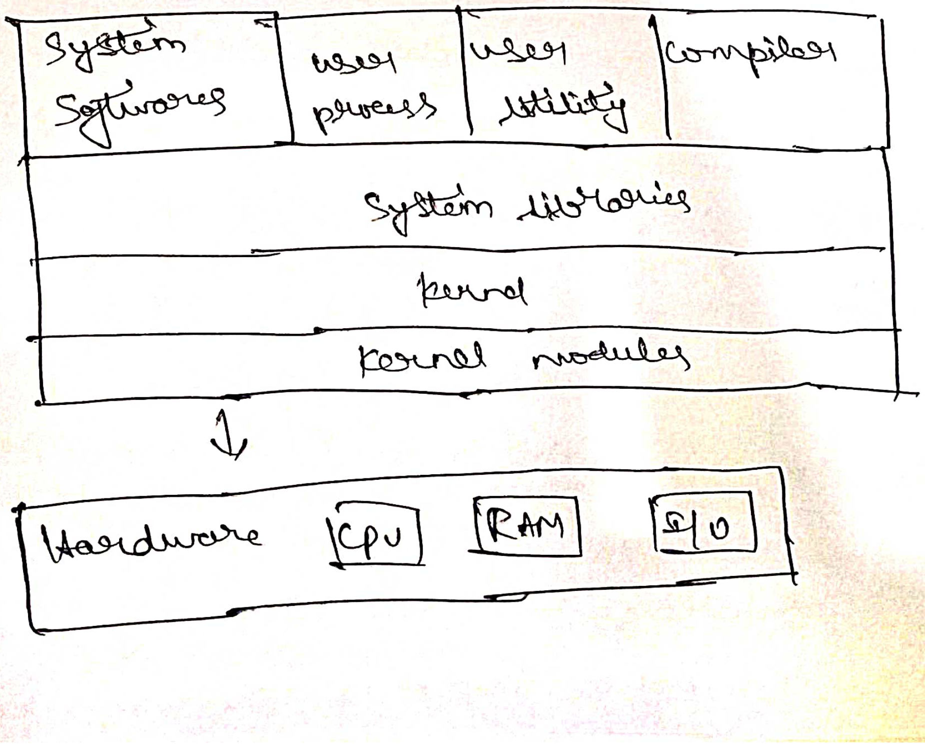
(c) Tree structure directory:- It is the most common directory structure. The tree has a root directory and every file in the system has a unique path.

(d) Acyclic-graph directory:- An acyclic graph is a graph with no cycle and allows us to share subdirectories and files. The same file or subdirectories may be in 2 different directories.

(e) General graph directory structure:- In general graph directory structure, cycles are allowed within a directory structure where multiple directories can be derived from more than one parent directory.

(5) Explain components of LINUX system with a neat diagram.

> LINUX OS



Components of LINUX OS

(1) Boot loader !- This boot process needs guidance, and your OS is the software in control throughout the boot process when you start your computer the bootloader for your OS kick starts the process.

(2) OS kernel :- It is the part which controls the cpu, access to memory and any peripheral devices. It is the lowest level at which OS works.

(3) Background services !- These small applications acts as servants in the background, ensuring that key functions such as Scheduling, printing and multimedia function correctly.

(4) OS shell :- Also known as the command line, it is a facility which lets you instruct your OS using ~~text~~.

(5) graphic server :- This provides a graphical subsystem that renders and shapes on your computer monitor.

(6) Explain the access matrix model of implementing protection in OS.

Access matrix is a security model of protection station in CS. It is represented as a matrix. Access matrix is used to define the rights of each process executing in the domain w.r.t each object. The rows of matrix represent domains and columns represent objects. Each cell of matrix represents set of access rights which are given to the process of domain means each entry (i, j) defines the set of operations that a process executing in domain D, can invoke an object O_j.

	F_1	F_2	F_3	printer
D_1	read		read	
D_2				print
D_3	read		readexecute	
D_4	write		read write	

According to the above matrix, there are 4 domains and 4 objects - 3 files (F_1, F_2, F_3) and one printer. A process executing in D_1 can read files f_1 and f_2. A process executing in domain D_4 has same rights as D_1 ~~and D_3~~ but it can also write files. printer can be accessed by only one process executing in the Domain D_2.

7 Explain the interprocess communication mechanisms in LINUX.

1 Shared memory:- LINUX system provide 2 separate APIs for Shared memory. the legacy System V API and more recent POSIX one. These APIs should never be mixed in a Single application.

2 Shared files:- programmers are all too familiar with file access, including the many pitfalls that reset the use of files in programs.

3 Message queues:- message queues allow one or more processes to write messages, which will be read by one or more reading processes. Each message is tagged with an application-specific type, agreed b/w the cooperating process.

⑧ Explain the following disk scheduling algorithm in brief.
(i) FCFS (ii) SSTF (iii) SCAN (iv) LOOK

> FCFS:- (First come first serve) : All incoming requests are placed at end of the queue, whatever number that is next in queue will be the next number served. ~~used~~ using this algorithm doesn't provide the best results. To determine the number of head movements you would simply find the number of tracks it took to move from one request to the next.

SSTF :- (Shortest Seek Time First):- In this technique OS will search for the shortest time means this will search which job will take a less time of cpu for running after Examining all the jobs, all the jobs are organized in the sequence wise or they are organized into the priority order.

SCAN:- This approach works like an elevator does. It scans down towards the nearest end then when it hits the bottom, it scans up servicing the requests that it didnt get going down. If the request comes in after it has been scanned it will not be serviced until the process comes backdown / moves backup.

LOOK scheduling algorithm:- In look scheduling algorithm the cpu scans the list from starting to end of the disk in which the various processes are running and in the look scheduling the cpu will scan the entire disk from one end to the second End.