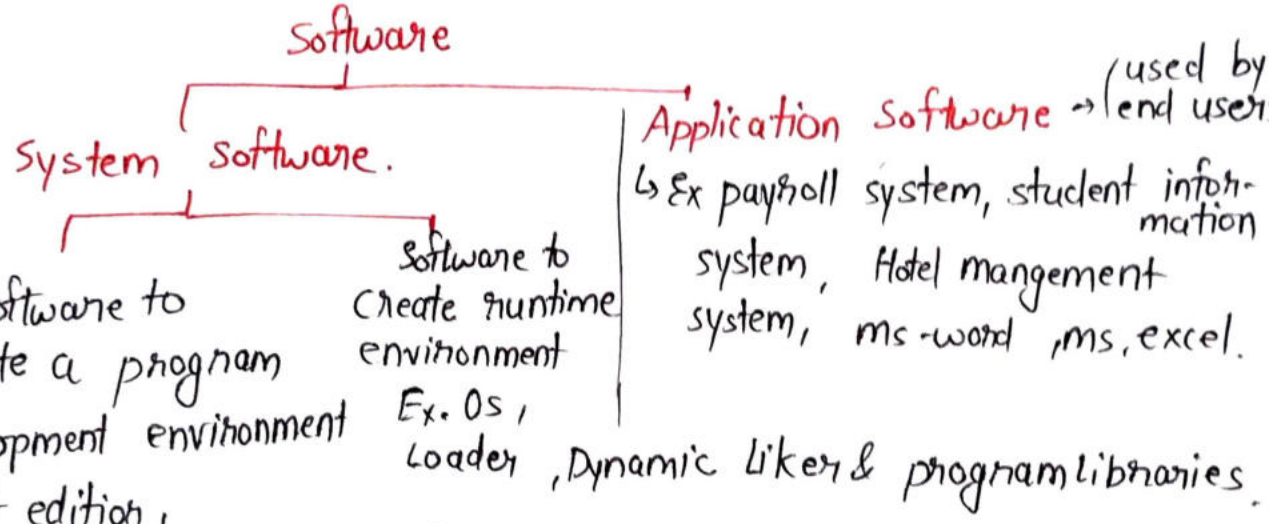
Operating System

Software - Software is a set of programs to perform certain operations / functions.

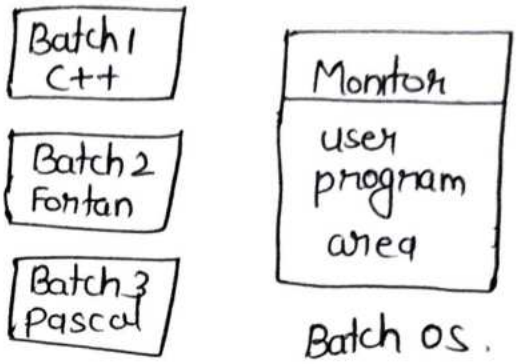


Ex-Text edition, Compiler, Assembler, Linker etc.

① **Application s/w** - Usually used by end user. It is concerned with solution of some problem, using computer as a tool, instead of how computers can work Ex: payroll system, student information System, Hotel management system etc.

System s/w - System s/w consists of a set of programs that support the operation of computer systems & help the programmer, to simplify the programming process & create an environment to run application s/w efficiently.

- Memory ~~execution~~ protection is required, do not allow the memory area containing the monitor to be altered



- There is no direct interaction blw user & computer.
- User has to submit a job (written on punch cards or tapes to a computer operator
- Operator group jobs into batches by type of languages & requirements.
- Monitor manages the execution of each program in the batch.
- Jobs are processed in FCFS i.e First come first served. fashion.

Examples - Payroll System, Bank statements etc.

Advantages -

① Batch processing takes much of the work of the operator to the computer.

② Increased performance as a new job get started as soon as the previous job is finished, without any manual intervention.

Disadvantages -

① Difficult to debug program

② A job could enter in infinite loop.

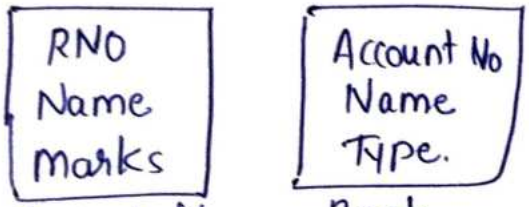
③ Due to lack of protection scheme, one batch job can affect pending jobs.

④ Lack of interaction blw the user & the job.

⑤ CPU is often idle, ⑥ Memory Usage.

UNIT-II

File→ A file is a collection of related information that is recorded /stored on secondary storage.



Student file Bank.

From user's prespective a file is the smallest allotment of logical secondary storage, which may be referred by name.

OR File is treated as a single entity by users & applications & may be referred by name.

- File is a sequence of bits, bytes, lines or records.
- A file has a certain defined structure according to its type-

① Text file ② Source file ③ Executable file ④ object file.

① Text file - sequence of characters organized into lines.

② Source file - Sequence of subroutines & functions written in programming language.

③ Object file - Sequence of bytes organised into blocks understandable by the system linker.

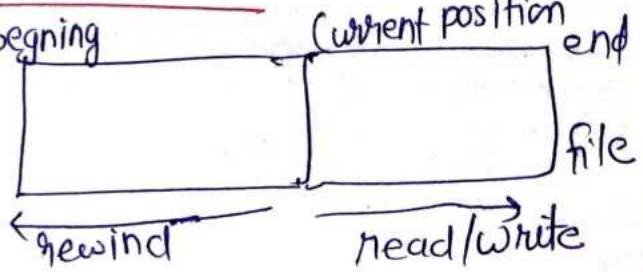
④ executable file - It contains code that is used by the loader to execute the program.

File Access Methods

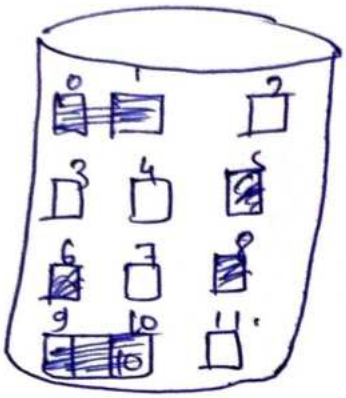
Methods are those provides reading from & writing to a file are known as Access Methods.
Following are the ways that the information in the file ~~are known as Access~~ can be accessed :-

1. Sequential Access
2. Direct Access
3. Index Access.

1. Sequential Access -



- Simplest method among all methods
2. Information in the file is processed in order, one record after the other.
3. Editors & compilers access files in this manner
4. Mostly used operations are read/write.
5. Read command/operation cause a pointer to be moved ahead by one (read next)
6. Write command/operation appends information. to end of the file & move the pointer to the new end of file (write next)
7. It is based on tape model.
8. For interactive applications that involve queries &/or updates of individual records the sequential file provides for performance.



Directory

File	start	length
count	0	2
New	8	3
List	5	2

Advantages –

① It is simplest allocation scheme & can be implemented easily. Only file size & first starting block number is necessary to remember entire file.

② Since entire file can be read in a simple operation, so we can stay it gives excellent performance.

③ It supports variable size portions.

④ Pre-allocation is required.

⑤ It require only single entry for a file.

Disadvantages –

① The size of file upto maximum limit must be known at the creation time. Otherwise this policy can not be implemented.

② It suffers from external fragmentation. Compaction is required to remove fragmentation.

③ If a file is deleted, holes are appeared in memory.

④ Memory is not utilized. More wastage of memory.

Read/write operation on disk requires 3 steps -

step1 - First moving the disk arm (in or out) such that heads are positioned at the specified cylinder / track (seek time)

- This movement of head arm is measured as the number of cylinders to be traversed by the read/write heads (seek time).

step2 - Wait till the specified sector is rotating directly above / below the read/write head (Rotational time).

step3 - Read/write the data.
This time is inversely proportional to rotation rate of disk.

★ seek time - The time for the disk arm to move the read/write heads to the cylinder/track containing the desired sector.

bandwidth of disk - is the ratio of total no. of bytes transferred & total time for this transfer

Disk scheduling

The main objective of disk scheduling is to reduce access time & increase bandwidth

(iv) Max size of logical address space $= 2^m$
$= 2^{32}$ bytes
$= 2^2 \times 2^{30}$
$= 4$ GBytes.

$1k = 2^{10}$ Bytes.
$1MB = 1024$ kB
$= 2^{10} \times 2^{10}$ B
$= 2^{20}$ Bytes.
$1GB = 1024$ MB
$= 2^{30}$ Bytes.

(vi) Max no. of pages in logical address space $= 2^{m-n}$
$= 2^{22} = 2^2 \times 2^{20}$
$= 4$ M Bytes $= 4$ million.

(v) Max length of page table of a process
$= 4m$ entries (max no. of pages in process).

Advantages & Disadvantages of paging scheme.

Advantages

(1) No external fragmentation.
(2) Efficient use of main memory.
(3) User's views of memory & actual physical memory are separated. The user view memory as single contiguous space that contains only one process. But the user process is non-contiguous in physical memory.
(4) Simple to implement.
(5) Swapping easier because equal to size of pages & frames.

Number of address line required depends on the number of devices connected in the system.

Ex - 8 devices → 3 address lines are required.

- In response to the bus request, controller generate a sequence of device address.
- When the requesting device recognizes its address, it activated the busy bus line & begins to use the bus.
- After a number of bus cycles, the polling process continue by choosing a different processor.
- The polling sequence is normally programmable & as result, the selection priority can be altered under program control.

(3) Least Recently Used (LRU) - This algorithm gives the highest priority to the requesting device that has not used the bus for logest interval. The priorities are adjusted after a number of bus cycles according to the LRU algorithm.

(4) FIFO (First in First Out - In FIFO scheme, requests are served in the order received. To implement this algorithm, the bus controller establishes a queue arranged according to the time that the bus request arrive. Each processor must wait for its turn to use the bus on a First in, First-out (FIFO) basis.

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